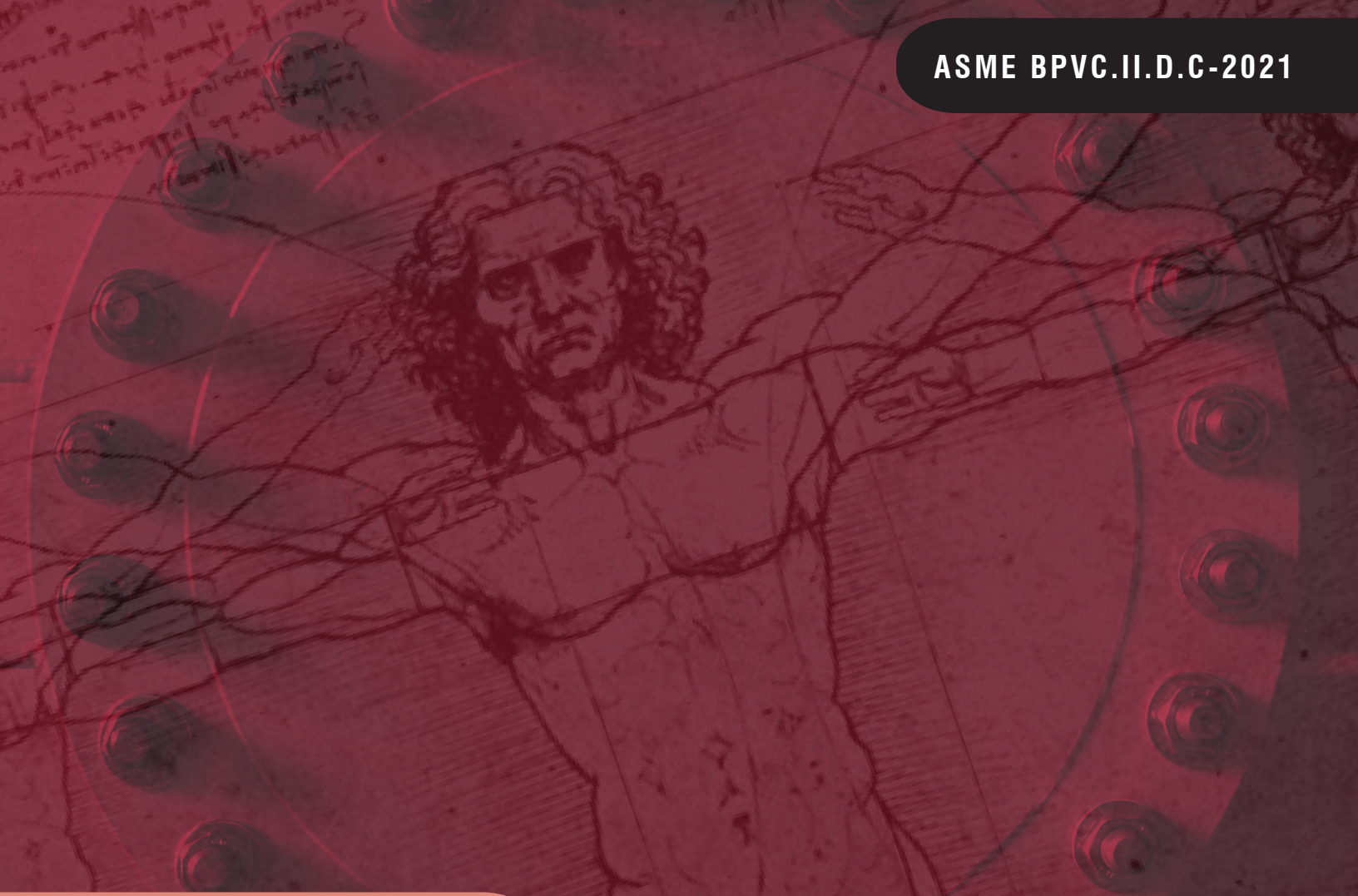
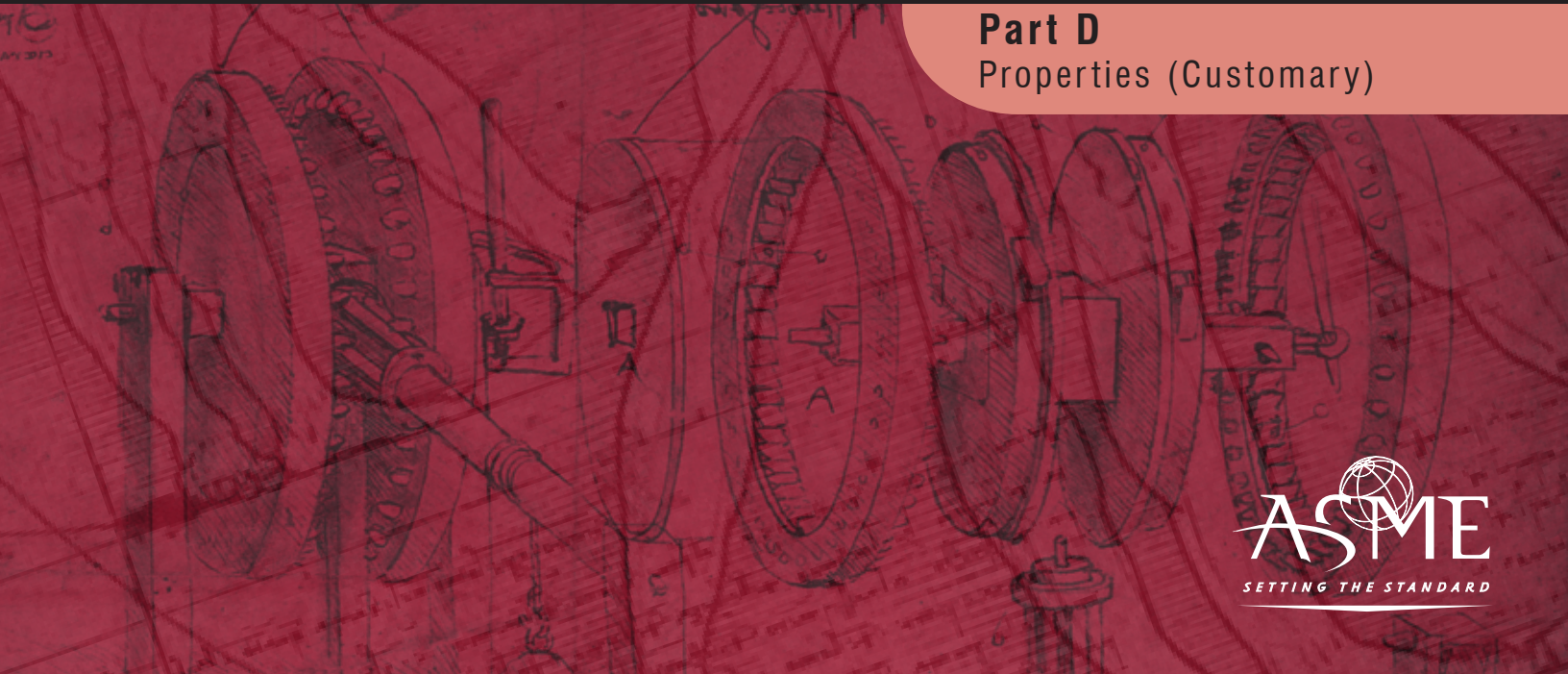
ASME BPVC.II.D.C-2021



SECTION II
MATERIALS

2021 ASME Boiler and Pressure Vessel Code
An International Code

Part D
Properties (Customary)



ASME
SETTING THE STANDARD

AN INTERNATIONAL CODE

2021 ASME Boiler & Pressure Vessel Code

2021 Edition July 1, 2021

II

MATERIALS

Part D

Properties (Customary)

ASME Boiler and Pressure Vessel Committee
on Materials

The American Society of Mechanical Engineers

Two Park Avenue • New York, NY • 10016 USA

Date of Issuance: July 1, 2021

This international code or standard was developed under procedures accredited as meeting the criteria for American National Standards and it is an American National Standard. The Standards Committee that approved the code or standard was balanced to assure that individuals from competent and concerned interests have had an opportunity to participate. The proposed code or standard was made available for public review and comment that provides an opportunity for additional public input from industry, academia, regulatory agencies, and the public-at-large.

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ASME accepts responsibility for only those interpretations of this document issued in accordance with the established ASME procedures and policies, which precludes the issuance of interpretations by individuals.

The endnotes and preamble in this document (if any) are part of this American National Standard.

ASME Collective Membership Mark

ASME Single Certification Mark

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The American Society of Mechanical Engineers
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INTERPRETATIONS

Interpretations are issued in real time in ASME's Interpretations Database at http://go.asme.org/Interpretations. Historical BPVC interpretations may also be found in the Database.

CODE CASES

The Boiler and Pressure Vessel Code committees meet regularly to consider proposed additions and revisions to the Code and to formulate Cases to clarify the intent of existing requirements or provide, when the need is urgent, rules for materials or constructions not covered by existing Code rules. Those Cases that have been adopted will appear in the appropriate 2021 Code Cases book: "Boilers and Pressure Vessels" or "Nuclear Components." Each Code Cases book is updated with seven Supplements. Supplements will be sent or made available automatically to the purchasers of the Code Cases books up to the publication of the 2023 Code. Annulments of Code Cases become effective six months after the first announcement of the annulment in a Code Case Supplement or Edition of the appropriate Code Case book. Code Case users can check the current status of any Code Case at http://go.asme.org/BPVCCDatabase. Code Case users can also view an index of the complete list of Boiler and Pressure Vessel Code Cases and Nuclear Code Cases at http://go.asme.org/BPVCC.

FOREWORD[*]

(21)

In 1911, The American Society of Mechanical Engineers established the Boiler and Pressure Vessel Committee to formulate standard rules for the construction of steam boilers and other pressure vessels. In 2009, the Boiler and Pressure Vessel Committee was superseded by the following committees:

(a) Committee on Power Boilers (I)
(b) Committee on Materials (II)
(c) Committee on Construction of Nuclear Facility Components (III)
(d) Committee on Heating Boilers (IV)
(e) Committee on Nondestructive Examination (V)
(f) Committee on Pressure Vessels (VIII)
(g) Committee on Welding, Brazing, and Fusing (IX)
(h) Committee on Fiber-Reinforced Plastic Pressure Vessels (X)
(i) Committee on Nuclear Inservice Inspection (XI)
(j) Committee on Transport Tanks (XII)
(k) Committee on Overpressure Protection (XIII)
(l) Technical Oversight Management Committee (TOMC)

Where reference is made to "the Committee" in this Foreword, each of these committees is included individually and collectively.

The Committee's function is to establish rules of safety relating only to pressure integrity, which govern the construction[**] of boilers, pressure vessels, transport tanks, and nuclear components, and the inservice inspection of nuclear components and transport tanks. The Committee also interprets these rules when questions arise regarding their intent. The technical consistency of the Sections of the Code and coordination of standards development activities of the Committees is supported and guided by the Technical Oversight Management Committee. This Code does not address other safety issues relating to the construction of boilers, pressure vessels, transport tanks, or nuclear components, or the inservice inspection of nuclear components or transport tanks. Users of the Code should refer to the pertinent codes, standards, laws, regulations, or other relevant documents for safety issues other than those relating to pressure integrity. Except for Sections XI and XII, and with a few other exceptions, the rules do not, of practical necessity, reflect the likelihood and consequences of deterioration in service related to specific service fluids or external operating environments. In formulating the rules, the Committee considers the needs of users, manufacturers, and inspectors of pressure vessels. The objective of the rules is to afford reasonably certain protection of life and property, and to provide a margin for deterioration in service to give a reasonably long, safe period of usefulness. Advancements in design and materials and evidence of experience have been recognized.

This Code contains mandatory requirements, specific prohibitions, and nonmandatory guidance for construction activities and inservice inspection and testing activities. The Code does not address all aspects of these activities and those aspects that are not specifically addressed should not be considered prohibited. The Code is not a handbook and cannot replace education, experience, and the use of engineering judgment. The phrase *engineering judgment* refers to technical judgments made by knowledgeable engineers experienced in the application of the Code. Engineering judgments must be consistent with Code philosophy, and such judgments must never be used to overrule mandatory requirements or specific prohibitions of the Code.

The Committee recognizes that tools and techniques used for design and analysis change as technology progresses and expects engineers to use good judgment in the application of these tools. The designer is responsible for complying with Code rules and demonstrating compliance with Code equations when such equations are mandatory. The Code neither requires nor prohibits the use of computers for the design or analysis of components constructed to the

[*] The information contained in this Foreword is not part of this American National Standard (ANS) and has not been processed in accordance with ANSI's requirements for an ANS. Therefore, this Foreword may contain material that has not been subjected to public review or a consensus process. In addition, it does not contain requirements necessary for conformance to the Code.

[**] *Construction*, as used in this Foreword, is an all-inclusive term comprising materials, design, fabrication, examination, inspection, testing, certification, and overpressure protection.

requirements of the Code. However, designers and engineers using computer programs for design or analysis are cautioned that they are responsible for all technical assumptions inherent in the programs they use and the application of these programs to their design.

The rules established by the Committee are not to be interpreted as approving, recommending, or endorsing any proprietary or specific design, or as limiting in any way the manufacturer's freedom to choose any method of design or any form of construction that conforms to the Code rules.

The Committee meets regularly to consider revisions of the rules, new rules as dictated by technological development, Code Cases, and requests for interpretations. Only the Committee has the authority to provide official interpretations of this Code. Requests for revisions, new rules, Code Cases, or interpretations shall be addressed to the Secretary in writing and shall give full particulars in order to receive consideration and action (see Submittal of Technical Inquiries to the Boiler and Pressure Vessel Standards Committees). Proposed revisions to the Code resulting from inquiries will be presented to the Committee for appropriate action. The action of the Committee becomes effective only after confirmation by ballot of the Committee and approval by ASME. Proposed revisions to the Code approved by the Committee are submitted to the American National Standards Institute (ANSI) and published at http://go.asme.org/BPVCPublicReview to invite comments from all interested persons. After public review and final approval by ASME, revisions are published at regular intervals in Editions of the Code.

The Committee does not rule on whether a component shall or shall not be constructed to the provisions of the Code. The scope of each Section has been established to identify the components and parameters considered by the Committee in formulating the Code rules.

Questions or issues regarding compliance of a specific component with the Code rules are to be directed to the ASME Certificate Holder (Manufacturer). Inquiries concerning the interpretation of the Code are to be directed to the Committee. ASME is to be notified should questions arise concerning improper use of the ASME Single Certification Mark.

When required by context in this Section, the singular shall be interpreted as the plural, and vice versa, and the feminine, masculine, or neuter gender shall be treated as such other gender as appropriate.

The words "shall," "should," and "may" are used in this Standard as follows:

- *Shall* is used to denote a requirement.
- *Should* is used to denote a recommendation.
- *May* is used to denote permission, neither a requirement nor a recommendation.

STATEMENT OF POLICY ON THE USE OF THE ASME SINGLE CERTIFICATION MARK AND CODE AUTHORIZATION IN ADVERTISING

ASME has established procedures to authorize qualified organizations to perform various activities in accordance with the requirements of the ASME Boiler and Pressure Vessel Code. It is the aim of the Society to provide recognition of organizations so authorized. An organization holding authorization to perform various activities in accordance with the requirements of the Code may state this capability in its advertising literature.

Organizations that are authorized to use the ASME Single Certification Mark for marking items or constructions that have been constructed and inspected in compliance with the ASME Boiler and Pressure Vessel Code are issued Certificates of Authorization. It is the aim of the Society to maintain the standing of the ASME Single Certification Mark for the benefit of the users, the enforcement jurisdictions, and the holders of the ASME Single Certification Mark who comply with all requirements.

Based on these objectives, the following policy has been established on the usage in advertising of facsimiles of the ASME Single Certification Mark, Certificates of Authorization, and reference to Code construction. The American Society of Mechanical Engineers does not "approve," "certify," "rate," or "endorse" any item, construction, or activity and there shall be no statements or implications that might so indicate. An organization holding the ASME Single Certification Mark and/or a Certificate of Authorization may state in advertising literature that items, constructions, or activities "are built (produced or performed) or activities conducted in accordance with the requirements of the ASME Boiler and Pressure Vessel Code," or "meet the requirements of the ASME Boiler and Pressure Vessel Code." An ASME corporate logo shall not be used by any organization other than ASME.

The ASME Single Certification Mark shall be used only for stamping and nameplates as specifically provided in the Code. However, facsimiles may be used for the purpose of fostering the use of such construction. Such usage may be by an association or a society, or by a holder of the ASME Single Certification Mark who may also use the facsimile in advertising to show that clearly specified items will carry the ASME Single Certification Mark.

STATEMENT OF POLICY ON THE USE OF ASME MARKING TO IDENTIFY MANUFACTURED ITEMS

The ASME Boiler and Pressure Vessel Code provides rules for the construction of boilers, pressure vessels, and nuclear components. This includes requirements for materials, design, fabrication, examination, inspection, and stamping. Items constructed in accordance with all of the applicable rules of the Code are identified with the ASME Single Certification Mark described in the governing Section of the Code.

Markings such as "ASME," "ASME Standard," or any other marking including "ASME" or the ASME Single Certification Mark shall not be used on any item that is not constructed in accordance with all of the applicable requirements of the Code.

Items shall not be described on ASME Data Report Forms nor on similar forms referring to ASME that tend to imply that all Code requirements have been met when, in fact, they have not been. Data Report Forms covering items not fully complying with ASME requirements should not refer to ASME or they should clearly identify all exceptions to the ASME requirements.

(21) # SUBMITTAL OF TECHNICAL INQUIRIES TO THE BOILER AND PRESSURE VESSEL STANDARDS COMMITTEES

1 INTRODUCTION

(a) The following information provides guidance to Code users for submitting technical inquiries to the applicable Boiler and Pressure Vessel (BPV) Standards Committee (hereinafter referred to as the Committee). See the guidelines on approval of new materials under the ASME Boiler and Pressure Vessel Code in Section II, Part D for requirements for requests that involve adding new materials to the Code. See the guidelines on approval of new welding and brazing materials in Section II, Part C for requirements for requests that involve adding new welding and brazing materials ("consumables") to the Code.

Technical inquiries can include requests for revisions or additions to the Code requirements, requests for Code Cases, or requests for Code Interpretations, as described below:

(1) Code Revisions. Code revisions are considered to accommodate technological developments, to address administrative requirements, to incorporate Code Cases, or to clarify Code intent.

(2) Code Cases. Code Cases represent alternatives or additions to existing Code requirements. Code Cases are written as a Question and Reply, and are usually intended to be incorporated into the Code at a later date. When used, Code Cases prescribe mandatory requirements in the same sense as the text of the Code. However, users are cautioned that not all regulators, jurisdictions, or Owners automatically accept Code Cases. The most common applications for Code Cases are as follows:

(-a) to permit early implementation of an approved Code revision based on an urgent need

(-b) to permit use of a new material for Code construction

(-c) to gain experience with new materials or alternative requirements prior to incorporation directly into the Code

(3) Code Interpretations

(-a) Code Interpretations provide clarification of the meaning of existing requirements in the Code and are presented in Inquiry and Reply format. Interpretations do not introduce new requirements.

(-b) Interpretations will be issued only if existing Code text is ambiguous or conveys conflicting requirements. If a revision of the requirements is required to support the Interpretation, an Intent Interpretation will be issued in parallel with a revision to the Code.

(b) Code requirements, Code Cases, and Code Interpretations established by the Committee are not to be considered as approving, recommending, certifying, or endorsing any proprietary or specific design, or as limiting in any way the freedom of manufacturers, constructors, or Owners to choose any method of design or any form of construction that conforms to the Code requirements.

(c) Inquiries that do not comply with the following guidance or that do not provide sufficient information for the Committee's full understanding may result in the request being returned to the Inquirer with no action.

2 INQUIRY FORMAT

Submittals to the Committee should include the following information:

(a) Purpose. Specify one of the following:

(1) request for revision of present Code requirements

(2) request for new or additional Code requirements

(3) request for Code Case

(4) request for Code Interpretation

(b) Background. The Inquirer should provide the information needed for the Committee's understanding of the Inquiry, being sure to include reference to the applicable Code Section, Division, Edition, Addenda (if applicable), paragraphs, figures, and tables. This information should include a statement indicating why the included paragraphs, figures, or tables are ambiguous or convey conflicting requirements. Preferably, the Inquirer should provide a copy of, or relevant extracts from, the specific referenced portions of the Code.

(c) Presentations. The Inquirer may desire to attend or be asked to attend a meeting of the Committee to make a formal presentation or to answer questions from the Committee members with regard to the Inquiry. Attendance at a BPV Standards Committee meeting shall be at the expense of the Inquirer. The Inquirer's attendance or lack of attendance at a meeting will not be used by the Committee as a basis for acceptance or rejection of the Inquiry by the Committee. However, if the Inquirer's request is unclear, attendance by the Inquirer or a representative may be necessary for the Committee to understand the request sufficiently to be able to provide an Interpretation. If the Inquirer desires to make a presentation at a Committee meeting, the Inquirer should provide advance notice to the Committee Secretary, to ensure time will be allotted for the presentation in the meeting agenda. The Inquirer should consider the need for additional audiovisual equipment that might not otherwise be provided by the Committee. With sufficient advance notice to the Committee Secretary, such equipment may be made available.

3 CODE REVISIONS OR ADDITIONS

Requests for Code revisions or additions should include the following information:

(a) Requested Revisions or Additions. For requested revisions, the Inquirer should identify those requirements of the Code that they believe should be revised, and should submit a copy of, or relevant extracts from, the appropriate requirements as they appear in the Code, marked up with the requested revision. For requested additions to the Code, the Inquirer should provide the recommended wording and should clearly indicate where they believe the additions should be located in the Code requirements.

(b) Statement of Need. The Inquirer should provide a brief explanation of the need for the revision or addition.

(c) Background Information. The Inquirer should provide background information to support the revision or addition, including any data or changes in technology that form the basis for the request, that will allow the Committee to adequately evaluate the requested revision or addition. Sketches, tables, figures, and graphs should be submitted, as appropriate. The Inquirer should identify any pertinent portions of the Code that would be affected by the revision or addition and any portions of the Code that reference the requested revised or added paragraphs.

4 CODE CASES

Requests for Code Cases should be accompanied by a statement of need and background information similar to that described in 3(b) and 3(c), respectively, for Code revisions or additions. The urgency of the Code Case (e.g., project underway or imminent, new procedure) should be described. In addition, it is important that the request is in connection with equipment that will bear the ASME Single Certification Mark, with the exception of Section XI applications. The proposed Code Case should identify the Code Section and Division, and should be written as a Question and a Reply, in the same format as existing Code Cases. Requests for Code Cases should also indicate the applicable Code Editions and Addenda (if applicable) to which the requested Code Case applies.

5 CODE INTERPRETATIONS

(a) Requests for Code Interpretations should be accompanied by the following information:

(1) Inquiry. The Inquirer should propose a condensed and precise Inquiry, omitting superfluous background information and, when possible, composing the Inquiry in such a way that a "yes" or a "no" Reply, with brief limitations or conditions, if needed, can be provided by the Committee. The proposed question should be technically and editorially correct.

(2) Reply. The Inquirer should propose a Reply that clearly and concisely answers the proposed Inquiry question. Preferably, the Reply should be "yes" or "no," with brief limitations or conditions, if needed.

(3) Background Information. The Inquirer should include a statement indicating why the included paragraphs, figures, or tables are ambiguous or convey conflicting requirements. The Inquirer should provide any need or background information, such as described in 3(b) and 3(c), respectively, for Code revisions or additions, that will assist the Committee in understanding the proposed Inquiry and Reply.

If the Inquirer believes a revision of the Code requirements would be helpful to support the Interpretation, the Inquirer may propose such a revision for consideration by the Committee. In most cases, such a proposal is not necessary.

(b) Requests for Code Interpretations should be limited to an Interpretation of a particular requirement in the Code or in a Code Case. Except with regard to interpreting a specific Code requirement, the Committee is not permitted to consider consulting-type requests such as the following:

(1) a review of calculations, design drawings, welding qualifications, or descriptions of equipment or parts to determine compliance with Code requirements

(2) a request for assistance in performing any Code-prescribed functions relating to, but not limited to, material selection, designs, calculations, fabrication, inspection, pressure testing, or installation

(3) a request seeking the rationale for Code requirements

6 SUBMITTALS

(a) Submittal. Requests for Code Interpretation should preferably be submitted through the online Interpretation Submittal Form. The form is accessible at http://go.asme.org/InterpretationRequest. Upon submittal of the form, the Inquirer will receive an automatic e-mail confirming receipt. If the Inquirer is unable to use the online form, the Inquirer may mail the request to the following address:

Secretary
ASME Boiler and Pressure Vessel Committee
Two Park Avenue
New York, NY 10016-5990

All other Inquiries should be mailed to the Secretary of the BPV Committee at the address above. Inquiries are unlikely to receive a response if they are not written in clear, legible English. They must also include the name of the Inquirer and the company they represent or are employed by, if applicable, and the Inquirer's address, telephone number, fax number, and e-mail address, if available.

(b) Response. The Secretary of the appropriate Committee will provide a written response, via letter or e-mail, as appropriate, to the Inquirer, upon completion of the requested action by the Committee. Inquirers may track the status of their Interpretation Request at http://go.asme.org/Interpretations.

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(21)

January 1, 2021

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SUMMARY OF CHANGES

Errata to the BPV Code may be posted on the ASME website to provide corrections to incorrectly published items, or to correct typographical or grammatical errors in the BPV Code. Such Errata shall be used on the date posted.

Information regarding Special Notices and Errata is published by ASME at http://go.asme.org/BPVCerrata.

Changes given below are identified on the pages by a margin note, **(21)**, placed next to the affected area.

Page	*Location*	*Change*
xiii	List of Sections	*(1)* Listing for Section III updated *(2)* Section XIII added *(3)* Code Case information updated
xv	Foreword	*(1)* Subparagraph (k) added and subsequent subparagraph redesignated *(2)* Second footnote revised *(3)* Last paragraph added
xviii	Submittal of Technical Inquiries to the Boiler and Pressure Vessel Standards Committees	Paragraphs 1(a)(3)(-b), 2(b), and 5(a)(3) revised
xxi	Personnel	Updated
1	Statement of Policy on Information Provided in the Stress Tables	First, third, and fourth paragraphs revised
3	1	Revised
3	2	Revised
3	2.1	Last paragraph revised
4	2.3	Revised
4	2.4	Revised
4	2.6	Revised
4	2.7	Revised
4	2.8	Revised
4	3	Second paragraph added
5	3.2	Deleted
8	Table 1A	Title revised
8–11	Table 1A	Lines 41, 43, and 44 added
12–15	Table 1A	*(1)* Lines 21, 24, 28, and 34 added *(2)* Lines 23, 27, and 33 revised
16–19	Table 1A	Lines 37–40 added
20–23	Table 1A	*(1)* Lines 12–16 added *(2)* Line 25 revised
24–27	Table 1A	Lines 29–32 added

Page	*Location*	*Change*
28–31	Table 1A	Lines 13–15, 26, and 37 added
36–39	Table 1A	Line 41 revised
48–51	Table 1A	*(1)* Lines 26–35 revised *(2)* Lines 36–42 added
68–71	Table 1A	Line 45 revised
100–103	Table 1A	Lines 25 and 26 revised
124–127	Table 1A	*(1)* Lines 26 and 28–30 revised *(2)* Lines 31 and 32 added
140–143	Table 1A	Lines 20–39 added
144–147	Table 1A	*(1)* Lines 16–22 added *(2)* Lines 36–39 revised
160, 162	Table 1A	*(1)* General Notes (h) and (i) redesignated as (c) and (d), respectively *(2)* In Note W13, subparas. (c) and (d) revised
164	Table 1B	Title revised
180–183	Table 1B	Lines 8–10 revised
184–187	Table 1B	Lines 41 and 42 revised
188–191	Table 1B	Lines 10, 11, 17, 18, 24, 25, 34, and 35 revised
192–195	Table 1B	Lines 19, 20, 35–38, 44, and 45 revised
196–199	Table 1B	Lines 7, 8, 10–15, 22, 23, 27–29, 33–35, and 39–45 revised
200–203	Table 1B	Lines 1–4, 7, 8, 10, 11, 14–19, 36, 38, 42, and 43 revised
204–207	Table 1B	*(1)* Lines 1–12, 21–27, 30–32, 35, 39, 41, 43, and 45 revised *(2)* Lines 34, 36, 38, 40, 42, and 44 added
208–211	Table 1B	*(1)* Lines 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, and 25 added *(2)* Lines 2, 4, 6, 8, 18, 20, 22, 24, 26, 29–31, and 38–45 revised
212–215	Table 1B	*(1)* Lines 11, 19, 21, 23, 25, 27, 29, 31, and 43 revised *(2)* Lines 12, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, and 44 added
216–219	Table 1B	*(1)* Lines 1, 6, 7, 10–13, 15, 16, 25, 27, and 28 added *(2)* Lines 5, 8, 9, 14, 24, and 26 deleted
240–243	Table 1B	*(1)* Lines 6, 7, 15, 17, 18, 21, and 22 revised *(2)* Line 16 added
244–247	Table 1B	Lines 36, 37, 42, and 43 deleted
252–255	Table 1B	Lines 17–26 added
256–259	Table 1B	Lines 35, 39, and 41 revised
260–263	Table 1B	Line 2 revised
276–279	Table 1B	Lines 26 and 44 revised
280–283	Table 1B	Line 17 revised

Page	*Location*	*Change*
292, 293	Table 1B	*(1)* General Notes (g) and (h) redesignated as (c) and (d), respectively *(2)* Note G22 revised *(3)* Note G34 added *(4)* Note W15 redesignated as W8
296	Table 2A	Title and column head over temperatures revised
320–322	Table 2A	Lines 11–14 revised
379	Table 2A	Notes E1–E4, G9–G12, G17, and G18 revised
382	Table 2B	Title and column head over temperatures revised
386–388	Table 2B	*(1)* Lines 24, 25, 30, and 42–45 revised *(2)* Lines 31, 33, and 35–41 added
390–392	Table 2B	*(1)* Lines 1, 2, and 17 deleted *(2)* Lines 3, 4, 8, 10, 12, and 16 revised *(3)* Lines 9, 11, 13–15, 18, and 19 added
398–400	Table 2B	*(1)* Line 5 revised *(2)* Line 6 added
409	Table 2B	Notes E1–E4, G4, G5, G8, W2, and W3 revised
410	Table 3	Title revised
410–413	Table 3	Lines 5 and 8 revised
414–417	Table 3	Lines 20–23 and 26–29 revised
422–425	Table 3	Line 14 added
426–429	Table 3	*(1)* Lines 11–15, 18, 24–28, 31, 32, 34–36, and 38 revised *(2)* Lines 19, 20, and 37 deleted *(3)* Lines 21–23, 29, 30, and 33 added
438	Table 3	General Notes (j) and (k) redesignated as (b) and (c), respectively
440	Table 4	Title revised
448–450	Table 4	Lines 4–8 revised
451	Table 4	General Note (a) revised
452	Table 5A	Title revised
472–475	Table 5A	Lines 13–17 revised
476–479	Table 5A	Line 12 deleted
514	Table 5B	Title revised
514–517	Table 5B	Lines 5–8 revised
518–521	Table 5B	Lines 30, 31, 37, and 40–44 revised
522–525	Table 5B	Lines 2–6, 8, 13, and 15 revised
534–537	Table 5B	Lines 15–21 revised
540	Table 6A	Title revised
540, 541	Table 6A	Stress line for SA-311 1018 Bolting repositioned
542, 543	Table 6A	Lines 29, 32, 34, and 35 revised
548	Table 6B	Title revised

Page	*Location*	*Change*
548, 549	Table 6B	*(1)* Lines 16 and 17 revised *(2)* Line 45 added
550, 551	Table 6B	Line 36 revised
556	Table 6C	Title revised
562	Table 6D	Title revised
568	Table U	Table expanded to accommodate UTS values up to 1650°F
568–570	Table U	Line 31 added
572–574	Table U	*(1)* Lines 3, 4, 8, and 13 added *(2)* Line 12 revised
576–578	Table U	*(1)* Lines 9–12 and 30–34 added *(2)* Line 39 revised
580–582	Table U	Lines 39–42 added
584–586	Table U	Lines 22–24 and 35 added
588–590	Table U	*(1)* Lines 2 and 5 revised *(2)* Line 14 added
596–598	Table U	Line 15 revised
608–610	Table U	Lines 32–38 revised
624–626	Table U	*(1)* Line 9 deleted *(2)* Lines 44 and 45 revised
628–630	Table U	*(1)* Lines 1–4, 32, and 35 revised *(2)* Lines 13 and 27 added
632–634	Table U	*(1)* Line 7 added *(2)* Lines 26, 27, and 41–45 revised
636–638	Table U	Lines 1–11, 17, 18, and 21–39 revised
644–646	Table U	Lines 31–44 revised
648–650	Table U	Lines 1, 3, 7, 10, 13, 15–17, 20, 22, 24, 26–30, 37, 39, 41, and 43 revised
652–654	Table U	Lines 1 and 3 revised
656–658	Table U	Lines 9, 10, 13, 14, 16–31, and 45 revised
660–662	Table U	Lines 1–13, 28, 29, 32, 33, and 37–44 revised
664–666	Table U	Lines 1–8 and 25–35 revised
672–674	Table U	Lines 25–42 revised
676–678	Table U	*(1)* Lines 3–12 revised *(2)* Lines 26–36 added
680–682	Table U	*(1)* Lines 9–15 added *(2)* Lines 25, 26, and 42–44 revised
684–686	Table U	Lines 1–7 revised
700–702	Table U	Lines 22–40 revised
708–710	Table U	*(1)* Line 6 added *(2)* Lines 15, 28, and 34 revised

Page	*Location*	*Change*
712–714	Table U	*(1)* Lines 3, 25, 40, and 41 revised *(2)* Line 19 added
716–718	Table U	*(1)* Lines 13, 14, 19, 20, 25, 26, 31, 32, 36, 38, 41, and 45 revised *(2)* Lines 42 and 43 added
720–722	Table U	*(1)* Lines 1, 4–7, 35, and 36 revised *(2)* Lines 2, 8–13, and 26–31 added
724–726	Table U	*(1)* Lines 7, 9, 17, 29, and 30 revised *(2)* Lines 24–27 added
728–730	Table U	*(1)* Lines 9–12, 20, and 21 added *(2)* Lines 25–30 revised
732–734	Table U	Lines 5–12 and 21–28 revised
736–738	Table U	Line 19 added
740–742	Table U	Lines 8–19 and 31–38 revised
744–746	Table U	Lines 32 and 35 deleted
748–750	Table U	*(1)* Lines 15–21 revised *(2)* Lines 22–26 added
752–754	Table U	*(1)* Lines 1–6 and 10–16 revised *(2)* Lines 17–28 added
756–758	Table U	Lines 11–13 and 21–28 revised
772	Table Y-1	Table expanded to accommodate UTS values up to 1650°F
772–776	Table Y-1	Line 33 added
778–782	Table Y-1	*(1)* Lines 5, 6, 12, 15, 19, and 25 added *(2)* Lines 14, 18, and 24 revised
784–788	Table Y-1	Lines 23–26 added
790–794	Table Y-1	*(1)* Lines 4–8 added *(2)* Line 19 revised
796–800	Table Y-1	Lines 23–26 added
802–806	Table Y-1	*(1)* Lines 10–12 and 23 added *(2)* Lines 35 and 38 revised
808–812	Table Y-1	Line 15 added
820–824	Table Y-1	Line 19 revised
832–836	Table Y-1	Line 30 revised
838–842	Table Y-1	Lines 21–27 revised
856–860	Table Y-1	Line 45 deleted
862–866	Table Y-1	Lines 42–45 revised
868–872	Table Y-1	Lines 1, 2, 30, and 34 revised
874–878	Table Y-1	Lines 29, 30, 44, and 45 revised
880–884	Table Y-1	Lines 1–14, 20, 21, and 24–42 revised
892–896	Table Y-1	Lines 21 and 35–45 revised

Page	*Location*	*Change*
898–902	Table Y-1	Lines 1–5, 7, 11, 14, 17, 19–21, 24, 26, 28, 30–34, 41, 43, and 45 revised
904–908	Table Y-1	Lines 2, 4, 5, and 7 revised
910–914	Table Y-1	Lines 19, 20, 23, 24, and 26–41 revised
916–920	Table Y-1	Lines 10–23, 42, and 43 revised
922–926	Table Y-1	Lines 1, 2, and 6–22 revised
928–932	Table Y-1	Lines 3–13 revised
940–944	Table Y-1	Lines 5–19 and 28–37 revised
946–950	Table Y-1	Lines 6–16 and 34–40 added
952–956	Table Y-1	Lines 5, 6, and 22–32 revised
982–986	Table Y-1	Lines 16–34 added
988–992	Table Y-1	*(1)* Line 24 added *(2)* Line 33 revised
994–998	Table Y-1	*(1)* Lines 1, 7, 13, 16, and 38 revised *(2)* Line 27 added
1000–1004	Table Y-1	Lines 8, 9, 26, 27, 32, 33, 38, 39, 44, and 45 revised
1006–1010	Table Y-1	*(1)* Lines 1, 2, 6, 7, 9, 10, 12–15, 18–20, 22–27, and 29–33 revised *(2)* Lines 16, 17, and 21 added
1012–1016	Table Y-1	*(1)* Lines 2–7 and 45 added *(2)* Lines 11, 12, 28–31, and 38 revised
1018–1022	Table Y-1	*(1)* Lines 1–3, 27–30, 38, and 39 added *(2)* Lines 5, 6, 15, 16, and 18 revised
1024–1028	Table Y-1	Lines 1–6, 27–34, and 43–45 revised
1030–1034	Table Y-1	*(1)* Lines 1–5 revised *(2)* Line 41 added
1036–1040	Table Y-1	Lines 30–43 revised
1042–1046	Table Y-1	Lines 10–22 revised
1048–1052	Table Y-1	*(1)* Lines 15 and 18 deleted *(2)* Lines 43–45 revised
1054–1058	Table Y-1	*(1)* Lines 1–4, 27–36, and 39–45 revised *(2)* Lines 5–9 added
1060–1064	Table Y-1	*(1)* Lines 1–12 added *(2)* Lines 41–43 revised
1066–1070	Table Y-1	Lines 6–13 revised
1090	Table Y-2	General Note revised
1092	Table TE-1	*(1)* For 7Ni Steels, coefficient C, entries for 70°F, 100°F, 150°F, and 200°F revised *(2)* Notes (2) and (4) revised
1099	Table TE-4	N08354 added
1110	Table TCD	*(1)* N08354 added *(2)* Note (11) revised

Page	*Location*	*Change*
1124	Table TM-1	Note (10) revised
1129	Table TM-4	N08354 added
1130	Table PRD	N08354 added
1147	Figure HA-5	Title revised
1214	Table CS-1	Revised
1215	Table CS-2	Revised
1216	Table CS-3	Revised
1217	Table CS-4	Revised
1225	Table HA-10	Revised
1278	Table 5-800	*(1)* C177 deleted *(2)* D2766, E289, E1225, and E1461 added *(3)* Note (1) added
1279	5-1200	*(1)* Revised *(2)* Endnotes 4–6 deleted
1279	5-1400	Subparagraphs (a) and (b) revised
1317	Nonmandatory Appendix D	*(1)* Title revised *(2)* D-210 revised

LIST OF CHANGES IN RECORD NUMBER ORDER

DELETED

CROSS-REFERENCING AND STYLISTIC CHANGES IN THE BOILER AND PRESSURE VESSEL CODE

There have been structural and stylistic changes to BPVC, starting with the 2011 Addenda, that should be noted to aid navigating the contents. The following is an overview of the changes:

Subparagraph Breakdowns/Nested Lists Hierarchy

- First-level breakdowns are designated as (a), (b), (c), etc., as in the past.
- Second-level breakdowns are designated as (1), (2), (3), etc., as in the past.
- Third-level breakdowns are now designated as (-a), (-b), (-c), etc.
- Fourth-level breakdowns are now designated as (-1), (-2), (-3), etc.
- Fifth-level breakdowns are now designated as (+a), (+b), (+c), etc.
- Sixth-level breakdowns are now designated as (+1), (+2), etc.

Footnotes

With the exception of those included in the front matter (roman-numbered pages), all footnotes are treated as endnotes. The endnotes are referenced in numeric order and appear at the end of each BPVC section/subsection.

Submittal of Technical Inquiries to the Boiler and Pressure Vessel Standards Committees

Submittal of Technical Inquiries to the Boiler and Pressure Vessel Standards Committees has been moved to the front matter. This information now appears in all Boiler Code Sections (except for Code Case books).

Cross-References

It is our intention to establish cross-reference link functionality in the current edition and moving forward. To facilitate this, cross-reference style has changed. Cross-references within a subsection or subarticle will not include the designator/identifier of that subsection/subarticle. Examples follow:

- *(Sub-)Paragraph Cross-References.* The cross-references to subparagraph breakdowns will follow the hierarchy of the designators under which the breakdown appears.
  - If subparagraph (-a) appears in X.1(c)(1) and is referenced in X.1(c)(1), it will be referenced as (-a).
  - If subparagraph (-a) appears in X.1(c)(1) but is referenced in X.1(c)(2), it will be referenced as (1)(-a).
  - If subparagraph (-a) appears in X.1(c)(1) but is referenced in X.1(e)(1), it will be referenced as (c)(1)(-a).
  - If subparagraph (-a) appears in X.1(c)(1) but is referenced in X.2(c)(2), it will be referenced as X.1(c)(1)(-a).
- *Equation Cross-References.* The cross-references to equations will follow the same logic. For example, if eq. (1) appears in X.1(a)(1) but is referenced in X.1(b), it will be referenced as eq. (a)(1)(1). If eq. (1) appears in X.1(a)(1) but is referenced in a different subsection/subarticle/paragraph, it will be referenced as eq. X.1(a)(1)(1).

SUBPART 1
STRESS TABLES

STATEMENT OF POLICY ON INFORMATION PROVIDED IN THE STRESS TABLES (21)

The purpose of this Statement of Policy is to clarify which information in the stress tables is mandatory and which is not. The information and restrictions provided in the Notes found throughout the various stress tables provided in Section II, Part D, Subpart 1, are mandatory. It is vital to recognize that lines of information in Tables 1A, 1B, 2A, 2B, 3, 4, 5A, 5B, 6A, 6B, 6C, and 6D frequently have essential information referenced in the Notes column. These Notes are organized as follows:

(a) EXX: defining onset of values based on successful experience in service

(b) GXX: general requirements

(c) HXX: heat treatment requirements

(d) SXX: size requirements

(e) TXX: defining onset of time-dependent behavior

(f) WXX: welding requirements

The specifications and grades or types, coupled with the assigned Notes for each line, provide the complete description of material in the context of the allowable stresses or design stress intensities. Additional requirements for particular types of construction must also be obtained from the rules governing the construction.

In Tables 1A, 2A, 5A, 6A, 6C, and 6D, the information in the Nominal Composition column is nonmandatory and is for information only. However, these nominal compositions are the primary sorting used in these six tables. See the Guideline on Locating Materials in Stress Tables, and in Tables of Mechanical and Physical Properties. The information in the Alloy Designation/UNS Number column is nonmandatory for specifications for which a grade or type is provided. This is primarily true for the non-stainless steel alloys in these tables. For specifications for which no type or grade is listed, the UNS number is mandatory. Particularly for the stainless steels, for which no type or grade is listed, the UNS number is the grade.

The only difference between Tables 1A, 2A, 5A, 6A, 6C, and 6D and Tables 1B, 2B, 5B, and 6B, with regard to the mandatory/nonmandatory nature of the information, is that in Tables 1B, 2B, 5B, and 6B, the UNS number information is used as the basis of the sorting scheme for materials and is almost always mandatory.

Where provided, the information in the columns for Product Form, Specification Number, Type/Grade, Class/Condition/Temper, and External Pressure Chart Number is mandatory. The information in the P-Number and Group Number columns is also mandatory; however, the primary source for this information is Table QW/QB-422 in Section IX. When there is a conflict between the P-number and Group number information in these stress tables and that in Section IX, the numbers in Section IX shall govern.

The information in the Minimum Tensile Strength, Minimum Yield Strength, and Size/Thickness dimension columns is also mandatory; however, the primary source for this information is the material specifications in Section II, Parts A and B. These values are a primary basis for establishing the allowable stresses and design stress intensities. When there is a conflict between the tensile and yield strength values in the stress tables and those in the material specifications in Section II, Parts A and B, the minimum tensile and yield strength values in Parts A and B shall govern. For dual-unit specifications and for product forms for which separate U.S. Customary and Metric specifications are provided, for the Size/Thickness dimensions for size breaks at which the Minimum Specified Yield or Tensile Strengths, or both, decrease with increasing size or thickness, the values in the material specifications in Parts A and B shall govern. When there is a conflict between the maximum size or thickness values in the stress tables and those in the material specifications, the values in the stress tables shall govern.

The information in the Applicability and Maximum Temperature Limits columns is mandatory. Where a material is permitted for use in more than one Construction Code, and in the SI units version of these tables, the maximum use temperature limit in these columns is critical. The temperature to which allowable stress or design stress intensity values are listed is not necessarily the

temperature to which use is permitted by a particular Construction Code. Different Construction Codes often have different use temperature limits for the same material and condition. Further, values may be listed in the stress tables at temperatures above the maximum use temperature limit. These stress values are provided to permit interpolation to be used to determine the allowable stress or design stress intensity at temperatures between the next lowest temperature for which stress values are listed and the maximum-use temperature limit listed in these columns.

GUIDELINE ON LOCATING MATERIALS IN STRESS TABLES, AND IN TABLES OF MECHANICAL AND PHYSICAL PROPERTIES

(21) 1 INTRODUCTION

The goal of this Guideline is to assist the users of Section II, Part D in locating materials in stress tables (Tables 1A, 1B, 2A, 2B, 3, 4, 5A, 5B, 6A, 6B, 6C, and 6D), tables of mechanical properties (Tables U and Y-1), and tables of physical properties (Tables TE-1 through TE-5, TCD, TM-1 through TM-5, and PRD). This Guideline defines the logic used to place materials within these tables.

(21) 2 STRESS TABLES

Stress tables are all found within Section II, Part D, Subpart 1. Tables 1A, 1B, 3, 5A, 5A, 5B, 6A, 6B, 6C, and 6D cover allowable stresses, while Tables 2A, 2B, and 4 cover design stress intensities. The governing allowable stresses for those materials are provided in ASME BPVC, Section IV. Although Subpart 1 also covers ultimate tensile strength and yield strength, the organization of those mechanical property tables will be discussed separately in para. 3. A table-by-table listing of the materials-organization logic used to place materials within the designated tables follows.

(21) 2.1 TABLE 1A

Table 1A provides allowable stresses for ferrous[1] materials used in Section I; Section III, Division 1, Classes 2 and 3; Section VIII, Division 1; and Section XII construction. Within Table 1A, the first step in ordering materials is to use their nominal compositions. These nominal compositions are nothing more than accepted compositional fingerprints or widely recognized designators for each alloy or alloy class. These nominal compositions are arranged in Table 1A as follows:

(a) carbon steels

(b) carbon steels with small additions of Cb, Ti, and V (microalloyed steels)

(c) C–$\frac{1}{2}$Mo steels

(d) chromium steels, including ferritic stainless steels, by increasing Cr content [$\frac{1}{2}$Cr, $\frac{3}{4}$Cr, 1Cr, 1$\frac{1}{4}$Cr, 2$\frac{1}{4}$Cr, 3Cr, 5Cr, 9Cr, 11Cr, 12Cr, 13Cr, 15Cr, 17Cr (including 17Cr–4Ni–4Cu and 17Cr–4Ni–6Mn), 18Cr, 26Cr, 27Cr, and 29Cr]

(e) manganese steels (Mn–$\frac{1}{4}$Mo, Mn–$\frac{1}{2}$Mo, Mn–$\frac{1}{2}$Ni, and Mn–V)

(f) silicon steel (1$\frac{1}{2}$Si–$\frac{1}{2}$Mo)

(g) nickel steels ($\frac{1}{2}$Ni, $\frac{3}{4}$Ni, 1Ni, 1$\frac{1}{4}$Ni, 2Ni, 2$\frac{1}{2}$Ni, 2$\frac{3}{4}$Ni, 3Ni, 3$\frac{1}{2}$Ni, 4Ni, 5Ni, 8Ni, and 9Ni)

(h) other high nickel steels [25Ni–15Cr–2Ti (Grade 660) and 29Ni–20Cr–3Cu–2Mo (CN7M)]

(i) high alloy steels, including the duplex stainless steels, in order of increasing chromium content [beginning with 14Cr–16Ni–6Si–Cu–Mo, then 16Cr–9Mn–2Ni–N, then 16Cr–12Ni–2Mo (316L), etc.], then by increasing nickel content within a given chromium or other alloy content [18Cr–8Ni, 18Cr–8Ni–N, 18Cr–8Ni–4Si–N, 18Cr–10Ni–Cb (first S34700, then S34709, S34800, and S34809), 18Cr–10Ni–Ti, 18Cr–11Ni, etc., ending with 29Cr–6.5Ni–2Mo–N].

Unfortunately, most specifications for materials do not give nominal compositions — and without that information, one may not know the nominal composition for a particular material in Table 1A. If the specification number and alloy grade or type designation are known, then one can go to Section IX, Table QW/QB-422 and find the corresponding nominal composition.

Now, for a given nominal composition, Table 1A is arranged by increasing strength — first tensile strength and then yield strength. For a given nominal composition, tensile strength, and yield strength, stress listings are provided in order of increasing specification number. Sometimes, for a given nominal composition, tensile strength, yield strength, and specification number/grade or type, there may be more than one line of stresses. At this point, the Notes referenced on the second page of each page set within Table 1A will define why there are two or more lines of stresses and when each applies.

2.2 TABLE 1B

Table 1B provides allowable stresses for nonferrous materials used in Section I; Section III, Division 1, Classes 2 and 3; Section VIII, Division 1; and Section XII construction. Aluminum alloys (UNS AXXXXX materials) are the first materials covered in Table 1B, followed by copper alloys (UNS CXXXXX), nickel alloys (UNS NXXXXX), and the reactive and refractory metals and alloys (UNS RXXXXX). Within this latter category there are the following:

(a) chromium alloys (R2XXXX)

(b) cobalt alloys (R3XXXX)

(c) titanium alloys (R5XXXX)

(d) zirconium alloys (R6XXXX)

Within each of these material class groupings, stress lines are first organized by increasing UNS (Unified Numbering System) number. The nonferrous specifications now show these numbers in association with grade designations. Then, for a given UNS number, stress lines are

next ordered by strength — first tensile strength and then yield strength. Finally, for a given UNS number, tensile strength, and yield strength, stress lines are ordered by increasing specification number. Again, some materials may have two or more stress lines even if their UNS number, tensile strength, yield strength, and specification number are the same. The Notes provide direction for the applicability of each line.

For those material specifications that may not show UNS numbers associated with alloy grades, one again can refer to Section IX, Table QW/QB-422 for that information.

For Table 1B, nominal compositions are shown only for the NXXXXX and RXXXXX materials, but they have no influence on the location of alloys in the table. In this Table, the nominal compositions are simply for information.

(21) 2.3 TABLE 2A

Table 2A provides design stress intensities for ferrous materials for Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 construction; and allowable stresses for ferrous materials for Section VIII, Division 2, Class 1 construction. This Table is organized in the same manner as Table 1A. Refer back to para. 2.1 for that description.

(21) 2.4 TABLE 2B

Table 2B provides design stress intensities for nonferrous materials for Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 construction; and allowable stresses for nonferrous materials for Section VIII, Division 2, Class 1 construction. Table 2B materials are ordered in the same manner as in Table 1B. Refer back to para. 2.2 for that description.

2.5 TABLE 3

Table 3 provides allowable stresses for bolting materials for use in Section III, Division 1, Classes 2 and 3; Section VIII, Division 1; Section VIII, Division 2 (using Section VIII, Division 2, Part 4.16); and Section XII construction. The table first covers ferrous materials and then nonferrous materials. For the ferrous materials, the ordering logic parallels that used in Tables 1A and 2A — first by nominal composition, then by increasing ultimate tensile strength, then by increasing yield strength, and finally by increasing specification number. Again, refer back to para. 2.1 for a discussion on nominal composition.

Nonferrous materials are presented using the same logic as in Tables 1B and 2B; see para. 2.2 for that discussion.

(21) 2.6 TABLE 4

Table 4 provides design stress intensities for bolting materials used in Section III, Division 1, Classes 1 and MC; Section III, Division 3; and Section III, Division 5; and allowable stresses for bolting materials used in Section VIII, Division 2 (using Section VIII, Division 2, Part 5 and Annex 5.F).

Table 4 is organized in the same manner as Table 3 — first covering ferrous materials and then nonferrous materials — except that Table 4 covers far fewer materials. For the ordering logic, again refer to paras. 2.1 and 2.2 for ferrous and nonferrous materials, respectively.

2.7 TABLE 5A (21)

Table 5A provides allowable stresses for ferrous materials for Section VIII, Division 2, Class 2 construction. This Table is organized in the same manner as Table 1A. Refer back to para. 2.1 for that description.

2.8 TABLE 5B (21)

Table 5B provides allowable stresses for nonferrous materials for Section VIII, Division 2, Class 2 construction. This Table is organized in the same manner as Table 1B. Refer back to para. 2.2 for that description.

2.9 TABLE 6A

Table 6A provides allowable stresses for ferrous materials for Section IV construction. This Table is organized in the same manner as Table 1A. Refer back to para. 2.1 for that description.

2.10 TABLE 6B

Table 6B provides allowable stresses for nonferrous materials for Section IV construction. This Table is organized in the same manner as Table 1B. Refer back to para. 2.2 for that description.

2.11 TABLE 6C

Table 6C provides allowable stresses for Section IV construction of lined water heaters. This Table is organized in the same manner as Table 1A. Refer back to para. 2.1 for that description.

2.12 TABLE 6D

Table 6D provides allowable stresses for Section IV construction of unlined water heaters. This Table is organized in the same manner as Table 1A. Refer back to para. 2.1 for that description.

3 MECHANICAL PROPERTY TABLES (21)

Ultimate tensile strength values and yield strength values are to be used in design calculations according to the rules of the Construction Codes. However, they are not to be construed as minimum strength values at temperature. This is explained in the General Notes to these tables. Paragraphs 3.1 through 3.3 provide a table-by-table listing of the materials-organization logic.

Tensile (Table U) and yield (Table Y-1) strengths at elevated temperatures are based on trend curves determined by statistical curve fitting of submitted mechanical property data. Wrought materials and cast materials are considered different materials. A material has only one trend curve for tensile strengths and one trend curve for yield strengths. Each curve is anchored to the minimum value at room temperature in its set of units. See Nonmandatory Appendix D for more information.

3.1 TABLE U

Table U provides tensile strength values for ferrous and nonferrous materials, in that order. The ordering logic for ferrous materials is the same as used in Table 1A, except yield strength level is not shown. Using the logic described in para. 2.1, stress lines are organized by nominal composition, then by increasing tensile strength level, and then by increasing specification number.

Nonferrous materials coverage begins following the last of the high alloy steels (25Cr–22Ni–2Mo–N). Coverage of nonferrous alloys begins with the UNS AXXXXX alloys, followed by NXXXXX and RXXXXX alloys. The ordering of materials within these three groups has been previously described in para. 2.2.

(21) 3.2 TABLE U-2

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3.3 TABLE Y-1

Table Y-1 provides yield strength values for ferrous and nonferrous materials, in that order. Again, the ordering of yield strength lines parallels the logic described for ferrous and nonferrous materials in paras. 2.1 and 2.2, respectively. Unlike Table U, for ferrous materials, the tensile strength level does enter into the ordering process, again following nominal composition designation. Table Y-1's nonferrous materials listings begin with the aluminum-base alloys (UNS AXXXXX). These are followed by the copper materials (CXXXXX), nickel-base materials (NXXXXX), and the reactive and refractory metals and alloys (RXXXXX).

4 PHYSICAL PROPERTY TABLES

Since physical properties (thermal conductivity, thermal diffusivity, thermal expansion, and density), Young's modulus, and Poisson's ratio values can be shown for numerous materials with a single set of property values, most of the tables found in Section II, Part D, Subpart 2 are based on nominal composition. Paragraphs 4.1 through 4.4 describe how these tables are organized.

4.1 TABLE TE

Table TE covers thermal expansion behavior, presented in terms of A (instantaneous coefficient of thermal expansion), B (mean coefficient of thermal expansion), and C (linear thermal expansion). This Table is split into five parts as follows:

(a) Table TE-1 covers numerous individual ferrous materials and ferrous material groupings. Notes at the end of Table TE-1 list the nominal compositions covered by the designated groupings. Again, knowledge of the nominal composition for a given material is essential, and it was noted previously that these can be extracted from Section IX, Table QW/QB-422, given the specification number and grade or type designation.

(b) Table TE-2 covers aluminum alloys. One set of A/B/C values covers all of the aluminum-base materials listed in General Note (a) of Table TE-2.

(c) Table TE-3 covers copper alloys, currently in five general groupings: C1XXXX alloys, bronze alloys, brass alloys, 70Cu–30Ni, and 90Cu–10Ni. According to an article in ASM International's "Advanced Materials & Processes" (December 1999), the general terms of bronze and brass cover the following alloys:

(1) wrought copper-base alloys

(-a) C20500–C28580 — brasses (Cu–Zn)

(-b) C31200–C38590 — leaded brasses (Cu–Zn–Pb)

(-c) C40400–C49080 — tin brasses (Cu–Zn–Sn–Pb)

(-d) C60600–C64400 — aluminum bronzes (Cu–Al–Ni–Fe–Si–Sn)

(-e) C64700–C66100 — silicon bronzes (Cu–Si–Sn)

(2) cast copper-base alloys

(-a) C83300–C85800 — red and leaded red brasses (Cu–Zn–Sn–Pb)

(-b) C86100–C86800 — manganese bronzes and leaded manganese bronzes (Cu–Zn–Mn–Fe–Pb)

(-c) C90200–C94500 — tin bronzes and leaded tin bronzes (Cu–Sn–Zn–Pb)

(-d) C95300–C95810 — aluminum bronzes (Cu–Al–Fe–Ni)

This guidance should help define which group of A/B/C values of thermal expansion to select for a given brass or bronze.

(d) Table TE-4 provides thermal expansion values for nickel alloys and refractory alloys. The thermal expansion value sets for the nickel alloys are arranged by increasing UNS NXXXXX numbers.

(e) Table TE-5 provides thermal expansion values for two groupings of titanium-base alloys. One group covers only Grade 9; the other group covers the other alloys. In this Table, there is no reference to the UNS number, just to the grade number.

4.2 TABLE TCD

Table TCD provides both thermal conductivity (TC) and thermal diffusivity (TD) values for numerous ferrous and nonferrous materials and material groupings. The table begins with ferrous materials, split into groups of carbon and low alloy steels, followed by groups of high chromium steels and groups of high alloy steels. For each of these groups, there is a listing of nominal composition designations found at the end of the table, defining the extent of coverage.

The next series of materials are the nickel-base alloys, covered by TC/TD listings for nickel alloys (arranged by increasing UNS number) and refractory alloys. Then there are TC/TD listings for individual titanium and aluminum alloys (arranged by increasing UNS number). Table TCD does not currently provide values for copper or zirconium alloys.

4.3 TABLE TM

Table TM provides moduli of elasticity for five categories of materials, as follows:

(a) Table TM-1 covers ferrous materials in nine general categories and with additional lines for specific materials. Groups A through G are subdivided by nominal composition; see the Notes at the end of Table TM-1.

(b) Table TM-2 covers aluminum alloys, listed by UNS number designation.

(c) Table TM-3 covers copper alloys, listed by UNS number designation.

(d) Table TM-4 covers nickel alloys, listed by UNS number designation.

(e) Table TM-5 covers titanium alloys, listed by increasing grade numbers, and zirconium-base alloys, listed by increasing UNS number (or grade) designation.

4.4 TABLE PRD

Table PRD provides Poisson's ratio and density for ferrous and nonferrous materials.

5 REFERENCES

The official reference for UNS numbers is *Metals & Alloys in the Unified Numbering System*, ASTM DS-56. This document is periodically updated as various material specifications are revised, added, or deleted by their sponsoring organizations. Only UNS numbers published in this reference appear in Section II, Part A and Part B specifications, and in the various Section II, Part D stress tables, mechanical property tables, and physical property tables.

Nominal compositions are defined by various groups within the ASME Code committee structure and there are no published guidelines describing how these designations are developed. These designations have the greatest relevance in the arrangement of ferrous materials and, as indicated previously, the simplest way to obtain these designations is to look in Section IX of the ASME Boiler and Pressure Vessel Code and use Table QW/QB-422, which is arranged by increasing specification number. These start with the "SA" specification numbers, followed by the "SB" numbers.

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Table 1A
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	Carbon steel	Sheet	SA–1008	CS–A	...	...	...	1	1
2	Carbon steel	Sheet	SA–1008	CS–B	...	...	...	1	1
3	Carbon steel	Bar	SA–675	45	...	...	...	1	1
4	Carbon steel	Wld. pipe	SA–134	A283A	...	...	...	1	1
5	Carbon steel	Plate	SA–283	A	...	...	...	1	1
6	Carbon steel	Plate	SA–285	A	K01700	...	...	1	1
7	Carbon steel	Wld. pipe	SA–672	A45	K01700	...	...	1	1
8	Carbon steel	Sheet	SA–414	A	K01501	...	...	1	1
9	Carbon steel	Wld. tube	SA–178	A	K01200	...	...	1	1
10	Carbon steel	Wld. tube	SA–178	A	K01200	...	...	1	1
11	Carbon steel	Smls. tube	SA–179	...	K01200	...	...	1	1
12	Carbon steel	Smls. tube	SA–192	...	K01201	...	...	1	1
13	Carbon steel	Wld. tube	SA–214	...	K01807	...	...	1	1
14	Carbon steel	Smls. tube	SA–556	A2	K01807	...	...	1	1
15	Carbon steel	Wld. tube	SA–557	A2	K01807	...	...	1	1
16	Carbon steel	Wld. pipe	SA–53	E/A	K02504	...	...	1	1
17	Carbon steel	Wld. pipe	SA–53	E/A	K02504	...	...	1	1
18	Carbon steel	Wld. pipe	SA–53	E/A	K02504	...	...	1	1
19	Carbon steel	Wld. pipe	SA–53	F/A	...	...	...	1	1
20	Carbon steel	Smls. pipe	SA–53	S/A	K02504	...	...	1	1
21	Carbon steel	Smls. pipe	SA–53	S/A	K02504	...	...	1	1
22	Carbon steel	Smls. pipe	SA–106	A	K02501	...	...	1	1
23	Carbon steel	Wld. pipe	SA–135	A	...	...	...	1	1
24	Carbon steel	Forged pipe	SA–369	FPA	K02501	...	...	1	1
25	Carbon steel	Wld. pipe	SA–587	...	K11500	...	...	1	1
26	Carbon steel	Wld. pipe	SA–587	...	K11500	...	...	1	1
27	Carbon steel	Bar	SA–675	50	...	...	...	1	1
28	Carbon steel	Bar	SA–675	50	...	...	...	1	1
29	Carbon steel	Wld. pipe	SA–134	A283B	...	...	...	1	1
30	Carbon steel	Plate	SA–283	B	...	...	...	1	1
31	Carbon steel	Plate	SA–285	B	K02200	...	...	1	1
32	Carbon steel	Plate	SA–285	B	K02200	...	...	1	1
33	Carbon steel	Wld. pipe	SA–672	A50	K02200	...	...	1	1
34	Carbon steel	Sheet	SA–414	B	K02201	...	...	1	1
35	Carbon steel	Plate	SA/EN 10028–3	P275NH	...	...	$6 < t \le 10$	1	1
36	Carbon steel	Plate	SA/EN 10028–2	P235GH	...	...	$\le 2\frac{1}{4}$	1	1
37	Carbon steel	Smls. tube	SA/EN 10216–2	P235GH	...	...	$1\frac{5}{8} < t \le 2\frac{1}{2}$	1	1
38	Carbon steel	Plate	SA/EN 10028–3	P275NH	...	...	$4 < t \le 6$	1	1
39	Carbon steel	Smls. tube	SA/EN 10216–2	P235GH	...	...	$\frac{5}{8} < t \le 1\frac{5}{8}$	1	1
40	Carbon steel	Smls. tube	SA/EN 10216–2	P235GH	...	...	$t \le \frac{5}{8}$	1	1
(21) 41	Carbon steel	Sheet, strip	SA–1011	36	SS	Type 1	$t \le 0.23$	...	...
42	Carbon steel	Plate	SA/EN 10028–3	P275NH	...	...	$2\frac{1}{4} < t \le 4$	1	1
(21) 43	Carbon steel	Sheet, strip	SA–1011	40	SS	...	$t \le 0.23$	...	...
(21) 44	Carbon steel	Sheet, strip	SA–1011	45	HSLAS	2	...	...	...
45	Carbon steel	Bar	SA–675	55	...	...	...	1	1

Table 1A
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only)				External Pressure Chart No.	Notes
			I	III	VIII-1	XII		
1	40	20	NP	NP	650	NP	CS-6	...
2	40	20	NP	NP	650	NP	CS-6	...
3	45	22.5	NP	650 (Cl. 3 only)	900	650	CS-6	G10, G22, T10
4	45	24	NP	300 (Cl. 3 only)	NP	NP	CS-1	W12
5	45	24	NP	300 (Cl. 3 only)	650	650	CS-1	...
6	45	24	900	700	900	650	CS-1	G10, T2
7	45	24	NP	700	NP	NP	CS-1	S6, W10, W12
8	45	25	NP	NP	900	650	CS-1	G10, T2
9	47	26	1000	NP	NP	NP	CS-1	G4, G10, S1, T2, W13
10	47	26	1000	NP	1000	650	CS-1	G3, G10, G24, S1, T2, W6
11	47	26	NP	NP	900	650	CS-1	G10, T2
12	47	26	1000	NP	1000	650	CS-1	G10, S1, T2
13	47	26	NP	NP	1000	650	CS-1	G24, T2, W6
14	47	26	NP	NP	1000	650	CS-1	G10, T2
15	47	26	NP	NP	1000	650	CS-1	G24, T2, W6
16	48	30	900	NP	NP	NP	CS-2	G3, G10, S1, T2
17	48	30	900	300 (Cl. 3 only)	NP	NP	CS-2	G10, S1, T2, W12, W13
18	48	30	NP	NP	900	650	CS-2	G24, T2, W6
19	48	30	750	NP	NP	NP	CS-2	G2, G10, S10, T2, W15
20	48	30	900	300 (Cl. 3 only)	NP	NP	CS-2	G10, S1, T2
21	48	30	NP	700 (SPT)	900	650	CS-2	G10, T2
22	48	30	1000	700	1000	650	CS-2	G10, S1, T1
23	48	30	NP	NP	900	650	CS-2	G24, T2, W6
24	48	30	1000	NP	NP	NP	CS-2	G10, S1, T1
25	48	30	NP	300 (Cl. 3 only)	NP	NP	CS-2	...
26	48	30	NP	NP	850	650	CS-2	G24, T2, W6
27	50	25	NP	650 (Cl. 3 only)	NP	NP	CS-1	...
28	50	25	850	700 (SPT)	900	650	CS-1	G10, G15, G22, S1, T2
29	50	27	NP	300 (Cl. 3 only)	NP	NP	CS-1	W12
30	50	27	NP	300 (Cl. 3 only)	650	650	CS-1	...
31	50	27	900	NP	NP	NP	CS-1	G10, S1, T1
32	50	27	NP	700	900	650	CS-1	G10, T1
33	50	27	NP	700	NP	NP	CS-1	S6, T1, W10, W12
34	50	30	NP	NP	900	650	CS-2	G10, T1
35	51	31	NP	NP	400	NP	CS-2	G10
36	52	31	NP	NP	700	NP	CS-2	T11
37	52	31	1000	NP	1000	NP	CS-2	G10, S1, T2, W14
38	52	32.5	NP	NP	400	NP	CS-2	G10
39	52	32.5	1000	NP	1000	NP	CS-2	G10, S1, T2, W14
40	52	34	1000	NP	1000	NP	CS-2	G10, S1, T2, W14
41	53	36	NP	NP	600	600	CS-2	...
42	53.5	34	NP	NP	400	NP	CS-2	G10
43	55	40	NP	NP	600	600	CS-2	...
44	55	45	NP	NP	600	600	CS-3	...
45	55	27.5	850	700 (SPT)	900	650	CS-1	G10, G15, G22, S1, T2

Table 1A
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	11.4	11.4	11.4	...	11.4	11.4	10.9	10.2	9.99	...	...	...	...	...
2	11.4	11.4	11.4	...	11.4	11.4	10.9	10.2	9.9	...	...	...	...	...
3	12.9	12.9	12.9	...	12.9	12.8	12.2	11.5	11.1	10.7	10.4	*9.2*	*7.9*	*5.9*
4	12.9	...	12.9	...	12.9	...	...	...	...	...	...	...	...	...
5	12.9	12.9	12.9	...	12.9	12.9	12.9	12.3	11.9	...	...	...	...	...
6	12.9	12.9	12.9	...	12.9	12.9	12.9	12.3	11.9	11.5	*10.7*	*9.2*	*7.9*	*5.9*
7	12.9	...	12.9	...	12.9	12.9	12.9	12.3	11.9	11.5	...	...	...	...
8	12.9	12.9	12.9	...	12.9	12.9	12.9	12.8	12.4	11.9	*10.7*	*9.2*	*7.9*	*5.9*
9	13.4	...	13.4	...	13.4	13.4	13.4	13.3	12.8	12.4	*10.7*	*9.2*	*7.9*	*5.9*
10	11.4	11.4	11.4	...	11.4	11.4	11.4	11.3	10.9	10.5	*9.1*	*7.8*	*6.7*	*5.0*
11	13.4	13.4	13.4	...	13.4	13.4	13.4	13.3	12.8	12.4	*10.7*	*9.2*	*7.9*	*5.9*
12	13.4	13.4	13.4	...	13.4	13.4	13.4	13.3	12.8	12.4	*10.7*	*9.2*	*7.9*	*5.9*
13	11.4	11.4	11.4	...	11.4	11.4	11.4	11.3	10.9	10.5	*9.1*	*7.8*	*6.7*	*5.0*
14	13.4	13.4	13.4	...	13.4	13.4	13.4	13.3	12.8	12.4	*10.7*	*9.2*	*7.9*	*5.9*
15	11.4	11.4	11.4	...	11.4	11.4	11.4	11.3	10.9	10.5	*9.1*	*7.8*	*6.7*	*5.0*
16	11.7	...	11.7	...	11.7	11.7	11.7	11.7	11.7	10.6	*9.1*	*7.7*	*6.1*	*4.3*
17	13.7	...	13.7	...	13.7	13.7	13.7	13.7	13.7	12.5	*10.7*	*9.0*	*7.1*	*5.0*
18	11.7	11.7	11.7	...	11.7	11.7	11.7	11.7	11.7	10.6	*9.1*	*7.9*	*6.7*	*5.5*
19	8.2	...	8.2	...	8.2	8.2	8.2	8.2	8.2	7.5	*6.4*	...	...	...
20	13.7	...	13.7	...	13.7	13.7	13.7	13.7	13.7	12.5	*10.7*	*9.0*	*7.1*	*5.0*
21	13.7	13.7	13.7	...	13.7	13.7	13.7	13.7	13.7	12.5	*10.7*	*9.3*	*7.9*	*6.5*
22	13.7	13.7	13.7	...	13.7	13.7	13.7	13.7	13.7	*12.5*	*10.7*	*9.3*	*7.9*	*6.5*
23	11.7	11.7	11.7	...	11.7	11.7	11.7	11.7	11.7	10.6	*9.1*	*7.9*	*6.7*	*5.5*
24	13.7	...	13.7	...	13.7	13.7	13.7	13.7	13.7	*12.5*	*10.7*	*9.0*	*7.1*	*5.0*
25	13.7	...	13.7	...	13.7	...	...	...	...	...	...	...	...	...
26	11.7	11.7	11.7	...	11.7	11.7	11.7	11.7	11.7	10.6	*9.1*	*7.9*	*6.7*	...
27	14.3	...	14.3	...	14.3	14.2	13.6	12.8	12.4	...	...	...	...	...
28	14.3	14.3	14.3	...	14.3	14.2	13.6	12.8	12.4	11.9	*10.7*	*9.3*	*7.9*	*6.5*
29	14.3	...	14.3	...	14.3	...	...	...	...	...	...	...	...	...
30	14.3	14.3	14.3	...	14.3	14.3	14.3	13.8	13.3	...	...	...	...	...
31	14.3	...	14.3	...	14.3	14.3	14.3	13.8	13.3	*12.5*	*11.0*	*9.4*	*7.3*	*5.0*
32	14.3	14.3	14.3	...	14.3	14.3	14.3	13.8	13.3	*12.5*	*11.2*	*9.6*	*8.1*	*5.9*
33	14.3	...	14.3	...	14.3	14.3	14.3	13.8	13.3	*12.5*	...	...	...	...
34	14.3	14.3	14.3	...	14.3	14.3	14.3	14.3	14.3	*12.5*	*11.2*	*9.6*	*8.1*	*5.9*
35	14.5	14.5	14.5	...	14.5	14.5	...	...	...	...	...	...	...	...
36	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	*14.6*	*12.5*	...	...	...	...
37	14.9	...	14.9	...	14.9	14.9	14.9	14.9	14.9	14.9	*13.0*	*10.8*	*8.7*	*5.9*
38	14.9	14.9	14.9	...	14.9	14.9	...	...	...	...	...	...	...	...
39	14.9	...	14.9	...	14.9	14.9	14.9	14.9	14.9	14.9	*13.0*	*10.8*	*8.7*	*5.9*
40	14.9	...	14.9	...	14.9	14.9	14.9	14.9	14.9	14.9	*13.0*	*10.8*	*8.7*	*5.9*
41	15.1	15.1	15.1	15.1	15.1	15.1	15.1	15.1	...	...	...	...	...	...
42	15.3	15.3	15.3	...	15.3	15.3	...	...	...	...	...	...	...	...
43	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	...	...	...	...	...	...
44	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	...	...	...	...	...	...
45	15.7	15.7	15.7	...	15.7	15.7	14.9	14.1	13.6	13.1	*12.7*	*10.8*	*8.7*	*5.9*

Table 1A
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding															
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	*3.4*	*2.1*	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	*3.4*	*2.1*	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	*3.4*	*2.1*	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	*4.5*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	*3.0*	*1.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
	1	Carbon steel	Bar	SA–675	55	...	...	...	1	1
	2	Carbon steel	Wld. pipe	SA–134	A283C	K02401	...	...	1	1
	3	Carbon steel	Plate	SA–283	C	K02401	...	...	1	1
	4	Carbon steel	Plate	SA–285	C	K02801	...	...	1	1
	5	Carbon steel	Smls. & wld. pipe	SA–333	1	K03008	...	...	1	1
	6	Carbon steel	Smls. & wld. tube	SA–334	1	K03008	...	...	1	1
	7	Carbon steel	Wld. tube	SA–334	1	K03008	...	...	1	1
	8	Carbon steel	Plate	SA–516	55	K01800	...	...	1	1
	9	Carbon steel	Smls. pipe	SA–524	II	K02104	...	...	1	1
	10	Carbon steel	Wld. pipe	SA–671	CA55	K02801	...	...	1	1
	11	Carbon steel	Wld. pipe	SA–671	CE55	K02202	...	...	1	1
	12	Carbon steel	Wld. pipe	SA–672	A55	K02801	...	...	1	1
	13	Carbon steel	Wld. pipe	SA–672	B55	K02001	...	...	1	1
	14	Carbon steel	Wld. pipe	SA–672	C55	K01800	...	...	1	1
	15	Carbon steel	Wld. pipe	SA–672	E55	K02202	...	...	1	1
	16	Carbon steel	Sheet	SA–414	C	K02503	...	...	1	1
	17	Carbon steel	Plate	SA/EN 10028–3	P275NH	...	...	$\leq 2\frac{1}{4}$	1	1
	18	Carbon steel	Bar	SA–36	...	K02600	...	...	1	1
	19	Carbon steel	Plate, sheet	SA–36	...	K02600	...	...	1	1
	20	Carbon steel	Plate, sheet	SA–662	A	K01701	...	...	1	1
(**21**)	21	Carbon steel	Sheet, strip	SA–1011	36	SS	Type 2	$t \leq 0.23$	...	...
	22	Carbon steel	Plate, bar, shapes	SA/IS 2062	E250A	...	...	$t > 1\frac{1}{2}$	1	1
(**21**)	23	Carbon steel	Plate, bar, shapes	SA/IS 2062	E250BR	...	...	$t > 1\frac{1}{2}$	1	1
(**21**)	24	Carbon steel	Plate, bar, shapes	SA/IS 2062	E250BO	...	...	$t \leq \frac{3}{4}$	1	1
	25	Carbon steel	Plate, bar, shapes	SA/IS 2062	E250C	...	...	$t > 1\frac{1}{2}$	1	1
	26	Carbon steel	Plate, bar, shapes	SA/IS 2062	E250A	...	...	$\frac{3}{4} < t \leq 1\frac{1}{2}$	1	1
(**21**)	27	Carbon steel	Plate, bar, shapes	SA/IS 2062	E250BR	...	...	$\frac{3}{4} < t \leq 1\frac{1}{2}$	1	1
(**21**)	28	Carbon steel	Plate, bar, shapes	SA/IS 2062	E250BO	...	...	$\frac{3}{4} < t \leq 1\frac{1}{2}$	1	1
	29	Carbon steel	Plate, bar, shapes	SA/IS 2062	E250C	...	...	$\frac{3}{4} < t \leq 1\frac{1}{2}$	1	1
	30	Carbon steel	Plate	SA/EN 10028–2	P265GH	...	...	$\leq 2\frac{1}{4}$	1	1
	31	Carbon steel	Smls. tube	SA/EN 10216–2	P265GH	...	...	$1\frac{5}{8} < t \leq 2\frac{1}{2}$	1	1
	32	Carbon steel	Plate, bar, shapes	SA/IS 2062	E250A	...	...	$t \leq \frac{3}{4}$	1	1
(**21**)	33	Carbon steel	Plate, bar, shapes	SA/IS 2062	E250BR	...	...	$t \leq \frac{3}{4}$	1	1
(**21**)	34	Carbon steel	Plate, bar, shapes	SA/IS 2062	E250BO	...	...	$t > 1\frac{1}{2}$	1	1
	35	Carbon steel	Plate, bar, shapes	SA/IS 2062	E250C	...	...	$t \leq \frac{3}{4}$	1	1
	36	Carbon steel	Smls. tube	SA/EN 10216–2	P265GH	...	...	$\frac{5}{8} < t \leq 1\frac{5}{8}$	1	1
	37	Carbon steel	Smls. tube	SA/EN 10216–2	P265GH	...	...	$t \leq \frac{5}{8}$	1	1
	38	Carbon steel	Forgings	SA–181	...	K03502	60	...	1	1
	39	Carbon steel	Castings	SA–216	WCA	J02502	...	...	1	1
	40	Carbon steel	Forgings	SA–266	1	K03506	...	...	1	1
	41	Carbon steel	Forgings	SA–350	LF1	K03009	1	...	1	1
	42	Carbon steel	Castings	SA–352	LCA	J02504	...	...	1	1
	43	Carbon steel	Cast pipe	SA–660	WCA	J02504	...	...	1	1
	44	Carbon steel	Bar	SA–675	60	...	...	...	1	1
	45	Carbon steel	Bar	SA–675	60	...	...	...	1	1

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	55	27.5	NP	650 (Cl. 3 only)	NP	NP	CS–1	...
2	55	30	NP	300 (Cl. 3 only)	NP	NP	CS–2	W12
3	55	30	NP	300 (Cl. 3 only)	650	650	CS–2	...
4	55	30	900	700	900	650	CS–2	G10, S1, T2
5	55	30	NP	700	650	650	CS–2	W12, W14
6	55	30	NP	700	650	650	CS–2	W12, W14
7	55	30	NP	NP	650	650	CS–2	G24, W6
8	55	30	850	700	1000	650	CS–2	G10, S1, T2
9	55	30	NP	NP	1000	650	CS–2	G10, T2
10	55	30	NP	700	NP	NP	CS–2	S6, W10, W12
11	55	30	NP	700	NP	NP	CS–2	S6, W10, W12
12	55	30	NP	700	NP	NP	CS–2	S6, W10, W12
13	55	30	NP	700	NP	NP	CS–2	S6, W10, W12
14	55	30	NP	700	NP	NP	CS–2	S6, W10, W12
15	55	30	NP	700	NP	NP	CS–2	S6, W10, W12
16	55	33	NP	700	900	650	CS–2	G10, T1
17	56.5	...	NP	NP	400	400	CS–2	G10, G18
18	58	36	650	650 (SPT)	900	650	CS–2	G10, G15, T1
19	58	36	NP	700	650	650	CS–2	G9, G10, T1
20	58	40	NP	NP	700	650	CS–2	T1
21	58	36	NP	NP	600	600	CS–2	...
22	59.5	33.4	NP	NP	650	650	CS–2	...
23	59.5	33.4	NP	NP	650	650	CS–2	...
24	59.5	36.3	NP	NP	650	650	CS–2	...
25	59.5	33.4	NP	NP	650	NP	CS–2	...
26	59.5	34.8	NP	NP	650	650	CS–2	...
27	59.5	34.8	NP	NP	650	650	CS–2	...
28	59.5	34.8	NP	NP	650	650	CS–2	...
29	59.5	34.8	NP	NP	650	650	CS–2	...
30	59.5	35.5	NP	NP	700	NP	CS–2	T1
31	59.5	35.5	1000	NP	1000	NP	CS–2	G10, S1, T2
32	59.5	36.3	NP	NP	650	650	CS–2	...
33	59.5	36.3	NP	NP	650	650	CS–2	...
34	59.5	33.4	NP	NP	650	650	CS–2	...
35	59.5	36.3	NP	NP	650	650	CS–2	...
36	59.5	37	1000	NP	1000	NP	CS–2	G10, S1, T2
37	59.5	38.5	1000	NP	1000	NP	CS–2	G10, S1, T2
38	60	30	1000	700	1000	650	CS–2	G10, S1, T2
39	60	30	1000	700	1000	650	CS–2	G1, G10, G17, S1, T2
40	60	30	1000	700	1000	650	CS–2	G10, S1, T2
41	60	30	NP	700	1000	650	CS–2	G10, T2
42	60	30	NP	700	NP	NP	CS–2	G17
43	60	30	1000	700	NP	NP	CS–2	G1, G10, G17, S1, T2
44	60	30	850	700 (SPT)	NP	NP	CS–2	G10, G15, S1, T2
45	60	30	NP	650 (Cl. 3 only)	900	650	CS–2	G10, G22, T2

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	15.7	...	15.7	...	15.7	15.7	14.9	14.1	13.6	...	...	...	...	...
2	15.7	...	15.7	...	15.7	...	...	...	...	...	...	...	...	...
3	15.7	15.7	15.7	...	15.7	15.7	15.7	15.3	14.8	...	...	...	...	...
4	15.7	15.7	15.7	...	15.7	15.7	15.7	15.3	14.8	14.3	*13.0*	*10.8*	*8.7*	*5.9*
5	15.7	...	15.7	...	15.7	15.7	15.7	15.3	14.8	14.3	...	...	...	...
6	15.7	...	15.7	...	15.7	15.7	15.7	15.3	14.8	14.3	...	...	...	...
7	13.4	13.4	13.4	...	13.4	13.4	13.4	13.0	12.6	...	...	...	...	...
8	15.7	15.7	15.7	...	15.7	15.7	15.7	15.3	14.8	14.3	*13.0*	*10.8*	*8.7*	*5.9*
9	15.7	15.7	15.7	...	15.7	15.7	15.7	15.3	14.8	14.3	*13.0*	*10.8*	*8.7*	*5.9*
10	15.7	...	15.7	...	15.7	15.7	15.7	15.3	14.8	14.3	...	...	...	...
11	15.7	...	15.7	...	15.7	15.7	15.7	15.3	14.8	14.3	...	...	...	...
12	15.7	...	15.7	...	15.7	15.7	15.7	15.3	14.8	14.3	...	...	...	...
13	15.7	...	15.7	...	15.7	15.7	15.7	15.3	14.8	14.3	...	...	...	...
14	15.7	...	15.7	...	15.7	15.7	15.7	15.3	14.8	14.3	...	...	...	...
15	15.7	...	15.7	...	15.7	15.7	15.7	15.3	14.8	14.3	...	...	...	...
16	15.7	15.7	15.7	...	15.7	15.7	15.7	15.7	15.7	*15.6*	*13.0*	*10.8*	*8.7*	*5.9*
17	16.2	16.2	16.2	...	16.2	16.2	...	...	...	...	...	...	...	...
18	16.6	16.6	16.6	...	16.6	16.6	16.6	16.6	16.6	*15.6*	*13.0*	*10.8*	*8.7*	*5.9*
19	16.6	...	16.6	...	16.6	16.6	16.6	16.6	16.6	*15.6*	...	...	...	...
20	16.6	16.6	16.6	...	16.6	16.6	16.6	16.6	16.6	*15.6*	...	...	...	...
21	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	...	...	...	...	...	...
22	17.0	...	17.0	...	17.0	17.0	17.0	17.0	16.5	...	...	...	...	...
23	17.0	...	17.0	...	17.0	17.0	17.0	17.0	16.5	...	...	...	...	...
24	17.0	...	17.0	...	17.0	17.0	17.0	17.0	17.0	...	...	...	...	...
25	17.0	...	17.0	...	17.0	17.0	17.0	17.0	16.5	...	...	...	...	...
26	17.0	...	17.0	...	17.0	17.0	17.0	17.0	17.0	...	...	...	...	...
27	17.0	...	17.0	...	17.0	17.0	17.0	17.0	17.0	...	...	...	...	...
28	17.0	...	17.0	...	17.0	17.0	17.0	17.0	17.0	...	...	...	...	...
29	17.0	...	17.0	...	17.0	17.0	17.0	17.0	17.0	...	...	...	...	...
30	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	*15.6*	...	...	...	...
31	17.0	...	17.0	...	17.0	17.0	17.0	17.0	17.0	17.0	*13.0*	*10.8*	*8.7*	*5.9*
32	17.0	...	17.0	...	17.0	17.0	17.0	17.0	17.0	...	...	...	...	...
33	17.0	...	17.0	...	17.0	17.0	17.0	17.0	17.0	...	...	...	...	...
34	17.0	...	17.0	...	17.0	17.0	17.0	17.0	16.5	...	...	...	...	...
35	17.0	...	17.0	...	17.0	17.0	17.0	17.0	17.0	...	...	...	...	...
36	17.0	...	17.0	...	17.0	17.0	17.0	17.0	17.0	17.0	*13.0*	*10.8*	*8.7*	*5.9*
37	17.0	...	17.0	...	17.0	17.0	17.0	17.0	17.0	17.0	*13.0*	*10.8*	*8.7*	*5.9*
38	17.1	17.1	17.1	...	17.1	17.1	16.3	15.3	14.8	14.3	*13.0*	*10.8*	*8.7*	*5.9*
39	17.1	...	17.1	...	17.1	17.1	16.3	15.3	14.8	14.3	*13.0*	*10.8*	*8.7*	*5.9*
40	17.1	17.1	17.1	...	17.1	17.1	16.3	15.3	14.8	14.3	*13.0*	*10.8*	*8.7*	*5.9*
41	17.1	17.1	17.1	...	17.1	17.1	16.3	15.3	14.8	14.3	*13.0*	*10.8*	*8.7*	*5.9*
42	17.1	...	17.1	...	17.1	17.1	16.3	15.3	14.8	14.3	...	...	...	...
43	17.1	...	17.1	...	17.1	17.1	16.3	15.3	14.8	14.3	*13.0*	*10.8*	*8.7*	*5.9*
44	17.1	...	17.1	...	17.1	17.1	16.3	15.3	14.8	14.3	*13.0*	*10.8*	*8.7*	...
45	17.1	17.1	17.1	...	17.1	17.1	16.3	15.3	14.8	14.3	*13.0*	*10.8*	*8.7*	*5.9*

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding															
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	Carbon steel	Forgings	SA–765	I	K03046	...	...	1	1
2	Carbon steel	Plate	SA–515	60	K02401	...	...	1	1
3	Carbon steel	Plate	SA–516	60	K02100	...	...	1	1
4	Carbon steel	Wld. pipe	SA–671	CB60	K02401	...	...	1	1
5	Carbon steel	Wld. pipe	SA–671	CC60	K02100	...	...	1	1
6	Carbon steel	Wld. pipe	SA–671	CE60	K02402	...	...	1	1
7	Carbon steel	Wld. pipe	SA–672	B60	K02401	...	...	1	1
8	Carbon steel	Wld. pipe	SA–672	C60	K02100	...	...	1	1
9	Carbon steel	Wld. pipe	SA–672	E60	K02402	...	...	1	1
10	Carbon steel	Wld. pipe	SA–134	A283D	K02702	...	...	1	1
11	Carbon steel	Plate	SA–283	D	K02702	...	...	1	1
12	Carbon steel	Wld. pipe	SA–53	E/B	K03005	...	...	1	1
13	Carbon steel	Wld. pipe	SA–53	E/B	K03005	...	...	1	1
14	Carbon steel	Smls. pipe	SA–53	S/B	K03005	...	...	1	1
15	Carbon steel	Smls. pipe	SA–53	S/B	K03005	...	...	1	1
16	Carbon steel	Smls. pipe	SA–106	B	K03006	...	...	1	1
17	Carbon steel	Wld. pipe	SA–135	B	...	...	...	1	1
18	Carbon steel	Smls. & wld. fittings	SA–234	WPB	K03006	...	...	1	1
19	Carbon steel	Smls. & wld. pipe	SA–333	6	K03006	...	...	1	1
20	Carbon steel	Wld. pipe	SA–333	6	K03006	...	...	1	1
21	Carbon steel	Smls. & wld. tube	SA–334	6	K03006	...	...	1	1
22	Carbon steel	Wld. tube	SA–334	6	K03006	...	...	1	1
23	Carbon steel	Forged pipe	SA–369	FPB	K03006	...	...	1	1
24	Carbon steel	Forgings	SA–372	A	K03002	...	...	1	1
25	Carbon steel	Sheet	SA–414	D	K02505	...	...	1	1
26	Carbon steel	Smls. & wld. fittings	SA–420	WPL6	...	...	...	1	1
27	Carbon steel	Smls. pipe	SA–524	I	K02104	...	...	1	1
28	Carbon steel	Bar	SA–696	B	K03200	...	...	1	1
29	Carbon steel	Forgings	SA–727	...	K02506	...	...	1	1
30	Carbon steel	Wld. tube	SA–178	C	K03503	...	...	1	1
31	Carbon steel	Wld. tube	SA–178	C	K03503	...	...	1	1
32	Carbon steel	Wld. tube	SA–178	C	K03503	...	...	1	1
33	Carbon steel	Smls. tube	SA–210	A–1	K02707	...	...	1	1
34	Carbon steel	Smls. tube	SA–556	B2	K02707	...	...	1	1
35	Carbon steel	Wld. tube	SA–557	B2	K03007	...	...	1	1
36	Carbon steel	Plate, bar	SA/CSA–G40.21	38W	...	...	...	1	1
(**21**) 37	Carbon steel	Plate, sheet, bar	SA–572	42	...	...	$t \le 6$	...	...
(**21**) 38	Carbon steel	Sheet, strip	SA–1011	45	HSLAS	1	...	...	...
(**21**) 39	Carbon steel	Sheet, strip	SA–1011	45	SS	...	$t \le 0.23$	...	...
(**21**) 40	Carbon steel	Sheet, strip	SA–1011	50	HSLAS	2	...	...	...
41	Carbon steel	Plate	SA/AS 1548	PT430N	...	Normalized	≤6	1	1
42	Carbon steel	Plate	SA/AS 1548	PT430NR	...	Norm. rld.	≤6	1	1
43	Carbon steel	Plate	SA/EN 10028–2	P295GH	...	...	$6 < t \le 10$	1	1
44	Carbon steel	Plate	SA/EN 10028–2	P295GH	...	...	$4 < t \le 6$	1	1
45	Carbon steel	Bar	SA–675	65	...	...	...	1	1

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	60	30	NP	NP	1000	650	CS–2	G10, T2
2	60	32	1000	700	1000	650	CS–2	G10, S1, T2
3	60	32	850	700	1000	650	CS–2	G10, S1, T2
4	60	32	NP	700	NP	NP	CS–2	S6, W10, W12
5	60	32	NP	700	NP	NP	CS–2	S6, W10, W12
6	60	32	NP	700	NP	NP	CS–2	S6, W10, W12
7	60	32	NP	700	NP	NP	CS–2	S6, W10, W12
8	60	32	NP	700	NP	NP	CS–2	S6, W10, W12
9	60	32	NP	700	NP	NP	CS–2	S6, W10, W12
10	60	33	NP	300 (Cl. 3 only)	NP	NP	CS–2	W12
11	60	33	NP	300 (Cl. 3 only)	650	650	CS–2	...
12	60	35	900	300 (Cl. 3 only)	NP	NP	CS–2	G10, S1, T1, W12, W13
13	60	35	900	NP	900	650	CS–2	G3, G10, G24, S1, T1, W6
14	60	35	900	300 (Cl. 3 only)	NP	NP	CS–2	G10, S1, T1
15	60	35	NP	700 (SPT)	900	650	CS–2	G10, T1
16	60	35	1000	700	1000	650	CS–2	G10, S1, T1
17	60	35	NP	NP	900	650	CS–2	G24, T1, W6
18	60	35	1000	700	1000	650	CS–2	G10, S1, T1
19	60	35	700	700	1000	650	CS–2	G10, T1, W12, W13, W14
20	60	35	700	NP	NP	NP	CS–2	T1
21	60	35	NP	700	650	650	CS–2	T1, W12, W14
22	60	35	NP	NP	650	650	CS–2	G24, W6
23	60	35	1000	NP	NP	NP	CS–2	G10, S1, T1
24	60	35	NP	NP	650	650	CS–2	...
25	60	35	NP	NP	900	650	CS–2	G10, T1
26	60	35	NP	700	850	650	CS–2	G10, T1, W14
27	60	35	NP	NP	1000	650	CS–2	G10, T1
28	60	35	NP	700	NP	NP	CS–2	T1
29	60	36	NP	700	1000	650	CS–2	G10, G22, T1
30	60	37	1000	NP	NP	NP	CS–2	G4, G10, S1, T2
31	60	37	1000	700	NP	NP	CS–2	G10, S1, T1, W13
32	60	37	1000	NP	1000	650	CS–2	G3, G10, G24, S1, T2, W6
33	60	37	1000	700	1000	650	CS–2	G10, S1, T1
34	60	37	NP	NP	1000	650	CS–2	G10, T1
35	60	37	NP	NP	1000	650	CS–2	G24, T1, W6
36	60	38	NP	NP	650	650	CS–2	...
37	60	42	NP	NP	600	600	CS–2	...
38	60	45	NP	NP	600	600	CS–3	...
39	60	45	NP	NP	600	600	CS–3	...
40	60	50	NP	NP	600	600	CS–3	...
41	62.5	...	1000	NP	1000	NP	CS–2	G10, G18, S1, T1
42	62.5	...	1000	NP	1000	NP	CS–2	G10, G18, S1, T1
43	62.5	32	850	NP	1000	NP	CS–2	G10, S1, T2
44	64	34	850	NP	1000	NP	CS–2	G10, S1, T2
45	65	32.5	850	650 (Cl. 3 only)	1000	650	CS–2	G10, G15, G22, S1, T2

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
No.	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	17.1	17.1	17.1	...	17.1	17.1	16.3	15.3	14.8	14.3	*13.0*	*10.8*	*8.7*	*5.9*
2	17.1	17.1	17.1	...	17.1	17.1	17.1	16.4	15.8	15.3	*13.0*	*10.8*	*8.7*	*5.9*
3	17.1	17.1	17.1	...	17.1	17.1	17.1	16.4	15.8	15.3	*13.0*	*10.8*	*8.7*	*5.9*
4	17.1	...	17.1	...	17.1	17.1	17.1	16.4	15.8	15.3	...	...	...	...
5	17.1	...	17.1	...	17.1	17.1	17.1	16.4	15.8	15.3	...	...	...	...
6	17.1	...	17.1	...	17.1	17.1	17.1	16.4	15.8	15.3	...	...	...	...
7	17.1	...	17.1	...	17.1	17.1	17.1	16.4	15.8	15.3	...	...	...	...
8	17.1	...	17.1	...	17.1	17.1	17.1	16.4	15.8	15.3	...	...	...	...
9	17.1	...	17.1	...	17.1	17.1	17.1	16.4	15.8	15.3	...	...	...	...
10	17.1	...	17.1	...	17.1	...	...	...	...	...	...	...	...	...
11	17.1	17.1	17.1	...	17.1	17.1	17.1	16.9	16.3	...	...	...	...	...
12	17.1	...	17.1	...	17.1	17.1	17.1	17.1	17.1	*15.6*	*13.0*	*10.8*	*8.7*	*5.9*
13	14.6	14.6	14.6	...	14.6	14.6	14.6	14.6	14.6	*13.3*	*11.1*	*9.2*	*7.4*	*5.0*
14	17.1	...	17.1	...	17.1	17.1	17.1	17.1	17.1	*15.6*	*13.0*	*10.8*	*8.7*	*5.9*
15	17.1	17.1	17.1	...	17.1	17.1	17.1	17.1	17.1	*15.6*	*13.0*	*10.8*	*8.7*	*5.9*
16	17.1	17.1	17.1	...	17.1	17.1	17.1	17.1	17.1	*15.6*	*13.0*	*10.8*	*8.7*	*5.9*
17	14.6	14.6	14.6	...	14.6	14.6	14.6	14.6	14.6	*13.3*	*11.1*	*9.2*	*7.4*	*5.0*
18	17.1	17.1	17.1	...	17.1	17.1	17.1	17.1	17.1	*15.6*	*13.0*	*10.8*	*8.7*	*5.9*
19	17.1	17.1	17.1	...	17.1	17.1	17.1	17.1	17.1	*15.6*	*13.0*	*10.8*	*8.7*	*5.9*
20	14.6	14.6	14.6	...	14.6	14.6	14.6	14.6	14.6	*13.3*	...	...	...	...
21	17.1	...	17.1	...	17.1	17.1	17.1	17.1	17.1	*15.6*	...	...	...	...
22	14.6	14.6	14.6	...	14.6	14.6	14.6	14.6	14.6	...	...	...	...	...
23	17.1	...	17.1	...	17.1	17.1	17.1	17.1	17.1	*15.6*	*13.0*	*10.8*	*8.7*	*5.9*
24	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	...	...	...	...	...
25	17.1	17.1	17.1	...	17.1	17.1	17.1	17.1	17.1	*15.6*	*13.0*	*10.8*	*8.7*	*5.9*
26	17.1	17.1	17.1	...	17.1	17.1	17.1	17.1	17.1	*15.6*	*13.0*	*10.8*	*8.7*	...
27	17.1	17.1	17.1	...	17.1	17.1	17.1	17.1	17.1	*15.6*	*13.0*	*10.8*	*8.7*	*5.9*
28	17.1	...	17.1	...	17.1	17.1	17.1	17.1	17.1	*15.6*	...	...	...	...
29	17.1	17.1	17.1	...	17.1	17.1	17.1	17.1	17.1	*15.6*	*13.0*	*10.8*	*8.7*	*5.9*
30	17.1	...	17.1	...	17.1	17.1	17.1	17.1	17.1	15.6	*13.0*	*10.8*	*8.7*	*5.0*
31	17.1	...	17.1	...	17.1	17.1	17.1	17.1	17.1	*15.6*	*13.0*	*10.8*	*8.7*	*5.9*
32	14.6	...	14.6	...	14.6	14.6	14.6	14.6	14.6	13.3	*11.1*	*9.2*	*7.4*	*5.0*
33	17.1	17.1	17.1	...	17.1	17.1	17.1	17.1	17.1	*15.6*	*13.0*	*10.8*	*8.7*	*5.9*
34	17.1	17.1	17.1	...	17.1	17.1	17.1	17.1	17.1	*15.6*	*13.0*	*10.8*	*8.7*	*5.9*
35	14.6	14.6	14.6	...	14.6	14.6	14.6	14.6	14.6	*13.3*	*11.1*	*9.2*	*7.4*	*5.0*
36	17.1	...	17.1	...	17.1	17.1	17.1	17.1	17.1	...	...	...	...	...
37	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	...	...	...	...	...	...
38	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	...	...	...	...	...	...
39	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	...	...	...	...	...	...
40	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	...	...	...	...	...	...
41	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	*16.9*	*13.9*	*11.4*	*8.7*	*5.9*
42	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	*16.9*	*13.9*	*11.4*	*8.7*	*5.9*
43	17.9	17.9	17.9	17.9	17.9	17.9	17.4	16.4	15.8	15.3	*13.9*	*11.4*	*8.7*	*5.9*
44	18.3	18.3	18.3	18.3	18.3	18.3	18.3	17.4	16.8	16.2	*13.9*	*11.4*	*8.7*	*5.9*
45	18.6	18.6	18.6	18.6	18.6	18.5	17.7	16.6	16.1	15.5	*13.9*	*11.4*	*8.7*	*5.0*

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding															
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
1	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	*3.4*	*2.1*	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	*3.4*	*2.1*	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	*3.4*	*2.1*	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
41	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
	1	Carbon steel	Castings	SA–352	LCB	J03003	...	...	1	1
	2	Carbon steel	Plate	SA–515	65	K02800	...	...	1	1
	3	Carbon steel	Plate	SA–516	65	K02403	...	...	1	1
	4	Carbon steel	Wld. pipe	SA–671	CB65	K02800	...	...	1	1
	5	Carbon steel	Wld. pipe	SA–671	CC65	K02403	...	...	1	1
	6	Carbon steel	Wld. pipe	SA–672	B65	K02800	...	...	1	1
	7	Carbon steel	Wld. pipe	SA–672	C65	K02403	...	...	1	1
	8	Carbon steel	Sheet	SA–414	E	K02704	...	...	1	1
	9	Carbon steel	Plate	SA–662	B	K02203	...	...	1	1
	10	Carbon steel	Plate	SA–537	...	K12437	1	$2\frac{1}{2} < t \le 4$	1	2
	11	Carbon steel	Wld. pipe	SA–691	CMSH–70	K12437	...	$2\frac{1}{2} < t \le 4$	1	2
(**21**)	12	Carbon steel	Plate, sheet, bar	SA–572	50	...	...	$t \le 4$	...	...
(**21**)	13	Carbon steel	Round bar	SA–572	50	...	...	$t \le 11$	...	...
(**21**)	14	Carbon steel	Sheet, strip	SA–1011	50	SS	...	$t \le 0.23$	...	...
(**21**)	15	Carbon steel	Sheet, strip	SA–1011	50	HSLAS	1	...	...	...
(**21**)	16	Carbon steel	Sheet, strip	SA–1011	55	HSLAS	2	...	...	...
	17	Carbon steel	Plate, bar	SA/CSA–G40.21	44W	...	...	$t \le 8$	1	1
	18	Carbon steel	Plate, bar	SA/CSA–G40.21	50W	...	...	$t \le 6$	1	1
	19	Carbon steel	Plate	SA/AS 1548	PT460N	...	Normalized	≤6	1	1
	20	Carbon steel	Plate	SA/AS 1548	PT460NR	...	Norm. rld.	≤6	1	1
	21	Carbon steel	Forgings	SA/EN 10222–2	P280GH	...	NT or QT	$1.4 < t \le 6.3$	1	1
	22	Carbon steel	Plate	SA/EN 10028–2	P295GH	...	...	$2\frac{1}{4} < t \le 4$	1	1
	23	Carbon steel	Plate	SA/EN 10028–2	P295GH	...	...	$\le 2\frac{1}{4}$	1	1
	24	Carbon steel	Forgings	SA/EN 10222–2	P280GH	...	Normalized	$t \le 1.4$	1	1
(**21**)	25	Carbon steel	Plate	SA/GB 713	Q345R	...	...	$6 < t \le 10$	1	2
	26	Carbon steel	Plate	SA/EN 10028–2	P355GH	...	...	$6 < t \le 10$	1	2
	27	Carbon steel	Plate	SA/GB 713	Q345R	...	...	$4 < t \le 6$	1	2
	28	Carbon steel	Plate	SA/EN 10028–2	P355GH	...	...	$4 < t \le 6$	1	2
	29	Carbon steel	Plate	SA–455	...	K03300	...	$0.58 < t \le \frac{3}{4}$	1	2
	30	Carbon steel	Bar	SA–675	70	...	...	...	1	2
	31	Carbon steel	Forgings	SA–105	...	K03504	...	...	1	2
	32	Carbon steel	Forgings	SA–181	...	K03502	70	...	1	2
	33	Carbon steel	Castings	SA–216	WCB	J03002	...	...	1	2
	34	Carbon steel	Forgings	SA–266	2	K03506	...	...	1	2
	35	Carbon steel	Forgings	SA–266	4	K03017	...	...	1	2
	36	Carbon steel	Forgings	SA–350	LF2	K03011	1	...	1	2
	37	Carbon steel	Forgings	SA–350	LF2	K03011	2	...	1	2
	38	Carbon steel	Forgings	SA–508	1	K13502	...	...	1	2
	39	Carbon steel	Forgings	SA–508	1A	K13502	...	...	1	2
	40	Carbon steel	Forgings	SA–541	1	K03506	...	...	1	2
	41	Carbon steel	Forgings	SA–541	1A	K03020	...	...	1	2
	42	Carbon steel	Cast pipe	SA–660	WCB	J03003	...	...	1	2
	43	Carbon steel	Forgings	SA–765	II	K03047	...	...	1	2
	44	Carbon steel	Plate	SA–515	70	K03101	...	...	1	2
	45	Carbon steel	Plate	SA–516	70	K02700	...	...	1	2

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	65	35	NP	700	650	650	CS–2	G1, G17
2	65	35	1000	700	1000	650	CS–2	G10, S1, T2
3	65	35	850	700	1000	650	CS–2	G10, S1, T2
4	65	35	NP	700	NP	NP	CS–2	S6, W10, W12
5	65	35	NP	700	NP	NP	CS–2	S6, W10, W12
6	65	35	NP	700	NP	NP	CS–2	S6, W10, W12
7	65	35	NP	700	NP	NP	CS–2	S6, W10, W12
8	65	38	NP	NP	900	650	CS–2	G10, T1
9	65	40	NP	NP	700	650	CS–2	T1
10	65	45	NP	700	650	650	CS–2	T1
11	65	45	NP	700	NP	NP	CS–2	G26, T1, W10, W12
12	65	50	NP	NP	600	600	CS–3	...
13	65	50	NP	NP	600	600	CS–3	...
14	65	50	NP	NP	600	600	CS–3	...
15	65	50	NP	NP	600	600	CS–3	...
16	65	55	NP	NP	600	600	CS–3	...
17	65	...	650	NP	650	650	CS–2	G18
18	65	...	650	NP	650	650	CS–2	G18
19	66.5	...	1000	NP	1000	NP	CS–2	G10, G18, S1, T1
20	66.5	...	1000	NP	1000	NP	CS–2	G10, G18, S1, T1
21	66.5	37	1000	NP	1000	NP	CS–2	G10, S1, T2
22	66.5	37.5	850	NP	1000	NP	CS–2	G10, S1, T1
23	66.5	...	850	NP	1000	650	CS–2	G10, G18, S1, T1
24	66.5	40.5	1000	NP	1000	NP	CS–2	G10, S1, T2
25	68	38.5	800	NP	800	NP	CS–2	T1
26	68	40.5	850	NP	1000	NP	CS–2	G10, S1, T1
27	69.5	41.5	800	NP	800	NP	CS–2	T1
28	69.5	43	850	NP	1000	NP	CS–2	G10, S1, T1
29	70	35	NP	400 (Cl. 3 only)	650	650	CS–2	...
30	70	35	850	650 (Cl. 3 only)	1000	650	CS–2	G10, G15, G22, S1, T2
31	70	36	1000	700	1000	650	CS–2	G10, S1, T2
32	70	36	1000	700	1000	650	CS–2	G10, S1, T2
33	70	36	1000	700	1000	650	CS–2	G1, G10, G17, S1, T2
34	70	36	1000	700	1000	650	CS–2	G10, S1, T2
35	70	36	NP	NP	1000	650	CS–2	G10, T2
36	70	36	850	700	1000	650	CS–2	G10, T2
37	70	36	850	700	1000	650	CS–2	G10, T2
38	70	36	NP	700	1000	650	CS–2	G10, T2
39	70	36	NP	700	1000	650	CS–2	G10, T2
40	70	36	NP	700	1000	650	CS–2	G10, T2
41	70	36	NP	700	1000	650	CS–2	G10, T2
42	70	36	1000	700	NP	NP	CS–2	G1, G10, G17, S1, T2
43	70	36	NP	NP	1000	650	CS–2	G10, T2
44	70	38	1000	700	1000	650	CS–2	G10, S1, T2
45	70	38	850	700	1000	650	CS–2	G10, S1, T2

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	18.6	18.6	18.6	...	18.6	18.6	18.6	17.9	17.3	16.7	...	...	...	...
2	18.6	18.6	18.6	...	18.6	18.6	18.6	17.9	17.3	16.7	*13.9*	*11.4*	*8.7*	*5.9*
3	18.6	18.6	18.6	...	18.6	18.6	18.6	17.9	17.3	16.7	*13.9*	*11.4*	*8.7*	*5.9*
4	18.6	...	18.6	...	18.6	18.6	18.6	17.9	17.3	16.7	...	...	...	...
5	18.6	...	18.6	...	18.6	18.6	18.6	17.9	17.3	16.7	...	...	...	...
6	18.6	...	18.6	...	18.6	18.6	18.6	17.9	17.3	16.7	...	...	...	...
7	18.6	...	18.6	...	18.6	18.6	18.6	17.9	17.3	16.7	...	...	...	...
8	18.6	18.6	18.6	...	18.6	18.6	18.6	18.6	18.6	*16.9*	*13.9*	*11.4*	*8.7*	*5.9*
9	18.6	18.6	18.6	...	18.6	18.6	18.6	18.6	18.6	*16.9*	...	...	...	...
10	18.6	...	18.6	...	18.6	18.6	18.6	18.6	18.6	*16.9*	...	...	...	...
11	18.6	...	18.6	...	18.6	18.6	18.6	18.6	18.6	*16.9*	...	...	...	...
12	18.6	18.6	18.6	18.6	18.6	18.6	18.6	18.6	...	...	...	...	...	...
13	18.6	18.6	18.6	18.6	18.6	18.6	18.6	18.6	...	...	...	...	...	...
14	18.6	18.6	18.6	18.6	18.6	18.6	18.6	18.6	...	...	...	...	...	...
15	18.6	18.6	18.6	18.6	18.6	18.6	18.6	18.6	...	...	...	...	...	...
16	18.6	18.6	18.6	18.6	18.6	18.6	18.6	18.6	...	...	...	...	...	...
17	18.6	...	18.6	...	18.6	18.6	18.6	18.6	18.6	...	...	...	...	...
18	18.6	...	18.6	...	18.6	18.6	18.6	18.6	18.6	...	...	...	...	...
19	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	*16.9*	*13.9*	*11.4*	*8.7*	*5.9*
20	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	*16.9*	*13.9*	*11.4*	*8.7*	*5.9*
21	19.1	...	19.1	...	19.1	19.1	19.1	18.8	18.1	17.5	*14.8*	*12.0*	*9.3*	*6.7*
22	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	18.5	*16.7*	*13.9*	*11.4*	*8.7*	*5.9*
23	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	*16.7*	*13.9*	*11.4*	*8.7*	*5.9*
24	19.1	...	19.1	...	19.1	19.1	19.1	19.1	19.1	19.1	*14.8*	*12.0*	*9.3*	*6.7*
25	19.5	...	19.5	...	19.5	19.5	19.5	19.5	19.0	*18.3*	*14.8*	*12.0*	...	...
26	19.5	19.5	19.5	19.5	19.5	19.5	19.5	19.5	19.5	*18.3*	*14.8*	*12.0*	*9.3*	*6.7*
27	19.9	...	19.9	...	19.9	19.9	19.9	19.9	19.9	*18.3*	*14.8*	*12.0*	...	...
28	19.9	19.9	19.9	19.9	19.9	19.9	19.9	19.9	19.9	*18.3*	*14.8*	*12.0*	*9.3*	*6.7*
29	20.0	20.0	20.0	...	20.0	19.9	19.0	17.9	17.3	...	...	...	...	...
30	20.0	20.0	20.0	...	20.0	19.9	19.0	17.9	17.3	16.7	*14.8*	*12.0*	*9.3*	*6.7*
31	20.0	20.0	20.0	...	20.0	20.0	19.6	18.4	17.8	17.2	*14.8*	*12.0*	*9.3*	*6.7*
32	20.0	20.0	20.0	...	20.0	20.0	19.6	18.4	17.8	17.2	*14.8*	*12.0*	*9.3*	*6.7*
33	20.0	20.0	20.0	...	20.0	20.0	19.6	18.4	17.8	17.2	*14.8*	*12.0*	*9.3*	*6.7*
34	20.0	...	20.0	...	20.0	20.0	19.6	18.4	17.8	17.2	*14.8*	*12.0*	*9.3*	*6.7*
35	20.0	20.0	20.0	...	20.0	20.0	19.6	18.4	17.8	17.2	*14.8*	*12.0*	*9.3*	*6.7*
36	20.0	20.0	20.0	...	20.0	20.0	19.6	18.4	17.8	17.2	*14.8*	*12.0*	*9.3*	*6.7*
37	20.0	20.0	20.0	...	20.0	20.0	19.6	18.4	17.8	17.2	*14.8*	*12.0*	*9.3*	*6.7*
38	20.0	20.0	20.0	...	20.0	20.0	19.6	18.4	17.8	17.2	*14.8*	*12.0*	*9.3*	*6.7*
39	20.0	20.0	20.0	...	20.0	20.0	19.6	18.4	17.8	17.2	*14.8*	*12.0*	*9.3*	*6.7*
40	20.0	20.0	20.0	...	20.0	20.0	19.6	18.4	17.8	17.2	*14.8*	*12.0*	*9.3*	*6.7*
41	20.0	20.0	20.0	...	20.0	20.0	19.6	18.4	17.8	17.2	*14.8*	*12.0*	*9.3*	*6.7*
42	20.0	...	20.0	...	20.0	20.0	19.6	18.4	17.8	17.2	*14.8*	*12.0*	*9.3*	*6.7*
43	20.0	20.0	20.0	...	20.0	20.0	19.6	18.4	17.8	17.2	*14.8*	*12.0*	*9.3*	*6.7*
44	20.0	20.0	20.0	...	20.0	20.0	20.0	19.4	18.8	18.1	*14.8*	*12.0*	*9.3*	*6.7*
45	20.0	20.0	20.0	...	20.0	20.0	20.0	19.4	18.8	18.1	*14.8*	*12.0*	*9.3*	*6.7*

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding															
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
26	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	Carbon steel	Wld. pipe	SA–671	CB70	K03101	...	...	1	2
2	Carbon steel	Wld. pipe	SA–671	CC70	K02700	...	...	1	2
3	Carbon steel	Wld. pipe	SA–672	B70	K03101	...	...	1	2
4	Carbon steel	Wld. pipe	SA–672	C70	K02700	...	...	1	2
5	Carbon steel	Plate	SA/JIS G3118	SGV480	...	...	...	1	2
6	Carbon steel	Smls. pipe	SA–106	C	K03501	...	...	1	2
7	Carbon steel	Wld. tube	SA–178	D	...	...	...	1	2
8	Carbon steel	Wld. tube	SA–178	D	...	...	...	1	2
9	Carbon steel	Wld. tube	SA–178	D	...	...	...	1	2
10	Carbon steel	Smls. tube	SA–210	C	K03501	...	...	1	2
11	Carbon steel	Castings	SA–216	WCC	J02503	...	...	1	2
12	Carbon steel	Smls. & wld. fittings	SA–234	WPC	K03501	...	...	1	2
13	Carbon steel	Castings	SA–352	LCC	J02505	...	...	1	2
14	Carbon steel	Castings	SA–487	16	...	A	...	1	2
15	Carbon steel	Plate	SA–537	...	K12437	3	$4 < t \le 6$	1	3
16	Carbon steel	Smls. tube	SA–556	C2	K03006	...	...	1	2
17	Carbon steel	Wld. tube	SA–557	C2	K03505	...	...	1	2
18	Carbon steel	Cast pipe	SA–660	WCC	J02505	...	...	1	2
19	Carbon steel	Bar	SA–696	C	K03200	...	...	1	2
20	Carbon steel	Sheet	SA–414	F	K03102	...	...	1	2
21	Carbon steel	Plate	SA–662	C	K02007	...	...	1	2
22	Carbon steel	Plate	SA–537	...	K12437	2	$4 < t \le 6$	1	3
23	Carbon steel	Plate	SA–738	C	K02008	...	$4 < t \le 6$	1	3
24	Carbon steel	Plate	SA–537	...	K12437	1	$\le 2\frac{1}{2}$	1	2
25	Carbon steel	Wld. pipe	SA–671	CD70	K12437	...	$\le 2\frac{1}{2}$	1	2
26	Carbon steel	Wld. pipe	SA–672	D70	K12437	...	$\le 2\frac{1}{2}$	1	2
27	Carbon steel	Wld. pipe	SA–691	CMSH–70	K12437	...	$\le 2\frac{1}{2}$	1	2
28	Carbon steel	Plate	SA–841	A	...	1	≤4	1	2
(**21**) 29	Carbon steel	Plate, sheet, bar	SA–572	55	...	...	$t \le 2$	...	...
(**21**) 30	Carbon steel	Round bar	SA–572	55	...	...	$t \le 3\frac{1}{2}$	...	...
(**21**) 31	Carbon steel	Sheet, strip	SA–1011	55	HSLAS	1	...	...	...
(**21**) 32	Carbon steel	Sheet, strip	SA–1011	60	HSLAS	2	...	...	...
33	Carbon steel	Forgings	SA/EN 10222–2	P305GH	...	NT	$1.4 < t \le 6.3$	1	2
34	Carbon steel	Forgings	SA/EN 10222–2	P305GH	...	Normalized	$t \le 1.4$	1	2
35	Carbon steel	Plate	SA/GB 713	Q345R	...	...	$2\frac{1}{4} < t \le 4$	1	2
36	Carbon steel	Plate	SA/EN 10028–2	P355GH	...	...	$2.5 < t \le 4$	1	2
37	Carbon steel	Plate	SA/GB 713	Q345R	...	...	$1.5 < t \le 2\frac{1}{4}$	1	2
38	Carbon steel	Plate	SA/GB 713	Q345R	...	...	$\frac{5}{8} < t \le 1.5$	1	2
39	Carbon steel	Plate	SA–455	...	K03300	...	$\frac{3}{8} < t \le 0.58$	1	2
40	Carbon steel	Forgings	SA/EN 10222–2	P305GH	...	QT	$t \le 2.8$	1	2
41	Carbon steel	Plate	SA/GB 713	Q345R	...	...	$\frac{1}{8} \le t \le \frac{5}{8}$	1	2
42	Carbon steel	Plate	SA/EN 10028–2	P355GH	...	...	≤2.5	1	2
43	Carbon steel	Forgings	SA–266	3	K05001	...	...	1	2
44	Carbon steel	Plate	SA–455	...	K03300	...	$\le \frac{3}{8}$	1	2
45	Carbon steel	Plate	SA–299	A	K02803	...	>1	1	2

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	70	38	NP	700	NP	NP	CS–2	S5, W10, W12
2	70	38	NP	700	NP	NP	CS–2	S6, W10, W12
3	70	38	NP	700	NP	NP	CS–2	S5, W10, W12
4	70	38	NP	700	NP	NP	CS–2	S6, W10, W12
5	70	38	850	NP	NP	NP	CS–2	G10, S1, T2
6	70	40	1000	700	1000	650	CS–2	G10, S1, T1
7	70	40	1000	NP	NP	NP	CS–2	G10, S1, T1, W13
8	70	40	1000	NP	NP	NP	CS–2	G4, G10, S1, T4
9	70	40	1000	NP	NP	NP	CS–2	G3, G10, S1, T2
10	70	40	1000	NP	1000	650	CS–2	G10, S1, T1
11	70	40	1000	700	1000	650	CS–2	G1, G10, G17, S1, T1
12	70	40	800	700	800	650	CS–2	G10, T1, W14
13	70	40	NP	700	NP	NP	CS–2	G17, T1
14	70	40	NP	700	NP	NP	CS–2	...
15	70	40	NP	NP	700	650	CS–2	G23, W11
16	70	40	NP	NP	800	650	CS–2	G10, T1
17	70	40	NP	NP	1000	650	CS–2	G24, T2, W6
18	70	40	1000	700	NP	NP	CS–2	G1, G10, G17, S1, T1
19	70	40	NP	700	NP	NP	CS–2	T1
20	70	42	NP	NP	900	650	CS–2	G10, T1
21	70	43	NP	NP	700	650	CS–3	T1
22	70	46	NP	700	700	650	CS–3	G23, T1, W11
23	70	46	NP	650	650	650	CS–3	G23, W11
24	70	50	NP	700	650	650	CS–3	G23, T1
25	70	50	NP	700	NP	NP	CS–3	S6, T1, W10, W12
26	70	50	NP	700	NP	NP	CS–3	S6, T1, W10, W12
27	70	50	NP	700	NP	NP	CS–3	S6, T1, W10, W12
28	70	50	NP	NP	650	NP	CS–3	...
29	70	55	NP	NP	600	600	CS–3	...
30	70	55	NP	NP	600	600	CS–3	...
31	70	55	NP	NP	600	600	CS–3	...
32	70	60	NP	NP	600	600	CS–3	...
33	71	40.5	1000	NP	1000	NP	CS–2	G10, S1, T2
34	71	44	1000	NP	1000	NP	CS–2	G10, S1, T2
35	71	44	800	NP	800	NP	CS–2	T1
36	71	45.5	850	NP	1000	NP	CS–2	G10, S1, T1
37	71	45.5	800	NP	800	NP	CS–2	T1
38	72.5	47	800	NP	800	NP	CS–2	T1
39	73	37	NP	400 (Cl. 3 only)	650	650	CS–2	...
40	74	41.5	1000	NP	1000	NP	CS–2	G10, S1, T2
41	74	50	800	NP	800	NP	CS–2	T1
42	74	...	850	NP	1000	NP	CS–2	G10, G18, S1, T1
43	75	37.5	1000	700	1000	NP	CS–2	G10, S1, T2, W8, W11
44	75	38	NP	400 (Cl. 3 only)	650	650	CS–2	...
45	75	40	1000	700	1000	650	CS–2	G10, S1, T2

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	20.0	...	20.0	...	20.0	20.0	20.0	19.4	18.8	18.1	...	...	...	...
2	20.0	...	20.0	...	20.0	20.0	20.0	19.4	18.8	18.1	...	...	...	...
3	20.0	...	20.0	...	20.0	20.0	20.0	19.4	18.8	18.1	...	...	...	...
4	20.0	...	20.0	...	20.0	20.0	20.0	19.4	18.8	18.1	...	...	...	...
5	20.0	20.0	20.0	...	20.0	20.0	20.0	19.4	18.8	18.1	*14.8*	*12.0*	*9.3*	...
6	20.0	...	20.0	...	20.0	20.0	20.0	20.0	19.8	*18.3*	*14.8*	*12.0*	*9.3*	*6.7*
7	20.0	...	20.0	...	20.0	20.0	20.0	20.0	19.8	*18.3*	*14.8*	*12.0*	*9.3*	*6.7*
8	20.0	...	20.0	...	20.0	20.0	20.0	20.0	19.8	18.3	14.8	12.0	9.3	*5.7*
9	17.0	...	17.0	...	17.0	17.0	17.0	17.0	16.8	15.5	*12.6*	*10.2*	*7.9*	*5.7*
10	20.0	...	20.0	...	20.0	20.0	20.0	20.0	19.8	*18.3*	*14.8*	*12.0*	*9.3*	*6.7*
11	20.0	20.0	20.0	...	20.0	20.0	20.0	20.0	19.8	*18.3*	*14.8*	*12.0*	*9.3*	*6.7*
12	20.0	...	20.0	...	20.0	20.0	20.0	20.0	19.8	*18.3*	*14.8*	*12.0*	...	...
13	20.0	...	20.0	...	20.0	20.0	20.0	20.0	19.8	*18.3*	...	...	...	...
14	20.0	...	19.9	...	18.8	18.1	17.9	17.9	17.9	17.9	...	...	...	...
15	20.0	20.0	20.0	...	19.7	19.5	18.9	18.0	17.6	17.2	...	...	...	...
16	20.0	20.0	20.0	...	20.0	20.0	20.0	20.0	19.8	*18.3*	*14.8*	*12.0*	...	...
17	17.0	17.0	17.0	...	17.0	17.0	17.0	17.0	16.8	15.5	*12.6*	*10.2*	*7.9*	*5.7*
18	20.0	...	20.0	...	20.0	20.0	20.0	20.0	19.8	*18.3*	*14.8*	*12.0*	*9.3*	*6.7*
19	20.0	...	20.0	...	20.0	20.0	20.0	20.0	19.8	*18.3*	...	...	...	...
20	20.0	20.0	20.0	...	20.0	20.0	20.0	20.0	20.0	*18.3*	*14.8*	*12.0*	*9.3*	*6.7*
21	20.0	20.0	20.0	...	20.0	20.0	20.0	20.0	20.0	*18.3*	...	...	...	...
22	20.0	...	20.0	...	19.7	19.5	19.5	19.5	19.5	*18.3*	...	...	...	...
23	20.0	...	20.0	...	19.7	19.5	19.5	19.5	19.5	...	...	...	...	...
24	20.0	...	20.0	...	19.7	19.5	19.5	19.5	19.5	*18.3*	...	...	...	...
25	20.0	...	20.0	...	19.7	19.5	19.5	19.5	19.5	*18.3*	...	...	...	...
26	20.0	...	20.0	...	19.7	19.5	19.5	19.5	19.5	*18.3*	...	...	...	...
27	20.0	...	20.0	...	19.7	19.5	19.5	19.5	19.5	*18.3*	...	...	...	...
28	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	...	...	...	...	...
29	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	...	...	...	...	...	...
30	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	...	...	...	...	...	...
31	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	...	...	...	...	...	...
32	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	...	...	...	...	...	...
33	20.3	...	20.3	...	20.3	20.3	20.3	20.3	19.9	19.2	*14.8*	*12.0*	*9.3*	*6.7*
34	20.3	...	20.3	...	20.3	20.3	20.3	20.3	20.3	20.0	*14.8*	*12.0*	*9.3*	*6.7*
35	20.3	...	20.3	...	20.3	20.3	20.3	20.3	20.3	*18.3*	*14.8*	*12.0*	...	...
36	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	*18.3*	*14.8*	*12.0*	*9.3*	*6.7*
37	20.3	...	20.3	...	20.3	20.3	20.3	20.3	20.3	*18.3*	*14.8*	*12.0*	...	...
38	20.7	...	20.7	...	20.7	20.7	20.7	20.7	20.7	*18.3*	*14.8*	*12.0*	...	...
39	20.9	20.9	20.9	...	20.9	20.9	20.1	18.9	18.3	...	...	...	...	...
40	21.1	...	21.1	...	21.1	21.1	21.1	21.0	20.3	19.6	*14.8*	*12.0*	*9.3*	*6.7*
41	21.1	...	21.1	...	21.1	21.1	21.1	21.1	21.1	*18.3*	*14.8*	*12.0*	...	...
42	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	*18.3*	*14.8*	*12.0*	*9.3*	*6.7*
43	21.4	21.4	21.4	...	21.4	21.4	20.4	19.2	18.5	17.9	*15.7*	*12.6*	*9.3*	*6.7*
44	21.4	21.4	21.4	...	21.4	21.4	20.6	19.4	18.8	...	...	...	...	...
45	21.4	21.4	21.4	...	21.4	21.4	21.4	20.4	19.8	19.1	*15.7*	*12.6*	*9.3*	*6.7*

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding															
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	*3.4*	*2.1*	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	*3.4*	*2.1*	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	*3.4*	*2.1*	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
33	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
	1	Carbon steel	Wld. pipe	SA–671	CK75	K02803	...	>1	1	2
	2	Carbon steel	Wld. pipe	SA–672	N75	K02803	...	>1	1	2
	3	Carbon steel	Wld. pipe	SA–691	CMS–75	K02803	...	>1	1	2
	4	Carbon steel	Plate	SA–299	A	K02803	...	≤1	1	2
	5	Carbon steel	Wld. pipe	SA–691	CMS–75	K02803	...	≤1	1	2
	6	Carbon steel	Forgings	SA–372	B	K04001	...	...	1	2
	7	Carbon steel	Sheet	SA–414	G	K03103	...	...	1	2
	8	Carbon steel	Plate	SA–738	A	K12447	...	...	1	2
	9	Carbon steel	Plate	SA–537	...	K12437	3	$2\frac{1}{2} < t \le 4$	1	3
	10	Carbon steel	Plate	SA–537	...	K12437	2	$2\frac{1}{2} < t \le 4$	1	3
	11	Carbon steel	Wld. pipe	SA–691	CMSH–80	K12437	...	$2\frac{1}{2} < t \le 4$	1	3
	12	Carbon steel	Plate	SA–738	C	K02008	...	$2\frac{1}{2} < t \le 4$	1	3
(**21**)	13	Carbon steel	Plate, sheet, bar	SA–572	60	...	...	$t \le 1\frac{1}{4}$	...	...
(**21**)	14	Carbon steel	Round bar	SB–572	60	...	...	$t \le 3\frac{1}{2}$	...	...
(**21**)	15	Carbon steel	Sheet, strip	SA–1011	60	HSLAS	1	...	...	...
	16	Carbon steel	Plate	SA–299	B	K02803	...	>1	1	3
	17	Carbon steel	Plate	SA–299	B	K02803	...	≤1	1	3
	18	Carbon steel	Forgings	SA–765	IV	K02009	...	...	1	3
	19	Carbon steel	Plate	SA–537	...	K12437	3	$\le 2\frac{1}{2}$	1	3
	20	Carbon steel	Plate	SA–537	...	K12437	2	$\le 2\frac{1}{2}$	1	3
	21	Carbon steel	Wld. pipe	SA–671	CD80	K12437	...	$\le 2\frac{1}{2}$	1	3
	22	Carbon steel	Wld. pipe	SA–672	D80	K12437	...	$\le 2\frac{1}{2}$	1	3
	23	Carbon steel	Wld. pipe	SA–691	CMSH–80	K12437	...	$\le 2\frac{1}{2}$	1	3
	24	Carbon steel	Plate	SA–738	C	K02008	...	$\le 2\frac{1}{2}$	1	3
	25	Carbon steel	Plate	SA–841	B	...	2	≤4	1	3
(**21**)	26	Carbon steel	Plate, sheet, bar	SA–572	65	...	...	$t \le 1\frac{1}{4}$	...	...
	27	Carbon steel	Plate	SA–612	...	K02900	...	$\frac{1}{2} < t \le 1$	10C	1
	28	Carbon steel	Plate	SA–612	...	K02900	...	$\le \frac{1}{2}$	10C	1
	29	Carbon steel	Plate	SA–738	B	K12007	...	...	1	3
	30	Carbon steel	Forgings	SA–372	C	K04801	...	...	...	...
	31	Carbon steel	Plate	SA–724	A	K11831	...	...	1	4
	32	Carbon steel	Plate	SA–724	C	K12037	...	...	1	4
	33	Carbon steel	Plate	SA–724	B	K12031	...	...	1	4
	34	C–Mn–Si–Cb	Plate	SA–737	B	K12001	...	...	1	2
	35	C–Mn–Si–Cb	Plate	SA/AS 1548	PT490N	...	Normalized	≤6	1	2
	36	C–Mn–Si–Cb	Plate	SA/AS 1548	PT490NR	...	Norm. rld.	≤6	1	2
(**21**)	37	C–Mn–Si–Cb	Plate	SA/GB 713	Q370R	...	Normalized	$2.5 < t \le 4$	1	2
	38	C–Mn–Si–Cb	Plate	SA/GB 713	Q370R	...	Normalized	$1.5 < t \le 2.5$	1	2
	39	C–Mn–Si–Cb	Plate	SA/GB 713	Q370R	...	Normalized	$0.6 < t \le 1.5$	1	2
	40	C–Mn–Si–Cb	Plate	SA/GB 713	Q370R	...	Normalized	$0.4 \le t \le 0.6$	1	2
	41	C–Mn–Si–V	Plate	SA–737	C	K12202	...	...	1	3
	42	C–Mn–Si–V–Cb	Plate	SA–656	T3	...	...	≤2	1	1
	43	C–Mn–Si–V–Cb	Plate	SA–656	T7	...	...	≤2	1	1
	44	C–Mn–Si–V–Cb	Plate	SA–656	T3	...	...	$\le 1\frac{1}{2}$	1	2
	45	C–Mn–Si–V–Cb	Plate	SA–656	T7	...	...	$\le 1\frac{1}{2}$	1	2

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	75	40	NP	700	NP	NP	CS–2	S6, W10, W12
2	75	40	NP	700	NP	NP	CS–2	S6, W10, W12
3	75	40	NP	700	NP	NP	CS–2	S6, W10, W12
4	75	42	1000	700	1000	650	CS–2	G10, S1, T1
5	75	42	NP	700	NP	NP	CS–2	T1, W10, W12
6	75	45	NP	NP	650	650	CS–3	W11
7	75	45	NP	NP	900	650	CS–3	G10, T1
8	75	45	NP	NP	700	650	CS–2	T1
9	75	50	NP	NP	700	650	CS–5	G23, T1, W11
10	75	55	NP	700	650	650	CS–5	G23, T1, W11
11	75	55	NP	700	NP	NP	CS–5	G26, T1, W10, W12
12	75	55	NP	650	650	650	CS–5	G23, W11
13	75	60	NP	NP	600	600	CS–3	...
14	75	60	NP	NP	600	600	CS–3	...
15	75	60	NP	NP	600	600	CS–3	...
16	80	45	800	NP	1000	650	CS–3	G10, S1, T1
17	80	47	800	NP	1000	650	CS–3	G10, S1, T1
18	80	50	NP	NP	700	NP	CS–3	...
19	80	55	NP	NP	700	650	CS–5	G23, T1, W11
20	80	60	NP	700	650	650	CS–5	G23, S6, T1, W10, W11, W12
21	80	60	NP	700	NP	NP	CS–5	S6, T1, W10, W12
22	80	60	NP	700	NP	NP	CS–5	S6, T1, W10, W12
23	80	60	NP	700	NP	NP	CS–5	S6, T1, W10, W12
24	80	60	NP	650	650	650	CS–5	G23, W11
25	80	60	NP	NP	650	NP	CS–3	...
26	80	65	NP	NP	600	600	CS–3	...
27	81	50	NP	700	650	650	CS–3	T1
28	83	50	NP	650	650	650	CS–3	...
29	85	60	NP	650	650	650	CS–5	...
30	90	55	NP	NP	650	650	CS–3	W11
31	90	70	NP	NP	700	650	CS–5	...
32	90	70	NP	NP	700	650	CS–5	...
33	95	75	NP	NP	700	650	CS–5	...
34	70	50	NP	700	700	650	CS–3	T1
35	71	...	1000	NP	1000	NP	CS–2	G10, G18, S1, T1
36	71	...	1000	NP	1000	NP	CS–2	G10, G18, S1, T1
37	74	48	800	NP	NP	NP	CS–3	T1
38	75.5	49.5	800	NP	NP	NP	CS–3	T1
39	77	52	800	NP	NP	NP	CS–3	T1
40	77	53.5	800	NP	NP	NP	CS–3	T1
41	80	60	NP	700	700	650	CS–3	...
42	60	50	NP	NP	NP	650	...	...
43	60	50	NP	NP	NP	650	...	...
44	70	60	NP	NP	NP	650	...	...
45	70	60	NP	NP	NP	650	...	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	21.4	...	21.4	...	21.4	21.4	21.4	20.4	19.8	19.1	...	...	...	...
2	21.4	...	21.4	...	21.4	21.4	21.4	20.4	19.8	19.1	...	...	...	...
3	21.4	...	21.4	...	21.4	21.4	21.4	20.4	19.8	19.1	...	...	...	...
4	21.4	21.4	21.4	...	21.4	21.4	21.4	21.4	20.8	*19.6*	*15.7*	*12.6*	*9.3*	*6.7*
5	21.4	...	21.4	...	21.4	21.4	21.4	21.4	20.8	*19.6*	...	...	...	...
6	21.4	...	21.4	...	21.4	21.4	21.4	21.4	21.4	...	...	...	...	...
7	21.4	21.4	21.4	...	21.4	21.4	21.4	21.4	21.4	*19.6*	*15.7*	*12.6*	*9.3*	*6.7*
8	21.4	...	21.4	...	21.4	21.4	21.4	21.4	21.4	*19.6*	...	...	...	...
9	21.4	...	21.4	...	21.1	20.9	20.9	20.9	20.9	*18.3*	...	...	...	...
10	21.4	...	21.4	...	21.1	20.9	20.9	20.9	20.9	*19.6*	...	...	...	...
11	21.4	...	21.4	...	21.1	20.9	20.9	20.9	20.9	*19.6*	...	...	...	...
12	21.4	...	21.4	...	21.1	20.9	20.9	20.9	20.9	...	...	...	...	...
13	21.4	21.4	21.4	21.3	21.1	20.9	20.9	20.9	...	...	...	...	...	...
14	21.4	21.4	21.4	21.3	21.1	20.9	20.9	20.9	...	...	...	...	...	...
15	21.4	21.4	21.4	21.3	21.1	20.9	20.9	20.9	...	...	...	...	...	...
16	22.9	22.9	22.9	...	22.9	22.9	22.9	22.9	22.2	*19.6*	*15.7*	*12.6*	*9.3*	*6.7*
17	22.9	22.9	22.9	...	22.9	22.9	22.9	22.9	22.9	*19.6*	*15.7*	*12.6*	*9.3*	*6.7*
18	22.9	...	22.9	...	22.9	22.6	22.6	22.6	22.5	22.2	...	...	...	...
19	22.9	...	22.9	...	22.6	22.3	22.3	22.3	22.3	*19.6*	...	...	...	...
20	22.9	...	22.9	...	22.6	22.3	22.3	22.3	22.3	*19.6*	...	...	...	...
21	22.9	...	22.9	...	22.6	22.3	22.3	22.3	22.3	*19.6*	...	...	...	...
22	22.9	...	22.9	...	22.6	22.3	22.3	22.3	22.3	*19.6*	...	...	...	...
23	22.9	...	22.9	...	22.6	22.3	22.3	22.3	22.3	*19.6*	...	...	...	...
24	22.9	...	22.9	...	22.6	22.3	22.3	22.3	22.3	...	...	...	...	...
25	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	...	...	...	...	...
26	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	...	...	...	...	...	...
27	23.1	...	23.1	...	22.8	22.6	22.6	22.5	22.0	*19.6*	...	...	...	...
28	23.7	...	23.7	...	23.4	23.2	23.2	22.5	22.0	...	...	...	...	...
29	24.3	24.3	24.3	24.3	24.3	24.3	24.3	24.1	23.7	...	...	...	...	...
30	25.7	25.7	25.7	25.7	25.7	25.7	25.7	25.7	24.4	...	...	...	...	...
31	25.7	25.7	25.7	25.6	25.4	25.1	25.1	25.1	24.4	21.9	...	...	...	...
32	25.7	25.7	25.7	25.6	25.4	25.1	25.1	25.1	24.4	21.9	...	...	...	...
33	27.1	27.1	27.1	27.0	26.8	26.5	26.5	26.5	24.4	23.1	...	...	...	...
34	20.0	20.0	20.0	...	20.0	20.0	20.0	20.0	20.0	*19.6*	...	...	...	...
35	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	*18.3*	*14.8*	*12.0*	*9.3*	*6.7*
36	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	*18.3*	*14.8*	*12.0*	*9.3*	*6.7*
37	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	*19.6*	*15.7*	*12.6*	...	...
38	21.5	...	21.5	...	21.5	21.5	21.5	21.5	21.5	*19.6*	*15.7*	*12.6*	...	...
39	22.0	...	22.0	...	22.0	22.0	22.0	22.0	22.0	*19.6*	*15.7*	*12.6*	...	...
40	22.0	...	22.0	...	22.0	22.0	22.0	22.0	22.0	*19.6*	*15.7*	*12.6*	...	...
41	22.9	...	22.9	...	22.9	22.9	22.9	22.9	22.9	20.0	...	...	...	...
42	17.1	...	17.1	...	17.1	17.1	17.1	17.1	17.1	...	...	...	...	...
43	17.1	...	17.1	...	17.1	17.1	17.1	17.1	17.1	...	...	...	...	...
44	20.0	...	20.0	...	20.0	20.0	20.0	20.0	20.0	...	...	...	...	...
45	20.0	...	20.0	...	20.0	20.0	20.0	20.0	20.0	...	...	...	...	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding															
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
16	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	C–Mn–Si–V–Cb	Plate	SA–656	T3	...	...	≤1	1	3
2	C–Mn–Si–V–Cb	Plate	SA–656	T7	...	...	≤1	1	3
3	C–Mn–Si–V–Cb	Plate	SA–656	T3	...	...	≤3/4	1	4
4	C–Mn–Si–V–Cb	Plate	SA–656	T7	...	...	≤3/4	1	4
5	C–Mn–Ti	Plate, sheet	SA–562	...	K11224	...	...	1	1
6	C–Si–Ti	Forgings	SA–836	...	...	1	...	1	1
7	C–0.3Mo	Smls. tube	SA/EN 10216–2	16Mo3	...	...	$1\frac{5}{8} < t \le 2\frac{1}{2}$	3	1
8	C–0.3Mo	Smls. tube	SA/EN 10216–2	16Mo3	...	...	$\frac{5}{8} < t \le 1\frac{5}{8}$	3	1
9	C–0.3Mo	Smls. tube	SA/EN 10216–2	16Mo3	...	...	$t \le \frac{5}{8}$	3	1
10	C–½Mo	Smls. tube	SA–209	T1b	K11422	...	...	3	1
11	C–½Mo	Wld. tube	SA–250	T1b	K11422	...	...	3	1
12	C–½Mo	Wld. tube	SA–250	T1b	K11422	...	...	3	1
13	C–½Mo	Smls. tube	SA–209	T1	K11522	...	...	3	1
14	C–½Mo	Smls. & wld. fittings	SA–234	WP1	K12821	...	...	3	1
15	C–½Mo	Wld. tube	SA–250	T1	K11522	...	...	3	1
16	C–½Mo	Wld. tube	SA–250	T1	K11522	...	...	3	1
17	C–½Mo	Smls. pipe	SA–335	P1	K11522	...	...	3	1
18	C–½Mo	Forged pipe	SA–369	FP1	K11522	...	...	3	1
19	C–½Mo	Smls. tube	SA–209	T1a	K12023	...	...	3	1
20	C–½Mo	Wld. tube	SA–250	T1a	K12023	...	...	3	1
21	C–½Mo	Wld. tube	SA–250	T1a	K12023	...	...	3	1
22	C–½Mo	Castings	SA–217	WC1	J12524	...	...	3	1
23	C–½Mo	Castings	SA–352	LC1	J12522	...	...	3	1
24	C–½Mo	Cast pipe	SA–426	CP1	J12521	...	...	3	1
25	C–½Mo	Plate	SA–204	A	K11820	...	...	3	1
26	C–½Mo	Wld. pipe	SA–672	L65	K11820	...	...	3	1
27	C–½Mo	Wld. pipe	SA–691	CM–65	K11820	...	...	3	1
28	C–½Mo	Wld. pipe	SA–691	CM–65	K11820	...	...	3	1
29	C–½Mo	Forgings	SA–182	F1	K12822	...	...	3	2
30	C–½Mo	Plate	SA–204	B	K12020	...	...	3	2
31	C–½Mo	Forgings	SA–336	F1	K12520	...	...	3	2
32	C–½Mo	Wld. pipe	SA–672	L70	K12020	...	...	3	2
33	C–½Mo	Wld. pipe	SA–691	CM–70	K12020	...	...	3	2
34	C–½Mo	Wld. pipe	SA–691	CM–70	K12020	...	...	3	2
35	C–½Mo	Plate	SA–204	C	K12320	...	...	3	2
36	C–½Mo	Wld. pipe	SA–672	L75	K12320	...	...	3	2
37	C–½Mo	Wld. pipe	SA–691	CM–75	K12320	...	...	3	2
38	C–½Mo	Wld. pipe	SA–691	CM–75	K12320	...	...	3	2
39	½Cr–⅕Mo	Forgings	SA–372	G	K13049	55	...	...	...
40	½Cr–⅕Mo	Forgings	SA–372	H	K13547	55	...	...	...
41	½Cr–⅕Mo	Forgings	SA–372	G	K13049	65	...	...	...
42	½Cr–⅕Mo	Forgings	SA–372	H	K13547	65	...	...	...
43	½Cr–⅕Mo	Forgings	SA–372	G	K13049	70	...	...	...
44	½Cr–⅕Mo	Forgings	SA–372	H	K13547	70	...	...	...
45	½Cr–⅕Mo–V	Plate	SA–517	B	K11630	...	≤1¼	11B	4

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	80	70	NP	NP	NP	650	...	...
2	80	70	NP	NP	NP	650	...	...
3	90	80	NP	NP	NP	650	...	...
4	90	80	NP	NP	NP	650	...	...
5	71	30	NP	NP	650	NP	CS–6	G7
6	55	25	NP	NP	650	650	CS–1	...
7	65.5	37.5	1000	NP	1000	NP	CS–2	G11, S2, T4
8	65.5	39	1000	NP	1000	NP	CS–2	G11, S2, T4
9	65.5	40.5	1000	NP	1000	NP	CS–2	G11, S2, T4
10	53	28	1000	NP	1000	650	CS–1	G11, S3, T5
11	53	28	1000	NP	NP	NP	CS–1	G11, S2, T5, W13
12	53	28	1000	NP	1000	650	CS–1	G3, G11, G24, S2, T5
13	55	30	1000	NP	1000	650	CS–2	G11, S3, T4
14	55	30	1000	700	1000	650	CS–2	G11, T4, W14
15	55	30	1000	NP	NP	NP	CS–2	G11, S2, T4, W13
16	55	30	1000	NP	1000	650	CS–2	G3, G11, G24, S2, T4
17	55	30	1000	700	1000	650	CS–2	G11, S2, T4
18	55	30	1000	700	1000	650	CS–2	G11, S2, T4
19	60	32	1000	NP	1000	650	CS–2	G11, S3, T4
20	60	32	1000	NP	NP	NP	CS–2	G11, S2, T4, W13
21	60	32	1000	NP	1000	650	CS–2	G3, G11, G24, S2, T4
22	65	35	1000	700	1000	650	CS–2	G1, G11, G17, S2, T4
23	65	35	NP	700	650	650	CS–2	G1, G17
24	65	35	NP	700	NP	NP	CS–2	G17
25	65	37	1000	700	1000	650	CS–2	G11, S2, T4
26	65	37	NP	700	NP	NP	CS–2	G26, W10, W12
27	65	37	NP	700	NP	NP	CS–2	G26, W10, W12
28	65	37	NP	300 (Cl. 3 only)	NP	NP	CS–2	G27, W10, W12
29	70	40	1000	700	1000	650	CS–2	G11, S2, T4
30	70	40	1000	700	1000	650	CS–2	G11, S2, T4
31	70	40	1000	700	1000	650	CS–2	G11, S2, T4
32	70	40	NP	700	NP	NP	CS–2	G26, W10, W12
33	70	40	NP	700	NP	NP	CS–2	G26, W10, W12
34	70	40	NP	300 (Cl. 3 only)	NP	NP	CS–2	G27, W10, W12
35	75	43	1000	700	1000	650	CS–2	G11, S2, T4, W12
36	75	43	NP	700	NP	NP	CS–2	G26, W10, W12
37	75	43	NP	700	NP	NP	CS–2	G26, W10, W12
38	75	43	NP	300 (Cl. 3 only)	NP	NP	CS–2	G27, W10, W12
39	85	55	NP	NP	600	600	CS–3	W11
40	85	55	NP	NP	600	600	CS–3	W11
41	105	65	NP	NP	600	600	CS–3	W11
42	105	65	NP	NP	600	600	CS–3	W11
43	120	70	NP	NP	200	200	CS–3	W11
44	120	70	NP	NP	200	200	CS–3	W11
45	115	100	NP	650 (SPT)	650	650	HT–1	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	22.9	...	22.9	...	22.9	22.9	22.9	22.9	22.9	...	...	...	...	...
2	22.9	...	22.9	...	22.9	22.9	22.9	22.9	22.9	...	...	...	...	...
3	25.7	...	25.7	...	25.7	25.7	25.7	25.7	25.7	...	...	...	...	...
4	25.7	...	25.7	...	25.7	25.7	25.7	25.7	25.7	...	...	...	...	...
5	12.9	...	11.5	...	10.6	10.4	10.4	10.4	10.4	...	...	...	...	...
6	15.7	...	14.3	...	13.3	13.0	13.0	12.9	12.7	...	...	...	...	...
7	18.6	...	18.6	...	18.6	18.6	18.6	18.6	18.6	18.6	18.6	18.6	18.2	*13.7*
8	18.6	...	18.6	...	18.6	18.6	18.6	18.6	18.6	18.6	18.6	18.6	18.2	*13.7*
9	18.6	...	18.6	...	18.6	18.6	18.6	18.6	18.6	18.6	18.6	18.6	18.2	*13.7*
10	15.1	15.1	15.1	...	15.1	15.1	15.1	15.1	15.0	14.7	14.3	14.0	13.5	13.0
11	15.1	...	15.1	...	15.1	15.1	15.1	15.1	15.0	14.7	14.3	14.0	13.5	13.0
12	12.9	12.9	12.9	...	12.9	12.9	12.9	12.9	12.7	12.5	12.2	11.9	11.5	11.1
13	15.7	15.7	15.7	...	15.7	15.7	15.7	15.7	15.7	15.7	15.4	14.9	14.5	*13.7*
14	15.7	15.7	15.7	...	15.7	15.7	15.7	15.7	15.7	15.7	15.4	14.9	14.5	*13.7*
15	15.7	...	15.7	...	15.7	15.7	15.7	15.7	15.7	15.7	15.4	14.9	14.5	*13.7*
16	13.4	13.4	13.4	...	13.4	13.4	13.4	13.4	13.4	13.4	13.1	12.7	12.3	*11.6*
17	15.7	15.7	15.7	...	15.7	15.7	15.7	15.7	15.7	15.7	15.4	14.9	14.5	*13.7*
18	15.7	15.7	15.7	...	15.7	15.7	15.7	15.7	15.7	15.7	15.4	14.9	14.5	*13.7*
19	17.1	...	17.1	...	17.1	17.1	17.1	17.1	17.1	16.8	16.4	15.9	15.4	*13.7*
20	17.1	...	17.1	...	17.1	17.1	17.1	17.1	17.1	16.8	16.4	15.9	15.4	*13.7*
21	14.6	...	14.6	...	14.6	14.6	14.6	14.6	14.6	14.3	13.9	13.6	13.1	*11.6*
22	18.6	...	18.6	...	18.6	18.6	18.6	18.6	18.6	18.4	17.9	17.4	16.9	*13.7*
23	18.6	...	18.6	...	18.6	18.6	18.6	18.6	18.6	18.4	...	...	...	...
24	18.6	...	18.6	...	18.6	18.6	18.6	18.6	18.6	18.4	...	...	...	...
25	18.6	...	18.6	...	18.6	18.6	18.6	18.6	18.6	18.6	18.6	18.4	17.9	*13.7*
26	18.6	...	18.6	...	18.6	18.6	18.6	18.6	18.6	18.6	...	...	...	...
27	18.6	...	18.6	...	18.6	18.6	18.6	18.6	18.6	18.6	...	...	...	...
28	18.6	...	18.6	...	18.6	...	...	...	...	...	...	...	...	...
29	20.0	...	20.0	...	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.9	19.3	*13.7*
30	20.0	...	20.0	...	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.9	19.3	*13.7*
31	20.0	...	20.0	...	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.9	19.3	*13.7*
32	20.0	...	20.0	...	20.0	20.0	20.0	20.0	20.0	20.0	...	...	...	...
33	20.0	...	20.0	...	20.0	20.0	20.0	20.0	20.0	20.0	...	...	...	...
34	20.0	...	20.0	...	20.0	...	...	...	...	...	...	...	...	...
35	21.4	...	21.4	...	21.4	21.4	21.4	21.4	21.4	21.4	21.4	21.4	20.7	*13.7*
36	21.4	...	21.4	...	21.4	21.4	21.4	21.4	21.4	21.4	...	...	...	...
37	21.4	...	21.4	...	21.4	21.4	21.4	21.4	21.4	21.4	...	...	...	...
38	21.4	...	21.4	...	21.4	...	...	...	...	...	...	...	...	...
39	24.3	...	24.3	...	24.3	24.3	24.3	24.3	...	...	...	...	...	...
40	24.3	...	24.3	...	24.3	24.3	24.3	24.3	...	...	...	...	...	...
41	30.0	...	30.0	...	30.0	30.0	30.0	30.0	...	...	...	...	...	...
42	30.0	...	30.0	...	30.0	30.0	30.0	30.0	...	...	...	...	...	...
43	34.3	...	34.3	...	...	...	...	...	...	...	...	...	...	...
44	34.3	...	34.3	...	...	...	...	...	...	...	...	...	...	...
45	32.9	...	32.9	32.9	32.9	32.9	32.9	32.9	32.8	...	...	...	...	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding														
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
7	*8.2*	*4.8*	...	...	...	...	...	...	...	...	...	...	...	...	...
8	*8.2*	*4.8*	...	...	...	...	...	...	...	...	...	...	...	...	...
9	*8.2*	*4.8*	...	...	...	...	...	...	...	...	...	...	...	...	...
10	*8.2*	*4.8*	...	...	...	...	...	...	...	...	...	...	...	...	...
11	*8.2*	*4.8*	...	...	...	...	...	...	...	...	...	...	...	...	...
12	*7.0*	*4.1*	...	...	...	...	...	...	...	...	...	...	...	...	...
13	*8.2*	*4.8*	...	...	...	...	...	...	...	...	...	...	...	...	...
14	*8.2*	*4.8*	...	...	...	...	...	...	...	...	...	...	...	...	...
15	*8.2*	*4.8*	...	...	...	...	...	...	...	...	...	...	...	...	...
16	*7.0*	*4.1*	...	...	...	...	...	...	...	...	...	...	...	...	...
17	*8.2*	*4.8*	...	...	...	...	...	...	...	...	...	...	...	...	...
18	*8.2*	*4.8*	...	...	...	...	...	...	...	...	...	...	...	...	...
19	*8.2*	*4.8*	...	...	...	...	...	...	...	...	...	...	...	...	...
20	*8.2*	*4.8*	...	...	...	...	...	...	...	...	...	...	...	...	...
21	*7.0*	*4.1*	...	...	...	...	...	...	...	...	...	...	...	...	...
22	*8.2*	*4.8*	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
25	*8.2*	*4.8*	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
29	*8.2*	*4.8*	...	...	...	...	...	...	...	...	...	...	...	...	...
30	*8.2*	*4.8*	...	...	...	...	...	...	...	...	...	...	...	...	...
31	*8.2*	*4.8*	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
35	*8.2*	*4.8*	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
	1	1/2Cr–1/4Mo–Si	Plate	SA–517	A	K11856	...	≤1 1/4	11B	1
	2	1/2Cr–1/4Mo–Si	Forgings	SA–592	A	K11856	...	≤2 1/2	11B	1
	3	1/2Cr–1/2Mo	Smls. pipe	SA–335	P2	K11547	...	...	3	1
	4	1/2Cr–1/2Mo	Forged pipe	SA–369	FP2	K11547	...	...	3	1
	5	1/2Cr–1/2Mo	Plate	SA–387	2	K12143	1	...	3	1
	6	1/2Cr–1/2Mo	Wld. pipe	SA–691	1/2CR	K12143	...	...	3	1
	7	1/2Cr–1/2Mo	Wld. pipe	SA–691	1/2CR	K12143	...	...	3	1
	8	1/2Cr–1/2Mo	Smls. tube	SA–213	T2	K11547	...	...	3	1
	9	1/2Cr–1/2Mo	Wld. tube	SA–250	T2	K11547	...	...	3	1
	10	1/2Cr–1/2Mo	Wld. tube	SA–250	T2S1	K11547	...	...	3	1
	11	1/2Cr–1/2Mo	Cast pipe	SA–426	CP2	J11547	...	...	3	1
	12	1/2Cr–1/2Mo	Forgings	SA–182	F2	K12122	...	...	3	2
	13	1/2Cr–1/2Mo	Plate	SA–387	2	K12143	2	...	3	2
	14	1/2Cr–1/2Mo	Wld. pipe	SA–691	1/2CR	K12143	...	...	3	2
	15	3/4Cr–1/2Ni–Cu	Smls. & wld. tube	SA–423	1	K11535	...	...	4	2
	16	3/4Cr–1/2Ni–Cu	Wld. tube	SA–423	1	K11535	...	...	4	2
	17	3/4Cr–3/4Ni–Cu–Al	Pipe	SA–333	4	K11267	...	...	4	2
	18	1Cr–1/5Mo	Forgings	SA–372	E	K13047	55	...	...	...
	19	1Cr–1/5Mo	Forgings	SA–372	F	G41350	55	...	...	...
	20	1Cr–1/5Mo	Forgings	SA–372	J	K13548	55	...	...	...
	21	1Cr–1/5Mo	Forgings	SA–372	E	K13047	65	...	...	...
	22	1Cr–1/5Mo	Forgings	SA–372	F	G41350	65	...	...	...
	23	1Cr–1/5Mo	Forgings	SA–372	J	K13548	65	...	...	...
	24	1Cr–1/5Mo	Forgings	SA–372	E	K13047	70	...	...	...
	25	1Cr–1/5Mo	Forgings	SA–372	F	G41350	70	...	...	...
	26	1Cr–1/5Mo	Forgings	SA–372	J	K13548	70	...	...	...
	27	1Cr–1/5Mo	Forgings	SA–372	J	G41370	110	...	...	...
	28	1Cr–1/2Mo	Plate	SA–387	12	K11757	1	...	4	1
	29	1Cr–1/2Mo	Wld. pipe	SA–691	1CR	K11757	...	...	4	1
	30	1Cr–1/2Mo	Cast pipe	SA–426	CP12	J11562	...	...	4	1
	31	1Cr–1/2Mo	Forgings	SA–182	F12	K11562	1	...	4	1
	32	1Cr–1/2Mo	Smls. tube	SA–213	T12	K11562	...	...	4	1
	33	1Cr–1/2Mo	Smls. & wld. fittings	SA–234	WP12	K12062	1	...	4	1
	34	1Cr–1/2Mo	Wld. tube	SA–250	T12	K11562	...	...	4	1
	35	1Cr–1/2Mo	Wld. tube	SA–250	T12S1	K11562	...	...	4	1
	36	1Cr–1/2Mo	Smls. pipe	SA–335	P12	K11562	...	...	4	1
	37	1Cr–1/2Mo	Forged pipe	SA–369	FP12	K11562	...	...	4	1
	38	1Cr–1/2Mo	Forgings	SA/EN 10222–2	13CrMo4–5	...	NT or QT	10 < t ≤ 20	4	1
	39	1Cr–1/2Mo	Plate	SA/EN 10028–2	13CrMo4–5	...	...	6 < t ≤ 10	4	1
	40	1Cr–1/2Mo	Plate	SA/EN 10028–2	13CrMo4–5	...	...	4 < t ≤ 6	4	1
(**21**)	41	1Cr–1/2Mo	Plate	SA/GB 713	15CrMoR	...	NT	4 < t ≤ 8	4	1
	42	1Cr–1/2Mo	Forgings	SA/EN 10222–2	13CrMo4–5	...	NT or QT	4 < t ≤ 10	4	1
	43	1Cr–1/2Mo	Plate	SA/EN 10028–2	13CrMo4–5	...	...	2.5 < t ≤ 4	4	1
	44	1Cr–1/2Mo	Forgings	SA/EN 10222–2	13CrMo4–5	...	NT or QT	2.8 < t ≤ 4	4	1
	45	1Cr–1/2Mo	Smls. tube	SA/EN 10216–2	13CrMo4–5	...	...	1 5/8 < t ≤ 2 1/2	4	1

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	115	100	NP	650 (SPT)	650	650	HT–1	...
2	115	100	NP	650 (SPT)	650	650	HT–1	...
3	55	30	1000	700	1000	650	CS–2	T5
4	55	30	1000	700	1000	650	CS–2	T5
5	55	33	1000	700	1000	650	CS–2	T5
6	55	33	NP	700	NP	NP	CS–2	G26, W10, W12
7	55	33	NP	300 (Cl. 3 only)	NP	NP	CS–2	G27, W10, W12
8	60	30	1000	700	1000	650	CS–2	T5
9	60	30	1000	NP	NP	NP	CS–2	G3, T5
10	60	30	1000	NP	NP	NP	CS–2	T5, W13
11	60	30	NP	700	NP	NP	CS–2	G17
12	70	40	1000	NP	1000	650	CS–2	T5
13	70	45	NP	700	1000	650	CS–3	T5
14	70	45	NP	700	NP	NP	CS–3	G26, W10, W12
15	60	37	700	NP	650	NP	CS–2	W13, W14
16	60	37	700	NP	650	NP	CS–2	G3, G24
17	60	35	NP	700	650	NP	CS–2	...
18	85	55	NP	NP	600	600	CS–3	W11
19	85	55	NP	NP	600	600	CS–3	W11
20	85	55	NP	NP	600	600	CS–3	W11
21	105	65	NP	NP	650	650	CS–2	W11
22	105	65	NP	NP	600	600	CS–3	W11
23	105	65	NP	NP	650	650	CS–2	W11
24	120	70	NP	NP	650	650	CS–5	W11
25	120	70	NP	NP	650	650	CS–5	W11
26	120	70	NP	NP	650	650	CS–5	W11
27	135	110	NP	NP	650	650	HT–1	W11
28	55	33	1200	700	1200	NP	CS–2	S4, T5
29	55	33	NP	700	NP	NP	CS–2	G26, W10, W12
30	60	30	NP	700	NP	NP	CS–2	G17
31	60	32	1200	NP	1200	NP	CS–2	T5
32	60	32	1200	700	1200	NP	CS–2	S4, T5
33	60	32	1200	700	1200	NP	CS–2	S4, T5, W14
34	60	32	1200	NP	NP	NP	CS–2	G3, S4, T5
35	60	32	1200	NP	NP	NP	CS–2	S4, T5, W13
36	60	32	1200	700	1200	NP	CS–2	S4, T5
37	60	32	1200	700	1200	NP	CS–2	S4, T5
38	61	35	1200	NP	1200	NP	CS–2	S4, T5
39	61	35.5	1200	NP	1200	NP	CS–2	S4, T5
40	62.5	37	1200	NP	1200	NP	CS–2	S4, T5
41	64	37	1200	NP	NP	NP	CS–2	S4, T5
42	64	38.5	1200	NP	1200	NP	CS–2	S4, T5
43	64	39	1200	NP	1200	NP	CS–2	S4, T5
44	64	40	1200	NP	1200	NP	CS–2	S4, T5
45	64	40.5	1200	NP	1200	NP	CS–2	T5

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	32.9	...	32.9	32.9	32.9	32.9	32.9	32.9	32.8	...	...	...	...	...
2	32.9	...	32.9	...	32.9	32.9	32.9	32.9	32.8	...	...	...	...	...
3	15.7	...	15.7	...	15.7	15.7	15.7	15.7	15.7	15.7	15.4	14.9	14.5	13.9
4	15.7	...	15.7	...	15.7	15.7	15.7	15.7	15.7	15.7	15.4	14.9	14.5	13.9
5	15.7	...	15.7	...	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.3	14.3
6	15.7	...	15.7	...	15.7	15.7	15.7	15.7	15.7	15.7	...	...	...	...
7	15.7	...	15.7	...	15.7	...	...	...	...	...	...	...	...	...
8	17.1	...	17.1	...	17.1	17.1	16.9	16.4	16.1	15.7	15.4	14.9	14.5	13.9
9	14.5	...	14.5	...	14.5	14.5	14.4	13.9	13.7	13.3	13.1	12.7	12.3	11.8
10	17.1	...	17.1	...	17.1	17.1	16.9	16.4	16.1	15.7	15.4	14.9	14.5	13.9
11	17.1	...	17.1	...	17.1	17.1	16.9	16.4	16.1	15.7	...	...	...	...
12	20.0	...	20.0	...	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.9	19.3	18.6
13	20.0	20.0	20.0	...	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.5	18.6
14	20.0	...	20.0	...	20.0	20.0	20.0	20.0	20.0	20.0	...	...	...	...
15	17.1	...	17.1	...	17.1	17.1	17.1	17.1	17.1	17.1	...	...	...	...
16	14.6	...	14.6	...	14.6	14.6	14.6	14.6	14.6	14.6	...	...	...	...
17	17.1	17.1	17.1	...	17.1	17.1	17.1	17.1	17.1	17.1	...	...	...	...
18	24.3	...	24.3	...	24.3	24.3	24.3	24.3	...	...	...	...	...	...
19	24.3	...	24.3	...	24.3	24.3	24.3	24.3	...	...	...	...	...	...
20	24.3	...	24.3	...	24.3	24.3	24.3	24.3	...	...	...	...	...	...
21	30.0	...	30.0	...	30.0	30.0	30.0	30.0	29.8	...	...	...	...	...
22	30.0	...	30.0	...	30.0	30.0	30.0	30.0	...	...	...	...	...	...
23	30.0	...	30.0	...	30.0	30.0	30.0	30.0	29.8	...	...	...	...	...
24	34.3	34.3	34.3	...	34.3	34.3	34.3	34.3	34.1	...	...	...	...	...
25	34.3	...	33.3	...	32.6	32.3	32.2	31.8	30.6	...	...	...	...	...
26	34.3	...	34.3	...	34.3	34.3	34.3	34.3	34.1	...	...	...	...	...
27	38.5	...	36.9	...	36.7	36.5	36.1	35.9	34.3	...	...	...	...	...
28	15.7	...	15.4	...	15.1	15.1	15.1	15.1	15.1	15.1	15.1	15.1	15.1	14.7
29	15.7	...	15.4	...	15.1	15.1	15.1	15.1	15.1	15.1	...	...	...	...
30	17.1	...	16.8	...	16.5	16.2	15.7	15.2	15.0	14.8	...	...	...	...
31	17.1	17.1	16.8	...	16.5	16.5	16.5	16.3	16.0	15.8	15.5	15.3	14.9	14.5
32	17.1	...	16.8	...	16.5	16.5	16.5	16.3	16.0	15.8	15.5	15.3	14.9	14.5
33	17.1	...	16.8	...	16.5	16.5	16.5	16.3	16.0	15.8	15.5	15.3	14.9	14.5
34	14.5	14.5	14.3	...	14.0	14.0	14.0	13.8	13.6	13.4	13.2	13.0	12.7	12.3
35	17.1	17.1	16.8	...	16.5	16.5	16.5	16.3	16.0	15.8	15.5	15.3	14.9	14.5
36	17.1	...	16.8	...	16.5	16.5	16.5	16.3	16.0	15.8	15.5	15.3	14.9	14.5
37	17.1	...	16.8	...	16.5	16.5	16.5	16.3	16.0	15.8	15.5	15.3	14.9	14.5
38	17.4	...	17.2	...	16.7	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.3	15.8
39	17.4	17.2	17.1	16.9	16.8	16.8	16.7	16.7	16.7	16.7	16.7	16.7	16.5	16.1
40	17.8	17.7	17.5	17.3	17.2	17.2	17.1	17.1	17.1	17.1	17.1	17.1	17.0	16.7
41	18.2	...	17.9	...	17.6	17.6	17.1	16.6	16.4	16.1	15.9	15.5	15.2	14.8
42	18.2	...	18.0	...	17.5	17.4	17.4	17.4	17.4	17.4	17.4	17.4	17.3	16.9
43	18.2	18.1	17.9	17.7	17.6	17.6	17.5	17.5	17.5	17.5	17.5	17.5	17.4	17.1
44	18.2	...	18.0	...	17.5	17.4	17.4	17.4	17.4	17.4	17.4	17.4	17.3	16.9
45	18.2	...	18.2	...	18.2	18.2	18.2	18.2	18.2	18.2	18.2	18.2	17.7	17.0

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding															
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	*9.2*	*5.9*	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	*9.2*	*5.9*	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	*9.2*	*5.9*	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	*9.2*	*5.9*	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	*7.8*	*5.0*	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	*9.2*	*5.9*	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	*9.2*	*5.9*	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	*9.2*	*5.9*	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	*11.3*	*7.2*	*4.5*	*2.8*	*1.8*	*1.1*	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	*11.3*	*7.2*	*4.5*	*2.8*	*1.8*	*1.1*	...	...	...	...	...	...	...	...	...	
32	*11.3*	*7.2*	*4.5*	*2.8*	*1.8*	*1.1*	...	...	...	...	...	...	...	...	...	
33	*11.3*	*7.2*	*4.5*	*2.8*	*1.8*	*1.1*	...	...	...	...	...	...	...	...	...	
34	*9.6*	*6.1*	*3.8*	*2.4*	*1.5*	*0.94*	...	...	...	...	...	...	...	...	...	
35	*11.3*	*7.2*	*4.5*	*2.8*	*1.8*	*1.1*	...	...	...	...	...	...	...	...	...	
36	*11.3*	*7.2*	*4.5*	*2.8*	*1.8*	*1.1*	...	...	...	...	...	...	...	...	...	
37	*11.3*	*7.2*	*4.5*	*2.8*	*1.8*	*1.1*	...	...	...	...	...	...	...	...	...	
38	*11.3*	*7.2*	*4.5*	*2.8*	*1.8*	*1.1*	...	...	...	...	...	...	...	...	...	
39	*11.3*	*7.2*	*4.5*	*2.8*	*1.8*	*1.1*	...	...	...	...	...	...	...	...	...	
40	*11.3*	*7.2*	*4.5*	*2.8*	*1.8*	*1.1*	...	...	...	...	...	...	...	...	...	
41	*11.3*	*7.2*	*4.5*	*2.8*	*1.8*	*1.1*	...	...	...	...	...	...	...	...	...	(**21**)
42	*11.3*	*7.2*	*4.5*	*2.8*	*1.8*	*1.1*	...	...	...	...	...	...	...	...	...	
43	*11.3*	*7.2*	*4.5*	*2.8*	*1.8*	*1.1*	...	...	...	...	...	...	...	...	...	
44	*11.3*	*7.2*	*4.5*	*2.8*	*1.8*	*1.1*	...	...	...	...	...	...	...	...	...	
45	*11.3*	*7.2*	*4.5*	*2.8*	*1.9*	*1.2*	...	...	...	...	...	...	...	...	...	

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	1Cr–½Mo	Forgings	SA/EN 10222–2	13CrMo4–5	...	NT	1.4 < $t \le 2.8$	4	1
2	1Cr–½Mo	Smls. tube	SA/EN 10216–2	13CrMo4–5	...	...	$t \le 1\frac{5}{8}$	4	1
3	1Cr–½Mo	Forgings	SA/EN 10222–2	13CrMo4–5	...	NT	$t \le 1.4$	4	1
4	1Cr–½Mo	Plate	SA–387	12	K11757	2	...	4	1
5	1Cr–½Mo	Wld. pipe	SA–691	1CR	K11757	...	...	4	1
6	1Cr–½Mo	Plate	SA/GB 713	15CrMoR	...	NT	2.5 < $t \le 4$	4	1
7	1Cr–½Mo	Plate	SA/EN 10028–2	13CrMo4–5	...	...	$\frac{5}{8} < t \le 2.5$	4	1
8	1Cr–½Mo	Plate	SA/GB 713	15CrMoR	...	NT	$0.25 \le t \le 2.5$	4	1
9	1Cr–½Mo	Plate	SA/EN 10028–2	13CrMo4–5	...	...	$t \le \frac{5}{8}$	4	1
10	1Cr–½Mo	Forgings	SA–182	F12	K11564	2	...	4	1
11	1Cr–½Mo	Forgings	SA–336	F12	K11564	...	...	4	1
12	1Cr–V	Smls. tube	SA–213	T17	K12047	...	...	10B	1
13	1¼Cr–½Mo	Castings	SA–217	WC6	J12072	...	...	4	1
14	1¼Cr–½Mo	Cast pipe	SA–426	CP11	J12072	...	...	4	1
15	1¼Cr–½Mo	Bar	SA–739	B11	K11797	...	...	4	1
16	1¼Cr–½Mo–Si	Forgings	SA–182	F11	K11597	1	...	4	1
17	1¼Cr–½Mo–Si	Smls. tube	SA–213	T11	K11597	...	...	4	1
18	1¼Cr–½Mo–Si	Smls. & wld. fittings	SA–234	WP11	...	1	...	4	1
19	1¼Cr–½Mo–Si	Wld. tube	SA–250	T11	K11597	...	...	4	1
20	1¼Cr–½Mo–Si	Wld. tube	SA–250	T11S1	K11597	...	...	4	1
21	1¼Cr–½Mo–Si	Smls. pipe	SA–335	P11	K11597	...	...	4	1
22	1¼Cr–½Mo–Si	Forgings	SA–336	F11	K11597	1	...	4	1
23	1¼Cr–½Mo–Si	Forged pipe	SA–369	FP11	K11597	...	...	4	1
24	1¼Cr–½Mo–Si	Plate	SA–387	11	K11789	1	...	4	1
25	1¼Cr–½Mo–Si	Wld. pipe	SA–691	1¼CR	K11789	...	...	4	1
26	1¼Cr–½Mo–Si	Wld. pipe	SA–691	1¼CR	K11789	...	...	4	1
27	1¼Cr–½Mo–Si	Forgings	SA–182	F11	K11572	2	...	4	1
28	1¼Cr–½Mo–Si	Forgings	SA–336	F11	K11572	2	...	4	1
29	1¼Cr–½Mo–Si	Forgings	SA–336	F11	K11572	3	...	4	1
30	1¼Cr–½Mo–Si	Plate	SA–387	11	K11789	2	...	4	1
31	1¼Cr–½Mo–Si	Wld. pipe	SA–691	1¼CR	K11789	...	...	4	1
32	1¾Cr–½Mo–Cu	Forgings	SA–592	E	K11695	...	2½ < $t \le 4$	11B	2
33	1¾Cr–½Mo–Cu	Forgings	SA–592	E	K11695	...	≤2½	11B	2
34	1¾Cr–½Mo–Ti	Plate	SA–517	E	K21604	...	2½ < $t \le 6$	11B	2
35	1¾Cr–½Mo–Ti	Plate	SA–517	E	K21604	...	≤2½	11B	2
36	2¼Cr–1Mo	Forgings	SA–182	F22	K21590	1	...	5A	1
37	2¼Cr–1Mo	Smls. tube	SA–213	T22	K21590	...	...	5A	1
38	2¼Cr–1Mo	Smls. & wld. fittings	SA–234	WP22	K21590	1	...	5A	1
39	2¼Cr–1Mo	Wld. tube	SA–250	T22	K21590	...	...	5A	1
40	2¼Cr–1Mo	Wld. tube	SA–250	T22S1	K21590	...	...	5A	1
41	2¼Cr–1Mo	Smls. pipe	SA–335	P22	K21590	...	...	5A	1
42	2¼Cr–1Mo	Forgings	SA–336	F22	K21590	1	...	5A	1
43	2¼Cr–1Mo	Forged pipe	SA–369	FP22	K21590	...	...	5A	1
44	2¼Cr–1Mo	Plate	SA–387	22	K21590	1	...	5A	1
45	2¼Cr–1Mo	Wld. pipe	SA–691	2¼CR	K21590	...	...	5A	1

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	64	41.5	1200	NP	1200	NP	CS-2	S4, T5
2	64	42	1200	NP	1200	NP	CS-2	T5
3	64	43	1200	NP	1200	NP	CS-2	S4, T5
4	65	40	1200	700	1200	NP	CS-2	S4, T5
5	65	40	NP	700	NP	NP	CS-2	G26, W10, W12
6	65.5	40	1200	NP	NP	NP	CS-2	S4, T5
7	65.5	42	1200	NP	1200	NP	CS-2	S4, T5
8	65.5	43	1200	NP	NP	NP	CS-2	S4, T5
9	65.5	43.5	1200	NP	1200	NP	CS-2	S4, T5
10	70	40	1200	700	1200	NP	CS-2	S4, T4
11	70	40	1200	700	1200	NP	CS-2	S4, T4
12	60	30	NP	NP	650	650	CS-2	...
13	70	40	1100	700	1100	NP	CS-2	G1, G17, T4
14	70	40	NP	700	NP	NP	CS-2	G17
15	70	45	NP	700	1200	NP	CS-3	T4
16	60	30	1200	NP	1200	NP	CS-2	S4, T5
17	60	30	1200	700	1200	NP	CS-2	S4, T5
18	60	30	1200	700	1200	NP	CS-2	S4, T5, W14
19	60	30	1200	NP	NP	NP	CS-2	G3, S4, T5
20	60	30	1200	NP	NP	NP	CS-2	S4, T5, W13
21	60	30	1200	700	1200	NP	CS-2	S4, T5
22	60	30	1200	NP	NP	NP	CS-2	S4, T5
23	60	30	1200	700	1200	NP	CS-2	S4, T5
24	60	35	1200	700	1200	NP	CS-2	S4, T4
25	60	35	NP	300 (Cl. 3 only)	NP	NP	CS-2	G27, W10, W12
26	60	35	NP	700	NP	NP	CS-2	G26, W10, W12
27	70	40	1200	700	1200	NP	CS-2	S4, T4
28	70	40	1200	NP	1200	NP	CS-2	S4, T4
29	75	45	NP	NP	1200	NP	CS-3	T3
30	75	45	1200	700	1200	NP	CS-3	S4, T3
31	75	45	NP	700	NP	NP	CS-3	G26, W10, W12
32	105	90	NP	650 (SPT)	650	650	CS-5	S7
33	115	100	NP	NP	650	650	HT-1	...
34	105	90	NP	700 (Cl. MC & SPT)	650	650	CS-5	...
35	115	100	NP	700 (Cl. MC & SPT)	650	650	HT-1	...
36	60	30	1200	700	1200	NP	CS-2	S4, T4, W7, W9
37	60	30	1200	700	1200	NP	CS-2	S4, T4, W7, W9
38	60	30	1200	700	1200	NP	CS-2	S4, T4, W7, W9, W14
39	60	30	1200	NP	NP	NP	CS-2	G3, S4, T4, W9
40	60	30	1200	NP	NP	NP	CS-2	S4, T4, W9, W13
41	60	30	1200	700	1200	NP	CS-2	S4, T4, W7, W9
42	60	30	1200	700	1200	NP	CS-2	S4, T4, W7, W9
43	60	30	1200	700	1200	NP	CS-2	S4, T4, W7, W9
44	60	30	1200	700	1200	NP	CS-2	S4, T4, W7, W9
45	60	30	NP	700	NP	NP	CS-2	G26, W10, W12

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	18.2	...	18.0	...	17.5	17.4	17.4	17.4	17.4	17.4	17.4	17.4	17.3	16.9
2	18.2	...	18.2	...	18.2	18.2	18.2	18.2	18.2	18.2	18.2	18.2	17.7	17.0
3	18.2	...	18.0	...	17.5	17.4	17.4	17.4	17.4	17.4	17.4	17.4	17.3	16.9
4	18.6	18.6	18.2	...	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.4
5	18.6	...	18.2	...	17.9	17.9	17.9	17.9	17.9	17.9	...	...	...	...
6	18.6	...	18.3	...	18.0	18.0	17.9	17.9	17.9	17.9	17.9	17.9	17.7	17.1
7	18.6	18.5	18.3	18.1	18.0	18.0	17.9	17.9	17.9	17.9	17.9	17.9	17.8	17.5
8	18.6	...	18.3	...	18.0	18.0	17.9	17.9	17.9	17.9	17.9	17.9	17.7	17.1
9	18.6	18.5	18.3	18.1	18.0	18.0	17.9	17.9	17.9	17.9	17.9	17.9	17.8	17.5
10	20.0	...	19.6	...	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.1	18.6	*18.0*
11	20.0	20.0	19.6	...	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.1	18.6	*18.0*
12	17.1	17.1	17.1	...	17.1	16.8	16.2	15.7	15.4	...	...	...	...	...
13	20.0	...	20.0	...	20.0	20.0	20.0	20.0	20.0	20.0	19.7	19.2	18.7	*13.7*
14	20.0	...	20.0	...	20.0	20.0	20.0	20.0	20.0	20.0	...	...	...	...
15	20.0	20.0	20.0	...	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.4	*13.7*
16	17.1	...	17.1	...	17.1	16.8	16.2	15.7	15.4	15.1	14.8	14.4	14.0	13.6
17	17.1	...	17.1	...	17.1	16.8	16.2	15.7	15.4	15.1	14.8	14.4	14.0	13.6
18	17.1	...	17.1	...	17.1	16.8	16.2	15.7	15.4	15.1	14.8	14.4	14.0	13.6
19	14.5	...	14.5	...	14.5	14.3	13.8	13.3	13.1	12.8	12.6	12.2	11.9	11.6
20	17.1	...	17.1	...	17.1	16.8	16.2	15.7	15.4	15.1	14.8	14.4	14.0	13.6
21	17.1	...	17.1	...	17.1	16.8	16.2	15.7	15.4	15.1	14.8	14.4	14.0	13.6
22	17.1	...	17.1	...	17.1	16.8	16.2	15.7	15.4	15.1	14.8	14.4	14.0	13.6
23	17.1	...	17.1	...	17.1	16.8	16.2	15.7	15.4	15.1	14.8	14.4	14.0	13.6
24	17.1	...	17.1	...	17.1	17.1	17.1	17.1	17.1	17.1	17.1	16.8	16.4	*13.7*
25	17.1	...	17.1	...	17.1	...	...	...	...	...	...	...	...	...
26	17.1	...	17.1	...	17.1	17.1	17.1	17.1	17.1	17.1	...	...	...	...
27	20.0	...	20.0	...	20.0	20.0	20.0	20.0	20.0	20.0	19.7	19.2	18.7	*13.7*
28	20.0	...	20.0	...	20.0	20.0	20.0	20.0	20.0	20.0	19.7	19.2	18.7	*13.7*
29	21.4	21.4	21.4	...	21.4	21.4	21.4	21.4	21.4	21.4	21.4	21.4	*20.2*	*13.7*
30	21.4	...	21.4	...	21.4	21.4	21.4	21.4	21.4	21.4	21.4	21.4	*20.2*	*13.7*
31	21.4	...	21.4	...	21.4	21.4	21.4	21.4	21.4	21.4	...	...	...	...
32	30.0	...	30.0	...	30.0	30.0	30.0	30.0	30.0	...	...	...	...	...
33	32.9	...	32.9	...	32.9	32.9	32.9	32.9	32.9	...	...	...	...	...
34	30.0	...	30.0	30.0	30.0	30.0	30.0	30.0	30.0	29.9	...	...	...	...
35	32.9	...	32.9	32.9	32.9	32.9	32.9	32.9	32.9	32.7	...	...	...	...
36	17.1	...	17.1	...	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	*13.6*
37	17.1	...	17.1	...	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	*13.6*
38	17.1	17.1	17.1	...	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	*13.6*
39	14.5	...	14.5	...	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	*11.6*
40	17.1	...	17.1	...	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	*13.6*
41	17.1	17.1	17.1	...	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	*13.6*
42	17.1	17.1	17.1	...	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	*13.6*
43	17.1	17.1	17.1	...	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	*13.6*
44	17.1	...	17.1	...	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	*13.6*
45	17.1	...	17.1	...	16.6	16.6	16.6	16.6	16.6	16.6	...	...	...	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding														
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
1	*11.3*	*7.2*	*4.5*	*2.8*	*1.8*	*1.1*	...	...	...	...	...	...	...	...	...
2	*11.3*	*7.2*	*4.5*	*2.8*	*1.9*	*1.2*	...	...	...	...	...	...	...	...	...
3	*11.3*	*7.2*	*4.5*	*2.8*	*1.8*	*1.1*	...	...	...	...	...	...	...	...	...
4	*11.3*	*7.2*	*4.5*	*2.8*	*1.8*	*1.1*	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6	*11.3*	*7.2*	*4.5*	*2.8*	*1.8*	*1.1*	...	...	...	...	...	...	...	...	...
7	*11.3*	*7.2*	*4.5*	*2.8*	*1.8*	*1.1*	...	...	...	...	...	...	...	...	...
8	*11.3*	*7.2*	*4.5*	*2.8*	*1.8*	*1.1*	...	...	...	...	...	...	...	...	...
9	*11.3*	*7.2*	*4.5*	*2.8*	*1.8*	*1.1*	...	...	...	...	...	...	...	...	...
10	*11.3*	*7.2*	*4.5*	*2.8*	*1.8*	*1.1*	...	...	...	...	...	...	...	...	...
11	*11.3*	*7.2*	*4.5*	*2.8*	*1.8*	*1.1*	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
13	*9.3*	*6.3*	*4.2*	*2.8*	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
15	*9.3*	*6.3*	*4.2*	*2.8*	*1.9*	*1.2*	...	...	...	...	...	...	...	...	...
16	*9.3*	*6.3*	*4.2*	*2.8*	*1.9*	*1.2*	...	...	...	...	...	...	...	...	...
17	*9.3*	*6.3*	*4.2*	*2.8*	*1.9*	*1.2*	...	...	...	...	...	...	...	...	...
18	*9.3*	*6.3*	*4.2*	*2.8*	*1.9*	*1.2*	...	...	...	...	...	...	...	...	...
19	*7.9*	*5.4*	*3.6*	*2.4*	*1.6*	*1.0*	...	...	...	...	...	...	...	...	...
20	*9.3*	*6.3*	*4.2*	*2.8*	*1.9*	*1.2*	...	...	...	...	...	...	...	...	...
21	*9.3*	*6.3*	*4.2*	*2.8*	*1.9*	*1.2*	...	...	...	...	...	...	...	...	...
22	*9.3*	*6.3*	*4.2*	*2.8*	*1.9*	*1.2*	...	...	...	...	...	...	...	...	...
23	*9.3*	*6.3*	*4.2*	*2.8*	*1.9*	*1.2*	...	...	...	...	...	...	...	...	...
24	*9.3*	*6.3*	*4.2*	*2.8*	*1.9*	*1.2*	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
27	*9.3*	*6.3*	*4.2*	*2.8*	*1.9*	*1.2*	...	...	...	...	...	...	...	...	...
28	*9.3*	*6.3*	*4.2*	*2.8*	*1.9*	*1.2*	...	...	...	...	...	...	...	...	...
29	*9.3*	*6.3*	*4.2*	*2.8*	*1.9*	*1.2*	...	...	...	...	...	...	...	...	...
30	*9.3*	*6.3*	*4.2*	*2.8*	*1.9*	*1.2*	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
36	*10.8*	*8.0*	*5.7*	*3.8*	*2.4*	*1.4*	...	...	...	...	...	...	...	...	...
37	*10.8*	*8.0*	*5.7*	*3.8*	*2.4*	*1.4*	...	...	...	...	...	...	...	...	...
38	*10.8*	*8.0*	*5.7*	*3.8*	*2.4*	*1.4*	...	...	...	...	...	...	...	...	...
39	*9.2*	*6.8*	*4.8*	*3.2*	*2.0*	*1.2*	...	...	...	...	...	...	...	...	...
40	*10.8*	*8.0*	*5.7*	*3.8*	*2.4*	*1.4*	...	...	...	...	...	...	...	...	...
41	*10.8*	*8.0*	*5.7*	*3.8*	*2.4*	*1.4*	...	...	...	...	...	...	...	...	...
42	*10.8*	*8.0*	*5.7*	*3.8*	*2.4*	*1.4*	...	...	...	...	...	...	...	...	...
43	*10.8*	*8.0*	*5.7*	*3.8*	*2.4*	*1.4*	...	...	...	...	...	...	...	...	...
44	*10.8*	*8.0*	*5.7*	*3.8*	*2.4*	*1.4*	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	2¼Cr–1Mo	Plate	SA/EN 10028–2	10CrMo9–10	...	...	$6 < t \le 10$	5A	1
2	2¼Cr–1Mo	Forgings	SA/EN 10222–2	11CrMo9–10	...	NT or QT	$8 < t \le 20$	5A	1
3	2¼Cr–1Mo	Plate	SA/EN 10028–2	10CrMo9–10	...	...	$4 < t \le 6$	5A	1
4	2¼Cr–1Mo	Plate	SA/EN 10028–2	10CrMo9–10	...	...	$2.5 < t \le 4$	5A	1
5	2¼Cr–1Mo	Smls. tube	SA/EN 10216–2	10CrMo9–10	...	...	$1\frac{5}{8} < t \le 2\frac{1}{2}$	5A	1
6	2¼Cr–1Mo	Smls. tube	SA/EN 10216–2	10CrMo9–10	...	...	$t \le 1\frac{5}{8}$	5A	1
7	2¼Cr–1Mo	Plate	SA/EN 10028–2	10CrMo9–10	...	...	$t \le 2.5$	5A	1
8	2¼Cr–1Mo	Castings	SA–217	WC9	J21890	...	...	5A	1
9	2¼Cr–1Mo	Cast pipe	SA–426	CP22	J21890	...	...	5A	1
10	2¼Cr–1Mo	Forgings	SA–182	F22	K21590	3	...	5A	1
11	2¼Cr–1Mo	Forgings	SA–336	F22	K21590	3	...	5A	1
12	2¼Cr–1Mo	Plate	SA–387	22	K21590	2	...	5A	1
13	2¼Cr–1Mo	Wld. pipe	SA–691	2¼CR	K21590	...	...	5A	1
14	2¼Cr–1Mo	Bar	SA–739	B22	K21390	...	...	5A	1
15	2¼Cr–1Mo	Forgings	SA/EN 10222–2	11CrMo9–10	...	NT	$t \le 8$	5A	1
16	2¼Cr–1Mo	Castings	SA–487	8	J22091	A	...	5C	1
17	2¼Cr–1Mo	Forgings	SA–508	22	K21590	3	...	5C	1
18	2¼Cr–1Mo	Forgings	SA–541	22	K21390	3	...	5C	1
19	2¼Cr–1Mo	Plate	SA–542	B	K21590	4	...	5C	1
20	2¼Cr–1Mo–V	Forgings	SA–182	F22V	K31835	...	...	5C	1
21	2¼Cr–1Mo–V	Forgings	SA–336	F22V	K31835	...	...	5C	1
22	2¼Cr–1Mo–V	Forgings	SA–541	22V	K31835	...	...	5C	1
23	2¼Cr–1Mo–V	Plate	SA–542	D	K31835	4a	...	5C	1
24	2¼Cr–1Mo–V	Plate	SA–832	22V	K31835	...	...	5C	1
25	3Cr–1Mo	Smls. tube	SA–213	T21	K31545	...	...	5A	1
26	3Cr–1Mo	Smls. pipe	SA–335	P21	K31545	...	...	5A	1
27	3Cr–1Mo	Forgings	SA–336	F21	K31545	1	...	5A	1
28	3Cr–1Mo	Forged pipe	SA–369	FP21	K31545	...	...	5A	1
29	3Cr–1Mo	Plate	SA–387	21	K31545	1	...	5A	1
30	3Cr–1Mo	Cast pipe	SA–426	CP21	J31545	...	...	5A	1
31	3Cr–1Mo	Forgings	SA–182	F21	K31545	...	...	5A	1
32	3Cr–1Mo	Forgings	SA–336	F21	K31545	3	...	5A	1
33	3Cr–1Mo	Plate	SA–387	21	K31545	2	...	5A	1
34	3Cr–1Mo–¼V–Ti–B	Forgings	SA–182	F3V	K31830	...	...	5C	1
35	3Cr–1Mo–¼V–Ti–B	Forgings	SA–336	F3V	K31830	...	...	5C	1
36	3Cr–1Mo–¼V–Ti–B	Forgings	SA–508	3V	K31830	...	...	5C	1
37	3Cr–1Mo–¼V–Ti–B	Forgings	SA–541	3V	K31830	...	...	5C	1
38	3Cr–1Mo–¼V–Ti–B	Plate	SA–542	C	K31830	4a	...	5C	1
39	3Cr–1Mo–¼V–Ti–B	Plate	SA–832	21V	K31830	...	...	5C	1
40	3Cr–1Mo–¼V–Cb–Ca	Forgings	SA–182	F3VCb	...	...	...	5C	1
41	3Cr–1Mo–¼V–Cb–Ca	Forgings	SA–336	F3VCb	...	...	...	5C	1
42	3Cr–1Mo–¼V–Cb–Ca	Forgings	SA–508	3VCb	...	...	...	5C	1
43	3Cr–1Mo–¼V–Cb–Ca	Forgings	SA–541	3VCb	...	...	...	5C	1
44	3Cr–1Mo–¼V–Cb–Ca	Plate	SA–542	E	...	4a	...	5C	1
45	3Cr–1Mo–¼V–Cb–Ca	Plate	SA–832	23V	...	...	...	5C	1

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	65.5	36.5	1100	NP	1100	NP	CS–3	S4, T4, W7, W9
2	65.5	38.5	1200	NP	1200	NP	CS–3	S4, T5, W7, W9
3	66.5	37.5	1100	NP	1100	NP	CS–3	S4, T4, W7, W9
4	68	40.5	1100	NP	1100	NP	CS–3	S4, T4, W7, W9
5	69.5	39	1200	NP	1200	NP	CS–2	T4, W7, W9
6	69.5	40.5	1200	NP	1200	NP	CS–2	T4, W7, W9
7	69.5	...	1100	NP	1100	NP	CS–3	G18, S4, T4, W7, W9
8	70	40	1200	700	1200	NP	CS–2	G1, G17, S4, T4, W7, W9
9	70	40	NP	700	NP	NP	CS–2	G17
10	75	45	1200	700	1200	NP	CS–3	S4, T4, W7, W9
11	75	45	1200	700	1200	NP	CS–3	S4, T4, W7, W9
12	75	45	1200	700	1200	NP	CS–3	S4, T4, W7, W9
13	75	45	NP	700	NP	NP	CS–3	G26, W10, W12
14	75	45	NP	700	1200	NP	CS–3	T4, W7
15	75.5	45	1200	NP	1200	NP	CS–3	S4, T4, W7, W9
16	85	55	NP	NP	1000	NP	CS–3	G1, T4, W7
17	85	55	NP	NP	850	NP	CS–2	...
18	85	55	NP	NP	850	NP	CS–2	...
19	85	55	NP	NP	850	NP	CS–2	...
20	85	60	NP	NP	900	NP	CS–2	...
21	85	60	NP	NP	900	NP	CS–2	...
22	85	60	NP	NP	900	NP	CS–2	...
23	85	60	NP	NP	900	NP	CS–2	...
24	85	60	NP	NP	900	NP	CS–2	...
25	60	30	1200	700	1200	NP	CS–2	S4, T3
26	60	30	1200	700	1200	NP	CS–2	S4, T3
27	60	30	1200	700	1200	NP	CS–2	S4, T3
28	60	30	1200	700	1200	NP	CS–2	S4, T3
29	60	30	1200	700	1200	NP	CS–2	S4, T3
30	60	30	NP	700	NP	NP	CS–2	G17
31	75	45	1200	700	1200	NP	CS–3	S4, T3
32	75	45	1200	700	1200	NP	CS–3	S4, T3
33	75	45	1200	700	1200	NP	CS–3	S4, T3
34	85	60	NP	NP	900	NP	CS–3	...
35	85	60	NP	NP	900	NP	CS–3	...
36	85	60	NP	NP	900	NP	CS–3	...
37	85	60	NP	NP	900	NP	CS–3	...
38	85	60	NP	NP	900	NP	CS–3	...
39	85	60	NP	NP	900	NP	CS–3	...
40	85	60	NP	NP	900	NP	CS–3	...
41	85	60	NP	NP	900	NP	CS–3	...
42	85	60	NP	NP	900	NP	CS–3	...
43	85	60	NP	NP	900	NP	CS–3	...
44	85	60	NP	NP	900	NP	CS–3	...
45	85	60	NP	NP	900	NP	CS–3	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	18.6	...	18.6	...	18.2	18.0	17.9	17.7	17.6	17.4	17.2	16.8	16.3	*15.8*
2	18.6	...	18.6	...	18.3	18.0	17.9	17.8	17.7	17.5	17.3	16.9	16.3	15.7
3	19.1	...	19.1	...	18.6	18.4	18.3	18.1	18.0	17.8	17.5	17.2	16.7	*15.8*
4	19.5	...	19.5	...	19.0	18.8	18.7	18.5	18.4	18.2	17.9	17.5	17.0	*15.8*
5	19.9	...	19.9	...	19.4	19.2	19.1	18.9	18.8	18.6	18.3	17.9	17.4	*15.8*
6	19.9	...	19.9	...	19.4	19.2	19.1	18.9	18.8	18.6	18.3	17.9	17.4	*15.8*
7	19.9	...	19.9	...	19.4	19.2	19.1	18.9	18.8	18.6	18.3	17.9	17.4	*15.8*
8	20.0	...	20.0	...	19.7	19.4	19.3	19.2	19.1	18.8	18.5	17.9	17.2	*15.8*
9	20.0	...	20.0	...	19.7	19.4	19.3	19.2	19.1	18.8	...	...	...	...
10	21.4	...	21.4	...	20.9	20.6	20.5	20.4	20.2	20.0	19.7	19.3	18.7	*15.8*
11	21.4	...	21.4	...	20.9	20.6	20.5	20.4	20.2	20.0	19.7	19.3	18.7	*15.8*
12	21.4	...	21.4	...	20.9	20.6	20.5	20.4	20.2	20.0	19.7	19.3	18.7	*15.8*
13	21.4	...	21.4	...	20.9	20.6	20.5	20.4	20.2	20.0	...	...	...	...
14	21.4	...	21.4	...	20.9	20.6	20.5	20.4	20.2	20.0	19.7	19.3	18.7	*15.8*
15	21.5	...	21.5	...	21.1	20.8	20.7	20.6	20.5	20.3	19.9	19.5	18.9	*15.8*
16	24.3	24.3	24.3	...	23.7	23.5	23.5	23.3	23.2	22.9	22.4	21.7	20.8	*15.8*
17	24.3	...	24.3	...	24.3	24.3	23.8	23.3	23.1	22.9	22.6	21.9	20.4	...
18	24.3	...	24.3	...	24.3	24.3	23.8	23.3	23.1	22.9	22.6	21.9	20.4	...
19	24.3	...	24.3	...	24.3	24.3	23.8	23.3	23.1	22.9	22.6	21.9	20.4	...
20	24.3	...	24.3	...	24.3	24.3	24.3	23.7	23.2	22.8	22.2	21.6	21.0	20.3
21	24.3	...	24.3	...	24.3	24.3	24.3	23.7	23.2	22.8	22.2	21.6	21.0	20.3
22	24.3	...	24.3	...	24.3	24.3	24.3	23.7	23.2	22.8	22.2	21.6	21.0	20.3
23	24.3	...	24.3	...	24.3	24.3	24.3	23.7	23.2	22.8	22.2	21.6	21.0	20.3
24	24.3	...	24.3	...	24.3	24.3	24.3	23.7	23.2	22.8	22.2	21.6	21.0	20.3
25	17.1	...	17.1	...	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	*16.0*	*12.0*
26	17.1	17.1	17.1	...	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	*16.0*	*12.0*
27	17.1	17.1	17.1	...	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	*16.0*	*12.0*
28	17.1	...	17.1	...	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	*16.0*	*12.0*
29	17.1	...	17.1	...	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	*16.0*	*12.0*
30	17.1	...	17.1	...	16.6	16.6	16.6	16.6	16.6	16.6	...	...	...	...
31	21.4	...	21.4	...	20.9	20.6	20.5	20.4	20.2	20.0	19.7	19.3	*18.1*	*13.1*
32	21.4	...	21.4	...	20.9	20.6	20.5	20.4	20.2	20.0	19.7	19.3	*18.1*	*13.1*
33	21.4	...	21.4	...	20.9	20.6	20.5	20.4	20.2	20.0	19.7	19.3	*18.1*	*13.1*
34	24.3	...	24.3	...	23.3	22.6	22.2	21.8	21.6	21.4	21.1	20.8	20.4	20.0
35	24.3	...	24.3	...	23.3	22.6	22.2	21.8	21.6	21.4	21.1	20.8	20.4	20.0
36	24.3	...	24.3	...	23.3	22.6	22.2	21.8	21.6	21.4	21.1	20.8	20.4	20.0
37	24.3	...	24.3	...	23.3	22.6	22.2	21.8	21.6	21.4	21.1	20.8	20.4	20.0
38	24.3	...	24.3	...	23.3	22.6	22.2	21.8	21.6	21.4	21.1	20.8	20.4	20.0
39	24.3	...	24.3	...	23.3	22.6	22.2	21.8	21.6	21.4	21.1	20.8	20.4	20.0
40	24.3	...	24.3	...	23.3	22.6	22.2	21.8	21.6	21.4	21.1	20.8	20.4	20.0
41	24.3	...	24.3	...	23.3	22.6	22.2	21.8	21.6	21.4	21.1	20.8	20.4	20.0
42	24.3	...	24.3	...	23.3	22.6	22.2	21.8	21.6	21.4	21.1	20.8	20.4	20.0
43	24.3	...	24.3	...	23.3	22.6	22.2	21.8	21.6	21.4	21.1	20.8	20.4	20.0
44	24.3	...	24.3	...	23.3	22.6	22.2	21.8	21.6	21.4	21.1	20.8	20.4	20.0
45	24.3	...	24.3	...	23.3	22.6	22.2	21.8	21.6	21.4	21.1	20.8	20.4	20.0

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding														
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
1	*11.4*	*7.8*	*5.1*	*3.2*	...	...	...	...	...	...	...	...	...	...	...
2	*11.4*	*7.8*	*5.1*	*3.2*	*2.0*	*1.2*	...	...	...	...	...	...	...	...	...
3	*11.4*	*7.8*	*5.1*	*3.2*	...	...	...	...	...	...	...	...	...	...	...
4	*11.4*	*7.8*	*5.1*	*3.2*	...	...	...	...	...	...	...	...	...	...	...
5	*11.4*	*7.8*	*5.1*	*3.2*	*2.0*	*1.2*	...	...	...	...	...	...	...	...	...
6	*11.4*	*7.8*	*5.1*	*3.2*	*2.0*	*1.2*	...	...	...	...	...	...	...	...	...
7	*11.4*	*7.8*	*5.1*	*3.2*	...	...	...	...	...	...	...	...	...	...	...
8	*11.4*	*7.8*	*5.1*	*3.2*	*2.0*	*1.2*	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
10	*11.4*	*7.8*	*5.1*	*3.2*	*2.0*	*1.2*	...	...	...	...	...	...	...	...	...
11	*11.4*	*7.8*	*5.1*	*3.2*	*2.0*	*1.2*	...	...	...	...	...	...	...	...	...
12	*11.4*	*7.8*	*5.1*	*3.2*	*2.0*	*1.2*	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
14	*11.4*	*7.8*	*5.1*	*3.2*	*2.0*	*1.2*	...	...	...	...	...	...	...	...	...
15	*11.4*	*7.8*	*5.1*	*3.2*	*2.0*	*1.2*	...	...	...	...	...	...	...	...	...
16	*11.4*	*7.8*	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
25	*9.0*	*7.0*	*5.5*	*4.0*	*2.7*	*1.5*	...	...	...	...	...	...	...	...	...
26	*9.0*	*7.0*	*5.5*	*4.0*	*2.7*	*1.5*	...	...	...	...	...	...	...	...	...
27	*9.0*	*7.0*	*5.5*	*4.0*	*2.7*	*1.5*	...	...	...	...	...	...	...	...	...
28	*9.0*	*7.0*	*5.5*	*4.0*	*2.7*	*1.5*	...	...	...	...	...	...	...	...	...
29	*9.0*	*7.0*	*5.5*	*4.0*	*2.7*	*1.5*	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
31	*9.5*	*6.8*	*4.9*	*3.2*	*2.4*	*1.3*	...	...	...	...	...	...	...	...	...
32	*9.5*	*6.8*	*4.9*	*3.2*	*2.4*	*1.3*	...	...	...	...	...	...	...	...	...
33	*9.5*	*6.8*	*4.9*	*3.2*	*2.4*	*1.3*	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
	1	5Cr–½Mo	Smls. tube	SA–213	T5	K41545	...	...	5B	1
	2	5Cr–½Mo	Smls. & wld. fittings	SA–234	WP5	K41545	...	...	5B	1
	3	5Cr–½Mo	Smls. pipe	SA–335	P5	K41545	...	...	5B	1
	4	5Cr–½Mo	Forged pipe	SA–369	FP5	K41545	...	...	5B	1
	5	5Cr–½Mo	Plate	SA–387	5	K41545	1	...	5B	1
	6	5Cr–½Mo	Wld. pipe	SA–691	5CR	K41545	...	...	5B	1
	7	5Cr–½Mo	Forgings	SA–336	F5	K41545	...	...	5B	1
	8	5Cr–½Mo	Forgings	SA–182	F5	K41545	...	...	5B	1
	9	5Cr–½Mo	Plate	SA–387	5	K41545	2	...	5B	1
	10	5Cr–½Mo	Forgings	SA–336	F5A	K42544	...	...	5B	1
	11	5Cr–½Mo	Castings	SA–217	C5	J42045	...	...	5B	1
	12	5Cr–½Mo	Cast pipe	SA–426	CP5	J42045	...	...	5B	1
	13	5Cr–½Mo	Forgings	SA–182	F5a	K42544	...	...	5B	1
	14	5Cr–½Mo–Si	Smls. tube	SA–213	T5b	K51545	...	...	5B	1
	15	5Cr–½Mo–Si	Smls. pipe	SA–335	P5b	K51545	...	...	5B	1
	16	5Cr–½Mo–Ti	Smls. tube	SA–213	T5c	K41245	...	...	5B	1
	17	5Cr–½Mo–Ti	Smls. pipe	SA–335	P5c	K41245	...	...	5B	1
	18	9Cr–1Mo	Smls. tube	SA–213	T9	K90941	...	...	5B	1
	19	9Cr–1Mo	Fittings	SA–234	WP9	K90941	...	...	5B	1
	20	9Cr–1Mo	Smls. pipe	SA–335	P9	K90941	...	...	5B	1
	21	9Cr–1Mo	Forged pipe	SA–369	FP9	K90941	...	...	5B	1
	22	9Cr–1Mo	Forgings	SA–182	F9	K90941	...	...	5B	1
	23	9Cr–1Mo	Forgings	SA–336	F9	K90941	...	...	5B	1
	24	9Cr–1Mo	Castings	SA–217	C12	J82090	...	...	5B	1
	25	9Cr–1Mo	Cast pipe	SA–426	CP9	J82090	...	...	5B	1
(**21**)	26	9Cr–1Mo–V	Smls. tube	SA–213	T91 Type 1	K90901	...	...	15E	1
(**21**)	27	9Cr–1Mo–V	Fittings	SA–234	WP91 Type 1	K90901	...	...	15E	1
(**21**)	28	9Cr–1Mo–V	Smls. pipe	SA–335	P91 Type 1	K90901	...	$t \le 3$	15E	1
(**21**)	29	9Cr–1Mo–V	Smls. pipe	SA–335	P91 Type 1	K90901	...	$t > 3$	15E	1
(**21**)	30	9Cr–1Mo–V	Forged pipe	SA–369	FP91 Type 1	K90901	...	...	15E	1
(**21**)	31	9Cr–1Mo–V	Plate	SA–387	91 Type 1	K90901	2	$t \le 3$	15E	1
(**21**)	32	9Cr–1Mo–V	Plate	SA–387	91 Type 1	K90901	2	$t > 3$	15E	1
(**21**)	33	9Cr–1Mo–V	Forgings	SA–182	F91 Type 1	K90901	...	$t \le 3$	15E	1
(**21**)	34	9Cr–1Mo–V	Forgings	SA–182	F91 Type 1	K90901	...	$t > 3$	15E	1
(**21**)	35	9Cr–1Mo–V	Forgings	SA–336	F91 Type 1	K90901	...	...	15E	1
(**21**)	36	9Cr–1Mo–V	Smls. tube	SA–213	T91 Type 2	K90901	...	...	15E	1
(**21**)	37	9Cr–1Mo–V	Fittings	SA–234	WP91 Type 2	K90901	...	...	15E	1
(**21**)	38	9Cr–1Mo–V	Smls. pipe	SA–335	P91 Type 2	K90901	...	...	15E	1
(**21**)	39	9Cr–1Mo–V	Forged pipe	SA–369	FP91 Type 2	K90901	...	...	15E	1
(**21**)	40	9Cr–1Mo–V	Plate	SA–387	91 Type 2	K90901	2	...	15E	1
(**21**)	41	9Cr–1Mo–V	Forgings	SA–182	F91 Type 2	K90901	...	...	15E	1
(**21**)	42	9Cr–1Mo–V	Forgings	SA–336	F91 Type 2	K90901	...	...	15E	1
	43	11Cr–Ti	Plate	SA–240	...	S40910	...	...	7	1
	44	11Cr–Ti	Plate	SA–240	...	S40920	...	...	7	1
	45	11Cr–Ti	Plate	SA–240	...	S40930	...	...	7	1

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	60	30	1200	700	1200	NP	CS-2	T4
2	60	30	1200	700	1200	NP	CS-2	T4, W14
3	60	30	1200	700	1200	NP	CS-2	T4
4	60	30	1200	700	1200	NP	CS-2	T4
5	60	30	1200	700	1200	NP	CS-2	T4
6	60	30	NP	700	NP	NP	CS-2	G26, W10, W12
7	60	36	1200	NP	1200	NP	CS-2	T4
8	70	40	1200	700	1200	NP	CS-2	T3
9	75	45	NP	700	1200	NP	CS-3	T3
10	80	50	1200	NP	1200	NP	CS-3	T3
11	90	60	1200	700	1200	NP	CS-3	G1, G17, T3
12	90	60	NP	700	NP	NP	CS-3	G17
13	90	65	1200	NP	1200	NP	CS-5	T3
14	60	30	1200	NP	1200	NP	CS-2	T4
15	60	30	1200	NP	1200	NP	CS-2	T4
16	60	30	1200	NP	1200	NP	CS-2	T4
17	60	30	1200	NP	1200	NP	CS-2	T4
18	60	30	1200	700	1200	NP	CS-2	T5
19	60	30	1200	NP	1200	NP	CS-2	T5
20	60	30	1200	700	1200	NP	CS-2	T5
21	60	30	1200	700	1200	NP	CS-2	T5
22	85	55	1200	NP	1200	NP	CS-3	T4
23	85	55	NP	NP	1200	NP	CS-3	T4
24	90	60	1200	700 (SPT)	1200	NP	CS-3	G1, T4
25	90	60	NP	700	NP	NP	CS-3	G17
26	85	60	1200	700	1200	NP	CS-3	T6
27	90	60	1200	NP	NP	NP	CS-3	T6
28	85	60	1200	700	1200	NP	CS-3	T6
29	85	60	1200	NP	1200	NP	CS-3	T6
30	85	60	1200	NP	NP	NP	CS-3	T6
31	85	60	1200	700	1200	NP	CS-3	T6
32	85	60	1200	NP	1200	NP	CS-3	T6
33	90	60	1200	700	1200	NP	CS-3	T6
34	90	60	1200	NP	1200	NP	CS-3	T6
35	90	60	1200	NP	1200	NP	CS-3	T6
36	85	60	1200	NP	NP	NP	CS-3	T7
37	90	60	1200	NP	NP	NP	CS-3	T6
38	85	60	1200	NP	NP	NP	CS-3	T7
39	85	60	1200	NP	NP	NP	CS-3	T7
40	85	60	1200	NP	NP	NP	CS-3	T7
41	90	60	1200	NP	NP	NP	CS-3	T6
42	90	60	1200	NP	NP	NP	CS-3	T6
43	55	25	NP	NP	800	NP	CS-1	...
44	55	25	NP	NP	800	NP	CS-1	...
45	55	25	NP	NP	800	NP	CS-1	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	17.1	...	17.1	...	16.6	16.5	16.4	16.2	15.9	15.6	15.1	14.5	13.8	*10.9*
2	17.1	...	17.1	...	16.6	16.5	16.4	16.2	15.9	15.6	15.1	14.5	13.8	*10.9*
3	17.1	...	17.1	...	16.6	16.5	16.4	16.2	15.9	15.6	15.1	14.5	13.8	*10.9*
4	17.1	...	17.1	...	16.6	16.5	16.4	16.2	15.9	15.6	15.1	14.5	13.8	*10.9*
5	17.1	...	17.1	...	16.6	16.5	16.4	16.2	15.9	15.6	15.1	14.5	13.8	*10.9*
6	17.1	...	17.1	...	16.6	16.5	16.4	16.2	15.9	15.6	...	...	...	...
7	17.1	...	17.1	...	16.6	16.5	16.4	16.2	15.9	15.6	15.1	14.5	13.8	*10.9*
8	20.0	...	20.0	...	19.4	19.2	19.2	18.9	18.6	18.2	17.6	17.0	*14.3*	*10.9*
9	21.4	...	21.4	...	20.8	20.6	20.5	20.2	19.9	19.5	18.9	18.2	*14.3*	*10.9*
10	22.9	...	22.8	...	22.1	22.0	21.9	21.6	21.3	20.8	20.2	19.1	*14.3*	*10.9*
11	25.7	...	25.7	...	24.9	24.7	24.6	24.3	23.9	23.4	22.7	19.1	*14.3*	*10.9*
12	25.7	...	25.7	...	24.9	24.7	24.6	24.3	23.9	23.4	...	...	...	...
13	25.7	...	25.7	...	24.9	24.7	24.6	24.3	23.9	23.4	22.7	19.1	*14.3*	*10.9*
14	17.1	...	17.1	...	16.6	16.5	16.4	16.2	15.9	15.6	15.1	14.5	13.8	*10.9*
15	17.1	...	17.1	...	16.6	16.5	16.4	16.2	15.9	15.6	15.1	14.5	13.8	*10.9*
16	17.1	...	17.1	...	16.6	16.5	16.4	16.2	15.9	15.6	15.1	14.5	13.8	*10.9*
17	17.1	...	17.1	...	16.6	16.5	16.4	16.2	15.9	15.6	15.1	14.5	13.8	*10.9*
18	17.1	...	17.1	...	16.6	16.5	16.4	16.2	15.9	15.6	15.1	14.5	13.8	13.0
19	17.1	...	17.1	...	16.6	16.5	16.4	16.2	15.9	15.6	15.1	14.5	13.8	13.0
20	17.1	...	17.1	...	16.6	16.5	16.4	16.2	15.9	15.6	15.1	14.5	13.8	13.0
21	17.1	...	17.1	...	16.6	16.5	16.4	16.2	15.9	15.6	15.1	14.5	13.8	13.0
22	24.3	...	24.2	...	23.5	23.4	23.3	22.9	22.6	22.1	21.4	20.6	19.6	*16.4*
23	24.3	...	24.2	...	23.5	23.4	23.3	22.9	22.6	22.1	21.4	20.6	19.6	*16.4*
24	25.7	...	25.7	...	24.9	24.7	24.6	24.3	23.9	23.4	22.7	21.8	20.8	*16.4*
25	25.7	...	25.7	...	24.9	24.7	24.6	24.3	23.9	23.4	...	...	...	...
26	24.3	...	24.3	...	24.3	24.2	24.1	23.7	23.4	22.9	22.2	21.3	20.3	19.1
27	25.7	...	25.7	...	25.7	25.6	25.5	25.1	24.7	24.2	23.5	22.6	21.5	20.2
28	24.3	...	24.3	...	24.3	24.2	24.1	23.7	23.4	22.9	22.2	21.3	20.3	19.1
29	24.3	...	24.3	...	24.3	24.2	24.1	23.7	23.4	22.9	22.2	21.3	20.3	19.1
30	24.3	...	24.3	...	24.3	24.2	24.1	23.7	23.4	22.9	22.2	21.3	20.3	19.1
31	24.3	...	24.3	...	24.3	24.2	24.1	23.7	23.4	22.9	22.2	21.3	20.3	19.1
32	24.3	...	24.3	...	24.3	24.2	24.1	23.7	23.4	22.9	22.2	21.3	20.3	19.1
33	25.7	...	25.7	...	25.7	25.6	25.5	25.1	24.7	24.2	23.5	22.6	21.5	20.2
34	25.7	...	25.7	...	25.7	25.6	25.5	25.1	24.7	24.2	23.5	22.6	21.5	20.2
35	25.7	...	25.7	...	25.7	25.6	25.5	25.1	24.7	24.2	23.5	22.6	21.5	20.2
36	24.3	...	24.3	...	24.3	24.2	24.1	23.7	23.4	22.9	22.2	21.3	20.3	19.1
37	25.7	...	25.7	...	25.7	25.6	25.5	25.1	24.7	24.2	23.5	22.6	21.5	20.2
38	24.3	...	24.3	...	24.3	24.2	24.1	23.7	23.4	22.9	22.2	21.3	20.3	19.1
39	24.3	...	24.3	...	24.3	24.2	24.1	23.7	23.4	22.9	22.2	21.3	20.3	19.1
40	24.3	...	24.3	...	24.3	24.2	24.1	23.7	23.4	22.9	22.2	21.3	20.3	19.1
41	25.7	...	25.7	...	25.7	25.6	25.5	25.1	24.7	24.2	23.5	22.6	21.5	20.2
42	25.7	...	25.7	...	25.7	25.6	25.5	25.1	24.7	24.2	23.5	22.6	21.5	20.2
43	15.7	...	14.5	...	13.1	12.1	11.6	11.3	11.3	11.3	11.2	11.1	...	...
44	15.7	...	14.5	...	13.1	12.1	11.6	11.3	11.3	11.3	11.2	11.1	...	...
45	15.7	...	14.5	...	13.1	12.1	11.6	11.3	11.3	11.3	11.2	11.1	...	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding															
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
1	*8.0*	*5.8*	*4.2*	*2.9*	*1.8*	*1.0*	...	...	...	...	...	...	...	...	...	
2	*8.0*	*5.8*	*4.2*	*2.9*	*1.8*	*1.0*	...	...	...	...	...	...	...	...	...	
3	*8.0*	*5.8*	*4.2*	*2.9*	*1.8*	*1.0*	...	...	...	...	...	...	...	...	...	
4	*8.0*	*5.8*	*4.2*	*2.9*	*1.8*	*1.0*	...	...	...	...	...	...	...	...	...	
5	*8.0*	*5.8*	*4.2*	*2.9*	*1.8*	*1.0*	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	*8.0*	*5.8*	*4.2*	*2.9*	*1.8*	*1.0*	...	...	...	...	...	...	...	...	...	
8	*8.0*	*5.8*	*4.2*	*2.9*	*1.8*	*1.0*	...	...	...	...	...	...	...	...	...	
9	*8.0*	*5.8*	*4.2*	*2.9*	*1.8*	*1.0*	...	...	...	...	...	...	...	...	...	
10	*8.0*	*5.8*	*4.2*	*2.9*	*1.8*	*1.0*	...	...	...	...	...	...	...	...	...	
11	*8.0*	*5.8*	*4.2*	*2.9*	*1.8*	*1.0*	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	*8.0*	*5.8*	*4.2*	*2.9*	*1.8*	*1.0*	...	...	...	...	...	...	...	...	...	
14	*8.0*	*5.8*	*4.2*	*2.9*	*1.8*	*1.0*	...	...	...	...	...	...	...	...	...	
15	*8.0*	*5.8*	*4.2*	*2.9*	*1.8*	*1.0*	...	...	...	...	...	...	...	...	...	
16	*8.0*	*5.8*	*4.2*	*2.9*	*1.8*	*1.0*	...	...	...	...	...	...	...	...	...	
17	*8.0*	*5.8*	*4.2*	*2.9*	*1.8*	*1.0*	...	...	...	...	...	...	...	...	...	
18	*10.6*	*7.4*	*5.0*	*3.3*	*2.2*	*1.5*	...	...	...	...	...	...	...	...	...	
19	*10.6*	*7.4*	*5.0*	*3.3*	*2.2*	*1.5*	...	...	...	...	...	...	...	...	...	
20	*10.6*	*7.4*	*5.0*	*3.3*	*2.2*	*1.5*	...	...	...	...	...	...	...	...	...	
21	*10.6*	*7.4*	*5.0*	*3.3*	*2.2*	*1.5*	...	...	...	...	...	...	...	...	...	
22	*11.0*	*7.4*	*5.0*	*3.3*	*2.2*	*1.5*	...	...	...	...	...	...	...	...	...	
23	*11.0*	*7.4*	*5.0*	*3.3*	*2.2*	*1.5*	...	...	...	...	...	...	...	...	...	
24	*11.0*	*7.4*	*5.0*	*3.3*	*2.2*	*1.5*	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	17.8	*16.1*	*12.2*	*8.7*	*5.7*	*3.5*	...	...	...	...	...	...	...	...	...	(**21**)
27	18.8	*16.1*	*12.2*	*8.7*	*5.7*	*3.5*	...	...	...	...	...	...	...	...	...	(**21**)
28	17.8	*16.1*	*12.2*	*8.7*	*5.7*	*3.5*	...	...	...	...	...	...	...	...	...	(**21**)
29	17.8	*16.1*	*12.2*	*8.7*	*5.7*	*3.5*	...	...	...	...	...	...	...	...	...	(**21**)
30	17.8	*16.1*	*12.2*	*8.7*	*5.7*	*3.5*	...	...	...	...	...	...	...	...	...	(**21**)
31	17.8	*16.1*	*12.2*	*8.7*	*5.7*	*3.5*	...	...	...	...	...	...	...	...	...	(**21**)
32	17.8	*16.1*	*12.2*	*8.7*	*5.7*	*3.5*	...	...	...	...	...	...	...	...	...	(**21**)
33	18.8	*16.1*	*12.2*	*8.7*	*5.7*	*3.5*	...	...	...	...	...	...	...	...	...	(**21**)
34	18.8	*16.1*	*12.2*	*8.7*	*5.7*	*3.5*	...	...	...	...	...	...	...	...	...	(**21**)
35	18.8	*16.1*	*12.2*	*8.7*	*5.7*	*3.5*	...	...	...	...	...	...	...	...	...	(**21**)
36	17.8	16.3	*12.6*	*9.1*	*6.1*	*3.7*	...	...	...	...	...	...	...	...	...	(**21**)
37	18.8	*16.7*	*12.6*	*9.1*	*6.1*	*3.7*	...	...	...	...	...	...	...	...	...	(**21**)
38	17.8	16.3	*12.6*	*9.1*	*6.1*	*3.7*	...	...	...	...	...	...	...	...	...	(**21**)
39	17.8	16.3	*12.6*	*9.1*	*6.1*	*3.7*	...	...	...	...	...	...	...	...	...	(**21**)
40	17.8	16.3	*12.6*	*9.1*	*6.1*	*3.7*	...	...	...	...	...	...	...	...	...	(**21**)
41	18.8	*16.7*	*12.6*	*9.1*	*6.1*	*3.7*	...	...	...	...	...	...	...	...	...	(**21**)
42	18.8	*16.7*	*12.6*	*9.1*	*6.1*	*3.7*	...	...	...	...	...	...	...	...	...	(**21**)
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	11Cr–Ti	Wld. tube	SA–268	TP409	S40900	...	...	7	1
2	11Cr–Ti	Smls. tube	SA–268	TP409	S40900	...	...	7	1
3	12Cr	Plate	SA–1010	40	S41003	...	$t \le 3/4$	7	1
4	12Cr	Bar	SA–479	403	S40300	A	...	6	1
5	12Cr	Bar	SA–479	403	S40300	1	...	6	1
6	12Cr	Plate	SA–1010	50	S41003	...	$t \le 3/4$	7	1
7	12Cr–Al	Plate	SA–240	405	S40500	...	...	7	1
8	12Cr–Al	Plate	SA–240	405	S40500	...	...	7	1
9	12Cr–Al	Bar	SA–479	405	S40500	...	...	7	1
10	12Cr–Al	Bar	SA/JIS G4303	SUS405	...	...	...	7	1
11	12Cr–Al	Smls. & wld. tube	SA–268	TP405	S40500	...	...	7	1
12	12Cr–Al	Wld. tube	SA–268	TP405	S40500	...	...	7	1
13	12Cr–Ti	Wld. tube	SA–268	...	S40800	...	...	7	1
14	12Cr–Ti	Smls. tube	SA–268	...	S40800	...	...	7	1
15	13Cr	Plate	SA–240	410S	S41008	...	...	7	1
16	13Cr	Smls. & wld. tube	SA–268	TP410	S41000	...	...	6	1
17	13Cr	Wld. tube	SA–268	TP410	S41000	...	...	6	1
18	13Cr	Plate	SA–240	410	S41000	...	...	6	1
19	13Cr	Forgings	SA–182	F6a	S41000	1	...	6	1
20	13Cr	Bar	SA–479	410	S41000	...	...	6	1
21	13Cr	Bar	SA–479	410	S41000	A	...	6	1
22	13Cr	Bar	SA–479	410	S41000	1	...	6	1
23	13Cr	Forgings	SA–182	F6a	S41000	2	...	6	3
24	13Cr	Castings	SA–217	CA15	J91150	...	...	6	3
25	13Cr	Cast pipe	SA–426	CPCA15	J91150	...	...	6	3
26	13Cr	Bar	SA/EN 10088–3	X12Cr13	...	QT650	$t \le 6.25$	...	...
27	13Cr–4Ni	Castings	SA–487	CA6NM	J91540	A	...	6	4
28	13Cr–4Ni	Forgings	SA–182	F6NM	S41500	...	...	6	4
29	15Cr	Wld. tube	SA–268	TP429	S42900	...	...	6	2
30	15Cr	Smls. & wld. tube	SA–268	TP429	S42900	...	...	6	2
31	15Cr	Plate	SA–240	429	S42900	...	...	6	2
32	17Cr	Wld. tube	SA–268	TP430	S43000	...	...	7	2
33	17Cr	Smls. & wld. tube	SA–268	TP430	S43000	...	...	7	2
34	17Cr	Plate	SA–240	430	S43000	...	...	7	2
35	17Cr	Bar	SA–479	430	S43000	...	...	7	2
36	17Cr–4Ni–3Cu	Castings	SA–747	CB7Cu–1	J92180	...	...	...	...
37	17Cr–4Ni–4Cu	Bar	SA–564	630	S17400	H1150	...	...	...
38	17Cr–4Ni–4Cu	Plate	SA–693	630	S17400	H1150	...	...	...
39	17Cr–4Ni–4Cu	Forgings	SA–705	630	S17400	H1150	...	...	...
40	17Cr–4Ni–4Cu	Bar	SA–564	630	S17400	H1100	...	...	...
41	17Cr–4Ni–4Cu	Plate	SA–693	630	S17400	H1100	...	...	...
42	17Cr–4Ni–4Cu	Forgings	SA–705	630	S17400	H1100	...	...	...
43	17Cr–4Ni–4Cu	Bar	SA–564	630	S17400	H1075	...	...	...
44	17Cr–4Ni–4Cu	Plate	SA–693	630	S17400	H1075	...	...	...
45	17Cr–4Ni–4Cu	Forgings	SA–705	630	S17400	H1075	...	...	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	55	25	NP	NP	800	650	CS–1	G24
2	55	25	NP	NP	800	650	CS–1	...
3	66	40	NP	NP	600	600	CS–2	...
4	70	40	NP	700	NP	NP	...	...
5	70	40	NP	700	NP	NP	...	...
6	70	50	NP	NP	600	600	CS–3	...
7	60	25	700	NP	1000	650	CS–1	G19, T5
8	60	25	NP	700	NP	NP	CS–1	G19
9	60	25	NP	700	1000	650	CS–1	G19, T5
10	60	25	NP	700	1000	NP	CS–1	G19, T5
11	60	30	700	NP	1000	650	CS–2	G19, T5, W13, W14
12	60	30	700	NP	1000	650	CS–2	G3, G19, G24, T5
13	55	30	NP	NP	800	650	CS–2	G19, W14
14	55	30	NP	NP	800	650	CS–2	G19
15	60	30	NP	700	1200	650	CS–2	T4
16	60	30	700	NP	1200	650	CS–2	T4, W13, W14
17	60	30	700	NP	1200	650	CS–2	G3, G24, T4
18	65	30	NP	NP	1200	650	CS–2	T4
19	70	40	NP	700	1000	650	CS–2	T4
20	70	40	NP	NP	1000	650	CS–2	G22, T4
21	70	40	NP	700	NP	NP	CS–2	...
22	70	40	700	700	NP	NP	CS–2	...
23	85	55	NP	700	1200	650	CS–3	T3
24	90	65	NP	700	1200	650	CS–5	G1, G17, T3
25	90	65	NP	700	NP	NP	CS–5	G17
26	94.5	65.5	NP	700 (SPT)	NP	NP	...	H3, W1
27	110	80	NP	700	800	650	CS–5	G1, G17
28	115	90	NP	700	NP	NP	CS–3	G17
29	60	35	700	NP	700	650	CS–2	G3, G19, W14
30	60	35	700	NP	1200	650	CS–2	G19, T4, W13, W14
31	65	30	NP	NP	1200	650	CS–2	G19, T4
32	60	35	700	NP	1200	650	CS–2	G3, G19, G24, T4
33	60	35	700	700	1200	650	CS–2	G19, T4, W12, W13, W14
34	65	30	NP	NP	1200	650	CS–2	G19, T4
35	70	40	700	700	1000	650	CS–2	G19, G22, T4
36	150	140	NP	NP	200	NP	HT–1	G1, G28, W1
37	135	105	NP	650	650	NP	HT–1	G8, G19, W1
38	135	105	NP	650	NP	NP	HT–1	G19, W1
39	135	105	NP	650	NP	NP	HT–1	G19, W1
40	140	115	NP	650	650	NP	HT–1	G8, G19, W1
41	140	115	NP	650	NP	NP	HT–1	G19, W1
42	140	115	NP	650	NP	NP	HT–1	G19, W1
43	145	125	NP	650	NP	NP	HT–1	G19, W1
44	145	125	NP	650	NP	NP	HT–1	G19, W1
45	145	125	NP	650	NP	NP	HT–1	G19, W1

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	13.4	...	12.3	...	11.1	10.3	9.9	9.6	9.6	9.6	9.5	9.4	...	...
2	15.7	...	14.5	...	13.1	12.1	11.6	11.3	11.3	11.3	11.2	11.1	...	...
3	18.9	...	18.9	...	18.9	18.4	17.7	17.1	...	...	...	...	...	...
4	20.0	...	20.0	...	19.6	19.3	19.0	18.5	18.1	17.7	...	...	...	...
5	20.0	...	20.0	...	19.6	19.3	19.0	18.5	18.1	17.7	...	...	...	...
6	20.0	...	20.0	...	20.0	19.5	18.8	18.1	...	...	...	...	...	...
7	16.7	...	15.3	...	14.8	14.5	14.3	14.0	13.8	13.5	13.1	12.6	12.0	11.3
8	16.7	...	15.3	...	14.8	14.5	14.3	14.0	13.8	13.5	...	...	...	...
9	16.7	...	15.3	...	14.8	14.5	14.3	14.0	13.8	13.5	13.1	12.6	12.0	11.3
10	16.7	...	15.3	...	14.8	14.5	14.3	14.0	13.8	13.5	13.1	12.6	12.0	11.3
11	17.1	...	17.1	...	16.8	16.5	16.3	15.9	15.6	15.2	14.7	14.1	13.4	12.6
12	14.6	...	14.6	...	14.3	14.0	13.8	13.5	13.2	12.9	12.5	12.0	11.4	10.7
13	13.4	...	13.4	...	13.1	12.9	12.7	12.4	12.1	11.8	11.4	11.0	...	...
14	15.7	...	15.7	...	15.4	15.1	14.9	14.5	14.3	13.9	13.5	12.9	...	...
15	17.1	...	17.1	...	16.8	16.5	16.3	15.9	15.6	15.2	14.7	14.1	13.4	*12.3*
16	17.1	...	17.1	...	16.8	16.5	16.3	15.9	15.6	15.2	14.7	14.1	13.4	*12.3*
17	14.6	...	14.6	...	14.3	14.0	13.8	13.5	13.2	12.9	12.5	12.0	11.4	*10.5*
18	18.6	...	18.4	...	17.8	17.4	17.2	16.8	16.6	16.2	15.7	15.1	14.4	*12.3*
19	20.0	...	20.0	...	19.6	19.3	19.0	18.5	18.1	17.7	17.1	16.4	15.6	*12.3*
20	20.0	...	20.0	...	19.6	19.3	19.0	18.5	18.1	17.7	17.1	16.4	15.6	*12.3*
21	20.0	...	20.0	...	19.6	19.3	19.0	18.5	18.1	17.7	...	...	...	...
22	20.0	...	20.0	...	19.6	19.3	19.0	18.5	18.1	17.7	...	...	...	...
23	24.3	...	24.3	...	23.8	23.4	23.0	22.5	22.0	21.5	20.8	19.9	*17.2*	*12.3*
24	25.7	...	25.7	...	25.2	24.8	24.4	23.8	23.3	22.7	22.0	21.1	*15.9*	*11.0*
25	25.7	...	25.7	...	25.2	24.8	24.4	23.8	23.3	22.7	...	...	...	...
26	26.9	...	26.9	...	26.4	25.9	25.5	24.9	24.5	23.8	...	...	...	...
27	31.4	...	31.4	31.3	30.8	30.1	29.4	28.8	28.4	27.9	27.4	26.7	...	...
28	32.9	...	32.9	...	32.9	32.5	31.3	30.0	29.4	28.7	...	...	...	...
29	14.6	...	14.6	...	14.3	14.0	13.8	13.5	13.2	12.9	...	...	...	...
30	17.1	...	17.1	...	16.8	16.5	16.3	15.9	15.6	15.2	14.7	14.1	13.4	*12.0*
31	18.6	...	18.4	...	17.8	17.4	17.2	16.8	16.6	16.2	15.7	15.1	14.4	*12.0*
32	14.6	...	14.6	...	14.3	14.0	13.8	13.5	13.2	12.9	12.5	12.0	11.4	*10.2*
33	17.1	...	17.1	...	16.8	16.5	16.3	15.9	15.6	15.2	14.7	14.1	13.4	*12.0*
34	18.6	...	18.4	...	17.8	17.4	17.2	16.8	16.6	16.2	15.7	15.1	14.4	*12.0*
35	20.0	...	20.0	...	19.6	19.3	19.0	18.5	18.1	17.7	17.1	16.4	15.6	*12.0*
36	32.0	...	32.0	...	...	...	...	...	...	...	...	...	...	...
37	38.6	...	38.6	...	38.6	37.5	36.8	36.2	35.9	...	...	...	...	...
38	38.6	...	38.6	...	38.6	37.5	36.8	36.2	35.9	...	...	...	...	...
39	38.6	...	38.6	...	38.6	37.5	36.8	36.2	35.9	...	...	...	...	...
40	40.0	...	40.0	...	40.0	38.9	38.1	37.5	37.2	...	...	...	...	...
41	40.0	...	40.0	...	40.0	38.9	38.1	37.5	37.2	...	...	...	...	...
42	40.0	...	40.0	...	40.0	38.9	38.1	37.5	37.2	...	...	...	...	...
43	41.4	...	41.4	...	41.4	40.3	39.5	38.9	38.5	...	...	...	...	...
44	41.4	...	41.4	...	41.4	40.3	39.5	38.9	38.5	...	...	...	...	...
45	41.4	...	41.4	...	41.4	40.3	39.5	38.9	38.5	...	...	...	...	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding														
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
7	*8.4*	*4.0*	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
9	*8.4*	*4.0*	...	...	...	...	...	...	...	...	...	...	...	...	...
10	*8.4*	*4.0*	...	...	...	...	...	...	...	...	...	...	...	...	...
11	*8.4*	*4.0*	...	...	...	...	...	...	...	...	...	...	...	...	...
12	*7.1*	*3.4*	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
15	*8.8*	*6.4*	*4.4*	*2.9*	*1.8*	*1.0*	...	...	...	...	...	...	...	...	...
16	*8.8*	*6.4*	*4.4*	*2.9*	*1.8*	*1.0*	...	...	...	...	...	...	...	...	...
17	*7.5*	*5.4*	*3.7*	*2.5*	*1.5*	*0.85*	...	...	...	...	...	...	...	...	...
18	*8.8*	*6.4*	*4.4*	*2.9*	*1.8*	*1.0*	...	...	...	...	...	...	...	...	...
19	*8.8*	*6.4*	...	...	...	...	...	...	...	...	...	...	...	...	...
20	*8.8*	*6.4*	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
23	*8.8*	*6.4*	*4.4*	*2.9*	*1.8*	*1.0*	...	...	...	...	...	...	...	...	...
24	*7.6*	*5.0*	*3.3*	*2.2*	*1.5*	*1.0*	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
30	*9.2*	*6.5*	*4.5*	*3.2*	*2.4*	*1.8*	...	...	...	...	...	...	...	...	...
31	*9.2*	*6.5*	*4.5*	*3.2*	*2.4*	*1.8*	...	...	...	...	...	...	...	...	...
32	*7.8*	*5.5*	*3.8*	*2.7*	*2.0*	*1.5*	...	...	...	...	...	...	...	...	...
33	*9.2*	*6.5*	*4.5*	*3.2*	*2.4*	*1.8*	...	...	...	...	...	...	...	...	...
34	*9.2*	*6.5*	*4.5*	*3.2*	*2.4*	*1.8*	...	...	...	...	...	...	...	...	...
35	*9.2*	*6.5*	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	18Cr–2Mo	Plate	SA–240	...	S44400	...	...	7	2
2	18Cr–2Mo	Wld. tube	SA–268	...	S44400	...	...	7	2
3	18Cr–2Mo	Smls. tube	SA–268	...	S44400	...	...	7	2
4	18Cr–Ti	Wld. tube	SA–268	TP439	S43035	...	...	7	2
5	18Cr–Ti	Smls. tube	SA–268	TP439	S43035	...	...	7	2
6	18Cr–Ti	Wld. pipe	SA–731	TP439	S43035	...	...	7	2
7	18Cr–Ti	Smls. pipe	SA–731	TP439	S43035	...	...	7	2
8	18Cr–Ti	Wld. tube	SA–803	TP439	S43035	...	...	7	2
9	18Cr–Ti	Smls. tube	SA–268	TP430 Ti	S43036	...	...	7	2
10	18Cr–Ti	Wld. tube	SA–268	TP430 Ti	S43036	...	...	7	2
11	18Cr–Ti	Bar	SA–479	439	S43035	...	...	7	2
12	26Cr–3Ni–3Mo	Plate	SA–240	26–3–3	S44660	...	≤ 2/10	10K	1
13	26Cr–3Ni–3Mo	Smls. tube	SA–268	26–3–3	S44660	...	≤ 2/10	10K	1
14	26Cr–3Ni–3Mo	Wld. tube	SA–268	26–3–3	S44660	...	≤ 2/10	10K	1
15	26Cr–3Ni–3Mo	Wld. tube	SA–268	26–3–3	S44660	...	≤ 2/10	10K	1
16	26Cr–3Ni–3Mo	Wld. tube	SA–803	26–3–3	S44660	...	≤ 2/10	10K	1
17	27Cr	Smls. tube	SA–268	TP446–1	S44600	...	...	10I	1
18	27Cr–1Mo	Forgings	SA–182	FXM–27Cb	S44627	...	...	10I	1
19	27Cr–1Mo	Plate	SA–240	XM–27	S44627	...	...	10I	1
20	27Cr–1Mo	Wld. tube	SA–268	TPXM–27	S44627	...	...	10I	1
21	27Cr–1Mo	Smls. tube	SA–268	TPXM–27	S44627	...	...	10I	1
22	27Cr–1Mo	Bar	SA–479	XM–27	S44627	...	...	10I	1
23	27Cr–1Mo	Smls. pipe	SA–731	TPXM–27	S44627	...	...	10I	1
24	27Cr–1Mo	Wld. pipe	SA–731	TPXM–27	S44627	...	...	10I	1
25	27Cr–1Mo–Ti	Smls. pipe	SA–731	TPXM–33	S44626	...	...	10I	1
26	27Cr–1Mo–Ti	Wld. pipe	SA–731	TPXM–33	S44626	...	...	10I	1
27	27Cr–1Mo–Ti	Plate	SA–240	XM–33	S44626	...	...	10I	1
28	27Cr–1Mo–Ti	Smls. tube	SA–268	TPXM–33	S44626	...	...	10I	1
29	27Cr–1Mo–Ti	Wld. tube	SA–268	TPXM–33	S44626	...	...	10I	1
30	29Cr–4Mo	Bar	SA–479	...	S44700	...	...	10J	1
31	29Cr–4Mo	Plate	SA–240	...	S44700	...	...	10J	1
32	29Cr–4Mo	Smls. tube	SA–268	29–4	S44700	...	...	10J	1
33	29Cr–4Mo	Wld. tube	SA–268	29–4	S44700	...	...	10J	1
34	29Cr–4Mo–2Ni	Bar	SA–479	...	S44800	...	...	10K	1
35	29Cr–4Mo–2Ni	Plate	SA–240	...	S44800	...	...	10K	1
36	29Cr–4Mo–2Ni	Smls. tube	SA–268	29–4–2	S44800	...	...	10K	1
37	29Cr–4Mo–2Ni	Wld. tube	SA–268	29–4–2	S44800	...	...	10K	1
38	29Cr–4Mo–Ti	Smls. tube	SA–268	...	S44735	...	...	10J	1
39	29Cr–4Mo–Ti	Wld. tube	SA–268	...	S44735	...	...	10J	1
40	Mn–1/4Mo	Forgings	SA–372	D	K14508	...	...	...	...
41	Mn–1/4Mo–V	Castings	SA–487	2	J13005	A	...	3	3
42	Mn–1/4Mo–V	Castings	SA–487	2	J13005	B	...	3	3
43	Mn–1/2Mo	Plate	SA–302	A	K12021	...	...	3	2
44	Mn–1/2Mo	Wld. pipe	SA–672	H75	K12021	...	...	3	2
45	Mn–1/2Mo	Plate	SA–302	B	K12022	...	...	3	3

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	60	40	NP	NP	650	650	CS–2	G19
2	60	40	NP	NP	650	650	CS–2	G19, G24
3	60	40	NP	NP	650	650	CS–2	G19
4	60	30	800	NP	800	650	CS–2	G19, G24
5	60	30	800	NP	800	650	CS–2	G19
6	60	30	800	NP	NP	NP	CS–2	G19, G24
7	60	30	800	NP	NP	NP	CS–2	G19
8	60	30	NP	NP	600	600	CS–2	G19, G24
9	60	35	NP	NP	800	NP	CS–2	G19
10	60	35	NP	NP	800	NP	CS–2	G19, G24
11	70	40	NP	NP	1000	650	CS–2	G19, G22, T4
12	85	65	NP	NP	700	650	HA–5	G19
13	85	65	NP	700	700	650	HA–5	G19, H5
14	85	65	NP	700	NP	NP	HA–5	G19, H5, W12
15	85	65	NP	NP	700	650	HA–5	G19, G24
16	85	65	NP	NP	600	600	HA–5	G19, G24
17	70	40	700	NP	650	650	CS–2	G19
18	60	35	NP	NP	650	650	HA–2	G19
19	65	40	NP	650	650	650	HA–2	G19
20	65	40	NP	NP	650	650	HA–2	G19, G24
21	65	40	NP	650	650	650	HA–2	G19
22	65	40	NP	700	650	650	HA–2	G19, G22
23	65	40	NP	NP	650	650	HA–2	G19
24	65	40	NP	NP	650	650	HA–2	G19, G24
25	65	40	NP	NP	650	650	HA–2	G19
26	65	40	NP	NP	650	650	HA–2	G19, G24
27	68	45	NP	NP	650	650	HA–6	G19
28	68	45	NP	NP	650	650	HA–6	G19
29	68	45	NP	NP	650	650	HA–6	G19, G24
30	70	55	NP	NP	600	600	HA–6	G19, G22
31	80	60	NP	NP	600	600	HA–6	G19
32	80	60	NP	NP	600	600	HA–6	G19
33	80	60	NP	NP	600	600	HA–6	G19, G24
34	70	55	NP	NP	600	600	HA–6	G19, G22
35	80	60	NP	NP	600	600	HA–6	G19
36	80	60	NP	NP	600	600	HA–6	G19
37	80	60	NP	NP	600	600	HA–6	G19, G24
38	75	60	NP	NP	600	600	HA–6	G19
39	75	60	NP	NP	600	600	HA–6	G19, G24
40	105	65	NP	650	650	650	CS–5	G25, W2, W11
41	85	53	NP	700 (SPT)	650	650	CS–3	G1
42	90	65	NP	NP	650	650	CS–5	G1
43	75	45	1000	700	1000	650	CS–3	G11, S2, T3
44	75	45	NP	700	NP	NP	CS–3	S6, W10, W12
45	80	50	1000	700	1000	650	CS–3	G11, S2, T3

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	17.1	...	17.1	...	16.6	16.2	15.9	15.4	15.1	...	...	...	...	...
2	14.6	...	14.6	...	14.1	13.8	13.5	13.1	12.8	...	...	...	...	...
3	17.1	...	17.1	...	16.6	16.2	15.9	15.4	15.1	...	...	...	...	...
4	14.6	...	14.6	...	13.3	12.4	11.8	11.6	11.5	11.5	11.4	11.2	...	...
5	17.1	...	17.1	...	15.7	14.6	13.9	13.6	13.6	13.5	13.4	13.2	...	...
6	14.6	...	14.6	...	13.3	12.4	11.8	11.6	11.5	11.5	11.4	11.2	...	...
7	17.1	...	17.1	...	15.7	14.6	13.9	13.6	13.6	13.5	13.4	13.2	...	...
8	14.6	...	14.6	...	13.3	12.4	11.8	11.6	...	...	...	...	...	...
9	17.1	...	17.1	...	16.6	16.1	15.8	15.4	15.1	14.8	14.5	14.0	...	...
10	14.6	...	14.6	...	14.1	13.7	13.4	13.1	12.9	12.6	12.3	11.9	...	...
11	20.0	...	20.0	...	19.3	18.8	18.4	17.9	17.7	17.3	16.9	16.4	15.8	*12.2*
12	24.3	...	24.3	...	24.2	23.9	23.8	23.6	23.5	23.4	...	...	...	...
13	24.3	...	24.3	...	24.2	23.9	23.8	23.6	23.5	23.4	...	...	...	...
14	24.3	...	24.3	...	24.2	23.9	23.8	23.6	23.5	23.4	...	...	...	...
15	20.6	...	20.6	...	20.6	20.3	20.2	20.1	20.0	19.9	...	...	...	...
16	20.6	...	20.6	...	20.6	20.3	20.2	20.1	...	...	...	...	...	...
17	20.0	...	20.0	...	19.3	18.8	18.4	17.9	17.7	17.3	...	...	...	...
18	17.1	...	17.1	...	16.6	16.1	16.1	16.1	16.1	...	...	...	...	...
19	18.6	...	18.6	...	18.3	18.1	18.1	18.1	18.1	...	...	...	...	...
20	15.8	...	15.8	...	15.5	15.4	15.4	15.4	15.4	...	...	...	...	...
21	18.6	...	18.6	...	18.3	18.1	18.1	18.1	18.1	...	...	...	...	...
22	18.6	...	18.6	...	18.3	18.1	18.1	18.1	18.1	18.1	...	...	...	...
23	18.6	...	18.6	...	18.3	18.1	18.1	18.1	18.1	...	...	...	...	...
24	15.8	...	15.8	...	15.5	15.4	15.4	15.4	15.4	...	...	...	...	...
25	18.6	...	18.6	...	18.4	18.2	18.0	17.6	17.3	...	...	...	...	...
26	15.8	...	15.8	...	15.7	15.4	15.3	15.0	14.7	...	...	...	...	...
27	19.4	...	19.4	...	19.3	19.0	18.8	18.4	18.1	...	...	...	...	...
28	19.4	...	19.4	...	19.3	19.0	18.8	18.4	18.1	...	...	...	...	...
29	16.5	...	16.5	...	16.4	16.2	16.0	15.7	15.4	...	...	...	...	...
30	20.0	...	20.0	...	19.3	19.2	19.2	19.2	...	...	...	...	...	...
31	22.9	...	22.8	...	22.1	21.9	21.9	21.9	...	...	...	...	...	...
32	22.9	...	22.8	...	22.1	21.9	21.9	21.9	...	...	...	...	...	...
33	19.4	...	19.4	...	18.8	18.6	18.6	18.6	...	...	...	...	...	...
34	20.0	...	19.6	...	19.3	19.2	18.9	18.6	...	...	...	...	...	...
35	22.9	...	22.4	...	22.1	21.9	21.6	21.3	...	...	...	...	...	...
36	22.9	...	22.4	...	22.1	21.9	21.6	21.3	...	...	...	...	...	...
37	19.4	...	19.1	...	18.8	18.6	18.4	18.1	...	...	...	...	...	...
38	21.4	...	21.0	...	20.7	20.5	20.3	20.0	...	...	...	...	...	...
39	18.2	...	17.9	...	17.6	17.5	17.2	17.0	...	...	...	...	...	...
40	30.0	...	30.0	30.0	30.0	30.0	30.0	30.0	30.0	...	...	...	...	...
41	24.3	...	24.3	...	24.3	24.2	24.2	24.2	24.1	24.1	...	...	...	...
42	25.7	...	25.7	...	25.7	25.6	25.6	25.6	25.6	...	...	...	...	...
43	21.4	...	21.4	...	21.4	21.4	21.4	21.4	21.4	21.4	21.4	21.4	*20.0*	*13.7*
44	21.4	...	21.4	...	21.4	21.4	21.4	21.4	21.4	21.4	...	...	...	...
45	22.9	...	22.9	...	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	*20.0*	*13.7*

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding														
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
11	*9.2*	*6.5*	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
43	*8.2*	*4.8*	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
45	*8.2*	*4.8*	...	...	...	...	...	...	...	...	...	...	...	...	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	Mn–½Mo	Plate	SA–533	A	K12521	1	...	3	3
2	Mn–½Mo	Plate	SA–533	A	K12521	2	...	3	3
3	Mn–½Mo	Plate	SA–533	A	K12521	3	...	11A	4
4	Mn–½Mo–¼Ni	Plate	SA–533	D	K12529	1	...	3	3
5	Mn–½Mo–¼Ni	Plate	SA–533	D	K12529	2	...	3	3
6	Mn–½Mo–¼Ni	Plate	SA–533	D	K12529	3	...	11A	4
7	Mn–½Mo–½Ni	Plate	SA–302	C	K12039	...	...	3	3
8	Mn–½Mo–½Ni	Plate	SA–533	B	K12539	1	...	3	3
9	Mn–½Mo–½Ni	Wld. pipe	SA–672	H80	K12039	...	...	3	3
10	Mn–½Mo–½Ni	Wld. pipe	SA–672	J80	K12539	...	...	3	3
11	Mn–½Mo–½Ni	Plate	SA–533	B	K12539	2	...	3	3
12	Mn–½Mo–½Ni	Wld. pipe	SA–672	J90	K12539	...	...	3	3
13	Mn–½Mo–½Ni	Plate	SA–533	B	K12539	3	...	11A	4
14	Mn–½Mo–½Ni	Wld. pipe	SA–672	J100	K12539	...	...	11A	4
15	Mn–½Mo–¾Ni	Plate	SA–302	D	K12054	...	...	3	3
16	Mn–½Mo–¾Ni	Plate	SA–533	C	K12554	1	...	3	3
17	Mn–½Mo–¾Ni	Plate	SA–533	E	K12554	1	...	3	3
18	Mn–½Mo–¾Ni	Plate	SA–533	C	K12554	2	...	3	3
19	Mn–½Mo–¾Ni	Plate	SA–533	E	K12554	2	...	3	3
20	Mn–½Mo–¾Ni	Plate	SA–533	C	K12554	3	...	11A	4
21	Mn–½Ni–V	Plate	SA–225	C	K12524	...	...	10A	1
22	Mn–V	Castings	SA–487	1	J13002	A	...	10A	1
23	Mn–V	Castings	SA–487	1	J13002	A	...	10A	1
24	Mn–V	Castings	SA–487	1	J13002	B	...	10A	1
25	1½Si–½Mo	Smls. pipe	SA–335	P15	K11578	...	...	3	1
26	½Ni–½Cr–¼Mo–V	Castings	SA–487	4	J13047	A	...	3	3
27	½Ni–½Cr–¼Mo–V	Castings	SA–487	4	J13047	B	...	11A	3
28	½Ni–½Cr–¼Mo–V	Castings	SA–487	4	J13047	E	...	11A	3
29	½Ni–½Mo–V	Forgings	SA–541	3	K12045	1	...	3	3
30	½Ni–½Mo–V	Forgings	SA–541	3	K12045	2	...	3	3
31	¾Ni–½Cr–½Mo–V	Forgings	SA–592	F	K11576	...	$2\frac{1}{2} < t \le 4$	11B	3
32	¾Ni–½Cr–½Mo–V	Plate	SA–517	F	K11576	...	≤2½	11B	3
33	¾Ni–½Cr–½Mo–V	Forgings	SA–592	F	K11576	...	≤2½	11B	3
34	¾Ni–½Cu–Mo	Smls. & wld. tube	SA–423	2	K11540	...	...	4	2
35	¾Ni–½Cu–Mo	Wld. tube	SA–423	2	K11540	...	...	4	2
36	¾Ni–½Mo–⅓Cr–V	Forgings	SA–508	2	K12766	1	...	3	3
37	¾Ni–½Mo–⅓Cr–V	Forgings	SA–541	2	K12765	1	...	3	3
38	¾Ni–½Mo–⅓Cr–V	Forgings	SA–508	2	K12766	2	...	3	3
39	¾Ni–½Mo–⅓Cr–V	Forgings	SA–541	2	K12765	2	...	3	3
40	¾Ni–½Mo–Cr–V	Forgings	SA–508	3	K12042	1	...	3	3
41	¾Ni–½Mo–Cr–V	Forgings	SA–508	3	K12042	2	...	3	3
42	¾Ni–1Mo–¾Cr	Castings	SA–217	WC5	J22000	...	...	4	1
43	1Ni–½Cr–½Mo	Castings	SA–217	WC4	J12082	...	...	4	1
44	1¼Ni–1Cr–½Mo	Plate	SA–517	P	K21650	...	$2\frac{1}{2} < t \le 4$	11B	8
45	1¼Ni–1Cr–½Mo	Plate	SA–517	P	K21650	...	≤2½	11B	8

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	80	50	NP	700	1000	NP	CS–5	G23, T4
2	90	70	NP	700	800	NP	CS–5	...
3	100	83	NP	700	NP	NP	CS–5	...
4	80	50	NP	700	NP	NP	CS–5	...
5	90	70	NP	700	800	NP	CS–5	...
6	100	83	NP	700	750	650	CS–5	...
7	80	50	1000	700	1000	650	CS–3	G11, S2, T3
8	80	50	NP	700	800	NP	CS–5	G23
9	80	50	NP	700	NP	NP	CS–3	G26, W10, W12
10	80	50	NP	700	NP	NP	CS–5	G26, W10, W12
11	90	70	NP	700	800	NP	CS–5	...
12	90	70	NP	700	NP	NP	CS–5	G26, W10, W12
13	100	83	NP	700	750	650	CS–5	...
14	100	83	NP	700	NP	NP	CS–5	G26, W10, W12
15	80	50	1000	700	1000	650	CS–3	G11, S2, T3
16	80	50	NP	700	800	NP	CS–5	G23
17	80	50	NP	NP	800	NP	CS–5	G23
18	90	70	NP	700	800	NP	CS–5	...
19	90	70	NP	NP	800	NP	CS–5	...
20	100	83	NP	700	NP	NP	CS–5	...
21	105	70	NP	NP	700	650	CS–5	...
22	85	55	NP	700 (SPT)	NP	NP	CS–3	...
23	85	55	NP	NP	650	650	CS–3	G1
24	90	65	NP	NP	650	650	CS–5	G1
25	60	30	NP	NP	1000	650	CS–2	T3
26	90	60	NP	650	650	650	CS–3	G1
27	105	85	NP	NP	700	650	CS–5	G1
28	115	95	NP	NP	700	650	CS–5	G1
29	80	50	NP	700	800	650	CS–5	G23
30	90	65	NP	700	700	NP	CS–5	...
31	105	90	NP	650 (SPT)	650	650	CS–5	S7
32	115	100	NP	650 (SPT)	650	650	HT–1	...
33	115	100	NP	NP	650	650	HT–1	...
34	60	37	650	NP	650	NP	CS–2	W13, W14
35	60	37	650	NP	650	NP	CS–2	G3, G24
36	80	50	NP	700	800	650	CS–5	G23
37	80	50	NP	700	800	650	CS–5	G23
38	90	65	NP	700	700	NP	CS–5	...
39	90	65	NP	700	700	NP	CS–5	...
40	80	50	NP	700	800	650	CS–5	G23
41	90	65	NP	700	700	NP	CS–5	...
42	70	40	1100	700	1100	NP	CS–2	G1, G17, T4
43	70	40	1000	700	1000	NP	CS–2	G1, G17, T4
44	105	90	NP	700 (SPT)	650	650	CS–5	...
45	115	100	NP	650 (SPT)	650	650	HT–1	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	22.9	22.9	22.9	...	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.1	*13.3*
2	25.7	...	25.7	25.7	25.7	25.7	25.7	25.7	25.7	25.7	25.7	25.7	...	...
3	28.6	...	28.6	...	28.6	28.6	28.6	28.6	28.6	28.6	...	...	...	...
4	22.9	...	22.9	...	22.9	22.9	22.9	22.9	22.9	22.9	...	...	...	...
5	25.7	...	25.7	25.7	25.7	25.7	25.7	25.7	25.7	25.7	25.7	25.7	...	...
6	28.6	...	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	...	...	...
7	22.9	...	22.9	...	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	*20.0*	*13.7*
8	22.9	22.9	22.9	...	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	...	...
9	22.9	...	22.9	...	22.9	22.9	22.9	22.9	22.9	22.9	...	...	...	...
10	22.9	...	22.9	...	22.9	22.9	22.9	22.9	22.9	22.9	...	...	...	...
11	25.7	...	25.7	25.7	25.7	25.7	25.7	25.7	25.7	25.7	25.7	25.7	...	...
12	25.7	...	25.7	...	25.7	25.7	25.7	25.7	25.7	25.7	...	...	...	...
13	28.6	...	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	...	...	...
14	28.6	...	28.6	...	28.6	28.6	28.6	28.6	28.6	28.6	...	...	...	...
15	22.9	...	22.9	...	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	*20.0*	*13.7*
16	22.9	22.9	22.9	...	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	...	...
17	22.9	22.9	22.9	...	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	...	...
18	25.7	...	25.7	25.7	25.7	25.7	25.7	25.7	25.7	25.7	25.7	25.7	...	...
19	25.7	...	25.7	25.7	25.7	25.7	25.7	25.7	25.7	25.7	25.7	25.7	...	...
20	28.6	...	28.6	...	28.6	28.6	28.6	28.6	28.6	28.6	...	...	...	...
21	30.0	30.0	30.0	...	30.0	30.0	30.0	30.0	30.0	30.0	...	...	...	...
22	24.3	...	23.0	...	22.4	22.4	22.4	21.9	21.5	20.9	...	...	...	...
23	24.3	...	23.1	...	22.5	22.5	22.5	21.9	21.5	...	...	...	...	...
24	25.7	...	24.6	...	24.2	24.1	24.1	23.9	23.4	...	...	...	...	...
25	17.1	17.1	17.1	...	17.1	17.1	17.1	16.8	16.6	16.3	15.9	15.4	*13.8*	*12.5*
26	25.7	...	25.7	25.7	25.7	25.7	25.7	25.7	25.7	...	...	...	...	...
27	30.0	...	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	...	...	...	...
28	32.9	32.9	32.9	32.9	32.9	32.9	32.9	32.9	32.9	32.9	...	...	...	...
29	22.9	22.9	22.9	...	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	...	...
30	25.7	...	25.7	...	25.7	25.7	25.7	25.7	25.7	25.7	...	...	...	...
31	30.0	...	30.0	...	30.0	30.0	30.0	30.0	30.0	...	...	...	...	...
32	32.9	...	32.9	...	32.9	32.9	32.9	32.9	32.8	...	...	...	...	...
33	32.9	...	32.9	...	32.9	32.9	32.9	32.9	32.8	...	...	...	...	...
34	17.1	...	17.1	...	17.1	17.1	17.1	17.1	17.1	...	...	...	...	...
35	14.6	...	14.6	...	14.6	14.6	14.6	14.6	14.6	...	...	...	...	...
36	22.9	22.9	22.9	...	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	...	...
37	22.9	22.9	22.9	...	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	...	...
38	25.7	...	25.7	...	25.7	25.7	25.7	25.7	25.7	25.7	...	...	...	...
39	25.7	...	25.7	...	25.7	25.7	25.7	25.7	25.7	25.7	...	...	...	...
40	22.9	22.9	22.9	...	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	...	...
41	25.7	...	25.7	...	25.7	25.7	25.7	25.7	25.7	25.7	...	...	...	...
42	20.0	20.0	20.0	...	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.3	*16.3*
43	20.0	...	20.0	...	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.3	*15.0*
44	30.0	...	30.0	30.0	30.0	30.0	30.0	30.0	30.0	29.4	...	...	...	...
45	32.9	...	32.9	32.9	32.9	32.9	32.9	32.9	32.8	...	...	...	...	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding														
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
1	*10.0*	*6.3*	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
7	*8.2*	*4.8*	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
15	*8.2*	*4.8*	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
25	*10.0*	*6.3*	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
42	*11.0*	*6.9*	*4.6*	*2.8*	...	...	...	...	...	...	...	...	...	...	...
43	*9.2*	*5.9*	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	1½Ni	Forgings	SA–350	LF5	K13050	1	...	9A	1
2	1½Ni	Forgings	SA–350	LF5	K13050	2	...	9A	1
3	1¾Ni–¾Cr–Mo	Forgings	SA–372	L	K24055	...	...	...	...
4	2Ni–1Cu	Forgings	SA–182	FR	K22035	...	...	9A	1
5	2Ni–1Cu	Fittings	SA–234	WPR	K22035	...	...	9A	1
6	2Ni–1Cu	Pipe	SA–333	9	K22035	...	...	9A	1
7	2Ni–1Cu	Smls. pipe	SA–333	9	K22035	...	...	9A	1
8	2Ni–1Cu	Wld. pipe	SA–333	9	K22035	...	...	9A	1
9	2Ni–1Cu	Tube	SA–334	9	K22035	...	...	9A	1
10	2Ni–1Cu	Forgings	SA–350	LF9	K22036	...	...	9A	1
11	2Ni–1Cu	Smls. & wld. fittings	SA–420	WPL9	K22035	...	...	9A	1
12	2Ni–1½Cr–¼Mo–V	Forgings	SA–723	1	K23550	1	...	...	...
13	2Ni–1½Cr–¼Mo–V	Forgings	SA–723	1	K23550	2	...	...	...
14	2Ni–1½Cr–¼Mo–V	Forgings	SA–723	1	K23550	3	...	...	...
15	2Ni–1½Cr–¼Mo–V	Forgings	SA–723	1	K23550	4	...	...	...
16	2Ni–1½Cr–¼Mo–V	Forgings	SA–723	1	K23550	5	...	...	...
17	2½Ni	Pipe	SA–333	7	K21903	...	...	9A	1
18	2½Ni	Wld. pipe	SA–333	7	K21903	...	...	9A	1
19	2½Ni	Tube	SA–334	7	K21903	...	...	9A	1
20	2½Ni	Wld. tube	SA–334	7	K21903	...	...	9A	1
21	2½Ni	Plate	SA–203	A	K21703	...	...	9A	1
22	2½Ni	Plate	SA–203	B	K22103	...	...	9A	1
23	2½Ni	Castings	SA–352	LC2	J22500	...	...	9A	1
24	2¾Ni–1½Cr–½Mo	Plate	SA–543	C	...	3	...	3	3
25	2¾Ni–1½Cr–½Mo	Plate	SA–543	C	...	1	...	11A	5
26	2¾Ni–1½Cr–½Mo	Plate	SA–543	C	...	2	...	11B	10
27	2¾Ni–1½Cr–½Mo–V	Forgings	SA–723	2	K34035	1	...	...	...
28	2¾Ni–1½Cr–½Mo–V	Forgings	SA–723	2	K34035	2	...	...	...
29	2¾Ni–1½Cr–½Mo–V	Forgings	SA–723	2	K34035	3	...	...	...
30	2¾Ni–1½Cr–½Mo–V	Forgings	SA–723	2	K34035	4	...	...	...
31	2¾Ni–1½Cr–½Mo–V	Forgings	SA–723	2	K34035	5	...	...	...
32	3Ni–1¾Cr–½Mo	Plate	SA–543	B	K42339	3	...	3	3
33	3Ni–1¾Cr–½Mo	Forgings	SA–372	M	K42365	85	...	...	...
34	3Ni–1¾Cr–½Mo	Plate	SA–543	B	K42339	1	...	11A	5
35	3Ni–1¾Cr–½Mo	Plate	SA–543	B	K42339	2	...	11B	10
36	3Ni–1¾Cr–½Mo	Forgings	SA–372	M	K42365	100	...	...	...
37	3½Ni	Pipe	SA–333	3	K31918	...	...	9B	1
38	3½Ni	Wld. pipe	SA–333	3	K31918	...	...	9B	1
39	3½Ni	Tube	SA–334	3	K31918	...	...	9B	1
40	3½Ni	Wld. tube	SA–334	3	K31918	...	...	9B	1
41	3½Ni	Fittings	SA–420	WPL3	...	...	...	9B	1
42	3½Ni	Plate	SA–203	D	K31718	...	...	9B	1
43	3½Ni	Forgings	SA–350	LF3	K32025	1	...	9B	1
44	3½Ni	Forgings	SA–350	LF3	K32025	2	...	9B	1
45	3½Ni	Forgings	SA–765	III	K32026	...	...	9B	1

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	60	30	NP	NP	500	500	CS-2	...
2	70	37.5	NP	NP	500	500	CS-2	...
3	155	135	NP	NP	650	650	...	W11
4	63	46	NP	NP	100	100	CS-3	...
5	63	46	NP	NP	100	NP	CS-3	...
6	63	46	NP	NP	100	100	CS-3	...
7	63	46	NP	100	NP	NP	CS-3	...
8	63	46	NP	NP	100	100	CS-3	G24
9	63	46	NP	NP	100	100	CS-3	...
10	63	46	NP	NP	100	100	CS-3	...
11	63	46	NP	100	100	100	CS-3	W14
12	115	100	NP	700 (SPT)	NP	NP	HT-1	W1
13	135	120	NP	700 (SPT)	NP	NP	HT-1	W1
14	155	140	NP	700 (SPT)	NP	NP	HT-1	W1
15	175	160	NP	700 (SPT)	NP	NP	HT-1	W1
16	190	180	NP	700 (SPT)	NP	NP	HT-1	W1
17	65	35	NP	NP	650	650	CS-2	...
18	65	35	NP	NP	650	650	CS-2	G24
19	65	35	NP	NP	650	650	CS-2	...
20	65	35	NP	NP	650	650	CS-2	G24
21	65	37	NP	700	1000	650	CS-2	T2
22	70	40	NP	650	1000	650	CS-2	T2
23	70	40	NP	100	650	650	CS-2	G1
24	90	70	NP	NP	650	NP	CS-5	...
25	105	85	NP	NP	650	NP	CS-5	...
26	115	100	NP	NP	650	NP	HT-1	...
27	115	100	NP	700 (SPT)	NP	NP	HT-1	W1
28	135	120	NP	700 (SPT)	NP	NP	HT-1	W1
29	155	140	NP	700 (SPT)	NP	NP	HT-1	W1
30	175	160	NP	700 (SPT)	NP	NP	HT-1	W1
31	190	180	NP	700 (SPT)	NP	NP	HT-1	W1
32	90	70	NP	NP	650	NP	CS-5	...
33	105	85	NP	NP	650	650	...	W11
34	105	85	NP	NP	650	NP	CS-5	...
35	115	100	NP	NP	650	NP	HT-1	...
36	120	100	NP	NP	650	650	...	W11
37	65	35	NP	NP	650	650	CS-2	...
38	65	35	NP	NP	650	650	CS-2	G24
39	65	35	NP	NP	650	650	CS-2	...
40	65	35	NP	NP	650	650	CS-2	G24
41	65	35	NP	NP	650	650	CS-2	...
42	65	37	NP	700	1000	650	CS-2	T2
43	70	37.5	NP	650	650	650	CS-2	...
44	70	37.5	NP	650	650	650	CS-2	...
45	70	37.5	NP	NP	650	650	CS-2	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	17.1	...	16.5	...	15.7	15.3	15.3	...	...	...	...	...	...	...
2	20.0	...	19.2	...	18.3	17.8	17.8	...	...	...	...	...	...	...
3	44.3	...	44.3	...	44.3	44.3	44.3	44.1	42.9	...	...	...	...	...
4	18.1	...	...	...	...	...	...	...	...	...	...	...	...	...
5	18.1	...	...	...	...	...	...	...	...	...	...	...	...	...
6	18.1	...	...	...	...	...	...	...	...	...	...	...	...	...
7	17.9	...	...	...	...	...	...	...	...	...	...	...	...	...
8	15.3	...	...	...	...	...	...	...	...	...	...	...	...	...
9	18.1	...	...	...	...	...	...	...	...	...	...	...	...	...
10	18.1	...	...	...	...	...	...	...	...	...	...	...	...	...
11	18.1	...	...	...	...	...	...	...	...	...	...	...	...	...
12	32.9	...	32.9	...	32.9	32.9	32.9	32.9	32.4	31.6	...	...	...	...
13	38.6	...	38.6	...	38.6	38.6	38.6	38.6	38.0	37.1	...	...	...	...
14	44.3	...	44.3	...	44.3	44.3	44.3	44.3	43.6	42.6	...	...	...	...
15	50.0	...	50.0	...	50.0	50.0	50.0	50.0	49.2	48.0	...	...	...	...
16	54.3	...	54.3	...	54.3	54.3	54.3	54.3	53.5	52.2	...	...	...	...
17	18.6	18.6	18.6	...	18.6	18.6	18.6	17.5	16.7	...	...	...	...	...
18	15.8	...	15.8	...	15.8	15.8	15.8	14.9	14.2	...	...	...	...	...
19	18.6	18.6	18.6	...	18.6	18.6	18.6	17.5	16.7	...	...	...	...	...
20	15.8	15.8	15.8	...	15.8	15.8	15.8	14.9	14.2	...	...	...	...	...
21	18.6	18.6	18.6	...	18.6	18.6	18.6	18.5	17.6	16.6	*13.9*	*11.4*	*9.0*	*6.5*
22	20.0	20.0	20.0	...	20.0	20.0	20.0	20.0	19.0	18.0	*14.8*	*12.0*	*9.3*	*6.5*
23	20.0	20.0	20.0	...	20.0	20.0	20.0	20.0	19.0	...	...	...	...	...
24	25.7	...	25.7	25.7	25.7	25.5	25.3	25.0	24.6	...	...	...	...	...
25	30.0	...	30.0	30.0	30.0	29.7	29.5	29.1	28.7	...	...	...	...	...
26	32.9	...	32.9	32.9	32.9	32.5	32.3	31.9	31.5	...	...	...	...	...
27	32.9	...	32.9	...	32.9	32.9	32.9	32.9	32.4	31.6	...	...	...	...
28	38.6	...	38.6	...	38.6	38.6	38.6	38.6	38.0	37.1	...	...	...	...
29	44.3	...	44.3	...	44.3	44.3	44.3	44.3	43.6	42.6	...	...	...	...
30	50.0	...	50.0	...	50.0	50.0	50.0	50.0	49.2	48.0	...	...	...	...
31	54.3	...	54.3	...	54.3	54.3	54.3	54.3	53.5	52.2	...	...	...	...
32	25.7	...	25.7	25.7	25.7	25.5	25.3	25.0	24.6	...	...	...	...	...
33	30.0	...	30.0	30.0	30.0	29.7	29.5	29.1	28.7	...	...	...	...	...
34	30.0	...	30.0	30.0	30.0	29.7	29.5	29.1	28.7	...	...	...	...	...
35	32.9	...	32.9	32.9	32.9	32.5	32.3	31.9	31.5	...	...	...	...	...
36	34.3	...	34.3	34.3	34.3	33.9	33.7	33.3	32.9	...	...	...	...	...
37	18.6	18.6	18.6	...	18.6	18.6	18.6	17.5	16.7	...	...	...	...	...
38	15.8	...	15.8	...	15.8	15.8	15.8	14.9	14.2	...	...	...	...	...
39	18.6	18.6	18.6	...	18.6	18.6	18.6	17.5	16.7	...	...	...	...	...
40	15.8	15.8	15.8	...	15.8	15.8	15.8	14.9	14.2	...	...	...	...	...
41	18.6	18.6	18.6	...	18.6	18.6	18.6	17.5	16.7	...	...	...	...	...
42	18.6	18.6	18.6	...	18.6	18.6	18.6	18.5	17.6	16.6	*13.9*	*11.4*	*9.0*	*6.5*
43	20.0	...	20.0	...	20.0	20.0	20.0	18.8	17.9	...	...	...	...	...
44	20.0	...	20.0	...	20.0	20.0	20.0	18.8	17.9	...	...	...	...	...
45	20.0	20.0	20.0	...	20.0	20.0	20.0	18.8	17.9	...	...	...	...	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding														
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
21	*4.5*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...
22	*4.5*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
42	*4.5*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	3½Ni	Plate	SA–203	E	K32018	...	...	9B	1
2	3½Ni	Plate	SA–203	E	K32018	...	...	9B	1
3	3½Ni	Castings	SA–352	LC3	J31550	...	...	9B	1
4	3½Ni	Plate	SA–203	F	...	...	>2	9B	1
5	3½Ni	Plate	SA–203	F	...	...	≤2	9B	1
6	3½Ni–1¾Cr–½Mo–V	Forgings	SA–508	4N	K22375	3	...	3	3
7	3½Ni–1¾Cr–½Mo–V	Forgings	SA–508	4N	K22375	1	...	11A	5
8	3½Ni–1¾Cr–½Mo–V	Forgings	SA–508	4N	K22375	2	...	11B	10
9	4Ni–1½Cr–½Mo–V	Forgings	SA–723	3	K44045	1	...	...	...
10	4Ni–1½Cr–½Mo–V	Forgings	SA–723	3	K44045	2	...	...	...
11	4Ni–1½Cr–½Mo–V	Forgings	SA–723	3	K44045	3	...	...	...
12	4Ni–1½Cr–½Mo–V	Forgings	SA–723	3	K44045	4	...	...	...
13	4Ni–1½Cr–½Mo–V	Forgings	SA–723	3	K44045	5	...	...	...
14	5Ni–¼Mo	Plate	SA–645	A	K41583	...	...	11A	2
15	7Ni	Plate	SA–553	III	K61365	...	≤2	11A	1
16	7Ni	Plate	SA–553	III	K61365	...	≤2	11A	1
17	8Ni	Forgings	SA–522	II	K71340	...	...	11A	1
18	8Ni	Plate	SA–553	II	K71340	...	...	11A	1
19	8Ni	Plate	SA–553	II	K71340	...	...	11A	1
20	9Ni	Plate	SA/EN 10028–4	X8Ni9	...	NNT640	≤2	11A	1
21	9Ni	Plate	SA/EN 10028–4	X8Ni9	...	QT640	≤2	11A	1
22	9Ni	Plate	SA/EN 10028–4	X7Ni9	...	QT	≤2	11A	1
23	9Ni	Plate	SA/EN 10028–4	X7Ni9	...	QT	≤2	11A	1
24	9Ni	Plate	SA/EN 10028–4	X8Ni9	...	QT680	≤2	11A	1
25	9Ni	Plate	SA/EN 10028–4	X8Ni9	...	QT680	≤2	11A	1
26	9Ni	Smls. & wld. pipe	SA–333	8	K81340	...	...	11A	1
27	9Ni	Smls. & wld. pipe	SA–333	8	K81340	...	...	11A	1
28	9Ni	Smls. pipe	SA–333	8	K81340	...	...	11A	1
29	9Ni	Smls. pipe	SA–333	8	K81340	...	...	11A	1
30	9Ni	Wld. pipe	SA–333	8	K81340	...	...	11A	1
31	9Ni	Wld. tube	SA–334	8	K81340	...	...	11A	1
32	9Ni	Smls. & wld. tube	SA–334	8	K81340	...	...	11A	1
33	9Ni	Smls. tube	SA–334	8	K81340	...	...	11A	1
34	9Ni	Smls. tube	SA–334	8	K81340	...	...	11A	1
35	9Ni	Wld. tube	SA–334	8	K81340	...	...	11A	1
36	9Ni	Plate	SA–353	...	K81340	...	...	11A	1
37	9Ni	Plate	SA–353	...	K81340	...	...	11A	1
38	9Ni	Plate	SA–353	...	K81340	...	...	11A	1
39	9Ni	Smls. & wld. fittings	SA–420	WPL8	K81340	...	...	11A	1
40	9Ni	Smls. & wld. fittings	SA–420	WPL8	K81340	...	...	11A	1
41	9Ni	Forgings	SA–522	I	K81340	...	...	11A	1
42	9Ni	Forgings	SA–522	I	K81340	...	...	11A	1
43	9Ni	Plate	SA–553	I	K81340	...	...	11A	1
44	9Ni	Plate	SA–553	I	K81340	...	...	11A	1
(**21**) 45	25Ni–15Cr–2Ti	Forgings, bar	SA–638	660	S66286	...	...	...	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	70	40	NP	300 (SPT)	NP	NP	CS–2	...
2	70	40	NP	650	1000	650	CS–2	T2
3	70	40	NP	100	650	650	CS–2	G1
4	75	50	NP	NP	650	650	CS–3	...
5	80	55	NP	NP	650	650	CS–3	...
6	90	70	NP	NP	650	650	CS–5	...
7	105	85	NP	600 (SPT)	650	NP	CS–5	...
8	115	100	NP	NP	650	NP	HT–1	...
9	115	100	NP	700 (SPT)	NP	NP	HT–1	W1
10	135	120	NP	700 (SPT)	NP	NP	HT–1	W1
11	155	140	NP	700 (SPT)	NP	NP	HT–1	W1
12	175	160	NP	700 (SPT)	NP	NP	HT–1	W1
13	190	180	NP	700 (SPT)	NP	NP	HT–1	W1
14	95	65	NP	NP	250	250	CS–3	...
15	100	85	NP	NP	150	NP	CS–3	G20, W4
16	100	85	NP	NP	150	NP	CS–3	G20, W5
17	100	75	NP	200 (Cl. 3 only)	NP	NP	CS–3	G20, W5
18	100	85	NP	200 (Cl. 3 only)	250	250	CS–3	G20, W5
19	100	85	NP	200 (Cl. 3 only)	250	250	CS–3	G20, W4
20	93	69.5	NP	NP	250	250	CS–3	G20
21	93	69.5	NP	NP	250	250	CS–3	G20
22	98.5	83.5	NP	NP	250	250	CS–3	G20, W4
23	98.5	83.5	NP	NP	250	250	CS–3	G20, W5
24	98.5	83.5	NP	NP	250	250	CS–3	G20, W4
25	98.5	83.5	NP	NP	250	250	CS–3	G20, W5
26	100	75	NP	200 (Cl. 3 only)	NP	NP	CS–3	G20, W12
27	100	75	NP	200 (Cl. 3 only)	NP	NP	CS–3	G20, W5, W12
28	100	75	NP	NP	250	250	CS–3	G20, W4
29	100	75	NP	NP	250	250	CS–3	G20, W5
30	100	75	NP	NP	250	250	CS–3	G20, G24, W3
31	100	75	NP	200 (Cl. 3 only)	NP	NP	CS–3	G20, W12
32	100	75	NP	200 (Cl. 3 only)	NP	NP	CS–3	G20, W5, W12
33	100	75	NP	NP	250	250	CS–3	G20, W4
34	100	75	NP	NP	250	250	CS–3	G20, W5
35	100	75	NP	NP	250	250	CS–3	G20, G24, W3
36	100	75	NP	200 (Cl. 3 only)	250	250	CS–3	G20, W4
37	100	75	NP	NP	250	250	CS–3	G20, W5
38	100	75	NP	200 (Cl. 3 only)	NP	NP	CS–3	G20, W5
39	100	75	NP	NP	250	250	CS–3	G20, W4
40	100	75	NP	NP	250	250	CS–3	G20, W3
41	100	75	NP	200 (Cl. 3 only)	250	250	CS–3	G20, S8, W4
42	100	75	NP	NP	250	250	CS–3	G20, S8, W5
43	100	85	NP	200 (Cl. 3 only)	250	250	CS–3	G20, W4
44	100	85	NP	200 (Cl. 3 only)	250	250	CS–3	G20, W5
45	130	85	NP	700	700	NP	HA–5	W1

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
No.	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	20.0	...	20.0	...	20.0	...	...	...	...	...	...	...	...	...
2	20.0	...	20.0	...	20.0	20.0	20.0	20.0	19.0	18.0	*14.8*	*12.0*	*9.3*	*6.5*
3	20.0	20.0	20.0	...	20.0	20.0	20.0	20.0	19.0	...	...	...	...	...
4	21.4	21.4	21.4	...	21.4	21.4	21.4	21.4	20.5	...	...	...	...	...
5	22.9	22.9	22.9	...	22.9	22.9	22.9	22.9	20.5	...	...	...	...	...
6	25.7	...	25.7	25.7	25.7	25.5	25.3	25.0	24.6	...	...	...	...	...
7	30.0	...	30.0	30.0	30.0	29.7	29.5	29.1	28.7	...	...	...	...	...
8	32.9	...	32.9	32.9	32.9	32.5	32.3	31.9	31.5	...	...	...	...	...
9	32.9	...	32.9	...	32.9	32.9	32.9	32.9	32.4	31.6	...	...	...	...
10	38.6	...	38.6	...	38.6	38.6	38.6	38.6	38.0	37.1	...	...	...	...
11	44.3	...	44.3	...	44.3	44.3	44.3	44.3	43.6	42.6	...	...	...	...
12	50.0	...	50.0	...	50.0	50.0	50.0	50.0	49.2	48.0	...	...	...	...
13	54.3	...	54.3	...	54.3	54.3	54.3	54.3	53.5	52.2	...	...	...	...
14	27.1	...	27.1	26.6	...	...	...	...	...	...	...	...	...	...
15	28.6	28.6	...	...	...	...	...	...	...	...	...	...	...	...
16	27.1	27.1	...	...	...	...	...	...	...	...	...	...	...	...
17	27.1	27.1	25.4	...	...	...	...	...	...	...	...	...	...	...
18	27.1	27.1	25.4	24.6	...	...	...	...	...	...	...	...	...	...
19	28.6	28.6	26.7	25.9	...	...	...	...	...	...	...	...	...	...
20	26.5	26.5	26.5	26.5	...	...	...	...	...	...	...	...	...	...
21	26.5	26.5	26.5	26.5	...	...	...	...	...	...	...	...	...	...
22	28.2	28.2	28.2	28.2	...	...	...	...	...	...	...	...	...	...
23	27.1	27.1	27.1	27.1	...	...	...	...	...	...	...	...	...	...
24	28.2	28.2	28.2	28.2	...	...	...	...	...	...	...	...	...	...
25	27.1	27.1	27.1	27.1	...	...	...	...	...	...	...	...	...	...
26	28.6	28.6	26.7	...	...	...	...	...	...	...	...	...	...	...
27	27.1	27.1	25.4	...	...	...	...	...	...	...	...	...	...	...
28	28.6	28.6	26.7	25.9	...	...	...	...	...	...	...	...	...	...
29	27.1	27.1	25.4	24.6	...	...	...	...	...	...	...	...	...	...
30	24.3	24.3	22.7	22.1	...	...	...	...	...	...	...	...	...	...
31	28.6	28.6	26.7	...	...	...	...	...	...	...	...	...	...	...
32	27.1	27.1	25.4	...	...	...	...	...	...	...	...	...	...	...
33	28.6	28.6	26.7	25.9	...	...	...	...	...	...	...	...	...	...
34	27.1	27.1	25.4	24.6	...	...	...	...	...	...	...	...	...	...
35	24.3	24.3	22.7	22.1	...	...	...	...	...	...	...	...	...	...
36	28.6	28.6	26.7	25.9	...	...	...	...	...	...	...	...	...	...
37	27.1	27.1	25.4	24.6	...	...	...	...	...	...	...	...	...	...
38	27.1	27.1	25.4	...	...	...	...	...	...	...	...	...	...	...
39	28.6	28.6	26.7	25.9	...	...	...	...	...	...	...	...	...	...
40	27.1	27.1	25.4	24.6	...	...	...	...	...	...	...	...	...	...
41	28.6	28.6	26.7	25.9	...	...	...	...	...	...	...	...	...	...
42	27.1	27.1	25.4	24.6	...	...	...	...	...	...	...	...	...	...
43	28.6	28.6	26.7	25.9	...	...	...	...	...	...	...	...	...	...
44	27.1	27.1	25.4	24.6	...	...	...	...	...	...	...	...	...	...
45	37.1	...	37.1	...	37.1	37.1	36.5	35.8	35.4	35.0	...	...	...	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding														
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
2	*4.5*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	... (**21**)

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	27Ni–22Cr–7Mo–Mn–Cu–N	Smls. tube	SA–213	...	S31277	...	...	45	...
2	27Ni–22Cr–7Mo–Mn–Cu–N	Smls. tube	SA–213	...	S31277	...	...	45	...
3	27Ni–22Cr–7Mo–Mn–Cu–N	Plate	SA–240	...	S31277	...	...	45	...
4	27Ni–22Cr–7Mo–Mn–Cu–N	Plate	SA–240	...	S31277	...	...	45	...
5	27Ni–22Cr–7Mo–Mn–Cu–N	Wld. tube	SA–249	...	S31277	...	...	45	...
6	27Ni–22Cr–7Mo–Mn–Cu–N	Wld. tube	SA–249	...	S31277	...	...	45	...
7	29Ni–20Cr–3Cu–2Mo	Castings	SA–351	CN7M	J95150	...	...	45	...
8	29Ni–20Cr–3Cu–2Mo	Castings	SA–351	CN7M	J95150	...	...	45	...
9	14Cr–16Ni–6Si–Cu–Mo	Smls. tube	SA–213	...	S38815	...	...	8	1
10	14Cr–16Ni–6Si–Cu–Mo	Smls. tube	SA–213	...	S38815	...	...	8	1
11	14Cr–16Ni–6Si–Cu–Mo	Plate	SA–240	...	S38815	...	...	8	1
12	14Cr–16Ni–6Si–Cu–Mo	Plate	SA–240	...	S38815	...	...	8	1
13	14Cr–16Ni–6Si–Cu–Mo	Wld. tube	SA–249	...	S38815	...	...	8	1
14	14Cr–16Ni–6Si–Cu–Mo	Wld. tube	SA–249	...	S38815	...	...	8	1
15	14Cr–16Ni–6Si–Cu–Mo	Wld. pipe	SA–312	...	S38815	...	...	8	1
16	14Cr–16Ni–6Si–Cu–Mo	Wld. pipe	SA–312	...	S38815	...	...	8	1
17	14Cr–16Ni–6Si–Cu–Mo	Smls. & wld. fittings	SA–403	...	S38815	...	...	8	1
18	14Cr–16Ni–6Si–Cu–Mo	Smls. & wld. fittings	SA–403	...	S38815	...	...	8	1
19	14Cr–16Ni–6Si–Cu–Mo	Bar	SA–479	...	S38815	...	...	8	1
20	14Cr–16Ni–6Si–Cu–Mo	Bar	SA–479	...	S38815	...	...	8	1
21	16Cr–4Ni–6Mn	Plate	SA–240	201LN	S20153	...	...	8	3
22	16Cr–4Ni–6Mn	Plate	SA–240	201LN	S20153	...	...	8	3
23	16Cr–9Mn–2Ni–N	Plate	SA–240	204	S20400	...	...	8	3
24	16Cr–9Mn–2Ni–N	Plate	SA–240	204	S20400	...	...	8	3
25	16Cr–12Ni–2Mo	Forgings	SA–182	F316L	S31603	...	>5	8	1
26	16Cr–12Ni–2Mo	Forgings	SA–182	F316L	S31603	...	>5	8	1
27	16Cr–12Ni–2Mo	Forgings	SA–965	F316L	S31603	...	...	8	1
28	16Cr–12Ni–2Mo	Forgings	SA–965	F316L	S31603	...	...	8	1
29	16Cr–12Ni–2Mo	Forgings	SA–182	F316L	S31603	...	≤5	8	1
30	16Cr–12Ni–2Mo	Forgings	SA–182	F316L	S31603	...	≤5	8	1
31	16Cr–12Ni–2Mo	Smls. tube	SA–213	TP316L	S31603	...	...	8	1
32	16Cr–12Ni–2Mo	Smls. tube	SA–213	TP316L	S31603	...	...	8	1
33	16Cr–12Ni–2Mo	Plate	SA–240	316L	S31603	...	...	8	1
34	16Cr–12Ni–2Mo	Plate	SA–240	316L	S31603	...	...	8	1
35	16Cr–12Ni–2Mo	Wld. tube	SA–249	TP316L	S31603	...	...	8	1
36	16Cr–12Ni–2Mo	Wld. tube	SA–249	TP316L	S31603	...	...	8	1
37	16Cr–12Ni–2Mo	Wld. tube	SA–249	TP316L	S31603	...	...	8	1
38	16Cr–12Ni–2Mo	Smls. & wld. pipe	SA–312	TP316L	S31603	...	...	8	1
39	16Cr–12Ni–2Mo	Smls. pipe	SA–312	TP316L	S31603	...	...	8	1
40	16Cr–12Ni–2Mo	Wld. pipe	SA–312	TP316L	S31603	...	...	8	1
41	16Cr–12Ni–2Mo	Wld. pipe	SA–312	TP316L	S31603	...	...	8	1
42	16Cr–12Ni–2Mo	Wld. pipe	SA–358	316L	S31603	1	...	8	1
43	16Cr–12Ni–2Mo	Smls. & wld. fittings	SA–403	316L	S31603	...	...	8	1
44	16Cr–12Ni–2Mo	Wld. pipe	SA–409	TP316L	S31603	...	...	8	1
45	16Cr–12Ni–2Mo	Bar	SA–479	316L	S31603	...	...	8	1

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	112	52	NP	NP	800	NP	NFN–26	G5
2	112	52	NP	NP	800	NP	NFN–26	...
3	112	52	NP	NP	800	NP	NFN–26	G5
4	112	52	NP	NP	800	NP	NFN–26	...
5	112	52	NP	NP	800	NP	NFN–26	G3, G5
6	112	52	NP	NP	800	NP	NFN–26	...
7	62	25	600	600 (Cl. 3 only)	600	NP	NFN–9	G1, G5
8	62	25	600	NP	600	NP	NFN–9	G1
9	78	37	NP	NP	800	NP	HA–2	G5
10	78	37	NP	NP	800	NP	HA–2	...
11	78	37	NP	NP	800	NP	HA–2	G5
12	78	37	NP	NP	800	NP	HA–2	...
13	78	37	NP	NP	800	NP	HA–2	G5
14	78	37	NP	NP	800	NP	HA–2	...
15	78	37	NP	NP	800	NP	HA–2	G5
16	78	37	NP	NP	800	NP	HA–2	...
17	78	37	NP	NP	800	NP	HA–2	G5, W14
18	78	37	NP	NP	800	NP	HA–2	W14
19	78	37	NP	NP	800	NP	HA–2	G5
20	78	37	NP	NP	800	NP	HA–2	...
21	95	45	NP	NP	800	650	HA–6	G5
22	95	45	NP	NP	800	650	HA–6	...
23	95	48	NP	NP	900	650	HA–6	G5
24	95	48	NP	NP	900	650	HA–6	...
25	65	25	850	800	850	650	HA–4	G5
26	65	25	850	NP	850	650	HA–4	G21
27	65	25	850	800	850	650	HA–4	G5
28	65	25	850	NP	850	650	HA–4	G21
29	70	25	850	800	850	650	HA–4	G5
30	70	25	850	NP	850	650	HA–4	G21
31	70	25	850	800	850	NP	HA–4	G5
32	70	25	850	NP	850	NP	HA–4	G21
33	70	25	850	800	850	650	HA–4	G5
34	70	25	850	NP	850	650	HA–4	G21
35	70	25	NP	800	NP	NP	HA–4	G5, W12
36	70	25	850	NP	850	650	HA–4	G5, G21, G24
37	70	25	850	NP	850	650	HA–4	G21, G24
38	70	25	850	800	850	650	HA–4	G5, G21, W12, W14
39	70	25	850	NP	850	650	HA–4	G21
40	70	25	850	NP	850	650	HA–4	G5, G21, G24
41	70	25	850	NP	850	650	HA–4	G21, G24
42	70	25	NP	800	NP	NP	HA–4	G5
43	70	25	NP	800	850	650	HA–4	G5, W12, W14
44	70	25	NP	800	NP	NP	HA–4	G5
45	70	25	850	800	850	650	HA–4	G5, G21, G22

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	32.0	32.0	32.0	31.5	30.7	29.4	28.4	27.5	27.1	26.8	26.5	26.3	...	...
2	32.0	32.0	32.0	30.4	28.8	26.5	25.5	25.4	25.4	25.3	25.1	24.9	...	...
3	32.0	32.0	32.0	31.5	30.7	29.4	28.4	27.5	27.1	26.8	26.5	26.3	...	...
4	32.0	32.0	32.0	30.4	28.8	26.5	25.5	25.4	25.4	25.3	25.1	24.9	...	...
5	27.2	27.2	27.2	26.8	26.1	24.9	24.1	23.4	23.1	22.7	22.5	22.3	...	...
6	27.2	27.2	27.2	25.8	24.5	22.5	21.7	21.6	21.6	21.5	21.3	21.2	...	...
7	16.7	...	16.0	...	13.6	12.8	12.1	11.6	...	...	...	...	...	...
8	16.7	...	14.4	...	12.9	11.8	10.8	10.0	...	...	...	...	...	...
9	22.3	...	22.3	...	22.2	21.5	21.0	20.7	20.6	20.6	20.6	20.5	...	...
10	22.3	...	20.8	...	18.5	17.1	16.3	16.0	16.0	16.0	16.0	16.0	...	...
11	22.3	...	22.3	...	22.2	21.5	21.0	20.7	20.6	20.6	20.6	20.5	...	...
12	22.3	...	20.8	...	18.5	17.1	16.3	16.0	16.0	16.0	16.0	16.0	...	...
13	18.9	...	18.9	...	18.9	18.3	17.8	17.6	17.5	17.5	17.5	17.5	...	...
14	18.9	...	17.7	...	15.7	14.5	13.8	13.6	13.6	13.6	13.6	13.6	...	...
15	18.9	...	18.9	...	18.9	18.3	17.8	17.6	17.5	17.5	17.5	17.5	...	...
16	18.9	...	17.7	...	15.7	14.5	13.8	13.6	13.6	13.6	13.6	13.6	...	...
17	22.3	...	22.3	...	22.2	21.5	21.0	20.7	20.6	20.6	20.6	20.5	...	...
18	22.3	...	20.8	...	18.5	17.1	16.3	16.0	16.0	16.0	16.0	16.0	...	...
19	22.3	...	22.3	...	22.2	21.5	21.0	20.7	20.6	20.6	20.6	20.5	...	...
20	22.3	...	20.8	...	18.5	17.1	16.3	16.0	16.0	16.0	16.0	16.0	...	...
21	27.1	...	23.7	...	21.2	20.1	20.0	19.6	19.6	19.4	19.2	18.8	...	...
22	27.1	...	23.7	...	21.2	20.1	19.7	19.2	18.6	18.0	17.4	16.7	...	...
23	27.1	...	23.6	...	20.6	18.9	18.1	17.9	17.9	17.9	17.8	17.7	17.4	16.9
24	27.1	...	23.6	...	20.3	17.9	16.5	15.8	15.6	15.5	15.3	15.1	14.8	14.3
25	16.7	...	16.7	...	16.7	15.7	14.8	14.0	13.7	13.5	13.2	12.9	12.7	...
26	16.7	...	14.2	...	12.7	11.7	10.9	10.4	10.2	10.0	9.8	9.6	9.4	...
27	16.7	...	16.7	...	16.7	15.7	14.8	14.0	13.7	13.5	13.2	12.9	12.7	...
28	16.7	...	14.2	...	12.7	11.7	10.9	10.4	10.2	10.0	9.8	9.6	9.4	...
29	16.7	...	16.7	...	16.7	15.7	14.8	14.0	13.7	13.5	13.2	12.9	12.7	...
30	16.7	...	14.2	...	12.7	11.7	10.9	10.4	10.2	10.0	9.8	9.6	9.4	...
31	16.7	...	16.7	...	16.7	15.7	14.8	14.0	13.7	13.5	13.2	12.9	12.7	...
32	16.7	...	14.2	...	12.7	11.7	10.9	10.4	10.2	10.0	9.8	9.6	9.4	...
33	16.7	...	16.7	...	16.7	15.7	14.8	14.0	13.7	13.5	13.2	12.9	12.7	...
34	16.7	...	14.2	...	12.7	11.7	10.9	10.4	10.2	10.0	9.8	9.6	9.4	...
35	16.7	...	16.7	...	16.7	15.7	14.8	14.0	13.7	13.5	13.2	12.9	...	...
36	14.2	...	14.2	...	14.2	13.4	12.5	11.9	11.7	11.4	11.2	11.0	10.8	...
37	14.2	...	12.1	...	10.8	9.9	9.3	8.8	8.7	8.5	8.3	8.1	8.0	...
38	16.7	...	16.7	...	16.7	15.7	14.8	14.0	13.7	13.5	13.2	12.9	12.7	...
39	16.7	...	14.2	...	12.7	11.7	10.9	10.4	10.2	10.0	9.8	9.6	9.4	...
40	14.2	...	14.2	...	14.2	13.4	12.5	11.9	11.7	11.4	11.2	11.0	10.8	...
41	14.2	...	12.1	...	10.8	9.9	9.3	8.8	8.7	8.5	8.3	8.1	8.0	...
42	16.7	...	16.7	...	16.7	15.7	14.8	14.0	13.7	13.5	13.2	12.9	...	...
43	16.7	...	16.7	...	16.7	15.7	14.8	14.0	13.7	13.5	13.2	12.9	12.7	...
44	16.7	...	16.7	...	16.7	15.7	14.8	14.0	13.7	13.5	13.2	12.9	...	...
45	16.7	...	16.7	...	16.7	15.7	14.8	14.0	13.7	13.5	13.2	12.9	12.7	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding														
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	16Cr–12Ni–2Mo	Bar	SA–479	316L	S31603	...	...	8	1
2	16Cr–12Ni–2Mo	Wld. tube	SA–688	TP316L	S31603	...	...	8	1
3	16Cr–12Ni–2Mo	Wld. tube	SA–688	TP316L	S31603	...	...	8	1
4	16Cr–12Ni–2Mo	Wld. tube	SA–688	TP316L	S31603	...	...	8	1
5	16Cr–12Ni–2Mo	Wld. pipe	SA–813	TP316L	S31603	...	...	8	1
6	16Cr–12Ni–2Mo	Wld. pipe	SA–814	TP316L	S31603	...	...	8	1
7	16Cr–12Ni–2Mo	Bar	SA/JIS G4303	SUS316L	...	...	...	8	1
8	16Cr–12Ni–2Mo	Castings	SA–351	CF3M	J92800	...	...	8	1
9	16Cr–12Ni–2Mo	Castings	SA–351	CF3M	J92800	...	...	8	1
10	16Cr–12Ni–2Mo	Cast pipe	SA–451	CPF3M	J92800	...	...	8	1
11	16Cr–12Ni–2Mo	Castings	SA–351	CF8M	J92900	...	...	8	1
12	16Cr–12Ni–2Mo	Castings	SA–351	CF8M	J92900	...	...	8	1
13	16Cr–12Ni–2Mo	Cast pipe	SA–451	CPF8M	J92900	...	...	8	1
14	16Cr–12Ni–2Mo	Forgings	SA–182	F316	S31600	...	>5	8	1
15	16Cr–12Ni–2Mo	Forgings	SA–182	F316	S31600	...	>5	8	1
16	16Cr–12Ni–2Mo	Forgings	SA–965	F316	S31600	...	...	8	1
17	16Cr–12Ni–2Mo	Forgings	SA–965	F316	S31600	...	...	8	1
18	16Cr–12Ni–2Mo	Forgings	SA–182	F316H	S31609	...	>5	8	1
19	16Cr–12Ni–2Mo	Forgings	SA–182	F316H	S31609	...	>5	8	1
20	16Cr–12Ni–2Mo	Forgings	SA–965	F316H	S31609	...	...	8	1
21	16Cr–12Ni–2Mo	Forgings	SA–965	F316H	S31609	...	...	8	1
22	16Cr–12Ni–2Mo	Forgings	SA–182	F316	S31600	...	≤5	8	1
23	16Cr–12Ni–2Mo	Forgings	SA–182	F316	S31600	...	≤5	8	1
24	16Cr–12Ni–2Mo	Smls. tube	SA–213	TP316	S31600	...	...	8	1
25	16Cr–12Ni–2Mo	Smls. tube	SA–213	TP316	S31600	...	...	8	1
26	16Cr–12Ni–2Mo	Plate	SA–240	316	S31600	...	...	8	1
27	16Cr–12Ni–2Mo	Plate	SA–240	316	S31600	...	...	8	1
28	16Cr–12Ni–2Mo	Wld. tube	SA–249	TP316	S31600	...	...	8	1
29	16Cr–12Ni–2Mo	Wld. tube	SA–249	TP316	S31600	...	...	8	1
30	16Cr–12Ni–2Mo	Wld. tube	SA–249	TP316	S31600	...	...	8	1
31	16Cr–12Ni–2Mo	Wld. tube	SA–249	TP316	S31600	...	...	8	1
32	16Cr–12Ni–2Mo	Smls. & wld. pipe	SA–312	TP316	S31600	...	...	8	1
33	16Cr–12Ni–2Mo	Smls. & wld. pipe	SA–312	TP316	S31600	...	...	8	1
34	16Cr–12Ni–2Mo	Wld. pipe	SA–312	TP316	S31600	...	...	8	1
35	16Cr–12Ni–2Mo	Wld. pipe	SA–312	TP316	S31600	...	...	8	1
36	16Cr–12Ni–2Mo	Wld. pipe	SA–358	316	S31600	1	...	8	1
37	16Cr–12Ni–2Mo	Smls. pipe	SA–376	TP316	S31600	...	...	8	1
38	16Cr–12Ni–2Mo	Smls. pipe	SA–376	TP316	S31600	...	...	8	1
39	16Cr–12Ni–2Mo	Smls. & wld. fittings	SA–403	316	S31600	...	...	8	1
40	16Cr–12Ni–2Mo	Wld. pipe	SA–409	TP316	S31600	...	...	8	1
41	16Cr–12Ni–2Mo	Bar	SA–479	316	S31600	...	...	8	1
42	16Cr–12Ni–2Mo	Bar	SA–479	316	S31600	...	...	8	1
43	16Cr–12Ni–2Mo	Wld. tube	SA–688	TP316	S31600	...	...	8	1
44	16Cr–12Ni–2Mo	Wld. tube	SA–688	TP316	S31600	...	...	8	1
45	16Cr–12Ni–2Mo	Wld. tube	SA–688	TP316	S31600	...	...	8	1

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	70	25	850	NP	850	650	HA–4	G21, G22
2	70	25	NP	800	NP	NP	HA–4	G5, W12
3	70	25	NP	NP	850	650	HA–4	G5, G24
4	70	25	NP	NP	850	650	HA–4	G24
5	70	25	NP	800	NP	NP	HA–4	G5, W12
6	70	25	NP	800	NP	NP	HA–4	G5, W12
7	70	25	850	800	850	NP	HA–4	G5, G21, G22
8	70	30	NP	800	850	650	HA–4	G1, G5, G16, G17, G19
9	70	30	NP	NP	850	650	HA–4	G1, G19
10	70	30	NP	800	800	NP	HA–4	G1, G5, G16, G17, G19
11	70	30	1500	800	1500	650	HA–2	G1, G5, G12, G16, G17, G19, H1, T6
12	70	30	1500	NP	1500	650	HA–2	G1, G12, G19, H1, T8
13	70	30	NP	800	800	NP	HA–2	G1, G5, G16, G17, G19
14	70	30	1500	800	1500	650	HA–2	G5, G12, T8
15	70	30	1500	NP	1500	650	HA–2	G12, T9
16	70	30	1500	800	1500	650	HA–2	G5, G12, T8
17	70	30	1500	NP	1500	650	HA–2	G12, T9
18	70	30	1500	800	1500	NP	HA–2	G5, G12, T8
19	70	30	1500	NP	1500	NP	HA–2	T9
20	70	30	NP	800	1500	NP	HA–2	G5, T8
21	70	30	NP	NP	1500	NP	HA–2	T9
22	75	30	1500	800	1500	NP	HA–2	G5, G12, T8
23	75	30	1500	NP	1500	NP	HA–2	G12, T9
24	75	30	1500	800	1500	NP	HA–2	G5, G12, T8
25	75	30	1500	NP	1500	NP	HA–2	G12, T9
26	75	30	1500	800	1500	650	HA–2	G5, G12, T8
27	75	30	1500	NP	1500	650	HA–2	G12, T9
28	75	30	1500	NP	NP	NP	HA–2	G12, T9, W13
29	75	30	1500	800	NP	NP	HA–2	G5, G12, T8, W12, W13
30	75	30	1500	NP	1500	650	HA–2	G3, G5, G12, G24, T7
31	75	30	1500	NP	1500	650	HA–2	G3, G12, G24, T9
32	75	30	1500	800	1500	650	HA–2	G5, G12, T8, W12, W13, W14
33	75	30	1500	NP	1500	650	HA–2	G12, T9, W13, W14
34	75	30	1500	NP	1500	650	HA–2	G3, G5, G12, G24, T7
35	75	30	1500	NP	1500	650	HA–2	G3, G12, G24, T9
36	75	30	NP	800	NP	NP	HA–2	G5, W12
37	75	30	1500	800	1500	650	HA–2	G5, G12, H1, T8, W12
38	75	30	1500	NP	1500	650	HA–2	G12, H1, T9
39	75	30	NP	800	1500	650	HA–2	G5, G12, T8, W12, W14
40	75	30	NP	800	NP	NP	HA–2	G5, W12
41	75	30	1500	800	1500	650	HA–2	G5, G12, G22, H1, T8
42	75	30	1500	NP	1500	650	HA–2	G12, G22, H1, T9
43	75	30	NP	800	NP	NP	HA–2	G5, W12
44	75	30	NP	NP	1500	650	HA–2	G5, G12, G24, T7
45	75	30	NP	NP	1500	650	HA–2	G12, G24, T9

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	16.7	...	14.2	...	12.7	11.7	10.9	10.4	10.2	10.0	9.8	9.6	9.4	...
2	16.7	...	16.7	...	16.7	15.7	14.8	14.0	13.7	13.5	13.2	12.9	...	...
3	14.2	...	14.2	...	14.2	13.4	12.5	11.9	11.7	11.4	11.2	11.0	10.8	...
4	14.2	...	12.1	...	10.8	9.9	9.3	8.8	8.7	8.5	8.3	8.1	8.0	...
5	16.7	...	16.7	...	16.7	15.7	14.8	14.0	13.7	13.5	13.2	12.9	...	...
6	16.7	...	16.7	...	16.7	15.7	14.8	14.0	13.7	13.5	13.2	12.9	...	...
7	16.7	...	16.7	...	16.7	15.7	14.8	14.0	13.7	13.5	13.2	12.9	12.7	...
8	20.0	...	20.0	...	19.4	19.2	17.9	17.0	16.6	16.3	16.0	15.8	15.7	...
9	20.0	...	17.2	...	15.5	14.2	13.3	12.6	12.3	12.1	11.9	11.7	11.6	...
10	20.0	...	20.0	...	19.4	19.2	17.9	17.0	16.6	16.3	16.1	15.8	...	...
11	20.0	...	20.0	...	19.4	19.2	17.9	17.0	16.6	16.3	16.0	15.8	15.7	15.5
12	20.0	...	17.2	...	15.5	14.2	13.3	12.6	12.3	12.1	11.9	11.7	11.6	11.5
13	20.0	...	20.0	...	19.4	19.2	17.9	17.0	16.6	16.3	16.0	15.8	...	...
14	20.0	...	20.0	...	19.4	19.2	18.0	17.0	16.6	16.3	16.1	15.9	15.7	15.6
15	20.0	...	17.3	...	15.6	14.3	13.3	12.6	12.3	12.1	11.9	11.8	11.6	11.5
16	20.0	...	20.0	...	19.4	19.2	18.0	17.0	16.6	16.3	16.1	15.9	15.7	15.6
17	20.0	...	17.3	...	15.6	14.3	13.3	12.6	12.3	12.1	11.9	11.8	11.6	11.5
18	20.0	...	20.0	...	19.4	19.2	18.0	17.0	16.6	16.3	16.1	15.9	15.7	15.6
19	20.0	...	17.3	...	15.6	14.3	13.3	12.6	12.3	12.1	11.9	11.8	11.6	11.5
20	20.0	...	20.0	...	19.4	19.2	18.0	17.0	16.6	16.3	16.1	15.9	15.7	15.6
21	20.0	...	17.3	...	15.6	14.3	13.3	12.6	12.3	12.1	11.9	11.8	11.6	11.5
22	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	15.7	15.6
23	20.0	...	17.3	...	15.6	14.3	13.3	12.6	12.3	12.1	11.9	11.8	11.6	11.5
24	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	15.7	15.6
25	20.0	...	17.3	...	15.6	14.3	13.3	12.6	12.3	12.1	11.9	11.8	11.6	11.5
26	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	15.7	15.6
27	20.0	...	17.3	...	15.6	14.3	13.3	12.6	12.3	12.1	11.9	11.8	11.6	11.5
28	20.0	...	17.3	...	15.6	14.3	13.3	12.6	12.3	12.1	11.9	11.8	11.6	11.5
29	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	15.7	15.6
30	17.0	...	17.0	...	17.0	16.4	15.3	14.5	14.1	13.9	13.7	13.5	13.4	13.2
31	17.0	...	14.7	...	13.2	12.1	11.3	10.7	10.5	10.3	10.1	10.0	9.9	9.8
32	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	15.7	15.6
33	20.0	...	17.3	...	15.6	14.3	13.3	12.6	12.3	12.1	11.9	11.8	11.6	11.5
34	17.0	...	17.0	...	17.0	16.4	15.3	14.5	14.1	13.9	13.7	13.5	13.4	13.2
35	17.0	...	14.7	...	13.2	12.1	11.3	10.7	10.5	10.3	10.1	10.0	9.9	9.8
36	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...
37	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	15.7	15.6
38	20.0	...	17.3	...	15.6	14.3	13.3	12.6	12.3	12.1	11.9	11.8	11.6	11.5
39	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	15.7	15.6
40	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...
41	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	15.7	15.6
42	20.0	...	17.3	...	15.6	14.3	13.3	12.6	12.3	12.1	11.9	11.8	11.6	11.5
43	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...
44	17.0	...	17.0	...	17.0	16.4	15.3	14.5	14.1	13.9	13.7	13.5	13.4	13.2
45	17.0	...	14.7	...	13.2	12.1	11.3	10.7	10.5	10.3	10.1	10.0	9.9	9.8

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding														
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
11	15.4	*14.9*	*11.5*	*8.9*	*6.9*	*5.4*	*4.3*	*3.4*	*2.8*	*2.3*	*1.9*	*1.6*	...	...	...
12	11.4	11.3	11.2	*8.9*	*6.9*	*5.4*	*4.3*	*3.4*	*2.8*	*2.3*	*1.9*	*1.6*	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
14	15.4	15.3	15.1	*12.4*	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...
15	11.4	11.3	11.2	11.1	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...
16	15.4	15.3	15.1	*12.4*	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...
17	11.4	11.3	11.2	11.1	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...
18	15.4	15.3	15.1	*12.4*	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...
19	11.4	11.3	11.2	11.1	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...
20	15.4	15.3	15.1	*12.4*	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...
21	11.4	11.3	11.2	11.1	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...
22	15.4	15.3	15.1	*12.4*	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...
23	11.4	11.3	11.2	11.1	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...
24	15.4	15.3	15.1	*12.4*	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...
25	11.4	11.3	11.2	11.1	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...
26	15.4	15.3	15.1	*12.4*	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...
27	11.4	11.3	11.2	11.1	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...
28	11.4	11.3	11.2	11.1	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...
29	15.4	15.3	15.1	*12.4*	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...
30	13.1	13.0	*12.9*	*10.5*	*8.3*	*6.3*	*4.7*	*3.5*	*2.6*	*1.9*	*1.4*	*1.1*	...	...	...
31	9.7	9.6	9.5	9.4	*8.3*	*6.3*	*4.7*	*3.5*	*2.6*	*1.9*	*1.4*	*1.1*	...	...	...
32	15.4	15.3	15.1	*12.4*	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...
33	11.4	11.3	11.2	11.1	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...
34	13.1	13.0	*12.9*	*10.5*	*8.3*	*6.3*	*4.7*	*3.5*	*2.6*	*1.9*	*1.4*	*1.1*	...	...	...
35	9.7	9.6	9.5	9.4	*8.3*	*6.3*	*4.7*	*3.5*	*2.6*	*1.9*	*1.4*	*1.1*	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
37	15.4	15.3	15.1	*12.4*	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...
38	11.4	11.3	11.2	11.1	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...
39	15.4	15.3	15.1	*12.4*	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
41	15.4	15.3	15.1	*12.4*	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...
42	11.4	11.3	11.2	11.1	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
44	13.1	13.0	*12.9*	*10.5*	*8.3*	*6.3*	*4.7*	*3.5*	*2.6*	*1.9*	*1.4*	*1.1*	...	...	...
45	9.7	9.6	9.5	9.4	*8.3*	*6.3*	*4.7*	*3.5*	*2.6*	*1.9*	*1.4*	*1.1*	...	...	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	16Cr–12Ni–2Mo	Wld. pipe	SA–813	TP316	S31600	...	...	8	1
2	16Cr–12Ni–2Mo	Wld. pipe	SA–814	TP316	S31600	...	...	8	1
3	16Cr–12Ni–2Mo	Bar	SA/JIS G4303	SUS316	...	...	...	8	1
4	16Cr–12Ni–2Mo	Forgings	SA–182	F316H	S31609	...	≤5	8	1
5	16Cr–12Ni–2Mo	Forgings	SA–182	F316H	S31609	...	≤5	8	1
6	16Cr–12Ni–2Mo	Smls. tube	SA–213	TP316H	S31609	...	...	8	1
7	16Cr–12Ni–2Mo	Smls. tube	SA–213	TP316H	S31609	...	...	8	1
8	16Cr–12Ni–2Mo	Plate	SA–240	316H	S31609	...	...	8	1
9	16Cr–12Ni–2Mo	Plate	SA–240	316H	S31609	...	...	8	1
10	16Cr–12Ni–2Mo	Wld. tube	SA–249	TP316H	S31609	...	...	8	1
11	16Cr–12Ni–2Mo	Wld. tube	SA–249	TP316H	S31609	...	...	8	1
12	16Cr–12Ni–2Mo	Wld. tube	SA–249	TP316H	S31609	...	...	8	1
13	16Cr–12Ni–2Mo	Wld. tube	SA–249	TP316H	S31609	...	...	8	1
14	16Cr–12Ni–2Mo	Smls. & wld. pipe	SA–312	TP316H	S31609	...	...	8	1
15	16Cr–12Ni–2Mo	Smls. & wld. pipe	SA–312	TP316H	S31609	...	...	8	1
16	16Cr–12Ni–2Mo	Wld. pipe	SA–312	TP316H	S31609	...	...	8	1
17	16Cr–12Ni–2Mo	Wld. pipe	SA–312	TP316H	S31609	...	...	8	1
18	16Cr–12Ni–2Mo	Wld. pipe	SA–358	316H	S31609	1	...	8	1
19	16Cr–12Ni–2Mo	Smls. pipe	SA–376	TP316H	S31609	...	...	8	1
20	16Cr–12Ni–2Mo	Smls. pipe	SA–376	TP316H	S31609	...	...	8	1
21	16Cr–12Ni–2Mo	Smls. & wld. fittings	SA–403	316H	S31609	...	...	8	1
22	16Cr–12Ni–2Mo	Bar	SA–479	316H	S31609	...	...	8	1
23	16Cr–12Ni–2Mo	Bar	SA–479	316H	S31609	...	...	8	1
24	16Cr–12Ni–2Mo	Wld. pipe	SA–813	TP316H	S31609	...	...	8	1
25	16Cr–12Ni–2Mo	Wld. pipe	SA–814	TP316H	S31609	...	...	8	1
26	16Cr–12Ni–2Mo	Plate	SA/EN 10028–7	X2CrNiMo17–12–2	...	...	≤3	8	1
27	16Cr–12Ni–2Mo	Plate	SA/EN 10028–7	X2CrNiMo17–12–2	...	...	≤3	8	1
28	16Cr–12Ni–2Mo	Plate	SA/EN 10028–7	X5CrNiMo17–12–2	...	...	≤3	8	1
29	16Cr–12Ni–2Mo	Plate	SA/EN 10028–7	X5CrNiMo17–12–2	...	...	≤3	8	1
30	16Cr–12Ni–2Mo–Cb	Plate	SA–240	316Cb	S31640	...	...	8	1
31	16Cr–12Ni–2Mo–Cb	Plate	SA–240	316Cb	S31640	...	...	8	1
32	16Cr–12Ni–2Mo–N	Forgings	SA–182	F316LN	S31653	...	>5	8	1
33	16Cr–12Ni–2Mo–N	Forgings	SA–965	F316LN	S31653	...	...	8	1
34	16Cr–12Ni–2Mo–N	Forgings	SA–182	F316LN	S31653	...	≤5	8	1
35	16Cr–12Ni–2Mo–N	Smls. tube	SA–213	TP316LN	S31653	...	...	8	1
36	16Cr–12Ni–2Mo–N	Plate	SA–240	316LN	S31653	...	...	8	1
37	16Cr–12Ni–2Mo–N	Wld. tube	SA–249	TP316LN	S31653	...	...	8	1
38	16Cr–12Ni–2Mo–N	Smls. & wld. pipe	SA–312	TP316LN	S31653	...	...	8	1
39	16Cr–12Ni–2Mo–N	Wld. pipe	SA–358	316LN	S31653	1	...	8	1
40	16Cr–12Ni–2Mo–N	Smls. pipe	SA–376	TP316LN	S31653	...	...	8	1
41	16Cr–12Ni–2Mo–N	Fittings	SA–403	316LN	S31653	...	...	8	1
42	16Cr–12Ni–2Mo–N	Bar	SA–479	316LN	S31653	...	...	8	1
43	16Cr–12Ni–2Mo–N	Wld. tube	SA–688	TP316LN	S31653	...	...	8	1
44	16Cr–12Ni–2Mo–N	Forgings	SA–182	F316N	S31651	...	...	8	1
45	16Cr–12Ni–2Mo–N	Smls. tube	SA–213	TP316N	S31651	...	...	8	1

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	75	30	NP	800	NP	NP	HA–2	G5, W12
2	75	30	NP	800	NP	NP	HA–2	G5, W12
3	75	30	1500	800	1500	NP	HA–2	G5, G12, G22, H1, T8
4	75	30	1500	800	1500	NP	HA–2	G5, T8
5	75	30	1500	NP	1500	NP	HA–2	T9
6	75	30	1500	800	1500	NP	HA–2	G5, T8
7	75	30	1500	NP	1500	NP	HA–2	T9
8	75	30	1500	800	1500	NP	HA–2	G5, T8
9	75	30	1500	NP	1500	NP	HA–2	T9
10	75	30	1500	NP	1500	NP	HA–2	G3, G5, G24, T7
11	75	30	1500	NP	1500	NP	HA–2	G3, G24, T9
12	75	30	1500	NP	NP	NP	HA–2	T9, W13
13	75	30	1500	800	NP	NP	HA–2	G5, T8, W12, W13
14	75	30	1500	800	1500	NP	HA–2	G5, T8, W12, W13
15	75	30	1500	NP	1500	NP	HA–2	T9, W13
16	75	30	1500	NP	1500	NP	HA–2	G3, G5, G24, T7
17	75	30	1500	NP	1500	NP	HA–2	G3, G24, T9
18	75	30	NP	800	NP	NP	HA–2	G5, W12
19	75	30	1500	800	1500	NP	HA–2	G5, H1, T8
20	75	30	1500	NP	1500	NP	HA–2	H1, T9
21	75	30	NP	800	1500	NP	HA–2	G5, G12, T8, W12, W14
22	75	30	1500	800	NP	NP	HA–2	G5, H1, T8
23	75	30	1500	NP	NP	NP	HA–2	H1, T9
24	75	30	NP	800	NP	NP	HA–2	G5, W12
25	75	30	NP	800	NP	NP	HA–2	G5, W12
26	75	32	NP	NP	850	650	HA–4	G5, G30
27	75	32	NP	NP	850	650	HA–4	G30
28	75	32	NP	NP	1022	650	HA–2	G5, G12, G30
29	75	32	NP	NP	1022	650	HA–2	G12, G30
30	75	30	NP	NP	1500	650	HA–2	G5, G12, T8
31	75	30	NP	NP	1500	650	HA–2	G12, T9
32	70	30	NP	800	NP	NP	HA–2	G5
33	70	30	NP	800	NP	NP	HA–2	G5
34	75	30	NP	800	NP	NP	HA–2	G5
35	75	30	NP	800	NP	NP	HA–2	G5
36	75	30	NP	800	NP	NP	HA–2	G5
37	75	30	NP	800	NP	NP	HA–2	G5, W12
38	75	30	NP	800	NP	NP	HA–2	G5, W12
39	75	30	NP	800	NP	NP	HA–2	G5, W12
40	75	30	NP	800	NP	NP	HA–2	G5
41	75	30	NP	800	NP	NP	HA–2	G5, W12
42	75	30	NP	800	NP	NP	HA–2	G5
43	75	30	NP	800	NP	NP	HA–2	G5, W12
44	80	35	NP	800	NP	NP	HA–2	G5
45	80	35	1200	800	1200	NP	HA–2	G5, G12, T7

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
No.	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...
2	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...
3	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	15.7	15.6
4	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	15.7	15.6
5	20.0	...	17.3	...	15.6	14.3	13.3	12.6	12.3	12.1	11.9	11.8	11.6	11.5
6	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	15.7	15.6
7	20.0	...	17.3	...	15.6	14.3	13.3	12.6	12.3	12.1	11.9	11.8	11.6	11.5
8	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	15.7	15.6
9	20.0	...	17.3	...	15.6	14.3	13.3	12.6	12.3	12.1	11.9	11.8	11.6	11.5
10	17.0	...	17.0	...	17.0	16.4	15.3	14.5	14.1	13.9	13.7	13.5	13.4	13.2
11	17.0	...	14.7	...	13.2	12.1	11.3	10.7	10.5	10.3	10.1	10.0	9.9	9.8
12	20.0	...	17.3	...	15.6	14.3	13.3	12.6	12.3	12.1	11.9	11.8	11.6	11.5
13	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	15.7	15.6
14	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	15.7	15.6
15	20.0	...	17.3	...	15.6	14.3	13.3	12.6	12.3	12.1	11.9	11.8	11.6	11.5
16	17.0	...	17.0	...	17.0	16.4	15.3	14.5	14.1	13.9	13.7	13.5	13.4	13.2
17	17.0	...	14.7	...	13.2	12.1	11.3	10.7	10.5	10.3	10.1	10.0	9.9	9.8
18	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...
19	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	15.7	15.6
20	20.0	...	17.3	...	15.6	14.3	13.3	12.6	12.3	12.1	11.9	11.8	11.6	11.5
21	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	15.7	15.6
22	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	15.7	15.6
23	20.0	...	17.3	...	15.6	14.3	13.3	12.6	12.3	12.1	11.9	11.8	11.6	11.5
24	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...
25	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...
26	21.3	...	21.3	...	21.3	20.1	18.8	17.9	17.6	17.2	16.9	16.6	16.2	...
27	21.3	...	18.1	...	16.2	14.9	13.9	13.3	13.0	12.8	12.5	12.3	12.0	...
28	21.3	...	21.3	...	21.3	20.5	19.1	18.1	17.7	17.4	17.2	16.9	16.7	16.6
29	21.3	...	18.4	...	16.6	15.2	14.2	13.4	13.1	12.9	12.7	12.5	12.4	12.3
30	20.0	...	20.0	...	20.0	19.4	17.8	16.8	16.5	16.2	16.0	15.9	15.8	15.7
31	20.0	...	17.7	...	15.8	14.3	13.2	12.4	12.2	12.0	11.9	11.8	11.7	11.6
32	20.0	...	20.0	...	18.9	17.9	17.2	16.5	16.0	15.6	15.2	14.8	...	...
33	20.0	...	20.0	...	18.9	17.9	17.2	16.5	16.0	15.6	15.2	14.8	...	...
34	20.0	...	20.0	...	20.0	18.9	17.5	16.5	16.0	15.6	15.2	14.8	...	...
35	20.0	...	20.0	...	20.0	18.9	17.5	16.5	16.0	15.6	15.2	14.8	...	...
36	20.0	...	20.0	...	20.0	18.9	17.5	16.5	16.0	15.6	15.2	14.8	...	...
37	20.0	...	20.0	...	20.0	18.9	17.5	16.5	16.0	15.6	15.2	14.8	...	...
38	20.0	...	20.0	...	20.0	18.9	17.5	16.5	16.0	15.6	15.2	14.8	...	...
39	20.0	...	20.0	...	20.0	18.9	17.5	16.5	16.0	15.6	15.2	14.8	...	...
40	20.0	...	20.0	...	20.0	18.9	17.5	16.5	16.0	15.6	15.2	14.8	...	...
41	20.0	...	20.0	...	20.0	18.9	17.5	16.5	16.0	15.6	15.2	14.8	...	...
42	20.0	...	20.0	...	20.0	18.9	17.5	16.5	16.0	15.6	15.2	14.8	...	...
43	20.0	...	20.0	...	20.0	18.9	17.5	16.5	16.0	15.6	15.2	14.8	...	...
44	22.9	...	22.9	...	22.0	21.5	21.2	21.0	20.5	20.0	19.6	19.2	...	...
45	22.9	...	22.9	...	22.0	21.5	21.2	21.0	20.5	20.0	19.6	19.2	18.8	18.5

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding														
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
3	15.4	15.3	15.1	*12.4*	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...
4	15.4	15.3	15.1	*12.4*	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...
5	11.4	11.3	11.2	11.1	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...
6	15.4	15.3	15.1	*12.4*	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...
7	11.4	11.3	11.2	11.1	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...
8	15.4	15.3	15.1	*12.4*	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...
9	11.4	11.3	11.2	11.1	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...
10	13.1	13.0	*12.9*	*10.5*	*8.3*	*6.3*	*4.7*	*3.5*	*2.6*	*1.9*	*1.4*	*1.1*	...	...	...
11	9.7	9.6	9.5	9.4	*8.3*	*6.3*	*4.7*	*3.5*	*2.6*	*1.9*	*1.4*	*1.1*	...	...	...
12	11.4	11.3	11.2	11.1	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...
13	15.4	15.3	15.1	*12.4*	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...
14	15.4	15.3	15.1	*12.4*	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...
15	11.4	11.3	11.2	11.1	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...
16	13.1	13.0	*12.9*	*10.5*	*8.3*	*6.3*	*4.7*	*3.5*	*2.6*	*1.9*	*1.4*	*1.1*	...	...	...
17	9.7	9.6	9.5	9.4	*8.3*	*6.3*	*4.7*	*3.5*	*2.6*	*1.9*	*1.4*	*1.1*	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
19	15.4	15.3	15.1	*12.4*	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...
20	11.4	11.3	11.2	11.1	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...
21	15.4	15.3	15.1	*12.4*	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...
22	15.4	15.3	15.1	*12.4*	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...
23	11.4	11.3	11.2	11.1	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
28	16.4	16.3	16.1	...	...	...	...	...	...	...	...	...	...	...	...
29	12.1	12.0	11.9	...	...	...	...	...	...	...	...	...	...	...	...
30	15.5	15.3	15.1	*12.3*	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...
31	11.5	11.4	11.2	11.0	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
45	18.1	17.8	*15.8*	*12.3*	*9.8*	*7.4*	...	...	...	...	...	...	...	...	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	16Cr–12Ni–2Mo–N	Smls. tube	SA–213	TP316N	S31651	...	...	8	1
2	16Cr–12Ni–2Mo–N	Plate	SA–240	316N	S31651	...	...	8	1
3	16Cr–12Ni–2Mo–N	Plate	SA–240	316N	S31651	...	...	8	1
4	16Cr–12Ni–2Mo–N	Wld. tube	SA–249	TP316N	S31651	...	...	8	1
5	16Cr–12Ni–2Mo–N	Wld. tube	SA–249	TP316N	S31651	...	...	8	1
6	16Cr–12Ni–2Mo–N	Wld. tube	SA–249	TP316N	S31651	...	...	8	1
7	16Cr–12Ni–2Mo–N	Wld. tube	SA–249	TP316N	S31651	...	...	8	1
8	16Cr–12Ni–2Mo–N	Smls. & wld. pipe	SA–312	TP316N	S31651	...	...	8	1
9	16Cr–12Ni–2Mo–N	Smls. & wld. pipe	SA–312	TP316N	S31651	...	...	8	1
10	16Cr–12Ni–2Mo–N	Wld. pipe	SA–312	TP316N	S31651	...	...	8	1
11	16Cr–12Ni–2Mo–N	Wld. pipe	SA–312	TP316N	S31651	...	...	8	1
12	16Cr–12Ni–2Mo–N	Wld. pipe	SA–358	316N	S31651	1	...	8	1
13	16Cr–12Ni–2Mo–N	Smls. pipe	SA–376	TP316N	S31651	...	...	8	1
14	16Cr–12Ni–2Mo–N	Smls. pipe	SA–376	TP316N	S31651	...	...	8	1
15	16Cr–12Ni–2Mo–N	Smls. & wld. fittings	SA–403	316N	S31651	...	...	8	1
16	16Cr–12Ni–2Mo–N	Bar	SA–479	316N	S31651	...	...	8	1
17	16Cr–12Ni–2Mo–N	Bar	SA–479	316N	S31651	...	...	8	1
18	16Cr–12Ni–2Mo–N	Wld. tube	SA–688	TP316N	S31651	...	...	8	1
19	16Cr–12Ni–2Mo–N	Wld. pipe	SA–813	TP316N	S31651	...	...	8	1
20	16Cr–12Ni–2Mo–N	Wld. pipe	SA–814	TP316N	S31651	...	...	8	1
21	16Cr–12Ni–2Mo–N	Forgings	SA–965	F316N	S31651	...	...	8	1
22	16Cr–12Ni–2Mo–N	Forgings	SA–965	F316N	S31651	...	...	8	1
23	16Cr–12Ni–2Mo–N	Plate	SA/EN 10028–7	X2CrNiMoN17–11–2	...	...	≤3	8	1
24	16Cr–12Ni–2Mo–N	Plate	SA/EN 10028–7	X2CrNiMoN17–13–3	...	...	≤3	8	1
25	16Cr–12Ni–2Mo–Ti	Plate	SA–240	316Ti	S31635	...	...	8	1
26	16Cr–12Ni–2Mo–Ti	Plate	SA–240	316Ti	S31635	...	...	8	1
27	17Cr–4Ni–6Mn	Plate	SA–240	201–1	S20100	...	...	8	3
28	17Cr–4Ni–6Mn	Plate	SA–240	201–1	S20100	...	...	8	3
29	17Cr–4Ni–6Mn	Plate	SA–666	201–1	S20100	...	...	8	3
30	17Cr–4Ni–6Mn	Plate	SA–666	201–1	S20100	...	...	8	3
31	17Cr–4Ni–6Mn	Plate	SA–240	201–2	S20100	...	...	8	3
32	17Cr–4Ni–6Mn	Plate	SA–666	201–2	S20100	...	...	8	3
33	17Cr–7Ni	Plate, sheet, strip	SA–240	301	S30100	...	...	8	1
34	17Cr–7Ni	Plate, sheet, strip	SA–240	301	S30100	...	...	8	1
35	17.5Cr–17.5Ni–5.3Si	Plate	SA–240	...	S30601	Sol. ann.	...	8	1
36	17.5Cr–17.5Ni–5.3Si	Plate	SA–240	...	S30601	Sol. ann.	...	8	1
37	18Cr–3Ni–12Mn	Plate	SA–240	XM–29	S24000	...	...	8	3
38	18Cr–3Ni–12Mn	Plate	SA–240	XM–29	S24000	...	...	8	3
39	18Cr–3Ni–12Mn	Wld. tube	SA–249	XM–29	S24000	...	...	8	3
40	18Cr–3Ni–12Mn	Wld. tube	SA–249	XM–29	S24000	...	...	8	3
41	18Cr–3Ni–12Mn	Wld. pipe	SA–312	XM–29	S24000	...	...	8	3
42	18Cr–3Ni–12Mn	Wld. pipe	SA–312	XM–29	S24000	...	...	8	3
43	18Cr–3Ni–12Mn	Bar	SA–479	XM–29	S24000	...	...	8	3
44	18Cr–3Ni–12Mn	Bar	SA–479	XM–29	S24000	...	...	8	3
45	18Cr–3Ni–12Mn	Wld. tube	SA–688	TPXM–29	S24000	...	...	8	3

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	80	35	1200	NP	1200	NP	HA–2	G12, T8
2	80	35	NP	800	1200	650	HA–2	G5, G12, T7
3	80	35	NP	NP	1200	650	HA–2	G12, T8
4	80	35	1200	NP	NP	NP	HA–2	G5, G12, T7, W13
5	80	35	1200	NP	NP	NP	HA–2	G12, T8, W13
6	80	35	1200	NP	1200	650	HA–2	G3, G12, G24, T8
7	80	35	1200	NP	1200	650	HA–2	G3, G5, G12, G24, T7
8	80	35	1200	800	1200	650	HA–2	G5, G12, T7, W12, W13, W14
9	80	35	1200	NP	1200	650	HA–2	G12, T8, W13, W14
10	80	35	1200	NP	1200	650	HA–2	G3, G12, G24, T8
11	80	35	1200	NP	1200	650	HA–2	G3, G5, G12, G24, T7
12	80	35	NP	800	NP	NP	HA–2	G5, W12
13	80	35	1200	800	1200	650	HA–2	G5, G12, H1, T7
14	80	35	1200	NP	1200	650	HA–2	G12, H1, T8
15	80	35	NP	800	1200	650	HA–2	G5, G12, T7, W12, W14
16	80	35	1200	800	NP	NP	HA–2	G5, G12, H1, T7
17	80	35	1200	NP	NP	NP	HA–2	G12, H1, T8
18	80	35	NP	800	NP	NP	HA–2	G5, W12
19	80	35	NP	800	NP	NP	HA–2	G5, W12
20	80	35	NP	800	NP	NP	HA–2	G5, W12
21	80	35	NP	800	1200	650	HA–2	G5, G12, T7
22	80	35	NP	NP	1200	650	HA–2	G12, T8
23	84	41	NP	NP	800	650	HA–2	G5, G30
24	84	41	NP	NP	800	650	HA–2	G5, G30
25	75	30	NP	NP	1500	650	HA–2	G5, G12, T8
26	75	30	NP	NP	1500	650	HA–2	G12, T9
27	75	38	NP	NP	300	300	HA–2	...
28	75	38	NP	NP	300	300	HA–2	G5
29	75	38	NP	NP	300	300	HA–2	...
30	75	38	NP	NP	300	300	HA–2	G5
31	95	45	NP	NP	300	300	HA–6	...
32	95	45	NP	NP	300	300	HA–6	...
33	75	30	NP	NP	800	NP	HA–1	G5
34	75	30	NP	NP	800	NP	HA–1	...
35	78	37	NP	NP	500	NP	HA–1	G5, H6
36	78	37	NP	NP	500	NP	HA–1	H6
37	100	55	NP	NP	800	650	HA–6	G5
38	100	55	NP	NP	800	650	HA–6	...
39	100	55	NP	NP	800	650	HA–6	G5, G24
40	100	55	NP	NP	800	650	HA–6	G24
41	100	55	NP	NP	800	650	HA–6	G5, G24
42	100	55	NP	NP	800	650	HA–6	G24
43	100	55	NP	NP	800	650	HA–6	G5, G22
44	100	55	NP	NP	800	650	HA–6	G22
45	100	55	NP	NP	800	650	HA–6	G5, G24

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	22.9	...	20.7	...	19.0	17.6	16.5	15.6	15.2	14.9	14.5	14.2	13.9	13.7
2	22.9	...	22.9	...	22.0	21.5	21.2	21.0	20.5	20.0	19.6	19.2	18.8	18.5
3	22.9	...	20.7	...	19.0	17.6	16.5	15.6	15.2	14.9	14.5	14.2	13.9	13.7
4	22.9	...	22.9	...	22.0	21.5	21.2	21.0	20.5	20.0	19.6	19.2	18.8	18.5
5	22.9	...	20.7	...	19.0	17.6	16.5	15.6	15.2	14.9	14.5	14.2	13.9	13.7
6	19.4	...	17.6	...	16.1	15.0	14.0	13.3	12.9	12.6	12.3	12.1	11.9	11.6
7	19.4	...	19.4	...	18.7	18.2	18.1	17.9	17.4	17.0	16.7	16.3	16.0	15.7
8	22.9	...	22.9	...	22.0	21.5	21.2	21.0	20.5	20.0	19.6	19.2	18.8	18.5
9	22.9	...	20.7	...	19.0	17.6	16.5	15.6	15.2	14.9	14.5	14.2	13.9	13.7
10	19.4	...	17.6	...	16.1	15.0	14.0	13.3	12.9	12.6	12.3	12.1	11.9	11.6
11	19.4	...	19.4	...	18.7	18.2	18.1	17.9	17.4	17.0	16.7	16.3	16.0	15.7
12	22.9	...	22.9	...	22.0	21.5	21.2	21.0	20.5	20.0	19.6	19.2	...	...
13	22.9	...	22.9	...	22.0	21.5	21.2	21.0	20.5	20.0	19.6	19.2	18.8	18.5
14	22.9	...	20.7	...	19.0	17.6	16.5	15.6	15.2	14.9	14.5	14.2	13.9	13.7
15	22.9	...	22.9	...	22.0	21.5	21.2	21.0	20.5	20.0	19.6	19.2	18.8	18.5
16	22.9	...	22.9	...	22.0	21.5	21.2	21.0	20.5	20.0	19.6	19.2	18.8	18.5
17	22.9	...	20.7	...	19.0	17.6	16.5	15.6	15.2	14.9	14.5	14.2	13.9	13.7
18	22.9	...	22.9	...	22.0	21.5	21.2	21.0	20.5	20.0	19.6	19.2	...	...
19	22.9	...	22.9	...	22.0	21.5	21.2	21.0	20.5	20.0	19.6	19.2	...	...
20	22.9	...	22.9	...	22.0	21.5	21.2	21.0	20.5	20.0	19.6	19.2	...	...
21	22.9	...	22.9	...	22.0	21.5	21.2	21.0	20.5	20.0	19.6	19.2	18.8	18.5
22	22.9	...	20.7	...	19.0	17.6	16.5	15.6	15.2	14.9	14.5	14.2	13.9	13.7
23	24.0	...	24.0	...	24.0	23.7	22.8	22.3	21.7	21.1	20.6	20.1	...	...
24	24.0	...	24.0	...	24.0	23.7	22.8	22.3	21.7	21.1	20.6	20.1	...	...
25	20.0	...	20.0	...	20.0	19.4	17.8	16.8	16.5	16.2	16.0	15.9	15.8	15.7
26	20.0	...	17.7	...	15.8	14.3	13.2	12.4	12.2	12.0	11.9	11.8	11.7	11.6
27	21.4	...	18.7	...	16.6	...	...	...	...	...	...	...	...	...
28	21.4	...	18.7	...	17.2	...	...	...	...	...	...	...	...	...
29	21.4	...	18.7	...	16.6	...	...	...	...	...	...	...	...	...
30	21.4	...	18.7	...	17.2	...	...	...	...	...	...	...	...	...
31	27.1	...	22.8	...	19.7	...	...	...	...	...	...	...	...	...
32	27.1	...	22.8	...	19.7	...	...	...	...	...	...	...	...	...
33	20.0	...	17.5	...	15.7	15.4	15.4	15.4	15.4	15.3	15.0	14.6	...	...
34	20.0	...	16.1	...	14.4	13.5	13.0	12.5	12.2	11.9	11.5	11.1	...	...
35	22.3	...	22.3	...	21.1	20.0	18.9	...	...	...	...	...	...	...
36	22.3	...	20.3	...	18.1	16.5	15.1	...	...	...	...	...	...	...
37	28.6	...	27.9	...	26.0	24.9	24.3	23.8	23.4	23.0	22.4	21.8	...	...
38	28.6	...	27.9	...	25.0	21.9	20.1	19.2	18.8	18.5	18.2	17.8	...	...
39	24.3	...	23.7	...	22.1	21.2	20.7	20.2	19.9	19.5	19.1	18.5	...	...
40	24.3	...	23.7	...	21.3	18.7	17.1	16.3	16.0	15.7	15.4	15.1	...	...
41	24.3	...	23.7	...	22.1	21.2	20.7	20.2	19.9	19.5	19.1	18.5	...	...
42	24.3	...	23.7	...	21.3	18.7	17.1	16.3	16.0	15.7	15.4	15.1	...	...
43	28.6	...	27.9	...	26.0	24.9	24.3	23.8	23.4	23.0	22.4	21.8	...	...
44	28.6	...	27.9	...	25.0	21.9	20.1	19.2	18.8	18.5	18.2	17.8	...	...
45	24.3	...	23.7	...	22.1	21.2	20.7	20.2	19.9	19.5	19.1	18.5	...	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding														
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
1	13.4	13.2	12.9	*12.3*	*9.8*	*7.4*	...	...	...	...	...	...	...	...	...
2	18.1	17.8	*15.8*	*12.3*	*9.8*	*7.4*	...	...	...	...	...	...	...	...	...
3	13.4	13.2	12.9	*12.3*	*9.8*	*7.4*	...	...	...	...	...	...	...	...	...
4	18.1	17.8	*15.8*	*12.3*	*9.8*	*7.4*	...	...	...	...	...	...	...	...	...
5	13.4	13.2	12.9	*12.3*	*9.8*	*7.4*	...	...	...	...	...	...	...	...	...
6	11.4	11.2	11.0	*10.5*	*8.3*	*6.3*	...	...	...	...	...	...	...	...	...
7	15.4	15.1	*13.4*	*10.5*	*8.3*	*6.3*	...	...	...	...	...	...	...	...	...
8	18.1	17.8	*15.8*	*12.3*	*9.8*	*7.4*	...	...	...	...	...	...	...	...	...
9	13.4	13.2	12.9	*12.3*	*9.8*	*7.4*	...	...	...	...	...	...	...	...	...
10	11.4	11.2	11.0	*10.5*	*8.3*	*6.3*	...	...	...	...	...	...	...	...	...
11	15.4	15.1	*13.4*	*10.5*	*8.3*	*6.3*	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
13	18.1	17.8	*15.8*	*12.3*	*9.8*	*7.4*	...	...	...	...	...	...	...	...	...
14	13.4	13.2	12.9	*12.3*	*9.8*	*7.4*	...	...	...	...	...	...	...	...	...
15	18.1	17.8	*15.8*	*12.3*	*9.8*	*7.4*	...	...	...	...	...	...	...	...	...
16	18.1	17.8	*15.8*	*12.3*	*9.8*	*7.4*	...	...	...	...	...	...	...	...	...
17	13.4	13.2	12.9	*12.3*	*9.8*	*7.4*	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
21	18.1	17.8	*15.8*	*12.3*	*9.8*	*7.4*	...	...	...	...	...	...	...	...	...
22	13.4	13.2	12.9	*12.3*	*9.8*	*7.4*	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
25	15.5	15.3	15.1	*12.3*	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...
26	11.5	11.4	11.2	11.0	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	18Cr–3Ni–12Mn	Wld. tube	SA–688	TPXM–29	S24000	...	...	8	3
2	18Cr–5Ni–3Mo	Smls. tube	SA–789	...	S31500	...	...	10H	1
3	18Cr–5Ni–3Mo	Wld. tube	SA–789	...	S31500	...	...	10H	1
4	18Cr–5Ni–3Mo	Smls. pipe	SA–790	...	S31500	...	...	10H	1
5	18Cr–5Ni–3Mo	Wld. pipe	SA–790	...	S31500	...	...	10H	1
6	18Cr–8Ni	Forgings	SA–182	F304L	S30403	...	>5	8	1
7	18Cr–8Ni	Forgings	SA–182	F304L	S30403	...	>5	8	1
8	18Cr–8Ni	Forgings	SA–965	F304L	S30403	...	...	8	1
9	18Cr–8Ni	Forgings	SA–965	F304L	S30403	...	...	8	1
10	18Cr–8Ni	Forgings	SA–182	F304L	S30403	...	≤5	8	1
11	18Cr–8Ni	Forgings	SA–182	F304L	S30403	...	≤5	8	1
12	18Cr–8Ni	Smls. tube	SA–213	TP304L	S30403	...	...	8	1
13	18Cr–8Ni	Smls. tube	SA–213	TP304L	S30403	...	...	8	1
14	18Cr–8Ni	Plate	SA–240	304L	S30403	...	...	8	1
15	18Cr–8Ni	Plate	SA–240	304L	S30403	...	...	8	1
16	18Cr–8Ni	Wld. tube	SA–249	TP304L	S30403	...	...	8	1
17	18Cr–8Ni	Wld. tube	SA–249	TP304L	S30403	...	...	8	1
18	18Cr–8Ni	Wld. tube	SA–249	TP304L	S30403	...	...	8	1
19	18Cr–8Ni	Smls. & wld. pipe	SA–312	TP304L	S30403	...	...	8	1
20	18Cr–8Ni	Smls. pipe	SA–312	TP304L	S30403	...	...	8	1
21	18Cr–8Ni	Wld. pipe	SA–312	TP304L	S30403	...	...	8	1
22	18Cr–8Ni	Wld. pipe	SA–312	TP304L	S30403	...	...	8	1
23	18Cr–8Ni	Wld. pipe	SA–358	304L	S30403	1	...	8	1
24	18Cr–8Ni	Smls. & wld. fittings	SA–403	304L	S30403	...	...	8	1
25	18Cr–8Ni	Wld. pipe	SA–409	TP304L	S30403	...	...	8	1
26	18Cr–8Ni	Bar	SA–479	304L	S30403	...	...	8	1
27	18Cr–8Ni	Bar	SA–479	304L	S30403	...	...	8	1
28	18Cr–8Ni	Wld. tube	SA–688	TP304L	S30403	...	...	8	1
29	18Cr–8Ni	Wld. tube	SA–688	TP304L	S30403	...	...	8	1
30	18Cr–8Ni	Wld. tube	SA–688	TP304L	S30403	...	...	8	1
31	18Cr–8Ni	Wld. pipe	SA–813	TP304L	S30403	...	...	8	1
32	18Cr–8Ni	Wld. pipe	SA–814	TP304L	S30403	...	...	8	1
33	18Cr–8Ni	Bar	SA/JIS G4303	SUS304L	...	...	...	8	1
34	18Cr–8Ni	Forgings	SA–182	F304	S30400	...	>5	8	1
35	18Cr–8Ni	Forgings	SA–182	F304	S30400	...	>5	8	1
36	18Cr–8Ni	Forgings	SA–182	F304H	S30409	...	>5	8	1
37	18Cr–8Ni	Forgings	SA–182	F304H	S30409	...	>5	8	1
38	18Cr–8Ni	Castings	SA–351	CF3	J92500	...	...	8	1
39	18Cr–8Ni	Castings	SA–351	CF3	J92500	...	...	8	1
40	18Cr–8Ni	Castings	SA–351	CF8	J92600	...	...	8	1
41	18Cr–8Ni	Castings	SA–351	CF8	J92600	...	...	8	1
42	18Cr–8Ni	Castings	SA–351	CF8	J92600	...	...	8	1
43	18Cr–8Ni	Smls. pipe	SA–376	TP304	S30400	...	...	8	1
44	18Cr–8Ni	Smls. pipe	SA–376	TP304	S30400	...	...	8	1
45	18Cr–8Ni	Cast pipe	SA–451	CPF3	J92500	...	...	8	1

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	100	55	NP	NP	800	650	HA–6	G24
2	92	64	NP	NP	750	650	HA–5	G19
3	92	64	NP	NP	750	650	HA–5	G19, G24
4	92	64	NP	NP	750	650	HA–5	G19
5	92	64	NP	NP	750	650	HA–5	G19, G24
6	65	25	800	800	1200	650	HA–3	G5, G21, T4
7	65	25	800	NP	1200	650	HA–3	G21, T6
8	65	25	800	800	1200	650	HA–3	G5, G21, T4
9	65	25	800	NP	1200	650	HA–3	G21, T6
10	70	25	800	800	1200	650	HA–3	G5, G21, T4
11	70	25	800	NP	1200	650	HA–3	G21, T6
12	70	25	800	800	1200	NP	HA–3	G5, G21, T4
13	70	25	800	NP	1200	NP	HA–3	G21, T6
14	70	25	800	800	1200	650	HA–3	G5, G21, T4
15	70	25	800	NP	1200	650	HA–3	G21, T6
16	70	25	NP	800	NP	NP	HA–3	G5, W12
17	70	25	800	NP	1200	650	HA–3	G5, G21, G24, T4
18	70	25	800	NP	1200	650	HA–3	G21, G24, T6
19	70	25	800	800	1200	650	HA–3	G5, G21, T4, W12, W14
20	70	25	800	NP	1200	650	HA–3	G21, T6
21	70	25	800	NP	1200	650	HA–3	G5, G21, G24, T4
22	70	25	800	NP	1200	650	HA–3	G21, G24, T6
23	70	25	NP	800	NP	NP	HA–3	G5, W12
24	70	25	NP	800	1200	650	HA–3	G5, T4, W12, W14
25	70	25	NP	800	NP	NP	HA–3	G5, W12
26	70	25	800	800	1200	650	HA–3	G5, G21, G22, T4
27	70	25	800	NP	1200	650	HA–3	G21, G22, T6
28	70	25	NP	800	NP	NP	HA–3	G5, W12
29	70	25	NP	NP	1200	650	HA–3	G5, G24, T4
30	70	25	NP	NP	1200	650	HA–3	G24, T6
31	70	25	NP	800	NP	NP	HA–3	G5, W12
32	70	25	NP	800	NP	NP	HA–3	G5, W12
33	70	25	800	800	1200	NP	HA–3	G5, G21, G22, T4
34	70	30	1500	800	1500	650	HA–1	G5, G12, T7
35	70	30	1500	NP	1500	650	HA–1	G12, T8
36	70	30	1500	800	1500	NP	HA–1	G5, T7
37	70	30	1500	NP	1500	NP	HA–1	T8
38	70	30	NP	800	800	650	HA–3	G1, G5, G16, G17, G19
39	70	30	NP	NP	800	650	HA–3	G1, G19
40	70	30	1500	800	NP	NP	HA–1	G1, G5, G12, G16, G17, G19, H1, T6
41	70	30	1500	NP	1500	650	HA–1	G1, G12, G19, H1, T7
42	70	30	NP	NP	1500	650	HA–1	G1, G5, G12, G19, T6
43	70	30	NP	800	1500	650	HA–1	G5, G12, S9, T7
44	70	30	NP	NP	1500	650	HA–1	G12, S9, T8
45	70	30	NP	800	NP	NP	HA–3	G5, G16, G17, G19

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	24.3	...	23.7	...	21.3	18.7	17.1	16.3	16.0	15.7	15.4	15.1	...	...
2	26.3	...	25.4	...	24.4	24.2	24.2	24.2	24.2	24.2	24.2	...	...	...
3	22.3	...	21.6	...	20.7	20.6	20.6	20.6	20.6	20.6	20.6	...	...	...
4	26.3	...	25.4	...	24.4	24.2	24.2	24.2	24.2	24.2	24.2	...	...	...
5	22.3	...	21.6	...	20.7	20.6	20.6	20.6	20.6	20.6	20.6	...	...	...
6	16.7	...	16.7	...	16.2	15.6	14.7	14.0	13.7	13.5	13.3	13.0	12.8	*11.9*
7	16.7	...	14.3	...	12.8	11.7	10.9	10.4	10.2	10.0	9.8	9.7	9.5	9.3
8	16.7	...	16.7	...	16.2	15.6	14.7	14.0	13.7	13.5	13.3	13.0	12.8	*11.9*
9	16.7	...	14.3	...	12.8	11.7	10.9	10.4	10.2	10.0	9.8	9.7	9.5	9.3
10	16.7	...	16.7	...	16.7	15.8	14.7	14.0	13.7	13.5	13.3	13.0	12.8	*11.9*
11	16.7	...	14.3	...	12.8	11.7	10.9	10.4	10.2	10.0	9.8	9.7	9.5	9.3
12	16.7	...	16.7	...	16.7	15.8	14.7	14.0	13.7	13.5	13.3	13.0	12.8	*11.9*
13	16.7	...	14.3	...	12.8	11.7	10.9	10.4	10.2	10.0	9.8	9.7	9.5	9.3
14	16.7	...	16.7	...	16.7	15.8	14.7	14.0	13.7	13.5	13.3	13.0	12.8	*11.9*
15	16.7	...	14.3	...	12.8	11.7	10.9	10.4	10.2	10.0	9.8	9.7	9.5	9.3
16	16.7	...	16.7	...	16.7	15.8	14.7	14.0	13.7	13.5	13.3	13.0	...	...
17	14.2	...	14.2	...	14.2	13.4	12.5	11.9	11.7	11.4	11.3	11.1	10.9	*10.1*
18	14.2	...	12.1	...	10.9	9.9	9.3	8.8	8.6	8.5	8.3	8.2	8.1	7.9
19	16.7	...	16.7	...	16.7	15.8	14.7	14.0	13.7	13.5	13.3	13.0	12.8	*11.9*
20	16.7	...	14.3	...	12.8	11.7	10.9	10.4	10.2	10.0	9.8	9.7	9.5	9.3
21	14.2	...	14.2	...	14.2	13.4	12.5	11.9	11.7	11.4	11.3	11.1	10.9	*10.1*
22	14.2	...	12.1	...	10.9	9.9	9.3	8.8	8.6	8.5	8.3	8.2	8.1	7.9
23	16.7	...	16.7	...	16.7	15.8	14.7	14.0	13.7	13.5	13.3	13.0	...	...
24	16.7	...	16.7	...	16.7	15.8	14.7	14.0	13.7	13.5	13.3	13.0	12.8	*11.9*
25	16.7	...	16.7	...	16.7	15.8	14.7	14.0	13.7	13.5	13.3	13.0	...	...
26	16.7	...	16.7	...	16.7	15.8	14.7	14.0	13.7	13.5	13.3	13.0	12.8	*11.9*
27	16.7	...	14.3	...	12.8	11.7	10.9	10.4	10.2	10.0	9.8	9.7	9.5	9.3
28	16.7	...	16.7	...	16.7	15.8	14.7	14.0	13.7	13.5	13.3	13.0	...	...
29	14.2	...	14.2	...	14.2	13.4	12.5	11.9	11.7	11.4	11.3	11.1	10.9	*10.1*
30	14.2	...	12.1	...	10.9	9.9	9.3	8.8	8.6	8.5	8.3	8.2	8.1	7.9
31	16.7	...	16.7	...	16.7	15.8	14.7	14.0	13.7	13.5	13.3	13.0	...	...
32	16.7	...	16.7	...	16.7	15.8	14.7	14.0	13.7	13.5	13.3	13.0	...	...
33	16.7	...	16.7	...	16.7	15.8	14.7	14.0	13.7	13.5	13.3	13.0	12.8	*11.9*
34	20.0	...	18.9	...	17.7	17.1	16.9	16.6	16.2	15.8	15.5	15.2	14.9	14.6
35	20.0	...	16.7	...	15.0	13.8	12.9	12.3	12.0	11.7	11.5	11.2	11.0	10.8
36	20.0	...	18.9	...	17.7	17.1	16.9	16.6	16.2	15.8	15.5	15.2	14.9	14.6
37	20.0	...	16.7	...	15.0	13.8	12.9	12.3	12.0	11.7	11.5	11.2	11.0	10.8
38	20.0	...	18.9	...	17.7	17.1	16.9	16.6	16.2	15.8	15.5	15.2	...	...
39	20.0	...	16.7	...	15.0	13.8	12.9	12.3	12.0	11.7	11.5	11.2	...	...
40	20.0	...	18.9	...	17.7	17.1	16.9	16.6	16.2	15.8	15.5	15.2	14.9	14.6
41	20.0	...	16.7	...	15.0	13.8	12.9	12.3	12.0	11.7	11.5	11.2	11.0	10.8
42	20.0	...	18.9	...	17.7	17.1	16.9	16.6	16.2	15.8	15.5	15.2	14.9	14.6
43	20.0	...	18.9	...	17.7	17.1	16.9	16.6	16.2	15.8	15.5	15.2	14.9	14.6
44	20.0	...	16.7	...	15.0	13.8	12.9	12.3	12.0	11.7	11.5	11.2	11.0	10.8
45	20.0	...	18.9	...	17.7	17.1	16.9	16.6	16.2	15.8	15.5	15.2	...	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding														
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6	*9.9*	*7.8*	*6.3*	*5.1*	*4.0*	*3.2*	...	...	...	...	...	...	...	...	...
7	9.1	*7.8*	*6.3*	*5.1*	*4.0*	*3.2*	...	...	...	...	...	...	...	...	...
8	*9.9*	*7.8*	*6.3*	*5.1*	*4.0*	*3.2*	...	...	...	...	...	...	...	...	...
9	9.1	*7.8*	*6.3*	*5.1*	*4.0*	*3.2*	...	...	...	...	...	...	...	...	...
10	*9.9*	*7.8*	*6.3*	*5.1*	*4.0*	*3.2*	...	...	...	...	...	...	...	...	...
11	9.1	*7.8*	*6.3*	*5.1*	*4.0*	*3.2*	...	...	...	...	...	...	...	...	...
12	*9.9*	*7.8*	*6.3*	*5.1*	*4.0*	*3.2*	...	...	...	...	...	...	...	...	...
13	9.1	*7.8*	*6.3*	*5.1*	*4.0*	*3.2*	...	...	...	...	...	...	...	...	...
14	*9.9*	*7.8*	*6.3*	*5.1*	*4.0*	*3.2*	...	...	...	...	...	...	...	...	...
15	9.1	*7.8*	*6.3*	*5.1*	*4.0*	*3.2*	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
17	*8.4*	*6.6*	*5.4*	*4.3*	*3.4*	*2.7*	...	...	...	...	...	...	...	...	...
18	7.7	*6.6*	*5.4*	*4.3*	*3.4*	*2.7*	...	...	...	...	...	...	...	...	...
19	*9.9*	*7.8*	*6.3*	*5.1*	*4.0*	*3.2*	...	...	...	...	...	...	...	...	...
20	9.1	*7.8*	*6.3*	*5.1*	*4.0*	*3.2*	...	...	...	...	...	...	...	...	...
21	*8.4*	*6.6*	*5.4*	*4.3*	*3.4*	*2.7*	...	...	...	...	...	...	...	...	...
22	7.7	*6.6*	*5.4*	*4.3*	*3.4*	*2.7*	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
24	*9.9*	*7.8*	*6.3*	*5.1*	*4.0*	*3.2*	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
26	*9.9*	*7.8*	*6.3*	*5.1*	*4.0*	*3.2*	...	...	...	...	...	...	...	...	...
27	9.1	*7.8*	*6.3*	*5.1*	*4.0*	*3.2*	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
29	*8.4*	*6.6*	*5.4*	*4.3*	*3.4*	*2.7*	...	...	...	...	...	...	...	...	...
30	7.7	*6.6*	*5.4*	*4.3*	*3.4*	*2.7*	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
33	*9.9*	*7.8*	*6.3*	*5.1*	*4.0*	*3.2*	...	...	...	...	...	...	...	...	...
34	14.3	14.0	*12.4*	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*	...	...	...
35	10.6	10.4	10.1	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*	...	...	...
36	14.3	14.0	*12.4*	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*	...	...	...
37	10.6	10.4	10.1	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
40	14.3	*12.2*	*9.5*	*7.5*	*6.0*	*4.8*	*3.9*	*3.3*	*2.7*	*2.3*	*2.0*	*1.7*	...	...	...
41	10.6	10.4	*9.5*	*7.5*	*6.0*	*4.8*	*3.9*	*3.3*	*2.7*	*2.3*	*2.0*	*1.7*	...	...	...
42	14.3	*12.2*	*9.5*	*7.5*	*6.0*	*4.8*	*3.9*	*3.3*	*2.7*	*2.3*	*2.0*	*1.7*	...	...	...
43	14.3	14.0	*12.4*	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*	...	...	...
44	10.6	10.4	10.1	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	18Cr–8Ni	Cast pipe	SA–451	CPF8	J92600	...	...	8	1
2	18Cr–8Ni	Forgings	SA–965	F304	S30400	...	...	8	1
3	18Cr–8Ni	Forgings	SA–965	F304	S30400	...	...	8	1
4	18Cr–8Ni	Forgings	SA–965	F304H	S30409	...	...	8	1
5	18Cr–8Ni	Forgings	SA–965	F304H	S30409	...	...	8	1
6	18Cr–8Ni	Plate	SA/EN 10028–7	X2CrNi18–9	...	...	≤3	8	1
7	18Cr–8Ni	Plate	SA/EN 10028–7	X2CrNi18–9	...	...	≤3	8	1
8	18Cr–8Ni	Forgings	SA–182	F304	S30400	...	≤5	8	1
9	18Cr–8Ni	Forgings	SA–182	F304	S30400	...	≤5	8	1
10	18Cr–8Ni	Forgings	SA–182	F304H	S30409	...	≤5	8	1
11	18Cr–8Ni	Forgings	SA–182	F304H	S30409	...	≤5	8	1
12	18Cr–8Ni	Smls. tube	SA–213	TP304	S30400	...	...	8	1
13	18Cr–8Ni	Smls. tube	SA–213	TP304	S30400	...	...	8	1
14	18Cr–8Ni	Smls. tube	SA–213	TP304H	S30409	...	...	8	1
15	18Cr–8Ni	Smls. tube	SA–213	TP304H	S30409	...	...	8	1
16	18Cr–8Ni	Plate	SA–240	302	S30200	...	...	8	1
17	18Cr–8Ni	Plate	SA–240	302	S30200	...	...	8	1
18	18Cr–8Ni	Plate	SA–240	304	S30400	...	...	8	1
19	18Cr–8Ni	Plate	SA–240	304	S30400	...	...	8	1
20	18Cr–8Ni	Plate	SA–240	304H	S30409	...	...	8	1
21	18Cr–8Ni	Plate	SA–240	304H	S30409	...	...	8	1
22	18Cr–8Ni	Wld. tube	SA–249	TP304	S30400	...	...	8	1
23	18Cr–8Ni	Wld. tube	SA–249	TP304	S30400	...	...	8	1
24	18Cr–8Ni	Wld. tube	SA–249	TP304	S30400	...	...	8	1
25	18Cr–8Ni	Wld. tube	SA–249	TP304	S30400	...	...	8	1
26	18Cr–8Ni	Wld. tube	SA–249	TP304H	S30409	...	...	8	1
27	18Cr–8Ni	Wld. tube	SA–249	TP304H	S30409	...	...	8	1
28	18Cr–8Ni	Wld. tube	SA–249	TP304H	S30409	...	...	8	1
29	18Cr–8Ni	Wld. tube	SA–249	TP304H	S30409	...	...	8	1
30	18Cr–8Ni	Smls. & wld. pipe	SA–312	TP304	S30400	...	...	8	1
31	18Cr–8Ni	Smls. & wld. pipe	SA–312	TP304	S30400	...	...	8	1
32	18Cr–8Ni	Wld. pipe	SA–312	TP304	S30400	...	...	8	1
33	18Cr–8Ni	Wld. pipe	SA–312	TP304	S30400	...	...	8	1
34	18Cr–8Ni	Smls. & wld. pipe	SA–312	TP304H	S30409	...	...	8	1
35	18Cr–8Ni	Smls. & wld. pipe	SA–312	TP304H	S30409	...	...	8	1
36	18Cr–8Ni	Wld. pipe	SA–312	TP304H	S30409	...	...	8	1
37	18Cr–8Ni	Wld. pipe	SA–312	TP304H	S30409	...	...	8	1
38	18Cr–8Ni	Wld. pipe	SA–358	304	S30400	1	...	8	1
39	18Cr–8Ni	Wld. pipe	SA–358	304H	S30409	1	...	8	1
40	18Cr–8Ni	Wld. pipe	SA–358	304LN	S30453	1	...	8	1
41	18Cr–8Ni	Smls. pipe	SA–376	TP304	S30400	...	...	8	1
42	18Cr–8Ni	Smls. pipe	SA–376	TP304	S30400	...	...	8	1
43	18Cr–8Ni	Smls. pipe	SA–376	TP304H	S30409	...	...	8	1
44	18Cr–8Ni	Smls. pipe	SA–376	TP304H	S30409	...	...	8	1
45	18Cr–8Ni	Smls. & wld. fittings	SA–403	304	S30400	...	...	8	1

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	70	30	NP	800	NP	NP	HA–1	G5, G16, G17, G19
2	70	30	1500	800	1500	650	HA–1	G5, G12, T7
3	70	30	1500	NP	1500	650	HA–1	G12, T8
4	70	30	NP	800	1500	NP	HA–1	G5, T7
5	70	30	NP	NP	1500	NP	HA–1	T8
6	72.5	29	NP	NP	1022	650	HA–3	G5, G30, T4
7	72.5	29	NP	NP	1022	650	HA–3	G30, T6
8	75	30	1500	NP	1500	NP	HA–1	G12, T8
9	75	30	1500	800	1500	NP	HA–1	G5, G12, T7
10	75	30	1500	NP	1500	NP	HA–1	T8
11	75	30	1500	800	1500	NP	HA–1	G5, T7
12	75	30	1500	NP	1500	NP	HA–1	G12, T8
13	75	30	1500	800	1500	NP	HA–1	G5, G12, T7
14	75	30	1500	NP	1500	NP	HA–1	T8
15	75	30	1500	800	1500	NP	HA–1	G5, T7
16	75	30	NP	NP	750	650	HA–1	G5
17	75	30	NP	NP	750	650	HA–1	...
18	75	30	1500	NP	1500	650	HA–1	G12, T8
19	75	30	1500	800	1500	650	HA–1	G5, G12, H1, T7
20	75	30	1500	800	1500	NP	HA–1	G5, T7
21	75	30	1500	NP	1500	NP	HA–1	T8
22	75	30	1500	NP	NP	NP	HA–1	G12, T8, W13
23	75	30	1500	800	NP	NP	HA–1	G5, G12, T7, W12, W13
24	75	30	1500	NP	1500	650	HA–1	G3, G5, G12, G24, T7
25	75	30	1500	NP	1500	650	HA–1	G3, G12, G24, T8
26	75	30	1500	NP	NP	NP	HA–1	T8, W13
27	75	30	1500	800	NP	NP	HA–1	G5, T7, W12, W13
28	75	30	1500	NP	1500	NP	HA–1	G3, G5, G24, T7
29	75	30	1500	NP	1500	NP	HA–1	G3, G24, T8
30	75	30	1500	800	1500	650	HA–1	G5, G12, T7, W12, W13, W14
31	75	30	1500	NP	1500	650	HA–1	G12, T8, W13, W14
32	75	30	1500	NP	1500	650	HA–1	G3, G5, G12, G24, T7
33	75	30	1500	NP	1500	650	HA–1	G3, G12, G24, T8
34	75	30	1500	800	1500	NP	HA–1	G5, T7, W12, W13, W14
35	75	30	1500	NP	1500	NP	HA–1	T8, W13, W14
36	75	30	1500	NP	1500	NP	HA–1	G3, G5, G24, T7
37	75	30	1500	NP	1500	NP	HA–1	G3, G24, T8
38	75	30	NP	800	NP	NP	HA–1	G5, W12
39	75	30	NP	800	NP	NP	HA–1	G5, W12
40	75	30	NP	800	NP	NP	HA–1	G5, W12
41	75	30	1500	800	1500	650	HA–1	G5, G12, H1, S11, T7
42	75	30	1500	NP	1500	650	HA–1	G12, H1, S11, T8
43	75	30	1500	800	1500	NP	HA–1	G5, H1, T7
44	75	30	1500	NP	1500	NP	HA–1	H1, T8
45	75	30	NP	800	1500	650	HA–1	G5, G12, T7, W12, W14

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
No.	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	20.0	...	18.9	...	17.7	17.1	16.9	16.6	16.2	15.8	15.5	15.2	...	...
2	20.0	...	18.9	...	17.7	17.1	16.9	16.6	16.2	15.8	15.5	15.2	14.9	14.6
3	20.0	...	16.7	...	15.0	13.8	12.9	12.3	12.0	11.7	11.5	11.2	11.0	10.8
4	20.0	...	18.9	...	17.7	17.1	16.9	16.6	16.2	15.8	15.5	15.2	14.9	14.6
5	20.0	...	16.7	...	15.0	13.8	12.9	12.3	12.0	11.7	11.5	11.2	11.0	10.8
6	19.3	...	19.3	...	19.3	18.3	17.1	16.2	15.9	15.6	15.4	15.2	14.9	*11.9*
7	19.3	...	16.5	...	14.9	13.6	12.6	12,0	11.8	11.6	11.4	11.2	11.0	10.8
8	20.0	...	16.7	...	15.0	13.8	12.9	12.3	12.0	11.7	11.5	11.2	11.0	10.8
9	20.0	...	20.0	...	18.9	18.3	17.5	16.6	16.2	15.8	15.5	15.2	14.9	14.6
10	20.0	...	16.7	...	15.0	13.8	12.9	12.3	12.0	11.7	11.5	11.2	11.0	10.8
11	20.0	...	20.0	...	18.9	18.3	17.5	16.6	16.2	15.8	15.5	15.2	14.9	14.6
12	20.0	...	16.7	...	15.0	13.8	12.9	12.3	12.0	11.7	11.5	11.2	11.0	10.8
13	20.0	...	20.0	...	18.9	18.3	17.5	16.6	16.2	15.8	15.5	15.2	14.9	14.6
14	20.0	...	16.7	...	15.0	13.8	12.9	12.3	12.0	11.7	11.5	11.2	11.0	10.8
15	20.0	...	20.0	...	18.9	18.3	17.5	16.6	16.2	15.8	15.5	15.2	14.9	14.6
16	20.0	...	20.0	...	18.9	18.3	17.5	16.6	16.2	15.8	15.5	...	...	...
17	20.0	...	16.7	...	15.0	13.8	12.9	12.3	12.0	11.7	11.5	...	...	...
18	20.0	...	16.7	...	15.0	13.8	12.9	12.3	12.0	11.7	11.5	11.2	11.0	10.8
19	20.0	...	20.0	...	18.9	18.3	17.5	16.6	16.2	15.8	15.5	15.2	14.9	14.6
20	20.0	...	20.0	...	18.9	18.3	17.5	16.6	16.2	15.8	15.5	15.2	14.9	14.6
21	20.0	...	16.7	...	15.0	13.8	12.9	12.3	12.0	11.7	11.5	11.2	11.0	10.8
22	20.0	...	16.7	...	15.0	13.8	12.9	12.3	12.0	11.7	11.5	11.2	11.0	10.8
23	20.0	...	20.0	...	18.9	18.3	17.5	16.6	16.2	15.8	15.5	15.2	14.9	14.6
24	17.0	...	17.0	...	16.1	15.5	14.8	14.1	13.8	13.5	13.2	12.9	12.6	12.4
25	17.0	...	14.2	...	12.7	11.7	11.0	10.4	10.2	10.0	9.8	9.6	9.4	9.2
26	20.0	...	16.7	...	15.0	13.8	12.9	12.3	12.0	11.7	11.5	11.2	11.0	10.8
27	20.0	...	20.0	...	18.9	18.3	17.5	16.6	16.2	15.8	15.5	15.2	14.9	14.6
28	17.0	...	17.0	...	16.1	15.5	14.8	14.1	13.8	13.5	13.2	12.9	12.6	12.4
29	17.0	...	14.2	...	12.7	11.7	11.0	10.4	10.2	10.0	9.8	9.6	9.4	9.2
30	20.0	...	20.0	...	18.9	18.3	17.5	16.6	16.2	15.8	15.5	15.2	14.9	14.6
31	20.0	...	16.7	...	15.0	13.8	12.9	12.3	12.0	11.7	11.5	11.2	11.0	10.8
32	17.0	...	17.0	...	16.1	15.5	14.8	14.1	13.8	13.5	13.2	12.9	12.6	12.4
33	17.0	...	14.2	...	12.7	11.7	11.0	10.4	10.2	10.0	9.8	9.6	9.4	9.2
34	20.0	...	20.0	...	18.9	18.3	17.5	16.6	16.2	15.8	15.5	15.2	14.9	14.6
35	20.0	...	16.7	...	15.0	13.8	12.9	12.3	12.0	11.7	11.5	11.2	11.0	10.8
36	17.0	...	17.0	...	16.1	15.5	14.8	14.1	13.8	13.5	13.2	12.9	12.6	12.4
37	17.0	...	14.2	...	12.7	11.7	11.0	10.4	10.2	10.0	9.8	9.6	9.4	9.2
38	20.0	...	20.0	...	18.9	18.3	17.5	16.6	16.2	15.8	15.5	15.2	...	...
39	20.0	...	20.0	...	18.9	18.3	17.5	16.6	16.2	15.8	15.5	15.2	...	...
40	20.0	...	20.0	...	18.9	18.3	17.5	16.6	16.2	15.8	15.5	15.2	...	...
41	20.0	...	20.0	...	18.9	18.3	17.5	16.6	16.2	15.8	15.5	15.2	14.9	14.6
42	20.0	...	16.7	...	15.0	13.8	12.9	12.3	12.0	11.7	11.5	11.2	11.0	10.8
43	20.0	...	20.0	...	18.9	18.3	17.5	16.6	16.2	15.8	15.5	15.2	14.9	14.6
44	20.0	...	16.7	...	15.0	13.8	12.9	12.3	12.0	11.7	11.5	11.2	11.0	10.8
45	20.0	...	20.0	...	18.9	18.3	17.5	16.6	16.2	15.8	15.5	15.2	14.9	14.6

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding														
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
2	14.3	14.0	*12.4*	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*	...	...	...
3	10.6	10.4	10.1	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*	...	...	...
4	14.3	14.0	*12.4*	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*	...	...	...
5	10.6	10.4	10.1	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*	...	...	...
6	*9.9*	*7.8*	*6.3*	...	...	...	...	...	...	...	...	...	...	...	...
7	10.6	*7.8*	*6.3*	...	...	...	...	...	...	...	...	...	...	...	...
8	10.6	10.4	10.1	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*	...	...	...
9	14.3	14.0	*12.4*	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*	...	...	...
10	10.6	10.4	10.1	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*	...	...	...
11	14.3	14.0	*12.4*	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*	...	...	...
12	10.6	10.4	10.1	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*	...	...	...
13	14.3	14.0	*12.4*	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*	...	...	...
14	10.6	10.4	10.1	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*	...	...	...
15	14.3	14.0	*12.4*	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
18	10.6	10.4	10.1	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*	...	...	...
19	14.3	14.0	*12.4*	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*	...	...	...
20	14.3	14.0	*12.4*	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*	...	...	...
21	10.6	10.4	10.1	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*	...	...	...
22	10.6	10.4	10.1	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*	...	...	...
23	14.3	14.0	*12.4*	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*	...	...	...
24	12.1	11.9	*10.5*	*8.3*	*6.6*	*5.2*	*4.0*	*3.1*	*2.5*	*2.0*	*1.6*	*1.2*	...	...	...
25	9.0	8.8	8.6	*8.3*	*6.6*	*5.2*	*4.0*	*3.1*	*2.5*	*2.0*	*1.6*	*1.2*	...	...	...
26	10.6	10.4	10.1	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*	...	...	...
27	14.3	14.0	*12.4*	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*	...	...	...
28	12.1	11.9	*10.5*	*8.3*	*6.6*	*5.2*	*4.0*	*3.1*	*2.5*	*2.0*	*1.6*	*1.2*	...	...	...
29	9.0	8.8	8.6	*8.3*	*6.6*	*5.2*	*4.0*	*3.1*	*2.5*	*2.0*	*1.6*	*1.2*	...	...	...
30	14.3	14.0	*12.4*	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*	...	...	...
31	10.6	10.4	10.1	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*	...	...	...
32	12.1	11.9	*10.5*	*8.3*	*6.6*	*5.2*	*4.0*	*3.1*	*2.5*	*2.0*	*1.6*	*1.2*	...	...	...
33	9.0	8.8	8.6	*8.3*	*6.6*	*5.2*	*4.0*	*3.1*	*2.5*	*2.0*	*1.6*	*1.2*	...	...	...
34	14.3	14.0	*12.4*	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*	...	...	...
35	10.6	10.4	10.1	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*	...	...	...
36	12.1	11.9	*10.5*	*8.3*	*6.6*	*5.2*	*4.0*	*3.1*	*2.5*	*2.0*	*1.6*	*1.2*	...	...	...
37	9.0	8.8	8.6	*8.3*	*6.6*	*5.2*	*4.0*	*3.1*	*2.5*	*2.0*	*1.6*	*1.2*	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
41	14.3	14.0	*12.4*	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*	...	...	...
42	10.6	10.4	10.1	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*	...	...	...
43	14.3	14.0	*12.4*	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*	...	...	...
44	10.6	10.4	10.1	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*	...	...	...
45	14.3	14.0	*12.4*	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*	...	...	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	18Cr–8Ni	Smls. & wld. fittings	SA–403	304H	S30409	...	...	8	1
2	18Cr–8Ni	Wld. pipe	SA–409	TP304	S30400	...	...	8	1
3	18Cr–8Ni	Bar	SA–479	302	S30200	...	...	8	1
4	18Cr–8Ni	Bar	SA–479	302	S30200	...	...	8	1
5	18Cr–8Ni	Bar	SA–479	304	S30400	...	...	8	1
6	18Cr–8Ni	Bar	SA–479	304	S30400	...	...	8	1
7	18Cr–8Ni	Bar	SA–479	304H	S30409	...	...	8	1
8	18Cr–8Ni	Bar	SA–479	304H	S30409	...	...	8	1
9	18Cr–8Ni	Wld. tube	SA–688	TP304	S30400	...	...	8	1
10	18Cr–8Ni	Wld. tube	SA–688	TP304	S30400	...	...	8	1
11	18Cr–8Ni	Wld. tube	SA–688	TP304	S30400	...	...	8	1
12	18Cr–8Ni	Wld. pipe	SA–813	TP304	S30400	...	...	8	1
13	18Cr–8Ni	Wld. pipe	SA–813	TP304H	S30409	...	...	8	1
14	18Cr–8Ni	Wld. pipe	SA–814	TP304	S30400	...	...	8	1
15	18Cr–8Ni	Wld. pipe	SA–814	TP304H	S30409	...	...	8	1
16	18Cr–8Ni	Bar	SA/JIS G4303	SUS302	...	...	...	8	1
17	18Cr–8Ni	Bar	SA/JIS G4303	SUS304	...	...	...	8	1
18	18Cr–8Ni	Plate	SA/EN 10028–7	X5CrNi18–10	...	...	≤3	8	1
19	18Cr–8Ni	Plate	SA/EN 10028–7	X5CrNi18–10	...	...	≤3	8	1
20	18Cr–8Ni	Castings	SA–351	CF3A	J92500	...	...	8	1
21	18Cr–8Ni	Castings	SA–351	CF3A	J92500	...	...	8	1
22	18Cr–8Ni	Castings	SA–351	CF8A	J92600	...	...	8	1
23	18Cr–8Ni	Castings	SA–351	CF8A	J92600	...	...	8	1
24	18Cr–8Ni	Cast pipe	SA–451	CPF3A	J92500	...	...	8	1
25	18Cr–8Ni	Cast pipe	SA–451	CPF8A	J92600	...	...	8	1
26	18Cr–8Ni–N	Forgings	SA–182	F304LN	S30453	...	>5	8	1
27	18Cr–8Ni–N	Forgings	SA–965	F304LN	S30453	...	...	8	1
28	18Cr–8Ni–N	Forgings	SA–182	F304LN	S30453	...	≤5	8	1
29	18Cr–8Ni–N	Smls. tube	SA–213	TP304LN	S30453	...	...	8	1
30	18Cr–8Ni–N	Plate	SA–240	304LN	S30453	...	...	8	1
31	18Cr–8Ni–N	Wld. tube	SA–249	TP304LN	S30453	...	...	8	1
32	18Cr–8Ni–N	Smls. & wld. pipe	SA–312	TP304LN	S30453	...	...	8	1
33	18Cr–8Ni–N	Smls. pipe	SA–376	TP304LN	S30453	...	...	8	1
34	18Cr–8Ni–N	Smls. & wld. fittings	SA–403	304LN	S30453	WP	...	8	1
35	18Cr–8Ni–N	Bar	SA–479	304LN	S30453	...	...	8	1
36	18Cr–8Ni–N	Wld. tube	SA–688	TP304LN	S30453	...	...	8	1
37	18Cr–8Ni–N	Wld. pipe	SA–813	TP304LN	S30453	...	...	8	1
38	18Cr–8Ni–N	Wld. pipe	SA–814	TP304LN	S30453	...	...	8	1
39	18Cr–8Ni–N	Forgings	SA–182	F304N	S30451	...	...	8	1
40	18Cr–8Ni–N	Smls. tube	SA–213	TP304N	S30451	...	...	8	1
41	18Cr–8Ni–N	Smls. tube	SA–213	TP304N	S30451	...	...	8	1
42	18Cr–8Ni–N	Plate	SA–240	304N	S30451	...	...	8	1
43	18Cr–8Ni–N	Plate	SA–240	304N	S30451	...	...	8	1
44	18Cr–8Ni–N	Wld. tube	SA–249	TP304N	S30451	...	...	8	1
45	18Cr–8Ni–N	Wld. tube	SA–249	TP304N	S30451	...	...	8	1

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	75	30	NP	800	1500	NP	HA–1	G5, T7, W12, W14
2	75	30	NP	800	NP	NP	HA–1	G5, W12
3	75	30	NP	800	750	650	HA–1	G5, G24
4	75	30	NP	NP	750	650	HA–1	G22
5	75	30	1500	800	1500	650	HA–1	G5, G12, G22, T7
6	75	30	1500	NP	1500	650	HA–1	G12, G22, T8
7	75	30	1500	800	1500	NP	HA–1	G5, G22, T7
8	75	30	1500	NP	1500	NP	HA–1	G22, T8
9	75	30	NP	800	NP	NP	HA–1	G5, W12
10	75	30	NP	NP	1500	650	HA–1	G5, G12, G24, T7
11	75	30	NP	NP	1500	650	HA–1	G12, G24, T8
12	75	30	NP	800	NP	NP	HA–1	G5, W12
13	75	30	NP	800	NP	NP	HA–1	G5, W12
14	75	30	NP	800	NP	NP	HA–1	G5, W12
15	75	30	NP	800	NP	NP	HA–1	G5, W12
16	75	30	NP	800	750	NP	HA–1	G5, G24
17	75	30	1500	800	1500	NP	HA–1	G5, G12, G22, T7
18	75	31	NP	NP	1022	650	HA–1	G5, G12, G30, H1, T7
19	75	31	NP	NP	1022	650	HA–1	G12, G30
20	77	35	NP	650	700	650	HA–3	G1, G5, G16, G17, G19
21	77	35	NP	NP	700	650	HA–3	G1, G19
22	77	35	NP	650	650	650	HA–1	G1, G5, G16, G17, G19
23	77	35	NP	NP	650	650	HA–1	G1, G19
24	77	35	NP	650	NP	NP	HA–3	G5, G16, G17, G19
25	77	35	NP	650	NP	NP	HA–1	G5, G16, G17, G19
26	70	30	NP	800	800	NP	HA–1	G5
27	70	30	NP	800	800	NP	HA–1	G5
28	75	30	NP	800	800	NP	HA–1	G5
29	75	30	NP	800	800	NP	HA–1	G5
30	75	30	NP	800	800	NP	HA–1	G5
31	75	30	NP	800	800	NP	HA–1	G5, W12, W14
32	75	30	NP	800	800	NP	HA–1	G5, W12, W14
33	75	30	NP	800	800	NP	HA–1	G5
34	75	30	NP	800	800	NP	HA–1	G5, W12, W14
35	75	30	NP	800	800	NP	HA–1	G5
36	75	30	NP	800	800	NP	HA–1	G5, W12, W14
37	75	30	NP	800	800	NP	HA–1	G5, W12, W14
38	75	30	NP	800	800	NP	HA–1	G5, W12, W14
39	80	35	NP	800	NP	NP	HA–1	G5
40	80	35	1200	800	1200	NP	HA–1	G5, G12, T7
41	80	35	1200	NP	1200	NP	HA–1	G12, T8
42	80	35	NP	800	1200	650	HA–1	G5, G12, T7
43	80	35	NP	NP	1200	650	HA–1	G12, T8
44	80	35	1200	NP	NP	NP	HA–1	G5, G12, T7, W13
45	80	35	1200	NP	NP	NP	HA–1	G12, T8, W13

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	20.0	...	20.0	...	18.9	18.3	17.5	16.6	16.2	15.8	15.5	15.2	14.9	14.6
2	20.0	...	20.0	...	18.9	18.3	17.5	16.6	16.2	15.8	15.5	15.2	...	...
3	20.0	...	20.0	...	18.9	18.3	17.5	16.6	16.2	15.8	15.5	15.2	...	...
4	20.0	...	16.7	...	15.0	13.8	12.9	12.3	12.0	11.7	11.5	...	...	...
5	20.0	...	20.0	...	18.9	18.3	17.5	16.6	16.2	15.8	15.5	15.2	14.9	14.6
6	20.0	...	16.7	...	15.0	13.8	12.9	12.3	12.0	11.7	11.5	11.2	11.0	10.8
7	20.0	...	20.0	...	18.9	18.3	17.5	16.6	16.2	15.8	15.5	15.2	14.9	14.6
8	20.0	...	16.7	...	15.0	13.8	12.9	12.3	12.0	11.7	11.5	11.2	11.0	10.8
9	20.0	...	20.0	...	18.9	18.3	17.5	16.6	16.2	15.8	15.5	15.2	...	...
10	17.0	...	17.0	...	16.1	15.5	14.8	14.1	13.8	13.5	13.2	12.9	12.6	12.4
11	17.0	...	14.2	...	12.7	11.7	11.0	10.4	10.2	10.0	9.8	9.6	9.4	9.2
12	20.0	...	20.0	...	18.9	18.3	17.5	16.6	16.2	15.8	15.5	15.2	...	...
13	20.0	...	20.0	...	18.9	18.3	17.5	16.6	16.2	15.8	15.5	15.2	...	...
14	20.0	...	20.0	...	18.9	18.3	17.5	16.6	16.2	15.8	15.5	15.2	...	...
15	20.0	...	20.0	...	18.9	18.3	17.5	16.6	16.2	15.8	15.5	15.2	...	...
16	20.0	...	20.0	...	18.9	18.3	17.5	16.6	16.2	15.8	15.5	15.2	...	...
17	20.0	...	20.0	...	18.9	18.3	17.5	16.6	16.2	15.8	15.5	15.2	14.9	14.6
18	20.3	...	20.3	...	20.3	18.9	17.7	16.8	16.4	16.1	15.7	15.4	15.1	14.8
19	20.3	...	16.9	...	15.2	14.0	13.1	12.5	12.2	11.9	11.7	11.4	11.2	11.0
20	22.0	...	20.8	...	19.4	18.8	18.6	18.6	18.6	18.5	...	...	...	...
21	22.0	...	19.5	...	17.5	16.1	15.1	14.3	14.0	13.7	...	...	...	...
22	22.0	...	20.8	...	19.4	18.8	18.6	18.6	18.6	...	...	...	...	...
23	22.0	...	19.5	...	17.5	16.1	15.1	14.3	14.0	...	...	...	...	...
24	22.0	...	20.8	...	19.4	18.8	18.6	18.6	18.6	...	...	...	...	...
25	22.0	...	20.8	...	19.4	18.8	18.6	18.6	18.6	...	...	...	...	...
26	20.0	...	18.9	...	17.7	17.1	16.9	16.6	16.2	15.8	15.5	15.2	...	...
27	20.0	...	18.9	...	17.7	17.1	16.9	16.6	16.2	15.8	15.5	15.2	...	...
28	20.0	...	20.0	...	18.9	18.3	17.5	16.6	16.2	15.8	15.5	15.2	...	...
29	20.0	...	20.0	...	18.9	18.3	17.5	16.6	16.2	15.8	15.5	15.2	...	...
30	20.0	...	20.0	...	18.9	18.3	17.5	16.6	16.2	15.8	15.5	15.2	...	...
31	20.0	...	20.0	...	18.9	18.3	17.5	16.6	16.2	15.8	15.5	15.2	...	...
32	20.0	...	20.0	...	18.9	18.3	17.5	16.6	16.2	15.8	15.5	15.2	...	...
33	20.0	...	20.0	...	18.9	18.3	17.5	16.6	16.2	15.8	15.5	15.2	...	...
34	20.0	...	20.0	...	18.9	18.3	17.5	16.6	16.2	15.8	15.5	15.2	...	...
35	20.0	...	20.0	...	18.9	18.3	17.5	16.6	16.2	15.8	15.5	15.2	...	...
36	20.0	...	20.0	...	18.9	18.3	17.5	16.6	16.2	15.8	15.5	15.2	...	...
37	20.0	...	20.0	...	18.9	18.3	17.5	16.6	16.2	15.8	15.5	15.2	...	...
38	20.0	...	20.0	...	18.9	18.3	17.5	16.6	16.2	15.8	15.5	15.2	...	...
39	22.9	...	22.9	...	21.7	20.3	18.9	17.9	17.5	17.2	16.9	16.6	...	...
40	22.9	...	22.9	...	21.7	20.3	18.9	17.9	17.5	17.2	16.9	16.6	16.3	16.0
41	22.9	...	19.1	...	16.7	15.1	14.0	13.3	13.0	12.8	12.5	12.3	12.1	11.8
42	22.9	...	22.9	...	21.7	20.3	18.9	17.9	17.5	17.2	16.9	16.6	16.3	16.0
43	22.9	...	19.1	...	16.7	15.1	14.0	13.3	13.0	12.8	12.5	12.3	12.1	11.8
44	22.9	...	22.9	...	21.7	20.3	18.9	17.9	17.5	17.2	16.9	16.6	16.3	16.0
45	22.9	...	19.1	...	16.7	15.1	14.0	13.3	13.0	12.8	12.5	12.3	12.1	11.8

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding														
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
1	14.3	14.0	*12.4*	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
5	14.3	14.0	*12.4*	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*	...	...	...
6	10.6	10.4	10.1	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*	...	...	...
7	14.3	14.0	*12.4*	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*	...	...	...
8	10.6	10.4	10.1	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
10	12.1	11.9	*10.5*	*8.3*	*6.6*	*5.2*	*4.0*	*3.1*	*2.5*	*2.0*	*1.6*	*1.2*	...	...	...
11	9.0	8.8	8.6	*8.3*	*6.6*	*5.2*	*4.0*	*3.1*	*2.5*	*2.0*	*1.6*	*1.2*	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
17	14.3	14.0	*12.4*	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*	...	...	...
18	14.5	14.2	*12.4*	...	...	...	...	...	...	...	...	...	...	...	...
19	10.7	10.5	10.3	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
40	15.6	15.2	*12.4*	*9.8*	*7.7*	*6.1*	...	...	...	...	...	...	...	...	...
41	11.6	11.3	11.0	*9.8*	*7.7*	*6.1*	...	...	...	...	...	...	...	...	...
42	15.6	15.2	*12.4*	*9.8*	*7.7*	*6.1*	...	...	...	...	...	...	...	...	...
43	11.6	11.3	11.0	*9.8*	*7.7*	*6.1*	...	...	...	...	...	...	...	...	...
44	15.6	15.2	*12.4*	*9.8*	*7.7*	*6.1*	...	...	...	...	...	...	...	...	...
45	11.6	11.3	11.0	*9.8*	*7.7*	*6.1*	...	...	...	...	...	...	...	...	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	18Cr–8Ni–N	Wld. tube	SA–249	TP304N	S30451	...	...	8	1
2	18Cr–8Ni–N	Wld. tube	SA–249	TP304N	S30451	...	...	8	1
3	18Cr–8Ni–N	Wld. tube	SA–249	TP304N	S30451	...	...	8	1
4	18Cr–8Ni–N	Smls. & wld. pipe	SA–312	TP304N	S30451	...	...	8	1
5	18Cr–8Ni–N	Smls. & wld. pipe	SA–312	TP304N	S30451	...	...	8	1
6	18Cr–8Ni–N	Wld. pipe	SA–312	TP304N	S30451	...	...	8	1
7	18Cr–8Ni–N	Wld. pipe	SA–312	TP304N	S30451	...	...	8	1
8	18Cr–8Ni–N	Wld. pipe	SA–358	304N	S30451	1	...	8	1
9	18Cr–8Ni–N	Smls. pipe	SA–376	TP304N	S30451	...	...	8	1
10	18Cr–8Ni–N	Smls. pipe	SA–376	TP304N	S30451	...	...	8	1
11	18Cr–8Ni–N	Smls. & wld. fittings	SA–403	304N	S30451	...	...	8	1
12	18Cr–8Ni–N	Bar	SA–479	304N	S30451	...	...	8	1
13	18Cr–8Ni–N	Bar	SA–479	304N	S30451	...	...	8	1
14	18Cr–8Ni–N	Wld. tube	SA–688	TP304N	S30451	...	...	8	1
15	18Cr–8Ni–N	Wld. tube	SA–688	TP304N	S30451	...	...	8	1
16	18Cr–8Ni–N	Wld. tube	SA–688	TP304N	S30451	...	...	8	1
17	18Cr–8Ni–N	Wld. pipe	SA–813	TP304N	S30451	...	...	8	1
18	18Cr–8Ni–N	Wld. pipe	SA–814	TP304N	S30451	...	...	8	1
19	18Cr–8Ni–N	Forgings	SA–965	F304N	S30451	...	...	8	1
20	18Cr–8Ni–N	Forgings	SA–965	F304N	S30451	...	...	8	1
21	18Cr–8Ni–N	Plate	SA/EN 10028–7	X2CrNiN18–10	...	...	≤3	8	1
22	18Cr–8Ni–N	Plate	SA/EN 10028–7	X5CrNiN19–9	...	...	≤3	8	1
23	18Cr–8Ni–N	Plate	SA/EN 10028–7	X5CrNiN19–9	...	...	≤3	8	1
24	18Cr–8Ni–4Si–N	Bar	SA–479	...	S21800	...	...	8	3
(**21**) 25	18Cr–9Ni–3Cu–Cb–N	Smls. tube	SA–213	...	S30432	...	...	8	1
(**21**) 26	18Cr–9Ni–3Cu–Cb–N	Smls. tube	SA–213	...	S30432	...	...	8	1
27	18Cr–10Ni–Cb	Forgings	SA–965	F348H	S34809	...	...	8	1
28	18Cr–10Ni–Cb	Forgings	SA–965	F348H	S34809	...	...	8	1
29	18Cr–10Ni–Cb	Castings	SA–351	CF8C	J92710	...	...	8	1
30	18Cr–10Ni–Cb	Castings	SA–351	CF8C	J92710	...	...	8	1
31	18Cr–10Ni–Cb	Castings	SA–351	CF8C	J92710	...	...	8	1
32	18Cr–10Ni–Cb	Cast pipe	SA–451	CPF8C	J92710	...	...	8	1
33	18Cr–10Ni–Cb	Forgings	SA–182	F347	S34700	...	>5	8	1
34	18Cr–10Ni–Cb	Forgings	SA–965	F347	S34700	...	...	8	1
35	18Cr–10Ni–Cb	Forgings	SA–965	F347	S34700	...	...	8	1
36	18Cr–10Ni–Cb	Forgings	SA–182	F347H	S34709	...	>5	8	1
37	18Cr–10Ni–Cb	Forgings	SA–182	F347H	S34709	...	>5	8	1
38	18Cr–10Ni–Cb	Forgings	SA–965	F347H	S34709	...	...	8	1
39	18Cr–10Ni–Cb	Forgings	SA–965	F347H	S34709	...	...	8	1
40	18Cr–10Ni–Cb	Forgings	SA–182	F348	S34800	...	>5	8	1
41	18Cr–10Ni–Cb	Forgings	SA–182	F348	S34800	...	>5	8	1
42	18Cr–10Ni–Cb	Forgings	SA–965	F348	S34800	...	...	8	1
43	18Cr–10Ni–Cb	Forgings	SA–965	F348	S34800	...	...	8	1
44	18Cr–10Ni–Cb	Forgings	SA–182	F348H	S34809	...	>5	8	1
45	18Cr–10Ni–Cb	Forgings	SA–182	F348H	S34809	...	>5	8	1

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	80	35	1200	NP	NP	NP	HA–1	G3, G5, G12, T5
2	80	35	1200	NP	1200	650	HA–1	G3, G12, G24, T8
3	80	35	NP	NP	1200	650	HA–1	G5, G12, G24, T5
4	80	35	1200	800	1200	650	HA–1	G5, G12, T7, W12, W13, W14
5	80	35	1200	NP	1200	650	HA–1	G12, T8, W13, W14
6	80	35	1200	NP	1200	650	HA–1	G3, G5, G12, G24, T5
7	80	35	1200	NP	1200	650	HA–1	G3, G12, G24, T8
8	80	35	NP	800	NP	NP	HA–1	G5, W12
9	80	35	1200	800	1200	650	HA–1	G5, G12, H1, T7
10	80	35	1200	NP	1200	650	HA–1	G12, H1, T8
11	80	35	NP	800	1200	650	HA–1	G5, T7, W12, W14
12	80	35	1200	NP	NP	NP	HA–1	G12, T8
13	80	35	1200	800	NP	NP	HA–1	G5, G12, T7
14	80	35	NP	800	NP	NP	HA–1	G5, W12
15	80	35	NP	NP	1200	650	HA–1	G5, G12, G24, T7
16	80	35	NP	NP	1200	650	HA–1	G12, G24, T8
17	80	35	NP	800	NP	NP	HA–1	G5, W12
18	80	35	NP	800	NP	NP	HA–1	G5, W12
19	80	35	NP	800	1200	650	HA–1	G5, G12, T7
20	80	35	NP	NP	1200	650	HA–1	G12, T8
21	80	39	NP	NP	800	650	HA–1	G5, G30
22	80	39	NP	NP	1022	650	HA–1	G5, G12, G30, T7
23	80	39	NP	NP	1022	650	HA–1	G12, G30
24	95	50	NP	800	NP	NP	HA–6	...
25	86	34	1500	NP	1500	NP	HA–2	G5, T12
26	86	34	1500	NP	1500	NP	HA–2	T12
27	65	25	NP	NP	1500	NP	HA–2	G5, H2, T9
28	65	25	NP	NP	1500	NP	HA–2	H2, T9
29	70	30	NP	800	NP	NP	HA–2	G5, G16, G17, G19
30	70	30	NP	NP	1500	650	HA–2	G1, G5, G12, G19, T7
31	70	30	NP	NP	1500	650	HA–2	G1, G12, G19, T7
32	70	30	NP	800	NP	NP	HA–2	G5, G16, G17, G19
33	70	30	1500	800	1500	650	HA–2	G5, G12, T7
34	70	30	1500	800	1500	650	HA–2	G5, G12, H1, T7
35	70	30	1500	NP	1500	650	HA–2	G12, H1, T7
36	70	30	1500	NP	NP	NP	HA–2	H2, T9
37	70	30	1500	800	1500	NP	HA–2	G5, H2, T8
38	70	30	NP	NP	1500	NP	HA–2	H2, T9
39	70	30	NP	800	1500	NP	HA–2	G5, H2, T8
40	70	30	1500	NP	NP	NP	HA–2	T7
41	70	30	1500	800	1500	650	HA–2	G5, G12, T7
42	70	30	NP	NP	1500	650	HA–2	G5, G12, H1, T7
43	70	30	NP	NP	1500	650	HA–2	G12, H1, T7
44	70	30	1500	NP	NP	NP	HA–2	T9
45	70	30	1500	800	1500	NP	HA–2	G5, T8

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	19.4	...	19.4	...	18.5	17.3	16.0	15.2	14.9	14.6	14.4	14.1	13.8	13.6
2	19.4	...	16.2	...	14.2	12.8	11.9	11.3	11.0	10.8	10.6	10.5	10.3	10.0
3	19.4	...	19.4	...	18.5	17.3	16.0	15.2	14.9	14.6	14.4	14.1	13.8	13.6
4	22.9	...	22.9	...	21.7	20.3	18.9	17.9	17.5	17.2	16.9	16.6	16.3	16.0
5	22.9	...	19.1	...	16.7	15.1	14.0	13.3	13.0	12.8	12.5	12.3	12.1	11.8
6	19.4	...	19.4	...	18.5	17.3	16.0	15.2	14.9	14.6	14.4	14.1	13.8	13.6
7	19.4	...	16.2	...	14.2	12.8	11.9	11.3	11.0	10.8	10.6	10.5	10.3	10.0
8	22.9	...	22.9	...	21.7	20.3	18.9	17.9	17.5	17.2	16.9	16.6	...	...
9	22.9	...	22.9	...	21.7	20.3	18.9	17.9	17.5	17.2	16.9	16.6	16.3	16.0
10	22.9	...	19.1	...	16.7	15.1	14.0	13.3	13.0	12.8	12.5	12.3	12.1	11.8
11	22.9	...	22.9	...	21.7	20.3	18.9	17.9	17.5	17.2	16.9	16.6	16.3	16.0
12	22.9	...	19.1	...	16.7	15.1	14.0	13.3	13.0	12.8	12.5	12.3	12.1	11.8
13	22.9	...	22.9	...	21.7	20.3	18.9	17.9	17.5	17.2	16.9	16.6	16.3	16.0
14	22.9	...	22.9	...	21.7	20.3	18.9	17.9	17.5	17.2	16.9	16.6	...	...
15	19.4	...	19.4	...	18.5	17.3	16.0	15.2	14.9	14.6	14.4	14.1	13.8	13.6
16	19.4	...	16.2	...	14.2	12.8	11.9	11.3	11.0	10.8	10.6	10.5	10.3	10.0
17	22.9	...	22.9	...	21.7	20.3	18.9	17.9	17.5	17.2	16.9	16.6	...	...
18	22.9	...	22.9	...	21.7	20.3	18.9	17.9	17.5	17.2	16.9	16.6	...	...
19	22.9	...	22.9	...	21.7	20.3	18.9	17.9	17.5	17.2	16.9	16.6	16.3	16.0
20	22.9	...	19.1	...	16.7	15.1	14.0	13.3	13.0	12.8	12.5	12.3	12.1	11.8
21	22.8	...	22.8	...	22.3	21.4	21.1	21.1	21.1	20.7	20.2	19.8	...	...
22	22.8	...	22.8	...	22.8	22.7	21.1	20.0	19.6	19.3	18.9	18.6	18.2	17.8
23	22.8	...	21.3	...	18.7	16.8	15.6	14.8	14.5	14.3	14.0	13.8	13.5	13.2
24	27.1	...	25.9	...	22.1	19.8	18.4	17.6	17.3	17.1	16.9	16.8	...	...
25	22.7	...	22.7	...	22.7	22.7	21.9	21.1	20.7	20.4	20.1	19.8	19.5	19.2
26	22.7	...	19.8	...	18.2	17.1	16.3	15.6	15.3	15.1	14.9	14.6	14.4	14.2
27	16.7	...	16.7	...	16.3	15.4	14.9	14.6	14.6	14.6	14.6	14.6	14.5	14.5
28	16.7	...	15.3	...	14.3	13.3	12.5	11.9	11.7	11.5	11.4	11.3	11.2	11.2
29	20.0	...	19.1	...	17.6	16.6	16.0	15.7	15.7	15.7	15.7	15.7	...	...
30	20.0	...	19.1	...	17.6	16.6	16.0	15.8	15.7	15.7	15.7	15.7	15.7	15.6
31	20.0	...	18.4	...	17.1	16.0	15.0	14.3	14.0	13.8	13.7	13.6	13.5	13.4
32	20.0	...	19.1	...	17.6	16.6	16.0	15.7	15.7	15.7	15.7	15.7	...	...
33	20.0	...	19.1	...	17.6	16.6	16.0	15.8	15.7	15.7	15.7	15.7	15.7	15.6
34	20.0	...	19.1	...	17.6	16.6	16.0	15.8	15.7	15.7	15.7	15.7	15.7	15.6
35	20.0	...	18.4	...	17.1	16.0	15.0	14.3	14.0	13.8	13.7	13.6	13.5	13.4
36	20.0	...	18.4	...	17.1	16.0	15.0	14.3	14.0	13.8	13.7	13.6	13.5	13.4
37	20.0	...	19.1	...	17.6	16.6	16.0	15.7	15.7	15.7	15.7	15.7	15.7	15.6
38	20.0	...	18.4	...	17.1	16.0	15.0	14.3	14.0	13.8	13.7	13.6	13.5	13.4
39	20.0	...	19.1	...	17.6	16.6	16.0	15.7	15.7	15.7	15.7	15.7	15.7	15.6
40	20.0	...	18.4	...	17.1	16.0	15.0	14.3	14.0	13.8	13.7	13.6	13.5	13.4
41	20.0	...	19.1	...	17.6	16.6	16.0	15.8	15.7	15.7	15.7	15.7	15.7	15.6
42	20.0	...	19.1	...	17.6	16.6	16.0	15.8	15.7	15.7	15.7	15.7	15.7	15.6
43	20.0	...	18.4	...	17.1	16.0	15.0	14.3	14.0	13.8	13.7	13.6	13.5	13.4
44	20.0	...	18.4	...	17.1	16.0	15.0	14.3	14.0	13.8	13.7	13.6	13.5	13.4
45	20.0	...	19.1	...	17.6	16.6	16.0	15.7	15.7	15.7	15.7	15.7	15.7	15.6

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding															
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
1	*13.3*	*13.0*	*10.5*	*8.3*	*6.6*	*5.2*	...	...	...	...	...	...	...	...	...	
2	9.8	9.6	9.4	*8.3*	*6.6*	*5.2*	...	...	...	...	...	...	...	...	...	
3	*13.3*	*13.0*	*10.5*	*8.3*	*6.6*	*5.2*	...	...	...	...	...	...	...	...	...	
4	15.6	15.2	*12.4*	*9.8*	*7.7*	*6.1*	...	...	...	...	...	...	...	...	...	
5	11.6	11.3	11.0	*9.8*	*7.7*	*6.1*	...	...	...	...	...	...	...	...	...	
6	*13.3*	*13.0*	*10.5*	*8.3*	*6.6*	*5.2*	...	...	...	...	...	...	...	...	...	
7	9.8	9.6	9.4	*8.3*	*6.6*	*5.2*	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	15.6	15.2	*12.4*	*9.8*	*7.7*	*6.1*	...	...	...	...	...	...	...	...	...	
10	11.6	11.3	11.0	*9.8*	*7.7*	*6.1*	...	...	...	...	...	...	...	...	...	
11	15.6	15.2	*12.4*	*9.8*	*7.7*	*6.1*	...	...	...	...	...	...	...	...	...	
12	11.6	11.3	11.0	*9.8*	*7.7*	*6.1*	...	...	...	...	...	...	...	...	...	
13	15.6	15.2	*12.4*	*9.8*	*7.7*	*6.1*	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	13.3	13.0	*10.5*	*8.3*	*6.6*	*5.2*	...	...	...	...	...	...	...	...	...	
16	9.8	9.6	9.4	*8.3*	*6.6*	*5.2*	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	15.6	15.2	*12.4*	*9.8*	*7.7*	*6.1*	...	...	...	...	...	...	...	...	...	
20	11.6	11.3	11.0	*9.8*	*7.7*	*6.1*	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	17.4	17.0	*12.4*	...	...	...	...	...	...	...	...	...	...	...	...	
23	12.9	12.6	12.3	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	18.9	18.6	18.3	18.1	14.7	*11.4*	*8.7*	*6.5*	*4.7*	*3.3*	*2.2*	*1.5*	...	...	...	(**21**)
26	14.0	13.8	13.6	13.4	13.2	*11.4*	*8.7*	*6.5*	*4.7*	*3.3*	*2.2*	*1.5*	...	...	...	(**21**)
27	14.4	14.2	14.0	13.7	*10.5*	*7.9*	*5.9*	*4.4*	*3.2*	*2.5*	*1.8*	*1.3*	...	...	...	
28	11.2	11.2	11.1	11.1	*10.5*	*7.9*	*5.9*	*4.4*	*3.2*	*2.5*	*1.8*	*1.3*	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	15.5	15.3	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*	...	...	...	
31	13.4	13.4	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	15.5	15.3	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*	...	...	...	
34	15.5	15.3	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*	...	...	...	
35	13.4	13.4	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*	...	...	...	
36	13.4	13.4	13.4	13.3	*10.5*	*7.9*	*5.9*	*4.4*	*3.2*	*2.5*	*1.8*	*1.3*	...	...	...	
37	15.5	15.3	15.1	*14.1*	*10.5*	*7.9*	*5.9*	*4.4*	*3.2*	*2.5*	*1.8*	*1.3*	...	...	...	
38	13.4	13.4	13.4	13.3	*10.5*	*7.9*	*5.9*	*4.4*	*3.2*	*2.5*	*1.8*	*1.3*	...	...	...	
39	15.5	15.3	15.1	*14.1*	*10.5*	*7.9*	*5.9*	*4.4*	*3.2*	*2.5*	*1.8*	*1.3*	...	...	...	
40	13.4	13.4	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*	...	...	...	
41	15.5	15.3	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*	...	...	...	
42	15.5	15.3	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*	...	...	...	
43	13.4	13.4	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*	...	...	...	
44	13.4	13.4	13.4	13.3	*10.5*	*7.9*	*5.9*	*4.4*	*3.2*	*2.5*	*1.8*	*1.3*	...	...	...	
45	15.5	15.3	15.1	*14.1*	*10.5*	*7.9*	*5.9*	*4.4*	*3.2*	*2.5*	*1.8*	*1.3*	...	...	...	

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	18Cr–10Ni–Cb	Forgings	SA–182	F347	S34700	...	≤5	8	1
2	18Cr–10Ni–Cb	Forgings	SA–182	F347	S34700	...	≤5	8	1
3	18Cr–10Ni–Cb	Smls. tube	SA–213	TP347	S34700	...	...	8	1
4	18Cr–10Ni–Cb	Smls. tube	SA–213	TP347	S34700	...	...	8	1
5	18Cr–10Ni–Cb	Plate	SA–240	347	S34700	...	...	8	1
6	18Cr–10Ni–Cb	Plate	SA–240	347	S34700	...	...	8	1
7	18Cr–10Ni–Cb	Wld. tube	SA–249	TP347	S34700	...	...	8	1
8	18Cr–10Ni–Cb	Wld. tube	SA–249	TP347	S34700	...	...	8	1
9	18Cr–10Ni–Cb	Wld. tube	SA–249	TP347	S34700	...	...	8	1
10	18Cr–10Ni–Cb	Wld. tube	SA–249	TP347	S34700	...	...	8	1
11	18Cr–10Ni–Cb	Smls. & wld. pipe	SA–312	TP347	S34700	...	...	8	1
12	18Cr–10Ni–Cb	Smls. & wld. pipe	SA–312	TP347	S34700	...	...	8	1
13	18Cr–10Ni–Cb	Wld. pipe	SA–312	TP347	S34700	...	...	8	1
14	18Cr–10Ni–Cb	Wld. pipe	SA–312	TP347	S34700	...	...	8	1
15	18Cr–10Ni–Cb	Wld. pipe	SA–358	347	S34700	1	...	8	1
16	18Cr–10Ni–Cb	Smls. pipe	SA–376	TP347	S34700	...	...	8	1
17	18Cr–10Ni–Cb	Smls. pipe	SA–376	TP347	S34700	...	...	8	1
18	18Cr–10Ni–Cb	Smls. & wld. fittings	SA–403	347	S34700	...	...	8	1
19	18Cr–10Ni–Cb	Wld. pipe	SA–409	TP347	S34700	...	...	8	1
20	18Cr–10Ni–Cb	Bar	SA–479	347	S34700	...	...	8	1
21	18Cr–10Ni–Cb	Bar	SA–479	347	S34700	...	...	8	1
22	18Cr–10Ni–Cb	Wld. pipe	SA–813	TP347	S34700	...	...	8	1
23	18Cr–10Ni–Cb	Bar	SA/JIS G4303	SUS347	...	...	...	8	1
24	18Cr–10Ni–Cb	Forgings	SA–182	F347H	S34709	...	≤5	8	1
25	18Cr–10Ni–Cb	Forgings	SA–182	F347H	S34709	...	≤5	8	1
26	18Cr–10Ni–Cb	Smls. tube	SA–213	TP347H	S34709	...	...	8	1
27	18Cr–10Ni–Cb	Smls. tube	SA–213	TP347H	S34709	...	...	8	1
28	18Cr–10Ni–Cb	Plate	SA–240	347H	S34709	...	...	8	1
29	18Cr–10Ni–Cb	Plate	SA–240	347H	S34709	...	...	8	1
30	18Cr–10Ni–Cb	Wld. tube	SA–249	TP347H	S34709	...	...	8	1
31	18Cr–10Ni–Cb	Wld. tube	SA–249	TP347H	S34709	...	...	8	1
32	18Cr–10Ni–Cb	Wld. tube	SA–249	TP347H	S34709	...	...	8	1
33	18Cr–10Ni–Cb	Wld. tube	SA–249	TP347H	S34709	...	...	8	1
34	18Cr–10Ni–Cb	Smls. & wld. pipe	SA–312	TP347H	S34709	...	...	8	1
35	18Cr–10Ni–Cb	Smls. & wld. pipe	SA–312	TP347H	S34709	...	...	8	1
36	18Cr–10Ni–Cb	Wld. pipe	SA–312	TP347H	S34709	...	...	8	1
37	18Cr–10Ni–Cb	Wld. pipe	SA–312	TP347H	S34709	...	...	8	1
38	18Cr–10Ni–Cb	Smls. pipe	SA–376	TP347H	S34709	...	...	8	1
39	18Cr–10Ni–Cb	Smls. pipe	SA–376	TP347H	S34709	...	...	8	1
40	18Cr–10Ni–Cb	Smls. & wld. fittings	SA–403	347H	S34709	...	...	8	1
41	18Cr–10Ni–Cb	Bar	SA–479	347H	S34709	...	...	8	1
42	18Cr–10Ni–Cb	Bar	SA–479	347H	S34709	...	...	8	1
43	18Cr–10Ni–Cb	Wld. pipe	SA–813	TP347H	S34709	...	...	8	1
44	18Cr–10Ni–Cb	Wld. pipe	SA–814	TP347H	S34709	...	...	8	1
45	18Cr–10Ni–Cb	Smls. tube	SA–213	TP347LN	S34751	...	...	8	1

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	75	30	1500	800	1500	NP	HA–2	G5, G12, H1, T6
2	75	30	1500	NP	1500	NP	HA–2	G12, H1, T7
3	75	30	1500	800	1500	NP	HA–2	G5, G12, H1, T6
4	75	30	1500	NP	1500	NP	HA–2	G12, H1, T7
5	75	30	1500	800	1500	650	HA–2	G5, G12, T6
6	75	30	1500	NP	1500	650	HA–2	G12, T7
7	75	30	1500	NP	NP	NP	HA–2	G12, T7, W13
8	75	30	1500	800	NP	NP	HA–2	G5, G12, T6, W12, W13
9	75	30	1500	NP	1500	650	HA–2	G3, G5, G12, G24, T6
10	75	30	1500	NP	1500	650	HA–2	G3, G12, G24, T7
11	75	30	1500	800	1500	650	HA–2	G5, G12, T6, W12, W13, W14
12	75	30	1500	NP	1500	650	HA–2	G12, T7, W13, W14
13	75	30	1500	NP	1500	650	HA–2	G3, G5, G12, G24, T6
14	75	30	1500	NP	1500	650	HA–2	G3, G12, G24, T7
15	75	30	NP	800	NP	NP	HA–2	G5, H1, W12
16	75	30	1500	800	1500	650	HA–2	G5, G12, H1, T6
17	75	30	1500	NP	1500	650	HA–2	G12, H1, T7
18	75	30	NP	800	1500	650	HA–2	G5, G12, T6, W12, W14
19	75	30	NP	800	NP	NP	HA–2	G5, H1, W12
20	75	30	1500	800	1500	650	HA–2	G5, G12, G22, T6
21	75	30	1500	NP	1500	650	HA–2	G12, G22, T7
22	75	30	NP	800	NP	NP	HA–2	G5, H1, W12
23	75	30	1500	800	1500	NP	HA–2	G5, G12, G22, T6
24	75	30	1500	800	1500	NP	HA–2	G5, H2, T8
25	75	30	1500	NP	1500	NP	HA–2	H2, T9
26	75	30	1500	800	1500	NP	HA–2	G5, H2, T8
27	75	30	1500	NP	1500	NP	HA–2	H2, T9
28	75	30	1500	800	1500	NP	HA–2	G5, H2, T8
29	75	30	1500	NP	1500	NP	HA–2	H2, T9
30	75	30	1500	800	NP	NP	HA–2	G5, T8, W12, W13
31	75	30	1500	NP	NP	NP	HA–2	T9, W13
32	75	30	1500	NP	1500	NP	HA–2	G3, G5, G24, T8
33	75	30	1500	NP	1500	NP	HA–2	G3, G24, T9
34	75	30	1500	800	1500	NP	HA–2	G5, H2, T8, W12, W13, W14
35	75	30	1500	NP	1500	NP	HA–2	H2, T9, W13, W14
36	75	30	1500	NP	1500	NP	HA–2	G3, G5, G24, H2, T8
37	75	30	1500	NP	1500	NP	HA–2	G3, G24, H2, T9
38	75	30	1500	800	1500	NP	HA–2	G5, H2, T8
39	75	30	1500	NP	1500	NP	HA–2	H2, T9
40	75	30	NP	800	1500	NP	HA–2	G5, H2, T8, W12, W14
41	75	30	1500	800	NP	NP	HA–2	G5, H2, T8
42	75	30	1500	NP	NP	NP	HA–2	H2, T9
43	75	30	NP	800	NP	NP	HA–2	G5, H2, W12
44	75	30	NP	800	NP	NP	HA–2	G5, W12
45	75	30	NP	NP	1100	NP	HA–2	G5, T8

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
No.	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	20.0	...	20.0	...	18.8	17.8	17.2	16.9	16.8	16.8	16.8	16.8	16.8	16.7
2	20.0	...	18.4	...	17.1	16.0	15.0	14.3	14.0	13.8	13.7	13.6	13.5	13.4
3	20.0	...	20.0	...	18.8	17.8	17.2	16.9	16.8	16.8	16.8	16.8	16.8	16.7
4	20.0	...	18.4	...	17.1	16.0	15.0	14.3	14.0	13.8	13.7	13.6	13.5	13.4
5	20.0	...	20.0	...	18.8	17.8	17.2	16.9	16.8	16.8	16.8	16.8	16.8	16.7
6	20.0	...	18.4	...	17.1	16.0	15.0	14.3	14.0	13.8	13.7	13.6	13.5	13.4
7	20.0	...	18.4	...	17.1	16.0	15.0	14.3	14.0	13.8	13.7	13.6	13.5	13.4
8	20.0	...	20.0	...	18.8	17.8	17.2	16.9	16.8	16.8	16.8	16.8	16.8	16.7
9	17.0	...	17.0	...	16.0	15.1	14.6	14.3	14.3	14.3	14.3	14.3	14.3	14.2
10	17.0	...	15.6	...	14.6	13.6	12.8	12.2	11.9	11.8	11.6	11.5	11.5	11.4
11	20.0	...	20.0	...	18.8	17.8	17.2	16.9	16.8	16.8	16.8	16.8	16.8	16.7
12	20.0	...	18.4	...	17.1	16.0	15.0	14.3	14.0	13.8	13.7	13.6	13.5	13.4
13	17.0	...	17.0	...	16.0	15.1	14.6	14.3	14.3	14.3	14.3	14.3	14.3	14.2
14	17.0	...	15.6	...	14.6	13.6	12.8	12.2	11.9	11.8	11.6	11.5	11.5	11.4
15	20.0	...	20.0	...	18.8	17.8	17.1	16.9	16.8	16.8	16.8	16.8	...	...
16	20.0	...	20.0	...	18.8	17.8	17.2	16.9	16.8	16.8	16.8	16.8	16.8	16.7
17	20.0	...	18.4	...	17.1	16.0	15.0	14.3	14.0	13.8	13.7	13.6	13.5	13.4
18	20.0	...	20.0	...	18.8	17.8	17.2	16.9	16.8	16.8	16.8	16.8	16.8	16.7
19	20.0	...	20.0	...	18.8	17.8	17.1	16.9	16.8	16.8	16.8	16.8	...	...
20	20.0	...	20.0	...	18.8	17.8	17.2	16.9	16.8	16.8	16.8	16.8	16.8	16.7
21	20.0	...	18.4	...	17.1	16.0	15.0	14.3	14.0	13.8	13.7	13.6	13.5	13.4
22	20.0	...	20.0	...	18.8	17.8	17.1	16.9	16.8	16.8	16.8	16.8	...	...
23	20.0	...	20.0	...	18.8	17.8	17.2	16.9	16.8	16.8	16.8	16.8	16.8	16.7
24	20.0	...	20.0	...	18.8	17.8	17.1	16.9	16.8	16.8	16.8	16.8	16.8	16.7
25	20.0	...	18.4	...	17.1	16.0	15.0	14.3	14.0	13.8	13.7	13.6	13.5	13.4
26	20.0	...	20.0	...	18.8	17.8	17.1	16.9	16.8	16.8	16.8	16.8	16.8	16.7
27	20.0	...	18.4	...	17.1	16.0	15.0	14.3	14.0	13.8	13.7	13.6	13.5	13.4
28	20.0	...	20.0	...	18.8	17.8	17.1	16.9	16.8	16.8	16.8	16.8	16.8	16.7
29	20.0	...	18.4	...	17.1	16.0	15.0	14.3	14.0	13.8	13.7	13.6	13.5	13.4
30	20.0	...	20.0	...	18.8	17.8	17.1	16.9	16.8	16.8	16.8	16.8	16.8	16.7
31	20.0	...	18.4	...	17.1	16.0	15.0	14.3	14.0	13.8	13.7	13.6	13.5	13.4
32	17.0	...	17.0	...	16.0	15.1	14.6	14.3	14.3	14.3	14.3	14.3	14.3	14.2
33	17.0	...	15.6	...	14.6	13.6	12.8	12.2	11.9	11.8	11.6	11.5	11.5	11.4
34	20.0	...	20.0	...	18.8	17.8	17.1	16.9	16.8	16.8	16.8	16.8	16.8	16.7
35	20.0	...	18.4	...	17.1	16.0	15.0	14.3	14.0	13.8	13.7	13.6	13.5	13.4
36	17.0	...	17.0	...	16.0	15.1	14.6	14.3	14.3	14.3	14.3	14.3	14.3	14.2
37	17.0	...	15.6	...	14.6	13.6	12.8	12.2	11.9	11.8	11.6	11.5	11.5	11.4
38	20.0	...	20.0	...	18.8	17.8	17.1	16.9	16.8	16.8	16.8	16.8	16.8	16.7
39	20.0	...	18.4	...	17.1	16.0	15.0	14.3	14.0	13.8	13.7	13.6	13.5	13.4
40	20.0	...	20.0	...	18.8	17.8	17.1	16.9	16.8	16.8	16.8	16.8	16.8	16.7
41	20.0	...	20.0	...	18.8	17.8	17.1	16.9	16.8	16.8	16.8	16.8	16.8	16.7
42	20.0	...	18.4	...	17.1	16.0	15.0	14.3	14.0	13.8	13.7	13.6	13.5	13.4
43	20.0	...	20.0	...	18.8	17.8	17.1	16.9	16.8	16.8	16.8	16.8	...	...
44	20.0	...	20.0	...	18.8	17.8	17.1	16.9	16.8	16.8	16.8	16.8	...	...
45	20.0	...	20.0	...	19.1	17.8	16.9	16.5	16.4	16.3	16.3	16.3	16.3	16.2

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding														
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
1	16.6	*16.0*	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*	...	...	...
2	13.4	13.4	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*	...	...	...
3	16.6	*16.0*	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*	...	...	...
4	13.4	13.4	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*	...	...	...
5	16.6	*16.0*	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*	...	...	...
6	13.4	13.4	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*	...	...	...
7	13.4	13.4	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*	...	...	...
8	16.6	*16.0*	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*	...	...	...
9	14.1	*13.6*	*10.3*	*7.8*	*5.2*	*3.8*	*2.8*	*1.9*	*1.3*	*1.0*	*0.77*	*0.68*	...	...	...
10	11.4	11.4	*10.3*	*7.8*	*5.2*	*3.8*	*2.8*	*1.9*	*1.3*	*1.0*	*0.77*	*0.68*	...	...	...
11	16.6	*16.0*	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*	...	...	...
12	13.4	13.4	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*	...	...	...
13	14.1	*13.6*	*10.3*	*7.8*	*5.2*	*3.8*	*2.8*	*1.9*	*1.3*	*1.0*	*0.77*	*0.68*	...	...	...
14	11.4	11.4	*10.3*	*7.8*	*5.2*	*3.8*	*2.8*	*1.9*	*1.3*	*1.0*	*0.77*	*0.68*	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
16	16.6	*16.0*	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*	...	...	...
17	13.4	13.4	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*	...	...	...
18	16.6	*16.0*	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
20	16.6	*16.0*	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*	...	...	...
21	13.4	13.4	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
23	16.6	*16.0*	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*	...	...	...
24	16.6	16.4	16.2	*14.1*	*10.5*	*7.9*	*5.9*	*4.4*	*3.2*	*2.5*	*1.8*	*1.3*	...	...	...
25	13.4	13.4	13.4	13.3	*10.5*	*7.9*	*5.9*	*4.4*	*3.2*	*2.5*	*1.8*	*1.3*	...	...	...
26	16.6	16.4	16.2	*14.1*	*10.5*	*7.9*	*5.9*	*4.4*	*3.2*	*2.5*	*1.8*	*1.3*	...	...	...
27	13.4	13.4	13.4	13.3	*10.5*	*7.9*	*5.9*	*4.4*	*3.2*	*2.5*	*1.8*	*1.3*	...	...	...
28	16.6	16.4	16.2	*14.1*	*10.5*	*7.9*	*5.9*	*4.4*	*3.2*	*2.5*	*1.8*	*1.3*	...	...	...
29	13.4	13.4	13.4	13.3	*10.5*	*7.9*	*5.9*	*4.4*	*3.2*	*2.5*	*1.8*	*1.3*	...	...	...
30	16.6	16.4	16.2	*14.1*	*10.5*	*7.9*	*5.9*	*4.4*	*3.2*	*2.5*	*1.8*	*1.3*	...	...	...
31	13.4	13.4	13.4	13.3	*10.5*	*7.9*	*5.9*	*4.4*	*3.2*	*2.5*	*1.8*	*1.3*	...	...	...
32	14.1	14.0	13.7	*12.0*	*8.9*	*6.7*	*5.0*	*3.7*	*2.7*	*2.1*	*1.6*	*1.1*	...	...	...
33	11.4	11.4	11.4	11.3	*8.9*	*6.7*	*5.0*	*3.7*	*2.7*	*2.1*	*1.6*	*1.1*	...	...	...
34	16.6	16.4	16.2	*14.1*	*10.5*	*7.9*	*5.9*	*4.4*	*3.2*	*2.5*	*1.8*	*1.3*	...	...	...
35	13.4	13.4	13.4	13.3	*10.5*	*7.9*	*5.9*	*4.4*	*3.2*	*2.5*	*1.8*	*1.3*	...	...	...
36	14.1	14.0	13.7	*12.0*	*8.9*	*6.7*	*5.0*	*3.7*	*2.7*	*2.1*	*1.6*	*1.1*	...	...	...
37	11.4	11.4	11.4	11.3	*8.9*	*6.7*	*5.0*	*3.7*	*2.7*	*2.1*	*1.6*	*1.1*	...	...	...
38	16.6	16.4	16.2	*14.1*	*10.5*	*7.9*	*5.9*	*4.4*	*3.2*	*2.5*	*1.8*	*1.3*	...	...	...
39	13.4	13.4	13.4	13.3	*10.5*	*7.9*	*5.9*	*4.4*	*3.2*	*2.5*	*1.8*	*1.3*	...	...	...
40	16.6	16.4	16.2	*14.1*	*10.5*	*7.9*	*5.9*	*4.4*	*3.2*	*2.5*	*1.8*	*1.3*	...	...	...
41	16.6	16.4	16.2	*14.1*	*10.5*	*7.9*	*5.9*	*4.4*	*3.2*	*2.5*	*1.8*	*1.3*	...	...	...
42	13.4	13.4	13.4	13.3	*10.5*	*7.9*	*5.9*	*4.4*	*3.2*	*2.5*	*1.8*	*1.3*	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
45	16.1	15.8	15.6	*13.2*	...	...	...	...	...	...	...	...	...	...	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	18Cr–10Ni–Cb	Smls. tube	SA–213	TP347LN	S34751	...	...	8	1
2	18Cr–10Ni–Cb	Smls. pipe	SA–312	TP347LN	S34751	...	...	8	1
3	18Cr–10Ni–Cb	Smls. pipe	SA–312	TP347LN	S34751	...	...	8	1
4	18Cr–10Ni–Cb	Forgings	SA–182	F348	S34800	...	≤5	8	1
5	18Cr–10Ni–Cb	Forgings	SA–182	F348	S34800	...	≤5	8	1
6	18Cr–10Ni–Cb	Smls. tube	SA–213	TP348	S34800	...	...	8	1
7	18Cr–10Ni–Cb	Smls. tube	SA–213	TP348	S34800	...	...	8	1
8	18Cr–10Ni–Cb	Plate	SA–240	348	S34800	...	...	8	1
9	18Cr–10Ni–Cb	Plate	SA–240	348	S34800	...	...	8	1
10	18Cr–10Ni–Cb	Wld. tube	SA–249	TP348	S34800	...	...	8	1
11	18Cr–10Ni–Cb	Wld. tube	SA–249	TP348	S34800	...	...	8	1
12	18Cr–10Ni–Cb	Wld. tube	SA–249	TP348	S34800	...	...	8	1
13	18Cr–10Ni–Cb	Wld. tube	SA–249	TP348	S34800	...	...	8	1
14	18Cr–10Ni–Cb	Smls. & wld. pipe	SA–312	TP348	S34800	...	...	8	1
15	18Cr–10Ni–Cb	Smls. pipe	SA–312	TP348	S34800	...	...	8	1
16	18Cr–10Ni–Cb	Wld. pipe	SA–312	TP348	S34800	...	...	8	1
17	18Cr–10Ni–Cb	Wld. pipe	SA–312	TP348	S34800	...	...	8	1
18	18Cr–10Ni–Cb	Wld. pipe	SA–358	348	S34800	1	...	8	1
19	18Cr–10Ni–Cb	Smls. pipe	SA–376	TP348	S34800	...	...	8	1
20	18Cr–10Ni–Cb	Smls. pipe	SA–376	TP348	S34800	...	...	8	1
21	18Cr–10Ni–Cb	Smls. & wld. fittings	SA–403	348	S34800	...	...	8	1
22	18Cr–10Ni–Cb	Wld. pipe	SA–409	TP348	S34800	...	...	8	1
23	18Cr–10Ni–Cb	Bar	SA–479	348	S34800	...	...	8	1
24	18Cr–10Ni–Cb	Bar	SA–479	348	S34800	...	...	8	1
25	18Cr–10Ni–Cb	Wld. pipe	SA–813	TP348	S34800	...	...	8	1
26	18Cr–10Ni–Cb	Wld. pipe	SA–814	TP348	S34800	...	...	8	1
27	18Cr–10Ni–Cb	Forgings	SA–182	F348H	S34809	...	≤5	8	1
28	18Cr–10Ni–Cb	Forgings	SA–182	F348H	S34809	...	≤5	8	1
29	18Cr–10Ni–Cb	Smls. tube	SA–213	TP348H	S34809	...	...	8	1
30	18Cr–10Ni–Cb	Smls. tube	SA–213	TP348H	S34809	...	...	8	1
31	18Cr–10Ni–Cb	Plate	SA–240	348H	S34809	...	...	8	1
32	18Cr–10Ni–Cb	Wld. tube	SA–249	TP348H	S34809	...	...	8	1
33	18Cr–10Ni–Cb	Wld. tube	SA–249	TP348H	S34809	...	...	8	1
34	18Cr–10Ni–Cb	Wld. tube	SA–249	TP348H	S34809	...	...	8	1
35	18Cr–10Ni–Cb	Wld. tube	SA–249	TP348H	S34809	...	...	8	1
36	18Cr–10Ni–Cb	Smls. & wld. pipe	SA–312	TP348H	S34809	...	...	8	1
37	18Cr–10Ni–Cb	Smls. pipe	SA–312	TP348H	S34809	...	...	8	1
38	18Cr–10Ni–Cb	Wld. pipe	SA–312	TP348H	S34809	...	...	8	1
39	18Cr–10Ni–Cb	Wld. pipe	SA–312	TP348H	S34809	...	...	8	1
40	18Cr–10Ni–Cb	Smls. & wld. fittings	SA–403	348H	S34809	...	...	8	1
41	18Cr–10Ni–Cb	Bar	SA–479	348H	S34809	...	...	8	1
42	18Cr–10Ni–Cb	Bar	SA–479	348H	S34809	...	...	8	1
43	18Cr–10Ni–Cb	Wld. pipe	SA–813	TP348H	S34809	...	...	8	1
44	18Cr–10Ni–Cb	Wld. pipe	SA–814	TP348H	S34809	...	...	8	1
45	18Cr–10Ni–Cb	Smls. tube	SA–213	TP347HFG	S34710	...	...	8	1

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	75	30	NP	NP	1100	NP	HA–2	...
2	75	30	NP	NP	1100	NP	HA–2	G5, T8
3	75	30	NP	NP	1100	NP	HA–2	...
4	75	30	1500	800	1500	NP	HA–2	G5, G12, T6
5	75	30	1500	NP	1500	NP	HA–2	G12, T7
6	75	30	1500	800	1500	NP	HA–2	G5, G12, T6
7	75	30	1500	NP	1500	NP	HA–2	G12, T7
8	75	30	NP	800	1500	650	HA–2	G5, G12, T6
9	75	30	NP	NP	1500	650	HA–2	G12, T7
10	75	30	1500	NP	NP	NP	HA–2	G12, T7, W13
11	75	30	1500	800	NP	NP	HA–2	G5, G12, T6, W12, W13
12	75	30	1500	NP	1500	650	HA–2	G3, G5, G12, G24, T6
13	75	30	1500	NP	1500	650	HA–2	G3, G12, G24, T7
14	75	30	1500	800	1500	650	HA–2	G5, G12, T6, W12, W14
15	75	30	1500	NP	1500	650	HA–2	G12, T7
16	75	30	NP	NP	1500	650	HA–2	G5, G12, G24, T6
17	75	30	NP	NP	1500	650	HA–2	G12, G24, T7
18	75	30	NP	800	NP	NP	HA–2	G5, W12
19	75	30	1500	800	1500	650	HA–2	G5, G12, H1, T6
20	75	30	1500	NP	1500	650	HA–2	G12, H1, T7
21	75	30	NP	800	1500	650	HA–2	G5, G12, H2, T6, W12, W14
22	75	30	NP	800	NP	NP	HA–2	G5, W12
23	75	30	1500	800	1500	650	HA–2	G5, G12, G22, H1, T6
24	75	30	1500	NP	1500	650	HA–2	G12, G22, H1, T7
25	75	30	NP	800	NP	NP	HA–2	G5, H1, W12
26	75	30	NP	800	NP	NP	HA–2	G5, W12
27	75	30	1500	800	1500	NP	HA–2	G5, T8
28	75	30	1500	NP	1500	NP	HA–2	T9
29	75	30	1500	800	1500	NP	HA–2	G5, H2, T8
30	75	30	1500	NP	1500	NP	HA–2	H2, T9
31	75	30	NP	800	NP	NP	HA–2	G5, H2
32	75	30	1500	800	NP	NP	HA–2	G5, T8, W12, W13
33	75	30	1500	NP	NP	NP	HA–2	T9, W13
34	75	30	1500	NP	1500	NP	HA–2	G3, G5, G24, T8
35	75	30	1500	NP	1500	NP	HA–2	G3, G24, T9
36	75	30	1500	800	1500	NP	HA–2	G5, H2, T8, W12, W14
37	75	30	1500	NP	1500	NP	HA–2	H2, T9
38	75	30	NP	NP	1500	NP	HA–2	G5, G24, H2, T8
39	75	30	NP	NP	1500	NP	HA–2	G24, H2, T9
40	75	30	NP	800	1500	NP	HA–2	G5, H2, T8, W12, W14
41	75	30	1500	800	NP	NP	HA–2	G5, H2, T8
42	75	30	1500	NP	NP	NP	HA–2	H2, T9
43	75	30	NP	800	NP	NP	HA–2	G5, H2, W12
44	75	30	NP	800	NP	NP	HA–2	G5, W12
45	80	30	1350	NP	NP	NP	HA–2	G5, T9

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	20.0	...	17.7	...	16.0	14.6	13.6	12.9	12.7	12.6	12.5	12.4	12.4	12.4
2	20.0	...	20.0	...	19.1	17.8	16.9	16.5	16.4	16.3	16.3	16.3	16.3	16.2
3	20.0	...	17.7	...	16.0	14.6	13.6	12.9	12.7	12.6	12.5	12.4	12.4	12.4
4	20.0	...	20.0	...	18.8	17.8	17.2	16.9	16.8	16.8	16.8	16.8	16.8	16.7
5	20.0	...	18.4	...	17.1	16.0	15.0	14.3	14.0	13.8	13.7	13.6	13.5	13.4
6	20.0	...	20.0	...	18.8	17.8	17.2	16.9	16.8	16.8	16.8	16.8	16.8	16.7
7	20.0	...	18.4	...	17.1	16.0	15.0	14.3	14.0	13.8	13.7	13.6	13.5	13.4
8	20.0	...	20.0	...	18.8	17.8	17.2	16.9	16.8	16.8	16.8	16.8	16.8	16.7
9	20.0	...	18.4	...	17.1	16.0	15.0	14.3	14.0	13.8	13.7	13.6	13.5	13.4
10	20.0	...	18.4	...	17.1	16.0	15.0	14.3	14.0	13.8	13.7	13.6	13.5	13.4
11	20.0	...	20.0	...	18.8	17.8	17.2	16.9	16.8	16.8	16.8	16.8	16.8	16.7
12	17.0	...	17.0	...	16.0	15.1	14.6	14.3	14.3	14.3	14.3	14.3	14.3	14.2
13	17.0	...	15.6	...	14.6	13.6	12.8	12.2	11.9	11.8	11.6	11.5	11.5	11.4
14	20.0	...	20.0	...	18.8	17.8	17.2	16.9	16.8	16.8	16.8	16.8	16.8	16.7
15	20.0	...	18.4	...	17.1	16.0	15.0	14.3	14.0	13.8	13.7	13.6	13.5	13.4
16	17.0	...	17.0	...	16.0	15.1	14.6	14.3	14.3	14.3	14.3	14.3	14.3	14.2
17	17.0	...	15.6	...	14.6	13.6	12.8	12.2	11.9	11.8	11.6	11.5	11.5	11.4
18	20.0	...	20.0	...	18.8	17.8	17.1	16.9	16.8	16.8	16.8	16.8	...	...
19	20.0	...	20.0	...	18.8	17.8	17.2	16.9	16.8	16.8	16.8	16.8	16.8	16.7
20	20.0	...	18.4	...	17.1	16.0	15.0	14.3	14.0	13.8	13.7	13.6	13.5	13.4
21	20.0	...	20.0	...	18.8	17.8	17.2	16.9	16.8	16.8	16.8	16.8	16.8	16.7
22	20.0	...	20.0	...	18.8	17.8	17.1	16.9	16.8	16.8	16.8	16.8	...	...
23	20.0	...	20.0	...	18.8	17.8	17.2	16.9	16.8	16.8	16.8	16.8	16.8	16.7
24	20.0	...	18.4	...	17.1	16.0	15.0	14.3	14.0	13.8	13.7	13.6	13.5	13.4
25	20.0	...	20.0	...	18.8	17.8	17.1	16.9	16.8	16.8	16.8	16.8	...	...
26	20.0	...	20.0	...	18.8	17.8	17.1	16.9	16.8	16.8	16.8	16.8	...	...
27	20.0	...	20.0	...	18.8	17.8	17.1	16.9	16.8	16.8	16.8	16.8	16.8	16.7
28	20.0	...	18.4	...	17.1	16.0	15.0	14.3	14.0	13.8	13.7	13.6	13.5	13.4
29	20.0	...	20.0	...	18.8	17.8	17.1	16.9	16.8	16.8	16.8	16.8	16.8	16.7
30	20.0	...	18.4	...	17.1	16.0	15.0	14.3	14.0	13.8	13.7	13.6	13.5	13.4
31	20.0	...	20.0	...	18.8	17.8	17.1	16.9	16.8	16.8	16.8	16.8	...	...
32	20.0	...	20.0	...	18.8	17.8	17.1	16.9	16.8	16.8	16.8	16.8	16.8	16.7
33	20.0	...	18.4	...	17.1	16.0	15.0	14.3	14.0	13.8	13.7	13.6	13.5	13.4
34	17.0	...	17.0	...	16.0	15.1	14.6	14.3	14.3	14.3	14.3	14.3	14.3	14.2
35	17.0	...	15.6	...	14.6	13.6	12.8	12.2	11.9	11.8	11.6	11.5	11.5	11.4
36	20.0	...	20.0	...	18.8	17.8	17.1	16.9	16.8	16.8	16.8	16.8	16.8	16.7
37	20.0	...	18.4	...	17.1	16.0	15.0	14.3	14.0	13.8	13.7	13.6	13.5	13.4
38	17.0	...	17.0	...	16.0	15.1	14.6	14.3	14.3	14.3	14.3	14.3	14.3	14.2
39	17.0	...	15.6	...	14.6	13.6	12.8	12.2	11.9	11.8	11.6	11.5	11.5	11.4
40	20.0	...	20.0	...	18.8	17.8	17.1	16.9	16.8	16.8	16.8	16.8	16.8	16.7
41	20.0	...	20.0	...	18.8	17.8	17.1	16.9	16.8	16.8	16.8	16.8	16.8	16.7
42	20.0	...	18.4	...	17.1	16.0	15.0	14.3	14.0	13.8	13.7	13.6	13.5	13.4
43	20.0	...	20.0	...	18.8	17.8	17.1	16.9	16.8	16.8	16.8	16.8	...	...
44	20.0	...	20.0	...	18.8	17.8	17.1	16.9	16.8	16.8	16.8	16.8	...	...
45	20.0	...	20.0	...	20.0	19.9	19.3	19.1	19.0	18.9	18.8	18.6	18.3	18.1

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding														
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
1	12.4	12.4	12.3	12.2	...	...	...	...	...	...	...	...	...	...	...
2	16.1	15.8	15.6	*13.2*	...	...	...	...	...	...	...	...	...	...	...
3	12.4	12.4	12.3	12.2	...	...	...	...	...	...	...	...	...	...	...
4	16.6	*16.0*	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*	...	...	...
5	13.4	13.4	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*	...	...	...
6	16.6	*16.0*	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*	...	...	...
7	13.4	13.4	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*	...	...	...
8	16.6	*16.0*	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*	...	...	...
9	13.4	13.4	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*	...	...	...
10	13.4	13.4	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*	...	...	...
11	16.6	*16.0*	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*	...	...	...
12	14.1	*13.6*	*10.3*	*7.8*	*5.2*	*3.8*	*2.8*	*1.9*	*1.3*	*1.0*	*0.77*	*0.68*	...	...	...
13	11.4	11.4	*10.3*	*7.8*	*5.2*	*3.8*	*2.8*	*1.9*	*1.3*	*1.0*	*0.77*	*0.68*	...	...	...
14	16.6	*16.0*	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*	...	...	...
15	13.4	13.4	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*	...	...	...
16	14.1	*13.6*	*10.3*	*7.8*	*5.2*	*3.8*	*2.8*	*1.9*	*1.3*	*1.0*	*0.77*	*0.68*	...	...	...
17	11.4	11.4	*10.3*	*7.8*	*5.2*	*3.8*	*2.8*	*1.9*	*1.3*	*1.0*	*0.77*	*0.68*	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
19	16.6	*16.0*	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*	...	...	...
20	13.4	13.4	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*	...	...	...
21	16.6	*16.0*	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
23	16.6	*16.0*	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*	...	...	...
24	13.4	13.4	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
27	16.6	16.4	16.2	*14.1*	*10.5*	*7.9*	*5.9*	*4.4*	*3.2*	*2.5*	*1.8*	*1.3*	...	...	...
28	13.4	13.4	13.4	13.3	*10.5*	*7.9*	*5.9*	*4.4*	*3.2*	*2.5*	*1.8*	*1.3*	...	...	...
29	16.6	16.4	16.2	*14.1*	*10.5*	*7.9*	*5.9*	*4.4*	*3.2*	*2.5*	*1.8*	*1.3*	...	...	...
30	13.4	13.4	13.4	13.3	*10.5*	*7.9*	*5.9*	*4.4*	*3.2*	*2.5*	*1.8*	*1.3*	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
32	16.6	16.4	16.2	*14.1*	*10.5*	*7.9*	*5.9*	*4.4*	*3.2*	*2.5*	*1.8*	*1.3*	...	...	...
33	13.4	13.4	13.4	13.3	*10.5*	*7.9*	*5.9*	*4.4*	*3.2*	*2.5*	*1.8*	*1.3*	...	...	...
34	14.1	14.0	13.7	*12.0*	*8.9*	*6.7*	*5.0*	*3.7*	*2.7*	*2.1*	*1.6*	*1.1*	...	...	...
35	11.4	11.4	11.4	11.3	*8.9*	*6.7*	*5.0*	*3.7*	*2.7*	*2.1*	*1.6*	*1.1*	...	...	...
36	16.6	16.4	16.2	*14.1*	*10.5*	*7.9*	*5.9*	*4.4*	*3.2*	*2.5*	*1.8*	*1.3*	...	...	...
37	13.4	13.4	13.4	13.3	*10.5*	*7.9*	*5.9*	*4.4*	*3.2*	*2.5*	*1.8*	*1.3*	...	...	...
38	14.1	14.0	13.7	*12.0*	*8.9*	*6.7*	*5.0*	*3.7*	*2.7*	*2.1*	*1.6*	*1.1*	...	...	...
39	11.4	11.4	11.4	11.3	*8.9*	*6.7*	*5.0*	*3.7*	*2.7*	*2.1*	*1.6*	*1.1*	...	...	...
40	16.6	16.4	16.2	*14.1*	*10.5*	*7.9*	*5.9*	*4.4*	*3.2*	*2.5*	*1.8*	*1.3*	...	...	...
41	16.6	16.4	16.2	*14.1*	*10.5*	*7.9*	*5.9*	*4.4*	*3.2*	*2.5*	*1.8*	*1.3*	...	...	...
42	13.4	13.4	13.4	13.3	*10.5*	*7.9*	*5.9*	*4.4*	*3.2*	*2.5*	*1.8*	*1.3*	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
45	17.9	17.7	17.5	16.6	*12.8*	*9.7*	*7.3*	*5.4*	*4.0*	...	...	...	...	...	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	18Cr–10Ni–Cb	Smls. tube	SA–213	TP347HFG	S34710	...	...	8	1
2	18Cr–10Ni–Ti	Smls. pipe	SA–312	TP321	S32100	...	>3/8	8	1
3	18Cr–10Ni–Ti	Smls. pipe	SA–312	TP321	S32100	...	>3/8	8	1
4	18Cr–10Ni–Ti	Wld. pipe	SA–312	TP321	S32100	...	>3/8	8	1
5	18Cr–10Ni–Ti	Wld. pipe	SA–312	TP321	S32100	...	>3/8	8	1
6	18Cr–10Ni–Ti	Smls. pipe	SA–376	TP321	S32100	...	>3/8	8	1
7	18Cr–10Ni–Ti	Smls. pipe	SA–376	TP321	S32100	...	>3/8	8	1
8	18Cr–10Ni–Ti	Smls. pipe	SA–312	TP321H	S32109	...	>3/16	8	1
9	18Cr–10Ni–Ti	Smls. pipe	SA–312	TP321H	S32109	...	>3/16	8	1
10	18Cr–10Ni–Ti	Wld. pipe	SA–312	TP321H	S32109	...	>3/16	8	1
11	18Cr–10Ni–Ti	Wld. pipe	SA–312	TP321H	S32109	...	>3/16	8	1
12	18Cr–10Ni–Ti	Smls. pipe	SA–376	TP321H	S32109	...	>3/8	8	1
13	18Cr–10Ni–Ti	Forgings	SA–182	F321	S32100	...	>5	8	1
14	18Cr–10Ni–Ti	Forgings	SA–182	F321	S32100	...	>5	8	1
15	18Cr–10Ni–Ti	Forgings	SA–965	F321	S32100	...	...	8	1
16	18Cr–10Ni–Ti	Forgings	SA–965	F321	S32100	...	...	8	1
17	18Cr–10Ni–Ti	Forgings	SA–182	F321H	S32109	...	>5	8	1
18	18Cr–10Ni–Ti	Forgings	SA–182	F321H	S32109	...	>5	8	1
19	18Cr–10Ni–Ti	Forgings	SA–965	F321H	S32109	...	...	8	1
20	18Cr–10Ni–Ti	Forgings	SA–965	F321H	S32109	...	...	8	1
21	18Cr–10Ni–Ti	Plate	SA/EN 10028–7	X6CrNiTi18–10	...	...	≤3	8	1
22	18Cr–10Ni–Ti	Plate	SA/EN 10028–7	X6CrNiTi18–10	...	...	≤3	8	1
23	18Cr–10Ni–Ti	Forgings	SA–182	F321	S32100	...	≤5	8	1
24	18Cr–10Ni–Ti	Forgings	SA–182	F321	S32100	...	≤5	8	1
25	18Cr–10Ni–Ti	Forgings	SA–182	F321	S32100	...	≤5	8	1
26	18Cr–10Ni–Ti	Smls. tube	SA–213	TP321	S32100	...	...	8	1
27	18Cr–10Ni–Ti	Smls. tube	SA–213	TP321	S32100	...	...	8	1
28	18Cr–10Ni–Ti	Smls. tube	SA–213	TP321	S32100	...	...	8	1
29	18Cr–10Ni–Ti	Plate	SA–240	321	S32100	...	...	8	1
30	18Cr–10Ni–Ti	Plate	SA–240	321	S32100	...	...	8	1
31	18Cr–10Ni–Ti	Plate	SA–240	321	S32100	...	...	8	1
32	18Cr–10Ni–Ti	Wld. tube	SA–249	TP321	S32100	...	...	8	1
33	18Cr–10Ni–Ti	Wld. tube	SA–249	TP321	S32100	...	...	8	1
34	18Cr–10Ni–Ti	Wld. tube	SA–249	TP321	S32100	...	...	8	1
35	18Cr–10Ni–Ti	Wld. tube	SA–249	TP321	S32100	...	...	8	1
36	18Cr–10Ni–Ti	Smls. pipe	SA–312	TP321	S32100	...	≤3/8	8	1
37	18Cr–10Ni–Ti	Smls. pipe	SA–312	TP321	S32100	...	≤3/8	8	1
38	18Cr–10Ni–Ti	Wld. pipe	SA–312	TP321	S32100	...	≤3/8	8	1
39	18Cr–10Ni–Ti	Wld. pipe	SA–312	TP321	S32100	...	≤3/8	8	1
40	18Cr–10Ni–Ti	Wld. pipe	SA–358	321	S32100	1	...	8	1
41	18Cr–10Ni–Ti	Smls. pipe	SA–376	TP321	S32100	...	≤3/8	8	1
42	18Cr–10Ni–Ti	Smls. pipe	SA–376	TP321	S32100	...	≤3/8	8	1
43	18Cr–10Ni–Ti	Smls. pipe	SA–376	TP321	S32100	...	≤3/8	8	1
44	18Cr–10Ni–Ti	Smls. & wld. fittings	SA–403	321	S32100	...	...	8	1
45	18Cr–10Ni–Ti	Wld. pipe	SA–409	TP321	S32100	...	...	8	1

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	80	30	1350	NP	NP	NP	HA–2	T9
2	70	25	1500	800	1500	NP	HA–2	G5, G12, T7
3	70	25	1500	NP	1500	NP	HA–2	G12, T7
4	70	25	1500	800	1500	NP	HA–2	G5, G12, T7, W12, W13, W14
5	70	25	1500	NP	1500	NP	HA–2	G12, T7, W13, W14
6	70	25	NP	800	1500	650	HA–2	G5, G12, H1, T7
7	70	25	NP	NP	1500	650	HA–2	G12, H1, T7
8	70	25	1500	800	1500	NP	HA–2	G5, T8
9	70	25	1500	NP	1500	NP	HA–2	T8
10	70	25	1500	800	1500	NP	HA–2	G5, T8, W12, W13, W14
11	70	25	1500	NP	1500	NP	HA–2	T8, W13, W14
12	70	25	NP	800	1500	NP	HA–2	G5, H2, T8
13	70	30	1500	800	1500	NP	HA–2	G5, G12, T6
14	70	30	1500	NP	1500	NP	HA–2	G12, T7
15	70	30	1500	800	1500	650	HA–2	G5, G12, H1, T6
16	70	30	1500	NP	1500	650	HA–2	G12, H1, T7
17	70	30	1500	800	1500	NP	HA–2	G5, H2, T8
18	70	30	1500	NP	1500	NP	HA–2	H2, T8
19	70	30	NP	800	1500	NP	HA–2	G5, H2, T8
20	70	30	NP	NP	1500	NP	HA–2	H2, T8
21	73	29	NP	NP	1022	650	HA–2	G5, G12, G30, T6
22	73	29	NP	NP	1022	650	HA–2	G12, G30, T7
23	75	30	1500	NP	NP	NP	HA–2	G5, G12, T7
24	75	30	1500	NP	1500	650	HA–2	G12, T7
25	75	30	NP	800	1500	650	HA–2	G5, G12, T6
26	75	30	1500	NP	NP	NP	HA–2	G5, G12, T7
27	75	30	1500	NP	1500	NP	HA–2	G12, T7
28	75	30	NP	800	1500	NP	HA–2	G5, G12, T6
29	75	30	1500	NP	NP	NP	HA–2	G5, G12, T7
30	75	30	1500	NP	1500	650	HA–2	G12, T7
31	75	30	NP	800	1500	650	HA–2	G5, G12, T6
32	75	30	1500	NP	NP	NP	HA–2	G12, T7, W13
33	75	30	1500	800	NP	NP	HA–2	G5, G12, T7, W12, W13
34	75	30	1500	NP	1500	650	HA–2	G3, G5, G12, G24, T7
35	75	30	1500	NP	1500	650	HA–2	G3, G12, G24, T7
36	75	30	1500	800	1500	650	HA–2	G5, G12, T7
37	75	30	1500	NP	1500	650	HA–2	G12, T7
38	75	30	1500	800	1500	650	HA–2	G5, G12, T7, W12, W13, W14
39	75	30	1500	NP	1500	650	HA–2	T7, W13, W14
40	75	30	NP	800	NP	NP	HA–2	G5, H1, W12
41	75	30	1500	NP	NP	NP	HA–2	G5, G12, H1, T7
42	75	30	1500	NP	1500	NP	HA–2	G12, H1, T7
43	75	30	NP	800	1500	NP	HA–2	G5, G12, T6
44	75	30	NP	800	1500	650	HA–2	G5, G12, T6, W12, W14
45	75	30	NP	800	NP	NP	HA–2	G5, W12

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
No.	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	20.0	...	18.1	...	16.9	15.9	15.2	14.6	14.4	14.1	13.9	13.8	13.6	13.4
2	16.7	16.7	16.7	16.7	16.7	16.7	16.1	15.2	14.9	14.6	14.3	14.1	13.9	13.8
3	16.7	15.6	15.0	14.4	13.8	12.8	11.9	11.3	11.0	10.8	10.6	10.5	10.3	10.2
4	16.7	16.7	16.7	16.7	16.7	16.7	16.1	15.2	14.9	14.6	14.3	14.1	13.9	13.8
5	16.7	15.6	15.0	14.4	13.8	12.8	11.9	11.3	11.0	10.8	10.6	10.5	10.3	10.2
6	16.7	...	16.7	...	16.7	16.7	16.1	15.2	14.9	14.6	14.3	14.1	13.9	13.8
7	16.7	...	15.0	...	13.8	12.8	11.9	11.3	11.0	10.8	10.6	10.5	10.3	10.2
8	16.7	16.7	16.7	16.7	16.7	16.7	16.1	15.2	14.9	14.6	14.3	14.1	13.9	13.8
9	16.7	15.6	15.0	14.4	13.8	12.8	11.9	11.3	11.0	10.8	10.6	10.5	10.3	10.2
10	16.7	16.7	16.7	16.7	16.7	16.7	16.1	15.2	14.9	14.6	14.3	14.1	13.9	13.8
11	16.7	15.6	15.0	14.4	13.8	12.8	11.9	11.3	11.0	10.8	10.6	10.5	10.3	10.2
12	16.7	...	16.7	...	16.7	16.7	16.1	15.2	14.9	14.6	14.3	14.1	13.9	13.8
13	20.0	...	19.0	...	17.8	17.5	17.5	17.5	17.5	17.5	17.2	16.9	16.7	16.5
14	20.0	...	18.0	...	16.5	15.3	14.3	13.5	13.2	13.0	12.7	12.6	12.4	12.3
15	20.0	...	19.0	...	17.8	17.5	17.5	17.5	17.5	17.5	17.2	16.9	16.7	16.5
16	20.0	...	18.0	...	16.5	15.3	14.3	13.5	13.2	13.0	12.7	12.6	12.4	12.3
17	20.0	...	19.0	...	17.8	17.5	17.5	17.5	17.5	17.5	17.2	16.9	16.7	16.5
18	20.0	...	18.0	...	16.5	15.3	14.3	13.5	13.2	13.0	12.7	12.6	12.4	12.3
19	20.0	...	19.0	...	17.8	17.5	17.5	17.5	17.5	17.5	17.2	16.9	16.7	16.5
20	20.0	...	18.0	...	16.5	15.3	14.3	13.5	13.2	13.0	12.7	12.6	12.4	12.3
21	19.3	...	19.3	...	19.3	19.3	18.7	17.7	17.2	16.9	16.6	16.4	16.2	16.0
22	19.3	...	17.4	...	16.0	14.8	13.8	13.1	12.8	12.5	12.3	12.1	12.0	11.9
23	20.0	...	20.0	...	19.1	18.7	18.7	18.3	17.9	17.5	17.2	16.9	16.7	16.5
24	20.0	...	18.0	...	16.5	15.3	14.3	13.5	13.2	13.0	12.7	12.6	12.4	12.3
25	20.0	...	20.0	...	19.1	18.7	18.7	18.3	17.9	17.5	17.2	16.9	16.7	16.5
26	20.0	...	20.0	...	19.1	18.7	18.7	18.3	17.9	17.5	17.2	16.9	16.7	16.5
27	20.0	...	18.0	...	16.5	15.3	14.3	13.5	13.2	13.0	12.7	12.6	12.4	12.3
28	20.0	...	20.0	...	19.1	18.7	18.7	18.3	17.9	17.5	17.2	16.9	16.7	16.5
29	20.0	...	20.0	...	19.1	18.7	18.7	18.3	17.9	17.5	17.2	16.9	16.7	16.5
30	20.0	...	18.0	...	16.5	15.3	14.3	13.5	13.2	13.0	12.7	12.6	12.4	12.3
31	20.0	...	20.0	...	19.1	18.7	18.7	18.3	17.9	17.5	17.2	16.9	16.7	16.5
32	20.0	...	18.0	...	16.5	15.3	14.3	13.5	13.2	13.0	12.7	12.6	12.4	12.3
33	20.0	...	20.0	...	19.1	18.7	18.7	18.3	17.9	17.5	17.2	16.9	16.7	16.5
34	17.0	...	17.0	...	16.2	15.9	15.9	15.5	15.2	14.9	14.6	14.4	14.2	14.1
35	17.0	...	15.3	...	14.1	13.0	12.2	11.5	11.2	11.0	10.8	10.7	10.5	10.4
36	20.0	20.0	20.0	19.6	19.1	18.7	18.7	18.3	17.9	17.5	17.2	16.9	16.7	16.5
37	20.0	18.7	18.0	17.2	16.5	15.3	14.3	13.5	13.2	13.0	12.7	12.6	12.4	12.3
38	20.0	20.0	20.0	19.6	19.1	18.7	18.7	18.3	17.9	17.5	17.2	16.9	16.7	16.5
39	20.0	18.7	18.0	17.2	16.5	15.3	14.3	13.5	13.2	13.0	12.7	12.6	12.4	12.3
40	20.0	...	20.0	...	19.1	18.7	18.7	18.3	17.9	17.5	17.2	16.9	...	...
41	20.0	...	20.0	...	19.1	18.7	18.7	18.3	17.9	17.5	17.2	16.9	16.7	16.5
42	20.0	...	18.0	...	16.5	15.3	14.3	13.5	13.2	13.0	12.7	12.6	12.4	12.3
43	20.0	...	20.0	...	19.1	18.7	18.7	18.3	17.9	17.5	17.2	16.9	16.7	16.5
44	20.0	...	20.0	...	19.1	18.7	18.7	18.3	17.9	17.5	17.2	16.9	16.7	16.5
45	20.0	...	20.0	...	19.1	18.7	18.7	18.3	17.9	17.5	17.2	16.9	...	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding														
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
1	13.3	13.1	13.0	12.8	*12.8*	*9.7*	*7.3*	*5.4*	*4.0*	...	...	...	...	...	...
2	13.6	13.5	*9.6*	*6.9*	*5.0*	*3.6*	*2.6*	*1.7*	*1.1*	*0.80*	*0.50*	*0.30*	...	...	...
3	10.1	10.0	*9.6*	*6.9*	*5.0*	*3.6*	*2.6*	*1.7*	*1.1*	*0.80*	*0.50*	*0.30*	...	...	...
4	13.6	13.5	*9.6*	*6.9*	*5.0*	*3.6*	*2.6*	*1.7*	*1.1*	*0.80*	*0.50*	*0.30*	...	...	...
5	10.1	10.0	*9.6*	*6.9*	*5.0*	*3.6*	*2.6*	*1.7*	*1.1*	*0.80*	*0.50*	*0.30*	...	...	...
6	13.6	13.5	*9.6*	*6.9*	*5.0*	*3.6*	*2.6*	*1.7*	*1.1*	*0.80*	*0.50*	*0.30*	...	...	...
7	10.1	10.0	*9.6*	*6.9*	*5.0*	*3.6*	*2.6*	*1.7*	*1.1*	*0.80*	*0.50*	*0.30*	...	...	...
8	13.6	13.5	12.3	*9.1*	*6.9*	*5.4*	*4.1*	*3.2*	*2.5*	*1.9*	*1.5*	*1.1*	...	...	...
9	10.1	10.0	9.9	*9.1*	*6.9*	*5.4*	*4.1*	*3.2*	*2.5*	*1.9*	*1.5*	*1.1*	...	...	...
10	13.6	13.5	12.3	*9.1*	*6.9*	*5.4*	*4.1*	*3.2*	*2.5*	*1.9*	*1.5*	*1.1*	...	...	...
11	10.1	10.0	9.9	*9.1*	*6.9*	*5.4*	*4.1*	*3.2*	*2.5*	*1.9*	*1.5*	*1.1*	...	...	...
12	13.6	13.5	12.3	*9.1*	*6.9*	*5.4*	*4.1*	*3.2*	*2.5*	*1.9*	*1.5*	*1.1*	...	...	...
13	16.4	*14.9*	*9.6*	*6.9*	*5.0*	*3.6*	*2.6*	*1.7*	*1.1*	*0.80*	*0.50*	*0.30*	...	...	...
14	12.1	12.0	*9.6*	*6.9*	*5.0*	*3.6*	*2.6*	*1.7*	*1.1*	*0.80*	*0.50*	*0.30*	...	...	...
15	16.4	*14.9*	*9.6*	*6.9*	*5.0*	*3.6*	*2.6*	*1.7*	*1.1*	*0.80*	*0.50*	*0.30*	...	...	...
16	12.1	12.0	*9.6*	*6.9*	*5.0*	*3.6*	*2.6*	*1.7*	*1.1*	*0.80*	*0.50*	*0.30*	...	...	...
17	16.4	16.2	12.3	*9.1*	*6.9*	*5.4*	*4.1*	*3.2*	*2.5*	*1.9*	*1.5*	*1.1*	...	...	...
18	12.1	12.0	11.9	*9.1*	*6.9*	*5.4*	*4.1*	*3.2*	*2.5*	*1.9*	*1.5*	*1.1*	...	...	...
19	16.4	16.2	12.3	*9.1*	*6.9*	*5.4*	*4.1*	*3.2*	*2.5*	*1.9*	*1.5*	*1.1*	...	...	...
20	12.1	12.0	11.9	*9.1*	*6.9*	*5.4*	*4.1*	*3.2*	*2.5*	*1.9*	*1.5*	*1.1*	...	...	...
21	15.8	*14.9*	*9.6*	...	...	...	...	...	...	...	...	...	...	...	...
22	11.7	11.6	*9.6*	...	...	...	...	...	...	...	...	...	...	...	...
23	16.4	16.2	*9.6*	*6.9*	*5.0*	*3.6*	*2.6*	*1.7*	*1.1*	*0.80*	*0.50*	*0.30*	...	...	...
24	12.1	12.0	*9.6*	*6.9*	*5.0*	*3.6*	*2.6*	*1.7*	*1.1*	*0.80*	*0.50*	*0.30*	...	...	...
25	16.4	*14.9*	*9.6*	*6.9*	*5.0*	*3.6*	*2.6*	*1.7*	*1.1*	*0.80*	*0.50*	*0.30*	...	...	...
26	16.4	16.2	*9.6*	*6.9*	*5.0*	*3.6*	*2.6*	*1.7*	*1.1*	*0.80*	*0.50*	*0.30*	...	...	...
27	12.1	12.0	*9.6*	*6.9*	*5.0*	*3.6*	*2.6*	*1.7*	*1.1*	*0.80*	*0.50*	*0.30*	...	...	...
28	16.4	*14.9*	*9.6*	*6.9*	*5.0*	*3.6*	*2.6*	*1.7*	*1.1*	*0.80*	*0.50*	*0.30*	...	...	...
29	16.4	16.2	*9.6*	*6.9*	*5.0*	*3.6*	*2.6*	*1.7*	*1.1*	*0.80*	*0.50*	*0.30*	...	...	...
30	12.1	12.0	*9.6*	*6.9*	*5.0*	*3.6*	*2.6*	*1.7*	*1.1*	*0.80*	*0.50*	*0.30*	...	...	...
31	16.4	*14.9*	*9.6*	*6.9*	*5.0*	*3.6*	*2.6*	*1.7*	*1.1*	*0.80*	*0.50*	*0.30*	...	...	...
32	12.1	12.0	*9.6*	*6.9*	*5.0*	*3.6*	*2.6*	*1.7*	*1.1*	*0.80*	*0.50*	*0.30*	...	...	...
33	16.4	16.2	*9.6*	*6.9*	*5.0*	*3.6*	*2.6*	*1.7*	*1.1*	*0.80*	*0.50*	*0.30*	...	...	...
34	13.9	13.8	*8.2*	*5.9*	*4.3*	*3.1*	*2.2*	*1.4*	*0.9*	*0.68*	*0.43*	*0.26*	...	...	...
35	10.3	10.2	*8.2*	*5.9*	*4.3*	*3.1*	*2.2*	*1.4*	*0.9*	*0.68*	*0.43*	*0.26*	...	...	...
36	16.4	16.2	*9.6*	*6.9*	*5.0*	*3.6*	*2.6*	*1.7*	*1.1*	*0.80*	*0.50*	*0.30*	...	...	...
37	12.1	12.0	*9.6*	*6.9*	*5.0*	*3.6*	*2.6*	*1.7*	*1.1*	*0.80*	*0.50*	*0.30*	...	...	...
38	16.4	16.2	*9.6*	*6.9*	*5.0*	*3.6*	*2.6*	*1.7*	*1.1*	*0.80*	*0.50*	*0.30*	...	...	...
39	12.1	12.0	*9.6*	*6.9*	*5.0*	*3.6*	*2.6*	*1.7*	*1.1*	*0.80*	*0.50*	*0.30*	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
41	16.4	16.2	*9.6*	*6.9*	*5.0*	*3.6*	*2.6*	*1.7*	*1.1*	*0.80*	*0.50*	*0.30*	...	...	...
42	12.1	12.0	*9.6*	*6.9*	*5.0*	*3.6*	*2.6*	*1.7*	*1.1*	*0.80*	*0.50*	*0.30*	...	...	...
43	16.4	*14.9*	*9.6*	*6.9*	*5.0*	*3.6*	*2.6*	*1.7*	*1.1*	*0.80*	*0.50*	*0.30*	...	...	...
44	16.4	*14.9*	*9.6*	*6.9*	*5.0*	*3.6*	*2.6*	*1.7*	*1.1*	*0.80*	*0.50*	*0.30*	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	18Cr–10Ni–Ti	Bar	SA–479	321	S32100	...	...	8	1
2	18Cr–10Ni–Ti	Bar	SA–479	321	S32100	...	...	8	1
3	18Cr–10Ni–Ti	Bar	SA–479	321	S32100	...	...	8	1
4	18Cr–10Ni–Ti	Wld. pipe	SA–813	TP321	S32100	...	...	8	1
5	18Cr–10Ni–Ti	Wld. pipe	SA–814	TP321	S32100	...	...	8	1
6	18Cr–10Ni–Ti	Bar	SA/JIS G4303	SUS321	...	...	...	8	1
7	18Cr–10Ni–Ti	Forgings	SA–182	F321H	S32109	...	≤5	8	1
8	18Cr–10Ni–Ti	Forgings	SA–182	F321H	S32109	...	≤5	8	1
9	18Cr–10Ni–Ti	Smls. tube	SA–213	TP321H	S32109	...	...	8	1
10	18Cr–10Ni–Ti	Smls. tube	SA–213	TP321H	S32109	...	...	8	1
11	18Cr–10Ni–Ti	Plate	SA–240	321H	S32109	...	...	8	1
12	18Cr–10Ni–Ti	Plate	SA–240	321H	S32109	...	...	8	1
13	18Cr–10Ni–Ti	Wld. tube	SA–249	TP321H	S32109	...	...	8	1
14	18Cr–10Ni–Ti	Wld. tube	SA–249	TP321H	S32109	...	...	8	1
15	18Cr–10Ni–Ti	Wld. tube	SA–249	TP321H	S32109	...	...	8	1
16	18Cr–10Ni–Ti	Wld. tube	SA–249	TP321H	S32109	...	...	8	1
17	18Cr–10Ni–Ti	Smls. pipe	SA–312	TP321H	S32109	...	≤3/16	8	1
18	18Cr–10Ni–Ti	Smls. pipe	SA–312	TP321H	S32109	...	≤3/16	8	1
19	18Cr–10Ni–Ti	Wld. pipe	SA–312	TP321H	S32109	...	≤3/16	8	1
20	18Cr–10Ni–Ti	Wld. pipe	SA–312	TP321H	S32109	...	≤3/16	8	1
21	18Cr–10Ni–Ti	Smls. pipe	SA–376	TP321H	S32109	...	≤3/8	8	1
22	18Cr–10Ni–Ti	Smls. pipe	SA–376	TP321H	S32109	...	≤3/8	8	1
23	18Cr–10Ni–Ti	Smls. & wld. fittings	SA–403	321H	S32109	...	...	8	1
24	18Cr–10Ni–Ti	Bar	SA–479	321H	S32109	...	...	8	1
25	18Cr–10Ni–Ti	Bar	SA–479	321H	S32109	...	...	8	1
26	18Cr–10Ni–Ti	Wld. pipe	SA–813	TP321H	S32109	...	...	8	1
27	18Cr–10Ni–Ti	Wld. pipe	SA–814	TP321H	S32109	...	...	8	1
28	18Cr–11Ni	Plate	SA–240	305	S30500	...	...	8	1
29	18Cr–13Ni–3Mo	Forgings	SA–182	F317L	S31703	...	>5	8	1
30	18Cr–13Ni–3Mo	Forgings	SA–182	F317L	S31703	...	>5	8	1
31	18Cr–13Ni–3Mo	Forgings	SA–182	F317L	S31703	...	≤5	8	1
32	18Cr–13Ni–3Mo	Forgings	SA–182	F317L	S31703	...	≤5	8	1
33	18Cr–13Ni–3Mo	Forgings	SA–182	F317	S31700	...	≤5	8	1
34	18Cr–13Ni–3Mo	Forgings	SA–182	F317	S31700	...	≤5	8	1
35	18Cr–13Ni–3Mo	Plate	SA–240	317	S31700	...	...	8	1
36	18Cr–13Ni–3Mo	Plate	SA–240	317	S31700	...	...	8	1
37	18Cr–13Ni–3Mo	Plate	SA–240	317L	S31703	...	...	8	1
38	18Cr–13Ni–3Mo	Plate	SA–240	317L	S31703	...	...	8	1
39	18Cr–13Ni–3Mo	Wld. tube	SA–249	TP317	S31700	...	...	8	1
40	18Cr–13Ni–3Mo	Wld. tube	SA–249	TP317	S31700	...	...	8	1
41	18Cr–13Ni–3Mo	Wld. tube	SA–249	TP317	S31700	...	...	8	1
42	18Cr–13Ni–3Mo	Wld. tube	SA–249	TP317L	S31703	...	...	8	1
43	18Cr–13Ni–3Mo	Wld. tube	SA–249	TP317L	S31703	...	...	8	1
44	18Cr–13Ni–3Mo	Smls. & wld. pipe	SA–312	TP317	S31700	...	...	8	1
45	18Cr–13Ni–3Mo	Smls. pipe	SA–312	TP317	S31700	...	...	8	1

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	75	30	1500	NP	NP	NP	HA–2	G5, G12, H1, T7
2	75	30	1500	NP	1500	650	HA–2	G12, G22, H1, T7
3	75	30	NP	800	1500	650	HA–2	G5, G12, G22, H1, T6
4	75	30	NP	800	NP	NP	HA–2	G5, H1, W12
5	75	30	NP	800	NP	NP	HA–2	G5, W12
6	75	30	NP	800	1500	NP	HA–2	G5, G12, G22, H1, T6
7	75	30	1500	800	1500	NP	HA–2	G5, H2, T8
8	75	30	1500	NP	1500	NP	HA–2	H2, T8
9	75	30	1500	800	1500	NP	HA–2	G5, H2, T8
10	75	30	1500	NP	1500	NP	HA–2	H2, T8
11	75	30	1500	800	1500	NP	HA–2	G5, H2, T8
12	75	30	1500	NP	1500	NP	HA–2	H2, T8
13	75	30	1500	NP	NP	NP	HA–2	T8, W13
14	75	30	1500	800	NP	NP	HA–2	G5, T8, W12, W13
15	75	30	1500	NP	1500	NP	HA–2	G3, G5, G24, T8
16	75	30	1500	NP	1500	NP	HA–2	G3, G24, T8
17	75	30	1500	800	1500	NP	HA–2	G5, T8
18	75	30	1500	NP	1500	NP	HA–2	T8
19	75	30	1500	800	1500	NP	HA–2	G5, T8, W12, W13, W14
20	75	30	1500	NP	1500	NP	HA–2	T8, W13, W14
21	75	30	1500	800	1500	NP	HA–2	G5, H2, T8
22	75	30	1500	NP	1500	NP	HA–2	H2, T8
23	75	30	NP	800	1500	NP	HA–2	G5, H2, T8, W12, W14
24	75	30	1500	NP	1500	NP	HA–2	H2, T8
25	75	30	1500	800	1500	NP	HA–2	G5, H2, T8
26	75	30	NP	800	NP	NP	HA–2	G5, H2, W12
27	75	30	NP	800	NP	NP	HA–2	G5, W12
28	75	30	NP	800	NP	NP	HA–1	G5
29	65	25	NP	NP	850	650	HA–4	G5
30	65	25	NP	NP	850	650	HA–4	...
31	70	25	NP	NP	850	650	HA–4	G5
32	70	25	NP	NP	850	650	HA–4	...
33	75	30	NP	NP	1500	650	HA–2	G5, G12, T8
34	75	30	NP	NP	1500	650	HA–2	G12, T9
35	75	30	NP	NP	1500	650	HA–2	G5, G12, T8
36	75	30	NP	NP	1500	650	HA–2	G12, T9
37	75	30	NP	NP	850	650	HA–4	G5
38	75	30	NP	NP	850	650	HA–4	...
39	75	30	NP	800	NP	NP	HA–2	G5, W12
40	75	30	NP	NP	1500	650	HA–2	G5, G12, G24, T8
41	75	30	NP	NP	1500	650	HA–2	G12, G24, T9
42	75	30	NP	NP	850	650	HA–4	G5, G24
43	75	30	NP	NP	850	650	HA–4	G24
44	75	30	NP	800	1500	650	HA–2	G5, G12, T8, W12, W14
45	75	30	NP	NP	1500	650	HA–2	G12, T9

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	20.0	...	20.0	...	19.1	18.7	18.7	18.3	17.9	17.5	17.2	16.9	16.7	16.5
2	20.0	...	18.0	...	16.5	15.3	14.3	13.5	13.2	13.0	12.7	12.6	12.4	12.3
3	20.0	...	20.0	...	19.1	18.7	18.7	18.3	17.9	17.5	17.2	16.9	16.7	16.5
4	20.0	...	20.0	...	19.1	18.7	18.7	18.3	17.9	17.5	17.2	16.9	...	...
5	20.0	...	20.0	...	19.1	18.7	18.7	18.3	17.9	17.5	17.2	16.9	...	...
6	20.0	...	20.0	...	19.1	18.7	18.7	18.3	17.9	17.5	17.2	16.9	16.7	16.5
7	20.0	...	20.0	...	19.1	18.7	18.7	18.3	17.9	17.5	17.2	16.9	16.7	16.5
8	20.0	...	18.0	...	16.5	15.3	14.3	13.5	13.2	13.0	12.7	12.6	12.4	12.3
9	20.0	...	20.0	...	19.1	18.7	18.7	18.3	17.9	17.5	17.2	16.9	16.7	16.5
10	20.0	...	18.0	...	16.5	15.3	14.3	13.5	13.2	13.0	12.7	12.6	12.4	12.3
11	20.0	...	20.0	...	19.1	18.7	18.7	18.3	17.9	17.5	17.2	16.9	16.7	16.5
12	20.0	...	18.0	...	16.5	15.3	14.3	13.5	13.2	13.0	12.7	12.6	12.4	12.3
13	20.0	...	18.0	...	16.5	15.3	14.3	13.5	13.2	13.0	12.7	12.6	12.4	12.3
14	20.0	...	20.0	...	19.1	18.7	18.7	18.3	17.9	17.5	17.2	16.9	16.7	16.5
15	17.0	...	17.0	...	16.2	15.9	15.9	15.5	15.2	14.9	14.6	14.4	14.2	14.1
16	17.0	...	15.3	...	14.1	13.0	12.2	11.5	11.2	11.0	10.8	10.7	10.5	10.4
17	20.0	20.0	20.0	19.6	19.1	18.7	18.7	18.3	17.9	17.5	17.2	16.9	16.7	16.5
18	20.0	18.7	18.0	17.2	16.5	15.3	14.3	13.5	13.2	13.0	12.7	12.6	12.4	12.3
19	20.0	20.0	20.0	19.6	19.1	18.7	18.7	18.3	17.9	17.5	17.2	16.9	16.7	16.5
20	20.0	18.7	18.0	17.2	16.5	15.3	14.3	13.5	13.2	13.0	12.7	12.6	12.4	12.3
21	20.0	...	20.0	...	19.1	18.7	18.7	18.3	17.9	17.5	17.2	16.9	16.7	16.5
22	20.0	...	18.0	...	16.5	15.3	14.3	13.5	13.2	13.0	12.7	12.6	12.4	12.3
23	20.0	...	20.0	...	19.1	18.7	18.7	18.3	17.9	17.5	17.2	16.9	16.7	16.5
24	20.0	...	18.0	...	16.5	15.3	14.3	13.5	13.2	13.0	12.7	12.6	12.4	12.3
25	20.0	...	20.0	...	19.1	18.7	18.7	18.3	17.9	17.5	17.2	16.9	16.7	16.5
26	20.0	...	20.0	...	19.1	18.7	18.7	18.3	17.9	17.5	17.2	16.9	...	...
27	20.0	...	20.0	...	19.1	18.7	18.7	18.3	17.9	17.5	17.2	16.9	...	...
28	20.0	...	20.0	...	18.9	18.3	17.5	16.6	16.2	15.8	15.5	15.2	...	...
29	16.7	...	16.7	...	16.7	15.7	14.8	14.0	13.7	13.5	13.2	12.9	12.7	...
30	16.7	...	14.2	...	12.7	11.7	10.9	10.4	10.2	10.0	9.8	9.6	9.4	...
31	16.7	...	16.7	...	16.7	15.7	14.8	14.0	13.7	13.5	13.2	12.9	12.7	...
32	16.7	...	14.2	...	12.7	11.7	10.9	10.4	10.2	10.0	9.8	9.6	9.4	...
33	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	15.7	15.6
34	20.0	...	17.3	...	15.6	14.3	13.3	12.6	12.3	12.1	11.9	11.8	11.6	11.5
35	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	15.7	15.6
36	20.0	...	17.3	...	15.6	14.3	13.3	12.6	12.3	12.1	11.9	11.8	11.6	11.5
37	20.0	...	20.0	...	19.6	18.9	17.7	16.9	16.5	16.2	15.8	15.5	15.2	...
38	20.0	...	17.0	...	15.2	14.0	13.1	12.5	12.2	12.0	11.7	11.5	11.3	...
39	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...
40	17.0	...	17.0	...	17.0	16.4	15.3	14.5	14.1	13.9	13.7	13.5	13.4	13.2
41	17.0	...	14.7	...	13.2	12.1	11.3	10.7	10.5	10.3	10.1	10.0	9.9	9.8
42	17.0	...	17.0	...	16.7	16.0	15.1	14.3	14.0	13.7	13.5	13.2	12.9	...
43	17.0	...	14.5	...	12.9	11.9	11.2	10.6	10.4	10.2	10.0	9.8	9.6	...
44	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	15.7	15.6
45	20.0	...	17.3	...	15.6	14.3	13.3	12.6	12.3	12.1	11.9	11.8	11.6	11.5

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding														
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
1	16.4	16.2	*9.6*	*6.9*	*5.0*	*3.6*	*2.6*	*1.7*	*1.1*	*0.80*	*0.50*	*0.30*	...	...	...
2	12.1	12.0	*9.6*	*6.9*	*5.0*	*3.6*	*2.6*	*1.7*	*1.1*	*0.80*	*0.50*	*0.30*	...	...	...
3	16.4	*14.9*	*9.6*	*6.9*	*5.0*	*3.6*	*2.6*	*1.7*	*1.1*	*0.80*	*0.50*	*0.30*	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6	16.4	*14.9*	*9.6*	*6.9*	*5.0*	*3.6*	*2.6*	*1.7*	*1.1*	*0.80*	*0.50*	*0.30*	...	...	...
7	16.4	16.2	12.3	*9.1*	*6.9*	*5.4*	*4.1*	*3.2*	*2.5*	*1.9*	*1.5*	*1.1*	...	...	...
8	12.1	12.0	11.9	*9.1*	*6.9*	*5.4*	*4.1*	*3.2*	*2.5*	*1.9*	*1.5*	*1.1*	...	...	...
9	16.4	16.2	12.3	*9.1*	*6.9*	*5.4*	*4.1*	*3.2*	*2.5*	*1.9*	*1.5*	*1.1*	...	...	...
10	12.1	12.0	11.9	*9.1*	*6.9*	*5.4*	*4.1*	*3.2*	*2.5*	*1.9*	*1.5*	*1.1*	...	...	...
11	16.4	16.2	12.3	*9.1*	*6.9*	*5.4*	*4.1*	*3.2*	*2.5*	*1.9*	*1.5*	*1.1*	...	...	...
12	12.1	12.0	11.9	*9.1*	*6.9*	*5.4*	*4.1*	*3.2*	*2.5*	*1.9*	*1.5*	*1.1*	...	...	...
13	12.1	12.0	11.9	*9.1*	*6.9*	*5.4*	*4.1*	*3.2*	*2.5*	*1.9*	*1.5*	*1.1*	...	...	...
14	16.4	16.2	12.3	*9.1*	*6.9*	*5.4*	*4.1*	*3.2*	*2.5*	*1.9*	*1.5*	*1.1*	...	...	...
15	13.9	13.8	10.5	*7.7*	*5.9*	*4.6*	*3.5*	*2.7*	*2.1*	*1.6*	*1.3*	*0.94*	...	...	...
16	10.3	10.2	10.1	*7.7*	*5.9*	*4.6*	*3.5*	*2.7*	*2.1*	*1.6*	*1.3*	*0.94*	...	...	...
17	16.4	16.2	12.3	*9.1*	*6.9*	*5.4*	*4.1*	*3.2*	*2.5*	*1.9*	*1.5*	*1.1*	...	...	...
18	12.1	12.0	11.9	*9.1*	*6.9*	*5.4*	*4.1*	*3.2*	*2.5*	*1.9*	*1.5*	*1.1*	...	...	...
19	16.4	16.2	12.3	*9.1*	*6.9*	*5.4*	*4.1*	*3.2*	*2.5*	*1.9*	*1.5*	*1.1*	...	...	...
20	12.1	12.0	11.9	*9.1*	*6.9*	*5.4*	*4.1*	*3.2*	*2.5*	*1.9*	*1.5*	*1.1*	...	...	...
21	16.4	16.2	12.3	*9.1*	*6.9*	*5.4*	*4.1*	*3.2*	*2.5*	*1.9*	*1.5*	*1.1*	...	...	...
22	12.1	12.0	11.9	*9.1*	*6.9*	*5.4*	*4.1*	*3.2*	*2.5*	*1.9*	*1.5*	*1.1*	...	...	...
23	16.4	16.2	12.3	*9.1*	*6.9*	*5.4*	*4.1*	*3.2*	*2.5*	*1.9*	*1.5*	*1.1*	...	...	...
24	12.1	12.0	11.9	*9.1*	*6.9*	*5.4*	*4.1*	*3.2*	*2.5*	*1.9*	*1.5*	*1.1*	...	...	...
25	16.4	16.2	12.3	*9.1*	*6.9*	*5.4*	*4.1*	*3.2*	*2.5*	*1.9*	*1.5*	*1.1*	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
33	15.4	15.3	15.1	*12.4*	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...
34	11.4	11.3	11.2	11.1	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...
35	15.4	15.3	15.1	*12.4*	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...
36	11.4	11.3	11.2	11.1	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
40	13.1	13.0	12.9	*10.5*	*8.3*	*6.3*	*4.7*	*3.5*	*2.6*	*1.9*	*1.5*	*1.1*	...	...	...
41	9.7	9.6	9.5	9.4	*8.3*	*6.3*	*4.7*	*3.5*	*2.6*	*1.9*	*1.5*	*1.1*	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
44	15.4	15.3	15.1	*12.4*	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...
45	11.4	11.3	11.2	11.1	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	18Cr–13Ni–3Mo	Wld. pipe	SA–312	TP317	S31700	...	...	8	1
2	18Cr–13Ni–3Mo	Wld. pipe	SA–312	TP317	S31700	...	...	8	1
3	18Cr–13Ni–3Mo	Smls. pipe	SA–312	TP317L	S31703	...	...	8	1
4	18Cr–13Ni–3Mo	Smls. pipe	SA–312	TP317L	S31703	...	...	8	1
5	18Cr–13Ni–3Mo	Wld. pipe	SA–312	TP317L	S31703	...	...	8	1
6	18Cr–13Ni–3Mo	Wld. pipe	SA–312	TP317L	S31703	...	...	8	1
7	18Cr–13Ni–3Mo	Smls. & wld. fittings	SA–403	317	S31700	...	...	8	1
8	18Cr–13Ni–3Mo	Fittings	SA–403	317L	S31703	CR	...	8	1
9	18Cr–13Ni–3Mo	Fittings	SA–403	317L	S31703	CR	...	8	1
10	18Cr–13Ni–3Mo	Fittings	SA–403	317L	S31703	WP–S	...	8	1
11	18Cr–13Ni–3Mo	Fittings	SA–403	317L	S31703	WP–S	...	8	1
12	18Cr–13Ni–3Mo	Fittings	SA–403	317L	S31703	WP–W	...	8	1
13	18Cr–13Ni–3Mo	Fittings	SA–403	317L	S31703	WP–W	...	8	1
14	18Cr–13Ni–3Mo	Fittings	SA–403	317L	S31703	WP–WU	...	8	1
15	18Cr–13Ni–3Mo	Fittings	SA–403	317L	S31703	WP–WU	...	8	1
16	18Cr–13Ni–3Mo	Fittings	SA–403	317L	S31703	WP–WX	...	8	1
17	18Cr–13Ni–3Mo	Fittings	SA–403	317L	S31703	WP–WX	...	8	1
18	18Cr–15Ni–4Si	Forgings	SA–182	...	S30600	Sol. ann.	...	8	1
19	18Cr–15Ni–4Si	Forgings	SA–182	...	S30600	Sol. ann.	...	8	1
20	18Cr–15Ni–4Si	Plate	SA–240	...	S30600	Sol. ann.	≤2	8	1
21	18Cr–15Ni–4Si	Plate	SA–240	...	S30600	Sol. ann.	≤2	8	1
22	18Cr–15Ni–4Si	Smls. & wld. pipe	SA–312	...	S30600	Sol. ann.	...	8	1
23	18Cr–15Ni–4Si	Smls. & wld. pipe	SA–312	...	S30600	Sol. ann.	...	8	1
24	18Cr–15Ni–4Si	Wld. pipe	SA–312	...	S30600	Sol. ann.	...	8	1
25	18Cr–15Ni–4Si	Wld. pipe	SA–312	...	S30600	Sol. ann.	...	8	1
26	18Cr–15Ni–4Si	Bar	SA–479	...	S30600	Sol. ann.	≤4	8	1
27	18Cr–15Ni–4Si	Bar	SA–479	...	S30600	Sol. ann.	≤4	8	1
28	18Cr–18Ni–2Si	Smls. tube	SA–213	XM–15	S38100	...	...	8	1
29	18Cr–18Ni–2Si	Smls. tube	SA–213	XM–15	S38100	...	...	8	1
30	18Cr–18Ni–2Si	Plate	SA–240	XM–15	S38100	...	...	8	1
31	18Cr–18Ni–2Si	Plate	SA–240	XM–15	S38100	...	...	8	1
32	18Cr–18Ni–2Si	Wld. tube	SA–249	TPXM–15	S38100	...	...	8	1
33	18Cr–18Ni–2Si	Wld. tube	SA–249	TPXM–15	S38100	...	...	8	1
34	18Cr–18Ni–2Si	Wld. pipe	SA–312	TPXM–15	S38100	...	...	8	1
35	18Cr–18Ni–2Si	Wld. pipe	SA–312	TPXM–15	S38100	...	...	8	1
36	18Cr–20Ni–5.5Si	Smls. tube	SA–213	...	S32615	Sol. ann.	...	8	1
37	18Cr–20Ni–5.5Si	Smls. tube	SA–213	...	S32615	Sol. ann.	...	8	1
38	18Cr–20Ni–5.5Si	Plate	SA–240	...	S32615	Sol. ann.	...	8	1
39	18Cr–20Ni–5.5Si	Plate	SA–240	...	S32615	Sol. ann.	...	8	1
40	18Cr–20Ni–5.5Si	Smls. & wld. pipe	SA–312	...	S32615	Sol. ann.	...	8	1
41	18Cr–20Ni–5.5Si	Smls. & wld. pipe	SA–312	...	S32615	Sol. ann.	...	8	1
42	18Cr–20Ni–5.5Si	Wld. pipe	SA–312	...	S32615	Sol. ann.	...	8	1
43	18Cr–20Ni–5.5Si	Wld. pipe	SA–312	...	S32615	Sol. ann.	...	8	1
44	18Cr–20Ni–5.5Si	Bar	SA–479	...	S32615	Sol. ann.	...	8	1
45	18Cr–20Ni–5.5Si	Bar	SA–479	...	S32615	Sol. ann.	...	8	1

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	75	30	NP	NP	1500	650	HA–2	G5, G12, G24, T8
2	75	30	NP	NP	1500	650	HA–2	G12, G24, T9
3	75	30	NP	NP	850	650	HA–4	G5
4	75	30	NP	NP	850	650	HA–4	...
5	75	30	NP	NP	850	650	HA–4	G5, G24
6	75	30	NP	NP	850	650	HA–4	G24
7	75	30	NP	NP	1500	650	HA–2	G5, G12, T8, W14
8	75	30	NP	NP	850	650	HA–4	G5, G24
9	75	30	NP	NP	850	650	HA–4	G24
10	75	30	NP	NP	850	650	HA–4	G5
11	75	30	NP	NP	850	650	HA–4	...
12	75	30	NP	NP	850	650	HA–4	G5, G24
13	75	30	NP	NP	850	650	HA–4	G24
14	75	30	NP	NP	850	650	HA–4	G5, G24
15	75	30	NP	NP	850	650	HA–4	G24
16	75	30	NP	NP	850	650	HA–4	G5, G24
17	75	30	NP	NP	850	650	HA–4	G24
18	78	35	NP	NP	300	NP	HA–2	G5, H6
19	78	35	NP	NP	300	NP	HA–2	H6
20	78	35	NP	NP	300	NP	HA–2	G5, H6
21	78	35	NP	NP	300	NP	HA–2	H6
22	78	35	NP	NP	300	NP	HA–2	G5, H6
23	78	35	NP	NP	300	NP	HA–2	H6
24	78	35	NP	NP	300	NP	HA–2	G5, G24, H6
25	78	35	NP	NP	300	NP	HA–2	G24, H6
26	78	35	NP	NP	300	NP	HA–2	G5, H6
27	78	35	NP	NP	300	NP	HA–2	H6
28	75	30	NP	NP	1000	650	HA–2	G5
29	75	30	NP	NP	1000	650	HA–2	...
30	75	30	NP	NP	1000	650	HA–2	G5
31	75	30	NP	NP	1000	650	HA–2	...
32	75	30	NP	NP	1000	650	HA–2	G5, G24
33	75	30	NP	NP	1000	650	HA–2	G24
34	75	30	NP	NP	950	650	HA–2	G5, G24
35	75	30	NP	NP	1000	650	HA–2	G24
36	80	32	NP	NP	400	NP	HA–2	G5, H6
37	80	32	NP	NP	400	NP	HA–2	H6
38	80	32	NP	NP	400	NP	HA–2	G5, H6
39	80	32	NP	NP	400	NP	HA–2	H6
40	80	32	NP	NP	400	NP	HA–2	G5, H6
41	80	32	NP	NP	400	NP	HA–2	H6
42	80	32	NP	NP	400	NP	HA–2	G5, G24, H6
43	80	32	NP	NP	400	NP	HA–2	G24, H6
44	80	32	NP	NP	400	NP	HA–2	G5, H6
45	80	32	NP	NP	400	NP	HA–2	H6

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	17.0	...	17.0	...	17.0	16.4	15.3	14.5	14.1	13.9	13.7	13.5	13.4	13.2
2	17.0	...	14.7	...	13.2	12.1	11.3	10.7	10.5	10.3	10.1	10.0	9.9	9.8
3	20.0	20.0	20.0	20.0	19.6	18.9	17.7	16.9	16.5	16.2	15.8	15.5	15.2	...
4	20.0	18.2	17.0	16.0	15.2	14.0	13.1	12.5	12.2	12.0	11.7	11.5	11.3	...
5	17.0	17.0	17.0	17.0	16.7	16.0	15.1	14.3	14.0	13.7	13.5	13.2	12.9	...
6	17.0	15.5	14.5	13.6	12.9	11.9	11.2	10.6	10.4	10.2	10.0	9.8	9.6	...
7	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	15.7	15.6
8	17.0	...	17.0	...	16.7	16.0	15.1	14.3	14.0	13.7	13.5	13.2	12.9	...
9	17.0	...	14.5	...	12.9	11.9	11.2	10.6	10.4	10.2	10.0	9.8	9.6	...
10	20.0	...	20.0	...	19.6	18.9	17.7	16.9	16.5	16.2	15.8	15.5	15.2	...
11	20.0	...	17.0	...	15.2	14.0	13.1	12.5	12.2	12.0	11.7	11.5	11.3	...
12	17.0	...	17.0	...	16.7	16.0	15.1	14.3	14.0	13.7	13.5	13.2	12.9	...
13	17.0	...	14.5	...	12.9	11.9	11.2	10.6	10.4	10.2	10.0	9.8	9.6	...
14	17.0	...	17.0	...	16.7	16.0	15.1	14.3	14.0	13.7	13.5	13.2	12.9	...
15	17.0	...	14.5	...	12.9	11.9	11.2	10.6	10.4	10.2	10.0	9.8	9.6	...
16	17.0	...	17.0	...	16.7	16.0	15.1	14.3	14.0	13.7	13.5	13.2	12.9	...
17	17.0	...	14.5	...	12.9	11.9	11.2	10.6	10.4	10.2	10.0	9.8	9.6	...
18	22.3	...	21.3	...	19.6	...	...	...	...	...	...	...	...	...
19	22.3	...	17.9	...	16.1	...	...	...	...	...	...	...	...	...
20	22.3	...	21.3	...	19.6	...	...	...	...	...	...	...	...	...
21	22.3	...	17.9	...	16.1	...	...	...	...	...	...	...	...	...
22	22.3	...	21.3	...	19.6	...	...	...	...	...	...	...	...	...
23	22.3	...	17.9	...	16.1	...	...	...	...	...	...	...	...	...
24	19.0	...	18.1	...	16.7	...	...	...	...	...	...	...	...	...
25	19.0	...	15.2	...	13.7	...	...	...	...	...	...	...	...	...
26	22.3	...	21.3	...	19.6	...	...	...	...	...	...	...	...	...
27	22.3	...	17.9	...	16.1	...	...	...	...	...	...	...	...	...
28	20.0	...	20.0	...	18.9	18.3	17.5	16.6	16.2	15.8	15.5	15.2	14.9	14.6
29	20.0	...	16.7	...	15.0	13.8	12.9	12.3	12.0	11.7	11.5	11.2	11.0	10.8
30	20.0	...	20.0	...	18.9	18.3	17.5	16.6	16.2	15.8	15.5	15.2	14.9	14.6
31	20.0	...	16.7	...	15.0	13.8	12.9	12.3	12.0	11.7	11.5	11.2	11.0	10.8
32	17.0	...	17.0	...	16.1	15.5	14.8	14.1	13.8	13.5	13.2	12.9	12.6	12.4
33	17.0	...	14.2	...	12.7	11.7	11.0	10.4	10.2	10.0	9.8	9.6	9.4	9.2
34	17.0	...	17.0	...	16.1	15.5	14.8	14.1	13.8	13.5	13.2	12.9	12.6	12.4
35	17.0	...	14.2	...	12.7	11.7	11.0	10.4	10.2	10.0	9.8	9.6	9.4	9.2
36	21.3	...	21.3	...	21.3	21.0	...	...	...	...	...	...	...	...
37	21.3	...	17.6	...	16.5	15.4	...	...	...	...	...	...	...	...
38	21.3	...	21.3	...	21.3	21.0	...	...	...	...	...	...	...	...
39	21.3	...	17.6	...	16.5	15.4	...	...	...	...	...	...	...	...
40	21.3	...	21.3	...	21.3	21.0	...	...	...	...	...	...	...	...
41	21.3	...	17.6	...	16.5	15.4	...	...	...	...	...	...	...	...
42	18.1	...	18.1	...	18.1	17.9	...	...	...	...	...	...	...	...
43	18.1	...	15.0	...	14.0	13.1	...	...	...	...	...	...	...	...
44	21.3	...	21.3	...	21.3	21.0	...	...	...	...	...	...	...	...
45	21.3	...	17.6	...	16.5	15.4	...	...	...	...	...	...	...	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding														
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
1	13.1	13.0	12.9	*10.5*	*8.3*	*6.3*	*4.7*	*3.5*	*2.6*	*1.9*	*1.5*	*1.1*	...	...	...
2	9.7	9.6	9.5	9.4	*8.3*	*6.3*	*4.7*	*3.5*	*2.6*	*1.9*	*1.5*	*1.1*	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
7	15.4	15.3	15.1	*12.4*	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
28	14.3	14.0	...	...	...	...	...	...	...	...	...	...	...	...	...
29	10.6	10.4	...	...	...	...	...	...	...	...	...	...	...	...	...
30	14.3	14.0	...	...	...	...	...	...	...	...	...	...	...	...	...
31	10.6	10.4	...	...	...	...	...	...	...	...	...	...	...	...	...
32	12.1	11.9	...	...	...	...	...	...	...	...	...	...	...	...	...
33	9.0	8.8	...	...	...	...	...	...	...	...	...	...	...	...	...
34	12.1	...	...	...	...	...	...	...	...	...	...	...	...	...	...
35	9.0	8.8	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
	1	19Cr–9Ni–$^1/_2$Mo	Castings	SA–351	CF10	J92590	...	...	8	1
	2	19Cr–9Ni–$^1/_2$Mo	Castings	SA–351	CF10	J92590	...	...	8	1
	3	19Cr–9Ni–2Mo	Castings	SA–351	CF10M	...	...	...	8	1
	4	19Cr–9Ni–2Mo	Castings	SA–351	CF10M	...	...	...	8	1
	5	19Cr–10Ni–3Mo	Castings	SA–351	CG8M	J93000	...	...	8	1
	6	19Cr–10Ni–3Mo	Castings	SA–351	CG8M	J93000	...	...	8	1
	7	19Cr–15Ni–4Mo	Smls. tube	SA–213	...	S31725	...	...	8	4
	8	19Cr–15Ni–4Mo	Smls. tube	SA–213	...	S31725	...	...	8	4
	9	19Cr–15Ni–4Mo	Plate	SA–240	...	S31725	...	...	8	4
	10	19Cr–15Ni–4Mo	Plate	SA–240	...	S31725	...	...	8	4
	11	19Cr–15Ni–4Mo	Wld. tube	SA–249	...	S31725	...	...	8	4
	12	19Cr–15Ni–4Mo	Wld. tube	SA–249	...	S31725	...	...	8	4
	13	19Cr–15Ni–4Mo	Smls. pipe	SA–312	...	S31725	...	...	8	4
	14	19Cr–15Ni–4Mo	Smls. pipe	SA–312	...	S31725	...	...	8	4
	15	19Cr–15Ni–4Mo	Wld. pipe	SA–312	...	S31725	...	...	8	4
	16	19Cr–15Ni–4Mo	Wld. pipe	SA–312	...	S31725	...	...	8	4
	17	19Cr–15Ni–4Mo	Wld. pipe	SA–358	...	S31725	...	...	8	4
	18	19Cr–15Ni–4Mo	Wld. pipe	SA–358	...	S31725	...	...	8	4
	19	19Cr–15Ni–4Mo	Smls. pipe	SA–376	...	S31725	...	...	8	4
	20	19Cr–15Ni–4Mo	Smls. pipe	SA–376	...	S31725	...	...	8	4
	21	19Cr–15Ni–4Mo	Fittings	SA–403	...	S31725	...	...	8	4
	22	19Cr–15Ni–4Mo	Wld. pipe	SA–409	...	S31725	...	...	8	4
	23	19Cr–15Ni–4Mo	Wld. pipe	SA–409	...	S31725	...	...	8	4
	24	19Cr–15Ni–4Mo	Bar	SA–479	...	S31725	...	...	8	4
	25	19Cr–15Ni–4Mo	Bar	SA–479	...	S31725	...	...	8	4
(**21**)	26	20Cr–3Ni–1.5Mo–N	Plate	SA–240	...	S32003	...	$t > {}^3/_{16}$	10H	1
	27	20Cr–3Ni–1.5Mo–N	Wld. pipe	SA–790	...	S32003	...	...	10H	1
(**21**)	28	20Cr–3Ni–1.5Mo–N	Sheet	SA–240	...	S32003	...	$t \le {}^3/_{16}$	10H	1
(**21**)	29	20Cr–3Ni–1.5Mo–N	Smls. tube	SA–789	...	S32003	...	$t \le {}^3/_{16}$	10H	1
(**21**)	30	20Cr–3Ni–1.5Mo–N	Wld. tube	SA–789	...	S32003	...	$t > {}^3/_{16}$	10H	1
(**21**)	31	20Cr–3Ni–1.5Mo–N	Smls. tube	SA–789	...	S32003	...	$t > {}^3/_{16}$	10H	1
(**21**)	32	20Cr–3Ni–1.5Mo–N	Wld. tube	SA–789	...	S32003	...	$t > {}^3/_{16}$	10H	1
	33	20Cr–10Ni	Bar	SA–479	ER308	S30880	...	...	...	...
	34	20Cr–18Ni–6Mo	Castings	SA–351	CK3MCuN	J93254	...	...	8	4
	35	20Cr–18Ni–6Mo	Castings	SA–351	CK3MCuN	J93254	...	...	8	4
	36	20Cr–18Ni–6Mo	Forgings	SA–182	F44	S31254	...	...	8	4
	37	20Cr–18Ni–6Mo	Forgings	SA–182	F44	S31254	...	...	8	4
	38	20Cr–18Ni–6Mo	Fittings	SA–403	...	S31254	...	...	8	4
	39	20Cr–18Ni–6Mo	Smls. tube	SA–213	...	S31254	...	$t > 0.187$	8	4
	40	20Cr–18Ni–6Mo	Smls. tube	SA–213	...	S31254	...	$t > 0.187$	8	4
	41	20Cr–18Ni–6Mo	Plate	SA–240	...	S31254	...	$> {}^3/_{16}$	8	4
	42	20Cr–18Ni–6Mo	Plate	SA–240	...	S31254	...	$> {}^3/_{16}$	8	4
	43	20Cr–18Ni–6Mo	Wld. tube	SA–249	...	S31254	...	$t > 0.187$	8	4
	44	20Cr–18Ni–6Mo	Wld. tube	SA–249	...	S31254	...	$t > 0.187$	8	4
	45	20Cr–18Ni–6Mo	Smls. pipe	SA–312	...	S31254	...	$t > 0.187$	8	4

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	70	30	NP	NP	1500	650	HA–1	G1, G5, G19, T6
2	70	30	NP	NP	1500	650	HA–1	G1, G19, T7
3	70	30	NP	NP	1500	NP	HA–2	G1, G5, G19, T6
4	70	30	NP	NP	1500	NP	HA–2	G1, G19, T8
5	75	35	NP	NP	1000	650	HA–2	G1, G5, G19
6	75	35	NP	NP	1000	650	HA–2	G1, G19
7	75	30	NP	NP	400	400	HA–4	G5
8	75	30	NP	NP	400	400	HA–4	...
9	75	30	NP	NP	400	400	HA–4	G5
10	75	30	NP	NP	400	400	HA–4	...
11	75	30	NP	NP	400	400	HA–4	G5, G24
12	75	30	NP	NP	400	400	HA–4	G24
13	75	30	NP	NP	400	NP	HA–4	G5
14	75	30	NP	NP	400	NP	HA–4	...
15	75	30	NP	NP	400	NP	HA–4	G5, G24
16	75	30	NP	NP	400	NP	HA–4	G24
17	75	30	NP	NP	400	400	HA–4	G5, G24
18	75	30	NP	NP	400	400	HA–4	G24
19	75	30	NP	NP	400	400	HA–4	G5
20	75	30	NP	NP	400	400	HA–4	...
21	75	30	NP	NP	400	400	HA–4	G5, W14
22	75	30	NP	NP	400	400	HA–4	G5, G24
23	75	30	NP	NP	400	400	HA–4	G24
24	75	30	NP	NP	400	400	HA–4	G5
25	75	30	NP	NP	400	400	HA–4	...
26	95	65	NP	NP	650	NP	HA–5	G19
27	95	65	NP	NP	650	NP	HA–5	G19, G24
28	100	70	NP	NP	650	NP	HA–5	G19
29	100	70	NP	NP	650	NP	HA–5	G19
30	100	70	NP	NP	650	NP	HA–5	G19, G24
31	95	65	NP	NP	650	NP	HA–5	G19
32	95	65	NP	NP	650	NP	HA–5	G19, G24
33	75	30	NP	800	NP	NP	HA–2	G5
34	80	38	NP	750	750	650	HA–2	G1, G5
35	80	38	NP	NP	750	650	HA–2	G1
36	94	44	NP	750	750	650	HA–2	G5
37	94	44	NP	NP	750	650	HA–2	...
38	94	44	NP	750	NP	NP	HA–2	G5, W12
39	95	45	NP	NP	750	NP	HA–2	G5
40	95	45	NP	NP	750	NP	HA–2	...
41	95	45	NP	750	750	650	HA–2	G5
42	95	45	NP	NP	750	650	HA–2	...
43	95	45	NP	750	750	650	HA–2	G5, G24
44	95	45	NP	NP	750	650	HA–2	G24
45	95	45	NP	750	750	NP	HA–2	G5

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	20.0	...	19.0	...	17.7	17.2	17.0	16.5	16.2	15.8	15.5	15.2	14.9	14.6
2	20.0	...	16.7	...	15.0	13.8	12.9	12.2	12.0	11.7	11.5	11.3	11.1	10.8
3	20.0	...	20.0	...	19.5	19.3	17.9	17.0	16.6	16.3	16.1	15.9	15.7	15.5
4	20.0	...	17.5	...	15.7	14.3	13.3	12.6	12.3	12.1	11.9	11.8	11.6	11.5
5	21.4	...	20.8	...	19.6	19.1	18.4	17.5	17.1	16.8	16.6	16.4	16.2	16.0
6	21.4	...	18.8	...	16.4	14.7	13.6	12.9	12.7	12.5	12.3	12.1	12.0	11.8
7	20.0	...	20.0	...	19.6	18.9	...	...	...	...	...	...	...	...
8	20.0	...	16.9	...	15.2	14.0	...	...	...	...	...	...	...	...
9	20.0	...	20.0	...	19.6	18.9	...	...	...	...	...	...	...	...
10	20.0	...	16.9	...	15.2	14.0	...	...	...	...	...	...	...	...
11	17.0	...	17.0	...	16.6	16.1	...	...	...	...	...	...	...	...
12	17.0	...	14.4	...	12.9	11.9	...	...	...	...	...	...	...	...
13	20.0	...	20.0	...	19.6	18.9	...	...	...	...	...	...	...	...
14	20.0	...	16.9	...	15.2	14.0	...	...	...	...	...	...	...	...
15	17.0	...	17.0	...	16.6	16.1	...	...	...	...	...	...	...	...
16	17.0	...	14.4	...	12.9	11.9	...	...	...	...	...	...	...	...
17	17.0	...	17.0	...	16.6	16.1	...	...	...	...	...	...	...	...
18	17.0	...	14.4	...	12.9	11.9	...	...	...	...	...	...	...	...
19	20.0	...	20.0	...	19.6	18.9	...	...	...	...	...	...	...	...
20	20.0	...	16.9	...	15.2	14.0	...	...	...	...	...	...	...	...
21	20.0	...	20.0	...	19.6	18.9	...	...	...	...	...	...	...	...
22	17.0	...	17.0	...	16.6	16.1	...	...	...	...	...	...	...	...
23	17.0	...	14.4	...	12.9	11.9	...	...	...	...	...	...	...	...
24	20.0	...	20.0	...	19.6	18.9	...	...	...	...	...	...	...	...
25	20.0	...	16.9	...	15.2	14.0	...	...	...	...	...	...	...	...
26	27.1	...	26.3	...	24.8	24.5	24.5	24.5	24.5	...	...	...	...	...
27	23.1	...	22.4	...	21.0	20.8	20.8	20.8	20.8	...	...	...	...	...
28	28.6	...	27.7	...	26.1	25.8	25.8	25.8	25.8	...	...	...	...	...
29	28.6	...	27.7	...	26.1	25.8	25.8	25.8	25.8	...	...	...	...	...
30	24.3	...	23.5	...	22.1	21.9	21.9	21.9	21.9	...	...	...	...	...
31	27.1	...	26.3	...	24.8	24.5	24.5	24.5	24.5	...	...	...	...	...
32	23.1	...	22.4	...	21.0	20.8	20.8	20.8	20.8	...	...	...	...	...
33	20.0	...	20.0	...	18.9	18.3	17.5	16.6	16.2	15.8	15.5	15.2	...	...
34	22.9	...	22.9	...	21.7	20.7	20.0	19.6	19.4	19.3	19.2	...	...	...
35	22.9	...	20.7	...	18.5	17.1	16.1	15.4	15.2	15.1	15.0	...	...	...
36	26.9	...	26.9	...	25.5	24.3	23.5	23.0	22.8	22.7	22.6	...	...	...
37	26.9	...	23.9	...	21.4	19.8	18.6	17.9	17.6	17.4	17.3	...	...	...
38	26.9	...	26.9	...	25.5	24.3	23.5	23.0	22.8	22.7	22.6	...	...	...
39	27.1	...	27.1	...	25.8	24.6	23.7	23.2	23.1	23.0	22.9	...	...	...
40	27.1	...	24.5	...	21.9	20.3	19.1	18.3	18.0	17.9	17.7	...	...	...
41	27.1	...	27.1	...	25.8	24.6	23.7	23.2	23.1	23.0	22.9	...	...	...
42	27.1	...	24.5	...	21.9	20.2	19.1	18.3	18.0	17.8	17.7	...	...	...
43	23.1	...	23.1	...	21.9	20.9	20.2	19.7	19.6	19.5	19.4	...	...	...
44	23.1	...	20.8	...	18.6	17.2	16.2	15.5	15.3	15.2	15.1	...	...	...
45	27.1	...	27.1	...	25.8	24.6	23.7	23.2	23.1	23.0	22.9	...	...	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding															
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
1	14.4	*12.2*	*9.5*	*7.5*	*6.0*	*4.8*	*3.9*	*3.3*	*2.7*	*2.3*	*2.0*	*1.7*	...	...	...	
2	10.6	10.4	*9.5*	*7.5*	*6.0*	*4.8*	*3.9*	*3.3*	*2.7*	*2.3*	*2.0*	*1.7*	...	...	...	
3	15.3	*14.9*	*11.5*	*8.9*	*6.9*	*5.4*	*4.3*	*3.4*	*2.8*	*2.3*	*1.9*	*1.6*	...	...	...	
4	11.4	11.3	11.2	*8.9*	*6.9*	*5.4*	*4.3*	*3.4*	*2.8*	*2.3*	*1.9*	*1.6*	...	...	...	
5	15.7	12.2	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	11.6	11.3	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	20Cr–18Ni–6Mo	Smls. pipe	SA–312	...	S31254	...	$t > 0.187$	8	4
2	20Cr–18Ni–6Mo	Wld. pipe	SA–312	...	S31254	...	$t > 0.187$	8	4
3	20Cr–18Ni–6Mo	Wld. pipe	SA–312	...	S31254	...	$t > 0.187$	8	4
4	20Cr–18Ni–6Mo	Wld. pipe	SA–358	...	S31254	...	$t \geq 0.187$	8	4
5	20Cr–18Ni–6Mo	Wld. pipe	SA–358	...	S31254	...	$t \geq 0.187$	8	4
6	20Cr–18Ni–6Mo	Smls. tube	SA–213	...	S31254	...	$t \leq 0.187$	8	4
7	20Cr–18Ni–6Mo	Smls. tube	SA–213	...	S31254	...	$t \leq 0.187$	8	4
8	20Cr–18Ni–6Mo	Wld. tube	SA–249	...	S31254	...	$t \leq 0.187$	8	4
9	20Cr–18Ni–6Mo	Wld. tube	SA–249	...	S31254	...	$t \leq 0.187$	8	4
10	20Cr–18Ni–6Mo	Smls. pipe	SA–312	...	S31254	...	$t \leq 0.187$	8	4
11	20Cr–18Ni–6Mo	Smls. pipe	SA–312	...	S31254	...	$t \leq 0.187$	8	4
12	20Cr–18Ni–6Mo	Wld. pipe	SA–312	...	S31254	...	$t \leq 0.187$	8	4
13	20Cr–18Ni–6Mo	Wld. pipe	SA–312	...	S31254	...	$t \leq 0.187$	8	4
14	20Cr–18Ni–6Mo	Plate	SA–240	...	S31254	...	$\leq 3/16$	8	4
15	20Cr–18Ni–6Mo	Plate	SA–240	...	S31254	...	$\leq 3/16$	8	4
16	20Cr–18Ni–6Mo	Wld. pipe	SA–358	...	S31254	...	$t < 0.187$	8	4
17	20Cr–18Ni–6Mo	Wld. pipe	SA–358	...	S31254	...	$t < 0.187$	8	4
18	21Cr–5Mn–1.5Ni–Cu–N	Plate	SA–240	...	S32101	...	$> 3/16$	10H	1
19	21Cr–5Mn–1.5Ni–Cu–N	Bar	SA–479	...	S32101	...	...	10H	1
20	21Cr–5Mn–1.5Ni–Cu–N	Smls. tube	SA–789	...	S32101	...	$> 3/16$	10H	1
21	21Cr–5Mn–1.5Ni–Cu–N	Wld. tube	SA–789	...	S32101	...	$> 3/16$	10H	1
22	21Cr–5Mn–1.5Ni–Cu–N	Smls. pipe	SA–790	...	S32101	...	$> 3/16$	10H	1
23	21Cr–5Mn–1.5Ni–Cu–N	Wld. pipe	SA–790	...	S32101	...	$> 3/16$	10H	1
24	21Cr–5Mn–1.5Ni–Cu–N	Fittings	SA–815	...	S32101	...	...	10H	1
25	21Cr–5Mn–1.5Ni–Cu–N	Sheet, strip	SA–240	...	S32101	...	$\leq 3/16$	10H	1
26	21Cr–5Mn–1.5Ni–Cu–N	Smls. tube	SA–789	...	S32101	...	$\leq 3/16$	10H	1
27	21Cr–5Mn–1.5Ni–Cu–N	Wld. tube	SA–789	...	S32101	...	$\leq 3/16$	10H	1
28	21Cr–5Mn–1.5Ni–Cu–N	Smls. pipe	SA–790	...	S32101	...	$\leq 3/16$	10H	1
29	21Cr–5Mn–1.5Ni–Cu–N	Wld. pipe	SA–790	...	S32101	...	$\leq 3/16$	10H	1
30	21Cr–6Ni–9Mn	Forgings	SA–182	FXM–11	S21904	...	...	8	3
31	21Cr–6Ni–9Mn	Smls. pipe	SA–312	TPXM–11	S21904	...	...	8	3
32	21Cr–6Ni–9Mn	Smls. pipe	SA–312	TPXM–11	S21904	...	...	8	3
33	21Cr–6Ni–9Mn	Wld. pipe	SA–312	TPXM–11	S21904	...	...	8	3
34	21Cr–6Ni–9Mn	Wld. pipe	SA–312	TPXM–11	S21904	...	...	8	3
35	21Cr–6Ni–9Mn	Plate	SA–666	XM–11	S21904	...	...	8	3
36	21Cr–6Ni–9Mn	Plate	SA–666	XM–11	S21904	...	...	8	3
37	21Cr–6Ni–9Mn	Forgings	SA–965	FXM–11	S21904	...	...	8	3
38	21Cr–6Ni–9Mn	Forgings	SA–965	FXM–11	S21904	...	...	8	3
39	21Cr–11Ni–N	Forgings	SA–182	F45	S30815	...	...	8	2
40	21Cr–11Ni–N	Forgings	SA–182	F45	S30815	...	...	8	2
41	21Cr–11Ni–N	Smls. tube	SA–213	...	S30815	...	...	8	2
42	21Cr–11Ni–N	Smls. tube	SA–213	...	S30815	...	...	8	2
43	21Cr–11Ni–N	Plate	SA–240	...	S30815	...	...	8	2
44	21Cr–11Ni–N	Plate	SA–240	...	S30815	...	...	8	2
45	21Cr–11Ni–N	Wld. tube	SA–249	...	S30815	...	...	8	2

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	95	45	NP	NP	750	NP	HA–2	...
2	95	45	NP	750	750	NP	HA–2	G5, G24
3	95	45	NP	NP	750	NP	HA–2	G24
4	95	45	NP	750	750	650	HA–2	G5, G24
5	95	45	NP	NP	750	650	HA–2	G24
6	98	45	NP	NP	750	NP	HA–2	G5
7	98	45	NP	NP	750	NP	HA–2	...
8	98	45	NP	750	750	650	HA–2	G5, G24
9	98	45	NP	NP	750	650	HA–2	G24
10	98	45	NP	750	750	NP	HA–2	G5
11	98	45	NP	NP	750	NP	HA–2	...
12	98	45	NP	750	750	NP	HA–2	G5, G24
13	98	45	NP	NP	750	NP	HA–2	G24
14	100	45	NP	750	750	650	HA–2	G5
15	100	45	NP	NP	750	650	HA–2	...
16	100	45	NP	750	750	650	HA–2	G5
17	100	45	NP	NP	750	650	HA–2	...
18	94	65	NP	NP	600	NP	HA–5	G19
19	94	65	NP	NP	600	NP	HA–5	G19
20	94	65	NP	NP	600	NP	HA–5	G19
21	94	65	NP	NP	600	NP	HA–5	G19, G24
22	94	65	NP	NP	600	NP	HA–5	G19
23	94	65	NP	NP	600	NP	HA–5	G19, G24
24	94	65	NP	NP	600	NP	HA–5	G19, W14
25	101	77	NP	NP	600	NP	HA–5	G19
26	101	77	NP	NP	600	NP	HA–5	G19
27	101	77	NP	NP	600	NP	HA–5	G19, G24
28	101	77	NP	NP	600	NP	HA–5	G19
29	101	77	NP	NP	600	NP	HA–5	G19, G24
30	90	50	NP	NP	600	600	HA–6	...
31	90	50	NP	NP	600	600	HA–6	G5
32	90	50	NP	NP	600	600	HA–6	...
33	90	50	NP	NP	600	600	HA–6	G5, G24
34	90	50	NP	NP	600	600	HA–6	G24
35	90	50	NP	NP	600	600	HA–6	G5
36	90	50	NP	NP	600	600	HA–6	...
37	90	50	NP	NP	600	600	HA–6	G5
38	90	50	NP	NP	600	600	HA–6	...
39	87	45	1650	NP	1650	650	HA–6	G5, G6, T5
40	87	45	1650	NP	1650	650	HA–6	G6, T6
41	87	45	1650	NP	1650	650	HA–6	G5, G6, T5
42	87	45	1650	NP	1650	650	HA–6	G6, T6
43	87	45	1650	NP	1650	650	HA–6	G5, G6, T5
44	87	45	1650	NP	1650	650	HA–6	G6, T6
45	87	45	1650	NP	1650	650	HA–6	G5, G6, G24, T5

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	27.1	...	24.5	...	21.9	20.3	19.1	18.3	18.0	17.9	17.7	...	...	...
2	23.1	...	23.1	...	21.9	20.9	20.2	19.7	19.6	19.5	19.4	...	...	...
3	23.1	...	20.8	...	18.6	17.2	16.2	15.5	15.3	15.2	15.1	...	...	...
4	23.1	...	23.1	...	21.9	20.9	20.2	19.7	19.6	19.5	19.4	...	...	...
5	23.1	...	20.8	...	18.6	17.2	16.2	15.5	15.3	15.2	15.1	...	...	...
6	28.0	...	28.0	...	26.6	25.4	24.5	23.9	23.8	23.7	23.6	...	...	...
7	28.0	...	24.5	...	21.9	20.3	19.1	18.3	18.0	17.9	17.7	...	...	...
8	23.8	...	23.8	...	22.6	21.6	20.8	20.4	20.2	20.1	20.1	...	...	...
9	23.8	...	20.8	...	18.6	17.2	16.2	15.5	15.3	15.2	15.1	...	...	...
10	28.0	...	28.0	...	26.6	25.4	24.5	23.9	23.8	23.7	23.6	...	...	...
11	28.0	...	24.5	...	21.9	20.3	19.1	18.3	18.0	17.9	17.7	...	...	...
12	23.8	...	23.8	...	22.6	21.6	20.8	20.4	20.2	20.1	20.1	...	...	...
13	23.8	...	20.8	...	18.6	17.2	16.2	15.5	15.3	15.2	15.1	...	...	...
14	28.6	...	28.6	...	27.2	25.9	25.0	24.4	24.3	24.1	23.9	...	...	...
15	28.6	...	24.5	...	21.9	20.2	19.1	18.3	18.0	17.8	17.7	...	...	...
16	24.3	...	24.3	...	23.1	22.0	21.3	20.8	20.6	20.5	20.3	...	...	...
17	24.3	...	20.8	...	18.7	17.2	16.2	15.5	15.2	15.2	15.1	...	...	...
18	26.9	...	26.9	...	25.6	24.7	24.7	24.7	...	...	...	...	...	...
19	26.9	...	26.9	...	25.6	24.7	24.7	24.7	...	...	...	...	...	...
20	26.9	...	26.9	...	25.6	24.7	24.7	24.7	...	...	...	...	...	...
21	22.8	...	21.1	...	19.8	19.1	19.1	19.1	...	...	...	...	...	...
22	26.9	...	26.9	...	25.6	24.7	24.7	24.7	...	...	...	...	...	...
23	22.8	...	21.1	...	19.8	19.1	19.1	19.1	...	...	...	...	...	...
24	26.9	...	26.9	...	25.6	24.7	24.7	24.7	...	...	...	...	...	...
25	28.9	...	28.9	...	27.5	26.5	26.5	26.5	...	...	...	...	...	...
26	28.9	...	28.9	...	27.5	26.5	26.5	26.5	...	...	...	...	...	...
27	24.5	...	24.5	...	23.4	22.6	22.6	22.6	...	...	...	...	...	...
28	28.9	...	28.9	...	27.5	26.5	26.5	26.5	...	...	...	...	...	...
29	24.5	...	24.5	...	23.4	22.6	22.6	22.6	...	...	...	...	...	...
30	25.7	...	25.7	...	22.0	19.6	18.1	17.1	...	...	...	...	...	...
31	25.7	...	25.7	...	24.0	22.8	22.0	21.5	...	...	...	...	...	...
32	25.7	...	25.7	...	22.0	19.6	18.1	17.1	...	...	...	...	...	...
33	21.9	...	21.9	...	20.4	19.4	18.7	18.3	...	...	...	...	...	...
34	21.9	...	21.9	...	18.7	16.6	15.3	14.6	...	...	...	...	...	...
35	25.7	...	25.7	...	24.0	22.8	22.0	21.5	...	...	...	...	...	...
36	25.7	...	25.7	...	22.0	19.6	18.1	17.1	...	...	...	...	...	...
37	25.7	...	25.7	...	24.0	22.8	22.0	21.5	...	...	...	...	...	...
38	25.7	...	25.7	...	22.0	19.6	18.1	17.1	...	...	...	...	...	...
39	24.9	...	24.7	...	23.3	22.4	21.8	21.4	21.2	21.0	20.8	20.6	20.3	20.0
40	24.9	...	24.7	...	22.0	19.9	18.5	17.7	17.4	17.2	17.0	16.8	16.6	16.4
41	24.9	...	24.7	...	23.3	22.4	21.8	21.4	21.2	21.0	20.8	20.6	20.3	20.0
42	24.9	...	24.7	...	22.0	19.9	18.5	17.7	17.4	17.2	17.0	16.8	16.6	16.4
43	24.9	...	24.7	...	23.3	22.4	21.8	21.4	21.2	21.0	20.8	20.6	20.3	20.0
44	24.9	...	24.7	...	22.0	19.9	18.5	17.7	17.4	17.2	17.0	16.8	16.6	16.4
45	21.1	...	21.0	...	19.8	19.1	18.5	18.2	18.0	17.8	17.7	17.5	17.3	17.0

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding														
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
39	*19.1*	*14.9*	*11.6*	*9.0*	*6.9*	*5.2*	*4.0*	*3.1*	*2.4*	*1.9*	*1.6*	*1.3*	*1.0*	*0.86*	*0.71*
40	16.2	*14.9*	*11.6*	*9.0*	*6.9*	*5.2*	*4.0*	*3.1*	*2.4*	*1.9*	*1.6*	*1.3*	*1.0*	*0.86*	*0.71*
41	*19.1*	*14.9*	*11.6*	*9.0*	*6.9*	*5.2*	*4.0*	*3.1*	*2.4*	*1.9*	*1.6*	*1.3*	*1.0*	*0.86*	*0.71*
42	16.2	*14.9*	*11.6*	*9.0*	*6.9*	*5.2*	*4.0*	*3.1*	*2.4*	*1.9*	*1.6*	*1.3*	*1.0*	*0.86*	*0.71*
43	*19.1*	*14.9*	*11.6*	*9.0*	*6.9*	*5.2*	*4.0*	*3.1*	*2.4*	*1.9*	*1.6*	*1.3*	*1.0*	*0.86*	*0.71*
44	16.2	*14.9*	*11.6*	*9.0*	*6.9*	*5.2*	*4.0*	*3.1*	*2.4*	*1.9*	*1.6*	*1.3*	*1.0*	*0.86*	*0.71*
45	*16.3*	*12.7*	*9.9*	*7.7*	*5.9*	*4.4*	*3.4*	*2.6*	*2.0*	*1.6*	*1.4*	*1.1*	*0.85*	*0.73*	*0.60*

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	21Cr–11Ni–N	Wld. tube	SA–249	...	S30815	...	...	8	2
2	21Cr–11Ni–N	Smls. pipe	SA–312	...	S30815	...	...	8	2
3	21Cr–11Ni–N	Smls. pipe	SA–312	...	S30815	...	...	8	2
4	21Cr–11Ni–N	Wld. pipe	SA–312	...	S30815	...	...	8	2
5	21Cr–11Ni–N	Wld. pipe	SA–312	...	S30815	...	...	8	2
6	21Cr–11Ni–N	Bar	SA–479	...	S30815	...	...	8	2
7	21Cr–11Ni–N	Bar	SA–479	...	S30815	...	...	8	2
8	22Cr–2Ni–Mo–N	Forgings	SA–182	F66	S32202	...	...	10H	1
9	22Cr–2Ni–Mo–N	Plate	SA–240	...	S32202	...	...	10H	1
10	22Cr–2Ni–Mo–N	Bar	SA–479	...	S32202	...	...	10H	1
11	22Cr–2Ni–Mo–N	Smls. tube	SA–789	...	S32202	...	...	10H	1
12	22Cr–2Ni–Mo–N	Wld. tube	SA–789	...	S32202	...	...	10H	1
13	22Cr–2Ni–Mo–N	Smls. pipe	SA–790	...	S32202	...	...	10H	1
14	22Cr–2Ni–Mo–N	Wld. pipe	SA–790	...	S32202	...	...	10H	1
15	22Cr–2Ni–Mo–N	Smls. fittings	SA–815	...	S32202	...	...	10H	1
16	22Cr–2Ni–Mo–N	Wld. fittings	SA–815	...	S32202	...	...	10H	1
17	22Cr–5Ni–3Mo–N	Castings	SA–995	4A	J92205	...	...	10H	1
18	22Cr–5Ni–3Mo–N	Forgings	SA–182	F51	S31803	...	...	10H	1
19	22Cr–5Ni–3Mo–N	Plate	SA–240	...	S31803	...	...	10H	1
20	22Cr–5Ni–3Mo–N	Bar	SA–479	...	S31803	...	...	10H	1
21	22Cr–5Ni–3Mo–N	Smls. tube	SA–789	...	S31803	...	...	10H	1
22	22Cr–5Ni–3Mo–N	Wld. tube	SA–789	...	S31803	...	...	10H	1
23	22Cr–5Ni–3Mo–N	Smls. pipe	SA–790	...	S31803	...	...	10H	1
24	22Cr–5Ni–3Mo–N	Wld. pipe	SA–790	...	S31803	...	...	10H	1
25	22Cr–5Ni–3Mo–N	Smls. fittings	SA–815	...	S31803	...	...	10H	1
26	22Cr–5Ni–3Mo–N	Wld. fittings	SA–815	...	S31803	...	...	10H	1
27	22Cr–5Ni–3Mo–N	Smls. & wld. fittings	SA–815	...	S31803	...	...	10H	1
28	22Cr–5Ni–3Mo–N	Plate	SA–240	...	S32205	...	...	10H	1
29	22Cr–5Ni–3Mo–N	Bar	SA–479	...	S32205	...	...	10H	1
30	22Cr–5Ni–3Mo–N	Smls. & wld. pipe	SA–790	...	S32205	...	...	10H	1
31	22Cr–5Ni–3Mo–N	Smls. pipe	SA–790	...	S32205	...	...	10H	1
32	22Cr–5Ni–3Mo–N	Wld. pipe	SA–790	...	S32205	...	...	10H	1
33	22Cr–5Ni–3Mo–N	Smls. & wld. fittings	SA–815	...	S32205	...	...	10H	1
34	22Cr–5Ni–3Mo–N	Smls. fittings	SA–815	...	S32205	...	...	10H	1
35	22Cr–5Ni–3Mo–N	Wld. fittings	SA–815	...	S32205	...	...	10H	1
36	22Cr–5Ni–3Mo–N	Forgings	SA–182	F60	S32205	...	...	10H	1
37	22Cr–5Ni–3Mo–N	Smls. & wld. tube	SA–789	...	S32205	...	...	10H	1
38	22Cr–5Ni–3Mo–N	Smls. tube	SA–789	...	S32205	...	...	10H	1
39	22Cr–5Ni–3Mo–N	Wld. tube	SA–789	...	S32205	...	...	10H	1
40	22Cr–13Ni–5Mn	Castings	SA–351	CG6MMN	J93790	...	...	8	3
41	22Cr–13Ni–5Mn	Forgings	SA–182	FXM–19	S20910	...	...	8	3
42	22Cr–13Ni–5Mn	Smls. tube	SA–213	XM–19	S20910	...	...	8	3
43	22Cr–13Ni–5Mn	Plate	SA–240	XM–19	S20910	...	...	8	3
44	22Cr–13Ni–5Mn	Wld. tube	SA–249	TPXM–19	S20910	...	...	8	3
45	22Cr–13Ni–5Mn	Wld. tube	SA–249	TPXM–19	S20910	...	...	8	3

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	87	45	1650	NP	1650	650	HA–6	G6, G24, T6
2	87	45	1650	NP	1650	650	HA–6	G5, G6, T5
3	87	45	1650	NP	1650	650	HA–6	G6, T6
4	87	45	1650	NP	1650	650	HA–6	G5, G6, G24, T5
5	87	45	1650	NP	1650	650	HA–6	G6, G24, T6
6	87	45	1650	NP	1650	650	HA–6	G5, G6, T5
7	87	45	1650	NP	1650	650	HA–6	G6, T6
8	94	65	NP	NP	600	NP	HA–5	G19
9	94	65	NP	NP	600	NP	HA–5	G19
10	94	65	NP	NP	600	NP	HA–5	G19
11	94	65	NP	NP	600	NP	HA–5	G19
12	94	65	NP	NP	600	NP	HA–5	G19, G24
13	94	65	NP	NP	600	NP	HA–5	G19
14	94	65	NP	NP	600	NP	HA–5	G19, G24
15	94	65	NP	NP	600	NP	HA–5	G19
16	94	65	NP	NP	600	NP	HA–5	G3, G19
17	90	60	NP	NP	500	NP	HA–5	G1, G19
18	90	65	600	NP	600	600	HA–5	G19
19	90	65	600	NP	600	600	HA–5	G19
20	90	65	600	NP	600	NP	HA–5	G19
21	90	65	600	NP	600	600	HA–5	G19
22	90	65	600	NP	600	600	HA–5	G19, G24
23	90	65	600	NP	600	600	HA–5	G19
24	90	65	600	NP	600	600	HA–5	G19, G24
25	90	65	600	NP	NP	NP	HA–5	G19
26	90	65	600	NP	NP	NP	HA–5	G19, G24
27	90	65	NP	NP	600	600	HA–5	G19, W14
28	95	65	NP	600	600	600	HA–5	G19
29	95	65	NP	600	600	NP	HA–5	G19
30	95	65	NP	600	NP	NP	HA–5	G19, W12
31	95	65	NP	NP	600	600	HA–5	G19
32	95	65	NP	NP	600	600	HA–5	G19, G24
33	95	65	NP	600	NP	NP	HA–5	G19, W12
34	95	65	NP	NP	600	600	HA–5	G19
35	95	65	NP	NP	600	600	HA–5	G19, G24
36	95	70	NP	600	600	600	HA–5	G19
37	95	70	NP	600	NP	NP	HA–5	G19, W12
38	95	70	NP	NP	600	600	HA–5	G19
39	95	70	NP	NP	600	600	HA–5	G19, G24
40	85	42.5	NP	NP	1050	650	HA–2	G1
41	100	55	NP	800	1200	650	HA–6	G5, T8
42	100	55	NP	NP	1200	NP	HA–6	T8
43	100	55	NP	800	1200	650	HA–6	G5, T8
44	100	55	NP	800	NP	NP	HA–6	G5, W12
45	100	55	NP	NP	1200	650	HA–6	G24, T8

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	21.1	...	21.0	...	18.7	16.9	15.8	15.0	14.8	14.6	14.5	14.3	14.2	14.0
2	24.9	...	24.7	...	23.3	22.4	21.8	21.4	21.2	21.0	20.8	20.6	20.3	20.0
3	24.9	...	24.7	...	22.0	19.9	18.5	17.7	17.4	17.2	17.0	16.8	16.6	16.4
4	21.1	...	21.0	...	19.8	19.1	18.5	18.2	18.0	17.8	17.7	17.5	17.3	17.0
5	21.1	...	21.0	...	18.7	16.9	15.8	15.0	14.8	14.6	14.5	14.3	14.2	14.0
6	24.9	...	24.7	...	23.3	22.4	21.8	21.4	21.2	21.0	20.8	20.6	20.3	20.0
7	24.9	...	24.7	...	22.0	19.9	18.5	17.7	17.4	17.2	17.0	16.8	16.6	16.4
8	26.9	26.9	26.6	25.5	24.9	24.7	24.7	24.7	...	...	...	...	...	...
9	26.9	26.9	26.6	25.5	24.9	24.7	24.7	24.7	...	...	...	...	...	...
10	26.9	26.9	26.6	25.5	24.9	24.7	24.7	24.7	...	...	...	...	...	...
11	26.9	26.9	26.6	25.5	24.9	24.7	24.7	24.7	...	...	...	...	...	...
12	22.8	22.8	22.6	21.7	21.1	21.0	21.0	21.0	...	...	...	...	...	...
13	26.9	26.9	26.6	25.5	24.9	24.7	24.7	24.7	...	...	...	...	...	...
14	22.8	22.8	22.6	21.7	21.1	21.0	21.0	21.0	...	...	...	...	...	...
15	26.9	26.9	26.6	25.5	24.9	24.7	24.7	24.7	...	...	...	...	...	...
16	22.8	22.8	22.6	21.7	21.1	21.0	21.0	21.0	...	...	...	...	...	...
17	25.7	25.7	25.7	25.2	24.6	24.3	24.3	...	...	...	...	...	...	...
18	25.7	...	25.7	...	24.8	23.9	23.3	23.1	...	...	...	...	...	...
19	25.7	...	25.7	...	24.8	23.9	23.3	23.1	...	...	...	...	...	...
20	25.7	...	25.7	...	24.8	23.9	23.3	23.1	...	...	...	...	...	...
21	25.7	...	25.7	...	24.8	23.9	23.3	23.1	...	...	...	...	...	...
22	21.9	...	21.9	...	21.1	20.3	19.8	19.6	...	...	...	...	...	...
23	25.7	...	25.7	...	24.8	23.9	23.3	23.1	...	...	...	...	...	...
24	21.9	...	21.9	...	21.1	20.3	19.8	19.6	...	...	...	...	...	...
25	25.7	...	25.7	...	24.8	23.9	23.3	23.1	...	...	...	...	...	...
26	21.9	...	21.9	...	21.1	20.3	19.8	19.6	...	...	...	...	...	...
27	25.7	...	25.7	...	24.8	23.9	23.3	23.1	...	...	...	...	...	...
28	27.1	...	27.1	...	26.2	25.2	24.6	24.3	...	...	...	...	...	...
29	27.1	...	27.1	...	26.2	25.2	24.6	24.3	...	...	...	...	...	...
30	27.1	...	27.1	...	26.2	25.2	24.6	24.3	...	...	...	...	...	...
31	27.1	...	27.1	...	26.2	25.2	24.6	24.3	...	...	...	...	...	...
32	23.1	...	23.0	...	22.3	21.4	20.9	20.7	...	...	...	...	...	...
33	27.1	...	27.1	...	26.2	25.2	24.6	24.3	...	...	...	...	...	...
34	27.1	...	27.1	...	26.2	25.2	24.6	24.3	...	...	...	...	...	...
35	23.1	...	23.0	...	22.3	21.4	20.9	20.7	...	...	...	...	...	...
36	27.1	...	27.1	...	26.2	25.2	24.6	24.3	...	...	...	...	...	...
37	27.1	...	27.1	...	26.2	25.2	24.6	24.3	...	...	...	...	...	...
38	27.1	...	27.1	...	26.2	25.2	24.6	24.3	...	...	...	...	...	...
39	23.1	...	23.0	...	22.3	21.4	20.9	20.7	...	...	...	...	...	...
40	19.4	...	19.3	...	17.8	16.8	16.0	15.4	15.2	14.9	14.7	14.6	14.4	14.2
41	28.6	...	28.4	...	26.9	26.0	25.5	25.1	24.9	24.7	24.5	24.2	23.9	23.6
42	28.6	...	28.4	...	26.9	26.0	25.5	25.0	24.6	24.2	23.9	23.5	23.3	23.0
43	28.6	...	28.4	...	26.9	26.0	25.5	25.1	24.9	24.7	24.5	24.2	23.9	23.6
44	28.6	...	28.4	...	26.9	26.0	25.5	25.1	24.9	24.7	24.5	24.2	...	...
45	24.3	...	24.1	...	22.9	22.1	21.6	21.2	20.9	20.6	20.3	20.0	19.8	19.5

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding														
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
1	13.8	*12.7*	*9.9*	*7.7*	*5.9*	*4.4*	*3.4*	*2.6*	*2.0*	*1.6*	*1.4*	*1.1*	*0.85*	*0.73*	*0.60*
2	*19.1*	*14.9*	*11.6*	*9.0*	*6.9*	*5.2*	*4.0*	*3.1*	*2.4*	*1.9*	*1.6*	*1.3*	*1.0*	*0.86*	*0.71*
3	16.2	*14.9*	*11.6*	*9.0*	*6.9*	*5.2*	*4.0*	*3.1*	*2.4*	*1.9*	*1.6*	*1.3*	*1.0*	*0.86*	*0.71*
4	*16.3*	*12.7*	*9.9*	*7.7*	*5.9*	*4.4*	*3.4*	*2.6*	*2.0*	*1.6*	*1.4*	*1.1*	*0.85*	*0.73*	*0.60*
5	13.8	*12.7*	*9.9*	*7.7*	*5.9*	*4.4*	*3.4*	*2.6*	*2.0*	*1.6*	*1.4*	*1.1*	*0.85*	*0.73*	*0.60*
6	*19.1*	*14.9*	*11.6*	*9.0*	*6.9*	*5.2*	*4.0*	*3.1*	*2.4*	*1.9*	*1.6*	*1.3*	*1.0*	*0.86*	*0.71*
7	16.2	*14.9*	*11.6*	*9.0*	*6.9*	*5.2*	*4.0*	*3.1*	*2.4*	*1.9*	*1.6*	*1.3*	*1.0*	*0.86*	*0.71*
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
40	14.1	13.9	13.6	...	...	...	...	...	...	...	...	...	...	...	...
41	23.2	22.8	22.3	*20.4*	*13.0*	*8.3*	...	...	...	...	...	...	...	...	...
42	22.7	22.5	22.2	*20.4*	*13.0*	*8.3*	...	...	...	...	...	...	...	...	...
43	23.2	22.8	22.3	*20.4*	*13.0*	*8.3*	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
45	19.3	19.1	18.9	*17.3*	*11.1*	*7.1*	...	...	...	...	...	...	...	...	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	22Cr–13Ni–5Mn	Smls. & wld. pipe	SA–312	TPXM–19	S20910	...	...	8	3
2	22Cr–13Ni–5Mn	Smls. pipe	SA–312	TPXM–19	S20910	...	...	8	3
3	22Cr–13Ni–5Mn	Wld. pipe	SA–312	TPXM–19	S20910	...	...	8	3
4	22Cr–13Ni–5Mn	Wld. pipe	SA–358	XM–19	S20910	1	...	8	3
5	22Cr–13Ni–5Mn	Smls. & wld. fittings	SA–403	XM–19	S20910	...	...	8	3
6	22Cr–13Ni–5Mn	Bar	SA–479	XM–19	S20910	...	...	8	3
7	22Cr–13Ni–5Mn	Wld. pipe	SA–813	TPXM–19	S20910	...	...	8	3
8	22Cr–13Ni–5Mn	Wld. pipe	SA–814	TPXM–19	S20910	...	...	8	3
9	23Cr–4Ni–Mo–Cu–N	Plate	SA–240	...	S32304	...	...	10H	1
10	23Cr–4Ni–Mo–Cu–N	Smls. tube	SA–789	...	S32304	...	>1	10H	1
11	23Cr–4Ni–Mo–Cu–N	Wld. tube	SA–789	...	S32304	...	>1	10H	1
12	23Cr–4Ni–Mo–Cu–N	Smls. pipe	SA–790	...	S32304	...	...	10H	1
13	23Cr–4Ni–Mo–Cu–N	Wld. pipe	SA–790	...	S32304	...	...	10H	1
14	23Cr–4Ni–Mo–Cu–N	Smls. tube	SA–789	...	S32304	...	≤1	10H	1
15	23Cr–4Ni–Mo–Cu–N	Wld. tube	SA–789	...	S32304	...	≤1	10H	1
16	23Cr–12Ni	Smls. & wld. fittings	SA–403	309	S30900	...	...	8	2
17	23Cr–12Ni	Smls. tube	SA–213	TP309S	S30908	...	...	8	2
18	23Cr–12Ni	Smls. tube	SA–213	TP309S	S30908	...	...	8	2
19	23Cr–12Ni	Plate	SA–240	309S	S30908	...	...	8	2
20	23Cr–12Ni	Plate	SA–240	309S	S30908	...	...	8	2
21	23Cr–12Ni	Wld. tube	SA–249	TP309S	S30908	...	...	8	2
22	23Cr–12Ni	Wld. tube	SA–249	TP309S	S30908	...	...	8	2
23	23Cr–12Ni	Smls. & wld. pipe	SA–312	TP309S	S30908	...	...	8	2
24	23Cr–12Ni	Smls. pipe	SA–312	TP309S	S30908	...	...	8	2
25	23Cr–12Ni	Wld. pipe	SA–312	TP309S	S30908	...	...	8	2
26	23Cr–12Ni	Wld. pipe	SA–312	TP309S	S30908	...	...	8	2
27	23Cr–12Ni	Wld. pipe	SA–312	TP309S	S30908	...	...	8	2
28	23Cr–12Ni	Wld. pipe	SA–312	TP309S	S30908	...	...	8	2
29	23Cr–12Ni	Wld. pipe	SA–358	309S	S30908	1	...	8	2
30	23Cr–12Ni	Bar	SA–479	309S	S30908	...	...	8	2
31	23Cr–12Ni	Bar	SA–479	309S	S30908	...	...	8	2
32	23Cr–12Ni	Wld. pipe	SA–813	TP309S	S30908	...	...	8	2
33	23Cr–12Ni	Wld. pipe	SA–813	TP309S	S30908	...	...	8	2
34	23Cr–12Ni	Wld. pipe	SA–814	TP309S	S30908	...	...	8	2
35	23Cr–12Ni	Wld. pipe	SA–814	TP309S	S30908	...	...	8	2
36	23Cr–12Ni	Smls. tube	SA–213	TP309H	S30909	...	...	8	2
37	23Cr–12Ni	Smls. tube	SA–213	TP309H	S30909	...	...	8	2
38	23Cr–12Ni	Plate	SA–240	309H	S30909	...	...	8	2
39	23Cr–12Ni	Plate	SA–240	309H	S30909	...	...	8	2
40	23Cr–12Ni	Wld. tube	SA–249	TP309H	S30909	...	...	8	2
41	23Cr–12Ni	Wld. tube	SA–249	TP309H	S30909	...	...	8	2
42	23Cr–12Ni	Wld. tube	SA–249	TP309H	S30909	...	...	8	2
43	23Cr–12Ni	Smls. pipe	SA–312	TP309H	S30909	...	...	8	2
44	23Cr–12Ni	Smls. pipe	SA–312	TP309H	S30909	...	...	8	2
45	23Cr–12Ni	Wld. pipe	SA–312	TP309H	S30909	...	...	8	2

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	100	55	NP	800	NP	NP	HA–6	G5, W12
2	100	55	NP	NP	1200	650	HA–6	T8
3	100	55	NP	NP	1200	650	HA–6	G24, T8
4	100	55	NP	800	NP	NP	HA–6	G5, W12
5	100	55	NP	800	1200	650	HA–6	G5, T8, W12, W14
6	100	55	NP	800	1200	650	HA–6	G5, G22, T8
7	100	55	NP	800	NP	NP	HA–6	G5, W12
8	100	55	NP	800	NP	NP	HA–6	G5, W12
9	87	58	NP	NP	600	600	HA–6	G19
10	87	58	NP	NP	600	600	HA–6	G19
11	87	58	NP	NP	600	600	HA–6	G19, G24
12	87	58	NP	NP	600	600	HA–6	G19
13	87	58	NP	NP	600	600	HA–6	G19, G24
14	100	65	NP	NP	600	600	HA–5	G19
15	100	65	NP	NP	600	600	HA–5	G19, G24
16	75	30	NP	800	1500	650	HA–2	G5, G12, T5, W12, W14
17	75	30	1500	NP	1500	650	HA–2	G5, G12, T5
18	75	30	1500	NP	1500	650	HA–2	G12, T6
19	75	30	1500	800	1500	650	HA–2	G5, G12, T5
20	75	30	1500	NP	1500	650	HA–2	G12, T6
21	75	30	NP	NP	1500	650	HA–2	G5, G12, G24, T5
22	75	30	NP	NP	1500	650	HA–2	G12, G24, T6
23	75	30	1500	800	1500	650	HA–2	G5, G12, T5, W12, W14
24	75	30	1500	NP	1500	650	HA–2	G12, T6
25	75	30	1500	NP	NP	NP	HA–2	G5, G12, T5, W13
26	75	30	1500	NP	NP	NP	HA–2	G12, T6, W13
27	75	30	1500	NP	1500	650	HA–2	G3, G5, G12, G24, T5
28	75	30	1500	NP	1500	650	HA–2	G3, G12, G24, T6
29	75	30	NP	800	NP	NP	HA–2	G5, W12
30	75	30	1000	NP	1000	650	HA–2	G5, G12, G22, T5
31	75	30	1000	NP	1000	650	HA–2	G12, G22, T6
32	75	30	NP	NP	1500	650	HA–2	G5, G12, G24, T5
33	75	30	NP	NP	1500	650	HA–2	G12, G24, T6
34	75	30	NP	NP	1500	650	HA–2	G5, G12, G24, T5
35	75	30	NP	NP	1500	650	HA–2	G12, G24, T6
36	75	30	1500	NP	1500	NP	HA–2	G5, T6
37	75	30	1500	NP	1500	NP	HA–2	T7
38	75	30	1500	NP	1500	NP	HA–2	G5, H1, T6
39	75	30	1500	NP	1500	NP	HA–2	H1, T7
40	75	30	NP	800	NP	NP	HA–2	G5, W12
41	75	30	NP	NP	1500	NP	HA–2	G5, G24, T6
42	75	30	NP	NP	1500	NP	HA–2	G24, T7
43	75	30	1500	NP	1500	NP	HA–2	G5, T6
44	75	30	1500	NP	1500	NP	HA–2	T7
45	75	30	1500	NP	1500	NP	HA–2	G3, G5, G24, T6

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	28.6	...	28.4	...	26.9	26.0	25.5	25.1	24.9	24.7	24.5	24.2	...	...
2	28.6	...	28.4	...	26.9	26.0	25.5	25.0	24.6	24.2	23.9	23.5	23.3	23.0
3	24.3	...	24.1	...	22.9	22.1	21.6	21.2	20.9	20.6	20.3	20.0	19.8	19.5
4	28.6	...	28.4	...	26.9	26.0	25.5	25.1	24.9	24.7	24.5	24.2	...	...
5	28.6	...	28.4	...	26.9	26.0	25.5	25.1	24.9	24.7	24.5	24.2	23.9	23.6
6	28.6	...	28.4	...	26.9	26.0	25.5	25.1	24.9	24.7	24.5	24.2	23.9	23.6
7	28.6	...	28.4	...	26.9	26.0	25.5	25.1	24.9	24.7	24.5	24.2	...	...
8	28.6	...	28.4	...	26.9	26.0	25.5	25.1	24.9	24.7	24.5	24.2	...	...
9	24.9	...	24.0	...	22.5	21.7	21.3	21.0	...	...	...	...	...	...
10	24.9	...	24.0	...	22.5	21.7	21.3	21.0	...	...	...	...	...	...
11	21.1	...	20.4	...	19.1	18.5	18.1	17.9	...	...	...	...	...	...
12	24.9	...	24.0	...	22.5	21.7	21.3	21.0	...	...	...	...	...	...
13	21.1	...	20.4	...	19.1	18.5	18.1	17.9	...	...	...	...	...	...
14	28.6	...	27.6	...	25.9	25.0	24.6	24.3	...	...	...	...	...	...
15	24.3	...	23.4	...	22.0	21.3	20.9	20.6	...	...	...	...	...	...
16	20.0	...	20.0	...	20.0	20.0	19.4	18.8	18.5	18.2	18.0	17.7	17.5	17.2
17	20.0	...	20.0	...	20.0	20.0	19.4	18.8	18.5	18.2	18.0	17.7	17.5	17.2
18	20.0	...	17.5	...	16.1	15.1	14.4	13.9	13.7	13.5	13.3	13.1	12.9	12.7
19	20.0	...	20.0	...	20.0	20.0	19.4	18.8	18.5	18.2	18.0	17.7	17.5	17.2
20	20.0	...	17.5	...	16.1	15.1	14.4	13.9	13.7	13.5	13.3	13.1	12.9	12.7
21	17.0	...	17.0	...	17.0	17.0	16.5	15.9	15.7	15.5	15.3	15.1	14.8	14.6
22	17.0	...	14.9	...	13.7	12.8	12.2	11.8	11.6	11.5	11.3	11.2	11.0	10.8
23	20.0	...	20.0	...	20.0	20.0	19.4	18.8	18.5	18.2	18.0	17.7	17.5	17.2
24	20.0	...	17.5	...	16.1	15.1	14.4	13.9	13.7	13.5	13.3	13.1	12.9	12.7
25	20.0	...	20.0	...	20.0	20.0	19.4	18.8	18.5	18.2	18.0	17.7	17.5	17.2
26	20.0	...	17.5	...	16.1	15.1	14.4	13.9	13.7	13.5	13.3	13.1	12.9	12.7
27	17.0	...	17.0	...	17.0	17.0	16.5	15.9	15.7	15.5	15.3	15.1	14.8	14.6
28	17.0	...	14.9	...	13.7	12.8	12.2	11.8	11.6	11.5	11.3	11.2	11.0	10.8
29	20.0	...	20.0	...	20.0	20.0	19.4	18.8	18.5	18.2	18.0	17.7	...	...
30	20.0	...	20.0	...	20.0	20.0	19.4	18.8	18.5	18.2	18.0	17.7	17.5	17.2
31	20.0	...	17.5	...	16.1	15.1	14.4	13.9	13.7	13.5	13.3	13.1	12.9	12.7
32	17.0	...	17.0	...	17.0	17.0	16.5	15.9	15.7	15.5	15.3	15.1	14.8	14.6
33	17.0	...	14.9	...	13.7	12.8	12.2	11.8	11.6	11.5	11.3	11.2	11.0	10.8
34	17.0	...	17.0	...	17.0	17.0	16.5	15.9	15.7	15.5	15.3	15.1	14.8	14.6
35	17.0	...	14.9	...	13.7	12.8	12.2	11.8	11.6	11.5	11.3	11.2	11.0	10.8
36	20.0	...	20.0	...	20.0	20.0	19.4	18.8	18.5	18.2	18.0	17.7	17.5	17.2
37	20.0	...	17.5	...	16.1	15.1	14.4	13.9	13.7	13.5	13.3	13.1	12.9	12.7
38	20.0	...	20.0	...	20.0	20.0	19.4	18.8	18.5	18.2	18.0	17.7	17.5	17.2
39	20.0	...	17.5	...	16.1	15.1	14.4	13.9	13.7	13.5	13.3	13.1	12.9	12.7
40	20.0	...	20.0	...	20.0	20.0	19.4	18.8	18.5	18.2	18.0	17.7	...	...
41	17.0	...	17.0	...	17.0	17.0	16.5	15.9	15.7	15.5	15.3	15.1	14.8	14.6
42	17.0	...	14.9	...	13.7	12.8	12.2	11.8	11.6	11.5	11.3	11.2	11.0	10.8
43	20.0	...	20.0	...	20.0	20.0	19.4	18.8	18.5	18.2	18.0	17.7	17.5	17.2
44	20.0	...	17.5	...	16.1	15.1	14.4	13.9	13.7	13.5	13.3	13.1	12.9	12.7
45	17.0	...	17.0	...	17.0	17.0	16.5	15.9	15.7	15.5	15.3	15.1	14.8	14.6

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding														
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
2	22.7	22.5	22.2	*20.4*	*13.0*	*8.3*	...	...	...	...	...	...	...	...	...
3	19.3	19.1	18.9	*17.3*	*11.1*	*7.1*	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
5	23.2	22.8	22.3	*20.4*	*13.0*	*8.3*	...	...	...	...	...	...	...	...	...
6	23.2	22.8	22.3	*20.4*	*13.0*	*8.3*	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
16	*15.9*	*9.9*	*7.1*	*5.0*	*3.6*	*2.5*	*1.5*	*0.80*	*0.50*	*0.40*	*0.30*	*0.20*	...	...	...
17	*15.9*	*9.9*	*7.1*	*5.0*	*3.6*	*2.5*	*1.5*	*0.80*	*0.50*	*0.40*	*0.30*	*0.20*	...	...	...
18	12.5	*9.9*	*7.1*	*5.0*	*3.6*	*2.5*	*1.5*	*0.80*	*0.50*	*0.40*	*0.30*	*0.20*	...	...	...
19	*15.9*	*9.9*	*7.1*	*5.0*	*3.6*	*2.5*	*1.5*	*0.80*	*0.50*	*0.40*	*0.30*	*0.20*	...	...	...
20	12.5	*9.9*	*7.1*	*5.0*	*3.6*	*2.5*	*1.5*	*0.80*	*0.50*	*0.40*	*0.30*	*0.20*	...	...	...
21	*13.5*	*8.4*	*6.0*	*4.3*	*3.1*	*2.1*	*1.3*	*0.68*	*0.43*	*0.34*	*0.26*	*0.17*	...	...	...
22	10.6	*8.4*	*6.0*	*4.3*	*3.1*	*2.1*	*1.3*	*0.68*	*0.43*	*0.34*	*0.26*	*0.17*	...	...	...
23	*15.9*	*9.9*	*7.1*	*5.0*	*3.6*	*2.5*	*1.5*	*0.80*	*0.50*	*0.40*	*0.30*	*0.20*	...	...	...
24	12.5	*9.9*	*7.1*	*5.0*	*3.6*	*2.5*	*1.5*	*0.80*	*0.50*	*0.40*	*0.30*	*0.20*	...	...	...
25	*15.9*	*9.9*	*7.1*	*5.0*	*3.6*	*2.5*	*1.5*	*0.80*	*0.50*	*0.40*	*0.30*	*0.20*	...	...	...
26	12.5	*9.9*	*7.1*	*5.0*	*3.6*	*2.5*	*1.5*	*0.80*	*0.50*	*0.40*	*0.30*	*0.20*	...	...	...
27	*13.5*	*8.4*	*6.0*	*4.3*	*3.1*	*2.1*	*1.3*	*0.68*	*0.43*	*0.34*	*0.26*	*0.17*	...	...	...
28	10.6	*8.4*	*6.0*	*4.3*	*3.1*	*2.1*	*1.3*	*0.68*	*0.43*	*0.34*	*0.26*	*0.17*	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
30	*15.9*	*9.9*	...	...	...	...	...	...	...	...	...	...	...	...	...
31	12.5	*9.9*	...	...	...	...	...	...	...	...	...	...	...	...	...
32	*13.5*	*8.4*	*6.0*	*4.3*	*3.1*	*2.1*	*1.3*	*0.68*	*0.43*	*0.34*	*0.26*	*0.17*	...	...	...
33	10.6	*8.4*	*6.0*	*4.3*	*3.1*	*2.1*	*1.3*	*0.68*	*0.43*	*0.34*	*0.26*	*0.17*	...	...	...
34	*13.5*	*8.4*	*6.0*	*4.3*	*3.1*	*2.1*	*1.3*	*0.68*	*0.43*	*0.34*	*0.26*	*0.17*	...	...	...
35	10.6	*8.4*	*6.0*	*4.3*	*3.1*	*2.1*	*1.3*	*0.68*	*0.43*	*0.34*	*0.26*	*0.17*	...	...	...
36	16.9	*13.8*	*10.3*	*7.6*	*5.5*	*4.0*	*3.0*	*2.2*	*1.7*	*1.3*	*1.0*	*0.75*	...	...	...
37	12.5	12.3	*10.3*	*7.6*	*5.5*	*4.0*	*3.0*	*2.2*	*1.7*	*1.3*	*1.0*	*0.75*	...	...	...
38	16.9	*13.8*	*10.3*	*7.6*	*5.5*	*4.0*	*3.0*	*2.2*	*1.7*	*1.3*	*1.0*	*0.75*	...	...	...
39	12.5	12.3	*10.3*	*7.6*	*5.5*	*4.0*	*3.0*	*2.2*	*1.7*	*1.3*	*1.0*	*0.75*	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
41	14.4	*11.7*	*8.8*	*6.5*	*4.7*	*3.4*	*2.6*	*1.9*	*1.4*	*1.1*	*0.82*	*0.64*	...	...	...
42	10.6	10.4	*8.8*	*6.5*	*4.7*	*3.4*	*2.6*	*1.9*	*1.4*	*1.1*	*0.82*	*0.64*	...	...	...
43	16.9	*13.8*	*10.3*	*7.6*	*5.5*	*4.0*	*3.0*	*2.2*	*1.7*	*1.3*	*1.0*	*0.75*	...	...	...
44	12.5	12.3	*10.3*	*7.6*	*5.5*	*4.0*	*3.0*	*2.2*	*1.7*	*1.3*	*1.0*	*0.75*	...	...	...
45	14.4	*11.7*	*8.8*	*6.5*	*4.7*	*3.4*	*2.6*	*1.9*	*1.4*	*1.1*	*0.82*	*0.64*	...	...	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
	1	23Cr–12Ni	Wld. pipe	SA–312	TP309H	S30909	...	...	8	2
	2	23Cr–12Ni	Bar	SA–479	309H	S30909	...	...	8	2
	3	23Cr–12Ni	Bar	SA–479	309H	S30909	...	...	8	2
	4	23Cr–12Ni–Cb	Smls. tube	SA–213	TP309Cb	S30940	...	...	8	2
	5	23Cr–12Ni–Cb	Smls. tube	SA–213	TP309Cb	S30940	...	...	8	2
	6	23Cr–12Ni–Cb	Plate	SA–240	309Cb	S30940	...	...	8	2
	7	23Cr–12Ni–Cb	Plate	SA–240	309Cb	S30940	...	...	8	2
	8	23Cr–12Ni–Cb	Wld. tube	SA–249	TP309Cb	S30940	...	...	8	2
	9	23Cr–12Ni–Cb	Wld. tube	SA–249	TP309Cb	S30940	...	...	8	2
	10	23Cr–12Ni–Cb	Smls. & wld. pipe	SA–312	TP309Cb	S30940	...	...	8	2
	11	23Cr–12Ni–Cb	Smls. pipe	SA–312	TP309Cb	S30940	...	...	8	2
	12	23Cr–12Ni–Cb	Wld. pipe	SA–312	TP309Cb	S30940	...	...	8	2
	13	23Cr–12Ni–Cb	Wld. pipe	SA–312	TP309Cb	S30940	...	...	8	2
	14	23Cr–12Ni–Cb	Bar	SA–479	309Cb	S30940	...	...	8	2
	15	23Cr–12Ni–Cb	Bar	SA–479	309Cb	S30940	...	...	8	2
	16	23Cr–12Ni–Cb	Wld. pipe	SA–813	TP309Cb	S30940	...	...	8	2
	17	23Cr–12Ni–Cb	Wld. pipe	SA–813	TP309Cb	S30940	...	...	8	2
	18	23Cr–12Ni–Cb	Wld. pipe	SA–814	TP309Cb	S30940	...	...	8	2
	19	23Cr–12Ni–Cb	Wld. pipe	SA–814	TP309Cb	S30940	...	...	8	2
(**21**)	20	23Cr–25Ni–5.5Mo–N	Forgings	SA–182	...	S32053	...	...	8	4
(**21**)	21	23Cr–25Ni–5.5Mo–N	Forgings	SA–182	...	S32053	...	...	8	4
(**21**)	22	23Cr–25Ni–5.5Mo–N	Plate	SA–240	...	S32053	...	...	8	4
(**21**)	23	23Cr–25Ni–5.5Mo–N	Plate	SA–240	...	S32053	...	...	8	4
(**21**)	24	23Cr–25Ni–5.5Mo–N	Wld. tube	SA–249	...	S32053	...	...	8	4
(**21**)	25	23Cr–25Ni–5.5Mo–N	Wld. tube	SA–249	...	S32053	...	...	8	4
(**21**)	26	23Cr–25Ni–5.5Mo–N	Smls. & wld. pipe	SA–312	...	S32053	...	...	8	4
(**21**)	27	23Cr–25Ni–5.5Mo–N	Smls. & wld. pipe	SA–312	...	S32053	...	...	8	4
(**21**)	28	23Cr–25Ni–5.5Mo–N	Wld. pipe	SA–358	...	S32053	...	...	8	4
(**21**)	29	23Cr–25Ni–5.5Mo–N	Wld. pipe	SA–358	...	S32053	...	...	8	4
(**21**)	30	23Cr–25Ni–5.5Mo–N	Fittings	SA–403	...	S32053	...	...	8	4
(**21**)	31	23Cr–25Ni–5.5Mo–N	Fittings	SA–403	...	S32053	...	...	8	4
(**21**)	32	23Cr–25Ni–5.5Mo–N	Wld. pipe	SA–409	...	S32053	...	...	8	4
(**21**)	33	23Cr–25Ni–5.5Mo–N	Wld. pipe	SA–409	...	S32053	...	...	8	4
(**21**)	34	23Cr–25Ni–5.5Mo–N	Bar	SA–479	...	S32053	...	...	8	4
(**21**)	35	23Cr–25Ni–5.5Mo–N	Bar	SA–479	...	S32053	...	...	8	4
(**21**)	36	23Cr–25Ni–5.5Mo–N	Wld. pipe	SA–813	...	S32053	...	...	8	4
(**21**)	37	23Cr–25Ni–5.5Mo–N	Wld. pipe	SA–813	...	S32053	...	...	8	4
(**21**)	38	23Cr–25Ni–5.5Mo–N	Wld. pipe	SA–814	...	S32053	...	...	8	4
(**21**)	39	23Cr–25Ni–5.5Mo–N	Wld. pipe	SA–814	...	S32053	...	...	8	4
	40	24Cr–10Ni–4Mo–N	Castings	SA–995	2A	J93345	...	...	10H	1
	41	24Cr–22Ni–6Mo–2W–Cu–N	Forgings	SA–182	F58	S31266	...	...	45	...
	42	24Cr–22Ni–6Mo–2W–Cu–N	Smls. tube	SA–213	...	S31266	...	...	45	...
	43	24Cr–22Ni–6Mo–2W–Cu–N	Plate	SA–240	...	S31266	...	...	45	...
	44	24Cr–22Ni–6Mo–2W–Cu–N	Wld. tube	SA–249	...	S31266	...	...	45	...
	45	24Cr–22Ni–6Mo–2W–Cu–N	Smls. pipe	SA–312	...	S31266	...	...	45	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	75	30	1500	NP	1500	NP	HA–2	G3, G24, T7
2	75	30	1500	NP	1500	NP	HA–2	G5, T6
3	75	30	1500	NP	1500	NP	HA–2	T7
4	75	30	NP	NP	1500	650	HA–2	G5, G12, T5
5	75	30	NP	NP	1500	650	HA–2	G12, T6
6	75	30	NP	NP	1500	650	HA–2	G5, G12, T5
7	75	30	NP	NP	1500	650	HA–2	G12, T6
8	75	30	NP	NP	1500	650	HA–2	G5, G12, G24, T5
9	75	30	NP	NP	1500	650	HA–2	G12, G24, T6
10	75	30	NP	800	1500	650	HA–2	G5, G12, T5, W12
11	75	30	NP	NP	1500	650	HA–2	G12, T6
12	75	30	NP	NP	1500	650	HA–2	G5, G12, G24, T5
13	75	30	NP	NP	1500	650	HA–2	G12, G24, T6
14	75	30	NP	NP	1000	650	HA–2	G5, G12, G22
15	75	30	NP	NP	1000	650	HA–2	G12, G22
16	75	30	NP	NP	1500	650	HA–2	G5, G12, G24, T5
17	75	30	NP	NP	1500	650	HA–2	G12, G24, T6
18	75	30	NP	NP	1500	650	HA–2	G5, G12, G13, G24, T5
19	75	30	NP	NP	1500	650	HA–2	G12, G24, T6
20	93	43	NP	NP	662	NP	NFN–12	G5
21	93	43	NP	NP	662	NP	NFN–12	...
22	93	43	NP	NP	662	NP	NFN–12	G5
23	93	43	NP	NP	662	NP	NFN–12	...
24	93	43	NP	NP	662	NP	NFN–12	G5, W12
25	93	43	NP	NP	662	NP	NFN–12	W12
26	93	43	NP	NP	662	NP	NFN–12	G5, W12
27	93	43	NP	NP	662	NP	NFN–12	W12
28	93	43	NP	NP	662	NP	NFN–12	G5, W12
29	93	43	NP	NP	662	NP	NFN–12	W12
30	93	43	NP	NP	662	NP	NFN–12	G5
31	93	43	NP	NP	662	NP	NFN–12	...
32	93	43	NP	NP	662	NP	NFN–12	G5, W12
33	93	43	NP	NP	662	NP	NFN–12	W12
34	93	43	NP	NP	662	NP	NFN–12	G5
35	93	43	NP	NP	662	NP	NFN–12	...
36	93	43	NP	NP	662	NP	NFN–12	G5, G12, W12
37	93	43	NP	NP	662	NP	NFN–12	G12, W12
38	93	43	NP	NP	662	NP	NFN–12	G5, G12, W12
39	93	43	NP	NP	662	NP	NFN–12	G12, W12
40	95	65	NP	NP	600	600	HA–5	G1, G19
41	109	61	NP	NP	800	NP	HA–10	G19
42	109	61	NP	NP	800	NP	HA–10	G5, G19
43	109	61	NP	NP	800	NP	HA–10	G19
44	109	61	NP	NP	800	NP	HA–10	G3, G5, G19
45	109	61	NP	NP	800	NP	HA–10	G5, G19

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	17.0	...	14.9	...	13.7	12.8	12.2	11.8	11.6	11.5	11.3	11.2	11.0	10.8
2	20.0	...	20.0	...	20.0	20.0	19.4	18.8	18.5	18.2	18.0	17.7	17.5	17.2
3	20.0	...	17.5	...	16.1	15.1	14.4	13.9	13.7	13.5	13.3	13.1	12.9	12.7
4	20.0	...	20.0	...	20.0	20.0	19.4	18.8	18.5	18.2	18.0	17.7	17.5	17.2
5	20.0	...	17.5	...	16.1	15.1	14.4	13.9	13.7	13.5	13.3	13.1	12.9	12.7
6	20.0	...	20.0	...	20.0	20.0	19.4	18.8	18.5	18.2	18.0	17.7	17.5	17.2
7	20.0	...	17.5	...	16.1	15.1	14.4	13.9	13.7	13.5	13.3	13.1	12.9	12.7
8	17.0	...	17.0	...	17.0	17.0	16.5	15.9	15.7	15.5	15.3	15.1	14.8	14.6
9	17.0	...	14.9	...	13.7	12.8	12.2	11.8	11.6	11.5	11.3	11.2	11.0	10.8
10	20.0	...	20.0	...	20.0	20.0	19.4	18.8	18.5	18.2	18.0	17.7	17.5	17.2
11	20.0	...	17.5	...	16.1	15.1	14.4	13.9	13.7	13.5	13.3	13.1	12.9	12.7
12	17.0	...	17.0	...	17.0	17.0	16.5	15.9	15.7	15.5	15.3	15.1	14.8	14.6
13	17.0	...	14.9	...	13.7	12.8	12.2	11.8	11.6	11.5	11.3	11.2	11.0	10.8
14	20.0	...	20.0	...	20.0	20.0	19.4	18.8	18.5	18.2	18.0	17.7	17.5	17.2
15	20.0	...	17.5	...	16.1	15.1	14.4	13.9	13.7	13.5	13.3	13.1	12.9	12.7
16	17.0	...	17.0	...	17.0	17.0	16.5	15.9	15.7	15.5	15.3	15.1	14.8	14.6
17	17.0	...	14.9	...	13.7	12.8	12.2	11.8	11.6	11.5	11.3	11.2	11.0	10.8
18	17.0	...	17.0	...	17.0	17.0	16.5	15.9	15.7	15.5	15.3	15.1	14.8	14.6
19	17.0	...	14.9	...	13.7	12.8	12.2	11.8	11.6	11.5	11.3	11.2	11.0	10.8
20	26.5	...	26.5	...	25.1	23.9	23.0	22.3	22.0	21.8	...	...	...	...
21	26.5	...	24.2	...	21.9	20.8	19.3	18.5	18.2	17.9	...	...	...	...
22	26.5	...	26.5	...	25.1	23.9	23.3	22.3	22.0	21.8	...	...	...	...
23	26.5	...	24.2	...	21.9	20.8	19.3	18.5	18.2	17.9	...	...	...	...
24	26.5	...	26.5	...	25.1	23.9	23.3	22.3	22.0	21.8	...	...	...	...
25	26.5	...	24.2	...	21.9	20.8	19.3	18.5	18.2	17.9	...	...	...	...
26	26.5	...	26.5	...	25.1	23.9	23.3	22.3	22.0	21.8	...	...	...	...
27	26.5	...	24.2	...	21.9	20.8	19.3	18.5	18.2	17.9	...	...	...	...
28	26.5	...	26.5	...	25.1	23.9	23.3	22.3	22.0	21.8	...	...	...	...
29	26.5	...	24.2	...	21.9	20.8	19.3	18.5	18.2	17.9	...	...	...	...
30	26.5	...	26.5	...	25.1	23.9	23.3	22.3	22.0	21.8	...	...	...	...
31	26.5	...	24.2	...	21.9	20.8	19.3	18.5	18.2	17.9	...	...	...	...
32	26.5	...	26.5	...	25.1	23.9	23.3	22.3	22.0	21.8	...	...	...	...
33	26.5	...	24.2	...	21.9	20.8	19.3	18.5	18.2	17.9	...	...	...	...
34	26.5	...	26.5	...	25.1	23.9	23.3	22.3	22.0	21.8	...	...	...	...
35	26.5	...	24.2	...	21.9	20.8	19.3	18.5	18.2	17.9	...	...	...	...
36	26.5	...	26.5	...	25.1	23.9	23.3	22.3	22.0	21.8	...	...	...	...
37	26.5	...	24.2	...	21.9	20.8	19.3	18.5	18.2	17.9	...	...	...	...
38	26.5	...	26.5	...	25.1	23.9	23.3	22.3	22.0	21.8	...	...	...	...
39	26.5	...	24.2	...	21.9	20.8	19.3	18.5	18.2	17.9	...	...	...	...
40	27.1	...	27.1	...	25.1	24.2	24.2	24.2	...	...	...	...	...	...
41	31.1	31.1	30.8	29.8	28.9	27.7	26.9	26.3	26.1	25.9	25.7	25.4	...	...
42	31.1	31.1	30.8	29.8	28.9	27.7	26.9	26.3	26.1	25.9	25.7	25.4	...	...
43	31.1	31.1	30.8	29.8	28.9	27.7	26.9	26.3	26.1	25.9	25.7	25.4	...	...
44	26.5	26.5	26.1	25.3	24.6	23.5	22.8	22.4	22.2	22.0	21.8	21.6	...	...
45	31.1	31.1	30.8	29.8	28.9	27.7	26.9	26.3	26.1	25.9	25.7	25.4	...	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding															
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
1	10.6	10.4	*8.8*	*6.5*	*4.7*	*3.4*	*2.6*	*1.9*	*1.4*	*1.1*	*0.82*	*0.64*	...	...	...	
2	16.9	*13.8*	*10.3*	*7.6*	*5.5*	*4.0*	*3.0*	*2.2*	*1.7*	*1.3*	*1.0*	*0.75*	...	...	...	
3	12.5	12.3	*10.3*	*7.6*	*5.5*	*4.0*	*3.0*	*2.2*	*1.7*	*1.3*	*1.0*	*0.75*	...	...	...	
4	*15.9*	*9.9*	*7.1*	*5.0*	*3.6*	*2.5*	*1.5*	*0.80*	*0.50*	*0.40*	*0.30*	*0.20*	...	...	...	
5	12.5	*9.9*	*7.1*	*5.0*	*3.6*	*2.5*	*1.5*	*0.80*	*0.50*	*0.40*	*0.30*	*0.20*	...	...	...	
6	*15.9*	*9.9*	*7.1*	*5.0*	*3.6*	*2.5*	*1.5*	*0.80*	*0.50*	*0.40*	*0.30*	*0.20*	...	...	...	
7	12.5	*9.9*	*7.1*	*5.0*	*3.6*	*2.5*	*1.5*	*0.80*	*0.50*	*0.40*	*0.30*	*0.20*	...	...	...	
8	*13.5*	*8.4*	*6.0*	*4.3*	*3.1*	*2.1*	*1.3*	*0.68*	*0.43*	*0.34*	*0.26*	*0.17*	...	...	...	
9	10.6	*8.4*	*6.0*	*4.3*	*3.1*	*2.1*	*1.3*	*0.68*	*0.43*	*0.34*	*0.26*	*0.17*	...	...	...	
10	*15.9*	*9.9*	*7.1*	*5.0*	*3.6*	*2.5*	*1.5*	*0.80*	*0.50*	*0.40*	*0.30*	*0.20*	...	...	...	
11	12.5	*9.9*	*7.1*	*5.0*	*3.6*	*2.5*	*1.5*	*0.80*	*0.50*	*0.40*	*0.30*	*0.20*	...	...	...	
12	*13.5*	*8.4*	*6.0*	*4.3*	*3.1*	*2.1*	*1.3*	*0.68*	*0.43*	*0.34*	*0.26*	*0.17*	...	...	...	
13	10.6	*8.4*	*6.0*	*4.3*	*3.1*	*2.1*	*1.3*	*0.68*	*0.43*	*0.34*	*0.26*	*0.17*	...	...	...	
14	15.9	9.9	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	12.5	9.9	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	*13.5*	*8.4*	*6.0*	*4.3*	*3.1*	*2.1*	*1.3*	*0.68*	*0.43*	*0.34*	*0.26*	*0.17*	...	...	...	
17	10.6	*8.4*	*6.0*	*4.3*	*3.1*	*2.1*	*1.3*	*0.68*	*0.43*	*0.34*	*0.26*	*0.17*	...	...	...	
18	*13.5*	*8.4*	*6.0*	*4.3*	*3.1*	*2.1*	*1.3*	*0.68*	*0.43*	*0.34*	*0.26*	*0.17*	...	...	...	
19	10.6	*8.4*	*6.0*	*4.3*	*3.1*	*2.1*	*1.3*	*0.68*	*0.43*	*0.34*	*0.26*	*0.17*	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
	1	24Cr–22Ni–6Mo–2W–Cu–N	Wld. pipe	SA–312	...	S31266	...	...	45	...
	2	24Cr–22Ni–6Mo–2W–Cu–N	Wld. pipe	SA–358	...	S31266	...	...	45	...
	3	24Cr–22Ni–6Mo–2W–Cu–N	Smls. fittings	SA–403	...	S31266	...	...	45	...
	4	24Cr–22Ni–6Mo–2W–Cu–N	Wld. fittings	SA–403	...	S31266	...	...	45	...
	5	24Cr–22Ni–6Mo–2W–Cu–N	Bar, shapes	SA–479	...	S31266	...	...	45	...
	6	24Cr–22Ni–6Mo–2W–Cu–N	Wld. pipe	SA–813	...	S31266	...	...	45	...
	7	25Cr–4Ni–4Mo–Ti	Plate	SA–240	...	S44635	...	...	10I	1
	8	25Cr–4Ni–4Mo–Ti	Wld. tube	SA–268	...	S44635	...	...	10I	1
	9	25Cr–5Ni–3Mo–2Cu	Castings	SA–995	1B	J93372	...	...	10H	1
	10	25Cr–5Ni–3Mo–2Cu	Plate	SA–240	...	S32550	...	...	10H	1
	11	25Cr–5Ni–3Mo–2Cu	Bar	SA–479	...	S32550	...	...	10H	1
	12	25Cr–5Ni–3Mo–2Cu	Smls. tube	SA–789	...	S32550	...	...	10H	1
	13	25Cr–5Ni–3Mo–2Cu	Wld. tube	SA–789	...	S32550	...	...	10H	1
	14	25Cr–5Ni–3Mo–2Cu	Smls. pipe	SA–790	...	S32550	...	...	10H	1
	15	25Cr–5Ni–3Mo–2Cu	Wld. pipe	SA–790	...	S32550	...	...	10H	1
(**21**)	16	25Cr–6Ni–Mo–N	Forgings	SA–182	...	S32506	...	...	10H	1
(**21**)	17	25Cr–6Ni–Mo–N	Plate, sheet	SA–240	...	S32506	...	...	10H	1
(**21**)	18	25Cr–6Ni–Mo–N	Bar	SA–479	...	S32506	...	...	10H	1
(**21**)	19	25Cr–6Ni–Mo–N	Smls. tube	SA–789	...	S32506	...	...	10H	1
(**21**)	20	25Cr–6Ni–Mo–N	Wld. tube	SA–789	...	S32506	...	...	10H	1
(**21**)	21	25Cr–6Ni–Mo–N	Smls. pipe	SA–790	...	S32506	...	...	10H	1
(**21**)	22	25Cr–6Ni–Mo–N	Wld. pipe	SA–790	...	S32506	...	...	10H	1
	23	25Cr–6Ni–Mo–N	Plate	SA–240	...	S31200	...	...	10H	1
	24	25Cr–6.5Ni–3Mo–N	Smls. tube	SA–789	...	S31260	...	...	10H	1
	25	25Cr–6.5Ni–3Mo–N	Wld. tube	SA–789	...	S31260	...	...	10H	1
	26	25Cr–6.5Ni–3Mo–N	Smls. pipe	SA–790	...	S31260	...	...	10H	1
	27	25Cr–6.5Ni–3Mo–N	Wld. pipe	SA–790	...	S31260	...	...	10H	1
	28	25Cr–6.5Ni–3Mo–N	Plate	SA–240	...	S31260	...	...	10H	1
	29	25Cr–7Ni–3Mo–W–Cu–N	Forgings	SA–182	F54	S39274	...	...	10H	1
	30	25Cr–7Ni–3Mo–W–Cu–N	Smls. tube	SA–789	...	S39274	...	...	10H	1
	31	25Cr–7Ni–3Mo–W–Cu–N	Wld. tube	SA–789	...	S39274	...	...	10H	1
	32	25Cr–7Ni–3Mo–W–Cu–N	Smls. pipe	SA–790	...	S39274	...	...	10H	1
	33	25Cr–7Ni–3Mo–W–Cu–N	Wld. pipe	SA–790	...	S39274	...	...	10H	1
	34	25Cr–7Ni–4Mo–N	Forgings	SA–182	F53	S32750	...	...	10H	1
	35	25Cr–7Ni–4Mo–N	Plate, sheet	SA–240	...	S32750	...	...	10H	1
(**21**)	36	25Cr–7Ni–4Mo–N	Smls. tube	SA–789	...	S32750	...	...	10H	1
(**21**)	37	25Cr–7Ni–4Mo–N	Wld. tube	SA–789	...	S32750	...	...	10H	1
(**21**)	38	25Cr–7Ni–4Mo–N	Smls. pipe	SA–790	...	S32750	...	...	10H	1
(**21**)	39	25Cr–7Ni–4Mo–N	Wld. pipe	SA–790	...	S32750	...	...	10H	1
	40	25Cr–7.5Ni–3.5Mo–N–Cu–W	Castings	SA–995	CD3MWCuN	J93380	...	...	10H	1
	41	25Cr–7.5Ni–3.5Mo–N–Cu–W	Forgings	SA–182	F55	S32760	...	...	10H	1
	42	25Cr–7.5Ni–3.5Mo–N–Cu–W	Plate	SA–240	...	S32760	...	...	10H	1
	43	25Cr–7.5Ni–3.5Mo–N–Cu–W	Bar	SA–479	...	S32760	Annealed	...	10H	1
	44	25Cr–7.5Ni–3.5Mo–N–Cu–W	Smls. tube	SA–789	...	S32760	...	...	10H	1
	45	25Cr–7.5Ni–3.5Mo–N–Cu–W	Wld. tube	SA–789	...	S32760	...	...	10H	1

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	109	61	NP	NP	800	NP	HA–10	G3, G5, G19
2	109	61	NP	NP	800	NP	HA–10	G3, G19
3	109	61	NP	NP	800	NP	HA–10	G5, G19
4	109	61	NP	NP	800	NP	HA–10	G3, G5, G19
5	109	61	NP	NP	800	NP	HA–10	G5, G19
6	109	61	NP	NP	800	NP	HA–10	G3, G5, G19
7	90	75	NP	NP	500	500	HA–5	G19
8	90	75	NP	NP	500	500	HA–5	G19, G24
9	100	70	NP	600	NP	NP	HA–5	G19, G29
10	110	80	NP	NP	500	500	HA–5	G19
11	110	80	NP	NP	500	500	HA–5	G19
12	110	80	NP	NP	500	500	HA–5	G19
13	110	80	NP	NP	500	500	HA–5	G19, G24
14	110	80	NP	NP	500	500	HA–5	G19
15	110	80	NP	NP	500	500	HA–5	G19, G24
16	90	65	NP	NP	600	NP	HA–5	G19
17	90	65	NP	NP	600	NP	HA–5	G19
18	90	65	NP	NP	600	NP	HA–5	G19
19	90	65	NP	NP	600	NP	HA–5	G19
20	90	65	NP	NP	600	NP	HA–5	G19, G24
21	90	65	NP	NP	600	NP	HA–5	G19
22	90	65	NP	NP	600	NP	HA–5	G19, G24
23	100	65	NP	NP	600	600	HA–5	G19
24	100	65	NP	NP	650	650	HA–5	G19
25	100	65	NP	NP	650	650	HA–5	G19, G24
26	100	65	NP	NP	650	650	HA–5	G19
27	100	65	NP	NP	650	650	HA–5	G19, G24
28	100	70	NP	NP	650	650	HA–5	G19
29	116	80	NP	NP	650	650	HA–8	G19
30	116	80	NP	NP	650	650	HA–8	G19
31	116	80	NP	NP	650	650	HA–8	G19, G24
32	116	80	NP	NP	650	650	HA–8	G19
33	116	80	NP	NP	650	650	HA–8	G19, G24
34	116	80	NP	NP	600	NP	HA–5	G19
35	116	80	NP	NP	600	NP	HA–5	G19
36	116	80	NP	NP	600	600	HA–5	G19
37	116	80	NP	NP	600	600	HA–5	G19, G24
38	116	80	NP	NP	600	600	HA–5	G19
39	116	80	NP	NP	600	600	HA–5	G19, G24
40	100	65	NP	NP	600	NP	HA–5	G19, H4
41	109	80	NP	NP	600	NP	HA–9	G19, H4
42	109	80	NP	NP	600	NP	HA–9	G19
43	109	80	NP	NP	600	NP	HA–9	G19
44	109	80	NP	NP	600	NP	HA–9	G19
45	109	80	NP	NP	600	NP	HA–9	G19, G24

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	26.5	26.5	26.1	25.3	24.6	23.5	22.8	22.4	22.2	22.0	21.8	21.6	...	...
2	26.5	26.5	26.1	25.3	24.6	23.5	22.8	22.4	22.2	22.0	21.8	21.6	...	...
3	31.1	31.1	30.8	29.8	28.9	27.7	26.9	26.3	26.1	25.9	25.7	25.4	...	...
4	26.5	26.5	26.1	25.3	24.6	23.5	22.8	22.4	22.2	22.0	21.8	21.6	...	...
5	31.1	31.1	30.8	29.8	28.9	27.7	26.9	26.3	26.1	25.9	25.7	25.4	...	...
6	26.5	26.5	26.1	25.3	24.6	23.5	22.8	22.4	22.2	22.0	21.8	21.6	...	...
7	25.7	...	24.9	...	23.5	22.5	22.0	...	...	...	...	...	...	...
8	21.9	...	21.2	...	19.9	19.1	18.7	...	...	...	...	...	...	...
9	28.6	...	28.6	...	27.9	27.5	27.5	27.4	...	...	...	...	...	...
10	31.4	...	31.3	...	29.5	28.6	28.2	...	...	...	...	...	...	...
11	31.4	...	31.3	...	29.5	28.6	28.2	...	...	...	...	...	...	...
12	31.4	...	31.3	...	29.5	28.6	28.2	...	...	...	...	...	...	...
13	26.7	...	26.6	...	25.1	24.3	24.0	...	...	...	...	...	...	...
14	31.4	...	31.3	...	29.5	28.6	28.2	...	...	...	...	...	...	...
15	26.7	...	26.6	...	25.1	24.3	24.0	...	...	...	...	...	...	...
16	25.7	...	25.7	...	24.4	24.1	24.1	24.1	...	...	...	...	...	...
17	25.7	...	25.7	...	24.4	24.1	24.1	24.1	...	...	...	...	...	...
18	25.7	...	25.7	...	24.4	24.1	24.1	24.1	...	...	...	...	...	...
19	25.7	...	25.7	...	24.4	24.1	24.1	24.1	...	...	...	...	...	...
20	25.7	...	25.7	...	24.4	24.1	24.1	24.1	...	...	...	...	...	...
21	25.7	...	25.7	...	24.4	24.1	24.1	24.1	...	...	...	...	...	...
22	25.7	...	25.7	...	24.4	24.1	24.1	24.1	...	...	...	...	...	...
23	28.6	...	28.6	...	27.1	26.3	26.1	26.1	...	...	...	...	...	...
24	28.6	...	28.5	...	27.1	26.4	26.3	26.3	26.3	...	...	...	...	...
25	24.3	...	24.3	...	23.0	22.5	22.4	22.4	22.4	...	...	...	...	...
26	28.6	...	28.5	...	27.1	26.4	26.3	26.3	26.3	...	...	...	...	...
27	24.3	...	24.3	...	23.0	22.5	22.4	22.4	22.4	...	...	...	...	...
28	28.6	...	28.5	...	27.1	26.4	26.3	26.3	26.3	...	...	...	...	...
29	33.1	...	33.1	...	31.6	31.4	31.4	31.4	31.4	...	...	...	...	...
30	33.1	...	33.1	...	31.6	31.4	31.4	31.4	31.4	...	...	...	...	...
31	28.2	...	28.2	...	26.8	26.7	26.7	26.7	26.7	...	...	...	...	...
32	33.1	...	33.1	...	31.6	31.4	31.4	31.4	31.4	...	...	...	...	...
33	28.2	...	28.2	...	26.8	26.7	26.7	26.7	26.7	...	...	...	...	...
34	33.1	...	33.0	...	31.2	30.1	29.6	29.4	...	...	...	...	...	...
35	33.1	...	33.0	...	31.2	30.1	29.6	29.4	...	...	...	...	...	...
36	33.1	...	33.0	...	31.2	30.1	29.6	29.4	...	...	...	...	...	...
37	28.2	...	28.0	...	26.5	25.6	25.2	25.0	...	...	...	...	...	...
38	33.1	...	33.0	...	31.2	30.1	29.6	29.4	...	...	...	...	...	...
39	28.2	...	28.0	...	26.5	25.6	25.2	25.0	...	...	...	...	...	...
40	28.6	28.5	28.4	27.7	26.9	26.6	26.6	26.6	...	...	...	...	...	...
41	31.1	...	30.2	...	29.2	29.2	29.2	29.2	...	...	...	...	...	...
42	31.1	...	30.2	...	29.2	29.2	29.2	29.2	...	...	...	...	...	...
43	31.1	...	30.2	...	29.2	29.2	29.2	29.2	...	...	...	...	...	...
44	31.1	...	30.2	...	29.2	29.2	29.2	29.2	...	...	...	...	...	...
45	26.5	...	25.7	...	24.8	24.8	24.8	24.8	...	...	...	...	...	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding															
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	25Cr–7.5Ni–3.5Mo–N–Cu–W	Smls. pipe	SA–790	...	S32760	...	...	10H	1
2	25Cr–7.5Ni–3.5Mo–N–Cu–W	Wld. pipe	SA–790	...	S32760	...	...	10H	1
3	25Cr–7.5Ni–3.5Mo–N–Cu–W	Smls. & wld. fittings	SA–815	...	S32760	...	...	10H	1
4	25Cr–12Ni	Castings	SA–351	CH8	J93400	...	...	8	2
5	25Cr–12Ni	Castings	SA–351	CH8	J93400	...	...	8	2
6	25Cr–12Ni	Cast pipe	SA–451	CPH8	J93400	...	...	8	2
7	25Cr–12Ni	Castings	SA–351	CH20	J93402	...	...	8	2
8	25Cr–12Ni	Castings	SA–351	CH20	J93402	...	...	8	2
9	25Cr–12Ni	Cast pipe	SA–451	CPH20	J93402	...	...	8	2
10	25Cr–20Ni	Castings	SA–351	CK20	J94202	...	...	8	2
11	25Cr–20Ni	Castings	SA–351	CK20	J94202	...	...	8	2
12	25Cr–20Ni	Cast pipe	SA–451	CPK20	J94202	...	...	8	2
13	25Cr–20Ni	Forgings	SA–182	F310	S31000	...	>5	8	2
14	25Cr–20Ni	Forgings	SA–182	F310	S31000	...	≤5	8	2
15	25Cr–20Ni	Forgings	SA–965	F310	S31000	...	...	8	2
16	25Cr–20Ni	Smls. tube	SA–213	TP310S	S31008	...	...	8	2
17	25Cr–20Ni	Smls. tube	SA–213	TP310S	S31008	...	...	8	2
18	25Cr–20Ni	Plate	SA–240	310S	S31008	...	...	8	2
19	25Cr–20Ni	Plate	SA–240	310S	S31008	...	...	8	2
20	25Cr–20Ni	Wld. tube	SA–249	TP310S	S31008	...	...	8	2
21	25Cr–20Ni	Wld. tube	SA–249	TP310S	S31008	...	...	8	2
22	25Cr–20Ni	Smls. & wld. pipe	SA–312	TP310S	S31008	...	...	8	2
23	25Cr–20Ni	Smls. pipe	SA–312	TP310S	S31008	...	...	8	2
24	25Cr–20Ni	Wld. pipe	SA–312	TP310S	S31008	...	...	8	2
25	25Cr–20Ni	Wld. pipe	SA–312	TP310S	S31008	...	...	8	2
26	25Cr–20Ni	Wld. pipe	SA–358	310S	S31008	1	...	8	2
27	25Cr–20Ni	Smls. & wld. fittings	SA–403	310S	S31008	...	...	8	2
28	25Cr–20Ni	Bar	SA–479	310S	S31008	...	...	8	2
29	25Cr–20Ni	Bar	SA–479	310S	S31008	...	...	8	2
30	25Cr–20Ni	Wld. pipe	SA–813	TP310S	S31008	...	...	8	2
31	25Cr–20Ni	Wld. pipe	SA–813	TP310S	S31008	...	...	8	2
32	25Cr–20Ni	Wld. pipe	SA–814	TP310S	S31008	...	...	8	2
33	25Cr–20Ni	Wld. pipe	SA–814	TP310S	S31008	...	...	8	2
34	25Cr–20Ni	Bar	SA/JIS G4303	SUS310S	...	...	...	8	2
35	25Cr–20Ni	Smls. tube	SA–213	TP310H	S31009	...	...	8	2
36	25Cr–20Ni	Plate	SA–240	310H	S31009	...	...	8	2
37	25Cr–20Ni	Plate	SA–240	310H	S31009	...	...	8	2
38	25Cr–20Ni	Wld. tube	SA–249	TP310H	S31009	...	...	8	2
39	25Cr–20Ni	Wld. tube	SA–249	TP310H	S31009	...	...	8	2
40	25Cr–20Ni	Wld. tube	SA–249	TP310H	S31009	...	...	8	2
41	25Cr–20Ni	Smls. pipe	SA–312	TP310H	S31009	...	...	8	2
42	25Cr–20Ni	Smls. pipe	SA–312	TP310H	S31009	...	...	8	2
43	25Cr–20Ni	Wld. pipe	SA–312	TP310H	S31009	...	...	8	2
44	25Cr–20Ni	Wld. pipe	SA–312	TP310H	S31009	...	...	8	2
45	25Cr–20Ni	Bar	SA–479	310H	S31009	...	...	8	2

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	109	80	NP	NP	600	NP	HA–9	G19
2	109	80	NP	NP	600	NP	HA–9	G19, G24
3	109	80	NP	NP	600	NP	HA–9	G19, W14
4	65	28	NP	800	1500	650	HA–3	G1, G5, G12, G16, G17, G19, T6
5	65	28	NP	NP	1500	650	HA–3	G1, G12, G19, T7
6	65	28	NP	800	NP	NP	HA–3	G5, G16, G17, G19
7	70	30	NP	800	1500	650	HA–2	G1, G5, G12, G16, G17, T6
8	70	30	NP	NP	1500	650	HA–2	G1, G12, T7
9	70	30	NP	800	NP	NP	HA–2	G5, G16, G17
10	65	28	NP	800	1500	650	HA–3	G1, G5, G12, G16, G17, T6
11	65	28	NP	NP	1500	650	HA–3	G1, G12, T8
12	65	28	NP	800	NP	NP	HA–3	G5, G16, G17
13	70	30	NP	800	NP	NP	HA–2	G5
14	75	30	NP	800	1500	650	HA–2	G5, G12, G14, T5
15	75	30	NP	800	1500	650	HA–2	G5, G12, T5
16	75	30	1500	NP	1500	650	HA–2	G5, G12, T5
17	75	30	1500	NP	1500	650	HA–2	G12, T6
18	75	30	1500	800	1500	650	HA–2	G5, G12, T5
19	75	30	1500	NP	1500	650	HA–2	G12, T6
20	75	30	NP	NP	1500	650	HA–2	G5, G12, G24, T5
21	75	30	NP	NP	1500	650	HA–2	G12, G24, T6
22	75	30	1500	800	1500	650	HA–2	G5, G12, T5, W12, W14
23	75	30	1500	NP	1500	650	HA–2	G12, T6
24	75	30	1500	NP	1500	650	HA–2	G3, G5, G12, G14, G24, T5
25	75	30	1500	NP	1500	650	HA–2	G3, G12, G14, G24, T6
26	75	30	NP	800	NP	NP	HA–2	G5, W12
27	75	30	NP	800	1500	650	HA–2	G5, G12, T5, W12, W14
28	75	30	1000	NP	1000	650	HA–2	G12, G22, T6
29	75	30	1000	800	1000	650	HA–2	G5, G12, G22, T5
30	75	30	NP	NP	1500	650	HA–2	G5, G12, G24, T5
31	75	30	NP	NP	1500	650	HA–2	G12, G24, T6
32	75	30	NP	NP	1500	650	HA–2	G5, G12, G24, T5
33	75	30	NP	NP	1500	650	HA–2	G12, G24, T6
34	75	30	1000	800	1000	NP	HA–2	G5, G12, G22, T5
35	75	30	1500	800	1500	NP	HA–2	G5, T6
36	75	30	1500	NP	1500	NP	HA–2	G5, T6
37	75	30	1500	NP	1500	NP	HA–2	T7
38	75	30	NP	800	NP	NP	HA–2	G5, W12
39	75	30	NP	NP	1500	NP	HA–2	G5, G12, G24, T6
40	75	30	NP	NP	1500	NP	HA–2	G12, G24, T7
41	75	30	1500	NP	1500	NP	HA–2	G5, T6
42	75	30	1500	NP	1500	NP	HA–2	T7
43	75	30	1500	NP	1500	NP	HA–2	G3, G5, G24, T6
44	75	30	1500	NP	1500	NP	HA–2	G3, G24, T7
45	75	30	1500	NP	1500	NP	HA–2	G5, T6

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	31.1	...	30.2	...	29.2	29.2	29.2	29.2	...	...	...	...	...	...
2	26.5	...	25.7	...	24.8	24.8	24.8	24.8	...	...	...	...	...	...
3	31.1	...	30.2	...	29.2	29.2	29.2	29.2	...	...	...	...	...	...
4	18.6	...	17.0	...	15.8	15.4	15.4	15.4	15.3	15.2	15.0	14.8	14.4	13.9
5	18.6	...	15.3	...	14.1	13.5	13.1	12.7	12.4	12.1	11.8	11.4	11.0	10.7
6	18.6	...	17.0	...	15.8	15.4	15.4	15.4	15.3	15.2	15.0	14.8	...	...
7	20.0	...	18.3	...	17.0	16.6	16.6	16.6	16.5	16.4	16.2	15.9	15.5	14.9
8	20.0	...	16.3	...	15.1	14.5	14.0	13.6	13.3	12.9	12.6	12.2	11.8	11.4
9	20.0	...	18.3	...	17.0	16.6	16.6	16.6	16.5	16.4	16.2	15.9	...	...
10	18.6	...	17.0	...	15.8	15.4	15.4	15.4	15.3	15.2	15.0	14.8	14.4	13.9
11	18.6	...	15.3	...	14.1	13.5	13.1	12.7	12.4	12.1	11.8	11.4	11.0	10.7
12	18.6	...	17.0	...	15.8	15.4	15.4	15.4	15.3	15.2	15.0	14.8	...	...
13	20.0	...	19.8	...	18.9	18.6	18.5	18.5	18.2	17.9	17.7	17.4	...	...
14	20.0	...	20.0	...	20.0	19.9	19.3	18.5	18.2	17.9	17.7	17.4	17.2	16.9
15	20.0	...	20.0	...	20.0	19.9	19.3	18.5	18.2	17.9	17.7	17.4	17.2	16.9
16	20.0	...	20.0	...	20.0	19.9	19.3	18.5	18.2	17.9	17.7	17.4	17.2	16.9
17	20.0	...	17.6	...	16.1	15.1	14.3	13.7	13.5	13.3	13.1	12.9	12.7	12.5
18	20.0	...	20.0	...	20.0	19.9	19.3	18.5	18.2	17.9	17.7	17.4	17.2	16.9
19	20.0	...	17.6	...	16.1	15.1	14.3	13.7	13.5	13.3	13.1	12.9	12.7	12.5
20	17.0	...	17.0	...	17.0	16.9	16.4	15.7	15.5	15.2	15.0	14.8	14.6	14.4
21	17.0	...	15.0	...	13.7	12.8	12.1	11.7	11.5	11.3	11.1	11.0	10.8	10.7
22	20.0	...	20.0	...	20.0	19.9	19.3	18.5	18.2	17.9	17.7	17.4	17.2	16.9
23	20.0	...	17.6	...	16.1	15.1	14.3	13.7	13.5	13.3	13.1	12.9	12.7	12.5
24	17.0	...	17.0	...	17.0	16.9	16.4	15.7	15.5	15.2	15.0	14.8	14.6	14.4
25	17.0	...	15.0	...	13.7	12.8	12.1	11.7	11.5	11.3	11.1	11.0	10.8	10.7
26	20.0	...	20.0	...	20.0	19.9	19.3	18.5	18.2	17.9	17.7	17.4	...	...
27	20.0	...	20.0	...	20.0	19.9	19.3	18.5	18.2	17.9	17.7	17.4	17.2	16.9
28	20.0	...	17.6	...	16.1	15.1	14.3	13.7	13.5	13.3	13.1	12.9	12.7	12.5
29	20.0	...	20.0	...	20.0	19.9	19.3	18.5	18.2	17.9	17.7	17.4	17.2	16.9
30	17.0	...	17.0	...	17.0	16.9	16.4	15.7	15.5	15.2	15.0	14.8	14.6	14.4
31	17.0	...	15.0	...	13.7	12.8	12.1	11.7	11.5	11.3	11.1	11.0	10.8	10.7
32	17.0	...	17.0	...	17.0	16.9	16.4	15.7	15.5	15.2	15.0	14.8	14.6	14.4
33	17.0	...	15.0	...	13.7	12.8	12.1	11.7	11.5	11.3	11.1	11.0	10.8	10.7
34	20.0	...	20.0	...	20.0	19.9	19.3	18.5	18.2	17.9	17.7	17.4	17.2	16.9
35	20.0	...	20.0	...	20.0	19.9	19.3	18.5	18.2	17.9	17.7	17.4	17.2	16.9
36	20.0	...	20.0	...	20.0	19.9	19.3	18.5	18.2	17.9	17.7	17.4	17.2	16.9
37	20.0	...	17.6	...	16.1	15.1	14.3	13.7	13.5	13.3	13.1	12.9	12.7	12.5
38	20.0	...	20.0	...	20.0	19.9	19.3	18.5	18.2	17.9	17.7	17.4	...	...
39	17.0	...	17.0	...	17.0	16.9	16.4	15.7	15.5	15.2	15.0	14.8	14.6	14.4
40	17.0	...	15.0	...	13.7	12.8	12.1	11.7	11.5	11.3	11.1	11.0	10.8	10.7
41	20.0	...	20.0	...	20.0	19.9	19.3	18.5	18.2	17.9	17.7	17.4	17.2	16.9
42	20.0	...	17.6	...	16.1	15.1	14.3	13.7	13.5	13.3	13.1	12.9	12.7	12.5
43	17.0	...	17.0	...	17.0	16.9	16.4	15.7	15.5	15.2	15.0	14.8	14.6	14.4
44	17.0	...	15.0	...	13.7	12.8	12.1	11.7	11.5	11.3	11.1	11.0	10.8	10.7
45	20.0	...	20.0	...	20.0	19.9	19.3	18.5	18.2	17.9	17.7	17.4	17.2	16.9

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding														
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4	13.2	11.1	8.5	6.5	5.0	3.8	2.9	2.3	1.8	1.3	0.90	0.80	...	...	...
5	10.3	9.9	8.5	6.5	5.0	3.8	2.9	2.3	1.8	1.3	0.90	0.80	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
7	14.3	11.1	8.5	6.5	5.0	3.8	2.9	2.3	1.8	1.3	0.90	0.80	...	...	...
8	11.0	10.6	8.5	6.5	5.0	3.8	2.9	2.3	1.8	1.3	0.90	0.80	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
10	13.2	11.3	9.8	8.5	7.3	6.0	4.8	3.5	2.4	1.6	1.1	0.80	...	...	...
11	10.3	9.9	9.5	8.5	7.3	6.0	4.8	3.5	2.4	1.6	1.1	0.80	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
14	15.9	9.9	7.1	5.0	3.6	2.5	1.5	0.80	0.50	0.40	0.30	0.20	...	...	...
15	15.9	9.9	7.1	5.0	3.6	2.5	1.5	0.80	0.50	0.40	0.30	0.20	...	...	...
16	15.9	9.9	7.1	5.0	3.6	2.5	1.5	0.80	0.50	0.40	0.30	0.20	...	...	...
17	12.3	9.9	7.1	5.0	3.6	2.5	1.5	0.80	0.50	0.40	0.30	0.20	...	...	...
18	15.9	9.9	7.1	5.0	3.6	2.5	1.5	0.80	0.50	0.40	0.30	0.20	...	...	...
19	12.3	9.9	7.1	5.0	3.6	2.5	1.5	0.80	0.50	0.40	0.30	0.20	...	...	...
20	13.5	8.4	6.0	4.3	3.1	2.1	1.3	0.68	0.43	0.34	0.26	0.17	...	...	...
21	10.5	8.4	6.0	4.3	3.1	2.1	1.3	0.68	0.43	0.34	0.26	0.17	...	...	...
22	15.9	9.9	7.1	5.0	3.6	2.5	1.5	0.80	0.50	0.40	0.30	0.20	...	...	...
23	12.3	9.9	7.1	5.0	3.6	2.5	1.5	0.80	0.50	0.40	0.30	0.20	...	...	...
24	13.5	8.4	6.0	4.3	3.1	2.1	1.3	0.68	0.43	0.34	0.26	0.17	...	...	...
25	10.5	8.4	6.0	4.3	3.1	2.1	1.3	0.68	0.43	0.34	0.26	0.17	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
27	15.9	9.9	7.1	5.0	3.6	2.5	1.5	0.80	0.50	0.40	0.30	0.20	...	...	...
28	12.3	9.9	...	...	...	...	...	...	...	...	...	...	...	...	...
29	15.9	9.9	...	...	...	...	...	...	...	...	...	...	...	...	...
30	13.5	8.4	6.0	4.3	3.1	2.1	1.3	0.68	0.43	0.34	0.26	0.17	...	...	...
31	10.5	8.4	6.0	4.3	3.1	2.1	1.3	0.68	0.43	0.34	0.26	0.17	...	...	...
32	13.5	8.4	6.0	4.3	3.1	2.1	1.3	0.68	0.43	0.34	0.26	0.17	...	...	...
33	10.5	8.4	6.0	4.3	3.1	2.1	1.3	0.68	0.43	0.34	0.26	0.17	...	...	...
34	15.9	9.9	...	...	...	...	...	...	...	...	...	...	...	...	...
35	16.7	13.8	10.3	7.6	5.5	4.0	3.0	2.2	1.7	1.3	0.97	0.75	...	...	...
36	16.7	13.8	10.3	7.6	5.5	4.0	3.0	2.2	1.7	1.3	0.97	0.75	...	...	...
37	12.3	12.1	10.3	7.6	5.5	4.0	3.0	2.2	1.7	1.3	0.97	0.75	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
39	14.2	11.7	8.8	6.5	4.7	3.4	2.6	1.9	1.4	1.1	0.82	0.64	...	...	...
40	10.5	10.3	8.8	6.5	4.7	3.4	2.6	1.9	1.4	1.1	0.82	0.64	...	...	...
41	16.7	13.8	10.3	7.6	5.5	4.0	3.0	2.2	1.7	1.3	0.97	0.75	...	...	...
42	12.3	12.1	10.3	7.6	5.5	4.0	3.0	2.2	1.7	1.3	0.97	0.75	...	...	...
43	14.2	11.7	8.8	6.5	4.7	3.4	2.6	1.9	1.4	1.1	0.82	0.64	...	...	...
44	10.5	10.3	8.8	6.5	4.7	3.4	2.6	1.9	1.4	1.1	0.82	0.64	...	...	...
45	16.7	13.8	10.3	7.6	5.5	4.0	3.0	2.2	1.7	1.3	0.97	0.75	...	...	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	25Cr–20Ni	Bar	SA–479	310H	S31009	...	...	8	2
2	25Cr–20Ni–Cb	Smls. tube	SA–213	TP310Cb	S31040	...	...	8	2
3	25Cr–20Ni–Cb	Smls. tube	SA–213	TP310Cb	S31040	...	...	8	2
4	25Cr–20Ni–Cb	Plate	SA–240	310Cb	S31040	...	...	8	2
5	25Cr–20Ni–Cb	Plate	SA–240	310Cb	S31040	...	...	8	2
6	25Cr–20Ni–Cb	Wld. tube	SA–249	TP310Cb	S31040	...	...	8	2
7	25Cr–20Ni–Cb	Wld. tube	SA–249	TP310Cb	S31040	...	...	8	2
8	25Cr–20Ni–Cb	Smls. & wld. pipe	SA–312	TP310Cb	S31040	...	...	8	2
9	25Cr–20Ni–Cb	Smls. pipe	SA–312	TP310Cb	S31040	...	...	8	2
10	25Cr–20Ni–Cb	Wld. pipe	SA–312	TP310Cb	S31040	...	...	8	2
11	25Cr–20Ni–Cb	Wld. pipe	SA–312	TP310Cb	S31040	...	...	8	2
12	25Cr–20Ni–Cb	Bar	SA–479	310Cb	S31040	...	...	8	2
13	25Cr–20Ni–Cb	Bar	SA–479	310Cb	S31040	...	...	8	2
14	25Cr–20Ni–Cb	Wld. pipe	SA–813	TP310Cb	S31040	...	...	8	2
15	25Cr–20Ni–Cb	Wld. pipe	SA–813	TP310Cb	S31040	...	...	8	2
16	25Cr–20Ni–Cb	Wld. pipe	SA–814	TP310Cb	S31040	...	...	8	2
17	25Cr–20Ni–Cb	Wld. pipe	SA–814	TP310Cb	S31040	...	...	8	2
18	25Cr–20Ni–Cb–N	Smls. tube	SA–213	TP310HCbN	S31042	...	...	8	3
19	25Cr–20Ni–Cb–N	Smls. tube	SA–213	TP310HCbN	S31042	...	...	8	3
20	25Cr–22Ni–2Mo–N	Forgings	SA–182	F310MoLN	S31050	...	...	8	2
21	25Cr–22Ni–2Mo–N	Forgings	SA–182	F310MoLN	S31050	...	...	8	2
22	25Cr–22Ni–2Mo–N	Smls. tube	SA–213	TP310MoLN	S31050	...	$0.250 < t \le 1.250$	8	2
23	25Cr–22Ni–2Mo–N	Smls. tube	SA–213	TP310MoLN	S31050	...	$0.250 < t \le 1.250$	8	2
24	25Cr–22Ni–2Mo–N	Plate	SA–240	310MoLN	S31050	...	$t > 0.250$	8	2
25	25Cr–22Ni–2Mo–N	Plate	SA–240	310MoLN	S31050	...	$t > 0.250$	8	2
26	25Cr–22Ni–2Mo–N	Wld. tube	SA–249	TP310MoLN	S31050	...	$0.250 < t \le 1.250$	8	2
27	25Cr–22Ni–2Mo–N	Wld. tube	SA–249	TP310MoLN	S31050	...	$0.250 < t \le 1.250$	8	2
28	25Cr–22Ni–2Mo–N	Wld. pipe	SA–312	TP310MoLN	S31050	...	$0.250 < t \le 1.250$	8	2
29	25Cr–22Ni–2Mo–N	Wld. pipe	SA–312	TP310MoLN	S31050	...	$0.250 < t \le 1.250$	8	2
30	25Cr–22Ni–2Mo–N	Smls. tube	SA–213	TP310MoLN	S31050	...	≤0.250, wall	8	2
31	25Cr–22Ni–2Mo–N	Smls. tube	SA–213	TP310MoLN	S31050	...	≤0.250, wall	8	2
32	25Cr–22Ni–2Mo–N	Plate	SA–240	310MoLN	S31050	...	$t \le 0.250$	8	2
33	25Cr–22Ni–2Mo–N	Plate	SA–240	310MoLN	S31050	...	$t \le 0.250$	8	2
34	25Cr–22Ni–2Mo–N	Wld. tube	SA–249	TP310MoLN	S31050	...	≤0.250, wall	8	2
35	25Cr–22Ni–2Mo–N	Wld. tube	SA–249	TP310MoLN	S31050	...	≤0.250, wall	8	2
36	25Cr–22Ni–2Mo–N	Wld. pipe	SA–312	TP310MoLN	S31050	...	≤0.250, wall	8	2
37	25Cr–22Ni–2Mo–N	Wld. pipe	SA–312	TP310MoLN	S31050	...	≤0.250, wall	8	2
38	26Cr–4Ni–Mo	Plate	SA–240	329	S32900	...	...	10H	1
39	26Cr–4Ni–Mo	Wld. tube	SA–789	...	S32900	...	...	10H	1
40	26Cr–4Ni–Mo	Smls. tube	SA–789	...	S32900	...	...	10H	1
41	26Cr–4Ni–Mo	Wld. pipe	SA–790	...	S32900	...	...	10H	1
42	26Cr–4Ni–Mo	Smls. pipe	SA–790	...	S32900	...	...	10H	1
43	26Cr–4Ni–Mo–N	Plate	SA–240	...	S32950	...	...	10H	1
44	26Cr–4Ni–Mo–N	Wld. tube	SA–789	...	S32950	...	...	10H	1
45	26Cr–4Ni–Mo–N	Smls. tube	SA–789	...	S32950	...	...	10H	1

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	75	30	1500	NP	1500	NP	HA–2	T7
2	75	30	NP	NP	1500	650	HA–2	G5, G12, T5
3	75	30	NP	NP	1500	650	HA–2	G12, T6
4	75	30	NP	NP	1500	650	HA–2	G5, G12, T5
5	75	30	NP	NP	1500	650	HA–2	G12, T6
6	75	30	NP	NP	1500	650	HA–2	G5, G12, G24, T5
7	75	30	NP	NP	1500	650	HA–2	G12, G24, T6
8	75	30	NP	800	1500	650	HA–2	G5, G12, T5, W12, W14
9	75	30	NP	NP	1500	650	HA–2	G12, T6
10	75	30	NP	NP	1500	650	HA–2	G5, G12, G24, T5
11	75	30	NP	NP	1500	650	HA–2	G12, G14, G24, T6
12	75	30	NP	NP	1000	650	HA–2	G5, G12, G22, T5
13	75	30	NP	NP	1000	650	HA–2	G12, G22, T6
14	75	30	NP	NP	1500	650	HA–2	G5, G12, G24, T5
15	75	30	NP	NP	1500	650	HA–2	G12, G24, T6
16	75	30	NP	NP	1500	650	HA–2	G5, G12, G24, T5
17	75	30	NP	NP	1500	650	HA–2	G12, G24, T6
18	95	43	1350	NP	NP	NP	HA–2	G5, G12, S4, T8
19	95	43	1350	NP	NP	NP	HA–2	G12, S4, T9
20	78	37	NP	NP	600	600	HA–2	G5
21	78	37	NP	NP	600	600	HA–2	...
22	78	37	NP	NP	900	650	HA–2	G5
23	78	37	NP	NP	900	650	HA–2	...
24	78	37	NP	NP	600	600	HA–2	G5
25	78	37	NP	NP	600	600	HA–2	...
26	78	37	NP	NP	900	650	HA–2	G5, G24
27	78	37	NP	NP	900	650	HA–2	G24
28	78	37	NP	NP	900	650	HA–2	G5, G24
29	78	37	NP	NP	900	650	HA–2	G24
30	84	39	NP	NP	900	650	HA–2	G5
31	84	39	NP	NP	900	650	HA–2	...
32	84	39	NP	NP	600	600	HA–2	G5
33	84	39	NP	NP	600	600	HA–2	...
34	84	39	NP	NP	900	650	HA–2	G5, G24
35	84	39	NP	NP	900	650	HA–2	G24
36	84	39	NP	NP	900	650	HA–2	G5, G24
37	84	39	NP	NP	900	650	HA–2	G24
38	90	70	NP	NP	500	500	HA–5	G19
39	90	70	NP	NP	500	500	HA–5	G19, G24
40	90	70	NP	NP	500	500	HA–5	G19
41	90	70	NP	NP	500	500	HA–5	G19, G24
42	90	70	NP	NP	500	500	HA–5	G19
43	100	70	NP	NP	600	600	HA–5	G19
44	100	70	NP	NP	600	600	HA–5	G19, G24
45	100	70	NP	NP	600	600	HA–5	G19

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	20.0	...	17.6	...	16.1	15.1	14.3	13.7	13.5	13.3	13.1	12.9	12.7	12.5
2	20.0	...	20.0	...	20.0	19.9	19.3	18.5	18.2	17.9	17.7	17.4	17.2	16.9
3	20.0	...	17.6	...	16.1	15.1	14.3	13.7	13.5	13.3	13.1	12.9	12.7	12.5
4	20.0	...	20.0	...	20.0	19.9	19.3	18.5	18.2	17.9	17.7	17.4	17.2	16.9
5	20.0	...	17.6	...	16.1	15.1	14.3	13.7	13.5	13.3	13.1	12.9	12.7	12.5
6	17.0	...	17.0	...	17.0	16.9	16.4	15.7	15.5	15.2	15.0	14.8	14.6	14.4
7	17.0	...	15.0	...	13.7	12.8	12.1	11.7	11.5	11.3	11.1	11.0	10.8	10.7
8	20.0	...	20.0	...	20.0	19.9	19.3	18.5	18.2	17.9	17.7	17.4	17.2	16.9
9	20.0	...	17.6	...	16.1	15.1	14.3	13.7	13.5	13.3	13.1	12.9	12.7	12.5
10	17.0	...	17.0	...	17.0	16.9	16.4	15.7	15.5	15.2	15.0	14.8	14.6	14.4
11	17.0	...	15.0	...	13.7	12.8	12.1	11.7	11.5	11.3	11.1	11.0	10.8	10.7
12	20.0	...	20.0	...	20.0	19.9	19.3	18.5	18.2	17.9	17.7	17.4	17.2	16.9
13	20.0	...	17.6	...	16.1	15.1	14.3	13.7	13.5	13.3	13.1	12.9	12.7	12.5
14	17.0	...	17.0	...	17.0	16.9	16.4	15.7	15.5	15.2	15.0	14.8	14.6	14.4
15	17.0	...	15.0	...	13.7	12.8	12.1	11.7	11.5	11.3	11.1	11.0	10.8	10.7
16	17.0	...	17.0	...	17.0	16.9	16.4	15.7	15.5	15.2	15.0	14.8	14.6	14.4
17	17.0	...	15.0	...	13.7	12.8	12.1	11.7	11.5	11.3	11.1	11.0	10.8	10.7
18	27.1	...	26.9	...	25.4	24.6	24.2	24.0	23.9	23.8	23.7	23.6	23.4	23.1
19	27.1	...	24.0	...	21.7	20.2	19.2	18.5	18.3	18.1	17.8	17.6	17.4	17.1
20	22.3	...	22.0	...	20.8	20.0	19.5	19.0	...	...	...	...	...	...
21	22.3	...	21.0	...	19.1	17.8	16.8	15.9	...	...	...	...	...	...
22	22.3	...	22.0	...	20.8	20.0	19.5	19.0	18.8	18.7	18.5	18.4	18.2	17.9
23	22.3	...	21.0	...	19.1	17.8	16.8	15.9	15.5	15.1	14.8	14.4	14.0	13.7
24	22.3	...	22.0	...	20.8	20.0	19.5	19.0	...	...	...	...	...	...
25	22.3	...	21.0	...	19.1	17.8	16.8	15.9	...	...	...	...	...	...
26	18.9	...	18.7	...	17.7	17.0	16.5	16.2	16.0	15.9	15.8	15.6	15.5	15.2
27	18.9	...	17.8	...	16.2	15.1	14.3	13.5	13.2	12.9	12.5	12.2	11.9	11.7
28	18.9	...	18.7	...	17.7	17.0	16.5	16.2	16.0	15.9	15.8	15.6	15.5	15.2
29	18.9	...	17.8	...	16.2	15.1	14.3	13.5	13.2	12.9	12.5	12.2	11.9	11.7
30	24.0	...	23.7	...	22.4	21.6	21.0	20.5	20.3	20.1	20.0	19.8	19.6	19.3
31	24.0	...	22.1	...	20.1	18.7	17.7	16.8	16.4	16.0	15.6	15.2	14.8	14.5
32	24.0	...	23.7	...	22.4	21.6	21.0	20.5	...	...	...	...	...	...
33	24.0	...	22.1	...	20.1	18.7	17.7	16.8	...	...	...	...	...	...
34	20.4	...	20.2	...	19.1	18.3	17.8	17.4	17.3	17.1	17.0	16.8	16.6	16.4
35	20.4	...	18.8	...	17.1	15.9	15.0	14.3	13.9	13.6	13.2	12.9	12.6	12.3
36	20.4	...	20.2	...	19.1	18.3	17.8	17.4	17.3	17.1	17.0	16.8	16.6	16.4
37	20.4	...	18.8	...	17.1	15.9	15.0	14.3	13.9	13.6	13.2	12.9	12.6	12.3
38	25.7	...	25.7	...	24.8	24.3	24.3	...	...	...	...	...	...	...
39	21.9	...	21.9	...	21.0	20.6	20.6	...	...	...	...	...	...	...
40	25.7	...	25.7	...	24.8	24.3	24.3	...	...	...	...	...	...	...
41	21.9	...	21.9	...	21.0	20.6	20.6	...	...	...	...	...	...	...
42	25.7	...	25.7	...	24.8	24.3	24.3	...	...	...	...	...	...	...
43	28.6	...	28.5	...	27.0	26.4	26.4	26.4	...	...	...	...	...	...
44	24.3	...	24.2	...	23.0	22.5	22.5	22.5	...	...	...	...	...	...
45	28.6	...	28.5	...	27.0	26.4	26.4	26.4	...	...	...	...	...	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding														
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
1	12.3	12.1	*10.3*	*7.6*	*5.5*	*4.0*	*3.0*	*2.2*	*1.7*	*1.3*	*0.97*	*0.75*	...	...	...
2	*15.9*	*9.9*	*7.1*	*5.0*	*3.6*	*2.5*	*1.5*	*0.80*	*0.50*	*0.40*	*0.30*	*0.20*	...	...	...
3	12.3	*9.9*	*7.1*	*5.0*	*3.6*	*2.5*	*1.5*	*0.80*	*0.50*	*0.40*	*0.30*	*0.20*	...	...	...
4	*15.9*	*9.9*	*7.1*	*5.0*	*3.6*	*2.5*	*1.5*	*0.80*	*0.50*	*0.40*	*0.30*	*0.20*	...	...	...
5	12.3	*9.9*	*7.1*	*5.0*	*3.6*	*2.5*	*1.5*	*0.80*	*0.50*	*0.40*	*0.30*	*0.20*	...	...	...
6	*13.5*	*8.4*	*6.0*	*4.3*	*3.1*	*2.1*	*1.3*	*0.68*	*0.43*	*0.34*	*0.26*	*0.17*	...	...	...
7	10.5	*8.4*	*6.0*	*4.3*	*3.1*	*2.1*	*1.3*	*0.68*	*0.43*	*0.34*	*0.26*	*0.17*	...	...	...
8	*15.9*	*9.9*	*7.1*	*5.0*	*3.6*	*2.5*	*1.5*	*0.80*	*0.50*	*0.40*	*0.30*	*0.20*	...	...	...
9	12.3	*9.9*	*7.1*	*5.0*	*3.6*	*2.5*	*1.5*	*0.80*	*0.50*	*0.40*	*0.30*	*0.20*	...	...	...
10	*13.5*	*8.4*	*6.0*	*4.3*	*3.1*	*2.1*	*1.3*	*0.68*	*0.43*	*0.34*	*0.26*	*0.17*	...	...	...
11	10.5	*8.4*	*6.0*	*4.3*	*3.1*	*2.1*	*1.3*	*0.68*	*0.43*	*0.34*	*0.26*	*0.17*	...	...	...
12	*15.9*	*9.9*	...	...	...	...	...	...	...	...	...	...	...	...	...
13	12.3	*9.9*	...	...	...	...	...	...	...	...	...	...	...	...	...
14	*13.5*	*8.4*	*6.0*	*4.3*	*3.1*	*2.1*	*1.3*	*0.68*	*0.43*	*0.34*	*0.26*	*0.17*	...	...	...
15	10.5	*8.4*	*6.0*	*4.3*	*3.1*	*2.1*	*1.3*	*0.68*	*0.43*	*0.34*	*0.26*	*0.17*	...	...	...
16	*13.5*	*8.4*	*6.0*	*4.3*	*3.1*	*2.1*	*1.3*	*0.68*	*0.43*	*0.34*	*0.26*	*0.17*	...	...	...
17	10.5	*8.4*	*6.0*	*4.3*	*3.1*	*2.1*	*1.3*	*0.68*	*0.43*	*0.34*	*0.26*	*0.17*	...	...	...
18	22.8	22.4	22.0	*18.4*	*13.6*	*10.1*	*7.6*	*5.7*	*4.3*	...	...	...	...	...	...
19	16.9	16.6	16.3	16.1	*13.6*	*10.1*	*7.6*	*5.7*	*4.3*	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	26Cr–4Ni–Mo–N	Wld. pipe	SA–790	...	S32950	...	...	10H	1
2	26Cr–4Ni–Mo–N	Smls. pipe	SA–790	...	S32950	...	...	10H	1
3	29Cr–6.5Ni–2Mo–N	Plate, sheet, strip	SA–240	...	S32906	...	≥0.40	10H	1
4	29Cr–6.5Ni–2Mo–N	Bar	SA–479	...	S32906	...	...	10H	1
5	29Cr–6.5Ni–2Mo–N	Smls. tube	SA–789	...	S32906	...	≥0.40	10H	1
6	29Cr–6.5Ni–2Mo–N	Smls. pipe	SA–790	...	S32906	...	≥0.40	10H	1
7	29Cr–6.5Ni–2Mo–N	Plate, sheet, strip	SA–240	...	S32906	...	<0.40	10H	1
8	29Cr–6.5Ni–2Mo–N	Smls. tube	SA–789	...	S32906	...	<0.40	10H	1
9	29Cr–6.5Ni–2Mo–N	Smls. pipe	SA–790	...	S32906	...	<0.40	10H	1

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only)				External Pressure Chart No.	Notes
			I	III	VIII-1	XII		
1	100	70	NP	NP	600	600	HA–5	G19, G24
2	100	70	NP	NP	600	600	HA–5	G19
3	109	80	NP	NP	600	600	HA–5	G19
4	109	80	NP	NP	600	600	HA–5	G19
5	109	80	NP	NP	600	600	HA–5	G19
6	109	80	NP	NP	600	600	HA–5	G19
7	116	94	NP	NP	600	600	HA–5	G19
8	116	94	NP	NP	600	600	HA–5	G19
9	116	94	NP	NP	600	600	HA–5	G19

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	24.3	...	24.2	...	23.0	22.5	22.5	22.5	...	...	...	...	...	...
2	28.6	...	28.5	...	27.0	26.4	26.4	26.4	...	...	...	...	...	...
3	31.1	...	31.1	...	29.6	28.7	28.3	28.3	...	...	...	...	...	...
4	31.1	...	31.1	...	29.6	28.7	28.3	28.3	...	...	...	...	...	...
5	31.1	...	31.1	...	29.6	28.7	28.3	28.3	...	...	...	...	...	...
6	31.1	...	31.1	...	29.6	28.7	28.3	28.3	...	...	...	...	...	...
7	33.1	...	33.1	...	31.5	30.6	30.1	30.1	...	...	...	...	...	...
8	33.1	...	33.1	...	31.5	30.6	30.1	30.1	...	...	...	...	...	...
9	33.1	...	33.1	...	31.5	30.6	30.1	30.1	...	...	...	...	...	...

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding														
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

NOTES TO TABLE 1A

GENERAL NOTES

(a) The following abbreviations are used: Norm. rld., Normalized rolled; NT, Normalized and tempered; QT, Quenched and tempered; Smls., Seamless; Sol. ann., Solution annealed; and Wld., Welded.

(b) The stress values in this Table may be interpolated to determine values for intermediate temperatures. The values at intermediate temperatures shall be rounded to the same number of decimal places as the value at the higher temperature between which values are being interpolated. The rounding rule is: when the next digit beyond the last place to be retained is less than 5, retain unchanged the digit in the last place retained; when the digit next beyond the last place to be retained is 5 or greater, increase by 1 the digit in the last place retained.

(**21**) (c) The properties of steels are influenced by the processing history, heat treatment, melting practice, and level of residual elements. See Nonmandatory Appendix A for more information.

(**21**) (d) Where a size limit appears in the Size/Thickness column, the limit applies to the dimension appropriate to the product form: wall thickness of tubing, pipe, pipe fittings, and hollow forgings; thickness of plate, flat bar and forgings, and polygonal bar; diameter of solid bar and bolting; and thickest cross–section of other pressure parts, e.g., castings and forgings.

(e) Stress values for 100°F are applicable for colder temperatures when the toughness requirements of Section III, VIII, or XII are met.

(f) An alternative typeface is used for stress values obtained from time–dependent properties (see Notes T1 through T12).

(g) Where specifications, grades, classes, and types are listed in this Table, and where the material specification in Section II, Part A or Part B is a dual–unit specification (e.g., SA–516/SA–516M), the values listed in this Table shall be applicable to either the customary U.S. version of the material specification or the SI units version of the material specification. For example, the values listed for SA–516 Grade 70 shall be used when SA–516M Grade 485 is used in construction.

NOTES – GENERAL REQUIREMENTS

G1 To these stress values a casting quality factor as specified in PG–25 of Section I; UG–24 of Section VIII, Division 1; or TM–190 of Section XII shall be applied.

G2 These stress values include a joint efficiency factor of 0.60.

G3 These stress values include a joint efficiency factor of 0.85.

G4 For Section I applications, these stresses apply when used for boiler, water wall, superheater, and economizer tubes that are enclosed within a setting. A joint efficiency factor of 0.85 is included in values above 850°F.

G5 Due to the relatively low yield strength of these materials, these higher stress values were established at temperatures where the short–time tensile properties govern to permit the use of these alloys where slightly greater deformation is acceptable. The stress values in this range exceed $66\frac{2}{3}$% but do not exceed 90% of the yield strength at temperature. Use of these stresses may result in dimensional changes due to permanent strain. These stress values are not recommended for the flanges of gasketed joints or other applications where slight amounts of distortion can cause leakage or malfunction. For Section III applications, Table Y–2 lists multiplying factors that, when applied to the yield strength values shown in Table Y–1, will give allowable stress values that will result in lower levels of permanent strain.

G6 Creep–fatigue, thermal ratcheting, and environmental effects are increasingly significant failure modes at temperatures in excess of 1500°F and shall be considered in the design.

G7 For Section VIII applications, these stress values are based on expected minimum values of 45,000 psi tensile strength and yield strength of 20,000 psi resulting from loss of strength due to thermal treatment required for the glass coating operation. UG–85 does not apply.

G8 These stress values are established from a consideration of strength only and will be satisfactory for average service. For bolted joints where freedom from leakage over a long period of time without retightening is required, lower stress values may be necessary as determined from the flexibility of the flange and bolts and corresponding relaxation properties.

G9 For Section III applications, the use of these materials shall be limited to materials for tanks covered in Subsections NC and ND, component supports, and for nonpressure–retaining attachments (NC/ND–2190).

G10 Upon prolonged exposure to temperatures above 800°F, the carbide phase of carbon steel may be converted to graphite. See Nonmandatory Appendix A, A–201 and A–202.

G11 Upon prolonged exposure to temperatures above 875°F, the carbide phase of carbon–molybdenum steel may be converted to graphite. See Nonmandatory Appendix A, A–201 and A–202.

G12 At temperatures above 1000°F, these stress values apply only when the carbon is 0.04% or higher on heat analysis.

G13 These stress values at 1050°F and above shall be used only when the grain size is ASTM No. 6 or coarser.

G14 These stress values shall be used when the grain size is not determined or is determined to be finer than ASTM No. 6.

G15 For Section I applications, use is limited to stays as defined in PG–13 except as permitted by PG–11.

G16 For Section III Class 3 applications, these *S* values do not include a casting quality factor. Statically and centrifugally cast products meeting the requirements of NC–2570 shall receive a casting quality factor of 1.00.

G17 For Section III Class 3 applications, statically and centrifugally cast products meeting the requirements of NC–2571(a) and (b), and cast pipe fittings, pumps, and valves with inlet piping connections of 2 in. nominal pipe size and less, shall receive a casting quality factor of 1.00. Other casting quality factors shall be in accordance with the following:

(a) for visual examination, 0.80
(b) for magnetic particle examination, 0.85
(c) for liquid penetrant examination, 0.85
(d) for radiography, 1.00
(e) for ultrasonic examination, 1.00
(f) for magnetic particle or liquid penetrant plus ultrasonic examination or radiography, 1.00

G18 See Table Y–1 for yield strength values as a function of thickness over this range. Allowable stresses are independent of yield strength in this thickness range.

NOTES TO TABLE 1A (CONT'D)

NOTES – GENERAL REQUIREMENTS (CONT'D)

G19 This steel may be expected to develop embrittlement after service at moderately elevated temperature; see Nonmandatory Appendix A, A–207 and A–208.

G20 These stresses are based on weld metal properties.

G21 For Section I, use is limited to PEB–5.3. See PG–5.5 for cautionary note.

G22 For Section I applications, use of external pressure charts for material in the form of bar stock is permitted for stiffening rings only.

G23 For temperatures above the maximum temperature shown on the external pressure chart for this material, Fig. CS–2 may be used for the design using this material.

G24 A factor of 0.85 has been applied in arriving at the maximum allowable stress values in tension for this material. Divide tabulated values by 0.85 for maximum allowable longitudinal tensile stress.

G25 For Section III applications, for both Class 2 and Class 3, the completed vessel after final heat treatment shall be examined by the ultrasonic method in accordance with NB–2542 except that angle beam examination in both the circumferential and the axial directions may be performed in lieu of the straight beam examination in the axial direction. The tensile strength shall not exceed 125,000 psi.

G26 Material that conforms to Class 10, 11, or 12 is not permitted.

G27 Material that conforms to Class 11 or 12 is not permitted.

G28 Supplementary Requirement S15 of SA–781, Alternate Mechanical Test Coupons and Specimen Locations for Castings, is mandatory.

G29 For Section III applications, impact testing in accordance with the requirements of NC–2300 is required for Class 2 components and in accordance with ND–2300 for Class 3 components.

G30 These stresses apply to all product forms (C, H, and P) as defined in SA/EN 10028–7.

NOTES – HEAT TREATMENT REQUIREMENTS

H1 For temperatures above 1000°F, these stress values may be used only if the material is heat treated by heating to the minimum temperature specified in the material specification, but not lower than 1900°F, and quenching in water or rapidly cooling by other means.

H2 For temperatures above 1000°F, these stress values may be used only if the material is heat treated by heating to a minimum temperature of 2000°F, and quenching in water or rapidly cooling by other means.

H3 Quenched and tempered at 1200°F.

H4 Solution treated and quenched.

H5 For Section III applications, if heat treatment is performed after forming or fabrication, it shall be performed at 1500°F to 1850°F for a period of time not to exceed 10 min at temperature, followed by rapid cooling.

H6 Material shall be solution annealed at 2010°F to 2140°F, followed by a rapid cooling in water or air.

NOTES – SIZE REQUIREMENTS

S1 For Section I applications, stress values at temperatures of 850°F and above are permissible but, except for tubular products 3 in. O.D. or less enclosed within the boiler setting, use of these materials at these temperatures is not current practice.

S2 For Section I applications, stress values at temperatures of 900°F and above are permissible but, except for tubular products 3 in. O.D. or less enclosed within the boiler setting, use of these materials at these temperatures is not current practice.

S3 For Section I applications, stress values at temperatures of 1000°F and above are permissible but, except for tubular products 3 in. O.D. or less enclosed within the boiler setting, use of these materials at these temperatures is not current practice.

S4 For Section I applications, stress values at temperatures of 1150°F and above are permissible but, except for tubular products 3 in. O.D. or less enclosed within the boiler setting, use of these materials at these temperatures is not current practice.

S5 Material that conforms to Class 10, 11, or 12 is not permitted when the nominal thickness of the material exceeds $^{3}/_{4}$ in.

S6 Material that conforms to Class 10, 11, or 12 is not permitted when the nominal thickness of the material exceeds $1^{1}/_{4}$ in.

S7 The maximum thickness of unheat–treated forgings shall not exceed $3^{3}/_{4}$ in. The maximum thickness as–heat–treated may be 4 in.

S8 The maximum section thickness shall not exceed 3 in. for double–normalized–and–tempered forgings, or 5 in. for quenched–and–tempered forgings.

S9 Both NPS 8 and larger, and schedule 140 and heavier.

S10 The maximum pipe size shall be NPS 4 and the maximum thickness in any pipe size shall be schedule 80.

S11 Either NPS 8 and larger and less than schedule 140 wall, or less than NPS 8 and all wall thicknesses.

NOTES – TIME–DEPENDENT PROPERTIES [See General Note (f)]

T1 Allowable stresses for temperatures of 700°F and above are values obtained from time–dependent properties.

T2 Allowable stresses for temperatures of 750°F and above are values obtained from time–dependent properties.

T3 Allowable stresses for temperatures of 850°F and above are values obtained from time–dependent properties.

T4 Allowable stresses for temperatures of 900°F and above are values obtained from time–dependent properties.

T5 Allowable stresses for temperatures of 950°F and above are values obtained from time–dependent properties.

T6 Allowable stresses for temperatures of 1000°F and above are values obtained from time–dependent properties.

T7 Allowable stresses for temperatures of 1050°F and above are values obtained from time–dependent properties.

T8 Allowable stresses for temperatures of 1100°F and above are values obtained from time–dependent properties.

T9 Allowable stresses for temperatures of 1150°F and above are values obtained from time–dependent properties.

T10 Allowable stresses for temperatures of 800°F and above are values obtained from time–dependent properties.

T11 Allowable stresses for temperatures of 650°F and above are values obtained from time–dependent properties.

T12 Allowable stresses for temperatures of 1200°F and above are values obtained from time–dependent properties.

NOTES – WELDING REQUIREMENTS

W1 Not for welded construction.

W2 Not for welded construction in Section III.

NOTES TO TABLE 1A (CONT'D)

NOTES – WELDING REQUIREMENTS (CONT'D)

W3 Welded.

W4 Nonwelded, or welded if the tensile strength of the Section IX reduced section tension test is not less than 100 ksi.

W5 Welded, with the tensile strength of the Section IX reduced tension test less than 100 ksi but not less than 95 ksi.

W6 This material may be welded by the resistance technique.

W7 In welded construction for temperatures above 850°F, the weld metal shall have a carbon content of greater than 0.05%.

W8 Welding and oxygen or other thermal cutting processes are not permitted when carbon content exceeds 0.35% by heat analysis.

W9 For Section I applications, for pressure retaining welds in $2\frac{1}{4}$Cr–1Mo materials, other than circumferential butt welds less than or equal to $3\frac{1}{2}$ in. in outside diameter, when the design metal temperatures exceed 850°F, the weld metal shall have a carbon content greater than 0.05%.

W10 For Section III applications, material that conforms to Class 10, 13, 20, 23, 30, 33, 40, 43, 50, or 53 is not permitted for Class 2 and Class 3 construction when a weld efficiency factor of 1.00 is used in accordance with Note W12.

W11 For Section VIII applications, Section IX, QW–250 Variables QW–404.12, QW–406.3, QW–407.2, and QW–409.1 shall also apply to this material. These variables shall be applied in accordance with the rules for welding of Part UF.

W12 These *S* values do not include a longitudinal weld efficiency factor. For Section III applications, for materials welded without filler metal, ultrasonic examination, radiographic examination, or eddy current examination, in accordance with NC–2550, shall provide a longitudinal weld efficiency factor of 1.00. Materials welded with filler metal meeting the requirements of NC–2560 shall receive a longitudinal weld efficiency factor of 1.00. Other longitudinal weld efficiency factors shall be in accordance with the following:

(a) for single butt weld, with filler metal, 0.80

(b) for single or double butt weld, without filler metal, 0.85

(c) for double butt weld, with filler metal, 0.90

(d) for single or double butt weld, with radiography, 1.00

(**21**) W13 For Section I applications, electric resistance and autogenous welded tubing may be used with these stresses, provided the following additional restrictions and requirements are met:

(a) The tubing shall be used for boiler, waterwall, superheater, and economizer tubes that are enclosed within the setting.

(b) The maximum outside diameter shall be $3\frac{1}{2}$ in.

(c) The weld seam of each tube shall be subjected to an angle beam ultrasonic inspection per SA–450/SA–1016.

(d) A complete volumetric inspection of the entire length of each tube shall be performed in accordance with SA–450/SA–1016.

(e) Material test reports shall be supplied.

W14 These *S* values do not include a weld factor. For Section VIII, Division 1 and Section XII applications using welds made without filler metal, the tabulated tensile stress values shall be multiplied by 0.85. For welds made with filler metal, consult UW–12 for Section VIII, Division 1, or TW–130.4 for Section XII, as applicable.

W15 The Nondestructive Electric Test requirements of SA–53 Type E pipe are required for all sizes. The pipe shall be additionally marked "NDE" and so noted on the material certification.

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Table 1B
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
1	...	Plate, sheet	SB–209	...	Alclad 3003	O
2	...	Plate, sheet	SB–209	...	Alclad 3003	O
3	...	Plate, sheet	SB–209	...	Alclad 3003	H112
4	...	Plate, sheet	SB–209	...	Alclad 3003	H112
5	...	Plate, sheet	SB–209	...	Alclad 3003	H112
6	...	Plate, sheet	SB–209	...	Alclad 3003	H12
7	...	Plate, sheet	SB–209	...	Alclad 3003	H12
8	...	Plate, sheet	SB–209	...	Alclad 3003	H14
9	...	Plate, sheet	SB–209	...	Alclad 3003	H14
10	...	Drawn smls. tube	SB–210	...	Alclad 3003	O
11	...	Drawn smls. tube	SB–210	...	Alclad 3003	H113
12	...	Drawn smls. tube	SB–210	...	Alclad 3003	H14
13	...	Drawn smls. tube	SB–210	...	Alclad 3003	H18
14	...	Cond. & heat exch. tubes	SB–234	...	Alclad 3003	H14
15	...	Cond. & heat exch. tubes	SB–234	...	Alclad 3003	H25
16	...	Smls. extr. tube	SB–241	...	Alclad 3003	O
17	...	Smls. extr. tube	SB–241	...	Alclad 3003	H112
18	...	Plate, sheet	SB–209	...	Alclad 3004	O
19	...	Plate, sheet	SB–209	...	Alclad 3004	O
20	...	Plate, sheet	SB–209	...	Alclad 3004	H112
21	...	Plate, sheet	SB–209	...	Alclad 3004	H112
22	...	Plate, sheet	SB–209	...	Alclad 3004	H32
23	...	Plate, sheet	SB–209	...	Alclad 3004	H32
24	...	Plate, sheet	SB–209	...	Alclad 3004	H34
25	...	Plate, sheet	SB–209	...	Alclad 3004	H34
26	...	Plate, sheet	SB–209	...	Alclad 6061	T4
27	...	Plate, sheet	SB–209	...	Alclad 6061	T451
28	...	Plate, sheet	SB–209	...	Alclad 6061	T451
29	...	Plate, sheet	SB–209	...	Alclad 6061	T4 wld.
30	...	Plate, sheet	SB–209	...	Alclad 6061	T451 wld.
31	...	Plate, sheet	SB–209	...	Alclad 6061	T6
32	...	Plate, sheet	SB–209	...	Alclad 6061	T651
33	...	Plate, sheet	SB–209	...	Alclad 6061	T651
34	...	Plate, sheet	SB–209	...	Alclad 6061	T651
35	...	Plate, sheet	SB–209	...	Alclad 6061	T6 wld.
36	...	Plate, sheet	SB–209	...	Alclad 6061	T651 wld.
37	...	Castings	SB–26	...	A02040	T4
38	...	Castings	SB–108	...	A02040	T4
39	...	Castings	SB–26	...	A03560	T71
40	...	Castings	SB–26	...	A03560	T6
41	...	Castings	SB–108	...	A03560	T6
42	...	Castings	SB/EN 1706	...	AC–42000–S	T6
43	...	Castings	SB–26	...	A24430	F
44	...	Plate, sheet	SB–209	...	A91060	O
45	...	Plate, sheet	SB–209	...	A91060	H112

Table 1B
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Size/ Thickness, in.	P-No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	0.006–0.499	21	13	4.5	NP	250 (Cl. 3 only)	400	400	NFA–7	G16
2	0.500–3.000	21	14	5	NP	250 (Cl. 3 only)	400	400	NFA–7	G25
3	0.250–0.499	21	16	9	NP	300 (Cl. 3 only)	400	400	NFA–7	G16, W3
4	0.500–2.000	21	15	6	NP	200 (Cl. 3 only)	400	400	NFA–7	G26, W3
5	2.001–3.000	21	14.5	6	NP	200 (Cl. 3 only)	400	400	NFA–7	G26, W3
6	0.017–0.499	21	16	11	NP	300 (Cl. 3 only)	400	400	NFA–7	G16, W3
7	0.500–2.000	21	17	12	NP	300 (Cl. 3 only)	400	400	NFA–7	G25, W3
8	0.009–0.499	21	19	16	NP	250 (Cl. 3 only)	400	400	NFA–7	G16, W3
9	0.500–1.000	21	20	17	NP	250 (Cl. 3 only)	400	400	NFA–7	G25, W3
10	0.010–0.500	21	13	4.5	NP	250 (Cl. 3 only)	400	400	NFA–7	G16
11	0.050–0.500	21	13	4.5	NP	250 (Cl. 3 only)	400	400	NFA–7	G16, W3
12	0.010–0.500	21	19	16	NP	250 (Cl. 3 only)	400	400	NFA–1	G16, W3
13	0.010–0.500	21	26	23	NP	250 (Cl. 3 only)	400	400	NFA–1	G16, W3
14	0.010–0.200	21	19	16	NP	250 (Cl. 3 only)	400	400	NFA–1	G16, W4
15	0.010–0.200	21	21	18	NP	250 (Cl. 3 only)	400	400	NFA–1	G16, W4
16	...	21	13	4.5	NP	250 (Cl. 3 only)	400	400	NFA–7	G16
17	...	21	13	4.5	NP	250 (Cl. 3 only)	400	400	NFA–7	G16, W3
18	0.006–0.499	22	21	8	NP	300 (Cl. 3 only)	400	400	NFA–7	G16
19	0.500–3.000	22	22	8.5	NP	300 (Cl. 3 only)	400	400	NFA–7	G25
20	0.250–0.499	22	22	8.5	NP	300 (Cl. 3 only)	400	400	NFA–7	G16, W3
21	0.500–3.000	22	23	9	NP	300 (Cl. 3 only)	400	400	NFA–7	G25, W3
22	0.017–0.499	22	27	20	NP	250 (Cl. 3 only)	400	400	NFA–7	G16, W3
23	0.500–2.000	22	28	21	NP	250 (Cl. 3 only)	400	400	NFA–7	G25, W3
24	0.009–0.499	22	31	24	NP	250 (Cl. 3 only)	400	400	NFA–7	G16, W3
25	0.500–1.000	22	32	25	NP	250 (Cl. 3 only)	400	400	NFA–7	G25, W3
26	0.010–0.249	23	27	14	NP	400 (Cl. 3 only)	400	400	NFA–12	G16, G24, W4
27	0.250–0.499	23	27	14	NP	400 (Cl. 3 only)	400	400	NFA–12	G16, G24, W4
28	0.500–3.000	23	30	16	NP	400 (Cl. 3 only)	400	400	NFA–12	G24, G25, W4
29	0.010–0.249	23	24	...	NP	400 (Cl. 3 only)	400	400	NFA–12	G24, W7
30	0.250–3.000	23	24	...	NP	400 (Cl. 3 only)	400	400	NFA–12	G24, W7
31	0.010–0.249	23	38	32	NP	400 (Cl. 3 only)	400	400	NFA–12	G16, G24, W4
32	0.250–0.499	23	38	32	NP	400 (Cl. 3 only)	400	400	NFA–12	G16, G24, W4
33	0.500–4.000	23	42	35	NP	400 (Cl. 3 only)	400	400	NFA–12	G24, G25, W4
34	4.001–5.000	23	40	35	NP	400 (Cl. 3 only)	400	400	NFA–12	G24, G26, W4
35	0.010–0.249	23	24	...	NP	400 (Cl. 3 only)	400	400	NFA–12	G24, W7
36	0.250–5.000	23	24	...	NP	400 (Cl. 3 only)	400	400	NFA–12	G24, W7
37	≤2.000	...	45	28	NP	NP	150	150	NFA–12	G15, W4
38	≤2.000	...	48	29	NP	NP	150	150	NFA–12	G15, W4
39	...	...	25	18	NP	350 (Cl. 3 only)	400	400	NFA–1	G15, W4
40	...	...	30	20	NP	250 (Cl. 3 only)	250	250	NFA–12	G15, W4
41	...	...	33	22	NP	NP	250	250	NFA–12	G15, W4
42	...	...	32	26	NP	NP	250	NP	NFA–12	G15, W4
43	...	...	17	6	NP	400 (Cl. 3 only)	400	400	NFA–1	G15, W4
44	0.006–3.000	21	8	2.5	NP	300 (Cl. 3 only)	400	400	NFA–7	T3
45	0.250–0.499	21	11	7	NP	300 (Cl. 3 only)	400	400	NFA–7	T3, W3

Table 1B
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																	
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950
1	3.0	2.9	2.8	2.7	2.2	1.6	1.3	...	...	...	...	...	...	...	...	...	...	...
2	3.3	3.2	3.1	3.0	2.2	1.6	1.3	...	...	...	...	...	...	...	...	...	...	...
3	4.6	4.5	4.2	3.9	3.3	2.7	2.1	...	...	...	...	...	...	...	...	...	...	...
4	4.0	3.9	3.8	3.6	2.2	1.6	1.3	...	...	...	...	...	...	...	...	...	...	...
5	4.0	3.9	3.8	3.5	2.2	1.6	1.3	...	...	...	...	...	...	...	...	...	...	...
6	4.6	4.6	4.5	4.2	3.3	2.7	2.1	...	...	...	...	...	...	...	...	...	...	...
7	4.9	4.9	4.8	4.5	3.3	2.7	2.1	...	...	...	...	...	...	...	...	...	...	...
8	5.4	5.4	5.4	5.2	3.9	2.7	2.1	...	...	...	...	...	...	...	...	...	...	...
9	5.7	5.7	5.7	5.5	3.9	2.7	2.1	...	...	...	...	...	...	...	...	...	...	...
10	3.0	2.9	2.8	2.7	2.2	1.6	1.3	...	...	...	...	...	...	...	...	...	...	...
11	3.0	2.9	2.8	2.7	2.2	1.6	1.3	...	...	...	...	...	...	...	...	...	...	...
12	5.4	5.4	5.4	5.2	3.9	2.7	2.1	...	...	...	...	...	...	...	...	...	...	...
13	7.4	7.4	7.3	6.9	4.8	3.2	2.3	...	...	...	...	...	...	...	...	...	...	...
14	5.4	5.4	5.4	5.2	3.9	2.7	2.1	...	...	...	...	...	...	...	...	...	...	...
15	6.0	6.0	6.0	5.7	3.9	2.7	2.1	...	...	...	...	...	...	...	...	...	...	...
16	3.0	2.9	2.8	2.7	2.2	1.6	1.2	...	...	...	...	...	...	...	...	...	...	...
17	3.0	2.9	2.8	2.7	2.2	1.6	1.2	...	...	...	...	...	...	...	...	...	...	...
18	5.3	5.3	5.3	5.3	4.5	3.4	2.1	...	...	...	...	...	...	...	...	...	...	...
19	5.7	5.7	5.7	5.7	4.5	3.4	2.1	...	...	...	...	...	...	...	...	...	...	...
20	5.7	5.7	5.7	5.7	4.6	3.4	2.1	...	...	...	...	...	...	...	...	...	...	...
21	6.0	6.0	6.0	6.0	4.6	3.4	2.1	...	...	...	...	...	...	...	...	...	...	...
22	7.7	7.7	7.7	7.7	5.2	3.4	2.1	...	...	...	...	...	...	...	...	...	...	...
23	8.0	8.0	8.0	8.0	5.2	3.4	2.1	...	...	...	...	...	...	...	...	...	...	...
24	8.9	8.9	8.9	8.9	5.2	3.4	2.1	...	...	...	...	...	...	...	...	...	...	...
25	9.1	9.1	9.1	9.1	5.2	3.4	2.1	...	...	...	...	...	...	...	...	...	...	...
26	7.7	7.7	7.7	7.6	6.2	5.7	4.0	...	...	...	...	...	...	...	...	...	...	...
27	7.7	7.7	7.7	7.6	6.2	5.7	4.0	...	...	...	...	...	...	...	...	...	...	...
28	8.6	8.6	8.6	8.5	6.2	5.7	4.0	...	...	...	...	...	...	...	...	...	...	...
29	6.9	6.9	6.9	6.8	5.5	4.6	3.5	...	...	...	...	...	...	...	...	...	...	...
30	6.9	6.9	6.9	6.8	5.5	4.6	3.5	...	...	...	...	...	...	...	...	...	...	...
31	10.9	10.9	10.9	10.6	7.6	5.7	4.0	...	...	...	...	...	...	...	...	...	...	...
32	10.9	10.9	10.9	10.6	7.6	5.7	4.0	...	...	...	...	...	...	...	...	...	...	...
33	12.0	12.0	12.0	11.7	7.6	5.7	4.0	...	...	...	...	...	...	...	...	...	...	...
34	11.4	11.4	11.4	11.1	7.4	5.7	4.0	...	...	...	...	...	...	...	...	...	...	...
35	6.9	6.9	6.9	6.8	5.5	4.6	3.5	...	...	...	...	...	...	...	...	...	...	...
36	6.9	6.9	6.9	6.8	5.5	4.6	3.5	...	...	...	...	...	...	...	...	...	...	...
37	8.4	7.1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
38	10.3	8.6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
39	7.2	7.2	7.2	6.3	5.4	4.1	2.4	...	...	...	...	...	...	...	...	...	...	...
40	8.6	8.6	8.6	6.3	...	...	...	...	...	...	...	...	...	...	...	...	...	...
41	9.5	9.3	8.5	6.4	...	...	...	...	...	...	...	...	...	...	...	...	...	...
42	9.1	9.1	9.1	9.1	...	...	...	...	...	...	...	...	...	...	...	...	...	...
43	4.0	4.0	4.0	3.8	3.5	3.1	2.8	...	...	...	...	...	...	...	...	...	...	...
44	1.7	1.7	1.6	1.4	1.3	*1.1*	*0.80*	...	...	...	...	...	...	...	...	...	...	...
45	3.1	3.0	2.7	2.4	1.8	*1.6*	*1.0*	...	...	...	...	...	...	...	...	...	...	...

Table 1B
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																
	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	1700	1750	1800
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
1	...	Plate, sheet	SB–209	...	A91060	H112
2	...	Plate, sheet	SB–209	...	A91060	H112
3	...	Plate, sheet	SB–209	...	A91060	H12
4	...	Plate, sheet	SB–209	...	A91060	H14
5	...	Drawn smls. tube	SB–210	...	A91060	O
6	...	Drawn smls. tube	SB–210	...	A91060	H14
7	...	Drawn smls. tube	SB–210	...	A91060	H113
8	...	Bar, rod, shapes	SB–221	...	A91060	O
9	...	Bar, rod, shapes	SB–221	...	A91060	H112
10	...	Cond. & heat exch. tubes	SB–234	...	A91060	H14
11	...	Smls. extr. tube	SB–241	...	A91060	O
12	...	Smls. extr. tube	SB–241	...	A91060	H112
13	...	Plate, sheet	SB–209	...	A91100	O
14	...	Plate, sheet	SB–209	...	A91100	H112
15	...	Plate, sheet	SB–209	...	A91100	H112
16	...	Plate, sheet	SB–209	...	A91100	H112
17	...	Plate, sheet	SB–209	...	A91100	H12
18	...	Plate, sheet	SB–209	...	A91100	H14
19	...	Bar, rod, shapes	SB–221	...	A91100	O
20	...	Bar, rod, shapes	SB–221	...	A91100	H112
21	...	Smls. extr. tube	SB–241	...	A91100	O
22	...	Smls. extr. tube	SB–241	...	A91100	H112
23	...	Die forgings	SB–247	...	A92014	T4
24	...	Die forgings	SB–247	...	A92014	T6
25	...	Die forgings	SB–247	...	A92014	T6
26	...	Bar, rod, wire	SB–211	...	A92024	T4
27	...	Bar, rod, wire	SB–211	...	A92024	T4
28	...	Bar, rod, wire	SB–211	...	A92024	T4
29	...	Bar, rod, wire	SB–211	...	A92024	T4
30	...	Bar, rod, shapes	SB–221	...	A92024	T3
31	...	Bar, rod, shapes	SB–221	...	A92024	T3
32	...	Bar, rod, shapes	SB–221	...	A92024	T3
33	...	Bar, rod, shapes	SB–221	...	A92024	T3
34	...	Plate, sheet	SB–209	...	A93003	O
35	...	Plate, sheet	SB–209	...	A93003	H112
36	...	Plate, sheet	SB–209	...	A93003	H112
37	...	Plate, sheet	SB–209	...	A93003	H112
38	...	Plate, sheet	SB–209	...	A93003	H12
39	...	Plate, sheet	SB–209	...	A93003	H14
40	...	Drawn smls. tube	SB–210	...	A93003	O
41	...	Drawn smls. tube	SB–210	...	A93003	H113
42	...	Drawn smls. tube	SB–210	...	A93003	H12
43	...	Drawn smls. tube	SB–210	...	A93003	H14
44	...	Drawn smls. tube	SB–210	...	A93003	H18
45	...	Bar, rod, shapes	SB–221	...	A93003	O

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Size/ Thickness, in.	P-No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	0.500–1.000	21	10	5	NP	300 (Cl. 3 only)	400	400	NFA–7	T4, W3
2	1.001–3.000	21	9	4	NP	250 (Cl. 3 only)	400	400	NFA–7	T3, W3
3	0.017–2.000	21	11	9	NP	300 (Cl. 3 only)	400	400	NFA–7	T3, W3
4	0.009–1.000	21	12	10	NP	300 (Cl. 3 only)	400	400	NFA–7	T3, W3
5	0.018–0.500	21	8.5	2.5	NP	300 (Cl. 3 only)	400	400	NFA–7	T3
6	0.018–0.500	...	12	10	NP	300 (Cl. 3 only)	400	400	NFA–7	T3, W3
7	0.018–0.500	21	8.5	2.5	NP	300 (Cl. 3 only)	400	400	NFA–7	T3, W3
8	...	21	8.5	2.5	NP	300 (Cl. 3 only)	400	400	NFA–7	G13, T3
9	...	21	8.5	2.5	NP	300 (Cl. 3 only)	400	400	NFA–7	G13, T3, W3
10	0.010–0.200	21	12	10	NP	300 (Cl. 3 only)	400	400	NFA–7	T3, W4
11	...	21	8.5	2.5	NP	300 (Cl. 3 only)	400	400	NFA–7	T3
12	...	21	8.5	2.5	NP	300 (Cl. 3 only)	400	400	NFA–7	T3, W3
13	0.006–3.000	21	11	3.5	NP	250 (Cl. 3 only)	400	400	NFA–7	T4
14	0.250–0.499	21	13	7	NP	250 (Cl. 3 only)	400	400	NFA–7	T4, W3
15	0.500–2.000	21	12	5	NP	250 (Cl. 3 only)	400	400	NFA–7	T4, W3
16	2.001–3.000	21	11.5	4	NP	250 (Cl. 3 only)	400	400	NFA–7	T4, W3
17	0.017–2.000	21	14	11	NP	250 (Cl. 3 only)	400	400	NFA–7	T4, W3
18	0.009–1.000	21	16	14	NP	250 (Cl. 3 only)	400	400	NFA–7	T4, W3
19	...	21	11	3	NP	250 (Cl. 3 only)	400	400	NFA–7	T4
20	...	21	11	3	NP	250 (Cl. 3 only)	400	400	NFA–7	T4, W3
21	...	21	11	3	NP	250 (Cl. 3 only)	400	400	NFA–7	T4
22	...	21	11	3	NP	250 (Cl. 3 only)	400	400	NFA–7	T4, W3
23	≤4.000	...	55	30	NP	400 (Cl. 3 only)	400	400	NFA–6	T3, W4
24	≤2.000	...	65	56	NP	400 (Cl. 3 only)	400	400	NFA–6	T2, W4
25	2.001–4.000	...	63	54	NP	400 (Cl. 3 only)	400	400	NFA–6	T2, W4
26	0.125–0.499	...	62	45	NP	400 (Cl. 3 only)	400	400	NFA–6	T2, W4
27	0.500–4.500	...	62	42	NP	400 (Cl. 3 only)	400	400	NFA–6	T2, W4
28	4.501–6.500	...	62	40	NP	400 (Cl. 3 only)	400	400	NFA–6	T2, W4
29	6.501–8.000	...	58	38	NP	400 (Cl. 3 only)	400	400	NFA–6	T2, W4
30	≤0.249	...	57	42	NP	400 (Cl. 3 only)	400	400	NFA–6	G24, T2, W4
31	0.250–0.749	...	60	44	NP	400 (Cl. 3 only)	400	400	NFA–6	G24, T2, W4
32	0.750–1.499	...	65	46	NP	400 (Cl. 3 only)	400	400	NFA–6	G24, T2, W4
33	≥1.500	...	68	48	NP	400 (Cl. 3 only)	400	400	NFA–6	G24, T2, W4
34	0.006–3.000	21	14	5	NP	250 (Cl. 3 only)	400	400	NFA–1	T3
35	0.250–0.499	21	17	10	NP	300 (Cl. 3 only)	400	400	NFA–1	T4, W3
36	0.500–2.000	21	15	6	NP	200 (Cl. 3 only)	400	400	NFA–1	T3, W3
37	2.001–3.000	21	14.5	6	NP	200 (Cl. 3 only)	400	400	NFA–1	T3, W3
38	0.017–2.000	21	17	12	NP	300 (Cl. 3 only)	400	400	NFA–1	T4, W3
39	0.009–1.000	21	20	17	NP	250 (Cl. 3 only)	400	400	NFA–2	T4, W3
40	0.010–0.500	21	14	5	NP	250 (Cl. 3 only)	400	400	NFA–1	T3
41	0.010–0.500	21	14	5	NP	250 (Cl. 3 only)	400	400	NFA–1	T3, W3
42	0.010–0.500	21	17	12	NP	300 (Cl. 3 only)	400	400	NFA–1	T4, W3
43	0.010–0.500	21	20	17	NP	250 (Cl. 3 only)	400	400	NFA–2	T4, W3
44	0.010–0.500	21	27	24	NP	250 (Cl. 3 only)	400	400	NFA–2	T4, W3
45	...	21	14	5	NP	250 (Cl. 3 only)	400	400	NFA–1	T3

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																	
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950
1	2.9	2.7	2.4	2.2	1.7	1.4	*1.0*	...	...	...	...	...	...	...	...	...	...	...
2	2.6	2.4	2.2	1.9	1.5	*1.1*	*0.80*	...	...	...	...	...	...	...	...	...	...	...
3	3.1	3.1	2.9	2.7	2.1	*1.8*	*1.1*	...	...	...	...	...	...	...	...	...	...	...
4	3.4	3.4	3.4	3.4	2.6	*1.8*	*1.2*	...	...	...	...	...	...	...	...	...	...	...
5	1.7	1.7	1.6	1.4	1.3	*1.1*	*0.80*	...	...	...	...	...	...	...	...	...	...	...
6	3.4	3.4	3.4	3.4	2.6	*1.8*	*1.2*	...	...	...	...	...	...	...	...	...	...	...
7	1.7	1.7	1.6	1.4	1.3	*1.1*	*0.80*	...	...	...	...	...	...	...	...	...	...	...
8	1.7	1.7	1.6	1.4	1.3	*1.1*	*0.80*	...	...	...	...	...	...	...	...	...	...	...
9	1.7	1.7	1.6	1.4	1.3	*1.1*	*0.80*	...	...	...	...	...	...	...	...	...	...	...
10	3.4	3.4	3.4	3.4	2.6	*1.8*	*1.2*	...	...	...	...	...	...	...	...	...	...	...
11	1.7	1.7	1.6	1.4	1.3	*1.1*	*0.80*	...	...	...	...	...	...	...	...	...	...	...
12	1.7	1.7	1.6	1.4	1.2	*1.0*	*0.80*	...	...	...	...	...	...	...	...	...	...	...
13	2.3	2.3	2.3	2.3	1.8	1.4	*1.0*	...	...	...	...	...	...	...	...	...	...	...
14	3.7	3.7	3.5	3.1	2.4	1.7	*1.0*	...	...	...	...	...	...	...	...	...	...	...
15	3.3	3.3	3.2	2.9	2.2	1.7	*1.0*	...	...	...	...	...	...	...	...	...	...	...
16	2.7	2.7	2.6	2.5	1.8	1.4	*1.0*	...	...	...	...	...	...	...	...	...	...	...
17	4.0	4.0	4.0	3.6	2.8	2.0	*1.2*	...	...	...	...	...	...	...	...	...	...	...
18	4.6	4.6	4.6	4.2	2.8	2.0	*1.2*	...	...	...	...	...	...	...	...	...	...	...
19	2.0	2.0	2.0	2.0	1.8	1.4	*1.0*	...	...	...	...	...	...	...	...	...	...	...
20	2.0	2.0	2.0	2.0	1.8	1.4	*1.0*	...	...	...	...	...	...	...	...	...	...	...
21	2.0	2.0	2.0	2.0	1.8	1.4	*1.0*	...	...	...	...	...	...	...	...	...	...	...
22	2.0	2.0	2.0	2.0	1.8	1.4	*1.0*	...	...	...	...	...	...	...	...	...	...	...
23	15.7	15.7	13.3	12.5	11.5	*6.8*	*3.9*	...	...	...	...	...	...	...	...	...	...	...
24	18.6	18.6	18.6	14.8	*11.5*	*6.8*	*3.9*	...	...	...	...	...	...	...	...	...	...	...
25	18.0	18.0	18.0	14.3	*11.5*	*6.8*	*3.9*	...	...	...	...	...	...	...	...	...	...	...
26	17.7	17.7	17.7	13.7	*10.4*	*6.5*	*4.5*	...	...	...	...	...	...	...	...	...	...	...
27	17.7	17.7	17.7	13.7	*10.4*	*6.5*	*4.5*	...	...	...	...	...	...	...	...	...	...	...
28	17.7	17.7	17.7	13.7	*10.4*	*6.5*	*4.5*	...	...	...	...	...	...	...	...	...	...	...
29	16.6	16.6	16.6	12.8	*9.7*	*6.1*	*4.2*	...	...	...	...	...	...	...	...	...	...	...
30	16.3	16.3	16.3	12.6	*9.5*	*6.0*	*4.2*	...	...	...	...	...	...	...	...	...	...	...
31	17.1	17.1	17.1	13.2	*10.0*	*6.3*	*4.4*	...	...	...	...	...	...	...	...	...	...	...
32	18.6	18.6	18.6	14.3	*10.8*	*6.8*	*4.7*	...	...	...	...	...	...	...	...	...	...	...
33	19.4	19.4	19.4	15.0	*11.3*	*7.1*	*5.0*	...	...	...	...	...	...	...	...	...	...	...
34	3.3	3.3	3.3	3.2	2.4	*1.8*	*1.4*	...	...	...	...	...	...	...	...	...	...	...
35	4.9	4.8	4.4	4.1	3.6	3.0	*2.4*	...	...	...	...	...	...	...	...	...	...	...
36	4.0	3.9	3.7	3.6	2.4	*1.8*	*1.4*	...	...	...	...	...	...	...	...	...	...	...
37	4.0	3.9	3.7	3.5	2.4	*1.8*	*1.4*	...	...	...	...	...	...	...	...	...	...	...
38	4.9	4.9	4.8	4.5	3.6	3.0	*2.4*	...	...	...	...	...	...	...	...	...	...	...
39	5.7	5.7	5.7	5.5	4.3	3.0	*2.4*	...	...	...	...	...	...	...	...	...	...	...
40	3.3	3.3	3.3	3.2	2.4	*1.8*	*1.4*	...	...	...	...	...	...	...	...	...	...	...
41	3.3	3.3	3.3	3.2	2.4	*1.8*	*1.4*	...	...	...	...	...	...	...	...	...	...	...
42	4.9	4.9	4.8	4.5	3.6	3.0	*2.4*	...	...	...	...	...	...	...	...	...	...	...
43	5.7	5.7	5.7	5.5	4.3	3.0	*2.4*	...	...	...	...	...	...	...	...	...	...	...
44	7.7	7.7	7.4	6.9	5.4	3.5	*2.5*	...	...	...	...	...	...	...	...	...	...	...
45	3.3	3.3	3.3	3.2	2.4	*1.8*	*1.4*	...	...	...	...	...	...	...	...	...	...	...

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																
	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	1700	1750	1800
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
1	...	Bar, rod, shapes	SB–221	...	A93003	H112
2	...	Cond. & heat exch. tubes	SB–234	...	A93003	H14
3	...	Cond. & heat exch. tubes	SB–234	...	A93003	H25
4	...	Smls. extr. tube	SB–241	...	A93003	O
5	...	Smls. extr. tube	SB–241	...	A93003	H112
6	...	Smls. pipe	SB–241	...	A93003	H112
7	...	Smls. pipe	SB–241	...	A93003	H18
8	...	Die forgings	SB–247	...	A93003	H112
9	...	Die forgings	SB–247	...	A93003	H112 wld.
10	...	Plate, sheet	SB–209	...	A93004	O
11	...	Plate, sheet	SB–209	...	A93004	H112
12	...	Plate, sheet	SB–209	...	A93004	H32
13	...	Plate, sheet	SB–209	...	A93004	H34
14	...	Plate, sheet	SB–209	...	A95052	O
15	...	Plate, sheet	SB–209	...	A95052	H112
16	...	Plate, sheet	SB–209	...	A95052	H112
17	...	Plate, sheet	SB–209	...	A95052	H32
18	...	Plate, sheet	SB–209	...	A95052	H34
19	...	Drawn smls. tube	SB–210	...	A95052	O
20	...	Drawn smls. tube	SB–210	...	A95052	H32
21	...	Drawn smls. tube	SB–210	...	A95052	H34
22	...	Cond. & heat exch. tubes	SB–234	...	A95052	H32
23	...	Cond. & heat exch. tubes	SB–234	...	A95052	H34
24	...	Smls. extr. tube	SB–241	...	A95052	O
25	...	Plate, sheet	SB–209	...	A95083	O
26	...	Plate, sheet	SB–209	...	A95083	O
27	...	Plate, sheet	SB–209	...	A95083	O
28	...	Plate, sheet	SB–209	...	A95083	O
29	...	Plate, sheet	SB–209	...	A95083	O
30	...	Plate, sheet	SB–209	...	A95083	H112
31	...	Plate, sheet	SB–209	...	A95083	H112
32	...	Plate, sheet	SB–209	...	A95083	H32
33	...	Plate, sheet	SB–209	...	A95083	H32
34	...	Bar, rod, shapes	SB–221	...	A95083	O
35	...	Bar, rod, shapes	SB–221	...	A95083	H111
36	...	Bar, rod, shapes	SB–221	...	A95083	H112
37	...	Smls. extr. tube	SB–241	...	A95083	O
38	...	Smls. extr. tube	SB–241	...	A95083	H111
39	...	Smls. extr. tube	SB–241	...	A95083	H112
40	...	Die & hand forgings	SB–247	...	A95083	H111
41	...	Die & hand forgings	SB–247	...	A95083	H112
42	...	Die & hand forgings	SB–247	...	A95083	H111 wld.
43	...	Die & hand forgings	SB–247	...	A95083	H112 wld.
44	...	Plate, sheet	SB–928	...	A95083	H321
45	...	Plate, sheet	SB–928	...	A95083	H321

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Size/ Thickness, in.	P-No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	...	21	14	5	NP	250 (Cl. 3 only)	400	400	NFA–1	T3, W3
2	0.010–0.200	21	20	17	NP	250 (Cl. 3 only)	400	400	NFA–2	T4, W4
3	0.010–0.200	21	22	19	NP	250 (Cl. 3 only)	400	400	NFA–2	T4, W4
4	...	21	14	5	NP	250 (Cl. 3 only)	400	400	NFA–1	T3
5	...	21	14	5	NP	250 (Cl. 3 only)	400	400	NFA–1	T3, W3
6	≥1.000	21	14	5	NP	250 (Cl. 3 only)	400	400	NFA–1	T3, W4
7	<1.000	21	27	24	NP	250 (Cl. 3 only)	400	400	NFA–1	T4, W4
8	≤4.000	21	14	5	NP	250 (Cl. 3 only)	400	400	NFA–1	T3
9	≤4.000	21	14	...	NP	250 (Cl. 3 only)	400	400	NFA–1	T3, W7
10	0.006–3.000	22	22	8.5	NP	300 (Cl. 3 only)	400	400	NFA–3	...
11	0.250–3.000	22	23	9	NP	300 (Cl. 3 only)	400	400	NFA–3	W3
12	0.017–2.000	22	28	21	NP	250 (Cl. 3 only)	400	400	NFA–3	W3
13	0.009–1.000	22	32	25	NP	250 (Cl. 3 only)	400	400	NFA–4	W3
14	0.006–3.000	22	25	9.5	NP	250 (Cl. 3 only)	400	400	NFA–8	...
15	0.250–0.499	22	28	16	NP	250 (Cl. 3 only)	400	400	NFA–8	W3
16	0.500–3.000	22	25	9.5	NP	250 (Cl. 3 only)	400	400	NFA–8	W3
17	0.017–2.000	22	31	23	NP	200 (Cl. 3 only)	400	400	NFA–3	W3
18	0.009–1.000	22	34	26	NP	200 (Cl. 3 only)	400	400	NFA–4	W3
19	0.010–0.450	22	25	10	NP	300 (Cl. 3 only)	400	400	NFA–8	...
20	0.010–0.450	22	31	23	NP	200 (Cl. 3 only)	400	400	NFA–8	W4
21	0.010–0.450	22	34	26	NP	200 (Cl. 3 only)	400	400	NFA–8	W4
22	0.010–0.200	22	31	23	NP	200 (Cl. 3 only)	400	400	NFA–8	W4
23	0.010–0.200	22	34	26	NP	200 (Cl. 3 only)	400	400	NFA–8	W4
24	...	22	25	10	NP	250 (Cl. 3 only)	400	400	NFA–8	...
25	0.051–1.500	25	40	18	NP	150 (Cl. 3 only)	150	150	NFA–11	G18, G19
26	1.501–3.000	25	39	17	NP	150 (Cl. 3 only)	150	150	NFA–11	G18, G19
27	3.001–5.000	25	38	16	NP	150 (Cl. 3 only)	150	150	NFA–11	G18, G19
28	5.001–7.000	25	37	15	NP	150 (Cl. 3 only)	150	150	NFA–11	G18, G19
29	7.001–8.000	25	36	14	NP	150 (Cl. 3 only)	150	150	NFA–11	G18, G19
30	0.250–1.500	25	40	18	NP	150 (Cl. 3 only)	150	150	NFA–11	G18, G19, W3
31	1.501–3.000	25	39	17	NP	150 (Cl. 3 only)	150	150	NFA–11	G18, G19, W3
32	0.125–1.500	25	44	31	NP	150 (Cl. 3 only)	150	150	NFA–11	G18, G19, W3
33	1.501–3.000	25	41	29	NP	150 (Cl. 3 only)	150	150	NFA–11	G18, G19, W3
34	≤5.000	25	39	16	NP	150 (Cl. 3 only)	150	150	NFA–11	G18, G19
35	≤5.000	25	40	24	NP	150 (Cl. 3 only)	150	150	NFA–11	G18, G19, W3
36	≤5.000	25	39	16	NP	150 (Cl. 3 only)	150	150	NFA–11	G18, G19, W3
37	...	25	39	16	NP	150 (Cl. 3 only)	150	150	NFA–11	G18, G19
38	...	25	40	24	NP	150 (Cl. 3 only)	150	150	NFA–11	G18, G19, W3
39	...	25	39	16	NP	150 (Cl. 3 only)	150	150	NFA–11	G18, G19, W3
40	≤4.000	25	39	20	NP	150 (Cl. 3 only)	150	150	NFA–11	G18, G19, W4
41	≤4.000	25	39	16	NP	150 (Cl. 3 only)	150	150	NFA–11	G18, G19, W4
42	≤4.000	25	38	...	NP	150 (Cl. 3 only)	150	150	NFA–11	G18, G19, W7
43	≤4.000	25	38	...	NP	150 (Cl. 3 only)	150	150	NFA–11	G18, G19, W7
44	0.125–1.500	25	44	31	NP	150 (Cl. 3 only)	150	150	NFA–11	G18, G19, W3
45	1.501–3.000	25	41	29	NP	150 (Cl. 3 only)	150	150	NFA–11	G18, G19, W3

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																	
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950
1	3.3	3.3	3.3	3.2	2.4	*1.8*	*1.4*	...	...	...	...	...	...	...	...	...	...	...
2	5.7	5.7	5.7	5.5	4.3	3.0	*2.4*	...	...	...	...	...	...	...	...	...	...	...
3	6.3	6.3	6.3	6.1	4.3	3.0	*2.4*	...	...	...	...	...	...	...	...	...	...	...
4	3.3	3.3	3.3	3.2	2.4	*1.8*	*1.4*	...	...	...	...	...	...	...	...	...	...	...
5	3.3	3.3	3.3	3.2	2.4	*1.8*	*1.4*	...	...	...	...	...	...	...	...	...	...	...
6	3.3	3.3	3.3	3.2	2.4	*1.8*	*1.4*	...	...	...	...	...	...	...	...	...	...	...
7	7.7	7.7	7.4	6.9	5.4	3.5	*2.5*	...	...	...	...	...	...	...	...	...	...	...
8	3.3	3.3	3.3	3.2	2.4	*1.8*	*1.4*	...	...	...	...	...	...	...	...	...	...	...
9	3.3	3.3	3.3	3.2	2.4	*1.8*	*1.4*	...	...	...	...	...	...	...	...	...	...	...
10	5.7	5.7	5.7	5.5	5.0	3.8	2.4	...	...	...	...	...	...	...	...	...	...	...
11	6.0	6.0	6.0	6.0	5.1	3.8	2.4	...	...	...	...	...	...	...	...	...	...	...
12	8.0	8.0	8.0	8.0	5.8	3.8	2.4	...	...	...	...	...	...	...	...	...	...	...
13	9.1	9.1	9.1	9.1	5.8	3.8	2.4	...	...	...	...	...	...	...	...	...	...	...
14	6.3	6.3	6.3	6.3	5.6	4.1	2.4	...	...	...	...	...	...	...	...	...	...	...
15	8.0	8.0	8.0	8.0	6.2	4.1	2.4	...	...	...	...	...	...	...	...	...	...	...
16	6.3	6.3	6.3	6.3	6.0	4.1	2.4	...	...	...	...	...	...	...	...	...	...	...
17	8.9	8.9	8.9	8.9	6.2	4.1	2.4	...	...	...	...	...	...	...	...	...	...	...
18	9.7	9.7	9.7	9.7	6.2	4.1	2.4	...	...	...	...	...	...	...	...	...	...	...
19	6.7	6.7	6.7	6.7	5.6	4.1	2.3	...	...	...	...	...	...	...	...	...	...	...
20	8.9	8.9	8.9	8.9	6.1	4.1	2.3	...	...	...	...	...	...	...	...	...	...	...
21	9.7	9.7	9.7	9.7	6.1	4.1	2.3	...	...	...	...	...	...	...	...	...	...	...
22	8.9	8.9	8.9	8.9	6.2	4.1	2.4	...	...	...	...	...	...	...	...	...	...	...
23	9.7	9.7	9.7	9.7	6.2	4.1	2.4	...	...	...	...	...	...	...	...	...	...	...
24	6.7	6.7	6.7	6.7	5.6	4.1	2.3	...	...	...	...	...	...	...	...	...	...	...
25	11.4	11.4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
26	11.1	11.1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
27	10.7	10.7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
28	10.0	10.0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
29	9.3	9.3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
30	11.4	11.4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
31	11.1	11.1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
32	12.6	12.6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
33	11.7	11.7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
34	10.7	10.7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
35	11.4	11.4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
36	10.7	10.7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
37	10.7	10.7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
38	11.4	11.4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
39	10.7	10.7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
40	11.1	11.1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
41	10.7	10.7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
42	10.9	10.9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
43	10.9	10.9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
44	12.6	12.6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
45	11.7	11.7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																
	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	1700	1750	1800
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
1	...	Plate, sheet	SB–209	...	A95086	O
2	...	Plate, sheet	SB–209	...	A95086	H112
3	...	Plate, sheet	SB–209	...	A95086	H112
4	...	Plate, sheet	SB–209	...	A95086	H112
5	...	Plate, sheet	SB–209	...	A95086	H112
6	...	Plate, sheet	SB–209	...	A95086	H32
7	...	Plate, sheet	SB–209	...	A95086	H34
8	...	Bar, rod, shapes	SB–221	...	A95086	H112
9	...	Smls. extr. tube	SB–241	...	A95086	O
10	...	Smls. extr. tube	SB–241	...	A95086	H111
11	...	Smls. extr. tube	SB–241	...	A95086	H112
12	...	Plate, sheet	SB–928	...	A95086	H116
13	...	Plate, sheet	SB–209	...	A95154	O
14	...	Plate, sheet	SB–209	...	A95154	H112
15	...	Plate, sheet	SB–209	...	A95154	H112
16	...	Plate, sheet	SB–209	...	A95154	H32
17	...	Plate, sheet	SB–209	...	A95154	H34
18	...	Drawn smls. tube	SB–210	...	A95154	O
19	...	Drawn smls. tube	SB–210	...	A95154	H34
20	...	Bar, rod, shapes	SB–221	...	A95154	O
21	...	Bar, rod, shapes	SB–221	...	A95154	H112
22	...	Plate, sheet	SB–209	...	A95254	O
23	...	Plate, sheet	SB–209	...	A95254	H112
24	...	Plate, sheet	SB–209	...	A95254	H112
25	...	Plate, sheet	SB–209	...	A95254	H32
26	...	Plate, sheet	SB–209	...	A95254	H34
27	...	Plate, sheet	SB–209	...	A95454	O
28	...	Plate, sheet	SB–209	...	A95454	H112
29	...	Plate, sheet	SB–209	...	A95454	H112
30	...	Plate, sheet	SB–209	...	A95454	H32
31	...	Plate, sheet	SB–209	...	A95454	H34
32	...	Bar, rod, shapes	SB–221	...	A95454	O
33	...	Bar, rod, shapes	SB–221	...	A95454	H111
34	...	Bar, rod, shapes	SB–221	...	A95454	H112
35	...	Cond. & heat exch. tubes	SB–234	...	A95454	H32
36	...	Cond. & heat exch. tubes	SB–234	...	A95454	H34
37	...	Smls. extr. tube	SB–241	...	A95454	O
38	...	Smls. extr. tube	SB–241	...	A95454	H111
39	...	Smls. extr. tube	SB–241	...	A95454	H112
40	...	Plate, sheet	SB–209	...	A95456	O
41	...	Plate, sheet	SB–209	...	A95456	O
42	...	Plate, sheet	SB–209	...	A95456	O
43	...	Plate, sheet	SB–209	...	A95456	O
44	...	Plate, sheet	SB–209	...	A95456	O
45	...	Plate, sheet	SB–209	...	A95456	H112

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Size/ Thickness, in.	P-No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	0.020–2.000	25	35	14	NP	150 (Cl. 3 only)	150	150	NFA–9	G18, G19
2	0.188–0.499	25	36	18	NP	150 (Cl. 3 only)	150	150	NFA–9	G18, G19, W3
3	0.500–1.000	25	35	16	NP	150 (Cl. 3 only)	150	150	NFA–9	G18, G19, W3
4	1.001–2.000	25	35	14	NP	150 (Cl. 3 only)	150	150	NFA–9	G18, G19, W3
5	2.001–3.000	25	34	14	NP	150 (Cl. 3 only)	150	150	NFA–9	G18, G19
6	0.051–2.000	25	40	28	NP	150 (Cl. 3 only)	150	150	NFA–11	G18, G19, W3
7	0.051–1.000	25	44	34	NP	150 (Cl. 3 only)	150	150	NFA–11	G18, G19, W3
8	≤5.000	25	35	14	NP	150 (Cl. 3 only)	150	150	NFA–9	G18, G19, W4
9	...	25	35	14	NP	150 (Cl. 3 only)	150	150	NFA–9	G18, G19
10	...	25	36	21	NP	150 (Cl. 3 only)	150	150	NFA–9	G18, G19, W3
11	...	25	35	14	NP	150 (Cl. 3 only)	150	150	NFA–9	...
12	0.063–2.000	25	40	28	NP	NP	150	150	NFA–11	G18, G19, W3
13	0.020–3.000	22	30	11	NP	150 (Cl. 3 only)	150	150	NFA–5	G18, G19
14	0.250–0.499	22	32	18	NP	150 (Cl. 3 only)	150	150	NFA–11	G18, G19, W3
15	0.500–3.000	22	30	11	NP	150 (Cl. 3 only)	150	150	NFA–5	G18, G19, W3
16	0.020–2.000	22	36	26	NP	150 (Cl. 3 only)	150	150	NFA–11	G18, G19, W3
17	0.009–1.000	22	39	29	NP	150 (Cl. 3 only)	150	150	NFA–11	G18, G19, W3
18	0.010–0.450	22	30	11	NP	150 (Cl. 3 only)	150	150	NFA–5	G18, G19
19	0.010–0.450	22	39	29	NP	150 (Cl. 3 only)	150	150	NFA–5	G18, G19, W3
20	...	22	30	11	NP	150 (Cl. 3 only)	150	150	NFA–5	G18, G19
21	...	22	30	11	NP	150 (Cl. 3 only)	150	150	NFA–5	G18, G19, W3
22	0.051–3.000	22	30	11	NP	150 (Cl. 3 only)	150	150	NFA–5	G18, G19
23	0.250–0.499	22	32	18	NP	150 (Cl. 3 only)	150	150	NFA–11	G18, G19, W3
24	0.500–3.000	22	30	11	NP	150 (Cl. 3 only)	150	150	NFA–5	G18, G19, W3
25	0.051–2.000	22	36	26	NP	150 (Cl. 3 only)	150	150	NFA–11	G18, G19, W3
26	0.051–1.000	22	39	29	NP	150 (Cl. 3 only)	150	150	NFA–11	G18, G19, W3
27	0.020–3.000	22	31	12	NP	250 (Cl. 3 only)	400	400	NFA–6	T2
28	0.250–0.499	22	32	18	NP	250 (Cl. 3 only)	400	400	NFA–6	T2, W3
29	0.500–3.000	22	31	12	NP	250 (Cl. 3 only)	400	400	NFA–6	T2, W3
30	0.020–2.000	22	36	26	NP	250 (Cl. 3 only)	400	400	NFA–6	T2, W3
31	0.020–1.000	22	39	29	NP	250 (Cl. 3 only)	400	400	NFA–6	T2, W3
32	≤5.000	22	31	12	NP	250 (Cl. 3 only)	400	400	NFA–6	T2
33	≤5.000	22	33	19	NP	250 (Cl. 3 only)	400	400	NFA–6	T2, W3
34	≤5.000	22	31	12	NP	250 (Cl. 3 only)	400	400	NFA–6	T2, W3
35	0.010–0.200	22	36	26	NP	250 (Cl. 3 only)	400	400	NFA–6	T2, W4
36	0.010–0.200	22	39	29	NP	250 (Cl. 3 only)	400	400	NFA–6	T2, W4
37	...	22	31	12	NP	250 (Cl. 3 only)	400	400	NFA–6	T2
38	...	22	33	19	NP	250 (Cl. 3 only)	400	400	NFA–6	T2, W3
39	...	22	31	12	NP	250 (Cl. 3 only)	400	400	NFA–6	T2, W3
40	0.051–1.500	25	42	19	NP	150 (Cl. 3 only)	150	150	NFA–10	G18, G19
41	1.501–3.000	25	41	18	NP	150 (Cl. 3 only)	150	150	NFA–10	G18, G19
42	3.001–5.000	25	40	17	NP	150 (Cl. 3 only)	150	150	NFA–10	G18, G19
43	5.001–7.000	25	39	16	NP	150 (Cl. 3 only)	150	150	NFA–10	G18, G19
44	7.001–8.000	25	38	15	NP	150 (Cl. 3 only)	150	150	NFA–10	G18, G19
45	0.250–1.500	25	42	19	NP	150 (Cl. 3 only)	150	150	NFA–10	G18, G19, W3

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																	
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950
1	9.3	9.3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
2	10.3	10.3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
3	10.0	10.0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4	9.3	9.3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
5	9.3	9.3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6	11.4	11.4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
7	12.6	12.6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
8	9.3	9.3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
9	9.3	9.3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
10	10.3	10.3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
11	9.3	9.3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
12	11.4	11.4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
13	7.3	7.3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
14	9.1	9.1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
15	7.3	7.3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
16	10.3	10.3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
17	11.1	11.1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
18	7.3	7.3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
19	11.1	11.1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
20	7.3	7.3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
21	7.3	7.3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
22	7.3	7.3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
23	9.1	9.1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
24	7.3	7.3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
25	10.3	10.3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
26	11.1	11.1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
27	8.0	8.0	8.0	8.0	*5.5*	*4.1*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
28	9.1	9.1	9.1	9.1	*5.5*	*4.1*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
29	8.0	8.0	8.0	8.0	*5.5*	*4.1*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
30	10.3	10.3	10.3	10.3	*5.5*	*4.1*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
31	11.1	11.1	11.1	10.8	*5.5*	*4.1*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
32	8.0	8.0	8.0	8.0	*5.5*	*4.1*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
33	9.4	9.4	9.4	9.4	*5.5*	*4.1*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
34	8.0	8.0	8.0	8.0	*5.5*	*4.1*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
35	10.3	10.3	10.3	10.3	*5.5*	*4.1*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
36	11.1	11.1	11.1	10.8	*5.5*	*4.1*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
37	8.0	8.0	8.0	8.0	*5.5*	*4.1*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
38	9.4	9.4	9.4	9.4	*5.5*	*4.1*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
39	8.0	8.0	8.0	8.0	*5.5*	*4.1*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
40	12.0	12.0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
41	11.7	11.7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
42	11.3	11.3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
43	10.7	10.7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
44	10.0	10.0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
45	12.0	12.0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																
	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	1700	1750	1800
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
	1	...	Plate, sheet	SB–209	...	A95456	H112
	2	...	Plate, sheet	SB–209	...	A95456	H32
	3	...	Plate, sheet	SB–209	...	A95456	H32
	4	...	Plate, sheet	SB–209	...	A95456	H32
	5	...	Bar, rod, shapes	SB–221	...	A95456	O
	6	...	Bar, rod, shapes	SB–221	...	A95456	H111
	7	...	Bar, rod, shapes	SB–221	...	A95456	H112
(**21**)	8	...	Smls. extr. tube	SB–241	...	A95456	O
(**21**)	9	...	Smls. extr. tube	SB–241	...	A95456	H111
(**21**)	10	...	Smls. extr. tube	SB–241	...	A95456	H112
	11	...	Plate, sheet	SB–928	...	A95456	H321
	12	...	Plate, sheet	SB–928	...	A95456	H321
	13	...	Plate, sheet	SB–928	...	A95456	H321
	14	...	Plate, sheet	SB–209	...	A95652	O
	15	...	Plate, sheet	SB–209	...	A95652	H112
	16	...	Plate, sheet	SB–209	...	A95652	H112
	17	...	Plate, sheet	SB–209	...	A95652	H32
	18	...	Plate, sheet	SB–209	...	A95652	H34
	19	...	Plate, sheet	SB–209	...	A96061	T4
	20	...	Plate, sheet	SB–209	...	A96061	T451
	21	...	Plate, sheet	SB–209	...	A96061	T6
	22	...	Plate, sheet	SB–209	...	A96061	T651
	23	...	Plate, sheet	SB–209	...	A96061	T651
	24	...	Plate, sheet	SB–209	...	A96061	T4 wld.
	25	...	Plate, sheet	SB–209	...	A96061	T451 wld.
	26	...	Plate, sheet	SB–209	...	A96061	T6 wld.
	27	...	Plate, sheet	SB–209	...	A96061	T651 wld.
	28	...	Drawn smls. tube	SB–210	...	A96061	T4
	29	...	Drawn smls. tube	SB–210	...	A96061	T6
	30	...	Drawn smls. tube	SB–210	...	A96061	T4 wld.
	31	...	Drawn smls. tube	SB–210	...	A96061	T6 wld.
	32	...	Bar, rod, wire	SB–211	...	A96061	T6
	33	...	Bar, rod, wire	SB–211	...	A96061	T651
	34	...	Bar, rod, wire	SB–211	...	A96061	T6 wld.
	35	...	Bar, rod, wire	SB–211	...	A96061	T651 wld.
	36	...	Bar, rod, shapes	SB–221	...	A96061	T4
	37	...	Bar, rod, shapes	SB–221	...	A96061	T6
	38	...	Bar, rod, shapes	SB–221	...	A96061	T4 wld.
	39	...	Bar, rod, shapes	SB–221	...	A96061	T6 wld.
	40	...	Cond. & heat exch. tubes	SB–234	...	A96061	T4
	41	...	Cond. & heat exch. tubes	SB–234	...	A96061	T6
	42	...	Cond. & heat exch. tubes	SB–234	...	A96061	T4 wld.
	43	...	Cond. & heat exch. tubes	SB–234	...	A96061	T6 wld.
	44	...	Smls. extr. tube	SB–241	...	A96061	T4
	45	...	Smls. extr. tube	SB–241	...	A96061	T6

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Size/ Thickness, in.	P-No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	1.501–3.000	25	41	18	NP	150 (Cl. 3 only)	150	150	NFA–10	G18, G19, W3
2	0.188–0.499	25	46	33	NP	150 (Cl. 3 only)	150	150	NFA–10	G18, G19, W3
3	0.500–1.500	25	44	31	NP	150 (Cl. 3 only)	150	150	NFA–10	G18, G19, W3
4	1.501–3.000	25	41	29	NP	150 (Cl. 3 only)	150	150	NFA–10	G18, G19, W3
5	≤5.000	25	41	19	NP	150 (Cl. 3 only)	150	150	NFA–10	G18, G19
6	≤5.000	25	42	26	NP	150 (Cl. 3 only)	150	150	NFA–10	G18, G19, W3
7	≤5.000	25	41	19	NP	150 (Cl. 3 only)	150	150	NFA–10	G18, G19, W3
8	...	25	41	19	NP	150 (Cl. 3 only)	150	150	NFA–10	G18, G19
9	...	25	42	26	NP	150 (Cl. 3 only)	150	150	NFA–10	G18, G19, W3
10	...	25	41	19	NP	150 (Cl. 3 only)	150	150	NFA–10	G18, G19, W3
11	0.188–0.499	25	46	33	NP	150 (Cl. 3 only)	150	150	NFA–10	G18, G19, W3
12	0.500–1.500	25	44	31	NP	150 (Cl. 3 only)	150	150	NFA–10	G18, G19, W3
13	1.501–3.000	25	41	29	NP	150 (Cl. 3 only)	150	150	NFA–10	G18, G19, W3
14	0.051–3.000	22	25	9.5	NP	250 (Cl. 3 only)	400	400	NFA–8	T2
15	0.250–0.499	22	28	16	NP	250 (Cl. 3 only)	400	400	NFA–8	T1, W3
16	0.500–3.000	22	25	9.5	NP	250 (Cl. 3 only)	400	400	NFA–8	T2, W3
17	0.051–2.000	22	31	23	NP	200 (Cl. 3 only)	400	400	NFA–3	T1, W3
18	0.051–1.000	22	34	26	NP	200 (Cl. 3 only)	400	400	NFA–4	T1, W3
19	0.006–0.249	23	30	16	NP	400 (Cl. 3 only)	400	400	NFA–13	G24, T3, W4
20	0.250–3.000	23	30	16	NP	400 (Cl. 3 only)	400	400	NFA–13	G24, T3, W4
21	0.006–0.249	23	42	35	NP	400 (Cl. 3 only)	400	400	NFA–12	G24, T3, W4
22	0.250–4.000	23	42	35	NP	400 (Cl. 3 only)	400	400	NFA–12,13	G24, T3, W4, W9
23	4.001–6.000	23	40	35	NP	400 (Cl. 3 only)	400	400	NFA–12,13	G24, T3, W4, W9
24	0.006–0.249	23	24	...	NP	400 (Cl. 3 only)	400	400	NFA–13	G24, T3, W7
25	0.250–3.000	23	24	...	NP	NP	400	400	NFA–13	G24, T3, W7
26	0.006–0.249	23	24	...	NP	400 (Cl. 3 only)	400	400	NFA–12	G24, T3, W7
27	0.250–6.000	23	24	...	NP	NP	400	400	NFA–12,13	G24, T3, W7, W9
28	0.025–0.500	23	30	16	NP	400 (Cl. 3 only)	400	400	NFA–13	T3, W4
29	0.025–0.500	23	42	35	NP	400 (Cl. 3 only)	400	400	NFA–12,13	T3, W4, W9
30	0.025–0.500	23	24	...	NP	400 (Cl. 3 only)	400	400	NFA–13	T3, W7
31	0.025–0.500	23	24	...	NP	400 (Cl. 3 only)	400	400	NFA–12,13	T3, W7, W9
32	0.125–0.249	23	42	35	NP	400 (Cl. 3 only)	400	400	NFA–12	G24, T3, W4
33	0.250–8.000	23	42	35	NP	400 (Cl. 3 only)	400	400	NFA–12,13	G24, T3, W4, W9
34	0.125–0.249	23	24	...	NP	400 (Cl. 3 only)	400	400	NFA–12	G13, G24, T3, W7
35	0.250–8.000	23	24	...	NP	400 (Cl. 3 only)	400	400	NFA–12,13	G13, G24, T3, W7, W9
36	...	23	26	16	NP	400 (Cl. 3 only)	400	400	NFA–13	G24, T3, W4
37	...	23	38	35	NP	400 (Cl. 3 only)	400	400	NFA–12,13	G24, T3, W4, W9
38	...	23	24	...	NP	400 (Cl. 3 only)	400	400	NFA–13	G24, T3, W7
39	...	23	24	...	NP	400 (Cl. 3 only)	400	400	NFA–12,13	G13, G24, T3, W7, W9
40	0.025–0.200	23	30	16	NP	400 (Cl. 3 only)	400	400	NFA–13	T3, W4
41	0.025–0.200	23	42	35	NP	400 (Cl. 3 only)	400	400	NFA–12	T3, W4
42	0.025–0.200	23	24	...	NP	400 (Cl. 3 only)	400	400	NFA–13	T3, W7
43	0.025–0.200	23	24	...	NP	400 (Cl. 3 only)	400	400	NFA–12	T3, W7
44	...	23	26	16	NP	400 (Cl. 3 only)	400	400	NFA–13	G24, T3, W4
45	...	23	38	35	NP	400 (Cl. 3 only)	400	400	NFA–12,13	G24, T3, W4, W9

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																	
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950
1	11.7	11.7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
2	13.1	13.1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
3	12.6	12.6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4	11.7	11.7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
5	11.7	11.7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6	12.0	12.0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
7	11.7	11.7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
8	11.7	11.7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
9	12.0	12.0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
10	11.7	11.7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
11	13.1	13.1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
12	12.6	12.6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
13	11.7	11.7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
14	6.3	6.3	6.3	6.3	*6.1*	*4.1*	*2.4*	...	...	...	...	...	...	...	...	...	...	...
15	8.0	8.0	8.0	*7.5*	*6.1*	*4.1*	*2.4*	...	...	...	...	...	...	...	...	...	...	...
16	6.3	6.3	6.3	6.3	*6.1*	*4.1*	*2.4*	...	...	...	...	...	...	...	...	...	...	...
17	8.9	8.9	8.9	*7.5*	*6.1*	*4.1*	*2.4*	...	...	...	...	...	...	...	...	...	...	...
18	9.7	9.7	9.7	*7.5*	*6.1*	*4.1*	*2.4*	...	...	...	...	...	...	...	...	...	...	...
19	8.6	8.6	8.6	8.5	6.9	*6.3*	*4.5*	...	...	...	...	...	...	...	...	...	...	...
20	8.6	8.6	8.6	8.5	6.9	*6.3*	*4.5*	...	...	...	...	...	...	...	...	...	...	...
21	12.0	12.0	12.0	11.7	8.4	*6.3*	*4.5*	...	...	...	...	...	...	...	...	...	...	...
22	12.0	12.0	12.0	11.7	8.4	*6.3*	*4.5*	...	...	...	...	...	...	...	...	...	...	...
23	11.4	11.4	11.4	11.1	8.2	*6.3*	*4.4*	...	...	...	...	...	...	...	...	...	...	...
24	6.9	6.9	6.9	6.8	5.5	*4.6*	*3.5*	...	...	...	...	...	...	...	...	...	...	...
25	6.9	6.9	6.9	6.8	5.5	*4.6*	*3.5*	...	...	...	...	...	...	...	...	...	...	...
26	6.9	6.9	6.9	6.8	5.5	*4.6*	*3.5*	...	...	...	...	...	...	...	...	...	...	...
27	6.9	6.9	6.9	6.8	5.5	*4.6*	*3.5*	...	...	...	...	...	...	...	...	...	...	...
28	8.6	8.6	8.6	8.5	6.9	*6.3*	*4.5*	...	...	...	...	...	...	...	...	...	...	...
29	12.0	12.0	12.0	11.7	8.4	*6.3*	*4.5*	...	...	...	...	...	...	...	...	...	...	...
30	6.9	6.9	6.9	6.8	5.5	*4.6*	*3.5*	...	...	...	...	...	...	...	...	...	...	...
31	6.9	6.9	6.9	6.8	5.5	*4.6*	*3.5*	...	...	...	...	...	...	...	...	...	...	...
32	12.0	12.0	12.0	11.7	8.4	*6.3*	*4.5*	...	...	...	...	...	...	...	...	...	...	...
33	12.0	12.0	12.0	11.7	8.4	*6.4*	*4.5*	...	...	...	...	...	...	...	...	...	...	...
34	6.9	6.9	6.9	6.8	5.5	*4.6*	*3.5*	...	...	...	...	...	...	...	...	...	...	...
35	6.9	6.9	6.9	6.8	5.5	*4.6*	*3.5*	...	...	...	...	...	...	...	...	...	...	...
36	7.4	7.4	7.4	7.4	6.0	*5.8*	*4.4*	...	...	...	...	...	...	...	...	...	...	...
37	10.9	10.9	10.9	10.6	7.9	*6.3*	*4.5*	...	...	...	...	...	...	...	...	...	...	...
38	6.9	6.9	6.9	6.8	5.5	*4.6*	*3.5*	...	...	...	...	...	...	...	...	...	...	...
39	6.9	6.9	6.9	6.8	5.5	*4.6*	*3.5*	...	...	...	...	...	...	...	...	...	...	...
40	8.6	8.6	8.6	8.5	6.9	*6.3*	*4.5*	...	...	...	...	...	...	...	...	...	...	...
41	12.0	12.0	12.0	11.7	8.4	*6.3*	*4.5*	...	...	...	...	...	...	...	...	...	...	...
42	6.9	6.9	6.9	6.8	5.5	*4.6*	*3.5*	...	...	...	...	...	...	...	...	...	...	...
43	6.9	6.9	6.9	6.8	5.5	*4.6*	*3.5*	...	...	...	...	...	...	...	...	...	...	...
44	7.4	7.4	7.4	7.4	6.0	*5.8*	*4.4*	...	...	...	...	...	...	...	...	...	...	...
45	10.9	10.9	10.9	10.6	7.9	*6.3*	*4.5*	...	...	...	...	...	...	...	...	...	...	...

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																	
	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	1700	1750	1800	
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
1	...	Smls. extr. tube	SB–241	...	A96061	T4 wld.
2	...	Smls. extr. tube	SB–241	...	A96061	T6 wld.
3	...	Smls. pipe	SB–241	...	A96061	T6 drawn
4	...	Smls. pipe	SB–241	...	A96061	T6
5	...	Smls. pipe	SB–241	...	A96061	T6 wld.
6	...	Die forgings	SB–247	...	A96061	T6
7	...	Hand forgings	SB–247	...	A96061	T6
8	...	Hand forgings	SB–247	...	A96061	T6
9	...	Die & hand forgings	SB–247	...	A96061	T6 wld.
10	...	Shapes	SB–308	...	A96061	T6
11	...	Shapes	SB–308	...	A96061	T6 wld.
12	...	Drawn smls. tube	SB–210	...	A96063	T6
13	...	Drawn smls. tube	SB–210	...	A96063	T6 wld.
14	...	Bar, rod, shapes	SB–221	...	A96063	T1
15	...	Bar, rod, shapes	SB–221	...	A96063	T1
16	...	Bar, rod, shapes	SB–221	...	A96063	T5
17	...	Bar, rod, shapes	SB–221	...	A96063	T5
18	...	Bar, rod, shapes	SB–221	...	A96063	T6
19	...	Bar, rod, shapes	SB–221	...	A96063	T5 wld.
20	...	Bar, rod, shapes	SB–221	...	A96063	T6 wld.
21	...	Smls. extr. tube	SB–241	...	A96063	T1
22	...	Smls. extr. tube	SB–241	...	A96063	T1
23	...	Smls. extr. tube	SB–241	...	A96063	T5
24	...	Smls. extr. tube	SB–241	...	A96063	T5
25	...	Smls. extr. tube	SB–241	...	A96063	T6
26	...	Smls. extr. tube	SB–241	...	A96063	T5 wld.
27	...	Smls. extr. tube	SB–241	...	A96063	T6 wld.
28	...	Smls. pipe	SB–241	...	A96063	T6
29	...	Smls. pipe	SB–241	...	A96063	T6 wld.
30	...	Rod	SB–187	...	C10200	O60
31	...	Rod	SB–187	...	C10200	O60
32	...	Smls. tube	SB–75	...	C10200	O60
33	...	Smls. tube	SB–75	...	C10200	O60
34	...	Smls. pipe	SB–42	...	C10200	O61
35	...	Smls. pipe	SB–42	...	C10200	O61
36	...	Plate, sheet, strip	SB–152	...	C10200	H00
37	...	Plate, sheet, strip	SB–152	...	C10200	H01
38	...	Plate, sheet, strip	SB–152	...	C10200	H02
39	...	Plate, sheet, strip	SB–152	...	C10200	H03
40	...	Plate, sheet, strip	SB–152	...	C10200	H04
(**21**) 41	...	Plate, sheet, strip	SB–152	...	C10200	M20, O25
(**21**) 42	...	Plate, sheet, strip	SB–152	...	C10200	M20, O25
43	...	Smls. pipe	SB–42	...	C10200	H55
44	...	Smls. tube	SB–75	...	C10200	H55
45	...	Smls. cond. tube	SB–111	...	C10200	H55

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Size/ Thickness, in.	P-No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	...	23	24	...	NP	400 (Cl. 3 only)	400	400	NFA–13	G24, T3, W7
2	...	23	24	...	NP	400 (Cl. 3 only)	400	400	NFA–12,13	G24, T3, W7, W9
3	<1.000	23	42	35	NP	400 (Cl. 3 only)	400	400	NFA–12,13	T3, W4, W9
4	≥1.000	23	38	35	NP	400 (Cl. 3 only)	400	400	NFA–12,13	T3, W4, W9
5	...	23	24	...	NP	400 (Cl. 3 only)	400	400	NFA–12,13	T3, W7, W9
6	≤4.000	23	38	35	NP	400 (Cl. 3 only)	400	400	NFA–12,13	T3, W4, W9
7	≤4.000	23	37	33	NP	400 (Cl. 3 only)	400	400	NFA–12,13	T3, W4, W9
8	4.001–8.000	23	35	32	NP	400 (Cl. 3 only)	400	400	NFA–12,13	T3, W4, W9
9	≤8.000	23	24	...	NP	400 (Cl. 3 only)	400	400	NFA–12,13	T3, W7, W9
10	...	23	38	35	NP	400 (Cl. 3 only)	400	400	NFA–12,13	T3, W4, W9
11	...	23	24	...	NP	400 (Cl. 3 only)	400	400	NFA–12,13	G13, T3, W7, W9
12	0.025–0.500	23	33	28	NP	400 (Cl. 3 only)	400	400	NFA–1	T3, W4
13	0.025–0.500	23	17	8	NP	400 (Cl. 3 only)	400	400	NFA–1	T3, W7
14	≤0.500	23	17	9	NP	350 (Cl. 3 only)	400	400	NFA–1	T3, W4
15	0.501–1.000	23	16	8	NP	350 (Cl. 3 only)	400	400	NFA–1	T3, W4
16	≤0.500	23	22	16	NP	400 (Cl. 3 only)	400	400	NFA–1	T3, W4
17	0.501–1.000	23	21	15	NP	400 (Cl. 3 only)	400	400	NFA–1	T3, W4
18	≤1.000	23	30	25	NP	400 (Cl. 3 only)	400	400	NFA–1	T3, W4
19	≤1.000	23	17	8	NP	400 (Cl. 3 only)	400	400	NFA–1	T3, W7
20	≤1.000	23	17	8	NP	400 (Cl. 3 only)	400	400	NFA–1	T3, W7
21	≤0.500	23	17	9	NP	350 (Cl. 3 only)	NP	NP	NFA–1	T3, W4
22	0.501–1.000	23	16	8	NP	350 (Cl. 3 only)	NP	NP	NFA–1	T3, W4
23	≤0.500	23	22	16	NP	350 (Cl. 3 only)	400	400	NFA–1	T3, W4
24	0.501–1.000	23	21	15	NP	350 (Cl. 3 only)	400	400	NFA–1	T3, W4
25	≤1.000	23	30	25	NP	350 (Cl. 3 only)	400	400	NFA–1	T3, W4
26	≤1.000	23	17	8	NP	350 (Cl. 3 only)	400	400	NFA–1	T3, W7
27	≤1.000	23	17	8	NP	350 (Cl. 3 only)	400	400	NFA–1	T3, W7
28	≤1.000	23	30	25	NP	400 (Cl. 3 only)	400	400	NFA–1	T3, W4
29	≤1.000	23	17	8	NP	400 (Cl. 3 only)	400	400	NFA–1	T3, W7
30	All	31	28	8	NP	300	400	400	NFC–1	T3
31	All	31	28	8	NP	300	400	400	NFC–1	G5, T3
32	All	31	30	9	400	300 (Cl. 3 only)	400	400	NFC–1	G1, T3
33	All	31	30	9	400	300 (Cl. 3 only)	400	400	NFC–1	G1, G5, T3
34	All	31	30	9	400	300	400	400	NFC–1	G1, T3
35	All	31	30	9	400	300	400	400	NFC–1	G1, G5, T3
36	...	31	30	10	NP	300 (Cl. 3 only)	400	400	NFC–1	G33, T3, W3
37	...	31	30	10	NP	300 (Cl. 3 only)	400	400	NFC–1	G33, T3, W3
38	...	31	30	10	NP	300 (Cl. 3 only)	400	400	NFC–1	G33, T3, W3
39	...	31	30	10	NP	300 (Cl. 3 only)	400	400	NFC–1	G33, T3, W3
40	...	31	30	10	NP	300 (Cl. 3 only)	400	400	NFC–1	G33, T3, W3
41	...	31	30	10	NP	300 (Cl. 3 only)	400	400	NFC–1	T3
42	...	31	30	10	NP	250 (Cl. 3 only)	400	400	NFC–1	G5, T2
43	2 < NPS ≤ 12	31	36	30	400	400	400	400	NFC–6	G1, G9, W3
44	All	31	36	30	400	400 (Cl. 3 only)	400	400	NFC–6	G1, G9, W3
45	...	31	36	30	NP	400	400	400	NFC–6	G9, W3

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																	
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950
1	6.9	6.9	6.9	6.8	5.5	*4.6*	*3.5*	...	...	...	...	...	...	...	...	...	...	...
2	6.9	6.9	6.9	6.8	5.5	*4.6*	*3.5*	...	...	...	...	...	...	...	...	...	...	...
3	12.0	12.0	12.0	11.7	8.4	*6.3*	*4.5*	...	...	...	...	...	...	...	...	...	...	...
4	10.9	10.9	10.9	10.6	7.9	*6.3*	*4.5*	...	...	...	...	...	...	...	...	...	...	...
5	6.9	6.9	6.9	6.8	5.5	*4.6*	*3.5*	...	...	...	...	...	...	...	...	...	...	...
6	10.9	10.9	10.9	10.6	7.9	*6.3*	*4.5*	...	...	...	...	...	...	...	...	...	...	...
7	10.6	10.6	10.6	10.5	7.7	*6.3*	*4.5*	...	...	...	...	...	...	...	...	...	...	...
8	10.0	10.0	10.0	9.9	7.4	*6.1*	*4.5*	...	...	...	...	...	...	...	...	...	...	...
9	6.9	6.9	6.9	6.8	5.5	*4.6*	*3.5*	...	...	...	...	...	...	...	...	...	...	...
10	10.9	10.9	10.9	10.6	7.2	*5.6*	*4.0*	...	...	...	...	...	...	...	...	...	...	...
11	6.9	6.9	6.9	6.8	5.0	*4.2*	*3.2*	...	...	...	...	...	...	...	...	...	...	...
12	9.4	9.4	9.4	8.3	5.5	*3.4*	*2.0*	...	...	...	...	...	...	...	...	...	...	...
13	4.9	4.9	4.9	4.9	3.9	*3.0*	*2.0*	...	...	...	...	...	...	...	...	...	...	...
14	4.9	4.9	4.9	4.9	4.2	*3.4*	*2.0*	...	...	...	...	...	...	...	...	...	...	...
15	4.6	4.6	4.6	4.6	4.0	*3.4*	*2.0*	...	...	...	...	...	...	...	...	...	...	...
16	6.3	6.3	6.1	5.8	4.6	*3.4*	*2.0*	...	...	...	...	...	...	...	...	...	...	...
17	6.0	6.0	5.9	5.6	4.3	*3.4*	*2.0*	...	...	...	...	...	...	...	...	...	...	...
18	8.6	8.6	8.6	7.5	5.0	*3.4*	*2.0*	...	...	...	...	...	...	...	...	...	...	...
19	4.9	4.9	4.9	4.9	3.9	*3.0*	*2.0*	...	...	...	...	...	...	...	...	...	...	...
20	4.9	4.9	4.9	4.9	3.9	*3.0*	*2.0*	...	...	...	...	...	...	...	...	...	...	...
21	4.9	4.9	4.9	4.9	4.2	*3.4*	...	...	...	...	...	...	...	...	...	...	...	...
22	4.6	4.6	4.6	4.6	4.0	*3.4*	...	...	...	...	...	...	...	...	...	...	...	...
23	6.3	6.3	6.1	5.8	4.6	*3.4*	*2.0*	...	...	...	...	...	...	...	...	...	...	...
24	6.0	6.0	5.9	5.6	4.4	*3.4*	*2.0*	...	...	...	...	...	...	...	...	...	...	...
25	8.6	8.6	8.6	7.5	5.0	*3.4*	*2.0*	...	...	...	...	...	...	...	...	...	...	...
26	4.9	4.9	4.9	4.9	3.9	*3.0*	*2.0*	...	...	...	...	...	...	...	...	...	...	...
27	4.9	4.9	4.9	4.9	3.9	*3.0*	*2.0*	...	...	...	...	...	...	...	...	...	...	...
28	8.6	8.6	8.6	7.5	5.0	*3.4*	*2.0*	...	...	...	...	...	...	...	...	...	...	...
29	4.9	4.9	4.9	4.9	3.9	*3.0*	*2.0*	...	...	...	...	...	...	...	...	...	...	...
30	5.3	4.7	4.7	4.7	4.7	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
31	5.3	5.3	5.3	5.3	5.3	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
32	6.0	5.3	5.3	5.3	5.3	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
33	6.0	6.0	6.0	6.0	6.0	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
34	6.0	5.3	5.3	5.3	5.3	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
35	6.0	6.0	6.0	6.0	6.0	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
36	6.7	5.9	5.9	5.9	5.8	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
37	6.7	5.9	5.9	5.9	5.8	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
38	6.7	5.9	5.9	5.9	5.8	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
39	6.7	5.9	5.9	5.9	5.8	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
40	6.7	5.9	5.9	5.9	5.8	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
41	6.7	5.9	5.9	5.9	5.8	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
42	6.7	6.7	6.7	6.7	*6.3*	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
43	10.3	10.3	10.3	10.3	10.0	9.7	9.4	...	...	...	...	...	...	...	...	...	...	...
44	10.3	10.3	10.3	10.3	10.0	9.7	9.4	...	...	...	...	...	...	...	...	...	...	...
45	10.3	10.3	10.3	10.3	10.0	9.7	9.4	...	...	...	...	...	...	...	...	...	...	...

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																	
	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	1700	1750	1800	
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
	1	...	Smls. U-bend tube	SB-395	...	C10200	H55
	2	...	Smls. pipe	SB-42	...	C10200	H80
	3	...	Smls. tube	SB-75	...	C10200	H80
	4	...	Smls. cond. tube	SB-111	...	C10200	H80
	5	...	Plate, sheet, strip	SB-152	...	C10400	H00
	6	...	Plate, sheet, strip	SB-152	...	C10400	H01
	7	...	Plate, sheet, strip	SB-152	...	C10400	H02
	8	...	Plate, sheet, strip	SB-152	...	C10400	H03
	9	...	Plate, sheet, strip	SB-152	...	C10400	H04
(**21**)	10	...	Plate, sheet, strip	SB-152	...	C10400	M20, O25
(**21**)	11	...	Plate, sheet, strip	SB-152	...	C10400	M20, O25
	12	...	Plate, sheet, strip	SB-152	...	C10500	H00
	13	...	Plate, sheet, strip	SB-152	...	C10500	H01
	14	...	Plate, sheet, strip	SB-152	...	C10500	H02
	15	...	Plate, sheet, strip	SB-152	...	C10500	H03
	16	...	Plate, sheet, strip	SB-152	...	C10500	H04
(**21**)	17	...	Plate, sheet, strip	SB-152	...	C10500	M20, O25
(**21**)	18	...	Plate, sheet, strip	SB-152	...	C10500	M20, O25
	19	...	Plate, sheet, strip	SB-152	...	C10700	H00
	20	...	Plate, sheet, strip	SB-152	...	C10700	H01
	21	...	Plate, sheet, strip	SB-152	...	C10700	H02
	22	...	Plate, sheet, strip	SB-152	...	C10700	H03
	23	...	Plate, sheet, strip	SB-152	...	C10700	H04
(**21**)	24	...	Plate, sheet, strip	SB-152	...	C10700	M20, O25
(**21**)	25	...	Plate, sheet, strip	SB-152	...	C10700	M20, O25
	26	...	Bar, rod	SB-187	...	C11000	H04
	27	...	Bar, rod	SB-187	...	C11000	O60
	28	...	Bar, rod	SB-187	...	C11000	O60
	29	...	Plate, sheet, strip, bar	SB-152	...	C11000	H00
	30	...	Plate, sheet, strip, bar	SB-152	...	C11000	H01
	31	...	Plate, sheet, strip, bar	SB-152	...	C11000	H02
	32	...	Plate, sheet, strip, bar	SB-152	...	C11000	H03
	33	...	Plate, sheet, strip, bar	SB-152	...	C11000	H04
(**21**)	34	...	Plate, sheet, strip, bar	SB-152	...	C11000	M20, O25
(**21**)	35	...	Plate, sheet, strip, bar	SB-152	...	C11000	M20, O25
	36	...	Smls. tube	SB-75	...	C12000	O50
	37	...	Smls. tube	SB-75	...	C12000	O50
	38	...	Smls. tube	SB-75	...	C12000	O60
	39	...	Smls. tube	SB-75	...	C12000	O60
	40	...	Smls. pipe	SB-42	...	C12000	O61
	41	...	Smls. pipe	SB-42	...	C12000	O61
	42	...	Smls. pipe	SB-42	...	C12000	H55
	43	...	Smls. tube	SB-75	...	C12000	H55
	44	...	Smls. cond. tube	SB-111	...	C12000	H55
	45	...	Smls. U-bend tube	SB-395	...	C12000	H55

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Size/ Thickness, in.	P-No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	...	31	36	30	NP	400 (Cl. 3 only)	400	400	NFC–6	G9, W3
2	1/8 < NPS ≤ 2	31	45	40	400	300	400	400	NFC–6	G1, G6, G9, T4, W3
3	<4	31	45	40	400	350	400	400	NFC–6	G1, G6, G9, T4, W3
4	...	31	45	40	NP	300	400	400	NFC–6	G6, G9, T4, W3
5	...	31	30	10	NP	300	400	400	NFC–1	G33, T3, W3
6	...	31	30	10	NP	300	400	400	NFC–1	G33, T3, W3
7	...	31	30	10	NP	300	400	400	NFC–1	G33, T3, W3
8	...	31	30	10	NP	300	400	400	NFC–1	G33, T3, W3
9	...	31	30	10	NP	300	400	400	NFC–1	G33, T3, W3
10	...	31	30	10	NP	300	400	400	NFC–1	T3
11	...	31	30	10	NP	250	400	400	NFC–1	G5, T2
12	...	31	30	10	NP	300	400	400	NFC–1	G33, T3, W3
13	...	31	30	10	NP	300	400	400	NFC–1	G33, T3, W3
14	...	31	30	10	NP	300	400	400	NFC–1	G33, T3, W3
15	...	31	30	10	NP	300	400	400	NFC–1	G33, T3, W3
16	...	31	30	10	NP	300	400	400	NFC–1	G33, T3, W3
17	...	31	30	10	NP	300	400	400	NFC–1	T3
18	...	31	30	10	NP	250	400	400	NFC–1	G5, T2
19	...	31	30	10	NP	300	400	400	NFC–1	G33, T3, W3
20	...	31	30	10	NP	300	400	400	NFC–1	G33, T3, W3
21	...	31	30	10	NP	300	400	400	NFC–1	G33, T3, W3
22	...	31	30	10	NP	300	400	400	NFC–1	G33, T3, W3
23	...	31	30	10	NP	300	400	400	NFC–1	G33, T3, W3
24	...	31	30	10	NP	300	400	400	NFC–1	T3
25	...	31	30	10	NP	250	400	400	NFC–1	G5, T2
26	All	31	28	8	NP	300	400	400	NFC–1	G33, T3
27	All	31	28	8	NP	300	400	400	NFC–1	T3
28	All	31	28	8	NP	300	400	400	NFC–1	G5, T3
29	...	31	30	10	NP	NP	400	400	NFC–1	G33, T3, W3
30	...	31	30	10	NP	NP	400	400	NFC–1	G33, T3, W3
31	...	31	30	10	NP	NP	400	400	NFC–1	G33, T3, W3
32	...	31	30	10	NP	NP	400	400	NFC–1	G33, T3, W3
33	...	31	30	10	NP	NP	400	400	NFC–1	G33, T3, W3
34	...	31	30	10	NP	NP	400	400	NFC–1	T3
35	...	31	30	10	NP	NP	400	400	NFC–1	G5, T2
36	All	31	30	9	NP	300 (Cl. 3 only)	NP	NP	NFC–1	...
37	All	31	30	9	NP	300 (Cl. 3 only)	NP	NP	NFC–1	G5
38	All	31	30	9	400	300 (Cl. 3 only)	400	400	NFC–1	G1, T3
39	All	31	30	9	400	300 (Cl. 3 only)	400	400	NFC–1	G1, G5, T3
40	All	31	30	9	400	300	400	400	NFC–1	G1, T3
41	All	31	30	9	400	300	400	400	NFC–1	G1, G5, T3
42	2 < NPS ≤ 12	31	36	30	400	400	400	400	NFC–6	G1, G9, W3
43	All	31	36	30	400	400 (Cl. 3 only)	400	400	NFC–6	G1, G9, W3
44	...	31	36	30	NP	400	400	400	NFC–6	G9, W3
45	...	31	36	30	NP	400 (Cl. 3 only)	400	400	NFC–6	G9, W3

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																	
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950
1	10.3	10.3	10.3	10.3	10.0	9.7	9.4	...	...	...	...	...	...	...	...	...	...	...
2	12.9	12.9	12.9	12.9	12.5	11.8	*4.3*	...	...	...	...	...	...	...	...	...	...	...
3	12.9	12.9	12.9	12.9	12.5	11.8	*4.3*	...	...	...	...	...	...	...	...	...	...	...
4	12.9	12.9	12.9	12.9	12.5	11.8	*4.3*	...	...	...	...	...	...	...	...	...	...	...
5	6.7	5.9	5.9	5.9	5.8	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
6	6.7	5.9	5.9	5.9	5.8	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
7	6.7	5.9	5.9	5.9	5.8	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
8	6.7	5.9	5.9	5.9	5.8	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
9	6.7	5.9	5.9	5.9	5.8	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
10	6.7	5.9	5.9	5.9	5.8	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
11	6.7	6.7	6.7	6.7	*6.3*	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
12	6.7	5.9	5.9	5.9	5.8	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
13	6.7	5.9	5.9	5.9	5.8	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
14	6.7	5.9	5.9	5.9	5.8	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
15	6.7	5.9	5.9	5.9	5.8	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
16	6.7	5.9	5.9	5.9	5.8	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
17	6.7	5.9	5.9	5.9	5.8	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
18	6.7	6.7	6.7	6.7	*6.3*	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
19	6.7	5.9	5.9	5.9	5.8	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
20	6.7	5.9	5.9	5.9	5.8	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
21	6.7	5.9	5.9	5.9	5.8	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
22	6.7	5.9	5.9	5.9	5.8	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
23	6.7	5.9	5.9	5.9	5.8	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
24	6.7	5.9	5.9	5.9	5.8	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
25	6.7	6.7	6.7	6.7	*6.3*	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
26	5.3	4.7	4.7	4.7	4.7	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
27	5.3	4.7	4.7	4.7	4.7	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
28	5.3	5.3	5.3	5.3	5.3	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
29	6.7	5.9	5.9	5.9	5.8	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
30	6.7	5.9	5.9	5.9	5.8	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
31	6.7	5.9	5.9	5.9	5.8	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
32	6.7	5.9	5.9	5.9	5.8	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
33	6.7	5.9	5.9	5.9	5.8	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
34	6.7	5.9	5.9	5.9	5.8	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
35	6.7	6.7	6.7	6.7	*6.3*	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
36	6.0	5.3	5.3	5.3	5.3	...	...	...	...	...	...	...	...	...	...	...	...	...
37	6.0	6.0	6.0	6.0	6.0	...	...	...	...	...	...	...	...	...	...	...	...	...
38	6.0	5.3	5.3	5.3	5.3	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
39	6.0	6.0	6.0	6.0	6.0	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
40	6.0	5.3	5.3	5.3	5.3	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
41	6.0	6.0	6.0	6.0	6.0	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
42	10.3	10.3	10.3	10.3	10.0	9.7	9.4	...	...	...	...	...	...	...	...	...	...	...
43	10.3	10.3	10.3	10.3	10.0	9.7	9.4	...	...	...	...	...	...	...	...	...	...	...
44	10.3	10.3	10.3	10.3	10.0	9.7	9.4	...	...	...	...	...	...	...	...	...	...	...
45	10.3	10.3	10.3	10.3	10.0	9.7	9.4	...	...	...	...	...	...	...	...	...	...	...

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																	
	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	1700	1750	1800	
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
	1	...	Smls. pipe	SB–42	...	C12000	H80
	2	...	Smls. tube	SB–75	...	C12000	H80
	3	...	Smls. cond. tube	SB–111	...	C12000	H80
	4	...	Smls. tube	SB–75	...	C12200	O50
	5	...	Smls. tube	SB–75	...	C12200	O50
	6	...	Smls. tube	SB–75	...	C12200	O60
	7	...	Smls. tube	SB–75	...	C12200	O60
	8	...	Smls. pipe	SB–42	...	C12200	O61
	9	...	Smls. pipe	SB–42	...	C12200	O61
	10	...	Finned tube	SB–359	...	C12200	O61
	11	...	Finned tube	SB–359	...	C12200	O61
	12	...	Wld. cond. tube	SB–543	...	C12200	WO61
	13	...	Wld. cond. tube	SB–543	...	C12200	WO61
	14	...	Plate, sheet, strip	SB–152	...	C12200	H00
	15	...	Plate, sheet, strip	SB–152	...	C12200	H01
	16	...	Plate, sheet, strip	SB–152	...	C12200	H02
	17	...	Plate, sheet, strip	SB–152	...	C12200	H03
	18	...	Plate, sheet, strip	SB–152	...	C12200	H04
(**21**)	19	...	Plate, sheet, strip	SB–152	...	C12200	M20, O25
(**21**)	20	...	Plate, sheet, strip	SB–152	...	C12200	M20, O25
	21	...	Wld. cond. tube	SB–543	...	C12200	WC55
	22	...	Smls. pipe	SB–42	...	C12200	H55
	23	...	Smls. tube	SB–75	...	C12200	H55
	24	...	Smls. cond. tube	SB–111	...	C12200	H55
	25	...	Finned tube	SB–359	...	C12200	H55
	26	...	Smls. U–bend tube	SB–395	...	C12200	H55
	27	...	Smls. pipe	SB–42	...	C12200	H80
	28	...	Smls. cond. tube	SB–75	...	C12200	H80
	29	...	Smls. tube	SB–111	...	C12200	H80
	30	...	Plate, sheet, strip, bar	SB–152	...	C12300	H00
	31	...	Plate, sheet, strip, bar	SB–152	...	C12300	H01
	32	...	Plate, sheet, strip, bar	SB–152	...	C12300	H02
	33	...	Plate, sheet, strip, bar	SB–152	...	C12300	H03
	34	...	Plate, sheet, strip, bar	SB–152	...	C12300	H04
(**21**)	35	...	Plate, sheet, strip, bar	SB–152	...	C12300	M20, O25
(**21**)	36	...	Plate, sheet, strip, bar	SB–152	...	C12300	M20, O25
(**21**)	37	...	Plate, sheet, strip	SB–152	...	C14200	M20, O25
(**21**)	38	...	Plate, sheet, strip	SB–152	...	C14200	M20, O25
	39	...	Smls. cond. tube	SB–111	...	C14200	H55
	40	...	Smls. U–bend tube	SB–395	...	C14200	H55
	41	...	Smls. cond. tube	SB–111	...	C14200	H80
	42	...	Smls. cond. tube	SB–111	...	C19200	O61
	43	...	Smls. U–bend tube	SB–395	...	C19200	O61
(**21**)	44	...	Wld. cond. tube	SB–543	...	C19400	WO61
(**21**)	45	...	Wld. cond. tube	SB–543	...	C19400	WC55

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Size/ Thickness, in.	P-No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	1/8 < NPS ≤ 2	31	45	40	400	300	400	400	NFC–6	G1, G6, G9, T4, W3
2	<4	31	45	40	400	350 (Cl. 3 only)	400	400	NFC–6	G1, G6, G9, T4, W3
3	...	31	45	40	NP	300	400	400	NFC–6	G6, G9, T4, W3
4	All	31	30	9	NP	300	400	400	NFC–7	T3
5	All	31	30	9	NP	300	400	400	NFC–7	G5, T3
6	All	31	30	9	400	300	NP	NP	NFC–1	G1, T3
7	All	31	30	9	400	300	NP	NP	NFC–1	G1, G5, T3
8	All	31	30	9	400	300	400	400	NFC–1	G1, T3
9	All	31	30	9	400	300	400	400	NFC–1	G1, G5, T3
10	...	31	30	9	NP	300 (Cl. 3 only)	400	NP	NFC–1	G1, T3
11	...	31	30	9	NP	300 (Cl. 3 only)	400	NP	NFC–1	G1, G5, T3
12	...	31	30	9	NP	300 (Cl. 3 only)	400	400	NFC–1	G14, T3, W11
13	...	31	30	9	NP	300 (Cl. 3 only)	400	400	NFC–1	G5, G14, T3, W11
14	...	31	30	10	NP	300	400	400	NFC–1	G33, T3, W3
15	...	31	30	10	NP	300	400	400	NFC–1	G33, T3, W3
16	...	31	30	10	NP	300	400	400	NFC–1	G33, T3, W3
17	...	31	30	10	NP	300	400	400	NFC–1	G33, T3, W3
18	...	31	30	10	NP	300	400	400	NFC–1	G33, T3, W3
19	...	31	30	10	NP	300	400	400	NFC–1	T3
20	...	31	30	10	NP	250	400	400	NFC–1	G5, T2
21	...	31	32	15	NP	300 (Cl. 3 only)	400	400	NFC–1	G14, T4, W10
22	2 < NPS ≤ 12	31	36	30	400	400	400	400	NFC–6	G1, G9, W3
23	All	31	36	30	400	400 (Cl. 3 only)	400	400	NFC–6	G1, G9, W3
24	...	31	36	30	NP	400	400	400	NFC–6	G9, W3
25	...	31	36	30	NP	300 (Cl. 3 only)	400	NP	NFC–6	G1, G9, W3
26	...	31	36	30	NP	400 (Cl. 3 only)	400	400	NFC–6	G9, W3
27	1/8 < NPS ≤ 2	31	45	40	400	300	400	400	NFC–6	G1, G6, G9, T4, W3
28	<4	31	45	40	400	350 (Cl. 3 only)	400	400	NFC–6	G1, G6, G9, T4, W3
29	...	31	45	40	NP	300	400	400	NFC–6	G6, G9, T4, W3
30	...	31	30	10	NP	300	400	400	NFC–1	G33, T3, W3
31	...	31	30	10	NP	300	400	400	NFC–1	G33, T3, W3
32	...	31	30	10	NP	300	400	400	NFC–1	G33, T3, W3
33	...	31	30	10	NP	300	400	400	NFC–1	G33, T3, W3
34	...	31	30	10	NP	300	400	400	NFC–1	G33, T3, W3
35	...	31	30	10	NP	300	400	400	NFC–1	T3
36	...	31	30	10	NP	250	400	400	NFC–1	G5, T2
37	...	31	30	10	NP	300 (Cl. 3 only)	NP	NP	NFC–1	...
38	...	31	30	10	NP	250 (Cl. 3 only)	NP	NP	NFC–1	G5
39	...	31	36	30	NP	400	400	400	NFC–6	G9, W3
40	...	31	36	30	NP	400 (Cl. 3 only)	400	400	NFC–6	G9, W3
41	...	31	45	40	NP	300	400	400	NFC–6	G6, G9, T4, W3
42	...	31	38	12	NP	NP	300	300	NFC–1	...
43	...	31	38	12	NP	NP	300	300	NFC–1	...
44	...	31	45	15	NP	NP	400	400	NFC–5	G14, T4, W11
45	...	31	45	22	NP	300 (Cl. 3 only)	400	400	NFC–5	G14, T4, W10

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																	
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950
1	12.9	12.9	12.9	12.9	12.5	11.8	*4.3*	...	...	...	...	...	...	...	...	...	...	...
2	12.9	12.9	12.9	12.9	12.5	11.8	*4.3*	...	...	...	...	...	...	...	...	...	...	...
3	12.9	12.9	12.9	12.9	12.5	11.8	*4.3*	...	...	...	...	...	...	...	...	...	...	...
4	6.0	5.3	5.3	5.3	5.3	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
5	6.0	6.0	6.0	6.0	6.0	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
6	6.0	5.3	5.3	5.3	5.3	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
7	6.0	6.0	6.0	6.0	6.0	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
8	6.0	5.3	5.3	5.3	5.3	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
9	6.0	6.0	6.0	6.0	6.0	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
10	6.0	5.3	5.3	5.3	5.3	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
11	6.0	6.0	6.0	6.0	6.0	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
12	5.7	5.0	5.0	5.0	5.0	*3.8*	*2.5*	...	...	...	...	...	...	...	...	...	...	...
13	5.7	5.7	5.7	5.7	5.4	*3.8*	*2.5*	...	...	...	...	...	...	...	...	...	...	...
14	6.7	5.9	5.9	5.9	5.8	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
15	6.7	5.9	5.9	5.9	5.8	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
16	6.7	5.9	5.9	5.9	5.8	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
17	6.7	5.9	5.9	5.9	5.8	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
18	6.7	5.9	5.9	5.9	5.8	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
19	6.7	5.9	5.9	5.9	5.8	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
20	6.7	6.7	6.7	6.7	*6.3*	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
21	7.8	7.8	7.8	7.8	7.5	7.3	*2.6*	...	...	...	...	...	...	...	...	...	...	...
22	10.3	10.3	10.3	10.3	10.0	9.7	9.4	...	...	...	...	...	...	...	...	...	...	...
23	10.3	10.3	10.3	10.3	10.0	9.7	9.4	...	...	...	...	...	...	...	...	...	...	...
24	10.3	10.3	10.3	10.3	10.0	9.7	9.4	...	...	...	...	...	...	...	...	...	...	...
25	10.3	10.3	10.3	10.3	10.0	9.7	9.4	...	...	...	...	...	...	...	...	...	...	...
26	10.3	10.3	10.3	10.3	10.0	9.7	9.4	...	...	...	...	...	...	...	...	...	...	...
27	12.9	12.9	12.9	12.9	12.5	11.8	*4.3*	...	...	...	...	...	...	...	...	...	...	...
28	12.9	12.9	12.9	12.9	12.5	11.8	*4.3*	...	...	...	...	...	...	...	...	...	...	...
29	12.9	12.9	12.9	12.9	12.5	11.8	*4.3*	...	...	...	...	...	...	...	...	...	...	...
30	6.7	5.9	5.9	5.9	5.8	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
31	6.7	5.9	5.9	5.9	5.8	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
32	6.7	5.9	5.9	5.9	5.8	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
33	6.7	5.9	5.9	5.9	5.8	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
34	6.7	5.9	5.9	5.9	5.8	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
35	6.7	5.9	5.9	5.9	5.8	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
36	6.7	6.7	6.7	6.7	*6.3*	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...	...
37	6.7	5.9	5.9	5.9	5.8	...	...	...	...	...	...	...	...	...	...	...	...	...
38	6.7	6.7	6.7	6.7	...	...	...	...	...	...	...	...	...	...	...	...	...	...
39	10.3	10.3	10.3	10.3	10.0	9.7	9.4	...	...	...	...	...	...	...	...	...	...	...
40	10.3	10.3	10.3	10.3	10.0	9.7	9.4	...	...	...	...	...	...	...	...	...	...	...
41	12.9	12.9	12.9	12.9	12.5	11.8	*4.3*	...	...	...	...	...	...	...	...	...	...	...
42	8.0	7.1	6.7	6.4	6.2	...	...	...	...	...	...	...	...	...	...	...	...	...
43	8.0	7.1	6.7	6.4	6.2	...	...	...	...	...	...	...	...	...	...	...	...	...
44	8.5	8.4	8.3	8.1	7.8	7.6	*6.0*	...	...	...	...	...	...	...	...	...	...	...
45	10.9	10.9	10.9	10.6	10.1	7.7	*6.0*	...	...	...	...	...	...	...	...	...	...	...

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																	
	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	1700	1750	1800	
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
	1	...	Smls. pipe	SB–43	...	C23000	H58
	2	...	Smls. tube	SB–135	...	C23000	O50
	3	...	Smls. red brass tube	SB–135	...	C23000	O60
	4	...	Smls. pipe	SB–43	...	C23000	O61
	5	...	Smls. cond. tube	SB–111	...	C23000	O61
	6	...	Smls. tube	SB–395	...	C23000	O61
(**21**)	7	...	Wld. cond. tube	SB–543	...	C23000	WO61
(**21**)	8	...	Wld. cond. tube	SB–543	...	C23000	WC55
	9	...	Smls. tube	SB–111	...	C28000	O61
(**21**)	10	...	Plate	SB–171	...	C36500	M10, M20
(**21**)	11	...	Plate	SB–171	...	C36500	O20, O25
(**21**)	12	...	Plate	SB–171	...	C36500	M10, M20
(**21**)	13	...	Plate	SB–171	...	C36500	O20, O25
(**21**)	14	...	Plate	SB–171	...	C36500	M10, M20
(**21**)	15	...	Plate	SB–171	...	C36500	O20, O25
	16	...	Forgings, brass	SB–283	...	C37700	M10
	17	...	Forgings, brass	SB–283	...	C37700	M11
	18	...	Forgings, brass	SB–283	...	C37700	O20
	19	...	Forgings, brass	SB–283	...	C37700	M10
	20	...	Forgings, brass	SB–283	...	C37700	M11
	21	...	Forgings, brass	SB–283	...	C37700	O20
(**21**)	22	...	Plate	SB–171	...	C44300	M10, M20
(**21**)	23	...	Plate	SB–171	...	C44300	O20, O25
	24	...	Smls. cond. tube	SB–111	...	C44300	O61
	25	...	Finned tube	SB–359	...	C44300	O61
	26	...	Smls. U–bend tube	SB–395	...	C44300	O61
(**21**)	27	...	Wld. cond. tube	SB–543	...	C44300	WO61
(**21**)	28	...	Plate	SB–171	...	C44400	M10, M20
(**21**)	29	...	Plate	SB–171	...	C44400	O20, O25
	30	...	Smls. cond. tube	SB–111	...	C44400	O61
	31	...	Finned tube	SB–359	...	C44400	O61
	32	...	Smls. U–bend tube	SB–395	...	C44400	O61
(**21**)	33	...	Wld. cond. tube	SB–543	...	C44400	WO61
(**21**)	34	...	Plate	SB–171	...	C44500	M10, M20
(**21**)	35	...	Plate	SB–171	...	C44500	O20, O25
	36	...	Smls. cond. tube	SB–111	...	C44500	O61
	37	...	Finned tube	SB–359	...	C44500	O61
	38	...	Smls. U–bend tube	SB–395	...	C44500	O61
(**21**)	39	...	Wld. cond. tube	SB–543	...	C44500	WO61
(**21**)	40	...	Plate	SB–171	...	C46400	M10, M20
(**21**)	41	...	Plate	SB–171	...	C46400	O20, O25
(**21**)	42	...	Plate	SB–171	...	C46400	M10, M20
(**21**)	43	...	Plate	SB–171	...	C46400	O20, O25
(**21**)	44	...	Plate	SB–171	...	C46500	M10, M20
(**21**)	45	...	Plate	SB–171	...	C46500	O20, O25

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Size/ Thickness, in.	P-No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	...	32	40	12	450	300 (Cl. 3 only)	450	450	NFC–1	G1, G33, T3, W3
2	...	32	40	12	NP	300 (Cl. 3 only)	NP	NP	NFC–1	...
3	...	32	40	12	NP	300 (Cl. 3 only)	450	450	NFC–1	T3
4	...	32	40	12	450	300 (Cl. 3 only)	450	450	NFC–1	G1, T3
5	...	32	40	12	NP	300 (Cl. 3 only)	450	450	NFC–1	T3
6	...	32	40	12	NP	300 (Cl. 3 only)	450	450	NFC–1	T3
7	...	32	40	12	NP	300 (Cl. 3 only)	450	450	NFC–1	G14, T3, W11
8	...	32	42	20	NP	300 (Cl. 3 only)	450	450	NFC–2	G14, G33, T3, W10
9	...	32	50	20	400	350 (Cl. 3 only)	400	400	NFC–3	G1, G6, T3
10	3.5 < t ≤ 5	32	40	12	NP	350 (Cl. 3 only)	400	400	NFC–2	G7, T4
11	3.5 < t ≤ 5	32	40	12	NP	350 (Cl. 3 only)	400	400	NFC–2	G7, T4
12	2 < t ≤ 3.5	32	45	15	NP	350 (Cl. 3 only)	400	400	NFC–2	T4
13	2 < t ≤ 3.5	32	45	15	NP	350 (Cl. 3 only)	400	400	NFC–2	T4
14	≤2	32	50	20	NP	350 (Cl. 3 only)	400	400	NFC–2	T3
15	≤2	32	50	20	NP	350 (Cl. 3 only)	400	400	NFC–2	T3
16	>1½	...	46	15	NP	NP	200	200	NFC–2	W14
17	>1½	...	46	15	NP	NP	200	200	NFC–2	W14
18	>1½	...	46	15	NP	NP	200	200	NFC–2	W14
19	≤1½	...	50	18	NP	NP	200	200	NFC–2	W14
20	≤1½	...	50	18	NP	NP	200	200	NFC–2	W14
21	≤1½	...	50	18	NP	NP	200	200	NFC–2	W14
22	≤4	32	45	15	NP	350 (Cl. 3 only)	450	450	NFC–2	T4
23	≤4	32	45	15	NP	350 (Cl. 3 only)	450	450	NFC–2	T4
24	...	32	45	15	450	350 (Cl. 3 only)	450	450	NFC–2	G1, G6, T4
25	...	32	45	15	NP	350 (Cl. 3 only)	450	NP	NFC–2	G1, G6, T4
26	...	32	45	15	NP	350 (Cl. 3 only)	450	450	NFC–2	T4
27	...	32	45	15	NP	NP	450	450	NFC–2	G7, G14, T4, W11
28	≤4	32	45	15	NP	350 (Cl. 3 only)	450	450	NFC–2	T4
29	≤4	32	45	15	NP	350 (Cl. 3 only)	450	450	NFC–2	T4
30	...	32	45	15	450	350 (Cl. 3 only)	450	450	NFC–2	G1, G6, T4
31	...	32	45	15	NP	350 (Cl. 3 only)	450	NP	NFC–2	G1, G6, T4
32	...	32	45	15	NP	350 (Cl. 3 only)	450	450	NFC–2	T4
33	...	32	45	15	NP	NP	450	450	NFC–2	G7, G14, T4, W11
34	≤4	32	45	15	NP	350 (Cl. 3 only)	450	450	NFC–2	T4
35	≤4	32	45	15	NP	350 (Cl. 3 only)	450	450	NFC–2	T4
36	...	32	45	15	450	350 (Cl. 3 only)	450	450	NFC–2	G1, G6, T4
37	...	32	45	15	NP	350 (Cl. 3 only)	450	NP	NFC–2	G1, G6, T4
38	...	32	45	15	NP	350 (Cl. 3 only)	450	450	NFC–2	T4
39	...	32	45	15	NP	NP	450	450	NFC–2	G7, G14, T4, W11
40	3 < t ≤ 5	32	50	18	NP	300 (Cl. 3 only)	400	400	NFC–2	T3
41	3 < t ≤ 5	32	50	18	NP	300 (Cl. 3 only)	400	400	NFC–2	T3
42	≤3	32	50	20	NP	300 (Cl. 3 only)	400	400	NFC–2	T3
43	≤3	32	50	20	NP	300 (Cl. 3 only)	400	400	NFC–2	T3
44	3 < t ≤ 5	32	50	18	NP	300 (Cl. 3 only)	400	400	NFC–2	T3
45	3 < t ≤ 5	32	50	18	NP	300 (Cl. 3 only)	400	400	NFC–2	T3

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																	
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950
1	8.0	8.0	8.0	8.0	8.0	*7.0*	*5.0*	*2.0*	...	...	...	...	...	...	...	...	...	...
2	8.0	8.0	8.0	8.0	8.0	...	...	...	...	...	...	...	...	...	...	...	...	...
3	8.0	8.0	8.0	8.0	8.0	*7.0*	*5.0*	*2.0*	...	...	...	...	...	...	...	...	...	...
4	8.0	8.0	8.0	8.0	8.0	*7.0*	*5.0*	*2.0*	...	...	...	...	...	...	...	...	...	...
5	8.0	8.0	8.0	8.0	8.0	*7.0*	*5.0*	*2.0*	...	...	...	...	...	...	...	...	...	...
6	8.0	8.0	8.0	8.0	8.0	*7.0*	*5.0*	*2.0*	...	...	...	...	...	...	...	...	...	...
7	6.8	6.8	6.8	6.8	6.8	*6.0*	*4.3*	*1.7*	...	...	...	...	...	...	...	...	...	...
8	6.8	6.8	6.8	6.8	6.8	*6.0*	*4.3*	*1.7*	...	...	...	...	...	...	...	...	...	...
9	13.3	13.3	13.3	13.3	13.3	*10.8*	*5.3*	...	...	...	...	...	...	...	...	...	...	...
10	8.0	8.0	8.0	8.0	8.0	8.0	*5.3*	...	...	...	...	...	...	...	...	...	...	...
11	8.0	8.0	8.0	8.0	8.0	8.0	*5.3*	...	...	...	...	...	...	...	...	...	...	...
12	10.0	10.0	10.0	10.0	10.0	10.0	*5.3*	...	...	...	...	...	...	...	...	...	...	...
13	10.0	10.0	10.0	10.0	10.0	10.0	*5.3*	...	...	...	...	...	...	...	...	...	...	...
14	13.3	13.3	13.3	13.3	13.3	*10.8*	*5.3*	...	...	...	...	...	...	...	...	...	...	...
15	13.3	13.3	13.3	13.3	13.3	*10.8*	*5.3*	...	...	...	...	...	...	...	...	...	...	...
16	10.0	9.4	9.0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
17	10.0	9.4	9.0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
18	10.0	9.4	9.0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
19	12.0	11.3	10.8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
20	12.0	11.3	10.8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
21	12.0	11.3	10.8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
22	10.0	10.0	10.0	10.0	10.0	10.0	*5.3*	*2.0*	...	...	...	...	...	...	...	...	...	...
23	10.0	10.0	10.0	10.0	10.0	10.0	*5.3*	*2.0*	...	...	...	...	...	...	...	...	...	...
24	10.0	10.0	10.0	10.0	10.0	10.0	*5.3*	*2.0*	...	...	...	...	...	...	...	...	...	...
25	10.0	10.0	10.0	10.0	10.0	10.0	*5.3*	*2.0*	...	...	...	...	...	...	...	...	...	...
26	10.0	10.0	10.0	10.0	10.0	10.0	*5.3*	*2.0*	...	...	...	...	...	...	...	...	...	...
27	8.5	8.5	8.5	8.5	8.5	8.5	*4.5*	*1.7*	...	...	...	...	...	...	...	...	...	...
28	10.0	10.0	10.0	10.0	10.0	10.0	*5.3*	*2.0*	...	...	...	...	...	...	...	...	...	...
29	10.0	10.0	10.0	10.0	10.0	10.0	*5.3*	*2.0*	...	...	...	...	...	...	...	...	...	...
30	10.0	10.0	10.0	10.0	10.0	10.0	*5.3*	*2.0*	...	...	...	...	...	...	...	...	...	...
31	10.0	10.0	10.0	10.0	10.0	10.0	*5.3*	*2.0*	...	...	...	...	...	...	...	...	...	...
32	10.0	10.0	10.0	10.0	10.0	10.0	*5.3*	*2.0*	...	...	...	...	...	...	...	...	...	...
33	8.5	8.5	8.5	8.5	8.5	8.5	*4.5*	*1.7*	...	...	...	...	...	...	...	...	...	...
34	10.0	10.0	10.0	10.0	10.0	10.0	*5.3*	*2.0*	...	...	...	...	...	...	...	...	...	...
35	10.0	10.0	10.0	10.0	10.0	10.0	*5.3*	*2.0*	...	...	...	...	...	...	...	...	...	...
36	10.0	10.0	10.0	10.0	10.0	10.0	*5.3*	*2.0*	...	...	...	...	...	...	...	...	...	...
37	10.0	10.0	10.0	10.0	10.0	10.0	*5.3*	*2.0*	...	...	...	...	...	...	...	...	...	...
38	10.0	10.0	10.0	10.0	10.0	10.0	*5.3*	*2.0*	...	...	...	...	...	...	...	...	...	...
39	8.5	8.5	8.5	8.5	8.5	8.5	*4.5*	*1.7*	...	...	...	...	...	...	...	...	...	...
40	12.0	12.0	12.0	12.0	12.0	*6.4*	*2.7*	...	...	...	...	...	...	...	...	...	...	...
41	12.0	12.0	12.0	12.0	12.0	*6.4*	*2.7*	...	...	...	...	...	...	...	...	...	...	...
42	13.3	13.3	13.3	13.3	13.3	*6.4*	*2.7*	...	...	...	...	...	...	...	...	...	...	...
43	13.3	13.3	13.3	13.3	13.3	*6.4*	*2.7*	...	...	...	...	...	...	...	...	...	...	...
44	12.0	12.0	12.0	12.0	12.0	*6.4*	*2.7*	...	...	...	...	...	...	...	...	...	...	...
45	12.0	12.0	12.0	12.0	12.0	*6.4*	*2.7*	...	...	...	...	...	...	...	...	...	...	...

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																	
	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	1700	1750	1800	
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
(**21**)	1	...	Plate	SB–171	...	C46500	M10, M20
(**21**)	2	...	Plate	SB–171	...	C46500	O20, O25
(**21**)	3	...	Smls. cond. tube	SB–111	...	C60800	O61
(**21**)	4	...	Smls. cond. tube	SB–111	...	C60800	O61
	5	...	Smls. U–bend tube	SB–395	...	C60800	O61
	6	...	Smls. U–bend tube	SB–395	...	C60800	O61
(**21**)	7	...	Plate	SB–171	...	C61400	M10, M20
(**21**)	8	...	Plate	SB–171	...	C61400	O20, O25
	9	...	Plate, sheet	SB–169	...	C61400	O25 or O60
(**21**)	10	...	Plate	SB–171	...	C61400	M10, M20
(**21**)	11	...	Plate	SB–171	...	C61400	O20, O25
	12	...	Plate, sheet	SB–169	...	C61400	O25 or O60
	13	...	Plate, sheet	SB–169	...	C61400	O25 or O60
(**21**)	14	...	Plate	SB–171	...	C63000	M10, M20
(**21**)	15	...	Plate	SB–171	...	C63000	O20, O25
(**21**)	16	...	Plate	SB–171	...	C63000	M10, M20
(**21**)	17	...	Plate	SB–171	...	C63000	O20, O25
(**21**)	18	...	Plate	SB–171	...	C63000	M10, M20
(**21**)	19	...	Plate	SB–171	...	C63000	O20, O25
	20	...	Forgings	SB–283	...	C64200	M10
	21	...	Forgings	SB–283	...	C64200	M11
	22	...	Forgings	SB–283	...	C64200	O20
	23	...	Forgings	SB–283	...	C64200	M10
	24	...	Forgings	SB–283	...	C64200	M11
	25	...	Forgings	SB–283	...	C64200	O20
	26	...	Bar, rod	SB–98	...	C65100	O60
	27	...	Bar, rod	SB–98	...	C65100	H02
	28	...	Smls. pipe & tube	SB–315	...	C65500	O61
	29	...	Plate, sheet	SB–96	...	C65500	O61
	30	...	Bar, rod	SB–98	...	C65500	O60
	31	...	Bar, rod	SB–98	...	C65500	H02
	32	...	Bar, rod	SB–98	...	C66100	O60
	33	...	Bar, rod	SB–98	...	C66100	H02
	34	...	Smls. cond. tube	SB–111	...	C68700	O61
	35	...	Smls. U–bend tube	SB–395	...	C68700	O61
(**21**)	36	...	Wld. cond. tube	SB–543	...	C68700	WO61
	37	...	Smls. cond. tube	SB–111	...	C70400	O61
(**21**)	38	...	Wld. tube	SB–543	...	C70400	WO61
	39	...	Smls. cond. tube	SB–111	...	C70400	H55
	40	...	Smls. pipe & tube	SB–466	...	C70600	O60
	41	...	Smls. pipe & tube	SB–466	...	C70600	O60
(**21**)	42	...	Wld. pipe	SB–467	...	C70600	WO61
(**21**)	43	...	Wld. pipe	SB–467	...	C70600	WO61
	44	...	Bar, rod	SB–151	...	C70600	O60
	45	...	Bar, rod	SB–151	...	C70600	O60

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Size/ Thickness, in.	P-No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	≤3	32	50	20	NP	300 (Cl. 3 only)	400	400	NFC–2	T3
2	≤3	32	50	20	NP	300 (Cl. 3 only)	400	400	NFC–2	T3
3	...	35	50	19	NP	300 (Cl. 3 only)	500	500	NFC–2	G6, T3
4	...	35	50	19	NP	300 (Cl. 3 only)	500	500	NFC–2	G5, G6, T3
5	...	35	50	19	NP	300 (Cl. 3 only)	500	500	NFC–2	T3
6	...	35	50	19	NP	300 (Cl. 3 only)	500	500	NFC–2	G5, T3
7	$2 < t \le 5$	35	65	28	NP	500 (Cl. 3 only)	500	500	NFC–8	...
8	$2 < t \le 5$	35	65	28	NP	500 (Cl. 3 only)	500	500	NFC–8	...
9	$2 < t \le 5$	35	65	28	NP	500 (Cl. 3 only)	500	500	NFC–8	...
10	≤2	35	70	30	NP	500 (Cl. 3 only)	500	500	NFC–8	...
11	≤2	35	70	30	NP	500 (Cl. 3 only)	500	500	NFC–8	...
12	$1/2 < t \le 2$	35	70	30	NP	500 (Cl. 3 only)	500	500	NFC–8	...
13	$\le 1/2$	35	72	32	NP	450 (Cl. 3 only)	500	500	NFC–8	...
14	$3.5 < t \le 5$	35	80	30	NP	500 (Cl. 3 only)	700	650	NFC–8	T6
15	$3.5 < t \le 5$	35	80	30	NP	500 (Cl. 3 only)	700	650	NFC–8	T6
16	$2 < t \le 3.5$	35	85	33	NP	500 (Cl. 3 only)	700	650	NFC–8	T6
17	$2 < t \le 3.5$	35	85	33	NP	500 (Cl. 3 only)	700	650	NFC–8	T6
18	≤2	35	90	36	NP	500 (Cl. 3 only)	700	650	NFC–8	T6
19	≤2	35	90	36	NP	500 (Cl. 3 only)	700	650	NFC–8	T6
20	$>1\frac{1}{2}$	...	68	23	NP	NP	500	500	NFC–3	G10, T4, W14
21	$>1\frac{1}{2}$	...	68	23	NP	NP	500	500	NFC–3	G10, T4, W14
22	$>1\frac{1}{2}$	...	68	23	NP	NP	500	500	NFC–3	G10, T4, W14
23	$\le 1\frac{1}{2}$	...	70	25	NP	NP	500	500	NFC–3	T4, W14
24	$\le 1\frac{1}{2}$	...	70	25	NP	NP	500	500	NFC–3	T4, W14
25	$\le 1\frac{1}{2}$	...	70	25	NP	NP	500	500	NFC–3	T4, W14
26	All	33	40	12	NP	300	350	350	NFC–1	G17
27	≤2	33	55	20	NP	300	350	350	NFC–2	G17, W3
28	...	33	50	15	NP	300 (Cl. 3 only)	400	400	NFC–2	G17, T4
29	≤2	33	50	18	NP	300 (Cl. 3 only)	350	350	NFC–2	G17, T3
30	All	33	52	15	NP	300	350	350	NFC–2	G17
31	≤2	33	70	38	NP	300	350	350	NFC–2	G17, W3
32	All	33	52	15	NP	300	350	350	NFC–2	G17
33	≤2	33	70	38	NP	300	350	350	NFC–2	G17, W3
34	...	32	50	18	NP	300 (Cl. 3 only)	450	450	NFC–2	T3
35	...	32	50	18	NP	300 (Cl. 3 only)	450	450	NFC–2	T3
36	...	32	50	18	NP	NP	450	450	NFC–2	G14, T3, W11
37	...	34	38	12	NP	150 (Cl. 3 only)	150	150	NFC–2	...
38	...	34	38	12	NP	NP	150	150	NFC–2	G14, W11
39	...	34	40	30	NP	150 (Cl. 3 only)	150	150	NFC–2	G7, W3
40	...	34	38	13	NP	400	600	600	NFC–3	T6
41	...	34	38	13	NP	400	600	600	NFC–3	G5, T5
42	$>4\frac{1}{2}$	34	38	13	NP	450 (Cl. 3 only)	600	600	NFC–3	G14, G34, T6, W11
43	$>4\frac{1}{2}$	34	38	13	NP	450 (Cl. 3 only)	600	600	NFC–3	G5, G14, G34, T5, W11
44	All	34	38	15	NP	200	NP	NP	NFC–3	...
45	All	34	38	15	NP	200	NP	NP	NFC–3	G5

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																	
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950
1	13.3	13.3	13.3	13.3	13.3	*6.4*	*2.7*	...	...	...	...	...	...	...	...	...	...	...
2	13.3	13.3	13.3	13.3	13.3	*6.4*	*2.7*	...	...	...	...	...	...	...	...	...	...	...
3	12.7	12.2	12.2	12.2	12.0	*10.0*	*6.0*	*4.0*	*2.0*	...	...	...	...	...	...	...	...	...
4	12.7	12.7	12.7	12.7	12.7	*10.0*	*6.0*	*4.0*	*2.0*	...	...	...	...	...	...	...	...	...
5	12.7	12.2	12.2	12.2	12.0	*10.0*	*6.0*	*4.0*	*2.0*	...	...	...	...	...	...	...	...	...
6	12.7	12.7	12.7	12.7	12.7	*10.0*	*6.0*	*4.0*	*2.0*	...	...	...	...	...	...	...	...	...
7	18.6	18.6	18.5	18.3	18.2	18.1	17.9	17.5	17.0	...	...	...	...	...	...	...	...	...
8	18.6	18.6	18.5	18.3	18.2	18.1	17.9	17.5	17.0	...	...	...	...	...	...	...	...	...
9	18.6	18.6	18.5	18.3	18.2	18.1	17.9	17.5	17.0	...	...	...	...	...	...	...	...	...
10	20.0	19.9	19.8	19.7	19.5	19.4	19.2	18.9	18.3	...	...	...	...	...	...	...	...	...
11	20.0	19.9	19.8	19.7	19.5	19.4	19.2	18.9	18.3	...	...	...	...	...	...	...	...	...
12	20.0	19.9	19.8	19.7	19.5	19.4	19.2	18.9	18.3	...	...	...	...	...	...	...	...	...
13	20.6	20.6	20.6	20.6	20.6	20.6	20.2	19.4	18.8	...	...	...	...	...	...	...	...	...
14	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.9	19.7	*16.0*	*12.0*	*8.6*	*6.0*	...	...	...	...	...
15	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.9	19.7	*16.0*	*12.0*	*8.6*	*6.0*	...	...	...	...	...
16	22.0	22.0	22.0	22.0	22.0	22.0	22.0	21.9	21.7	*16.0*	*12.0*	*8.6*	*6.0*	...	...	...	...	...
17	22.0	22.0	22.0	22.0	22.0	22.0	22.0	21.9	21.7	*16.0*	*12.0*	*8.6*	*6.0*	...	...	...	...	...
18	24.0	24.0	24.0	24.0	24.0	24.0	24.0	23.9	23.6	*16.0*	*12.0*	*8.6*	*6.0*	...	...	...	...	...
19	24.0	24.0	24.0	24.0	24.0	24.0	24.0	23.9	23.6	*16.0*	*12.0*	*8.6*	*6.0*	...	...	...	...	...
20	15.3	13.5	13.0	12.5	12.5	12.0	*11.0*	*7.5*	*5.2*	...	...	...	...	...	...	...	...	...
21	15.3	13.5	13.0	12.5	12.5	12.0	*11.0*	*7.5*	*5.2*	...	...	...	...	...	...	...	...	...
22	15.3	13.5	13.0	12.5	12.5	12.0	*11.0*	*7.5*	*5.2*	...	...	...	...	...	...	...	...	...
23	16.7	14.5	14.0	13.5	13.5	13.0	*11.0*	*7.5*	*5.2*	...	...	...	...	...	...	...	...	...
24	16.7	14.5	14.0	13.5	13.5	13.0	*11.0*	*7.5*	*5.2*	...	...	...	...	...	...	...	...	...
25	16.7	14.5	14.0	13.5	13.5	13.0	*11.0*	*7.5*	*5.2*	...	...	...	...	...	...	...	...	...
26	8.0	7.9	7.9	7.8	7.8	7.7	...	...	...	...	...	...	...	...	...	...	...	...
27	13.3	13.3	13.2	12.9	12.5	12.0	...	...	...	...	...	...	...	...	...	...	...	...
28	10.0	10.0	9.9	9.9	9.9	9.8	*6.8*	...	...	...	...	...	...	...	...	...	...	...
29	12.0	12.0	11.9	11.9	11.9	*10.7*	...	...	...	...	...	...	...	...	...	...	...	...
30	10.0	10.0	9.9	9.9	9.9	9.8	...	...	...	...	...	...	...	...	...	...	...	...
31	20.0	20.0	20.0	20.0	20.0	20.0	...	...	...	...	...	...	...	...	...	...	...	...
32	10.0	10.0	9.9	9.9	9.9	9.8	...	...	...	...	...	...	...	...	...	...	...	...
33	20.0	20.0	20.0	20.0	20.0	20.0	...	...	...	...	...	...	...	...	...	...	...	...
34	12.0	11.9	11.8	11.7	11.7	*6.5*	*3.3*	*1.8*	...	...	...	...	...	...	...	...	...	...
35	12.0	11.9	11.8	11.7	11.7	*6.5*	*3.3*	*1.8*	...	...	...	...	...	...	...	...	...	...
36	10.2	10.1	10.0	9.9	9.9	*5.5*	*2.7*	*1.4*	...	...	...	...	...	...	...	...	...	...
37	8.0	8.0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
38	6.8	6.8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
39	11.4	11.4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
40	8.7	8.4	8.2	8.0	7.8	7.7	7.5	7.4	7.3	*7.0*	*6.0*	...	...	...	...	...	...	...
41	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	*8.0*	*7.0*	*6.0*	...	...	...	...	...	...	...
42	7.4	7.2	7.0	6.8	6.7	6.5	6.4	6.3	6.2	*5.7*	*4.3*	...	...	...	...	...	...	...
43	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	*6.3*	*5.7*	*4.3*	...	...	...	...	...	...	...
44	10.0	9.7	9.5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
45	10.0	10.0	10.0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																	
	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	1700	1750	1800	
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
(**21**)	1	...	Plate	SB–171	...	C70600	M10, M20
(**21**)	2	...	Plate	SB–171	...	C70600	M10, M20
(**21**)	3	...	Plate, sheet	SB–171	...	C70600	M10, M20
(**21**)	4	...	Plate, sheet	SB–171	...	C70600	M10, M20
(**21**)	5	...	Plate	SB–171	...	C70600	M10, M20
(**21**)	6	...	Plate	SB–171	...	C70600	M10, M20
(**21**)	7	...	Plate	SB–171	...	C70600	O20, O25
(**21**)	8	...	Plate	SB–171	...	C70600	O20, O25
(**21**)	9	...	Plate, sheet	SB–171	...	C70600	O20, O25
(**21**)	10	...	Plate, sheet	SB–171	...	C70600	O20, O25
(**21**)	11	...	Plate	SB–171	...	C70600	O20, O25
(**21**)	12	...	Plate	SB–171	...	C70600	O20, O25
	13	...	Smls. cond. tube	SB–111	...	C70600	O61
	14	...	Smls. cond. tube	SB–111	...	C70600	O61
	15	...	Smls. cond. tube	SB–111	...	C70600	O61
	16	...	Smls. cond. tube	SB–111	...	C70600	O61
	17	...	Finned tube	SB–359	...	C70600	O61
	18	...	Finned tube	SB–359	...	C70600	O61
	19	...	Smls. U–bend tube	SB–395	...	C70600	O61
	20	...	Smls. U–bend tube	SB–395	...	C70600	O61
(**21**)	21	...	Wld. pipe	SB–467	...	C70600	WO61
(**21**)	22	...	Wld. pipe	SB–467	...	C70600	WO61
(**21**)	23	...	Wld. tube	SB–543	...	C70600	WO61
(**21**)	24	...	Wld. tube	SB–543	...	C70600	WO61
(**21**)	25	...	Finned wld. tube	SB–956	...	C70600	WO61
(**21**)	26	...	Finned wld. tube	SB–956	...	C70600	WO61
(**21**)	27	...	Wld. pipe	SB–467	...	C70600	WM50
	28	...	Smls. tube	SB–111	...	C70600	H55
	29	...	Smls. pipe & tube	SB–466	...	C70600	H55
(**21**)	30	...	Wld. tube	SB–543	...	C70600	WC55
(**21**)	31	...	Finned wld. tube	SB–956	...	C70600	WC55
(**21**)	32	...	Wld. pipe	SB–467	...	C70600	Wld. fr. cold rld. strip
	33	...	Smls. pipe & tube	SB–466	...	C70620	O60
(**21**)	34	...	Smls. pipe & tube	SB–466	...	C70620	O60
(**21**)	35	...	Wld. pipe	SB–467	...	C70620	WO61
(**21**)	36	...	Wld. pipe	SB–467	...	C70620	WO61
	37	...	Bar, rod	SB–151	...	C70620	O60
(**21**)	38	...	Bar, rod	SB–151	...	C70620	O60
(**21**)	39	...	Forgings	SB–283	...	C70620	M10
(**21**)	40	...	Forgings	SB–283	...	C70620	M10
(**21**)	41	...	Plate	SB–171	...	C70620	M10, M20
(**21**)	42	...	Plate	SB–171	...	C70620	M10, M20
(**21**)	43	...	Plate, sheet	SB–171	...	C70620	M10, M20
(**21**)	44	...	Plate, sheet	SB–171	...	C70620	M10, M20
(**21**)	45	...	Plate	SB–171	...	C70620	M10, M20

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Size/ Thickness, in.	P-No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	≤5	34	40	15	NP	400	NP	NP	NFC–3	...
2	≤5	34	40	15	NP	400	NP	NP	NFC–3	G5
3	≤5	34	40	15	NP	450 (Cl. 3 only)	NP	NP	NFC–3	...
4	≤5	34	40	15	NP	450 (Cl. 3 only)	NP	NP	NFC–3	G5
5	≤5	34	40	15	NP	NP	600	600	NFC–3	T5
6	≤5	34	40	15	NP	NP	600	600	NFC–3	G5, T5
7	≤5	34	40	15	NP	400	NP	NP	NFC–3	...
8	≤5	34	40	15	NP	400	NP	NP	NFC–3	G5
9	≤5	34	40	15	NP	450 (Cl. 3 only)	NP	NP	NFC–3	...
10	≤5	34	40	15	NP	450 (Cl. 3 only)	NP	NP	NFC–3	G5
11	≤5	34	40	15	NP	NP	600	600	NFC–3	T5
12	≤5	34	40	15	NP	NP	600	600	NFC–3	G5, T5
13	...	34	40	15	600	400	NP	NP	NFC–3	G1, T5
14	...	34	40	15	600	400	NP	NP	NFC–3	G1, G5, T5
15	...	34	40	15	NP	450 (Cl. 3 only)	600	600	NFC–3	T5
16	...	34	40	15	NP	450 (Cl. 3 only)	600	600	NFC–3	G5, T5
17	...	34	40	15	NP	450 (Cl. 3 only)	600	NP	NFC–3	G1, T5
18	...	34	40	15	NP	450 (Cl. 3 only)	600	NP	NFC–3	G1, G5, T5
19	...	34	40	15	NP	450 (Cl. 3 only)	600	600	NFC–3	T5
20	...	34	40	15	NP	450 (Cl. 3 only)	600	600	NFC–3	G5, T5
21	≤4½	34	40	15	NP	450 (Cl. 3 only)	600	600	NFC–3	G14, G34, T5, W11
22	≤4½	34	40	15	NP	450 (Cl. 3 only)	600	600	NFC–3	G5, G14, G34, T5, W11
23	...	34	40	15	NP	450 (Cl. 3 only)	600	600	NFC–3	G14, G34, T5, W11
24	...	34	40	15	NP	450 (Cl. 3 only)	600	600	NFC–3	G5, G14, G34, T5, W11
25	...	34	40	15	NP	NP	600	NP	NFC–3	G14, G34, T5, W11
26	...	34	40	15	NP	NP	600	NP	NFC–3	G5, G14, G34, T5, W11
27	≤4½	34	45	30	NP	NP	600	600	NFC–3	G14, G34, T5, W11
28	...	34	45	35	NP	450 (Cl. 3 only)	600	600	NFC–3	G33, T5, W3
29	...	34	45	35	NP	NP	600	NP	NFC–3	G33, T5, W3
30	...	34	45	35	NP	450 (Cl. 3 only)	600	600	NFC–3	G14, G33, G34, T5, W10
31	...	34	45	35	NP	NP	600	NP	NFC–3	G14, G33, G34, T5, W10
32	≤4½	34	54	45	NP	NP	600	600	NFC–3	G14, G34, T5, W11
33	...	34	38	13	NP	400	600	600	NFC–3	T6
34	...	34	38	13	NP	400	600	600	NFC–3	G5, T5
35	>4½	34	38	13	NP	450 (Cl. 3 only)	600	600	NFC–3	G14, G34, T6, W11
36	>4½	34	38	13	NP	450 (Cl. 3 only)	600	600	NFC–3	G5, G14, G34, T5, W11
37	All	34	38	15	NP	200	NP	NP	NFC–3	...
38	All	34	38	15	NP	200	NP	NP	NFC–3	G5
39	>6	34	40	15	NP	NP	600	600	NFC–3	T5
40	>6	34	40	15	NP	NP	600	600	NFC–3	G5, T5
41	≤5	34	40	15	NP	400	NP	NP	NFC–3	...
42	≤5	34	40	15	NP	400	NP	NP	NFC–3	G5
43	≤5	34	40	15	NP	450 (Cl. 3 only)	NP	NP	NFC–3	...
44	≤5	34	40	15	NP	450 (Cl. 3 only)	NP	NP	NFC–3	G5
45	≤5	34	40	15	NP	NP	600	600	NFC–3	T5

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																	
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950
1	10.0	9.7	9.5	9.3	9.0	8.8	8.7	...	...	...	...	...	...	...	...	...	...	...
2	10.0	10.0	10.0	10.0	10.0	10.0	10.0	...	...	...	...	...	...	...	...	...	...	...
3	10.0	9.7	9.5	9.3	9.0	8.8	8.7	8.5	...	...	...	...	...	...	...	...	...	...
4	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	...	...	...	...	...	...	...	...	...	...
5	10.0	9.7	9.5	9.3	9.0	8.8	8.7	8.5	*8.0*	*7.0*	*6.0*	...	...	...	...	...	...	...
6	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	*8.0*	*7.0*	*6.0*	...	...	...	...	...	...	...
7	10.0	9.7	9.5	9.3	9.0	8.8	8.7	...	...	...	...	...	...	...	...	...	...	...
8	10.0	10.0	10.0	10.0	10.0	10.0	10.0	...	...	...	...	...	...	...	...	...	...	...
9	10.0	9.7	9.5	9.3	9.0	8.8	8.7	8.5	...	...	...	...	...	...	...	...	...	...
10	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	...	...	...	...	...	...	...	...	...	...
11	10.0	9.7	9.5	9.3	9.0	8.8	8.7	8.5	*8.0*	*7.0*	*6.0*	...	...	...	...	...	...	...
12	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	*8.0*	*7.0*	*6.0*	...	...	...	...	...	...	...
13	10.0	9.7	9.5	9.3	9.0	8.8	8.7	8.5	*8.0*	*7.0*	*6.0*	...	...	...	...	...	...	...
14	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	*8.0*	*7.0*	*6.0*	...	...	...	...	...	...	...
15	10.0	9.7	9.5	9.3	9.0	8.8	8.7	8.5	*8.0*	*7.0*	*6.0*	...	...	...	...	...	...	...
16	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	*8.0*	*7.0*	*6.0*	...	...	...	...	...	...	...
17	10.0	9.7	9.5	9.3	9.0	8.8	8.7	8.5	*8.0*	*7.0*	*6.0*	...	...	...	...	...	...	...
18	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	*8.0*	*7.0*	*6.0*	...	...	...	...	...	...	...
19	10.0	9.7	9.5	9.3	9.0	8.8	8.7	8.5	*8.0*	*7.0*	*6.0*	...	...	...	...	...	...	...
20	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	*8.0*	*7.0*	*6.0*	...	...	...	...	...	...	...
21	8.5	8.3	8.1	7.9	7.7	7.5	7.4	7.2	*6.3*	*5.7*	*4.3*	...	...	...	...	...	...	...
22	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	*6.3*	*5.7*	*4.3*	...	...	...	...	...	...	...
23	8.5	8.3	8.1	7.9	7.7	7.5	7.4	7.2	*6.3*	*5.7*	*4.3*	...	...	...	...	...	...	...
24	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	*6.3*	*5.7*	*4.3*	...	...	...	...	...	...	...
25	8.5	8.3	8.1	7.9	7.7	7.5	7.4	7.2	*6.3*	*5.7*	*4.3*	...	...	...	...	...	...	...
26	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	*6.3*	*5.7*	*4.3*	...	...	...	...	...	...	...
27	8.5	8.3	8.1	7.9	7.7	7.5	7.4	7.2	*6.3*	*5.7*	*4.3*	...	...	...	...	...	...	...
28	10.0	9.7	9.5	9.3	9.0	8.8	8.7	8.5	*8.0*	*7.0*	*6.0*	...	...	...	...	...	...	...
29	10.0	9.7	9.5	9.3	9.0	8.8	8.7	8.5	*8.0*	*7.0*	*6.0*	...	...	...	...	...	...	...
30	8.5	8.3	8.1	7.9	7.7	7.5	7.4	7.2	*6.3*	*5.7*	*4.3*	...	...	...	...	...	...	...
31	8.5	8.3	8.1	7.9	7.7	7.5	7.4	7.2	*6.3*	*5.7*	*4.3*	...	...	...	...	...	...	...
32	8.5	8.3	8.1	7.9	7.7	7.5	7.4	7.2	*6.3*	*5.7*	*4.3*	...	...	...	...	...	...	...
33	8.7	8.4	8.2	8.0	7.8	7.7	7.5	7.4	7.3	*7.0*	*6.0*	...	...	...	...	...	...	...
34	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	*8.0*	*7.0*	*6.0*	...	...	...	...	...	...	...
35	7.4	7.2	7.0	6.8	6.7	6.5	6.4	6.3	6.2	*5.7*	*4.3*	...	...	...	...	...	...	...
36	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	*6.3*	*5.7*	*4.3*	...	...	...	...	...	...	...
37	10.0	9.7	9.5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
38	10.0	10.0	10.0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
39	10.0	9.7	9.5	9.3	9.0	8.8	8.7	8.5	*8.0*	*7.0*	*6.0*	...	...	...	...	...	...	...
40	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	*8.0*	*7.0*	*6.0*	...	...	...	...	...	...	...
41	10.0	9.7	9.5	9.3	9.0	8.8	8.7	...	...	...	...	...	...	...	...	...	...	...
42	10.0	10.0	10.0	10.0	10.0	10.0	10.0	...	...	...	...	...	...	...	...	...	...	...
43	10.0	9.7	9.5	9.3	9.0	8.8	8.7	8.5	...	...	...	...	...	...	...	...	...	...
44	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	...	...	...	...	...	...	...	...	...	...
45	10.0	9.7	9.5	9.3	9.0	8.8	8.7	8.5	*8.0*	*7.0*	*6.0*	...	...	...	...	...	...	...

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																	
	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	1700	1750	1800	
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
(**21**)	1	...	Plate	SB–171	...	C70620	M10, M20
(**21**)	2	...	Forgings	SB–283	...	C70620	O20
(**21**)	3	...	Forgings	SB–283	...	C70620	O20
(**21**)	4	...	Plate	SB–171	...	C70620	O20, O25
(**21**)	5	...	Plate	SB–171	...	C70620	O20, O25
(**21**)	6	...	Plate, sheet	SB–171	...	C70620	O20, O25
(**21**)	7	...	Plate, sheet	SB–171	...	C70620	O20, O25
(**21**)	8	...	Plate	SB–171	...	C70620	O20, O25
(**21**)	9	...	Plate	SB–171	...	C70620	O20, O25
	10	...	Smls. cond. tube	SB–111	...	C70620	O61
(**21**)	11	...	Smls. cond. tube	SB–111	...	C70620	O61
	12	...	Smls. cond. tube	SB–111	...	C70620	O61
(**21**)	13	...	Smls. cond. tube	SB–111	...	C70620	O61
	14	...	Finned tube	SB–359	...	C70620	O61
(**21**)	15	...	Finned tube	SB–359	...	C70620	O61
	16	...	Smls. U–bend tube	SB–395	...	C70620	O61
(**21**)	17	...	Smls. U–bend tube	SB–395	...	C70620	O61
(**21**)	18	...	Wld. pipe	SB–467	...	C70620	WO61
(**21**)	19	...	Wld. pipe	SB–467	...	C70620	WO61
(**21**)	20	...	Wld. tube	SB–543	...	C70620	WO61
(**21**)	21	...	Wld. tube	SB–543	...	C70620	WO61
(**21**)	22	...	Finned wld. tube	SB–956	...	C70620	WO61
(**21**)	23	...	Finned wld. tube	SB–956	...	C70620	WO61
(**21**)	24	...	Forgings	SB–283	...	C70620	M10
(**21**)	25	...	Forgings	SB–283	...	C70620	M10
(**21**)	26	...	Wld. pipe	SB–467	...	C70620	WM50
	27	...	Smls. tube	SB–111	...	C70620	H55
	28	...	Smls. pipe & tube	SB–466	...	C70620	H55
(**21**)	29	...	Wld. tube	SB–543	...	C70620	WC55
(**21**)	30	...	Finned wld. tube	SB–956	...	C70620	WC55
(**21**)	31	...	Wld. pipe	SB–467	...	C70620	Wld. fr. cold rld. strip
	32	...	Smls. tube	SB–466	...	C71000	O60
	33	...	Smls. cond. tube	SB–111	...	C71000	O61
	34	...	Finned tube	SB–359	...	C71000	O61
	35	...	Smls. tube	SB–395	...	C71000	O61
	36	...	Wld. pipe	SB–467	...	C71500	WO61
	37	...	Wld. pipe	SB–467	...	C71500	WO61
(**21**)	38	...	Plate, sheet	SB–171	...	C71500	M10, M20
(**21**)	39	...	Plate, sheet	SB–171	...	C71500	M10, M20
(**21**)	40	...	Plate, sheet	SB–171	...	C71500	O20, O25
(**21**)	41	...	Plate, sheet	SB–171	...	C71500	O20, O25
(**21**)	42	...	Plate, sheet	SB–171	...	C71500	M10, M20
(**21**)	43	...	Plate, sheet	SB–171	...	C71500	M10, M20
(**21**)	44	...	Plate, sheet	SB–171	...	C71500	O20, O25
(**21**)	45	...	Plate, sheet	SB–171	...	C71500	O20, O25

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Size/ Thickness, in.	P-No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	≤5	34	40	15	NP	NP	600	600	NFC–3	G5, T5
2	...	34	40	15	NP	NP	600	600	NFC–3	T5
3	...	34	40	15	NP	NP	600	600	NFC–3	G5, T5
4	≤5	34	40	15	NP	400	NP	NP	NFC–3	...
5	≤5	34	40	15	NP	400	NP	NP	NFC–3	G5
6	≤5	34	40	15	NP	450 (Cl. 3 only)	NP	NP	NFC–3	...
7	≤5	34	40	15	NP	450 (Cl. 3 only)	NP	NP	NFC–3	G5
8	≤5	34	40	15	NP	NP	600	600	NFC–3	T5
9	≤5	34	40	15	NP	NP	600	600	NFC–3	G5, T5
10	...	34	40	15	600	400	NP	NP	NFC–3	G1, T5
11	...	34	40	15	600	400	NP	NP	NFC–3	G1, G5, T5
12	...	34	40	15	NP	450 (Cl. 3 only)	600	600	NFC–3	T5
13	...	34	40	15	NP	450 (Cl. 3 only)	600	600	NFC–3	G5, T5
14	...	34	40	15	NP	450 (Cl. 3 only)	600	NP	NFC–3	G1, T5
15	...	34	40	15	NP	450 (Cl. 3 only)	600	NP	NFC–3	G1, G5, T5
16	...	34	40	15	NP	450 (Cl. 3 only)	600	600	NFC–3	T5
17	...	34	40	15	NP	450 (Cl. 3 only)	600	600	NFC–3	G5, T5
18	≤4½	34	40	15	NP	450 (Cl. 3 only)	600	600	NFC–3	G14, G34, T5, W11
19	≤4½	34	40	15	NP	450 (Cl. 3 only)	600	600	NFC–3	G5, G14, G34, T5, W11
20	...	34	40	15	NP	450 (Cl. 3 only)	600	600	NFC–3	G14, G34, T5, W11
21	...	34	40	15	NP	450 (Cl. 3 only)	600	600	NFC–3	G5, G14, G34, T5, W11
22	...	34	40	15	NP	NP	600	NP	NFC–3	G14, G34, T5, W11
23	...	34	40	15	NP	NP	600	NP	NFC–3	G5, G14, G34, T5, W11
24	≤6	34	45	18	NP	NP	600	600	NFC–3	G34, T5
25	≤6	34	45	18	NP	NP	600	600	NFC–3	G5, G34, T5
26	≤4½	34	45	30	NP	NP	600	600	NFC–3	G14, G34, T5, W11
27	...	34	45	35	NP	450 (Cl. 3 only)	600	600	NFC–3	G33, T5, W3
28	...	34	45	35	NP	NP	600	NP	NFC–3	G33, T5, W3
29	...	34	45	35	NP	450 (Cl. 3 only)	600	600	NFC–3	G14, G33, G34, T5, W10
30	...	34	45	35	NP	NP	600	NP	NFC–3	G14, G33, G34, T5, W10
31	≤4½	34	54	45	NP	NP	600	600	NFC–3	G14, G34, T5, W11
32	...	34	45	16	NP	700 (Cl. 3 only)	700	650	NFC–3	T7
33	...	34	45	16	700	700 (Cl. 3 only)	700	650	NFC–3	G1, T7
34	...	34	45	16	NP	700 (Cl. 3 only)	700	NP	NFC–3	G1, T7
35	...	34	45	16	NP	700 (Cl. 3 only)	700	650	NFC–3	T7
36	>4½	34	45	15	NP	600 (Cl. 3 only)	NP	NP	NFC–3	G14, W11
37	>4½	34	45	15	NP	600 (Cl. 3 only)	NP	NP	NFC–3	G5, G14, W11
38	2.5 < t ≤ 5	34	45	18	NP	700	700	650	NFC–4	...
39	2.5 < t ≤ 5	34	45	18	NP	700	700	650	NFC–4	G5
40	2.5 < t ≤ 5	34	45	18	NP	700	700	650	NFC–4	...
41	2.5 < t ≤ 5	34	45	18	NP	700	700	650	NFC–4	G5
42	≤2.5	34	50	20	NP	700	700	650	NFC–4	...
43	≤2.5	34	50	20	NP	700	700	650	NFC–4	G5
44	≤2.5	34	50	20	NP	700	700	650	NFC–4	...
45	≤2.5	34	50	20	NP	700	700	650	NFC–4	G5

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																	
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950
1	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	*8.0*	*7.0*	*6.0*	...	...	...	...	...	...	...
2	10.0	9.7	9.5	9.3	9.0	8.8	8.7	8.5	*8.0*	*7.0*	*6.0*	...	...	...	...	...	...	...
3	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	*8.0*	*7.0*	*6.0*	...	...	...	...	...	...	...
4	10.0	9.7	9.5	9.3	9.0	8.8	8.7	...	...	...	...	...	...	...	...	...	...	...
5	10.0	10.0	10.0	10.0	10.0	10.0	10.0	...	...	...	...	...	...	...	...	...	...	...
6	10.0	9.7	9.5	9.3	9.0	8.8	8.7	8.5	...	...	...	...	...	...	...	...	...	...
7	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	...	...	...	...	...	...	...	...	...	...
8	10.0	9.7	9.5	9.3	9.0	8.8	8.7	8.5	*8.0*	*7.0*	*6.0*	...	...	...	...	...	...	...
9	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	*8.0*	*7.0*	*6.0*	...	...	...	...	...	...	...
10	10.0	9.7	9.5	9.3	9.0	8.8	8.7	8.5	*8.0*	*7.0*	*6.0*	...	...	...	...	...	...	...
11	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	*8.0*	*7.0*	*6.0*	...	...	...	...	...	...	...
12	10.0	9.7	9.5	9.3	9.0	8.8	8.7	8.5	*8.0*	*7.0*	*6.0*	...	...	...	...	...	...	...
13	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	*8.0*	*7.0*	*6.0*	...	...	...	...	...	...	...
14	10.0	9.7	9.5	9.3	9.0	8.8	8.7	8.5	*8.0*	*7.0*	*6.0*	...	...	...	...	...	...	...
15	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	*8.0*	*7.0*	*6.0*	...	...	...	...	...	...	...
16	10.0	9.7	9.5	9.3	9.0	8.8	8.7	8.5	*8.0*	*7.0*	*6.0*	...	...	...	...	...	...	...
17	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	*8.0*	*7.0*	*6.0*	...	...	...	...	...	...	...
18	8.5	8.3	8.1	7.9	7.7	7.5	7.4	7.2	*6.3*	*5.7*	*4.3*	...	...	...	...	...	...	...
19	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	*6.3*	*5.7*	*4.3*	...	...	...	...	...	...	...
20	8.5	8.3	8.1	7.9	7.7	7.5	7.4	7.2	*6.3*	*5.7*	*4.3*	...	...	...	...	...	...	...
21	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	*6.3*	*5.7*	*4.3*	...	...	...	...	...	...	...
22	8.5	8.3	8.1	7.9	7.7	7.5	7.4	7.2	*6.3*	*5.7*	*4.3*	...	...	...	...	...	...	...
23	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	*6.3*	*5.7*	*4.3*	...	...	...	...	...	...	...
24	12.0	11.7	11.4	11.1	10.9	10.6	10.4	10.2	*8.0*	*7.0*	*6.0*	...	...	...	...	...	...	...
25	12.0	12.0	12.0	12.0	12.0	12.0	12.0	11.8	*8.0*	*7.0*	*6.0*	...	...	...	...	...	...	...
26	8.5	8.3	8.1	7.9	7.7	7.5	7.4	7.2	*6.3*	*5.7*	*4.3*	...	...	...	...	...	...	...
27	10.0	9.7	9.5	9.3	9.0	8.8	8.7	8.5	*8.0*	*7.0*	*6.0*	...	...	...	...	...	...	...
28	10.0	9.7	9.5	9.3	9.0	8.8	8.7	8.5	*8.0*	*7.0*	*6.0*	...	...	...	...	...	...	...
29	8.5	8.3	8.1	7.9	7.7	7.5	7.4	7.2	*6.3*	*5.7*	*4.3*	...	...	...	...	...	...	...
30	8.5	8.3	8.1	7.9	7.7	7.5	7.4	7.2	*6.3*	*5.7*	*4.3*	...	...	...	...	...	...	...
31	8.5	8.3	8.1	7.9	7.7	7.5	7.4	7.2	*6.3*	*5.7*	*4.3*	...	...	...	...	...	...	...
32	10.7	10.6	10.5	10.4	10.2	10.1	9.9	9.6	9.3	8.9	*8.4*	*7.7*	*7.0*	...	...	...	...	...
33	10.7	10.6	10.5	10.4	10.2	10.1	9.9	9.6	9.3	8.9	*8.4*	*7.7*	*7.0*	...	...	...	...	...
34	10.7	10.6	10.5	10.4	10.2	10.1	9.9	9.6	9.3	8.9	*8.4*	*7.7*	*7.0*	...	...	...	...	...
35	10.7	10.6	10.5	10.4	10.2	10.1	9.9	9.6	9.3	8.9	*8.4*	*7.7*	*7.0*	...	...	...	...	...
36	8.5	8.2	8.0	7.8	7.6	7.5	7.3	7.2	7.0	6.9	6.8	...	...	...	...	...	...	...
37	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	...	...	...	...	...	...	...
38	12.0	11.6	11.3	11.0	10.8	10.5	10.3	10.1	9.9	9.8	9.6	9.5	9.4	...	...	...	...	...
39	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	...	...	...	...	...
40	12.0	11.6	11.3	11.0	10.8	10.5	10.3	10.1	9.9	9.8	9.6	9.5	9.4	...	...	...	...	...
41	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	...	...	...	...	...
42	13.3	12.9	12.6	12.3	12.0	11.7	11.5	11.2	11.0	10.8	10.7	10.6	10.4	...	...	...	...	...
43	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	...	...	...	...	...
44	13.3	12.9	12.6	12.3	12.0	11.7	11.5	11.2	11.0	10.8	10.7	10.6	10.4	...	...	...	...	...
45	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	...	...	...	...	...

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																	
	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	1700	1750	1800	
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
	1	...	Wld. pipe	SB–467	...	C71500	WO61
	2	...	Wld. pipe	SB–467	...	C71500	WO61
	3	...	Smls. pipe & tube	SB–466	...	C71500	O60
	4	...	Smls. pipe & tube	SB–466	...	C71500	O60
	5	...	Smls. cond. tube	SB–111	...	C71500	O61
	6	...	Smls. cond. tube	SB–111	...	C71500	O61
	7	...	Finned tube	SB–359	...	C71500	O61
	8	...	Finned tube	SB–359	...	C71500	O61
	9	...	Smls. U–bend tube	SB–395	...	C71500	O61
	10	...	Smls. U–bend tube	SB–395	...	C71500	O61
(**21**)	11	...	Wld. cond. tube	SB–543	...	C71500	WO61
(**21**)	12	...	Wld. cond. tube	SB–543	...	C71500	WO61
	13	...	Finned wld. cond. tube	SB–956	...	C71500	WO61
	14	...	Finned wld. cond. tube	SB–956	...	C71500	WO61
	15	...	Smls. cond. tube	SB–111	...	C71500	HR50
	16	...	Smls. U–bend tube	SB–395	...	C71500	HR50
	17	...	Wld. pipe	SB–467	...	C71520	WO61
(**21**)	18	...	Wld. pipe	SB–467	...	C71520	WO61
(**21**)	19	...	Forgings	SB–283	...	C71520	M10
(**21**)	20	...	Forgings	SB–283	...	C71520	M10
(**21**)	21	...	Plate, sheet	SB–171	...	C71520	M10, M20
(**21**)	22	...	Plate, sheet	SB–171	...	C71520	M10, M20
(**21**)	23	...	Forgings	SB–283	...	C71520	O20
(**21**)	24	...	Forgings	SB–283	...	C71520	O20
(**21**)	25	...	Plate, sheet	SB–171	...	C71520	O20, O25
(**21**)	26	...	Plate, sheet	SB–171	...	C71520	O20, O25
(**21**)	27	...	Forgings	SB–283	...	C71520	M10
(**21**)	28	...	Forgings	SB–283	...	C71520	M10
(**21**)	29	...	Plate, sheet	SB–171	...	C71520	M10, M20
(**21**)	30	...	Plate, sheet	SB–171	...	C71520	M10, M20
(**21**)	31	...	Plate, sheet	SB–171	...	C71520	O20, O25
(**21**)	32	...	Plate, sheet	SB–171	...	C71520	O20, O25
	33	...	Wld. pipe	SB–467	...	C71520	WO61
(**21**)	34	...	Wld. pipe	SB–467	...	C71520	WO61
	35	...	Smls. pipe & tube	SB–466	...	C71520	O60
(**21**)	36	...	Smls. pipe & tube	SB–466	...	C71520	O60
	37	...	Smls. cond. tube	SB–111	...	C71520	O61
(**21**)	38	...	Smls. cond. tube	SB–111	...	C71520	O61
	39	...	Finned tube	SB–359	...	C71520	O61
(**21**)	40	...	Finned tube	SB–359	...	C71520	O61
	41	...	Smls. U–bend tube	SB–395	...	C71520	O61
(**21**)	42	...	Smls. U–bend tube	SB–395	...	C71520	O61
(**21**)	43	...	Wld. cond. tube	SB–543	...	C71520	WO61
(**21**)	44	...	Wld. cond. tube	SB–543	...	C71520	WO61
	45	...	Finned wld. cond. tube	SB–956	...	C71520	WO61

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Size/ Thickness, in.	P-No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	≤4½	34	50	20	NP	600 (Cl. 3 only)	NP	NP	NFC–4	G14
2	≤4½	34	50	20	NP	600 (Cl. 3 only)	NP	NP	NFC–4	G5, G14
3	...	34	52	18	NP	700	700	650	NFC–4	...
4	...	34	52	18	NP	700	700	650	NFC–4	G5
5	...	34	52	18	700	700	700	650	NFC–4	G1
6	...	34	52	18	700	700	700	650	NFC–4	G1, G5
7	...	34	52	18	NP	700 (Cl. 3 only)	700	NP	NFC–4	G1
8	...	34	52	18	NP	700 (Cl. 3 only)	700	NP	NFC–4	G1, G5
9	...	34	52	18	NP	700 (Cl. 3 only)	700	650	NFC–4	...
10	...	34	52	18	NP	700 (Cl. 3 only)	700	650	NFC–4	G5
11	...	34	52	18	NP	600 (Cl. 3 only)	600	600	NFC–4	G14, W11
12	...	34	52	18	NP	600 (Cl. 3 only)	600	600	NFC–4	G5, G14, W11
13	...	34	52	18	NP	NP	600	NP	NFC–4	G14, W11
14	...	34	52	18	NP	NP	600	NP	NFC–4	G5, G14, W11
15	...	34	72	50	NP	700	800	650	NFC–4	T9, W3
16	...	34	72	50	NP	700	800	650	NFC–8	T9, W3
17	>4½	34	45	15	NP	600 (Cl. 3 only)	NP	NP	NFC–3	G14, W11
18	>4½	34	45	15	NP	600 (Cl. 3 only)	NP	NP	NFC–3	G5, G14, W11
19	>6	34	45	18	NP	NP	700	650	NFC–4	...
20	>6	34	45	18	NP	NP	700	650	NFC–4	G5
21	2.5 < *t* ≤ 5	34	45	18	NP	700	700	650	NFC–4	...
22	2.5 < *t* ≤ 5	34	45	18	NP	700	700	650	NFC–4	G5
23	...	34	45	18	NP	NP	700	650	NFC–4	...
24	...	34	45	18	NP	NP	700	650	NFC–4	G5
25	2.5 < *t* ≤ 5	34	45	18	NP	700	700	650	NFC–4	...
26	2.5 < *t* ≤ 5	34	45	18	NP	700	700	650	NFC–4	G5
27	≤6	34	50	20	NP	NP	700	650	NFC–4	...
28	≤6	34	50	20	NP	NP	700	650	NFC–4	G5
29	≤2.5	34	50	20	NP	700	700	650	NFC–4	...
30	≤2.5	34	50	20	NP	700	700	650	NFC–4	G5
31	≤2.5	34	50	20	NP	700	700	650	NFC–4	...
32	≤2.5	34	50	20	NP	700	700	650	NFC–4	G5
33	≤4½	34	50	20	NP	600 (Cl. 3 only)	NP	NP	NFC–4	G14
34	≤4½	34	50	20	NP	600 (Cl. 3 only)	NP	NP	NFC–4	G5, G14
35	...	34	52	18	NP	700	700	650	NFC–4	...
36	...	34	52	18	NP	700	700	650	NFC–4	G5
37	...	34	52	18	700	700	700	650	NFC–4	G1
38	...	34	52	18	700	700	700	650	NFC–4	G1, G5
39	...	34	52	18	NP	700 (Cl. 3 only)	700	NP	NFC–4	G1
40	...	34	52	18	NP	700 (Cl. 3 only)	700	NP	NFC–4	G1, G5
41	...	34	52	18	NP	700 (Cl. 3 only)	700	650	NFC–4	...
42	...	34	52	18	NP	700 (Cl. 3 only)	700	650	NFC–4	G5
43	...	34	52	18	NP	600 (Cl. 3 only)	600	600	NFC–4	G14, W11
44	...	34	52	18	NP	600 (Cl. 3 only)	600	600	NFC–4	G5, G14, W11
45	...	34	52	18	NP	NP	600	NP	NFC–4	G14, W11

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																	
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950
1	11.3	10.9	10.7	10.4	10.2	10.0	9.7	9.6	9.4	9.2	9.1	...	...	...	...	...	...	...
2	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	...	...	...	...	...	...	...
3	12.0	11.6	11.3	11.0	10.8	10.5	10.3	10.1	9.9	9.8	9.6	9.5	9.4	...	...	...	...	...
4	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	...	...	...	...	...
5	12.0	11.6	11.3	11.0	10.8	10.5	10.3	10.1	9.9	9.8	9.6	9.5	9.4	...	...	...	...	...
6	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	...	...	...	...	...
7	12.0	11.6	11.3	11.0	10.8	10.5	10.3	10.1	9.9	9.8	9.6	9.5	9.4	...	...	...	...	...
8	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	...	...	...	...	...
9	12.0	11.6	11.3	11.0	10.8	10.5	10.3	10.1	9.9	9.8	9.6	9.5	9.4	...	...	...	...	...
10	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	...	...	...	...	...
11	10.2	9.8	9.6	9.4	9.2	9.0	8.8	8.6	8.4	8.3	8.2	...	...	...	...	...	...	...
12	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	...	...	...	...	...	...	...
13	10.2	9.8	9.6	9.4	9.2	9.0	8.8	8.6	8.4	8.3	8.2	...	...	...	...	...	...	...
14	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	...	...	...	...	...	...	...
15	20.6	20.6	20.6	20.6	20.6	20.2	19.7	19.2	18.9	18.6	18.5	18.3	17.9	17.2	*8.5*	...	...	...
16	20.6	20.6	20.6	20.6	20.6	20.2	19.7	19.2	18.9	18.6	18.5	18.3	17.9	17.2	*8.5*	...	...	...
17	8.5	8.2	8.0	7.8	7.6	7.5	7.3	7.2	7.0	6.9	6.8	...	...	...	...	...	...	...
18	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	...	...	...	...	...	...	...
19	12.0	11.6	11.3	11.0	10.8	10.5	10.3	10.1	9.9	9.8	9.6	9.5	9.4	...	...	...	...	...
20	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	...	...	...	...	...
21	12.0	11.6	11.3	11.0	10.8	10.5	10.3	10.1	9.9	9.8	9.6	9.5	9.4	...	...	...	...	...
22	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	...	...	...	...	...
23	12.0	11.6	11.3	11.0	10.8	10.5	10.3	10.1	9.9	9.8	9.6	9.5	9.4	...	...	...	...	...
24	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	...	...	...	...	...
25	12.0	11.6	11.3	11.0	10.8	10.5	10.3	10.1	9.9	9.8	9.6	9.5	9.4	...	...	...	...	...
26	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	...	...	...	...	...
27	13.3	12.9	12.6	12.3	12.0	11.7	11.5	11.2	11.0	10.8	10.7	10.6	10.4	...	...	...	...	...
28	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	...	...	...	...	...
29	13.3	12.9	12.6	12.3	12.0	11.7	11.5	11.2	11.0	10.8	10.7	10.6	10.4	...	...	...	...	...
30	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	...	...	...	...	...
31	13.3	12.9	12.6	12.3	12.0	11.7	11.5	11.2	11.0	10.8	10.7	10.6	10.4	...	...	...	...	...
32	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	...	...	...	...	...
33	11.3	10.9	10.7	10.4	10.2	10.0	9.7	9.6	9.4	9.2	9.1	...	...	...	...	...	...	...
34	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	...	...	...	...	...	...	...
35	12.0	11.6	11.3	11.0	10.8	10.5	10.3	10.1	9.9	9.8	9.6	9.5	9.4	...	...	...	...	...
36	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	...	...	...	...	...
37	12.0	11.6	11.3	11.0	10.8	10.5	10.3	10.1	9.9	9.8	9.6	9.5	9.4	...	...	...	...	...
38	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	...	...	...	...	...
39	12.0	11.6	11.3	11.0	10.8	10.5	10.3	10.1	9.9	9.8	9.6	9.5	9.4	...	...	...	...	...
40	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	...	...	...	...	...
41	12.0	11.6	11.3	11.0	10.8	10.5	10.3	10.1	9.9	9.8	9.6	9.5	9.4	...	...	...	...	...
42	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	...	...	...	...	...
43	10.2	9.8	9.6	9.4	9.2	9.0	8.8	8.6	8.4	8.3	8.2	...	...	...	...	...	...	...
44	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	...	...	...	...	...	...	...
45	10.2	9.8	9.6	9.4	9.2	9.0	8.8	8.6	8.4	8.3	8.2	...	...	...	...	...	...	...

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																	
	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	1700	1750	1800	
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
(**21**)	1	...	Finned wld. cond. tube	SB–956	...	C71520	WO61
	2	...	Smls. cond. tube	SB–111	...	C71520	HR50
	3	...	Smls. U–bend tube	SB–395	...	C71520	HR50
	4	...	Smls. cond. tube	SB–111	...	C72200	O61
(**21**)	5	...	...	...	...	...	...
(**21**)	6	...	Castings	SB–62	...	C83600	M01
(**21**)	7	...	Castings	SB–62	...	C83600	M01
(**21**)	8	...	...	...	...	...	...
(**21**)	9	...	...	...	...	...	...
(**21**)	10	...	Castings	SB–61	...	C92200	M01
(**21**)	11	...	Castings	SB–61	...	C92200	M01
(**21**)	12	...	Castings	SB–584	...	C92200	M01
(**21**)	13	...	Castings	SB–584	...	C92200	M01
(**21**)	14	...	...	...	...	...	...
(**21**)	15	...	Castings	SB–584	...	C93700	M01
(**21**)	16	...	Castings	SB–584	...	C93700	M01
	17	...	Castings	SB–148	...	C95200	M01
	18	...	Castings	SB–271	...	C95200	M02
	19	...	Castings	SB–505	...	C95200	M07
	20	...	Castings	SB–148	...	C95400	M01
	21	...	Castings	SB–271	...	C95400	M02
	22	...	Castings	SB–148	...	C95800	M01
	23	...	Castings	SB–148	...	C95820	M01
(**21**)	24	...	...	...	...	...	...
(**21**)	25	...	Castings	SB–369	...	C96200	M01
(**21**)	26	...	...	...	...	...	...
(**21**)	27	...	Castings	SB–584	...	C97600	M01
(**21**)	28	...	Castings	SB–584	...	C97600	M01
	29	99Ni	Smls. pipe & tube	SB–161	...	N02200	Annealed
	30	99Ni	Smls. & wld. fittings	SB–366	...	N02200	Annealed
	31	99Ni	Bar, rod	SB–160	...	N02200	Annealed
	32	99Ni	Smls. pipe & tube	SB–161	...	N02200	Annealed
	33	99Ni	Plate, sheet, strip	SB–162	...	N02200	Annealed
	34	99Ni	Smls. tube	SB–163	...	N02200	Annealed
	35	99Ni	Plate, sheet, strip	SB–162	...	N02200	As rolled
	36	99Ni	Bar, rod	SB–160	...	N02200	Hot rolled
	37	99Ni	Smls. pipe & tube	SB–161	...	N02200	Stress rel.
	38	99Ni	Smls. tube	SB–163	...	N02200	Stress rel.
	39	99Ni–Low C	Smls. pipe & tube	SB–161	...	N02201	Annealed
	40	99Ni–Low C	Smls. & wld. fittings	SB–366	...	N02201	Annealed
	41	99Ni–Low C	Bar, rod	SB–160	...	N02201	Hot rolled/ann.
	42	99Ni–Low C	Smls. pipe & tube	SB–161	...	N02201	Annealed
	43	99Ni–Low C	Smls. tube	SB–163	...	N02201	Annealed
	44	99Ni–Low C	Plate, sheet, strip	SB–162	...	N02201	Hot rolled/ann.
	45	99Ni–Low C	Smls. pipe & tube	SB–161	...	N02201	Stress rel.

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Size/ Thickness, in.	P-No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	...	34	52	18	NP	NP	600	NP	NFC–4	G5, G14, W11
2	...	34	72	50	NP	700	800	650	NFC–4	T9, W3
3	...	34	72	50	NP	700	800	650	NFC–8	T9, W3
4	...	34	45	16	NP	NP	150	150	NFC–3	...
5	...	...	...	...	...	...	...	...	...	...
6	...	...	30	14	450	450 (Cl. 3 only)	450	450	NFC–1	G1, G3, G15, W10, W14
7	...	...	30	14	450	450 (Cl. 3 only)	450	450	NFC–1	G1, G3, G5, G15, T19, W10, W14
8	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...
10	...	...	34	16	550	500 (Cl. 3 only)	550	550	NFN–1	G1, G3, G15, T5, W14
11	...	...	34	16	550	501 (Cl. 3 only)	550	550	NFN–2	G1, G3, G5, G15, T5, W8
12	...	...	34	16	NP	500 (Cl. 3 only)	550	550	NFN–1	G15, T5
13	...	...	34	16	NP	501 (Cl. 3 only)	550	550	NFN–2	G5, G15, T5
14	...	...	...	...	...	...	...	...	...	...
15	...	...	30	12	NP	400 (SPT)	400	400	NFC–1	G15, W8
16	...	...	30	12	NP	400 (SPT)	400	400	NFC–1	G5, G15, W8
17	...	35	65	25	550	500 (Cl. 3 only)	600	600	NFC–4	G15, T6
18	...	35	65	25	NP	500 (Cl. 3 only)	600	600	NFC–4	G15, T6
19	...	35	68	26	NP	500 (Cl. 3 only)	NP	NP	NFC–4	G15
20	...	35	75	30	550	400 (Cl. 3 only)	600	600	NFC–4	G15, T19
21	...	35	75	30	NP	400 (Cl. 3 only)	NP	NP	NFC–4	G15
22	...	35	85	35	NP	400 (Cl. 3 only)	NP	NP	NFC–4	G15
23	...	35	94	39	NP	NP	400	NP	NFC–4	G15
24	...	...	...	...	...	...	...	...	...	...
25	...	34	45	25	NP	200 (Cl. 3 only)	NP	NP	NFC–4	G15
26	...	...	...	...	...	...	...	...	...	...
27	...	...	40	17	NP	NP	300	300	NFC–1	G15, W8
28	...	...	40	17	NP	NP	300	300	NFC–1	G5, G15, W8
29	>5 O.D.	41	55	12	NP	600 (Cl. 3 only)	600	600	NFN–2	...
30	...	41	55	12	NP	NP	600	600	NFN–2	W12
31	...	41	55	15	NP	600 (Cl. 3 only)	600	600	NFN–2	...
32	≤5 O.D.	41	55	15	NP	600 (Cl. 3 only)	600	600	NFN–2	...
33	...	41	55	15	NP	600 (Cl. 3 only)	600	600	NFN–2	...
34	...	41	55	15	NP	600 (Cl. 3 only)	600	600	NFN–2	...
35	...	41	55	20	NP	600 (Cl. 3 only)	600	600	NFN–2	G20
36	...	41	60	15	NP	600 (Cl. 3 only)	600	600	NFN–2	...
37	...	41	65	40	NP	600 (Cl. 3 only)	600	600	NFN–25	G29
38	...	41	65	40	NP	600 (Cl. 3 only)	600	600	NFN–25	G29
39	>5 O.D.	41	50	10	NP	800 (Cl. 3 only)	1200	650	NFN–1	T10
40	...	41	50	10	NP	NP	1150	650	NFN–1	T10, W12
41	...	41	50	10	NP	800 (Cl. 3 only)	1200	650	NFN–1	T10
42	≤5 O.D.	41	50	12	NP	800 (Cl. 3 only)	1200	650	NFN–1	T9
43	...	41	50	12	NP	800 (Cl. 3 only)	1200	650	NFN–1	T9
44	...	41	50	12	NP	800 (Cl. 3 only)	1200	650	NFN–1	T9
45	...	41	60	30	NP	600 (Cl. 3 only)	600	600	NFN–1	...

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																	
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950
1	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	...	...	...	...	...	...	...
2	20.6	20.6	20.6	20.6	20.6	20.2	19.7	19.2	18.9	18.6	18.5	18.3	17.9	17.2	*8.5*	...	...	...
3	20.6	20.6	20.6	20.6	20.6	20.2	19.7	19.2	18.9	18.6	18.5	18.3	17.9	17.2	*8.5*	...	...	...
4	10.7	10.4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6	8.6	8.6	8.4	8.1	7.8	7.6	7.3	7.0	...	...	...	...	...	...	...	...	...	...
7	8.6	8.6	8.6	8.5	8.4	8.2	8.1	*7.5*	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
10	9.7	9.7	9.6	9.2	9.0	8.9	8.8	8.7	*7.4*	*5.0*	...	...	...	...	...	...	...	...
11	9.7	9.7	9.7	9.7	9.7	9.7	9.5	9.1	*7.4*	*5.0*	...	...	...	...	...	...	...	...
12	9.7	9.7	9.6	9.2	9.0	8.9	8.8	8.7	*7.4*	*5.0*	...	...	...	...	...	...	...	...
13	9.7	9.7	9.7	9.7	9.7	9.7	9.5	9.1	*7.4*	*5.0*	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
15	8.0	7.4	7.1	7.0	6.8	6.7	6.7	...	...	...	...	...	...	...	...	...	...	...
16	8.0	8.0	8.0	8.0	7.9	7.7	7.4	...	...	...	...	...	...	...	...	...	...	...
17	16.7	15.7	15.2	14.8	14.5	14.3	14.2	14.2	14.2	*11.7*	*7.4*	...	...	...	...	...	...	...
18	16.7	15.7	15.2	14.8	14.5	14.3	14.2	14.2	14.2	*11.7*	*7.4*	...	...	...	...	...	...	...
19	17.3	16.3	15.8	15.4	15.1	14.9	14.8	14.7	14.7	...	...	...	...	...	...	...	...	...
20	20.0	19.6	19.5	19.4	19.3	19.3	19.3	*16.0*	*13.9*	*11.0*	*8.5*	...	...	...	...	...	...	...
21	20.0	19.6	19.5	19.4	19.3	19.3	19.3	...	...	...	...	...	...	...	...	...	...	...
22	23.3	23.0	22.9	22.8	22.7	22.4	21.9	...	...	...	...	...	...	...	...	...	...	...
23	26.0	25.6	25.5	25.4	25.3	24.8	24.3	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
25	12.9	12.9	12.8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
27	11.3	10.2	9.6	9.1	8.7	...	...	...	...	...	...	...	...	...	...	...	...	...
28	11.3	11.3	11.3	11.1	11.0	...	...	...	...	...	...	...	...	...	...	...	...	...
29	8.0	...	8.0	...	8.0	...	8.0	...	8.0	...	8.0	...	...	...	...	...	...	...
30	8.0	...	8.0	...	8.0	...	8.0	...	8.0	...	8.0	...	...	...	...	...	...	...
31	10.0	...	10.0	...	10.0	...	10.0	...	10.0	...	10.0	...	...	...	...	...	...	...
32	10.0	...	10.0	...	10.0	...	10.0	...	10.0	...	10.0	...	...	...	...	...	...	...
33	10.0	...	10.0	...	10.0	...	10.0	...	10.0	...	10.0	...	...	...	...	...	...	...
34	10.0	...	10.0	...	10.0	...	10.0	...	10.0	...	10.0	...	...	...	...	...	...	...
35	13.3	...	13.3	...	13.3	...	13.3	...	12.6	...	11.5	...	...	...	...	...	...	...
36	10.0	...	10.0	...	10.0	...	10.0	...	10.0	...	10.0	...	...	...	...	...	...	...
37	18.6	...	18.6	...	18.6	...	18.6	...	18.3	...	17.7	...	...	...	...	...	...	...
38	18.6	...	18.6	...	18.6	...	18.6	...	18.3	...	17.7	...	...	...	...	...	...	...
39	6.7	...	6.4	...	6.3	...	6.2	...	6.2	...	6.2	6.2	6.2	6.1	6.0	*5.8*	*4.5*	*3.7*
40	6.7	...	6.4	...	6.3	...	6.2	...	6.2	...	6.2	6.2	6.2	6.1	6.0	*5.8*	*4.5*	*3.7*
41	6.7	...	6.4	...	6.3	...	6.2	...	6.2	...	6.2	6.2	6.2	6.1	6.0	*5.8*	*4.5*	*3.7*
42	8.0	...	7.7	...	7.5	...	7.5	...	7.5	...	7.5	7.5	7.4	7.4	*7.2*	*5.8*	*4.5*	*3.7*
43	8.0	...	7.7	...	7.5	...	7.5	...	7.5	...	7.5	7.5	7.4	7.4	*7.2*	*5.8*	*4.5*	*3.7*
44	8.0	...	7.7	...	7.5	...	7.5	...	7.5	...	7.5	7.5	7.4	7.4	*7.2*	*5.8*	*4.5*	*3.7*
45	17.1	...	17.1	...	17.0	...	17.0	...	16.8	...	16.3	...	...	...	...	...	...	...

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																	
	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	1700	1750	1800	
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	*3.0*	*2.4*	*2.0*	*1.5*	*1.2*	...	...	...	...	...	...	...	...	...	...	...	...	
40	*3.0*	*2.4*	*2.0*	*1.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	*3.0*	*2.4*	*2.0*	*1.5*	*1.2*	...	...	...	...	...	...	...	...	...	...	...	...	
42	*3.0*	*2.4*	*2.0*	*1.5*	*1.2*	...	...	...	...	...	...	...	...	...	...	...	...	
43	*3.0*	*2.4*	*2.0*	*1.5*	*1.2*	...	...	...	...	...	...	...	...	...	...	...	...	
44	*3.0*	*2.4*	*2.0*	*1.5*	*1.2*	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
1	99Ni–Low C	Smls. pipe & tube	SB–163	...	N02201	Stress rel.
2	67Ni–30Cu	Bar	SB–164	...	N04400	Annealed
3	67Ni–30Cu	Smls. pipe & tube	SB–165	...	N04400	Annealed
4	67Ni–30Cu	Forgings	SB–564	...	N04400	Annealed
5	67Ni–30Cu	Plate	SB–127	...	N04400	Annealed
6	67Ni–30Cu	Smls. tube	SB–163	...	N04400	Annealed
7	67Ni–30Cu	Smls. pipe & tube	SB–165	...	N04400	Annealed
8	67Ni–30Cu	Smls. & wld. fittings	SB–366	...	N04400	Annealed
9	67Ni–30Cu	Bar	SB–164	...	N04400	Hot worked
10	67Ni–30Cu	Plate	SB–127	...	N04400	As rolled
11	67Ni–30Cu	Bar, rod	SB–164	...	N04400	Hot worked
12	67Ni–30Cu	Bar, rod	SB–164	...	N04400	Hot worked
13	67Ni–30Cu	Smls. tube	SB–163	...	N04400	Stress rel.
14	67Ni–30Cu	Smls. pipe & tube	SB–165	...	N04400	Stress rel.
15	67Ni–30Cu–S	Bar	SB–164	...	N04405	Annealed
16	67Ni–30Cu–S	Bar	SB–164	...	N04405	Hot worked
17	47Ni–22Cr–9Mo–18Fe	Plate, sheet, strip	SB–435	...	N06002	Annealed
18	47Ni–22Cr–9Mo–18Fe	Plate, sheet, strip	SB–435	...	N06002	Annealed
19	47Ni–22Cr–9Mo–18Fe	Rod	SB–572	...	N06002	Annealed
20	47Ni–22Cr–9Mo–18Fe	Rod	SB–572	...	N06002	Annealed
21	47Ni–22Cr–9Mo–18Fe	Smls. & wld. fittings	SB–366	...	N06002	Annealed
22	47Ni–22Cr–9Mo–18Fe	Wld. pipe	SB–619	...	N06002	Solution ann.
23	47Ni–22Cr–9Mo–18Fe	Wld. pipe	SB–619	...	N06002	Solution ann.
24	47Ni–22Cr–9Mo–18Fe	Smls. pipe & tube	SB–622	...	N06002	Solution ann.
25	47Ni–22Cr–9Mo–18Fe	Smls. pipe & tube	SB–622	...	N06002	Solution ann.
26	47Ni–22Cr–9Mo–18Fe	Wld. tube	SB–626	...	N06002	Solution ann.
27	47Ni–22Cr–9Mo–18Fe	Wld. tube	SB–626	...	N06002	Solution ann.
28	47Ni–22Cr–19Fe–6Mo	Rod	SB–581	...	N06007	Solution ann.
29	47Ni–22Cr–19Fe–6Mo	Rod	SB–581	...	N06007	Solution ann.
30	47Ni–22Cr–19Fe–6Mo	Plate, sheet, strip	SB–582	...	N06007	Solution ann.
31	47Ni–22Cr–19Fe–6Mo	Plate, sheet, strip	SB–582	...	N06007	Solution ann.
32	47Ni–22Cr–19Fe–6Mo	Smls. & wld. fittings	SB–366	...	N06007	Annealed
33	47Ni–22Cr–19Fe–6Mo	Rod	SB–581	...	N06007	Solution ann.
34	47Ni–22Cr–19Fe–6Mo	Rod	SB–581	...	N06007	Solution ann.
35	47Ni–22Cr–19Fe–6Mo	Plate, sheet, strip	SB–582	...	N06007	Solution ann.
36	47Ni–22Cr–19Fe–6Mo	Plate, sheet, strip	SB–582	...	N06007	Solution ann.
37	47Ni–22Cr–19Fe–6Mo	Wld. pipe	SB–619	...	N06007	Solution ann.
38	47Ni–22Cr–19Fe–6Mo	Wld. pipe	SB–619	...	N06007	Solution ann.
39	47Ni–22Cr–19Fe–6Mo	Smls. pipe & tube	SB–622	...	N06007	Solution ann.
40	47Ni–22Cr–19Fe–6Mo	Smls. pipe & tube	SB–622	...	N06007	Solution ann.
41	47Ni–22Cr–19Fe–6Mo	Wld. tube	SB–626	...	N06007	Solution ann.
42	47Ni–22Cr–19Fe–6Mo	Wld. tube	SB–626	...	N06007	Solution ann.
43	55Ni–21Cr–13.5Mo	Smls. & wld. fittings	SB–366	...	N06022	Solution ann.
44	55Ni–21Cr–13.5Mo	Forgings	SB–462	...	N06022	Solution ann.
45	55Ni–21Cr–13.5Mo	Forgings	SB–462	...	N06022	Solution ann.

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Size/ Thickness, in.	P-No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	...	41	60	30	NP	800 (Cl. 3 only)	900	650	NFN–1	...
2	...	42	70	25	NP	800	900	650	NFN–3	T10
3	>5 O.D.	42	70	25	NP	800	900	650	NFN–3	T10
4	...	42	70	25	NP	800	900	650	NFN–3	T10
5	...	42	70	28	NP	800	900	650	NFN–3	T10
6	≤3	42	70	28	NP	800	900	650	NFN–3	T10
7	≤5 O.D.	42	70	28	NP	800	900	650	NFN–3	T10
8	...	42	70	28	NP	NP	900	650	NFN–3	T10, W12
9	...	42	75	30	NP	800	900	650	NFN–3	T9
10	...	42	75	40	NP	800	900	650	NFN–3	G12, G20, T9
11	...	42	75	40	NP	NP	900	650	NFN–3	T9
12	...	42	80	40	NP	800 (Cl. 3 only)	900	650	NFN–3	T9
13	...	42	85	55	NP	800	800	650	NFN–3	G11, T8
14	...	42	85	55	NP	800	500	500	NFN–3	G5, G21, T8
15	...	42	70	25	NP	800	900	650	NFN–3	T10
16	...	42	75	35	NP	800	900	650	NFN–3	T10
17	...	43	95	35	NP	800	1650	650	NFN–15	G4, G5, T15
18	...	43	95	35	NP	NP	1650	650	NFN–15	G4, T16
19	...	43	95	35	NP	800	1650	650	NFN–15	G4, G5, G13, T15
20	...	43	95	35	NP	NP	1650	650	NFN–15	G4, G13, T16
21	...	43	100	40	NP	NP	1650	650	NFN–15	G4, G5, T15, W12
22	...	43	100	40	NP	800	1650	650	NFN–15	G4, G5, G14, T14, W5
23	...	43	100	40	NP	NP	1650	650	NFN–15	G4, G14, T16
24	...	43	100	40	NP	800	1650	650	NFN–15	G4, G5, T14
25	...	43	100	40	NP	NP	1650	650	NFN–15	G4, T16
26	...	43	100	40	NP	800	1650	650	NFN–15	G4, G5, G14, T14, W5
27	...	43	100	40	NP	NP	1650	650	NFN–15	G4, G14, T16
28	>3/4	45	85	30	NP	NP	1000	650	NFN–11	...
29	>3/4	45	85	30	NP	NP	1000	650	NFN–11	G5
30	>3/4	45	85	30	NP	NP	1000	650	NFN–11	...
31	>3/4	45	85	30	NP	NP	1000	650	NFN–11	G5
32	...	45	90	35	NP	NP	1000	650	NFN–11	G5, W12
33	≤3/4	45	90	35	NP	NP	1000	650	NFN–11	...
34	≤3/4	45	90	35	NP	NP	1000	650	NFN–11	G5
35	≤3/4	45	90	35	NP	NP	1000	650	NFN–11	...
36	≤3/4	45	90	35	NP	NP	1000	650	NFN–11	G5
37	...	45	90	35	NP	NP	1000	650	NFN–11	G14
38	...	45	90	35	NP	NP	1000	650	NFN–11	G5, G14
39	...	45	90	35	NP	NP	1000	650	NFN–11	...
40	...	45	90	35	NP	NP	1000	650	NFN–11	G5
41	...	45	90	35	NP	NP	1000	650	NFN–11	G14
42	...	45	90	35	NP	NP	1000	650	NFN–11	G5, G14
43	...	43	100	45	1250	NP	1250	650	NFN–10	G5, G27, G28, T15, W12
44	...	43	100	45	1250	NP	1250	NP	NFN–10	G5, G27, G28, T15
45	...	43	100	45	1250	NP	1250	NP	NFN–10	G27, G28, T15

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																	
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950
1	17.1	...	17.1	...	17.0	...	17.0	...	16.8	...	16.3	14.0	13.4	12.8	12.1	11.7	11.1	...
2	16.7	...	14.6	...	13.6	...	13.2	...	13.1	...	13.1	13.1	13.0	12.9	12.7	*11.0*	*8.0*	...
3	16.7	...	14.6	...	13.6	...	13.2	...	13.1	...	13.1	13.1	13.0	12.9	12.7	*11.0*	*8.0*	...
4	16.7	...	14.6	...	13.6	...	13.2	...	13.1	...	13.1	13.1	13.0	12.9	12.7	*11.0*	*8.0*	...
5	18.7	...	16.4	...	15.2	...	14.7	...	14.7	...	14.7	14.7	14.6	14.5	14.3	*11.0*	*8.0*	...
6	18.7	...	16.4	...	15.2	...	14.7	...	14.7	...	14.7	14.7	14.6	14.5	14.3	*11.0*	*8.0*	...
7	18.7	...	16.4	...	15.2	...	14.7	...	14.7	...	14.7	14.7	14.6	14.5	14.3	*11.0*	*8.0*	...
8	18.7	...	16.4	...	15.2	...	14.7	...	14.7	...	14.7	14.7	14.6	14.5	14.3	*11.0*	*8.0*	...
9	20.0	...	19.4	...	18.6	...	17.9	...	17.6	...	17.3	17.2	17.0	16.8	*14.5*	*8.5*	*4.0*	...
10	21.4	...	21.4	...	21.4	...	21.4	...	21.4	...	21.4	21.4	20.7	18.5	*14.5*	*8.5*	*4.0*	...
11	21.4	...	21.4	...	21.4	...	21.4	...	21.4	...	21.4	21.4	20.7	18.5	*14.5*	*8.5*	*4.0*	...
12	22.9	...	22.9	...	22.9	...	22.9	...	22.9	...	22.9	22.8	22.0	18.5	*14.5*	*8.5*	*4.0*	...
13	24.3	...	24.3	...	24.3	...	24.3	...	24.3	...	23.9	23.5	22.8	*18.0*	*12.7*	...	...	...
14	24.3	...	24.3	...	24.3	...	24.3	...	24.3	...	23.9	23.5	22.8	*18.0*	*12.7*	...	...	...
15	16.7	...	14.6	...	13.6	...	13.2	...	13.1	...	13.1	13.1	13.0	12.9	12.7	*11.0*	*8.0*	...
16	21.4	...	21.4	...	21.4	...	20.9	...	20.5	...	20.2	20.1	19.8	18.5	14.5	*8.5*	*4.0*	...
17	23.3	...	23.3	...	23.3	...	23.3	...	22.3	...	21.2	20.7	20.3	20.1	19.9	19.7	19.6	19.5
18	23.3	...	21.0	...	19.2	...	17.7	...	16.5	...	15.7	15.3	15.1	14.9	14.7	14.6	14.5	14.4
19	23.3	...	23.3	...	23.3	...	23.3	...	22.3	...	21.2	20.7	20.3	20.1	19.9	19.7	19.6	19.5
20	23.3	...	21.0	...	19.2	...	17.7	...	16.5	...	15.7	15.3	15.1	14.9	14.7	14.6	14.5	14.4
21	26.7	...	26.7	...	26.7	...	26.7	...	25.5	...	24.2	...	23.3	...	22.7	...	22.4	...
22	22.7	...	22.7	...	22.7	...	22.7	...	21.7	...	20.5	20.1	19.8	19.5	19.3	19.1	19.0	18.9
23	22.7	...	20.4	...	18.7	...	17.2	...	16.1	...	15.2	14.9	14.6	14.4	14.3	14.2	14.1	14.0
24	26.7	...	26.7	...	26.7	...	26.7	...	25.5	...	24.2	23.7	23.3	22.9	22.7	22.5	22.4	22.2
25	26.7	...	24.0	...	22.0	...	20.3	...	18.9	...	17.9	17.5	17.2	17.0	16.8	16.7	16.6	16.5
26	22.7	...	22.7	...	22.7	...	22.7	...	21.7	...	20.5	20.1	19.8	19.5	19.3	19.1	19.0	18.9
27	22.7	...	20.4	...	18.7	...	17.2	...	16.1	...	15.2	14.9	14.6	14.4	14.3	14.2	14.1	14.0
28	20.0	...	18.0	...	16.7	...	15.7	...	14.9	...	14.4	14.2	14.1	14.0	13.9	13.8	13.7	13.6
29	20.0	...	20.0	...	20.0	...	20.0	...	20.0	...	19.5	19.2	19.0	18.8	18.7	18.6	18.5	18.4
30	20.0	...	18.0	...	16.7	...	15.7	...	14.9	...	14.4	14.2	14.1	14.0	13.9	13.8	13.7	13.6
31	20.0	...	20.0	...	20.0	...	20.0	...	20.0	...	19.5	19.2	19.0	18.8	18.7	18.6	18.5	18.4
32	23.3	...	23.3	...	23.3	...	23.3	...	23.3	...	22.7	...	22.2	...	21.8	...	21.6	...
33	23.3	...	21.0	...	19.5	...	18.3	...	17.4	...	16.8	16.6	16.4	16.3	16.2	16.1	16.0	15.9
34	23.3	...	23.3	...	23.3	...	23.3	...	23.3	...	22.7	22.4	22.2	22.0	21.8	21.7	21.6	21.5
35	23.3	...	21.0	...	19.5	...	18.3	...	17.4	...	16.8	16.6	16.4	16.3	16.2	16.1	16.0	15.9
36	23.3	...	23.3	...	23.3	...	23.3	...	23.3	...	22.7	22.4	22.2	22.0	21.8	21.7	21.6	21.5
37	19.8	...	17.8	...	16.5	...	15.5	...	14.8	...	14.3	14.1	14.0	13.8	13.7	13.7	13.6	13.5
38	19.8	...	19.8	...	19.8	...	19.8	...	19.8	...	19.3	19.1	18.8	18.7	18.5	18.4	18.3	18.3
39	23.3	...	21.0	...	19.5	...	18.3	...	17.4	...	16.8	16.6	16.4	16.3	16.2	16.1	16.0	15.9
40	23.3	...	23.3	...	23.3	...	23.3	...	23.3	...	22.7	22.4	22.2	22.0	21.8	21.7	21.6	21.5
41	19.8	...	17.8	...	16.5	...	15.5	...	14.8	...	14.3	14.1	14.0	13.8	13.7	13.7	13.6	13.5
42	19.8	...	19.8	...	19.8	...	19.8	...	19.8	...	19.3	19.1	18.8	18.7	18.5	18.4	18.3	18.3
43	28.6	...	28.6	...	28.2	...	27.2	...	26.5	...	26.0	25.8	25.6	25.4	25.3	25.1	24.9	24.7
44	28.6	...	28.6	...	28.2	...	27.2	...	26.5	...	26.0	25.8	25.6	25.4	25.3	25.1	24.9	24.7
45	28.6	...	26.7	...	24.6	...	22.9	...	21.5	...	20.4	20.0	19.6	19.3	19.0	18.8	18.6	18.5

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																
	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	1700	1750	1800
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
17	19.4	19.3	*17.5*	*14.1*	*11.3*	*9.3*	*7.7*	*6.1*	*4.8*	*3.8*	*3.0*	*2.3*	*1.7*	*1.2*	...	...	...
18	14.3	14.3	14.2	*14.1*	*11.3*	*9.3*	*7.7*	*6.1*	*4.8*	*3.8*	*3.0*	*2.3*	*1.7*	*1.2*	...	...	...
19	19.4	19.3	*17.5*	*14.1*	*11.3*	*9.3*	*7.7*	*6.1*	*4.8*	*3.8*	*3.0*	*2.3*	*1.7*	*1.2*	...	...	...
20	14.3	14.3	14.2	*14.1*	*11.3*	*9.3*	*7.7*	*6.1*	*4.8*	*3.8*	*3.0*	*2.3*	*1.7*	*1.2*	...	...	...
21	22.1	...	*17.5*	...	*11.3*	...	*7.7*	...	*4.8*	...	*3.0*	...	*1.7*	*1.2*	...	...	...
22	18.8	*18.5*	*14.9*	*12.0*	*9.6*	*7.9*	*6.5*	*5.2*	*4.1*	*3.2*	*2.6*	*2.0*	*1.4*	*1.0*	...	...	...
23	13.9	13.9	13.8	*12.0*	*9.6*	*7.9*	*6.5*	*5.2*	*4.1*	*3.2*	*2.6*	*2.0*	*1.4*	*1.0*	...	...	...
24	22.1	*21.7*	*17.5*	*14.1*	*11.3*	*9.3*	*7.7*	*6.1*	*4.8*	*3.8*	*3.0*	*2.3*	*1.7*	*1.2*	...	...	...
25	16.4	16.3	16.2	*14.1*	*11.3*	*9.3*	*7.7*	*6.1*	*4.8*	*3.8*	*3.0*	*2.3*	*1.7*	*1.2*	...	...	...
26	18.8	*18.5*	*14.9*	*12.0*	*9.6*	*7.9*	*6.5*	*5.2*	*4.1*	*3.2*	*2.6*	*2.0*	*1.4*	*1.0*	...	...	...
27	13.9	13.9	13.8	*12.0*	*9.6*	*7.9*	*6.5*	*5.2*	*4.1*	*3.2*	*2.6*	*2.0*	*1.4*	*1.0*	...	...	...
28	13.6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
29	18.3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
30	13.6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
31	18.3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
32	21.4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
33	15.8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
34	21.4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
35	15.8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
36	21.4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
37	13.5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
38	18.2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
39	15.8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
40	21.4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
41	13.5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
42	18.2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
43	24.4	23.0	*17.5*	*12.7*	*9.6*	*7.6*	...	...	...	...	...	...	...	...	...	...	...
44	24.4	23.0	*17.5*	*12.7*	*9.6*	*7.6*	...	...	...	...	...	...	...	...	...	...	...
45	18.3	18.2	*17.5*	*12.7*	*9.6*	*7.6*	...	...	...	...	...	...	...	...	...	...	...

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
1	55Ni–21Cr–13.5Mo	Forgings	SB–564	...	N06022	Solution ann.
2	55Ni–21Cr–13.5Mo	Forgings	SB–564	...	N06022	Solution ann.
3	55Ni–21Cr–13.5Mo	Rod	SB–574	...	N06022	Solution ann.
4	55Ni–21Cr–13.5Mo	Rod	SB–574	...	N06022	Solution ann.
5	55Ni–21Cr–13.5Mo	Plate, sheet, strip	SB–575	...	N06022	Solution ann.
6	55Ni–21Cr–13.5Mo	Plate, sheet, strip	SB–575	...	N06022	Solution ann.
7	55Ni–21Cr–13.5Mo	Wld. pipe	SB–619	...	N06022	Solution ann.
8	55Ni–21Cr–13.5Mo	Wld. pipe	SB–619	...	N06022	Solution ann.
9	55Ni–21Cr–13.5Mo	Smls. pipe & tube	SB–622	...	N06022	Solution ann.
10	55Ni–21Cr–13.5Mo	Smls. pipe & tube	SB–622	...	N06022	Solution ann.
11	55Ni–21Cr–13.5Mo	Wld. tube	SB–626	...	N06022	Solution ann.
12	55Ni–21Cr–13.5Mo	Wld. tube	SB–626	...	N06022	Solution ann.
13	60Ni–25Cr–9.5Fe–2.1Al	Smls. tube	SB–163	...	N06025	Annealed
14	60Ni–25Cr–9.5Fe–2.1Al	Smls. tube	SB–163	...	N06025	Annealed
15	60Ni–25Cr–9.5Fe–2.1Al	Plate, sheet, strip	SB–168	...	N06025	Annealed
16	60Ni–25Cr–9.5Fe–2.1Al	Plate, sheet, strip	SB–168	...	N06025	Annealed
17	60Ni–25Cr–9.5Fe–2.1Al	Wrought fittings	SB–366	...	N06025	Annealed
18	60Ni–25Cr–9.5Fe–2.1Al	Wrought fittings	SB–366	...	N06025	Annealed
19	60Ni–25Cr–9.5Fe–2.1Al	Forgings	SB–462	...	N06025	Annealed
20	60Ni–25Cr–9.5Fe–2.1Al	Forgings	SB–462	...	N06025	Annealed
21	60Ni–25Cr–9.5Fe–2.1Al	Wld. tube	SB–516	...	N06025	Annealed
22	60Ni–25Cr–9.5Fe–2.1Al	Wld. tube	SB–516	...	N06025	Annealed
23	60Ni–25Cr–9.5Fe–2.1Al	Wld. pipe	SB–517	...	N06025	Annealed
24	60Ni–25Cr–9.5Fe–2.1Al	Wld. pipe	SB–517	...	N06025	Annealed
25	60Ni–25Cr–9.5Fe–2.1Al	Forgings	SB–564	...	N06025	Annealed
26	60Ni–25Cr–9.5Fe–2.1Al	Forgings	SB–564	...	N06025	Annealed
27	60Ni–25Cr–9.5Fe–2.1Al	Bar	SB–166	...	N06025	HW or CW ann.
28	60Ni–25Cr–9.5Fe–2.1Al	Bar	SB–166	...	N06025	HW or CW ann.
29	60Ni–25Cr–9.5Fe–2.1Al	Smls. pipe & tube	SB–167	...	N06025	HW or CW ann.
30	60Ni–25Cr–9.5Fe–2.1Al	Smls. pipe & tube	SB–167	...	N06025	HW or CW ann.
31	40Ni–29Cr–15Fe–5Mo	Smls. & wld. fittings	SB–366	...	N06030	Solution ann.
32	40Ni–29Cr–15Fe–5Mo	Forgings	SB–462	...	N06030	Solution ann.
33	40Ni–29Cr–15Fe–5Mo	Forgings	SB–462	...	N06030	Solution ann.
34	40Ni–29Cr–15Fe–5Mo	Rod	SB–581	...	N06030	Solution ann.
35	40Ni–29Cr–15Fe–5Mo	Rod	SB–581	...	N06030	Solution ann.
36	40Ni–29Cr–15Fe–5Mo	Plate, sheet, strip	SB–582	...	N06030	Solution ann.
37	40Ni–29Cr–15Fe–5Mo	Plate, sheet, strip	SB–582	...	N06030	Solution ann.
38	40Ni–29Cr–15Fe–5Mo	Wld. pipe	SB–619	...	N06030	Solution ann.
39	40Ni–29Cr–15Fe–5Mo	Wld. pipe	SB–619	...	N06030	Solution ann.
40	40Ni–29Cr–15Fe–5Mo	Smls. pipe & tube	SB–622	...	N06030	Solution ann.
41	40Ni–29Cr–15Fe–5Mo	Smls. pipe & tube	SB–622	...	N06030	Solution ann.
42	40Ni–29Cr–15Fe–5Mo	Wld. tube	SB–626	...	N06030	Solution ann.
43	40Ni–29Cr–15Fe–5Mo	Wld. tube	SB–626	...	N06030	Solution ann.
44	58Ni–33Cr–8Mo	Smls. & wld. fittings	SB–366	...	N06035	Solution ann.
45	58Ni–33Cr–8Mo	Forgings	SB–462	...	N06035	Solution ann.

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Size/ Thickness, in.	P-No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	...	43	100	45	1250	800	1250	650	NFN–10	G5, G27, G28, T15
2	...	43	100	45	1250	NP	1250	650	NFN–10	G27, G28, T15
3	...	43	100	45	1250	800	1250	650	NFN–10	G5, G27, G28, T15
4	...	43	100	45	1250	NP	1250	650	NFN–10	G27, G28, T15
5	...	43	100	45	1250	800	1250	650	NFN–10	G5, G27, G28, T15
6	...	43	100	45	1250	NP	1250	650	NFN–10	G27, G28, T15
7	...	43	100	45	1250	800	1250	650	NFN–10	G5, G14, G27, G28, T15, W6
8	...	43	100	45	1250	NP	1250	650	NFN–10	G14, G27, G28, T15
9	...	43	100	45	1250	800	1250	650	NFN–10	G5, G27, G28, T15
10	...	43	100	45	1250	NP	1250	650	NFN–10	G27, G28, T15
11	...	43	100	45	1250	800	1250	650	NFN–10	G5, G14, G27, G28, T15, W6
12	...	43	100	45	1250	NP	1250	650	NFN–10	G14, G27, G28, T15
13	...	43	98	39	1650	NP	1800	NP	NFN–13	G4, G5, G30, G31, G32, T12
14	...	43	98	39	1650	NP	1800	NP	NFN–13	G4, G30, G31, G32, T13
15	...	43	98	39	1650	NP	1800	NP	NFN–13	G4, G5, G30, G31, G32, T12
16	...	43	98	39	1650	NP	1800	NP	NFN–13	G4, G30, G31, G32, T13
17	...	43	98	39	1650	NP	1800	NP	NFN–13	G4, G5, G30, G31, G32, T12
18	...	43	98	39	1650	NP	1800	NP	NFN–13	G4, G30, G31, G32, T13
19	$t \le 4$	43	98	39	1650	NP	1800	NP	NFN–13	G4, G5, G30, G31, G32, T12
20	$t \le 4$	43	98	39	1650	NP	1800	NP	NFN–13	G4, G30, G31, G32, T13
21	...	43	98	39	1650	NP	1800	NP	NFN–13	G4, G5, G14, G30, G31, G32, T12
22	...	43	98	39	1650	NP	1800	NP	NFN–13	G4, G14, G30, G31, G32, T13
23	...	43	98	39	1650	NP	1800	NP	NFN–13	G4, G5, G14, G30, G31, G32, T12
24	...	43	98	39	1650	NP	1800	NP	NFN–13	G4, G14, G30, G31, G32, T13
25	$t \le 4$	43	98	39	1650	NP	1800	NP	NFN–13	G4, G5, G30, G31, G32, T12
26	$t \le 4$	43	98	39	1650	NP	1800	NP	NFN–13	G4, G30, G31, G32, T13
27	$t \le 4$	43	98	39	1650	NP	1800	NP	NFN–13	G4, G5, G30, G31, G32, T12
28	$t \le 4$	43	98	39	1650	NP	1800	NP	NFN–13	G4, G30, G31, G32, T13
29	...	43	98	39	1650	NP	1800	NP	NFN–13	G4, G5, G30, G31, G32, T12
30	...	43	98	39	1650	NP	1800	NP	NFN–13	G4, G30, G31, G32, T13
31	...	45	85	35	NP	NP	800	650	NFN–19	G5, W12
32	...	45	85	35	NP	NP	800	NP	NFN–19	G5
33	...	45	85	35	NP	NP	800	NP	NFN–19	...
34	...	45	85	35	NP	800	800	650	NFN–19	G5
35	...	45	85	35	NP	NP	800	650	NFN–19	...
36	...	45	85	35	NP	800	800	650	NFN–19	G5
37	...	45	85	35	NP	NP	800	650	NFN–19	...
38	...	45	85	35	NP	800	800	650	NFN–19	G5, G14, W6
39	...	45	85	35	NP	NP	800	650	NFN–19	G14
40	...	45	85	35	NP	800	800	650	NFN–19	G5
41	...	45	85	35	NP	NP	800	650	NFN–19	...
42	...	45	85	35	NP	800	800	650	NFN–19	G5, G14, W6
43	...	45	85	35	NP	NP	800	650	NFN–19	G14
44	...	43	85	35	NP	NP	800	NP	NFN–27	G5, W12
45	...	43	85	35	NP	NP	800	NP	NFN–27	G5

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																	
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950
1	28.6	...	28.6	...	28.2	...	27.2	...	26.5	...	26.0	25.8	25.6	25.4	25.3	25.1	24.9	24.7
2	28.6	...	26.7	...	24.6	...	22.9	...	21.5	...	20.4	20.0	19.6	19.3	19.0	18.8	18.6	18.5
3	28.6	...	28.6	...	28.2	...	27.2	...	26.5	...	26.0	25.8	25.6	25.4	25.3	25.1	24.9	24.7
4	28.6	...	26.7	...	24.6	...	22.9	...	21.5	...	20.4	20.0	19.6	19.3	19.0	18.8	18.6	18.5
5	28.6	...	28.6	...	28.2	...	27.2	...	26.5	...	26.0	25.8	25.6	25.4	25.3	25.1	24.9	24.7
6	28.6	...	26.7	...	24.6	...	22.9	...	21.5	...	20.4	20.0	19.6	19.3	19.0	18.8	18.6	18.5
7	24.3	...	24.3	...	23.9	...	23.1	...	22.6	...	22.1	21.9	21.8	21.6	21.5	21.3	21.1	21.0
8	24.3	...	22.7	...	20.9	...	19.4	...	18.3	...	17.4	17.0	16.7	16.4	16.2	16.0	15.8	15.7
9	28.6	...	28.6	...	28.2	...	27.2	...	26.5	...	26.0	25.8	25.6	25.4	25.3	25.1	24.9	24.7
10	28.6	...	26.7	...	24.6	...	22.9	...	21.5	...	20.4	20.0	19.6	19.3	19.0	18.8	18.6	18.5
11	24.3	...	24.3	...	23.9	...	23.1	...	22.6	...	22.1	21.9	21.8	21.6	21.5	21.3	21.1	21.0
12	24.3	...	22.7	...	20.9	...	19.4	...	18.3	...	17.4	17.0	16.7	16.4	16.2	16.0	15.8	15.7
13	26.0	...	26.0	...	26.0	...	26.0	...	26.0	...	26.0	26.0	26.0	26.0	26.0	26.0	26.0	*22.1*
14	26.0	...	25.8	...	24.9	...	23.7	...	22.5	...	21.5	21.1	20.7	20.4	20.2	20.0	19.9	19.8
15	26.0	...	26.0	...	26.0	...	26.0	...	26.0	...	26.0	26.0	26.0	26.0	26.0	26.0	26.0	*22.1*
16	26.0	...	25.8	...	24.9	...	23.7	...	22.5	...	21.5	21.1	20.7	20.4	20.2	20.0	19.9	19.8
17	26.0	...	26.0	...	26.0	...	26.0	...	26.0	...	26.0	26.0	26.0	26.0	26.0	26.0	26.0	*22.1*
18	26.0	...	25.8	...	24.9	...	23.7	...	22.5	...	21.5	21.1	20.7	20.4	20.2	20.0	19.9	19.8
19	26.0	...	26.0	...	26.0	...	26.0	...	26.0	...	26.0	26.0	26.0	26.0	26.0	26.0	26.0	*22.1*
20	26.0	...	25.8	...	24.9	...	23.7	...	22.5	...	21.5	21.1	20.7	20.4	20.2	20.0	19.9	19.8
21	22.1	...	22.1	...	22.1	...	22.1	...	22.1	...	22.1	22.1	22.1	22.1	22.1	22.1	22.1	*18.8*
22	22.1	...	21.9	...	21.1	...	20.1	...	19.1	...	18.3	17.9	17.6	17.4	17.2	17.0	16.9	16.8
23	22.1	...	22.1	...	22.1	...	22.1	...	22.1	...	22.1	22.1	22.1	22.1	22.1	22.1	22.1	*18.8*
24	22.1	...	21.9	...	21.1	...	20.1	...	19.1	...	18.3	17.9	17.6	17.4	17.2	17.0	16.9	16.8
25	26.0	...	26.0	...	26.0	...	26.0	...	26.0	...	26.0	26.0	26.0	26.0	26.0	26.0	26.0	*22.1*
26	26.0	...	25.8	...	24.9	...	23.7	...	22.5	...	21.5	21.1	20.7	20.4	20.2	20.0	19.9	19.8
27	26.0	...	26.0	...	26.0	...	26.0	...	26.0	...	26.0	26.0	26.0	26.0	26.0	26.0	26.0	*22.1*
28	26.0	...	25.8	...	24.9	...	23.7	...	22.5	...	21.5	21.1	20.7	20.4	20.2	20.0	19.9	19.8
29	26.0	...	26.0	...	26.0	...	26.0	...	26.0	...	26.0	26.0	26.0	26.0	26.0	26.0	26.0	*22.1*
30	26.0	...	25.8	...	24.9	...	23.7	...	22.5	...	21.5	21.1	20.7	20.4	20.2	20.0	19.9	19.8
31	23.3	...	23.3	...	23.3	...	22.5	...	21.9	...	21.3	20.9	20.5	20.1	19.7	...	...	...
32	23.3	...	23.3	...	23.3	...	22.5	...	21.9	...	21.3	20.9	20.5	20.1	19.7	...	...	...
33	23.3	...	20.0	...	18.3	...	17.2	...	16.4	...	15.8	15.5	15.2	14.9	14.6	...	...	...
34	23.3	...	23.3	...	23.3	...	22.5	...	21.9	...	21.3	20.9	20.5	20.1	19.7	...	...	...
35	23.3	...	20.0	...	18.3	...	17.2	...	16.4	...	15.8	15.5	15.2	14.9	14.6	...	...	...
36	23.3	...	23.3	...	23.3	...	22.5	...	21.9	...	21.3	20.9	20.5	20.1	19.7	...	...	...
37	23.3	...	20.0	...	18.3	...	17.2	...	16.4	...	15.8	15.5	15.2	14.9	14.6	...	...	...
38	19.8	...	19.8	...	19.8	...	19.1	...	18.6	...	18.1	17.7	17.4	17.1	16.8	...	...	...
39	19.8	...	17.0	...	15.6	...	14.6	...	13.9	...	13.4	13.1	12.9	12.7	12.4	...	...	...
40	23.3	...	23.3	...	23.3	...	22.5	...	21.9	...	21.3	20.9	20.5	20.1	19.7	...	...	...
41	23.3	...	20.0	...	18.3	...	17.2	...	16.4	...	15.8	15.5	15.2	14.9	14.6	...	...	...
42	19.8	...	19.8	...	19.8	...	19.1	...	18.6	...	18.1	17.7	17.4	17.1	16.8	...	...	...
43	19.8	...	17.0	...	15.6	...	14.6	...	13.9	...	13.4	13.1	12.9	12.7	12.4	...	...	...
44	23.3	...	23.3	...	23.3	...	22.2	...	20.5	...	19.7	19.4	19.2	19.0	18.8	...	...	...
45	23.3	...	23.3	...	23.3	...	22.2	...	20.5	...	19.7	19.4	19.2	19.0	18.8	...	...	...

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																
	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	1700	1750	1800
1	24.4	23.0	*17.5*	*12.7*	*9.6*	*7.6*	...	...	...	...	...	...	...	...	...	...	...
2	18.3	18.2	*17.5*	*12.7*	*9.6*	*7.6*	...	...	...	...	...	...	...	...	...	...	...
3	24.4	23.0	*17.5*	*12.7*	*9.6*	*7.6*	...	...	...	...	...	...	...	...	...	...	...
4	18.3	18.2	*17.5*	*12.7*	*9.6*	*7.6*	...	...	...	...	...	...	...	...	...	...	...
5	24.4	23.0	*17.5*	*12.7*	*9.6*	*7.6*	...	...	...	...	...	...	...	...	...	...	...
6	18.3	18.2	*17.5*	*12.7*	*9.6*	*7.6*	...	...	...	...	...	...	...	...	...	...	...
7	20.7	19.6	*14.9*	*10.8*	*8.2*	*6.5*	...	...	...	...	...	...	...	...	...	...	...
8	15.6	15.5	*14.9*	*10.8*	*8.2*	*6.5*	...	...	...	...	...	...	...	...	...	...	...
9	24.4	23.0	*17.5*	*12.7*	*9.6*	*7.6*	...	...	...	...	...	...	...	...	...	...	...
10	18.3	18.2	*17.5*	*12.7*	*9.6*	*7.6*	...	...	...	...	...	...	...	...	...	...	...
11	20.7	19.6	*14.9*	*10.8*	*8.2*	*6.5*	...	...	...	...	...	...	...	...	...	...	...
12	15.6	15.5	*14.9*	*10.8*	*8.2*	*6.5*	...	...	...	...	...	...	...	...	...	...	...
13	*17.0*	*12.9*	*9.7*	*7.2*	*5.4*	*4.0*	*3.0*	*2.2*	*1.6*	*1.2*	*1.0*	*0.81*	*0.67*	*0.57*	*0.49*	*0.42*	*0.37*
14	*17.0*	*12.9*	*9.7*	*7.2*	*5.4*	*4.0*	*3.0*	*2.2*	*1.6*	*1.2*	*1.0*	*0.81*	*0.67*	*0.57*	*0.49*	*0.42*	*0.37*
15	*17.0*	*12.9*	*9.7*	*7.2*	*5.4*	*4.0*	*3.0*	*2.2*	*1.6*	*1.2*	*1.0*	*0.81*	*0.67*	*0.57*	*0.49*	*0.42*	*0.37*
16	*17.0*	*12.9*	*9.7*	*7.2*	*5.4*	*4.0*	*3.0*	*2.2*	*1.6*	*1.2*	*1.0*	*0.81*	*0.67*	*0.57*	*0.49*	*0.42*	*0.37*
17	*17.0*	*12.9*	*9.7*	*7.2*	*5.4*	*4.0*	*3.0*	*2.2*	*1.6*	*1.2*	*1.0*	*0.81*	*0.67*	*0.57*	*0.49*	*0.42*	*0.37*
18	*17.0*	*12.9*	*9.7*	*7.2*	*5.4*	*4.0*	*3.0*	*2.2*	*1.6*	*1.2*	*1.0*	*0.81*	*0.67*	*0.57*	*0.49*	*0.42*	*0.37*
19	*17.0*	*12.9*	*9.7*	*7.2*	*5.4*	*4.0*	*3.0*	*2.2*	*1.6*	*1.2*	*1.0*	*0.81*	*0.67*	*0.57*	*0.49*	*0.42*	*0.37*
20	*17.0*	*12.9*	*9.7*	*7.2*	*5.4*	*4.0*	*3.0*	*2.2*	*1.6*	*1.2*	*1.0*	*0.81*	*0.67*	*0.57*	*0.49*	*0.42*	*0.37*
21	*14.4*	*10.9*	*8.2*	*6.1*	*4.5*	*3.4*	*2.6*	*1.9*	*1.4*	*1.1*	*0.80*	*0.69*	*0.57*	*0.48*	*0.41*	*0.36*	*0.31*
22	*14.4*	*10.9*	*8.2*	*6.1*	*4.5*	*3.4*	*2.6*	*1.9*	*1.4*	*1.1*	*0.80*	*0.69*	*0.57*	*0.48*	*0.41*	*0.36*	*0.31*
23	*14.4*	*10.9*	*8.2*	*6.1*	*4.5*	*3.4*	*2.6*	*1.9*	*1.4*	*1.1*	*0.80*	*0.69*	*0.57*	*0.48*	*0.41*	*0.36*	*0.31*
24	*14.4*	*10.9*	*8.2*	*6.1*	*4.5*	*3.4*	*2.6*	*1.9*	*1.4*	*1.1*	*0.80*	*0.69*	*0.57*	*0.48*	*0.41*	*0.36*	*0.31*
25	*17.0*	*12.9*	*9.7*	*7.2*	*5.4*	*4.0*	*3.0*	*2.2*	*1.6*	*1.2*	*1.0*	*0.81*	*0.67*	*0.57*	*0.49*	*0.42*	*0.37*
26	*17.0*	*12.9*	*9.7*	*7.2*	*5.4*	*4.0*	*3.0*	*2.2*	*1.6*	*1.2*	*1.0*	*0.81*	*0.67*	*0.57*	*0.49*	*0.42*	*0.37*
27	*17.0*	*12.9*	*9.7*	*7.2*	*5.4*	*4.0*	*3.0*	*2.2*	*1.6*	*1.2*	*1.0*	*0.81*	*0.67*	*0.57*	*0.49*	*0.42*	*0.37*
28	*17.0*	*12.9*	*9.7*	*7.2*	*5.4*	*4.0*	*3.0*	*2.2*	*1.6*	*1.2*	*1.0*	*0.81*	*0.67*	*0.57*	*0.49*	*0.42*	*0.37*
29	*17.0*	*12.9*	*9.7*	*7.2*	*5.4*	*4.0*	*3.0*	*2.2*	*1.6*	*1.2*	*1.0*	*0.81*	*0.67*	*0.57*	*0.49*	*0.42*	*0.37*
30	*17.0*	*12.9*	*9.7*	*7.2*	*5.4*	*4.0*	*3.0*	*2.2*	*1.6*	*1.2*	*1.0*	*0.81*	*0.67*	*0.57*	*0.49*	*0.42*	*0.37*
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
1	58Ni–33Cr–8Mo	Forgings	SB–462	...	N06035	Solution ann.
2	58Ni–33Cr–8Mo	Forgings	SB–564	...	N06035	Solution ann.
3	58Ni–33Cr–8Mo	Forgings	SB–564	...	N06035	Solution ann.
4	58Ni–33Cr–8Mo	Rod	SB–574	...	N06035	Solution ann.
5	58Ni–33Cr–8Mo	Rod	SB–574	...	N06035	Solution ann.
6	58Ni–33Cr–8Mo	Plate, sheet, strip	SB–575	...	N06035	Solution ann.
7	58Ni–33Cr–8Mo	Plate, sheet, strip	SB–575	...	N06035	Solution ann.
8	58Ni–33Cr–8Mo	Wld. pipe	SB–619	...	N06035	Solution ann.
9	58Ni–33Cr–8Mo	Wld. pipe	SB–619	...	N06035	Solution ann.
10	58Ni–33Cr–8Mo	Smls. pipe & tube	SB–622	...	N06035	Solution ann.
11	58Ni–33Cr–8Mo	Smls. pipe & tube	SB–622	...	N06035	Solution ann.
12	58Ni–33Cr–8Mo	Wld. tube	SB–626	...	N06035	Solution ann.
13	58Ni–33Cr–8Mo	Wld. tube	SB–626	...	N06035	Solution ann.
14	46Ni–27Cr–23Fe–2.75Si	Rod	SB–166	...	N06045	Solution ann.
15	46Ni–27Cr–23Fe–2.75Si	Rod	SB–166	...	N06045	Solution ann.
16	46Ni–27Cr–23Fe–2.75Si	Smls. pipe & tube	SB–167	...	N06045	Solution ann.
17	46Ni–27Cr–23Fe–2.75Si	Smls. pipe & tube	SB–167	...	N06045	Solution ann.
18	46Ni–27Cr–23Fe–2.75Si	Plate, sheet, strip	SB–168	...	N06045	Solution ann.
19	46Ni–27Cr–23Fe–2.75Si	Plate, sheet, strip	SB–168	...	N06045	Solution ann.
20	46Ni–27Cr–23Fe–2.75Si	Smls. & wld. fittings	SB–366	...	N06045	Solution ann.
21	46Ni–27Cr–23Fe–2.75Si	Forged fittings	SB–462	...	N06045	Solution ann.
22	46Ni–27Cr–23Fe–2.75Si	Forged fittings	SB–462	...	N06045	Solution ann.
23	46Ni–27Cr–23Fe–2.75Si	Wld. tube	SB–516	...	N06045	Solution ann.
24	46Ni–27Cr–23Fe–2.75Si	Wld. tube	SB–516	...	N06045	Solution ann.
25	46Ni–27Cr–23Fe–2.75Si	Wld. pipe	SB–517	...	N06045	Solution ann.
26	46Ni–27Cr–23Fe–2.75Si	Wld. pipe	SB–517	...	N06045	Solution ann.
27	46Ni–27Cr–23Fe–2.75Si	Forgings	SB–564	...	N06045	Solution ann.
28	46Ni–27Cr–23Fe–2.75Si	Forgings	SB–564	...	N06045	Solution ann.
29	59Ni–23Cr–16Mo	Fittings	SB–366	CR5923	N06059	Annealed
30	59Ni–23Cr–16Mo	Fittings	SB–366	WP5923	N06059	Annealed
31	59Ni–23Cr–16Mo	Wld. fittings	SB–366	WP5923W	N06059	Annealed
32	59Ni–23Cr–16Mo	Fittings	SB–366	WP5923WX	N06059	Annealed
33	59Ni–23Cr–16Mo	Forged fittings	SB–462	...	N06059	Solution ann.
34	59Ni–23Cr–16Mo	Forged fittings	SB–462	...	N06059	Solution ann.
35	59Ni–23Cr–16Mo	Forgings	SB–564	...	N06059	Solution ann.
36	59Ni–23Cr–16Mo	Forgings	SB–564	...	N06059	Solution ann.
37	59Ni–23Cr–16Mo	Rod	SB–574	...	N06059	Solution ann.
38	59Ni–23Cr–16Mo	Rod	SB–574	...	N06059	Solution ann.
39	59Ni–23Cr–16Mo	Plate, sheet, strip	SB–575	...	N06059	Solution ann.
40	59Ni–23Cr–16Mo	Plate, sheet, strip	SB–575	...	N06059	Solution ann.
41	59Ni–23Cr–16Mo	Wld. pipe	SB–619	...	N06059	Solution ann.
42	59Ni–23Cr–16Mo	Wld. pipe	SB–619	...	N06059	Solution ann.
43	59Ni–23Cr–16Mo	Smls. pipe & tube	SB–622	...	N06059	Solution ann.
44	59Ni–23Cr–16Mo	Smls. pipe & tube	SB–622	...	N06059	Solution ann.
45	59Ni–23Cr–16Mo	Wld. tube	SB–626	...	N06059	Solution ann.

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Size/ Thickness, in.	P-No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	...	43	85	35	NP	NP	800	NP	NFN–27	...
2	...	43	85	35	NP	NP	800	NP	NFN–27	G5
3	...	43	85	35	NP	NP	800	NP	NFN–27	...
4	...	43	85	35	NP	NP	800	NP	NFN–27	G5
5	...	43	85	35	NP	NP	800	NP	NFN–27	...
6	...	43	85	35	NP	NP	800	NP	NFN–27	G5
7	...	43	85	35	NP	NP	800	NP	NFN–27	...
8	...	43	85	35	NP	NP	800	NP	NFN–27	G5, G14
9	...	43	85	35	NP	NP	800	NP	NFN–27	G14
10	...	43	85	35	NP	NP	800	NP	NFN–27	G5
11	...	43	85	35	NP	NP	800	NP	NFN–27	...
12	...	43	85	35	NP	NP	800	NP	NFN–27	G5, G14
13	...	43	85	35	NP	NP	800	NP	NFN–27	G14
14	...	46	90	35	1500	NP	1500	NP	NFN–8	G1, G5, T11
15	...	46	90	35	1500	NP	1500	NP	NFN–8	T11
16	...	46	90	35	1500	NP	1500	NP	NFN–8	G1, G5, T11
17	...	46	90	35	1500	NP	1500	NP	NFN–8	T11
18	...	46	90	35	1500	NP	1500	NP	NFN–8	G1, G5, T11
19	...	46	90	35	1500	NP	1500	NP	NFN–8	T11
20	...	46	90	35	1500	NP	1500	NP	NFN–8	G5, T11, W12
21	...	46	90	35	1500	NP	1500	NP	NFN–8	G5, T11
22	...	46	90	35	1500	NP	1500	NP	NFN–8	T11
23	...	46	90	35	1500	NP	1500	NP	NFN–8	G5, G14, T11
24	...	46	90	35	1500	NP	1500	NP	NFN–8	G14, T11
25	...	46	90	35	1500	NP	1500	NP	NFN–8	G1, G5, G14, T11
26	...	46	90	35	1500	NP	1500	NP	NFN–8	G14, T11
27	...	46	90	35	1500	NP	1500	NP	NFN–8	G1, G5, T11
28	...	46	90	35	1500	NP	1500	NP	NFN–8	T11
29	...	43	100	45	NP	800	1400	650	NFN–14	G5, G14, G23, T16
30	...	43	100	45	NP	800	1400	650	NFN–14	G5, G23, T16
31	...	43	100	45	NP	800	1400	650	NFN–14	G5, G14, G23, T16
32	...	43	100	45	NP	800	1400	650	NFN–14	G5, G23, T16
33	...	43	100	45	NP	NP	1400	650	NFN–14	G23, T16
34	...	43	100	45	NP	NP	1400	650	NFN–14	G5, G23, T16
35	...	43	100	45	NP	800	1400	650	NFN–14	G23, T16
36	...	43	100	45	NP	800	1400	650	NFN–14	G5, G23, T16
37	...	43	100	45	NP	800	1400	650	NFN–14	G23, T16
38	...	43	100	45	NP	800	1400	650	NFN–14	G5, G23, T16
39	...	43	100	45	NP	800	1400	650	NFN–14	G23, T16
40	...	43	100	45	NP	800	1400	650	NFN–14	G5, G23, T16
41	...	43	100	45	NP	800	1400	650	NFN–14	G14, G23, T16
42	...	43	100	45	NP	800	1400	650	NFN–14	G5, G14, G23, T16
43	...	43	100	45	NP	800	1400	650	NFN–14	G23, T16
44	...	43	100	45	NP	800	1400	650	NFN–14	G5, G23, T16
45	...	43	100	45	NP	800	1400	650	NFN–14	G14, G23, T16

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																	
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950
1	23.3	...	20.4	...	18.2	...	16.5	...	15.3	...	14.6	14.4	14.2	14.1	13.9	...	...	...
2	23.3	...	23.3	...	23.3	...	22.2	...	20.5	...	19.7	19.4	19.2	19.0	18.8	...	...	...
3	23.3	...	20.4	...	18.2	...	16.5	...	15.3	...	14.6	14.4	14.2	14.1	13.9	...	...	...
4	23.3	...	23.3	...	23.3	...	22.2	...	20.5	...	19.7	19.4	19.2	19.0	18.8	...	...	...
5	23.3	...	20.4	...	18.2	...	16.5	...	15.3	...	14.6	14.4	14.2	14.1	13.9	...	...	...
6	23.3	...	23.3	...	23.3	...	22.2	...	20.5	...	19.7	19.4	19.2	19.0	18.8	...	...	...
7	23.3	...	20.4	...	18.2	...	16.5	...	15.3	...	14.6	14.4	14.2	14.1	13.9	...	...	...
8	19.8	...	19.8	...	19.8	...	18.9	...	17.4	...	16.7	16.5	16.3	16.2	16.0	...	...	...
9	19.8	...	17.3	...	15.5	...	14.0	...	13.0	...	12.4	12.2	12.1	12.0	11.8	...	...	...
10	23.3	...	23.3	...	23.3	...	22.2	...	20.5	...	19.7	19.4	19.2	19.0	18.8	...	...	...
11	23.3	...	20.4	...	18.2	...	16.5	...	15.3	...	14.6	14.4	14.2	14.1	13.9	...	...	...
12	19.8	...	19.8	...	19.8	...	18.9	...	17.4	...	16.7	16.5	16.3	16.2	16.0	...	...	...
13	19.8	...	17.3	...	15.5	...	14.0	...	13.0	...	12.4	12.2	12.1	12.0	11.8	...	...	...
14	23.3	...	23.3	...	23.3	...	23.3	...	22.6	...	22.1	21.9	21.7	21.6	21.4	21.1	*16.0*	*12.9*
15	23.3	...	20.9	...	19.3	...	18.1	...	17.4	...	17.0	16.8	16.8	16.7	16.6	16.5	*16.0*	*12.9*
16	23.3	...	23.3	...	23.3	...	23.3	...	22.6	...	22.1	21.9	21.7	21.6	21.4	21.1	*16.0*	*12.9*
17	23.3	...	20.9	...	19.3	...	18.1	...	17.4	...	17.0	16.8	16.8	16.7	16.6	16.5	*16.0*	*12.9*
18	23.3	...	23.3	...	23.3	...	23.3	...	22.6	...	22.1	21.9	21.7	21.6	21.4	21.1	*16.0*	*12.9*
19	23.3	...	20.9	...	19.3	...	18.1	...	17.4	...	17.0	16.8	16.8	16.7	16.6	16.5	*16.0*	*12.9*
20	23.3	...	23.3	...	23.3	...	23.3	...	22.6	...	22.1	21.9	21.7	21.6	21.4	21.1	*16.0*	*12.9*
21	23.3	...	23.3	...	23.3	...	23.3	...	22.6	...	22.1	21.9	21.7	21.6	21.4	21.1	*16.0*	*12.9*
22	23.3	...	20.9	...	19.3	...	18.1	...	17.4	...	17.0	16.8	16.8	16.7	16.6	16.5	*16.0*	*12.9*
23	19.8	...	19.8	...	19.8	...	19.8	...	19.2	...	18.8	18.6	18.4	18.4	18.2	17.9	*13.6*	*11.0*
24	19.8	...	17.8	...	16.4	...	15.4	...	14.8	...	14.5	14.3	14.3	14.2	14.1	14.0	*13.6*	*11.0*
25	19.8	...	19.8	...	19.8	...	19.8	...	19.2	...	18.8	18.6	18.4	18.4	18.2	17.9	*13.6*	*11.0*
26	19.8	...	17.8	...	16.4	...	15.4	...	14.8	...	14.5	14.3	14.3	14.2	14.1	14.0	*13.6*	*11.0*
27	23.3	...	23.3	...	23.3	...	23.3	...	22.6	...	22.1	21.9	21.7	21.6	21.4	21.1	*16.0*	*12.9*
28	23.3	...	20.9	...	19.3	...	18.1	...	17.4	...	17.0	16.8	16.8	16.7	16.6	16.5	*16.0*	*12.9*
29	24.3	...	24.3	...	24.3	...	23.8	...	23.0	...	22.1	21.8	21.4	21.2	20.9	20.7	20.6	20.1
30	28.6	...	28.6	...	28.6	...	28.0	...	27.0	...	26.0	25.6	25.2	24.9	24.6	24.4	24.2	23.7
31	24.3	...	24.3	...	24.3	...	23.8	...	23.0	...	22.1	21.8	21.4	21.2	20.9	20.7	20.6	20.1
32	28.6	...	28.6	...	28.6	...	28.0	...	27.0	...	26.0	25.6	25.2	24.9	24.6	24.4	24.2	23.7
33	28.6	...	26.9	...	25.2	...	23.8	...	22.6	...	21.4	20.8	20.2	19.6	19.1	18.5	18.0	17.5
34	28.6	...	28.6	...	28.6	...	28.0	...	27.0	...	26.0	25.6	25.2	24.9	24.6	24.4	24.2	23.7
35	28.6	...	26.9	...	25.2	...	23.8	...	22.6	...	21.4	20.8	20.2	19.6	19.1	18.5	18.0	17.5
36	28.6	...	28.6	...	28.6	...	28.0	...	27.0	...	26.0	25.6	25.2	24.9	24.6	24.4	24.2	23.7
37	28.6	...	26.9	...	25.2	...	23.8	...	22.6	...	21.4	20.8	20.2	19.6	19.1	18.5	18.0	17.5
38	28.6	...	28.6	...	28.6	...	28.0	...	27.0	...	26.0	25.6	25.2	24.9	24.6	24.4	24.2	23.7
39	28.6	...	26.9	...	25.2	...	23.8	...	22.6	...	21.4	20.8	20.2	19.6	19.1	18.5	18.0	17.5
40	28.6	...	28.6	...	28.6	...	28.0	...	27.0	...	26.0	25.6	25.2	24.9	24.6	24.4	24.2	23.7
41	24.3	...	22.9	...	21.4	...	20.2	...	19.2	...	18.2	17.7	17.2	16.7	16.2	15.7	15.3	14.9
42	24.3	...	24.3	...	24.3	...	23.8	...	23.0	...	22.1	21.8	21.4	21.2	20.9	20.7	20.6	20.1
43	28.6	...	26.9	...	25.2	...	23.8	...	22.6	...	21.4	20.8	20.2	19.6	19.1	18.5	18.0	17.5
44	28.6	...	28.6	...	28.6	...	28.0	...	27.0	...	26.0	25.6	25.2	24.9	24.6	24.4	24.2	23.7
45	24.3	...	22.9	...	21.4	...	20.2	...	19.2	...	18.2	17.7	17.2	16.7	16.2	15.7	15.3	14.9

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																
	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	1700	1750	1800
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
14	*9.4*	*7.1*	*5.6*	*4.4*	*3.5*	*2.8*	*2.2*	*1.8*	*1.4*	*1.1*	*0.85*	...	...	...	...	...	...
15	*9.4*	*7.1*	*5.6*	*4.4*	*3.5*	*2.8*	*2.2*	*1.8*	*1.4*	*1.1*	*0.85*	...	...	...	...	...	...
16	*9.4*	*7.1*	*5.6*	*4.4*	*3.5*	*2.8*	*2.2*	*1.8*	*1.4*	*1.1*	*0.85*	...	...	...	...	...	...
17	*9.4*	*7.1*	*5.6*	*4.4*	*3.5*	*2.8*	*2.2*	*1.8*	*1.4*	*1.1*	*0.85*	...	...	...	...	...	...
18	*9.4*	*7.1*	*5.6*	*4.4*	*3.5*	*2.8*	*2.2*	*1.8*	*1.4*	*1.1*	*0.85*	...	...	...	...	...	...
19	*9.4*	*7.1*	*5.6*	*4.4*	*3.5*	*2.8*	*2.2*	*1.8*	*1.4*	*1.1*	*0.85*	...	...	...	...	...	...
20	*9.4*	*7.1*	*5.6*	*4.4*	*3.5*	*2.8*	*2.2*	*1.8*	*1.4*	*1.1*	*0.85*	...	...	...	...	...	...
21	*9.4*	*7.1*	*5.6*	*4.4*	*3.5*	*2.8*	*2.2*	*1.8*	*1.4*	*1.1*	*0.85*	...	...	...	...	...	...
22	*9.4*	*7.1*	*5.6*	*4.4*	*3.5*	*2.8*	*2.2*	*1.8*	*1.4*	*1.1*	*0.85*	...	...	...	...	...	...
23	*8.0*	*6.0*	*4.8*	*3.7*	*3.0*	*2.4*	*1.9*	*1.5*	*1.2*	*0.90*	*0.70*	...	...	...	...	...	...
24	*8.0*	*6.0*	*4.8*	*3.7*	*3.0*	*2.4*	*1.9*	*1.5*	*1.2*	*0.90*	*0.70*	...	...	...	...	...	...
25	*8.0*	*6.0*	*4.8*	*3.7*	*3.0*	*2.4*	*1.9*	*1.5*	*1.2*	*0.90*	*0.70*	...	...	...	...	...	...
26	*8.0*	*6.0*	*4.8*	*3.7*	*3.0*	*2.4*	*1.9*	*1.5*	*1.2*	*0.90*	*0.70*	...	...	...	...	...	...
27	*9.4*	*7.1*	*5.6*	*4.4*	*3.5*	*2.8*	*2.2*	*1.8*	*1.4*	*1.1*	*0.85*	...	...	...	...	...	...
28	*9.4*	*7.1*	*5.6*	*4.4*	*3.5*	*2.8*	*2.2*	*1.8*	*1.4*	*1.1*	*0.85*	...	...	...	...	...	...
29	19.6	19.2	16.0	*12.4*	*9.9*	*8.0*	*6.3*	*5.0*	*4.1*	...	...	...	...	...	...	...	...
30	23.1	22.6	18.8	*14.6*	*11.6*	*9.4*	*7.4*	*5.9*	*4.8*	...	...	...	...	...	...	...	...
31	19.6	19.2	16.0	*12.4*	*9.9*	*8.0*	*6.3*	*5.0*	*4.1*	...	...	...	...	...	...	...	...
32	23.1	22.6	18.8	*14.6*	*11.6*	*9.4*	*7.4*	*5.9*	*4.8*	...	...	...	...	...	...	...	...
33	17.1	16.8	16.5	*14.6*	*11.6*	*9.4*	*7.4*	*5.9*	*4.8*	...	...	...	...	...	...	...	...
34	23.1	22.6	18.8	*14.6*	*11.6*	*9.4*	*7.4*	*5.9*	*4.8*	...	...	...	...	...	...	...	...
35	17.1	16.8	16.5	*14.6*	*11.6*	*9.4*	*7.4*	*5.9*	*4.8*	...	...	...	...	...	...	...	...
36	23.1	22.6	18.8	*14.6*	*11.6*	*9.4*	*7.4*	*5.9*	*4.8*	...	...	...	...	...	...	...	...
37	17.1	16.8	16.5	*14.6*	*11.6*	*9.4*	*7.4*	*5.9*	*4.8*	...	...	...	...	...	...	...	...
38	23.1	22.6	18.8	*14.6*	*11.6*	*9.4*	*7.4*	*5.9*	*4.8*	...	...	...	...	...	...	...	...
39	17.1	16.8	16.5	*14.6*	*11.6*	*9.4*	*7.4*	*5.9*	*4.8*	...	...	...	...	...	...	...	...
40	23.1	22.6	18.8	*14.6*	*11.6*	*9.4*	*7.4*	*5.9*	*4.8*	...	...	...	...	...	...	...	...
41	14.5	14.3	14.0	*12.4*	*9.9*	*8.0*	*6.3*	*5.0*	*4.1*	...	...	...	...	...	...	...	...
42	19.6	19.2	16.0	*12.4*	*9.9*	*8.0*	*6.3*	*5.0*	*4.1*	...	...	...	...	...	...	...	...
43	17.1	16.8	16.5	*14.6*	*11.6*	*9.4*	*7.4*	*5.9*	*4.8*	...	...	...	...	...	...	...	...
44	23.1	22.6	18.8	*14.6*	*11.6*	*9.4*	*7.4*	*5.9*	*4.8*	...	...	...	...	...	...	...	...
45	14.5	14.3	14.0	*12.4*	*9.9*	*8.0*	*6.3*	*5.0*	*4.1*	...	...	...	...	...	...	...	...

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
1	59Ni–23Cr–16Mo	Wld. tube	SB–626	...	N06059	Solution ann.
2	59Ni–23Cr–16Mo–1.6Cu	Smls. & wld. fittings	SB–366	...	N06200	Solution ann.
3	59Ni–23Cr–16Mo–1.6Cu	Forgings	SB–462	...	N06200	Solution ann.
4	59Ni–23Cr–16Mo–1.6Cu	Forgings	SB–462	...	N06200	Solution ann.
5	59Ni–23Cr–16Mo–1.6Cu	Forgings	SB–564	...	N06200	Solution ann.
6	59Ni–23Cr–16Mo–1.6Cu	Forgings	SB–564	...	N06200	Solution ann.
7	59Ni–23Cr–16Mo–1.6Cu	Rod	SB–574	...	N06200	Solution ann.
8	59Ni–23Cr–16Mo–1.6Cu	Rod	SB–574	...	N06200	Solution ann.
9	59Ni–23Cr–16Mo–1.6Cu	Plate, sheet, strip	SB–575	...	N06200	Solution ann.
10	59Ni–23Cr–16Mo–1.6Cu	Plate, sheet, strip	SB–575	...	N06200	Solution ann.
11	59Ni–23Cr–16Mo–1.6Cu	Wld. pipe	SB–619	...	N06200	Solution ann.
12	59Ni–23Cr–16Mo–1.6Cu	Wld. pipe	SB–619	...	N06200	Solution ann.
13	59Ni–23Cr–16Mo–1.6Cu	Smls. pipe & tube	SB–622	...	N06200	Solution ann.
14	59Ni–23Cr–16Mo–1.6Cu	Smls. pipe & tube	SB–622	...	N06200	Solution ann.
15	59Ni–23Cr–16Mo–1.6Cu	Wld. tube	SB–626	...	N06200	Solution ann.
16	59Ni–23Cr–16Mo–1.6Cu	Wld. tube	SB–626	...	N06200	Solution ann.
17	60Ni–19Cr–19Mo–1.8Ta	Smls. & wld. fittings	SB–366	...	N06210	Solution ann.
18	60Ni–19Cr–19Mo–1.8Ta	Forgings	SB–564	...	N06210	Solution ann.
19	60Ni–19Cr–19Mo–1.8Ta	Forgings	SB–564	...	N06210	Solution ann.
20	60Ni–19Cr–19Mo–1.8Ta	Rod	SB–574	...	N06210	Solution ann.
21	60Ni–19Cr–19Mo–1.8Ta	Rod	SB–574	...	N06210	Solution ann.
22	60Ni–19Cr–19Mo–1.8Ta	Plate, sheet, strip	SB–575	...	N06210	Solution ann.
23	60Ni–19Cr–19Mo–1.8Ta	Plate, sheet, strip	SB–575	...	N06210	Solution ann.
24	60Ni–19Cr–19Mo–1.8Ta	Wld. pipe	SB–619	...	N06210	Solution ann.
25	60Ni–19Cr–19Mo–1.8Ta	Wld. pipe	SB–619	...	N06210	Solution ann.
26	60Ni–19Cr–19Mo–1.8Ta	Smls. pipe & tube	SB–622	...	N06210	Solution ann.
27	60Ni–19Cr–19Mo–1.8Ta	Smls. pipe & tube	SB–622	...	N06210	Solution ann.
28	60Ni–19Cr–19Mo–1.8Ta	Wld. tube	SB–626	...	N06210	Solution ann.
29	60Ni–19Cr–19Mo–1.8Ta	Wld. tube	SB–626	...	N06210	Solution ann.
30	57Ni–22Cr–14W–2Mo–La	Smls. & wld. fittings	SB–366	...	N06230	Solution ann.
31	57Ni–22Cr–14W–2Mo–La	Plate, sheet, strip	SB–435	...	N06230	Solution ann.
32	57Ni–22Cr–14W–2Mo–La	Plate, sheet, strip	SB–435	...	N06230	Solution ann.
33	57Ni–22Cr–14W–2Mo–La	Forgings	SB–564	...	N06230	Solution ann.
34	57Ni–22Cr–14W–2Mo–La	Forgings	SB–564	...	N06230	Solution ann.
35	57Ni–22Cr–14W–2Mo–La	Bar	SB–572	...	N06230	Solution ann.
36	57Ni–22Cr–14W–2Mo–La	Bar	SB–572	...	N06230	Solution ann.
37	57Ni–22Cr–14W–2Mo–La	Wld. pipe	SB–619	...	N06230	Solution ann.
38	57Ni–22Cr–14W–2Mo–La	Wld. pipe	SB–619	...	N06230	Solution ann.
39	57Ni–22Cr–14W–2Mo–La	Smls. pipe & tube	SB–622	...	N06230	Solution ann.
40	57Ni–22Cr–14W–2Mo–La	Smls. pipe & tube	SB–622	...	N06230	Solution ann.
41	57Ni–22Cr–14W–2Mo–La	Wld. tube	SB–626	...	N06230	Solution ann.
42	57Ni–22Cr–14W–2Mo–La	Wld. tube	SB–626	...	N06230	Solution ann.
43	61Ni–16Mo–16Cr	Smls. & wld. fittings	SB–366	...	N06455	Annealed
44	61Ni–16Mo–16Cr	Rod	SB–574	...	N06455	Solution ann.
45	61Ni–16Mo–16Cr	Rod	SB–574	...	N06455	Solution ann.

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Size/ Thickness, in.	P-No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	...	43	100	45	NP	800	1400	650	NFN–14	G5, G14, G23, T16
2	...	43	100	45	NP	NP	800	NP	NFN–10	G5, W12
3	...	43	100	45	NP	NP	800	NP	NFN–10	...
4	...	43	100	45	NP	NP	800	NP	NFN–10	G5
5	...	43	100	45	NP	NP	800	NP	NFN–10	...
6	...	43	100	45	NP	NP	800	NP	NFN–10	G5
7	...	43	100	45	NP	NP	800	NP	NFN–10	...
8	...	43	100	45	NP	NP	800	NP	NFN–10	G5
9	...	43	100	45	NP	NP	800	NP	NFN–10	...
10	...	43	100	45	NP	NP	800	NP	NFN–10	G5
11	...	43	100	45	NP	NP	800	NP	NFN–10	G14
12	...	43	100	45	NP	NP	800	NP	NFN–10	G5, G14
13	...	43	100	45	NP	NP	800	NP	NFN–10	...
14	...	43	100	45	NP	NP	800	NP	NFN–10	G5
15	...	43	100	45	NP	NP	800	NP	NFN–10	G14
16	...	43	100	45	NP	NP	800	NP	NFN–10	G5, G14
17	...	43	100	45	NP	NP	800	NP	NFN–14	G5, W12
18	...	43	100	45	NP	NP	800	NP	NFN–14	...
19	...	43	100	45	NP	NP	800	NP	NFN–14	G5
20	...	43	100	45	NP	NP	800	NP	NFN–14	...
21	...	43	100	45	NP	NP	800	NP	NFN–14	G5
22	...	43	100	45	NP	NP	800	NP	NFN–14	...
23	...	43	100	45	NP	NP	800	NP	NFN–14	G5
24	...	43	100	45	NP	NP	800	NP	NFN–14	...
25	...	43	100	45	NP	NP	800	NP	NFN–14	G5, G14
26	...	43	100	45	NP	NP	800	NP	NFN–14	...
27	...	43	100	45	NP	NP	800	NP	NFN–14	G5
28	...	43	100	45	NP	NP	800	NP	NFN–14	...
29	...	43	100	45	NP	NP	800	NP	NFN–14	G5, G14
30	...	43	110	45	1650	NP	1800	650	NFN–24	G4, G5, T15, W12
31	...	43	110	45	1650	NP	1800	650	NFN–24	G4, T16
32	...	43	110	45	1650	NP	1800	650	NFN–24	G4, G5, T15
33	...	43	110	45	1650	NP	1800	650	NFN–24	G4, T16
34	...	43	110	45	1650	NP	1800	650	NFN–24	G4, G5, T15
35	...	43	110	45	1650	NP	1800	650	NFN–24	G4, T16
36	...	43	110	45	1650	NP	1800	650	NFN–24	G4, G5, T15
37	...	43	110	45	1650	NP	1800	650	NFN–24	G4, G14, T16
38	...	43	110	45	1650	NP	1800	650	NFN–24	G4, G5, G14, T15
39	...	43	110	45	1650	NP	1800	650	NFN–24	G4, T16
40	...	43	110	45	1650	NP	1800	650	NFN–24	G4, G5, T15
41	...	43	110	45	1650	NP	1800	650	NFN–24	G4, G14, T16
42	...	43	110	45	1650	NP	1800	650	NFN–24	G4, G5, G14, T15
43	...	43	100	40	NP	NP	800	650	NFN–14	G5, W12
44	...	43	100	40	NP	NP	800	650	NFN–14	...
45	...	43	100	40	NP	NP	800	650	NFN–14	G5

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																	
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950
1	24.3	...	24.3	...	24.3	...	23.8	...	23.0	...	22.1	21.8	21.4	21.2	20.9	20.7	20.6	20.1
2	28.6	...	28.6	...	28.6	...	27.6	...	26.8	...	26.2	26.0	25.7	25.4	25.2	...	...	...
3	28.6	...	26.9	...	24.8	...	22.9	...	21.2	...	19.9	19.4	19.1	18.8	18.7	...	...	...
4	28.6	...	28.6	...	28.6	...	27.6	...	26.8	...	26.2	26.0	25.7	25.4	25.2	...	...	...
5	28.6	...	26.9	...	24.8	...	22.9	...	21.2	...	19.9	19.4	19.1	18.8	18.7	...	...	...
6	28.6	...	28.6	...	28.6	...	27.6	...	26.8	...	26.2	26.0	25.7	25.4	25.2	...	...	...
7	28.6	...	26.9	...	24.8	...	22.9	...	21.2	...	19.9	19.4	19.1	18.8	18.7	...	...	...
8	28.6	...	28.6	...	28.6	...	27.6	...	26.8	...	26.2	26.0	25.7	25.4	25.2	...	...	...
9	28.6	...	26.9	...	24.8	...	22.9	...	21.2	...	19.9	19.4	19.1	18.8	18.7	...	...	...
10	28.6	...	28.6	...	28.6	...	27.6	...	26.8	...	26.2	26.0	25.7	25.4	25.2	...	...	...
11	24.3	...	22.9	...	21.1	...	19.4	...	18.0	...	16.9	16.5	16.2	16.0	15.9	...	...	...
12	24.3	...	24.3	...	24.3	...	23.5	...	22.8	...	22.3	22.1	21.9	21.6	21.4	...	...	...
13	28.6	...	26.9	...	24.8	...	22.9	...	21.2	...	19.9	19.4	19.1	18.8	18.7	...	...	...
14	28.6	...	28.6	...	28.6	...	27.6	...	26.8	...	26.2	26.0	25.7	25.4	25.2	...	...	...
15	24.3	...	22.9	...	21.1	...	19.4	...	18.0	...	16.9	16.5	16.2	16.0	15.9	...	...	...
16	24.3	...	24.3	...	24.3	...	23.5	...	22.8	...	22.3	22.1	21.9	21.6	21.4	...	...	...
17	28.6	...	28.6	...	28.5	...	27.6	...	26.9	...	26.3	25.5	24.8	24.1	23.6	...	...	...
18	28.6	...	26.6	...	24.5	...	22.6	...	21.0	...	19.5	18.9	18.4	17.9	17.5	...	...	...
19	28.6	...	28.6	...	28.5	...	27.6	...	26.9	...	26.3	25.5	24.8	24.1	23.6	...	...	...
20	28.6	...	26.6	...	24.5	...	22.6	...	21.0	...	19.5	18.9	18.4	17.9	17.5	...	...	...
21	28.6	...	28.6	...	28.5	...	27.6	...	26.9	...	26.3	25.5	24.8	24.1	23.6	...	...	...
22	28.6	...	26.6	...	24.5	...	22.6	...	21.0	...	19.5	18.9	18.4	17.9	17.5	...	...	...
23	28.6	...	28.6	...	28.5	...	27.6	...	26.9	...	26.3	25.5	24.8	24.1	23.6	...	...	...
24	24.3	...	22.6	...	20.8	...	19.2	...	17.8	...	16.6	16.1	15.6	15.2	14.8	...	...	...
25	24.3	...	24.3	...	24.2	...	23.5	...	22.9	...	22.4	21.7	21.1	20.5	20.0	...	...	...
26	28.6	...	26.6	...	24.5	...	22.6	...	21.0	...	19.5	18.9	18.4	17.9	17.5	...	...	...
27	28.6	...	28.6	...	28.5	...	27.6	...	26.9	...	26.3	25.5	24.8	24.1	23.6	...	...	...
28	24.3	...	22.6	...	20.8	...	19.2	...	17.8	...	16.6	16.1	15.6	15.2	14.8	...	...	...
29	24.3	...	24.3	...	24.2	...	23.5	...	22.9	...	22.4	21.7	21.1	20.5	20.0	...	...	...
30	30.0	...	30.0	...	30.0	...	30.0	...	30.0	...	29.4	29.1	28.7	28.4	28.2	28.2	28.2	28.2
31	30.0	...	28.2	...	26.4	...	24.7	...	23.1	...	22.0	21.5	21.2	21.0	20.9	20.9	20.9	20.9
32	30.0	...	30.0	...	30.0	...	30.0	...	30.0	...	29.4	29.1	28.7	28.4	28.2	28.2	28.2	28.2
33	30.0	...	28.2	...	26.4	...	24.7	...	23.1	...	22.0	21.5	21.2	21.0	20.9	20.9	20.9	20.9
34	30.0	...	30.0	...	30.0	...	30.0	...	30.0	...	29.4	29.1	28.7	28.4	28.2	28.2	28.2	28.2
35	30.0	...	28.2	...	26.4	...	24.7	...	23.1	...	22.0	21.5	21.2	21.0	20.9	20.9	20.9	20.9
36	30.0	...	30.0	...	30.0	...	30.0	...	30.0	...	29.4	29.1	28.7	28.4	28.2	28.2	28.2	28.2
37	25.5	...	24.0	...	22.4	...	21.0	...	19.6	...	18.7	18.3	18.0	17.9	17.8	17.8	17.8	17.8
38	25.5	...	25.5	...	25.5	...	25.5	...	25.5	...	25.0	24.7	24.4	24.1	24.0	24.0	24.0	24.0
39	30.0	...	28.2	...	26.4	...	24.7	...	23.1	...	22.0	21.5	21.2	21.0	20.9	20.9	20.9	20.9
40	30.0	...	30.0	...	30.0	...	30.0	...	30.0	...	29.4	29.1	28.7	28.4	28.2	28.2	28.2	28.2
41	25.5	...	24.0	...	22.4	...	21.0	...	19.6	...	18.7	18.3	18.0	17.9	17.8	17.8	17.8	17.8
42	25.5	...	25.5	...	25.5	...	25.5	...	25.5	...	25.0	24.7	24.4	24.1	24.0	24.0	24.0	24.0
43	26.7	...	26.7	...	26.7	...	26.7	...	26.7	...	26.7	...	26.5	...	25.8	...	...	...
44	26.7	...	24.6	...	23.0	...	21.7	...	20.8	...	20.1	19.9	19.6	19.4	19.1	...	...	...
45	26.7	...	26.7	...	26.7	...	26.7	...	26.7	...	26.7	26.7	26.5	26.1	25.8	...	...	...

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																
	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	1700	1750	1800
1	19.6	19.2	16.0	*12.4*	*9.9*	*8.0*	*6.3*	*5.0*	*4.1*	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
30	28.2	28.2	*23.2*	*19.0*	*15.6*	*12.9*	*10.6*	*8.5*	*6.7*	*5.3*	*4.1*	*2.9*	*2.1*	*1.5*	*1.1*	*0.70*	*0.45*
31	20.9	20.9	20.9	*19.0*	*15.6*	*12.9*	*10.6*	*8.5*	*6.7*	*5.3*	*4.1*	*2.9*	*2.1*	*1.5*	*1.1*	*0.70*	*0.45*
32	28.2	28.2	*23.2*	*19.0*	*15.6*	*12.9*	*10.6*	*8.5*	*6.7*	*5.3*	*4.1*	*2.9*	*2.1*	*1.5*	*1.1*	*0.70*	*0.45*
33	20.9	20.9	20.9	*19.0*	*15.6*	*12.9*	*10.6*	*8.5*	*6.7*	*5.3*	*4.1*	*2.9*	*2.1*	*1.5*	*1.1*	*0.70*	*0.45*
34	28.2	28.2	*23.2*	*19.0*	*15.6*	*12.9*	*10.6*	*8.5*	*6.7*	*5.3*	*4.1*	*2.9*	*2.1*	*1.5*	*1.1*	*0.70*	*0.45*
35	20.9	20.9	20.9	*19.0*	*15.6*	*12.9*	*10.6*	*8.5*	*6.7*	*5.3*	*4.1*	*2.9*	*2.1*	*1.5*	*1.1*	*0.70*	*0.45*
36	28.2	28.2	*23.2*	*19.0*	*15.6*	*12.9*	*10.6*	*8.5*	*6.7*	*5.3*	*4.1*	*2.9*	*2.1*	*1.5*	*1.1*	*0.70*	*0.45*
37	17.8	17.8	17.8	*16.2*	*13.3*	*11.0*	*9.0*	*7.2*	*5.7*	*4.5*	*3.5*	*2.5*	*1.8*	*1.3*	*0.94*	*0.60*	*0.38*
38	24.0	24.0	*19.7*	*16.2*	*13.3*	*11.0*	*9.0*	*7.2*	*5.7*	*4.5*	*3.5*	*2.5*	*1.8*	*1.3*	*0.94*	*0.60*	*0.38*
39	20.9	20.9	20.9	*19.0*	*15.6*	*12.9*	*10.6*	*8.5*	*6.7*	*5.3*	*4.1*	*2.9*	*2.1*	*1.5*	*1.1*	*0.70*	*0.45*
40	28.2	28.2	*23.2*	*19.0*	*15.6*	*12.9*	*10.6*	*8.5*	*6.7*	*5.3*	*4.1*	*2.9*	*2.1*	*1.5*	*1.1*	*0.70*	*0.45*
41	17.8	17.8	17.8	*16.2*	*13.3*	*11.0*	*9.0*	*7.2*	*5.7*	*4.5*	*3.5*	*2.5*	*1.8*	*1.3*	*0.94*	*0.60*	*0.38*
42	24.0	24.0	*19.7*	*16.2*	*13.3*	*11.0*	*9.0*	*7.2*	*5.7*	*4.5*	*3.5*	*2.5*	*1.8*	*1.3*	*0.94*	*0.60*	*0.38*
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
1	61Ni–16Mo–16Cr	Plate, sheet, strip	SB–575	...	N06455	Solution ann.
2	61Ni–16Mo–16Cr	Plate, sheet, strip	SB–575	...	N06455	Solution ann.
3	61Ni–16Mo–16Cr	Wld. pipe	SB–619	...	N06455	Solution ann.
4	61Ni–16Mo–16Cr	Wld. pipe	SB–619	...	N06455	Solution ann.
5	61Ni–16Mo–16Cr	Smls. pipe & tube	SB–622	...	N06455	Solution ann.
6	61Ni–16Mo–16Cr	Smls. pipe & tube	SB–622	...	N06455	Solution ann.
7	61Ni–16Mo–16Cr	Wld. tube	SB–626	...	N06455	Solution ann.
8	61Ni–16Mo–16Cr	Wld. tube	SB–626	...	N06455	Solution ann.
9	72Ni–15Cr–8Fe	Smls. pipe & tube	SB–167	...	N06600	Hot fin./ann.
10	72Ni–15Cr–8Fe	Smls. pipe & tube	SB–167	...	N06600	Hot fin./ann.
11	72Ni–15Cr–8Fe	Smls. & wld. fittings	SB–366	...	N06600	Annealed
12	72Ni–15Cr–8Fe	Smls. pipe & tube	SB–167	...	N06600	Cold drawn/ann.
13	72Ni–15Cr–8Fe	Smls. pipe & tube	SB–167	...	N06600	Cold drawn/ann.
14	...	...	...	...	...	...
15	72Ni–15Cr–8Fe	Smls. pipe & tube	SB–167	...	N06600	Hot fin./ann.
16	72Ni–15Cr–8Fe	Smls. pipe & tube	SB–167	...	N06600	Hot fin./ann.
17	72Ni–15Cr–8Fe	Smls. tube	SB–163	...	N06600	Annealed
18	72Ni–15Cr–8Fe	Smls. tube	SB–163	...	N06600	Annealed
19	72Ni–15Cr–8Fe	Bar	SB–166	...	N06600	Annealed
20	72Ni–15Cr–8Fe	Bar	SB–166	...	N06600	Annealed
21	72Ni–15Cr–8Fe	Plate	SB–168	...	N06600	Annealed
22	72Ni–15Cr–8Fe	Plate, sheet, strip	SB–168	...	N06600	Annealed
23	72Ni–15Cr–8Fe	Wld. tube	SB–516	...	N06600	Annealed
24	72Ni–15Cr–8Fe	Wld. tube	SB–516	...	N06600	Annealed
25	72Ni–15Cr–8Fe	Forgings	SB–564	...	N06600	...
26	72Ni–15Cr–8Fe	Forgings	SB–564	...	N06600	Annealed
27	72Ni–15Cr–8Fe	Smls. pipe & tube	SB–167	...	N06600	Cold drawn/ann.
28	72Ni–15Cr–8Fe	Smls. pipe & tube	SB–167	...	N06600	Cold drawn/ann.
29	72Ni–15Cr–8Fe	Wld. pipe	SB–517	...	N06600	Cold drawn/ann.
30	72Ni–15Cr–8Fe	Wld. pipe	SB–517	...	N06600	Cold drawn/ann.
31	72Ni–15Cr–8Fe	Bar, rod	SB–166	...	N06600	Hot fin.
32	72Ni–15Cr–8Fe	Bar, rod	SB–166	...	N06600	Hot fin.
33	72Ni–15Cr–8Fe	Plate, sheet, strip	SB–168	...	N06600	Hot rolled
34	72Ni–15Cr–8Fe	Plate, sheet, strip	SB–168	...	N06600	Hot rolled
35	60Ni–23Cr–Fe	Smls. tube	SB–163	...	N06601	Annealed
36	60Ni–23Cr–Fe	Smls. tube	SB–163	...	N06601	Annealed
37	60Ni–23Cr–Fe	Bar	SB–166	...	N06601	Annealed
38	60Ni–23Cr–Fe	Bar	SB–166	...	N06601	Annealed
39	60Ni–23Cr–Fe	Smls. pipe & tube	SB–167	...	N06601	Annealed
40	60Ni–23Cr–Fe	Smls. pipe & tube	SB–167	...	N06601	Annealed
41	60Ni–23Cr–Fe	Plate, sheet, strip	SB–168	...	N06601	Annealed
42	60Ni–23Cr–Fe	Plate, sheet, strip	SB–168	...	N06601	Annealed
43	52Ni–22Cr–13Co–9Mo	Bar, rod	SB–166	...	N06617	Annealed
44	52Ni–22Cr–13Co–9Mo	Bar, rod	SB–166	...	N06617	Annealed
45	52Ni–22Cr–13Co–9Mo	Smls. pipe & tube	SB–167	...	N06617	Annealed

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Size/ Thickness, in.	P-No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	...	43	100	40	NP	NP	800	650	NFN–14	...
2	...	43	100	40	NP	NP	800	650	NFN–14	G5
3	...	43	100	40	NP	NP	800	650	NFN–14	G14
4	...	43	100	40	NP	NP	800	650	NFN–14	G5, G14
5	...	43	100	40	NP	NP	800	650	NFN–14	...
6	...	43	100	40	NP	NP	800	650	NFN–14	G5
7	...	43	100	40	NP	NP	800	650	NFN–14	G14
8	...	43	100	40	NP	NP	800	650	NFN–14	G5, G14
9	>5	43	75	25	NP	800	1200	650	NFN–4	T12
10	>5	43	75	25	NP	800	1200	650	NFN–4	G5, T11
11	...	43	80	30	NP	NP	1200	650	NFN–4	G5, T11, W12
12	>5	43	80	30	NP	800 (Cl. 3 only)	1200	650	NFN–4	T12
13	>5	43	80	30	NP	800 (Cl. 3 only)	1200	650	NFN–4	G5, T11
14	...	...	...	...	...	...	...	...	...	...
15	≤5	43	80	30	NP	800	1200	650	NFN–4	G5, T11
16	≤5	43	80	30	NP	NP	1200	650	NFN–4	T12
17	≤3	43	80	35	1200	800	1200	650	NFN–4	G5, T11
18	≤3	43	80	35	1200	NP	1200	650	NFN–4	T11
19	...	43	80	35	1200	800	1200	650	NFN–4	G5, T11
20	...	43	80	35	1200	NP	1200	650	NFN–4	T11
21	...	43	80	35	1200	800	1200	650	NFN–4	G5, T11
22	...	43	80	35	1200	NP	1200	650	NFN–4	T11
23	...	43	80	35	NP	NP	1200	650	NFN–4	G14, T11
24	...	43	80	35	NP	NP	1200	650	NFN–4	G5, G14, T11
25	...	43	80	35	NP	800	NP	NP	NFN–4	G5
26	...	43	80	35	NP	NP	1200	650	NFN–4	T11
27	≤5	43	80	35	1200	800 (Cl. 3 only)	1200	650	NFN–4	T11
28	≤5	43	80	35	1200	800	1200	650	NFN–4	G5, T11
29	...	43	80	35	NP	NP	1200	650	NFN–4	G14, T11
30	...	43	80	35	NP	NP	1200	650	NFN–4	G5, G14, T11
31	...	43	85	35	1200	800 (Cl. 3 only)	1200	650	NFN–4	T13
32	...	43	85	35	1200	800 (Cl. 3 only)	1200	650	NFN–4	G5, T12
33	...	43	85	35	1200	800 (Cl. 3 only)	1200	650	NFN–4	G20, T13
34	...	43	85	35	1200	800 (Cl. 3 only)	1200	650	NFN–4	G5, G20, T12
35	≤3 O.D.	43	80	30	1650	NP	1650	NP	NFN–4	G4, T14
36	≤3 O.D.	43	80	30	1650	NP	1650	NP	NFN–4	G4, G5, T13
37	...	43	80	30	1650	NP	1650	NP	NFN–4	G4, T14
38	...	43	80	30	1650	NP	1650	NP	NFN–4	G4, G5, T13
39	...	43	80	30	1650	NP	1650	NP	NFN–4	G4, T14
40	...	43	80	30	1650	NP	1650	NP	NFN–4	G4, G5, T13
41	...	43	80	30	1650	NP	1650	NP	NFN–4	G4, T14
42	...	43	80	30	1650	NP	1650	NP	NFN–4	G4, G5, T13
43	...	43	95	35	1650	NP	1800	NP	NFN–4	G4, T18
44	...	43	95	35	1650	NP	1800	NP	NFN–4	G4, G5, T17
45	...	43	95	35	1650	NP	1800	NP	NFN–4	G4, T18

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																	
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950
1	26.7	...	24.6	...	23.0	...	21.7	...	20.8	...	20.1	19.9	19.6	19.4	19.1	...	...	...
2	26.7	...	26.7	...	26.7	...	26.7	...	26.7	...	26.7	26.7	26.5	26.1	25.8	...	...	...
3	22.7	...	20.9	...	19.5	...	18.5	...	17.7	...	17.1	16.9	16.7	16.5	16.2	...	...	...
4	22.7	...	22.7	...	22.7	...	22.7	...	22.7	...	22.7	22.7	22.5	22.2	21.9	...	...	...
5	26.7	...	24.6	...	23.0	...	21.7	...	20.8	...	20.1	19.9	19.6	19.4	19.1	...	...	...
6	26.7	...	26.7	...	26.7	...	26.7	...	26.7	...	26.7	26.7	26.5	26.1	25.8	...	...	...
7	22.7	...	20.9	...	19.5	...	18.5	...	17.7	...	17.1	16.9	16.7	16.5	16.2	...	...	...
8	22.7	...	22.7	...	22.7	...	22.7	...	22.7	...	22.7	22.7	22.5	22.2	21.9	...	...	...
9	16.7	...	15.9	...	15.2	...	14.6	...	14.0	...	13.5	13.3	13.1	12.9	12.7	12.5	12.4	*10.6*
10	16.7	...	16.7	...	16.7	...	16.7	...	16.7	...	16.7	16.7	16.7	16.7	16.7	16.7	*16.0*	*10.6*
11	20.0	...	20.0	...	20.0	...	20.0	...	20.0	...	20.0	20.0	20.0	20.0	20.0	20.0	*16.0*	*10.6*
12	20.0	...	19.1	...	18.3	...	17.5	...	16.8	...	16.2	15.9	15.7	15.5	15.2	15.1	14.9	*10.6*
13	20.0	...	20.0	...	20.0	...	20.0	...	20.0	...	20.0	20.0	20.0	20.0	20.0	20.0	*16.0*	*10.6*
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
15	20.0	...	20.0	...	20.0	...	20.0	...	20.0	...	20.0	20.0	20.0	20.0	20.0	20.0	*16.0*	*10.6*
16	20.0	...	19.1	...	18.3	...	17.5	...	16.8	...	16.2	15.9	15.7	15.5	15.2	15.1	14.9	*10.6*
17	22.9	...	22.9	...	22.9	...	22.9	...	22.9	...	22.9	22.9	22.9	22.9	22.9	22.4	*16.0*	*10.6*
18	22.9	...	21.3	...	20.8	...	20.5	...	20.2	...	19.9	19.8	19.6	19.4	19.1	18.7	*16.0*	*10.6*
19	22.9	...	22.9	...	22.9	...	22.9	...	22.9	...	22.9	22.9	22.9	22.9	22.9	22.4	*16.0*	*10.6*
20	22.9	...	21.3	...	20.8	...	20.5	...	20.2	...	19.9	19.8	19.6	19.4	19.1	18.7	*16.0*	*10.6*
21	22.9	...	22.9	...	22.9	...	22.9	...	22.9	...	22.9	22.9	22.9	22.9	22.9	22.4	*16.0*	*10.6*
22	22.9	...	21.3	...	20.8	...	20.5	...	20.2	...	19.9	19.8	19.6	19.4	19.1	18.7	*16.0*	*10.6*
23	19.4	...	18.1	...	17.7	...	17.4	...	17.2	...	16.9	16.8	16.7	16.5	16.2	15.9	*13.6*	*9.0*
24	19.4	...	19.4	...	19.4	...	19.4	...	19.4	...	19.4	19.4	19.4	19.4	19.4	19.0	*13.6*	*9.0*
25	22.9	...	22.9	...	22.9	...	22.9	...	22.9	...	22.9	22.9	22.9	22.9	22.9	...	...	...
26	22.9	...	21.3	...	20.8	...	20.5	...	20.2	...	19.9	19.8	19.6	19.4	19.1	18.7	*16.0*	*10.6*
27	22.9	...	21.3	...	20.8	...	20.5	...	20.2	...	19.9	19.8	19.6	19.4	19.1	18.7	*16.0*	*10.6*
28	22.9	...	22.9	...	22.9	...	22.9	...	22.9	...	22.9	22.9	22.9	22.9	22.9	22.4	*16.0*	*10.6*
29	19.4	...	18.1	...	17.7	...	17.4	...	17.2	...	16.9	16.8	16.7	16.5	16.2	15.9	*13.6*	*9.0*
30	19.4	...	19.4	...	19.4	...	19.4	...	19.4	...	19.4	19.4	19.4	19.4	19.4	19.0	*13.6*	*9.0*
31	23.3	...	22.1	...	21.5	...	21.3	...	21.3	...	21.2	21.1	21.0	20.8	20.5	20.1	19.7	19.3
32	23.3	...	23.3	...	23.3	...	23.3	...	23.3	...	23.3	23.3	23.3	23.3	23.3	23.3	23.3	*20.4*
33	23.3	...	22.1	...	21.5	...	21.3	...	21.3	...	21.2	21.1	21.0	20.8	20.5	20.1	19.7	19.3
34	23.3	...	23.3	...	23.3	...	23.3	...	23.3	...	23.3	23.3	23.3	23.3	23.3	23.3	23.3	*20.4*
35	20.0	...	17.8	...	16.6	...	15.5	...	14.7	...	14.2	14.0	13.9	13.8	13.8	13.8	13.8	13.7
36	20.0	...	20.0	...	20.0	...	20.0	...	19.9	...	19.2	19.0	18.8	18.7	18.6	18.6	18.6	18.6
37	20.0	...	17.8	...	16.6	...	15.5	...	14.7	...	14.2	14.0	13.9	13.8	13.8	13.8	13.8	13.7
38	20.0	...	20.0	...	20.0	...	20.0	...	19.9	...	19.2	19.0	18.8	18.7	18.6	18.6	18.6	18.6
39	20.0	...	17.8	...	16.6	...	15.5	...	14.7	...	14.2	14.0	13.9	13.8	13.8	13.8	13.8	13.7
40	20.0	...	20.0	...	20.0	...	20.0	...	19.9	...	19.2	19.0	18.8	18.7	18.6	18.6	18.6	18.6
41	20.0	...	17.8	...	16.6	...	15.5	...	14.7	...	14.2	14.0	13.9	13.8	13.8	13.8	13.8	13.7
42	20.0	...	20.0	...	20.0	...	20.0	...	19.9	...	19.2	19.0	18.8	18.7	18.6	18.6	18.6	18.6
43	23.3	...	20.8	...	19.2	...	18.1	...	17.2	...	16.6	16.4	16.2	16.0	15.9	15.8	15.7	15.6
44	23.3	...	23.3	...	23.3	...	23.3	...	23.3	...	22.5	22.1	21.9	21.7	21.5	21.3	21.2	21.0
45	23.3	...	20.8	...	19.2	...	18.1	...	17.2	...	16.6	16.4	16.2	16.0	15.9	15.8	15.7	15.6

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																
	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	1700	1750	1800
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
9	*7.0*	*4.5*	*3.0*	*2.2*	*2.0*	...	...	...	...	...	...	...	...	...	...	...	...
10	*7.0*	*4.5*	*3.0*	*2.2*	*2.0*	...	...	...	...	...	...	...	...	...	...	...	...
11	*7.0*	*4.5*	*3.0*	*2.2*	*2.0*	...	...	...	...	...	...	...	...	...	...	...	...
12	*7.0*	*4.5*	*3.0*	*2.2*	*2.0*	...	...	...	...	...	...	...	...	...	...	...	...
13	*7.0*	*4.5*	*3.0*	*2.2*	*2.0*	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
15	*7.0*	*4.5*	*3.0*	*2.2*	*2.0*	...	...	...	...	...	...	...	...	...	...	...	...
16	*7.0*	*4.5*	*3.0*	*2.2*	*2.0*	...	...	...	...	...	...	...	...	...	...	...	...
17	*7.0*	*4.5*	*3.0*	*2.2*	*2.0*	...	...	...	...	...	...	...	...	...	...	...	...
18	*7.0*	*4.5*	*3.0*	*2.2*	*2.0*	...	...	...	...	...	...	...	...	...	...	...	...
19	*7.0*	*4.5*	*3.0*	*2.2*	*2.0*	...	...	...	...	...	...	...	...	...	...	...	...
20	*7.0*	*4.5*	*3.0*	*2.2*	*2.0*	...	...	...	...	...	...	...	...	...	...	...	...
21	*7.0*	*4.5*	*3.0*	*2.2*	*2.0*	...	...	...	...	...	...	...	...	...	...	...	...
22	*7.0*	*4.5*	*3.0*	*2.2*	*2.0*	...	...	...	...	...	...	...	...	...	...	...	...
23	*6.0*	*3.8*	*2.6*	*1.9*	*1.7*	...	...	...	...	...	...	...	...	...	...	...	...
24	*6.0*	*3.8*	*2.6*	*1.9*	*1.7*	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
26	*7.0*	*4.5*	*3.0*	*2.2*	*2.0*	...	...	...	...	...	...	...	...	...	...	...	...
27	*7.0*	*4.5*	*3.0*	*2.2*	*2.0*	...	...	...	...	...	...	...	...	...	...	...	...
28	*7.0*	*4.5*	*3.0*	*2.2*	*2.0*	...	...	...	...	...	...	...	...	...	...	...	...
29	*6.0*	*3.8*	*2.6*	*1.9*	*1.7*	...	...	...	...	...	...	...	...	...	...	...	...
30	*6.0*	*3.8*	*2.6*	*1.9*	*1.7*	...	...	...	...	...	...	...	...	...	...	...	...
31	*14.5*	*10.3*	*7.2*	*5.8*	*5.5*	...	...	...	...	...	...	...	...	...	...	...	...
32	*14.5*	*10.3*	*7.2*	*5.8*	*5.5*	...	...	...	...	...	...	...	...	...	...	...	...
33	*14.5*	*10.3*	*7.2*	*5.8*	*5.5*	...	...	...	...	...	...	...	...	...	...	...	...
34	*14.5*	*10.3*	*7.2*	*5.8*	*5.5*	...	...	...	...	...	...	...	...	...	...	...	...
35	13.7	*13.6*	*10.4*	*8.0*	*6.1*	*4.6*	*3.6*	*2.8*	*2.1*	*1.7*	*1.3*	*1.1*	*0.87*	*0.71*	...	...	...
36	*17.6*	*13.6*	*10.4*	*8.0*	*6.1*	*4.6*	*3.6*	*2.8*	*2.1*	*1.7*	*1.3*	*1.1*	*0.87*	*0.71*	...	...	...
37	13.7	*13.6*	*10.4*	*8.0*	*6.1*	*4.6*	*3.6*	*2.8*	*2.1*	*1.7*	*1.3*	*1.1*	*0.87*	*0.71*	...	...	...
38	*17.6*	*13.6*	*10.4*	*8.0*	*6.1*	*4.6*	*3.6*	*2.8*	*2.1*	*1.7*	*1.3*	*1.1*	*0.87*	*0.71*	...	...	...
39	13.7	*13.6*	*10.4*	*8.0*	*6.1*	*4.6*	*3.6*	*2.8*	*2.1*	*1.7*	*1.3*	*1.1*	*0.87*	*0.71*	...	...	...
40	*17.6*	*13.6*	*10.4*	*8.0*	*6.1*	*4.6*	*3.6*	*2.8*	*2.1*	*1.7*	*1.3*	*1.1*	*0.87*	*0.71*	...	...	...
41	13.7	*13.6*	*10.4*	*8.0*	*6.1*	*4.6*	*3.6*	*2.8*	*2.1*	*1.7*	*1.3*	*1.1*	*0.87*	*0.71*	...	...	...
42	*17.6*	*13.6*	*10.4*	*8.0*	*6.1*	*4.6*	*3.6*	*2.8*	*2.1*	*1.7*	*1.3*	*1.1*	*0.87*	*0.71*	...	...	...
43	15.5	15.4	15.4	15.3	15.3	*14.5*	*11.2*	*8.7*	*6.6*	*5.1*	*3.9*	*3.0*	*2.3*	*1.8*	*1.4*	*1.1*	*0.73*
44	20.9	20.9	20.8	20.7	*18.1*	*14.5*	*11.2*	*8.7*	*6.6*	*5.1*	*3.9*	*3.0*	*2.3*	*1.8*	*1.4*	*1.1*	*0.73*
45	15.5	15.4	15.4	15.3	15.3	*14.5*	*11.2*	*8.7*	*6.6*	*5.1*	*3.9*	*3.0*	*2.3*	*1.8*	*1.4*	*1.1*	*0.73*

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
	1	52Ni–22Cr–13Co–9Mo	Smls. pipe & tube	SB–167	...	N06617	Annealed
	2	52Ni–22Cr–13Co–9Mo	Plate, sheet, strip	SB–168	...	N06617	Annealed
	3	52Ni–22Cr–13Co–9Mo	Plate, sheet, strip	SB–168	...	N06617	Annealed
	4	52Ni–22Cr–13Co–9Mo	Forgings	SB–564	...	N06617	Annealed
	5	52Ni–22Cr–13Co–9Mo	Forgings	SB–564	...	N06617	Annealed
(**21**)	6	60Ni–22Cr–9Mo–3.5Cb	Plate, sheet, strip, bar	SB–443	2	N06625	Cold rolled/solution ann.
(**21**)	7	60Ni–22Cr–9Mo–3.5Cb	Plate, sheet	SB–443	2	N06625	Hot rolled/solution ann.
	8	60Ni–22Cr–9Mo–3.5Cb	Smls. pipe & tube	SB–444	2	N06625	Solution ann.
	9	60Ni–22Cr–9Mo–3.5Cb	Smls. pipe & tube	SB–444	2	N06625	Solution ann.
	10	60Ni–22Cr–9Mo–3.5Cb	Bar	SB–446	2	N06625	Solution ann.
	11	60Ni–22Cr–9Mo–3.5Cb	Bar	SB–446	2	N06625	Solution ann.
	12	60Ni–22Cr–9Mo–3.5Cb	Smls. & wld. fittings	SB–366	...	N06625	Annealed
	13	60Ni–22Cr–9Mo–3.5Cb	Bar	SB–446	1	N06625	Annealed
	14	60Ni–22Cr–9Mo–3.5Cb	Forgings	SB–564	...	N06625	Annealed
(**21**)	15	60Ni–22Cr–9Mo–3.5Cb	Plate	SB–443	1	N06625	Cold rolled/ann.
(**21**)	16	60Ni–22Cr–9Mo–3.5Cb	Plate, sheet	SB–443	1	N06625	Hot rolled/ann.
(**21**)	17	60Ni–22Cr–9Mo–3.5Cb	Sheet, strip	SB–443	1	N06625	Cold rolled/ann.
(**21**)	18	60Ni–22Cr–9Mo–3.5Cb	Smls. pipe	SB–444	1	N06625	Annealed
	19	60Ni–22Cr–9Mo–3.5Cb	Bar	SB–446	1	N06625	Annealed
	20	60Ni–22Cr–9Mo–3.5Cb	Forgings	SB–564	...	N06625	Annealed
(**21**)	21	60Ni–22Cr–9Mo–3.5Cb	Wld. tube	SB–704	...	N06625	Annealed
(**21**)	22	60Ni–22Cr–9Mo–3.5Cb	Wld. pipe	SB–705	1	N06625	Annealed
	23	Ni–Cr–Mo–W	Forged fittings	SB–462	...	N06686	Solution ann.
	24	Ni–Cr–Mo–W	Forged fittings	SB–462	...	N06686	Solution ann.
	25	Ni–Cr–Mo–W	Forgings	SB–564	...	N06686	Solution ann.
	26	Ni–Cr–Mo–W	Forgings	SB–564	...	N06686	Solution ann.
	27	Ni–Cr–Mo–W	Rod	SB–574	...	N06686	Solution ann.
	28	Ni–Cr–Mo–W	Rod	SB–574	...	N06686	Solution ann.
	29	Ni–Cr–Mo–W	Plate, sheet, strip	SB–575	...	N06686	Solution ann.
	30	Ni–Cr–Mo–W	Plate, sheet, strip	SB–575	...	N06686	Solution ann.
	31	Ni–Cr–Mo–W	Wld. pipe	SB–619	...	N06686	Solution ann.
	32	Ni–Cr–Mo–W	Wld. pipe	SB–619	...	N06686	Solution ann.
	33	Ni–Cr–Mo–W	Smls. pipe & tube	SB–622	...	N06686	Solution ann.
	34	Ni–Cr–Mo–W	Smls. pipe & tube	SB–622	...	N06686	Solution ann.
	35	Ni–Cr–Mo–W	Wld. tube	SB–626	...	N06686	Solution ann.
	36	Ni–Cr–Mo–W	Wld. tube	SB–626	...	N06686	Solution ann.
	37	58Ni–29Cr–9Fe	Bar, rod	SB–166	...	N06690	Annealed
	38	58Ni–29Cr–9Fe	Bar, rod	SB–166	...	N06690	Annealed
	39	58Ni–29Cr–9Fe	Plate, sheet, strip	SB–168	...	N06690	Annealed
	40	58Ni–29Cr–9Fe	Plate, sheet, strip	SB–168	...	N06690	Annealed
	41	58Ni–29Cr–9Fe	Smls. pipe & tube	SB–167	...	N06690	Cold drawn/ann.
	42	58Ni–29Cr–9Fe	Smls. pipe & tube	SB–167	...	N06690	Cold drawn/ann.
	43	49Ni–25Cr–18Fe–6Mo	Plate, sheet, strip	SB–582	...	N06975	Solution ann.
	44	49Ni–25Cr–18Fe–6Mo	Plate, sheet, strip	SB–582	...	N06975	Solution ann.
	45	49Ni–25Cr–18Fe–6Mo	Wld. pipe	SB–619	...	N06975	Solution ann.

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Size/ Thickness, in.	P-No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	...	43	95	35	1650	NP	1800	NP	NFN–4	G4, G5, T17
2	...	43	95	35	1650	NP	1800	NP	NFN–4	G4, T18
3	...	43	95	35	1650	NP	1800	NP	NFN–4	G4, G5, T17
4	...	43	95	35	1650	NP	1800	NP	NFN–4	G4, T18
5	...	43	95	35	1650	NP	1800	NP	NFN–4	G4, G5, T17
6	...	43	100	40	1100	NP	1600	650	NFN–22	G4, G5, G23, T17, W13
7	...	43	100	40	1100	NP	1600	650	NFN–22	G4, G23, T18, W13
8	...	43	100	40	1100	NP	1600	650	NFN–22	G4, G5, G23, T17, W13
9	...	43	100	40	1100	NP	1600	650	NFN–22	G4, G23, T18, W13
10	...	43	100	40	1100	NP	1600	650	NFN–22	G4, G5, G23, T17, W13
11	...	43	100	40	1100	NP	1600	650	NFN–22	G4, G23, T18, W13
12	...	43	110	50	1100	NP	1200	650	NFN–17	G23, T16, W12
13	$4 < t \le 10$	43	110	50	1100	800	1200	650	NFN–17	G23, T16
14	$4 < t \le 10$	43	110	50	1100	800	1200	650	NFN–17	G23, T16
15	≤0.375	43	110	55	1100	800	1200	650	NFN–17	G23, T16
16	≤2.75	43	110	55	1100	800	1200	650	NFN–17	G23, T16
17	...	43	120	60	1100	NP	1200	650	NFN–17	G22, G23, T16
18	...	43	120	60	1100	800	1200	650	NFN–17	G22, G23, T16
19	≤4	43	120	60	1100	800	1200	650	NFN–17	G22, G23, T16
20	≤4	43	120	60	1100	800	1200	650	NFN–17	G22, G23, T16
21	...	43	120	60	1100	800	1200	650	NFN–17	G14, G22, G23, T16
22	...	43	120	60	1100	NP	1200	650	NFN–17	G14, G22, G23, T16
23	≤3½	43	100	45	NP	NP	800	NP	NFN–10	G5
24	≤3½	43	100	45	NP	NP	800	NP	NFN–10	...
25	...	43	100	45	NP	NP	800	NP	NFN–10	G5
26	...	43	100	45	NP	NP	800	NP	NFN–10	...
27	≤3½	43	100	45	NP	NP	800	NP	NFN–10	G5
28	≤3½	43	100	45	NP	NP	800	NP	NFN–10	...
29	...	43	100	45	NP	NP	800	NP	NFN–10	G5
30	...	43	100	45	NP	NP	800	NP	NFN–10	...
31	≤8	43	100	45	NP	NP	800	NP	NFN–10	G5, G14
32	≤8	43	100	45	NP	NP	800	NP	NFN–10	G14
33	...	43	100	45	NP	NP	800	NP	NFN–10	G5
34	...	43	100	45	NP	NP	800	NP	NFN–10	...
35	≤3½	43	100	45	NP	NP	800	NP	NFN–10	G5, G14
36	≤3½	43	100	45	NP	NP	800	NP	NFN–10	G14
37	...	43	85	35	NP	NP	850	650	NFN–4	...
38	...	43	85	35	NP	NP	850	650	NFN–4	G5
39	...	43	85	35	NP	NP	850	650	NFN–4	...
40	...	43	85	35	NP	NP	850	650	NFN–4	G5
41	...	43	85	35	1200	NP	850	650	NFN–4	H3, T12
42	...	43	85	35	1200	NP	850	650	NFN–4	G5, H3, T12
43	...	45	85	32	NP	NP	800	650	NFN–11	...
44	...	45	85	32	NP	NP	800	650	NFN–11	G5
45	...	45	85	32	NP	NP	800	650	NFN–11	G14

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																	
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950
1	23.3	...	23.3	...	23.3	...	23.3	...	23.3	...	22.5	22.1	21.9	21.7	21.5	21.3	21.2	21.0
2	23.3	...	20.8	...	19.2	...	18.1	...	17.2	...	16.6	16.4	16.2	16.0	15.9	15.8	15.7	15.6
3	23.3	...	23.3	...	23.3	...	23.3	...	23.3	...	22.5	22.1	21.9	21.7	21.5	21.3	21.2	21.0
4	23.3	...	20.8	...	19.2	...	18.1	...	17.2	...	16.6	16.4	16.2	16.0	15.9	15.8	15.7	15.6
5	23.3	...	23.3	...	23.3	...	23.3	...	23.3	...	22.5	22.1	21.9	21.7	21.5	21.3	21.2	21.0
6	26.7	...	26.7	...	26.7	...	26.7	...	26.7	...	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.6
7	26.7	...	24.6	...	23.4	...	22.4	...	21.7	...	21.0	20.8	20.5	20.3	20.1	20.0	19.8	19.7
8	26.7	...	26.7	...	26.7	...	26.7	...	26.7	...	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.6
9	26.7	...	24.6	...	23.4	...	22.4	...	21.7	...	21.0	20.8	20.5	20.3	20.1	20.0	19.8	19.7
10	26.7	...	26.7	...	26.7	...	26.7	...	26.7	...	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.6
11	26.7	...	24.6	...	23.4	...	22.4	...	21.7	...	21.0	20.8	20.5	20.3	20.1	20.0	19.8	19.7
12	31.4	...	31.4	...	31.4	...	30.8	...	30.2	...	29.7	29.4	29.1	28.9	28.6	28.3	28.0	27.7
13	31.4	...	31.4	...	31.4	...	30.8	...	30.2	...	29.7	29.4	29.1	28.9	28.6	28.3	28.0	27.7
14	31.4	...	31.4	...	31.4	...	30.8	...	30.2	...	29.7	29.4	29.1	28.9	28.6	28.3	28.0	27.7
15	31.4	...	31.4	...	31.4	...	30.8	...	30.2	...	29.7	29.4	29.1	28.9	28.6	28.3	28.0	27.7
16	31.4	...	31.4	...	31.4	...	30.8	...	30.2	...	29.7	29.4	29.1	28.9	28.6	28.3	28.0	27.7
17	34.3	...	34.3	...	34.3	...	33.6	...	32.9	...	32.4	32.1	31.8	31.5	31.2	30.9	30.6	30.3
18	34.3	...	34.3	...	34.3	...	33.6	...	32.9	...	32.4	32.1	31.8	31.5	31.2	30.9	30.6	30.3
19	34.3	...	34.3	...	34.3	...	33.6	...	32.9	...	32.4	32.1	31.8	31.5	31.2	30.9	30.6	30.3
20	34.3	...	34.3	...	34.3	...	33.6	...	32.9	...	32.4	32.1	31.8	31.5	31.2	30.9	30.6	30.3
21	29.1	...	29.1	...	29.1	...	28.5	...	28.0	...	27.5	27.3	27.0	26.8	26.5	26.3	26.0	25.7
22	29.1	...	29.1	...	29.1	...	28.5	...	28.0	...	27.5	27.3	27.0	26.8	26.5	26.3	26.0	25.7
23	28.6	...	28.6	...	28.2	...	27.2	...	26.5	...	25.9	25.7	25.4	25.2	24.9	...	...	...
24	28.6	...	24.9	...	23.4	...	22.5	...	21.6	...	20.8	20.4	20.1	19.9	19.9	...	...	...
25	28.6	...	28.6	...	28.2	...	27.2	...	26.5	...	25.9	25.7	25.4	25.2	24.9	...	...	...
26	28.6	...	24.9	...	23.4	...	22.5	...	21.6	...	20.8	20.4	20.1	19.9	19.9	...	...	...
27	28.6	...	28.6	...	28.2	...	27.2	...	26.5	...	25.9	25.7	25.4	25.2	24.9	...	...	...
28	28.6	...	24.9	...	23.4	...	22.5	...	21.6	...	20.8	20.4	20.1	19.9	19.9	...	...	...
29	28.6	...	28.6	...	28.2	...	27.2	...	26.5	...	25.9	25.7	25.4	25.2	24.9	...	...	...
30	28.6	...	24.9	...	23.4	...	22.5	...	21.6	...	20.8	20.4	20.1	19.9	19.9	...	...	...
31	24.3	...	24.3	...	24.0	...	23.1	...	22.5	...	22.0	21.8	21.6	21.4	21.2	...	...	...
32	24.3	...	21.2	...	19.9	...	19.1	...	18.4	...	17.7	17.3	17.1	16.9	16.9	...	...	...
33	28.6	...	28.6	...	28.2	...	27.2	...	26.5	...	25.9	25.7	25.4	25.2	24.9	...	...	...
34	28.6	...	24.9	...	23.4	...	22.5	...	21.6	...	20.8	20.4	20.1	19.9	19.9	...	...	...
35	24.3	...	24.3	...	24.0	...	23.1	...	22.5	...	22.0	21.8	21.6	21.4	21.2	...	...	...
36	24.3	...	21.2	...	19.9	...	19.1	...	18.4	...	17.7	17.3	17.1	16.9	16.9	...	...	...
37	23.3	...	21.1	...	19.9	...	19.1	...	18.6	...	18.4	18.4	18.4	18.4	18.4	18.4	...	...
38	23.3	...	23.3	...	23.3	...	23.3	...	23.1	...	22.9	22.9	22.8	22.7	22.6	22.5	...	...
39	23.3	...	21.1	...	19.9	...	19.1	...	18.6	...	18.4	18.4	18.4	18.4	18.4	18.4	...	...
40	23.3	...	23.3	...	23.3	...	23.3	...	23.1	...	22.9	22.9	22.8	22.7	22.6	22.5	...	...
41	23.3	...	21.1	...	19.9	...	19.1	...	18.6	...	18.4	18.4	18.4	18.4	18.4	18.4	18.3	*16.5*
42	23.3	...	23.3	...	23.3	...	23.3	...	23.1	...	22.9	22.9	22.8	22.7	22.6	22.5	22.2	*16.5*
43	21.3	...	19.5	...	18.5	...	17.5	...	16.5	...	15.6	15.3	15.0	14.8	14.7	...	...	...
44	21.3	...	21.3	...	21.3	...	21.3	...	21.3	...	21.1	20.6	20.2	20.0	19.8	...	...	...
45	18.1	...	16.6	...	15.7	...	14.9	...	14.0	...	13.3	13.0	12.7	12.6	12.5	...	...	...

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																	
	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	1700	1750	1800	
1	20.9	20.9	20.8	20.7	*18.1*	*14.5*	*11.2*	*8.7*	*6.6*	*5.1*	*3.9*	*3.0*	*2.3*	*1.8*	*1.4*	*1.1*	*0.73*	
2	15.5	15.4	15.4	15.3	15.3	*14.5*	*11.2*	*8.7*	*6.6*	*5.1*	*3.9*	*3.0*	*2.3*	*1.8*	*1.4*	*1.1*	*0.73*	
3	20.9	20.9	20.8	20.7	*18.1*	*14.5*	*11.2*	*8.7*	*6.6*	*5.1*	*3.9*	*3.0*	*2.3*	*1.8*	*1.4*	*1.1*	*0.73*	
4	15.5	15.4	15.4	15.3	15.3	*14.5*	*11.2*	*8.7*	*6.6*	*5.1*	*3.9*	*3.0*	*2.3*	*1.8*	*1.4*	*1.1*	*0.73*	
5	20.9	20.9	20.8	20.7	*18.1*	*14.5*	*11.2*	*8.7*	*6.6*	*5.1*	*3.9*	*3.0*	*2.3*	*1.8*	*1.4*	*1.1*	*0.73*	
6	26.4	26.3	26.2	26.1	*20.0*	*15.0*	*11.6*	*8.5*	*6.7*	*4.9*	*3.8*	*2.6*	*1.9*	...	...	...	...	(**21**)
7	19.6	19.5	19.4	19.3	19.3	*15.0*	*11.6*	*8.5*	*6.7*	*4.9*	*3.8*	*2.6*	*1.9*	...	...	...	...	(**21**)
8	26.4	26.3	26.2	26.1	*20.0*	*15.0*	*11.6*	*8.5*	*6.7*	*4.9*	*3.8*	*2.6*	*1.9*	...	...	...	...	
9	19.6	19.5	19.4	19.3	19.3	*15.0*	*11.6*	*8.5*	*6.7*	*4.9*	*3.8*	*2.6*	*1.9*	...	...	...	...	
10	26.4	26.3	26.2	26.1	*20.0*	*15.0*	*11.6*	*8.5*	*6.7*	*4.9*	*3.8*	*2.6*	*1.9*	...	...	...	...	
11	19.6	19.5	19.4	19.3	19.3	*15.0*	*11.6*	*8.5*	*6.7*	*4.9*	*3.8*	*2.6*	*1.9*	...	...	...	...	
12	27.4	27.0	26.6	*21.0*	*13.2*	...	...	...	...	...	...	...	...	...	...	...	...	
13	27.4	27.0	26.6	*21.0*	*13.2*	...	...	...	...	...	...	...	...	...	...	...	...	
14	27.4	27.0	26.6	*21.0*	*13.2*	...	...	...	...	...	...	...	...	...	...	...	...	
15	27.4	27.0	26.6	*21.0*	*13.2*	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
16	27.4	27.0	26.6	*21.0*	*13.2*	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
17	29.9	29.5	29.0	*21.0*	*13.2*	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
18	29.9	29.5	29.0	*21.0*	*13.2*	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
19	29.9	29.5	29.0	*21.0*	*13.2*	...	...	...	...	...	...	...	...	...	...	...	...	
20	29.9	29.5	29.0	*21.0*	*13.2*	...	...	...	...	...	...	...	...	...	...	...	...	
21	25.4	25.1	24.7	*17.9*	*11.2*	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
22	25.4	25.1	24.7	*17.9*	*11.2*	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	*11.6*	*9.0*	*6.5*	*4.5*	*3.0*	...	...	...	...	...	...	...	...	...	...	...	...	
42	*11.6*	*9.0*	*6.5*	*4.5*	*3.0*	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
	1	49Ni–25Cr–18Fe–6Mo	Wld. pipe	SB–619	...	N06975	Solution ann.
	2	49Ni–25Cr–18Fe–6Mo	Smls. pipe & tube	SB–622	...	N06975	Solution ann.
	3	49Ni–25Cr–18Fe–6Mo	Smls. pipe & tube	SB–622	...	N06975	Solution ann.
	4	49Ni–25Cr–18Fe–6Mo	Wld. tube	SB–626	...	N06975	Solution ann.
	5	49Ni–25Cr–18Fe–6Mo	Wld. tube	SB–626	...	N06975	Solution ann.
	6	47Ni–22Cr–20Fe–7Mo	Rod	SB–581	...	N06985	Annealed
	7	47Ni–22Cr–20Fe–7Mo	Rod	SB–581	...	N06985	Annealed
	8	47Ni–22Cr–20Fe–7Mo	Plate, sheet, strip	SB–582	...	N06985	Annealed
	9	47Ni–22Cr–20Fe–7Mo	Plate, sheet, strip	SB–582	...	N06985	Annealed
	10	47Ni–22Cr–20Fe–7Mo	Smls. & wld. fittings	SB–366	...	N06985	Annealed
	11	47Ni–22Cr–20Fe–7Mo	Rod	SB–581	...	N06985	Annealed
	12	47Ni–22Cr–20Fe–7Mo	Rod	SB–581	...	N06985	Annealed
	13	47Ni–22Cr–20Fe–7Mo	Plate, sheet, strip	SB–582	...	N06985	Annealed
	14	47Ni–22Cr–20Fe–7Mo	Plate, sheet, strip	SB–582	...	N06985	Annealed
	15	47Ni–22Cr–20Fe–7Mo	Wld. pipe	SB–619	...	N06985	Annealed
	16	47Ni–22Cr–20Fe–7Mo	Wld. pipe	SB–619	...	N06985	Annealed
	17	47Ni–22Cr–20Fe–7Mo	Smls. pipe & tube	SB–622	...	N06985	Annealed
	18	47Ni–22Cr–20Fe–7Mo	Smls. pipe & tube	SB–622	...	N06985	Annealed
	19	47Ni–22Cr–20Fe–7Mo	Wld. tube	SB–626	...	N06985	Annealed
	20	47Ni–22Cr–20Fe–7Mo	Wld. tube	SB–626	...	N06985	Annealed
	21	35Ni–35Fe–20Cr–Cb	Forgings	SB–462	...	N08020	Annealed
	22	35Ni–35Fe–20Cr–Cb	Forgings	SB–462	...	N08020	Annealed
	23	35Ni–35Fe–20Cr–Cb	Plate	SB–463	...	N08020	Annealed
	24	35Ni–35Fe–20Cr–Cb	Plate	SB–463	...	N08020	Annealed
	25	35Ni–35Fe–20Cr–Cb	Bar	SB–473	...	N08020	Annealed
	26	35Ni–35Fe–20Cr–Cb	Bar	SB–473	...	N08020	Annealed
	27	35Ni–35Fe–20Cr–Cb	Smls. pipe & tube	SB–729	...	N08020	Annealed
	28	35Ni–35Fe–20Cr–Cb	Smls. pipe & tube	SB–729	...	N08020	Annealed
	29	35Ni–35Fe–20Cr–Cb	Wld. pipe	SB–464	...	N08020	Wld. ann.
	30	35Ni–35Fe–20Cr–Cb	Wld. pipe	SB–464	...	N08020	Wld. ann.
	31	35Ni–35Fe–20Cr–Cb	Wld. pipe	SB–464	...	N08020	Wld. ann.
	32	35Ni–35Fe–20Cr–Cb	Wld. tube	SB–468	...	N08020	Wld. ann.
	33	35Ni–35Fe–20Cr–Cb	Wld. tube	SB–468	...	N08020	Wld. ann.
	34	35Ni–35Fe–20Cr–Cb	Wld. tube	SB–468	...	N08020	Wld. ann.
	35	35Ni–35Fe–20Cr–Cb	Smls. & wld. fittings	SB–366	...	N08020	Annealed
(**21**)	36	...	...	...	...	...	...
(**21**)	37	...	...	...	...	...	...
	38	37Ni–33Fe–23Cr–4Mo–Cu	Wld. pipe	SB–464	...	N08024	Wld. ann.
	39	37Ni–33Fe–23Cr–4Mo–Cu	Wld. pipe	SB–464	...	N08024	Wld. ann.
	40	37Ni–33Fe–23Cr–4Mo–Cu	Wld. tube	SB–468	...	N08024	Wld. ann.
	41	37Ni–33Fe–23Cr–4Mo–Cu	Wld. tube	SB–468	...	N08024	Wld. ann.
(**21**)	42	...	...	...	...	...	...
(**21**)	43	...	...	...	...	...	...
	44	35Ni–30Fe–24Cr–6Mo–Cu	Wld. pipe	SB–464	...	N08026	Wld. ann.
	45	35Ni–30Fe–24Cr–6Mo–Cu	Wld. pipe	SB–464	...	N08026	Wld. ann.

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Size/ Thickness, in.	P-No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	...	45	85	32	NP	NP	800	650	NFN–11	G5, G14
2	...	45	85	32	NP	NP	800	650	NFN–11	...
3	...	45	85	32	NP	NP	800	650	NFN–11	G5
4	...	45	85	32	NP	NP	800	650	NFN–11	G14
5	...	45	85	32	NP	NP	800	650	NFN–11	G5, G14
6	>3/4	45	85	30	NP	NP	800	650	NFN–19	...
7	>3/4	45	85	30	NP	NP	800	650	NFN–19	G5
8	>3/4	45	85	30	NP	NP	800	650	NFN–19	...
9	>3/4	45	85	30	NP	NP	800	650	NFN–19	G5
10	...	45	90	35	NP	NP	800	650	NFN–18	G5, W12
11	≤3/4	45	90	35	NP	NP	800	650	NFN–18	...
12	≤3/4	45	90	35	NP	NP	800	650	NFN–18	G5
13	≤3/4	45	90	35	NP	NP	800	650	NFN–18	...
14	≤3/4	45	90	35	NP	NP	800	650	NFN–18	G5
15	...	45	90	35	NP	NP	800	650	NFN–18	G14
16	...	45	90	35	NP	NP	800	650	NFN–18	G5, G14
17	...	45	90	35	NP	NP	800	650	NFN–18	...
18	...	45	90	35	NP	NP	800	650	NFN–18	G5
19	...	45	90	35	NP	NP	800	650	NFN–18	G14
20	...	45	90	35	NP	NP	800	650	NFN–18	G5, G14
21	...	45	80	35	NP	800	800	650	NFN–12	G5
22	...	45	80	35	NP	NP	800	650	NFN–12	...
23	...	45	80	35	NP	NP	800	650	NFN–12	...
24	...	45	80	35	NP	800	800	650	NFN–12	G5
25	...	45	80	35	NP	800	800	650	NFN–12	G5
26	...	45	80	35	NP	NP	800	650	NFN–12	...
27	...	45	80	35	NP	NP	800	650	NFN–12	...
28	...	45	80	35	NP	NP	800	650	NFN–12	G5
29	...	45	80	35	NP	800	NP	NP	NFN–12	G5, W5
30	...	45	80	35	NP	NP	800	650	NFN–12	G14
31	...	45	80	35	NP	NP	800	650	NFN–12	G5, G14
32	...	45	80	35	NP	800	NP	NP	NFN–12	G5, W5
33	...	45	80	35	NP	NP	800	650	NFN–12	G14
34	...	45	80	35	NP	NP	800	650	NFN–12	G5, G14
35	...	45	85	40	NP	NP	800	650	NFN–12	G5, W12
36	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...
38	...	45	80	35	NP	NP	800	650	NFN–13	G14
39	...	45	80	35	NP	NP	800	650	NFN–13	G5, G14
40	...	45	80	35	NP	NP	800	650	NFN–13	G14
41	...	45	80	35	NP	NP	800	650	NFN–13	G5, G14
42	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...
44	...	45	80	35	NP	NP	800	650	NFN–13	G14
45	...	45	80	35	NP	NP	800	650	NFN–13	G5, G14

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																	
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950
1	18.1	...	18.1	...	18.1	...	18.1	...	18.1	...	17.9	17.5	17.2	17.0	16.8	...	...	...
2	21.3	...	19.5	...	18.5	...	17.5	...	16.5	...	15.6	15.3	15.0	14.8	14.7	...	...	...
3	21.3	...	21.3	...	21.3	...	21.3	...	21.3	...	21.1	20.6	20.2	20.0	19.8	...	...	...
4	18.1	...	16.6	...	15.7	...	14.9	...	14.0	...	13.3	13.0	12.7	12.6	12.5	...	...	...
5	18.1	...	18.1	...	18.1	...	18.1	...	18.1	...	17.9	17.5	17.2	17.0	16.8	...	...	...
6	20.0	...	17.8	...	16.2	...	14.9	...	13.9	...	13.1	12.8	12.5	12.3	12.0	...	...	...
7	20.0	...	20.0	...	20.0	...	20.0	...	18.8	...	17.7	17.3	16.9	16.5	16.2	...	...	...
8	20.0	...	17.8	...	16.2	...	14.9	...	13.9	...	13.1	12.8	12.5	12.3	12.0	...	...	...
9	20.0	...	20.0	...	20.0	...	20.0	...	18.8	...	17.7	17.3	16.9	16.5	16.2	...	...	...
10	23.3	...	23.3	...	23.3	...	23.3	...	21.9	...	20.7	20.2	19.7	19.3	18.9	...	...	...
11	23.3	...	20.8	...	18.9	...	17.4	...	16.2	...	15.3	14.9	14.6	14.3	14.0	...	...	...
12	23.3	...	23.3	...	23.3	...	23.3	...	21.9	...	20.7	20.2	19.7	19.3	18.9	...	...	...
13	23.3	...	20.8	...	18.9	...	17.4	...	16.2	...	15.3	14.9	14.6	14.3	14.0	...	...	...
14	23.3	...	23.3	...	23.3	...	23.3	...	21.9	...	20.7	20.2	19.7	19.3	18.9	...	...	...
15	19.8	...	17.7	...	16.1	...	14.8	...	13.8	...	13.0	12.7	12.4	12.1	11.9	...	...	...
16	19.8	...	19.8	...	19.8	...	19.8	...	18.6	...	17.6	17.1	16.8	16.4	16.1	...	...	...
17	23.3	...	20.8	...	18.9	...	17.4	...	16.2	...	15.3	14.9	14.6	14.3	14.0	...	...	...
18	23.3	...	23.3	...	23.3	...	23.3	...	21.9	...	20.7	20.2	19.7	19.3	18.9	...	...	...
19	19.8	...	17.7	...	16.1	...	14.8	...	13.8	...	13.0	12.7	12.4	12.1	11.9	...	...	...
20	19.8	...	19.8	...	19.8	...	19.8	...	18.6	...	17.6	17.1	16.8	16.4	16.1	...	...	...
21	22.9	...	22.9	...	22.6	...	22.2	...	22.1	...	22.1	22.0	21.9	21.8	21.8	...	...	...
22	22.9	...	20.6	...	19.7	...	18.9	...	18.2	...	17.7	17.5	17.4	17.2	16.8	...	...	...
23	22.9	...	20.6	...	19.7	...	18.9	...	18.2	...	17.7	17.5	17.4	17.2	16.8	...	...	...
24	22.9	...	22.9	...	22.6	...	22.2	...	22.1	...	22.1	22.0	21.9	21.8	21.8	...	...	...
25	22.9	...	22.9	...	22.6	...	22.2	...	22.1	...	22.1	22.0	21.9	21.8	21.8	...	...	...
26	22.9	...	20.6	...	19.7	...	18.9	...	18.2	...	17.7	17.5	17.4	17.2	16.8	...	...	...
27	22.9	...	20.6	...	19.7	...	18.9	...	18.2	...	17.7	17.5	17.4	17.2	16.8	...	...	...
28	22.9	...	22.9	...	22.6	...	22.2	...	22.1	...	22.1	22.0	21.9	21.8	21.8	...	...	...
29	22.9	...	22.9	...	22.6	...	22.2	...	22.1	...	22.1	22.0	21.9	21.8	21.8	...	...	...
30	19.4	...	17.5	...	16.7	...	16.1	...	15.5	...	15.0	14.9	14.8	14.6	14.3	...	...	...
31	19.4	...	19.4	...	19.2	...	18.8	...	18.8	...	18.8	18.7	18.6	18.5	18.5	...	...	...
32	22.9	...	22.9	...	22.6	...	22.2	...	22.1	...	22.1	22.0	21.9	21.8	21.8	...	...	...
33	19.4	...	17.5	...	16.7	...	16.1	...	15.5	...	15.0	14.9	14.8	14.6	14.3	...	...	...
34	19.4	...	19.4	...	19.2	...	18.8	...	18.8	...	18.8	18.7	18.6	18.5	18.5	...	...	...
35	22.9	...	22.9	...	22.6	...	22.2	...	22.1	...	22.1	22.0	21.9	21.8	21.8	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
38	19.4	...	17.5	...	16.3	...	15.4	...	14.5	...	13.6	13.2	12.9	12.6	12.4	...	...	...
39	19.4	...	19.4	...	19.2	...	18.6	...	18.2	...	17.7	17.5	17.3	17.0	16.7	...	...	...
40	19.4	...	17.5	...	16.3	...	15.4	...	14.5	...	13.6	13.2	12.9	12.6	12.4	...	...	...
41	19.4	...	19.4	...	19.2	...	18.6	...	18.2	...	17.7	17.5	17.3	17.0	16.7	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
44	19.4	...	17.6	...	16.1	...	14.9	...	13.8	...	13.0	12.7	12.4	12.1	11.9	...	...	...
45	19.4	...	19.4	...	19.1	...	18.5	...	18.0	...	17.5	17.1	16.7	16.3	16.0	...	...	...

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																	
	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	1700	1750	1800	
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
1	35Ni–30Fe–24Cr–6Mo–Cu	Wld. tube	SB–468	...	N08026	Wld. ann.
2	35Ni–30Fe–24Cr–6Mo–Cu	Wld. tube	SB–468	...	N08026	Wld. ann.
3	31Ni–31Fe–29Cr–Mo	Smls. tube	SB–668	...	N08028	Annealed
4	31Ni–31Fe–29Cr–Mo	Smls. tube	SB–668	...	N08028	Annealed
5	31Ni–31Fe–29Cr–Mo	Plate, sheet, strip	SB–709	...	N08028	Annealed
6	31Ni–31Fe–29Cr–Mo	Plate, sheet, strip	SB–709	...	N08028	Annealed
7	31Ni–33Fe–27Cr–6.5Mo–Cu–N	Smls. & wld. fittings	SB–366	...	N08031	Solution ann.
8	31Ni–33Fe–27Cr–6.5Mo–Cu–N	Forged fittings	SB–462	...	N08031	Solution ann.
9	31Ni–33Fe–27Cr–6.5Mo–Cu–N	Forged fittings	SB–462	...	N08031	Solution ann.
10	31Ni–33Fe–27Cr–6.5Mo–Cu–N	Forgings	SB–564	...	N08031	Solution ann.
11	31Ni–33Fe–27Cr–6.5Mo–Cu–N	Forgings	SB–564	...	N08031	Solution ann.
12	31Ni–33Fe–27Cr–6.5Mo–Cu–N	Rod	SB–581	...	N08031	Solution ann.
13	31Ni–33Fe–27Cr–6.5Mo–Cu–N	Rod	SB–581	...	N08031	Solution ann.
14	31Ni–33Fe–27Cr–6.5Mo–Cu–N	Wld. pipe	SB–619	...	N08031	Solution ann.
15	31Ni–33Fe–27Cr–6.5Mo–Cu–N	Wld. pipe	SB–619	...	N08031	Solution ann.
16	31Ni–33Fe–27Cr–6.5Mo–Cu–N	Smls. pipe & tube	SB–622	...	N08031	Solution ann.
17	31Ni–33Fe–27Cr–6.5Mo–Cu–N	Smls. pipe & tube	SB–622	...	N08031	Solution ann.
18	31Ni–33Fe–27Cr–6.5Mo–Cu–N	Plate, sheet, strip	SB–625	...	N08031	Solution ann.
19	31Ni–33Fe–27Cr–6.5Mo–Cu–N	Plate, sheet, strip	SB–625	...	N08031	Solution ann.
20	31Ni–33Fe–27Cr–6.5Mo–Cu–N	Wld. tube	SB–626	...	N08031	Solution ann.
21	31Ni–33Fe–27Cr–6.5Mo–Cu–N	Wld. tube	SB–626	...	N08031	Solution ann.
22	37Ni–33Fe–25Cr	Condenser tube	SB–163	...	N08120	Solution ann.
23	37Ni–33Fe–25Cr	Condenser tube	SB–163	...	N08120	Solution ann.
24	37Ni–33Fe–25Cr	Smls. & wld. fittings	SB–366	...	N08120	Solution ann.
25	37Ni–33Fe–25Cr	Smls. pipe & tube	SB–407	...	N08120	Solution ann.
26	37Ni–33Fe–25Cr	Smls. pipe & tube	SB–407	...	N08120	Solution ann.
27	37Ni–33Fe–25Cr	Bar, rod	SB–408	...	N08120	Solution ann.
28	37Ni–33Fe–25Cr	Bar, rod	SB–408	...	N08120	Solution ann.
29	37Ni–33Fe–25Cr	Plate, sheet, strip	SB–409	...	N08120	Solution ann.
30	37Ni–33Fe–25Cr	Plate, sheet, strip	SB–409	...	N08120	Solution ann.
31	37Ni–33Fe–25Cr	Wld. pipe	SB–514	...	N08120	Solution ann.
32	37Ni–33Fe–25Cr	Wld. pipe	SB–514	...	N08120	Solution ann.
33	37Ni–33Fe–25Cr	Wld. tube	SB–515	...	N08120	Solution ann.
34	37Ni–33Fe–25Cr	Wld. tube	SB–515	...	N08120	Solution ann.
35	37Ni–33Fe–25Cr	Forgings	SB–564	...	N08120	Solution ann.
36	37Ni–33Fe–25Cr	Forgings	SB–564	...	N08120	Solution ann.
37	26Ni–43Fe–22Cr–5Mo	Wld. pipe	SB–619	...	N08320	Solution ann.
38	26Ni–43Fe–22Cr–5Mo	Wld. pipe	SB–619	...	N08320	Solution ann.
39	26Ni–43Fe–22Cr–5Mo	Plate, sheet, strip	SB–620	...	N08320	Solution ann.
40	26Ni–43Fe–22Cr–5Mo	Plate, sheet, strip	SB–620	...	N08320	Solution ann.
41	26Ni–43Fe–22Cr–5Mo	Rod	SB–621	...	N08320	Solution ann.
42	26Ni–43Fe–22Cr–5Mo	Rod	SB–621	...	N08320	Solution ann.
43	26Ni–43Fe–22Cr–5Mo	Smls. pipe & tube	SB–622	...	N08320	Solution ann.
44	26Ni–43Fe–22Cr–5Mo	Smls. pipe & tube	SB–622	...	N08320	Solution ann.
45	26Ni–43Fe–22Cr–5Mo	Wld. tube	SB–626	...	N08320	Solution ann.

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Size/ Thickness, in.	P-No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	...	45	80	35	NP	NP	800	650	NFN–13	G14
2	...	45	80	35	NP	NP	800	650	NFN–13	G5, G14
3	...	45	73	31	NP	600	850	650	NFN–13	...
4	...	45	73	31	NP	600	850	650	NFN–13	G5
5	...	45	73	31	NP	NP	850	650	NFN–13	...
6	...	45	73	31	NP	NP	850	650	NFN–13	G5
7	...	45	94	40	NP	NP	800	NP	NFN–11	G5, W12
8	...	45	94	40	NP	NP	800	NP	NFN–11	...
9	...	45	94	40	NP	NP	800	NP	NFN–11	G5
10	...	45	94	40	NP	NP	800	NP	NFN–11	...
11	...	45	94	40	NP	NP	800	NP	NFN–11	G5
12	...	45	94	40	NP	NP	800	NP	NFN–11	...
13	...	45	94	40	NP	NP	800	NP	NFN–11	G5
14	...	45	94	40	NP	NP	800	NP	NFN–11	G14
15	...	45	94	40	NP	NP	800	NP	NFN–11	G5, G14
16	...	45	94	40	NP	NP	800	NP	NFN–11	...
17	...	45	94	40	NP	NP	800	NP	NFN–11	G5
18	...	45	94	40	NP	NP	800	NP	NFN–11	...
19	...	45	94	40	NP	NP	800	NP	NFN–11	G5
20	...	45	94	40	NP	NP	800	NP	NFN–11	G14
21	...	45	94	40	NP	NP	800	NP	NFN–11	G5, G14
22	...	45	90	40	NP	NP	1650	NP	NFN–9	G4, G14, T16
23	...	45	90	40	NP	NP	1650	NP	NFN–9	G4, G5, G14, T15
24	...	45	90	40	NP	NP	1650	NP	NFN–9	G4, G5, T15, W12
25	...	45	90	40	NP	NP	1650	NP	NFN–9	G4, T16
26	...	45	90	40	NP	NP	1650	NP	NFN–9	G4, G5, T15
27	...	45	90	40	NP	NP	1650	NP	NFN–9	G4, T16
28	...	45	90	40	NP	NP	1650	NP	NFN–9	G4, G5, T15
29	...	45	90	40	NP	NP	1650	NP	NFN–9	G4, T16
30	...	45	90	40	NP	NP	1650	NP	NFN–9	G4, G5, T15
31	...	45	90	40	NP	NP	1650	NP	NFN–9	G4, G14, T16
32	...	45	90	40	NP	NP	1650	NP	NFN–9	G4, G5, G14, T15
33	...	45	90	40	NP	NP	1650	NP	NFN–9	G4, G14, T16
34	...	45	90	40	NP	NP	1650	NP	NFN–9	G4, G5, G14, T15
35	...	45	90	40	NP	NP	1650	NP	NFN–9	G4, T16
36	...	45	90	40	NP	NP	1650	NP	NFN–9	G4, G5, T15
37	...	45	75	28	NP	NP	800	650	NFN–13	G14
38	...	45	75	28	NP	NP	800	650	NFN–13	G5, G14
39	...	45	75	28	NP	NP	800	650	NFN–13	...
40	...	45	75	28	NP	NP	800	650	NFN–13	G5
41	...	45	75	28	NP	NP	800	650	NFN–13	...
42	...	45	75	28	NP	NP	800	650	NFN–13	G5
43	...	45	75	28	NP	NP	800	650	NFN–13	...
44	...	45	75	28	NP	NP	800	650	NFN–13	G5
45	...	45	75	28	NP	NP	800	650	NFN–13	G14

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																	
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950
1	19.4	...	17.6	...	16.1	...	14.9	...	13.8	...	13.0	12.7	12.4	12.1	11.9	...	...	...
2	19.4	...	19.4	...	19.1	...	18.5	...	18.0	...	17.5	17.1	16.7	16.3	16.0	...	...	...
3	20.7	...	18.9	...	17.7	...	16.5	...	15.4	...	14.4	14.0	13.6	13.1	12.8	12.4	...	...
4	20.7	...	20.7	...	20.1	...	19.3	...	18.7	...	18.2	18.0	17.8	17.5	17.2	16.7	...	...
5	20.7	...	18.9	...	17.7	...	16.5	...	15.4	...	14.4	14.0	13.6	13.1	12.8	12.4	...	...
6	20.7	...	20.7	...	20.1	...	19.3	...	18.7	...	18.2	18.0	17.8	17.5	17.2	16.7	...	...
7	26.7	...	26.7	...	25.8	...	24.5	...	23.3	...	22.2	21.7	21.3	20.9	20.5	...	...	...
8	26.7	...	22.0	...	19.8	...	18.3	...	17.3	...	16.4	16.1	15.8	15.5	15.2	...	...	...
9	26.7	...	26.7	...	25.8	...	24.5	...	23.3	...	22.2	21.7	21.3	20.9	20.5	...	...	...
10	26.7	...	22.0	...	19.8	...	18.3	...	17.3	...	16.4	16.1	15.8	15.5	15.2	...	...	...
11	26.7	...	26.7	...	25.8	...	24.5	...	23.3	...	22.2	21.7	21.3	20.9	20.5	...	...	...
12	26.7	...	22.0	...	19.8	...	18.3	...	17.3	...	16.4	16.1	15.8	15.5	15.2	...	...	...
13	26.7	...	26.7	...	25.8	...	24.5	...	23.3	...	22.2	21.7	21.3	20.9	20.5	...	...	...
14	22.7	...	18.7	...	16.8	...	15.6	...	14.7	...	13.9	13.7	13.4	13.2	12.9	...	...	...
15	22.7	...	22.7	...	21.9	...	20.8	...	19.8	...	18.9	18.4	18.1	17.8	17.4	...	...	...
16	26.7	...	22.0	...	19.8	...	18.3	...	17.3	...	16.4	16.1	15.8	15.5	15.2	...	...	...
17	26.7	...	26.7	...	25.8	...	24.5	...	23.3	...	22.2	21.7	21.3	20.9	20.5	...	...	...
18	26.7	...	22.0	...	19.8	...	18.3	...	17.3	...	16.4	16.1	15.8	15.5	15.2	...	...	...
19	26.7	...	26.7	...	25.8	...	24.5	...	23.3	...	22.2	21.7	21.3	20.9	20.5	...	...	...
20	22.7	...	18.7	...	16.8	...	15.6	...	14.7	...	13.9	13.7	13.4	13.2	12.9	...	...	...
21	22.7	...	22.7	...	21.9	...	20.8	...	19.8	...	18.9	18.4	18.1	17.8	17.4	...	...	...
22	25.7	...	23.5	...	21.6	...	19.9	...	18.6	...	17.7	17.3	17.0	16.8	16.6	16.5	16.4	16.3
23	25.7	...	25.7	...	25.0	...	24.2	...	23.7	...	23.5	23.4	23.0	22.7	22.4	22.3	22.2	22.1
24	25.7	...	25.7	...	25.0	...	24.2	...	23.7	...	23.5	23.4	23.0	22.7	22.4	22.3	22.2	22.1
25	25.7	...	23.5	...	21.6	...	19.9	...	18.6	...	17.7	17.3	17.0	16.8	16.6	16.5	16.4	16.3
26	25.7	...	25.7	...	25.0	...	24.2	...	23.7	...	23.5	23.4	23.0	22.7	22.4	22.3	22.2	22.1
27	25.7	...	23.5	...	21.6	...	19.9	...	18.6	...	17.7	17.3	17.0	16.8	16.6	16.5	16.4	16.3
28	25.7	...	25.7	...	25.0	...	24.2	...	23.7	...	23.5	23.4	23.0	22.7	22.4	22.3	22.2	22.1
29	25.7	...	23.5	...	21.6	...	19.9	...	18.6	...	17.7	17.3	17.0	16.8	16.6	16.5	16.4	16.3
30	25.7	...	25.7	...	25.0	...	24.2	...	23.7	...	23.5	23.4	23.0	22.7	22.4	22.3	22.2	22.1
31	21.8	...	20.0	...	18.4	...	16.9	...	15.8	...	15.0	14.7	14.5	14.3	14.1	14.0	13.9	13.9
32	21.8	...	21.8	...	21.3	...	20.6	...	20.1	...	20.0	19.9	19.6	19.3	19.0	19.0	18.9	18.8
33	21.8	...	20.0	...	18.4	...	16.9	...	15.8	...	15.0	14.7	14.5	14.3	14.1	14.0	13.9	13.9
34	21.8	...	21.8	...	21.3	...	20.6	...	20.1	...	20.0	19.9	19.6	19.3	19.0	19.0	18.9	18.8
35	25.7	...	23.5	...	21.6	...	19.9	...	18.6	...	17.7	17.3	17.0	16.8	16.6	16.5	16.4	16.3
36	25.7	...	25.7	...	25.0	...	24.2	...	23.7	...	23.5	23.4	23.0	22.7	22.4	22.3	22.2	22.1
37	15.9	...	14.7	...	13.9	...	13.1	...	12.3	...	11.7	11.4	11.2	11.0	10.8	...	...	...
38	15.9	...	15.9	...	15.9	...	15.9	...	15.9	...	15.8	15.4	15.1	14.9	14.6	...	...	...
39	18.7	...	17.3	...	16.3	...	15.4	...	14.5	...	13.8	13.5	13.2	13.0	12.7	...	...	...
40	18.7	...	18.7	...	18.7	...	18.7	...	18.7	...	18.6	18.2	17.8	17.5	17.2	...	...	...
41	18.7	...	17.3	...	16.3	...	15.4	...	14.5	...	13.8	13.5	13.2	13.0	12.7	...	...	...
42	18.7	...	18.7	...	18.7	...	18.7	...	18.7	...	18.6	18.2	17.8	17.5	17.2	...	...	...
43	18.7	...	17.3	...	16.3	...	15.4	...	14.5	...	13.8	13.5	13.2	13.0	12.7	...	...	...
44	18.7	...	18.7	...	18.7	...	18.7	...	18.7	...	18.6	18.2	17.8	17.5	17.2	...	...	...
45	15.9	...	14.7	...	13.9	...	13.1	...	12.3	...	11.7	11.4	11.2	11.0	10.8	...	...	...

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																
	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	1700	1750	1800
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
22	16.3	16.3	16.2	*14.2*	*12.3*	*9.4*	*7.6*	*6.2*	*5.0*	*4.0*	*3.2*	*2.6*	*2.0*	*1.4*	...	...	...
23	22.0	21.9	*17.9*	*14.2*	*12.3*	*9.4*	*7.6*	*6.2*	*5.0*	*4.0*	*3.2*	*2.6*	*2.0*	*1.4*	...	...	...
24	22.0	21.9	*17.9*	*14.2*	*12.3*	*9.4*	*7.6*	*6.2*	*5.0*	*4.0*	*3.2*	*2.6*	*2.0*	*1.4*	...	...	...
25	16.3	16.3	16.2	*14.2*	*12.3*	*9.4*	*7.6*	*6.2*	*5.0*	*4.0*	*3.2*	*2.6*	*2.0*	*1.4*	...	...	...
26	22.0	21.9	*17.9*	*14.2*	*12.3*	*9.4*	*7.6*	*6.2*	*5.0*	*4.0*	*3.2*	*2.6*	*2.0*	*1.4*	...	...	...
27	16.3	16.3	16.2	*14.2*	*12.3*	*9.4*	*7.6*	*6.2*	*5.0*	*4.0*	*3.2*	*2.6*	*2.0*	*1.4*	...	...	...
28	22.0	21.9	*17.9*	*14.2*	*12.3*	*9.4*	*7.6*	*6.2*	*5.0*	*4.0*	*3.2*	*2.6*	*2.0*	*1.4*	...	...	...
29	16.3	16.3	16.2	*14.2*	*12.3*	*9.4*	*7.6*	*6.2*	*5.0*	*4.0*	*3.2*	*2.6*	*2.0*	*1.4*	...	...	...
30	22.0	21.9	*17.9*	*14.2*	*12.3*	*9.4*	*7.6*	*6.2*	*5.0*	*4.0*	*3.2*	*2.6*	*2.0*	*1.4*	...	...	...
31	13.9	13.9	13.8	*12.1*	*10.5*	*8.0*	*6.5*	*5.3*	*4.3*	*3.4*	*2.7*	*2.2*	*1.7*	*1.2*	...	...	...
32	18.7	18.6	*15.2*	*12.1*	*10.5*	*8.0*	*6.5*	*5.3*	*4.3*	*3.4*	*2.7*	*2.2*	*1.7*	*1.2*	...	...	...
33	13.9	13.9	13.8	*12.1*	*10.5*	*8.0*	*6.5*	*5.3*	*4.3*	*3.4*	*2.7*	*2.2*	*1.7*	*1.2*	...	...	...
34	18.7	18.6	*15.2*	*12.1*	*10.5*	*8.0*	*6.5*	*5.3*	*4.3*	*3.4*	*2.7*	*2.2*	*1.7*	*1.2*	...	...	...
35	16.3	16.3	16.2	*14.2*	*12.3*	*9.4*	*7.6*	*6.2*	*5.0*	*4.0*	*3.2*	*2.6*	*2.0*	*1.4*	...	...	...
36	22.0	21.9	*17.9*	*14.2*	*12.3*	*9.4*	*7.6*	*6.2*	*5.0*	*4.0*	*3.2*	*2.6*	*2.0*	*1.4*	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
	1	26Ni–43Fe–22Cr–5Mo	Wld. tube	SB–626	...	N08320	Solution ann.
	2	35Ni–19Cr–1¼Si	Bar	SB–511	...	N08330	...
	3	35Ni–19Cr–1¼Si	Bar	SB–511	...	N08330	...
	4	35Ni–19Cr–1¼Si	Bar	SB–511	...	N08330	...
	5	35Ni–19Cr–1¼Si	Bar	SB–511	...	N08330	...
	6	35Ni–19Cr–1¼Si	Pipe	SB–535	...	N08330	...
	7	35Ni–19Cr–1¼Si	Pipe	SB–535	...	N08330	...
	8	35Ni–19Cr–1¼Si	Plate	SB–536	...	N08330	...
	9	35Ni–19Cr–1¼Si	Plate	SB–536	...	N08330	...
	10	35Ni–19Cr–1¼Si	Smls. & wld. fittings	SB–366	...	N08330	Annealed
	11	35Ni–19Cr–1¼Si	Smls. & wld. pipe	SB–535	...	N08330	Annealed
	12	35Ni–19Cr–1¼Si	Smls. & wld. pipe	SB–535	...	N08330	Annealed
	13	35Ni–19Cr–1¼Si	Plate, sheet, strip	SB–536	...	N08330	Annealed
	14	35Ni–19Cr–1¼Si	Plate, sheet, strip	SB–536	...	N08330	Annealed
	15	35Ni–19Cr–1¼Si	Wld. pipe	SB–710	...	N08330	Annealed
	16	35Ni–19Cr–1¼Si	Wld. pipe	SB–710	...	N08330	Annealed
(**21**)	17	35Ni–23Cr–7.5Mo–N	Plate, sheet, strip	SB–625	...	N08354	Solution ann.
(**21**)	18	35Ni–23Cr–7.5Mo–N	Plate, sheet, strip	SB–625	...	N08354	Solution ann.
(**21**)	19	35Ni–23Cr–7.5Mo–N	Bar, wire	SB–649	...	N08354	Solution ann.
(**21**)	20	35Ni–23Cr–7.5Mo–N	Bar, wire	SB–649	...	N08354	Solution ann.
(**21**)	21	35Ni–23Cr–7.5Mo–N	Wld. pipe	SB–673	...	N08354	Solution ann.
(**21**)	22	35Ni–23Cr–7.5Mo–N	Wld. pipe	SB–673	...	N08354	Solution ann.
(**21**)	23	35Ni–23Cr–7.5Mo–N	Wld. tube	SB–674	...	N08354	Solution ann.
(**21**)	24	35Ni–23Cr–7.5Mo–N	Wld. tube	SB–674	...	N08354	Solution ann.
(**21**)	25	35Ni–23Cr–7.5Mo–N	Smls. pipe & tube	SB–677	...	N08354	Solution ann.
(**21**)	26	35Ni–23Cr–7.5Mo–N	Smls. pipe & tube	SB–677	...	N08354	Solution ann.
	27	46Fe–24Ni–21Cr–6Mo–N	Smls. & wld. fittings	SB–366	...	N08367	Solution ann.
	28	46Fe–24Ni–21Cr–6Mo–N	Forgings	SB–462	...	N08367	Solution ann.
	29	46Fe–24Ni–21Cr–6Mo–N	Forgings	SB–462	...	N08367	Solution ann.
	30	46Fe–24Ni–21Cr–6Mo–N	Forgings	SB–564	...	N08367	Solution ann.
	31	46Fe–24Ni–21Cr–6Mo–N	Forgings	SB–564	...	N08367	Solution ann.
	32	46Fe–24Ni–21Cr–6Mo–N	Wld. pipe	SB–675	...	N08367	Solution ann.
	33	46Fe–24Ni–21Cr–6Mo–N	Wld. pipe	SB–675	...	N08367	Solution ann.
	34	46Fe–24Ni–21Cr–6Mo–N	Wld. tube	SB–676	...	N08367	Solution ann.
	35	46Fe–24Ni–21Cr–6Mo–N	Wld. tube	SB–676	...	N08367	Solution ann.
	36	46Fe–24Ni–21Cr–6Mo–N	Plate, sheet, strip	SB–688	...	N08367	Solution ann.
	37	46Fe–24Ni–21Cr–6Mo–N	Plate, sheet, strip	SB–688	...	N08367	Solution ann.
	38	46Fe–24Ni–21Cr–6Mo–N	Smls. pipe & tube	SB–690	...	N08367	Solution ann.
	39	46Fe–24Ni–21Cr–6Mo–N	Smls. pipe & tube	SB–690	...	N08367	Solution ann.
	40	46Fe–24Ni–21Cr–6Mo–N	Bar, rod, wire	SB–691	...	N08367	Solution ann.
	41	46Fe–24Ni–21Cr–6Mo–N	Bar, rod, wire	SB–691	...	N08367	Solution ann.
	42	46Fe–24Ni–21Cr–6Mo–N	Wld. pipe	SB–804	...	N08367	Solution ann.
	43	46Fe–24Ni–21Cr–6Mo–N	Wld. pipe	SB–804	...	N08367	Solution ann.
	44	46Fe–24Ni–21Cr–6Mo–N	Smls. & wld. fittings	SB–366	...	N08367	Solution ann.
	45	46Fe–24Ni–21Cr–6Mo–N	Wld. pipe	SB–675	...	N08367	Solution ann.

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Size/ Thickness, in.	P-No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	...	45	75	28	NP	NP	800	650	NFN–13	G5, G14
2	...	46	70	30	1500	NP	NP	NP	NFN–13	G2, H2, T14
3	...	46	70	30	1500	NP	NP	NP	NFN–13	G2, G5, H2, T12
4	...	46	70	30	NP	NP	1650	650	NFN–13	G4, H1, T14
5	...	46	70	30	NP	NP	1650	650	NFN–13	G4, G5, H1, T12
6	...	46	70	30	1500	NP	NP	NP	NFN–13	G2, H2, T14
7	...	46	70	30	1500	NP	NP	NP	NFN–13	G2, G5, H2, T12
8	...	46	70	30	1500	NP	NP	NP	NFN–13	G2, H2, T14
9	...	46	70	30	1500	NP	NP	NP	NFN–13	G2, G5, H2, T12
10	...	46	70	30	NP	NP	1650	650	NFN–13	G4, G5, T12, W12
11	...	46	70	30	NP	NP	1500	650	NFN–13	H1, T14, W12
12	...	46	70	30	NP	NP	1500	650	NFN–13	G5, H1, T12, W12
13	...	46	70	30	NP	NP	1650	650	NFN–13	G4, H1, T14
14	...	46	70	30	NP	NP	1650	650	NFN–13	G4, G5, H1, T12
15	...	46	70	30	NP	NP	1650	650	NFN–13	G4, G14, H1, T14
16	...	46	70	30	NP	NP	1650	650	NFN–13	G4, G5, G14, H1, T12
17	...	45	93	43	NP	NP	800	NP	HA–6	...
18	...	45	93	43	NP	NP	800	NP	HA–6	G5
19	...	45	93	43	NP	NP	800	NP	HA–6	...
20	...	45	93	43	NP	NP	800	NP	HA–6	G5
21	...	45	93	43	NP	NP	800	NP	HA–6	G14
22	...	45	93	43	NP	NP	800	NP	HA–6	G5, G14
23	...	45	93	43	NP	NP	800	NP	HA–6	G14
24	...	45	93	43	NP	NP	800	NP	HA–6	G5, G14
25	...	45	93	43	NP	NP	800	NP	HA–6	...
26	...	45	93	43	NP	NP	800	NP	HA–6	G5
27	>3/16	45	95	45	NP	800	800	NP	NFN–12	G5, W5, W12
28	...	45	95	45	NP	800	800	650	NFN–12	...
29	...	45	95	45	NP	800	800	650	NFN–12	G5
30	...	45	95	45	NP	800	800	650	NFN–12	...
31	...	45	95	45	NP	800	800	650	NFN–12	G5
32	>3/16	45	95	45	NP	800	800	650	NFN–12	G14
33	>3/16	45	95	45	NP	800	800	650	NFN–12	G5, G14
34	>3/16	45	95	45	NP	800	800	650	NFN–12	G14
35	>3/16	45	95	45	NP	800	800	650	NFN–12	G5, G14
36	>3/16	45	95	45	NP	800	800	650	NFN–12	...
37	>3/16	45	95	45	NP	800	800	650	NFN–12	G5
38	>3/16	45	95	45	NP	800	800	650	NFN–12	...
39	>3/16	45	95	45	NP	800	800	650	NFN–12	G5
40	...	45	95	45	NP	800	800	650	NFN–12	...
41	...	45	95	45	NP	800	800	650	NFN–12	G5
42	>3/16	45	95	45	NP	800	800	650	NFN–12	G14
43	>3/16	45	95	45	NP	800	800	650	NFN–12	G5, G14
44	≤3/16	45	100	45	NP	NP	800	NP	NFN–12	G5, W12
45	≤3/16	45	100	45	NP	800	800	650	NFN–12	G14

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																	
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950
1	15.9	...	15.9	...	15.9	...	15.9	...	15.9	...	15.8	15.4	15.1	14.9	14.6	...	...	...
2	20.0	...	17.7	...	16.4	...	15.5	...	14.7	...	14.0	13.7	13.4	13.1	12.9	12.6	12.4	12.1
3	20.0	...	20.0	...	20.0	...	19.6	...	19.4	...	18.9	18.5	18.1	17.7	17.4	17.0	16.7	*16.1*
4	20.0	...	17.7	...	16.4	...	15.5	...	14.7	...	14.0	13.7	13.4	13.1	12.9	12.6	12.4	12.1
5	20.0	...	20.0	...	20.0	...	19.6	...	19.4	...	18.9	18.5	18.1	17.7	17.4	17.0	16.7	*16.1*
6	20.0	...	17.7	...	16.4	...	15.5	...	14.7	...	14.0	13.7	13.4	13.1	12.9	12.6	12.4	12.1
7	20.0	...	20.0	...	20.0	...	19.6	...	19.4	...	18.9	18.5	18.1	17.7	17.4	17.0	16.7	*16.1*
8	20.0	...	17.7	...	16.4	...	15.5	...	14.7	...	14.0	13.7	13.4	13.1	12.9	12.6	12.4	12.1
9	20.0	...	20.0	...	20.0	...	19.6	...	19.4	...	18.9	18.5	18.1	17.7	17.4	17.0	16.7	*16.1*
10	20.0	...	20.0	...	20.0	...	19.6	...	19.4	...	18.9	18.5	18.1	17.7	17.4	17.0	16.7	*16.1*
11	20.0	...	17.7	...	16.4	...	15.5	...	14.7	...	14.0	13.7	13.4	13.1	12.9	12.6	12.4	12.1
12	20.0	...	20.0	...	20.0	...	19.6	...	19.4	...	18.9	18.5	18.1	17.7	17.4	17.0	16.7	*16.1*
13	20.0	...	17.7	...	16.4	...	15.5	...	14.7	...	14.0	13.7	13.4	13.1	12.9	12.6	12.4	12.1
14	20.0	...	20.0	...	20.0	...	19.6	...	19.4	...	18.9	18.5	18.1	17.7	17.4	17.0	16.7	*16.1*
15	17.0	...	15.0	...	14.0	...	13.2	...	12.5	...	11.9	11.7	11.4	11.2	10.9	10.7	10.5	10.3
16	17.0	...	17.0	...	17.0	...	16.7	...	16.5	...	16.1	15.7	15.4	15.1	14.8	14.5	14.2	*13.7*
17	26.5	...	24.3	...	22.1	...	20.5	...	19.6	...	18.9	18.6	18.3	18.0	17.7	...	...	...
18	26.5	...	26.5	...	25.0	...	23.8	...	23.0	...	22.5	22.3	22.1	21.9	21.7	...	...	...
19	26.5	...	24.3	...	22.1	...	20.5	...	19.6	...	18.9	18.6	18.3	18.0	17.7	...	...	...
20	26.5	...	26.5	...	25.0	...	23.8	...	23.0	...	22.5	22.3	22.1	21.9	21.7	...	...	...
21	22.5	...	20.7	...	18.8	...	17.4	...	16.7	...	16.1	15.8	15.6	15.3	15.0	...	...	...
22	22.5	...	22.5	...	21.3	...	20.2	...	19.6	...	19.1	19.0	18.8	18.6	18.4	...	...	...
23	22.5	...	20.7	...	18.8	...	17.4	...	16.7	...	16.1	15.8	15.6	15.3	15.0	...	...	...
24	22.5	...	22.5	...	21.3	...	20.2	...	19.6	...	19.1	19.0	18.8	18.6	18.4	...	...	...
25	26.5	...	24.3	...	22.1	...	20.5	...	19.6	...	18.9	18.6	18.3	18.0	17.7	...	...	...
26	26.5	...	26.5	...	25.0	...	23.8	...	23.0	...	22.5	22.3	22.1	21.9	21.7	...	...	...
27	27.1	...	26.2	...	23.8	...	21.9	...	20.5	...	19.4	19.0	18.6	18.3	18.0	...	...	...
28	27.1	...	26.2	...	23.8	...	21.9	...	20.5	...	19.4	19.0	18.6	18.3	18.0	...	...	...
29	27.1	...	27.1	...	25.7	...	24.6	...	23.8	...	23.3	23.1	22.9	22.8	22.6	...	...	...
30	27.1	...	26.2	...	23.8	...	21.9	...	20.5	...	19.4	19.0	18.6	18.3	18.0	...	...	...
31	27.1	...	27.1	...	25.7	...	24.6	...	23.8	...	23.3	23.1	22.9	22.8	22.6	...	...	...
32	23.1	...	22.2	...	20.2	...	18.7	...	17.4	...	16.5	16.1	15.8	15.5	15.3	...	...	...
33	23.1	...	23.1	...	21.8	...	20.9	...	20.2	...	19.8	19.6	19.5	19.4	19.2	...	...	...
34	23.1	...	22.2	...	20.2	...	18.7	...	17.4	...	16.5	16.1	15.8	15.5	15.3	...	...	...
35	23.1	...	23.1	...	21.8	...	20.9	...	20.2	...	19.8	19.6	19.5	19.4	19.2	...	...	...
36	27.1	...	26.2	...	23.8	...	21.9	...	20.5	...	19.4	19.0	18.6	18.3	18.0	...	...	...
37	27.1	...	27.1	...	25.7	...	24.6	...	23.8	...	23.3	23.1	22.9	22.8	22.6	...	...	...
38	27.1	...	26.2	...	23.8	...	21.9	...	20.5	...	19.4	19.0	18.6	18.3	18.0	...	...	...
39	27.1	...	27.1	...	25.7	...	24.6	...	23.8	...	23.3	23.1	22.9	22.8	22.6	...	...	...
40	27.1	...	26.2	...	23.8	...	21.9	...	20.5	...	19.4	19.0	18.6	18.3	18.0	...	...	...
41	27.1	...	27.1	...	25.7	...	24.6	...	23.8	...	23.3	23.1	22.9	22.8	22.6	...	...	...
42	23.1	...	22.2	...	20.2	...	18.7	...	17.4	...	16.5	16.1	15.8	15.5	15.3	...	...	...
43	23.1	...	23.1	...	21.8	...	20.9	...	20.2	...	19.8	19.6	19.5	19.4	19.2	...	...	...
44	28.6	...	26.2	...	23.8	...	21.9	...	20.5	...	19.4	19.0	18.6	18.3	18.0	...	...	...
45	24.3	...	22.2	...	20.2	...	18.7	...	17.4	...	16.5	16.1	15.8	15.5	15.3	...	...	...

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																	
	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	1700	1750	1800	
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	11.9	*10.0*	*7.8*	*6.0*	*4.7*	*3.8*	*3.1*	*2.4*	*1.8*	*1.5*	*1.1*	...	...	...	...	...	...	
3	*12.7*	*10.0*	*7.8*	*6.0*	*4.7*	*3.8*	*3.1*	*2.4*	*1.8*	*1.5*	*1.1*	...	...	...	...	...	...	
4	11.9	*10.0*	*7.8*	*6.0*	*4.7*	*3.8*	*3.1*	*2.4*	*1.8*	*1.5*	*1.1*	*0.90*	*0.68*	*0.48*	...	...	...	
5	*12.7*	*10.0*	*7.8*	*6.0*	*4.7*	*3.8*	*3.1*	*2.4*	*1.8*	*1.5*	*1.1*	*0.90*	*0.68*	*0.48*	...	...	...	
6	11.9	*10.0*	*7.8*	*6.0*	*4.7*	*3.8*	*3.1*	*2.4*	*1.8*	*1.5*	*1.1*	...	...	...	...	...	...	
7	*12.7*	*10.0*	*7.8*	*6.0*	*4.7*	*3.8*	*3.1*	*2.4*	*1.8*	*1.5*	*1.1*	...	...	...	...	...	...	
8	11.9	*10.0*	*7.8*	*6.0*	*4.7*	*3.8*	*3.1*	*2.4*	*1.8*	*1.5*	*1.1*	...	...	...	...	...	...	
9	*12.7*	*10.0*	*7.8*	*6.0*	*4.7*	*3.8*	*3.1*	*2.4*	*1.8*	*1.5*	*1.1*	...	...	...	...	...	...	
10	*12.7*	*10.0*	*7.8*	*6.0*	*4.7*	*3.8*	*3.1*	*2.4*	*1.8*	*1.5*	*1.1*	*0.90*	*0.68*	*0.48*	...	...	...	
11	11.9	*10.0*	*7.8*	*6.0*	*4.7*	*3.8*	*3.1*	*2.4*	*1.8*	*1.5*	*1.1*	...	...	...	...	...	...	
12	*12.7*	*10.0*	*7.8*	*6.0*	*4.7*	*3.8*	*3.1*	*2.4*	*1.8*	*1.5*	*1.1*	...	...	...	...	...	...	
13	11.9	*10.0*	*7.8*	*6.0*	*4.7*	*3.8*	*3.1*	*2.4*	*1.8*	*1.5*	*1.1*	*0.90*	*0.68*	*0.48*	...	...	...	
14	*12.7*	*10.0*	*7.8*	*6.0*	*4.7*	*3.8*	*3.1*	*2.4*	*1.8*	*1.5*	*1.1*	*0.90*	*0.68*	*0.48*	...	...	...	
15	10.1	*8.5*	*6.6*	*5.1*	*4.0*	*3.2*	*2.6*	*2.0*	*1.5*	*1.3*	*0.94*	*0.77*	*0.58*	*0.41*	...	...	...	
16	*10.8*	*8.5*	*6.6*	*5.1*	*4.0*	*3.2*	*2.6*	*2.0*	*1.5*	*1.3*	*0.94*	*0.77*	*0.58*	*0.41*	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
	1	46Fe–24Ni–21Cr–6Mo–N	Wld. pipe	SB–675	...	N08367	Solution ann.
	2	46Fe–24Ni–21Cr–6Mo–N	Wld. tube	SB–676	...	N08367	Solution ann.
	3	46Fe–24Ni–21Cr–6Mo–N	Wld. tube	SB–676	...	N08367	Solution ann.
	4	46Fe–24Ni–21Cr–6Mo–N	Plate, sheet, strip	SB–688	...	N08367	Solution ann.
	5	46Fe–24Ni–21Cr–6Mo–N	Plate, sheet, strip	SB–688	...	N08367	Solution ann.
	6	46Fe–24Ni–21Cr–6Mo–N	Smls. pipe & tube	SB–690	...	N08367	Solution ann.
	7	46Fe–24Ni–21Cr–6Mo–N	Smls. pipe & tube	SB–690	...	N08367	Solution ann.
	8	46Fe–24Ni–21Cr–6Mo–N	Wld. pipe	SB–804	...	N08367	Solution ann.
	9	46Fe–24Ni–21Cr–6Mo–N	Wld. pipe	SB–804	...	N08367	Solution ann.
	10	46Fe–24Ni–21Cr–6Mo–N	Castings	SA–351	CN3MN	J94651	Solution ann.
	11	25Ni–47Fe–21Cr–5Mo	Plate, sheet, strip	SB–599	...	N08700	Solution ann.
	12	25Ni–47Fe–21Cr–5Mo	Plate, sheet, strip	SB–599	...	N08700	Solution ann.
	13	25Ni–47Fe–21Cr–5Mo	Bar, wire	SB–672	...	N08700	Solution ann.
	14	32Ni–45Fe–20Cr–Cb	Castings	SA–351	CT15C	...	As cast
	15	33Ni–42Fe–21Cr	Smls. tube	SB–163	...	N08800	Annealed
	16	33Ni–42Fe–21Cr	Smls. tube	SB–163	...	N08800	Annealed
	17	33Ni–42Fe–21Cr	Smls. & wld. fittings	SB–366	...	N08800	Annealed
	18	33Ni–42Fe–21Cr	Smls. pipe & tube	SB–407	...	N08800	Annealed
	19	33Ni–42Fe–21Cr	Smls. pipe & tube	SB–407	...	N08800	Annealed
	20	33Ni–42Fe–21Cr	Bar	SB–408	...	N08800	Annealed
	21	33Ni–42Fe–21Cr	Bar	SB–408	...	N08800	Annealed
	22	33Ni–42Fe–21Cr	Plate	SB–409	...	N08800	Annealed
	23	33Ni–42Fe–21Cr	Plate	SB–409	...	N08800	Annealed
	24	33Ni–42Fe–21Cr	Wld. pipe	SB–514	...	N08800	Annealed
	25	33Ni–42Fe–21Cr	Wld. pipe	SB–514	...	N08800	Annealed
	26	33Ni–42Fe–21Cr	Wld. tube	SB–515	...	N08800	Annealed
	27	33Ni–42Fe–21Cr	Wld. tube	SB–515	...	N08800	Annealed
	28	33Ni–42Fe–21Cr	Forgings	SB–564	...	N08800	Annealed
	29	33Ni–42Fe–21Cr	Forgings	SB–564	...	N08800	Annealed
	30	32Ni–44Fe–21Cr	Smls. tube	SB–163	...	N08801	Ann./stabilized
	31	32Ni–44Fe–21Cr	Smls. tube	SB–163	...	N08801	Ann./stabilized
	32	32Ni–44Fe–21Cr	Smls. pipe & tube	SB–407	...	N08801	Ann./stabilized
	33	32Ni–44Fe–21Cr	Smls. pipe & tube	SB–407	...	N08801	Ann./stabilized
	34	33Ni–42Fe–21Cr	Smls. tube	SB–163	...	N08810	Annealed
(**21**)	35	33Ni–42Fe–21Cr	Smls. tube	SB–163	...	N08810	Annealed
	36	33Ni–42Fe–21Cr	Smls. pipe & tube	SB–407	...	N08810	Annealed
	37	33Ni–42Fe–21Cr	Smls. pipe & tube	SB–407	...	N08810	Hot fin./ann.
	38	33Ni–42Fe–21Cr	Bar	SB–408	...	N08810	Annealed
(**21**)	39	33Ni–42Fe–21Cr	Bar	SB–408	...	N08810	Annealed
	40	33Ni–42Fe–21Cr	Plate	SB–409	...	N08810	Annealed
(**21**)	41	33Ni–42Fe–21Cr	Plate	SB–409	...	N08810	Annealed
	42	33Ni–42Fe–21Cr	Wld. pipe	SB–514	...	N08810	Annealed
	43	33Ni–42Fe–21Cr	Wld. pipe	SB–514	...	N08810	Annealed
	44	33Ni–42Fe–21Cr	Wld. tube	SB–515	...	N08810	Annealed
	45	33Ni–42Fe–21Cr	Wld. tube	SB–515	...	N08810	Annealed

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Size/ Thickness, in.	P-No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	≤3/16	45	100	45	NP	800	800	650	NFN–12	G5, G14
2	≤3/16	45	100	45	NP	800	800	650	NFN–12	G14
3	≤3/16	45	100	45	NP	800	800	650	NFN–12	G5, G14
4	≤3/16	45	100	45	NP	800	800	650	NFN–12	...
5	≤3/16	45	100	45	NP	800	800	650	NFN–12	G5
6	≤3/16	45	100	45	NP	800	800	650	NFN–12	...
7	≤3/16	45	100	45	NP	800	800	650	NFN–12	G5
8	≤3/16	45	100	45	NP	800	800	650	NFN–12	G14
9	≤3/16	45	100	45	NP	800	800	650	NFN–12	G5, G14
10	...	45	80	38	NP	800	800	650	NFN–12	G15
11	...	45	80	35	NP	NP	650	650	NFN–8	...
12	...	45	80	35	NP	NP	650	650	NFN–8	G5
13	...	45	80	35	NP	NP	650	650	NFN–8	...
14	...	45	63	25	NP	NP	1600	650	NFN–9	G4, G15
15	...	45	75	30	NP	800	1500	NP	NFN–8	G5, T14
16	...	45	75	30	NP	NP	1500	NP	NFN–8	T15
17	...	45	75	30	NP	NP	1500	NP	NFN–8	G5, T14, W12
18	...	45	75	30	1500	800	1500	NP	NFN–8	G5, T14
19	...	45	75	30	1500	NP	1500	NP	NFN–8	T15
20	...	45	75	30	1500	800	1500	NP	NFN–8	G5, T14
21	...	45	75	30	1500	NP	1500	NP	NFN–8	T15
22	...	45	75	30	1500	800	1500	NP	NFN–8	G5, T14
23	...	45	75	30	1500	NP	1500	NP	NFN–8	T15
24	...	45	75	30	NP	NP	1500	NP	NFN–8	G14, T15
25	...	45	75	30	NP	NP	1500	NP	NFN–8	G5, G14, T14
26	...	45	75	30	1500	NP	1500	NP	NFN–8	G5, G14, T14
27	...	45	75	30	1500	NP	1500	NP	NFN–8	G14, T15
28	...	45	75	30	1500	800	1500	NP	NFN–8	G5, T14
29	...	45	75	30	1500	NP	1500	NP	NFN–8	T15
30	...	45	65	25	1050	NP	900	NP	NFN–9	H4
31	...	45	65	25	1050	NP	900	NP	NFN–9	G5, H4
32	...	45	65	25	1050	NP	900	NP	NFN–9	H4
33	...	45	65	25	1050	NP	900	NP	NFN–9	G5, H4
34	...	45	65	25	NP	NP	1650	NP	NFN–9	G4, T16
35	...	45	65	25	NP	800	1650	NP	NFN–9	G4, G5, T15
36	...	45	65	25	1500	NP	1800	NP	NFN–9	G4, T16
37	...	45	65	25	1500	800	1800	NP	NFN–9	G4, G5, T15
38	...	45	65	25	1500	NP	1650	NP	NFN–9	G4, T16
39	...	45	65	25	1500	800	1650	NP	NFN–9	G4, G5, T15
40	...	45	65	25	1500	NP	1650	NP	NFN–9	G4, T16
41	...	45	65	25	1500	800	1650	NP	NFN–9	G4, G5, T15
42	...	45	65	25	NP	NP	1650	NP	NFN–9	G4, G14, T16
43	...	45	65	25	NP	NP	1650	NP	NFN–9	G4, G5, G14, T15
44	...	45	65	25	1500	NP	1650	NP	NFN–9	G4, G14, T16
45	...	45	65	25	1500	NP	1650	NP	NFN–9	G4, G5, G14, T15

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																	
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950
1	24.3	...	24.3	...	23.0	...	22.0	...	21.3	...	20.8	20.7	20.5	20.4	20.2	...	...	...
2	24.3	...	22.2	...	20.2	...	18.7	...	17.4	...	16.5	16.1	15.8	15.5	15.3	...	...	...
3	24.3	...	24.3	...	23.0	...	22.0	...	21.3	...	20.8	20.7	20.5	20.4	20.2	...	...	...
4	28.6	...	26.2	...	23.8	...	21.9	...	20.5	...	19.4	19.0	18.6	18.3	18.0	...	...	...
5	28.6	...	28.6	...	27.0	...	25.8	...	25.0	...	24.5	24.3	24.1	24.0	23.8	...	...	...
6	28.6	...	26.2	...	23.8	...	21.9	...	20.5	...	19.4	19.0	18.6	18.3	18.0	...	...	...
7	28.6	...	28.6	...	27.0	...	25.8	...	25.0	...	24.5	24.3	24.1	24.0	23.8	...	...	...
8	24.3	...	22.2	...	20.2	...	18.7	...	17.4	...	16.5	16.1	15.8	15.5	15.3	...	...	...
9	24.3	...	24.3	...	23.0	...	22.0	...	21.3	...	20.8	20.7	20.5	20.4	20.2	...	...	...
10	22.9	...	21.4	...	18.8	...	16.9	...	15.7	...	14.9	14.7	14.5	14.4	14.2	...	...	...
11	22.9	...	21.0	...	19.0	...	17.7	...	17.1	...	16.5	15.8	...	...	...	...	...	...
12	22.9	...	22.9	...	22.6	...	22.0	...	21.5	...	21.4	21.4	...	...	...	...	...	...
13	22.9	...	21.0	...	19.0	...	17.7	...	17.1	...	16.5	15.8	...	...	...	...	...	...
14	16.7	...	15.7	...	15.3	...	14.9	...	14.6	...	14.2	13.9	13.7	13.5	13.3	13.1	12.9	12.7
15	20.0	...	20.0	...	20.0	...	20.0	...	20.0	...	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
16	20.0	...	18.5	...	17.8	...	17.2	...	16.8	...	16.3	16.1	15.9	15.7	15.5	15.3	15.1	14.9
17	20.0	...	20.0	...	20.0	...	20.0	...	20.0	...	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
18	20.0	...	20.0	...	20.0	...	20.0	...	20.0	...	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
19	20.0	...	18.5	...	17.8	...	17.2	...	16.8	...	16.3	16.1	15.9	15.7	15.5	15.3	15.1	14.9
20	20.0	...	20.0	...	20.0	...	20.0	...	20.0	...	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
21	20.0	...	18.5	...	17.8	...	17.2	...	16.8	...	16.3	16.1	15.9	15.7	15.5	15.3	15.1	14.9
22	20.0	...	20.0	...	20.0	...	20.0	...	20.0	...	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
23	20.0	...	18.5	...	17.8	...	17.2	...	16.8	...	16.3	16.1	15.9	15.7	15.5	15.3	15.1	14.9
24	17.0	...	15.7	...	15.1	...	14.6	...	14.2	...	13.9	13.7	13.5	13.3	13.2	13.0	12.8	12.7
25	17.0	...	17.0	...	17.0	...	17.0	...	17.0	...	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
26	17.0	...	17.0	...	17.0	...	17.0	...	17.0	...	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
27	17.0	...	15.7	...	15.1	...	14.6	...	14.2	...	13.9	13.7	13.5	13.3	13.2	13.0	12.8	12.7
28	20.0	...	20.0	...	20.0	...	20.0	...	20.0	...	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
29	20.0	...	18.5	...	17.8	...	17.2	...	16.8	...	16.3	16.1	15.9	15.7	15.5	15.3	15.1	14.9
30	16.7	...	15.4	...	14.4	...	13.6	...	12.9	...	12.2	11.9	11.6	11.4	11.1	10.9	10.7	10.5
31	16.7	...	16.7	...	16.7	...	16.7	...	16.7	...	16.5	16.1	15.7	15.3	15.0	14.7	14.5	14.2
32	16.7	...	15.4	...	14.4	...	13.6	...	12.9	...	12.2	11.9	11.6	11.4	11.1	10.9	10.7	10.5
33	16.7	...	16.7	...	16.7	...	16.7	...	16.7	...	16.5	16.1	15.7	15.3	15.0	14.7	14.5	14.2
34	16.7	...	15.4	...	14.4	...	13.6	...	12.9	...	12.2	11.9	11.6	11.4	11.1	10.9	10.7	10.5
35	16.7	...	16.7	...	16.7	...	16.7	...	16.7	...	16.5	16.1	15.7	15.3	15.0	14.7	14.5	14.2
36	16.7	...	15.4	...	14.4	...	13.6	...	12.9	...	12.2	11.9	11.6	11.4	11.1	10.9	10.7	10.5
37	16.7	...	16.7	...	16.7	...	16.7	...	16.7	...	16.5	16.1	15.7	15.3	15.0	14.7	14.5	14.2
38	16.7	...	15.4	...	14.4	...	13.6	...	12.9	...	12.2	11.9	11.6	11.4	11.1	10.9	10.7	10.5
39	16.7	...	16.7	...	16.7	...	16.7	...	16.7	...	16.5	16.1	15.7	15.3	15.0	14.7	14.5	14.2
40	16.7	...	15.4	...	14.4	...	13.6	...	12.9	...	12.2	11.9	11.6	11.4	11.1	10.9	10.7	10.5
41	16.7	...	16.7	...	16.7	...	16.7	...	16.7	...	16.5	16.1	15.7	15.3	15.0	14.7	14.5	14.2
42	14.2	...	13.1	...	12.3	...	11.6	...	10.9	...	10.4	10.1	9.9	9.7	9.5	9.3	9.1	9.0
43	14.2	...	14.2	...	14.2	...	14.2	...	14.2	...	14.0	13.7	13.3	13.0	12.8	12.5	12.3	12.1
44	14.2	...	13.1	...	12.3	...	11.6	...	10.9	...	10.4	10.1	9.9	9.7	9.5	9.3	9.1	9.0
45	14.2	...	14.2	...	14.2	...	14.2	...	14.2	...	14.0	13.7	13.3	13.0	12.8	12.5	12.3	12.1

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																	
	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	1700	1750	1800	
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	11.5	10.1	8.9	7.8	6.7	5.7	4.8	4.0	3.3	2.7	2.2	1.8	1.4	...	...	...	...	
15	19.9	*17.0*	*13.0*	*9.8*	*6.6*	*4.2*	*2.0*	*1.6*	*1.1*	*1.0*	*0.80*	...	...	...	...	...	...	
16	14.7	14.5	*13.0*	*9.8*	*6.6*	*4.2*	*2.0*	*1.6*	*1.1*	*1.0*	*0.80*	...	...	...	...	...	...	
17	19.9	*17.0*	*13.0*	*9.8*	*6.6*	*4.2*	*2.0*	*1.6*	*1.1*	*1.0*	*0.80*	...	...	...	...	...	...	
18	19.9	*17.0*	*13.0*	*9.8*	*6.6*	*4.2*	*2.0*	*1.6*	*1.1*	*1.0*	*0.80*	...	...	...	...	...	...	
19	14.7	14.5	*13.0*	*9.8*	*6.6*	*4.2*	*2.0*	*1.6*	*1.1*	*1.0*	*0.80*	...	...	...	...	...	...	
20	19.9	*17.0*	*13.0*	*9.8*	*6.6*	*4.2*	*2.0*	*1.6*	*1.1*	*1.0*	*0.80*	...	...	...	...	...	...	
21	14.7	14.5	*13.0*	*9.8*	*6.6*	*4.2*	*2.0*	*1.6*	*1.1*	*1.0*	*0.80*	...	...	...	...	...	...	
22	19.9	*17.0*	*13.0*	*9.8*	*6.6*	*4.2*	*2.0*	*1.6*	*1.1*	*1.0*	*0.80*	...	...	...	...	...	...	
23	14.7	14.5	*13.0*	*9.8*	*6.6*	*4.2*	*2.0*	*1.6*	*1.1*	*1.0*	*0.80*	...	...	...	...	...	...	
24	12.5	12.3	*11.1*	*8.3*	*5.6*	*3.6*	*1.7*	*1.4*	*0.94*	*0.85*	*0.68*	...	...	...	...	...	...	
25	16.9	*14.5*	*11.1*	*8.3*	*5.6*	*3.6*	*1.7*	*1.4*	*0.94*	*0.85*	*0.68*	...	...	...	...	...	...	
26	16.9	*14.5*	*11.1*	*8.3*	*5.6*	*3.6*	*1.7*	*1.4*	*0.94*	*0.85*	*0.68*	...	...	...	...	...	...	
27	12.5	12.3	*11.1*	*8.3*	*5.6*	*3.6*	*1.7*	*1.4*	*0.94*	*0.85*	*0.68*	...	...	...	...	...	...	
28	19.9	*17.0*	*13.0*	*9.8*	*6.6*	*4.2*	*2.0*	*1.6*	*1.1*	*1.0*	*0.80*	...	...	...	...	...	...	
29	14.7	14.5	*13.0*	*9.8*	*6.6*	*4.2*	*2.0*	*1.6*	*1.1*	*1.0*	*0.80*	...	...	...	...	...	...	
30	10.4	10.2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	14.0	13.8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	10.4	10.2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	14.0	13.8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	10.4	10.2	10.0	*9.3*	*7.4*	*5.9*	*4.7*	*3.8*	*3.0*	*2.4*	*1.9*	*1.4*	*1.1*	*0.86*	...	...	...	
35	14.0	13.8	*11.6*	*9.3*	*7.4*	*5.9*	*4.7*	*3.8*	*3.0*	*2.4*	*1.9*	*1.4*	*1.1*	*0.86*	...	...	...	(**21**)
36	10.4	10.2	10.0	*9.3*	*7.4*	*5.9*	*4.7*	*3.8*	*3.0*	*2.4*	*1.9*	*1.4*	*1.1*	*0.86*	*0.71*	*0.56*	*0.44*	
37	14.0	13.8	*11.6*	*9.3*	*7.4*	*5.9*	*4.7*	*3.8*	*3.0*	*2.4*	*1.9*	*1.4*	*1.1*	*0.86*	*0.71*	*0.56*	*0.44*	
38	10.4	10.2	10.0	*9.3*	*7.4*	*5.9*	*4.7*	*3.8*	*3.0*	*2.4*	*1.9*	*1.4*	*1.1*	*0.86*	...	...	...	
39	14.0	13.8	*11.6*	*9.3*	*7.4*	*5.9*	*4.7*	*3.8*	*3.0*	*2.4*	*1.9*	*1.4*	*1.1*	*0.86*	...	...	...	(**21**)
40	10.4	10.2	10.0	*9.3*	*7.4*	*5.9*	*4.7*	*3.8*	*3.0*	*2.4*	*1.9*	*1.4*	*1.1*	*0.86*	...	...	...	
41	14.0	13.8	*11.6*	*9.3*	*7.4*	*5.9*	*4.7*	*3.8*	*3.0*	*2.4*	*1.9*	*1.4*	*1.1*	*0.86*	...	...	...	(**21**)
42	8.8	8.7	8.5	*7.9*	*6.3*	*5.0*	*4.0*	*3.2*	*2.6*	*2.0*	*1.6*	*1.2*	*0.94*	*0.73*	...	...	...	
43	11.9	11.7	*9.9*	*7.9*	*6.3*	*5.0*	*4.0*	*3.2*	*2.6*	*2.0*	*1.6*	*1.2*	*0.94*	*0.73*	...	...	...	
44	8.8	8.7	8.5	*7.9*	*6.3*	*5.0*	*4.0*	*3.2*	*2.6*	*2.0*	*1.6*	*1.2*	*0.94*	*0.73*	...	...	...	
45	11.9	11.7	*9.9*	*7.9*	*6.3*	*5.0*	*4.0*	*3.2*	*2.6*	*2.0*	*1.6*	*1.2*	*0.94*	*0.73*	...	...	...	

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
	1	33Ni–42Fe–21Cr	Forgings	SB–564	...	N08810	Annealed
(**21**)	2	33Ni–42Fe–21Cr	Forgings	SB–564	...	N08810	Annealed
	3	33Ni–42Fe–21Cr	Smls. tube	SB–163	...	N08811	Annealed
	4	33Ni–42Fe–21Cr	Smls. tube	SB–163	...	N08811	Annealed
	5	33Ni–42Fe–21Cr	Smls. pipe & tube	SB–407	...	N08811	Annealed
	6	33Ni–42Fe–21Cr	Smls. pipe & tube	SB–407	...	N08811	Annealed
	7	33Ni–42Fe–21Cr	Bar	SB–408	...	N08811	Annealed
	8	33Ni–42Fe–21Cr	Bar	SB–408	...	N08811	Annealed
	9	33Ni–42Fe–21Cr	Plate	SB–409	...	N08811	Annealed
	10	33Ni–42Fe–21Cr	Plate	SB–409	...	N08811	Annealed
	11	33Ni–42Fe–21Cr	Wld. tube	SB–515	...	N08811	Annealed
	12	33Ni–42Fe–21Cr	Wld. tube	SB–515	...	N08811	Annealed
	13	33Ni–42Fe–21Cr	Forgings	SB–564	...	N08811	Annealed
	14	33Ni–42Fe–21Cr	Forgings	SB–564	...	N08811	Annealed
	15	42Ni–21.5Cr–3Mo–2.3Cu	Smls. tube	SB–163	...	N08825	Annealed
	16	42Ni–21.5Cr–3Mo–2.3Cu	Smls. tube	SB–163	...	N08825	Annealed
	17	42Ni–21.5Cr–3Mo–2.3Cu	Smls. & wld. fittings	SB–366	...	N08825	Annealed
	18	42Ni–21.5Cr–3Mo–2.3Cu	Smls. pipe & tube	SB–423	...	N08825	Cold worked/ann.
	19	42Ni–21.5Cr–3Mo–2.3Cu	Smls. pipe & tube	SB–423	...	N08825	Cold worked/ann.
	20	42Ni–21.5Cr–3Mo–2.3Cu	Plate	SB–424	...	N08825	Annealed
	21	42Ni–21.5Cr–3Mo–2.3Cu	Plate	SB–424	...	N08825	Annealed
	22	42Ni–21.5Cr–3Mo–2.3Cu	Bar, rod	SB–425	...	N08825	Annealed
	23	42Ni–21.5Cr–3Mo–2.3Cu	Bar, rod	SB–425	...	N08825	Annealed
	24	42Ni–21.5Cr–3Mo–2.3Cu	Forgings	SB–564	...	N08825	Annealed
	25	42Ni–21.5Cr–3Mo–2.3Cu	Forgings	SB–564	...	N08825	Annealed
	26	42Ni–21.5Cr–3Mo–2.3Cu	Wld. tube	SB–704	...	N08825	Annealed
	27	42Ni–21.5Cr–3Mo–2.3Cu	Wld. tube	SB–704	...	N08825	Annealed
	28	42Ni–21.5Cr–3Mo–2.3Cu	Wld. pipe	SB–705	...	N08825	Annealed
	29	42Ni–21.5Cr–3Mo–2.3Cu	Wld. pipe	SB–705	...	N08825	Annealed
	30	44Fe–25Ni–21Cr–Mo	Forgings	SA–182	...	N08904	Annealed
	31	44Fe–25Ni–21Cr–Mo	Plate, sheet, strip	SA–240	...	N08904	Annealed
	32	44Fe–25Ni–21Cr–Mo	Wld. tube	SA–249	...	N08904	Annealed
	33	44Fe–25Ni–21Cr–Mo	Smls. pipe	SA–312	...	N08904	Annealed
	34	44Fe–25Ni–21Cr–Mo	Wld. pipe	SA–312	...	N08904	Annealed
	35	44Fe–25Ni–21Cr–Mo	Fittings	SA–403	...	N08904	Annealed
	36	44Fe–25Ni–21Cr–Mo	Bar, wire	SB–649	...	N08904	Annealed
	37	44Fe–25Ni–21Cr–Mo	Smls. tube	SB–677	...	N08904	Annealed
	38	25Ni–20Cr–6Mo–Cu–N	Plate, sheet, strip	SB–625	...	N08925	Annealed
	39	25Ni–20Cr–6Mo–Cu–N	Plate, sheet, strip	SB–625	...	N08925	Annealed
	40	25Ni–20Cr–6Mo–Cu–N	Bar, wire	SB–649	...	N08925	Annealed
	41	25Ni–20Cr–6Mo–Cu–N	Bar, wire	SB–649	...	N08925	Annealed
	42	25Ni–20Cr–6Mo–Cu–N	Wld. pipe	SB–673	...	N08925	Annealed
	43	25Ni–20Cr–6Mo–Cu–N	Wld. pipe	SB–673	...	N08925	Annealed
	44	25Ni–20Cr–6Mo–Cu–N	Wld. tube	SB–674	...	N08925	Annealed
	45	25Ni–20Cr–6Mo–Cu–N	Wld. tube	SB–674	...	N08925	Annealed

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Size/ Thickness, in.	P-No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	...	45	65	25	1500	NP	1650	NP	NFN-9	G4, T16
2	...	45	65	25	1500	800	1650	NP	NFN-9	G4, G5, T15
3	...	45	65	25	1500	NP	1650	NP	NFN-9	G4, T17
4	...	45	65	25	1500	NP	1650	NP	NFN-9	G4, G5, T15
5	...	45	65	25	1500	NP	1650	NP	NFN-9	G4, T17
6	...	45	65	25	1500	NP	1650	NP	NFN-9	G4, G5, T15
7	...	45	65	25	1500	NP	1650	NP	NFN-9	G4, T17
8	...	45	65	25	1500	NP	1650	NP	NFN-9	G4, G5, T15
9	...	45	65	25	1500	NP	1650	NP	NFN-9	G4, T17
10	...	45	65	25	1500	NP	1650	NP	NFN-9	G4, G5, T15
11	...	45	65	25	1500	NP	1650	NP	NFN-9	G4, G14, T17
12	...	45	65	25	1500	NP	1650	NP	NFN-9	G4, G5, G14, T16
13	...	45	65	25	1500	NP	1650	NP	NFN-9	G4, T17
14	...	45	65	25	1500	NP	1650	NP	NFN-9	G4, G5, T15
15	...	45	85	35	NP	800 (Cl. 3 only)	1000	650	NFN-7	...
16	...	45	85	35	NP	800 (Cl. 3 only)	1000	650	NFN-7	G5
17	...	45	85	35	NP	NP	1000	650	NFN-7	G5, W12
18	...	45	85	35	1000	800 (Cl. 3 only)	1000	650	NFN-7	...
19	...	45	85	35	1000	800 (Cl. 3 only)	1000	650	NFN-7	G5
20	...	45	85	35	1000	800 (Cl. 3 only)	1000	650	NFN-7	...
21	...	45	85	35	1000	800 (Cl. 3 only)	1000	650	NFN-7	G5
22	...	45	85	35	1000	800 (Cl. 3 only)	1000	650	NFN-7	...
23	...	45	85	35	1000	800 (Cl. 3 only)	1000	650	NFN-7	G5
24	...	45	85	35	NP	NP	1000	NP	NFN-7	...
25	...	45	85	35	NP	NP	1000	NP	NFN-7	G5
26	...	45	85	35	NP	800	1000	650	NFN-7	G14
27	...	45	85	35	NP	NP	1000	650	NFN-7	G5, G14
28	...	45	85	35	NP	NP	1000	650	NFN-7	G14
29	...	45	85	35	NP	NP	1000	650	NFN-7	G5, G14
30	...	45	71	31	NP	700	700	650	NFN-9	W12
31	...	45	71	31	NP	700	700	650	NFN-9	...
32	...	45	71	31	NP	700	700	650	NFN-9	G14
33	...	45	71	31	NP	700	700	650	NFN-9	...
34	...	45	71	31	NP	700	700	650	NFN-9	G14
35	...	45	71	31	NP	700	700	650	NFN-9	W12
36	...	45	71	31	NP	700	700	650	NFN-9	...
37	...	45	71	31	NP	700	700	650	NFN-9	...
38	...	45	87	43	NP	NP	800	650	NFN-12	...
39	...	45	87	43	NP	NP	800	650	NFN-12	G5
40	...	45	87	43	NP	NP	800	650	NFN-12	...
41	...	45	87	43	NP	NP	800	650	NFN-12	G5
42	...	45	87	43	NP	NP	800	650	NFN-12	G14
43	...	45	87	43	NP	NP	800	650	NFN-12	G5, G14
44	...	45	87	43	NP	NP	800	650	NFN-12	G14
45	...	45	87	43	NP	NP	800	650	NFN-12	G5, G14

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																	
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950
1	16.7	...	15.4	...	14.4	...	13.6	...	12.9	...	12.2	11.9	11.6	11.4	11.1	10.9	10.7	10.5
2	16.7	...	16.7	...	16.7	...	16.7	...	16.7	...	16.5	16.1	15.7	15.3	15.0	14.7	14.5	14.2
3	16.7	...	15.4	...	14.4	...	13.6	...	12.9	...	12.2	11.9	11.6	11.4	11.1	10.9	10.7	10.5
4	16.7	...	16.7	...	16.7	...	16.7	...	16.7	...	16.5	16.1	15.7	15.3	15.0	14.7	14.5	14.2
5	16.7	...	15.4	...	14.4	...	13.6	...	12.9	...	12.2	11.9	11.6	11.4	11.1	10.9	10.7	10.5
6	16.7	...	16.7	...	16.7	...	16.7	...	16.7	...	16.5	16.1	15.7	15.3	15.0	14.7	14.5	14.2
7	16.7	...	15.4	...	14.4	...	13.6	...	12.9	...	12.2	11.9	11.6	11.4	11.1	10.9	10.7	10.5
8	16.7	...	16.7	...	16.7	...	16.7	...	16.7	...	16.5	16.1	15.7	15.3	15.0	14.7	14.5	14.2
9	16.7	...	15.4	...	14.4	...	13.6	...	12.9	...	12.2	11.9	11.6	11.4	11.1	10.9	10.7	10.5
10	16.7	...	16.7	...	16.7	...	16.7	...	16.7	...	16.5	16.1	15.7	15.3	15.0	14.7	14.5	14.2
11	14.2	...	13.1	...	12.3	...	11.6	...	10.9	...	10.4	10.1	9.9	9.7	9.5	9.3	9.1	9.0
12	14.2	...	14.2	...	14.2	...	14.2	...	14.2	...	14.0	13.7	13.3	13.0	12.8	12.5	12.3	12.1
13	16.7	...	15.4	...	14.4	...	13.6	...	12.9	...	12.2	11.9	11.6	11.4	11.1	10.9	10.7	10.5
14	16.7	...	16.7	...	16.7	...	16.7	...	16.7	...	16.5	16.1	15.7	15.3	15.0	14.7	14.5	14.2
15	23.3	...	21.4	...	20.3	...	19.4	...	18.5	...	17.8	17.5	17.3	17.2	17.0	17.0	16.9	16.8
16	23.3	...	23.3	...	23.3	...	23.3	...	23.3	...	23.3	23.3	23.3	23.2	23.0	22.9	22.8	22.6
17	23.3	...	23.3	...	23.3	...	23.3	...	23.3	...	23.3	23.3	23.3	23.2	23.0	22.9	22.8	22.6
18	23.3	...	21.4	...	20.3	...	19.4	...	18.5	...	17.8	17.5	17.3	17.2	17.0	17.0	16.9	16.8
19	23.3	...	23.3	...	23.3	...	23.3	...	23.3	...	23.3	23.3	23.3	23.2	23.0	22.9	22.8	22.6
20	23.3	...	21.4	...	20.3	...	19.4	...	18.5	...	17.8	17.5	17.3	17.2	17.0	17.0	16.9	16.8
21	23.3	...	23.3	...	23.3	...	23.3	...	23.3	...	23.3	23.3	23.3	23.2	23.0	22.9	22.8	22.6
22	23.3	...	21.4	...	20.3	...	19.4	...	18.5	...	17.8	17.5	17.3	17.2	17.0	17.0	16.9	16.8
23	23.3	...	23.3	...	23.3	...	23.3	...	23.3	...	23.3	23.3	23.3	23.2	23.0	22.9	22.8	22.6
24	23.3	...	21.4	...	20.3	...	19.4	...	18.5	...	17.8	17.5	17.3	17.2	17.0	17.0	16.9	16.8
25	23.3	...	23.3	...	23.3	...	23.3	...	23.3	...	23.3	23.3	23.3	23.2	23.0	22.9	22.8	22.6
26	19.8	...	18.2	...	17.3	...	16.5	...	15.8	...	15.2	14.9	14.7	14.6	14.5	14.4	14.3	14.2
27	19.8	...	19.8	...	19.8	...	19.8	...	19.8	...	19.8	19.8	19.8	19.7	19.6	19.5	19.4	19.2
28	19.8	...	18.2	...	17.3	...	16.5	...	15.8	...	15.2	14.9	14.7	14.6	14.5	14.4	14.3	14.2
29	19.8	...	19.8	...	19.8	...	19.8	...	19.8	...	19.8	19.8	19.8	19.7	19.6	19.5	19.4	19.2
30	20.3	...	16.7	...	15.1	...	13.8	...	12.7	...	11.9	11.6	11.4	...	...	...	...	...
31	20.3	...	16.7	...	15.1	...	13.8	...	12.7	...	11.9	11.6	11.4	...	...	...	...	...
32	17.2	...	14.2	...	12.9	...	11.8	...	10.8	...	10.1	9.9	9.7	...	...	...	...	...
33	20.3	...	16.7	...	15.1	...	13.8	...	12.7	...	11.9	11.6	11.4	...	...	...	...	...
34	17.2	...	14.2	...	12.9	...	11.8	...	10.8	...	10.1	9.9	9.7	...	...	...	...	...
35	20.3	...	16.7	...	15.1	...	13.8	...	12.7	...	11.9	11.6	11.4	...	...	...	...	...
36	20.3	...	16.7	...	15.1	...	13.8	...	12.7	...	11.9	11.6	11.4	...	...	...	...	...
37	20.3	...	16.7	...	15.1	...	13.8	...	12.7	...	11.9	11.6	11.4	...	...	...	...	...
38	24.9	...	23.2	...	21.3	...	19.8	...	18.3	...	17.3	17.0	16.9	16.9	16.9	...	...	...
39	24.9	...	24.9	...	23.9	...	23.0	...	22.1	...	21.4	21.1	20.8	20.4	20.1	...	...	...
40	24.9	...	23.2	...	21.3	...	19.8	...	18.3	...	17.3	17.0	16.9	16.9	16.9	...	...	...
41	24.9	...	24.9	...	23.9	...	23.0	...	22.1	...	21.4	21.1	20.8	20.4	20.1	...	...	...
42	21.1	...	19.7	...	18.1	...	16.8	...	15.6	...	14.7	14.4	14.4	14.4	14.4	...	...	...
43	21.1	...	21.1	...	20.4	...	19.5	...	18.8	...	18.2	17.9	17.7	17.4	17.0	...	...	...
44	21.1	...	19.7	...	18.1	...	16.8	...	15.6	...	14.7	14.4	14.4	14.4	14.4	...	...	...
45	21.1	...	21.1	...	20.4	...	19.5	...	18.8	...	18.2	17.9	17.7	17.4	17.0	...	...	...

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																	
	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	1700	1750	1800	
1	10.4	10.2	10.0	*9.3*	*7.4*	*5.9*	*4.7*	*3.8*	*3.0*	*2.4*	*1.9*	*1.4*	*1.1*	*0.86*	...	...	...	
2	14.0	13.8	*11.6*	*9.3*	*7.4*	*5.9*	*4.7*	*3.8*	*3.0*	*2.4*	*1.9*	*1.4*	*1.1*	*0.86*	...	...	...	(**21**)
3	10.4	10.2	10.0	9.8	*8.3*	*6.7*	*5.4*	*4.3*	*3.4*	*2.7*	*2.2*	*1.6*	*1.2*	*0.91*	...	...	...	
4	14.0	13.8	*12.9*	*10.4*	*8.3*	*6.7*	*5.4*	*4.3*	*3.4*	*2.7*	*2.2*	*1.6*	*1.2*	*0.91*	...	...	...	
5	10.4	10.2	10.0	9.8	*8.3*	*6.7*	*5.4*	*4.3*	*3.4*	*2.7*	*2.2*	*1.6*	*1.2*	*0.91*	...	...	...	
6	14.0	13.8	*12.9*	*10.4*	*8.3*	*6.7*	*5.4*	*4.3*	*3.4*	*2.7*	*2.2*	*1.6*	*1.2*	*0.91*	...	...	...	
7	10.4	10.2	10.0	9.8	*8.3*	*6.7*	*5.4*	*4.3*	*3.4*	*2.7*	*2.2*	*1.6*	*1.2*	*0.91*	...	...	...	
8	14.0	13.8	*12.9*	*10.4*	*8.3*	*6.7*	*5.4*	*4.3*	*3.4*	*2.7*	*2.2*	*1.6*	*1.2*	*0.91*	...	...	...	
9	10.4	10.2	10.0	9.8	*8.3*	*6.7*	*5.4*	*4.3*	*3.4*	*2.7*	*2.2*	*1.6*	*1.2*	*0.91*	...	...	...	
10	14.0	13.8	*12.9*	*10.4*	*8.3*	*6.7*	*5.4*	*4.3*	*3.4*	*2.7*	*2.2*	*1.6*	*1.2*	*0.91*	...	...	...	
11	8.8	8.7	8.5	8.3	*7.1*	*5.7*	*4.6*	*3.7*	*2.9*	*2.3*	*1.9*	*1.3*	*1.0*	*0.77*	...	...	...	
12	11.9	11.7	11.5	*8.8*	*7.1*	*5.7*	*4.6*	*3.7*	*2.9*	*2.3*	*1.9*	*1.3*	*1.0*	*0.77*	...	...	...	
13	10.4	10.2	10.0	9.8	*8.3*	*6.7*	*5.4*	*4.3*	*3.4*	*2.7*	*2.2*	*1.6*	*1.2*	*0.91*	...	...	...	
14	14.0	13.8	*12.9*	*10.4*	*8.3*	*6.7*	*5.4*	*4.3*	*3.4*	*2.7*	*2.2*	*1.6*	*1.2*	*0.91*	...	...	...	
15	16.5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	22.3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	22.3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	16.5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	22.3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	16.5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	22.3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	16.5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	22.3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	16.5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	22.3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	14.0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	18.9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	14.0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	18.9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
1	25Ni–20Cr–6Mo–Cu–N	Smls. pipe & tube	SB–677	...	N08925	Annealed
2	25Ni–20Cr–6Mo–Cu–N	Smls. pipe & tube	SB–677	...	N08925	Annealed
3	62Ni–28Mo–5Fe	Plate	SB–333	...	N10001	Annealed
4	62Ni–28Mo–5Fe	Plate	SB–333	...	N10001	Annealed
5	62Ni–28Mo–5Fe	Smls. & wld. fittings	SB–366	...	N10001	Annealed
6	62Ni–28Mo–5Fe	Wld. pipe	SB–619	...	N10001	Solution ann.
7	62Ni–28Mo–5Fe	Wld. pipe	SB–619	...	N10001	Solution ann.
8	62Ni–28Mo–5Fe	Smls. pipe & tube	SB–622	...	N10001	Solution ann.
9	62Ni–28Mo–5Fe	Smls. pipe & tube	SB–622	...	N10001	Solution ann.
10	62Ni–28Mo–5Fe	Wld. tube	SB–626	...	N10001	Solution ann.
11	62Ni–28Mo–5Fe	Wld. tube	SB–626	...	N10001	Solution ann.
12	62Ni–28Mo–5Fe	Rod	SB–335	...	N10001	Annealed
13	62Ni–28Mo–5Fe	Rod	SB–335	...	N10001	Annealed
14	62Ni–28Mo–5Fe	Rod	SB–335	...	N10001	Annealed
15	62Ni–28Mo–5Fe	Rod	SB–335	...	N10001	Annealed
16	62Ni–28Mo–5Fe	Sheet, strip	SB–333	...	N10001	Annealed
17	62Ni–28Mo–5Fe	Sheet, strip	SB–333	...	N10001	Annealed
18	70Ni–16Mo–7Cr–5Fe	Smls. & wld. fittings	SB–366	...	N10003	Annealed
19	70Ni–16Mo–7Cr–5Fe	Plate, sheet, strip	SB–434	...	N10003	Annealed
20	70Ni–16Mo–7Cr–5Fe	Rod	SB–573	...	N10003	Annealed
21	62Ni–25Mo–8Cr–2Fe	Smls. & wld. fittings	SB–366	...	N10242	Annealed
22	62Ni–25Mo–8Cr–2Fe	Plate, sheet, strip	SB–434	...	N10242	Annealed
23	62Ni–25Mo–8Cr–2Fe	Plate, sheet, strip	SB–434	...	N10242	Annealed
24	62Ni–25Mo–8Cr–2Fe	Forgings	SB–564	...	N10242	Annealed
25	62Ni–25Mo–8Cr–2Fe	Forgings	SB–564	...	N10242	Annealed
26	62Ni–25Mo–8Cr–2Fe	Rod	SB–573	...	N10242	Annealed
27	62Ni–25Mo–8Cr–2Fe	Rod	SB–573	...	N10242	Annealed
28	62Ni–25Mo–8Cr–2Fe	Wld. pipe	SB–619	...	N10242	Solution ann.
29	62Ni–25Mo–8Cr–2Fe	Wld. pipe	SB–619	...	N10242	Solution ann.
30	62Ni–25Mo–8Cr–2Fe	Smls. pipe & tube	SB–622	...	N10242	Solution ann.
31	62Ni–25Mo–8Cr–2Fe	Smls. pipe & tube	SB–622	...	N10242	Solution ann.
32	62Ni–25Mo–8Cr–2Fe	Wld. tube	SB–626	...	N10242	Solution ann.
33	62Ni–25Mo–8Cr–2Fe	Wld. tube	SB–626	...	N10242	Solution ann.
34	54Ni–16Mo–15Cr	Smls. & wld. fittings	SB–366	...	N10276	Solution ann.
35	54Ni–16Mo–15Cr	Forgings	SB–462	...	N10276	Solution ann.
36	54Ni–16Mo–15Cr	Forgings	SB–462	...	N10276	Solution ann.
37	54Ni–16Mo–15Cr	Forgings	SB–564	...	N10276	Solution ann.
38	54Ni–16Mo–15Cr	Forgings	SB–564	...	N10276	Solution ann.
39	54Ni–16Mo–15Cr	Rod	SB–574	...	N10276	Solution ann.
40	54Ni–16Mo–15Cr	Rod	SB–574	...	N10276	Solution ann.
41	54Ni–16Mo–15Cr	Plate, sheet, strip	SB–575	...	N10276	Solution ann.
42	54Ni–16Mo–15Cr	Plate, sheet, strip	SB–575	...	N10276	Solution ann.
43	54Ni–16Mo–15Cr	Wld. pipe	SB–619	...	N10276	Solution ann.
44	54Ni–16Mo–15Cr	Wld. pipe	SB–619	...	N10276	Solution ann.
45	54Ni–16Mo–15Cr	Wld. pipe	SB–619	...	N10276	Solution ann.

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Size/ Thickness, in.	P-No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	...	45	87	43	NP	NP	800	650	NFN–12	...
2	...	45	87	43	NP	NP	800	650	NFN–12	G5
3	...	44	100	45	NP	800 (Cl. 3 only)	800	650	NFN–5	...
4	...	44	100	45	NP	800 (Cl. 3 only)	800	650	NFN–5	G5
5	...	44	100	45	NP	NP	800	650	NFN–5	G5, W12
6	...	44	100	45	NP	NP	800	650	NFN–5	G14
7	...	44	100	45	NP	NP	800	650	NFN–5	G5, G14
8	...	44	100	45	NP	NP	800	650	NFN–5	...
9	...	44	100	45	NP	NP	800	650	NFN–5	G5
10	...	44	100	45	NP	NP	800	650	NFN–5	G14
11	...	44	100	45	NP	NP	800	650	NFN–5	G5, G14
12	...	44	100	46	NP	800 (Cl. 3 only)	800	650	NFN–5	G13
13	...	44	100	46	NP	800 (Cl. 3 only)	800	650	NFN–5	G5, G13
14	...	44	115	46	NP	800 (Cl. 3 only)	800	650	NFN–5	G13
15	...	44	115	46	NP	800 (Cl. 3 only)	800	650	NFN–5	G5, G13
16	...	44	115	50	NP	800 (Cl. 3 only)	800	650	NFN–5	...
17	...	44	115	50	NP	800 (Cl. 3 only)	800	NP	NFN–5	G5
18	...	44	100	40	NP	NP	1300	650	NFN–6	T15, W12
19	...	44	100	40	NP	NP	1300	650	NFN–6	T15
20	...	44	100	40	NP	NP	1300	650	NFN–6	T15
21	...	44	105	45	NP	NP	1000	NP	NFN–6	G5, W12
22	...	44	105	45	NP	NP	1000	NP	NFN–6	G5
23	...	44	105	45	NP	NP	1000	NP	NFN–6	...
24	...	44	105	45	NP	NP	1000	NP	NFN–6	G5
25	...	44	105	45	NP	NP	1000	NP	NFN–6	...
26	...	44	105	45	NP	NP	1000	NP	NFN–6	G5
27	...	44	105	45	NP	NP	1000	NP	NFN–6	...
28	...	44	105	45	NP	NP	1000	NP	NFN–6	G5, G14
29	...	44	105	45	NP	NP	1000	NP	NFN–6	G14
30	...	44	105	45	NP	NP	1000	NP	NFN–6	G5
31	...	44	105	45	NP	NP	1000	NP	NFN–6	...
32	...	44	105	45	NP	NP	1000	NP	NFN–6	G5, G14
33	...	44	105	45	NP	NP	1000	NP	NFN–6	G14
34	...	43	100	41	1000	NP	1250	650	NFN–10	G5, T14, W12
35	...	43	100	41	NP	NP	1250	NP	NFN–10	T15
36	...	43	100	41	NP	NP	1250	NP	NFN–10	G5, T14
37	...	43	100	41	NP	NP	1250	650	NFN–10	T15
38	...	43	100	41	NP	NP	1250	650	NFN–10	G5, T14
39	...	43	100	41	1000	800 (Cl. 3 only)	1250	650	NFN–10	T15
40	...	43	100	41	1000	800	1250	650	NFN–10	G5, T14
41	...	43	100	41	1000	800	1250	650	NFN–10	G5, T14
42	...	43	100	41	1000	800 (Cl. 3 only)	1250	650	NFN–10	T15
43	...	43	100	41	NP	800 (Cl. 3 only)	NP	NP	NFN–10	W5
44	...	43	100	41	NP	800 (Cl. 3 only)	NP	NP	NFN–10	G5, W5
45	...	43	100	41	1000	800	1250	650	NFN–10	G5, G14, T14, W6

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																	
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950
1	24.9	...	23.2	...	21.3	...	19.8	...	18.3	...	17.3	17.0	16.9	16.9	16.9	...	...	...
2	24.9	...	24.9	...	23.9	...	23.0	...	22.1	...	21.4	21.1	20.8	20.4	20.1	...	...	...
3	28.6	...	27.2	...	25.7	...	24.6	...	23.7	...	23.0	22.8	22.5	22.3	22.1	...	...	...
4	28.6	...	28.6	...	28.6	...	28.1	...	27.8	...	27.7	27.5	27.4	27.3	27.2	...	...	...
5	28.6	...	28.6	...	28.6	...	28.1	...	27.8	...	27.7	...	27.4	...	27.2	...	...	...
6	24.3	...	23.1	...	21.8	...	20.9	...	20.2	...	19.6	19.3	19.1	18.9	18.8	...	...	...
7	24.3	...	24.3	...	24.3	...	23.9	...	23.7	...	23.5	23.4	23.3	23.2	23.1	...	...	...
8	28.6	...	27.2	...	25.7	...	24.6	...	23.7	...	23.0	22.8	22.5	22.3	22.1	...	...	...
9	28.6	...	28.6	...	28.6	...	28.1	...	27.8	...	27.7	27.5	27.4	27.3	27.2	...	...	...
10	24.3	...	23.1	...	21.8	...	20.9	...	20.2	...	19.6	19.3	19.1	18.9	18.8	...	...	...
11	24.3	...	24.3	...	24.3	...	23.9	...	23.7	...	23.5	23.4	23.3	23.2	23.1	...	...	...
12	28.6	...	27.8	...	26.3	...	25.1	...	24.3	...	23.6	23.3	23.0	22.8	22.6	...	...	...
13	28.6	...	28.6	...	28.6	...	28.1	...	27.8	...	27.7	27.5	27.4	27.3	27.2	...	...	...
14	30.7	...	27.8	...	26.3	...	25.1	...	24.3	...	23.6	23.3	23.0	22.8	22.6	...	...	...
15	30.7	...	30.7	...	30.7	...	30.7	...	30.7	...	30.7	30.7	30.7	30.7	30.5	...	...	...
16	32.9	...	30.2	...	28.6	...	27.3	...	26.4	...	25.6	25.3	25.0	24.8	24.6	...	...	...
17	32.9	...	32.9	...	32.9	...	32.3	...	32.0	...	31.8	31.7	31.5	31.4	31.3	...	...	...
18	26.7	...	24.6	...	22.7	...	21.1	...	20.0	...	19.3	...	18.9	...	18.4	...	17.5	...
19	26.7	...	24.6	...	22.7	...	21.1	...	20.0	...	19.3	19.1	18.9	18.7	18.4	18.1	17.5	16.8
20	26.7	...	24.6	...	22.7	...	21.1	...	20.0	...	19.3	19.1	18.9	18.7	18.4	18.1	17.5	16.8
21	30.0	...	30.0	...	30.0	...	30.0	...	30.0	...	29.8	29.8	29.7	29.6	29.6	29.5	29.5	29.2
22	30.0	...	30.0	...	30.0	...	30.0	...	30.0	...	29.8	29.8	29.7	29.6	29.6	29.5	29.5	29.2
23	30.0	...	28.2	...	26.1	...	24.7	...	23.9	...	23.7	23.6	23.4	23.2	22.9	22.4	22.0	21.6
24	30.0	...	30.0	...	30.0	...	30.0	...	30.0	...	29.8	29.8	29.7	29.6	29.6	29.5	29.5	29.2
25	30.0	...	28.2	...	26.1	...	24.7	...	23.9	...	23.7	23.6	23.4	23.2	22.9	22.4	22.0	21.6
26	30.0	...	30.0	...	30.0	...	30.0	...	30.0	...	29.8	29.8	29.7	29.6	29.6	29.5	29.5	29.2
27	30.0	...	28.2	...	26.1	...	24.7	...	23.9	...	23.7	23.6	23.4	23.2	22.9	22.4	22.0	21.6
28	25.5	...	25.5	...	25.5	...	25.5	...	25.5	...	25.4	25.3	25.2	25.2	25.1	25.1	25.1	24.8
29	25.5	...	24.0	...	22.2	...	21.0	...	20.3	...	20.1	20.0	19.9	19.7	19.4	19.1	18.7	18.4
30	30.0	...	30.0	...	30.0	...	30.0	...	30.0	...	29.8	29.8	29.7	29.6	29.6	29.5	29.5	29.2
31	30.0	...	28.2	...	26.1	...	24.7	...	23.9	...	23.7	23.6	23.4	23.2	22.9	22.4	22.0	21.6
32	25.5	...	25.5	...	25.5	...	25.5	...	25.5	...	25.4	25.3	25.2	25.2	25.1	25.1	25.1	24.8
33	25.5	...	24.0	...	22.2	...	21.0	...	20.3	...	20.1	20.0	19.9	19.7	19.4	19.1	18.7	18.4
34	27.3	...	27.3	...	27.3	...	27.3	...	26.9	...	25.2	24.6	24.0	23.5	23.1	22.8	22.6	22.4
35	27.3	...	24.9	...	23.0	...	21.3	...	19.9	...	18.7	18.2	17.8	17.4	17.1	16.9	16.7	16.6
36	27.3	...	27.3	...	27.3	...	27.3	...	26.9	...	25.2	24.6	24.0	23.5	23.1	22.8	22.6	22.4
37	27.3	...	24.9	...	23.0	...	21.3	...	19.9	...	18.7	18.2	17.8	17.4	17.1	16.9	16.7	16.6
38	27.3	...	27.3	...	27.3	...	27.3	...	26.9	...	25.2	24.6	24.0	23.5	23.1	22.8	22.6	22.4
39	27.3	...	24.9	...	23.0	...	21.3	...	19.9	...	18.7	18.2	17.8	17.4	17.1	16.9	16.7	16.6
40	27.3	...	27.3	...	27.3	...	27.3	...	26.9	...	25.2	24.6	24.0	23.5	23.1	22.8	22.6	22.4
41	27.3	...	27.3	...	27.3	...	27.3	...	26.9	...	25.2	24.6	24.0	23.5	23.1	22.8	22.6	22.4
42	27.3	...	24.9	...	23.0	...	21.3	...	19.9	...	18.7	18.2	17.8	17.4	17.1	16.9	16.7	16.6
43	27.3	...	24.9	...	23.0	...	21.3	...	19.9	...	18.7	18.2	17.8	17.4	17.1	...	...	...
44	27.3	...	27.3	...	27.3	...	27.3	...	26.9	...	25.2	24.6	24.0	23.5	23.1	...	...	...
45	23.2	...	23.2	...	23.2	...	23.2	...	22.8	...	21.5	20.9	20.4	20.0	19.6	19.4	19.2	19.0

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																
	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	1700	1750	1800
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
18	16.0	...	*12.4*	...	*6.0*	...	*3.5*	...	...	...	...	...	...	...	...	...	...
19	16.0	14.9	*12.4*	*9.3*	*6.0*	*4.8*	*3.5*	...	...	...	...	...	...	...	...	...	...
20	16.0	14.9	*12.4*	*9.3*	*6.0*	*4.8*	*3.5*	...	...	...	...	...	...	...	...	...	...
21	29.1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
22	29.1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
23	21.6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
24	29.1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
25	21.6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
26	29.1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
27	21.6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
28	24.7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
29	18.4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
30	29.1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
31	21.6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
32	24.7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
33	18.4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
34	22.3	*18.5*	*15.0*	*12.2*	*9.8*	*7.8*	...	...	...	...	...	...	...	...	...	...	...
35	16.5	16.5	*15.0*	*12.2*	*9.8*	*7.8*	...	...	...	...	...	...	...	...	...	...	...
36	22.3	*18.5*	*15.0*	*12.2*	*9.8*	*7.8*	...	...	...	...	...	...	...	...	...	...	...
37	16.5	16.5	*15.0*	*12.2*	*9.8*	*7.8*	...	...	...	...	...	...	...	...	...	...	...
38	22.3	*18.5*	*15.0*	*12.2*	*9.8*	*7.8*	...	...	...	...	...	...	...	...	...	...	...
39	16.5	16.5	*15.0*	*12.2*	*9.8*	*7.8*	...	...	...	...	...	...	...	...	...	...	...
40	22.3	*18.5*	*15.0*	*12.2*	*9.8*	*7.8*	...	...	...	...	...	...	...	...	...	...	...
41	22.3	*18.5*	*15.0*	*12.2*	*9.8*	*7.8*	...	...	...	...	...	...	...	...	...	...	...
42	16.5	16.5	*15.0*	*12.2*	*9.8*	*7.8*	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
45	19.0	*15.7*	*12.8*	*10.4*	*8.3*	*6.6*	...	...	...	...	...	...	...	...	...	...	...

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
1	54Ni–16Mo–15Cr	Wld. pipe	SB–619	...	N10276	Solution ann.
2	54Ni–16Mo–15Cr	Smls. pipe & tube	SB–622	...	N10276	Solution ann.
3	54Ni–16Mo–15Cr	Smls. pipe & tube	SB–622	...	N10276	Solution ann.
4	54Ni–16Mo–15Cr	Wld. tube	SB–626	...	N10276	Solution ann.
5	54Ni–16Mo–15Cr	Wld. tube	SB–626	...	N10276	Solution ann.
6	54Ni–16Mo–15Cr	Wld. tube	SB–626	...	N10276	Solution ann.
7	54Ni–16Mo–15Cr	Wld. tube	SB–626	...	N10276	Solution ann.
8	62Ni–22Mo–15Cr	Smls. & wld. fittings	SB–366	...	N10362	Solution ann.
9	62Ni–22Mo–15Cr	Forgings	SB–462	...	N10362	Solution ann.
10	62Ni–22Mo–15Cr	Forgings	SB–462	...	N10362	Solution ann.
11	62Ni–22Mo–15Cr	Forgings	SB–564	...	N10362	Solution ann.
12	62Ni–22Mo–15Cr	Forgings	SB–564	...	N10362	Solution ann.
13	62Ni–22Mo–15Cr	Rod	SB–574	...	N10362	Solution ann.
14	62Ni–22Mo–15Cr	Rod	SB–574	...	N10362	Solution ann.
15	62Ni–22Mo–15Cr	Plate, sheet, strip	SB–575	...	N10362	Solution ann.
16	62Ni–22Mo–15Cr	Plate, sheet, strip	SB–575	...	N10362	Solution ann.
17	62Ni–22Mo–15Cr	Wld. pipe	SB–619	...	N10362	Solution ann.
18	62Ni–22Mo–15Cr	Wld. pipe	SB–619	...	N10362	Solution ann.
19	62Ni–22Mo–15Cr	Smls. pipe & tube	SB–622	...	N10362	Solution ann.
20	62Ni–22Mo–15Cr	Smls. pipe & tube	SB–622	...	N10362	Solution ann.
21	62Ni–22Mo–15Cr	Wld. tube	SB–626	...	N10362	Solution ann.
22	62Ni–22Mo–15Cr	Wld. tube	SB–626	...	N10362	Solution ann.
23	Ni–28Mo–3Fe–1.3Cr–0.25Al	Plate, sheet, strip	SB–333	...	N10629	Solution ann.
24	Ni–28Mo–3Fe–1.3Cr–0.25Al	Plate, sheet, strip	SB–333	...	N10629	Solution ann.
25	Ni–28Mo–3Fe–1.3Cr–0.25Al	Rod	SB–335	...	N10629	Solution ann.
26	Ni–28Mo–3Fe–1.3Cr–0.25Al	Rod	SB–335	...	N10629	Solution ann.
27	Ni–28Mo–3Fe–1.3Cr–0.25Al	Smls. & wld. fittings	SB–366	...	N10629	Solution ann.
28	Ni–28Mo–3Fe–1.3Cr–0.25Al	Forged fittings	SB–462	...	N10629	Solution ann.
29	Ni–28Mo–3Fe–1.3Cr–0.25Al	Forged fittings	SB–462	...	N10629	Solution ann.
30	Ni–28Mo–3Fe–1.3Cr–0.25Al	Forgings	SB–564	...	N10629	Solution ann.
31	Ni–28Mo–3Fe–1.3Cr–0.25Al	Forgings	SB–564	...	N10629	Solution ann.
32	Ni–28Mo–3Fe–1.3Cr–0.25Al	Wld. pipe	SB–619	...	N10629	Solution ann.
33	Ni–28Mo–3Fe–1.3Cr–0.25Al	Wld. pipe	SB–619	...	N10629	Solution ann.
34	Ni–28Mo–3Fe–1.3Cr–0.25Al	Smls. pipe & tube	SB–622	...	N10629	Solution ann.
35	Ni–28Mo–3Fe–1.3Cr–0.25Al	Smls. pipe & tube	SB–622	...	N10629	Solution ann.
36	Ni–28Mo–3Fe–1.3Cr–0.25Al	Wld. tube	SB–626	...	N10629	Solution ann.
37	Ni–28Mo–3Fe–1.3Cr–0.25Al	Wld. tube	SB–626	...	N10629	Solution ann.
38	65Ni–28Mo–2Fe	Smls. & wld. fittings	SB–366	...	N10665	Annealed
39	65Ni–28Mo–2Fe	Wld. pipe	SB–619	...	N10665	Annealed
40	65Ni–28Mo–2Fe	Wld. pipe	SB–619	...	N10665	Annealed
41	65Ni–28Mo–2Fe	Wld. tube	SB–626	...	N10665	Annealed
42	65Ni–28Mo–2Fe	Wld. tube	SB–626	...	N10665	Annealed
43	65Ni–28Mo–2Fe	Plate, sheet, strip	SB–333	...	N10665	Solution ann.
44	65Ni–28Mo–2Fe	Plate, sheet, strip	SB–333	...	N10665	Solution ann.
45	65Ni–28Mo–2Fe	Rod	SB–335	...	N10665	Solution ann.

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Size/ Thickness, in.	P-No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	...	43	100	41	1000	NP	1250	650	NFN–10	G14, T15
2	...	43	100	41	1000	800	1250	650	NFN–10	G5, T14
3	...	43	100	41	1000	800 (Cl. 3 only)	1250	650	NFN–10	T15
4	...	43	100	41	NP	800 (Cl. 3 only)	NP	NP	NFN–10	W5
5	...	43	100	41	NP	800 (Cl. 3 only)	NP	NP	NFN–10	G5, W5
6	...	43	100	41	1000	800	1250	650	NFN–10	G5, G14, T14, W6
7	...	43	100	41	1000	NP	1250	650	NFN–10	G14, T15
8	...	43	105	45	NP	NP	800	NP	NFN–10	G5, W12
9	...	43	105	45	NP	NP	800	NP	NFN–10	...
10	...	43	105	45	NP	NP	800	NP	NFN–10	G5
11	...	43	105	45	NP	NP	800	NP	NFN–10	...
12	...	43	105	45	NP	NP	800	NP	NFN–10	G5
13	...	43	105	45	NP	NP	800	NP	NFN–10	...
14	...	43	105	45	NP	NP	800	NP	NFN–10	G5
15	...	43	105	45	NP	NP	800	NP	NFN–10	...
16	...	43	105	45	NP	NP	800	NP	NFN–10	G5
17	...	43	105	45	NP	NP	800	NP	NFN–10	G14
18	...	43	105	45	NP	NP	800	NP	NFN–10	G5, G14
19	...	43	105	45	NP	NP	800	NP	NFN–10	...
20	...	43	105	45	NP	NP	800	NP	NFN–10	G5
21	...	43	105	45	NP	NP	800	NP	NFN–10	G14
22	...	43	105	45	NP	NP	800	NP	NFN–10	G5, G14
23	...	44	110	51	NP	NP	800	NP	NFN–16	G5
24	...	44	110	51	NP	NP	800	NP	NFN–16	...
25	...	44	110	51	NP	NP	800	NP	NFN–16	G5
26	...	44	110	51	NP	NP	800	NP	NFN–16	...
27	...	44	110	51	NP	NP	800	NP	NFN–16	G5, W12
28	...	44	110	51	NP	NP	800	NP	NFN–16	G5
29	...	44	110	51	NP	NP	800	NP	NFN–16	...
30	...	44	110	51	NP	NP	800	NP	NFN–16	G5
31	...	44	110	51	NP	NP	800	NP	NFN–16	...
32	...	44	110	51	NP	NP	800	NP	NFN–16	G5, G14
33	...	44	110	51	NP	NP	800	NP	NFN–16	G14
34	...	44	110	51	NP	NP	800	NP	NFN–16	G5
35	...	44	110	51	NP	NP	800	NP	NFN–16	...
36	...	44	110	51	NP	NP	800	NP	NFN–16	G5, G14
37	...	44	110	51	NP	NP	800	NP	NFN–16	G14
38	...	44	110	51	NP	NP	800	650	NFN–16	G5, W12
39	...	44	110	51	NP	800 (Cl. 3 only)	NP	NP	NFN–16	G5, W5
40	...	44	110	51	NP	800 (Cl. 3 only)	NP	NP	NFN–16	W5
41	...	44	110	51	NP	800 (Cl. 3 only)	NP	NP	NFN–16	G5, W5
42	...	44	110	51	NP	800 (Cl. 3 only)	NP	NP	NFN–16	W5
43	...	44	110	51	NP	800 (Cl. 3 only)	800	650	NFN–16	...
44	...	44	110	51	NP	800 (Cl. 3 only)	800	NP	NFN–16	G5
45	...	44	110	51	NP	800 (Cl. 3 only)	800	650	NFN–16	G13

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																	
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950
1	23.2	...	21.1	...	19.6	...	18.1	...	16.9	...	15.9	15.5	15.1	14.8	14.5	14.3	14.2	14.1
2	27.3	...	27.3	...	27.3	...	27.3	...	26.9	...	25.2	24.6	24.0	23.5	23.1	22.8	22.6	22.4
3	27.3	...	24.9	...	23.0	...	21.3	...	19.9	...	18.7	18.2	17.8	17.4	17.1	16.9	16.7	16.6
4	27.3	...	24.9	...	23.0	...	21.3	...	19.9	...	18.7	18.2	17.8	17.4	17.1	...	...	...
5	27.3	...	27.3	...	27.3	...	27.3	...	26.9	...	25.2	24.6	24.0	23.5	23.1	...	...	...
6	23.2	...	23.2	...	23.2	...	23.2	...	22.8	...	21.5	20.9	20.4	20.0	19.6	19.4	19.2	19.0
7	23.2	...	21.1	...	19.6	...	18.1	...	16.9	...	15.9	15.5	15.1	14.8	14.5	14.3	14.2	14.1
8	30.0	...	30.0	...	30.0	...	29.6	...	28.8	...	27.7	27.3	27.0	26.7	26.4	...	...	...
9	30.0	...	26.7	...	24.5	...	22.7	...	21.4	...	20.5	20.2	20.0	19.8	19.6	...	...	...
10	30.0	...	30.0	...	30.0	...	29.6	...	28.8	...	27.7	27.3	27.0	26.7	26.4	...	...	...
11	30.0	...	26.7	...	24.5	...	22.7	...	21.4	...	20.5	20.2	20.0	19.8	19.6	...	...	...
12	30.0	...	30.0	...	30.0	...	29.6	...	28.8	...	27.7	27.3	27.0	26.7	26.4	...	...	...
13	30.0	...	26.7	...	24.5	...	22.7	...	21.4	...	20.5	20.2	20.0	19.8	19.6	...	...	...
14	30.0	...	30.0	...	30.0	...	29.6	...	28.8	...	27.7	27.3	27.0	26.7	26.4	...	...	...
15	30.0	...	26.7	...	24.5	...	22.7	...	21.4	...	20.5	20.2	20.0	19.8	19.6	...	...	...
16	30.0	...	30.0	...	30.0	...	29.6	...	28.8	...	27.7	27.3	27.0	26.7	26.4	...	...	...
17	25.5	...	22.7	...	20.8	...	19.3	...	18.2	...	17.4	17.2	17.0	16.8	16.7	...	...	...
18	25.5	...	25.5	...	25.5	...	25.2	...	24.5	...	23.5	23.2	23.0	22.7	22.4	...	...	...
19	30.0	...	26.7	...	24.5	...	22.7	...	21.4	...	20.5	20.2	20.0	19.8	19.6	...	...	...
20	30.0	...	30.0	...	30.0	...	29.6	...	28.8	...	27.7	27.3	27.0	26.7	26.4	...	...	...
21	25.5	...	22.7	...	20.8	...	19.3	...	18.2	...	17.4	17.2	17.0	16.8	16.7	...	...	...
22	25.5	...	25.5	...	25.5	...	25.2	...	24.5	...	23.5	23.2	23.0	22.7	22.4	...	...	...
23	31.4	...	31.4	...	31.4	...	31.4	...	31.1	...	30.6	30.4	30.2	30.1	29.9	...	...	...
24	31.4	...	31.4	...	29.6	...	28.1	...	27.0	...	26.1	25.8	25.5	25.3	25.1	...	...	...
25	31.4	...	31.4	...	31.4	...	31.4	...	31.1	...	30.6	30.4	30.2	30.1	29.9	...	...	...
26	31.4	...	31.4	...	29.6	...	28.1	...	27.0	...	26.1	25.8	25.5	25.3	25.1	...	...	...
27	31.4	...	31.4	...	31.4	...	31.4	...	31.1	...	30.6	30.4	30.2	30.1	29.9	...	...	...
28	31.4	...	31.4	...	31.4	...	31.4	...	31.1	...	30.6	30.4	30.2	30.1	29.9	...	...	...
29	31.4	...	31.4	...	29.6	...	28.1	...	27.0	...	26.1	25.8	25.5	25.3	25.1	...	...	...
30	31.4	...	31.4	...	31.4	...	31.4	...	31.1	...	30.6	30.4	30.2	30.1	29.9	...	...	...
31	31.4	...	31.4	...	29.6	...	28.1	...	27.0	...	26.1	25.8	25.5	25.3	25.1	...	...	...
32	26.7	...	26.7	...	26.7	...	26.7	...	26.4	...	26.0	25.8	25.7	25.6	25.4	...	...	...
33	26.7	...	26.7	...	25.2	...	23.9	...	23.0	...	22.2	21.9	21.7	21.5	21.3	...	...	...
34	31.4	...	31.4	...	31.4	...	31.4	...	31.1	...	30.6	30.4	30.2	30.1	29.9	...	...	...
35	31.4	...	31.4	...	29.6	...	28.1	...	27.0	...	26.1	25.8	25.5	25.3	25.1	...	...	...
36	26.7	...	26.7	...	26.7	...	26.7	...	26.4	...	26.0	25.8	25.7	25.6	25.4	...	...	...
37	26.7	...	26.7	...	25.2	...	23.9	...	23.0	...	22.2	21.9	21.7	21.5	21.3	...	...	...
38	31.4	...	31.4	...	31.4	...	31.4	...	31.4	...	31.2	31.1	30.9	30.7	30.6	...	...	...
39	31.4	...	31.4	...	31.4	...	31.4	...	31.4	...	31.2	31.1	30.9	30.7	30.6	...	...	...
40	31.4	...	31.4	...	30.2	...	28.9	...	27.9	...	27.2	26.9	26.6	26.2	25.8	...	...	...
41	31.4	...	31.4	...	31.4	...	31.4	...	31.4	...	31.2	31.1	30.9	30.7	30.6	...	...	...
42	31.4	...	31.4	...	30.2	...	28.9	...	27.9	...	27.2	26.9	26.6	26.2	25.8	...	...	...
43	31.4	...	31.4	...	30.2	...	28.9	...	27.9	...	27.2	26.9	26.6	26.2	25.8	...	...	...
44	31.4	...	31.4	...	31.4	...	31.4	...	31.4	...	31.2	31.1	30.9	30.7	30.6	...	...	...
45	31.4	...	31.4	...	30.2	...	28.9	...	27.9	...	27.2	26.9	26.6	26.2	25.8	...	...	...

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																
	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	1700	1750	1800
1	14.0	14.0	*12.8*	*10.4*	*8.3*	*6.6*	...	...	...	...	...	...	...	...	...	...	...
2	22.3	*18.5*	*15.0*	*12.2*	*9.8*	*7.8*	...	...	...	...	...	...	...	...	...	...	...
3	16.5	16.5	*15.0*	*12.2*	*9.8*	*7.8*	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6	19.0	*15.7*	*12.8*	*10.4*	*8.3*	*6.6*	...	...	...	...	...	...	...	...	...	...	...
7	14.0	14.0	*12.8*	*10.4*	*8.3*	*6.6*	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
1	65Ni–28Mo–2Fe	Rod	SB–335	...	N10665	Solution ann.
2	65Ni–28Mo–2Fe	Forgings	SB–462	...	N10665	Solution ann.
3	65Ni–28Mo–2Fe	Forgings	SB–462	...	N10665	Solution ann.
4	65Ni–28Mo–2Fe	Forgings	SB–564	...	N10665	Solution ann.
5	65Ni–28Mo–2Fe	Forgings	SB–564	...	N10665	Solution ann.
6	65Ni–28Mo–2Fe	Wld. pipe	SB–619	...	N10665	Solution ann.
7	65Ni–28Mo–2Fe	Wld. pipe	SB–619	...	N10665	Solution ann.
8	65Ni–28Mo–2Fe	Smls. pipe & tube	SB–622	...	N10665	Solution ann.
9	65Ni–28Mo–2Fe	Smls. pipe & tube	SB–622	...	N10665	Solution ann.
10	65Ni–28Mo–2Fe	Wld. tube	SB–626	...	N10665	Solution ann.
11	65Ni–28Mo–2Fe	Wld. tube	SB–626	...	N10665	Solution ann.
12	65Ni–29.5Mo–2Fe–2Cr	Plate, sheet, strip	SB–333	...	N10675	Solution ann.
13	65Ni–29.5Mo–2Fe–2Cr	Plate, sheet, strip	SB–333	...	N10675	Solution ann.
14	65Ni–29.5Mo–2Fe–2Cr	Rod	SB–335	...	N10675	Solution ann.
15	65Ni–29.5Mo–2Fe–2Cr	Rod	SB–335	...	N10675	Solution ann.
16	65Ni–29.5Mo–2Fe–2Cr	Smls. & wld. fittings	SB–366	...	N10675	Solution ann.
17	65Ni–29.5Mo–2Fe–2Cr	Forgings	SB–462	...	N10675	Solution ann.
18	65Ni–29.5Mo–2Fe–2Cr	Forgings	SB–462	...	N10675	Solution ann.
19	65Ni–29.5Mo–2Fe–2Cr	Forgings	SB–564	...	N10675	Solution ann.
20	65Ni–29.5Mo–2Fe–2Cr	Forgings	SB–564	...	N10675	Solution ann.
21	65Ni–29.5Mo–2Fe–2Cr	Wld. pipe	SB–619	...	N10675	Solution ann.
22	65Ni–29.5Mo–2Fe–2Cr	Wld. pipe	SB–619	...	N10675	Solution ann.
23	65Ni–29.5Mo–2Fe–2Cr	Smls. pipe & tube	SB–622	...	N10675	Solution ann.
24	65Ni–29.5Mo–2Fe–2Cr	Smls. pipe & tube	SB–622	...	N10675	Solution ann.
25	65Ni–29.5Mo–2Fe–2Cr	Wld. tube	SB–626	...	N10675	Solution ann.
26	65Ni–29.5Mo–2Fe–2Cr	Wld. tube	SB–626	...	N10675	Solution ann.
27	37Ni–30Co–28Cr–2.7Si	Smls. & wld. fittings	SB–366	...	N12160	Solution ann.
28	37Ni–30Co–28Cr–2.7Si	Plate, sheet, strip	SB–435	...	N12160	Solution ann.
29	37Ni–30Co–28Cr–2.7Si	Plate, sheet, strip	SB–435	...	N12160	Solution ann.
30	37Ni–30Co–28Cr–2.7Si	Forgings	SB–564	...	N12160	Solution ann.
31	37Ni–30Co–28Cr–2.7Si	Forgings	SB–564	...	N12160	Solution ann.
32	37Ni–30Co–28Cr–2.7Si	Rod	SB–572	...	N12160	Solution ann.
33	37Ni–30Co–28Cr–2.7Si	Rod	SB–572	...	N12160	Solution ann.
34	37Ni–30Co–28Cr–2.7Si	Wld. pipe	SB–619	...	N12160	Solution ann.
35	37Ni–30Co–28Cr–2.7Si	Wld. pipe	SB–619	...	N12160	Solution ann.
36	37Ni–30Co–28Cr–2.7Si	Smls. pipe & tube	SB–622	...	N12160	Solution ann.
37	37Ni–30Co–28Cr–2.7Si	Smls. pipe & tube	SB–622	...	N12160	Solution ann.
38	37Ni–30Co–28Cr–2.7Si	Wld. tube	SB–626	...	N12160	Solution ann.
39	37Ni–30Co–28Cr–2.7Si	Wld. tube	SB–626	...	N12160	Solution ann.
40	59Ni–22Cr–14Mo–4Fe–3W	Castings	SA–494	CX2MW	N26022	Solution ann.
41	53Ni–17Mo–16Cr–6Fe–5W	Castings	SA–494	CW–12MW/C	N30002	Annealed
42	62Ni–28Mo–5Fe	Castings	SA–494	N–12MV/B	N30012	Annealed
43	33Cr–31Ni–32Fe–1.5Mo–0.6Cu–N	Smls. & wld. fittings	SB–366	...	R20033	Solution ann.
44	33Cr–31Ni–32Fe–1.5Mo–0.6Cu–N	Forged fittings	SB–462	...	R20033	Solution ann.
45	33Cr–31Ni–32Fe–1.5Mo–0.6Cu–N	Forgings	SB–564	...	R20033	Solution ann.

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Size/ Thickness, in.	P-No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	...	44	110	51	NP	800 (Cl. 3 only)	800	650	NFN–16	G5, G13
2	...	44	110	51	NP	NP	800	NP	NFN–16	...
3	...	44	110	51	NP	NP	800	NP	NFN–16	G5
4	...	44	110	51	NP	NP	800	NP	NFN–16	...
5	...	44	110	51	NP	NP	800	NP	NFN–16	G5
6	...	44	110	51	NP	NP	800	650	NFN–16	G14
7	...	44	110	51	NP	NP	800	650	NFN–16	G5, G14
8	...	44	110	51	NP	800 (Cl. 3 only)	800	650	NFN–16	...
9	...	44	110	51	NP	800 (Cl. 3 only)	800	650	NFN–16	G5
10	...	44	110	51	NP	NP	800	650	NFN–16	G5, G14
11	...	44	110	51	NP	NP	800	650	NFN–16	G14
12	...	44	110	51	NP	NP	800	650	NFN–16	G5
13	...	44	110	51	NP	NP	800	650	NFN–16	...
14	...	44	110	51	NP	NP	800	650	NFN–16	G5
15	...	44	110	51	NP	NP	800	650	NFN–16	...
16	...	44	110	51	NP	NP	800	650	NFN–16	G5, W12
17	...	44	110	51	NP	NP	800	NP	NFN–16	G5
18	...	44	110	51	NP	NP	800	NP	NFN–16	...
19	...	44	110	51	NP	NP	800	650	NFN–16	G5
20	...	44	110	51	NP	NP	800	650	NFN–16	...
21	...	44	110	51	NP	NP	800	650	NFN–16	G5, G14
22	...	44	110	51	NP	NP	800	650	NFN–16	G14
23	...	44	110	51	NP	NP	800	650	NFN–16	G5
24	...	44	110	51	NP	NP	800	650	NFN–16	...
25	...	44	110	51	NP	NP	800	650	NFN–16	G5, G14
26	...	44	110	51	NP	NP	800	650	NFN–16	G14
27	...	46	90	35	NP	NP	1500	NP	NFN–13	G5, T14, W12
28	...	46	90	35	NP	NP	1500	NP	NFN–13	T14
29	...	46	90	35	NP	NP	1500	NP	NFN–13	G5, T14
30	...	46	90	35	NP	NP	1500	NP	NFN–13	T14
31	...	46	90	35	NP	NP	1500	NP	NFN–13	G5, T14
32	...	46	90	35	NP	NP	1500	NP	NFN–13	T14
33	...	46	90	35	NP	NP	1500	NP	NFN–13	G5, T14
34	...	46	90	35	NP	NP	1500	NP	NFN–13	G14, T14
35	...	46	90	35	NP	NP	1500	NP	NFN–13	G5, G14, T14
36	...	46	90	35	NP	NP	1500	NP	NFN–13	T14
37	...	46	90	35	NP	NP	1500	NP	NFN–13	G5, T14
38	...	46	90	35	NP	NP	1500	NP	NFN–13	G14, T14
39	...	46	90	35	NP	NP	1500	NP	NFN–13	G5, G14, T14
40	...	43	80	45	NP	NP	500	500	NFN–10	G15
41	...	...	72	40	NP	NP	1000	650	NFN–10	G15, W1
42	...	...	76	40	NP	NP	1000	650	NFN–10	G15, W1
43	...	45	109	55	NP	NP	800	NP	NFN–10	W12
44	...	45	109	55	NP	NP	800	NP	NFN–10	...
45	...	45	109	55	NP	NP	800	NP	NFN–10	...

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																	
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950
1	31.4	...	31.4	...	31.4	...	31.4	...	31.4	...	31.2	31.1	30.9	30.7	30.6	...	...	...
2	31.4	...	31.4	...	30.2	...	28.9	...	27.9	...	27.2	26.9	26.6	26.2	25.8	...	...	...
3	31.4	...	31.4	...	31.4	...	31.4	...	31.4	...	31.2	31.1	30.9	30.7	30.6	...	...	...
4	31.4	...	31.4	...	30.2	...	28.9	...	27.9	...	27.2	26.9	26.6	26.2	25.8	...	...	...
5	31.4	...	31.4	...	31.4	...	31.4	...	31.4	...	31.2	31.1	30.9	30.7	30.6	...	...	...
6	26.7	...	26.7	...	25.7	...	24.6	...	23.7	...	23.1	22.9	22.6	22.3	21.9	...	...	...
7	26.7	...	26.7	...	26.7	...	26.7	...	26.7	...	26.5	26.4	26.3	26.1	26.0	...	...	...
8	31.4	...	31.4	...	30.2	...	28.9	...	27.9	...	27.2	26.9	26.6	26.2	25.8	...	...	...
9	31.4	...	31.4	...	31.4	...	31.4	...	31.4	...	31.2	31.1	30.9	30.7	30.6	...	...	...
10	26.7	...	26.7	...	26.7	...	26.7	...	26.7	...	26.5	26.4	26.3	26.1	26.0	...	...	...
11	26.7	...	26.7	...	25.7	...	24.6	...	23.7	...	23.1	22.9	22.6	22.3	21.9	...	...	...
12	31.4	...	31.4	...	31.4	...	31.4	...	31.1	...	30.6	30.4	30.2	30.1	29.9	...	...	...
13	31.4	...	31.4	...	30.3	...	28.8	...	27.4	...	26.3	25.8	25.4	25.1	24.8	...	...	...
14	31.4	...	31.4	...	31.4	...	31.4	...	31.1	...	30.6	30.4	30.2	30.1	29.9	...	...	...
15	31.4	...	31.4	...	30.3	...	28.8	...	27.4	...	26.3	25.8	25.4	25.1	24.8	...	...	...
16	31.4	...	31.4	...	31.4	...	31.4	...	31.1	...	30.6	30.4	30.2	30.1	29.9	...	...	...
17	31.4	...	31.4	...	31.4	...	31.4	...	31.1	...	30.6	30.4	30.2	30.1	29.9	...	...	...
18	31.4	...	31.4	...	30.3	...	28.8	...	27.4	...	26.3	25.8	25.4	25.1	24.8	...	...	...
19	31.4	...	31.4	...	31.4	...	31.4	...	31.1	...	30.6	30.4	30.2	30.1	29.9	...	...	...
20	31.4	...	31.4	...	30.3	...	28.8	...	27.4	...	26.3	25.8	25.4	25.1	24.8	...	...	...
21	26.7	...	26.7	...	26.7	...	26.7	...	26.4	...	26.0	25.8	25.7	25.6	25.4	...	...	...
22	26.7	...	26.7	...	25.8	...	24.5	...	23.4	...	22.4	21.9	21.6	21.3	21.1	...	...	...
23	31.4	...	31.4	...	31.4	...	31.4	...	31.1	...	30.6	30.4	30.2	30.1	29.9	...	...	...
24	31.4	...	31.4	...	30.3	...	28.8	...	27.4	...	26.3	25.8	25.4	25.1	24.8	...	...	...
25	26.7	...	26.7	...	26.7	...	26.7	...	26.4	...	26.0	25.8	25.7	25.6	25.4	...	...	...
26	26.7	...	26.7	...	25.8	...	24.5	...	23.4	...	22.4	21.9	21.6	21.3	21.1	...	...	...
27	23.3	...	23.3	...	23.3	...	22.2	...	20.3	...	19.0	18.6	18.4	18.3	18.3	18.3	18.3	18.3
28	23.3	...	20.5	...	18.3	...	16.5	...	15.0	...	14.1	13.8	13.6	13.6	13.5	13.5	13.5	13.5
29	23.3	...	23.3	...	23.3	...	22.2	...	20.3	...	19.0	18.6	18.4	18.3	18.3	18.3	18.3	18.3
30	23.3	...	20.5	...	18.3	...	16.5	...	15.0	...	14.1	13.8	13.6	13.6	13.5	13.5	13.5	13.5
31	23.3	...	23.3	...	23.3	...	22.2	...	20.3	...	19.0	18.6	18.4	18.3	18.3	18.3	18.3	18.3
32	23.3	...	20.5	...	18.3	...	16.5	...	15.0	...	14.1	13.8	13.6	13.6	13.5	13.5	13.5	13.5
33	23.3	...	23.3	...	23.3	...	22.2	...	20.3	...	19.0	18.6	18.4	18.3	18.3	18.3	18.3	18.3
34	19.8	...	17.4	...	15.6	...	14.0	...	12.8	...	12.0	11.7	11.6	11.6	11.5	11.5	11.5	11.5
35	19.8	...	19.8	...	19.8	...	18.9	...	17.3	...	16.2	15.8	15.6	15.6	15.6	15.6	15.6	15.6
36	23.3	...	20.5	...	18.3	...	16.5	...	15.0	...	14.1	13.8	13.6	13.6	13.5	13.5	13.5	13.5
37	23.3	...	23.3	...	23.3	...	22.2	...	20.3	...	19.0	18.6	18.4	18.3	18.3	18.3	18.3	18.3
38	19.8	...	17.4	...	15.6	...	14.0	...	12.8	...	12.0	11.7	11.6	11.6	11.5	11.5	11.5	11.5
39	19.8	...	19.8	...	19.8	...	18.9	...	17.3	...	16.2	15.8	15.6	15.6	15.6	15.6	15.6	15.6
40	22.9	...	22.2	...	21.6	...	21.4	...	21.4	...	...	...	...	...	...	...	...	...
41	20.6	...	19.5	...	18.5	...	18.5	...	18.1	...	16.9	16.9	16.9	16.9	16.9	16.9	16.5	16.1
42	21.7	...	20.3	...	20.3	...	20.3	...	20.3	...	18.6	18.3	18.0	17.7	17.3	17.0	16.6	16.2
43	31.1	...	30.9	...	28.1	...	26.1	...	24.8	...	23.6	23.5	23.1	22.9	22.6	...	...	...
44	31.1	...	30.9	...	28.1	...	26.1	...	24.8	...	23.6	23.5	23.1	22.9	22.6	...	...	...
45	31.1	...	30.9	...	28.1	...	26.1	...	24.8	...	23.6	23.5	23.1	22.9	22.6	...	...	...

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																
	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	1700	1750	1800
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
27	16.6	*13.5*	*11.0*	*9.1*	*7.5*	*6.2*	*5.1*	*4.3*	*3.6*	*3.0*	*2.5*	...	...	...	...	...	...
28	13.5	*13.5*	*11.0*	*9.1*	*7.5*	*6.2*	*5.1*	*4.3*	*3.6*	*3.0*	*2.5*	...	...	...	...	...	...
29	16.6	*13.5*	*11.0*	*9.1*	*7.5*	*6.2*	*5.1*	*4.3*	*3.6*	*3.0*	*2.5*	...	...	...	...	...	...
30	13.5	*13.5*	*11.0*	*9.1*	*7.5*	*6.2*	*5.1*	*4.3*	*3.6*	*3.0*	*2.5*	...	...	...	...	...	...
31	16.6	*13.5*	*11.0*	*9.1*	*7.5*	*6.2*	*5.1*	*4.3*	*3.6*	*3.0*	*2.5*	...	...	...	...	...	...
32	13.5	*13.5*	*11.0*	*9.1*	*7.5*	*6.2*	*5.1*	*4.3*	*3.6*	*3.0*	*2.5*	...	...	...	...	...	...
33	16.6	*13.5*	*11.0*	*9.1*	*7.5*	*6.2*	*5.1*	*4.3*	*3.6*	*3.0*	*2.5*	...	...	...	...	...	...
34	11.5	*11.5*	*9.4*	*7.7*	*6.4*	*5.3*	*4.3*	*3.7*	*3.1*	*2.6*	*2.1*	...	...	...	...	...	...
35	14.1	*11.5*	*9.4*	*7.7*	*6.4*	*5.3*	*4.3*	*3.7*	*3.1*	*2.6*	*2.1*	...	...	...	...	...	...
36	13.5	*13.5*	*11.0*	*9.1*	*7.5*	*6.2*	*5.1*	*4.3*	*3.6*	*3.0*	*2.5*	...	...	...	...	...	...
37	16.6	*13.5*	*11.0*	*9.1*	*7.5*	*6.2*	*5.1*	*4.3*	*3.6*	*3.0*	*2.5*	...	...	...	...	...	...
38	11.5	*11.5*	*9.4*	*7.7*	*6.4*	*5.3*	*4.3*	*3.7*	*3.1*	*2.6*	*2.1*	...	...	...	...	...	...
39	14.1	*11.5*	*9.4*	*7.7*	*6.4*	*5.3*	*4.3*	*3.7*	*3.1*	*2.6*	*2.1*	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
41	15.8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
42	15.7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
	1	33Cr–31Ni–32Fe–1.5Mo–0.6Cu–N	Wld. pipe	SB–619	...	R20033	Solution ann.
	2	33Cr–31Ni–32Fe–1.5Mo–0.6Cu–N	Smls. pipe & tube	SB–622	...	R20033	Solution ann.
	3	33Cr–31Ni–32Fe–1.5Mo–0.6Cu–N	Plate, sheet, strip	SB–625	...	R20033	Solution ann.
	4	33Cr–31Ni–32Fe–1.5Mo–0.6Cu–N	Wld. tube	SB–626	...	R20033	Solution ann.
	5	33Cr–31Ni–32Fe–1.5Mo–0.6Cu–N	Rod	SB–649	...	R20033	Solution ann.
	6	21Ni–30Fe–22Cr–18Co–3Mo–3W	Plate, sheet, strip	SB–435	...	R30556	Annealed
	7	21Ni–30Fe–22Cr–18Co–3Mo–3W	Plate, sheet, strip	SB–435	...	R30556	Annealed
	8	21Ni–30Fe–22Cr–18Co–3Mo–3W	Rod	SB–572	...	R30556	Annealed
	9	21Ni–30Fe–22Cr–18Co–3Mo–3W	Rod	SB–572	...	R30556	Annealed
	10	21Ni–30Fe–22Cr–18Co–3Mo–3W	Wld. pipe	SB–619	...	R30556	Annealed
	11	21Ni–30Fe–22Cr–18Co–3Mo–3W	Wld. pipe	SB–619	...	R30556	Annealed
	12	21Ni–30Fe–22Cr–18Co–3Mo–3W	Smls. pipe & tube	SB–622	...	R30556	Annealed
	13	21Ni–30Fe–22Cr–18Co–3Mo–3W	Smls. pipe & tube	SB–622	...	R30556	Annealed
	14	21Ni–30Fe–22Cr–18Co–3Mo–3W	Wld. tube	SB–626	...	R30556	Annealed
	15	21Ni–30Fe–22Cr–18Co–3Mo–3W	Wld. tube	SB–626	...	R30556	Annealed
	16	Co–26Cr–9Ni–5Mo–3Fe–2W	Rod	SB–815	...	R31233	Solution ann.
	17	Co–26Cr–9Ni–5Mo–3Fe–2W	Plate, sheet, strip	SB–818	...	R31233	Solution ann.
	18	Ti	Plate, sheet, strip	SB–265	1	R50250	Annealed
	19	Ti	Smls. tube	SB–338	1	R50250	Annealed
	20	Ti	Wld. tube	SB–338	1	R50250	Annealed
	21	Ti	Bar, billet	SB–348	1	R50250	Annealed
	22	Ti	Smls. & wld. fittings	SB–363	WPT1	R50250	Annealed
	23	Ti	Forgings	SB–381	F–1	R50250	Annealed
	24	Ti	Smls. pipe	SB–861	1	R50250	Annealed
	25	Ti	Wld. pipe	SB–862	1	R50250	Annealed
(**21**)	26	Ti	Castings	SB–367	C–2	R50400	...
	27	Ti	Plate, sheet, strip	SB–265	2	R50400	Annealed
	28	Ti	Smls. tube	SB–338	2	R50400	Annealed
	29	Ti	Wld. tube	SB–338	2	R50400	Annealed
	30	Ti	Bar, billet	SB–348	2	R50400	Annealed
	31	Ti	Smls. & wld. fittings	SB–363	WPT2	R50400	Annealed
	32	Ti	Forgings	SB–381	F–2	R50400	Annealed
	33	Ti	Smls. pipe	SB–861	2	R50400	Annealed
	34	Ti	Wld. pipe	SB–862	2	R50400	Annealed
	35	Ti	Plate, sheet, strip	SB–265	2H	R50400	Annealed
	36	Ti	Smls. tube	SB–338	2H	R50400	Annealed
	37	Ti	Wld. tube	SB–338	2H	R50400	Annealed
	38	Ti	Bar, billet	SB–348	2H	R50400	Annealed
	39	Ti	Smls. fittings	SB–363	WPT2H	R50400	Annealed
	40	Ti	Wld. fittings	SB–363	WPT2HW	R50400	Annealed
	41	Ti	Forgings	SB–381	F–2H	R50400	Annealed
	42	Ti	Smls. pipe	SB–861	2H	R50400	Annealed
	43	Ti	Wld. pipe	SB–862	2H	R50400	Annealed
(**21**)	44	Ti	Castings	SB–367	C–3	R50550	...
	45	Ti	Plate, sheet, strip	SB–265	3	R50550	Annealed

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Size/ Thickness, in.	P-No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	...	45	109	55	NP	NP	800	NP	NFN–10	G14
2	...	45	109	55	NP	NP	800	NP	NFN–10	...
3	...	45	109	55	NP	NP	800	NP	NFN–10	...
4	...	45	109	55	NP	NP	800	NP	NFN–10	G14
5	...	45	109	55	NP	NP	800	NP	NFN–10	...
6	...	45	100	45	NP	NP	1650	650	NFN–15	G4, T17
7	...	45	100	45	NP	NP	1650	650	NFN–15	G4, G5, T16
8	...	45	100	45	NP	NP	1650	650	NFN–15	G4, T17
9	...	45	100	45	NP	NP	1650	650	NFN–15	G4, G5, T16
10	...	45	100	45	NP	NP	1650	650	NFN–15	G4, G14, T16
11	...	45	100	45	NP	NP	1650	650	NFN–15	G4, G5, G14, T15
12	...	45	100	45	NP	NP	1650	650	NFN–15	G4, T17
13	...	45	100	45	NP	NP	1650	650	NFN–15	G4, G5, T16
14	...	45	100	45	NP	NP	1650	650	NFN–15	G4, G14, T16
15	...	45	100	45	NP	NP	1650	650	NFN–15	G4, G5, G14, T15
16	...	49	130	55	NP	NP	800	NP	NFN–15	G8
17	...	49	130	55	NP	NP	800	NP	NFN–15	G8
18	...	51	35	20	600	600	600	NP	NFT–3	...
19	...	51	35	20	600	600	600	NP	NFT–3	...
20	...	51	35	20	600	600	600	NP	NFT–3	G14, W6
21	...	51	35	20	600	600	600	NP	NFT–3	...
22	...	51	35	20	NP	600	600	NP	NFT–3	W5, W12
23	...	51	35	20	NP	600	600	NP	NFT–3	...
24	...	51	35	20	600	600	600	NP	NFT–3	...
25	...	51	35	20	600	600	600	NP	NFT–3	G14, W6
26	...	51	50	40	NP	NP	500	500	NFT–2	G15
27	...	51	50	40	600	600	600	600	NFT–2	...
28	...	51	50	40	600	600	600	600	NFT–2	...
29	...	51	50	40	600	600	600	600	NFT–2	G14, W6
30	...	51	50	40	600	600	600	600	NFT–2	...
31	...	51	50	40	NP	600	600	600	NFT–2	W5, W12
32	...	51	50	40	NP	600	600	600	NFT–2	...
33	...	51	50	40	600	600	600	600	NFT–2	...
34	...	51	50	40	600	600	600	600	NFT–2	G14, W6
35	...	51	58	40	NP	NP	600	NP	NFT–2	...
36	...	51	58	40	NP	NP	600	NP	NFT–2	...
37	...	51	58	40	NP	NP	600	NP	NFT–2	G14, W6
38	...	51	58	40	NP	NP	600	NP	NFT–2	...
39	...	51	58	40	NP	NP	600	NP	NFT–2	...
40	...	51	58	40	NP	NP	600	NP	NFT–2	W12
41	...	51	58	40	NP	NP	600	NP	NFT–2	...
42	...	51	58	40	NP	NP	600	NP	NFT–2	...
43	...	51	58	40	NP	NP	600	NP	NFT–2	W12
44	...	52	65	55	NP	NP	500	NP	NFT–1	G15
45	...	52	65	55	600	600	600	600	NFT–1	...

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																	
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950
1	26.4	...	26.3	...	23.9	...	22.2	...	21.1	...	20.1	20.0	19.6	19.5	19.2	...	...	...
2	31.1	...	30.9	...	28.1	...	26.1	...	24.8	...	23.6	23.5	23.1	22.9	22.6	...	...	...
3	31.1	...	30.9	...	28.1	...	26.1	...	24.8	...	23.6	23.5	23.1	22.9	22.6	...	...	...
4	26.4	...	26.3	...	23.9	...	22.2	...	21.1	...	20.1	20.0	19.6	19.5	19.2	...	...	...
5	31.1	...	30.9	...	28.1	...	26.1	...	24.8	...	23.6	23.5	23.1	22.9	22.6	...	...	...
6	28.6	...	25.6	...	23.1	...	21.3	...	20.1	...	19.3	18.9	18.7	18.4	18.2	18.0	17.8	17.6
7	28.6	...	28.6	...	28.0	...	27.1	...	26.4	...	26.0	25.6	25.2	24.9	24.6	24.3	24.1	23.8
8	28.6	...	25.6	...	23.1	...	21.3	...	20.1	...	19.3	18.9	18.7	18.4	18.2	18.0	17.8	17.6
9	28.6	...	28.6	...	28.0	...	27.1	...	26.4	...	26.0	25.6	25.2	24.9	24.6	24.3	24.1	23.8
10	24.3	...	21.8	...	19.6	...	18.1	...	17.1	...	16.4	16.1	15.9	15.7	15.5	15.3	15.2	15.0
11	24.3	...	24.3	...	23.8	...	23.0	...	22.5	...	22.1	21.7	21.4	21.1	20.9	20.7	20.5	20.2
12	28.6	...	25.6	...	23.1	...	21.3	...	20.1	...	19.3	18.9	18.7	18.4	18.2	18.0	17.8	17.6
13	28.6	...	28.6	...	28.0	...	27.1	...	26.4	...	26.0	25.6	25.2	24.9	24.6	24.3	24.1	23.8
14	24.3	...	21.8	...	19.6	...	18.1	...	17.1	...	16.4	16.1	15.9	15.7	15.5	15.3	15.2	15.0
15	24.3	...	24.3	...	23.8	...	23.0	...	22.5	...	22.1	21.7	21.4	21.1	20.9	20.7	20.5	20.2
16	34.2	...	32.1	...	28.5	...	25.5	...	23.4	...	22.0	21.5	21.2	20.9	20.5	...	...	...
17	34.2	...	32.1	...	28.5	...	25.5	...	23.4	...	22.0	21.5	21.2	20.9	20.5	...	...	...
18	10.0	9.3	8.3	7.4	6.6	6.0	5.4	4.7	4.2	3.8	3.5	...	...	...	...	...	...	...
19	10.0	9.3	8.3	7.4	6.6	6.0	5.5	4.7	4.2	3.8	3.5	...	...	...	...	...	...	...
20	8.5	7.9	7.0	6.3	5.6	5.1	4.7	4.1	3.6	3.2	3.0	...	...	...	...	...	...	...
21	10.0	9.3	8.3	7.4	6.6	6.0	5.5	4.7	4.2	3.8	3.5	...	...	...	...	...	...	...
22	10.0	9.3	8.3	7.4	6.6	6.0	5.5	4.7	4.2	3.8	3.5	...	...	...	...	...	...	...
23	10.0	9.3	8.3	7.4	6.6	6.0	5.5	4.7	4.2	3.8	3.5	...	...	...	...	...	...	...
24	10.0	9.3	8.3	7.4	6.6	6.0	5.5	4.7	4.2	3.8	3.5	...	...	...	...	...	...	...
25	8.5	7.9	7.0	6.3	5.6	5.1	4.7	4.1	3.6	3.2	3.0	...	...	...	...	...	...	...
26	14.3	13.1	11.8	10.7	9.7	8.9	8.1	7.4	6.8	...	...	...	...	...	...	...	...	...
27	14.3	13.7	12.4	11.3	10.3	9.5	8.8	8.2	7.6	7.0	6.5	...	...	...	...	...	...	...
28	14.3	13.7	12.4	11.3	10.3	9.5	8.8	8.2	7.6	7.0	6.5	...	...	...	...	...	...	...
29	12.1	11.7	10.6	9.6	8.8	8.1	7.5	7.0	6.5	6.0	5.5	...	...	...	...	...	...	...
30	14.3	13.7	12.4	11.3	10.3	9.5	8.8	8.2	7.6	7.0	6.5	...	...	...	...	...	...	...
31	14.3	13.7	12.4	11.3	10.3	9.5	8.8	8.2	7.6	7.0	6.5	...	...	...	...	...	...	...
32	14.3	13.7	12.4	11.3	10.3	9.5	8.8	8.2	7.6	7.0	6.5	...	...	...	...	...	...	...
33	14.3	13.7	12.4	11.3	10.3	9.5	8.8	8.2	7.6	7.0	6.5	...	...	...	...	...	...	...
34	12.1	11.7	10.6	9.6	8.8	8.1	7.5	7.0	6.5	6.0	5.5	...	...	...	...	...	...	...
35	16.6	15.9	14.4	13.1	12.0	11.1	10.2	9.5	8.8	8.2	7.6	...	...	...	...	...	...	...
36	16.6	15.9	14.4	13.1	12.0	11.1	10.2	9.5	8.8	8.2	7.6	...	...	...	...	...	...	...
37	14.1	13.5	12.3	11.2	10.2	9.4	8.7	8.1	7.5	6.9	6.4	...	...	...	...	...	...	...
38	16.6	15.9	14.4	13.1	12.0	11.1	10.2	9.5	8.8	8.2	7.6	...	...	...	...	...	...	...
39	16.6	15.9	14.4	13.1	12.0	11.1	10.2	9.5	8.8	8.2	7.6	...	...	...	...	...	...	...
40	16.6	15.9	14.4	13.1	12.0	11.1	10.2	9.5	8.8	8.2	7.6	...	...	...	...	...	...	...
41	16.6	15.9	14.4	13.1	12.0	11.1	10.2	9.5	8.8	8.2	7.6	...	...	...	...	...	...	...
42	16.6	15.9	14.4	13.1	12.0	11.1	10.2	9.5	8.8	8.2	7.6	...	...	...	...	...	...	...
43	16.6	15.9	14.4	13.1	12.0	11.1	10.2	9.5	8.8	8.2	7.6	...	...	...	...	...	...	...
44	18.6	17.5	15.8	14.2	12.8	11.5	10.3	9.3	8.5	...	...	...	...	...	...	...	...	...
45	18.6	17.5	15.8	14.2	12.8	11.5	10.3	9.3	8.5	7.9	7.4	...	...	...	...	...	...	...

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																	
	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	1700	1750	1800	
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	17.5	17.3	17.1	16.9	*13.6*	*10.9*	*8.8*	*7.0*	*5.6*	*4.5*	*3.6*	*2.7*	*2.1*	*1.6*	...	...	...	
7	23.6	23.3	21.2	*17.0*	*13.6*	*10.9*	*8.8*	*7.0*	*5.6*	*4.5*	*3.6*	*2.7*	*2.1*	*1.6*	...	...	...	
8	17.5	17.3	17.1	16.9	*13.6*	*10.9*	*8.8*	*7.0*	*5.6*	*4.5*	*3.6*	*2.7*	*2.1*	*1.6*	...	...	...	
9	23.6	23.3	21.2	*17.0*	*13.6*	*10.9*	*8.8*	*7.0*	*5.6*	*4.5*	*3.6*	*2.7*	*2.1*	*1.6*	...	...	...	
10	14.8	14.7	14.5	*14.4*	*11.6*	*9.3*	*7.5*	*6.0*	*4.8*	*3.8*	*3.1*	*2.3*	*1.8*	*1.4*	...	...	...	
11	20.0	19.8	*18.0*	*14.4*	*11.6*	*9.3*	*7.5*	*6.0*	*4.8*	*3.8*	*3.1*	*2.3*	*1.8*	*1.4*	...	...	...	
12	17.5	17.3	17.1	16.9	*13.6*	*10.9*	*8.8*	*7.0*	*5.6*	*4.5*	*3.6*	*2.7*	*2.1*	*1.6*	...	...	...	
13	23.6	23.3	21.2	*17.0*	*13.6*	*10.9*	*8.8*	*7.0*	*5.6*	*4.5*	*3.6*	*2.7*	*2.1*	*1.6*	...	...	...	
14	14.8	14.7	14.5	*14.4*	*11.6*	*9.3*	*7.5*	*6.0*	*4.8*	*3.8*	*3.1*	*2.3*	*1.8*	*1.4*	...	...	...	
15	20.0	19.8	*18.0*	*14.4*	*11.6*	*9.3*	*7.5*	*6.0*	*4.8*	*3.8*	*3.1*	*2.3*	*1.8*	*1.4*	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
1	Ti	Smls. tube	SB–338	3	R50550	Annealed
2	Ti	Wld. tube	SB–338	3	R50550	Annealed
3	Ti	Bar, billet	SB–348	3	R50550	Annealed
4	Ti	Smls. & wld. fittings	SB–363	WPT3	R50550	Annealed
5	Ti	Forgings	SB–381	F–3	R50550	Annealed
6	Ti	Smls. pipe	SB–861	3	R50550	Annealed
7	Ti	Wld. pipe	SB–862	3	R50550	Annealed
8	Ti–Pd	Plate, sheet, strip	SB–265	11	R52250	Annealed
9	Ti–Pd	Plate, sheet, strip	SB–265	17	R52252	Annealed
10	Ti–Ru	Plate, sheet, strip	SB–265	27	R52254	Annealed
11	Ti–Pd	Plate, sheet, strip	SB–265	7	R52400	Annealed
12	Ti–Pd	Smls. tube	SB–338	7	R52400	Annealed
13	Ti–Pd	Wld. tube	SB–338	7	R52400	Annealed
14	Ti–Pd	Bar, billet	SB–348	7	R52400	Annealed
15	Ti–Pd	Smls. fittings	SB–363	WPT7	R52400	Annealed
16	Ti–Pd	Wld. fittings	SB–363	WPT7W	R52400	Annealed
(**21**) 17	Ti–Pd	Castings	SB–367	C–7	R52400	Annealed
18	Ti–Pd	Forgings	SB–381	F–7	R52400	Annealed
19	Ti–Pd	Smls. pipe	SB–861	7	R52400	Annealed
20	Ti–Pd	Wld. pipe	SB–862	7	R52400	Annealed
21	Ti–0.15Pd	Plate, sheet, strip	SB–265	7H	R52400	Annealed
22	Ti–0.15Pd	Smls. tube	SB–338	7H	R52400	Annealed
23	Ti–0.15Pd	Wld. tube	SB–338	7H	R52400	Annealed
24	Ti–0.15Pd	Bar, billet	SB–348	7H	R52400	Annealed
25	Ti–0.15Pd	Smls. fittings	SB–363	WPT7H	R52400	Annealed
26	Ti–0.15Pd	Wld. fittings	SB–363	WPT7HW	R52400	Annealed
27	Ti–0.15Pd	Forgings	SB–381	F–7H	R52400	Annealed
28	Ti–0.15Pd	Smls. pipe	SB–861	7H	R52400	Annealed
29	Ti–0.15Pd	Wld. pipe	SB–862	7H	R52400	Annealed
30	Ti–Pd	Plate, sheet, strip	SB–265	16	R52402	Annealed
31	Ti–Pd	Smls. tube	SB–338	16	R52402	Annealed
32	Ti–Pd	Wld. tube	SB–338	16	R52402	Annealed
33	Ti–Pd	Bar, billet	SB–348	16	R52402	Annealed
34	Ti–Pd	Forgings	SB–381	F–16	R52402	Annealed
35	Ti–0.05Pd	Plate, sheet, strip	SB–265	16H	R52402	Annealed
36	Ti–0.05Pd	Smls. tube	SB–338	16H	R52402	Annealed
37	Ti–0.05Pd	Wld. tube	SB–338	16H	R52402	Annealed
38	Ti–0.05Pd	Bar, billet	SB–348	16H	R52402	Annealed
39	Ti–0.05Pd	Smls. fittings	SB–363	WPT16H	R52402	Annealed
40	Ti–0.05Pd	Wld. fittings	SB–363	WPT16HW	R52402	Annealed
41	Ti–0.05Pd	Forgings	SB–381	F–16H	R52402	Annealed
42	Ti–0.05Pd	Smls. pipe	SB–861	16H	R52402	Annealed
43	Ti–0.05Pd	Wld. pipe	SB–862	16H	R52402	Annealed
44	Ti–Ru	Plate, sheet, strip	SB–265	26	R52404	Annealed
45	Ti–Ru	Smls. tube	SB–338	26	R52404	Annealed

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Size/ Thickness, in.	P-No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	...	52	65	55	600	600	600	600	NFT–1	...
2	...	52	65	55	600	600	600	600	NFT–1	G14, W6
3	...	52	65	55	600	600	600	600	NFT–1	...
4	...	52	65	55	NP	600	600	600	NFT–1	W5, W12
5	...	52	65	55	NP	600	600	600	NFT–1	...
6	...	52	65	55	600	600	600	600	NFT–1	...
7	...	52	65	55	600	600	600	600	NFT–1	G14, W6
8	...	51	35	20	NP	NP	600	NP	NFT–3	...
9	...	51	35	20	NP	NP	600	NP	NFT–3	...
10	...	51	35	20	NP	NP	600	NP	NFT–3	...
11	...	51	50	40	NP	600	600	600	NFT–2	...
12	...	51	50	40	NP	600	600	600	NFT–2	...
13	...	51	50	40	NP	600	600	600	NFT–2	G14, W6
14	...	51	50	40	NP	600	600	600	NFT–2	...
15	...	51	50	40	NP	NP	600	600	NFT–2	...
16	...	51	50	40	NP	NP	600	600	NFT–2	G14
17	...	51	50	40	NP	NP	500	500	NFT–2	G15
18	...	51	50	40	NP	NP	600	600	NFT–2	...
19	...	51	50	40	NP	600	600	600	NFT–2	...
20	...	51	50	40	NP	600	600	600	NFT–2	G14, W6
21	...	51	58	40	NP	NP	600	NP	NFT–2	...
22	...	51	58	40	NP	NP	600	NP	NFT–2	...
23	...	51	58	40	NP	NP	600	NP	NFT–2	G14, W6
24	...	51	58	40	NP	NP	600	NP	NFT–2	...
25	...	51	58	40	NP	NP	600	NP	NFT–2	...
26	...	51	58	40	NP	NP	600	NP	NFT–2	W12
27	...	51	58	40	NP	NP	600	NP	NFT–2	...
28	...	51	58	40	NP	NP	600	NP	NFT–2	...
29	...	51	58	40	NP	NP	600	NP	NFT–2	W12
30	...	51	50	40	NP	NP	600	600	NFT–2	...
31	...	51	50	40	NP	NP	600	600	NFT–2	...
32	...	51	50	40	NP	NP	600	600	NFT–2	G14, W6
33	...	51	50	40	NP	NP	600	600	NFT–2	...
34	...	51	50	40	NP	NP	600	600	NFT–2	...
35	...	51	58	40	NP	NP	600	NP	NFT–2	...
36	...	51	58	40	NP	NP	600	NP	NFT–2	...
37	...	51	58	40	NP	NP	600	NP	NFT–2	G14, W6
38	...	51	58	40	NP	NP	600	NP	NFT–2	...
39	...	51	58	40	NP	NP	600	NP	NFT–2	...
40	...	51	58	40	NP	NP	600	NP	NFT–2	W12
41	...	51	58	40	NP	NP	600	NP	NFT–2	...
42	...	51	58	40	NP	NP	600	NP	NFT–2	...
43	...	51	58	40	NP	NP	600	NP	NFT–2	W12
44	...	51	50	40	NP	NP	600	600	NFT–2	...
45	...	51	50	40	NP	NP	600	600	NFT–2	...

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																	
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950
1	18.6	17.5	15.8	14.2	12.8	11.5	10.3	9.3	8.5	7.9	7.4	...	...	...	...	...	...	...
2	15.8	14.9	13.4	12.1	10.8	9.7	8.8	7.9	7.2	6.7	6.3	...	...	...	...	...	...	...
3	18.6	17.5	15.8	14.2	12.8	11.5	10.3	9.3	8.5	7.9	7.4	...	...	...	...	...	...	...
4	18.6	17.5	15.8	14.2	12.8	11.5	10.3	9.3	8.5	7.9	7.4	...	...	...	...	...	...	...
5	18.6	17.5	15.8	14.2	12.8	11.5	10.3	9.3	8.5	7.9	7.4	...	...	...	...	...	...	...
6	18.6	17.5	15.8	14.2	12.8	11.5	10.3	9.3	8.5	7.9	7.4	...	...	...	...	...	...	...
7	15.8	14.9	13.4	12.1	10.8	9.7	8.8	7.9	7.2	6.7	6.3	...	...	...	...	...	...	...
8	10.0	9.3	8.3	7.4	6.6	6.0	5.4	4.7	4.2	3.8	3.5	...	...	...	...	...	...	...
9	10.0	9.3	8.3	7.4	6.6	6.0	5.4	4.7	4.2	3.8	3.5	...	...	...	...	...	...	...
10	10.0	9.3	8.3	7.4	6.6	6.0	5.4	4.7	4.2	3.8	3.5	...	...	...	...	...	...	...
11	14.3	13.7	12.4	11.3	10.3	9.5	8.8	8.2	7.6	7.0	6.5	...	...	...	...	...	...	...
12	14.3	13.7	12.4	11.3	10.3	9.5	8.8	8.2	7.6	7.0	6.5	...	...	...	...	...	...	...
13	12.1	11.7	10.6	9.6	8.8	8.1	7.5	7.0	6.5	6.0	5.5	...	...	...	...	...	...	...
14	14.3	13.7	12.4	11.3	10.3	9.5	8.8	8.2	7.6	7.0	6.5	...	...	...	...	...	...	...
15	14.3	13.7	12.4	11.3	10.3	9.5	8.8	8.2	7.6	7.0	6.5	...	...	...	...	...	...	...
16	12.1	11.7	10.6	9.6	8.8	8.1	7.5	7.0	6.5	6.0	5.5	...	...	...	...	...	...	...
17	14.3	13.1	11.8	10.7	9.7	8.9	8.1	7.4	6.8	...	...	...	...	...	...	...	...	...
18	14.3	13.7	12.4	11.3	10.3	9.5	8.8	8.2	7.6	7.0	6.5	...	...	...	...	...	...	...
19	14.3	13.7	12.4	11.3	10.3	9.5	8.8	8.2	7.6	7.0	6.5	...	...	...	...	...	...	...
20	12.1	11.7	10.6	9.6	8.8	8.1	7.5	7.0	6.5	6.0	5.5	...	...	...	...	...	...	...
21	16.6	15.9	14.4	13.1	12.0	11.1	10.2	9.5	8.8	8.2	7.6	...	...	...	...	...	...	...
22	16.6	15.9	14.4	13.1	12.0	11.1	10.2	9.5	8.8	8.2	7.6	...	...	...	...	...	...	...
23	14.1	13.5	12.3	11.2	10.2	9.4	8.7	8.1	7.5	6.9	6.4	...	...	...	...	...	...	...
24	16.6	15.9	14.4	13.1	12.0	11.1	10.2	9.5	8.8	8.2	7.6	...	...	...	...	...	...	...
25	16.6	15.9	14.4	13.1	12.0	11.1	10.2	9.5	8.8	8.2	7.6	...	...	...	...	...	...	...
26	16.6	15.9	14.4	13.1	12.0	11.1	10.2	9.5	8.8	8.2	7.6	...	...	...	...	...	...	...
27	16.6	15.9	14.4	13.1	12.0	11.1	10.2	9.5	8.8	8.2	7.6	...	...	...	...	...	...	...
28	16.6	15.9	14.4	13.1	12.0	11.1	10.2	9.5	8.8	8.2	7.6	...	...	...	...	...	...	...
29	16.6	15.9	14.4	13.1	12.0	11.1	10.2	9.5	8.8	8.2	7.6	...	...	...	...	...	...	...
30	14.3	13.7	12.4	11.3	10.3	9.5	8.8	8.2	7.6	7.0	6.5	...	...	...	...	...	...	...
31	14.3	13.7	12.4	11.3	10.3	9.5	8.8	8.2	7.6	7.0	6.5	...	...	...	...	...	...	...
32	12.1	11.7	10.6	9.6	8.8	8.1	7.5	7.0	6.5	6.0	5.5	...	...	...	...	...	...	...
33	14.3	13.7	12.4	11.3	10.3	9.5	8.8	8.2	7.6	7.0	6.5	...	...	...	...	...	...	...
34	14.3	13.7	12.4	11.3	10.3	9.5	8.8	8.2	7.6	7.0	6.5	...	...	...	...	...	...	...
35	16.6	15.9	14.4	13.1	12.0	11.1	10.2	9.5	8.8	8.2	7.6	...	...	...	...	...	...	...
36	16.6	15.9	14.4	13.1	12.0	11.1	10.2	9.5	8.8	8.2	7.6	...	...	...	...	...	...	...
37	14.1	13.5	12.3	11.2	10.2	9.4	8.7	8.1	7.5	6.9	6.4	...	...	...	...	...	...	...
38	16.6	15.9	14.4	13.1	12.0	11.1	10.2	9.5	8.8	8.2	7.6	...	...	...	...	...	...	...
39	16.6	15.9	14.4	13.1	12.0	11.1	10.2	9.5	8.8	8.2	7.6	...	...	...	...	...	...	...
40	16.6	15.9	14.4	13.1	12.0	11.1	10.2	9.5	8.8	8.2	7.6	...	...	...	...	...	...	...
41	16.6	15.9	14.4	13.1	12.0	11.1	10.2	9.5	8.8	8.2	7.6	...	...	...	...	...	...	...
42	16.6	15.9	14.4	13.1	12.0	11.1	10.2	9.5	8.8	8.2	7.6	...	...	...	...	...	...	...
43	16.6	15.9	14.4	13.1	12.0	11.1	10.2	9.5	8.8	8.2	7.6	...	...	...	...	...	...	...
44	14.3	13.7	12.4	11.3	10.3	9.5	8.8	8.2	7.6	7.0	6.5	...	...	...	...	...	...	...
45	14.3	13.7	12.4	11.3	10.3	9.5	8.8	8.2	7.6	7.0	6.5	...	...	...	...	...	...	...

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																
	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	1700	1750	1800
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	... (**21**)
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
1	Ti–Ru	Wld. tube	SB–338	26	R52404	Annealed
2	Ti–Ru	Bar, billet	SB–348	26	R52404	Annealed
3	Ti–Ru	Smls. fittings	SB–363	WPT26	R52404	Annealed
4	Ti–Ru	Wld. fittings	SB–363	WPT26W	R52404	Annealed
5	Ti–Ru	Forgings	SB–381	F–26	R52404	Annealed
6	Ti–Ru	Smls. pipe	SB–861	26	R52404	Annealed
7	Ti–Ru	Wld. pipe	SB–862	26	R52404	Annealed
8	Ti–0.10Ru	Plate, sheet, strip	SB–265	26H	R52404	Annealed
9	Ti–0.10Ru	Smls. tube	SB–338	26H	R52404	Annealed
10	Ti–0.10Ru	Wld. tube	SB–338	26H	R52404	Annealed
11	Ti–0.10Ru	Bar, billet	SB–348	26H	R52404	Annealed
12	Ti–0.10Ru	Smls. fittings	SB–363	WPT26H	R52404	Annealed
13	Ti–0.10Ru	Wld. fittings	SB–363	WPT26HW	R52404	Annealed
14	Ti–0.10Ru	Forgings	SB–381	F–26H	R52404	Annealed
15	Ti–0.10Ru	Smls. pipe	SB–861	26H	R52404	Annealed
16	Ti–0.10Ru	Wld. pipe	SB–862	26H	R52404	Annealed
17	Ti–0.3Mo–0.8Ni	Plate, sheet, strip	SB–265	12	R53400	Annealed
18	Ti–0.3Mo–0.8Ni	Smls. tube	SB–338	12	R53400	Annealed
19	Ti–0.3Mo–0.8Ni	Wld. tube	SB–338	12	R53400	Annealed
20	Ti–0.3Mo–0.8Ni	Bar, billet	SB–348	12	R53400	Annealed
21	Ti–0.3Mo–0.8Ni	Smls. fittings	SB–363	WPT12	R53400	Annealed
22	Ti–0.3Mo–0.8Ni	Wld. fittings	SB–363	WPT12W	R53400	Annealed
23	Ti–0.3Mo–0.8Ni	Forgings	SB–381	F–12	R53400	Annealed
24	Ti–0.3Mo–0.8Ni	Smls. pipe	SB–861	12	R53400	Annealed
25	Ti–0.3Mo–0.8Ni	Wld. pipe	SB–862	12	R53400	Annealed
26	Ti–4Al–2.5V–1.5Fe	Plate, sheet, strip	SB–265	38	R54250	Annealed
27	Ti–4Al–2.5V–1.5Fe	Smls. tube	SB–338	38	R54250	Annealed
28	Ti–4Al–2.5V–1.5Fe	Wld. tube	SB–338	38	R54250	Annealed
29	Ti–4Al–2.5V–1.5Fe	Bar, billet	SB–348	38	R54250	Annealed
30	Ti–4Al–2.5V–1.5Fe	Smls. fittings	SB–363	WPT38	R54250	Annealed
31	Ti–4Al–2.5V–1.5Fe	Wld. fittings	SB–363	WPT38W	R54250	Annealed
32	Ti–4Al–2.5V–1.5Fe	Forgings	SB–381	F–38	R54250	Annealed
33	Ti–4Al–2.5V–1.5Fe	Smls. pipe	SB–861	38	R54250	Annealed
34	Ti–4Al–2.5V–1.5Fe	Wld. pipe	SB–862	38	R54250	Annealed
35	Ti–3Al–2.5V	Plate, sheet, strip	SB–265	9	R56320	Annealed
36	Ti–3Al–2.5V	Smls. tube	SB–338	9	R56320	Annealed
37	Ti–3Al–2.5V	Wld. tube	SB–338	9	R56320	Annealed
38	Ti–3Al–2.5V	Bar, billet	SB–348	9	R56320	Annealed
39	Ti–3Al–2.5V	Smls. fittings	SB–363	WPT9	R56320	Annealed
40	Ti–3Al–2.5V	Wld. fittings	SB–363	WPT9W	R56320	Annealed
41	Ti–3Al–2.5V	Forgings	SB–381	F–9	R56320	Annealed
42	Ti–3Al–2.5V	Smls. pipe	SB–861	9	R56320	Annealed
43	Ti–3Al–2.5V	Wld. pipe	SB–862	9	R56320	Annealed
44	Ti–3Al–2.5V–0.1Ru	Plate, sheet, strip	SB–265	28	R56323	Annealed
45	Ti–3Al–2.5V–0.1Ru	Smls. tube	SB–338	28	R56323	Annealed

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Size/ Thickness, in.	P-No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	...	51	50	40	NP	NP	600	600	NFT–2	G14, W6
2	...	51	50	40	NP	NP	600	600	NFT–2	...
3	...	51	50	40	NP	NP	600	600	NFT–2	...
4	...	51	50	40	NP	NP	600	600	NFT–2	G14
5	...	51	50	40	NP	NP	600	600	NFT–2	...
6	...	51	50	40	NP	NP	600	600	NFT–2	...
7	...	51	50	40	NP	NP	600	600	NFT–2	G14, W6
8	...	51	58	40	NP	NP	600	NP	NFT–2	...
9	...	51	58	40	NP	NP	600	NP	NFT–2	...
10	...	51	58	40	NP	NP	600	NP	NFT–2	G14, W6
11	...	51	58	40	NP	NP	600	NP	NFT–2	...
12	...	51	58	40	NP	NP	600	NP	NFT–2	...
13	...	51	58	40	NP	NP	600	NP	NFT–2	W12
14	...	51	58	40	NP	NP	600	NP	NFT–2	...
15	...	51	58	40	NP	NP	600	NP	NFT–2	...
16	...	51	58	40	NP	NP	600	NP	NFT–2	W12
17	...	52	70	50	NP	NP	600	600	NFT–1	...
18	...	52	70	50	NP	NP	600	600	NFT–1	...
19	...	52	70	50	NP	NP	600	600	NFT–1	G14, W6
20	...	52	70	50	NP	NP	600	600	NFT–1	...
21	...	52	70	50	NP	NP	600	600	NFT–1	...
22	...	52	70	50	NP	NP	600	600	NFT–1	G14
23	...	52	70	50	NP	NP	600	600	NFT–1	...
24	...	52	70	50	NP	NP	600	600	NFT–1	...
25	...	52	70	50	NP	NP	600	600	NFT–1	G14, W6
26	...	54	130	115	NP	NP	650	NP	NFT–6	...
27	...	54	130	115	NP	NP	650	NP	NFT–6	...
28	...	54	130	115	NP	NP	650	NP	NFT–6	G14, W6
29	...	54	130	115	NP	NP	650	NP	NFT–6	...
30	...	54	130	115	NP	NP	650	NP	NFT–6	...
31	...	54	130	115	NP	NP	650	NP	NFT–6	G14, W6
32	...	54	130	115	NP	NP	650	NP	NFT–6	...
33	...	54	130	115	NP	NP	650	NP	NFT–6	...
34	...	54	130	115	NP	NP	650	NP	NFT–6	G14, W6
35	...	53	90	70	NP	600	600	600	NFT–4	...
36	...	53	90	70	NP	600	600	600	NFT–4	...
37	...	53	90	70	NP	600	600	600	NFT–4	G14, W6
38	...	53	90	70	NP	600	NP	NP	NFT–4	...
39	...	53	90	70	NP	600	NP	NP	NFT–4	...
40	...	53	90	70	NP	600	NP	NP	NFT–4	G14, W6
41	...	53	90	70	NP	600	NP	NP	NFT–4	...
42	...	53	90	70	NP	600	600	600	NFT–4	...
43	...	53	90	70	NP	600	600	600	NFT–4	G14, W6
44	...	53	90	70	NP	NP	600	NP	NFT–4	...
45	...	53	90	70	NP	NP	600	NP	NFT–4	...

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																	
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950
1	12.1	11.7	10.6	9.6	8.8	8.1	7.5	7.0	6.5	6.0	5.5	...	...	...	...	...	...	...
2	14.3	13.7	12.4	11.3	10.3	9.5	8.8	8.2	7.6	7.0	6.5	...	...	...	...	...	...	...
3	14.3	13.7	12.4	11.3	10.3	9.5	8.8	8.2	7.6	7.0	6.5	...	...	...	...	...	...	...
4	12.1	11.7	10.6	9.6	8.8	8.1	7.5	7.0	6.5	6.0	5.5	...	...	...	...	...	...	...
5	14.3	13.7	12.4	11.3	10.3	9.5	8.8	8.2	7.6	7.0	6.5	...	...	...	...	...	...	...
6	14.3	13.7	12.4	11.3	10.3	9.5	8.8	8.2	7.6	7.0	6.5	...	...	...	...	...	...	...
7	12.1	11.7	10.6	9.6	8.8	8.1	7.5	7.0	6.5	6.0	5.5	...	...	...	...	...	...	...
8	16.6	15.9	14.4	13.1	12.0	11.1	10.2	9.5	8.8	8.2	7.6	...	...	...	...	...	...	...
9	16.6	15.9	14.4	13.1	12.0	11.1	10.2	9.5	8.8	8.2	7.6	...	...	...	...	...	...	...
10	14.1	13.5	12.3	11.2	10.2	9.4	8.7	8.1	7.5	6.9	6.4	...	...	...	...	...	...	...
11	16.6	15.9	14.4	13.1	12.0	11.1	10.2	9.5	8.8	8.2	7.6	...	...	...	...	...	...	...
12	16.6	15.9	14.4	13.1	12.0	11.1	10.2	9.5	8.8	8.2	7.6	...	...	...	...	...	...	...
13	16.6	15.9	14.4	13.1	12.0	11.1	10.2	9.5	8.8	8.2	7.6	...	...	...	...	...	...	...
14	16.6	15.9	14.4	13.1	12.0	11.1	10.2	9.5	8.8	8.2	7.6	...	...	...	...	...	...	...
15	16.6	15.9	14.4	13.1	12.0	11.1	10.2	9.5	8.8	8.2	7.6	...	...	...	...	...	...	...
16	16.6	15.9	14.4	13.1	12.0	11.1	10.2	9.5	8.8	8.2	7.6	...	...	...	...	...	...	...
17	20.0	20.0	18.7	17.4	16.2	15.2	14.3	13.6	13.1	12.7	12.3	...	...	...	...	...	...	...
18	20.0	20.0	18.7	17.4	16.2	15.2	14.3	13.6	13.1	12.7	12.3	...	...	...	...	...	...	...
19	17.0	17.0	15.9	14.8	13.8	12.9	12.1	11.5	11.1	10.8	10.5	...	...	...	...	...	...	...
20	20.0	20.0	18.7	17.4	16.2	15.2	14.3	13.6	13.1	12.7	12.3	...	...	...	...	...	...	...
21	20.0	20.0	18.7	17.4	16.2	15.2	14.3	13.6	13.1	12.7	12.3	...	...	...	...	...	...	...
22	17.0	17.0	15.9	14.8	13.8	12.9	12.1	11.5	11.1	10.8	10.5	...	...	...	...	...	...	...
23	20.0	20.0	18.7	17.4	16.2	15.2	14.3	13.6	13.1	12.7	12.3	...	...	...	...	...	...	...
24	20.0	20.0	18.7	17.4	16.2	15.2	14.3	13.6	13.1	12.7	12.3	...	...	...	...	...	...	...
25	17.0	17.0	15.9	14.8	13.8	12.9	12.1	11.5	11.1	10.8	10.5	...	...	...	...	...	...	...
26	37.1	37.1	36.9	35.3	33.8	32.3	31.0	29.9	29.0	28.2	27.7	27.3	...	...	...	...	...	...
27	37.1	37.1	36.9	35.3	33.8	32.3	31.0	29.9	29.0	28.2	27.7	27.3	...	...	...	...	...	...
28	31.5	31.5	31.4	30.0	28.7	27.5	26.4	25.4	24.7	24.0	23.5	23.2	...	...	...	...	...	...
29	37.1	37.1	36.9	35.3	33.8	32.3	31.0	29.9	29.0	28.2	27.7	27.3	...	...	...	...	...	...
30	37.1	37.1	36.9	35.3	33.8	32.3	31.0	29.9	29.0	28.2	27.7	27.3	...	...	...	...	...	...
31	31.5	31.5	31.4	30.0	28.7	27.5	26.4	25.4	24.7	24.0	23.5	23.2	...	...	...	...	...	...
32	37.1	37.1	36.9	35.3	33.8	32.3	31.0	29.9	29.0	28.2	27.7	27.3	...	...	...	...	...	...
33	37.1	37.1	36.9	35.3	33.8	32.3	31.0	29.9	29.0	28.2	27.7	27.3	...	...	...	...	...	...
34	31.5	31.5	31.4	30.0	28.7	27.5	26.4	25.4	24.7	24.0	23.5	23.2	...	...	...	...	...	...
35	25.7	25.7	24.7	23.7	22.6	21.4	20.2	19.0	18.1	17.5	17.2	...	...	...	...	...	...	...
36	25.7	25.7	24.7	23.7	22.6	21.4	20.2	19.0	18.1	17.5	17.2	...	...	...	...	...	...	...
37	21.9	21.9	21.0	20.2	19.2	18.2	17.1	16.2	15.4	14.9	14.7	...	...	...	...	...	...	...
38	25.7	25.7	24.7	23.7	22.6	21.4	20.2	19.0	18.1	17.5	17.2	...	...	...	...	...	...	...
39	25.7	25.7	24.7	23.7	22.6	21.4	20.2	19.0	18.1	17.5	17.2	...	...	...	...	...	...	...
40	21.9	21.9	21.0	20.2	19.2	18.2	17.1	16.2	15.4	14.9	14.7	...	...	...	...	...	...	...
41	25.7	25.7	24.7	23.7	22.6	21.4	20.2	19.0	18.1	17.5	17.2	...	...	...	...	...	...	...
42	25.7	25.7	24.7	23.7	22.6	21.4	20.2	19.0	18.1	17.5	17.2	...	...	...	...	...	...	...
43	21.9	21.9	21.0	20.2	19.2	18.2	17.1	16.2	15.4	14.9	14.7	...	...	...	...	...	...	...
44	25.7	25.7	24.7	23.7	22.6	21.4	20.2	19.0	18.1	17.5	17.2	...	...	...	...	...	...	...
45	25.7	25.7	24.7	23.7	22.6	21.4	20.2	19.0	18.1	17.5	17.2	...	...	...	...	...	...	...

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																
	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	1700	1750	1800
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
1	Ti–3Al–2.5V–0.1Ru	Wld. tube	SB–338	28	R56323	Annealed
2	Ti–3Al–2.5V–0.1Ru	Bar, billet	SB–348	28	R56323	Annealed
3	Ti–3Al–2.5V–0.1Ru	Smls. fittings	SB–363	WPT28	R56323	Annealed
4	Ti–3Al–2.5V–0.1Ru	Wld. fittings	SB–363	WPT28W	R56323	Annealed
5	Ti–3Al–2.5V–0.1Ru	Forgings	SB–381	F–28	R56323	Annealed
6	Ti–3Al–2.5V–0.1Ru	Smls. pipe	SB–861	28	R56323	Annealed
7	Ti–3Al–2.5V–0.1Ru	Wld. pipe	SB–862	28	R56323	Annealed
8	99.2Zr	Forgings	SB–493	...	R60702	Annealed
9	99.2Zr	Smls. tube	SB–523	...	R60702	Annealed
10	99.2Zr	Wld. tube	SB–523	...	R60702	Annealed
11	99.2Zr	Bar, wire	SB–550	...	R60702	Annealed
12	99.2Zr	Plate, sheet, strip	SB–551	...	R60702	Annealed
13	99.2Zr	Smls. fittings	SB–653	PZ–2	R60702	Annealed
14	99.2Zr	Wld. fittings	SB–653	PZ–2W	R60702	Annealed
15	99.2Zr	Smls. & wld. pipe	SB–658	...	R60702	Annealed
16	95.5Zr + 2.5Nb	Forgings	SB–493	...	R60705	Annealed
17	95.5Zr + 2.5Nb	Smls. tube	SB–523	...	R60705	Annealed
18	95.5Zr + 2.5Nb	Wld. tube	SB–523	...	R60705	Annealed
19	95.5Zr + 2.5Nb	Bar, wire	SB–550	...	R60705	Annealed
20	95.5Zr + 2.5Nb	Plate, sheet, strip	SB–551	...	R60705	Annealed
21	95.5Zr + 2.5Nb	Smls. & wld. pipe	SB–658	...	R60705	Annealed

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Size/ Thickness, in.	P-No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	...	53	90	70	NP	NP	600	NP	NFT–4	G14, W6
2	...	53	90	70	NP	NP	600	NP	NFT–4	...
3	...	53	90	70	NP	NP	600	NP	NFT–4	...
4	...	53	90	70	NP	NP	600	NP	NFT–4	G14, W6
5	...	53	90	70	NP	NP	600	NP	NFT–4	...
6	...	53	90	70	NP	NP	600	NP	NFT–4	...
7	...	53	90	70	NP	NP	600	NP	NFT–4	G14, W6
8	...	61	55	30	NP	400	700	NP	NFZ–1	...
9	...	61	55	30	NP	400	700	NP	NFZ–1	...
10	...	61	55	30	NP	400	700	NP	NFZ–1	G14, W6
11	...	61	55	30	NP	400	700	NP	NFZ–1	...
12	...	61	55	30	NP	400	700	NP	NFZ–1	...
13	...	61	55	30	NP	400	700	NP	NFZ–1	...
14	...	61	55	30	NP	400	700	NP	NFZ–1	G14, W6
15	...	61	55	30	NP	400	700	NP	NFZ–1	W12
16	...	62	70	55	NP	NP	700	NP	NFZ–2	W2
17	...	62	80	55	NP	NP	700	NP	NFZ–2	W2
18	...	62	80	55	NP	NP	700	NP	NFZ–2	G14, W2, W6
19	...	62	80	55	NP	NP	700	NP	NFZ–2	W2
20	...	62	80	55	NP	NP	700	NP	NFZ–2	W2
21	...	62	80	55	NP	NP	700	NP	NFZ–2	W2, W12

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																	
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950
1	21.9	21.9	21.0	20.2	19.2	18.2	17.1	16.2	15.4	14.9	14.7	...	...	...	...	...	...	...
2	25.7	25.7	24.7	23.7	22.6	21.4	20.2	19.0	18.1	17.5	17.2	...	...	...	...	...	...	...
3	25.7	25.7	24.7	23.7	22.6	21.4	20.2	19.0	18.1	17.5	17.2	...	...	...	...	...	...	...
4	21.9	21.9	21.0	20.2	19.2	18.2	17.1	16.2	15.4	14.9	14.7	...	...	...	...	...	...	...
5	25.7	25.7	24.7	23.7	22.6	21.4	20.2	19.0	18.1	17.5	17.2	...	...	...	...	...	...	...
6	25.7	25.7	24.7	23.7	22.6	21.4	20.2	19.0	18.1	17.5	17.2	...	...	...	...	...	...	...
7	21.9	21.9	21.0	20.2	19.2	18.2	17.1	16.2	15.4	14.9	14.7	...	...	...	...	...	...	...
8	15.7	15.1	13.7	12.4	11.2	10.1	9.1	8.3	7.4	6.6	6.0	5.6	5.2	...	...	...	...	...
9	15.7	15.1	13.7	12.4	11.2	10.1	9.1	8.3	7.4	6.6	6.0	5.6	5.2	...	...	...	...	...
10	13.4	12.8	11.6	10.5	9.5	8.6	7.7	7.0	6.3	5.6	5.1	4.7	4.5	...	...	...	...	...
11	15.7	15.1	13.7	12.4	11.2	10.1	9.1	8.3	7.4	6.6	6.0	5.6	5.2	...	...	...	...	...
12	15.7	15.1	13.7	12.4	11.2	10.1	9.1	8.3	7.4	6.6	6.0	5.6	5.2	...	...	...	...	...
13	15.7	15.1	13.7	12.4	11.2	10.1	9.1	8.3	7.4	6.6	6.0	5.6	5.2	...	...	...	...	...
14	13.4	12.8	11.6	10.5	9.5	8.6	7.7	7.0	6.3	5.6	5.1	4.7	4.5	...	...	...	...	...
15	15.7	15.1	13.7	12.4	11.2	10.1	9.1	8.3	7.4	6.6	6.0	5.6	5.2	...	...	...	...	...
16	20.0	...	16.6	...	14.2	...	12.5	...	11.3	...	10.4	...	9.9	...	...	...	...	...
17	22.9	...	19.0	...	16.2	...	14.3	...	12.9	...	11.9	...	11.3	...	...	...	...	...
18	19.4	...	16.1	...	13.8	...	12.2	...	11.0	...	10.1	...	9.6	...	...	...	...	...
19	22.9	...	19.0	...	16.2	...	14.3	...	12.9	...	11.9	...	11.3	...	...	...	...	...
20	22.9	...	19.0	...	16.2	...	14.3	...	12.9	...	11.9	...	11.3	...	...	...	...	...
21	22.9	...	19.0	...	16.2	...	14.3	...	12.9	...	11.9	...	11.3	...	...	...	...	...

Table 1B (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Nonferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																
	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	1700	1750	1800
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

NOTES TO TABLE 1B

GENERAL NOTES

(a) The following abbreviations are used: ann., annealed; cond., condenser; CW, cold worked; exch., exchanger; extr., extruded; fin., finished; fr., from; HW, Hot worked; rel., relieved; rld., rolled; Smls., Seamless; Sol., Solution; treat., treated; and Wld., Welded.

(b) The stress values in this Table may be interpolated to determine values for intermediate temperatures. The values at intermediate temperatures shall be rounded to the same number of decimal places as the value at the higher temperature between which values are being interpolated. The rounding rule is: when the next digit beyond the last place to be retained is less than 5, retain unchanged the digit in the last place retained; when the digit next beyond the last place to be retained is 5 or greater, increase by 1 the digit in the last place retained.

(**21**) (c) The properties of steels are influenced by the processing history, heat treatment, melting practice, and level of residual elements. See Nonmandatory Appendix A for more information.

(**21**) (d) Where a size limit appears in the Size/Thickness column, the limit applies to the dimension appropriate to the product form: wall thickness of tubing, pipe, pipe fittings, and hollow forgings; thickness of plate, flat bar and forgings, and polygonal bar; diameter of solid bar and bolting; and thickest cross–section of other pressure parts, e.g., castings and forgings.

(e) An alternative typeface is used for stress values obtained from time–dependent properties (see Notes T1 through T19).

(f) Where specifications, grades, classes, and types are listed in this Table, and where the material specification in Section II, Part A or Part B is a dual–unit specification (e.g., SB–407/SB–407M), the values listed in this Table shall be applicable to either the customary U.S. version of the material specification or the SI units version of the material specification. For example, the values listed for SB–407 Grade N08800 shall be used when SB–407M Grade N08800 is used in construction.

NOTES – GENERAL REQUIREMENTS

G1 For steam at 250 psi (406°F), the values given for 400°F may be used.

G2 At temperatures over 1000°F, these stress values apply only when the carbon is 0.04% or higher.

G3 In the absence of evidence that the casting is of high quality throughout, values not in excess of 80% of those given in the Table shall be used. This is not intended to apply to valves and fittings made to recognized standards.

G4 Creep–fatigue, thermal ratcheting, and environmental effects are increasingly significant failure modes at temperatures in excess of 1500°F and shall be considered in the design.

G5 Due to the relatively low yield strength of these materials, these higher stress values were established at temperatures where the short–time tensile properties govern to permit the use of these alloys where slightly greater deformation is acceptable. The stress values in this range exceed $66\frac{2}{3}$% but do not exceed 90% of the yield strength at temperature. Use of these stresses may result in dimensional changes due to permanent strain. These stress values are not recommended for the flanges of gasketed joints or other applications where slight amounts of distortion can cause leakage or malfunction. For Section III applications, Table Y–2 lists multiplying factors that, when applied to the yield strength values shown in Table Y–1, will give allowable stress values that will result in lower levels of permanent strain.

G6 Maximum temperature for external pressure not to exceed 350°F.

G7 Use 350°F curve for all temperature values below 350°F.

G8 The stresses for this material are based on 120 ksi minimum tensile strength because of weld metal strength limitations.

G9 Use Figure NFC–6 up to and including 300°F. Use the 600°F curve of Figure NFC–3 above 300°F up to and including 400°F. Maximum temperature for external pressure not to exceed 400°F.

G10 Maximum temperature for external pressure not to exceed 450°F.

G11 Referenced external pressure chart is applicable up to 700°F.

G12 Referenced external pressure chart is applicable up to 800°F.

G13 For Section VIII and XII applications, use of external pressure charts for material in the form of bar stock is permitted for stiffener rings only.

G14 For Section VIII applications, a factor of 0.85 has been applied in arriving at the maximum allowable stress values in tension for this material. Divide tabulated values by 0.85 for maximum allowable longitudinal tensile stress.

G15 To these stress values a quality factor as specified in ND–3115 of Section III; UG–24 of Section VIII, Division 1; or TM–190 of Section XII shall be applied for castings. This is not intended to apply to valves and fittings made to recognized standards.

G16 Allowable stress values shown are 90% of those for the corresponding core material.

G17 Copper–silicon alloys are not always suitable when exposed to certain media and high temperatures, particularly steam above 212°F. The user should ensure that the alloy selected is satisfactory for the service for which it is to be used.

G18 Because of the occasionally contingent danger from the failure of pressure vessels by stress corrosion cracking, the following is pertinent. These materials are suitable for engineering use under a wide variety of ordinary corrosive conditions with no particular hazard in respect to stress corrosion.

G19 Few alloys are completely immune to stress corrosion cracking in all combinations of stress and corrosive environments, and the supplier of the material should be consulted. Reference may also be made to the following sources: (1) Stress Corrosion Cracking Control Measures, B. F. Brown, U.S. National Bureau of Standards (1977), available from NACE, Texas; (2) The Stress Corrosion of Metals, H. L. Logan, John Wiley & Sons, New York, 1966.

G20 For plate only.

G21 The maximum operating temperature is arbitrarily set at 500°F because harder temper adversely affects design stress in the creep rupture temperature range.

(**21**) G22 The minimum tensile strength of reduced section tension specimens in accordance with QW–462.1 of Section IX shall not be less than 110,000 psi.

G23 This alloy is subject to severe loss of impact strength at room temperatures after exposure in the range of 1000°F to 1400°F.

NOTES TO TABLE 1B (CONT'D)

NOTES – GENERAL REQUIREMENTS (CONT'D)

G24 For stress relieved tempers (T351, T3510, T3511, T451, T4510, T4511, T651, T6510, T6511), stress values for materials in the basic temper shall be used.

G25 The tension test specimen from plate 0.500 in. and thicker is machined from the core and does not include the cladding alloy; therefore, the allowable stress values for thickness less than 0.500 in. shall be used.

G26 The tension test specimen from plate 0.500 in. and thicker is machined from the core and does not include the cladding alloy; therefore, the allowable stress values shown are 90% of those for the core material of the same thickness.

G27 Alloy N06022 in the solution annealed condition is subject to severe loss of impact strength at room temperatures after exposure in the range of 1000°F to 1250°F.

G28 For external pressure design, the maximum design temperature is limited to 1000°F.

G29 External pressure chart NFN–2 may be used for temperatures between 400°F and 600°F.

G30 Alloy N06025 in the solution annealed condition is subject to severe loss of rupture ductility in the approximate temperature range of 1200°F to 1400°F.

G31 For external pressure design, the maximum design temperature is limited to 1200°F.

G32 For Section I use, the y values (see Section I, PG–27.4.6) shall be as follows: for 1050°F and below, 0.4; for 1100°F, 0.5; and for 1150°F and above, 0.7.

G33 Allowable stress values listed are set equal to those of an annealed temper, as data were not provided to justify higher values.

(**21**) G34 Time–dependent values are based on creep testing of as–welded product.

NOTES – HEAT TREATMENT REQUIREMENTS

H1 For temperatures above 1000°F, these stress values may be used only if the material is annealed at a minimum temperature of 1900°F and has a carbon content of 0.04% or higher.

H2 For temperatures above 1000°F, these stress values may be used only if the material is heat treated by heating it to a minimum temperature of 1900°F and quenching in water or rapidly cooling by other means.

H3 For Section I applications, cold drawn pipe and tube shall be annealed at 1900°F minimum.

H4 The material shall be given a 1725°F to 1825°F stabilizing heat treatment.

NOTES – TIME–DEPENDENT PROPERTIES [See General Note (e)]

T1 Allowable stresses for temperatures of 250°F and above are values obtained from time–dependent properties.

T2 Allowable stresses for temperatures of 300°F and above are values obtained from time–dependent properties.

T3 Allowable stresses for temperatures of 350°F and above are values obtained from time–dependent properties.

T4 Allowable stresses for temperatures of 400°F and above are values obtained from time–dependent properties.

T5 Allowable stresses for temperatures of 500°F and above are values obtained from time–dependent properties.

T6 Allowable stresses for temperatures of 550°F and above are values obtained from time–dependent properties.

T7 Allowable stresses for temperatures of 600°F and above are values obtained from time–dependent properties.

T8 Allowable stresses for temperatures of 750°F and above are values obtained from time–dependent properties.

T9 Allowable stresses for temperatures of 800°F and above are values obtained from time–dependent properties.

T10 Allowable stresses for temperatures of 850°F and above are values obtained from time–dependent properties.

T11 Allowable stresses for temperatures of 900°F and above are values obtained from time–dependent properties.

T12 Allowable stresses for temperatures of 950°F and above are values obtained from time–dependent properties.

T13 Allowable stresses for temperatures of 1000°F and above are values obtained from time–dependent properties.

T14 Allowable stresses for temperatures of 1050°F and above are values obtained from time–dependent properties.

T15 Allowable stresses for temperatures of 1100°F and above are values obtained from time–dependent properties.

T16 Allowable stresses for temperatures of 1150°F and above are values obtained from time–dependent properties.

T17 Allowable stresses for temperatures of 1200°F and above are values obtained from time–dependent properties.

T18 Allowable stresses for temperatures of 1250°F and above are values obtained from time–dependent properties.

T19 Allowable stresses for temperatures of 450°F and above are values obtained from time–dependent properties.

NOTES – WELDING REQUIREMENTS

W1 No welding or brazing permitted.

W2 For Section VIII applications, UNF–56(d) shall apply for welded constructions.

W3 For welded and brazed constructions, stress values for O (annealed) temper material shall be used.

W4 The stress values given for this material are not applicable when either welding or thermal cutting is employed.

W5 These S values do not include a longitudinal weld efficiency factor. For Section III applications, for materials welded without filler metal, ultrasonic examination, radiographic examination, or eddy current examination, in accordance with NC–2550, shall provide a longitudinal weld efficiency factor of 1.00. Materials welded with filler metal meeting the requirements of NC–2560 shall receive a longitudinal weld efficiency factor of 1.00. Other longitudinal weld efficiency factors shall be in accordance with the following:

(a) for single butt weld, with filler metal, 0.80

(b) for single or double butt weld, without filler metal, 0.85

(c) for double butt weld, with filler metal, 0.90

(d) for single or double butt weld, with radiography or ultrasonic, 1.00

W6 Filler metal shall not be used in the manufacture of welded pipe or tubing.

W7 Strength of reduced–section tensile specimen required to qualify welding procedures. See QW–150, Section IX.

(**21**) W8 For Section VIII and XII applications, no welding is permitted.

NOTES TO TABLE 1B (CONT'D)

NOTES – WELDING REQUIREMENTS (CONT'D)

W9 Use NFA–12 when welded with 5356 or 5556 filler metal, all thicknesses, or 4043 or 5554 filler metal, thickness ≤ $^{3}/_{8}$ in. Use NFA–13 when welded with 4043 or 5554 filler metal, thickness > $^{3}/_{8}$ in.

W10 For welded and brazed constructions, stress values for the welded and annealed (WO61) temper material shall be used.

W11 These maximum allowable stress values are to be used in welded or brazed constructions.

W12 These S values do not include a weld factor. For Section VIII, Division 1 and Section XII applications using welds made without filler metal, the tabulated tensile stress values shall be multiplied by 0.85. For welds made with filler metal, consult UW–12 of Section VIII, Division 1, or TW–130.4 of Section XII, as applicable.

W13 For service at 1200°F or higher, the deposited weld metal shall be of the same nominal chemistry as the base metal.

W14 No welding permitted.

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Table 2A
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/ Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	Carbon steel	Bar, shapes	SA–675	45	...	...	...	1	1
2	Carbon steel	Plate	SA–285	A	K01700	...	...	1	1
3	Carbon steel	Wld. pipe	SA–672	A45	K01700	...	...	1	1
4	Carbon steel	Wld. pipe	SA–53	E/A	K02504	...	...	1	1
5	Carbon steel	Smls. pipe	SA–53	S/A	K02504	...	...	1	1
6	Carbon steel	Smls. pipe	SA–106	A	K02501	...	...	1	1
7	Carbon steel	Bar, shapes	SA–675	50	...	...	...	1	1
8	Carbon steel	Plate	SA–283	B	...	...	...	1	1
9	Carbon steel	Plate	SA–285	B	K02200	...	≤2	1	1
10	Carbon steel	Wld. pipe	SA–672	A50	K02200	...	...	1	1
11	Carbon steel	Bar, shapes	SA–675	55	...	...	...	1	1
12	Carbon steel	Plate	SA–285	C	K02801	...	≤2	1	1
13	Carbon steel	Wld. pipe	SA–333	1	K03008	...	...	1	1
14	Carbon steel	Smls. pipe	SA–333	1	K03008	...	...	1	1
15	Carbon steel	Wld. tube	SA–334	1	K03008	...	...	1	1
16	Carbon steel	Smls. tube	SA–334	1	K03008	...	...	1	1
17	Carbon steel	Plate	SA–516	55	K01800	...	...	1	1
18	Carbon steel	Smls. pipe	SA–524	II	K02104	...	...	1	1
19	Carbon steel	Wld. pipe	SA–671	CA55	K02801	...	...	1	1
20	Carbon steel	Wld. pipe	SA–671	CE55	K02202	...	...	1	1
21	Carbon steel	Wld. pipe	SA–672	A55	K02801	...	...	1	1
22	Carbon steel	Wld. pipe	SA–672	B55	K02001	...	...	1	1
23	Carbon steel	Wld. pipe	SA–672	C55	K01800	...	...	1	1
24	Carbon steel	Wld. pipe	SA–672	E55	K02202	...	...	1	1
25	Carbon steel	Plate, bar, shapes	SA–36	...	K02600	...	...	1	1
26	Carbon steel	Plate	SA–662	A	K01701	...	...	1	1
27	Carbon steel	Forgings	SA–181	...	K03502	60	...	1	1
28	Carbon steel	Castings	SA–216	WCA	J02502	...	...	1	1
29	Carbon steel	Forgings	SA–266	1	K03506	...	...	1	1
30	Carbon steel	Forgings	SA–350	LF1	K03009	1	...	1	1
31	Carbon steel	Castings	SA–352	LCA	J02504	...	...	1	1
32	Carbon steel	Cast pipe	SA–660	WCA	J02504	...	...	1	1
33	Carbon steel	Bar, shapes	SA–675	60	...	...	...	1	1
34	Carbon steel	Forgings	SA–765	I	K03046	...	...	1	1
35	Carbon steel	Plate	SA–515	60	K02401	...	...	1	1
36	Carbon steel	Plate	SA–516	60	K02100	...	...	1	1
37	Carbon steel	Wld. pipe	SA–671	CB60	K02401	...	...	1	1
38	Carbon steel	Wld. pipe	SA–671	CC60	K02100	...	...	1	1
39	Carbon steel	Wld. pipe	SA–671	CE60	K02402	...	...	1	1
40	Carbon steel	Wld. pipe	SA–672	B60	K02401	...	...	1	1
41	Carbon steel	Wld. pipe	SA–672	C60	K02100	...	...	1	1
42	Carbon steel	Wld. pipe	SA–672	E60	K02402	...	...	1	1
43	Carbon steel	Plate	SA–283	D	K02702	...	...	1	1
44	Carbon steel	Wld. pipe	SA–53	E/B	K03005	...	...	1	1
45	Carbon steel	Smls. pipe	SA–53	S/B	K03005	...	...	1	1

Table 2A
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only)		External Pressure Chart No.	Notes
			III	VIII-2		
1	45	22.5	NP	700	CS-6	...
2	45	24	700	700	CS-1	...
3	45	24	700	NP	CS-1	G1, G4
4	48	30	700 (SPT)	NP	CS-2	E2
5	48	30	700 (SPT)	NP	CS-2	E2
6	48	30	700	700	CS-2	E2
7	50	25	700 (SPT)	700	CS-1	...
8	50	27	NP	700	CS-1	E2
9	50	27	700	700	CS-1	E2
10	50	27	700	NP	CS-1	E2, G1, G4
11	55	27.5	700 (SPT)	700	CS-1	...
12	55	30	700	700	CS-2	...
13	55	30	700	NP	CS-2	...
14	55	30	700	700	CS-2	...
15	55	30	700	NP	CS-2	...
16	55	30	700	700	CS-2	...
17	55	30	700	700	CS-2	...
18	55	30	NP	700	CS-2	...
19	55	30	700	NP	CS-2	G1, G4
20	55	30	700	NP	CS-2	G1, G4
21	55	30	700	NP	CS-2	G1, G4
22	55	30	700	NP	CS-2	G1, G4
23	55	30	700	NP	CS-2	G1, G4
24	55	30	700	NP	CS-2	G1, G4
25	58	36	700 (SPT)	700	CS-2	E2
26	58	40	NP	700	CS-2	E1
27	60	30	700	700	CS-2	...
28	60	30	700	700	CS-2	...
29	60	30	700	700	CS-2	...
30	60	30	700	700	CS-2	...
31	60	30	700	NP	CS-2	...
32	60	30	700	NP	CS-2	...
33	60	30	700 (SPT)	700	CS-2	...
34	60	30	NP	700	CS-2	...
35	60	32	700	700	CS-2	...
36	60	32	700	700	CS-2	...
37	60	32	700	NP	CS-2	G1, G4
38	60	32	700	NP	CS-2	G1, G4
39	60	32	700	NP	CS-2	G1, G4
40	60	32	700	NP	CS-2	G1, G4
41	60	32	700	NP	CS-2	G1, G4
42	60	32	700	NP	CS-2	G1, G4
43	60	33	NP	700	CS-2	E2
44	60	35	700 (SPT)	NP	CS-2	E2
45	60	35	700 (SPT)	NP	CS-2	E2

Table 2A
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Design Stress Intensity or Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	15.0	14.1	13.7	...	13.3	12.8	12.2	11.5	11.1	10.7	...	...	...	...
2	15.0	...	14.7	...	14.2	13.7	13.0	12.3	11.9	11.5	...	...	...	...
3	15.0	...	14.7	...	14.2	13.7	13.0	12.3	11.9	11.5	...	...	...	...
4	16.0	...	16.0	...	16.0	16.0	16.0	15.3	14.6	**14.4**	...	...	...	...
5	16.0	16.0	16.0	...	16.0	16.0	16.0	15.3	14.6	**14.4**	...	...	...	...
6	16.0	16.0	16.0	...	16.0	16.0	16.0	15.3	14.6	**14.4**	...	...	...	...
7	16.7	...	15.3	...	14.7	14.2	13.6	12.8	12.4	11.9	...	...	...	...
8	16.7	16.7	16.5	...	15.9	15.4	14.7	13.8	13.3	**13.0**	...	...	...	...
9	16.7	16.7	16.5	...	15.9	15.4	14.7	13.8	13.3	**13.0**	...	...	...	...
10	16.7	16.7	16.5	...	15.9	15.4	14.7	13.8	13.3	**13.0**	...	...	...	...
11	18.3	...	16.8	...	16.2	15.7	14.9	14.1	13.6	13.1	...	...	...	...
12	18.3	18.3	18.3	...	17.7	17.1	16.3	15.3	14.8	14.3	...	...	...	...
13	18.3	...	18.3	...	17.7	17.1	16.3	15.3	14.8	14.3	...	...	...	...
14	18.3	...	18.3	...	17.7	17.1	16.3	15.3	14.8	14.3	...	...	...	...
15	18.3	...	18.3	...	17.7	17.1	16.3	15.3	14.8	14.3	...	...	...	...
16	18.3	...	18.3	...	17.7	17.1	16.3	15.3	14.8	14.3	...	...	...	...
17	18.3	18.3	18.3	...	17.7	17.1	16.3	15.3	14.8	14.3	...	...	...	...
18	18.3	18.3	18.3	...	17.7	17.1	16.3	15.3	14.8	14.3	...	...	...	...
19	18.3	...	18.3	...	17.7	17.1	16.3	15.3	14.8	14.3	...	...	...	...
20	18.3	...	18.3	...	17.7	17.1	16.3	15.3	14.8	14.3	...	...	...	...
21	18.3	...	18.3	...	17.7	17.1	16.3	15.3	14.8	14.3	...	...	...	...
22	18.3	...	18.3	...	17.7	17.1	16.3	15.3	14.8	14.3	...	...	...	...
23	18.3	...	18.3	...	17.7	17.1	16.3	15.3	14.8	14.3	...	...	...	...
24	18.3	...	18.3	...	17.7	17.1	16.3	15.3	14.8	14.3	...	...	...	...
25	19.3	...	19.3	...	19.3	19.3	19.3	18.4	17.8	**17.3**	...	...	...	...
26	19.3	19.3	19.3	...	19.3	19.3	19.3	19.3	**19.3**	**19.2**	...	...	...	...
27	20.0	18.8	18.3	...	17.7	17.1	16.3	15.3	14.8	14.3	...	...	...	...
28	20.0	...	18.3	...	17.7	17.1	16.3	15.3	14.8	14.3	...	...	...	...
29	20.0	18.8	18.3	...	17.7	17.1	16.3	15.3	14.8	14.3	...	...	...	...
30	20.0	18.8	18.3	...	17.7	17.1	16.3	15.3	14.8	14.3	...	...	...	...
31	20.0	...	18.3	...	17.7	17.1	16.3	15.3	14.8	14.3	...	...	...	...
32	20.0	...	18.3	...	17.7	17.1	16.3	15.3	14.8	14.3	...	...	...	...
33	20.0	...	18.3	...	17.7	17.1	16.3	15.3	14.8	14.3	...	...	...	...
34	20.0	18.8	18.3	...	17.7	17.1	16.3	15.3	14.8	14.3	...	...	...	...
35	20.0	20.0	19.5	...	18.9	18.2	17.4	16.4	15.8	15.3	...	...	...	...
36	20.0	20.0	19.5	...	18.9	18.2	17.4	16.4	15.8	15.3	...	...	...	...
37	20.0	...	19.5	...	18.9	18.2	17.4	16.4	15.8	15.3	...	...	...	...
38	20.0	...	19.5	...	18.9	18.2	17.4	16.4	15.8	15.3	...	...	...	...
39	20.0	...	19.5	...	18.9	18.2	17.4	16.4	15.8	15.3	...	...	...	...
40	20.0	...	19.5	...	18.9	18.2	17.4	16.4	15.8	15.3	...	...	...	...
41	20.0	...	19.5	...	18.9	18.2	17.4	16.4	15.8	15.3	...	...	...	...
42	20.0	...	19.5	...	18.9	18.2	17.4	16.4	15.8	15.3	...	...	...	...
43	20.0	20.0	20.0	...	19.5	18.8	17.9	16.9	16.3	**15.4**	...	...	...	...
44	20.0	...	20.0	...	20.0	19.9	19.0	17.9	17.3	**16.8**	...	...	...	...
45	20.0	...	20.0	...	20.0	19.9	19.0	17.9	17.3	**16.8**	...	...	...	...

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Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/ Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	Carbon steel	Smls. pipe	SA–106	B	K03006	...	...	1	1
2	Carbon steel	Fittings	SA–234	WPB	K03006	...	...	1	1
3	Carbon steel	Wld. fittings	SA–234	WPB	K03006	W	...	1	1
4	Carbon steel	Wld. pipe	SA–333	6	K03006	...	...	1	1
5	Carbon steel	Smls. pipe	SA–333	6	K03006	...	...	1	1
6	Carbon steel	Smls. & wld. tube	SA–334	6	K03006	...	...	1	1
7	Carbon steel	Forgings	SA–372	A	K03002	...	...	1	1
8	Carbon steel	Fittings	SA–420	WPL6	...	...	...	1	1
9	Carbon steel	Wld. fittings	SA–420	WPL6	...	WP–W	...	1	1
10	Carbon steel	Smls. pipe	SA–524	I	K02104	...	...	1	1
11	Carbon steel	Bar	SA–696	B	K03200	...	...	1	1
12	Carbon steel	Forgings	SA–727	...	K02506	...	...	1	1
13	Carbon steel	Wld. tube	SA–178	C	K03503	...	...	1	1
14	Carbon steel	Wld. tube	SA–178	C	K03503	...	...	1	1
15	Carbon steel	Smls. tube	SA–210	A–1	K02707	...	...	1	1
16	Carbon steel	Bar, shapes	SA–675	65	...	...	...	1	1
17	Carbon steel	Castings	SA–352	LCB	J03003	...	...	1	1
18	Carbon steel	Plate	SA–515	65	K02800	...	...	1	1
19	Carbon steel	Plate	SA–516	65	K02403	...	...	1	1
20	Carbon steel	Wld. pipe	SA–671	CB65	K02800	...	...	1	1
21	Carbon steel	Wld. pipe	SA–671	CC65	K02403	...	...	1	1
22	Carbon steel	Wld. pipe	SA–672	B65	K02800	...	...	1	1
23	Carbon steel	Wld. pipe	SA–672	C65	K02403	...	...	1	1
24	Carbon steel	Plate	SA–662	B	K02203	...	...	1	1
25	Carbon steel	Plate	SA–537	...	K12437	1	$2\frac{1}{2} < t \le 4$	1	2
26	Carbon steel	Wld. pipe	SA–691	CMSH–70	K12437	...	$2\frac{1}{2} < t \le 4$	1	2
27	Carbon steel	Bar, shapes	SA–675	70	...	...	...	1	1
28	Carbon steel	Forgings	SA–105	...	K03504	...	...	1	2
29	Carbon steel	Forgings	SA–181	...	K03502	70	...	1	2
30	Carbon steel	Castings	SA–216	WCB	J03002	...	...	1	2
31	Carbon steel	Forgings	SA–266	2	K03506	...	...	1	2
32	Carbon steel	Forgings	SA–266	4	K03017	...	...	1	2
33	Carbon steel	Forgings	SA–350	LF2	K03011	...	...	1	2
34	Carbon steel	Forgings	SA–508	1	K13502	...	...	1	2
35	Carbon steel	Forgings	SA–508	1A	K13502	...	...	1	2
36	Carbon steel	Forgings	SA–541	1	K03506	...	...	1	2
37	Carbon steel	Forgings	SA–541	1A	K03020	...	...	1	2
38	Carbon steel	Cast pipe	SA–660	WCB	J03003	...	...	1	2
39	Carbon steel	Forgings	SA–765	II	K03047	...	...	1	2
40	Carbon steel	Plate	SA–515	70	K03101	...	...	1	2
41	Carbon steel	Plate	SA–516	70	K02700	...	...	1	2
42	Carbon steel	Wld. pipe	SA–671	CB70	K03101	...	...	1	2
43	Carbon steel	Wld. pipe	SA–671	CC70	K02700	...	...	1	2
44	Carbon steel	Wld. pipe	SA–672	B70	K03101	...	...	1	2
45	Carbon steel	Wld. pipe	SA–672	C70	K02700	...	...	1	2

Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only)		External Pressure Chart No.	Notes
			III	VIII-2		
1	60	35	700	700	CS-2	E2
2	60	35	700	700	CS-2	E2
3	60	35	700	NP	CS-2	E2
4	60	35	700	NP	CS-2	E2
5	60	35	700	700	CS-2	E2
6	60	35	700	NP	CS-2	E2
7	60	35	NP	650	CS-2	G19, H5
8	60	35	700	700	CS-2	E2
9	60	35	700	NP	CS-2	E2
10	60	35	NP	700	CS-2	E2
11	60	35	700	NP	CS-2	E2
12	60	36	700 (SPT)	700	CS-2	E2
13	60	37	700	NP	CS-2	E2
14	60	37	NP	700	CS-2	E2, G18
15	60	37	700	700	CS-2	E2
16	65	32.5	NP	700	CS-2	...
17	65	35	700	700	CS-2	...
18	65	35	700	700	CS-2	...
19	65	35	700	700	CS-2	...
20	65	35	700	NP	CS-2	G1, G4
21	65	35	700	NP	CS-2	G1, G4
22	65	35	700	NP	CS-2	G1, G4
23	65	35	700	NP	CS-2	G1, G4
24	65	40	NP	700	CS-2	E2
25	65	45	700	700	CS-2	E2
26	65	45	700	NP	CS-2	E2, G1, G2
27	70	35	NP	700	CS-2	...
28	70	36	700	700	CS-2	...
29	70	36	700	700	CS-2	...
30	70	36	700	700	CS-2	...
31	70	36	700	700	CS-2	...
32	70	36	NP	700	CS-2	...
33	70	36	700	700	CS-2	...
34	70	36	700	700	CS-2	...
35	70	36	700	700	CS-2	...
36	70	36	700	700	CS-2	...
37	70	36	700	700	CS-2	...
38	70	36	700	NP	CS-2	...
39	70	36	NP	700	CS-2	...
40	70	38	700	700	CS-2	...
41	70	38	700	700	CS-2	...
42	70	38	700	NP	CS-2	G1, G3
43	70	38	700	NP	CS-2	G1, G4
44	70	38	700	NP	CS-2	G1, G3
45	70	38	700	NP	CS-2	G1, G4

Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Design Stress Intensity or Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	20.0	20.0	20.0	...	20.0	19.9	19.0	17.9	17.3	**16.8**	...	...	...	...
2	20.0	20.0	20.0	...	20.0	19.9	19.0	17.9	17.3	**16.8**	...	...	...	...
3	20.0	20.0	20.0	...	20.0	19.9	19.0	17.9	17.3	**16.8**	...	...	...	...
4	20.0	20.0	20.0	...	20.0	19.9	19.0	17.9	17.3	**16.8**	...	...	...	...
5	20.0	20.0	20.0	...	20.0	19.9	19.0	17.9	17.3	**16.8**	...	...	...	...
6	20.0	...	20.0	...	20.0	19.9	19.0	17.9	17.3	**16.8**	...	...	...	...
7	20.0	20.0	20.0	20.0	20.0	19.9	19.0	17.9	17.3	...	...	...	...	...
8	20.0	20.0	20.0	...	20.0	19.9	19.0	17.9	17.3	**16.8**	...	...	...	...
9	20.0	20.0	20.0	...	20.0	19.9	19.0	17.9	17.3	**16.8**	...	...	...	...
10	20.0	20.0	20.0	...	20.0	19.9	19.0	17.9	17.3	**16.8**	...	...	...	...
11	20.0	...	20.0	...	20.0	19.9	19.0	17.9	17.3	**16.8**	...	...	...	...
12	20.0	20.0	20.0	...	20.0	20.0	19.6	18.4	17.8	**17.3**	...	...	...	...
13	20.0	...	20.0	...	20.0	20.0	20.0	18.9	18.3	**17.8**	...	...	...	...
14	17.0	...	17.0	...	17.0	17.0	17.0	16.1	15.5	**15.1**	...	...	...	...
15	20.0	20.0	20.0	...	20.0	20.0	20.0	18.9	18.3	**17.8**	...	...	...	...
16	21.7	20.4	19.8	19.5	19.2	18.5	17.7	16.6	16.1	15.5	...	...	...	...
17	21.7	21.7	21.4	...	20.6	19.9	19.0	17.9	17.3	16.7	...	...	...	...
18	21.7	21.7	21.4	...	20.6	19.9	19.0	17.9	17.3	16.7	...	...	...	...
19	21.7	21.7	21.4	...	20.6	19.9	19.0	17.9	17.3	16.7	...	...	...	...
20	21.7	...	21.4	...	20.6	19.9	19.0	17.9	17.3	16.7	...	...	...	...
21	21.7	...	21.4	...	20.6	19.9	19.0	17.9	17.3	16.7	...	...	...	...
22	21.7	...	21.4	...	20.6	19.9	19.0	17.9	17.3	16.7	...	...	...	...
23	21.7	...	21.4	...	20.6	19.9	19.0	17.9	17.3	16.7	...	...	...	...
24	21.7	21.7	21.7	...	21.7	21.7	21.7	20.4	19.8	**19.2**	...	...	...	...
25	21.7	...	21.7	...	21.7	21.7	21.7	21.7	20.5	**19.6**	...	...	...	...
26	21.7	...	21.7	...	21.7	21.7	21.7	21.7	20.5	**19.6**	...	...	...	...
27	23.3	21.9	21.4	...	20.6	19.9	19.0	17.9	17.3	16.7	...	...	...	...
28	23.3	22.6	22.0	...	21.2	20.5	19.6	18.4	17.8	17.2	...	...	...	...
29	23.3	22.6	22.0	...	21.2	20.5	19.6	18.4	17.8	17.2	...	...	...	...
30	23.3	22.6	22.0	...	21.2	20.5	19.6	18.4	17.8	17.2	...	...	...	...
31	23.3	...	22.0	...	21.2	20.5	19.6	18.4	17.8	17.2	...	...	...	...
32	23.3	22.6	22.0	...	21.2	20.5	19.6	18.4	17.8	17.2	...	...	...	...
33	23.3	22.6	22.0	...	21.2	20.5	19.6	18.4	17.8	17.2	...	...	...	...
34	23.3	22.6	22.0	...	21.2	20.5	19.6	18.4	17.8	17.2	...	...	...	...
35	23.3	22.6	22.0	...	21.2	20.5	19.6	18.4	17.8	17.2	...	...	...	...
36	23.3	22.6	22.0	...	21.2	20.5	19.6	18.4	17.8	17.2	...	...	...	...
37	23.3	22.6	22.0	...	21.2	20.5	19.6	18.4	17.8	17.2	...	...	...	...
38	23.3	...	22.0	...	21.2	20.5	19.6	18.4	17.8	17.2	...	...	...	...
39	23.3	22.6	22.0	...	21.2	20.5	19.6	18.4	17.8	17.2	...	...	...	...
40	23.3	23.3	23.2	...	22.4	21.6	20.6	19.4	18.8	18.1	...	...	...	...
41	23.3	23.3	23.2	...	22.4	21.6	20.6	19.4	18.8	18.1	...	...	...	...
42	23.3	...	23.2	...	22.4	21.6	20.6	19.4	18.8	18.1	...	...	...	...
43	23.3	...	23.2	...	22.4	21.6	20.6	19.4	18.8	18.1	...	...	...	...
44	23.3	...	23.2	...	22.4	21.6	20.6	19.4	18.8	18.1	...	...	...	...
45	23.3	...	23.2	...	22.4	21.6	20.6	19.4	18.8	18.1	...	...	...	...

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Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/ Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	Carbon steel	Smls. pipe	SA–106	C	K03501	...	...	1	2
2	Carbon steel	Smls. tube	SA–210	C	K03501	...	...	1	2
3	Carbon steel	Castings	SA–216	WCC	K02503	...	...	1	2
4	Carbon steel	Fittings	SA–234	WPC	K03501	...	...	1	2
5	Carbon steel	Wld. fittings	SA–234	WPC	K03501	W	...	1	2
6	Carbon steel	Castings	SA–352	LCC	J02505	...	...	1	2
7	Carbon steel	Castings	SA–487	16	...	A	...	1	2
8	Carbon steel	Plate	SA–537	...	K12437	3	$4 < t \le 6$	1	3
9	Carbon steel	Cast pipe	SA–660	WCC	J02505	...	...	1	2
10	Carbon steel	Bar	SA–696	C	K03200	...	...	1	2
11	Carbon steel	Plate	SA–662	C	K02007	...	...	1	2
12	Carbon steel	Plate	SA–537	...	K12437	2	$4 < t \le 6$	1	3
13	Carbon steel	Plate	SA–738	C	...	...	$4 < t \le 6$	1	3
14	Carbon steel	Plate	SA–537	...	K12437	1	$\le 2\frac{1}{2}$	1	2
15	Carbon steel	Wld. pipe	SA–671	CD70	K12437	...	$\le 2\frac{1}{2}$	1	2
16	Carbon steel	Wld. pipe	SA–672	D70	K12437	...	$\le 2\frac{1}{2}$	1	2
17	Carbon steel	Wld. pipe	SA–691	CMSH–70	K12437	...	$\le 2\frac{1}{2}$	1	2
18	Carbon steel	Forgings	SA–266	3	K05001	...	...	1	2
19	Carbon steel	Plate	SA–299	A	K02803	...	>1	1	2
20	Carbon steel	Wld. pipe	SA–691	CMS–75	K02803	...	>1	1	2
21	Carbon steel	Plate	SA–299	A	K02803	...	≤1	1	2
22	Carbon steel	Wld. pipe	SA–671	CK75	K02803	...	≤1	1	2
23	Carbon steel	Wld. pipe	SA–672	N75	K02803	...	≤1	1	2
24	Carbon steel	Wld. pipe	SA–691	CMS–75	K02803	...	≤1	1	2
25	Carbon steel	Forgings	SA–372	B	K04001	...	...	1	2
26	Carbon steel	Plate	SA–738	A	K12447	N	$\le 2\frac{1}{2}$	1	2
27	Carbon steel	Plate	SA–738	A	K12447	QT	...	1	2
28	Carbon steel	Plate	SA–537	...	K12437	3	$2\frac{1}{2} < t \le 4$	1	3
29	Carbon steel	Plate	SA–537	...	K12437	2	$2\frac{1}{2} < t \le 4$	1	3
30	Carbon steel	Wld. pipe	SA–691	CMSH–80	K12437	...	$2\frac{1}{2} < t \le 4$	1	3
31	Carbon steel	Plate	SA–738	C	...	...	$2\frac{1}{2} < t \le 4$	1	3
32	Carbon steel	Forgings	SA–765	IV	K02009	...	...	1	3
33	Carbon steel	Plate	SA–537	...	K12437	3	$\le 2\frac{1}{2}$	1	3
34	Carbon steel	Plate	SA–537	...	K12437	2	$\le 2\frac{1}{2}$	1	3
35	Carbon steel	Wld. pipe	SA–671	CD80	K12437	...	$\le 2\frac{1}{2}$	1	3
36	Carbon steel	Wld. pipe	SA–672	D80	K12437	...	$\le 2\frac{1}{2}$	1	3
37	Carbon steel	Wld. pipe	SA–691	CMSH–80	K12437	...	$\le 2\frac{1}{2}$	1	3
38	Carbon steel	Plate	SA–738	C	...	...	$\le 2\frac{1}{2}$	1	3
39	Carbon steel	Plate	SA–612	...	K02900	N	$\frac{1}{2} < t \le 1$	10C	1
40	Carbon steel	Plate	SA–612	...	K02900	N	$\le \frac{1}{2}$	10C	1
41	Carbon steel	Plate	SA–738	B	K12007	...	...	1	3
42	Carbon steel	Forgings	SA–372	C	K04801	...	...	...	...
43	Carbon steel	Plate	SA–724	A	K11831	...	...	1	4
44	Carbon steel	Plate	SA–724	C	K12037	...	...	1	4
45	Carbon steel	Plate	SA–724	B	K12031	...	...	1	4

Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only)		External Pressure Chart No.	Notes
			III	VIII-2		
1	70	40	700	700	CS-2	E2
2	70	40	NP	700	CS-2	E2
3	70	40	700	700	CS-2	E2
4	70	40	700	700	CS-2	E2
5	70	40	700	NP	CS-2	E2
6	70	40	700	NP	CS-2	E2
7	70	40	700	NP	CS-2	E2
8	70	40	NP	700	CS-2	E2
9	70	40	700	NP	CS-2	E2
10	70	40	700	NP	CS-2	E2
11	70	43	NP	700	CS-3	E2
12	70	46	700	700	CS-3	E2
13	70	46	NP	650	CS-3	...
14	70	50	700	700	CS-3	E2
15	70	50	700	NP	CS-3	E2, G1, G4
16	70	50	700	NP	CS-3	E2, G1, G4
17	70	50	700	NP	CS-3	E2, G1, G4
18	75	37.5	700	700	CS-2	W1, W6
19	75	40	700	700	CS-2	...
20	75	40	700	NP	CS-2	G1, G4
21	75	42	700	700	CS-2	E2
22	75	42	700	NP	CS-2	E2, G1
23	75	42	700	NP	CS-2	E2, G1
24	75	42	700	NP	CS-2	E2, G1
25	75	45	NP	100	CS-3	G19, H5, W5, W6
26	75	45	NP	700	CS-2	...
27	75	45	NP	700	CS-2	...
28	75	50	NP	700	CS-5	E2
29	75	55	700	700	CS-5	E2
30	75	55	700	NP	CS-5	E2
31	75	55	NP	650	CS-5	...
32	80	50	NP	700	CS-3	...
33	80	55	NP	700	CS-5	E1
34	80	60	700	700	CS-5	E1
35	80	60	700	NP	CS-5	E1, G1, G4
36	80	60	700	NP	CS-5	E1, G1, G4
37	80	60	700	NP	CS-5	E1, G1, G4
38	80	60	NP	650	CS-5	E1
39	81	50	NP	650	CS-3	...
40	83	50	NP	650	CS-3	...
41	85	60	600	600	CS-5	...
42	90	55	NP	100	CS-3	G19, H5, W5, W6
43	90	70	NP	700	CS-5	E1
44	90	70	NP	700	CS-5	E1
45	95	75	NP	700	CS-5	E1

Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Design Stress Intensity or Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	23.3	...	23.3	...	23.3	22.8	21.7	20.4	19.8	**19.2**	...	...	...	...
2	23.3	...	23.3	...	23.3	22.8	21.7	20.4	19.8	**19.2**	...	...	...	...
3	23.3	23.3	23.3	...	23.3	22.8	21.7	20.4	19.8	**19.2**	...	...	...	...
4	23.3	...	23.3	...	23.3	22.8	21.7	20.4	19.8	**19.2**	...	...	...	...
5	23.3	...	23.3	...	23.3	22.8	21.7	20.4	19.8	**19.2**	...	...	...	...
6	23.3	...	23.3	...	23.3	22.8	21.7	20.4	19.8	**19.2**	...	...	...	...
7	23.3	...	23.2	...	21.9	21.1	20.4	19.6	19.1	**18.6**	...	...	...	...
8	23.3	23.3	23.3	...	23.2	22.2	21.3	20.6	20.2	**19.8**	...	...	...	...
9	23.3	...	23.3	...	23.3	22.8	21.7	20.4	19.8	**19.2**	...	...	...	...
10	23.3	...	23.3	...	23.3	22.8	21.7	20.4	19.8	**19.2**	...	...	...	...
11	23.3	...	23.3	...	23.3	23.3	23.3	22.0	21.2	**20.7**	...	...	...	...
12	23.3	...	23.3	...	23.3	23.3	23.3	23.1	22.5	**20.7**	...	...	...	...
13	23.3	...	23.3	...	23.3	23.3	23.3	23.1	22.5	...	...	...	...	...
14	23.3	...	23.3	...	22.8	22.7	22.7	22.4	21.9	**21.4**	...	...	...	...
15	23.3	...	23.3	...	22.8	22.7	22.7	22.4	21.9	**21.4**	...	...	...	...
16	23.3	...	23.3	...	22.8	22.7	22.7	22.4	21.9	**21.4**	...	...	...	...
17	23.3	...	23.3	...	22.8	22.7	22.7	22.4	21.9	**21.4**	...	...	...	...
18	25.0	23.5	22.9	...	22.1	21.4	20.4	19.2	18.5	17.9	...	...	...	...
19	25.0	25.0	24.4	...	23.6	22.8	21.7	20.4	19.8	19.1	...	...	...	...
20	25.0	...	24.4	...	23.6	22.8	21.7	20.4	19.8	19.1	...	...	...	...
21	25.0	25.0	25.0	...	24.8	23.9	22.8	21.5	20.8	**20.2**	...	...	...	...
22	25.0	25.0	25.0	...	24.8	23.9	22.8	21.5	20.8	**20.2**	...	...	...	...
23	25.0	25.0	25.0	...	24.8	23.9	22.8	21.5	20.8	**20.2**	...	...	...	...
24	25.0	...	25.0	...	24.8	23.9	22.8	21.5	20.8	**20.2**	...	...	...	...
25	25.0	...	...	...	...	...	...	...	...	...	...	...	...	...
26	25.0	...	25.0	...	24.3	22.6	21.2	20.2	19.7	19.3	...	...	...	...
27	25.0	...	25.0	...	25.0	25.0	24.0	23.1	22.7	22.3	...	...	...	...
28	25.0	...	25.0	...	25.0	25.0	25.0	24.8	22.5	**21.4**	...	...	...	...
29	25.0	...	25.0	...	25.0	25.0	25.0	24.8	24.4	**24.3**	...	...	...	...
30	25.0	...	25.0	...	25.0	25.0	25.0	24.8	24.4	**24.3**	...	...	...	...
31	25.0	...	25.0	...	25.0	25.0	25.0	24.8	24.4	...	...	...	...	...
32	26.7	...	26.7	...	26.7	26.4	26.4	25.5	25.1	24.7	...	...	...	...
33	26.7	...	26.7	...	26.7	26.7	26.7	26.4	**26.0**	**24.3**	...	...	...	...
34	26.7	...	26.7	...	26.7	26.7	26.7	26.4	**26.0**	**24.3**	...	...	...	...
35	26.7	...	26.7	...	26.7	26.7	26.7	26.4	**26.0**	**24.3**	...	...	...	...
36	26.7	...	26.7	...	26.7	26.7	26.7	26.4	**26.0**	**24.3**	...	...	...	...
37	26.7	...	26.7	...	26.7	26.7	26.7	26.4	**26.0**	**24.3**	...	...	...	...
38	26.7	...	26.7	...	26.7	26.7	26.7	26.4	**26.0**	...	...	...	...	...
39	27.0	...	27.0	...	26.5	25.0	23.5	22.6	22.0	...	...	...	...	...
40	27.7	...	27.7	...	27.1	25.0	23.5	22.6	22.0	...	...	...	...	...
41	28.3	28.3	28.3	28.3	28.3	28.3	28.3	28.1	...	...	...	...	...	...
42	30.0	...	...	...	...	...	...	...	...	...	...	...	...	...
43	30.0	30.0	30.0	30.0	30.0	30.0	30.0	29.7	**26.2**	**25.9**	...	...	...	...
44	30.0	30.0	30.0	30.0	30.0	30.0	30.0	29.7	**26.2**	**25.9**	...	...	...	...
45	31.7	31.7	31.7	31.7	31.7	31.7	31.7	31.4	**26.2**	**25.9**	...	...	...	...

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Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/ Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	Ductile cast iron	Castings	SA–874	...	...	...	12 < t < 21	...	...
2	Ductile cast iron	Castings	SA/JIS G5504	FCD 300 LT	...	...	12 < t < 21	...	...
3	C–Mn–Si–Cb	Plate	SA–737	B	K12001	...	...	1	2
4	C–Mn–Si–V	Plate	SA–737	C	K12202	...	...	1	3
5	C–½Mo	Smls. tube	SA–209	T1b	K11422	...	...	3	1
6	C–½Mo	Smls. tube	SA–209	T1	K11522	...	...	3	1
7	C–½Mo	Fittings	SA–234	WP1	K12821	...	...	3	1
8	C–½Mo	Wld. fittings	SA–234	WP1	K12821	W	...	3	1
9	C–½Mo	Smls. pipe	SA–335	P1	K11522	...	...	3	1
10	C–½Mo	Forged pipe	SA–369	FP1	K11522	...	...	3	1
11	C–½Mo	Smls. tube	SA–209	T1a	K12023	...	...	3	1
12	C–½Mo	Castings	SA–217	WC1	J12524	...	...	3	1
13	C–½Mo	Castings	SA–352	LC1	J12522	...	...	3	1
14	C–½Mo	Cast pipe	SA–426	CP1	J12521	...	...	3	1
15	C–½Mo	Plate	SA–204	A	K11820	...	...	3	1
16	C–½Mo	Wld. pipe	SA–672	L65	K11820	...	...	3	1
17	C–½Mo	Wld. pipe	SA–691	CM–65	K11820	...	...	3	1
18	C–½Mo	Forgings	SA–182	F1	K12822	...	...	3	2
19	C–½Mo	Plate	SA–204	B	K12020	...	...	3	2
20	C–½Mo	Forgings	SA–336	F1	K12520	...	...	3	2
21	C–½Mo	Wld. pipe	SA–672	L70	K12020	...	...	3	2
22	C–½Mo	Wld. pipe	SA–691	CM–70	K12020	...	...	3	2
23	C–½Mo	Plate	SA–204	C	K12320	...	...	3	2
24	C–½Mo	Wld. pipe	SA–672	L75	K12320	...	...	3	2
25	C–½Mo	Wld. pipe	SA–691	CM–75	K12320	...	...	3	2
26	½Cr–⅕Mo	Forgings	SA–372	G	K13049	70	...	...	...
27	½Cr–⅕Mo	Forgings	SA–372	H	K13547	70	...	...	...
28	½Cr–⅕Mo–V	Plate	SA–517	B	K11630	...	≤1¼	11B	4
29	½Cr–¼Mo–Si	Forgings	SA–592	A	K11856	...	2½ < t ≤ 4	11B	1
30	½Cr–¼Mo–Si	Plate	SA–517	A	K11856	...	≤1¼	11B	1
31	½Cr–¼Mo–Si	Forgings	SA–592	A	K11856	...	≤2½	11B	1
32	½Cr–½Mo	Smls. pipe	SA–335	P2	K11547	...	...	3	1
33	½Cr–½Mo	Forged pipe	SA–369	FP2	K11547	...	...	3	1
34	½Cr–½Mo	Plate	SA–387	2	K12143	1	...	3	1
35	½Cr–½Mo	Wld. pipe	SA–691	½CR	K12143	...	...	3	1
36	½Cr–½Mo	Smls. tube	SA–213	T2	K11547	...	...	3	1
37	½Cr–½Mo	Cast pipe	SA–426	CP2	J11547	...	...	3	1
38	½Cr–½Mo	Forgings	SA–182	F2	K12122	...	...	3	2
39	½Cr–½Mo	Plate	SA–387	2	K12143	2/NT	...	3	2
40	¾Cr–½Ni–Cu	Smls. tube	SA–423	1	K11535	...	...	4	2
41	¾Cr–¾Ni–Cu–Al	Smls. pipe	SA–333	4	K11267	...	...	4	2
42	1Cr–⅕Mo	Forgings	SA–372	E	K13047	70	...	...	...
43	1Cr–⅕Mo	Forgings	SA–372	F	G41350	70	...	...	...
44	1Cr–⅕Mo	Forgings	SA–372	J	K13548	70	...	...	...
45	1Cr–⅕Mo	Forgings	SA–372	J	G41370	110	...	...	...

Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only)		External Pressure Chart No.	Notes
			III	VIII-2		
1	43.5	29	650	NP	CD–2	G17, W1
2	43.5	29	650	NP	CD–2	G17, W1
3	70	50	700	700	CS–3	E2
4	80	60	700	700	CS–3	E1
5	53	28	NP	700	CS–1	...
6	55	30	NP	700	CS–2	...
7	55	30	700	700	CS–2	...
8	55	30	700	NP	CS–2	...
9	55	30	700	700	CS–2	...
10	55	30	700	700	CS–2	...
11	60	32	NP	700	CS–2	...
12	65	35	700	700	CS–2	...
13	65	35	700	700	CS–2	...
14	65	35	700	NP	CS–2	...
15	65	37	700	700	CS–2	...
16	65	37	700	NP	CS–2	G1, G2
17	65	37	700	NP	CS–2	G1, G2
18	70	40	700	700	CS–2	...
19	70	40	700	700	CS–2	...
20	70	40	700	700	CS–2	...
21	70	40	700	NP	CS–2	G1, G2
22	70	40	700	NP	CS–2	G1, G2
23	75	43	700	700	CS–2	...
24	75	43	700	NP	CS–2	G1, G2
25	75	43	700	NP	CS–2	G1, G2
26	120	70	NP	100	CS–3	G19, H4, W5, W6
27	120	70	NP	100	CS–3	G19, H4, W5, W6
28	115	100	700 (SPT)	700	HT–1	...
29	105	90	700 (SPT)	NP	CS–5	...
30	115	100	700 (SPT)	700	HT–1	...
31	115	100	NP	700	HT–1	...
32	55	30	700	700	CS–2	...
33	55	30	700	700	CS–2	...
34	55	33	700	700	CS–2	...
35	55	33	700	NP	CS–2	G1, G2
36	60	30	700	700	CS–2	...
37	60	30	700	NP	CS–2	...
38	70	40	NP	700	CS–2	...
39	70	45	NP	100	CS–3	...
40	60	37	NP	700	CS–2	...
41	60	35	NP	100	CS–2	...
42	120	70	NP	650	CS–5	G19, H4, W5, W6
43	120	70	NP	650	CS–5	G19, H4, W5, W6
44	120	70	NP	650	CS–5	G19, H4, W5, W6
45	135	110	NP	650	HT–1	H4, W5, W6

Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Design Stress Intensity or Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	10.9	...	10.8	...	10.3	10.0	9.8	9.6	9.4	...	...	...	...	...
2	10.9	...	10.8	...	10.3	10.0	9.8	9.6	9.4	...	...	...	...	...
3	23.3	23.3	23.3	...	23.3	23.3	23.3	22.6	22.3	**22.1**	...	...	...	...
4	26.7	...	26.7	...	26.7	26.7	26.7	26.7	**26.2**	**25.9**	...	...	...	...
5	17.7	...	17.5	...	16.8	16.3	15.8	15.3	15.0	14.7	...	...	...	...
6	18.3	...	18.3	...	18.0	17.4	16.9	16.4	16.1	15.7	...	...	...	...
7	18.3	18.3	18.3	...	18.0	17.4	16.9	16.4	16.1	15.7	...	...	...	...
8	18.3	18.3	18.3	...	18.0	17.4	16.9	16.4	16.1	15.7	...	...	...	...
9	18.3	...	18.3	...	18.0	17.4	16.9	16.4	16.1	15.7	...	...	...	...
10	18.3	...	18.3	...	18.0	17.4	16.9	16.4	16.1	15.7	...	...	...	...
11	20.0	...	20.0	...	19.2	18.6	18.0	17.4	17.1	16.8	...	...	...	...
12	21.7	...	21.7	...	21.0	20.3	19.7	19.1	18.7	18.4	...	...	...	...
13	21.7	...	21.7	...	21.0	20.3	19.7	19.1	18.7	18.4	...	...	...	...
14	21.7	...	21.7	...	21.0	20.3	19.7	19.1	18.7	18.4	...	...	...	...
15	21.7	...	21.7	...	21.7	21.5	20.8	20.2	19.8	19.4	...	...	...	...
16	21.7	...	21.7	...	21.7	21.5	20.8	20.2	19.8	19.4	...	...	...	...
17	21.7	...	21.7	...	21.7	21.5	20.8	20.2	19.8	19.4	...	...	...	...
18	23.3	...	23.3	...	23.3	23.2	22.5	21.8	21.4	21.0	...	...	...	...
19	23.3	...	23.3	...	23.3	23.2	22.5	21.8	21.4	21.0	...	...	...	...
20	23.3	...	23.3	...	23.3	23.2	22.5	21.8	21.4	21.0	...	...	...	...
21	23.3	...	23.3	...	23.3	23.2	22.5	21.8	21.4	21.0	...	...	...	...
22	23.3	...	23.3	...	23.3	23.2	22.5	21.8	21.4	21.0	...	...	...	...
23	25.0	...	25.0	...	25.0	25.0	24.2	23.4	23.0	22.6	...	...	...	...
24	25.0	...	25.0	...	25.0	25.0	24.2	23.4	23.0	22.6	...	...	...	...
25	25.0	...	25.0	...	25.0	25.0	24.2	23.4	23.0	22.6	...	...	...	...
26	40.0	...	...	...	...	...	...	...	...	...	...	...	...	...
27	40.0	...	...	...	...	...	...	...	...	...	...	...	...	...
28	38.3	...	38.3	...	38.3	38.3	38.3	38.3	38.3	37.5	...	...	...	...
29	35.0	...	35.0	...	35.0	35.0	35.0	34.8	34.0	33.2	...	...	...	...
30	38.3	...	38.3	...	38.3	38.3	38.3	38.3	38.3	37.5	...	...	...	...
31	38.3	...	38.3	...	38.3	38.3	38.3	38.3	38.3	37.5	...	...	...	...
32	18.3	...	18.3	...	18.0	17.4	16.9	16.4	16.1	15.7	...	...	...	...
33	18.3	...	18.3	...	18.0	17.4	16.9	16.4	16.1	15.7	...	...	...	...
34	18.3	...	18.3	...	18.3	18.3	18.3	18.0	17.7	17.3	...	...	...	...
35	18.3	...	18.3	...	18.3	18.3	18.3	18.0	17.7	17.3	...	...	...	...
36	20.0	...	18.8	...	18.0	17.4	16.9	16.4	16.1	15.7	...	...	...	...
37	20.0	...	18.8	...	18.0	17.4	16.9	16.4	16.1	15.7	...	...	...	...
38	23.3	...	23.3	...	23.3	23.2	22.5	21.8	21.4	21.0	...	...	...	...
39	23.3	...	...	...	...	...	...	...	...	...	...	...	...	...
40	20.0	...	20.0	...	20.0	20.0	20.0	20.0	20.0	20.0	...	...	...	...
41	20.0	...	...	...	...	...	...	...	...	...	...	...	...	...
42	40.0	40.0	40.0	...	40.0	40.0	39.4	37.9	36.9	...	...	...	...	...
43	40.0	...	38.8	...	38.0	37.7	37.6	37.1	35.7	...	...	...	...	...
44	40.0	...	40.0	...	40.0	40.0	39.4	37.9	36.9	...	...	...	...	...
45	44.9	...	43.1	...	42.8	42.5	42.1	41.9	40.0	...	...	...	...	...

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Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/ Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	1Cr–½Mo	Plate	SA–387	12	K11757	1	...	4	1
2	1Cr–½Mo	Wld. pipe	SA–691	1CR	K11757	22	...	4	1
3	1Cr–½Mo	Cast pipe	SA–426	CP12	J11562	...	...	4	1
4	1Cr–½Mo	Forgings	SA–182	F12	K11562	1	...	4	1
5	1Cr–½Mo	Smls. tube	SA–213	T12	K11562	...	...	4	1
6	1Cr–½Mo	Fittings	SA–234	WP12	K12062	1	...	4	1
7	1Cr–½Mo	Smls. pipe	SA–335	P12	K11562	...	...	4	1
8	1Cr–½Mo	Forged pipe	SA–369	FP12	K11562	...	...	4	1
9	1Cr–½Mo	Plate	SA–387	12	K11757	2	...	4	1
10	1Cr–½Mo	Wld. pipe	SA–691	1CR	K11757	42/NT	...	4	1
11	1Cr–½Mo	Forgings	SA–182	F12	K11564	2	...	4	1
12	1Cr–½Mo	Forgings	SA–336	F12	K11564	...	...	4	1
13	1¼Cr–½Mo	Castings	SA–217	WC6	J12072	...	...	4	1
14	1¼Cr–½Mo	Cast pipe	SA–426	CP11	J12072	...	...	4	1
15	1¼Cr–½Mo	Bar	SA–739	B11	K11797	...	...	4	1
16	1¼Cr–½Mo–Si	Forgings	SA–182	F11	K11597	1	...	4	1
17	1¼Cr–½Mo–Si	Smls. tube	SA–213	T11	K11597	...	...	4	1
18	1¼Cr–½Mo–Si	Fittings	SA–234	WP11	...	1	...	4	1
19	1¼Cr–½Mo–Si	Wld. fittings	SA–234	WP11	...	1/W	...	4	1
20	1¼Cr–½Mo–Si	Smls. pipe	SA–335	P11	K11597	...	...	4	1
21	1¼Cr–½Mo–Si	Forged pipe	SA–369	FP11	K11597	...	...	4	1
22	1¼Cr–½Mo–Si	Plate	SA–387	11	K11789	1	...	4	1
23	1¼Cr–½Mo–Si	Wld. pipe	SA–691	1¼CR	K11789	...	...	4	1
24	1¼Cr–½Mo–Si	Forgings	SA–182	F11	K11572	2	...	4	1
25	1¼Cr–½Mo–Si	Forgings	SA–336	F11	K11572	2	...	4	1
26	1¼Cr–½Mo–Si	Forgings	SA–336	F11	K11572	3	...	4	1
27	1¼Cr–½Mo–Si	Plate	SA–387	11	K11789	2	...	4	1
28	1¼Cr–½Mo–Si	Wld. pipe	SA–691	1¼CR	K11789	NT	...	4	1
29	1¾Cr–½Mo–Cu	Forgings	SA–592	E	K11695	...	$2\frac{1}{2} < t \le 4$	11B	2
30	1¾Cr–½Mo–Cu	Forgings	SA–592	E	K11695	...	$\le 2\frac{1}{2}$	11B	2
31	1¾Cr–½Mo–Ti	Plate	SA–517	E	K21604	...	$2\frac{1}{2} < t \le 6$	11B	2
32	1¾Cr–½Mo–Ti	Plate	SA–517	E	K21604	...	$\le 2\frac{1}{2}$	11B	2
33	2¼Cr–1Mo	Forgings	SA–182	F22	K21590	1	...	5A	1
34	2¼Cr–1Mo	Smls. tube	SA–213	T22	K21590	...	...	5A	1
35	2¼Cr–1Mo	Fittings	SA–234	WP22	K21590	1	...	5A	1
36	2¼Cr–1Mo	Wld. fittings	SA–234	WP22	K21590	1/W	...	5A	1
37	2¼Cr–1Mo	Smls. pipe	SA–335	P22	K21590	...	...	5A	1
38	2¼Cr–1Mo	Forgings	SA–336	F22	K21590	1	...	5A	1
39	2¼Cr–1Mo	Forged pipe	SA–369	FP22	K21590	...	...	5A	1
40	2¼Cr–1Mo	Plate	SA–387	22	K21590	1	...	5A	1
41	2¼Cr–1Mo	Wld. pipe	SA–691	2¼CR	K21590	...	...	5A	1
42	2¼Cr–1Mo	Castings	SA–217	WC9	J21890	...	...	5A	1
43	2¼Cr–1Mo	Castings	SA–217	WC9	J21890	...	...	5A	1
44	2¼Cr–1Mo	Cast pipe	SA–426	CP22	J21890	...	...	5A	1
45	2¼Cr–1Mo	Forgings	SA–182	F22	K21590	3	...	5A	1

Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only)		External Pressure Chart No.	Notes
			III	VIII-2		
1	55	33	700	900	CS-2	...
2	55	33	700	NP	CS-2	G15
3	60	30	700	NP	CS-2	...
4	60	32	NP	900	CS-2	...
5	60	32	700	900	CS-2	...
6	60	32	700	900	CS-2	...
7	60	32	700	900	CS-2	...
8	60	32	700	900	CS-2	...
9	65	40	700	900	CS-2	E4
10	65	40	700	NP	CS-2	G16
11	70	40	700	900	CS-2	E4
12	70	40	700	900	CS-2	E4
13	70	40	700	900	CS-2	E4
14	70	40	700	NP	CS-2	...
15	70	45	700	900	CS-3	E4
16	60	30	NP	900	CS-2	...
17	60	30	700	900	CS-2	...
18	60	30	700	900	CS-2	...
19	60	30	700	NP	CS-2	...
20	60	30	700	900	CS-2	...
21	60	30	700	900	CS-2	...
22	60	35	700	900	CS-2	E4
23	60	35	700	NP	CS-2	G1, G2
24	70	40	700	900	CS-2	E4
25	70	40	NP	900	CS-2	E4
26	75	45	NP	700	CS-3	...
27	75	45	700	900	CS-3	E3
28	75	45	700	NP	CS-3	G1, G2
29	105	90	700 (SPT)	700	CS-5	S1
30	115	100	NP	700	HT-1	...
31	105	90	700 (Cl. MC & SPT)	700	CS-5	...
32	115	100	700 (Cl. MC & SPT)	700	HT-1	...
33	60	30	700	NP	CS-2	...
34	60	30	700	900	CS-2	E3, W2
35	60	30	700	900	CS-2	E3, W2
36	60	30	700	NP	CS-2	...
37	60	30	700	900	CS-2	E3, W2
38	60	30	700	900	CS-2	E3, W2
39	60	30	700	900	CS-2	E3, W2
40	60	30	700	900	CS-2	E3, H1, W2
41	60	30	700	NP	CS-2	G1, G2
42	70	40	700	900	CS-2	E4, W2
43	70	40	700 (SPT)	NP	CS-2	...
44	70	40	700	NP	CS-2	...
45	75	45	700	900	CS-3	E3, W2

Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Design Stress Intensity or Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	18.3	...	18.0	...	17.6	17.6	17.2	16.8	16.5	16.3	16.0	15.7	15.4	15.0
2	18.3	...	18.0	...	17.6	17.6	17.2	16.8	16.5	16.3	...	...	...	...
3	20.0	...	18.1	...	17.0	16.2	15.7	15.2	15.0	14.8	...	...	...	...
4	20.0	...	19.3	...	18.1	17.3	16.7	16.3	16.0	15.8	15.5	15.3	14.9	14.5
5	20.0	...	19.3	...	18.1	17.3	16.7	16.3	16.0	15.8	15.5	15.3	14.9	14.5
6	20.0	...	19.3	...	18.1	17.3	16.7	16.3	16.0	15.8	15.5	15.3	14.9	14.5
7	20.0	...	19.3	...	18.1	17.3	16.7	16.3	16.0	15.8	15.5	15.3	14.9	14.5
8	20.0	...	19.3	...	18.1	17.3	16.7	16.3	16.0	15.8	15.5	15.3	14.9	14.5
9	21.7	21.7	21.3	...	20.8	20.8	20.8	20.3	20.0	19.7	19.4	19.1	18.6	**18.0**
10	21.7	...	21.3	...	20.8	20.8	20.8	20.3	20.0	19.7	...	...	...	...
11	23.3	...	22.9	...	22.4	21.7	20.9	20.3	20.0	19.7	19.4	19.1	18.6	**18.0**
12	23.3	23.3	22.9	...	22.4	21.7	20.9	20.3	20.0	19.7	19.4	19.1	18.6	**18.0**
13	23.3	...	23.3	...	23.3	22.5	21.7	20.9	20.5	20.1	19.7	19.2	18.7	**13.7**
14	23.3	...	23.3	...	23.3	22.5	21.7	20.9	20.5	20.1	...	...	...	...
15	23.3	23.3	23.3	...	23.3	23.3	23.3	23.3	23.1	22.6	22.2	21.6	20.2	**13.7**
16	20.0	...	18.5	...	17.6	16.8	16.2	15.7	15.4	15.1	14.8	14.4	14.0	13.6
17	20.0	...	18.5	...	17.6	16.8	16.2	15.7	15.4	15.1	14.8	14.4	14.0	13.6
18	20.0	...	18.5	...	17.6	16.8	16.2	15.7	15.4	15.1	14.8	14.4	14.0	13.6
19	20.0	...	18.5	...	17.6	16.8	16.2	15.7	15.4	15.1	...	...	...	...
20	20.0	...	18.5	...	17.6	16.8	16.2	15.7	15.4	15.1	14.8	14.4	14.0	13.6
21	20.0	...	18.5	...	17.6	16.8	16.2	15.7	15.4	15.1	14.8	14.4	14.0	13.6
22	20.0	...	20.0	...	20.0	19.6	18.9	18.3	18.0	17.6	17.2	16.8	16.4	**15.0**
23	20.0	...	20.0	...	20.0	19.6	18.9	18.3	18.0	17.6	...	...	...	...
24	23.3	...	23.3	...	23.3	22.5	21.7	20.9	20.5	20.1	19.7	19.2	18.7	**14.5**
25	23.3	...	23.3	...	23.3	22.5	21.7	20.9	20.5	20.1	19.7	19.2	18.7	**14.5**
26	25.0	25.0	25.0	...	25.0	25.0	24.4	23.5	23.1	22.6	...	...	...	...
27	25.0	...	25.0	...	25.0	25.0	24.4	23.5	23.1	22.6	22.2	21.6	**20.2**	**16.0**
28	25.0	...	25.0	...	25.0	25.0	24.4	23.5	23.1	22.6	...	...	...	...
29	35.0	...	35.0	...	35.0	35.0	35.0	35.0	35.0	34.9	...	...	...	...
30	38.3	...	38.3	...	38.3	38.3	38.3	38.3	38.3	38.2	...	...	...	...
31	35.0	...	35.0	...	35.0	35.0	35.0	35.0	35.0	34.9	...	...	...	...
32	38.3	...	38.3	...	38.3	38.3	38.3	38.3	38.3	38.2	...	...	...	...
33	20.0	...	18.7	...	18.2	18.0	17.9	17.9	17.9	17.9	...	...	...	...
34	20.0	...	18.7	...	18.2	18.0	17.9	17.9	17.9	17.9	17.9	17.7	**17.1**	**13.6**
35	20.0	19.1	18.7	...	18.2	18.0	17.9	17.9	17.9	17.9	17.9	17.7	**17.1**	**13.6**
36	20.0	19.1	18.7	...	18.2	18.0	17.9	17.9	17.9	17.9	...	...	...	...
37	20.0	19.1	18.7	...	18.2	18.0	17.9	17.9	17.9	17.9	17.9	17.7	**17.1**	**13.6**
38	20.0	19.1	18.7	...	18.2	18.0	17.9	17.9	17.9	17.9	17.9	17.7	**17.1**	**13.6**
39	20.0	19.1	18.7	...	18.2	18.0	17.9	17.9	17.9	17.9	17.9	17.7	**17.1**	**13.6**
40	20.0	...	18.7	...	18.2	18.0	17.9	17.9	17.9	17.9	17.9	17.7	**17.1**	**13.6**
41	20.0	...	18.7	...	18.2	18.0	17.9	17.9	17.9	17.9	...	...	...	...
42	23.3	...	23.3	...	23.0	22.6	22.5	22.4	22.2	21.9	21.5	21.0	19.8	**16.0**
43	23.3	...	23.3	...	23.0	22.6	22.5	22.4	22.2	21.9	...	...	...	...
44	23.3	...	23.3	...	23.0	22.6	22.5	22.4	22.2	21.9	...	...	...	...
45	25.0	...	25.0	...	24.3	24.1	24.0	23.8	23.6	23.4	23.0	22.5	**21.9**	**17.0**

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Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/ Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	2¼Cr–1Mo	Forgings	SA–336	F22	K21590	3	...	5A	1
2	2¼Cr–1Mo	Plate	SA–387	22	K21590	2	...	5A	1
3	2¼Cr–1Mo	Wld. pipe	SA–691	2¼CR	K21590	NT	...	5A	1
4	2¼Cr–1Mo	Bar	SA–739	B22	K21390	...	...	5A	1
5	2¼Cr–1Mo	Castings	SA–487	8	J22091	A	...	5C	1
6	2¼Cr–1Mo	Forgings	SA–508	22	K21590	3	...	5C	1
7	2¼Cr–1Mo	Forgings	SA–541	22	K21390	3	...	5C	1
8	2¼Cr–1Mo	Plate	SA–542	B	K21590	4	...	5C	1
9	2¼Cr–1Mo	Forgings	SA–541	22	K21390	4	≥¼	5C	4
10	2¼Cr–1Mo–V	Forgings	SA–182	F22V	K31835	...	...	5C	1
11	2¼Cr–1Mo–V	Forgings	SA–336	F22V	K31835	...	...	5C	1
12	2¼Cr–1Mo–V	Forgings	SA–541	22V	K31835	...	...	5C	1
13	2¼Cr–1Mo–V	Plate	SA–542	D	K31835	4a	...	5C	1
14	2¼Cr–1Mo–V	Plate	SA–832	22V	K31835	...	...	5C	1
15	3Cr–1Mo	Smls. tube	SA–213	T21	K31545	...	...	5A	1
16	3Cr–1Mo	Smls. pipe	SA–335	P21	K31545	...	...	5A	1
17	3Cr–1Mo	Forgings	SA–336	F21	K31545	1	...	5A	1
18	3Cr–1Mo	Forged pipe	SA–369	FP21	K31545	...	...	5A	1
19	3Cr–1Mo	Plate	SA–387	21	K31545	1	...	5A	1
20	3Cr–1Mo	Cast pipe	SA–426	CP21	J31545	...	...	5A	1
21	3Cr–1Mo	Forgings	SA–182	F21	K31545	...	...	5A	1
22	3Cr–1Mo	Forgings	SA–336	F21	K31545	3	...	5A	1
23	3Cr–1Mo	Plate	SA–387	21	K31545	2	...	5A	1
24	3Cr–1Mo–¼V–Ti–B	Forgings	SA–182	F3V	K31830	...	...	5C	1
25	3Cr–1Mo–¼V–Ti–B	Forgings	SA–336	F3V	K31830	...	...	5C	1
26	3Cr–1Mo–¼V–Ti–B	Forgings	SA–508	3V	K31830	...	...	5C	1
27	3Cr–1Mo–¼V–Ti–B	Forgings	SA–541	3V	K31830	...	...	5C	1
28	3Cr–1Mo–¼V–Ti–B	Plate	SA–542	C	K31830	4a	...	5C	1
29	3Cr–1Mo–¼V–Ti–B	Plate	SA–832	21V	K31830	...	...	5C	1
30	5Cr–½Mo	Smls. tube	SA–213	T5	K41545	...	...	5B	1
31	5Cr–½Mo	Fittings	SA–234	WP5	K41545	...	...	5B	1
32	5Cr–½Mo	Wld. fittings	SA–234	WP5	K41545	W	...	5B	1
33	5Cr–½Mo	Smls. pipe	SA–335	P5	K41545	...	...	5B	1
34	5Cr–½Mo	Forged pipe	SA–369	FP5	K41545	...	...	5B	1
35	5Cr–½Mo	Plate	SA–387	5	K41545	1	...	5B	1
36	5Cr–½Mo	Wld. pipe	SA–691	5CR	K41545	...	...	5B	1
37	5Cr–½Mo	Forgings	SA–336	F5	K41545	...	...	5B	1
38	5Cr–½Mo	Forgings	SA–182	F5	K41545	...	...	5B	1
39	5Cr–½Mo	Plate	SA–387	5	K41545	2	...	5B	1
40	5Cr–½Mo	Forgings	SA–336	F5A	K42544	...	...	5B	1
41	5Cr–½Mo	Castings	SA–217	C5	J42045	NT	...	5B	1
42	5Cr–½Mo	Cast pipe	SA–426	CP5	J42045	...	...	5B	1
43	5Cr–½Mo	Forgings	SA–182	F5a	K42544	...	...	5B	1
44	5Cr–½Mo–Si	Smls. tube	SA–213	T5b	K51545	...	...	5B	1
45	5Cr–½Mo–Si	Smls. pipe	SA–335	P5b	K51545	...	...	5B	1

Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) III	VIII-2	External Pressure Chart No.	Notes
1	75	45	700	900	CS-3	E3, W2
2	75	45	700	900	CS-3	E3, W2
3	75	45	700	NP	CS-3	G1, G2
4	75	45	700	900	CS-3	E3, W2
5	85	55	700	700	CS-3	...
6	85	55	700	850	CS-2	G21
7	85	55	NP	850	CS-2	G21
8	85	55	NP	850	CS-2	G21
9	105	85	700	NP	CS-3	S3, W1
10	85	60	NP	900	CS-2	G21
11	85	60	NP	900	CS-2	G21
12	85	60	NP	900	CS-2	G21
13	85	60	NP	900	CS-2	G21
14	85	60	NP	900	CS-2	G21
15	60	30	700	850	CS-2	E3
16	60	30	700	850	CS-2	E3
17	60	30	700	850	CS-2	E3
18	60	30	700	850	CS-2	E3
19	60	30	700	850	CS-2	E3
20	60	30	700	NP	CS-2	...
21	75	45	700	850	CS-3	E3
22	75	45	700	850	CS-3	E3
23	75	45	700	850	CS-3	E3
24	85	60	NP	850	CS-3	G21
25	85	60	NP	850	CS-3	G21
26	85	60	NP	850	CS-3	G21
27	85	60	NP	850	CS-3	G21
28	85	60	NP	850	CS-3	G21
29	85	60	NP	850	CS-3	G21
30	60	30	700	700	CS-2	...
31	60	30	700	700	CS-2	...
32	60	30	700	NP	CS-2	...
33	60	30	700	700	CS-2	...
34	60	30	700	700	CS-2	...
35	60	30	700	700	CS-2	...
36	60	30	700	NP	CS-2	G1, G2
37	60	36	NP	700	CS-2	...
38	70	40	700	700	CS-2	...
39	75	45	700	700	CS-3	...
40	80	50	NP	700	CS-3	...
41	90	60	700	700	CS-3	...
42	90	60	700	NP	CS-3	...
43	90	65	NP	700	CS-5	...
44	60	30	NP	700	CS-2	...
45	60	30	NP	700	CS-2	...

Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line	Design Stress Intensity or Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
No.	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	25.0	...	25.0	...	24.3	24.1	24.0	23.8	23.6	23.4	23.0	22.5	**21.9**	**17.0**
2	25.0	...	25.0	...	24.3	24.1	24.0	23.8	23.6	23.4	23.0	22.5	**21.9**	**17.0**
3	25.0	...	25.0	...	24.3	24.1	24.0	23.8	23.6	23.4	...	...	...	...
4	25.0	...	25.0	...	24.3	24.1	24.0	23.8	23.6	23.4	23.0	22.5	**21.9**	**17.0**
5	28.3	28.3	28.3	...	27.7	27.4	27.4	27.2	27.0	26.7	...	...	...	...
6	28.3	28.3	28.3	...	27.7	27.4	27.4	27.2	27.0	26.7	26.1	25.4	21.9	...
7	28.3	28.3	28.3	...	27.7	27.4	27.4	27.2	27.0	26.7	26.1	25.4	21.9	...
8	28.3	28.3	28.3	...	27.7	27.4	27.4	27.2	27.0	26.7	26.1	25.4	21.9	...
9	35.0	...	35.0	...	35.0	35.0	34.8	34.3	34.0	33.6	...	...	...	...
10	28.3	...	28.3	...	28.3	28.3	28.3	27.6	27.1	26.5	25.9	25.2	24.5	23.6
11	28.3	...	28.3	...	28.3	28.3	28.3	27.6	27.1	26.5	25.9	25.2	24.5	23.6
12	28.3	...	28.3	...	28.3	28.3	28.3	27.6	27.1	26.5	25.9	25.2	24.5	23.6
13	28.3	...	28.3	...	28.3	28.3	28.3	27.6	27.1	26.5	25.9	25.2	24.5	23.6
14	28.3	...	28.3	...	28.3	28.3	28.3	27.6	27.1	26.5	25.9	25.2	24.5	23.6
15	20.0	...	18.7	...	18.2	18.0	17.9	17.9	17.9	17.9	17.9	17.7	**16.0**	...
16	20.0	...	18.7	...	18.2	18.0	17.9	17.9	17.9	17.9	17.9	17.7	**16.0**	...
17	20.0	19.1	18.7	...	18.2	18.0	17.9	17.9	17.9	17.9	17.9	17.7	**16.0**	...
18	20.0	...	18.7	...	18.2	18.0	17.9	17.9	17.9	17.9	17.9	17.7	**16.0**	...
19	20.0	...	18.7	...	18.2	18.0	17.9	17.9	17.9	17.9	17.9	17.7	**16.0**	...
20	20.0	...	18.7	...	18.2	18.0	17.9	17.9	17.9	17.9	...	...	...	...
21	25.0	...	25.0	...	24.3	24.1	24.0	23.8	23.6	23.4	23.0	22.5	**19.0**	...
22	25.0	...	25.0	...	24.3	24.1	24.0	23.8	23.6	23.4	23.0	22.5	**19.0**	...
23	25.0	...	25.0	...	24.3	24.1	24.0	23.8	23.6	23.4	23.0	22.5	**19.0**	...
24	28.3	...	28.3	...	27.2	26.4	25.8	25.4	25.2	25.0	24.7	24.3	23.8	...
25	28.3	...	28.3	...	27.2	26.4	25.8	25.4	25.2	25.0	24.7	24.3	23.8	...
26	28.3	...	28.3	...	27.2	26.4	25.8	25.4	25.2	25.0	24.7	24.3	23.8	...
27	28.3	...	28.3	...	27.2	26.4	25.8	25.4	25.2	25.0	24.7	24.3	23.8	...
28	28.3	...	28.3	...	27.2	26.4	25.8	25.4	25.2	25.0	24.7	24.3	23.8	...
29	28.3	...	28.3	...	27.2	26.4	25.8	25.4	25.2	25.0	24.7	24.3	23.8	...
30	20.0	...	18.1	...	17.4	17.2	17.1	16.8	16.6	16.3	...	...	...	...
31	20.0	...	18.1	...	17.4	17.2	17.1	16.8	16.6	16.3	...	...	...	...
32	20.0	...	18.1	...	17.4	17.2	17.1	16.8	16.6	16.3	...	...	...	...
33	20.0	...	18.1	...	17.4	17.2	17.1	16.8	16.6	16.3	...	...	...	...
34	20.0	...	18.1	...	17.4	17.2	17.1	16.8	16.6	16.3	...	...	...	...
35	20.0	...	18.1	...	17.4	17.2	17.1	16.8	16.6	16.3	...	...	...	...
36	20.0	...	18.1	...	17.4	17.2	17.1	16.8	16.6	16.3	...	...	...	...
37	20.0	...	20.0	...	19.4	19.2	19.2	18.9	18.6	18.2	...	...	...	...
38	23.3	...	23.3	...	22.6	22.4	22.4	22.0	21.7	21.2	...	...	...	...
39	25.0	...	24.9	...	24.2	24.0	24.0	23.6	23.2	22.7	...	...	...	...
40	26.7	...	26.6	...	25.8	25.6	25.6	25.2	24.8	24.3	...	...	...	...
41	30.0	...	29.9	...	29.1	28.8	28.7	28.3	27.9	27.3	...	...	...	...
42	30.0	...	29.9	...	29.1	28.8	28.7	28.3	27.9	27.3	...	...	...	...
43	30.0	...	29.9	...	29.1	28.8	28.7	28.3	27.9	27.3	...	...	...	...
44	20.0	...	18.1	...	17.4	17.2	17.1	16.8	16.6	16.3	...	...	...	...
45	20.0	...	18.1	...	17.4	17.2	17.1	16.8	16.6	16.3	...	...	...	...

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Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/ Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	5Cr–½Mo–Ti	Smls. tube	SA–213	T5c	K41245	...	...	5B	1
2	5Cr–½Mo–Ti	Smls. pipe	SA–335	P5c	K41245	...	...	5B	1
3	9Cr–1Mo	Smls. tube	SA–213	T9	K90941	...	...	5B	1
4	9Cr–1Mo	Fittings	SA–234	WP9	K90941	...	...	5B	1
5	9Cr–1Mo	Smls. pipe	SA–335	P9	K90941	...	...	5B	1
6	9Cr–1Mo	Forged pipe	SA–369	FP9	K90941	...	...	5B	1
7	9Cr–1Mo	Forgings	SA–182	F9	K90941	...	...	5B	1
8	9Cr–1Mo	Forgings	SA–336	F9	K90941	...	...	5B	1
9	9Cr–1Mo	Castings	SA–217	C12	J82090	NT	...	5B	1
10	9Cr–1Mo	Cast pipe	SA–426	CP9	J82090	...	...	5B	1
(**21**) 11	9Cr–1Mo–V	Smls. tube	SA–213	T91 Type 1	K90901	...	...	15E	1
(**21**) 12	9Cr–1Mo–V	Smls. pipe	SA–335	P91 Type 1	K90901	...	...	15E	1
(**21**) 13	9Cr–1Mo–V	Plate	SA–387	91 Type 1	K90901	2	...	15E	1
(**21**) 14	9Cr–1Mo–V	Forgings	SA–182	F91 Type 1	K90901	...	...	15E	1
15	12Cr	Bar	SA–479	403	S40300	A	...	6	1
16	12Cr	Bar	SA–479	403	S40300	1	...	6	1
17	12Cr–Al	Plate	SA–240	405	S40500	...	...	7	1
18	12Cr–Al	Bar	SA–479	405	S40500	...	...	7	1
19	12Cr–Al	Bar	SA/JIS G4303	SUS405	...	...	...	7	1
20	12Cr–Al	Smls. tube	SA–268	TP405	S40500	...	...	7	1
21	12½Cr–2Ni	Bar	SA–479	414	S41400	...	...	6	4
22	13Cr	Plate	SA–240	410S	S41008	...	...	7	1
23	13Cr	Smls. tube	SA–268	TP410	S41000	...	...	6	1
24	13Cr	Plate	SA–240	410	S41000	...	...	6	1
25	13Cr	Forgings	SA–182	F6a	S41000	1	...	6	1
26	13Cr	Bar	SA–479	410	S41000	A	...	6	1
27	13Cr	Bar	SA–479	410	S41000	1	...	6	1
28	13Cr	Forgings	SA–182	F6a	S41000	2	...	6	3
29	13Cr	Forgings	SA–336	F6	S41000	...	...	6	3
30	13Cr	Castings	SA–217	CA15	J91150	...	...	6	3
31	13Cr	Cast pipe	SA–426	CPCA15	J91150	...	...	6	3
32	13Cr	Bar	SA/EN 10088–3	X12Cr13	...	QT650	$t \le 6.25$	...	...
33	13Cr–4Ni	Castings	SA–487	CA6NM	J91540	A	...	6	4
34	13Cr–4Ni	Forgings	SA–182	F6NM	S41500	...	...	6	4
35	13Cr–4Ni	Bar	SA–479	...	S41500	...	...	6	4
36	13Cr–8Ni–2Mo	Forgings	SA–705	XM–13	S13800	...	...	...	...
37	15Cr	Smls. tube	SA–268	TP429	S42900	...	...	6	2
38	15Cr	Plate	SA–240	429	S42900	...	...	6	2
39	17Cr	Smls. tube	SA–268	TP430	S43000	...	...	7	2
40	17Cr	Plate	SA–240	430	S43000	...	...	7	2
41	17Cr–4Ni–4Cu	Forgings, bar	SA–564	630	S17400	H1150	...	...	...
42	17Cr–4Ni–4Cu	Plate	SA–693	630	S17400	H1150	...	...	...
43	17Cr–4Ni–4Cu	Forgings	SA–705	630	S17400	H1150	...	...	...
44	17Cr–4Ni–4Cu	Bar	SA–564	630	S17400	H1100	...	...	...
45	17Cr–4Ni–4Cu	Plate	SA–693	630	S17400	H1100	...	...	...

Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only)		External Pressure Chart No.	Notes
			III	VIII-2		
1	60	30	NP	700	CS–2	...
2	60	30	NP	700	CS–2	...
3	60	30	700	700	CS–2	...
4	60	30	NP	700	CS–2	...
5	60	30	700	700	CS–2	...
6	60	30	700	700	CS–2	...
7	85	55	NP	700	CS–3	...
8	85	55	NP	700	CS–3	...
9	90	60	700 (SPT)	700	CS–3	...
10	90	60	700	NP	CS–3	...
11	85	60	700	900	CS–3	...
12	85	60	700	900	CS–3	...
13	85	60	700	900	CS–3	...
14	90	60	700	900	CS–3	...
15	70	40	700	NP	...	...
16	70	40	700	NP	...	...
17	60	25	700	800	CS–1	G13
18	60	25	700	NP	CS–1	G13
19	60	25	700	NP	CS–1	G13
20	60	30	NP	800	CS–2	G13
21	115	90	700	NP	CS–3	...
22	60	30	700	800	CS–2	...
23	60	30	NP	800	CS–2	...
24	65	30	NP	800	CS–2	...
25	70	40	700	NP	CS–2	...
26	70	40	700	NP	CS–2	...
27	70	40	700	NP	CS–2	...
28	85	55	700	800	CS–3	...
29	85	55	NP	800	CS–3	...
30	90	65	700	100	CS–5	...
31	90	65	700	NP	CS–5	...
32	94.5	65.5	700 (SPT)	NP	...	H2, W1
33	110	80	700	NP	CS–5	...
34	115	90	700	NP	CS–3	...
35	115	90	700	NP	CS–3	...
36	150	135	600	NP	HA–7	W1
37	60	35	NP	800	CS–2	G13
38	65	30	NP	800	CS–2	G13
39	60	35	NP	800	CS–2	G13
40	65	30	NP	800	CS–2	G13
41	135	105	650	NP	HT–1	G8, W1
42	135	105	650	NP	HT–1	G8, W1
43	135	105	650	NP	HT–1	G8, W1
44	140	115	650	NP	HT–1	G8, W1
45	140	115	650	NP	HT–1	G8, W1

Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Design Stress Intensity or Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding														
	100	150	200	250	300	400	500	600	650	700	750	800	850	900	
1	20.0	...	18.1	...	17.4	17.2	17.1	16.8	16.6	16.3	...	...	...	...	
2	20.0	...	18.1	...	17.4	17.2	17.1	16.8	16.6	16.3	...	...	...	...	
3	20.0	...	18.1	...	17.4	17.2	17.1	16.8	16.6	16.3	...	...	...	...	
4	20.0	...	18.1	...	17.4	17.2	17.1	16.8	16.6	16.3	...	...	...	...	
5	20.0	...	18.1	...	17.4	17.2	17.1	16.8	16.6	16.3	...	...	...	...	
6	20.0	...	18.1	...	17.4	17.2	17.1	16.8	16.6	16.3	...	...	...	...	
7	28.3	...	28.3	...	27.4	27.2	27.1	26.8	26.3	25.8	...	...	...	...	
8	28.3	...	28.3	...	27.4	27.2	27.1	26.8	26.3	25.8	...	...	...	...	
9	30.0	...	29.9	...	29.1	28.8	28.7	28.3	27.9	27.3	...	...	...	...	
10	30.0	...	29.9	...	29.1	28.8	28.7	28.3	27.9	27.3	...	...	...	...	
11	28.3	...	28.3	...	28.3	28.2	28.1	27.7	27.3	26.7	25.9	24.9	23.7	22.3	(**21**)
12	28.3	...	28.3	...	28.3	28.2	28.1	27.7	27.3	26.7	25.9	24.9	23.7	22.3	(**21**)
13	28.3	...	28.3	...	28.3	28.2	28.1	27.7	27.3	26.7	25.9	24.9	23.7	22.3	(**21**)
14	30.0	...	30.0	...	30.0	29.9	29.8	29.3	28.9	28.2	27.4	26.4	25.1	23.6	(**21**)
15	23.3	...	23.3	...	22.9	22.5	22.1	21.6	21.2	20.6	...	...	...	...	
16	23.3	...	23.3	...	22.9	22.5	22.1	21.6	21.2	20.6	...	...	...	...	
17	16.7	...	15.3	...	14.8	14.5	14.3	14.0	13.8	13.5	13,1	12,6	...	...	
18	16.7	...	15.3	...	14.8	14.5	14.3	14.0	13.8	13.5	...	...	...	...	
19	16.7	...	15.3	...	14.8	14.5	14.3	14.0	13.8	13.5	...	...	...	...	
20	20.0	...	18.4	...	17.8	17.4	17.2	16.8	16.6	16.2	15.7	15.1	...	...	
21	38.3	38.3	38.3	...	37.7	36.8	36.0	35.1	34.5	33.7	...	...	...	...	
22	20.0	...	18.4	...	17.8	17.4	17.2	16.8	16.6	16.2	15.7	15.1	...	...	
23	20.0	...	18.4	...	17.8	17.4	17.2	16.8	16.6	16.2	15.7	15.1	...	...	
24	20.0	...	18.4	...	17.8	17.4	17.2	16.8	16.6	16.2	15.7	15.1	...	...	
25	23.3	...	23.3	...	22.9	22.5	22.1	21.6	21.2	20.6	...	...	...	...	
26	23.3	...	23.3	...	22.9	22.5	22.1	21.6	21.2	20.6	...	...	...	...	
27	23.3	...	23.3	...	22.9	22.5	22.1	21.6	21.2	20.6	...	...	...	...	
28	28.3	...	28.3	...	27.8	27.3	26.9	26.2	25.7	25.1	24.3	23.3	...	...	
29	28.3	...	28.3	...	27.8	27.3	26.9	26.2	25.7	25.1	24.3	23.3	...	...	
30	30.0	...	30.0	...	29.4	28.9	28.4	27.7	27.2	26.5	...	...	...	...	
31	30.0	...	30.0	...	29.4	28.9	28.4	27.7	27.2	26.5	...	...	...	...	
32	31.4	31.4	31.4	31.2	30.8	30.2	29.8	29.1	28.5	27.8	...	...	...	...	
33	36.7	...	36.7	...	36.0	35.1	34.4	33.6	33.1	32.6	...	...	...	...	
34	38.3	...	38.3	...	38.3	37.9	36.5	35.0	34.3	33.4	...	...	...	...	
35	38.3	...	38.3	...	38.3	37.9	36.5	35.0	34.3	33.4	...	...	...	...	
36	50.0	50.0	50.0	...	50.0	49.3	47.7	45.7	...	...	...	...	...	...	
37	20.0	...	20.0	...	19.6	19.3	19.0	18.5	18.1	17.7	17.1	16.4	...	...	
38	20.0	...	18.4	...	17.8	17.4	17.2	16.8	16.6	16.2	15.7	15.1	...	...	
39	20.0	...	20.0	...	19.6	19.3	19.0	18.5	18.1	17.7	17.1	16.4	...	...	
40	20.0	...	18.4	...	17.8	17.4	17.2	16.8	16.6	16.2	15.7	15.1	...	...	
41	45.0	...	45.0	...	45.0	43.7	42.9	42.2	41.8	...	...	...	...	...	
42	45.0	...	45.0	...	45.0	43.7	42.9	42.2	41.8	...	...	...	...	...	
43	45.0	...	45.0	...	45.0	43.7	42.9	42.2	41.8	...	...	...	...	...	
44	46.7	...	46.7	...	46.7	45.4	44.5	43.8	43.4	...	...	...	...	...	
45	46.7	...	46.7	...	46.7	45.4	44.5	43.8	43.4	...	...	...	...	...	

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Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/ Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	17Cr–4Ni–4Cu	Forgings	SA–705	630	S17400	H1100	...	...	...
2	17Cr–4Ni–4Cu	Bar	SA–564	630	S17400	H1075	...	...	...
3	17Cr–4Ni–4Cu	Plate	SA–693	630	S17400	H1075	...	...	...
4	17Cr–4Ni–4Cu	Forgings	SA–705	630	S17400	H1075	...	...	...
5	26Cr–3Ni–3Mo	Plate	SA–240	26–3–3	S44660	...	≤2/10	10K	1
6	26Cr–3Ni–3Mo	Smls. tube	SA–268	26–3–3	S44660	...	≤2/10	10K	1
7	26Cr–3Ni–3Mo	Wld. tube	SA–268	26–3–3	S44660	...	≤2/10	10K	1
8	26Cr–3Ni–3Mo	Wld. tube	SA–803	26–3–3	S44660	...	≤2/10	10K	1
9	27Cr–1Mo	Plate	SA–240	XM–27	S44627	...	...	10I	1
10	27Cr–1Mo	Smls. & wld. tube	SA–268	TPXM–27	S44627	...	...	10I	1
11	27Cr–1Mo	Bar	SA–479	XM–27	S44627	...	...	10I	1
12	29Cr–4Mo–Ti	Smls. tube	SA–268	...	S44735	...	...	10J	1
13	Mn–1/4Mo	Forgings	SA–372	D	K14508	NT	...	...	...
14	Mn–1/4Mo	Forgings	SA–372	D	K14508	QT	...	...	...
15	Mn–1/4Mo–V	Castings	SA–487	2	J13005	A	...	3	3
16	Mn–1/2Mo	Plate	SA–302	A	K12021	...	...	3	2
17	Mn–1/2Mo	Wld. pipe	SA–672	H75	K12021	...	...	3	2
18	Mn–1/2Mo	Plate	SA–302	B	K12022	...	...	3	3
19	Mn–1/2Mo	Plate	SA–533	A	K12521	1	...	3	3
20	Mn–1/2Mo	Wld. pipe	SA–672	H80	K12022	...	...	3	3
21	Mn–1/2Mo	Plate	SA–533	A	K12521	2	...	3	3
22	Mn–1/2Mo	Plate	SA–533	A	K12521	3	...	11A	4
23	Mn–1/2Mo–1/4Ni	Plate	SA–533	D	K12529	1	...	3	3
24	Mn–1/2Mo–1/4Ni	Plate	SA–533	D	K12529	2	...	3	3
25	Mn–1/2Mo–1/4Ni	Plate	SA–533	D	K12529	3	...	11A	4
26	Mn–1/2Mo–1/2Ni	Plate	SA–302	C	K12039	...	...	3	3
27	Mn–1/2Mo–1/2Ni	Plate	SA–533	B	K12539	1	...	3	3
28	Mn–1/2Mo–1/2Ni	Wld. pipe	SA–672	J80	K12539	...	...	3	3
29	Mn–1/2Mo–1/2Ni	Plate	SA–533	B	K12539	2	...	3	3
30	Mn–1/2Mo–1/2Ni	Wld. pipe	SA–672	J90	K12539	...	...	3	3
31	Mn–1/2Mo–1/2Ni	Plate	SA–533	B	K12539	3	...	11A	4
32	Mn–1/2Mo–1/2Ni	Wld. pipe	SA–672	J100	K12539	...	...	11A	4
33	Mn–1/2Mo–3/4Ni	Plate	SA–302	D	K12054	...	...	3	3
34	Mn–1/2Mo–3/4Ni	Plate	SA–533	C	K12554	1	...	3	3
35	Mn–1/2Mo–3/4Ni	Plate	SA–533	C	K12554	2	...	3	3
36	Mn–1/2Mo–3/4Ni	Plate	SA–533	C	K12554	3	...	11A	4
37	Mn–1/2Ni–V	Plate	SA–225	C	K12524	...	...	10A	1
38	Mn–V	Castings	SA–487	1	J13002	A/NT	...	10A	1
39	1/2Ni–1/2Cr–1/4Mo–V	Castings	SA–487	4	J13047	A/NT	...	3	3
40	1/2Ni–1/2Mo–V	Forgings	SA–541	3	K12045	1	...	3	3
41	1/2Ni–1/2Mo–V	Forgings	SA–541	3	K12045	2	...	3	3
42	3/4Ni–1/2Cr–1/2Mo–V	Forgings	SA–592	F	K11576	...	$2\frac{1}{2} < t \leq 4$	11B	3
43	3/4Ni–1/2Cr–1/2Mo–V	Plate	SA–517	F	K11576	...	≤2 1/2	11B	3
44	3/4Ni–1/2Cr–1/2Mo–V	Forgings	SA–592	F	K11576	...	≤2 1/2	11B	3
45	3/4Ni–1/2Cu–Mo	Smls. tube	SA–423	2	K11540	...	...	4	2

Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only)		External Pressure Chart No.	Notes
			III	VIII-2		
1	140	115	650	NP	HT–1	G8, W1
2	145	125	650	NP	HT–1	G8, W1
3	145	125	650	NP	HT–1	G8, W1
4	145	125	650	NP	HT–1	G8, W1
5	85	65	NP	700	HA–5	G13, H6
6	85	65	NP	700	HA–5	G13, H6
7	85	65	NP	700	HA–5	G13, G18, H6
8	85	65	NP	600	HA–5	G13, G18, H6
9	65	40	650	NP	HA–2	G13
10	65	40	650	NP	HA–2	G13
11	65	40	650	NP	HA–2	G13
12	75	60	NP	600	HA–6	G13
13	105	65	NP	650	CS–5	G19, W5, W6
14	105	65	NP	650	CS–5	G19, W5, W6
15	85	53	700 (SPT)	NP	CS–3	...
16	75	45	700	700	CS–3	...
17	75	45	700	NP	CS–3	G1, G2
18	80	50	700	700	CS–3	...
19	80	50	700	700	CS–5	...
20	80	50	700	NP	CS–3	G1, G2
21	90	70	700	700	CS–5	...
22	100	83	700	NP	CS–5	...
23	80	50	700	NP	CS–5	...
24	90	70	700	700	CS–5	...
25	100	83	700	700	CS–5	...
26	80	50	700	700	CS–3	...
27	80	50	700	700	CS–5	...
28	80	50	700	NP	CS–5	G1, G2
29	90	70	700	700	CS–5	...
30	90	70	700	NP	CS–5	G1, G2
31	100	83	700	700	CS–5	...
32	100	83	700	NP	CS–5	G1, G2
33	80	50	700	700	CS–3	...
34	80	50	700	700	CS–5	...
35	90	70	700	700	CS–5	...
36	100	83	700	NP	CS–5	...
37	105	70	NP	700	CS–5	...
38	85	55	700 (SPT)	700	CS–3	...
39	90	60	700	700	CS–3	...
40	80	50	700	700	CS–5	...
41	90	65	700	700	CS–5	...
42	105	90	700 (SPT)	700	CS–5	S1
43	115	100	700 (SPT)	700	HT–1	...
44	115	100	NP	700	HT–1	...
45	60	37	NP	700	CS–2	...

Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Design Stress Intensity or Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	46.7	...	46.7	...	46.7	45.4	44.5	43.8	43.4	...	...	...	...	...
2	48.3	...	48.3	...	48.3	47.0	46.1	45.4	44.9	...	...	...	...	...
3	48.3	...	48.3	...	48.3	47.0	46.1	45.4	44.9	...	...	...	...	...
4	48.3	...	48.3	...	48.3	47.0	46.1	45.4	44.9	...	...	...	...	...
5	28.3	...	28.3	...	28.3	27.9	27.7	27.6	27.5	27.3	...	...	...	...
6	28.3	...	28.3	...	28.3	27.9	27.7	27.6	27.5	27.3	...	...	...	...
7	24.1	...	24.1	...	24.0	23.7	23.6	23.4	23.3	23.2	...	...	...	...
8	24.1	...	24.1	...	24.0	23.7	23.6	23.4	...	...	...	...	...	...
9	21.7	...	21.7	...	20.9	19.5	18.9	18.7	18.6	...	...	...	...	...
10	21.7	...	21.7	...	20.9	19.5	18.9	18.7	18.6	...	...	...	...	...
11	21.7	...	21.7	...	20.9	19.5	18.9	18.7	18.6	...	...	...	...	...
12	25.0	...	24.6	...	24.2	24.0	23.6	23.3	...	...	...	...	...	...
13	35.0	...	33.3	...	32.8	32.8	32.8	32.8	32.8	...	...	...	...	...
14	35.0	...	33.3	...	32.8	32.8	32.8	32.8	32.8	...	...	...	...	...
15	28.3	...	28.3	...	28.3	28.2	28.2	27.3	27.0	26.5	...	...	...	...
16	25.0	...	25.0	...	25.0	25.0	25.0	25.0	24.9	24.4	...	...	...	...
17	25.0	...	25.0	...	25.0	25.0	25.0	25.0	24.9	24.4	...	...	...	...
18	26.7	...	26.7	...	26.7	26.7	26.7	26.7	26.7	26.7	...	...	...	...
19	26.7	26.7	26.7	...	26.7	26.7	26.7	26.7	26.7	26.7	...	...	...	...
20	26.7	26.7	26.7	...	26.7	26.7	26.7	26.7	26.7	26.7	...	...	...	...
21	30.0	...	30.0	...	30.0	30.0	30.0	30.0	30.0	30.0	...	...	...	...
22	33.3	...	33.3	...	33.3	33.3	33.3	33.3	33.3	33.3	...	...	...	...
23	26.7	...	26.7	...	26.7	26.7	26.7	26.7	26.7	26.7	...	...	...	...
24	30.0	...	30.0	...	30.0	30.0	30.0	30.0	30.0	30.0	...	...	...	...
25	33.3	...	33.3	...	33.3	33.3	33.3	33.3	33.3	33.3	...	...	...	...
26	26.7	...	26.7	...	26.7	26.7	26.7	26.7	26.7	26.7	...	...	...	...
27	26.7	26.7	26.7	...	26.7	26.7	26.7	26.7	26.7	26.7	...	...	...	...
28	26.7	...	26.7	...	26.7	26.7	26.7	26.7	26.7	26.7	...	...	...	...
29	30.0	...	30.0	...	30.0	30.0	30.0	30.0	30.0	30.0	...	...	...	...
30	30.0	...	30.0	...	30.0	30.0	30.0	30.0	30.0	30.0	...	...	...	...
31	33.3	...	33.3	...	33.3	33.3	33.3	33.3	33.3	33.3	...	...	...	...
32	33.3	...	33.3	...	33.3	33.3	33.3	33.3	33.3	33.3	...	...	...	...
33	26.7	...	26.7	...	26.7	26.7	26.7	26.7	26.7	26.7	...	...	...	...
34	26.7	26.7	26.7	...	26.7	26.7	26.7	26.7	26.7	26.7	...	...	...	...
35	30.0	...	30.0	...	30.0	30.0	30.0	30.0	30.0	30.0	...	...	...	...
36	33.3	...	33.3	...	33.3	33.3	33.3	33.3	33.3	33.3	...	...	...	...
37	35.0	35.0	35.0	...	35.0	35.0	35.0	34.9	34.0	33.3	...	...	...	...
38	28.4	...	26.8	...	26.1	26.1	26.1	25.6	25.1	24.4	...	...	...	...
39	30.0	...	30.0	...	30.0	30.0	30.0	30.0	30.0	30.0	...	...	...	...
40	26.7	26.7	26.7	...	26.7	26.7	26.7	26.7	26.7	26.7	...	...	...	...
41	30.0	...	30.0	...	30.0	30.0	30.0	30.0	30.0	30.0	...	...	...	...
42	35.0	...	35.0	...	35.0	35.0	35.0	35.0	34.9	34.3	...	...	...	...
43	38.3	...	38.3	...	38.3	38.3	38.3	38.3	38.3	37.5	...	...	...	...
44	38.3	...	38.3	...	38.3	38.3	38.3	38.3	38.3	37.5	...	...	...	...
45	20.0	...	20.0	...	20.0	20.0	20.0	20.0	20.0	20.0	...	...	...	...

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Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/ Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	¾Ni–½Mo–⅓Cr–V	Forgings	SA–508	2	K12766	1	...	3	3
2	¾Ni–½Mo–⅓Cr–V	Forgings	SA–541	2	K12765	1	...	3	3
3	¾Ni–½Mo–⅓Cr–V	Forgings	SA–508	2	K12766	2	...	3	3
4	¾Ni–½Mo–⅓Cr–V	Forgings	SA–541	2	K12765	2	...	3	3
5	¾Ni–½Mo–Cr–V	Forgings	SA–508	3	K12042	1	...	3	3
6	¾Ni–½Mo–Cr–V	Forgings	SA–508	3	K12042	2	...	3	3
7	¾Ni–1Mo–¾Cr	Castings	SA–217	WC5	J22000	...	...	4	1
8	1Ni–½Cr–½Mo	Castings	SA–217	WC4	J12082	...	...	4	1
9	1¼Ni–1Cr–½Mo	Plate	SA–517	P	K21650	...	$2\frac{1}{2} < t \le 4$	11B	8
10	1¼Ni–1Cr–½Mo	Plate	SA–517	P	K21650	...	≤2½	11B	8
11	2Ni–1Cu	Forgings	SA–182	FR	K22035	...	...	9A	1
12	2Ni–1Cu	Smls. pipe	SA–333	9	K22035	...	...	9A	1
13	2Ni–1Cu	Smls. pipe	SA–334	9	K22035	...	...	9A	1
14	2Ni–1Cu	Forgings	SA–350	LF9	K22036	...	...	9A	1
15	2Ni–1Cu	Fittings	SA–420	WPL9	K22035	...	...	9A	1
16	2Ni–1½Cr–¼Mo–V	Forgings	SA–723	1	K23550	1	...	...	...
17	2Ni–1½Cr–¼Mo–V	Forgings	SA–723	1	K23550	2	...	...	...
18	2Ni–1½Cr–¼Mo–V	Forgings	SA–723	1	K23550	3	...	...	...
19	2Ni–1½Cr–¼Mo–V	Forgings	SA–723	1	K23550	4	...	...	...
20	2Ni–1½Cr–¼Mo–V	Forgings	SA–723	1	K23550	5	...	...	...
21	2½Ni	Plate	SA–203	A	K21703	...	...	9A	1
22	2½Ni	Plate	SA–203	B	K22103	...	...	9A	1
23	2½Ni	Castings	SA–352	LC2	J22500	...	...	9A	1
24	2¾Ni–1½Cr–½Mo	Plate	SA–543	C	...	3	...	3	3
25	2¾Ni–1½Cr–½Mo	Plate	SA–543	C	...	1	...	11A	5
26	2¾Ni–1½Cr–½Mo	Plate	SA–543	C	...	2	...	11B	10
27	2¾Ni–1½Cr–½Mo–V	Forgings	SA–723	2	K34035	1	...	...	...
28	2¾Ni–1½Cr–½Mo–V	Forgings	SA–723	2	K34035	2	...	...	...
29	2¾Ni–1½Cr–½Mo–V	Forgings	SA–723	2	K34035	3	...	...	...
30	2¾Ni–1½Cr–½Mo–V	Forgings	SA–723	2	K34035	4	...	...	...
31	2¾Ni–1½Cr–½Mo–V	Forgings	SA–723	2	K34035	5	...	...	...
32	3Ni–1¾Cr–½Mo	Plate	SA–543	B	K42339	3	...	3	3
33	3Ni–1¾Cr–½Mo	Plate	SA–543	B	K42339	1	...	11A	5
34	3Ni–1¾Cr–½Mo	Plate	SA–543	B	K42339	2	...	11B	10
35	3½Ni	Smls. pipe	SA–333	3	K31918	...	...	9B	1
36	3½Ni	Smls. tube	SA–334	3	K31918	...	...	9B	1
37	3½Ni	Fittings	SA–420	WPL3	...	...	...	9B	1
38	3½Ni	Plate	SA–203	D	K31718	...	...	9B	1
39	3½Ni	Forgings	SA–350	LF3	K32025	...	...	9B	1
40	3½Ni	Forgings	SA–765	III	K32026	...	...	9B	1
41	3½Ni	Plate	SA–203	E	K32018	...	...	9B	1
42	3½Ni	Plate	SA–203	E	K32018	...	...	9B	1
43	3½Ni	Castings	SA–352	LC3	J31550	...	...	9B	1
44	3½Ni	Plate	SA–203	F	...	...	>2	9B	1
45	3½Ni	Plate	SA–203	F	...	...	≤2	9B	1

Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only)		External Pressure Chart No.	Notes
			III	VIII-2		
1	80	50	700	700	CS–5	...
2	80	50	700	700	CS–5	...
3	90	65	700	700	CS–5	...
4	90	65	700	700	CS–5	...
5	80	50	700	700	CS–5	...
6	90	65	700	700	CS–5	...
7	70	40	700	700	CS–2	...
8	70	40	700 (SPT)	700	CS–2	...
9	105	90	700 (SPT)	700	CS–5	...
10	115	100	700 (SPT)	700	HT–1	...
11	63	46	NP	100	CS–3	...
12	63	46	NP	100	CS–3	...
13	63	46	NP	100	CS–3	...
14	63	46	NP	100	CS–3	...
15	63	46	NP	100	CS–3	...
16	115	100	700 (SPT)	700	HT–1	G14, G20, W1
17	135	120	700 (SPT)	700	HT–1	G6, G20, W1
18	155	140	700 (SPT)	NP	HT–1	W1
19	175	160	700 (SPT)	NP	HT–1	W1
20	190	180	700 (SPT)	NP	HT–1	W1
21	65	37	NP	300	CS–2	...
22	70	40	NP	300	CS–2	...
23	70	40	100	100	CS–2	...
24	90	70	NP	650	CS–5	...
25	105	85	NP	650	CS–5	...
26	115	100	NP	650	HT–1	...
27	115	100	700 (SPT)	700	HT–1	G14, G20, W1
28	135	120	700 (SPT)	700	HT–1	G6, G20, W1
29	155	140	700 (SPT)	NP	HT–1	W1
30	175	160	700 (SPT)	NP	HT–1	W1
31	190	180	700 (SPT)	NP	HT–1	W1
32	90	70	NP	650	CS–5	...
33	105	85	650	650	CS–5	G5, H3, S4, W3
34	115	100	NP	650	HT–1	...
35	65	35	NP	100	CS–2	...
36	65	35	NP	100	CS–2	...
37	65	35	NP	300	CS–2	...
38	65	37	NP	300	CS–2	...
39	70	37.5	700	300	CS–2	...
40	70	37.5	NP	100	CS–2	...
41	70	40	300 (SPT)	300	CS–2	...
42	70	40	500	NP	CS–2	...
43	70	40	100	100	CS–2	...
44	75	50	NP	100	CS–3	...
45	80	55	NP	100	CS–3	...

Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Design Stress Intensity or Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	26.7	26.7	26.7	...	26.7	26.7	26.7	26.7	26.7	26.7	...	...	...	...
2	26.7	26.7	26.7	...	26.7	26.7	26.7	26.7	26.7	26.7	...	...	...	...
3	30.0	...	30.0	...	30.0	30.0	30.0	30.0	30.0	30.0	...	...	...	...
4	30.0	...	30.0	...	30.0	30.0	30.0	30.0	30.0	30.0	...	...	...	...
5	26.7	26.7	26.7	...	26.7	26.7	26.7	26.7	26.7	26.7	...	...	...	...
6	30.0	...	30.0	...	30.0	30.0	30.0	30.0	30.0	30.0	...	...	...	...
7	23.3	...	23.3	...	23.3	23.3	23.0	22.4	22.1	21.7	...	...	...	...
8	23.3	...	23.3	...	23.3	23.3	23.0	22.4	22.1	21.7	...	...	...	...
9	35.0	...	35.0	...	35.0	35.0	35.0	35.0	34.9	34.3	...	...	...	...
10	38.3	...	38.3	...	38.3	38.3	38.3	38.3	38.3	37.5	...	...	...	...
11	21.0	...	...	...	...	...	...	...	...	...	...	...	...	...
12	21.0	...	...	...	...	...	...	...	...	...	...	...	...	...
13	21.0	...	...	...	...	...	...	...	...	...	...	...	...	...
14	21.0	...	...	...	...	...	...	...	...	...	...	...	...	...
15	21.0	...	...	...	...	...	...	...	...	...	...	...	...	...
16	38.3	...	38.3	...	38.3	38.3	38.3	38.3	37.7	36.8	...	...	...	...
17	45.0	...	45.0	...	45.0	45.0	45.0	45.0	44.3	43.2	...	...	...	...
18	51.7	...	51.7	...	51.7	51.7	51.7	51.7	50.9	49.7	...	...	...	...
19	58.3	...	58.3	...	58.3	58.3	58.3	58.3	57.4	56.1	...	...	...	...
20	63.3	...	63.3	...	63.3	63.3	63.3	63.3	62.4	60.9	...	...	...	...
21	21.7	...	21.7	...	21.7	...	...	...	...	...	...	...	...	...
22	23.3	...	23.3	...	23.3	...	...	...	...	...	...	...	...	...
23	23.3	...	...	...	...	...	...	...	...	...	...	...	...	...
24	30.0	...	30.0	...	30.0	29.7	29.5	29.1	28.7	...	...	...	...	...
25	35.0	...	35.0	...	35.0	34.6	34.4	34.0	33.5	...	...	...	...	...
26	38.3	...	38.3	...	38.3	37.9	37.7	37.2	36.7	...	...	...	...	...
27	38.3	...	38.3	...	38.3	38.3	38.3	38.3	37.7	36.8	...	...	...	...
28	45.0	...	45.0	...	45.0	45.0	45.0	45.0	44.3	43.2	...	...	...	...
29	51.7	...	51.7	...	51.7	51.7	51.7	51.7	50.9	49.7	...	...	...	...
30	58.3	...	58.3	...	58.3	58.3	58.3	58.3	57.4	56.1	...	...	...	...
31	63.3	...	63.3	...	63.3	63.3	63.3	63.3	62.4	60.9	...	...	...	...
32	30.0	...	30.0	...	30.0	29.7	29.5	29.1	28.7	...	...	...	...	...
33	35.0	...	35.0	...	35.0	34.6	34.4	34.0	33.5	...	...	...	...	...
34	38.3	...	38.3	...	38.3	37.9	37.7	37.2	36.7	...	...	...	...	...
35	21.7	...	...	...	...	...	...	...	...	...	...	...	...	...
36	21.7	...	...	...	...	...	...	...	...	...	...	...	...	...
37	21.7	...	21.4	...	20.6	...	...	...	...	...	...	...	...	...
38	21.7	...	21.7	...	21.7	...	...	...	...	...	...	...	...	...
39	23.3	...	22.9	...	22.1	21.4	20.3	18.8	17.9	16.9	...	...	...	...
40	23.3	...	...	...	...	...	...	...	...	...	...	...	...	...
41	23.3	...	23.3	...	23.3	...	...	...	...	...	...	...	...	...
42	23.3	...	23.3	...	23.3	22.9	21.6	...	...	...	...	...	...	...
43	23.3	...	...	...	...	...	...	...	...	...	...	...	...	...
44	25.0	...	...	...	...	...	...	...	...	...	...	...	...	...
45	26.7	...	...	...	...	...	...	...	...	...	...	...	...	...

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Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/ Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	3½Ni–1¾Cr–½Mo–V	Forgings	SA–508	4N	K22375	3	...	3	3
2	3½Ni–1¾Cr–½Mo–V	Forgings	SA–508	4N	K22375	1	...	11A	5
3	3½Ni–1¾Cr–½Mo–V	Forgings	SA–508	4N	K22375	2	...	11B	10
4	4Ni–1½Cr–½Mo–V	Forgings	SA–723	3	K44045	1	...	...	...
5	4Ni–1½Cr–½Mo–V	Forgings	SA–723	3	K44045	2	...	...	...
6	4Ni–1½Cr–½Mo–V	Forgings	SA–723	3	K44045	3	...	...	...
7	4Ni–1½Cr–½Mo–V	Forgings	SA–723	3	K44045	4	...	...	...
8	4Ni–1½Cr–½Mo–V	Forgings	SA–723	3	K44045	5	...	...	...
9	5Ni–¼Mo	Plate	SA–645	...	K41583	...	...	11A	2
10	7Ni	Plate	SA–553	III	K61365	...	≤2	11A	1
11	7Ni	Plate	SA–553	III	K61365	...	≤2	11A	1
12	8Ni	Plate	SA–553	II	K71340	...	...	11A	1
13	8Ni	Plate	SA–553	II	K71340	...	...	11A	1
14	9Ni	Smls. pipe	SA–333	8	K81340	...	...	11A	1
15	9Ni	Smls. pipe	SA–333	8	K81340	...	...	11A	1
16	9Ni	Smls. tube	SA–334	8	K81340	...	...	11A	1
17	9Ni	Smls. tube	SA–334	8	K81340	...	...	11A	1
18	9Ni	Plate	SA–353	...	K81340	...	...	11A	1
19	9Ni	Plate	SA–353	...	K81340	...	...	11A	1
20	9Ni	Fittings	SA–420	WPL8	K81340	...	...	11A	1
21	9Ni	Fittings	SA–420	WPL8	K81340	...	...	11A	1
22	9Ni	Forgings	SA–522	I	K81340	...	...	11A	1
23	9Ni	Forgings	SA–522	I	K81340	...	...	11A	1
24	9Ni	Plate	SA–553	I	K81340	...	...	11A	1
25	9Ni	Plate	SA–553	I	K81340	...	...	11A	1
26	25Ni–15Cr–2Ti	Forgings, bar	SA–638	660	S66286	...	...	...	...
27	16Cr–4Ni–6Mn	Plate	SA–240	201LN	S20153	...	...	8	3
28	16Cr–12Ni–2Mo	Forgings	SA–182	F316L	S31603	...	>5	8	1
29	16Cr–12Ni–2Mo	Forgings	SA–965	F316L	S31603	...	...	8	1
30	16Cr–12Ni–2Mo	Forgings	SA–182	F316L	S31603	...	≤5	8	1
31	16Cr–12Ni–2Mo	Smls. tube	SA–213	TP316L	S31603	...	...	8	1
32	16Cr–12Ni–2Mo	Plate	SA–240	316L	S31603	...	...	8	1
33	16Cr–12Ni–2Mo	Wld. tube	SA–249	TP316L	S31603	...	...	8	1
34	16Cr–12Ni–2Mo	Wld. tube	SA–249	TP316L	S31603	...	...	8	1
35	16Cr–12Ni–2Mo	Wld. pipe	SA–312	TP316L	S31603	...	...	8	1
36	16Cr–12Ni–2Mo	Smls. pipe	SA–312	TP316L	S31603	...	...	8	1
37	16Cr–12Ni–2Mo	Wld. pipe	SA–312	TP316L	S31603	...	...	8	1
38	16Cr–12Ni–2Mo	Wld. pipe	SA–358	316L	S31603	1	...	8	1
39	16Cr–12Ni–2Mo	Wld. pipe	SA–358	316L	S31603	3	...	8	1
40	16Cr–12Ni–2Mo	Wld. pipe	SA–358	316L	S31603	4	...	8	1
41	16Cr–12Ni–2Mo	Fittings	SA–403	316L	S31603	...	...	8	1
42	16Cr–12Ni–2Mo	Fittings	SA–403	316L	S31603	CR	...	8	1
43	16Cr–12Ni–2Mo	Wld. fittings	SA–403	316L	S31603	WP–W	...	8	1
44	16Cr–12Ni–2Mo	Wld. fittings	SA–403	316L	S31603	WP–W	...	8	1
45	16Cr–12Ni–2Mo	Wld. fittings	SA–403	316L	S31603	WP–WX	...	8	1

Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only)		External Pressure Chart No.	Notes
			III	VIII-2		
1	90	70	650	700	CS–5	...
2	105	85	650	700	CS–5	H3, S4, W3
3	115	100	NP	650	HT–1	...
4	115	100	700 (SPT)	700	HT–1	G14, G20, W1
5	135	120	700 (SPT)	700	HT–1	G6, G20, W1
6	155	140	700 (SPT)	NP	HT–1	W1
7	175	160	700 (SPT)	NP	HT–1	W1
8	190	180	700 (SPT)	NP	HT–1	W1
9	95	65	NP	250	CS–3	W4
10	100	85	NP	150	CS–3	W7
11	100	85	NP	150	CS–3	W4
12	100	85	NP	250	CS–3	W7
13	100	85	NP	250	CS–3	W4
14	100	75	NP	250	CS–3	W7
15	100	75	NP	250	CS–3	W4
16	100	75	NP	250	CS–3	W7
17	100	75	NP	250	CS–3	W4
18	100	75	NP	250	CS–3	W7
19	100	75	NP	250	CS–3	W4
20	100	75	NP	250	CS–3	W7
21	100	75	NP	250	CS–3	W4
22	100	75	NP	250	CS–3	G19, S6, W7
23	100	75	NP	250	CS–3	G19, S6, W4
24	100	85	NP	250	CS–3	W7
25	100	85	NP	250	CS–3	W4
26	130	85	700	NP	HA–5	W1
27	95	45	NP	100	CS–2	...
28	65	25	800	800	HA–4	G7
29	65	25	800	800	HA–4	G7
30	70	25	800	800	HA–4	G7
31	70	25	800	800	HA–4	G7
32	70	25	800	800	HA–4	G7
33	70	25	800	NP	HA–4	G7
34	70	25	NP	800	HA–4	G7, G18
35	70	25	800	NP	HA–4	G7
36	70	25	800	800	HA–4	G7
37	70	25	NP	800	HA–4	G7, G18
38	70	25	800	NP	HA–4	G7
39	70	25	800	NP	HA–4	G7
40	70	25	800	NP	HA–4	G7
41	70	25	800	NP	HA–4	G7
42	70	25	NP	800	HA–4	G7, G18
43	70	25	800	NP	HA–4	G7
44	70	25	NP	800	HA–4	G7, G18
45	70	25	NP	800	HA–4	G7, G18

Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Design Stress Intensity or Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	30.0	30.0	30.0	30.0	30.0	29.7	29.5	29.1	28.7	28.2	...	...	...	...
2	35.0	35.0	35.0	35.0	35.0	34.6	34.4	34.0	33.5	32.9	...	...	...	...
3	38.3	38.3	38.3	38.3	38.3	37.9	37.7	37.2	36.7	...	...	...	...	...
4	38.3	38.3	38.3	38.3	38.3	38.3	38.3	38.3	37.7	36.8	...	...	...	...
5	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	44.3	43.2	...	...	...	...
6	51.7	51.7	51.7	51.7	51.7	51.7	51.7	51.7	50.9	49.7	...	...	...	...
7	58.3	58.3	58.3	58.3	58.3	58.3	58.3	58.3	57.4	56.1	...	...	...	...
8	63.3	63.3	63.3	63.3	63.3	63.3	63.3	63.3	62.4	60.9	...	...	...	...
9	30.1	30.1	28.1	27.7	...	...	...	...	...	...	...	...	...	...
10	33.3	33.3	...	...	...	...	...	...	...	...	...	...	...	...
11	31.7	31.7	...	...	...	...	...	...	...	...	...	...	...	...
12	33.3	33.3	31.1	30.2	...	...	...	...	...	...	...	...	...	...
13	31.7	31.7	29.6	28.7	...	...	...	...	...	...	...	...	...	...
14	33.3	33.3	31.1	30.2	...	...	...	...	...	...	...	...	...	...
15	31.7	31.7	29.6	28.7	...	...	...	...	...	...	...	...	...	...
16	33.3	33.3	31.1	30.2	...	...	...	...	...	...	...	...	...	...
17	31.7	31.7	29.6	28.7	...	...	...	...	...	...	...	...	...	...
18	33.3	33.3	31.1	30.2	...	...	...	...	...	...	...	...	...	...
19	31.7	31.7	29.6	28.7	...	...	...	...	...	...	...	...	...	...
20	33.3	33.3	31.1	30.2	...	...	...	...	...	...	...	...	...	...
21	31.7	31.7	29.6	28.7	...	...	...	...	...	...	...	...	...	...
22	33.3	33.3	31.1	30.2	...	...	...	...	...	...	...	...	...	...
23	31.7	31.7	29.6	28.7	...	...	...	...	...	...	...	...	...	...
24	33.3	33.3	31.1	30.2	...	...	...	...	...	...	...	...	...	...
25	31.7	31.7	29.6	28.7	...	...	...	...	...	...	...	...	...	...
26	43.3	...	43.3	...	43.3	43.3	42.5	41.7	41.3	40.9	...	...	...	...
27	30.0	...	...	...	...	...	...	...	...	...	...	...	...	...
28	16.7	...	16.7	...	16.7	15.7	14.8	14.0	13.7	13.5	13.2	12.9	...	...
29	16.7	...	16.7	...	16.7	15.7	14.8	14.0	13.7	13.5	13.2	12.9	...	...
30	16.7	...	16.7	...	16.7	15.7	14.8	14.0	13.7	13.5	13.2	12.9	...	...
31	16.7	...	16.7	...	16.7	15.7	14.8	14.0	13.7	13.5	13.2	12.9	...	...
32	16.7	...	16.7	...	16.7	15.7	14.8	14.0	13.7	13.5	13.2	12.9	...	...
33	16.7	...	16.7	...	16.7	15.7	14.8	14.0	13.7	13.5	13.2	12.9	...	...
34	14.2	...	14.2	...	14.2	13.4	12.5	11.9	11.7	11.4	11.2	11.0	...	...
35	16.7	...	16.7	...	16.7	15.7	14.8	14.0	13.7	13.5	13.2	12.9	...	...
36	16.7	...	16.7	...	16.7	15.7	14.8	14.0	13.7	13.5	13.2	12.9	...	...
37	14.2	...	14.2	...	14.2	13.4	12.5	11.9	11.7	11.4	11.2	11.0	...	...
38	16.7	...	16.7	...	16.7	15.7	14.8	14.0	13.7	13.5	13.2	12.9	...	...
39	16.7	...	16.7	...	16.7	15.7	14.8	14.0	13.7	13.5	13.2	12.9	...	...
40	16.7	...	16.7	...	16.7	15.7	14.8	14.0	13.7	13.5	13.2	12.9	...	...
41	16.7	...	16.7	...	16.7	15.7	14.8	14.0	13.7	13.5	13.2	12.9	...	...
42	14.2	...	14.2	...	14.2	13.4	12.5	11.9	11.7	11.4	11.2	11.0	...	...
43	16.7	...	16.7	...	16.7	15.7	14.8	14.0	13.7	13.5	13.2	12.9	...	...
44	14.2	...	14.2	...	14.2	13.4	12.5	11.9	11.7	11.4	11.2	11.0	...	...
45	14.2	...	14.2	...	14.2	13.4	12.5	11.9	11.7	11.4	11.2	11.0	...	...

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Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/ Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	16Cr–12Ni–2Mo	Bar	SA–479	316L	S31603	...	...	8	1
2	16Cr–12Ni–2Mo	Wld. tube	SA–688	TP316L	S31603	...	...	8	1
3	16Cr–12Ni–2Mo	Wld. pipe	SA–688	TP316L	S31603	...	...	8	1
4	16Cr–12Ni–2Mo	Wld. pipe	SA–813	TP316L	S31603	...	...	8	1
5	16Cr–12Ni–2Mo	Wld. pipe	SA–814	TP316L	S31603	...	...	8	1
6	16Cr–12Ni–2Mo	Bar	SA/JIS G4303	SUS316L	...	...	...	8	1
7	16Cr–12Ni–2Mo	Castings	SA–351	CF3M	J92800	...	...	8	1
8	16Cr–12Ni–2Mo	Cast pipe	SA–451	CPF3M	J92800	...	...	8	1
9	16Cr–12Ni–2Mo	Castings	SA–351	CF8M	J92900	...	...	8	1
10	16Cr–12Ni–2Mo	Cast pipe	SA–451	CPF8M	J92900	...	...	8	1
11	16Cr–12Ni–2Mo	Forgings	SA–182	F316	S31600	...	>5	8	1
12	16Cr–12Ni–2Mo	Forgings	SA–965	F316	S31600	...	...	8	1
13	16Cr–12Ni–2Mo	Forgings	SA–182	F316H	S31609	...	>5	8	1
14	16Cr–12Ni–2Mo	Forgings	SA–965	F316H	S31609	...	...	8	1
15	16Cr–12Ni–2Mo	Forgings	SA–182	F316	S31600	...	≤5	8	1
16	16Cr–12Ni–2Mo	Smls. tube	SA–213	TP316	S31600	...	...	8	1
17	16Cr–12Ni–2Mo	Plate	SA–240	316	S31600	...	...	8	1
18	16Cr–12Ni–2Mo	Wld. tube	SA–249	TP316	S31600	...	...	8	1
19	16Cr–12Ni–2Mo	Wld. tube	SA–249	TP316	S31600	...	...	8	1
20	16Cr–12Ni–2Mo	Wld. pipe	SA–312	TP316	S31600	...	...	8	1
21	16Cr–12Ni–2Mo	Smls. pipe	SA–312	TP316	S31600	...	...	8	1
22	16Cr–12Ni–2Mo	Wld. pipe	SA–312	TP316	S31600	...	...	8	1
23	16Cr–12Ni–2Mo	Wld. pipe	SA–358	316	S31600	1	...	8	1
24	16Cr–12Ni–2Mo	Wld. pipe	SA–358	316	S31600	3	...	8	1
25	16Cr–12Ni–2Mo	Wld. pipe	SA–358	316	S31600	4	...	8	1
26	16Cr–12Ni–2Mo	Smls. pipe	SA–376	TP316	S31600	...	...	8	1
27	16Cr–12Ni–2Mo	Fittings	SA–403	316	S31600	...	...	8	1
28	16Cr–12Ni–2Mo	Fittings	SA–403	316	S31600	WP–S	...	8	1
29	16Cr–12Ni–2Mo	Wld. fittings	SA–403	316	S31600	WP–W	...	8	1
30	16Cr–12Ni–2Mo	Bar	SA–479	316	S31600	...	...	8	1
31	16Cr–12Ni–2Mo	Wld. tube	SA–688	TP316	S31600	...	...	8	1
32	16Cr–12Ni–2Mo	Wld. tube	SA–688	TP316	S31600	...	...	8	1
33	16Cr–12Ni–2Mo	Wld. pipe	SA–813	TP316	S31600	...	...	8	1
34	16Cr–12Ni–2Mo	Wld. pipe	SA–814	TP316	S31600	...	...	8	1
35	16Cr–12Ni–2Mo	Bar	SA/JIS G4303	SUS316	...	...	...	8	1
36	16Cr–12Ni–2Mo	Forgings	SA–182	F316H	S31609	...	≤5	8	1
37	16Cr–12Ni–2Mo	Smls. tube	SA–213	TP316H	S31609	...	...	8	1
38	16Cr–12Ni–2Mo	Plate	SA–240	316H	S31609	...	...	8	1
39	16Cr–12Ni–2Mo	Wld. tube	SA–249	TP316H	S31609	...	...	8	1
40	16Cr–12Ni–2Mo	Wld. tube	SA–249	TP316H	S31609	...	...	8	1
41	16Cr–12Ni–2Mo	Wld. pipe	SA–312	TP316H	S31609	...	...	8	1
42	16Cr–12Ni–2Mo	Smls. pipe	SA–312	TP316H	S31609	...	...	8	1
43	16Cr–12Ni–2Mo	Wld. pipe	SA–312	TP316H	S31609	...	...	8	1
44	16Cr–12Ni–2Mo	Wld. pipe	SA–358	316H	S31609	1	...	8	1
45	16Cr–12Ni–2Mo	Wld. pipe	SA–358	316H	S31609	3	...	8	1

Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) III	VIII-2	External Pressure Chart No.	Notes
1	70	25	800	NP	HA–4	G7
2	70	25	800	NP	HA–4	G7
3	70	25	NP	800	HA–4	G7, G18
4	70	25	800	NP	HA–4	G7
5	70	25	800	NP	HA–4	G7
6	70	25	800	NP	HA–4	G7
7	70	30	800	NP	HA–4	G7, G13
8	70	30	800	NP	HA–4	G7, G13
9	70	30	800	800	HA–2	G7, G9, G10, G13
10	70	30	800	NP	HA–2	G7, G13
11	70	30	800	800	HA–2	G7
12	70	30	800	800	HA–2	G7, G9, G10
13	70	30	800	800	HA–2	G7
14	70	30	800	800	HA–2	G7
15	75	30	800	800	HA–2	G7, G9
16	75	30	800	800	HA–2	G7, G9
17	75	30	800	800	HA–2	G7, G9, G10
18	75	30	800	NP	HA–2	G7
19	75	30	NP	800	HA–2	G7, G9, G18
20	75	30	800	NP	HA–2	G7
21	75	30	800	800	HA–2	G7, G9, G10
22	75	30	NP	800	HA–2	G7, G9, G18
23	75	30	800	NP	HA–2	G7
24	75	30	800	NP	HA–2	G7
25	75	30	800	NP	HA–2	G7
26	75	30	800	800	HA–2	G7, G9, G10
27	75	30	800	NP	HA–2	G7
28	75	30	NP	800	HA–2	G7
29	75	30	800	NP	HA–2	G7
30	75	30	800	NP	HA–2	G7
31	75	30	800	NP	HA–2	G7
32	75	30	NP	800	HA–2	G7, G9, G18
33	75	30	800	NP	HA–2	G7
34	75	30	800	NP	HA–2	G7
35	75	30	800	NP	HA–2	G7
36	75	30	800	NP	HA–2	G7
37	75	30	800	800	HA–2	G7
38	75	30	800	NP	HA–2	G7
39	75	30	800	NP	HA–2	G7
40	75	30	NP	800	HA–2	G7, G18
41	75	30	800	NP	HA–2	G7
42	75	30	800	800	HA–2	G7
43	75	30	NP	800	HA–2	G7, G18
44	75	30	800	NP	HA–2	G7
45	75	30	800	NP	HA–2	G7

Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line	Design Stress Intensity or Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
No.	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	16.7	...	16.7	...	16.7	15.7	14.8	14.0	13.7	13.5	13.2	12.9	...	...
2	16.7	...	16.7	...	16.7	15.7	14.8	14.0	13.7	13.5	13.2	12.9	...	...
3	14.2	...	14.2	...	14.2	13.4	12.5	11.9	11.7	11.4	11.2	11.0	...	...
4	16.7	...	16.7	...	16.7	15.7	14.8	14.0	13.7	13.5	13.2	12.9	...	...
5	16.7	...	16.7	...	16.7	15.7	14.8	14.0	13.7	13.5	13.2	12.9	...	...
6	16.7	...	16.7	...	16.7	15.7	14.8	14.0	13.7	13.5	13.2	12.9	...	...
7	20.0	...	20.0	...	20.0	19.2	17.9	17.0	16.6	16.3	16.0	15.8	...	...
8	20.0	...	20.0	...	20.0	19.2	17.9	17.0	16.6	16.3	16.0	15.8	...	...
9	20.0	...	20.0	...	20.0	19.2	17.9	17.0	16.6	16.3	16.0	15.8	...	...
10	20.0	...	20.0	...	20.0	19.2	17.9	17.0	16.6	16.3	16.0	15.8	...	...
11	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...
12	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...
13	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...
14	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...
15	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...
16	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...
17	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...
18	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...
19	17.0	...	17.0	...	17.0	16.4	15.3	14.5	14.1	13.9	13.7	13.5	...	...
20	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...
21	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...
22	17.0	...	17.0	...	17.0	16.4	15.3	14.5	14.1	13.9	13.7	13.5	...	...
23	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...
24	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...
25	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...
26	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...
27	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...
28	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...
29	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...
30	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...
31	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...
32	17.0	...	17.0	...	17.0	16.4	15.3	14.5	14.1	13.9	13.7	13.5	...	...
33	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...
34	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...
35	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...
36	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...
37	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...
38	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...
39	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...
40	17.0	...	17.0	...	17.0	16.4	15.3	14.5	14.1	13.9	13.7	13.5	...	...
41	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...
42	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...
43	17.0	...	17.0	...	17.0	16.4	15.3	14.5	14.1	13.9	13.7	13.5	...	...
44	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...
45	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...

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Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/ Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	16Cr–12Ni–2Mo	Wld. pipe	SA–358	316H	S31609	4	...	8	1
2	16Cr–12Ni–2Mo	Smls. pipe	SA–376	TP316H	S31609	...	...	8	1
3	16Cr–12Ni–2Mo	Fittings	SA–403	316H	S31609	...	...	8	1
4	16Cr–12Ni–2Mo	Wld. fittings	SA–403	316H	S31609	WP–W	...	8	1
5	16Cr–12Ni–2Mo	Bar	SA–479	316H	S31609	...	...	8	1
6	16Cr–12Ni–2Mo	Wld. pipe	SA–813	TP316H	S31609	...	...	8	1
7	16Cr–12Ni–2Mo	Wld. pipe	SA–814	TP316H	S31609	...	...	8	1
8	16Cr–12Ni–2Mo–N	Forgings	SA–182	F316LN	S31653	...	>5	8	1
9	16Cr–12Ni–2Mo–N	Forgings	SA–965	F316LN	S31653	...	...	8	1
10	16Cr–12Ni–2Mo–N	Forgings	SA–182	F316LN	S31653	...	≤5	8	1
11	16Cr–12Ni–2Mo–N	Smls. tube	SA–213	TP316LN	S31653	...	...	8	1
12	16Cr–12Ni–2Mo–N	Plate	SA–240	316LN	S31653	...	...	8	1
13	16Cr–12Ni–2Mo–N	Wld. tube	SA–249	TP316LN	S31653	...	...	8	1
14	16Cr–12Ni–2Mo–N	Smls. & wld. pipe	SA–312	TP316LN	S31653	...	...	8	1
15	16Cr–12Ni–2Mo–N	Wld. pipe	SA–358	316LN	S31653	1	...	8	1
16	16Cr–12Ni–2Mo–N	Wld. pipe	SA–358	316LN	S31653	3	...	8	1
17	16Cr–12Ni–2Mo–N	Wld. pipe	SA–358	316LN	S31653	4	...	8	1
18	16Cr–12Ni–2Mo–N	Smls. pipe	SA–376	TP316LN	S31653	...	...	8	1
19	16Cr–12Ni–2Mo–N	Fittings	SA–403	316LN	S31653	...	...	8	1
20	16Cr–12Ni–2Mo–N	Wld. fittings	SA–403	316LN	S31653	WP–W	...	8	1
21	16Cr–12Ni–2Mo–N	Bar	SA–479	316LN	S31653	...	...	8	1
22	16Cr–12Ni–2Mo–N	Wld. tube	SA–688	TP316LN	S31653	...	...	8	1
23	16Cr–12Ni–2Mo–N	Wld. pipe	SA–813	TP316LN	S31653	...	...	8	1
24	16Cr–12Ni–2Mo–N	Wld. pipe	SA–814	TP316LN	S31653	...	...	8	1
25	16Cr–12Ni–2Mo–N	Forgings	SA–182	F316N	S31651	...	≤5	8	1
26	16Cr–12Ni–2Mo–N	Smls. tube	SA–213	TP316N	S31651	...	≤5	8	1
27	16Cr–12Ni–2Mo–N	Plate	SA–240	316N	S31651	...	≤5	8	1
28	16Cr–12Ni–2Mo–N	Wld. tube	SA–249	TP316N	S31651	...	...	8	1
29	16Cr–12Ni–2Mo–N	Wld. pipe	SA–312	TP316N	S31651	...	≤5	8	1
30	16Cr–12Ni–2Mo–N	Smls. pipe	SA–312	TP316N	S31651	...	≤5	8	1
31	16Cr–12Ni–2Mo–N	Wld. pipe	SA–312	TP316N	S31651	...	...	8	1
32	16Cr–12Ni–2Mo–N	Wld. pipe	SA–358	316N	S31651	1	≤5	8	1
33	16Cr–12Ni–2Mo–N	Wld. pipe	SA–358	316N	S31651	3	≤5	8	1
34	16Cr–12Ni–2Mo–N	Wld. pipe	SA–358	316N	S31651	4	≤5	8	1
35	16Cr–12Ni–2Mo–N	Smls. pipe	SA–376	TP316N	S31651	...	...	8	1
36	16Cr–12Ni–2Mo–N	Fittings	SA–403	316N	S31651	...	...	8	1
37	16Cr–12Ni–2Mo–N	Fittings	SA–403	316N	S31651	CR	...	8	1
38	16Cr–12Ni–2Mo–N	Wld. fittings	SA–403	316N	S31651	WP–W	...	8	1
39	16Cr–12Ni–2Mo–N	Wld. fittings	SA–403	316N	S31651	WP–W	...	8	1
40	16Cr–12Ni–2Mo–N	Wld. fittings	SA–403	316N	S31651	WP–WX	...	8	1
41	16Cr–12Ni–2Mo–N	Bar	SA–479	316N	S31651	...	...	8	1
42	16Cr–12Ni–2Mo–N	Wld. tube	SA–688	TP316N	S31651	...	...	8	1
43	16Cr–12Ni–2Mo–N	Wld. pipe	SA–813	TP316N	S31651	...	...	8	1
44	16Cr–12Ni–2Mo–N	Wld. pipe	SA–814	TP316N	S31651	...	...	8	1
45	16Cr–12Ni–2Mo–N	Forgings	SA–965	F316N	S31651	...	≤5	8	1

Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only)		External Pressure Chart No.	Notes
			III	VIII-2		
1	75	30	800	NP	HA–2	G7
2	75	30	800	800	HA–2	G7
3	75	30	800	NP	HA–2	G7
4	75	30	800	NP	HA–2	G7
5	75	30	800	NP	HA–2	G7
6	75	30	800	NP	HA–2	G7
7	75	30	800	NP	HA–2	G7
8	70	30	800	NP	HA–2	G7
9	70	30	800	NP	HA–2	G7
10	75	30	800	NP	HA–2	G7
11	75	30	800	NP	HA–2	G7
12	75	30	800	NP	HA–2	G7
13	75	30	800	NP	HA–2	G7
14	75	30	800	NP	HA–2	G7
15	75	30	800	NP	HA–2	G7
16	75	30	800	NP	HA–2	G7
17	75	30	800	NP	HA–2	G7
18	75	30	800	NP	HA–2	G7
19	75	30	800	NP	HA–2	G7
20	75	30	800	NP	HA–2	G7
21	75	30	800	NP	HA–2	G7
22	75	30	800	NP	HA–2	G7
23	75	30	800	NP	HA–2	G7
24	75	30	800	NP	HA–2	G7
25	80	35	800	NP	HA–2	G7
26	80	35	800	800	HA–2	G7
27	80	35	800	800	HA–2	G7
28	80	35	NP	800	HA–2	G7, G18
29	80	35	800	NP	HA–2	G7
30	80	35	800	800	HA–2	G7
31	80	35	NP	800	HA–2	G7, G18
32	80	35	800	NP	HA–2	G7
33	80	35	800	NP	HA–2	G7
34	80	35	800	NP	HA–2	G7
35	80	35	800	800	HA–2	G7
36	80	35	800	NP	HA–2	G7
37	80	35	NP	800	HA–2	G7, G18
38	80	35	800	NP	HA–2	G7
39	80	35	NP	800	HA–2	G7, G18
40	80	35	NP	800	HA–2	G7, G18
41	80	35	800	NP	HA–2	G7
42	80	35	800	NP	HA–2	G7
43	80	35	800	NP	HA–2	G7
44	80	35	800	NP	HA–2	G7
45	80	35	800	800	HA–2	G7

Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line	Design Stress Intensity or Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
No.	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...
2	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...
3	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...
4	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...
5	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...
6	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...
7	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...
8	20.0	...	20.0	...	20.0	18.9	17.5	16.5	16.0	15.6	15.2	14.8	...	...
9	20.0	...	20.0	...	20.0	18.9	17.5	16.5	16.0	15.6	15.2	14.8	...	...
10	20.0	...	20.0	...	20.0	18.9	17.5	16.5	16.0	15.6	15.2	14.8	...	...
11	20.0	...	20.0	...	20.0	18.9	17.5	16.5	16.0	15.6	15.2	14.8	...	...
12	20.0	...	20.0	...	20.0	18.9	17.5	16.5	16.0	15.6	15.2	14.8	...	...
13	20.0	...	20.0	...	20.0	18.9	17.5	16.5	16.0	15.6	15.2	14.8	...	...
14	20.0	...	20.0	...	20.0	18.9	17.5	16.5	16.0	15.6	15.2	14.8	...	...
15	20.0	...	20.0	...	20.0	18.9	17.5	16.5	16.0	15.6	15.2	14.8	...	...
16	20.0	...	20.0	...	20.0	18.9	17.5	16.5	16.0	15.6	15.2	14.8	...	...
17	20.0	...	20.0	...	20.0	18.9	17.5	16.5	16.0	15.6	15.2	14.8	...	...
18	20.0	...	20.0	...	20.0	18.9	17.5	16.5	16.0	15.6	15.2	14.8	...	...
19	20.0	...	20.0	...	20.0	18.9	17.5	16.5	16.0	15.6	15.2	14.8	...	...
20	20.0	...	20.0	...	20.0	18.9	17.5	16.5	16.0	15.6	15.2	14.8	...	...
21	20.0	...	20.0	...	20.0	18.9	17.5	16.5	16.0	15.6	15.2	14.8	...	...
22	20.0	...	20.0	...	20.0	18.9	17.5	16.5	16.0	15.6	15.2	14.8	...	...
23	20.0	...	20.0	...	20.0	18.9	17.5	16.5	16.0	15.6	15.2	14.8	...	...
24	20.0	...	20.0	...	20.0	18.9	17.5	16.5	16.0	15.6	15.2	14.8	...	...
25	23.3	...	23.3	...	23.3	23.3	22.3	21.0	20.5	20.0	19.6	19.2	...	...
26	23.3	...	23.3	...	23.3	23.3	22.3	21.0	20.5	20.0	19.6	19.2	...	...
27	23.3	...	23.3	...	23.3	23.3	22.3	21.0	20.5	20.0	19.6	19.2	...	...
28	19.8	...	19.8	...	19.8	19.8	18.9	17.9	17.4	17.0	16.7	16.3	...	...
29	23.3	...	23.3	...	23.3	23.3	22.3	21.0	20.5	20.0	19.6	19.2	...	...
30	23.3	...	23.3	...	23.3	23.3	22.3	21.0	20.5	20.0	19.6	19.2	...	...
31	19.8	...	19.8	...	19.8	19.8	18.9	17.9	17.4	17.0	16.7	16.3	...	...
32	23.3	...	23.3	...	23.3	23.3	22.3	21.0	20.5	20.0	19.6	19.2	...	...
33	23.3	...	23.3	...	23.3	23.3	22.3	21.0	20.5	20.0	19.6	19.2	...	...
34	23.3	...	23.3	...	23.3	23.3	22.3	21.0	20.5	20.0	19.6	19.2	...	...
35	23.3	...	23.3	...	23.3	23.3	22.3	21.0	20.5	20.0	19.6	19.2	...	...
36	23.3	...	23.3	...	23.3	23.3	22.3	21.0	20.5	20.0	19.6	19.2	...	...
37	19.8	...	19.8	...	19.8	19.8	18.9	17.9	17.4	17.0	16.7	16.3	...	...
38	23.3	...	23.3	...	23.3	23.3	22.3	21.0	20.5	20.0	19.6	19.2	...	...
39	19.8	...	19.8	...	19.8	19.8	18.9	17.9	17.4	17.0	16.7	16.3	...	...
40	19.8	...	19.8	...	19.8	19.8	18.9	17.9	17.4	17.0	16.7	16.3	...	...
41	23.3	...	23.3	...	23.3	23.3	22.3	21.0	20.5	20.0	19.6	19.2	...	...
42	23.3	...	23.3	...	23.3	23.3	22.3	21.0	20.5	20.0	19.6	19.2	...	...
43	23.3	...	23.3	...	23.3	23.3	22.3	21.0	20.5	20.0	19.6	19.2	...	...
44	23.3	...	23.3	...	23.3	23.3	22.3	21.0	20.5	20.0	19.6	19.2	...	...
45	23.3	...	23.3	...	23.3	23.3	22.3	21.0	20.5	20.0	19.6	19.2	...	...

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Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/ Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	17.5Cr–17.5Ni–5.3Si	Plate	SA–240	...	S30601	...	...	8	1
2	18Cr–3Ni–12Mn	Plate	SA–240	XM–29	S24000	...	...	8	3
3	18Cr–3Ni–12Mn	Plate	SA–240	XM–29	S24000	...	...	8	3
4	18Cr–5Ni–3Mo	Smls. tube	SA–789	...	S31500	...	...	10H	1
5	18Cr–5Ni–3Mo	Wld. tube	SA–789	...	S31500	...	...	10H	1
6	18Cr–5Ni–3Mo	Smls. pipe	SA–790	...	S31500	...	...	10H	1
7	18Cr–5Ni–3Mo	Wld. pipe	SA–790	...	S31500	...	...	10H	1
8	18Cr–8Ni	Forgings	SA–182	F304L	S30403	...	>5	8	1
9	18Cr–8Ni	Forgings	SA–965	F304L	S30403	...	...	8	1
10	18Cr–8Ni	Forgings	SA–182	F304L	S30403	...	≤5	8	1
11	18Cr–8Ni	Smls. tube	SA–213	TP304L	S30403	...	...	8	1
12	18Cr–8Ni	Plate	SA–240	304L	S30403	...	...	8	1
13	18Cr–8Ni	Wld. tube	SA–249	TP304L	S30403	...	...	8	1
14	18Cr–8Ni	Wld. tube	SA–249	TP304L	S30403	...	...	8	1
15	18Cr–8Ni	Wld. pipe	SA–312	TP304L	S30403	...	...	8	1
16	18Cr–8Ni	Smls. pipe	SA–312	TP304L	S30403	...	...	8	1
17	18Cr–8Ni	Wld. pipe	SA–312	TP304L	S30403	...	...	8	1
18	18Cr–8Ni	Wld. pipe	SA–358	304L	S30403	1	...	8	1
19	18Cr–8Ni	Wld. pipe	SA–358	304L	S30403	3	...	8	1
20	18Cr–8Ni	Wld. pipe	SA–358	304L	S30403	4	...	8	1
21	18Cr–8Ni	Fittings	SA–403	304L	S30403	...	...	8	1
22	18Cr–8Ni	Fittings	SA–403	304L	S30403	WP–S	...	8	1
23	18Cr–8Ni	Wld. fittings	SA–403	304L	S30403	WP–W	...	8	1
24	18Cr–8Ni	Bar	SA–479	304L	S30403	...	...	8	1
25	18Cr–8Ni	Wld. tube	SA–688	TP304L	S30403	...	...	8	1
26	18Cr–8Ni	Wld. tube	SA–688	TP304L	S30403	...	...	8	1
27	18Cr–8Ni	Wld. pipe	SA–813	TP304L	S30403	...	...	8	1
28	18Cr–8Ni	Wld. pipe	SA–814	TP304L	S30403	...	...	8	1
29	18Cr–8Ni	Bar	SA/JIS G4303	SUS304L	...	...	...	8	1
30	18Cr–8Ni	Castings	SA–351	CF3	J92500	...	...	8	1
31	18Cr–8Ni	Cast pipe	SA–451	CPF3	J92500	...	...	8	1
32	18Cr–8Ni	Castings	SA–351	CF10	J92590	...	...	8	1
33	18Cr–8Ni	Castings	SA–351	CF8	J92600	...	...	8	1
34	18Cr–8Ni	Cast pipe	SA–451	CPF8	J92600	...	...	8	1
35	18Cr–8Ni	Forgings	SA–182	F304	S30400	...	>5	8	1
36	18Cr–8Ni	Smls. pipe	SA–376	TP304	S30400	...	...	8	1
37	18Cr–8Ni	Forgings	SA–965	F304	S30400	...	...	8	1
38	18Cr–8Ni	Forgings	SA–182	F304H	S30409	...	>5	8	1
39	18Cr–8Ni	Forgings	SA–965	F304H	S30409	...	...	8	1
40	18Cr–8Ni	Plate	SA–240	302	S30200	...	...	8	1
41	18Cr–8Ni	Bar	SA–479	302	S30200	...	...	8	1
42	18Cr–8Ni	Bar	SA/JIS G4303	SUS302	...	...	...	8	1
43	18Cr–8Ni	Forgings	SA–182	F304	S30400	...	≤5	8	1
44	18Cr–8Ni	Smls. tube	SA–213	TP304	S30400	...	...	8	1
45	18Cr–8Ni	Plate	SA–240	304	S30400	...	...	8	1

Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only)		External Pressure Chart No.	Notes
			III	VIII-2		
1	78	37	NP	500	HA–1	...
2	100	55	NP	800	HA–6	G7
3	100	60	NP	800	HA–6	G7
4	92	64	NP	600	HA–5	G13
5	92	64	NP	600	HA–5	G13, G18
6	92	64	NP	600	HA–5	G13
7	92	64	NP	600	HA–5	G13, G18
8	65	25	800	800	HA–3	G7
9	65	25	NP	800	HA–3	G7
10	70	25	800	800	HA–3	G7
11	70	25	800	800	HA–3	G7
12	70	25	800	800	HA–3	G7
13	70	25	800	NP	HA–3	G7
14	70	25	NP	800	HA–3	G7, G18
15	70	25	800	NP	HA–3	G7
16	70	25	800	800	HA–3	G7
17	70	25	NP	800	HA–3	G7, G18
18	70	25	800	NP	HA–3	G7
19	70	25	800	NP	HA–3	G7
20	70	25	800	NP	HA–3	G7
21	70	25	800	NP	HA–3	G7
22	70	25	NP	800	HA–3	G7
23	70	25	800	NP	HA–3	G7
24	70	25	800	NP	HA–3	G7
25	70	25	800	NP	HA–3	G7
26	70	25	NP	800	HA–3	G7, G18
27	70	25	800	NP	HA–3	G7
28	70	25	800	NP	HA–3	G7
29	70	25	800	NP	HA–3	G7
30	70	30	800	800	HA–3	G7, G13
31	70	30	800	NP	HA–3	G7, G13
32	70	30	NP	800	HA–3	G7, G10, G13
33	70	30	800	800	HA–1	G7, G9, G10, G13
34	70	30	800	NP	HA–1	G7, G13
35	70	30	800	800	HA–1	G7, G9, G10
36	70	30	800	800	HA–1	G7, G9, G10, S2
37	70	30	800	800	HA–1	G7, G9, G10
38	70	30	800	800	HA–1	G7
39	70	30	800	800	HA–1	G7
40	75	30	NP	800	HA–1	G7, G9
41	75	30	800	NP	HA–1	G7
42	75	30	800	NP	HA–1	G7
43	75	30	800	800	HA–1	G7, G9, G10
44	75	30	800	800	HA–1	G7, G9
45	75	30	800	800	HA–1	G7, G9, G10

Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line	Design Stress Intensity or Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
No.	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	24.7	...	24.7	...	24.4	22.2	20.4	...	...	...	...	...	...	...
2	33.3	...	32.6	...	30.4	29.1	27.2	25.9	25.4	25.0	24.5	24.0	...	...
3	33.3	...	32.6	...	30.4	29.1	28.4	27.8	27.3	26.8	26.2	25.4	...	...
4	30.7	...	29.6	...	28.5	28.3	28.3	28.3	...	...	...	...	...	...
5	26.1	...	25.2	...	24.2	24.0	24.0	24.0	...	...	...	...	...	...
6	30.7	...	29.6	...	28.5	28.3	28.3	28.3	...	...	...	...	...	...
7	26.1	...	25.2	...	24.2	24.0	24.0	24.0	...	...	...	...	...	...
8	16.7	...	16.7	...	16.7	15.8	14.7	14.0	13.7	13.5	13.3	13.0	...	...
9	16.7	...	16.7	...	16.7	15.8	14.7	14.0	13.7	13.5	13.3	13.0	...	...
10	16.7	...	16.7	...	16.7	15.8	14.7	14.0	13.7	13.5	13.3	13.0	...	...
11	16.7	...	16.7	...	16.7	15.8	14.7	14.0	13.7	13.5	13.3	13.0	...	...
12	16.7	...	16.7	...	16.7	15.8	14.7	14.0	13.7	13.5	13.3	13.0	...	...
13	16.7	...	16.7	...	16.7	15.8	14.7	14.0	13.7	13.5	13.3	13.0	...	...
14	14.2	...	14.2	...	14.2	13.4	12.5	11.9	11.7	11.4	11.3	11.1	...	...
15	16.7	...	16.7	...	16.7	15.8	14.7	14.0	13.7	13.5	13.3	13.0	...	...
16	16.7	...	16.7	...	16.7	15.8	14.7	14.0	13.7	13.5	13.3	13.0	...	...
17	14.2	...	14.2	...	14.2	13.4	12.5	11.9	11.7	11.4	11.3	11.1	...	...
18	16.7	...	16.7	...	16.7	15.8	14.7	14.0	13.7	13.5	13.3	13.0	...	...
19	16.7	...	16.7	...	16.7	15.8	14.7	14.0	13.7	13.5	13.3	13.0	...	...
20	16.7	...	16.7	...	16.7	15.8	14.7	14.0	13.7	13.5	13.3	13.0	...	...
21	16.7	...	16.7	...	16.7	15.8	14.7	14.0	13.7	13.5	13.3	13.0	...	...
22	16.7	...	16.7	...	16.7	15.8	14.7	14.0	13.7	13.5	13.3	13.0	...	...
23	16.7	...	16.7	...	16.7	15.8	14.7	14.0	13.7	13.5	13.3	13.0	...	...
24	16.7	...	16.7	...	16.7	15.8	14.7	14.0	13.7	13.5	13.3	13.0	...	...
25	16.7	...	16.7	...	16.7	15.8	14.7	14.0	13.7	13.5	13.3	13.0	...	...
26	14.2	...	14.2	...	14.2	13.4	12.5	11.9	11.7	11.4	11.3	11.1	...	...
27	16.7	...	16.7	...	16.7	15.8	14.7	14.0	13.7	13.5	13.3	13.0	...	...
28	16.7	...	16.7	...	16.7	15.8	14.7	14.0	13.7	13.5	13.3	13.0	...	...
29	16.7	...	16.7	...	16.7	15.8	14.7	14.0	13.7	13.5	13.3	13.0	...	...
30	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
31	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
32	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
33	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
34	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
35	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
36	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
37	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
38	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
39	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
40	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
41	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
42	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
43	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
44	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
45	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...

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Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/ Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	18Cr–8Ni	Wld. tube	SA–249	TP304	S30400	...	...	8	1
2	18Cr–8Ni	Wld. tube	SA–249	TP304	S30400	...	...	8	1
3	18Cr–8Ni	Wld. pipe	SA–312	TP304	S30400	...	...	8	1
4	18Cr–8Ni	Smls. pipe	SA–312	TP304	S30400	...	...	8	1
5	18Cr–8Ni	Wld. pipe	SA–312	TP304	S30400	...	...	8	1
6	18Cr–8Ni	Wld. pipe	SA–358	304	S30400	1	...	8	1
7	18Cr–8Ni	Wld. pipe	SA–358	304	S30400	3	...	8	1
8	18Cr–8Ni	Wld. pipe	SA–358	304	S30400	4	...	8	1
9	18Cr–8Ni	Smls. pipe	SA–376	TP304	S30400	...	...	8	1
10	18Cr–8Ni	Fittings	SA–403	304	S30400	...	...	8	1
11	18Cr–8Ni	Fittings	SA–403	304	S30400	CR	...	8	1
12	18Cr–8Ni	Fittings	SA–403	304	S30400	WP–S	...	8	1
13	18Cr–8Ni	Wld. fittings	SA–403	304	S30400	WP–W	...	8	1
14	18Cr–8Ni	Wld. fittings	SA–403	304	S30400	WP–W	...	8	1
15	18Cr–8Ni	Wld. fittings	SA–403	304	S30400	WP–WX	...	8	1
16	18Cr–8Ni	Bar	SA–479	304	S30400	...	...	8	1
17	18Cr–8Ni	Wld. tube	SA–688	TP304	S30400	...	...	8	1
18	18Cr–8Ni	Wld. tube	SA–688	TP304	S30400	...	...	8	1
19	18Cr–8Ni	Wld. tube	SA–813	TP304	S30400	...	...	8	1
20	18Cr–8Ni	Wld. tube	SA–814	TP304	S30400	...	...	8	1
21	18Cr–8Ni	Bar	SA/JIS G4303	SUS304	...	...	...	8	1
22	18Cr–8Ni	Forgings	SA–182	F304H	S30409	...	≤5	8	1
23	18Cr–8Ni	Smls. tube	SA–213	TP304H	S30409	...	...	8	1
24	18Cr–8Ni	Plate	SA–240	304H	S30409	...	...	8	1
25	18Cr–8Ni	Wld. tube	SA–249	TP304H	S30409	...	...	8	1
26	18Cr–8Ni	Wld. tube	SA–249	TP304H	S30409	...	...	8	1
27	18Cr–8Ni	Wld. pipe	SA–312	TP304H	S30409	...	...	8	1
28	18Cr–8Ni	Smls. pipe	SA–312	TP304H	S30409	...	...	8	1
29	18Cr–8Ni	Wld. pipe	SA–312	TP304H	S30409	...	...	8	1
30	18Cr–8Ni	Wld. pipe	SA–358	304H	S30409	1	...	8	1
31	18Cr–8Ni	Wld. pipe	SA–358	304H	S30409	3	...	8	1
32	18Cr–8Ni	Wld. pipe	SA–358	304H	S30409	4	...	8	1
33	18Cr–8Ni	Smls. pipe	SA–376	TP304H	S30409	...	...	8	1
34	18Cr–8Ni	Fittings	SA–403	304H	S30409	...	...	8	1
35	18Cr–8Ni	Fittings	SA–403	304H	S30409	CR	...	8	1
36	18Cr–8Ni	Fittings	SA–403	304H	S30409	WP–S	...	8	1
37	18Cr–8Ni	Wld. fittings	SA–403	304H	S30409	WP–W	...	8	1
38	18Cr–8Ni	Wld. fittings	SA–403	304H	S30409	WP–W	...	8	1
39	18Cr–8Ni	Wld. fittings	SA–403	304H	S30409	WP–WX	...	8	1
40	18Cr–8Ni	Bar	SA–479	304H	S30409	...	...	8	1
41	18Cr–8Ni	Wld. tube	SA–813	TP304H	S30409	...	...	8	1
42	18Cr–8Ni	Wld. tube	SA–814	TP304H	S30409	...	...	8	1
43	18Cr–8Ni	Castings	SA–351	CF3A	J92500	...	...	8	1
44	18Cr–8Ni	Cast pipe	SA–451	CPF3A	J92500	...	...	8	1
45	18Cr–8Ni	Castings	SA–351	CF8A	J92600	...	...	8	1

Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only)		External Pressure Chart No.	Notes
			III	VIII-2		
1	75	30	800	NP	HA–1	G7
2	75	30	NP	800	HA–1	G7, G9, G18
3	75	30	800	NP	HA–1	G7
4	75	30	800	800	HA–1	G7, G9, G10
5	75	30	NP	800	HA–1	G7, G9, G18
6	75	30	800	NP	HA–1	G7
7	75	30	800	NP	HA–1	G7
8	75	30	800	NP	HA–1	G7
9	75	30	800	800	HA–1	G7, G9, G10, S5
10	75	30	800	NP	HA–1	G7
11	75	30	NP	800	HA–1	G7, G18
12	75	30	NP	800	HA–1	G7
13	75	30	800	NP	HA–1	G7
14	75	30	NP	800	HA–1	G7, G18
15	75	30	NP	800	HA–1	G7, G18
16	75	30	800	NP	HA–1	G7
17	75	30	800	NP	HA–1	G7
18	75	30	NP	800	HA–1	G7, G9, G18
19	75	30	800	NP	HA–1	G7
20	75	30	800	NP	HA–1	G7
21	75	30	800	NP	HA–1	G7
22	75	30	800	800	HA–1	G7
23	75	30	800	800	HA–1	G7
24	75	30	800	NP	HA–1	G7
25	75	30	800	NP	HA–1	G7
26	75	30	NP	800	HA–1	G7, G18
27	75	30	800	NP	HA–1	G7
28	75	30	800	800	HA–1	G7
29	75	30	NP	800	HA–1	G7, G18
30	75	30	800	NP	HA–1	G7
31	75	30	800	NP	HA–1	G7
32	75	30	800	NP	HA–1	G7
33	75	30	800	800	HA–1	G7
34	75	30	800	NP	HA–1	G7
35	75	30	NP	800	HA–1	G7, G18
36	75	30	NP	800	HA–1	G7
37	75	30	800	NP	HA–1	G7
38	75	30	NP	800	HA–1	G7, G18
39	75	30	NP	800	HA–1	G7, G18
40	75	30	800	NP	HA–1	G7
41	75	30	800	NP	HA–1	G7
42	75	30	800	NP	HA–1	G7
43	77	35	700	NP	HA–3	G7, G13
44	77	35	700	NP	HA–3	G7, G13
45	77	35	700	NP	HA–1	G7, G13

Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line	Design Stress Intensity or Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
No.	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
2	17.0	...	17.0	...	17.0	15.8	14.8	14.1	13.8	13.5	13.2	12.9	...	...
3	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
4	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
5	17.0	...	17.0	...	17.0	15.8	14.8	14.1	13.8	13.5	13.2	12.9	...	...
6	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
7	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
8	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
9	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
10	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
11	17.0	...	17.0	...	17.0	15.8	14.8	14.1	13.8	13.5	13.2	12.9	...	...
12	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
13	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
14	17.0	...	17.0	...	17.0	15.8	14.8	14.1	13.8	13.5	13.2	12.9	...	...
15	17.0	...	17.0	...	17.0	15.8	14.8	14.1	13.8	13.5	13.2	12.9	...	...
16	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
17	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
18	17.0	...	17.0	...	17.0	15.8	14.8	14.1	13.8	13.5	13.2	12.9	...	...
19	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
20	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
21	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
22	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
23	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
24	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
25	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
26	17.0	...	17.0	...	17.0	15.8	14.8	14.1	13.8	13.5	13.2	12.9	...	...
27	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
28	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
29	17.0	...	17.0	...	17.0	15.8	14.8	14.1	13.8	13.5	13.2	12.9	...	...
30	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
31	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
32	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
33	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
34	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
35	17.0	...	17.0	...	17.0	15.8	14.8	14.1	13.8	13.5	13.2	12.9	...	...
36	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
37	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
38	17.0	...	17.0	...	17.0	15.8	14.8	14.1	13.8	13.5	13.2	12.9	...	...
39	17.0	...	17.0	...	17.0	15.8	14.8	14.1	13.8	13.5	13.2	12.9	...	...
40	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
41	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
42	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
43	23.3	...	23.3	...	22.7	21.7	20.4	19.3	18.9	18.5	...	...	...	...
44	23.3	...	23.3	...	22.7	21.7	20.4	19.3	18.9	18.5	...	...	...	...
45	23.3	...	23.3	...	22.7	21.7	20.4	19.3	18.9	18.5	...	...	...	...

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Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/ Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	18Cr–8Ni	Cast pipe	SA–451	CPF8A	J92600	...	...	8	1
2	18Cr–8Ni–N	Forgings	SA–182	F304LN	S30453	...	>5	8	1
3	18Cr–8Ni–N	Forgings	SA–965	F304LN	S30453	...	...	8	1
4	18Cr–8Ni–N	Forgings	SA–182	F304LN	S30453	...	≤5	8	1
5	18Cr–8Ni–N	Smls. tube	SA–213	TP304LN	S30453	...	...	8	1
6	18Cr–8Ni–N	Plate	SA–240	304LN	S30453	...	...	8	1
7	18Cr–8Ni–N	Wld. tube	SA–249	TP304LN	S30453	...	...	8	1
8	18Cr–8Ni–N	Smls. & wld. pipe	SA–312	TP304LN	S30453	...	...	8	1
9	18Cr–8Ni–N	Wld. pipe	SA–358	304LN	S30453	1	...	8	1
10	18Cr–8Ni–N	Wld. pipe	SA–358	304LN	S30453	3	...	8	1
11	18Cr–8Ni–N	Wld. pipe	SA–358	304LN	S30453	4	...	8	1
12	18Cr–8Ni–N	Smls. pipe	SA–376	TP304LN	S30453	...	...	8	1
13	18Cr–8Ni–N	Fittings	SA–403	304LN	S30453	...	...	8	1
14	18Cr–8Ni–N	Wld. fittings	SA–403	304LN	S30453	WP–W	...	8	1
15	18Cr–8Ni–N	Bar	SA–479	304LN	S30453	...	...	8	1
16	18Cr–8Ni–N	Wld. tube	SA–688	TP304LN	S30453	...	...	8	1
17	18Cr–8Ni–N	Wld. tube	SA–813	TP304LN	S30453	...	...	8	1
18	18Cr–8Ni–N	Wld. tube	SA–814	TP304LN	S30453	...	...	8	1
19	18Cr–8Ni–N	Forgings	SA–182	F304N	S30451	...	...	8	1
20	18Cr–8Ni–N	Smls. tube	SA–213	TP304N	S30451	...	...	8	1
21	18Cr–8Ni–N	Plate	SA–240	304N	S30451	...	...	8	1
22	18Cr–8Ni–N	Wld. tube	SA–249	TP304N	S30451	...	...	8	1
23	18Cr–8Ni–N	Wld. pipe	SA–312	TP304N	S30451	...	...	8	1
24	18Cr–8Ni–N	Smls. pipe	SA–312	TP304N	S30451	...	...	8	1
25	18Cr–8Ni–N	Wld. pipe	SA–312	TP304N	S30451	...	...	8	1
26	18Cr–8Ni–N	Wld. pipe	SA–358	304N	S30451	1	...	8	1
27	18Cr–8Ni–N	Wld. pipe	SA–358	304N	S30451	3	...	8	1
28	18Cr–8Ni–N	Wld. pipe	SA–358	304N	S30451	4	...	8	1
29	18Cr–8Ni–N	Smls. pipe	SA–376	TP304N	S30451	...	...	8	1
30	18Cr–8Ni–N	Fittings	SA–403	304N	S30451	...	...	8	1
31	18Cr–8Ni–N	Fittings	SA–403	304N	S30451	CR	...	8	1
32	18Cr–8Ni–N	Wld. fittings	SA–403	304N	S30451	WP–W	...	8	1
33	18Cr–8Ni–N	Wld. fittings	SA–403	304N	S30451	WP–W	...	8	1
34	18Cr–8Ni–N	Wld. fittings	SA–403	304N	S30451	WP–WX	...	8	1
35	18Cr–8Ni–N	Bar	SA–479	304N	S30451	...	...	8	1
36	18Cr–8Ni–N	Wld. tube	SA–688	TP304N	S30451	...	...	8	1
37	18Cr–8Ni–N	Wld. pipe	SA–813	TP304N	S30451	...	...	8	1
38	18Cr–8Ni–N	Wld. pipe	SA–814	TP304N	S30451	...	...	8	1
39	18Cr–8Ni–N	Forgings	SA–965	F304N	S30451	...	...	8	1
40	18Cr–8Ni–4Si–N	Bar	SA–479	...	S21800	...	...	8	3
41	18Cr–10Ni–Cb	Castings	SA–351	CF8C	J92710	...	...	8	1
42	18Cr–10Ni–Cb	Cast pipe	SA–451	CPF8C	J92710	...	...	8	1
43	18Cr–10Ni–Cb	Forgings	SA–182	F347	S34700	...	>5	8	1
44	18Cr–10Ni–Cb	Forgings	SA–965	F347	S34700	...	...	8	1
45	18Cr–10Ni–Cb	Forgings	SA–182	F347H	S34709	...	>5	8	1

Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only)		External Pressure Chart No.	Notes
			III	VIII-2		
1	77	35	700	NP	HA–1	G7, G13
2	70	30	800	NP	HA–1	G7
3	70	30	800	NP	HA–1	G7
4	75	30	800	NP	HA–1	G7
5	75	30	800	NP	HA–1	G7
6	75	30	800	NP	HA–1	G7
7	75	30	800	NP	HA–1	G7
8	75	30	800	NP	HA–1	G7
9	75	30	800	NP	HA–1	G7
10	75	30	800	NP	HA–1	G7
11	75	30	800	NP	HA–1	G7
12	75	30	800	NP	HA–1	G7
13	75	30	800	NP	HA–1	G7
14	75	30	800	NP	HA–1	G7
15	75	30	800	NP	HA–1	G7
16	75	30	800	NP	HA–1	G7
17	75	30	800	NP	HA–1	G7
18	75	30	800	NP	HA–1	G7
19	80	35	800	NP	HA–1	G7
20	80	35	800	800	HA–1	G7
21	80	35	800	800	HA–1	G7
22	80	35	NP	800	HA–1	G7, G18
23	80	35	800	NP	HA–1	G7
24	80	35	800	800	HA–1	G7
25	80	35	NP	800	HA–1	G7, G18
26	80	35	800	NP	HA–1	G7
27	80	35	800	NP	HA–1	G7
28	80	35	800	NP	HA–1	G7
29	80	35	800	800	HA–1	G7
30	80	35	800	NP	HA–1	G7
31	80	35	NP	800	HA–1	G7, G18
32	80	35	800	NP	HA–1	G7
33	80	35	NP	800	HA–1	G7, G18
34	80	35	NP	800	HA–1	G7, G18
35	80	35	800	NP	HA–1	G7
36	80	35	800	NP	HA–1	G7
37	80	35	800	NP	HA–1	G7
38	80	35	800	NP	HA–1	G7
39	80	35	800	800	HA–1	G7
40	95	50	800	NP	HA–6	...
41	70	30	800	800	HA–2	G7, G9, G13
42	70	30	800	NP	HA–2	G7, G13
43	70	30	800	800	HA–2	G7, G9
44	70	30	800	800	HA–2	G7, G9
45	70	30	800	800	HA–2	G7

Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Design Stress Intensity or Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	23.3	...	23.3	...	22.7	21.7	20.4	19.3	18.9	18.5	...	...	...	...
2	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
3	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
4	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
5	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
6	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
7	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
8	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
9	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
10	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
11	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
12	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
13	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
14	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
15	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
16	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
17	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
18	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
19	23.3	...	23.3	...	22.5	20.3	18.9	17.9	17.5	17.2	16.9	16.6	...	...
20	23.3	...	23.3	...	22.5	20.3	18.9	17.9	17.5	17.2	16.9	16.6	...	...
21	23.3	...	23.3	...	22.5	20.3	18.9	17.9	17.5	17.2	16.9	16.6	...	...
22	19.8	...	19.8	...	19.2	17.3	16.0	15.2	14.9	14.6	14.4	14.1	...	...
23	23.3	...	23.3	...	22.5	20.3	18.9	17.9	17.5	17.2	16.9	16.6	...	...
24	23.3	...	23.3	...	22.5	20.3	18.9	17.9	17.5	17.2	16.9	16.6	...	...
25	19.8	...	19.8	...	19.2	17.3	16.0	15.2	14.9	14.6	14.4	14.1	...	...
26	23.3	...	23.3	...	22.5	20.3	18.9	17.9	17.5	17.2	16.9	16.6	...	...
27	23.3	...	23.3	...	22.5	20.3	18.9	17.9	17.5	17.2	16.9	16.6	...	...
28	23.3	...	23.3	...	22.5	20.3	18.9	17.9	17.5	17.2	16.9	16.6	...	...
29	23.3	...	23.3	...	22.5	20.3	18.9	17.9	17.5	17.2	16.9	16.6	...	...
30	23.3	...	23.3	...	22.5	20.3	18.9	17.9	17.5	17.2	16.9	16.6	...	...
31	19.8	...	19.8	...	19.2	17.3	16.0	15.2	14.9	14.6	14.4	14.1	...	...
32	23.3	...	23.3	...	22.5	20.3	18.9	17.9	17.5	17.2	16.9	16.6	...	...
33	19.8	...	19.8	...	19.2	17.3	16.0	15.2	14.9	14.6	14.4	14.1	...	...
34	19.8	...	19.8	...	19.2	17.3	16.0	15.2	14.9	14.6	14.4	14.1	...	...
35	23.3	...	23.3	...	22.5	20.3	18.9	17.9	17.5	17.2	16.9	16.6	...	...
36	23.3	...	23.3	...	22.5	20.3	18.9	17.9	17.5	17.2	16.9	16.6	...	...
37	23.3	...	23.3	...	22.5	20.3	18.9	17.9	17.5	17.2	16.9	16.6	...	...
38	23.3	...	23.3	...	22.5	20.3	18.9	17.9	17.5	17.2	16.9	16.6	...	...
39	23.3	...	23.3	...	22.5	20.3	18.9	17.9	17.5	17.2	16.9	16.6	...	...
40	31.7	...	25.9	...	22.1	19.8	18.4	17.6	17.3	17.1	16.9	16.8	...	...
41	20.0	...	20.0	...	20.0	19.3	18.7	18.4	18.3	18.3	18.3	18.3	...	...
42	20.0	...	20.0	...	20.0	19.3	18.7	18.4	18.3	18.3	18.3	18.3	...	...
43	20.0	...	20.0	...	20.0	19.3	18.7	18.4	18.3	18.3	18.3	18.3	...	...
44	20.0	...	20.0	...	20.0	19.3	18.7	18.4	18.3	18.3	18.3	18.3	...	...
45	20.0	...	20.0	...	20.0	19.3	18.7	18.4	18.3	18.3	18.3	18.3	...	...

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Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/ Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	18Cr–10Ni–Cb	Forgings	SA–965	F347H	S34709	...	...	8	1
2	18Cr–10Ni–Cb	Forgings	SA–182	F348	S34800	...	>5	8	1
3	18Cr–10Ni–Cb	Forgings	SA–182	F348H	S34809	...	>5	8	1
4	18Cr–10Ni–Cb	Forgings	SA–182	F347	S34700	...	≤5	8	1
5	18Cr–10Ni–Cb	Smls. tube	SA–213	TP347	S34700	...	...	8	1
6	18Cr–10Ni–Cb	Plate	SA–240	347	S34700	...	...	8	1
7	18Cr–10Ni–Cb	Wld. tube	SA–249	TP347	S34700	...	...	8	1
8	18Cr–10Ni–Cb	Wld. tube	SA–249	TP347	S34700	...	...	8	1
9	18Cr–10Ni–Cb	Wld. pipe	SA–312	TP347	S34700	...	...	8	1
10	18Cr–10Ni–Cb	Smls. pipe	SA–312	TP347	S34700	...	...	8	1
11	18Cr–10Ni–Cb	Wld. pipe	SA–312	TP347	S34700	...	...	8	1
12	18Cr–10Ni–Cb	Wld. pipe	SA–358	347	S34700	1	...	8	1
13	18Cr–10Ni–Cb	Wld. pipe	SA–358	347	S34700	3	...	8	1
14	18Cr–10Ni–Cb	Wld. pipe	SA–358	347	S34700	4	...	8	1
15	18Cr–10Ni–Cb	Smls. pipe	SA–376	TP347	S34700	...	...	8	1
16	18Cr–10Ni–Cb	Fittings	SA–403	347	S34700	...	...	8	1
17	18Cr–10Ni–Cb	Fittings	SA–403	347	S34700	CR	...	8	1
18	18Cr–10Ni–Cb	Fittings	SA–403	347	S34700	WP–S	...	8	1
19	18Cr–10Ni–Cb	Wld. fittings	SA–403	347	S34700	WP–W	...	8	1
20	18Cr–10Ni–Cb	Wld. fittings	SA–403	347	S34700	WP–W	...	8	1
21	18Cr–10Ni–Cb	Wld. fittings	SA–403	347	S34700	WP–WX	...	8	1
22	18Cr–10Ni–Cb	Bar	SA–479	347	S34700	...	...	8	1
23	18Cr–10Ni–Cb	Wld. pipe	SA–813	TP347	S34700	...	...	8	1
24	18Cr–10Ni–Cb	Wld. pipe	SA–814	TP347	S34700	...	...	8	1
25	18Cr–10Ni–Cb	Bar	SA/JIS G4303	SUS347	...	...	...	8	1
26	18Cr–10Ni–Cb	Forgings	SA–182	F347H	S34709	...	≤5	8	1
27	18Cr–10Ni–Cb	Smls. tube	SA–213	TP347H	S34709	...	...	8	1
28	18Cr–10Ni–Cb	Plate	SA–240	347H	S34709	...	...	8	1
29	18Cr–10Ni–Cb	Wld. tube	SA–249	TP347H	S34709	...	...	8	1
30	18Cr–10Ni–Cb	Wld. tube	SA–249	TP347H	S34709	...	...	8	1
31	18Cr–10Ni–Cb	Wld. pipe	SA–312	TP347H	S34709	...	...	8	1
32	18Cr–10Ni–Cb	Smls. pipe	SA–312	TP347H	S34709	...	...	8	1
33	18Cr–10Ni–Cb	Wld. pipe	SA–312	TP347H	S34709	...	...	8	1
34	18Cr–10Ni–Cb	Smls. pipe	SA–376	TP347H	S34709	...	...	8	1
35	18Cr–10Ni–Cb	Fittings	SA–403	347H	S34709	...	...	8	1
36	18Cr–10Ni–Cb	Fittings	SA–403	347H	S34709	CR	...	8	1
37	18Cr–10Ni–Cb	Fittings	SA–403	347H	S34709	WP–S	...	8	1
38	18Cr–10Ni–Cb	Wld. fittings	SA–403	347H	S34709	WP–W	...	8	1
39	18Cr–10Ni–Cb	Wld. fittings	SA–403	347H	S34709	WP–W	...	8	1
40	18Cr–10Ni–Cb	Wld. fittings	SA–403	347H	S34709	WP–WX	...	8	1
41	18Cr–10Ni–Cb	Bar	SA–479	347H	S34709	...	...	8	1
42	18Cr–10Ni–Cb	Wld. pipe	SA–813	TP347H	S34709	...	...	8	1
43	18Cr–10Ni–Cb	Wld. pipe	SA–814	TP347H	S34709	...	...	8	1
44	18Cr–10Ni–Cb	Forgings	SA–182	F348	S34800	...	≤5	8	1
45	18Cr–10Ni–Cb	Smls. tube	SA–213	TP348	S34800	...	...	8	1

Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) III	VIII-2	External Pressure Chart No.	Notes
1	70	30	800	800	HA–2	G7, G9
2	70	30	NP	800	HA–2	G7, G9
3	70	30	NP	800	HA–2	G7
4	75	30	800	800	HA–2	G7, G9
5	75	30	800	800	HA–2	G7, G9
6	75	30	800	800	HA–2	G7, G9
7	75	30	800	NP	HA–2	G7
8	75	30	NP	800	HA–2	G7, G9, G18
9	75	30	800	NP	HA–2	G7
10	75	30	800	800	HA–2	G7, G9
11	75	30	NP	800	HA–2	G7, G9, G18
12	75	30	800	NP	HA–2	G7
13	75	30	800	NP	HA–2	G7
14	75	30	800	NP	HA–2	G7
15	75	30	800	800	HA–2	G7, G9
16	75	30	800	NP	HA–2	G7
17	75	30	NP	800	HA–2	G7, G18
18	75	30	NP	800	HA–2	G7
19	75	30	800	NP	HA–2	G7
20	75	30	NP	800	HA–2	G7, G18
21	75	30	NP	800	HA–2	G7, G18
22	75	30	800	NP	HA–2	G7
23	75	30	800	NP	HA–2	G7
24	75	30	800	NP	HA–2	G7
25	75	30	800	NP	HA–2	G7
26	75	30	800	800	HA–2	G7
27	75	30	800	800	HA–2	G7
28	75	30	800	800	HA–2	G7
29	75	30	800	NP	HA–2	G7
30	75	30	NP	800	HA–2	G7, G18
31	75	30	800	NP	HA–2	G7
32	75	30	800	800	HA–2	G7
33	75	30	NP	800	HA–2	G7, G18
34	75	30	800	800	HA–2	G7
35	75	30	800	NP	HA–2	G7
36	75	30	NP	800	HA–2	G7, G18
37	75	30	NP	800	HA–2	G7
38	75	30	800	NP	HA–2	G7
39	75	30	NP	800	HA–2	G7, G18
40	75	30	NP	800	HA–2	G7, G18
41	75	30	800	NP	HA–2	G7
42	75	30	800	NP	HA–2	G7
43	75	30	800	NP	HA–2	G7
44	75	30	800	800	HA–2	G7, G9
45	75	30	800	800	HA–2	G7, G9

Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Design Stress Intensity or Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	20.0	...	20.0	...	20.0	19.3	18.7	18.4	18.3	18.3	18.3	18.3	...	...
2	20.0	...	20.0	...	20.0	19.3	18.7	18.4	18.3	18.3	18.3	18.3	...	...
3	20.0	...	20.0	...	20.0	19.3	18.7	18.4	18.3	18.3	18.3	18.3	...	...
4	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
5	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
6	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
7	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
8	17.0	...	17.0	...	17.0	17.0	17.0	16.4	16.1	15.9	15.7	15.6	...	...
9	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
10	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
11	17.0	...	17.0	...	17.0	17.0	17.0	16.4	16.1	15.9	15.7	15.6	...	...
12	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
13	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
14	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
15	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
16	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
17	17.0	...	17.0	...	17.0	17.0	17.0	16.4	16.1	15.9	15.7	15.6	...	...
18	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
19	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
20	17.0	...	17.0	...	17.0	17.0	17.0	16.4	16.1	15.9	15.7	15.6	...	...
21	17.0	...	17.0	...	17.0	17.0	17.0	16.4	16.1	15.9	15.7	15.6	...	...
22	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
23	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
24	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
25	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
26	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
27	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
28	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
29	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
30	17.0	...	17.0	...	17.0	17.0	17.0	16.4	16.1	15.9	15.7	15.6	...	...
31	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
32	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
33	17.0	...	17.0	...	17.0	17.0	17.0	16.4	16.1	15.9	15.7	15.6	...	...
34	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
35	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
36	17.0	...	17.0	...	17.0	17.0	17.0	16.4	16.1	15.9	15.7	15.6	...	...
37	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
38	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
39	17.0	...	17.0	...	17.0	17.0	17.0	16.4	16.1	15.9	15.7	15.6	...	...
40	17.0	...	17.0	...	17.0	17.0	17.0	16.4	16.1	15.9	15.7	15.6	...	...
41	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
42	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
43	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
44	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
45	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...

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Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/ Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	18Cr–10Ni–Cb	Plate	SA–240	348	S34800	...	...	8	1
2	18Cr–10Ni–Cb	Wld. tube	SA–249	TP348	S34800	...	...	8	1
3	18Cr–10Ni–Cb	Wld. tube	SA–249	TP348	S34800	...	...	8	1
4	18Cr–10Ni–Cb	Wld. pipe	SA–312	TP348	S34800	...	...	8	1
5	18Cr–10Ni–Cb	Smls. pipe	SA–312	TP348	S34800	...	...	8	1
6	18Cr–10Ni–Cb	Wld. pipe	SA–312	TP348	S34800	...	...	8	1
7	18Cr–10Ni–Cb	Wld. pipe	SA–358	348	S34800	1	...	8	1
8	18Cr–10Ni–Cb	Wld. pipe	SA–358	348	S34800	3	...	8	1
9	18Cr–10Ni–Cb	Wld. pipe	SA–358	348	S34800	4	...	8	1
10	18Cr–10Ni–Cb	Smls. pipe	SA–376	TP348	S34800	...	...	8	1
11	18Cr–10Ni–Cb	Fittings	SA–403	348	S34800	...	...	8	1
12	18Cr–10Ni–Cb	Fittings	SA–403	348	S34800	CR	...	8	1
13	18Cr–10Ni–Cb	Fittings	SA–403	348	S34800	WP–S	...	8	1
14	18Cr–10Ni–Cb	Wld. fittings	SA–403	348	S34800	WP–W	...	8	1
15	18Cr–10Ni–Cb	Wld. fittings	SA–403	348	S34800	WP–W	...	8	1
16	18Cr–10Ni–Cb	Wld. fittings	SA–403	348	S34800	WP–WX	...	8	1
17	18Cr–10Ni–Cb	Bar	SA–479	348	S34800	...	...	8	1
18	18Cr–10Ni–Cb	Wld. pipe	SA–813	TP348	S34800	...	...	8	1
19	18Cr–10Ni–Cb	Wld. pipe	SA–814	TP348	S34800	...	...	8	1
20	18Cr–10Ni–Cb	Forgings	SA–182	F348H	S34809	...	≤5	8	1
21	18Cr–10Ni–Cb	Smls. tube	SA–213	TP348H	S34809	...	...	8	1
22	18Cr–10Ni–Cb	Plate	SA–240	348H	S34809	...	...	8	1
23	18Cr–10Ni–Cb	Wld. tube	SA–249	TP348H	S34809	...	...	8	1
24	18Cr–10Ni–Cb	Wld. tube	SA–249	TP348H	S34809	...	...	8	1
25	18Cr–10Ni–Cb	Wld. pipe	SA–312	TP348H	S34809	...	...	8	1
26	18Cr–10Ni–Cb	Smls. pipe	SA–312	TP348H	S34809	...	...	8	1
27	18Cr–10Ni–Cb	Wld. pipe	SA–312	TP348H	S34809	...	...	8	1
28	18Cr–10Ni–Cb	Fittings	SA–403	348H	S34809	...	...	8	1
29	18Cr–10Ni–Cb	Fittings	SA–403	348H	S34809	CR	...	8	1
30	18Cr–10Ni–Cb	Fittings	SA–403	348H	S34809	WP–S	...	8	1
31	18Cr–10Ni–Cb	Wld. fittings	SA–403	348H	S34809	WP–W	...	8	1
32	18Cr–10Ni–Cb	Wld. fittings	SA–403	348H	S34809	WP–W	...	8	1
33	18Cr–10Ni–Cb	Wld. fittings	SA–403	348H	S34809	WP–WX	...	8	1
34	18Cr–10Ni–Cb	Bar	SA–479	348H	S34809	...	...	8	1
35	18Cr–10Ni–Cb	Wld. pipe	SA–813	TP348H	S34809	...	...	8	1
36	18Cr–10Ni–Cb	Wld. pipe	SA–814	TP348H	S34809	...	...	8	1
37	18Cr–10Ni–Ti	Smls. pipe	SA–312	TP321	S32100	...	>$^3/_8$	8	1
38	18Cr–10Ni–Ti	Smls. pipe	SA–376	TP321	S32100	...	>$^3/_8$	8	1
39	18Cr–10Ni–Ti	Smls. pipe	SA–312	TP321H	S32109	...	>$^3/_{16}$	8	1
40	18Cr–10Ni–Ti	Smls. pipe	SA–376	TP321H	S32109	...	>$^3/_8$	8	1
41	18Cr–10Ni–Ti	Forgings	SA–182	F321	S32100	...	>5	8	1
42	18Cr–10Ni–Ti	Forgings	SA–965	F321	S32100	...	...	8	1
43	18Cr–10Ni–Ti	Forgings	SA–182	F321H	S32109	...	>5	8	1
44	18Cr–10Ni–Ti	Forgings	SA–965	F321H	S32109	...	...	8	1
45	18Cr–10Ni–Ti	Forgings	SA–182	F321	S32100	...	≤5	8	1

Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only)		External Pressure Chart No.	Notes
			III	VIII-2		
1	75	30	800	800	HA–2	G7, G9
2	75	30	800	NP	HA–2	G7
3	75	30	NP	800	HA–2	G7, G9, G18
4	75	30	800	NP	HA–2	G7
5	75	30	800	800	HA–2	G7, G9
6	75	30	NP	800	HA–2	G7, G9, G18
7	75	30	800	NP	HA–2	G7
8	75	30	800	NP	HA–2	G7
9	75	30	800	NP	HA–2	G7
10	75	30	800	800	HA–2	G7, G9
11	75	30	800	NP	HA–2	G7
12	75	30	NP	800	HA–2	G7, G18
13	75	30	NP	800	HA–2	G7
14	75	30	800	NP	HA–2	G7
15	75	30	NP	800	HA–2	G7, G18
16	75	30	NP	800	HA–2	G7, G18
17	75	30	800	NP	HA–2	G7
18	75	30	800	NP	HA–2	G7
19	75	30	800	NP	HA–2	G7
20	75	30	800	800	HA–2	G7
21	75	30	800	800	HA–2	G7
22	75	30	800	NP	HA–2	G7
23	75	30	800	NP	HA–2	G7
24	75	30	NP	800	HA–2	G7, G18
25	75	30	800	NP	HA–2	G7
26	75	30	800	800	HA–2	G7
27	75	30	NP	800	HA–2	G7, G18
28	75	30	800	NP	HA–2	G7
29	75	30	NP	800	HA–2	G7, G18
30	75	30	NP	800	HA–2	G7
31	75	30	800	NP	HA–2	G7
32	75	30	NP	800	HA–2	G7, G18
33	75	30	NP	800	HA–2	G7, G18
34	75	30	800	NP	HA–2	G7
35	75	30	800	NP	HA–2	G7
36	75	30	800	NP	HA–2	G7
37	70	25	NP	800	HA–2	G7, G9
38	70	25	800	800	HA–2	G7, G9
39	70	25	NP	800	HA–2	G7
40	70	25	800	800	HA–2	G7
41	70	30	800	800	HA–2	G7, G9
42	70	30	800	800	HA–2	G7, G9
43	70	30	800	800	HA–2	G7
44	70	30	800	800	HA–2	G7, G9
45	75	30	800	800	HA–2	G7, G9

Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line	Design Stress Intensity or Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
No.	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
2	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
3	17.0	...	17.0	...	17.0	17.0	17.0	16.4	16.1	15.9	15.7	15.6	...	...
4	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
5	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
6	17.0	...	17.0	...	17.0	17.0	17.0	16.4	16.1	15.9	15.7	15.6	...	...
7	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
8	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
9	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
10	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
11	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
12	17.0	...	17.0	...	17.0	17.0	17.0	16.4	16.1	15.9	15.7	15.6	...	...
13	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
14	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
15	17.0	...	17.0	...	17.0	17.0	17.0	16.4	16.1	15.9	15.7	15.6	...	...
16	17.0	...	17.0	...	17.0	17.0	17.0	16.4	16.1	15.9	15.7	15.6	...	...
17	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
18	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
19	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
20	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
21	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
22	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
23	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
24	17.0	...	17.0	...	17.0	17.0	17.0	16.4	16.1	15.9	15.7	15.6	...	...
25	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
26	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
27	17.0	...	17.0	...	17.0	17.0	17.0	16.4	16.1	15.9	15.7	15.6	...	...
28	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
29	17.0	...	17.0	...	17.0	17.0	17.0	16.4	16.1	15.9	15.7	15.6	...	...
30	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
31	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
32	17.0	...	17.0	...	17.0	17.0	17.0	16.4	16.1	15.9	15.7	15.6	...	...
33	17.0	...	17.0	...	17.0	17.0	17.0	16.4	16.1	15.9	15.7	15.6	...	...
34	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
35	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
36	20.0	...	20.0	...	20.0	20.0	20.0	19.3	19.0	18.7	18.5	18.3	...	...
37	16.7	...	16.7	...	16.7	16.7	16.1	15.2	14.9	14.6	14.3	14.1	...	...
38	16.7	...	16.7	...	16.7	16.7	16.1	15.2	14.9	14.6	14.3	14.1	...	...
39	16.7	...	16.7	...	16.7	16.7	16.1	15.2	14.9	14.6	14.3	14.1	...	...
40	16.7	...	16.7	...	16.7	16.7	16.1	15.2	14.9	14.6	14.3	14.1	...	...
41	20.0	...	20.0	...	20.0	20.0	19.3	18.3	17.9	17.5	17.2	16.9	...	...
42	20.0	...	20.0	...	20.0	20.0	19.3	18.3	17.9	17.5	17.2	16.9	...	...
43	20.0	...	20.0	...	20.0	20.0	19.3	18.3	17.9	17.5	17.2	16.9	...	...
44	20.0	...	20.0	...	20.0	20.0	19.3	18.3	17.9	17.5	17.2	16.9	...	...
45	20.0	...	20.0	...	20.0	20.0	19.3	18.3	17.9	17.5	17.2	16.9	...	...

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Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/ Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	18Cr–10Ni–Ti	Smls. tube	SA–213	TP321	S32100	...	...	8	1
2	18Cr–10Ni–Ti	Plate	SA–240	321	S32100	...	...	8	1
3	18Cr–10Ni–Ti	Wld. tube	SA–249	TP321	S32100	...	...	8	1
4	18Cr–10Ni–Ti	Wld. tube	SA–249	TP321	S32100	...	...	8	1
5	18Cr–10Ni–Ti	Wld. pipe	SA–312	TP321	S32100	...	≤3/8	8	1
6	18Cr–10Ni–Ti	Smls. pipe	SA–312	TP321	S32100	...	≤3/8	8	1
7	18Cr–10Ni–Ti	Wld. pipe	SA–312	TP321	S32100	...	≤3/8	8	1
8	18Cr–10Ni–Ti	Wld. pipe	SA–358	321	S32100	1	...	8	1
9	18Cr–10Ni–Ti	Wld. pipe	SA–358	321	S32100	3	...	8	1
10	18Cr–10Ni–Ti	Wld. pipe	SA–358	321	S32100	4	...	8	1
11	18Cr–10Ni–Ti	Smls. pipe	SA–376	TP321	S32100	...	≤3/8	8	1
12	18Cr–10Ni–Ti	Fittings	SA–403	321	S32100	...	...	8	1
13	18Cr–10Ni–Ti	Fittings	SA–403	321	S32100	CR	...	8	1
14	18Cr–10Ni–Ti	Fittings	SA–403	321	S32100	WP–S	...	8	1
15	18Cr–10Ni–Ti	Wld. fittings	SA–403	321	S32100	WP–W	...	8	1
16	18Cr–10Ni–Ti	Wld. fittings	SA–403	321	S32100	WP–W	...	8	1
17	18Cr–10Ni–Ti	Wld. fittings	SA–403	321	S32100	WP–WX	...	8	1
18	18Cr–10Ni–Ti	Bar	SA–479	321	S32100	...	...	8	1
19	18Cr–10Ni–Ti	Wld. pipe	SA–813	TP321	S32100	...	...	8	1
20	18Cr–10Ni–Ti	Wld. pipe	SA–814	TP321	S32100	...	...	8	1
21	18Cr–10Ni–Ti	Bar	SA/JIS G4303	SUS321	...	...	...	8	1
22	18Cr–10Ni–Ti	Forgings	SA–182	F321H	S32109	...	≤5	8	1
23	18Cr–10Ni–Ti	Smls. tube	SA–213	TP321H	S32109	...	...	8	1
24	18Cr–10Ni–Ti	Plate	SA–240	321H	S32109	...	...	8	1
25	18Cr–10Ni–Ti	Wld. tube	SA–249	TP321H	S32109	...	...	8	1
26	18Cr–10Ni–Ti	Wld. tube	SA–249	TP321H	S32109	...	...	8	1
27	18Cr–10Ni–Ti	Wld. pipe	SA–312	TP321H	S32109	...	≤3/16	8	1
28	18Cr–10Ni–Ti	Smls. pipe	SA–312	TP321H	S32109	...	≤3/16	8	1
29	18Cr–10Ni–Ti	Wld. pipe	SA–312	TP321H	S32109	...	≤3/16	8	1
30	18Cr–10Ni–Ti	Smls. pipe	SA–376	TP321H	S32109	...	≤3/8	8	1
31	18Cr–10Ni–Ti	Fittings	SA–403	321H	S32109	...	...	8	1
32	18Cr–10Ni–Ti	Fittings	SA–403	321H	S32109	CR	...	8	1
33	18Cr–10Ni–Ti	Fittings	SA–403	321H	S32109	WP–S	...	8	1
34	18Cr–10Ni–Ti	Wld. fittings	SA–403	321H	S32109	WP–W	...	8	1
35	18Cr–10Ni–Ti	Wld. fittings	SA–403	321H	S32109	WP–W	...	8	1
36	18Cr–10Ni–Ti	Wld. fittings	SA–403	321H	S32109	WP–WX	...	8	1
37	18Cr–10Ni–Ti	Bar	SA–479	321H	S32109	...	...	8	1
38	18Cr–10Ni–Ti	Wld. pipe	SA–813	TP321H	S32109	...	...	8	1
39	18Cr–10Ni–Ti	Wld. pipe	SA–814	TP321H	S32109	...	...	8	1
40	18Cr–11Ni	Plate	SA–240	305	S30500	...	...	8	1
41	18Cr–13Ni–3Mo	Plate	SA–240	317	S31700	...	≤5	8	1
42	18Cr–13Ni–3Mo	Wld. tube	SA–249	TP317	S31700	...	...	8	1
43	18Cr–13Ni–3Mo	Wld. tube	SA–249	TP317	S31700	...	...	8	1
44	18Cr–13Ni–3Mo	Smls. & wld. pipe	SA–312	TP317	S31700	...	...	8	1
45	18Cr–13Ni–3Mo	Smls. pipe	SA–312	TP317	S31700	...	≤5	8	1

Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only)		External Pressure Chart No.	Notes
			III	VIII-2		
1	75	30	800	800	HA–2	G7, G9
2	75	30	800	800	HA–2	G7, G9
3	75	30	800	NP	HA–2	G7
4	75	30	NP	800	HA–2	G7, G9, G18
5	75	30	800	NP	HA–2	G7
6	75	30	800	800	HA–2	G7, G9
7	75	30	NP	800	HA–2	G7, G9, G18
8	75	30	800	NP	HA–2	G7
9	75	30	800	NP	HA–2	G7
10	75	30	800	NP	HA–2	G7
11	75	30	800	800	HA–2	G7, G9
12	75	30	800	NP	HA–2	G7
13	75	30	NP	800	HA–2	G7, G18
14	75	30	NP	800	HA–2	G7
15	75	30	800	NP	HA–2	G7
16	75	30	NP	800	HA–2	G7, G18
17	75	30	NP	800	HA–2	G7, G18
18	75	30	800	NP	HA–2	G7
19	75	30	800	NP	HA–2	G7
20	75	30	800	NP	HA–2	G7
21	75	30	800	NP	HA–2	G7
22	75	30	800	800	HA–2	G7
23	75	30	800	800	HA–2	G7
24	75	30	800	800	HA–2	G7
25	75	30	800	NP	HA–2	G7
26	75	30	NP	800	HA–2	G7, G18
27	75	30	800	NP	HA–2	G7
28	75	30	800	800	HA–2	G7
29	75	30	NP	800	HA–2	G7, G18
30	75	30	800	800	HA–2	G7
31	75	30	800	NP	HA–2	G7
32	75	30	NP	800	HA–2	G7, G18
33	75	30	NP	800	HA–2	G7
34	75	30	800	NP	HA–2	G7
35	75	30	NP	800	HA–2	G7, G18
36	75	30	NP	800	HA–2	G7, G18
37	75	30	800	NP	HA–2	G7
38	75	30	800	NP	HA–2	G7
39	75	30	800	NP	HA–2	G7
40	75	30	800	NP	HA–1	G7
41	75	30	NP	800	HA–2	G7, G9
42	75	30	800	NP	HA–2	G7
43	75	30	NP	800	HA–2	G7, G9, G18
44	75	30	800	NP	HA–2	G7
45	75	30	NP	800	HA–2	G7, G9

Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Design Stress Intensity or Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	20.0	...	20.0	...	20.0	20.0	19.3	18.3	17.9	17.5	17.2	16.9	...	...
2	20.0	...	20.0	...	20.0	20.0	19.3	18.3	17.9	17.5	17.2	16.9	...	...
3	20.0	...	20.0	...	20.0	20.0	19.3	18.3	17.9	17.5	17.2	16.9	...	...
4	17.0	...	17.0	...	17.0	17.0	16.4	15.5	15.2	14.9	14.6	14.4	...	...
5	20.0	...	20.0	...	20.0	20.0	19.3	18.3	17.9	17.5	17.2	16.9	...	...
6	20.0	...	20.0	...	20.0	20.0	19.3	18.3	17.9	17.5	17.2	16.9	...	...
7	17.0	...	17.0	...	17.0	17.0	16.4	15.5	15.2	14.9	14.6	14.4	...	...
8	20.0	...	20.0	...	20.0	20.0	19.3	18.3	17.9	17.5	17.2	16.9	...	...
9	20.0	...	20.0	...	20.0	20.0	19.3	18.3	17.9	17.5	17.2	16.9	...	...
10	20.0	...	20.0	...	20.0	20.0	19.3	18.3	17.9	17.5	17.2	16.9	...	...
11	20.0	...	20.0	...	20.0	20.0	19.3	18.3	17.9	17.5	17.2	16.9	...	...
12	20.0	...	20.0	...	20.0	20.0	19.3	18.3	17.9	17.5	17.2	16.9	...	...
13	17.0	...	17.0	...	17.0	17.0	16.4	15.5	15.2	14.9	14.6	14.4	...	...
14	20.0	...	20.0	...	20.0	20.0	19.3	18.3	17.9	17.5	17.2	16.9	...	...
15	20.0	...	20.0	...	20.0	20.0	19.3	18.3	17.9	17.5	17.2	16.9	...	...
16	17.0	...	17.0	...	17.0	17.0	16.4	15.5	15.2	14.9	14.6	14.4	...	...
17	17.0	...	17.0	...	17.0	17.0	16.4	15.5	15.2	14.9	14.6	14.4	...	...
18	20.0	...	20.0	...	20.0	20.0	19.3	18.3	17.9	17.5	17.2	16.9	...	...
19	20.0	...	20.0	...	20.0	20.0	19.3	18.3	17.9	17.5	17.2	16.9	...	...
20	20.0	...	20.0	...	20.0	20.0	19.3	18.3	17.9	17.5	17.2	16.9	...	...
21	20.0	...	20.0	...	20.0	20.0	19.3	18.3	17.9	17.5	17.2	16.9	...	...
22	20.0	...	20.0	...	20.0	20.0	19.3	18.3	17.9	17.5	17.2	16.9	...	...
23	20.0	...	20.0	...	20.0	20.0	19.3	18.3	17.9	17.5	17.2	16.9	...	...
24	20.0	...	20.0	...	20.0	20.0	19.3	18.3	17.9	17.5	17.2	16.9	...	...
25	20.0	...	20.0	...	20.0	20.0	19.3	18.3	17.9	17.5	17.2	16.9	...	...
26	17.0	...	17.0	...	17.0	17.0	16.4	15.5	15.2	14.9	14.6	14.4	...	...
27	20.0	...	20.0	...	20.0	20.0	19.3	18.3	17.9	17.5	17.2	16.9	...	...
28	20.0	...	20.0	...	20.0	20.0	19.3	18.3	17.9	17.5	17.2	16.9	...	...
29	17.0	...	17.0	...	17.0	17.0	16.4	15.5	15.2	14.9	14.6	14.4	...	...
30	20.0	...	20.0	...	20.0	20.0	19.3	18.3	17.9	17.5	17.2	16.9	...	...
31	20.0	...	20.0	...	20.0	20.0	19.3	18.3	17.9	17.5	17.2	16.9	...	...
32	17.0	...	17.0	...	17.0	17.0	16.4	15.5	15.2	14.9	14.6	14.4	...	...
33	20.0	...	20.0	...	20.0	20.0	19.3	18.3	17.9	17.5	17.2	16.9	...	...
34	20.0	...	20.0	...	20.0	20.0	19.3	18.3	17.9	17.5	17.2	16.9	...	...
35	17.0	...	17.0	...	17.0	17.0	16.4	15.5	15.2	14.9	14.6	14.4	...	...
36	17.0	...	17.0	...	17.0	17.0	16.4	15.5	15.2	14.9	14.6	14.4	...	...
37	20.0	...	20.0	...	20.0	20.0	19.3	18.3	17.9	17.5	17.2	16.9	...	...
38	20.0	...	20.0	...	20.0	20.0	19.3	18.3	17.9	17.5	17.2	16.9	...	...
39	20.0	...	20.0	...	20.0	20.0	19.3	18.3	17.9	17.5	17.2	16.9	...	...
40	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
41	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...
42	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...
43	17.0	...	17.0	...	17.0	16.4	15.3	14.5	14.1	13.9	13.7	13.5	...	...
44	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...
45	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...

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Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/ Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	18Cr–13Ni–3Mo	Wld. pipe	SA–312	TP317	S31700	...	≤5	8	1
2	18Cr–13Ni–3Mo	Fittings	SA–403	317	S31700	WP–S	...	8	1
3	18Cr–13Ni–3Mo	Plate	SA–240	317L	S31703	...	...	8	1
4	18Cr–13Ni–3Mo	Fittings	SA–403	317L	S31703	WP–S	...	8	1
5	18Cr–18Ni–2Si	Smls. tube	SA–213	XM–15	S38100	...	≤5	8	1
6	18Cr–18Ni–2Si	Plate	SA–240	XM–15	S38100	...	≤5	8	1
7	18Cr–18Ni–2Si	Wld. tube	SA–249	TPXM–15	S38100	...	≤5	8	1
8	18Cr–18Ni–2Si	Smls. pipe	SA–312	TPXM–15	S38100	...	≤5	8	1
9	18Cr–18Ni–2Si	Wld. pipe	SA–312	TPXM–15	S38100	...	≤5	8	1
10	20Cr–10Ni	Bar	SA–479	ER308	S30880	...	...	8	1
11	21Cr–6Ni–9Mn	Forgings	SA–182	FXM–11	S21904	...	...	8	3
12	21Cr–6Ni–9Mn	Wld. pipe	SA–312	TPXM–11	S21904	...	...	8	3
13	21Cr–6Ni–9Mn	Smls. pipe	SA–312	TPXM–11	S21904	...	...	8	3
14	21Cr–6Ni–9Mn	Wld. pipe	SA–312	TPXM–11	S21904	...	...	8	3
15	21Cr–6Ni–9Mn	Plate	SA–666	XM–11	S21904	...	...	8	3
16	21Cr–6Ni–9Mn	Forgings	SA–965	FXM–11	S21904	...	...	8	3
17	22Cr–5Ni–3Mo–N	Forgings	SA–182	F51	S31803	...	...	10H	1
18	22Cr–5Ni–3Mo–N	Plate	SA–240	...	S31803	...	...	10H	1
19	22Cr–5Ni–3Mo–N	Smls. tube	SA–789	...	S31803	...	...	10H	1
20	22Cr–5Ni–3Mo–N	Wld. tube	SA–789	...	S31803	...	...	10H	1
21	22Cr–5Ni–3Mo–N	Smls. pipe	SA–790	...	S31803	...	...	10H	1
22	22Cr–5Ni–3Mo–N	Wld. pipe	SA–790	...	S31803	...	...	10H	1
23	22Cr–13Ni–5Mn	Forgings	SA–182	FXM–19	S20910	...	...	8	3
24	22Cr–13Ni–5Mn	Plate	SA–240	XM–19	S20910	...	...	8	3
25	22Cr–13Ni–5Mn	Wld. tube	SA–249	TPXM–19	S20910	...	...	8	3
26	22Cr–13Ni–5Mn	Wld. tube	SA–249	TPXM–19	S20910	...	...	8	3
27	22Cr–13Ni–5Mn	Wld. pipe	SA–312	TPXM–19	S20910	...	...	8	3
28	22Cr–13Ni–5Mn	Smls. pipe	SA–312	TPXM–19	S20910	...	...	8	3
29	22Cr–13Ni–5Mn	Wld. pipe	SA–312	TPXM–19	S20910	...	...	8	3
30	22Cr–13Ni–5Mn	Wld. pipe	SA–358	XM–19	S20910	1	...	8	3
31	22Cr–13Ni–5Mn	Wld. pipe	SA–358	XM–19	S20910	3	...	8	3
32	22Cr–13Ni–5Mn	Wld. pipe	SA–358	XM–19	S20910	4	...	8	3
33	22Cr–13Ni–5Mn	Fittings	SA–403	XM–19	S20910	...	...	8	3
34	22Cr–13Ni–5Mn	Fittings	SA–403	XM–19	S20910	CR	...	8	3
35	22Cr–13Ni–5Mn	Wld. fittings	SA–403	XM–19	S20910	WP–W	...	8	3
36	22Cr–13Ni–5Mn	Wld. fittings	SA–403	XM–19	S20910	WP–W	...	8	3
37	22Cr–13Ni–5Mn	Wld. fittings	SA–403	XM–19	S20910	WP–WX	...	8	3
38	22Cr–13Ni–5Mn	Bar	SA–479	XM–19	S20910	...	...	8	3
39	22Cr–13Ni–5Mn	Wld. pipe	SA–813	TPXM–19	S20910	...	...	8	3
40	22Cr–13Ni–5Mn	Wld. pipe	SA–814	TPXM–19	S20910	...	...	8	3
41	22Cr–13Ni–5Mn	Forgings	SA–965	FXM–19	S20910	...	...	8	3
42	23Cr–4Ni–Mo–Cu	Plate	SA–240	...	S32304	...	...	10H	1
43	23Cr–12Ni	Fittings	SA–403	309	S30900	...	...	8	2
44	23Cr–12Ni	Fittings	SA–403	309	S30900	...	...	8	2
45	23Cr–12Ni	Fittings	SA–403	309	S30900	WP–S	...	8	2

Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only)		External Pressure Chart No.	Notes
			III	VIII-2		
1	75	30	NP	800	HA–2	G7, G9, G18
2	75	30	NP	800	HA–2	G7
3	75	30	NP	800	HA–4	G7
4	75	30	NP	800	HA–4	G7
5	75	30	NP	800	HA–2	G7, G9
6	75	30	NP	800	HA–2	G7, G9
7	75	30	NP	800	HA–2	G7, G9, G18
8	75	30	NP	800	HA–2	G7, G9
9	75	30	NP	800	HA–2	G7, G9, G18
10	75	30	800	NP	HA–2	G7
11	90	50	600	600	HA–6	G7
12	90	50	600	NP	HA–6	G7
13	90	50	600	600	HA–6	G7
14	90	50	NP	600	HA–6	G7, G18
15	90	50	600	600	HA–6	G7
16	90	50	600	600	HA–6	G7
17	90	65	NP	600	HA–5	G13
18	90	65	NP	600	HA–5	G13
19	90	65	NP	600	HA–5	G13
20	90	65	NP	600	HA–5	G13, G18
21	90	65	NP	600	HA–5	G13
22	90	65	NP	600	HA–5	G13, G18
23	100	55	800	800	HA–6	G7
24	100	55	800	800	HA–6	G7
25	100	55	800	NP	HA–6	G7
26	100	55	NP	800	HA–6	G7, G18
27	100	55	800	NP	HA–6	G7
28	100	55	800	800	HA–6	G7
29	100	55	NP	800	HA–6	G7, G18
30	100	55	800	NP	HA–6	G7
31	100	55	800	NP	HA–6	G7
32	100	55	800	NP	HA–6	G7
33	100	55	800	NP	HA–6	G7
34	100	55	NP	800	HA–6	G7, G18
35	100	55	800	NP	HA–6	G7
36	100	55	NP	800	HA–6	G7, G18
37	100	55	NP	800	HA–6	G7, G18
38	100	55	800	800	HA–6	G7
39	100	55	800	NP	HA–6	G7
40	100	55	800	NP	HA–6	G7
41	100	55	800	800	HA–6	G7
42	87	58	NP	600	HA–6	G7, G13
43	75	30	800	NP	HA–2	G7
44	75	30	NP	800	HA–2	G7, G18
45	75	30	NP	800	HA–2	G7

Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line	Design Stress Intensity or Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
No.	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	17.0	...	17.0	...	17.0	16.4	15.3	14.5	14.1	13.9	13.7	13.5	...	...
2	20.0	...	20.0	...	20.0	19.3	18.0	17.0	16.6	16.3	16.1	15.9	...	...
3	20.0	...	20.0	...	20.0	18.9	17.7	16.9	16.5	16.2	15.8	15.5	...	...
4	20.0	...	20.0	...	20.0	18.9	17.7	16.9	16.5	16.2	15.8	15.5	...	...
5	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
6	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
7	17.0	...	17.0	...	17.0	15.8	14.8	14.1	13.8	13.5	13.2	12.9	...	...
8	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
9	17.0	...	17.0	...	17.0	15.8	14.8	14.1	13.8	13.5	13.2	12.9	...	...
10	20.0	...	20.0	...	20.0	18.6	17.5	16.6	16.2	15.8	15.5	15.2	...	...
11	30.0	...	30.0	...	28.0	26.4	24.4	23.1	...	...	...	...	...	...
12	30.0	...	30.0	...	28.0	26.4	24.4	23.1	...	...	...	...	...	...
13	30.0	...	30.0	...	28.0	26.4	24.4	23.1	...	...	...	...	...	...
14	25.5	...	25.5	...	23.8	22.5	20.7	19.7	...	...	...	...	...	...
15	30.0	...	30.0	...	28.0	26.4	24.4	23.1	...	...	...	...	...	...
16	30.0	...	30.0	...	28.0	26.4	24.4	23.1	...	...	...	...	...	...
17	30.0	...	30.0	...	28.9	27.9	27.2	26.9	...	...	...	...	...	...
18	30.0	...	30.0	...	28.9	27.9	27.2	26.9	...	...	...	...	...	...
19	30.0	...	30.0	...	28.9	27.9	27.2	26.9	...	...	...	...	...	...
20	25.5	...	25.5	...	24.6	23.7	23.1	22.9	...	...	...	...	...	...
21	30.0	...	30.0	...	28.9	27.9	27.2	26.9	...	...	...	...	...	...
22	25.5	...	25.5	...	24.6	23.7	23.1	22.9	...	...	...	...	...	...
23	33.3	...	33.1	...	31.4	30.4	29.7	29.2	29.0	28.8	28.5	28.3	...	...
24	33.3	...	33.1	...	31.4	30.4	29.7	29.2	29.0	28.8	28.5	28.3	...	...
25	33.3	...	33.1	...	31.4	30.4	29.7	29.2	29.0	28.8	28.5	28.3	...	...
26	28.3	...	26.7	...	24.5	23.1	22.0	21.2	20.9	20.6	20.3	20.0	...	...
27	33.3	...	33.1	...	31.4	30.4	29.7	29.2	29.0	28.8	28.5	28.3	...	...
28	33.3	...	33.1	...	31.4	30.4	29.7	29.2	29.0	28.8	28.5	28.3	...	...
29	28.3	...	28.2	...	26.7	25.8	25.2	24.8	24.7	24.5	24.3	24.0	...	...
30	33.3	...	33.1	...	31.4	30.4	29.7	29.2	29.0	28.8	28.5	28.3	...	...
31	33.3	...	33.1	...	31.4	30.4	29.7	29.2	29.0	28.8	28.5	28.3	...	...
32	33.3	...	33.1	...	31.4	30.4	29.7	29.2	29.0	28.8	28.5	28.3	...	...
33	33.3	...	33.1	...	31.4	30.4	29.7	29.2	29.0	28.8	28.5	28.3	...	...
34	28.3	...	28.2	...	26.7	25.8	25.2	24.8	24.7	24.5	24.3	24.0	...	...
35	33.3	...	33.1	...	31.4	30.4	29.7	29.2	29.0	28.8	28.5	28.3	...	...
36	28.3	...	28.2	...	26.7	25.8	25.2	24.8	24.7	24.5	24.3	24.0	...	...
37	28.3	...	28.2	...	26.7	25.8	25.2	24.8	24.7	24.5	24.3	24.0	...	...
38	33.3	...	33.1	...	31.4	30.4	29.7	29.2	29.0	28.8	28.5	28.3	...	...
39	33.3	...	33.1	...	31.4	30.4	29.7	29.2	29.0	28.8	28.5	28.3	...	...
40	33.3	...	33.1	...	31.4	30.4	29.7	29.2	29.0	28.8	28.5	28.3	...	...
41	33.3	...	33.1	...	31.4	30.4	29.7	29.2	29.0	28.8	28.5	28.3	...	...
42	29.0	...	28.0	...	26.2	25.3	24.9	24.5	...	...	...	...	...	...
43	20.0	...	20.0	...	20.0	20.0	19.4	18.8	18.5	18.2	18.0	17.7	...	...
44	17.0	...	17.0	...	17.0	17.0	16.5	15.9	15.7	15.5	15.3	15.1	...	...
45	20.0	...	20.0	...	20.0	20.0	19.4	18.8	18.5	18.2	18.0	17.7	...	...

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Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/ Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	23Cr–12Ni	Wld. fittings	SA–403	309	S30900	WP–W	...	8	2
2	23Cr–12Ni	Wld. fittings	SA–403	309	S30900	WP–W	...	8	2
3	23Cr–12Ni	Wld. fittings	SA–403	309	S30900	WP–WX	...	8	2
4	23Cr–12Ni	Smls. tube	SA–213	TP309S	S30908	...	...	8	2
5	23Cr–12Ni	Plate	SA–240	309S	S30908	...	...	8	2
6	23Cr–12Ni	Wld. tube	SA–249	TP309S	S30908	...	...	8	2
7	23Cr–12Ni	Smls. pipe	SA–312	TP309S	S30908	...	...	8	2
8	23Cr–12Ni	Wld. pipe	SA–312	TP309S	S30908	...	...	8	2
9	23Cr–12Ni	Wld. pipe	SA–358	309S	S30908	1	...	8	2
10	23Cr–12Ni	Wld. pipe	SA–358	309S	S30908	3	...	8	2
11	23Cr–12Ni	Wld. pipe	SA–358	309S	S30908	4	...	8	2
12	23Cr–12Ni	Bar	SA–479	309S	S30908	...	...	8	2
13	23Cr–12Ni	Wld. pipe	SA–813	TP309S	S30908	...	...	8	2
14	23Cr–12Ni	Wld. pipe	SA–814	TP309S	S30908	...	...	8	2
15	23Cr–12Ni	Bar	SA/JIS G4303	SUS309S	...	...	...	8	2
16	23Cr–12Ni	Smls. tube	SA–213	TP309H	S30909	...	...	8	2
17	23Cr–12Ni	Plate	SA–240	309H	S30909	...	...	8	2
18	23Cr–12Ni	Wld. tube	SA–249	TP309H	S30909	...	...	8	2
19	23Cr–12Ni	Smls. pipe	SA–312	TP309H	S30909	...	...	8	2
20	23Cr–12Ni	Wld. pipe	SA–312	TP309H	S30909	...	...	8	2
21	23Cr–12Ni	Bar	SA–479	309H	S30909	...	...	8	2
22	23Cr–12Ni–Cb	Smls. tube	SA–213	TP309Cb	S30940	...	...	8	2
23	23Cr–12Ni–Cb	Plate	SA–240	309Cb	S30940	...	...	8	2
24	23Cr–12Ni–Cb	Wld. tube	SA–249	TP309Cb	S30940	...	...	8	2
25	23Cr–12Ni–Cb	Smls. pipe	SA–312	TP309Cb	S30940	...	...	8	2
26	23Cr–12Ni–Cb	Wld. pipe	SA–312	TP309Cb	S30940	...	...	8	2
27	23Cr–12Ni–Cb	Wld. pipe	SA–813	TP309Cb	S30940	...	...	8	2
28	23Cr–12Ni–Cb	Wld. pipe	SA–814	TP309Cb	S30940	...	...	8	2
29	25Cr–6Ni–Mo–N	Plate	SA–240	...	S31200	...	...	10H	1
30	25Cr–12Ni	Castings	SA–351	CH8	J93400	...	...	8	2
31	25Cr–12Ni	Cast pipe	SA–451	CPH8	J93400	...	...	8	2
32	25Cr–12Ni	Castings	SA–351	CH20	J93402	...	...	8	2
33	25Cr–12Ni	Cast pipe	SA–451	CPH20	J93402	...	...	8	2
34	25Cr–20Ni	Castings	SA–351	CK20	J94202	...	...	8	2
35	25Cr–20Ni	Cast pipe	SA–451	CPK20	J94202	...	...	8	2
36	25Cr–20Ni	Forgings	SA–182	F310	S31000	...	≤5	8	2
37	25Cr–20Ni	Forgings	SA–965	F310	S31000	...	...	8	2
38	25Cr–20Ni	Smls. tube	SA–213	TP310S	S31008	...	...	8	2
39	25Cr–20Ni	Plate	SA–240	310S	S31008	...	...	8	2
40	25Cr–20Ni	Wld. tube	SA–249	TP310S	S31008	...	...	8	2
41	25Cr–20Ni	Smls. pipe	SA–312	TP310S	S31008	...	...	8	2
42	25Cr–20Ni	Wld. pipe	SA–312	TP310S	S31008	...	...	8	2
43	25Cr–20Ni	Wld. pipe	SA–358	310S	S31008	1	...	8	2
44	25Cr–20Ni	Wld. pipe	SA–358	310S	S31008	3	...	8	2
45	25Cr–20Ni	Wld. pipe	SA–358	310S	S31008	4	...	8	2

Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) III	VIII-2	External Pressure Chart No.	Notes
1	75	30	800	NP	HA–2	G7
2	75	30	NP	800	HA–2	G7, G18
3	75	30	NP	800	HA–2	G7, G18
4	75	30	NP	800	HA–2	G7, G9
5	75	30	NP	800	HA–2	G7, G9
6	75	30	NP	800	HA–2	G7, G18
7	75	30	NP	800	HA–2	G7, G9
8	75	30	NP	800	HA–2	G7, G9, G18
9	75	30	800	NP	HA–2	G7
10	75	30	800	NP	HA–2	G7
11	75	30	800	NP	HA–2	G7
12	75	30	800	NP	HA–2	G7
13	75	30	NP	800	HA–2	G7, G9, G18
14	75	30	NP	800	HA–2	G7, G9, G18
15	75	30	800	NP	HA–2	G7
16	75	30	NP	800	HA–2	G7
17	75	30	NP	800	HA–2	G7
18	75	30	NP	800	HA–2	G7, G18
19	75	30	NP	800	HA–2	G7
20	75	30	NP	800	HA–2	G7, G18
21	75	30	NP	800	HA–2	G7
22	75	30	NP	800	HA–2	G7, G9
23	75	30	NP	800	HA–2	G7, G9
24	75	30	NP	800	HA–2	G7, G9, G18
25	75	30	NP	800	HA–2	G7, G9
26	75	30	NP	800	HA–2	G7, G9, G18
27	75	30	NP	800	HA–2	G7, G9, G18
28	75	30	NP	800	HA–2	G7, G9, G18
29	100	65	NP	600	HA–5	G7, G13
30	65	28	800	800	HA–3	G7, G9, G10, G13
31	65	28	800	NP	HA–3	G7, G13
32	70	30	800	800	HA–2	G7
33	70	30	800	NP	HA–2	G7
34	65	28	800	800	HA–3	G7
35	65	28	800	NP	HA–3	G7
36	75	30	NP	800	HA–2	G7, G9, G11, G12
37	75	30	800	800	HA–2	G7, G9, G11, G12
38	75	30	NP	800	HA–2	G7, G9, G11, G12
39	75	30	NP	800	HA–2	G7, G9, G11, G12
40	75	30	NP	800	HA–2	G7, G9, G11, G12, G18
41	75	30	NP	800	HA–2	G7, G9, G11, G12
42	75	30	NP	800	HA–2	G7, G9, G11, G12, G18
43	75	30	800	NP	HA–2	G7
44	75	30	800	NP	HA–2	G7
45	75	30	800	NP	HA–2	G7

Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Design Stress Intensity or Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	20.0	...	20.0	...	20.0	20.0	19.4	18.8	18.5	18.2	18.0	17.7	...	...
2	17.0	...	17.0	...	17.0	17.0	16.5	15.9	15.7	15.5	15.3	15.1	...	...
3	17.0	...	17.0	...	17.0	17.0	16.5	15.9	15.7	15.5	15.3	15.1	...	...
4	20.0	...	20.0	...	20.0	20.0	19.4	18.8	18.5	18.2	18.0	17.7	...	...
5	20.0	...	20.0	...	20.0	20.0	19.4	18.8	18.5	18.2	18.0	17.7	...	...
6	17.0	...	17.0	...	17.0	17.0	16.5	15.9	15.7	15.5	15.3	15.1	...	...
7	20.0	...	20.0	...	20.0	20.0	19.4	18.8	18.5	18.2	18.0	17.7	...	...
8	17.0	...	17.0	...	17.0	17.0	16.5	15.9	15.7	15.5	15.3	15.1	...	...
9	20.0	...	20.0	...	20.0	20.0	19.4	18.8	18.5	18.2	18.0	17.7	...	...
10	20.0	...	20.0	...	20.0	20.0	19.4	18.8	18.5	18.2	18.0	17.7	...	...
11	20.0	...	20.0	...	20.0	20.0	19.4	18.8	18.5	18.2	18.0	17.7	...	...
12	20.0	...	20.0	...	20.0	20.0	19.4	18.8	18.5	18.2	18.0	17.7	...	...
13	17.0	...	17.0	...	17.0	17.0	16.5	15.9	15.7	15.5	15.3	15.1	...	...
14	17.0	...	17.0	...	17.0	17.0	16.5	15.9	15.7	15.5	15.3	15.1	...	...
15	20.0	...	20.0	...	20.0	20.0	19.4	18.8	18.5	18.2	18.0	17.7	...	...
16	20.0	...	20.0	...	20.0	20.0	19.4	18.8	18.5	18.2	18.0	17.7	...	...
17	20.0	...	20.0	...	20.0	20.0	19.4	18.8	18.5	18.2	18.0	17.7	...	...
18	17.0	...	17.0	...	17.0	17.0	16.5	15.9	15.7	15.5	15.3	15.1	...	...
19	20.0	...	20.0	...	20.0	20.0	19.4	18.8	18.5	18.2	18.0	17.7	...	...
20	17.0	...	17.0	...	17.0	17.0	16.5	15.9	15.7	15.5	15.3	15.1	...	...
21	20.0	...	20.0	...	20.0	20.0	19.4	18.8	18.5	18.2	18.0	17.7	...	...
22	20.0	...	20.0	...	20.0	20.0	19.4	18.8	18.5	18.2	18.0	17.7	...	...
23	20.0	...	20.0	...	20.0	20.0	19.4	18.8	18.5	18.2	18.0	17.7	...	...
24	17.0	...	17.0	...	17.0	17.0	16.5	15.9	15.7	15.5	15.3	15.1	...	...
25	20.0	...	20.0	...	20.0	20.0	19.4	18.8	18.5	18.2	18.0	17.7	...	...
26	17.0	...	17.0	...	17.0	17.0	16.5	15.9	15.7	15.5	15.3	15.1	...	...
27	17.0	...	17.0	...	17.0	17.0	16.5	15.9	15.7	15.5	15.3	15.1	...	...
28	17.0	...	17.0	...	17.0	17.0	16.5	15.9	15.7	15.5	15.3	15.1	...	...
29	33.3	...	33.3	...	31.6	30.7	30.5	30.5	...	...	...	...	...	...
30	18.7	...	18.7	...	18.5	18.0	17.7	17.1	16.7	16.3	15.9	15.4	...	...
31	18.7	...	18.7	...	18.5	18.0	17.7	17.1	16.7	16.3	15.9	15.4	...	...
32	20.0	...	20.0	...	19.9	19.4	18.9	18.3	17.9	17.5	17.0	16.5	...	...
33	20.0	...	20.0	...	19.9	19.4	18.9	18.3	17.9	17.5	17.0	16.5	...	...
34	18.7	...	18.7	...	18.5	18.0	17.7	17.1	16.7	16.3	15.9	15.4	...	...
35	18.7	...	18.7	...	18.5	18.0	17.7	17.1	16.7	16.3	15.9	15.4	...	...
36	20.0	...	20.0	...	20.0	20.0	19.3	18.5	18.2	17.9	17.7	17.4	...	...
37	20.0	...	20.0	...	20.0	20.0	19.3	18.5	18.2	17.9	17.7	17.4	...	...
38	20.0	...	20.0	...	20.0	20.0	19.3	18.5	18.2	17.9	17.7	17.4	...	...
39	20.0	...	20.0	...	20.0	20.0	19.3	18.5	18.2	17.9	17.7	17.4	...	...
40	17.0	...	17.0	...	17.0	17.0	16.4	15.7	15.5	15.2	15.0	14.8	...	...
41	20.0	...	20.0	...	20.0	20.0	19.3	18.5	18.2	17.9	17.7	17.4	...	...
42	17.0	...	17.0	...	17.0	17.0	16.4	15.7	15.5	15.2	15.0	14.8	...	...
43	20.0	...	20.0	...	20.0	20.0	19.3	18.5	18.2	17.9	17.7	17.4	...	...
44	20.0	...	20.0	...	20.0	20.0	19.3	18.5	18.2	17.9	17.7	17.4	...	...
45	20.0	...	20.0	...	20.0	20.0	19.3	18.5	18.2	17.9	17.7	17.4	...	...

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Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/ Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	25Cr–20Ni	Fittings	SA–403	310S	S31008	...	...	8	2
2	25Cr–20Ni	Fittings	SA–403	310S	S31008	CR	...	8	2
3	25Cr–20Ni	Fittings	SA–403	310S	S31008	WP–S	...	8	2
4	25Cr–20Ni	Wld. fittings	SA–403	310S	S31008	WP–W	...	8	2
5	25Cr–20Ni	Wld. fittings	SA–403	310S	S31008	WP–W	...	8	2
6	25Cr–20Ni	Wld. fittings	SA–403	310S	S31008	WP–WX	...	8	2
7	25Cr–20Ni	Wld. pipe	SA–813	TP310S	S31008	...	...	8	2
8	25Cr–20Ni	Wld. pipe	SA–814	TP310S	S31008	...	...	8	2
9	25Cr–20Ni	Smls. tube	SA–213	TP310H	S31009	...	...	8	2
10	25Cr–20Ni	Plate	SA–240	310H	S31009	...	...	8	2
11	25Cr–20Ni	Wld. tube	SA–249	TP310H	S31009	...	...	8	2
12	25Cr–20Ni	Smls. pipe	SA–312	TP310H	S31009	...	...	8	2
13	25Cr–20Ni	Wld. pipe	SA–312	TP310H	S31009	...	...	8	2
14	25Cr–20Ni–Cb	Wld. tube	SA–249	TP310Cb	S31040	...	...	8	2
15	25Cr–20Ni–Cb	Wld. pipe	SA–312	TP310Cb	S31040	...	...	8	2
16	25Cr–20Ni–Cb	Wld. pipe	SA–813	TP310Cb	S31040	...	...	8	2
17	25Cr–20Ni–Cb	Wld. pipe	SA–814	TP310Cb	S31040	...	...	8	2
18	25Cr–22Ni–2Mo–N	Smls. tube	SA–213	TP310MoLN	S31050	...	$0.250 < t \le 1.250$	8	2
19	25Cr–22Ni–2Mo–N	Wld. tube	SA–249	TP310MoLN	S31050	...	$0.250 < t \le 1.250$	8	2
20	25Cr–22Ni–2Mo–N	Wld. pipe	SA–312	TP310MoLN	S31050	...	$0.250 < t \le 1.250$	8	2
21	25Cr–22Ni–2Mo–N	Plate	SA–240	310MoLN	S31050	...	...	8	2
22	25Cr–22Ni–2Mo–N	Smls. tube	SA–213	TP310MoLN	S31050	...	≤0.250, wall	8	2
23	25Cr–22Ni–2Mo–N	Wld. tube	SA–249	TP310MoLN	S31050	...	≤0.250, wall	8	2
24	25Cr–22Ni–2Mo–N	Wld. pipe	SA–312	TP310MoLN	S31050	...	≤0.250, wall	8	2

Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only)		External Pressure Chart No.	Notes
			III	VIII-2		
1	75	30	800	NP	HA–2	G7
2	75	30	NP	800	HA–2	G7, G18
3	75	30	NP	800	HA–2	G7
4	75	30	800	NP	HA–2	G7
5	75	30	NP	800	HA–2	G7, G18
6	75	30	NP	800	HA–2	G7, G18
7	75	30	NP	800	HA–2	G7, G9, G11, G12, G18
8	75	30	NP	800	HA–2	G7, G9, G11, G12, G18
9	75	30	NP	800	HA–2	G7
10	75	30	NP	800	HA–2	G7
11	75	30	NP	800	HA–2	G7, G18
12	75	30	NP	800	HA–2	G7
13	75	30	NP	800	HA–2	G7, G18
14	75	30	NP	800	HA–2	G7, G9, G11, G12, G18
15	75	30	NP	800	HA–2	G7, G9, G11, G12, G18
16	75	30	NP	800	HA–2	G7, G9, G11, G12, G18
17	75	30	NP	800	HA–2	G7, G9, G11, G12, G18
18	78	37	NP	800	HA–2	...
19	78	37	NP	800	HA–2	G18
20	78	37	NP	800	HA–2	G18
21	80	35	NP	600	HA–2	...
22	84	39	NP	800	HA–2	...
23	84	39	NP	800	HA–2	G18
24	84	39	NP	800	HA–2	G18

Table 2A (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Ferrous Materials

Line No.	Design Stress Intensity or Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	20.0	...	20.0	...	20.0	20.0	19.3	18.5	18.2	17.9	17.7	17.4	...	...
2	17.0	...	17.0	...	17.0	17.0	16.4	15.7	15.5	15.2	15.0	14.8	...	...
3	20.0	...	20.0	...	20.0	20.0	19.3	18.5	18.2	17.9	17.7	17.4	...	...
4	20.0	...	20.0	...	20.0	20.0	19.3	18.5	18.2	17.9	17.7	17.4	...	...
5	17.0	...	17.0	...	17.0	17.0	16.4	15.7	15.5	15.2	15.0	14.8	...	...
6	17.0	...	17.0	...	17.0	17.0	16.4	15.7	15.5	15.2	15.0	14.8	...	...
7	17.0	...	17.0	...	17.0	17.0	16.4	15.7	15.5	15.2	15.0	14.8	...	...
8	17.0	...	17.0	...	17.0	17.0	16.4	15.7	15.5	15.2	15.0	14.8	...	...
9	20.0	...	20.0	...	20.0	20.0	19.3	18.5	18.2	17.9	17.7	17.4	...	...
10	20.0	...	20.0	...	20.0	20.0	19.3	18.5	18.2	17.9	17.7	17.4	...	...
11	17.0	...	17.0	...	17.0	17.0	16.4	15.7	15.5	15.2	15.0	14.8	...	...
12	20.0	...	20.0	...	20.0	20.0	19.3	18.5	18.2	17.9	17.7	17.4	...	...
13	17.0	...	17.0	...	17.0	17.0	16.4	15.7	15.5	15.2	15.0	14.8	...	...
14	17.0	...	17.0	...	17.0	17.0	16.4	15.7	15.5	15.2	15.0	14.8	...	...
15	17.0	...	17.0	...	17.0	17.0	16.4	15.7	15.5	15.2	15.0	14.8	...	...
16	17.0	...	17.0	...	17.0	17.0	16.4	15.7	15.5	15.2	15.0	14.8	...	...
17	17.0	...	17.0	...	17.0	17.0	16.4	15.7	15.5	15.2	15.0	14.8	...	...
18	24.7	...	24.7	...	24.3	23.4	22.7	21.5	21.0	20.4	19.9	19.4	...	...
19	21.0	...	21.0	...	20.7	19.9	19.3	18.3	17.8	17.4	16.9	16.5	...	...
20	21.0	...	21.0	...	20.7	19.9	19.3	18.3	17.8	17.4	16.9	16.5	...	...
21	23.3	...	23.3	...	23.3	22.7	21.4	20.3	...	...	...	...	...	...
22	26.0	...	26.0	...	26.0	25.2	23.9	22.7	22.1	21.5	21.0	20.5	...	...
23	22.1	...	22.1	...	22.1	21.4	20.3	19.3	18.8	18.3	17.8	17.4	...	...
24	22.1	...	22.1	...	22.1	21.4	20.3	19.3	18.8	18.3	17.8	17.4	...	...

NOTES TO TABLE 2A

GENERAL NOTES

(a) The following abbreviations are used: Smls., Seamless; Temp., Temperature; and Wld., Welded.

(b) An alternative typeface is used for stress values based on successful experience in service (see Notes E1 through E4).

(c) Where specifications, grades, classes, and types are listed in this Table, and where the material specification in Section II, Part A or Part B is a dual–unit specification (e.g., SA–516/SA–516M), the values listed in this Table shall be applicable to either the customary U.S. version of the material specification or the SI units version of the material specification. For example, the values listed for SA–516 Grade 70 shall be used when SA–516M Grade 485 is used in construction.

(d) The values in this Table may be interpolated to determine values for intermediate temperatures. The values at intermediate temperatures shall be rounded to the same number of decimal places as the value at the higher temperature between which values are being interpolated. The rounding rule is: when the next digit beyond the last place to be retained is less than 5, retain unchanged the digit in the last place retained; when the digit next beyond the last place to be retained is 5 or greater, increase by 1 the digit in the last place retained.

(e) The properties of steels are influenced by the processing history, heat treatment, melting practice, and level of residual elements. See Nonmandatory Appendix A for more information.

(f) Where a size limit appears in the Size/Thickness column, the limit applies to the dimension appropriate to the product form: wall thickness of tubing, pipe, pipe fittings, and hollow forgings; thickness of plate, flat bar and forgings, and polygonal bar; diameter of solid bar and bolting; and thickest cross–section of other pressure parts, e.g., castings and forgings.

(**21**) **NOTES – EXPERIENCE CRITERION**

E1 For values at 650°F and above, the design stress intensity values or maximum allowable stress values are based on successful experience in service.

E2 For values at 700°F and above, the design stress intensity values or maximum allowable stress values are based on successful experience in service.

E3 For values at 850°F and above, the design stress intensity values or maximum allowable stress values are based on successful experience in service.

E4 For values at 900°F, the design stress intensity values or maximum allowable stress values are based on successful experience in service.

NOTES – GENERAL REQUIREMENTS

G1 Material that conforms to Class 10, 13, 20, 23, 30, 33, 40, 43, 50, or 53 is not permitted.

G2 Material that conforms to Class 11 or 12 is not permitted.

G3 Material that conforms to Class 11 or 12 is not permitted when the nominal thickness of the material exceeds $^{3}/_{4}$ in.

G4 Material that conforms to Class 11 or 12 is not permitted when the nominal thickness of the material exceeds $1^{1}/_{4}$ in.

G5 For Section III applications, a product analysis is required on this material.

G6 SA–723 shall not be used for minimum permissible temperature below +40°F.

G7 Due to the relatively low yield strength of these materials, these higher stress values were established at temperatures where the short–time tensile properties govern to permit the use of these alloys where slightly greater deformation is acceptable. The stress values in this range exceed $66^{2}/_{3}$% but do not exceed 90% of the yield strength at temperature. Use of these stresses may result in dimensional changes due to permanent strain. These stress values are not recommended for the flanges of gasketed joints or other applications where slight amounts of distortion can cause leakage or malfunction. Table Y–2 lists multiplying factors that, when applied to the yield strength values shown in Table Y–1, will give allowable stress values that will result in lower levels of permanent strain.

G8 This material has reduced toughness at room temperature after exposure at high temperature. The degree of embrittlement depends on composition, heat treatment, time, and temperature. The lowest temperature of concern is about 500°F. See Nonmandatory Appendix A, A–207.

(**21**) G9 At temperatures over 1000°F, these stress values apply only when the carbon is 0.04% or higher. This note is applicable only when stresses above 1000°F are published.

(**21**) G10 For temperatures above 1000°F, these stress values may be used only if the material has been heat treated by heating to a minimum temperature of 1900°F and quenching in water or rapidly cooling by other means. This note is applicable only when stresses above 1000°F are published.

(**21**) G11 These stress values at temperatures of 1050°F and above should be used only when assurance is provided that the steel has a predominant grain size not finer than ASTM No. 6. This note is applicable only when stresses above 1000°F are published.

(**21**) G12 These stress values shall be considered basic values to be used when no effort is made to control or check the grain size of the steel.

G13 This steel may be expected to develop embrittlement after service at moderately elevated temperature; see Nonmandatory Appendix A, A–207 and A–208.

G14 All forgings shall have a maximum tensile strength not in excess of 25 ksi above the specified minimum.

G15 Fabricated from SA–387 Grade 12 Class 1 plate.

G16 Fabricated from SA–387 Grade 12 Class 2 plate.

(**21**) G17 A factor of 4 was used for tensile strength to obtain the stress value.

(**21**) G18 A quality factor of 0.85 has been applied in arriving at the stress values for this material.

G19 The tensile strength shall not be in excess of 20,000 psi above the specified minimum.

G20 For Section VIII applications, SA–723 is exempt from the requirement in Section VIII, Division 2, 6.7.6.3(b) that the average of the individual Brinell hardness numbers shall not be more than 10% below or 25% above the number corresponding to the tensile strength.

G21 See Section VIII, Division 2, 3.4.

NOTES – HEAT TREATMENT REQUIREMENTS

H1 Annealed.

NOTES TO TABLE 2A (CONT'D)

NOTES – HEAT TREATMENT REQUIREMENTS (CONT'D)

H2 Quenched and tempered at 1200°F.

H3 For Section III applications, pieces that are formed (after quenching and tempering) at a temperature lower than 25°F below the final tempering temperature shall be heat treated after forming when the extreme fiber strain from forming exceeds 3%. Heat treatment shall be 1075°F minimum, but not higher than 25°F below the final tempering temperature for a minimum time of 1 hr per inch of thickness. Pieces formed at temperatures within 25°F higher than the original tempering temperature shall be requenched and tempered, either before or after welding into the vessel.

H4 Liquid quenched and tempered.

H5 Normalized, normalized and tempered, or quenched and tempered.

H6 For Section VIII applications involving consideration of heat treatment after forming or welding, see Section VIII, Division 2, Table 6.15 for P–No. 10K, Group No. 1 materials.

NOTES – SIZE REQUIREMENTS

S1 The maximum thickness of forgings shall not exceed $3\frac{3}{4}$ in. (4 in. as heat treated).

S2 Both NPS 8 and larger, and schedule 140 and heavier.

S3 The minimum thickness of pressure–retaining parts shall be $\frac{1}{4}$ in.

S4 For Section III applications, the minimum thickness of shells, heads, and other pressure–retaining parts shall be $\frac{1}{4}$ in. The maximum thickness shall be limited only by the ability to develop the specified mechanical properties.

S5 Either NPS 8 and larger and less than schedule 140 wall, or less than NPS 8 and all wall thicknesses.

S6 The maximum section thickness shall not exceed 3 in. for double–normalized–and–tempered forgings, or 5 in. for quenched–and–tempered forgings.

NOTES – WELDING REQUIREMENTS

W1 Not for welded construction.

W2 In welded construction, for temperatures above 850°F, the weld metal shall have a carbon content of greater than 0.05%.

W3 The following, in addition to the variables in Section IX, QW–250, shall be considered as essential variables requiring requalification of the welding procedure:

(a) An increase in the maximum or a decrease in the minimum specified preheat or interpass temperatures. The specified range of preheat temperatures shall not exceed 150°F.

(b) A change in the thickness *T* of the welding procedure qualification test plate as follows:

(1) For welded joints that are quenched and tempered after welding, any increase in thickness (the minimum thickness qualified in all cases is $\frac{1}{4}$ in.).

(2) For welded joints that are not quenched and tempered after welding, any change as follows:

(-a) for *T* less than $\frac{5}{8}$ in., any decrease in thickness (the maximum thickness qualified is 2*T*);

(-b) for *T* equal to $\frac{5}{8}$ in. and over, any departure from the range of $\frac{5}{8}$ in. to 2*T*.

W4 Welded, with the tensile strength of the Section IX reduced section tension test less than 100 ksi but not less than 95 ksi.

W5 For Section VIII applications, welding not permitted when carbon content exceeds 0.35% by ladle analysis except for limited types of welding, as allowed in Section VIII, Division 2, Part 6.

W6 For Section VIII applications, Section IX, QW–250 Variables QW–404.12, QW–406.3, QW–407.2, and QW–409.1 shall also apply to this material. These variables shall be applied in accordance with the rules for welding of Section VIII, Division 2, Part 6.

W7 Nonwelded, or welded if the tensile strength of the Section IX reduced section tension test is not less than 100 ksi.

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Table 2B
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/ Thickness, in.	P-No.
1	...	Drawn smls. tube	SB–210	Alclad 3003	O	0.010–0.500	21
2	...	Drawn smls. tube	SB–210	Alclad 3003	H113	0.050–0.500	21
3	...	Smls. extr. tube	SB–241	Alclad 3003	O	...	21
4	...	Smls. extr. tube	SB–241	Alclad 3003	H112	...	21
5	...	Plate, sheet	SB–209	A93003	O	0.006–3.000	21
6	...	Plate, sheet	SB–209	A93003	H112	0.250–0.499	21
7	...	Plate, sheet	SB–209	A93003	H112	0.500–2.000	21
8	...	Plate, sheet	SB–209	A93003	H112	2.001–3.000	21
9	...	Drawn smls. tube	SB–210	A93003	O	0.010–0.500	21
10	...	Drawn smls. tube	SB–210	A93003	H113	0.010–0.500	21
11	...	Bar, rod, shapes	SB–221	A93003	O	...	21
12	...	Bar, rod, shapes	SB–221	A93003	H112	...	21
13	...	Smls. extr. tube	SB–241	A93003	O	...	21
14	...	Smls. pipe	SB–241	A93003	H112	≥1.000	21
15	...	Smls. extr. tube	SB–241	A93003	H112	...	21
16	...	Plate, sheet	SB–209	A93004	O	0.006–3.000	22
17	...	Plate, sheet	SB–209	A93004	H112	0.250–3.000	22
18	...	Plate, sheet	SB–209	A95052	O	0.051–3.000	22
19	...	Plate, sheet	SB–209	A95052	H112	0.250–0.499	22
20	...	Plate, sheet	SB–209	A95052	H112	0.500–3.000	22
21	...	Plate, sheet	SB–209	A95083	O	0.051–1.500	25
22	...	Plate, sheet	SB–209	A95083	O	1.501–3.000	25
23	...	Plate, sheet	SB–209	A95083	O	3.001–5.000	25
24	...	Plate, sheet	SB–209	A95083	O	5.001–7.000	25
25	...	Plate, sheet	SB–209	A95083	O	7.001–8.000	25
26	...	Plate, sheet	SB–209	A95083	H112	0.250–1.500	25
27	...	Plate, sheet	SB–209	A95083	H112	1.501–3.000	25
28	...	Bar, rod, shapes	SB–221	A95083	H111	≤5.000	25
29	...	Smls. extr. tube	SB–241	A95083	H111	...	25
30	...	Plate, sheet	SB–209	A95086	O	0.051–2.000	25
31	...	Plate, sheet	SB–209	A95086	H112	0.063–0.499	25
32	...	Plate, sheet	SB–209	A95086	H112	0.500–1.000	25
33	...	Plate, sheet	SB–209	A95086	H112	1.001–2.000	25
34	...	Plate, sheet	SB–209	A95086	H112	2.001–3.000	25
35	...	Plate, sheet	SB–209	A95454	O	0.051–3.000	22
36	...	Plate, sheet	SB–209	A95454	H112	0.250–0.499	22
37	...	Plate, sheet	SB–209	A95454	H112	0.500–3.000	22
38	...	Bar, rod, shapes	SB–221	A95454	O	≤5.000	22
39	...	Bar, rod, shapes	SB–221	A95454	H112	≤5.000	22
40	...	Smls. extr. tube	SB–241	A95454	O	≤5.000	22
41	...	Smls. extr. tube	SB–241	A95454	H112	≤5.000	22
42	...	Plate, sheet	SB–209	A96061	T4	0.051–0.249	23
43	...	Plate, sheet	SB–209	A96061	T451	0.250–3.000	23
44	...	Plate, sheet	SB–209	A96061	T6	0.051–0.249	23
45	...	Plate, sheet	SB–209	A96061	T651	0.250–4.000	23

Table 2B
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Nonferrous Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only)		External Pressure Chart No.	Notes
			III	VIII-2		
1	13	4.5	NP	250	NFA–7	G8
2	13	4.5	NP	250	NFA–7	G8, W2
3	13	4.5	NP	250	NFA–7	G8
4	13	4.5	NP	250	NFA–7	G8, W2
5	14	5	NP	250	NFA–1	G8
6	17	10	NP	250	NFA–1	G8, W2
7	15	6	NP	200	NFA–1	G8, W2
8	14.5	6	NP	200	NFA–1	G8, W2
9	14	5	NP	250	NFA–1	G8
10	14	5	NP	250	NFA–1	G8, W2
11	14	5	NP	250	NFA–1	G2, G8
12	14	5	NP	250	NFA–1	G2, G8, W2
13	14	5	NP	250	NFA–1	G8
14	14	5	NP	250	NFA–1	G8
15	14	5	NP	250	NFA–1	G8, W2
16	22	8.5	NP	250	NFA–3	G8
17	23	9	NP	250	NFA–3	G8, W2
18	25	9.5	NP	200	NFA–8	G8
19	28	16	NP	200	NFA–8	G8, W2
20	25	9.5	NP	200	NFA–8	G8, W2
21	40	18	NP	150	NFA–11	G7, G8
22	39	17	NP	150	NFA–11	G7, G8
23	38	16	NP	150	NFA–11	G7, G8
24	37	15	NP	150	NFA–11	G7, G8
25	36	14	NP	150	NFA–11	G7, G8
26	40	18	NP	150	NFA–11	G7, G8, W2
27	39	17	NP	150	NFA–11	G7, G8, W2
28	40	24	NP	150	NFA–11	G2, G7, G8, W2
29	40	24	NP	150	NFA–11	G7, G8, W2
30	35	14	NP	150	NFA–9	G7, G8
31	36	18	NP	150	NFA–9	G7, G8, W2
32	35	16	NP	150	NFA–9	G7, G8, W2
33	35	14	NP	150	NFA–9	G7, G8, W2
34	34	14	NP	150	NFA–9	G7, G8, W2
35	31	12	NP	250	NFA–6	E2, G8
36	32	18	NP	250	NFA–6	E2, G8, W2
37	31	12	NP	250	NFA–6	E2, G8, W2
38	31	12	NP	250	NFA–6	E2, G2, G8
39	31	12	NP	250	NFA–6	E2, G2, G8, W2
40	31	12	NP	250	NFA–6	E2, G8
41	31	12	NP	250	NFA–6	E2, G8, W2
42	30	16	NP	300	NFA–13	G8, G9, W3
43	30	16	NP	300	NFA–13	G8, G9, W3
44	42	35	NP	300	NFA–12	G8, G9, W3
45	42	35	NP	300	NFA–12,13	G8, G9, W3

Table 2B
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Nonferrous Materials

Line No.	Design Stress Intensity or Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding														
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
1	3.0	3.0	3.0	2.7	...	...	...	...	...	...	...	...	...	...	...
2	3.0	3.0	3.0	2.7	...	...	...	...	...	...	...	...	...	...	...
3	3.0	3.0	3.0	2.7	...	...	...	...	...	...	...	...	...	...	...
4	3.0	3.0	3.0	2.7	...	...	...	...	...	...	...	...	...	...	...
5	3.3	3.3	3.3	3.0	...	...	...	...	...	...	...	...	...	...	...
6	5.7	5.7	5.7	5.3	...	...	...	...	...	...	...	...	...	...	...
7	4.0	4.0	4.0	...	...	...	...	...	...	...	...	...	...	...	...
8	4.0	4.0	4.0	...	...	...	...	...	...	...	...	...	...	...	...
9	3.3	3.3	3.3	3.0	...	...	...	...	...	...	...	...	...	...	...
10	3.3	3.3	3.3	3.0	...	...	...	...	...	...	...	...	...	...	...
11	3.3	3.3	3.3	3.0	...	...	...	...	...	...	...	...	...	...	...
12	3.3	3.3	3.3	3.0	...	...	...	...	...	...	...	...	...	...	...
13	3.3	3.3	3.3	3.0	...	...	...	...	...	...	...	...	...	...	...
14	3.3	3.3	3.3	3.0	...	...	...	...	...	...	...	...	...	...	...
15	3.3	3.3	3.3	3.0	...	...	...	...	...	...	...	...	...	...	...
16	5.7	5.7	5.7	5.5	...	...	...	...	...	...	...	...	...	...	...
17	6.0	6.0	6.0	5.8	...	...	...	...	...	...	...	...	...	...	...
18	6.3	6.3	6.3	...	...	...	...	...	...	...	...	...	...	...	...
19	9.3	9.3	9.3	...	...	...	...	...	...	...	...	...	...	...	...
20	6.3	6.3	6.3	...	...	...	...	...	...	...	...	...	...	...	...
21	12.0	12.0	...	...	...	...	...	...	...	...	...	...	...	...	...
22	11.4	11.3	...	...	...	...	...	...	...	...	...	...	...	...	...
23	10.7	10.7	...	...	...	...	...	...	...	...	...	...	...	...	...
24	10.0	10.0	...	...	...	...	...	...	...	...	...	...	...	...	...
25	9.3	9.3	...	...	...	...	...	...	...	...	...	...	...	...	...
26	12.0	12.0	...	...	...	...	...	...	...	...	...	...	...	...	...
27	11.3	11.3	...	...	...	...	...	...	...	...	...	...	...	...	...
28	13.3	13.3	...	...	...	...	...	...	...	...	...	...	...	...	...
29	13.3	13.3	...	...	...	...	...	...	...	...	...	...	...	...	...
30	9.3	9.1	...	...	...	...	...	...	...	...	...	...	...	...	...
31	12.0	11.8	...	...	...	...	...	...	...	...	...	...	...	...	...
32	10.7	10.5	...	...	...	...	...	...	...	...	...	...	...	...	...
33	9.3	9.1	...	...	...	...	...	...	...	...	...	...	...	...	...
34	9.3	9.1	...	...	...	...	...	...	...	...	...	...	...	...	...
35	8.0	8.0	8.0	**7.5**	...	...	...	...	...	...	...	...	...	...	...
36	10.7	10.7	10.7	**7.5**	...	...	...	...	...	...	...	...	...	...	...
37	8.0	8.0	8.0	**7.5**	...	...	...	...	...	...	...	...	...	...	...
38	8.0	8.0	8.0	**7.5**	...	...	...	...	...	...	...	...	...	...	...
39	8.0	8.0	8.0	**7.5**	...	...	...	...	...	...	...	...	...	...	...
40	8.0	8.0	8.0	**7.5**	...	...	...	...	...	...	...	...	...	...	...
41	8.0	8.0	8.0	**7.5**	...	...	...	...	...	...	...	...	...	...	...
42	10.0	10.0	10.0	8.6	8.1	...	...	...	...	...	...	...	...	...	...
43	10.0	10.0	10.0	8.6	8.1	...	...	...	...	...	...	...	...	...	...
44	14.0	14.0	14.0	13.4	11.3	...	...	...	...	...	...	...	...	...	...
45	14.0	14.0	14.0	13.4	11.3	...	...	...	...	...	...	...	...	...	...

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Table 2B (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/ Thickness, in.	P-No.
	1	...	Plate, sheet	SB–209	A96061	T651	4.001–6.000	23
	2	...	Drawn smls. tube	SB–210	A96061	T4	0.025–0.500	23
	3	...	Drawn smls. tube	SB–210	A96061	T6	0.025–0.500	23
	4	...	Bar, rod, shapes	SB–221	A96061	T4	...	23
	5	...	Bar, rod, shapes	SB–221	A96061	T6	...	23
	6	...	Smls. extr. tube/pipe	SB–241	A96061	T4	...	23
	7	...	Smls. extr. tube/pipe	SB–241	A96061	T6	...	23
	8	...	Smls. drawn pipe	SB–241	A96061	T6	<1 NPS	23
	9	...	Smls. drawn pipe	SB–241	A96061	T6	≥1 NPS	23
	10	...	Shapes	SB–308	A96061	T6	...	23
	11	...	Drawn smls. tube	SB–210	A96063	T6	0.025–0.500	23
	12	...	Bar, rod, shapes	SB–221	A96063	T5	≤0.500	23
	13	...	Bar, rod, shapes	SB–221	A96063	T5	0.501–1.000	23
	14	...	Bar, rod, shapes	SB–221	A96063	T6	≤1.000	23
	15	...	Smls. extr. tube	SB–241	A96063	T5	≤0.500	23
	16	...	Smls. extr. tube	SB–241	A96063	T5	0.501–1.000	23
	17	...	Smls. extr. tube	SB–241	A96063	T6	≤1.000	23
	18	...	Bar, rod	SB–187	C10200	O60	All	31
	19	...	Bar, rod	SB–187	C11000	O60	All	31
	20	...	Smls. tube	SB–111	C28000	O61	...	32
	21	...	Smls. tube	SB–111	C44300	O61	...	32
	22	...	Smls. tube	SB–111	C44400	O61	...	32
	23	...	Smls. tube	SB–111	C44500	O61	...	32
(**21**)	24	...	Plate	SB–171	C46400	M10, M20, O20, O25	3 < t ≤ 5	32
(**21**)	25	...	Plate	SB–171	C46400	M10, M20, O20, O25	≤3	32
	26	...	Smls. tube	SB–111	C60800	O61	...	35
	27	...	Plate, sheet	SB–169	C61400	O25 or O60	2 < t ≤ 5	35
	28	...	Plate, sheet	SB–169	C61400	O25 or O60	≤2	35
	29	...	Plate, sheet	SB–96	C65500	O61	≤2	33
(**21**)	30	...	Plate	SB–171	C70600	M10, M20, O20, O25	≤5	34
(**21**)	31	...	Plate	SB–171	C70600	M10, M20, O20, O25	≤5	34
	32	...	Cond. tube	SB–111	C70600	O61	...	34
(**21**)	33	...	Cond. tube	SB–111	C70600	O61	...	34
	34	...	Smls. U–bend tube	SB–395	C70600	O61	...	34
(**21**)	35	...	Smls. U–bend tube	SB–395	C70600	O61	...	34
(**21**)	36	...	Plate	SB–171	C70620	M10, M20, O20, O25	≤5	34
(**21**)	37	...	Plate	SB–171	C70620	M10, M20, O20, O25	≤5	34
(**21**)	38	...	Cond. tube	SB–111	C70620	O61	...	34
(**21**)	39	...	Cond. tube	SB–111	C70620	O61	...	34
(**21**)	40	...	Smls. U–bend tube	SB–395	C70620	O61	...	34
(**21**)	41	...	Smls. U–bend tube	SB–395	C70620	O61	...	34
(**21**)	42	...	Plate	SB–171	C71500	M10, M20, O20, O25	$2\frac{1}{2}$ < t ≤ 5	34
(**21**)	43	...	Plate	SB–171	C71500	M10, M20, O20, O25	$2\frac{1}{2}$ < t ≤ 5	34
(**21**)	44	...	Plate	SB–171	C71500	M10, M20, O20, O25	≤$2\frac{1}{2}$	34
(**21**)	45	...	Plate	SB–171	C71500	M10, M20, O20, O25	≤$2\frac{1}{2}$	34

Table 2B (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Nonferrous Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only)		External Pressure Chart No.	Notes
			III	VIII-2		
1	40	35	NP	300	NFA–12,13	G8, G9, W3
2	30	16	NP	300	NFA–13	G8, W3
3	42	35	NP	300	NFA–12,13	G8, W3
4	26	16	NP	300	NFA–13	G2, G8, G9, W3
5	38	35	NP	300	NFA–12,13	G2, G8, G9, W3
6	26	16	NP	300	NFA–13	G8, G9, W3
7	38	35	NP	300	NFA–12,13	G8, G9, W3
8	42	35	NP	300	NFA–12,13	G8, W3
9	38	35	NP	300	NFA–12,13	G8, W3
10	38	35	NP	300	NFA–12,13	G2, G8, W3
11	33	28	NP	300	NFA–1	G8, W3
12	22	16	NP	300	NFA–1	E2, G2, G8, W3
13	21	15	NP	300	NFA–1	E2, G2, G8, W3
14	30	25	NP	300	NFA–1	G2, G8, W3
15	22	16	NP	300	NFA–1	E2, G8, W3
16	21	15	NP	300	NFA–1	E2, G8, W3
17	30	25	NP	300	NFA–1	G8, W3
18	28	8	NP	300	NFC–1	G4
19	28	8	NP	300	NFC–1	G4
20	50	20	NP	500	NFC–3	E3, G4, G6
21	45	15	NP	500	NFC–2	E3, G4, G6
22	45	15	NP	500	NFC–2	E3, G4, G6
23	45	15	NP	500	NFC–2	E3, G4, G6
24	50	18	NP	100	NFC–2	G4
25	50	20	NP	100	NFC–2	G4
26	50	19	NP	100	NFC–3	G4, G6
27	65	28	NP	500	NFC–8	G4
28	70	30	NP	500	NFC–8	G4
29	50	18	NP	350	NFC–2	G4, G10
30	40	15	NP	450	NFC–3	G4
31	40	15	NP	450	NFC–3	G1, G4
32	40	15	NP	450	NFC–3	G4
33	40	15	NP	450	NFC–3	G1, G4
34	40	15	NP	450	NFC–3	G4
35	40	15	NP	450	NFC–3	G1, G4
36	40	15	NP	450	NFC–3	G4
37	40	15	NP	450	NFC–3	G1, G4
38	40	15	NP	450	NFC–3	G4
39	40	15	NP	450	NFC–3	G1, G4
40	40	15	NP	450	NFC–3	G4
41	40	15	NP	450	NFC–3	G1, G4
42	45	18	500	650	NFC–4	G4
43	45	18	500	650	NFC–4	G1, G4
44	50	20	500	650	NFC–4	G4
45	50	20	500	650	NFC–4	G1, G4

Table 2B (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Nonferrous Materials

Line No.	Design Stress Intensity or Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding															
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	
1	13.3	13.3	13.3	12.8	10.8	...	...	...	...	...	...	...	...	...	...	
2	10.0	10.0	10.0	8.6	8.1	...	...	...	...	...	...	...	...	...	...	
3	14.0	14.0	14.0	13.4	11.3	...	...	...	...	...	...	...	...	...	...	
4	8.7	8.7	8.7	8.5	8.0	...	...	...	...	...	...	...	...	...	...	
5	12.7	12.7	12.7	12.1	10.2	...	...	...	...	...	...	...	...	...	...	
6	8.7	8.7	8.7	8.5	8.0	...	...	...	...	...	...	...	...	...	...	
7	12.7	12.7	12.7	12.1	10.2	...	...	...	...	...	...	...	...	...	...	
8	14.0	14.0	14.0	13.4	11.3	...	...	...	...	...	...	...	...	...	...	
9	12.7	12.7	12.7	12.1	10.2	...	...	...	...	...	...	...	...	...	...	
10	12.7	12.7	12.7	12.1	10.2	...	...	...	...	...	...	...	...	...	...	
11	11.0	11.0	11.0	8.7	6.4	...	...	...	...	...	...	...	...	...	...	
12	7.3	7.3	7.3	**5.1**	**4.6**	...	...	...	...	...	...	...	...	...	...	
13	7.0	7.0	7.0	**4.9**	**4.4**	...	...	...	...	...	...	...	...	...	...	
14	10.0	10.0	10.0	7.9	5.8	...	...	...	...	...	...	...	...	...	...	
15	7.3	7.3	7.3	**5.1**	**4.6**	...	...	...	...	...	...	...	...	...	...	
16	7.0	7.0	7.0	**4.9**	**4.4**	...	...	...	...	...	...	...	...	...	...	
17	10.0	10.0	10.0	7.9	5.8	...	...	...	...	...	...	...	...	...	...	
18	5.3	4.5	4.3	4.2	4.0	...	...	...	...	...	...	...	...	...	...	
19	5.3	4.5	4.3	4.2	4.0	...	...	...	...	...	...	...	...	...	...	
20	13.3	13.3	13.3	13.3	13.3	10.8	**5.3**	**2.0**	**1.0**	...	...	...	...	...	...	
21	10.0	10.0	10.0	10.0	10.0	9.8	**3.5**	**2.0**	**1.0**	...	...	...	...	...	...	
22	10.0	10.0	10.0	10.0	10.0	9.8	**3.5**	**2.0**	**1.0**	...	...	...	...	...	...	
23	10.0	10.0	10.0	10.0	10.0	9.8	**3.5**	**2.0**	**1.0**	...	...	...	...	...	...	
24	12.0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
25	13.3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
26	12.7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	18.7	18.6	18.5	18.3	18.2	18.1	17.9	17.5	17.0	...	...	...	...	...	...	
28	20.0	19.9	19.8	19.7	19.5	19.4	19.2	18.4	18.3	...	...	...	...	...	...	
29	12.0	11.9	11.7	11.7	10.0	5.0	...	...	...	...	...	...	...	...	...	
30	10.0	9.7	9.5	9.3	9.0	8.8	8.7	8.5	...	...	...	...	...	...	...	(**21**)
31	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	...	...	...	...	...	...	...	(**21**)
32	10.0	9.7	9.5	9.3	9.0	8.8	8.7	8.5	...	...	...	...	...	...	...	
33	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	...	...	...	...	...	...	...	(**21**)
34	10.0	9.7	9.5	9.3	9.0	8.8	8.7	8.5	...	...	...	...	...	...	...	
35	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	...	...	...	...	...	...	...	(**21**)
36	10.0	9.7	9.5	9.3	9.0	8.8	8.7	8.5	...	...	...	...	...	...	...	(**21**)
37	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	...	...	...	...	...	...	...	(**21**)
38	10.0	9.7	9.5	9.3	9.0	8.8	8.7	8.5	...	...	...	...	...	...	...	(**21**)
39	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	...	...	...	...	...	...	...	(**21**)
40	10.0	9.7	9.5	9.3	9.0	8.8	8.7	8.5	...	...	...	...	...	...	...	(**21**)
41	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	...	...	...	...	...	...	...	(**21**)
42	12.0	11.6	11.3	11.0	10.8	10.5	10.3	10.1	9.9	9.8	9.6	9.5	...	...	...	(**21**)
43	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	...	...	...	(**21**)
44	13.3	12.9	12.6	12.3	12.0	11.7	11.5	11.2	11.0	10.8	10.7	10.6	...	...	...	(**21**)
45	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	...	...	...	(**21**)

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Table 2B (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/ Thickness, in.	P-No.
(**21**)	1	...	...	...	...	...	...	...
(**21**)	2	...	...	...	...	...	...	...
(**21**)	3	...	Cond. tube	SB–111	C71500	O61	...	34
(**21**)	4	...	Cond. tube	SB–111	C71500	O61	...	34
	5	...	Smls. U–bend tube	SB–395	C71500	O61	...	34
	6	...	Smls. U–bend tube	SB–395	C71500	O61	...	34
	7	...	Smls. tube	SB–111	C71500	HR50	...	34
(**21**)	8	...	Plate	SB–171	C71520	M10, M20, O20, O25	$2\frac{1}{2} < t \le 5$	34
(**21**)	9	...	Plate	SB–171	C71520	M10, M20, O20, O25	$2\frac{1}{2} < t \le 5$	34
(**21**)	10	...	Plate	SB–171	C71520	M10, M20, O20, O25	$\le 2\frac{1}{2}$	34
(**21**)	11	...	Plate	SB–171	C71520	M10, M20, O20, O25	$\le 2\frac{1}{2}$	34
(**21**)	12	...	Smls. tube	SB–111	C71520	O61	...	34
(**21**)	13	...	Smls. tube	SB–111	C71520	O61	...	34
(**21**)	14	...	Smls. U–bend tube	SB–395	C71520	O61	...	34
(**21**)	15	...	Smls. U–bend tube	SB–395	C71520	O61	...	34
(**21**)	16	...	Smls. tube	SB–111	C71520	HR50	...	34
(**21**)	17	...	...	...	...	...	...	...
(**21**)	18	...	Castings	SB–584	C93700	M01 or M07	...	...
(**21**)	19	...	Castings	SB–584	C93700	M01 or M07	...	...
	20	99Ni	Smls. pipe & tube	SB–161	N02200	Annealed	>5 O.D.	41
	21	99Ni	Bar, rod	SB–160	N02200	Annealed	...	41
	22	99Ni	Smls. pipe & tube	SB–161	N02200	Annealed	≤5 O.D.	41
	23	99Ni	Plate, sheet, strip	SB–162	N02200	Annealed	...	41
	24	99Ni	Smls. tube	SB–163	N02200	Annealed	...	41
	25	99Ni	Plate, sheet, strip	SB–162	N02200	As rolled	...	41
	26	99Ni–Low C	Bar, rod	SB–160	N02201	Annealed	...	41
	27	99Ni–Low C	Smls. pipe & tube	SB–161	N02201	Annealed	>5 O.D.	41
	28	99Ni–Low C	Bar, rod	SB–160	N02201	Hot fin.	...	41
	29	99Ni–Low C	Smls. pipe & tube	SB–161	N02201	Annealed	≤5 O.D.	41
	30	99Ni–Low C	Plate, sheet, strip	SB–162	N02201	Annealed	...	41
	31	99Ni–Low C	Smls. tube	SB–163	N02201	Annealed	...	41
	32	67Ni–30Cu	Bar, rod	SB–164	N04400	Annealed	...	42
	33	67Ni–30Cu	Smls. pipe & tube	SB–165	N04400	Annealed	>5 O.D.	42
	34	67Ni–30Cu	Forgings	SB–564	N04400	Annealed	...	42
	35	67Ni–30Cu	Plate	SB–127	N04400	Annealed	...	42
	36	67Ni–30Cu	Smls. tube	SB–163	N04400	Annealed	...	42
	37	67Ni–30Cu	Smls. pipe & tube	SB–165	N04400	Annealed	≤5 O.D.	42
	38	67Ni–30Cu	Bar, rod	SB–164	N04400	Hot worked	...	42
	39	67Ni–30Cu	Plate	SB–127	N04400	As rolled	...	42
	40	67Ni–30Cu	Bar	SB–164	N04400	Hot worked	...	42
	41	67Ni–30Cu	Smls. tube	SB–163	N04400	Stress rel.	...	42
	42	67Ni–30Cu	Smls. pipe & tube	SB–165	N04400	Stress rel.	...	42
	43	67Ni–30Cu–S	Bar, rod	SB–164	N04405	Annealed	...	42
	44	67Ni–30Cu–S	Bar, rod	SB–164	N04405	Hot worked	...	42
	45	47Ni–22Cr–9Mo–18Fe	Plate	SB–435	N06002	Annealed	$\frac{3}{16} < t \le 2\frac{1}{2}$	43

Table 2B (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Nonferrous Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only)		External Pressure Chart No.	Notes
			III	VIII-2		
1	...	...	...	...	...	...
2	...	...	...	...	...	...
3	52	18	500	650	NFC–4	G4
4	52	18	500	650	NFC–4	G1, G4
5	52	18	NP	650	NFC–4	G4
6	52	18	NP	650	NFC–4	G1, G4
7	72	50	500	NP	NFC–4	...
8	45	18	500	650	NFC–4	G4
9	45	18	500	650	NFC–4	G1, G4
10	50	20	500	650	NFC–4	G4
11	50	20	500	650	NFC–4	G1, G4
12	52	18	500	650	NFC–4	G4
13	52	18	500	650	NFC–4	G1, G4
14	52	18	NP	650	NFC–4	G4
15	52	18	NP	650	NFC–4	G1, G4
16	72	50	500	500	NFC–4	...
17	...	...	...	...	...	...
18	30	12	400 (SPT)	NP	NFC–1	...
19	30	12	400 (SPT)	NP	NFC–1	G1
20	55	12	NP	600	NFN–2	G4
21	55	15	NP	600	NFN–2	G2, G4
22	55	15	NP	600	NFN–2	G4
23	55	15	NP	600	NFN–2	G4
24	55	15	NP	600	NFN–2	G4
25	55	20	NP	600	NFN–2	G4
26	50	10	NP	800	NFN–1	G2, G4
27	50	10	NP	800	NFN–1	G4
28	50	10	NP	800	NFN–1	G2, G4
29	50	12	NP	800	NFN–1	E1, G4
30	50	12	NP	800	NFN–1	E1, G4
31	50	12	NP	800	NFN–1	E1, G4
32	70	25	800	800	NFN–3	G1, G2, G4
33	70	25	800	800	NFN–3	G1, G4
34	70	25	800	800	NFN–3	G1, G2, G4
35	70	28	800	800	NFN–3	G1, G4
36	70	28	800	800	NFN–3	G1, G4
37	70	28	800	800	NFN–3	G1, G4
38	75	30	800	NP	NFN–3	E1, G1
39	75	40	800	800	NFN–3	E1, G1, G4
40	75	40	800	NP	NFN–3	E1, G1
41	85	55	500	800	NFN–3	E4, G1, G4, W1
42	85	55	500	NP	NFN–3	G1
43	70	25	800	800	NFN–3	G1, G2, G4
44	75	35	800	NP	NFN–3	G1
45	95	35	800	800	NFN–15	G1, G4

Table 2B (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Nonferrous Materials

Line No.	Design Stress Intensity or Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding															
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
3	12.0	11.6	11.3	11.0	10.8	10.5	10.3	10.1	9.9	9.8	9.6	9.5	...	...	...	(**21**)
4	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	...	...	...	(**21**)
5	12.0	11.6	11.3	11.0	10.8	10.5	10.3	10.1	9.9	9.8	9.6	9.5	...	...	...	
6	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	...	...	...	
7	24.0	24.0	24.0	24.0	24.0	23.5	23.0	22.5	22.0	...	...	...	...	...	...	
8	12.0	11.6	11.3	11.0	10.8	10.5	10.3	10.1	9.9	9.8	9.6	9.5	...	...	...	(**21**)
9	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	...	...	...	(**21**)
10	13.3	12.9	12.6	12.3	12.0	11.7	11.5	11.2	11.0	10.8	10.7	10.6	...	...	...	(**21**)
11	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	...	...	...	(**21**)
12	12.0	11.6	11.3	11.0	10.8	10.5	10.3	10.1	9.9	9.8	9.6	9.5	...	...	...	(**21**)
13	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	...	...	...	(**21**)
14	12.0	11.6	11.3	11.0	10.8	10.5	10.3	10.0	9.9	9.8	9.6	9.5	...	...	...	(**21**)
15	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	...	...	...	(**21**)
16	24.0	24.0	24.0	24.0	24.0	23.5	23.0	22.5	22.0	9.8	9.6	9.5	...	...	...	(**21**)
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
18	8.0	7.4	7.1	7.0	6.8	6.7	6.7	...	...	...	...	...	...	...	...	(**21**)
19	8.0	8.0	8.0	8.0	8.0	8.0	8.0	...	...	...	...	...	...	...	...	(**21**)
20	8.0	...	8.0	...	8.0	...	8.0	...	8.0	...	8.0	...	...	...	...	
21	10.0	...	10.0	...	10.0	...	10.0	...	10.0	...	10.0	...	...	...	...	
22	10.0	...	10.0	...	10.0	...	10.0	...	10.0	...	10.0	...	...	...	...	
23	10.0	...	10.0	...	10.0	...	10.0	...	10.0	...	10.0	...	...	...	...	
24	10.0	...	10.0	...	10.0	...	10.0	...	10.0	...	10.0	...	...	...	...	
25	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.1	12.6	12.0	11.5	...	...	...	...	
26	6.7	6.5	6.4	6.3	6.3	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.1	6.0	
27	6.7	6.5	6.4	6.3	6.3	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.1	6.0	
28	6.7	6.5	6.4	6.3	6.3	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.1	6.0	
29	8.0	7.8	7.7	7.6	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.4	7.4	**7.2**	
30	8.0	7.8	7.7	7.6	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.4	7.4	**7.2**	
31	8.0	7.8	7.7	7.6	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.4	7.4	**7.2**	
32	16.7	15.3	14.6	14.0	13.6	13.3	13.2	13.1	13.1	13.1	13.1	13.1	13.0	12.9	12.7	
33	16.7	15.3	14.6	14.0	13.6	13.3	13.2	13.1	13.1	13.1	13.1	13.1	13.0	12.9	12.7	
34	16.7	15.3	14.6	14.0	13.6	13.3	13.2	13.1	13.1	13.1	13.1	13.1	13.0	12.9	12.7	
35	18.7	17.2	16.4	15.7	15.2	14.9	14.7	14.7	14.7	14.7	14.7	14.7	14.6	14.5	14.3	
36	18.7	17.2	16.4	15.7	15.2	14.9	14.7	14.7	14.7	14.7	14.7	14.7	14.6	14.5	14.3	
37	18.7	17.2	16.4	15.7	15.2	14.9	14.7	14.7	14.7	14.7	14.7	14.7	14.6	14.5	14.3	
38	20.0	19.7	19.4	19.0	18.6	18.2	17.9	17.7	17.6	17.5	17.3	17.2	17.0	16.8	**15.2**	
39	25.0	25.0	25.0	25.0	24.8	24.3	23.9	23.7	23.4	23.3	23.1	22.9	22.7	20.9	**20.3**	
40	25.0	25.0	25.0	25.0	24.8	24.3	23.9	23.7	23.4	23.3	23.1	22.9	22.7	20.9	**20.3**	
41	28.3	28.3	28.3	28.3	28.3	28.3	28.3	28.3	28.3	28.2	27.9	27.4	26.6	**18.0**	**12.7**	
42	28.3	28.3	28.3	28.3	28.3	28.3	28.3	28.3	28.3	...	...	...	...	...	...	
43	16.7	15.3	14.6	14.0	13.6	13.3	13.2	13.1	13.1	13.1	13.1	13.1	13.0	12.9	12.7	
44	23.3	...	20.6	...	19.2	...	18.5	...	18.5	...	18.5	18.5	18.5	18.2	17.6	
45	23.3	21.9	21.0	20.1	19.2	18.4	17.7	17.1	16.5	16.1	15.7	15.3	15.1	14.9	14.7	

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Table 2B (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/ Thickness, in.	P-No.
1	47Ni–22Cr–9Mo–18Fe	Sheet	SB–435	N06002	Annealed	$^1/_{16} < t \le {}^3/_{16}$	43
2	47Ni–22Cr–9Mo–18Fe	Rod	SB–572	N06002	Solution ann.	$\ge {}^3/_{16}$	43
3	47Ni–22Cr–9Mo–18Fe	Wld. pipe	SB–619	N06002	Solution ann.	...	43
4	47Ni–22Cr–9Mo–18Fe	Wld. pipe	SB–619	N06002	Solution ann.	...	43
5	47Ni–22Cr–9Mo–18Fe	Smls. pipe & tube	SB–622	N06002	Solution ann.	...	43
6	47Ni–22Cr–9Mo–18Fe	Wld. tube	SB–626	N06002	Solution ann.	...	43
7	47Ni–22Cr–9Mo–18Fe	Wld. tube	SB–626	N06002	Solution ann.	...	43
8	47Ni–22Cr–19Fe–6Mo	Rod	SB–581	N06007	Solution ann.	$> {}^3/_4$	45
9	47Ni–22Cr–19Fe–6Mo	Plate, sheet, strip	SB–582	N06007	Solution ann.	$> {}^3/_4$	45
10	47Ni–22Cr–19Fe–6Mo	Rod	SB–581	N06007	Solution ann.	$^5/_{16} < t \le {}^3/_4$	45
11	47Ni–22Cr–19Fe–6Mo	Plate, sheet, strip	SB–582	N06007	Solution ann.	$^3/_{16} < t \le {}^3/_4$	45
12	47Ni–22Cr–19Fe–6Mo	Wld. pipe	SB–619	N06007	Solution ann.	...	45
13	47Ni–22Cr–19Fe–6Mo	Smls. pipe & tube	SB–622	N06007	Solution ann.	...	45
14	47Ni–22Cr–19Fe–6Mo	Wld. tube	SB–626	N06007	Solution ann.	...	45
15	55Ni–21Cr–13.5Mo	Smls. & wld. fittings	SB–366	N06022	Solution ann.	...	43
16	55Ni–21Cr–13.5Mo	Forgings	SB–462	N06022	Solution ann.	...	43
17	55Ni–21Cr–13.5Mo	Forgings	SB–564	N06022	Solution ann.	...	43
18	55Ni–21Cr–13.5Mo	Rod	SB–574	N06022	Solution ann.	...	43
19	55Ni–21Cr–13.5Mo	Plate, sheet, strip	SB–575	N06022	Solution ann.	...	43
20	55Ni–21Cr–13.5Mo	Wld. pipe	SB–619	N06022	Solution ann.	...	43
21	55Ni–21Cr–13.5Mo	Smls. pipe & tube	SB–622	N06022	Solution ann.	...	43
22	55Ni–21Cr–13.5Mo	Wld. tube	SB–626	N06022	Solution ann.	...	43
23	59Ni–23Cr–16Mo	Wld. fittings	SB–366	N06059	Solution ann.	...	43
24	59Ni–23Cr–16Mo	Smls. fittings	SB–366	N06059	Solution ann.	...	43
25	59Ni–23Cr–16Mo	Wld. fittings	SB–366	N06059	Solution ann.	...	43
26	59Ni–23Cr–16Mo	Forged fittings	SB–462	N06059	Solution ann.	...	43
27	59Ni–23Cr–16Mo	Forgings	SB–564	N06059	Solution ann.	...	43
28	59Ni–23Cr–16Mo	Bar, rod	SB–574	N06059	Solution ann.	...	43
29	59Ni–23Cr–16Mo	Plate, sheet, strip	SB–575	N06059	Solution ann.	...	43
30	59Ni–23Cr–16Mo	Wld. pipe	SB–619	N06059	Solution ann.	...	43
31	59Ni–23Cr–16Mo	Wld. pipe	SB–619	N06059	Solution ann.	...	43
32	59Ni–23Cr–16Mo	Smls. pipe & tube	SB–622	N06059	Solution ann.	...	43
33	59Ni–23Cr–16Mo	Wld. tube	SB–626	N06059	Solution ann.	...	43
34	59Ni–23Cr–16Mo	Wld. tube	SB–626	N06059	Solution ann.	...	43
35	61Ni–16Mo–16Cr	Rod	SB–574	N06455	Solution ann.	...	43
36	61Ni–16Mo–16Cr	Plate, sheet, strip	SB–575	N06455	Solution ann.	...	43
37	61Ni–16Mo–16Cr	Wld. pipe	SB–619	N06455	Solution ann.	...	43
38	61Ni–16Mo–16Cr	Wld. pipe & tube	SB–622	N06455	Solution ann.	...	43
39	61Ni–16Mo–16Cr	Wld. tube	SB–626	N06455	Solution ann.	...	43
40	72Ni–15Cr–8Fe	Smls. pipe & tube	SB–167	N06600	Hot fin.	>5 O.D.	43
41	72Ni–15Cr–8Fe	Smls. pipe & tube	SB–167	N06600	Cold worked/ann.	>5 O.D.	43
42	72Ni–15Cr–8Fe	Smls. tube	SB–163	N06600	Annealed	...	43
43	72Ni–15Cr–8Fe	Bar, rod	SB–166	N06600	Annealed	...	43
44	72Ni–15Cr–8Fe	Smls. pipe & tube	SB–167	N06600	Cold worked/ann.	≤5 O.D.	43
45	72Ni–15Cr–8Fe	Plate	SB–168	N06600	Annealed	...	43

Table 2B (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Nonferrous Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only)		External Pressure Chart No.	Notes
			III	VIII-2		
1	95	35	800	800	NFN–15	G1, G4
2	95	35	800	800	NFN–15	G1, G2, G4
3	100	40	800	NP	NFN–15	G1
4	100	40	NP	800	NFN–15	G1, G4, G5
5	100	40	800	800	NFN–15	G1, G4
6	100	40	800	NP	NFN–15	G1
7	100	40	NP	800	NFN–15	G1, G4, G5
8	85	30	NP	800	NFN–11	G1, G2, G4
9	85	30	NP	800	NFN–11	G1, G4
10	90	35	NP	800	NFN–11	G1, G2, G4
11	90	35	NP	800	NFN–11	G1, G4
12	90	35	NP	800	NFN–11	G1, G4, G5
13	90	35	NP	800	NFN–11	G1, G4
14	90	35	NP	800	NFN–11	G1, G4, G5
15	100	45	800	800	NFN–10	G1
16	100	45	800	800	NFN–10	G1
17	100	45	800	800	NFN–10	G1
18	100	45	800	800	NFN–10	G1
19	100	45	800	800	NFN–10	G1
20	100	45	800	800	NFN–10	G1
21	100	45	800	800	NFN–10	G1
22	100	45	800	800	NFN–10	G1
23	100	45	800	NP	NFN–14	G1, G4
24	100	45	800	800	NFN–14	G1, G4
25	100	45	NP	800	NFN–14	G1, G4, G5
26	100	45	800	800	NFN–14	G1, G4
27	100	45	800	800	NFN–14	G1, G4
28	100	45	800	800	NFN–14	G1, G4
29	100	45	800	800	NFN–14	G1, G4
30	100	45	800	NP	NFN–14	G1, G4
31	100	45	NP	800	NFN–14	G1, G4, G5
32	100	45	800	800	NFN–14	G1, G4
33	100	45	800	NP	NFN–14	G1, G4
34	100	45	NP	800	NFN–14	G1, G4, G5
35	100	40	NP	800	NFN–14	G1, G2, G4
36	100	40	NP	800	NFN–14	G1, G4
37	100	40	NP	800	NFN–14	G1, G4, G5
38	100	40	NP	800	NFN–14	G1, G4
39	100	40	NP	800	NFN–14	G1, G4, G5
40	75	25	800	NP	NFN–4	G1
41	80	30	800	800	NFN–4	G1, G4
42	80	35	800	800	NFN–4	G1, G4
43	80	35	800	800	NFN–4	G1, G2, G4
44	80	35	800	800	NFN–4	G1, G4
45	80	35	800	800	NFN–4	G1, G4

Table 2B (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Nonferrous Materials

Line No.	Design Stress Intensity or Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding														
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
1	23.3	21.9	21.0	20.1	19.2	18.4	17.7	17.1	16.5	16.1	15.7	15.3	15.1	14.9	14.7
2	23.3	21.9	21.0	20.1	19.2	18.4	17.7	17.1	16.5	16.1	15.7	15.3	15.1	14.9	14.7
3	26.7	25.0	24.0	22.9	22.0	21.1	20.3	19.5	18.9	18.4	17.9	17.5	17.2	17.0	16.8
4	22.7	21.3	20.4	19.5	18.7	17.9	17.2	16.6	16.1	15.6	15.2	14.9	14.6	14.4	14.3
5	26.7	25.0	24.0	22.9	22.0	21.1	20.3	19.5	18.9	18.4	17.9	17.5	17.2	17.0	16.8
6	26.7	25.0	24.0	22.9	22.0	21.1	20.3	19.5	18.9	18.4	17.9	17.5	17.2	17.0	16.8
7	22.7	21.3	20.4	19.5	18.7	17.9	17.2	16.6	16.1	15.6	15.2	14.9	14.6	14.4	14.3
8	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.8	19.5	19.2	19.0	18.8	18.7
9	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.8	19.5	19.2	19.0	18.8	18.7
10	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.1	22.7	22.4	22.2	22.0	21.8
11	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.1	22.7	22.4	22.2	22.0	21.8
12	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.6	19.3	19.1	18.8	18.7	18.5
13	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.1	22.7	22.4	22.2	22.0	21.8
14	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.6	19.3	19.1	18.8	18.7	18.5
15	30.0	...	30.0	...	30.0	...	30.0	...	29.0	...	27.6	27.0	26.5	26.1	25.7
16	30.0	...	30.0	...	30.0	...	30.0	...	29.0	...	27.6	27.0	26.5	26.1	25.7
17	30.0	...	30.0	...	30.0	...	30.0	...	29.0	...	27.6	27.0	26.5	26.1	25.7
18	30.0	...	30.0	...	30.0	...	30.0	...	29.0	...	27.6	27.0	26.5	26.1	25.7
19	30.0	...	30.0	...	30.0	...	30.0	...	29.0	...	27.6	27.0	26.5	26.1	25.7
20	25.5	...	25.5	...	25.5	...	25.5	...	24.7	...	23.5	23.0	22.5	22.2	21.8
21	30.0	...	30.0	...	30.0	...	30.0	...	29.0	...	27.6	27.0	26.5	26.1	25.7
22	25.5	...	25.5	...	25.5	...	25.5	...	24.7	...	23.5	23.0	22.5	22.2	21.8
23	30.0	...	30.0	...	30.0	...	30.0	...	30.0	...	28.9	28.1	27.3	26.5	25.7
24	30.0	...	30.0	...	30.0	...	30.0	...	30.0	...	28.9	28.1	27.3	26.5	25.7
25	25.5	...	25.5	...	25.5	...	25.5	...	25.5	...	24.6	23.9	23.2	22.5	21.8
26	30.0	...	30.0	...	30.0	...	30.0	...	30.0	...	28.9	28.1	27.3	26.5	25.7
27	30.0	...	30.0	...	30.0	...	30.0	...	30.0	...	28.9	28.1	27.3	26.5	25.7
28	30.0	...	30.0	...	30.0	...	30.0	...	30.0	...	28.9	28.1	27.3	26.5	25.7
29	30.0	...	30.0	...	30.0	...	30.0	...	30.0	...	28.9	28.1	27.3	26.5	25.7
30	30.0	...	30.0	...	30.0	...	30.0	...	30.0	...	28.9	28.1	27.3	26.5	25.7
31	25.5	...	25.5	...	25.5	...	25.5	...	25.5	...	24.6	23.9	23.2	22.5	21.8
32	30.0	...	30.0	...	30.0	...	30.0	...	30.0	...	28.9	28.1	27.3	26.5	25.7
33	30.0	...	30.0	...	30.0	...	30.0	...	30.0	...	28.9	28.1	27.3	26.5	25.7
34	25.5	...	25.5	...	25.5	...	25.5	...	25.5	...	24.6	23.9	23.2	22.5	21.8
35	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.5	26.1	25.8
36	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.5	26.1	25.8
37	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.5	22.2	21.9
38	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.5	26.1	25.8
39	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.5	22.2	21.9
40	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7
41	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
42	23.3	...	23.3	...	23.3	...	23.3	...	23.3	...	23.3	23.3	23.3	23.3	23.3
43	23.3	...	23.3	...	23.3	...	23.3	...	23.3	...	23.3	23.3	23.3	23.3	23.3
44	23.3	...	23.3	...	23.3	...	23.3	...	23.3	...	23.3	23.3	23.3	23.3	23.3
45	23.3	...	23.3	...	23.3	...	23.3	...	23.3	...	23.3	23.3	23.3	23.3	23.3

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Table 2B (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/ Thickness, in.	P-No.
	1	72Ni–15Cr–8Fe	Forgings	SB–564	N06600	Annealed	...	43
	2	72Ni–15Cr–8Fe	Wld. tube	SB–516	N06600	Cold drawn/ann.	≤4 1/2 O.D.	43
	3	72Ni–15Cr–8Fe	Wld. pipe	SB–517	N06600	Cold drawn/ann.	≤4 1/2 O.D.	43
	4	72Ni–15Cr–8Fe	Smls. tube	SB–163	N06600	Annealed	1/4 < O.D. ≤ 7/8	43
(**21**)	5	60Ni–22Cr–9Mo–3.5Cb	Bar, rod	SB–446	N06625	Cold rolled/ann.	≤0.375	43
(**21**)	6	60Ni–22Cr–9Mo–3.5Cb	Plate, sheet	SB–443	N06625	Hot rolled/ann.	≤2.75	43
	7	60Ni–22Cr–9Mo–3.5Cb	Plate	SB–443	N06625	Annealed	...	43
	8	60Ni–22Cr–9Mo–3.5Cb	Smls. pipe & tube	SB–444	N06625	Annealed	...	43
	9	60Ni–22Cr–9Mo–3.5Cb	Bar, rod	SB–446	N06625	Annealed	≤4	43
	10	58Ni–29Cr–9Fe	Smls. pipe & tube	SB–167	N06690	Hot worked/ann.	>5 O.D.	43
	11	58Ni–29Cr–9Fe	Smls. pipe & tube	SB–167	N06690	Cold worked/ann.	>5 O.D.	43
	12	58Ni–29Cr–9Fe	Smls. pipe & tube	SB–167	N06690	Hot worked/ann.	≤5 O.D.	43
	13	58Ni–29Cr–9Fe	Smls. tube	SB–163	N06690	Annealed	...	43
	14	58Ni–29Cr–9Fe	Plate	SB–168	N06690	Annealed	...	43
	15	58Ni–29Cr–9Fe	Forgings	SB–564	N06690	Annealed	...	43
	16	58Ni–29Cr–9Fe	Bar, rod	SB–166	N06690	Cold worked/ann.	...	43
	17	58Ni–29Cr–9Fe	Smls. pipe & tube	SB–167	N06690	Cold worked/ann.	≤5 O.D.	43
	18	58Ni–29Cr–9Fe	Bar, rod	SB–166	N06690	Hot worked	...	43
	19	58Ni–29Cr–9Fe	Bar, rod	SB–166	N06690	Hot worked/ann.	...	43
	20	58Ni–29Cr–9Fe	Smls. tube	SB–163	N06690	Annealed	1/4 < O.D. ≤ 7/8	43
	21	35Ni–19Cr–1 1/4Si	Bar	SB–511	N08330	Annealed	...	46
	22	35Ni–19Cr–1 1/4Si	Smls. & wld. pipe	SB–535	N08330	Annealed	...	46
	23	35Ni–19Cr–1 1/4Si	Plate, sheet, strip	SB–536	N08330	Annealed	...	46
	24	42Fe–33Ni–21Cr	Smls. tube	SB–163	N08800	Annealed	...	45
	25	42Fe–33Ni–21Cr	Smls. pipe & tube	SB–407	N08800	Annealed	...	45
	26	42Fe–33Ni–21Cr	Plate	SB–409	N08800	Annealed	...	45
	27	42Fe–33Ni–21Cr	Wld. pipe	SB–514	N08800	Annealed	...	45
	28	42Fe–33Ni–21Cr	Wld. tube	SB–515	N08800	Annealed	...	45
	29	42Fe–33Ni–21Cr	Forgings	SB–564	N08800	Annealed	...	45
	30	42Fe–33Ni–21Cr	Bar, rod	SB–408	N08800	Hot fin.	...	45
	31	42Fe–33Ni–21Cr	Smls. tube	SB–163	N08800	Annealed	1/4 < O.D. ≤ 7/8	45
	32	42Fe–33Ni–21Cr	Smls. tube	SB–163	N08800	Cold worked	...	45
	33	42Fe–33Ni–21Cr	Smls. tube	SB–163	N08810	Annealed	...	45
	34	42Fe–33Ni–21Cr	Smls. pipe & tube	SB–407	N08810	Annealed	...	45
	35	42Fe–33Ni–21Cr	Bar, rod	SB–408	N08810	Annealed	...	45
	36	42Fe–33Ni–21Cr	Plate	SB–409	N08810	Annealed	...	45
	37	42Fe–33Ni–21Cr	Wld. pipe	SB–514	N08810	Annealed	...	45
	38	42Fe–33Ni–21Cr	Wld. tube	SB–515	N08810	Annealed	...	45
	39	42Fe–33Ni–21Cr	Forgings	SB–564	N08810	Annealed	...	45
	40	42Ni–21.5Cr–3Mo–2.3Cu	Smls. tube	SB–163	N08825	Annealed	...	45
	41	42Ni–21.5Cr–3Mo–2.3Cu	Smls. pipe & tube	SB–423	N08825	Annealed	...	45
	42	42Ni–21.5Cr–3Mo–2.3Cu	Plate, sheet, strip	SB–424	N08825	Annealed	...	45
	43	42Ni–21.5Cr–3Mo–2.3Cu	Bar, rod	SB–425	N08825	Annealed	...	45
	44	62Ni–28Mo–5Fe	Plate, strip	SB–333	N10001	Solution ann.	3/16 ≤ t ≤ 2 1/2	44
	45	62Ni–28Mo–5Fe	Wld. pipe	SB–619	N10001	Solution ann.	...	44

Table 2B (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Nonferrous Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only)		External Pressure Chart No.	Notes
			III	VIII-2		
1	80	35	800	800	NFN–4	G1, G2, G4
2	80	35	NP	800	NFN–4	G1, G4
3	80	35	NP	800	NFN–4	G1, G4
4	80	40	800	NP	NFN–21	G1, G3, S1
5	110	50	800	NP	NFN–17	...
6	110	55	800	NP	NFN–17	...
7	110	55	800	NP	NFN–17	...
8	120	60	800	NP	NFN–17	...
9	120	60	800	NP	NFN–17	...
10	75	25	800	NP	NFN–4	G1
11	85	30	800	NP	NFN–4	G1
12	85	30	800	NP	NFN–4	G1
13	85	35	800	NP	NFN–4	G1
14	85	35	800	NP	NFN–4	G1
15	85	35	800	NP	NFN–4	G1
16	85	35	800	NP	NFN–4	G1
17	85	35	800	NP	NFN–4	G1
18	85	35	800	NP	NFN–4	G1
19	85	35	800	NP	NFN–4	G1
20	85	40	800	NP	NFN–21	G1, G3, S1
21	70	30	NP	800	NFN–13	G1, G2, G4
22	70	30	NP	800	NFN–13	G1, G4, G5
23	70	30	NP	800	NFN–13	G1, G4
24	75	30	800	800	NFN–8	G1, G4
25	75	30	800	800	NFN–8	G1, G4
26	75	30	800	800	NFN–8	G1, G4
27	75	30	NP	800	NFN–8	G1, G4
28	75	30	NP	800	NFN–8	G1, G4
29	75	30	800	800	NFN–8	G1, G2, G4
30	75	30	800	800	NFN–8	G1, G2, G4
31	75	40	800	NP	NFN–8	G1, G3, S1
32	83	47	650	NP	NFN–23	G1
33	65	25	800	800	NFN–9	G1, G4
34	65	25	800	800	NFN–9	G1, G4
35	65	25	800	800	NFN–9	G1, G2, G4
36	65	25	800	800	NFN–9	G1, G4
37	65	25	NP	800	NFN–9	G1, G4, G5
38	65	25	NP	800	NFN–9	G1, G4, G5
39	65	25	800	800	NFN–9	G1, G2, G4
40	85	35	800	800	NFN–7	G1, G4
41	85	35	NP	800	NFN–7	G1, G4
42	85	35	NP	800	NFN–7	G4
43	85	35	800	800	NFN–7	G2, G4
44	100	45	NP	800	NFN–5	G1, G4
45	100	45	NP	800	NFN–5	G1, G4, G5

Table 2B (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Nonferrous Materials

Line No.	Design Stress Intensity or Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding															
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	
1	23.3	...	23.3	...	23.3	...	23.3	...	23.3	...	23.3	23.3	23.3	23.3	23.3	
2	19.8	...	19.8	...	19.8	...	19.8	...	19.8	...	19.8	19.8	19.8	19.8	19.8	
3	19.8	...	19.8	...	19.8	...	19.8	...	19.8	...	19.8	19.8	19.8	19.8	19.8	
4	26.7	...	26.7	...	26.7	...	26.7	...	26.7	...	26.7	26.7	26.7	26.7	26.7	
5	33.3	...	32.1	...	31.2	...	30.3	...	29.4	...	28.6	28.3	27.9	27.6	27.4	(**21**)
6	36.7	...	35.3	...	34.3	...	33.3	...	32.4	...	31.5	31.1	30.7	30.4	30.1	(**21**)
7	36.7	...	35.3	...	34.3	...	33.3	...	32.4	...	31.5	31.1	30.7	30.4	30.1	
8	40.0	...	38.5	...	37.4	...	36.3	...	35.3	...	34.4	33.9	33.5	33.2	32.9	
9	40.0	...	38.5	...	37.4	...	36.3	...	35.3	...	34.4	33.9	33.5	33.2	32.9	
10	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	
11	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	
12	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	
13	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	
14	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	
15	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	
16	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	
17	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	
18	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	
19	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	
20	26.7	...	26.7	...	26.7	...	26.7	...	26.7	...	26.7	26.7	26.6	26.5	26.4	
21	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.8	19.4	18.9	18.5	18.1	17.7	17.4	
22	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.9	16.5	16.1	15.7	15.4	15.1	14.8	
23	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.8	19.4	18.9	18.5	18.1	17.7	17.4	
24	20.0	...	20.0	...	20.0	...	20.0	...	20.0	...	20.0	20.0	20.0	20.0	20.0	
25	20.0	...	20.0	...	20.0	...	20.0	...	20.0	...	20.0	20.0	20.0	20.0	20.0	
26	20.0	...	20.0	...	20.0	...	20.0	...	20.0	...	20.0	20.0	20.0	20.0	20.0	
27	17.0	...	17.0	...	17.0	...	17.0	...	17.0	...	17.0	17.0	17.0	17.0	17.0	
28	17.0	...	17.0	...	17.0	...	17.0	...	17.0	...	17.0	17.0	17.0	17.0	17.0	
29	20.0	...	20.0	...	20.0	...	20.0	...	20.0	...	20.0	20.0	20.0	20.0	20.0	
30	20.0	...	20.0	...	20.0	...	20.0	...	20.0	...	20.0	20.0	20.0	20.0	20.0	
31	25.0	...	25.0	...	25.0	...	25.0	...	25.0	...	24.9	24.8	24.8	24.7	24.6	
32	27.7	...	27.7	...	27.7	...	27.5	...	26.9	...	26.6	26.6	...	...	...	
33	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.5	16.1	15.7	15.3	15.0	
34	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.5	16.1	15.7	15.3	15.0	
35	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.5	16.1	15.7	15.3	15.0	
36	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.5	16.1	15.7	15.3	15.0	
37	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.0	13.7	13.3	13.0	12.8	
38	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.0	13.7	13.3	13.0	12.8	
39	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.5	16.1	15.7	15.3	15.0	
40	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.2	23.0	
41	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.2	23.0	
42	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.2	23.0	
43	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.2	23.0	
44	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	29.9	
45	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.4	

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Table 2B (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/ Thickness, in.	P-No.
1	62Ni–28Mo–5Fe	Smls. pipe & tube	SB–622	N10001	Solution ann.	...	44
2	62Ni–28Mo–5Fe	Wld. tube	SB–626	N10001	Solution ann.	...	44
3	62Ni–28Mo–5Fe	Rod	SB–335	N10001	Solution ann.	$1\frac{1}{2} < t \le 3\frac{1}{2}$	44
4	62Ni–28Mo–5Fe	Rod	SB–335	N10001	Solution ann.	$\frac{5}{16} \le t \le 1\frac{1}{2}$	44
5	62Ni–28Mo–5Fe	Plate, strip	SB–333	N10001	Solution ann.	$<\frac{3}{16}$	44
6	70Ni–16Mo–7Cr–5Fe	Plate, sheet, strip	SB–434	N10003	Annealed	$<2\frac{1}{2}$	44
7	70Ni–16Mo–7Cr–5Fe	Rod	SB–573	N10003	Solution ann.	...	44
8	54Ni–16Mo–15Cr	Smls. fittings	SB–366	N10276	Solution ann.	...	43
9	54Ni–16Mo–15Cr	Wld. fittings	SB–366	N10276	Solution ann.	...	43
10	54Ni–16Mo–15Cr	Forgings	SB–462	N10276	Solution ann.	...	43
11	54Ni–16Mo–15Cr	Rod	SB–574	N10276	Solution ann.	...	43
12	54Ni–16Mo–15Cr	Plate, sheet, strip	SB–575	N10276	Solution ann.	...	43
13	54Ni–16Mo–15Cr	Wld. pipe	SB–619	N10276	Solution ann.	...	43
14	54Ni–16Mo–15Cr	Smls. pipe & tube	SB–622	N10276	Solution ann.	...	43
15	54Ni–16Mo–15Cr	Wld. tube	SB–626	N10276	Solution ann.	...	43
16	65Ni–28Mo–2Fe	Plate, strip	SB–333	N10665	Solution ann.	...	44
17	65Ni–28Mo–2Fe	Rod	SB–335	N10665	Solution ann.	...	44
18	65Ni–28Mo–2Fe	Smls. fittings	SB–366	N10665	Solution ann.	...	44
19	65Ni–28Mo–2Fe	Wld. fittings	SB–366	N10665	Solution ann.	...	44
20	65Ni–28Mo–2Fe	Forgings	SB–462	N10665	Solution ann.	...	44
21	65Ni–28Mo–2Fe	Wld. pipe	SB–619	N10665	Solution ann.	...	44
22	65Ni–28Mo–2Fe	Smls. pipe & tube	SB–622	N10665	Solution ann.	...	44
23	65Ni–28Mo–2Fe	Wld. tube	SB–626	N10665	Solution ann.	...	44
24	Ti	Plate, sheet, strip	SB–265	R50250	Annealed	...	51
25	Ti	Bar, billet	SB–348	R50250	Annealed	...	51
26	Ti	Forgings	SB–381	R50250	Annealed	...	51
27	Ti	Smls. tube	SB–338	R50250	Smls. ann.	...	51
28	Ti	Smls. pipe	SB–861	R50250	Smls. ann.	...	51
29	Ti	Wld. tube	SB–338	R50250	Wld. ann.	...	51
30	Ti	Wld. pipe	SB–862	R50250	Wld. ann.	...	51
31	Ti	Plate, sheet, strip	SB–265	R50400	Annealed	...	51
32	Ti	Bar, billet	SB–348	R50400	Annealed	...	51
33	Ti	Forgings	SB–381	R50400	Annealed	...	51
34	Ti	Smls. tube	SB–338	R50400	Smls. ann.	...	51
35	Ti	Smls. pipe	SB–861	R50400	Smls. ann.	...	51
36	Ti	Wld. tube	SB–338	R50400	Wld. ann.	...	51
37	Ti	Wld. pipe	SB–862	R50400	Wld. ann.	...	51
38	Ti	Plate, sheet, strip	SB–265	R50550	Annealed	...	52
39	Ti	Bar, billet	SB–348	R50550	Annealed	...	52
40	Ti	Forgings	SB–381	R50550	Annealed	...	52
41	Ti	Smls. tube	SB–338	R50550	Smls. ann.	...	52
42	Ti	Smls. pipe	SB–861	R50550	Smls. ann.	...	52
43	Ti	Wld. tube	SB–338	R50550	Wld. ann.	...	52
44	Ti	Wld. pipe	SB–862	R50550	Wld. ann.	...	52
45	Ti–Pd	Plate, sheet, strip	SB–265	R52400	Annealed	...	51

Table 2B (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Nonferrous Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only)		External Pressure Chart No.	Notes
			III	VIII-2		
1	100	45	NP	800	NFN–5	G1, G4
2	100	45	NP	800	NFN–5	G1, G4, G5
3	100	46	NP	800	NFN–5	G1, G2, G4
4	115	46	NP	800	NFN–5	G1, G2, G4
5	115	50	NP	800	NFN–5	G1, G4
6	100	40	NP	800	NFN–6	G4
7	100	40	NP	800	NFN–6	G1, G2, G4
8	100	41	NP	800	NFN–10	G1, G4
9	100	41	NP	800	NFN–10	G1, G4, G5
10	100	41	NP	800	NFN–10	G1, G4
11	100	41	NP	800	NFN–10	G1, G2, G4
12	100	41	NP	800	NFN–10	G1, G4
13	100	41	NP	800	NFN–10	G1, G4, G5
14	100	41	NP	800	NFN–10	G1, G4
15	100	41	NP	800	NFN–10	G1, G4, G5
16	110	51	NP	800	NFN–16	G1, G4
17	110	51	NP	800	NFN–16	G1, G2, G4
18	110	51	NP	800	NFN–16	G1, G4
19	110	51	NP	800	NFN–16	G1, G4, G5
20	110	51	NP	800	NFN–16	G1, G4
21	110	51	NP	800	NFN–16	G1, G4, G5
22	110	51	NP	800	NFN–16	G1, G4
23	110	51	NP	800	NFN–16	G1, G4, G5
24	35	25	NP	600	NFT–3	...
25	35	25	NP	600	NFT–3	...
26	35	25	NP	600	NFT–3	...
27	35	25	NP	600	NFT–3	...
28	35	25	NP	600	NFT–3	...
29	35	25	NP	600	NFT–3	G5
30	35	25	NP	600	NFT–3	G5
31	50	40	NP	600	NFT–2	...
32	50	40	NP	600	NFT–2	...
33	50	40	NP	600	NFT–2	...
34	50	40	NP	600	NFT–2	...
35	50	40	NP	600	NFT–2	...
36	50	40	NP	600	NFT–2	G5
37	50	40	NP	600	NFT–2	G5
38	65	55	NP	600	NFT–1	...
39	65	55	NP	600	NFT–1	...
40	65	55	NP	600	NFT–1	...
41	65	55	NP	600	NFT–1	...
42	65	55	NP	600	NFT–1	...
43	65	55	NP	600	NFT–1	G5
44	65	55	NP	600	NFT–1	G5
45	50	40	NP	600	NFT–2	...

Table 2B (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Nonferrous Materials

Line No.	Design Stress Intensity or Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding														
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
1	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	29.9
2	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.4
3	30.7	30.7	30.7	30.7	30.7	30.7	30.7	30.7	30.7	30.7	30.7	30.7	30.7	30.7	30.5
4	30.7	30.7	30.7	30.7	30.7	30.7	30.7	30.7	30.7	30.7	30.7	30.7	30.7	30.7	30.5
5	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.2
6	26.7	25.5	24.6	23.6	22.7	21.8	21.1	20.4	20.0	19.6	19.3	19.1	18.9	18.7	18.4
7	26.7	25.5	24.6	23.6	22.7	21.8	21.1	20.4	20.0	19.6	19.3	19.1	18.9	18.7	18.4
8	27.3	27.3	27.3	27.3	27.3	27.3	27.3	27.3	26.9	26.0	25.2	24.6	24.0	23.5	23.1
9	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	22.8	22.1	21.5	20.9	20.4	20.0	19.6
10	27.3	27.3	27.3	27.3	27.3	27.3	27.3	27.3	26.9	26.0	25.2	24.6	24.0	23.5	23.1
11	27.3	27.3	27.3	27.3	27.3	27.3	27.3	27.3	26.9	26.0	25.2	24.6	24.0	23.5	23.1
12	27.3	27.3	27.3	27.3	27.3	27.3	27.3	27.3	26.9	26.0	25.2	24.6	24.0	23.5	23.1
13	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	22.8	22.1	21.5	20.9	20.4	20.0	19.6
14	27.3	27.3	27.3	27.3	27.3	27.3	27.3	27.3	26.9	26.0	25.2	24.6	24.0	23.5	23.1
15	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	22.8	22.1	21.5	20.9	20.4	20.0	19.6
16	34.0	...	34.0	...	34.0	...	34.0	...	34.0	...	34.0	34.0	34.0	34.0	34.0
17	34.0	...	34.0	...	34.0	...	34.0	...	34.0	...	34.0	34.0	34.0	34.0	34.0
18	34.0	...	34.0	...	34.0	...	34.0	...	34.0	...	34.0	34.0	34.0	34.0	34.0
19	28.9	...	28.9	...	28.9	...	28.9	...	28.9	...	28.9	28.9	28.9	28.9	28.9
20	34.0	...	34.0	...	34.0	...	34.0	...	34.0	...	34.0	34.0	34.0	34.0	34.0
21	28.9	...	28.9	...	28.9	...	28.9	...	28.9	...	28.9	28.9	28.9	28.9	28.9
22	34.0	...	34.0	...	34.0	...	34.0	...	34.0	...	34.0	34.0	34.0	34.0	34.0
23	28.9	...	28.9	...	28.9	...	28.9	...	28.9	...	28.9	28.9	28.9	28.9	28.9
24	11.7	10.9	9.6	8.6	7.7	7.0	6.4	5.9	5.2	4.7	4.2	...	...	...	...
25	11.7	10.9	9.6	8.6	7.7	7.0	6.4	5.9	5.2	4.7	4.2	...	...	...	...
26	11.7	10.9	9.6	8.6	7.7	7.0	6.4	5.9	5.2	4.7	4.2	...	...	...	...
27	11.7	10.9	9.6	8.6	7.7	7.0	6.4	5.9	5.2	4.7	4.2	...	...	...	...
28	11.7	10.9	9.6	8.6	7.7	7.0	6.4	5.9	5.2	4.7	4.2	...	...	...	...
29	9.9	9.2	8.2	7.3	6.5	5.9	5.5	5.0	4.5	4.0	3.5	...	...	...	...
30	9.9	9.2	8.2	7.3	6.5	5.9	5.5	5.0	4.5	4.0	3.5	...	...	...	...
31	16.7	16.0	14.5	13.2	12.1	11.1	10.3	9.6	8.9	8.2	7.6	...	...	...	...
32	16.7	16.0	14.5	13.2	12.1	11.1	10.3	9.6	8.9	8.2	7.6	...	...	...	...
33	16.7	16.0	14.5	13.2	12.1	11.1	10.3	9.6	8.9	8.2	7.6	...	...	...	...
34	16.7	16.0	14.5	13.2	12.1	11.1	10.3	9.6	8.9	8.2	7.6	...	...	...	...
35	16.7	16.0	14.5	13.2	12.1	11.1	10.3	9.6	8.9	8.2	7.6	...	...	...	...
36	14.2	13.6	12.3	11.2	10.3	9.4	8.8	8.1	7.5	7.0	6.5	...	...	...	...
37	14.2	13.6	12.3	11.2	10.3	9.4	8.8	8.1	7.5	7.0	6.5	...	...	...	...
38	21.7	20.4	18.4	16.6	14.9	13.4	12.1	10.9	9.9	9.2	8.6	...	...	...	...
39	21.7	20.4	18.4	16.6	14.9	13.4	12.1	10.9	9.9	9.2	8.6	...	...	...	...
40	21.7	20.4	18.4	16.6	14.9	13.4	12.1	10.9	9.9	9.2	8.6	...	...	...	...
41	21.7	20.4	18.4	16.6	14.9	13.4	12.1	10.9	9.9	9.2	8.6	...	...	...	...
42	21.7	20.4	18.4	16.6	14.9	13.4	12.1	10.9	9.9	9.2	8.6	...	...	...	...
43	18.4	17.4	15.6	14.1	12.7	11.4	10.2	9.3	8.4	7.8	7.3	...	...	...	...
44	18.4	17.4	15.6	14.1	12.7	11.4	10.2	9.3	8.4	7.8	7.3	...	...	...	...
45	16.7	16.0	14.5	13.2	12.1	11.1	10.3	9.6	8.9	8.2	7.6	...	...	...	...

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Table 2B (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/ Thickness, in.	P-No.
1	Ti–Pd	Bar, billet	SB–348	R52400	Annealed	...	51
2	Ti–Pd	Forgings	SB–381	R52400	Annealed	...	51
3	Ti–Pd	Smls. tube	SB–338	R52400	Smls. ann.	...	51
4	Ti–Pd	Smls. pipe	SB–861	R52400	Smls. ann.	...	51
5	Ti–Pd	Wld. tube	SB–338	R52400	Wld. ann.	...	51
6	Ti–Pd	Wld. pipe	SB–862	R52400	Wld. ann.	...	51
7	Ti–Pd	Plate, sheet, strip	SB–265	R52402	Annealed	...	51
8	Ti–0.3Mo–0.8Ni	Plate, sheet, strip	SB–265	R53400	Annealed	...	52
9	Ti–0.3Mo–0.8Ni	Bar, billet	SB–348	R53400	Annealed	...	52
10	Ti–0.3Mo–0.8Ni	Forgings	SB–381	R53400	Annealed	...	52
11	Ti–0.3Mo–0.8Ni	Smls. tube	SB–338	R53400	Smls. ann.	...	52
12	Ti–0.3Mo–0.8Ni	Smls. pipe	SB–861	R53400	Smls. ann.	...	52
13	Ti–0.3Mo–0.8Ni	Wld. tube	SB–338	R53400	Wld. ann.	...	52
14	Ti–0.3Mo–0.8Ni	Wld. pipe	SB–862	R53400	Wld. ann.	...	52
15	Ti–3Al–2.5V	Plate, sheet, strip	SB–265	R56320	Annealed	...	53
16	Ti–3Al–2.5V	Bar, billet	SB–348	R56320	Annealed	...	53
17	Ti–3Al–2.5V	Forgings	SB–381	R56320	Annealed	...	53
18	Ti–3Al–2.5V	Smls. & wld. tube	SB–338	R56320	Smls. ann.	...	53
19	Ti–3Al–2.5V	Wld. fittings	SB–363	R56320	Smls. ann.	...	53
20	Ti–3Al–2.5V	Smls. pipe	SB–861	R56320	Smls. ann.	...	53
21	Ti–3Al–2.5V	Smls. & wld. tube	SB–338	R56320	Wld. ann.	...	53
22	Ti–3Al–2.5V	Wld. fittings	SB–363	R56320	Wld. ann.	...	53
23	Ti–3Al–2.5V	Wld. pipe	SB–862	R56320	Wld. ann.	...	53

Table 2B (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Nonferrous Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only)		External Pressure Chart No.	Notes
			III	VIII-2		
1	50	40	NP	600	NFT–2	...
2	50	40	NP	600	NFT–2	...
3	50	40	NP	600	NFT–2	...
4	50	40	NP	600	NFT–2	...
5	50	40	NP	600	NFT–2	G5
6	50	40	NP	600	NFT–2	G5
7	50	40	NP	600	NFT–2	...
8	70	50	NP	600	NFT–1	...
9	70	50	NP	600	NFT–1	...
10	70	50	NP	600	NFT–1	...
11	70	50	NP	600	NFT–1	...
12	70	50	NP	600	NFT–1	...
13	70	50	NP	600	NFT–1	G5
14	70	50	NP	600	NFT–1	G5
15	90	70	600	NP	NFT–4	...
16	90	70	600	NP	NFT–4	...
17	90	70	600	NP	NFT–4	...
18	90	70	600	NP	NFT–4	...
19	90	70	600	NP	NFT–4	...
20	90	70	600	NP	NFT–4	...
21	90	70	600	NP	NFT–4	G5
22	90	70	600	NP	NFT–4	G5
23	90	70	600	NP	NFT–4	G5

Table 2B (Cont'd)
Section III, Division 1, Classes 1, MC, and CS; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2, Class 1 Maximum Allowable Stress Values, S, for Nonferrous Materials

Line No.	Design Stress Intensity or Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding														
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
1	16.7	16.0	14.5	13.2	12.1	11.1	10.3	9.6	8.9	8.2	7.6	...	...	...	...
2	16.7	16.0	14.5	13.2	12.1	11.1	10.3	9.6	8.9	8.2	7.6	...	...	...	...
3	16.7	16.0	14.5	13.2	12.1	11.1	10.3	9.6	8.9	8.2	7.6	...	...	...	...
4	16.7	16.0	14.5	13.2	12.1	11.1	10.3	9.6	8.9	8.2	7.6	...	...	...	...
5	14.2	13.6	12.3	11.2	10.3	9.4	8.8	8.1	7.5	7.0	6.5	...	...	...	...
6	14.2	13.6	12.3	11.2	10.3	9.4	8.8	8.1	7.5	7.0	6.5	...	...	...	...
7	16.7	16.0	14.5	13.2	12.1	11.1	10.3	9.6	8.9	8.2	7.6	...	...	...	...
8	23.3	23.3	21.8	20.3	18.9	17.7	16.7	15.9	15.2	14.8	14.4	...	...	...	...
9	23.3	23.3	21.8	20.3	18.9	17.7	16.7	15.9	15.2	14.8	14.4	...	...	...	...
10	23.3	23.3	21.8	20.3	18.9	17.7	16.7	15.9	15.2	14.8	14.4	...	...	...	...
11	23.3	23.3	21.8	20.3	18.9	17.7	16.7	15.9	15.2	14.8	14.4	...	...	...	...
12	23.3	23.3	21.8	20.3	18.9	17.7	16.7	15.9	15.2	14.8	14.4	...	...	...	...
13	19.8	19.8	18.5	17.3	16.1	15.1	14.2	13.5	12.9	12.6	12.2	...	...	...	...
14	19.8	19.8	18.5	17.3	16.1	15.1	14.2	13.5	12.9	12.6	12.2	...	...	...	...
15	30.0	30.0	28.9	27.7	26.4	25.0	23.5	22.2	21.1	20.5	20.1	...	...	...	...
16	30.0	30.0	28.9	27.7	26.4	25.0	23.5	22.2	21.1	20.5	20.1	...	...	...	...
17	30.0	30.0	28.9	27.7	26.4	25.0	23.5	22.2	21.1	20.5	20.1	...	...	...	...
18	30.0	30.0	28.9	27.7	26.4	25.0	23.5	22.2	21.1	20.5	20.1	...	...	...	...
19	30.0	30.0	28.9	27.7	26.4	25.0	23.5	22.2	21.1	20.5	20.1	...	...	...	...
20	30.0	30.0	28.9	27.7	26.4	25.0	23.5	22.2	21.1	20.5	20.1	...	...	...	...
21	25.5	25.5	24.5	23.5	22.4	21.2	20.0	18.9	18.0	17.4	17.1	...	...	...	...
22	25.5	25.5	24.5	23.5	22.4	21.2	20.0	18.9	18.0	17.4	17.1	...	...	...	...
23	25.5	25.5	24.5	23.5	22.4	21.2	20.0	18.9	18.0	17.4	17.1	...	...	...	...

NOTES TO TABLE 2B

GENERAL NOTES

(a) The following abbreviations are used: ann., annealed; fin., finished; rel., relieved; Smls., Seamless; and Wld., Welded.

(b) An alternative typeface is used for stress values based on successful experience in service (see Notes E1 through E4).

(c) Where specifications, grades, classes, and types are listed in this Table, and where the material specification in Section II, Part A or Part B is a dual–unit specification (e.g., SB–407/SB–407M), the values listed in this Table shall be applicable to either the customary U.S. version of the material specification or the SI units version of the material specification. For example, the values listed for SB–407 Grade N08800 shall be used when SB–407M Grade N08800 is used in construction.

(d) The values in this Table may be interpolated to determine values for intermediate temperatures. The values at intermediate temperatures shall be rounded to the same number of decimal places as the value at the higher temperature between which values are being interpolated. The rounding rule is: when the next digit beyond the last place to be retained is less than 5, retain unchanged the digit in the last place retained; when the digit next beyond the last place to be retained is 5 or greater, increase by 1 the digit in the last place retained.

(e) The properties of steels are influenced by the processing history, heat treatment, melting practice, and level of residual elements. See Nonmandatory Appendix A for more information.

(f) Where a size limit appears in the Size/Thickness column, the limit applies to the dimension appropriate to the product form: wall thickness of tubing, pipe, pipe fittings, and hollow forgings; thickness of plate, flat bar and forgings, and polygonal bar; diameter of solid bar and bolting; and thickest cross–section of other pressure parts, e.g., castings and forgings.

(**21**) **NOTES – EXPERIENCE CRITERION**

E1 For values at 800°F, the design stress intensity values or maximum allowable stress values are based on successful experience in service.

E2 For values at 250°F and above, the design stress intensity values or maximum allowable stress values are based on successful experience in service.

E3 For values at 400°F and above, the design stress intensity values or maximum allowable stress values are based on successful experience in service.

E4 For values at 750°F and above, the design stress intensity values or maximum allowable stress values are based on successful experience in service.

NOTES – GENERAL REQUIREMENTS

G1 Due to the relatively low yield strength of these materials, these higher stress values were established at temperatures where the short–time tensile properties govern to permit the use of these alloys where slightly greater deformation is acceptable. The stress values in this range exceed $66\frac{2}{3}\%$ but do not exceed 90% of the yield strength at temperature. Use of these stresses may result in dimensional changes due to permanent strain. These stress values are not recommended for the flanges of gasketed joints or other applications where slight amounts of distortion can cause leakage or malfunction. Table Y–2 lists multiplying factors that, when applied to the yield strength values shown in Table Y–1, will give allowable stress values that will result in lower levels of permanent strain.

G2 Use of external pressure charts for material in the form of bar stock is permitted for stiffening rings only.

G3 SB–163 Supplementary Requirement S2 shall be met.

(**21**) G4 Stress values for 100°F may be used at temperatures down to –325°F without additional specification requirements.

(**21**) G5 A joint efficiency factor of 0.85 has been applied in arriving at the stress values for this material.

G6 Maximum temperature for external pressure design not to exceed 350°F.

G7 These alloys are occasionally subject to the hazard of stress corrosion cracking. Even though they are suitable for engineering use under a wide variety of corrosive conditions, with no particular hazard with respect to stress corrosion, the supplier of the material should be consulted before applying them.

(**21**) G8 Stress values for 100°F may be used at temperatures down to –452°F without additional specification requirements.

G9 For stress relieved tempers (T451, T4510, T4511, T651, T6510, and T6511), stress values for materials in the basic temper shall be used.

G10 Copper–silicon alloys are not always suitable when exposed to certain media and high temperature, particularly steam above 212°F. The user should satisfy him/herself that the alloy selected is satisfactory for the service for which it is to be used.

NOTES – SIZE REQUIREMENTS

S1 Thickness ≤ 0.100 in.

NOTES – WELDING REQUIREMENTS

W1 Welding except for seal welds is not permitted.

(**21**) W2 For welded construction, stress values for material of O temper shall be used.

(**21**) W3 The stress values given for this material are not applicable when either welding or thermal cutting is employed.

(21)

Table 3
Section III, Division 1, Classes 2 and 3;* Section VIII, Divisions 1 and 2;† and Section XII
Maximum Allowable Stress Values, *S*, for Bolting Materials
(*See Maximum Temperature Limits for Restrictions on Class)
(†Use with Part 4.16 of Section VIII, Division 2)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/ Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/ Thickness, in.
	Ferrous Materials						
1	Carbon steel	Bolting	SA–307	A	...	...	$\frac{1}{4} \le t \le 4$
2	Carbon steel	Bolting	SA–307	B	...	...	...
3	Carbon steel	Bolting	SA–449	1	K04200	...	$1\frac{1}{2} < t \le 3$
4	Carbon steel	Bolting	SA–325	...	...	...	...
(21) 5	Carbon steel	Bolting	SA–325	1	K02706	...	$1\frac{1}{8} \le t \le 1\frac{1}{2}$
6	Carbon steel	Bolting	SA–449	1	K04200	...	$1 < t < 1\frac{1}{2}$
7	Carbon steel	Bolting	SA–354	BC	K04100	...	$2\frac{1}{2} < t \le 4$
(21) 8	Carbon steel	Bolting	SA–325	1	K02706	...	$\frac{1}{2} \le t \le 1$
9	Carbon steel	Bolting	SA–449	1	K04200	...	≤1
10	Carbon steel	Bolting	SA–354	BC	K04100	...	$\frac{1}{4} < t \le 2\frac{1}{2}$
11	Carbon steel	Bolting	SA–354	BD	K04100	...	$2\frac{1}{2} < t \le 4$
12	Carbon steel	Bolting	SA–354	BD	K04100	...	$\frac{1}{4} < t \le 2\frac{1}{2}$
13	C–$\frac{1}{4}$Mo	Bolting	SA–320	L7A	G40370	...	≤$2\frac{1}{2}$
14	C–$\frac{1}{4}$Mo	Bolting	SA–574	4037	G40370	...	≥$\frac{5}{8}$
15	C–$\frac{1}{4}$Mo	Bolting	SA–574	4042	G40420	...	≥$\frac{5}{8}$
16	C–$\frac{1}{4}$Mo	Bolting	SA–574	4037	G40370	...	≤$\frac{1}{2}$
17	C–$\frac{1}{4}$Mo	Bolting	SA–574	4042	G40420	...	≤$\frac{1}{2}$
18	$\frac{3}{4}$Cr	Bolting	SA–574	5137M	...	...	≥$\frac{5}{8}$
19	$\frac{3}{4}$Cr	Bolting	SA–574	51B37M	...	...	≥$\frac{5}{8}$
20	$\frac{3}{4}$Cr	Bolting	SA–574	5137M	...	...	≤$\frac{1}{2}$
21	$\frac{3}{4}$Cr	Bolting	SA–574	51B37M	...	...	≤$\frac{1}{2}$
22	1Cr–1Mn–$\frac{1}{4}$Mo	Bolting	SA–540	B22	H41420	5	$2 < t \le 4$
23	1Cr–1Mn–$\frac{1}{4}$Mo	Bolting	SA–540	B22	H41420	5	≤2
24	1Cr–1Mn–$\frac{1}{4}$Mo	Bolting	SA–540	B22	H41420	4	≤4
25	1Cr–1Mn–$\frac{1}{4}$Mo	Bolting	SA–540	B22	H41420	3	≤4
26	1Cr–1Mn–$\frac{1}{4}$Mo	Bolting	SA–540	B22	H41420	2	≤3
27	1Cr–1Mn–$\frac{1}{4}$Mo	Bolting	SA–540	B22	H41420	1	≤$1\frac{1}{2}$
28	1Cr–$\frac{1}{5}$Mo	Bolting	SA–193	B7	G41400	...	$4 < t \le 7$
29	1Cr–$\frac{1}{5}$Mo	Bolting	SA–193	B7M	G41400	...	≤$2\frac{1}{2}$
30	1Cr–$\frac{1}{5}$Mo	Bolting	SA–320	L7M	G41400	...	≤$2\frac{1}{2}$
31	1Cr–$\frac{1}{5}$Mo	Bolting	SA–193	B7	G41400	...	$2\frac{1}{2} < t \le 4$
32	1Cr–$\frac{1}{5}$Mo	Bolting	SA–193	B7	G41400	...	≤$2\frac{1}{2}$
33	1Cr–$\frac{1}{5}$Mo	Bolting	SA–320	L7	G41400	...	≤$2\frac{1}{2}$
34	1Cr–$\frac{1}{5}$Mo	Bolting	SA–574	4137	G41370	...	≥$\frac{5}{8}$
35	1Cr–$\frac{1}{5}$Mo	Bolting	SA–574	4140	G41400	...	≥$\frac{5}{8}$
36	1Cr–$\frac{1}{5}$Mo	Bolting	SA–574	4142	G41420	...	≥$\frac{5}{8}$
37	1Cr–$\frac{1}{5}$Mo	Bolting	SA–574	4145	G41450	...	≥$\frac{5}{8}$
38	1Cr–$\frac{1}{5}$Mo	Bolting	SA–574	4137	G41370	...	≤$\frac{1}{2}$
39	1Cr–$\frac{1}{5}$Mo	Bolting	SA–574	4140	G41400	...	≤$\frac{1}{2}$
40	1Cr–$\frac{1}{5}$Mo	Bolting	SA–574	4142	G41420	...	≤$\frac{1}{2}$
41	1Cr–$\frac{1}{5}$Mo	Bolting	SA–574	4145	G41450	...	≤$\frac{1}{2}$
42	1Cr–$\frac{1}{2}$Mo–V	Bolting	SA–193	B16	K14072	...	$4 < t \le 8$
43	1Cr–$\frac{1}{2}$Mo–V	Bolting	SA–193	B16	K14072	...	$2\frac{1}{2} < t \le 4$
44	1Cr–$\frac{1}{2}$Mo–V	Bolting	SA–540	B21	K14073	5	$2 < t \le 8$
45	1Cr–$\frac{1}{2}$Mo–V	Bolting	SA–540	B21	K14073	5	≤2

Table 3
Section III, Division 1, Classes 2 and 3;* Section VIII, Divisions 1 and 2;† and Section XII
Maximum Allowable Stress Values, *S*, for Bolting Materials
(*See Maximum Temperature Limits for Restrictions on Class)
(†Use with Part 4.16 of Section VIII, Division 2)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) III	VIII-1	VIII-2	XII	Notes
							Ferrous Materials
1	60	...	NP	450	NP	NP	G12
2	60	...	400	450	NP	450	...
3	90	58	700	650	650	650	...
4	105	81	650	650	650	NP	...
5	105	81	NP	650	650	650	...
6	105	81	700	700	700	650	...
7	115	99	650	650	650	650	...
8	120	92	NP	650	650	650	...
9	120	92	700	650	650	650	...
10	125	109	650	650	650	650	...
11	140	115	650	650	650	650	...
12	150	130	650	650	650	650	...
13	125	105	NP	650	650	650	W3
14	170	135	550	550	NP	550	G7, G11, W1
15	170	135	550	550	NP	550	G7, G11, W1
16	180	140	550	550	NP	550	G7, G11, W1
17	180	140	550	550	NP	550	G7, G11, W1
18	170	135	550	550	NP	NP	G7, G11, W1
19	170	135	550	550	NP	NP	G7, G11, W1
20	180	140	550	550	NP	NP	G7, G11, W1
21	180	140	550	550	NP	NP	G7, G11, W1
22	115	100	700	NP	NP	NP	...
23	120	105	700	NP	NP	NP	...
24	135	120	700	NP	NP	NP	...
25	145	130	700	700	NP	650	...
26	155	140	700	NP	NP	NP	...
27	165	150	700	NP	NP	NP	...
28	100	75	800	1000	800	650	T5
29	100	80	NP	1000	800	650	T5
30	100	80	NP	1000	800	650	T5
31	115	95	800	1000	800	650	T5
32	125	105	800	1000	800	650	T5
33	125	105	700	800	800	650	...
34	170	135	550	NP	NP	NP	G7, G11, W1
35	170	135	550	550	NP	550	G7, G11, W1
36	170	135	550	NP	NP	NP	G7, G11, W1
37	170	135	550	NP	NP	NP	G7, G11, W1
38	180	140	550	NP	NP	NP	G7, G11, W1
39	180	140	550	NP	NP	NP	G7, G11, W1
40	180	140	550	NP	NP	NP	G7, G11, W1
41	180	140	550	NP	NP	NP	G7, G11, W1
42	100	85	800	1100	800	650	T8
43	110	95	800	1100	800	650	T8
44	115	100	700	700	700	NP	...
45	120	105	700	700	700	NP	...

Table 3
Section III, Division 1, Classes 2 and 3;* Section VIII, Divisions 1 and 2;† and Section XII
Maximum Allowable Stress Values, *S*, for Bolting Materials
(*See Maximum Temperature Limits for Restrictions on Class)
(†Use with Part 4.16 of Section VIII, Division 2)

Line	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																
No.	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900
	Ferrous Materials																
1	7.0	...	7.0	...	7.0	...	7.0	7.0	...	...	...	...	...	...	...	...	...
2	7.0	...	7.0	...	7.0	...	7.0	7.0	...	...	...	...	...	...	...	...	...
3	14.5	14.5	14.5	...	14.5	...	14.5	...	14.5	14.5	14.5	14.5	14.5	...	...	...	...
4	20.2	...	20.2	...	20.2	...	20.2	...	20.2	...	20.2	20.2	...	...	...	...	...
5	20.2	20.2	20.2	...	20.2	...	20.2	...	20.2	20.2	20.2	20.2	...	...	...	...	...
6	20.2	...	20.2	...	20.2	...	20.2	...	20.2	...	20.2	20.2	20.2	...	...	...	...
7	23.0	23.0	23.0	...	23.0	...	23.0	...	23.0	23.0	23.0	23.0	...	...	...	...	...
8	23.0	23.0	23.0	...	23.0	...	23.0	...	23.0	23.0	23.0	23.0	...	...	...	...	...
9	23.0	23.0	23.0	...	23.0	...	23.0	...	23.0	23.0	23.0	23.0	23.0	...	...	...	...
10	25.0	25.0	25.0	...	25.0	...	25.0	...	25.0	25.0	25.0	25.0	...	...	...	...	...
11	28.0	28.0	28.0	...	28.0	...	28.0	...	28.0	...	28.0	28.0	...	...	...	...	...
12	30.0	30.0	30.0	...	30.0	...	30.0	...	30.0	30.0	30.0	30.0	...	...	...	...	...
13	25.0	25.0	25.0	...	25.0	...	25.0	...	25.0	25.0	25.0	25.0	...	...	...	...	...
14	33.8	...	33.8	...	33.8	...	33.8	...	33.8	33.8	...	...	...	...	...	...	...
15	33.8	...	33.8	...	33.8	...	33.8	...	33.8	33.8	...	...	...	...	...	...	...
16	35.0	...	35.0	...	35.0	...	35.0	...	35.0	35.0	...	...	...	...	...	...	...
17	35.0	...	35.0	...	35.0	...	35.0	...	35.0	35.0	...	...	...	...	...	...	...
18	33.8	...	33.8	...	33.8	...	33.8	...	33.8	33.8	...	...	...	...	...	...	...
19	33.8	...	33.8	...	33.8	...	33.8	...	33.8	33.8	...	...	...	...	...	...	...
20	35.0	...	35.0	...	35.0	...	35.0	...	35.0	35.0	...	...	...	...	...	...	...
21	35.0	...	35.0	...	35.0	...	35.0	...	35.0	35.0	...	...	...	...	...	...	...
22	23.0	...	23.0	...	23.0	...	23.0	...	23.0	...	23.0	23.0	23.0	...	...	...	...
23	24.0	...	24.0	...	24.0	...	24.0	...	24.0	...	24.0	24.0	24.0	...	...	...	...
24	27.0	...	27.0	...	27.0	...	27.0	...	27.0	...	27.0	27.0	27.0	...	...	...	...
25	29.0	...	29.0	...	29.0	...	29.0	...	29.0	...	29.0	29.0	29.0	...	...	...	...
26	31.0	...	31.0	...	31.0	...	31.0	...	31.0	...	31.0	31.0	31.0	...	...	...	...
27	33.0	...	33.0	...	33.0	...	33.0	...	33.0	...	33.0	33.0	33.0	...	...	...	...
28	18.8	18.8	18.8	...	18.8	...	18.8	...	18.8	18.8	18.8	18.8	18.8	18.8	18.0	*16.3*	*12.5*
29	20.0	20.0	20.0	...	20.0	...	20.0	...	20.0	20.0	20.0	20.0	20.0	20.0	18.5	*16.3*	*12.5*
30	20.0	20.0	20.0	...	20.0	...	20.0	...	20.0	20.0	20.0	20.0	20.0	20.0	18.5	*16.3*	*12.5*
31	23.0	23.0	23.0	...	23.0	...	23.0	...	23.0	23.0	23.0	23.0	23.0	22.2	20.0	*16.3*	*12.5*
32	25.0	25.0	25.0	...	25.0	...	25.0	...	25.0	25.0	25.0	25.0	25.0	23.6	21.0	*16.3*	*12.5*
33	25.0	25.0	25.0	...	25.0	...	25.0	...	25.0	25.0	25.0	25.0	25.0	23.6	21.0	...	...
34	33.8	...	33.8	...	33.8	...	33.8	...	33.8	33.8	...	...	...	...	...	...	...
35	33.8	...	33.8	...	33.8	...	33.8	...	33.8	33.8	...	...	...	...	...	...	...
36	33.8	...	33.8	...	33.8	...	33.8	...	33.8	33.8	...	...	...	...	...	...	...
37	33.8	...	33.8	...	33.8	...	33.8	...	33.8	33.8	...	...	...	...	...	...	...
38	35.0	...	35.0	...	35.0	...	35.0	...	35.0	35.0	...	...	...	...	...	...	...
39	35.0	...	35.0	...	35.0	...	35.0	...	35.0	35.0	...	...	...	...	...	...	...
40	35.0	...	35.0	...	35.0	...	35.0	...	35.0	35.0	...	...	...	...	...	...	...
41	35.0	...	35.0	...	35.0	...	35.0	...	35.0	35.0	...	...	...	...	...	...	...
42	20.0	20.0	20.0	...	20.0	...	20.0	...	20.0	20.0	20.0	20.0	20.0	20.0	20.0	18.8	16.7
43	22.0	22.0	22.0	...	22.0	...	22.0	...	22.0	...	22.0	22.0	22.0	22.0	22.0	21.0	18.5
44	23.0	...	23.0	...	23.0	...	23.0	...	23.0	...	23.0	23.0	23.0	...	...	...	...
45	24.0	...	24.0	...	24.0	...	24.0	...	24.0	...	24.0	24.0	24.0	...	...	...	...

Table 3
Section III, Division 1, Classes 2 and 3;* Section VIII, Divisions 1 and 2;† and Section XII
Maximum Allowable Stress Values, *S*, for Bolting Materials
(*See Maximum Temperature Limits for Restrictions on Class)
(†Use with Part 4.16 of Section VIII, Division 2)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding															
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
															Ferrous Materials	
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	*8.5*	*4.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	*8.5*	*4.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	*8.5*	*4.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	*8.5*	*4.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	*8.5*	*4.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	14.3	*11.0*	*6.3*	*2.8*	...	...	...	...	...	...	...	...	...	...	...	
43	15.3	*11.0*	*6.3*	*2.8*	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	

Table 3 (Cont'd)
Section III, Division 1, Classes 2 and 3;* Section VIII, Divisions 1 and 2;† and Section XII
Maximum Allowable Stress Values, *S*, for Bolting Materials
(*See Maximum Temperature Limits for Restrictions on Class)
(†Use with Part 4.16 of Section VIII, Division 2)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/ Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/ Thickness, in.
	Ferrous Materials (Cont'd)						
1	1Cr–½Mo–V	Bolting	SA–193	B16	K14072	...	≤2½
2	1Cr–½Mo–V	Bolting	SA–540	B21	K14073	4	≤6
3	1Cr–½Mo–V	Bolting	SA–540	B21	K14073	3	≤6
4	1Cr–½Mo–V	Bolting	SA–540	B21	K14073	2	≤4
5	1Cr–½Mo–V	Bolting	SA–540	B21	K14073	1	≤4
6	5Cr–½Mo	Bolting	SA–193	B5	K50100	...	≤4
7	12Cr–1Mo–V–W	Bolting	SA–437	B4C	K91352	...	...
8	12Cr–1Mo–V–W	Bolting	SA–437	B4B	K91352	...	...
9	13Cr	Bolting	SA–193	B6	S41000	...	≤4
10	17Cr–4Ni–4Cu	Bolting	SA–564	630	S17400	H1150	≤8
11	17Cr–4Ni–4Cu	Bolting	SA–564	630	S17400	H1100	≤8
12	17Cr–4Ni–4Cu	Bolting	SA–705	630	S17400	H1100	≤8
13	½Ni–½Cr–¼Mo	Bolting	SA–574	8740	G87400	...	≥⅝
14	½Ni–½Cr–¼Mo	Bolting	SA–574	8740	G87400	...	≤½
15	1¾Ni–¾Cr–¼Mo	Bolting	SA–320	L43	G43400	...	≤4
16	1¾Ni–¾Cr–¼Mo	Bolting	SA–574	4340	G43400	...	≥⅝
17	1¾Ni–¾Cr–¼Mo	Bolting	SA–574	4340	G43400	...	≤½
18	2Ni–¾Cr–¼Mo	Bolting	SA–540	B23	H43400	5	≤6
19	2Ni–¾Cr–¼Mo	Bolting	SA–540	B23	H43400	5	6 < t ≤ 9½
(**21**) 20	2Ni–¾Cr–¼Mo	Bolting	SA–540	B23	H43400	4	≤9½
(**21**) 21	2Ni–¾Cr–¼Mo	Bolting	SA–540	B23	H43400	3	≤9½
(**21**) 22	2Ni–¾Cr–¼Mo	Bolting	SA–540	B23	H43400	2	≤9½
(**21**) 23	2Ni–¾Cr–¼Mo	Bolting	SA–540	B23	H43400	1	≤8
24	2Ni–¾Cr–⅓Mo	Bolting	SA–540	B24	K24064	5	≤6
25	2Ni–¾Cr–⅓Mo	Bolting	SA–540	B24	K24064	5	6 < t ≤ 9½
(**21**) 26	2Ni–¾Cr–⅓Mo	Bolting	SA–540	B24	K24064	4	≤9½
(**21**) 27	2Ni–¾Cr–⅓Mo	Bolting	SA–540	B24	K24064	3	≤9½
(**21**) 28	2Ni–¾Cr–⅓Mo	Bolting	SA–540	B24	K24064	2	≤9½
(**21**) 29	2Ni–¾Cr–⅓Mo	Bolting	SA–540	B24	K24064	1	≤8
30	2Ni–¾Cr–⅓Mo–V	Bolting	SA–540	B24V	K24070	3	≤11
31	3½Ni–1¾Cr–½Mo–V	Forgings	SA–508	5	K42365	2	...
32	25Ni–15Cr–2Ti	Bolting	SA–453	660	S66286	A	...
33	25Ni–15Cr–2Ti	Bolting	SA–453	660	S66286	B	...
34	16Cr–12Ni–2Mo	Bolting	SA–193	B8M	S31600	1	...
35	16Cr–12Ni–2Mo	Bolting	SA–320	B8M	S31600	1	...
36	16Cr–12Ni–2Mo	Bolting	SA–320	B8MA	S31600	1A	...
37	16Cr–12Ni–2Mo	Bolting	SA–193	B8M2	S31600	...	2½ < t ≤ 3
38	16Cr–12Ni–2Mo	Bolting	SA–193	B8M	S31600	2	1¼ < t ≤ 1½
39	16Cr–12Ni–2Mo	Bolting	SA–320	B8M	S31600	2	1¼ < t ≤ 1½
40	16Cr–12Ni–2Mo	Bolting	SA–193	B8M2	S31600	...	2 < t ≤ 2½
41	16Cr–12Ni–2Mo	Bolting	SA–193	B8M	S31600	2	1 < t ≤ 1¼
42	16Cr–12Ni–2Mo	Bolting	SA–320	B8M	S31600	2	1 < t ≤ 1¼
43	16Cr–12Ni–2Mo	Bolting	SA–193	B8M2	S31600	...	≤2
44	16Cr–12Ni–2Mo	Bolting	SA–193	B8M	S31600	2	¾ < t ≤ 1
45	16Cr–12Ni–2Mo	Bolting	SA–320	B8M	S31600	2	¾ < t ≤ 1

Table 3 (Cont'd)
Section III, Division 1, Classes 2 and 3;* Section VIII, Divisions 1 and 2;† and Section XII
Maximum Allowable Stress Values, *S*, for Bolting Materials
(*See Maximum Temperature Limits for Restrictions on Class)
(†Use with Part 4.16 of Section VIII, Division 2)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) III	VIII-1	VIII-2	XII	Notes
							Ferrous Materials (Cont'd)
1	125	105	800	1100	800	650	T8
2	135	120	700	700	700	650	...
3	145	130	700	700	700	650	...
4	155	140	700	700	700	650	...
5	165	150	700	700	700	650	...
6	100	80	800	1200	800	650	T5
7	115	85	700	700	700	650	...
8	145	105	700	700	700	650	...
9	110	85	800	900	800	650	T5
10	135	105	NP	650	650	NP	G4
11	140	115	650	650	650	650	G4
12	140	115	650	650	650	650	G4
13	170	135	550	NP	NP	NP	G7, G11, W1
14	180	140	550	NP	NP	NP	G7, G11, W1
15	125	105	400	400	700	400	...
16	170	135	550	550	NP	NP	G7, G11, W1
17	180	140	550	550	NP	NP	G7, G11, W1
18	115	100	700	700	700	650	...
19	120	105	700	700	700	650	...
20	135	120	700	700	700	650	...
21	145	130	700	700	700	650	...
22	155	140	700	700	700	650	...
23	165	150	700	700	700	650	...
24	115	100	700	700	700	650	...
25	120	105	700	700	700	650	...
26	135	120	700	700	700	650	...
27	145	130	700	700	700	650	...
28	155	140	700	700	700	650	...
29	165	150	700	700	700	650	...
30	145	130	700	700	700	650	...
31	115	100	NP	100	100	100	...
32	130	85	800	1000	800	650	...
33	130	85	800	1000	800	650	...
34	75	30	800	1500	800	650	G5, G6, T11
35	75	30	400	800	800	100	...
36	75	30	NP	800	800	100	...
37	80	55	NP	1000	800	650	G9
38	90	50	800	800	NP	650	G8
39	90	50	NP	800	800	100	G8, G9
40	90	65	NP	1000	800	650	G9
41	95	65	800	800	NP	650	G8
42	95	65	NP	800	800	100	G8
43	95	75	NP	1000	800	650	G9
44	100	80	800	800	NP	650	G8
45	100	80	NP	800	800	100	G8

Table 3 (Cont'd)
Section III, Division 1, Classes 2 and 3;* Section VIII, Divisions 1 and 2;† and Section XII
Maximum Allowable Stress Values, *S*, for Bolting Materials
(*See Maximum Temperature Limits for Restrictions on Class)
(†Use with Part 4.16 of Section VIII, Division 2)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900
	Ferrous Materials (Cont'd)																
1	25.0	25.0	25.0	...	25.0	...	25.0	...	25.0	25.0	25.0	25.0	25.0	25.0	25.0	23.5	20.5
2	27.0	...	27.0	...	27.0	...	27.0	...	27.0	...	27.0	27.0	27.0	...	...	...	...
3	29.0	...	29.0	...	29.0	...	29.0	...	29.0	...	29.0	29.0	29.0	...	...	...	...
4	31.0	...	31.0	...	31.0	...	31.0	...	31.0	...	31.0	31.0	31.0	...	...	...	...
5	33.0	...	33.0	...	33.0	...	33.0	...	33.0	...	33.0	33.0	33.0	...	...	...	...
6	20.0	20.0	20.0	...	20.0	...	20.0	...	20.0	...	20.0	20.0	20.0	20.0	18.5	*14.5*	*10.4*
7	21.3	...	21.3	...	21.3	...	21.3	...	21.3	...	21.3	21.3	21.3	...	...	...	...
8	26.2	...	26.2	...	26.2	...	26.2	...	26.2	...	26.2	26.2	26.2	...	...	...	...
9	21.3	...	21.3	...	21.3	...	21.3	...	21.3	...	21.3	21.3	21.3	21.3	21.3	*17.2*	*12.3*
10	26.3	...	26.3	...	26.3	...	26.3	...	26.3	...	26.3	26.3	...	...	...	...	...
11	28.0	...	28.0	...	28.0	...	28.0	...	28.0	...	28.0	28.0	...	...	...	...	...
12	28.0	...	28.0	...	28.0	...	28.0	...	28.0	...	28.0	28.0	...	...	...	...	...
13	33.8	...	33.8	...	33.8	...	33.8	...	33.8	33.8	...	...	...	...	...	...	...
14	35.0	...	35.0	...	35.0	...	35.0	...	35.0	35.0	...	...	...	...	...	...	...
15	25.0	...	25.0	...	25.0	...	25.0	...	25.0	...	25.0	25.0	25.0	...	...	...	...
16	33.8	...	33.8	...	33.8	...	33.8	...	33.8	33.8	...	...	...	...	...	...	...
17	35.0	...	35.0	...	35.0	...	35.0	...	35.0	35.0	...	...	...	...	...	...	...
18	23.0	23.0	23.0	...	23.0	...	23.0	...	23.0	23.0	23.0	23.0	23.0	...	...	...	...
19	24.0	24.0	24.0	...	24.0	...	24.0	...	24.0	24.0	24.0	24.0	24.0	...	...	...	...
20	27.0	27.0	27.0	...	27.0	...	27.0	...	27.0	27.0	27.0	27.0	27.0	...	...	...	...
21	29.0	29.0	29.0	...	29.0	...	29.0	...	29.0	29.0	29.0	29.0	29.0	...	...	...	...
22	31.0	...	31.0	...	31.0	...	31.0	...	31.0	...	31.0	31.0	31.0	...	...	...	...
23	33.0	...	33.0	...	33.0	...	33.0	...	33.0	...	33.0	33.0	33.0	...	...	...	...
24	23.0	23.0	23.0	...	23.0	...	23.0	...	23.0	23.0	23.0	23.0	23.0	...	...	...	...
25	24.0	24.0	24.0	...	24.0	...	24.0	...	24.0	24.0	24.0	24.0	24.0	...	...	...	...
26	27.0	27.0	27.0	...	27.0	...	27.0	...	27.0	27.0	27.0	27.0	27.0	...	...	...	...
27	29.0	29.0	29.0	...	29.0	...	29.0	...	29.0	29.0	29.0	29.0	29.0	...	...	...	...
28	31.0	...	31.0	...	31.0	...	31.0	...	31.0	...	31.0	31.0	31.0	...	...	...	...
29	33.0	...	33.0	...	33.0	...	33.0	...	33.0	...	33.0	33.0	33.0	...	...	...	...
30	29.0	...	29.0	...	29.0	...	29.0	...	29.0	...	29.0	29.0	29.0	...	...	...	...
31	23.0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
32	21.3	...	21.3	...	21.3	...	21.3	...	21.3	...	21.3	21.3	21.3	21.3	21.3	21.3	21.3
33	21.3	...	21.3	...	21.3	...	21.3	...	21.3	...	21.3	21.3	21.3	21.3	21.3	21.3	21.3
34	18.8	...	17.7	...	15.6	...	14.3	...	13.3	...	12.6	12.3	12.1	11.9	11.7	11.6	11.5
35	18.8	...	17.7	...	15.6	...	14.3	...	13.3	...	12.6	12.3	12.1	11.9	11.7	...	...
36	18.8	...	17.7	...	15.6	...	14.3	...	13.3	...	12.6	12.3	12.1	11.9	11.7	...	...
37	18.8	...	17.7	...	15.6	...	14.3	...	13.8	...	13.8	13.8	13.8	13.8	13.8	13.8	13.8
38	18.8	...	17.7	...	15.6	...	14.3	...	13.3	...	12.6	12.5	12.5	12.5	12.5	...	...
39	18.8	...	17.7	...	15.6	...	14.3	...	13.3	...	12.6	12.5	12.5	12.5	12.5	...	...
40	18.8	...	17.7	...	16.3	...	16.3	...	16.3	...	16.3	16.3	16.3	16.3	16.3	16.3	16.3
41	18.8	...	17.7	...	16.3	...	16.3	...	16.3	...	16.3	16.3	16.3	16.3	16.3	...	...
42	18.8	...	17.7	...	16.3	...	16.3	...	16.3	...	16.3	16.3	16.3	16.3	16.3	...	...
43	18.8	...	18.8	...	18.8	...	18.8	...	18.8	...	18.8	18.8	18.8	18.8	18.8	18.8	18.8
44	20.0	...	20.0	...	20.0	...	20.0	...	20.0	...	20.0	20.0	20.0	20.0	20.0	...	...
45	20.0	...	20.0	...	20.0	...	20.0	...	20.0	...	20.0	20.0	20.0	20.0	20.0	...	...

Table 3 (Cont'd)
Section III, Division 1, Classes 2 and 3;* Section VIII, Divisions 1 and 2;† and Section XII
Maximum Allowable Stress Values, *S*, for Bolting Materials
(*See Maximum Temperature Limits for Restrictions on Class)
(†Use with Part 4.16 of Section VIII, Division 2)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding															
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
																Ferrous Materials (Cont'd)
1	16.0	*11.0*	*6.3*	*2.8*	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	*7.6*	*5.6*	*4.2*	*3.1*	*2.0*	*1.3*	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	21.3	21.3	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	21.3	21.3	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	11.4	11.3	11.2	11.0	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	13.8	13.8	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	16.3	16.3	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	18.8	18.8	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	

Table 3 (Cont'd)
Section III, Division 1, Classes 2 and 3;* Section VIII, Divisions 1 and 2;† and Section XII
Maximum Allowable Stress Values, *S*, for Bolting Materials
(*See Maximum Temperature Limits for Restrictions on Class)
(†Use with Part 4.16 of Section VIII, Division 2)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/ Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/ Thickness, in.
	Ferrous Materials (Cont'd)						
1	16Cr–12Ni–2Mo	Bolting	SA–193	B8M	S31600	2	$\leq 3/4$
2	16Cr–12Ni–2Mo	Bolting	SA–320	B8M	S31600	2	$\leq 3/4$
3	16Cr–12Ni–2Mo–N	Bolting	SA–193	B8MNA	S31651	1A	...
4	18Cr–8Ni	Bolting	SA–193	B8	S30400	1	...
5	18Cr–8Ni	Bolting	SA–320	B8	S30400	1	...
6	18Cr–8Ni	Bolting	SA–320	B8A	S30400	1A	...
7	18Cr–8Ni	Bolting	SA–193	B8	S30400	2	$1 1/4 < t \leq 1 1/2$
8	18Cr–8Ni	Bolting	SA–320	B8	S30400	2	$1 1/4 < t \leq 1 1/2$
9	18Cr–8Ni	Bolting	SA–193	B8	S30400	2	$1 < t \leq 1 1/4$
10	18Cr–8Ni	Bolting	SA–320	B8	S30400	2	$1 < t \leq 1 1/4$
11	18Cr–8Ni	Bolting	SA–193	B8	S30400	2	$3/4 < t \leq 1$
12	18Cr–8Ni	Bolting	SA–320	B8	S30400	2	$3/4 < t \leq 1$
13	18Cr–8Ni	Bolting	SA–193	B8	S30400	2	$\leq 3/4$
14	18Cr–8Ni	Bolting	SA–320	B8	S30400	2	$\leq 3/4$
15	18Cr–8Ni–N	Bolting	SA–193	B8NA	S30451	1A	...
16	18Cr–8Ni–Se	Bolting	SA–320	B8F	S30323	1	...
17	18Cr–8Ni–Se	Bolting	SA–320	B8FA	S30323	1A	...
18	18Cr–8Ni–4Si–N	Bolting	SA–193	B8S	S21800	...	...
19	18Cr–8Ni–4Si–N	Bolting	SA–193	B8SA	S21800	...	...
20	18Cr–10Ni–Cb	Bolting	SA–193	B8C	S34700	1	...
21	18Cr–10Ni–Cb	Bolting	SA–320	B8C	S34700	1	...
22	18Cr–10Ni–Cb	Bolting	SA–320	B8CA	S34700	1A	...
23	18Cr–10Ni–Cb	Bolting	SA–193	B8C	S34700	2	$1 1/4 < t \leq 1 1/2$
24	18Cr–10Ni–Cb	Bolting	SA–320	B8C	S34700	2	$1 1/4 < t \leq 1 1/2$
25	18Cr–10Ni–Cb	Bolting	SA–193	B8C	S34700	2	$1 < t \leq 1 1/4$
26	18Cr–10Ni–Cb	Bolting	SA–320	B8C	S34700	2	$1 < t \leq 1 1/4$
27	18Cr–10Ni–Cb	Bolting	SA–193	B8C	S34700	2	$3/4 < t \leq 1$
28	18Cr–10Ni–Cb	Bolting	SA–320	B8C	S34700	2	$3/4 < t \leq 1$
29	18Cr–10Ni–Cb	Bolting	SA–193	B8C	S34700	2	$\leq 3/4$
30	18Cr–10Ni–Cb	Bolting	SA–320	B8C	S34700	2	$\leq 3/4$
31	18Cr–10Ni–Ti	Bolting	SA–193	B8T	S32100	1	...
32	18Cr–10Ni–Ti	Bolting	SA–320	B8T	S32100	1	...
33	18Cr–10Ni–Ti	Bolting	SA–320	B8TA	S32100	1A	...
34	18Cr–10Ni–Ti	Bolting	SA–193	B8T	S32100	2	$1 1/4 < t \leq 1 1/2$
35	18Cr–10Ni–Ti	Bolting	SA–320	B8T	S32100	2	$1 1/4 < t \leq 1 1/2$
36	18Cr–10Ni–Ti	Bolting	SA–193	B8T	S32100	2	$1 < t \leq 1 1/4$
37	18Cr–10Ni–Ti	Bolting	SA–320	B8T	S32100	2	$1 < t \leq 1 1/4$
38	18Cr–10Ni–Ti	Bolting	SA–193	B8T	S32100	2	$3/4 < t \leq 1$
39	18Cr–10Ni–Ti	Bolting	SA–320	B8T	S32100	2	$3/4 < t \leq 1$
40	18Cr–10Ni–Ti	Bolting	SA–193	B8T	S32100	2	$\leq 3/4$
41	18Cr–10Ni–Ti	Bolting	SA–320	B8T	S32100	2	$\leq 3/4$
42	18Cr–11Ni	Bolting	SA–193	B8P	S30500	1	...
43	18Cr–11Ni	Bolting	SA–193	B8P	S30500	2	$1 1/4 < t \leq 1 1/2$
44	18Cr–11Ni	Bolting	SA–193	B8P	S30500	2	$1 < t \leq 1 1/4$
45	18Cr–11Ni	Bolting	SA–193	B8P	S30500	2	$3/4 < t \leq 1$

Table 3 (Cont'd)
Section III, Division 1, Classes 2 and 3;* Section VIII, Divisions 1 and 2;† and Section XII
Maximum Allowable Stress Values, *S*, for Bolting Materials
(*See Maximum Temperature Limits for Restrictions on Class)
(†Use with Part 4.16 of Section VIII, Division 2)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) III	VIII-1	VIII-2	XII	Notes
							Ferrous Materials (Cont'd)
1	110	95	800	800	NP	650	G8
2	110	95	NP	800	800	100	G8
3	75	30	800	1000	800	650	G5
4	75	30	800	1500	800	650	G5, G6, T10
5	75	30	400	800	800	100	...
6	75	30	NP	800	800	100	...
7	100	50	NP	1000	800	650	G8, G9
8	100	50	NP	1000	800	100	G8
9	105	65	NP	1000	800	650	G8, G9
10	105	65	NP	1000	800	100	G8
11	115	80	NP	1000	800	650	G8, G9
12	115	80	NP	1000	800	100	G8
13	125	100	NP	1000	800	650	G8, G9
14	125	100	NP	1000	800	100	G8
15	75	30	800	1000	800	650	G5
16	75	30	400	400	400	100	...
17	75	30	NP	400	400	100	...
18	95	50	NP	950	800	650	...
19	95	50	NP	950	800	650	...
20	75	30	800	1500	800	650	G5, G6, T9
21	75	30	400	800	800	100	...
22	75	30	NP	800	800	100	...
23	100	50	NP	100	100	100	G8
24	100	50	NP	100	100	100	G8
25	105	65	NP	100	100	100	G8
26	105	65	NP	100	100	100	G8
27	115	80	NP	100	100	100	G8
28	115	80	NP	100	100	100	G8
29	125	100	NP	100	100	100	G8
30	125	100	NP	100	100	100	G8
31	75	30	800	1500	800	650	G5, G6, T9
32	75	30	400	800	800	100	...
33	75	30	NP	800	800	100	...
34	100	50	NP	1000	800	650	G8
35	100	50	NP	800	800	100	G8
36	105	65	NP	1000	800	650	G8
37	105	65	NP	800	800	100	G8
38	115	80	NP	1000	800	650	G8
39	115	80	NP	800	800	100	G8
40	125	100	NP	1000	800	650	G8
41	125	100	NP	800	800	100	G8
42	75	30	NP	1500	800	650	T10
43	100	50	NP	1000	800	650	G8
44	105	65	NP	1000	800	650	G8
45	115	80	NP	1000	800	650	G8

Table 3 (Cont'd)
Section III, Division 1, Classes 2 and 3;* Section VIII, Divisions 1 and 2;† and Section XII
Maximum Allowable Stress Values, *S*, for Bolting Materials
(*See Maximum Temperature Limits for Restrictions on Class)
(†Use with Part 4.16 of Section VIII, Division 2)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900
	Ferrous Materials (Cont'd)																
1	22.0	...	22.0	...	22.0	...	22.0	...	22.0	...	22.0	22.0	22.0	22.0	22.0	...	...
2	22.0	...	22.0	...	22.0	...	22.0	...	22.0	...	22.0	22.0	22.0	22.0	22.0	...	...
3	18.8	...	17.8	...	16.3	...	15.2	...	14.2	...	13.4	13.1	12.8	12.5	12.3	12.0	11.8
4	18.8	...	16.7	...	15.0	...	13.8	...	12.9	...	12.1	12.0	11.8	11.5	11.2	11.0	10.8
5	18.8	...	16.7	...	15.0	...	13.8	...	12.9	...	12.1	12.0	11.8	11.5	11.2	...	...
6	18.8	...	16.7	...	15.0	...	13.8	...	12.9	...	12.1	12.0	11.8	11.5	11.2	...	...
7	18.8	...	16.7	...	15.0	...	13.8	...	12.9	...	12.5	12.5	12.5	12.5	12.5	12.5	12.5
8	18.8	...	16.7	...	15.0	...	13.8	...	12.9	...	12.5	12.5	12.5	12.5	12.5	12.5	12.5
9	18.8	...	16.7	...	16.3	...	16.3	...	16.3	...	16.3	16.3	16.3	16.3	16.3	16.3	16.3
10	18.8	...	16.7	...	16.3	...	16.3	...	16.3	...	16.3	16.3	16.3	16.3	16.3	16.3	16.3
11	20.0	...	20.0	...	20.0	...	20.0	...	20.0	...	20.0	20.0	20.0	20.0	20.0	20.0	20.0
12	20.0	...	20.0	...	20.0	...	20.0	...	20.0	...	20.0	20.0	20.0	20.0	20.0	20.0	20.0
13	25.0	...	25.0	...	25.0	...	25.0	...	25.0	...	25.0	25.0	25.0	25.0	25.0	25.0	25.0
14	25.0	...	25.0	...	25.0	...	25.0	...	25.0	...	25.0	25.0	25.0	25.0	25.0	25.0	25.0
15	18.8	...	16.5	...	14.4	...	12.9	...	12.0	...	11.4	11.2	11.0	10.8	10.6	10.4	10.2
16	18.8	...	15.0	...	13.6	...	12.6	...	...	...	...	...	...	...	...	...	...
17	18.8	...	15.0	...	13.6	...	12.6	...	...	...	...	...	...	...	...	...	...
18	23.8	...	23.4	...	21.8	...	19.7	...	18.5	...	17.6	17.3	17.1	16.9	16.7	16.7	16.7
19	23.8	...	23.4	...	21.8	...	19.7	...	18.5	...	17.6	17.3	17.1	16.9	16.7	16.7	16.7
20	18.8	...	17.9	...	16.4	...	15.5	...	15.0	...	14.3	14.1	13.8	13.7	13.6	13.5	13.5
21	18.8	...	17.9	...	16.4	...	15.5	...	15.0	...	14.3	14.1	13.8	13.7	13.6	...	...
22	18.8	...	17.9	...	16.4	...	15.5	...	15.0	...	14.3	14.1	13.8	13.7	13.6	...	...
23	18.8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
24	18.8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
25	18.8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
26	18.8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
27	20.0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
28	20.0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
29	25.0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
30	25.0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
31	18.8	...	17.8	...	16.5	...	15.3	...	14.3	...	13.5	13.3	12.9	12.7	12.5	12.4	12.3
32	18.8	...	17.8	...	16.5	...	15.3	...	14.3	...	13.5	13.3	12.9	12.7	12.5	...	...
33	18.8	...	17.8	...	16.5	...	15.3	...	14.3	...	13.5	13.3	12.9	12.7	12.5	...	...
34	18.8	...	17.8	...	16.5	...	15.3	...	14.3	...	13.5	13.3	12.9	12.7	12.5	12.5	12.5
35	18.8	...	17.8	...	16.5	...	15.3	...	14.3	...	13.5	13.3	12.9	12.7	12.5	...	...
36	18.8	...	17.8	...	16.5	...	16.3	...	16.3	...	16.3	16.3	16.3	16.3	16.3	16.3	16.3
37	18.8	...	17.8	...	16.5	...	16.3	...	16.3	...	16.3	16.3	16.3	16.3	16.3	...	...
38	20.0	...	20.0	...	20.0	...	20.0	...	20.0	...	20.0	20.0	20.0	20.0	20.0	20.0	20.0
39	20.0	...	20.0	...	20.0	...	20.0	...	20.0	...	20.0	20.0	20.0	20.0	20.0	...	...
40	25.0	...	25.0	...	25.0	...	25.0	...	25.0	...	25.0	25.0	25.0	25.0	25.0	25.0	25.0
41	25.0	...	25.0	...	25.0	...	25.0	...	25.0	...	25.0	25.0	25.0	25.0	25.0	...	...
42	18.8	...	16.7	...	15.0	...	13.8	...	12.9	...	12.1	12.0	11.8	11.5	11.2	11.0	10.8
43	18.8	...	18.8	...	18.8	...	18.8	...	18.8	...	18.8	18.8	18.8	18.8	18.7	18.3	18.0
44	18.8	...	18.8	...	18.8	...	18.8	...	18.8	...	18.8	18.8	18.8	18.8	18.8	18.8	18.8
45	20.0	...	20.0	...	20.0	...	20.0	...	20.0	...	20.0	20.0	20.0	20.0	20.0	20.0	20.0

Table 3 (Cont'd)
Section III, Division 1, Classes 2 and 3;* Section VIII, Divisions 1 and 2;† and Section XII
Maximum Allowable Stress Values, *S*, for Bolting Materials
(*See Maximum Temperature Limits for Restrictions on Class)
(†Use with Part 4.16 of Section VIII, Division 2)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding														
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
															Ferrous Materials (Cont'd)
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
3	11.6	11.4	...	...	...	...	...	...	...	...	...	...	...	...	...
4	10.6	10.4	10.1	*9.8*	*7.7*	*6.0*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
7	12.5	12.5	...	...	...	...	...	...	...	...	...	...	...	...	...
8	12.5	12.5	...	...	...	...	...	...	...	...	...	...	...	...	...
9	16.3	16.3	...	...	...	...	...	...	...	...	...	...	...	...	...
10	16.3	16.3	...	...	...	...	...	...	...	...	...	...	...	...	...
11	20.0	20.0	...	...	...	...	...	...	...	...	...	...	...	...	...
12	20.0	20.0	...	...	...	...	...	...	...	...	...	...	...	...	...
13	24.8	24.1	...	...	...	...	...	...	...	...	...	...	...	...	...
14	24.8	24.1	...	...	...	...	...	...	...	...	...	...	...	...	...
15	9.9	9.7	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
18	16.7	...	...	...	...	...	...	...	...	...	...	...	...	...	...
19	16.7	...	...	...	...	...	...	...	...	...	...	...	...	...	...
20	13.4	13.4	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
31	12.1	12.0	*9.6*	*6.9*	*5.0*	*3.6*	*2.5*	*1.7*	*1.1*	*0.80*	*0.50*	*0.30*	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
34	12.5	12.5	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
36	16.3	16.3	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
38	20.0	20.0	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
40	25.0	25.0	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
42	10.6	10.4	10.1	*9.8*	*7.7*	*6.0*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*	...	...	...
43	17.7	17.3	...	...	...	...	...	...	...	...	...	...	...	...	...
44	18.8	18.8	...	...	...	...	...	...	...	...	...	...	...	...	...
45	20.0	20.0	...	...	...	...	...	...	...	...	...	...	...	...	...

Table 3 (Cont'd)
Section III, Division 1, Classes 2 and 3;* Section VIII, Divisions 1 and 2;† and Section XII
Maximum Allowable Stress Values, *S*, for Bolting Materials
(*See Maximum Temperature Limits for Restrictions on Class)
(†Use with Part 4.16 of Section VIII, Division 2)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/ Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/ Thickness, in.
	Ferrous Materials (Cont'd)						
1	18Cr–11Ni	Bolting	SA–193	B8P	S30500	2	≤$^{3}/_{4}$
2	19Cr–9Ni–Mo–W	Bolting	SA–453	651	S63198	B	>3
3	19Cr–9Ni–Mo–W	Bolting	SA–453	651	S63198	B	>3
4	19Cr–9Ni–Mo–W	Bolting	SA–453	651	S63198	B	≤3
5	19Cr–9Ni–Mo–W	Bolting	SA–453	651	S63198	B	≤3
6	19Cr–9Ni–Mo–W	Bolting	SA–453	651	S63198	A	>3
7	19Cr–9Ni–Mo–W	Bolting	SA–453	651	S63198	A	>3
8	19Cr–9Ni–Mo–W	Bolting	SA–453	651	S63198	A	≤3
9	19Cr–9Ni–Mo–W	Bolting	SA–453	651	S63198	A	≤3
10	22Cr–13Ni–5Mn	Bolting	SA–479	XM–19	S20910	Annealed	...
11	22Cr–13Ni–5Mn	Bolting	SA–479	XM–19	S20910	Hot rolled	3 < t ≤ 8
12	22Cr–13Ni–5Mn	Bolting	SA–479	XM–19	S20910	Hot rolled	2 < t ≤ 3
13	22Cr–13Ni–5Mn	Bolting	SA–479	XM–19	S20910	Hot rolled	≤2
(**21**) 14	23Cr–25Ni–5.5Mo–N	Bolting	SA–193	...	S32053	...	...

Table 3 (Cont'd)
Section III, Division 1, Classes 2 and 3;* Section VIII, Divisions 1 and 2;† and Section XII
Maximum Allowable Stress Values, *S*, for Bolting Materials
(*See Maximum Temperature Limits for Restrictions on Class)
(†Use with Part 4.16 of Section VIII, Division 2)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) III	VIII-1	VIII-2	XII	Notes
							Ferrous Materials (Cont'd)
1	125	100	NP	1000	800	650	G8
2	95	50	800	NP	NP	NP	...
3	95	50	NP	1000	800	650	...
4	95	60	800	NP	NP	NP	...
5	95	60	NP	1000	800	650	...
6	100	60	800	NP	NP	NP	...
7	100	60	NP	1000	800	650	...
8	100	70	800	NP	NP	NP	...
9	100	70	NP	1000	800	650	...
10	100	55	NP	1150	800	650	T9
11	100	60	NP	1150	800	650	T9
12	115	75	NP	1150	800	650	T9
13	135	105	NP	1150	800	650	T9
14	93	43	NP	662	NP	NP	...

Table 3 (Cont'd)
Section III, Division 1, Classes 2 and 3;* Section VIII, Divisions 1 and 2;† and Section XII
Maximum Allowable Stress Values, *S*, for Bolting Materials
(*See Maximum Temperature Limits for Restrictions on Class)
(†Use with Part 4.16 of Section VIII, Division 2)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900
	Ferrous Materials (Cont'd)																
1	25.0	...	25.0	...	25.0	...	25.0	...	25.0	...	25.0	25.0	25.0	25.0	25.0	25.0	25.0
2	12.5	...	11.4	...	10.6	...	10.0	...	9.5	...	9.0	8.8	8.6	8.4	8.3	...	...
3	12.5	...	11.5	...	10.7	...	10.0	...	9.5	...	9.0	8.8	8.7	8.5	8.3	8.2	8.0
4	15.0	...	13.7	...	12.7	...	12.0	...	11.5	...	10.9	10.6	10.4	10.1	9.9	...	...
5	15.0	...	13.8	...	12.8	...	12.1	...	11.5	...	10.9	10.6	10.4	10.2	10.0	9.8	9.6
6	15.0	...	13.7	...	12.7	...	12.0	...	11.5	...	10.9	10.6	10.4	10.1	9.9	...	...
7	15.0	...	13.8	...	12.8	...	12.1	...	11.5	...	10.9	10.7	10.4	10.2	10.0	9.8	9.6
8	17.5	...	16.0	...	14.8	...	14.0	...	13.4	...	12.7	12.4	12.1	11.8	11.6	...	...
9	17.5	...	16.1	...	14.9	...	14.1	...	13.4	...	12.7	12.4	12.2	11.9	11.6	11.4	11.2
10	25.0	...	24.9	...	23.6	...	22.7	...	22.3	...	21.9	21.8	21.6	21.4	21.2	20.9	20.6
11	25.0	...	24.9	...	23.6	...	22.7	...	22.3	...	21.9	21.8	21.6	21.4	21.2	20.9	20.6
12	25.0	...	24.9	...	23.6	...	22.7	...	22.3	...	21.9	21.8	21.6	21.4	21.2	20.9	20.6
13	26.2	...	26.2	...	26.2	...	26.2	...	26.2	...	26.2	26.2	26.2	26.2	26.2	26.2	26.2
14	26.5	...	24.2	...	21.9	...	20.8	...	19.3	...	18.5	18.2	17.9	...	...	...	...

Table 3 (Cont'd)
Section III, Division 1, Classes 2 and 3;* Section VIII, Divisions 1 and 2;† and Section XII
Maximum Allowable Stress Values, *S*, for Bolting Materials
(*See Maximum Temperature Limits for Restrictions on Class)
(†Use with Part 4.16 of Section VIII, Division 2)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding														
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
															Ferrous Materials (Cont'd)
1	24.8	24.1	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
3	7.9	7.7	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
5	9.4	9.2	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
7	9.4	9.2	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
9	11.0	10.7	...	...	...	...	...	...	...	...	...	...	...	...	...
10	20.3	19.9	*19.0*	*13.0*	*8.3*	...	...	...	...	...	...	...	...	...	...
11	20.3	19.9	*19.0*	*13.0*	*8.3*	...	...	...	...	...	...	...	...	...	...
12	20.3	19.9	*19.0*	*13.0*	*8.3*	...	...	...	...	...	...	...	...	...	...
13	26.2	26.2	*19.0*	*13.0*	*8.3*	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	... (**21**)

Table 3 (Cont'd)
Section III, Division 1, Classes 2 and 3;* Section VIII, Divisions 1 and 2;† and Section XII
Maximum Allowable Stress Values, *S*, for Bolting Materials
(*See Maximum Temperature Limits for Restrictions on Class)
(†Use with Part 4.16 of Section VIII, Division 2)

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/ Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/ Thickness, in.
		Nonferrous Materials						
	1	...	Bolting	SB–211	2014	A92014	T6	0.125–8.000
	2	...	Bolting	SB–211	2014	A92014	T651	0.125–8.000
	3	...	Bolting	SB–211	2024	A92024	T4	0.125–0.499
	4	...	Bolting	SB–211	2024	A92024	T4	0.500–4.500
	5	...	Bolting	SB–211	2024	A92024	T4	4.501–6.500
	6	...	Bolting	SB–211	2024	A92024	T4	6.501–8.000
	7	...	Bolting	SB–211	6061	A96061	T6	0.125–8.000
	8	...	Bolting	SB–211	6061	A96061	T651	0.125–8.000
	9	...	Rod	SB–187	...	C10200	O60	All
	10	...	Rod	SB–187	...	C11000	O60	All
(**21**)	11	...	Rod	SB–150	...	C61400	HR50	$2 < t \le 3$
(**21**)	12	...	Rod	SB–150	...	C61400	HR50	$1 < t \le 2$
(**21**)	13	...	Rod	SB–150	...	C61400	HR50	$\frac{1}{2} < t \le 1$
(**21**)	14	...	Rod	SB–150	...	C61400	HR50	$\le \frac{1}{2}$
(**21**)	15	...	Round rod	SB–150	...	C62300	HR50	>3
	16	...	Bar, rod	SB–150	...	C62300	M20	>3
	17	...	Bar, rod	SB–150	...	C62300	M30	>3
(**21**)	18	...	Bar, rod	SB–150	...	C62300	O20, O25, O30	>3
(**21**)	19	...	...	...	...	...	...	...
(**21**)	20	...	...	...	...	...	...	...
(**21**)	21	...	Hex/oct rod & bar	SB–150	...	C62300	M20	>2
(**21**)	22	...	Hex/oct rod & bar	SB–150	...	C62300	HR50	$1 < t \le 2$
(**21**)	23	...	Hex/oct rod & bar	SB–150	...	C62300	HR50	≤1
(**21**)	24	...	Round rod	SB–150	...	C62300	HR50	$2 < t \le 3$
(**21**)	25	...	Round rod	SB–150	...	C62300	HR50	$1 < t \le 2$
(**21**)	26	...	Round rod	SB–150	...	C62300	HR50	$\frac{1}{2} < t \le 1$
(**21**)	27	...	Round rod	SB–150	...	C62300	HR50	$\le \frac{1}{2}$
(**21**)	28	...	Bar, rod	SB–150	...	C63000	M20, M30	>4
(**21**)	29	...	Bar, rod	SB–150	...	C63000	O20, O25, O30	>4
(**21**)	30	...	Bar, rod	SB–150	...	C63000	HR50	>4
(**21**)	31	...	Rod	SB–150	...	C63000	HR50	$2 < t \le 4$
(**21**)	32	...	Bar, rod	SB–150	...	C63000	M20, M30	$2 < t \le 4$
(**21**)	33	...	Bar, rod	SB–150	...	C63000	O20, O25, O30	$2 < t \le 4$
(**21**)	34	...	Bar, rod	SB–150	...	C63000	HR50	$\frac{1}{2} < t \le 1$
(**21**)	35	...	Bar, rod	SB–150	...	C63000	HR50	$\frac{1}{2} < t \le 1$
(**21**)	36	...	Bar, rod	SB–150	...	C64200	M10, M20, M30	>4
(**21**)	37	...	...	...	...	...	...	...
(**21**)	38	...	Bar, rod	SB–150	...	C64200	M10, M20, M30	$3 < t \le 4$
	39	...	Bar, rod	SB–150	...	C64200	HR50	$2 < t \le 3$
	40	...	Bar, rod	SB–150	...	C64200	HR50	$1 < t \le 2$
	41	...	Bar, rod	SB–150	...	C64200	HR50	$\frac{1}{2} < t \le 1$
	42	...	Bar, rod	SB–150	...	C64200	HR50	$\le \frac{1}{2}$
	43	...	Rod	SB–98	...	C65100	O60	All
	44	...	Rod	SB–98	...	C65100	H06	$1 < t \le 1\frac{1}{2}$
	45	...	Rod	SB–98	...	C65100	H06	$\frac{1}{2} < t \le 1$

Table 3 (Cont'd)
Section III, Division 1, Classes 2 and 3;* Section VIII, Divisions 1 and 2;† and Section XII
Maximum Allowable Stress Values, *S*, for Bolting Materials
(*See Maximum Temperature Limits for Restrictions on Class)
(†Use with Part 4.16 of Section VIII, Division 2)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted)				Notes
			III	VIII-1	VIII-2	XII	
							Nonferrous Materials
1	65	55	400 (Cl. 3 only)	400	400	400	T1, W4
2	65	55	NP	400	400	400	G10, T1, W4
3	62	45	400 (Cl. 3 only)	400	400	400	T1, W4
4	62	42	400 (Cl. 3 only)	400	400	400	T1, W4
5	62	40	400 (Cl. 3 only)	400	400	400	T2, W4
6	58	38	400 (Cl. 3 only)	400	400	400	T2, W4
7	42	35	400 (Cl. 3 only)	400	400	400	T2, W4
8	42	35	NP	400	400	400	G10, T2, W4
9	28	8	NP	400	400	400	T2
10	28	8	NP	400	400	400	T2
11	70	30	500 (Cl. 3 only)	500	500	500	...
12	70	32	500 (Cl. 3 only)	500	500	500	...
13	75	35	500 (Cl. 3 only)	500	500	500	...
14	80	40	500 (Cl. 3 only)	500	500	500	...
15	75	30	400 (Cl. 3 only)	600	400	600	T3, W1
16	75	30	400 (Cl. 3 only)	600	400	600	T3, W1
17	75	30	400 (Cl. 3 only)	600	400	600	T3, W1
18	75	30	400 (Cl. 3 only)	600	400	600	T3, W1
19	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...
21	75	30	400 (Cl. 3 only)	600	400	600	T3, W1
22	78	32	400 (Cl. 3 only)	600	400	600	T3, W1
23	80	35	400 (Cl. 3 only)	600	400	600	T3, W1
24	76	37	400 (Cl. 3 only)	600	400	600	T3, W1
25	84	40	400 (Cl. 3 only)	600	400	600	T3, W1
26	88	44	400 (Cl. 3 only)	600	400	600	T3, W1
27	90	50	400 (Cl. 3 only)	600	400	600	T3, W1
28	80	40	700 (Cl. 3 only)	700	500	650	T4, W4
29	80	40	700 (Cl. 3 only)	700	500	650	T4, W4
30	80	40	700 (Cl. 3 only)	700	500	650	T4, W4
31	85	42.5	700 (Cl. 3 only)	700	500	650	T4, W4
32	85	42.5	700 (Cl. 3 only)	700	500	650	T4, W4
33	85	42.5	700 (Cl. 3 only)	700	500	650	T4, W4
34	100	50	700 (Cl. 3 only)	700	500	650	T4, W4
35	100	50	700 (Cl. 3 only)	700	500	650	T4, W4
36	70	25	350 (Cl. 3 only)	600	350	600	T3, W1
37	...	...	...	...	...	...	...
38	70	30	350 (Cl. 3 only)	600	350	600	T3, W4
39	75	35	350 (Cl. 3 only)	600	350	600	T3, W1
40	80	42	350 (Cl. 3 only)	600	350	600	T3, W1
41	85	45	350 (Cl. 3 only)	600	350	600	T3, W1
42	90	45	350 (Cl. 3 only)	600	350	600	T3, W1
43	40	12	350 (Cl. 3 only)	350	350	350	G2
44	75	40	350 (Cl. 3 only)	350	350	350	G2, W2
45	75	45	350 (Cl. 3 only)	350	350	350	G2, W2

Table 3 (Cont'd)
Section III, Division 1, Classes 2 and 3;* Section VIII, Divisions 1 and 2;† and Section XII
Maximum Allowable Stress Values, *S*, for Bolting Materials
(*See Maximum Temperature Limits for Restrictions on Class)
(†Use with Part 4.16 of Section VIII, Division 2)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900
	Nonferrous Materials																
1	13.0	13.0	13.0	13.0	*11.4*	*6.8*	*3.9*	...	...	...	...	...	...	...	...	...	...
2	13.0	13.0	13.0	13.0	*11.4*	*6.8*	*3.9*	...	...	...	...	...	...	...	...	...	...
3	11.3	11.3	11.3	11.3	*10.4*	*6.5*	*4.5*	...	...	...	...	...	...	...	...	...	...
4	10.5	10.5	10.5	10.5	*10.4*	*6.5*	*4.5*	...	...	...	...	...	...	...	...	...	...
5	10.0	10.0	10.0	10.0	10.0	*6.5*	*4.5*	...	...	...	...	...	...	...	...	...	...
6	9.5	9.5	9.5	9.5	9.5	*6.1*	*4.2*	...	...	...	...	...	...	...	...	...	...
7	8.4	8.4	8.4	8.4	8.4	*6.3*	*4.4*	...	...	...	...	...	...	...	...	...	...
8	8.4	8.4	8.4	8.4	8.4	*6.3*	*4.4*	...	...	...	...	...	...	...	...	...	...
9	5.3	4.7	4.7	4.7	4.7	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...
10	5.3	4.7	4.7	4.7	4.7	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...
11	17.5	17.5	17.5	17.5	17.5	17.5	17.2	16.6	16.1	...	...	...	...	...	...	...	...
12	17.5	17.5	17.5	17.5	17.5	17.5	17.2	16.6	16.1	...	...	...	...	...	...	...	...
13	17.5	17.5	17.5	17.5	17.5	17.5	17.2	16.6	16.1	...	...	...	...	...	...	...	...
14	17.5	17.5	17.5	17.5	17.5	17.5	17.2	16.6	16.1	...	...	...	...	...	...	...	...
15	18.8	18.8	18.8	18.8	18.7	18.1	17.7	*16.0*	*12.5*	*10.6*	*9.9*	...	...	...	...	...	...
16	18.8	18.8	18.8	18.8	18.7	18.1	17.7	*16.0*	*12.5*	*10.6*	*9.9*	...	...	...	...	...	...
17	18.8	18.8	18.8	18.8	18.7	18.1	17.7	*16.0*	*12.5*	*10.6*	*9.9*	...	...	...	...	...	...
18	18.8	18.8	18.8	18.8	18.7	18.1	17.7	*16.0*	*12.5*	*10.6*	*9.9*	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
21	18.8	18.8	18.8	18.8	18.7	18.1	17.7	*16.0*	*12.5*	*10.6*	*9.9*	...	...	...	...	...	...
22	18.8	18.8	18.8	18.8	18.7	18.1	17.7	*16.0*	*12.5*	*10.6*	*9.9*	...	...	...	...	...	...
23	18.8	18.8	18.8	18.8	18.7	18.1	17.7	*16.0*	*12.5*	*10.6*	*9.9*	...	...	...	...	...	...
24	18.8	18.8	18.8	18.8	18.7	18.1	17.7	*16.0*	*12.5*	*10.6*	*9.9*	...	...	...	...	...	...
25	18.8	18.8	18.8	18.8	18.7	18.1	17.7	*16.0*	*12.5*	*10.6*	*9.9*	...	...	...	...	...	...
26	18.8	18.8	18.8	18.8	18.7	18.1	17.7	*16.0*	*12.5*	*10.6*	*9.9*	...	...	...	...	...	...
27	18.8	18.8	18.8	18.8	18.7	18.1	17.7	*16.0*	*12.5*	*10.6*	*9.9*	...	...	...	...	...	...
28	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	*16.4*	*12.0*	*8.5*	*6.0*	...	...	...	...
29	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	*16.4*	*12.0*	*8.5*	*6.0*	...	...	...	...
30	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	*16.4*	*12.0*	*8.5*	*6.0*	...	...	...	...
31	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	*16.4*	*12.0*	*8.5*	*6.0*	...	...	...	...
32	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	*16.4*	*12.0*	*8.5*	*6.0*	...	...	...	...
33	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	*16.4*	*12.0*	*8.5*	*6.0*	...	...	...	...
34	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	*16.4*	*12.0*	*8.5*	*6.0*	...	...	...	...
35	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	*16.4*	*12.0*	*8.5*	*6.0*	...	...	...	...
36	16.7	14.5	14.0	13.5	13.5	13.0	11.0	*7.5*	*5.2*	*2.5*	*1.7*	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
38	16.7	14.5	14.0	13.5	13.5	13.0	11.0	*7.5*	*5.2*	*2.5*	*1.7*	...	...	...	...	...	...
39	16.7	14.5	14.0	13.5	13.5	13.0	11.0	*7.5*	*5.2*	*2.5*	*1.7*	...	...	...	...	...	...
40	16.7	14.5	14.0	13.5	13.5	13.0	11.0	*7.5*	*5.2*	*2.5*	*1.7*	...	...	...	...	...	...
41	16.7	14.5	14.0	13.5	13.5	13.0	11.0	*7.5*	*5.2*	*2.5*	*1.7*	...	...	...	...	...	...
42	16.7	14.5	14.0	13.5	13.5	13.0	11.0	*7.5*	*5.2*	*2.5*	*1.7*	...	...	...	...	...	...
43	8.0	7.9	7.9	7.8	7.8	7.7	...	...	...	...	...	...	...	...	...	...	...
44	10.0	10.0	10.0	10.0	10.0	10.0	...	...	...	...	...	...	...	...	...	...	...
45	11.3	11.3	11.3	11.3	11.3	11.3	...	...	...	...	...	...	...	...	...	...	...

Table 3 (Cont'd)
Section III, Division 1, Classes 2 and 3;* Section VIII, Divisions 1 and 2;† and Section XII
Maximum Allowable Stress Values, *S*, for Bolting Materials
(*See Maximum Temperature Limits for Restrictions on Class)
(†Use with Part 4.16 of Section VIII, Division 2)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding															
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
															Nonferrous Materials	
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	

Table 3 (Cont'd)
Section III, Division 1, Classes 2 and 3;* Section VIII, Divisions 1 and 2;† and Section XII
Maximum Allowable Stress Values, *S*, for Bolting Materials
(*See Maximum Temperature Limits for Restrictions on Class)
(†Use with Part 4.16 of Section VIII, Division 2)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/ Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/ Thickness, in.
	Nonferrous Materials (Cont'd)						
1	...	Rod	SB–98	...	C65100	H06	≤1½
2	...	Rod	SB–98	...	C65500	O60	All
3	...	Rod	SB–98	...	C65500	H01	All
4	...	Rod	SB–98	...	C65500	H02	≤2
5	...	Rod	SB–98	...	C66100	O60	All
6	...	Rod	SB–98	...	C66100	H01	All
7	...	Rod	SB–98	...	C66100	H02	≤2
8	99Ni	Bolting	SB–160	...	N02200	Annealed	...
9	99Ni	Bolting	SB–160	...	N02200	Hot fin./ann.	...
10	99Ni	Bolting	SB–160	...	N02200	Cold drawn	...
11	99Ni–Low C	Bolting	SB–160	...	N02201	Hot fin./ann.	...
12	67Ni–30Cu	Bolting	SB–164	...	N04400	Annealed	...
13	67Ni–30Cu	Bolting	SB–164	...	N04400	Hot worked	...
14	67Ni–30Cu	Bolting	SB–164	...	N04400	Hot worked	...
15	67Ni–30Cu	Bolting	SB–164	...	N04400	CD–str. rel.	...
16	67Ni–30Cu	Bolting	SB–164	...	N04400	Cold worked	...
17	67Ni–30Cu	Bolting	SB–164	...	N04400	CD–str. rel.	...
18	67Ni–30Cu–S	Bolting	SB–164	...	N04405	Annealed	...
19	67Ni–30Cu–S	Bolting	SB–164	...	N04405	Annealed	...
20	67Ni–30Cu–S	Bolting	SB–164	...	N04405	Hot worked	...
21	67Ni–30Cu–S	Bolting	SB–164	...	N04405	Hot worked	...
22	67Ni–30Cu–S	Bolting	SB–164	...	N04405	Cold worked	...
23	67Ni–28Cu–3Al	Bolting	SF–468	...	N05500	Ann./aged	1.000–1.500
24	67Ni–28Cu–3Al	Bolting	SF–468	...	N05500	Ann./aged	0.250–0.875
25	47Ni–22Cr–9Mo–18Fe	Bolting	SB–572	...	N06002	Annealed	...
26	47Ni–22Cr–19Fe–6Mo	Bolting	SB–581	...	N06007	Solution ann.	>¾
27	47Ni–22Cr–19Fe–6Mo	Bolting	SB–581	...	N06007	Solution ann.	<¾
28	55Ni–21Cr–13.5Mo	Bolting	SB–574	...	N06022	Solution ann.	...
29	40Ni–29Cr–15Fe–5Mo	Bolting	SB–581	...	N06030	Solution ann.	...
30	61Ni–16Mo–16Cr	Bolting	SB–574	...	N06455	Solution ann.	...
31	72Ni–15Cr–8Fe	Bolting	SB–166	...	N06600	Annealed	...
32	72Ni–15Cr–8Fe	Bolting	SB–166	...	N06600	Hot fin.	...
33	72Ni–15Cr–8Fe	Bolting	SB–166	...	N06600	Cold drawn	...
34	72Ni–15Cr–8Fe	Bolting	SB–166	...	N06600	Hot fin.	...
35	72Ni–15Cr–8Fe	Bolting	SB–166	...	N06600	Hot fin.	...
36	60Ni–22Cr–9Mo–3.5Cb	Bolting	SB–446	1	N06625	Annealed	...
37	49Ni–25Cr–18Fe–6Mo	Bolting	SB–581	...	N06975	Solution ann.	...
38	53Ni–19Cr–19Fe–Cb–Mo	Bolting	SB–637	...	N07718	Ann./aged	≤6
39	70Ni–16Cr–7Fe–Ti–Al	Bolting	SB–637	2	N07750	Ann./aged	...
40	26Ni–43Fe–22Cr–5Mo	Bolting	SB–621	...	N08320	Solution ann.	...
41	46Fe–24Ni–21Cr–6Mo–N	Bolting	SB–691	...	N08367	Solution ann.	...
42	33Ni–42Fe–21Cr	Bolting	SB–408	...	N08800	Annealed	...
43	33Ni–42Fe–21Cr	Bolting	SB–408	...	N08810	Annealed	...
44	42Ni–21.5Cr–3Mo–2.3Cu	Bolting	SB–425	...	N08825	Annealed	...
45	62Ni–28Mo–5Fe	Bolting	SB–335	...	N10001	Annealed	$1\frac{1}{2} < t \le 3\frac{1}{2}$

Table 3 (Cont'd)
Section III, Division 1, Classes 2 and 3;* Section VIII, Divisions 1 and 2;† and Section XII
Maximum Allowable Stress Values, *S*, for Bolting Materials
(*See Maximum Temperature Limits for Restrictions on Class)
(†Use with Part 4.16 of Section VIII, Division 2)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) III	VIII-1	VIII-2	XII	Notes
							Nonferrous Materials (Cont'd)
1	85	55	350 (Cl. 3 only)	350	350	350	G2, W2
2	52	15	350 (Cl. 3 only)	350	350	350	G2
3	55	24	350 (Cl. 3 only)	NP	350	NP	G2, W2
4	70	38	350 (Cl. 3 only)	NP	350	NP	G2, W2
5	52	15	350 (Cl. 3 only)	350	350	350	G2
6	55	24	350 (Cl. 3 only)	NP	350	NP	G2, W2
7	70	38	350 (Cl. 3 only)	NP	350	NP	G2, W2
8	55	15	600 (Cl. 3 only)	600	600	600	...
9	60	15	600 (Cl. 3 only)	600	600	600	...
10	65	40	600 (Cl. 3 only)	600	600	600	...
11	50	10	600 (Cl. 3 only)	1200	800	650	T5
12	70	25	800	900	800	650	T5
13	75	30	800	900	800	650	T5
14	80	40	800	900	800	650	T5
15	84	50	500	500	500	500	G3
16	85	55	500	500	500	500	G3
17	87	60	NP	500	500	500	G3
18	70	25	800	NP	NP	NP	...
19	70	25	NP	900	800	650	T5
20	75	35	800	NP	NP	NP	...
21	75	35	NP	900	800	650	T5
22	85	50	500	500	500	500	G3
23	130	85	NP	500	NP	NP	...
24	130	90	NP	500	NP	NP	...
25	95	35	NP	1650	800	650	T11
26	85	30	NP	1000	800	650	...
27	90	35	NP	1000	800	650	...
28	100	45	NP	800	800	650	...
29	85	35	NP	800	800	650	...
30	100	40	NP	800	800	650	...
31	80	35	800	1200	800	650	T6
32	85	35	800	1200	800	650	T7
33	90	40	NP	500	500	500	G3, H1
34	90	40	800	NP	NP	NP	...
35	90	40	NP	1200	800	650	T7
36	120	60	NP	1200	800	650	G1, T11
37	85	32	NP	800	800	650	...
38	185	150	800	1150	800	650	W4, W5
39	170	115	800	800	800	650	...
40	75	28	NP	800	800	650	...
41	95	45	800	800	NP	NP	...
42	75	30	NP	1500	800	650	T10
43	65	25	NP	1650	800	650	T11
44	85	35	NP	1000	800	650	...
45	100	46	800	800	800	650	...

Table 3 (Cont'd)
Section III, Division 1, Classes 2 and 3;* Section VIII, Divisions 1 and 2;† and Section XII
Maximum Allowable Stress Values, *S*, for Bolting Materials
(*See Maximum Temperature Limits for Restrictions on Class)
(†Use with Part 4.16 of Section VIII, Division 2)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900
	Nonferrous Materials (Cont'd)																
1	13.8	13.8	13.8	13.8	13.8	13.8	...	...	...	...	...	...	...	...	...	...	...
2	10.0	10.0	9.9	9.9	9.9	9.8	...	...	...	...	...	...	...	...	...	...	...
3	10.0	10.0	9.9	9.9	9.9	9.8	...	...	...	...	...	...	...	...	...	...	...
4	10.0	10.0	9.9	9.9	9.9	9.8	...	...	...	...	...	...	...	...	...	...	...
5	10.0	10.0	9.9	9.9	9.9	9.8	...	...	...	...	...	...	...	...	...	...	...
6	10.0	10.0	9.9	9.9	9.9	9.8	...	...	...	...	...	...	...	...	...	...	...
7	10.0	10.0	9.9	9.9	9.9	9.8	...	...	...	...	...	...	...	...	...	...	...
8	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	...	...	...	...	...	...
9	10.0	10.0	10.0	10.0	10.0	10.0	10.0	9.8	9.5	8.9	8.3	...	...	...	...	...	...
10	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	...	...	...	...	...	...
11	6.7	6.6	6.4	6.3	6.3	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.0	5.9	*5.8*	*4.8*
12	16.7	...	14.6	...	13.6	...	13.2	...	13.1	...	13.1	13.1	13.1	12.9	12.7	*11.0*	*8.0*
13	16.7	...	14.6	...	13.6	...	13.2	...	13.1	...	13.1	13.1	13.1	12.9	12.7	*11.0*	*8.0*
14	16.7	...	14.6	...	13.6	...	13.2	...	13.1	...	13.1	13.1	13.0	12.9	12.7	*8.5*	*4.0*
15	16.7	...	14.6	...	13.6	...	13.2	...	13.1	...	...	...	...	...	...	...	...
16	16.7	...	14.6	...	13.8	...	13.8	...	13.8	...	...	...	...	...	...	...	...
17	16.7	...	15.0	...	15.0	...	15.0	...	15.0	...	...	...	...	...	...	...	...
18	16.6	...	14.6	...	13.6	...	13.2	...	13.1	...	13.1	13.1	13.1	12.9	12.7	...	...
19	16.6	...	14.6	...	13.6	...	13.2	...	13.1	...	13.1	13.1	13.1	13.0	12.7	*11.0*	*8.0*
20	18.7	...	18.7	...	18.7	...	18.7	...	18.7	...	18.7	18.4	18.0	16.3	14.5	...	...
21	18.7	...	18.7	...	18.7	...	18.7	...	18.7	...	18.7	18.7	18.0	17.2	14.5	*8.5*	*4.0*
22	12.5	...	12.5	...	12.5	...	12.5	...	12.5	...	...	...	...	...	...	...	...
23	21.3	...	21.3	...	21.3	...	21.3	...	21.3	...	...	...	...	...	...	...	...
24	22.5	...	22.5	...	22.5	...	22.5	...	22.5	...	...	...	...	...	...	...	...
25	23.3	...	20.9	...	19.2	...	17.8	...	16.5	...	15.6	15.3	15.0	14.9	14.7	14.6	14.5
26	20.0	...	19.9	...	16.6	...	15.6	...	15.0	...	14.4	14.2	14.0	13.9	13.8	13.7	13.6
27	22.5	...	20.9	...	19.5	...	18.2	...	17.4	...	16.8	16.6	16.4	16.3	16.1	16.0	16.0
28	25.0	...	25.0	...	24.5	...	22.7	...	21.2	...	20.1	19.6	19.2	18.9	18.6	...	...
29	21.3	...	20.0	...	18.3	...	17.2	...	16.4	...	15.8	15.5	15.2	14.9	14.6	...	...
30	25.0	...	24.6	...	23.0	...	21.7	...	20.9	...	20.1	19.8	19.6	19.4	19.1	...	...
31	20.0	...	20.0	...	20.0	...	20.0	...	20.0	...	20.0	19.8	19.6	19.4	19.1	18.7	*16.0*
32	21.2	...	21.2	...	21.2	...	21.2	...	21.2	...	21.2	21.2	21.1	21.0	20.4	20.2	19.5
33	20.0	...	20.0	...	20.0	...	20.0	...	20.0	...	...	...	...	...	...	...	...
34	10.0	...	9.5	...	9.2	...	9.1	...	9.1	...	9.1	9.0	8.9	8.9	8.8	...	...
35	21.2	...	21.2	...	21.2	...	21.2	...	21.2	...	21.2	21.2	21.1	21.0	20.4	20.2	19.5
36	30.0	...	30.0	...	30.0	...	28.2	...	27.0	...	26.4	26.2	26.0	26.0	24.6	24.3	24.0
37	21.3	...	19.6	...	18.4	...	17.6	...	16.5	...	15.6	15.3	15.1	14.9	14.7	...	...
38	37.0	...	36.0	...	35.2	...	34.6	...	34.2	...	33.8	33.7	33.6	33.5	33.3	33.1	32.9
39	28.7	...	28.7	...	28.7	...	28.7	...	28.7	...	28.7	28.7	28.7	28.7	28.7	...	...
40	18.7	...	17.3	...	16.4	...	15.3	...	14.6	...	13.7	13.5	13.2	12.9	12.8	...	...
41	23.8	...	23.8	...	22.4	...	21.5	...	20.5	...	19.4	19.0	18.6	18.3	18.0	...	...
42	18.7	...	18.7	...	17.9	...	17.2	...	16.7	...	16.3	16.1	15.9	15.7	15.5	15.3	15.1
43	16.2	...	15.4	...	14.5	...	13.5	...	12.9	...	12.2	11.9	11.7	11.4	11.1	10.9	10.7
44	21.2	...	21.2	...	20.4	...	19.2	...	18.3	...	17.8	17.6	17.3	17.2	17.1	16.9	16.8
45	25.0	...	25.0	...	25.0	...	24.7	...	24.3	...	23.7	23.4	23.0	22.8	22.5	...	...

Table 3 (Cont'd)
Section III, Division 1, Classes 2 and 3;* Section VIII, Divisions 1 and 2;† and Section XII
Maximum Allowable Stress Values, *S*, for Bolting Materials
(*See Maximum Temperature Limits for Restrictions on Class)
(†Use with Part 4.16 of Section VIII, Division 2)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding														
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
															Nonferrous Materials (Cont'd)
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
11	*3.7*	*3.0*	*2.4*	*2.0*	*1.5*	*1.2*	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
25	14.4	14.3	14.2	14.2	*14.1*	*11.3*	*9.3*	*7.7*	*6.1*	*4.8*	*3.8*	*3.0*	*2.3*	*1.7*	*1.2*
26	13.6	13.5	...	...	...	...	...	...	...	...	...	...	...	...	...
27	15.9	15.8	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
31	*10.6*	*7.0*	*4.5*	*3.0*	*2.2*	*2.2*	...	...	...	...	...	...	...	...	...
32	*19.3*	*14.5*	*10.3*	*7.2*	*5.8*	*5.5*	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
35	*19.3*	*14.5*	*10.3*	*7.2*	*5.8*	*5.5*	...	...	...	...	...	...	...	...	...
36	23.9	23.7	23.6	23.4	*21.0*	*13.2*	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
38	32.6	32.3	32.0	30.7	29.5	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
42	14.9	14.7	14.5	*13.0*	*9.8*	*6.6*	*4.2*	*2.2*	*1.6*	*1.1*	*1.0*	*0.80*	...	...	...
43	10.5	10.3	10.1	10.0	*9.3*	*7.4*	*5.9*	*4.7*	*3.8*	*3.0*	*2.4*	*1.9*	*1.5*	*1.2*	*0.98*
44	16.7	16.6	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

Table 3 (Cont'd)
Section III, Division 1, Classes 2 and 3;* Section VIII, Divisions 1 and 2;† and Section XII
Maximum Allowable Stress Values, *S*, for Bolting Materials
(*See Maximum Temperature Limits for Restrictions on Class)
(†Use with Part 4.16 of Section VIII, Division 2)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/ Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/ Thickness, in.
	Nonferrous Materials (Cont'd)						
1	62Ni–28Mo–5Fe	Bolting	SB–335	...	N10001	Annealed	≤1½
2	70Ni–16Mo–7Cr–5Fe	Bolting	SB–573	...	N10003	Annealed	...
3	54Ni–16Mo–15Cr	Bolting	SB–574	...	N10276	Solution ann.	...
4	65Ni–28Mo–2Fe	Bolting	SB–335	...	N10665	Solution ann.	...
5	21Ni–30Fe–22Cr–18Co–3Mo–3W	Bolting	SB–572	...	R30556	Annealed	...

Table 3 (Cont'd)
Section III, Division 1, Classes 2 and 3;* Section VIII, Divisions 1 and 2;† and Section XII
Maximum Allowable Stress Values, *S*, for Bolting Materials
(*See Maximum Temperature Limits for Restrictions on Class)
(†Use with Part 4.16 of Section VIII, Division 2)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted)				Notes
			III	VIII-1	VIII-2	XII	
							Nonferrous Materials (Cont'd)
1	115	46	800	800	800	650	...
2	100	40	NP	1300	800	650	T10
3	100	41	NP	1250	800	650	T10
4	110	51	NP	800	800	650	...
5	100	45	NP	1650	800	650	T12

Table 3 (Cont'd)
Section III, Division 1, Classes 2 and 3;* Section VIII, Divisions 1 and 2;† and Section XII
Maximum Allowable Stress Values, *S*, for Bolting Materials
(*See Maximum Temperature Limits for Restrictions on Class)
(†Use with Part 4.16 of Section VIII, Division 2)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900
	Nonferrous Materials (Cont'd)																
1	11.5	...	10.0	...	9.8	...	9.1	...	8.8	...	8.3	8.3	8.3	8.3	8.3	...	...
2	25.0	...	24.0	...	23.0	...	21.0	...	20.0	...	20.0	19.5	19.0	18.5	18.0	17.7	17.5
3	25.0	...	25.0	...	23.0	...	21.2	...	20.0	...	18.8	18.3	17.8	17.4	17.1	16.8	16.6
4	27.5	...	27.5	...	27.5	...	27.5	...	27.5	...	27.2	26.8	26.6	26.1	25.6	...	...
5	25.0	...	25.0	...	23.1	...	21.3	...	20.1	...	19.3	19.0	18.7	18.5	18.2	18.0	17.8

Table 3 (Cont'd)
Section III, Division 1, Classes 2 and 3;* Section VIII, Divisions 1 and 2;† and Section XII
Maximum Allowable Stress Values, *S*, for Bolting Materials
(*See Maximum Temperature Limits for Restrictions on Class)
(†Use with Part 4.16 of Section VIII, Division 2)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding														
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
															Nonferrous Materials (Cont'd)
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
2	17.3	17.0	15.5	*12.4*	*9.3*	*6.6*	*4.8*	*3.5*	...	...	...	...	...	...	...
3	16.5	16.5	16.5	*15.0*	*12.2*	*9.8*	*7.8*	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
5	17.6	17.4	17.2	17.1	16.9	*13.6*	*10.9*	*8.8*	*7.0*	*5.6*	*4.5*	*3.6*	*2.8*	*2.2*	*1.8*

NOTES TO TABLE 3

GENERAL NOTES

(a) The stress values in this Table may be interpolated to determine values for intermediate temperatures. The values at intermediate temperatures shall be rounded to the same number of decimal places as the value at the higher temperature between which values are being interpolated. The rounding rule is: when the next digit beyond the last place to be retained is less than 5, retain unchanged the digit in the last place retained; when the digit next beyond the last place to be retained is 5 or greater, increase by 1 the digit in the last place retained.

(**21**) (b) The properties of steels are influenced by the processing history, heat treatment, melting practice, and level of residual elements. See Nonmandatory Appendix A for more information.

(**21**) (c) Where a size limit appears in the Size/Thickness column, the limit applies to the dimension appropriate to the product form: wall thickness of tubing, pipe, pipe fittings, and hollow forgings; thickness of plate, flat bar and forgings, and polygonal bar; diameter of solid bar and bolting; and thickest cross–section of other pressure parts, e.g., castings and forgings.

(d) These stress values are established from a consideration of strength only and will be satisfactory for average service. For bolted joints where freedom from leakage over a long period of time without retightening is required, lower stress values may be necessary as determined from the relative flexibility of the flange and bolts, and corresponding relaxation properties.

(e) Stress values for 100°F are applicable for colder temperatures when toughness requirements of Section III or Section VIII are met.

(f) For bolting with a reported hardness exceeding 350 HB, user is cautioned that under certain conditions of temperature and environment or fatigue conditions, stress corrosion cracking of this high hardness bolting shall be considered.

(g) The following abbreviations are used: Ann., Annealed; ann., annealed; CD, Cold drawn; fin., finished; rel., relieved; str., stress; and wld., welded.

(h) Where specifications, grades, classes, and types are listed in this Table, and where the material specification in Section II, Part A or Part B is a dual–unit specification (e.g., SA–193/SA–193M), the values listed in this Table shall be applicable to either the customary U.S. version of the material specification or the SI units version of the material specification. For example, the values listed for SA–193 Grade B6 shall be used when SA–193M Grade B6 is used in construction.

(i) An alternative typeface is used for stress values obtained from time–dependent properties (see Notes T1 through T12).

NOTES – GENERAL REQUIREMENTS

G1 Alloy N06625 in the annealed condition is subject to severe loss of impact strength at room temperatures after exposure in the range of 1000°F to 1400°F.

G2 Copper–silicon alloys are not always suitable when exposed to certain media and high temperatures, particularly steam above 212°F. The owner, the owner's designated agent, or the user should ensure him/herself that the alloy selected is satisfactory for the service for which it is to be used.

G3 The maximum operating temperature is arbitrarily set at 500°F because harder temper adversely affects design stress in the creep rupture temperature range.

G4 This material has reduced toughness at room temperature after exposure for about 5000 hr at 600°F and after shorter exposure above 650°F.

G5 At temperatures above 1000°F, these stress values apply only when the carbon is 0.04% or higher on heat analysis.

G6 For temperatures above 1000°F, these stress values may be used only if the material is heat treated by heating it to a minimum temperature of 1900°F.

G7 The user is cautioned that under certain conditions of temperature and environment or fatigue conditions, stress corrosion of this material shall be considered.

G8 For all design temperatures, the maximum hardness shall be Rockwell C35 immediately under thread roots. The hardness shall be taken on a flat area at least $\frac{1}{8}$ in. across, prepared by removing threads; no more material than necessary shall be removed to prepare the flat area. Hardness determinations shall be made at the same frequency as tensile tests.

G9 For Section VIII, Division 1 applications, use of external pressure charts for material in the form of bar stock is permitted for stiffening rings only.

G10 For stress relieved tempers, stress values for T3 temper can be used for T351, T3510, and T3511; stress values for T4 temper can be used for T451, T4510, and T4511; and stress values for T6 temper can be used for T651, T6510, and T6511.

G11 The shipping lot testing method of SA–574, 11.3, is prohibited.

G12 Since these bolts could be used in flanged joints, the maximum permitted temperature and maximum allowable stress are limited to reduce the potential for bolt relaxation and associated flange leakage.

NOTES – HEAT TREATMENT REQUIREMENTS

H1 Design stresses for the cold drawn temper based on hot rolled properties until required data on cold drawn is submitted.

NOTES – TIME–DEPENDENT PROPERTIES [See General Note (i)]

T1 Allowable stresses for temperatures of 300°F and above are values obtained from time–dependent properties.

T2 Allowable stresses for temperatures of 350°F and above are values obtained from time–dependent properties.

T3 Allowable stresses for temperatures of 450°F and above are values obtained from time–dependent properties.

T4 Allowable stresses for temperatures of 550°F and above are values obtained from time–dependent properties.

T5 Allowable stresses for temperatures of 850°F and above are values obtained from time–dependent properties.

T6 Allowable stresses for temperatures of 900°F and above are values obtained from time–dependent properties.

T7 Allowable stresses for temperatures of 950°F and above are values obtained from time–dependent properties.

T8 Allowable stresses for temperatures of 1000°F and above are values obtained from time–dependent properties.

T9 Allowable stresses for temperatures of 1050°F and above are values obtained from time–dependent properties.

T10 Allowable stresses for temperatures of 1100°F and above are values obtained from time–dependent properties.

NOTES TO TABLE 3 (CONT'D)

NOTES – TIME–DEPENDENT PROPERTIES [See General Note (i)] (CONT'D)

T11 Allowable stresses for temperatures of 1150°F and above are values obtained from time–dependent properties.

T12 Allowable stresses for temperatures of 1200°F and above are values obtained from time–dependent properties.

NOTES – WELDING REQUIREMENTS

W1 Welding, brazing, and thermal cutting are not permitted.

W2 If welded, the allowable stress values for the annealed condition shall be used.

W3 This material may be welded by the resistance technique.

W4 The stress values given for this material are not applicable when either welding or thermal cutting is employed.

W5 Except for nonstructural tack welds used as a locking device, welding is prohibited for Section VIII, Division 1 use.

(21)

Table 4
Section III, Division 1, Classes 1 and MC; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2* Maximum Allowable Stress Values, S, for Bolting Materials
(*Use with Part 5 and Annex 5.F of Section VIII, Division 2)

Line No.	Nominal Composition	Spec. No.	Type/ Grade	Alloy Desig./ UNS No.	Class/Condition/ Temper	Size/ Thickness, in.
	Ferrous Materials					
1	1Cr–1Mn–¼Mo	SA–540	B22	K41420	5	2 < t ≤ 4
2	1Cr–1Mn–¼Mo	SA–540	B22	K41420	5	≤2
3	1Cr–1Mn–¼Mo	SA–540	B22	K41420	4	≤4
4	1Cr–1Mn–¼Mo	SA–540	B22	K41420	3	≤4
5	1Cr–1Mn–¼Mo	SA–540	B22	K41420	2	≤3
6	1Cr–1Mn–¼Mo	SA–540	B22	K41420	1	≤1½
7	1Cr–⅕Mo	SA–193	B7	G41400	...	4 < t ≤ 7
8	1Cr–⅕Mo	SA–193	B7M	G41400	...	≤2½
9	1Cr–⅕Mo	SA–193	B7	G41400	...	2½ < t ≤ 4
10	1Cr–⅕Mo	SA–193	B7	G41400	...	≤2½
11	1Cr–½Mo–V	SA–193	B16	K14072	...	4 < t ≤ 8
12	1Cr–½Mo–V	SA–193	B16	K14072	...	4 < t ≤ 8
13	1Cr–½Mo–V	SA–193	B16	K14072	...	2½ < t ≤ 4
14	1Cr–½Mo–V	SA–193	B16	K14072	...	2½ < t ≤ 4
15	1Cr–½Mo–V	SA–540	B21	K14073	5	2 < t ≤ 8
16	1Cr–½Mo–V	SA–540	B21	K14073	5	≤2
17	1Cr–½Mo–V	SA–193	B16	K14072	...	≤2½
18	1Cr–½Mo–V	SA–193	B16	K14072	...	≤2½
19	1Cr–½Mo–V	SA–540	B21	K14073	4	≤6
20	1Cr–½Mo–V	SA–540	B21	K14073	3	≤6
21	1Cr–½Mo–V	SA–540	B21	K14073	2	≤4
22	1Cr–½Mo–V	SA–540	B21	K14073	1	≤4
23	12Cr–1Mo–V–W	SA–437	B4C	K91352	...	...
24	12Cr–1Mo–V–W	SA–437	B4B	K91352	...	...
25	13Cr	SA–193	B6	S41000	...	≤4
26	17Cr–4Ni–4Cu	SA–564	630	S17400	H1100	≤8
27	17Cr–4Ni–4Cu	SA–705	630	S17400	H1100	≤8
28	1¾Ni–¾Cr–¼Mo	SA–320	L43	G43400	...	≤4
29	2Ni–¾Cr–¼Mo	SA–540	B23	H43400	5	6 < t ≤ 9½
30	2Ni–¾Cr–¼Mo	SA–540	B23	H43400	5	6 < t ≤ 9½
31	2Ni–¾Cr–¼Mo	SA–540	B23	H43400	5	≤6
32	2Ni–¾Cr–¼Mo	SA–540	B23	H43400	4	≤9½
33	2Ni–¾Cr–¼Mo	SA–540	B23	H43400	3	≤9½
34	2Ni–¾Cr–¼Mo	SA–540	B23	H43400	2	≤9½
35	2Ni–¾Cr–¼Mo	SA–540	B23	H43400	1	≤8
36	2Ni–¾Cr–⅓Mo	SA–540	B24	K24064	5	6 < t ≤ 9½
37	2Ni–¾Cr–⅓Mo	SA–540	B24	K24064	5	6 < t ≤ 9½
38	2Ni–¾Cr–⅓Mo	SA–540	B24	K24064	5	≤6
39	2Ni–¾Cr–⅓Mo	SA–540	B24	K24064	4	≤9½
40	2Ni–¾Cr–⅓Mo	SA–540	B24	K24064	3	≤9½
41	2Ni–¾Cr–⅓Mo	SA–540	B24	K24064	2	≤9½
42	2Ni–¾Cr–⅓Mo	SA–540	B24	K24064	1	≤8
43	2Ni–¾Cr–⅓Mo–V	SA–540	B24V	K24070	3	≤11
44	25Ni–15Cr–2Ti	SA–453	660	S66286	A	...
45	25Ni–15Cr–2Ti	SA–453	660	S66286	B	...

Table 4
Section III, Division 1, Classes 1 and MC; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2* Maximum Allowable Stress Values, S, for Bolting Materials
(*Use with Part 5 and Annex 5.F of Section VIII, Division 2)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted)		Notes
			III	VIII-2	
					Ferrous Materials
1	115	100	700	700	G4
2	120	105	700	700	G4
3	135	120	700	700	G4
4	145	130	700	700	G3
5	155	140	700	700	G3
6	165	150	600	600	G1
7	100	75	800	800	G4
8	100	80	NP	800	G4
9	115	95	800	800	G4
10	125	105	800	800	G4
11	100	85	800	NP	...
12	100	85	NP	800	...
13	110	95	800	NP	...
14	110	95	NP	800	...
15	115	100	700	700	G4
16	120	105	700	700	G4
17	125	105	800	NP	...
18	125	105	NP	800	...
19	135	120	700	700	G4
20	145	130	700	700	G3
21	155	140	700	700	G3
22	165	150	700	700	G1
23	115	85	700	700	...
24	145	105	700	700	...
25	110	85	700	700	...
26	140	115	650	650	G2
27	140	115	650	650	G2
28	125	105	800	800	G4
29	115	100	700	NP	G4
30	115	100	NP	700	G4
31	120	105	700	700	G4
32	135	120	700	700	G4
33	145	130	700	700	G3
34	155	140	700	700	G3
35	165	150	600	600	G1
36	115	100	700	NP	G4
37	115	100	NP	700	G4
38	120	105	700	700	G4
39	135	120	700	700	G4
40	145	130	700	700	G3
41	155	140	700	700	G3
42	165	150	600	600	G1
43	145	130	700	700	G3
44	130	85	800	800	...
45	130	85	800	800	...

Table 4
Section III, Division 1, Classes 1 and MC; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2* Maximum Allowable Stress Values, S, for Bolting Materials
(*Use with Part 5 and Annex 5.F of Section VIII, Division 2)

Line No.	Design Stress Intensity or Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	100	200	300	400	500	600	650	700	750	800
	Ferrous Materials									
1	33.3	31.8	30.9	29.8	28.9	27.6	...	25.9	...	...
2	35.0	33.4	32.4	31.3	30.3	29.0	...	27.2	...	...
3	40.0	38.2	36.9	35.9	34.7	33.1	...	31.1	...	...
4	43.3	41.4	40.2	38.8	37.6	35.9	...	33.7	...	...
5	46.7	44.6	43.1	41.8	40.5	38.7	...	36.3	...	...
6	50.0	47.8	46.2	44.8	43.4	41.4	...	...	...	...
7	25.0	23.3	22.4	21.8	21.1	20.3	19.8	19.2	18.5	17.6
8	26.7	24.9	23.9	23.2	22.5	21.7	21.1	20.5	19.7	18.8
9	31.7	29.5	28.4	27.6	26.7	25.7	25.0	24.3	23.4	22.3
10	35.0	32.6	31.4	30.5	29.5	28.4	27.7	26.9	25.9	24.6
11	28.3	27.4	26.6	25.9	25.2	24.5	...	23.7	...	22.6
12	28.3	27.5	26.9	26.3	25.7	25.0	...	23.8	...	22.4
13	31.7	30.6	29.7	29.0	28.2	27.4	...	26.5	...	25.3
14	31.7	30.7	30.0	29.4	28.8	27.9	...	26.6	...	25.1
15	33.3	32.2	31.3	30.5	29.7	28.8	...	27.9	...	...
16	35.0	33.8	32.8	32.0	31.2	30.3	...	29.3	...	...
17	35.0	33.8	32.8	32.0	31.2	30.3	...	29.3	...	27.9
18	35.0	34.0	33.2	32.5	31.8	30.9	...	29.4	...	27.7
19	40.0	38.7	37.5	36.6	35.6	34.6	...	33.4	...	...
20	43.3	41.9	40.6	39.7	38.6	37.5	...	36.2	...	...
21	46.7	45.1	43.8	42.7	41.5	40.4	...	39.0	...	...
22	50.0	48.4	46.9	45.8	44.5	43.3	...	41.8	...	...
23	28.3	27.2	26.3	25.6	25.0	24.6	24.3	24.0	...	...
24	35.0	33.5	32.4	31.6	30.9	30.2	29.9	29.7	...	...
25	28.3	27.0	26.1	25.3	24.6	23.9	...	23.3	...	...
26	38.3	35.4	33.9	32.7	31.7	30.9	30.5	...	...	...
27	38.3	35.4	33.9	32.7	31.7	30.9	30.5	...	...	...
28	35.0	33.0	31.9	30.6	29.5	28.1	...	26.4	...	24.2
29	33.3	31.8	30.9	29.8	28.9	27.6	...	25.9	...	...
30	33.3	31.8	30.7	29.8	28.9	27.6	...	25.9	...	...
31	35.0	33.4	32.4	31.3	30.3	29.0	...	27.2	...	...
32	40.0	38.2	36.9	35.9	34.7	33.1	...	31.1	...	...
33	43.3	41.4	40.2	38.8	37.6	35.9	...	33.7	...	...
34	46.7	44.6	43.1	41.8	40.5	38.7	...	36.3	...	...
35	50.0	47.8	46.2	44.8	43.4	41.4	...	...	...	...
36	33.3	31.8	30.9	29.8	28.9	27.6	...	25.9	...	...
37	33.3	31.8	30.7	29.8	28.9	27.6	...	25.9	...	...
38	35.0	33.4	32.4	31.3	30.3	29.0	...	27.2	...	...
39	40.0	38.2	36.9	35.9	34.7	33.1	...	31.1	...	...
40	43.3	41.4	40.2	38.8	37.6	35.9	...	33.7	...	...
41	46.7	44.6	43.1	41.8	40.5	38.7	...	36.3	...	...
42	50.0	47.8	46.2	44.8	43.4	41.4	...	...	...	...
43	43.3	41.4	40.2	38.8	37.6	35.9	...	33.7	...	...
44	28.3	27.8	27.3	26.9	26.4	26.0	25.7	25.5	25.2	25.0
45	28.3	27.8	27.3	26.9	26.4	26.0	25.7	25.5	25.2	25.0

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Table 4 (Cont'd)
Section III, Division 1, Classes 1 and MC; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2* Maximum Allowable Stress Values, S, for Bolting Materials
(*Use with Part 5 and Annex 5.F of Section VIII, Division 2)

Line No.	Nominal Composition	Spec. No.	Type/ Grade	Alloy Desig./ UNS No.	Class/Condition/ Temper	Size/ Thickness, in.
	Ferrous Materials (Cont'd)					
1	16Cr–12Ni–2Mo	SA–193	B8M	S31600	1/Sol. treat.	...
2	16Cr–12Ni–2Mo	SA–193	B8MA	S31600	1A/Sol. treat.	...
3	16Cr–12Ni–2Mo–N	SA–193	B8MNA	S31651	1A/Sol. treat.	...
4	18Cr–8Ni	SA–193	B8	S30400	1/Sol. treat.	...
5	18Cr–8Ni	SA–193	B8A	S30400	1A/Sol. treat.	...
6	18Cr–8Ni–N	SA–193	B8NA	S30451	1A/Sol. treat.	...
7	18Cr–8Ni–4Si–N	SA–193	B8S	S21800	Sol. treat.	...
8	18Cr–8Ni–4Si–N	SA–193	B8SA	S21800	Sol. treat.	...
9	18Cr–10Ni–Cb	SA–193	B8C	S34700	1/Sol. treat.	...
10	18Cr–10Ni–Ti	SA–193	B8T	S32100	1/Sol. treat.	...
11	19Cr–9Ni–Mo–W	SA–453	651	S63198	B	>3
12	19Cr–9Ni–Mo–W	SA–453	651	S63198	B	≤3
13	19Cr–9Ni–Mo–W	SA–453	651	S63198	A	>3
14	19Cr–9Ni–Mo–W	SA–453	651	S63198	A	≤3
15	22Cr–13Ni–5Mn	SA–193	B8R	S20910	1C/Sol. treat.	...
16	22Cr–13Ni–5Mn	SA–193	B8RA	S20910	Sol. treat.	...

Table 4 (Cont'd)
Section III, Division 1, Classes 1 and MC; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2* Maximum Allowable Stress Values, S, for Bolting Materials
(*Use with Part 5 and Annex 5.F of Section VIII, Division 2)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted)		Notes
			III	VIII-2	
					Ferrous Materials (Cont'd)
1	75	30	800	800	...
2	75	30	800	800	...
3	75	30	800	800	...
4	75	30	800	800	...
5	75	30	800	800	...
6	75	30	800	800	...
7	95	50	800	800	...
8	95	50	800	800	...
9	75	30	800	800	...
10	75	30	800	800	...
11	95	50	800	800	...
12	95	60	800	800	...
13	100	60	800	800	...
14	100	70	800	800	...
15	100	55	800	800	...
16	100	55	800	800	...

Table 4 (Cont'd)
Section III, Division 1, Classes 1 and MC; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2* Maximum Allowable Stress Values, S, for Bolting Materials
(*Use with Part 5 and Annex 5.F of Section VIII, Division 2)

Line No.	Design Stress Intensity or Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	100	200	300	400	500	600	650	700	750	800
	Ferrous Materials (Cont'd)									
1	18.8	17.7	15.6	14.3	13.3	12.6	...	12.1	...	11.7
2	10.0	8.6	7.8	7.2	6.7	6.3	...	6.0	...	5.8
3	18.8	17.8	16.3	15.2	14.2	13.4	13.1	12.8	12.5	12.3
4	18.8	16.7	15.0	13.8	12.9	12.1	...	11.8	...	11.2
5	10.0	8.3	7.5	6.9	6.5	6.1	...	5.9	...	5.6
6	18.8	16.5	14.4	12.9	12.0	11.4	11.2	11.0	10.8	10.6
7	23.8	23.4	21.8	19.7	18.5	17.6	17.3	17.1	16.9	16.7
8	23.8	23.4	21.8	19.7	18.5	17.6	17.3	17.1	16.9	16.7
9	18.8	17.9	16.4	15.5	15.0	14.3	...	13.8	...	13.6
10	18.8	17.8	16.5	15.3	14.3	13.5	...	12.9	...	12.5
11	16.7	15.3	14.2	13.3	12.7	12.0	...	11.5	...	11.1
12	20.0	18.3	17.0	16.0	15.1	14.5	...	13.8	...	13.2
13	20.0	18.3	17.0	16.0	15.1	14.5	...	13.8	...	13.2
14	23.3	21.4	19.8	18.7	17.7	16.9	...	16.1	...	15.4
15	18.3	15.7	14.5	13.6	12.9	12.4	12.3	12.1	11.9	11.8
16	18.3	15.7	14.5	13.6	12.9	12.4	12.3	12.1	11.9	11.8

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Table 4 (Cont'd)
Section III, Division 1, Classes 1 and MC; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2* Maximum Allowable Stress Values, S, for Bolting Materials
(*Use with Part 5 and Annex 5.F of Section VIII, Division 2)

	Line No.	Nominal Composition	Spec. No.	Type/ Grade	Alloy Desig./ UNS No.	Class/Condition/ Temper	Size/ Thickness, in.
		Nonferrous Materials					
	1	67Ni–30Cu	SB–164	...	N04400	Annealed	...
	2	67Ni–30Cu	SB–164	...	N04400	Hot worked	...
	3	67Ni–30Cu	SB–164	...	N04400	Hot worked	...
(**21**)	4	67Ni–30Cu	SB–164	...	N04400	CD–str. rel.	...
(**21**)	5	67Ni–30Cu	SB–164	...	N04400	CD–str. rel.	...
(**21**)	6	67Ni–30Cu	SB–164	...	N04400	As drawn	...
(**21**)	7	67Ni–30Cu	SB–164	...	N04400	CD–str. rel.	...
(**21**)	8	67Ni–30Cu	SB–164	...	N04400	As drawn	...
	9	67Ni–30Cu–S	SB–164	...	N04405	Annealed	...
	10	67Ni–30Cu–S	SB–164	...	N04405	Hot worked	...
	11	67Ni–30Cu–S	SB–164	...	N04405	As drawn	...
	12	53Ni–19Cr–19Fe–Cb–Mo	SB–637	...	N07718	Sol. & precip. harden	≤6
	13	70Ni–16Cr–7Fe–Ti–Al	SB–637	2	N07750	...	<4

Table 4 (Cont'd)
Section III, Division 1, Classes 1 and MC; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2* Maximum Allowable Stress Values, S, for Bolting Materials
(*Use with Part 5 and Annex 5.F of Section VIII, Division 2)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted)		Notes
			III	VIII-2	
					Nonferrous Materials
1	70	25	800	800	...
2	75	30	800	800	...
3	80	40	800	800	...
4	80	50	500	500	...
5	84	55	500	500	...
6	85	55	500	500	...
7	87	60	500	500	...
8	110	85	500	500	...
9	70	25	800	800	...
10	75	35	800	800	...
11	85	50	500	500	...
12	185	150	800	800	...
13	170	115	800	800	...

Table 4 (Cont'd)
Section III, Division 1, Classes 1 and MC; Section III, Division 3; and Section III, Division 5 Design Stress Intensity Values, S_m, and Section VIII, Division 2* Maximum Allowable Stress Values, S, for Bolting Materials
(*Use with Part 5 and Annex 5.F of Section VIII, Division 2)

Line No.	Design Stress Intensity or Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding										
	100	200	300	400	500	600	650	700	750	800	
	Nonferrous Materials										
1	16.7	14.6	13.6	13.2	13.1	13.1	13.1	13.1	...	12.7	
2	16.7	14.6	13.6	13.2	13.1	13.1	13.1	13.1	...	12.7	
3	16.7	14.6	13.6	13.2	13.1	13.1	13.1	13.0	...	12.7	
4	16.7	15.8	15.3	15.0	14.9	...	...	...	...	...	(**21**)
5	18.3	17.4	16.8	16.5	16.4	...	...	...	...	...	(**21**)
6	18.3	17.4	16.8	16.5	16.4	...	...	...	...	...	(**21**)
7	20.0	19.0	18.3	18.0	17.9	...	...	...	...	...	(**21**)
8	28.3	26.9	25.9	25.6	25.4	...	...	...	...	...	(**21**)
9	16.6	14.6	13.6	13.2	13.1	13.1	13.1	13.1	...	12.7	
10	18.7	18.7	18.7	18.7	18.7	18.7	18.4	18.0	...	14.5	
11	16.6	14.6	13.8	13.2	13.2	...	...	...	...	...	
12	50.0	48.0	46.9	46.1	45.6	45.1	...	44.8	...	44.4	
13	38.3	37.3	36.8	36.3	36.0	35.8	35.7	35.6	35.5	35.4	

NOTES TO TABLE 4
GENERAL NOTES

(**21**) (a) The stress values for bolting materials given in this Table do not exceed the lesser of one–third of the specified minimum yield strength or one–third of the yield strength at temperature, with credit granted for the enhancement of properties produced by heat treatment. They are intended for Section VIII, Division 2 use when flanges are designed in accordance with the rules of Part 5 and Annex 5.F when the bolting requirements are determined in accordance with 5.7.1 and 5.7.2. They are intended for Section III use in the design equations. For allowable values of actual preload and service stresses, see Section III, Subsection NB, NB–3230 and Section III Appendices, Nonmandatory Appendix E.

(b) Stress values for 100°F are applicable for colder temperatures when toughness requirements of Section III or Section VIII are met.

(c) The following abbreviations are used: CD, Cold drawn; precip., precipitation; rel., relieved; Sol., Solution; str., stress; and treat., treated.

(d) Where specifications, grades, classes, and types are listed in this Table, and where the material specification in Section II, Part A or Part B is a dual–unit specification (e.g., SA–193/SA–193M), the values listed in this Table shall be applicable to either the customary U.S. version of the material specification or the SI units version of the material specification. For example, the values listed for SA–193 Grade B6 shall be used when SA–193M Grade B6 is used in construction.

(e) The values in this Table may be interpolated to determine values for intermediate temperatures. The values at intermediate temperatures shall be rounded to the same number of decimal places as the value at the higher temperature between which values are being interpolated. The rounding rule is: when the next digit beyond the last place to be retained is less than 5, retain unchanged the digit in the last place retained; when the digit next beyond the last place to be retained is 5 or greater, increase by 1 the digit in the last place retained.

(f) The properties of steels are influenced by the processing history, heat treatment, melting practice, and level of residual elements. See Nonmandatory Appendix A for more information.

(g) Where a size limit appears in the Size/Thickness column, the limit applies to the dimension appropriate to the product form: wall thickness of tubing, pipe, pipe fittings, and hollow forgings; thickness of plate, flat bar and forgings, and polygonal bar; diameter of solid bar and bolting; and thickest cross–section of other pressure parts, e.g., castings and forgings.

NOTES – GENERAL REQUIREMENTS

G1 Stress values may result in relaxation of the bolting materials after prolonged service at temperatures of 500°F and higher, and the designer is to investigate the effect of this relaxation on the application.

G2 This material has reduced toughness at room temperature after exposure for about 5000 hr at 600°F and after shorter exposure above 650°F.

G3 Stress values may result in relaxation of the bolting materials after prolonged service at temperatures of 600°F and higher, and the designer is to investigate the effect of this relaxation on the application.

G4 Stress values may result in relaxation of the bolting materials after prolonged service at temperatures of 700°F and higher, and the designer is to investigate the effect of this relaxation on the application.

(21)

Table 5A
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/ Thickness, in.	P-No.	Group No.
1	Carbon steel	Bar, shapes	SA–675	45	...	...	...	1	1
2	Carbon steel	Plate	SA–285	A	K01700	...	...	1	1
3	Carbon steel	Smls. pipe	SA–106	A	K02501	...	...	1	1
4	Carbon steel	Bar, shapes	SA–675	50	...	...	...	1	1
5	Carbon steel	Plate	SA–283	B	...	...	...	1	1
6	Carbon steel	Plate	SA–285	B	K02200	...	$t \le 2$	1	1
7	Carbon steel	Bar, shapes	SA–675	55	...	...	...	1	1
8	Carbon steel	Plate	SA–285	C	K02801	...	$t \le 2$	1	1
9	Carbon steel	Smls. pipe	SA–333	1	K03008	...	...	1	1
10	Carbon steel	Smls. tube	SA–334	1	K03008	...	...	1	1
11	Carbon steel	Plate	SA–516	55	K01800	...	...	1	1
12	Carbon steel	Smls. pipe	SA–524	II	K02104	...	...	1	1
13	Carbon steel	Plate, bar, shapes	SA–36	...	K02600	...	...	1	1
14	Carbon steel	Plate	SA–662	A	K01701	...	...	1	1
15	Carbon steel	Forgings	SA–181	...	K03502	60	...	1	1
16	Carbon steel	Castings	SA–216	WCA	J02502	...	...	1	1
17	Carbon steel	Forgings	SA–266	1	K03506	...	...	1	1
18	Carbon steel	Forgings	SA–350	LF1	K03009	1	...	1	1
19	Carbon steel	Bar, shapes	SA–675	60	...	...	...	1	1
20	Carbon steel	Forgings	SA–765	I	K03046	...	...	1	1
21	Carbon steel	Plate	SA–515	60	K02401	...	...	1	1
22	Carbon steel	Plate	SA–516	60	K02100	...	...	1	1
23	Carbon steel	Plate	SA–283	D	K02702	...	...	1	1
24	Carbon steel	Smls. pipe	SA–106	B	K03006	...	...	1	1
25	Carbon steel	Fittings	SA–234	WPB	K03006	...	...	1	1
26	Carbon steel	Smls. pipe	SA–333	6	K03006	...	...	1	1
27	Carbon steel	Forgings	SA–372	A	K03002	...	...	1	1
28	Carbon steel	Fittings	SA–420	WPL6	...	...	...	1	1
29	Carbon steel	Smls. pipe	SA–524	I	K02104	...	...	1	1
30	Carbon steel	Forgings	SA–727	...	K02506	...	...	1	1
31	Carbon steel	Wld. tube	SA–178	C	K03503	...	...	1	1
32	Carbon steel	Smls. tube	SA–210	A–1	K02707	...	...	1	1
33	Carbon steel	Bar, shapes	SA–675	65	...	...	...	1	1
34	Carbon steel	Castings	SA–352	LCB	J03003	...	...	1	1
35	Carbon steel	Plate	SA–515	65	K02800	...	...	1	1
36	Carbon steel	Plate	SA–516	65	K02403	...	...	1	1
37	Carbon steel	Plate	SA–662	B	K02203	...	...	1	1
38	Carbon steel	Plate	SA–537	...	K12437	1	$2\frac{1}{2} < t \le 4$	1	2
39	Carbon steel	Forgings	SA/EN 10222–2	P280GH	...	NT or QT	$1.4 < t \le 6.3$	1	1
40	Carbon steel	Forgings	SA/EN 10222–2	P280GH	...	Normalized	$t \le 1.4$	1	1
41	Carbon steel	Plate	SA/EN 10028–2	P355GH	...	...	$6 < t \le 10$	1	2
42	Carbon steel	Plate	SA/EN 10028–2	P355GH	...	...	$4 < t \le 6$	1	2
43	Carbon steel	Bar, shapes	SA–675	70	...	...	...	1	1
44	Carbon steel	Forgings	SA–105	...	K03504	...	...	1	2
45	Carbon steel	Forgings	SA–181	...	K03502	70	...	1	2

Table 5A
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Maximum Use Temperature, °F	External Pressure Chart No.	Notes
1	45	22.5	900	CS-6	G13, T4
2	45	24	900	CS-1	G13, T3
3	48	30	1000	CS-2	G13, T1
4	50	25	900	CS-1	G13, T3
5	50	27	700	CS-1	...
6	50	27	900	CS-1	G13, T3
7	55	27.5	900	CS-1	G13, T4
8	55	30	1000	CS-2	G13, T3
9	55	30	1000	CS-2	T4
10	55	30	700	CS-2	...
11	55	30	1000	CS-2	G13, T3
12	55	30	1000	CS-2	G13, T3
13	58	36	650	CS-2	G13
14	58	40	700	CS-2	...
15	60	30	1000	CS-2	G13, T4
16	60	30	1000	CS-2	G13, T4
17	60	30	1000	CS-2	G13, T4
18	60	30	700	CS-2	G13
19	60	30	900	CS-2	G13, T4
20	60	30	1000	CS-2	G13, T4
21	60	32	1000	CS-2	G13, T3
22	60	32	1000	CS-2	G13, T3
23	60	33	700	CS-2	...
24	60	35	700	CS-2	G13
25	60	35	1000	CS-2	G13, T3
26	60	35	1000	CS-2	G13, T3
27	60	35	650	CS-2	G9, H2
28	60	35	850	CS-2	G13, T3
29	60	35	1000	CS-2	G13, T3
30	60	36	1000	CS-2	G13, T3
31	60	37	1000	CS-2	G6, G13, T2
32	60	37	1000	CS-2	G13, T3
33	65	32.5	1000	CS-2	G13, T3
34	65	35	650	CS-2	...
35	65	35	1000	CS-2	G13, T3
36	65	35	1000	CS-2	G13, T3
37	65	40	700	CS-2	...
38	65	45	700	CS-2	...
39	66.5	37	1000	CS-2	G13, T3
40	66.5	40.5	1000	CS-2	G13, T3
41	68	40.5	1000	CS-2	G13, T2
42	69.5	43	1000	CS-2	G13, T2
43	70	35	1000	CS-2	G13, T3
44	70	36	1000	CS-2	G13, T3
45	70	36	1000	CS-2	G13, T3

Table 5A
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900
1	15.0	14.1	13.7	13.5	13.3	13.1	12.8	12.5	12.2	11.9	11.5	11.1	10.7	10.4	*9.2*	*7.9*	*5.9*
2	16.0	15.0	14.7	14.4	14.2	13.9	13.7	13.4	13.0	12.7	12.3	11.9	11.5	*10.7*	*9.2*	*7.9*	*5.9*
3	20.0	18.8	18.3	18.0	17.7	17.4	17.1	16.7	16.3	15.8	15.3	*14.6*	*14.4*	*10.7*	*9.2*	*7.9*	*5.9*
4	16.7	15.7	15.3	15.0	14.7	14.5	14.2	13.9	13.6	13.2	12.8	12.4	11.9	*10.7*	*9.2*	*7.9*	*5.9*
5	18.0	16.9	16.5	16.2	15.9	15.7	15.4	15.0	14.7	14.2	13.8	13.3	13.0	...	...	...	...
6	18.0	16.9	16.5	16.2	15.9	15.7	15.4	15.0	14.7	14.2	13.8	13.3	13.0	*10.7*	*9.2*	*7.9*	*5.9*
7	18.3	17.2	16.8	16.5	16.2	16.0	15.7	15.3	14.9	14.5	14.1	13.6	13.1	12.7	*10.8*	*8.7*	*5.9*
8	20.0	18.8	18.3	18.0	17.7	17.4	17.1	16.7	16.3	15.8	15.3	14.8	14.3	*13.0*	*10.8*	*8.7*	*5.9*
9	20.0	18.8	18.3	18.0	17.7	17.4	17.1	16.7	16.3	15.8	15.3	14.8	14.3	13.8	*11.4*	*8.7*	*5.9*
10	20.0	18.8	18.3	18.0	17.7	17.4	17.1	16.7	16.3	15.8	15.3	14.8	14.3	...	...	...	...
11	20.0	18.8	18.3	18.0	17.7	17.4	17.1	16.7	16.3	15.8	15.3	14.8	14.3	*13.0*	*10.8*	*8.7*	*5.9*
12	20.0	18.8	18.3	18.0	17.7	17.4	17.1	16.7	16.3	15.8	15.3	14.8	14.3	*13.0*	*10.8*	*8.7*	*5.9*
13	24.0	22.6	22.0	21.6	21.2	20.9	20.5	20.1	19.6	19.0	18.4	17.8	...	...	...	...	...
14	24.2	24.2	24.2	24.0	23.6	23.2	22.8	22.3	21.7	21.1	20.4	19.3	19.2	...	...	...	...
15	20.0	18.8	18.3	18.0	17.7	17.4	17.1	16.7	16.3	15.8	15.3	14.8	14.3	13.8	*11.4*	*8.7*	*5.9*
16	20.0	18.8	18.3	18.0	17.7	17.4	17.1	16.7	16.3	15.8	15.3	14.8	14.3	13.8	*11.4*	*8.7*	*5.9*
17	20.0	18.8	18.3	18.0	17.7	17.4	17.1	16.7	16.3	15.8	15.3	14.8	14.3	13.8	*11.4*	*8.7*	*5.9*
18	20.0	18.8	18.3	18.0	17.7	17.4	17.1	16.7	16.3	15.8	15.3	14.8	14.3	...	...	...	...
19	20.0	18.8	18.3	18.0	17.7	17.4	17.1	16.7	16.3	15.8	15.3	14.8	14.3	13.8	*11.4*	*8.7*	*5.9*
20	20.0	18.8	18.3	18.0	17.7	17.4	17.1	16.7	16.3	15.8	15.3	14.8	14.3	13.8	*11.4*	*8.7*	*5.9*
21	21.3	20.0	19.5	19.2	18.9	18.6	18.2	17.8	17.4	16.9	16.4	15.8	15.3	*13.9*	*11.4*	*8.7*	*5.9*
22	21.3	20.0	19.5	19.2	18.9	18.6	18.2	17.8	17.4	16.9	16.4	15.8	15.3	*13.9*	*11.4*	*8.7*	*5.9*
23	22.0	20.7	20.2	19.8	19.5	19.1	18.8	18.4	17.9	17.4	16.9	16.3	15.4	...	...	...	...
24	23.3	21.9	21.4	21.0	20.6	20.3	19.9	19.5	19.0	18.5	17.9	17.3	16.8	...	...	...	...
25	23.3	21.9	21.4	21.0	20.6	20.3	19.9	19.5	19.0	18.5	17.9	17.3	16.8	*13.9*	*11.4*	*8.7*	*5.9*
26	23.3	21.9	21.4	21.0	20.6	20.3	19.9	19.5	19.0	18.5	17.9	17.3	16.8	*13.9*	*11.4*	*8.7*	*5.9*
27	23.3	22.4	21.4	20.3	19.3	18.4	17.6	16.9	16.5	16.1	15.8	15.6	...	...	...	...	...
28	23.3	21.9	21.4	21.0	20.6	20.3	19.9	19.5	19.0	18.5	17.9	17.3	16.8	*13.9*	*11.4*	*8.7*	...
29	23.3	21.9	21.4	21.0	20.6	20.3	19.9	19.5	19.0	18.5	17.9	17.3	16.8	*13.9*	*11.4*	*8.7*	*5.9*
30	24.0	22.6	22.0	21.6	21.2	20.9	20.5	20.1	19.6	19.0	18.4	17.8	17.3	*13.9*	*11.4*	*8.7*	*5.9*
31	21.0	19.7	19.2	18.8	18.5	18.2	17.9	17.5	17.1	16.6	16.1	15.5	*14.4*	*11.8*	*9.7*	*7.4*	*5.0*
32	24.7	23.2	22.6	22.2	21.8	21.5	21.1	20.6	20.1	19.5	18.9	18.3	17.8	*13.9*	*11.4*	*8.7*	*5.9*
33	21.7	20.4	19.8	19.5	19.2	18.9	18.5	18.1	17.7	17.1	16.6	16.1	15.5	*13.9*	*11.4*	*9.0*	*6.3*
34	23.3	21.9	21.4	21.0	20.6	20.3	19.9	19.5	19.0	18.5	17.9	17.3	...	...	...	...	...
35	23.3	21.9	21.4	21.0	20.6	20.3	19.9	19.5	19.0	18.5	17.9	17.3	16.7	*13.9*	*11.4*	*9.0*	*6.3*
36	23.3	21.9	21.4	21.0	20.6	20.3	19.9	19.5	19.0	18.5	17.9	17.3	16.7	*13.9*	*11.4*	*9.0*	*6.3*
37	26.7	25.1	24.4	24.0	23.6	23.2	22.8	22.3	21.7	21.1	20.4	19.8	19.2	...	...	...	...
38	27.1	27.1	26.5	25.3	24.3	23.4	22.6	21.9	21.2	20.7	20.5	20.5	19.6	...	...	...	...
39	24.7	23.1	22.5	22.0	21.7	21.3	20.9	...	19.9	19.4	18.8	18.1	17.5	*14.8*	*12.0*	*9.3*	*6.7*
40	27.1	25.3	24.7	24.2	23.8	23.4	23.0	...	21.9	21.3	20.6	19.9	19.2	*14.8*	*12.0*	*9.3*	*6.7*
41	27.1	25.3	24.7	24.3	24.0	23.6	23.2	22.6	22.1	21.4	20.7	20.0	*18.3*	*14.8*	*12.0*	*9.3*	*6.7*
42	28.5	26.7	26.1	25.6	25.2	24.8	24.4	23.8	23.3	22.6	21.9	21.1	*18.3*	*14.8*	*12.0*	*9.3*	*6.7*
43	23.3	21.9	21.4	21.0	20.6	20.3	19.9	19.5	19.0	18.5	17.9	17.3	16.7	*14.8*	*12.0*	*9.3*	*6.7*
44	24.0	22.6	22.0	21.6	21.2	20.9	20.5	20.1	19.6	19.0	18.4	17.8	17.2	*14.8*	*12.0*	*9.3*	*6.7*
45	24.0	22.6	22.0	21.6	21.2	20.9	20.5	20.1	19.6	19.0	18.4	17.8	17.2	*14.8*	*12.0*	*9.3*	*6.7*

Table 5A
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding											
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500
1	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...
3	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...
8	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
9	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...
11	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
12	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...
15	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
16	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
17	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...
20	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
21	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
22	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...
25	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
26	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...
29	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
30	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
31	*3.4*	*2.1*	...	...	...	...	...	...	...	...	...	...
32	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
33	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...
35	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
36	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...
39	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
40	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
41	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
42	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
43	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
44	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
45	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/ Thickness, in.	P-No.	Group No.
1	Carbon steel	Castings	SA–216	WCB	J03002	...	...	1	2
2	Carbon steel	Forgings	SA–266	2	K03506	...	...	1	2
3	Carbon steel	Forgings	SA–266	4	K03017	...	...	1	2
4	Carbon steel	Forgings	SA–350	LF2	K03011	...	...	1	2
5	Carbon steel	Forgings	SA–508	1	K13502	...	...	1	2
6	Carbon steel	Forgings	SA–508	1A	K13502	...	...	1	2
7	Carbon steel	Forgings	SA–541	1	K03506	...	...	1	2
8	Carbon steel	Forgings	SA–541	1A	K03020	...	...	1	2
9	Carbon steel	Forgings	SA–765	II	K03047	...	...	1	2
10	Carbon steel	Plate	SA–515	70	K03101	...	...	1	2
11	Carbon steel	Plate	SA–516	70	K02700	...	...	1	2
12	Carbon steel	Smls. pipe	SA–106	C	K03501	...	...	1	2
13	Carbon steel	Smls. tube	SA–210	C	K03501	...	...	1	2
14	Carbon steel	Castings	SA–216	WCC	K02503	...	...	1	2
15	Carbon steel	Fittings	SA–234	WPC	K03501	...	...	1	2
16	Carbon steel	Plate	SA–537	...	K12437	3	$4 < t \le 6$	1	3
17	Carbon steel	Plate	SA–662	C	K02007	...	...	1	2
18	Carbon steel	Plate	SA–537	...	K12437	2	$4 < t \le 6$	1	3
19	Carbon steel	Plate	SA–738	C	K02008	...	$4 < t \le 6$	1	3
20	Carbon steel	Plate	SA–537	...	K12437	1	$t \le 2\frac{1}{2}$	1	2
21	Carbon steel	Plate	SA–841	A	...	1	$t \le 4$	1	2
22	Carbon steel	Forgings	SA/EN 10222–2	P305GH	...	NT	$1.4 < t \le 6.3$	1	2
23	Carbon steel	Forgings	SA/EN 10222–2	P305GH	...	Normalized	$t \le 1.4$	1	2
24	Carbon steel	Plate	SA/EN 10028–2	P355GH	...	...	$2.5 < t \le 4$	1	2
25	Carbon steel	Forgings	SA/EN 10222–2	P305GH	...	QT	$t \le 2.8$	1	2
26	Carbon steel	Plate	SA/EN 10028–2	P355GH	...	...	$1.5 < t \le 2.5$	1	2
27	Carbon steel	Plate	SA/EN 10028–2	P355GH	...	...	$\frac{5}{8} < t \le 1.5$	1	2
28	Carbon steel	Plate	SA/EN 10028–2	P355GH	...	...	$\le\frac{5}{8}$	1	2
29	Carbon steel	Forgings	SA–266	3	K05001	...	...	1	2
30	Carbon steel	Plate	SA–299	A	K02803	...	$t > 1$	1	2
31	Carbon steel	Plate	SA–299	A	K02803	...	$t \le 1$	1	2
32	Carbon steel	Forgings	SA–372	B	K04001	...	...	1	2
33	Carbon steel	Plate	SA–738	A	K12447	Normalized	$t \le 2\frac{1}{2}$	1	2
34	Carbon steel	Plate	SA–738	A	K12447	QT	...	1	2
35	Carbon steel	Plate	SA–537	...	K12437	3	$2\frac{1}{2} < t \le 4$	1	3
36	Carbon steel	Plate	SA–537	...	K12437	2	$2\frac{1}{2} < t \le 4$	1	3
37	Carbon steel	Plate	SA–738	C	K02008	...	$2\frac{1}{2} < t \le 4$	1	3
38	Carbon steel	Plate	SA–299	B	K02803	...	$t > 1$	1	3
39	Carbon steel	Plate	SA–299	B	K02803	...	$t \le 1$	1	3
40	Carbon steel	Forgings	SA–765	IV	K02009	...	...	1	3
41	Carbon steel	Plate	SA–537	...	K12437	3	$t \le 2\frac{1}{2}$	1	3
42	Carbon steel	Plate	SA–537	...	K12437	2	$t \le 2\frac{1}{2}$	1	3
43	Carbon steel	Plate	SA–738	C	K02008	...	$t \le 2\frac{1}{2}$	1	3
44	Carbon steel	Plate	SA–841	B	...	2	$t \le 4$	1	3
45	Carbon steel	Plate	SA–612	...	K02900	Normalized	$\frac{1}{2} < t \le 1$	10C	1

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Maximum Use Temperature, °F	External Pressure Chart No.	Notes
1	70	36	1000	CS-2	G13, T3
2	70	36	1000	CS-2	G13, T3
3	70	36	1000	CS-2	G13, T3
4	70	36	1000	CS-2	G13, T2
5	70	36	1000	CS-2	G13, T3
6	70	36	1000	CS-2	G13, T3
7	70	36	1000	CS-2	G13, T3
8	70	36	1000	CS-2	G13, T3
9	70	36	1000	CS-2	G13, T3
10	70	38	1000	CS-2	G13, T3
11	70	38	1000	CS-2	G13, T3
12	70	40	1000	CS-2	G13, T3
13	70	40	1000	CS-2	G13, T3
14	70	40	1000	CS-2	G13, T3
15	70	40	800	CS-2	G13, T3
16	70	40	700	CS-2	...
17	70	43	700	CS-3	...
18	70	46	650	CS-3	...
19	70	46	650	CS-3	T1
20	70	50	700	CS-3	T1
21	70	50	650	CS-3	...
22	71	40.5	1000	CS-2	G13, T3
23	71	44	1000	CS-2	G13, T2
24	71	45.5	1000	CS-2	G13, T2
25	74	41.5	1000	CS-2	G13, T3
26	74	48.5	1000	CS-2	G13, T2
27	74	50	1000	CS-2	G13, T2
28	74	51.5	1000	CS-2	G13, T2
29	75	37.5	1000	CS-2	G13, T3, W1, W6
30	75	40	1000	CS-2	G13, T3
31	75	42	1000	CS-2	G13, T2
32	75	45	650	CS-3	G9, H2, W2, W6
33	75	45	700	CS-2	...
34	75	45	700	CS-2	...
35	75	50	700	CS-5	T1
36	75	55	650	CS-5	T1
37	75	55	650	CS-5	T1
38	80	45	1000	CS-3	G13, T2
39	80	47	1000	CS-3	G13, T2
40	80	50	700	CS-3	T1
41	80	55	700	CS-5	...
42	80	60	650	CS-5	...
43	80	60	650	CS-5	...
44	80	60	650	CS-3	...
45	81	50	650	CS-3	...

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900
1	24.0	22.6	22.0	21.6	21.2	20.9	20.5	20.1	19.6	19.0	18.4	17.8	17.2	*14.8*	*12.0*	*9.3*	*6.7*
2	24.0	22.6	22.0	21.6	21.2	20.9	20.5	20.1	19.6	19.0	18.4	17.8	17.2	*14.8*	*12.0*	*9.3*	*6.7*
3	24.0	22.6	22.0	21.6	21.2	20.9	20.5	20.1	19.6	19.0	18.4	17.8	17.2	*14.8*	*12.0*	*9.3*	*6.7*
4	24.0	22.6	22.0	21.6	21.2	20.9	20.5	20.1	19.6	19.0	18.4	17.8	*16.9*	*13.9*	*11.4*	*8.7*	*5.9*
5	24.0	22.6	22.0	21.6	21.2	20.9	20.5	20.1	19.6	19.0	18.4	17.8	17.2	*14.8*	*12.0*	*9.3*	*6.7*
6	24.0	22.6	22.0	21.6	21.2	20.9	20.5	20.1	19.6	19.0	18.4	17.8	17.2	*14.8*	*12.0*	*9.3*	*6.7*
7	24.0	22.6	22.0	21.6	21.2	20.9	20.5	20.1	19.6	19.0	18.4	17.8	17.2	*14.8*	*12.0*	*9.3*	*6.7*
8	24.0	22.6	22.0	21.6	21.2	20.9	20.5	20.1	19.6	19.0	18.4	17.8	17.2	*14.8*	*12.0*	*9.3*	*6.7*
9	24.0	22.6	22.0	21.6	21.2	20.9	20.5	20.1	19.6	19.0	18.4	17.8	17.2	*14.8*	*12.0*	*9.3*	*6.7*
10	25.3	23.8	23.2	22.8	22.4	22.1	21.6	21.2	20.6	20.1	19.4	18.8	18.1	*14.8*	*12.0*	*9.3*	*6.7*
11	25.3	23.8	23.2	22.8	22.4	22.1	21.6	21.2	20.6	20.1	19.4	18.8	18.1	*14.8*	*12.0*	*9.3*	*6.7*
12	26.7	25.1	24.4	24.0	23.6	23.2	22.8	22.3	21.7	21.1	20.4	19.8	19.2	*14.8*	*12.0*	*9.3*	*6.7*
13	26.7	25.1	24.4	24.0	23.6	23.2	22.8	22.3	21.7	21.1	20.4	19.8	19.2	*14.8*	*12.0*	*9.3*	*6.7*
14	26.7	25.1	24.4	24.0	23.6	23.2	22.8	22.3	21.7	21.1	20.4	19.8	19.2	*14.8*	*12.0*	*9.3*	*6.7*
15	26.7	25.1	24.4	24.0	23.6	23.2	22.8	22.3	21.7	21.1	20.4	19.8	19.2	*14.8*	*12.0*	...	...
16	26.7	25.3	24.5	23.8	23.2	22.7	22.2	21.7	21.3	20.9	20.6	20.2	19.2	...	...	...	...
17	28.7	26.9	26.3	25.8	25.4	25.0	24.5	24.0	23.4	22.7	22.0	21.2	20.7	...	...	...	...
18	29.2	28.4	27.1	25.9	24.8	23.9	23.1	22.4	21.7	21.2	20.7	20.2	...	...	...	...	...
19	29.2	28.8	28.1	27.6	27.1	26.7	26.2	25.6	25.0	24.3	23.5	*22.5*	...	...	...	...	...
20	29.2	29.2	29.2	29.2	29.0	28.3	27.7	27.2	26.7	26.2	25.7	*22.5*	*18.3*	...	...	...	...
21	29.2	29.2	29.2	29.2	29.2	28.6	28.2	...	27.5	27.2	26.8	26.2	...	...	...	...	...
22	27.1	25.3	24.7	24.2	23.8	23.4	23.0	...	21.9	21.3	20.6	19.9	19.2	*14.8*	*12.0*	*9.3*	*6.7*
23	29.5	27.6	26.9	26.3	25.9	25.5	25.0	...	23.9	23.2	22.5	21.7	*20.0*	*14.8*	*12.0*	*9.3*	*6.7*
24	29.6	28.5	27.8	27.3	26.9	26.5	26.1	25.4	24.8	24.1	23.3	22.5	*18.3*	*14.8*	*12.0*	*9.3*	*6.7*
25	27.6	25.8	25.1	24.6	24.2	23.8	23.4	...	22.3	21.7	21.0	20.3	19.6	*14.8*	*12.0*	*9.3*	*6.7*
26	30.8	30.3	29.6	29.1	28.7	28.2	27.7	27.1	26.4	25.6	24.8	24.0	*18.3*	*14.8*	*12.0*	*9.3*	*6.7*
27	30.8	30.8	30.5	30.0	29.5	29.1	28.5	27.9	27.2	26.4	25.6	24.7	*18.3*	*14.8*	*12.0*	*9.3*	*6.7*
28	30.8	30.8	30.8	30.8	30.4	29.9	29.4	28.7	28.0	27.2	26.3	25.4	*18.3*	*14.8*	*12.0*	*9.3*	*6.7*
29	25.0	23.5	22.9	22.5	22.1	21.8	21.4	20.9	20.4	19.8	19.2	18.5	17.9	*15.7*	*12.6*	*9.3*	*6.7*
30	26.7	25.1	24.4	24.0	23.6	23.2	22.8	22.3	21.7	21.1	20.4	19.8	19.1	*15.7*	*12.6*	*9.3*	*6.7*
31	28.0	26.3	25.7	25.2	24.8	24.4	23.9	23.4	22.8	22.2	21.5	20.8	*19.6*	*15.7*	*12.6*	*9.3*	*6.7*
32	30.0	28.2	27.5	27.0	26.5	26.1	25.6	25.1	24.4	23.7	23.0	22.2	...	...	...	...	...
33	30.0	27.8	26.5	25.3	24.3	23.4	22.6	21.9	21.2	20.7	20.2	19.7	19.3	...	...	...	...
34	30.0	27.8	26.5	25.3	24.3	23.4	22.6	21.9	21.2	20.7	20.2	19.7	19.3	...	...	...	...
35	31.3	31.3	30.7	29.8	29.0	28.3	27.7	27.2	26.7	26.2	25.7	*24.4*	*21.4*	...	...	...	...
36	31.3	31.3	31.3	31.3	31.3	31.2	30.5	29.9	29.3	28.8	28.3	*24.4*	...	...	...	...	...
37	31.3	31.3	31.3	31.3	31.3	31.2	30.5	29.9	29.3	28.8	28.3	*24.4*	...	...	...	...	...
38	30.0	28.1	27.5	27.0	26.5	26.1	25.6	...	24.4	23.7	23.0	22.2	*19.6*	*15.7*	*12.6*	*9.3*	*6.7*
39	31.3	29.4	28.7	28.2	27.7	27.3	26.8	...	25.5	24.8	24.0	23.2	*19.6*	*15.7*	*12.6*	*9.3*	*6.7*
40	33.3	31.3	30.5	30.0	29.5	29.0	28.5	27.9	27.2	26.4	25.6	*24.4*	*19.6*	...	...	...	...
41	33.3	33.3	33.3	32.8	31.9	31.2	30.5	29.9	29.3	28.8	28.3	25.1	24.7	...	...	...	...
42	33.3	33.3	33.3	33.3	33.3	33.3	33.3	32.6	32.0	31.4	30.8	26.0	...	...	...	...	...
43	33.3	33.3	33.3	33.3	33.3	33.3	33.3	32.6	32.0	31.4	30.8	26.0	...	...	...	...	...
44	33.3	...	33.3	...	33.3	...	33.3	...	33.0	32.6	32.1	31.4	...	...	...	...	...
45	33.3	31.9	30.6	29.1	27.6	26.2	25.1	24.2	23.5	23.0	22.6	22.3	...	...	...	...	...

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding											
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500
1	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
2	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
3	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
4	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
5	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
6	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
7	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
8	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
9	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
10	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
11	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
12	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
13	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
14	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...
22	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
23	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
24	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
25	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
26	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
27	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
28	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
29	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
30	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
31	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...
38	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
39	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/ Thickness, in.	P-No.	Group No.
1	Carbon steel	Plate	SA–612	...	K02900	Normalized	$t \le 1/2$	10C	1
2	Carbon steel	Plate	SA–738	B	K12007	...	...	1	3
3	Carbon steel	Forgings	SA–372	C	K04801	...	...	...	...
4	Carbon steel	Plate	SA–724	A	K11831	...	...	1	4
5	Carbon steel	Plate	SA–724	C	K12037	...	...	1	4
6	Carbon steel	Plate	SA–724	B	K12031	...	...	1	4
7	C–Mn–Si–Cb	Plate	SA–737	B	K12001	...	...	1	2
8	C–Mn–Si–V	Plate	SA–737	C	K12202	...	...	1	3
9	C–1/2Mo	Smls. tube	SA–209	T1b	K11422	...	...	3	1
10	C–1/2Mo	Smls. tube	SA–209	T1	K11522	...	...	3	1
11	C–1/2Mo	Fittings	SA–234	WP1	K12821	...	...	3	1
12	C–1/2Mo	Smls. pipe	SA–335	P1	K11522	...	...	3	1
13	C–1/2Mo	Forged pipe	SA–369	FP1	K11522	...	...	3	1
14	C–1/2Mo	Smls. tube	SA–209	T1a	K12023	...	...	3	1
15	C–1/2Mo	Castings	SA–217	WC1	J12524	...	...	3	1
16	C–1/2Mo	Castings	SA–352	LC1	J12522	...	...	3	1
17	C–1/2Mo	Plate	SA–204	A	K11820	...	...	3	1
18	C–1/2Mo	Forgings	SA–182	F1	K12822	...	...	3	2
19	C–1/2Mo	Plate	SA–204	B	K12020	...	...	3	2
20	C–1/2Mo	Forgings	SA–336	F1	K12520	...	...	3	2
21	C–1/2Mo	Plate	SA–204	C	K12320	...	...	3	2
22	1/2Cr–1/5Mo	Forgings	SA–372	G	K13049	70	...	11B	...
23	1/2Cr–1/5Mo	Forgings	SA–372	H	K13547	70	...	11B	...
24	1/2Cr–1/5Mo–V	Plate	SA–517	B	K11630	...	$t \le 1\frac{1}{4}$	11B	4
25	1/2Cr–1/4Mo–Si	Plate	SA–517	A	K11856	...	$t \le 1\frac{1}{4}$	11B	1
26	1/2Cr–1/4Mo–Si	Forgings	SA–592	A	K11856	...	$t \le 2\frac{1}{2}$	11B	1
27	1/2Cr–1/2Mo	Smls. pipe	SA–335	P2	K11547	...	...	3	1
28	1/2Cr–1/2Mo	Forged pipe	SA–369	FP2	K11547	...	...	3	1
29	1/2Cr–1/2Mo	Plate	SA–387	2	K12143	1	...	3	1
30	1/2Cr–1/2Mo	Smls. tube	SA–213	T2	K11547	...	...	3	1
31	1/2Cr–1/2Mo	Forgings	SA–182	F2	K12122	...	...	3	2
32	1/2Cr–1/2Mo	Plate	SA–387	2	K12143	2/NT	...	3	2
33	3/4Cr–1/2Ni–Cu	Smls. tube	SA–423	1	K11535	...	...	4	2
34	3/4Cr–3/4Ni–Cu–Al	Smls. pipe	SA–333	4	K11267	...	...	4	2
35	1Cr–1/5Mo	Forgings	SA–372	E	K13047	70	...	11B	1
36	1Cr–1/5Mo	Forgings	SA–372	F	G41350	70	...	11B	1
37	1Cr–1/5Mo	Forgings	SA–372	J	K13548	70	...	11B	1
38	1Cr–1/5Mo	Forgings	SA–372	J	G41370	110	...	11B	1
39	1Cr–1/2Mo	Plate	SA–387	12	K11757	1	...	4	1
40	1Cr–1/2Mo	Forgings	SA–182	F12	K11562	1	...	4	1
41	1Cr–1/2Mo	Smls. tube	SA–213	T12	K11562	...	...	4	1
42	1Cr–1/2Mo	Fittings	SA–234	WP12	K12062	1	...	4	1
43	1Cr–1/2Mo	Smls. pipe	SA–335	P12	K11562	...	...	4	1
44	1Cr–1/2Mo	Forged pipe	SA–369	FP12	K11562	...	...	4	1
45	1Cr–1/2Mo	Forgings	SA/EN 10222–2	13CrMo4–5	...	NT or QT	$10 < t \le 20$	4	1

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Maximum Use Temperature, °F	External Pressure Chart No.	Notes
1	83	50	650	CS-3	...
2	85	60	650	CS-5	T1
3	90	55	650	CS-3	G9, H2, T1, W2, W6
4	90	70	700	CS-5	...
5	90	70	700	CS-5	...
6	95	75	700	CS-5	...
7	70	50	700	CS-3	...
8	80	60	700	CS-3	...
9	53	28	1000	CS-1	G14, T7
10	55	30	1000	CS-2	G14, T6
11	55	30	1000	CS-2	G14, T6
12	55	30	1000	CS-2	G14, T6
13	55	30	1000	CS-2	G14, T6
14	60	32	1000	CS-2	G14, T6
15	65	35	1000	CS-2	G14, T6
16	65	35	650	CS-2	...
17	65	37	1000	CS-2	G14, T6
18	70	40	1000	CS-2	G14, T6
19	70	40	1000	CS-2	G14, T6
20	70	40	1000	CS-2	G14, T6
21	75	43	1000	CS-2	G14, T6
22	120	70	200	CS-3	G9, H4, W2, W6
23	120	70	200	CS-3	G9, H4, W2, W6
24	115	100	650	HT-1	...
25	115	100	650	HT-1	...
26	115	100	650	HT-1	...
27	55	30	1000	CS-2	T7
28	55	30	1000	CS-2	T7
29	55	33	1000	CS-2	T6
30	60	30	1000	CS-2	T7
31	70	40	1000	CS-2	G14, T6
32	70	45	1000	CS-3	T6
33	60	37	650	CS-2	...
34	60	35	650	CS-2	...
35	120	70	650	CS-5	G9, H4, W2, W6
36	120	70	650	CS-5	G9, H4, W2, W6
37	120	70	650	CS-5	G9, H4, W2, W6
38	135	110	650	HT-1	H4, W2, W6
39	55	33	1200	CS-2	T7
40	60	32	1200	CS-2	T7
41	60	32	1200	CS-2	T7
42	60	32	1200	CS-2	T7
43	60	32	1200	CS-2	T7
44	60	32	1200	CS-2	T7
45	61	35	1200	CS-2	T7

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900
1	33.3	31.9	30.6	29.1	27.6	26.2	25.1	24.2	23.5	23.0	22.6	22.3	...	...	...	...	...
2	35.4	35.4	35.4	35.4	34.8	34.0	33.3	32.6	32.0	31.4	30.8	*24.4*	...	...	...	...	...
3	36.7	35.1	33.6	32.0	30.3	28.9	27.6	26.6	25.9	25.3	24.9	*24.4*	...	...	...	...	...
4	37.5	37.5	37.5	37.5	37.5	36.7	35.2	33.9	32.9	32.2	31.7	26.2	25.9	...	...	...	...
5	37.5	37.5	37.5	37.5	37.5	36.7	35.2	33.9	32.9	32.2	31.7	26.2	25.9	...	...	...	...
6	39.6	39.6	39.6	39.6	39.6	39.4	37.7	36.3	35.3	34.5	33.9	26.2	25.9	...	...	...	...
7	29.2	29.2	29.2	29.1	27.6	26.2	25.1	24.2	23.5	23.0	22.6	22.3	22.1	...	...	...	...
8	33.3	33.3	33.3	33.3	33.1	31.5	30.1	29.1	28.2	27.6	27.1	26.2	25.9	...	...	...	...
9	18.7	18.0	17.5	17.2	16.8	16.5	16.3	16.0	15.8	15.5	15.3	15.0	14.7	14.3	14.0	13.5	13.0
10	20.0	19.2	18.8	18.4	18.0	17.7	17.4	17.1	16.9	16.6	16.4	16.1	15.7	15.4	14.9	14.5	*13.7*
11	20.0	19.2	18.8	18.4	18.0	17.7	17.4	17.1	16.9	16.6	16.4	16.1	15.7	15.4	14.9	14.5	*13.7*
12	20.0	19.2	18.8	18.4	18.0	17.7	17.4	17.1	16.9	16.6	16.4	16.1	15.7	15.4	14.9	14.5	*13.7*
13	20.0	19.2	18.8	18.4	18.0	17.7	17.4	17.1	16.9	16.6	16.4	16.1	15.7	15.4	14.9	14.5	*13.7*
14	21.3	20.5	20.1	19.6	19.2	18.9	18.6	18.3	18.0	17.7	17.4	17.1	16.8	16.4	15.9	15.4	*13.7*
15	23.3	22.5	21.9	21.5	21.0	20.7	20.3	20.0	19.7	19.4	19.1	18.7	18.4	17.9	17.4	16.9	*13.7*
16	23.3	22.5	21.9	21.5	21.0	20.7	20.3	20.0	19.7	19.4	19.1	18.7	...	...	...	...	...
17	24.7	23.7	23.2	22.7	22.2	21.8	21.5	21.1	20.8	20.5	20.2	19.8	19.4	19.0	18.4	17.9	*13.7*
18	26.7	25.7	25.1	24.5	24.0	23.6	23.2	22.9	22.5	22.2	21.8	21.4	21.0	20.5	19.9	19.3	*13.7*
19	26.7	25.7	25.1	24.5	24.0	23.6	23.2	22.9	22.5	22.2	21.8	21.4	21.0	20.5	19.9	19.3	*13.7*
20	26.7	25.7	25.1	24.5	24.0	23.6	23.2	22.9	22.5	22.2	21.8	21.4	21.0	20.5	19.9	19.3	*13.7*
21	28.7	27.6	26.9	26.4	25.9	25.4	25.0	24.6	24.2	23.8	23.4	23.0	22.6	22.0	21.4	20.7	*13.7*
22	46.7	46.7	46.7	...	...	...	...	...	...	...	...	...	...	...	...	...	...
23	46.7	46.7	46.7	...	...	...	...	...	...	...	...	...	...	...	...	...	...
24	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	...	...	...	...	...
25	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	...	...	...	...	...
26	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	...	...	...	...	...
27	20.0	19.2	18.8	18.4	18.0	17.7	17.4	17.1	16.9	16.6	16.4	16.1	15.7	15.4	14.9	14.5	13.9
28	20.0	19.2	18.8	18.4	18.0	17.7	17.4	17.1	16.9	16.6	16.4	16.1	15.7	15.4	14.9	14.5	13.9
29	22.0	21.2	20.7	20.2	19.8	19.5	19.2	18.9	18.6	18.3	18.0	17.7	17.3	16.9	16.4	15.9	*14.3*
30	20.0	19.2	18.8	18.4	18.0	17.7	17.4	17.1	16.9	16.6	16.4	16.1	15.7	15.4	14.9	14.5	13.9
31	26.7	25.7	25.1	24.5	24.0	23.6	23.2	22.9	22.5	22.2	21.8	21.4	21.0	20.5	19.9	19.3	*15.0*
32	29.2	28.9	28.2	27.6	27.1	26.6	26.1	25.7	25.3	24.9	24.5	24.1	23.6	23.1	22.4	21.7	*14.5*
33	24.7	23.3	22.7	22.3	22.0	21.8	21.5	21.3	21.1	20.9	20.6	20.3	...	...	...	...	...
34	23.3	22.1	21.5	21.1	20.8	20.6	20.4	20.2	20.0	19.7	19.5	19.2	...	...	...	...	...
35	46.7	44.5	43.5	42.6	41.9	41.2	40.6	40.0	39.4	38.7	37.9	36.9	...	...	...	...	...
36	46.7	44.5	43.5	42.6	41.9	41.2	40.6	40.0	39.4	38.7	37.9	36.9	...	...	...	...	...
37	46.7	44.5	43.5	42.6	41.9	41.2	40.6	40.0	39.4	38.7	37.9	36.9	...	...	...	...	...
38	56.3	56.3	56.3	56.3	56.3	56.3	56.3	56.3	56.3	56.3	56.3	56.3	...	...	...	...	...
39	22.0	20.6	19.9	19.2	18.7	18.2	17.9	17.5	17.2	17.0	16.8	16.5	16.3	16.0	15.7	15.4	15.0
40	21.3	20.0	19.3	18.7	18.1	17.7	17.3	17.0	16.7	16.5	16.3	16.0	15.8	15.5	15.3	14.9	14.5
41	21.3	20.0	19.3	18.7	18.1	17.7	17.3	17.0	16.7	16.5	16.3	16.0	15.8	15.5	15.3	14.9	14.5
42	21.3	20.0	19.3	18.7	18.1	17.7	17.3	17.0	16.7	16.5	16.3	16.0	15.8	15.5	15.3	14.9	14.5
43	21.3	20.0	19.3	18.7	18.1	17.7	17.3	17.0	16.7	16.5	16.3	16.0	15.8	15.5	15.3	14.9	14.5
44	21.3	20.0	19.3	18.7	18.1	17.7	17.3	17.0	16.7	16.5	16.3	16.0	15.8	15.5	15.3	14.9	14.5
45	23.2	21.9	21.1	20.4	19.8	19.3	18.9	...	18.2	18.0	17.8	17.5	17.3	17.0	16.6	16.3	15.8

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding											
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500
1	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...
9	*8.2*	*4.8*	...	...	...	...	...	...	...	...	...	...
10	*8.2*	*4.8*	...	...	...	...	...	...	...	...	...	...
11	*8.2*	*4.8*	...	...	...	...	...	...	...	...	...	...
12	*8.2*	*4.8*	...	...	...	...	...	...	...	...	...	...
13	*8.2*	*4.8*	...	...	...	...	...	...	...	...	...	...
14	*8.2*	*4.8*	...	...	...	...	...	...	...	...	...	...
15	*8.2*	*4.8*	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...
17	*8.2*	*4.8*	...	...	...	...	...	...	...	...	...	...
18	*8.2*	*4.8*	...	...	...	...	...	...	...	...	...	...
19	*8.2*	*4.8*	...	...	...	...	...	...	...	...	...	...
20	*8.2*	*4.8*	...	...	...	...	...	...	...	...	...	...
21	*8.2*	*4.8*	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...
27	*9.2*	*5.9*	...	...	...	...	...	...	...	...	...	...
28	*9.2*	*5.9*	...	...	...	...	...	...	...	...	...	...
29	*9.2*	*5.9*	...	...	...	...	...	...	...	...	...	...
30	*9.2*	*5.9*	...	...	...	...	...	...	...	...	...	...
31	*9.2*	*5.9*	...	...	...	...	...	...	...	...	...	...
32	*10.0*	*6.3*	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...
39	*11.3*	*7.2*	*4.5*	*2.8*	*1.8*	*1.1*	...	...	...	...	...	...
40	*11.3*	*7.2*	*4.5*	*2.8*	*1.8*	*1.1*	...	...	...	...	...	...
41	*11.3*	*7.2*	*4.5*	*2.8*	*1.8*	*1.1*	...	...	...	...	...	...
42	*11.3*	*7.2*	*4.5*	*2.8*	*1.8*	*1.1*	...	...	...	...	...	...
43	*11.3*	*7.2*	*4.5*	*2.8*	*1.8*	*1.1*	...	...	...	...	...	...
44	*11.3*	*7.2*	*4.5*	*2.8*	*1.8*	*1.1*	...	...	...	...	...	...
45	*11.3*	*7.2*	*4.5*	*2.8*	*1.8*	*1.1*	...	...	...	...	...	...

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/ Thickness, in.	P-No.	Group No.
1	1Cr–½Mo	Plate	SA/EN 10028–2	13CrMo4–5	...	...	$6 < t \le 10$	4	1
2	1Cr–½Mo	Plate	SA/EN 10028–2	13CrMo4–5	...	...	$4 < t \le 6$	4	1
3	1Cr–½Mo	Forgings	SA/EN 10222–2	13CrMo4–5	...	NT or QT	$4 < t \le 10$	4	1
4	1Cr–½Mo	Plate	SA/EN 10028–2	13CrMo4–5	...	...	$2.5 < t \le 4$	4	1
5	1Cr–½Mo	Forgings	SA/EN 10222–2	13CrMo4–5	...	NT or QT	$2.8 < t \le 4$	4	1
6	1Cr–½Mo	Forgings	SA/EN 10222–2	13CrMo4–5	...	NT	$1.4 < t \le 2.8$	4	1
7	1Cr–½Mo	Forgings	SA/EN 10222–2	13CrMo4–5	...	NT	$t \le 1.4$	4	1
8	1Cr–½Mo	Plate	SA–387	12	K11757	2	...	4	1
9	1Cr–½Mo	Plate	SA/EN 10028–2	13CrMo4–5	...	...	$⅝ < t \le 2.5$	4	1
10	1Cr–½Mo	Plate	SA/EN 10028–2	13CrMo4–5	...	...	$t \le ⅝$	4	1
11	1Cr–½Mo	Forgings	SA–182	F12	K11564	2	...	4	1
12	1Cr–½Mo	Forgings	SA–336	F12	K11564	...	...	4	1
13	1¼Cr–½Mo	Castings	SA–217	WC6	J12072	...	...	4	1
14	1¼Cr–½Mo	Bar	SA–739	B11	K11797	...	...	4	1
15	1¼Cr–½Mo–Si	Forgings	SA–182	F11	K11597	1	...	4	1
16	1¼Cr–½Mo–Si	Smls. tube	SA–213	T11	K11597	...	...	4	1
17	1¼Cr–½Mo–Si	Fittings	SA–234	WP11	...	1	...	4	1
18	1¼Cr–½Mo–Si	Smls. pipe	SA–335	P11	K11597	...	...	4	1
19	1¼Cr–½Mo–Si	Forged pipe	SA–369	FP11	K11597	...	...	4	1
20	1¼Cr–½Mo–Si	Plate	SA–387	11	K11789	1	...	4	1
21	1¼Cr–½Mo–Si	Forgings	SA–182	F11	K11572	2	...	4	1
22	1¼Cr–½Mo–Si	Forgings	SA–336	F11	K11572	2	...	4	1
23	1¼Cr–½Mo–Si	Plate	SA/EN 10028–2	13CrMoSi5–5	...	QT	$4 < t \le 10$	4	1
24	1¼Cr–½Mo–Si	Plate	SA/EN 10028–2	13CrMoSi5–5	...	QT	$2.25 < t \le 4$	4	1
25	1¼Cr–½Mo–Si	Plate	SA/EN 10028–2	13CrMoSi5–5	...	QT	≤2.25	4	1
26	1¼Cr–½Mo–Si	Forgings	SA–336	F11	K11572	3	...	4	1
27	1¼Cr–½Mo–Si	Plate	SA–387	11	K11789	2	...	4	1
28	1¾Cr–½Mo–Cu	Forgings	SA–592	E	K11695	...	$2½ < t \le 4$	11B	2
29	1¾Cr–½Mo–Cu	Forgings	SA–592	E	K11695	...	$t \le 2½$	11B	2
30	1¾Cr–½Mo–Ti	Plate	SA–517	E	K21604	...	$2½ < t \le 6$	11B	2
31	1¾Cr–½Mo–Ti	Plate	SA–517	E	K21604	...	$t \le 2½$	11B	2
32	2¼Cr–1Mo	Forgings	SA–182	F22	K21590	1	...	5A	1
33	2¼Cr–1Mo	Smls. tube	SA–213	T22	K21590	...	...	5A	1
34	2¼Cr–1Mo	Fittings	SA–234	WP22	K21590	1	...	5A	1
35	2¼Cr–1Mo	Smls. pipe	SA–335	P22	K21590	...	...	5A	1
36	2¼Cr–1Mo	Forgings	SA–336	F22	K21590	1	...	5A	1
37	2¼Cr–1Mo	Forged pipe	SA–369	FP22	K21590	...	...	5A	1
38	2¼Cr–1Mo	Plate	SA–387	22	K21590	1	...	5A	1
39	2¼Cr–1Mo	Plate	SA/EN 10028–2	10CrMo9–10	...	...	$6 < t \le 10$	5A	1
40	2¼Cr–1Mo	Forgings	SA/EN 10222–2	11CrMo9–10	...	NT or QT	$8 < t \le 20$	5A	1
41	2¼Cr–1Mo	Plate	SA/EN 10028–2	10CrMo9–10	...	...	$4 < t \le 6$	5A	1
42	2¼Cr–1Mo	Plate	SA/EN 10028–2	10CrMo9–10	...	...	$2.5 < t \le 4$	5A	1
43	2¼Cr–1Mo	Plate	SA/EN 10028–2	10CrMo9–10	...	...	$1.5 < t \le 2.5$	5A	1
44	2¼Cr–1Mo	Plate	SA/EN 10028–2	10CrMo9–10	...	...	$⅝ < t \le 1.5$	5A	1
45	2¼Cr–1Mo	Plate	SA/EN 10028–2	10CrMo9–10	...	...	$t \le ⅝$	5A	1

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Maximum Use Temperature, °F	External Pressure Chart No.	Notes
1	61	35.5	1200	CS-2	T7
2	62.5	37	1200	CS-2	T7
3	64	38.5	1200	CS-2	T7
4	64	39	1200	CS-2	T7
5	64	40	1200	CS-2	T6
6	64	41.5	1200	CS-2	T6
7	64	43	1200	CS-2	T6
8	65	40	1200	CS-2	T6
9	65.5	42	1200	CS-2	T6
10	65.5	43.5	1200	CS-2	T6
11	70	40	1200	CS-2	T6
12	70	40	1200	CS-2	T6
13	70	40	1100	CS-2	T6
14	70	45	1200	CS-3	T5
15	60	30	1200	CS-2	T7
16	60	30	1200	CS-2	T7
17	60	30	1200	CS-2	T7
18	60	30	1200	CS-2	T7
19	60	30	1200	CS-2	T7
20	60	35	1200	CS-2	T6
21	70	40	1200	CS-2	T7
22	70	40	1200	CS-2	T7
23	71	55	1058	CS-3	G15, T5
24	72.5	56.5	1058	CS-3	G15, T5
25	74	58	1058	CS-3	G15, T5
26	75	45	1200	CS-3	T5
27	75	45	1200	CS-3	T5
28	105	90	650	CS-5	S1
29	115	100	650	HT-1	...
30	105	90	650	CS-5	...
31	115	100	650	HT-1	...
32	60	30	1200	CS-2	T5, W5
33	60	30	1200	CS-2	T5, W5
34	60	30	1200	CS-2	T5, W5
35	60	30	1200	CS-2	T5, W5
36	60	30	1200	CS-2	T5, W5
37	60	30	1200	CS-2	T5, W5
38	60	30	1200	CS-2	H1, T5, W5
39	65.5	36.5	1100	CS-3	T6, W5
40	65.5	38.5	1200	CS-3	T6, W5
41	66.5	37.5	1100	CS-3	T6, W5
42	68	40.5	1100	CS-3	T6, W5
43	69.5	42	1100	CS-3	T6, W5
44	69.5	43.5	1100	CS-3	T6, W5
45	69.5	45	1100	CS-3	T5, W5

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900
1	23.7	22.2	21.4	20.7	20.2	19.7	19.2	18.9	18.6	18.3	18.1	17.8	17.5	17.3	16.9	16.5	16.1
2	24.7	23.1	22.3	21.6	21.0	20.5	20.0	19.7	19.3	19.1	18.8	18.5	18.3	18.0	17.6	17.2	16.8
3	25.6	24.1	23.3	22.5	21.9	21.3	20.9	...	20.1	19.9	19.6	19.4	19.1	18.8	18.4	17.9	17.5
4	26.1	24.5	23.6	22.9	22.2	21.7	21.2	20.8	20.5	20.2	19.9	19.6	19.3	19.0	18.7	18.2	17.7
5	26.6	25.1	24.2	23.4	22.7	22.1	21.6	...	20.9	20.6	20.4	20.1	19.8	19.5	19.1	18.6	*18.0*
6	26.6	26.0	25.1	24.2	23.5	22.9	22.4	...	21.7	21.4	21.1	20.8	20.5	20.2	19.8	19.3	*18.0*
7	26.6	26.6	25.9	25.1	24.4	23.7	23.2	...	22.4	22.1	21.8	21.5	21.2	20.9	20.5	20.0	*18.0*
8	26.7	25.0	24.1	23.3	22.7	22.1	21.7	21.3	20.9	20.6	20.3	20.0	19.7	19.4	19.1	18.6	*18.0*
9	27.2	26.3	25.4	24.6	23.9	23.3	22.8	22.4	22.0	21.7	21.4	21.1	20.8	20.4	20.0	19.6	*18.0*
10	27.2	27.2	26.2	25.4	24.7	24.1	23.6	23.2	22.7	22.4	22.1	21.8	21.5	21.1	20.7	20.2	*18.0*
11	26.7	25.0	24.1	23.3	22.7	22.1	21.7	21.3	20.9	20.6	20.3	20.0	19.7	19.4	19.1	18.6	*18.0*
12	26.7	25.0	24.1	23.3	22.7	22.1	21.7	21.3	20.9	20.6	20.3	20.0	19.7	19.4	19.1	18.6	*18.0*
13	26.7	25.4	24.6	24.0	23.4	22.9	22.5	22.0	21.7	21.3	20.9	20.5	20.1	19.7	19.2	18.7	*13.7*
14	29.2	28.5	27.7	27.0	26.3	25.8	25.3	24.8	24.4	23.9	23.5	23.1	22.6	22.2	21.6	*20.2*	*13.7*
15	20.0	19.0	18.5	18.0	17.6	17.2	16.8	16.5	16.2	16.0	15.7	15.4	15.1	14.8	14.4	14.0	13.6
16	20.0	19.0	18.5	18.0	17.6	17.2	16.8	16.5	16.2	16.0	15.7	15.4	15.1	14.8	14.4	14.0	13.6
17	20.0	19.0	18.5	18.0	17.6	17.2	16.8	16.5	16.2	16.0	15.7	15.4	15.1	14.8	14.4	14.0	13.6
18	20.0	19.0	18.5	18.0	17.6	17.2	16.8	16.5	16.2	16.0	15.7	15.4	15.1	14.8	14.4	14.0	13.6
19	20.0	19.0	18.5	18.0	17.6	17.2	16.8	16.5	16.2	16.0	15.7	15.4	15.1	14.8	14.4	14.0	13.6
20	23.3	22.2	21.5	21.0	20.5	20.0	19.6	19.3	18.9	18.6	18.3	18.0	17.6	17.2	16.8	16.4	*13.7*
21	26.7	25.4	24.6	24.0	23.4	22.9	22.5	22.0	21.7	21.3	20.9	20.5	20.1	19.7	19.2	18.7	13.7
22	26.7	25.4	24.6	24.0	23.4	22.9	22.5	22.0	21.7	21.3	20.9	20.5	20.1	19.7	19.2	18.7	13.7
23	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.4	28.7	28.0	*20.2*	*13.7*
24	30.2	30.2	30.2	30.2	30.2	30.2	30.2	30.2	30.2	30.2	30.2	30.2	30.2	29.5	28.8	*20.2*	*13.7*
25	30.8	30.8	30.8	30.8	30.8	30.8	30.8	30.8	30.8	30.8	30.8	30.8	30.8	30.3	29.5	*20.2*	*13.7*
26	30.0	28.5	27.7	27.0	26.3	25.8	25.3	24.8	24.4	23.9	23.5	23.1	22.6	22.2	21.6	*20.2*	*13.7*
27	30.0	28.5	27.7	27.0	26.3	25.8	25.3	24.8	24.4	23.9	23.5	23.1	22.6	22.2	21.6	*20.2*	*13.7*
28	43.8	43.8	43.8	43.8	43.8	43.8	43.8	43.8	43.8	43.8	43.8	43.8	...	...	...	...	...
29	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	...	...	...	...	...
30	43.8	43.8	43.8	43.8	43.8	43.8	43.8	43.8	43.8	43.8	43.8	43.8	...	...	...	...	...
31	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	...	...	...	...	...
32	20.0	19.1	18.7	18.4	18.2	18.0	18.0	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.7	*17.1*	*13.6*
33	20.0	19.1	18.7	18.4	18.2	18.0	18.0	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.7	*17.1*	*13.6*
34	20.0	19.1	18.7	18.4	18.2	18.0	18.0	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.7	*17.1*	*13.6*
35	20.0	19.1	18.7	18.4	18.2	18.0	18.0	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.7	*17.1*	*13.6*
36	20.0	19.1	18.7	18.4	18.2	18.0	18.0	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.7	*17.1*	*13.6*
37	20.0	19.1	18.7	18.4	18.2	18.0	18.0	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.7	*17.1*	*13.6*
38	20.0	19.1	18.7	18.4	18.2	18.0	18.0	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.7	*17.1*	*13.6*
39	24.2	22.8	22.1	21.6	21.1	20.8	20.5	20.3	20.0	19.8	19.6	19.4	19.1	18.8	18.4	18.0	*15.8*
40	25.6	24.2	23.5	22.9	22.4	22.0	21.7	...	21.2	21.0	20.8	20.6	20.3	20.0	19.5	19.0	*15.8*
41	25.1	23.7	23.0	22.4	22.0	21.6	21.3	21.1	20.8	20.6	20.4	20.2	19.9	19.6	19.2	18.7	*15.8*
42	27.1	25.5	24.8	24.2	23.7	23.3	22.9	22.7	22.4	22.2	22.0	21.7	21.4	21.1	20.7	20.1	*15.8*
43	28.0	26.5	25.7	25.0	24.5	24.1	23.8	23.5	23.2	23.0	22.8	22.5	22.2	21.8	21.4	20.9	*15.8*
44	29.0	27.4	26.6	25.9	25.4	24.9	24.6	24.3	24.0	23.8	23.6	23.3	23.0	22.6	22.1	21.6	*15.8*
45	29.0	28.3	27.5	26.8	26.2	25.8	25.4	25.1	24.8	24.6	24.3	24.1	23.7	23.3	22.9	*21.9*	*15.8*

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding											
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500
1	*11.3*	*7.2*	*4.5*	*2.8*	*1.8*	*1.1*	...	...	...	...	...	...
2	*11.3*	*7.2*	*4.5*	*2.8*	*1.8*	*1.1*	...	...	...	...	...	...
3	*11.3*	*7.2*	*4.5*	*2.8*	*1.8*	*1.1*	...	...	...	...	...	...
4	*11.3*	*7.2*	*4.5*	*2.8*	*1.8*	*1.1*	...	...	...	...	...	...
5	*11.3*	*7.2*	*4.5*	*2.8*	*1.8*	*1.1*	...	...	...	...	...	...
6	*11.3*	*7.2*	*4.5*	*2.8*	*1.8*	*1.1*	...	...	...	...	...	...
7	*11.3*	*7.2*	*4.5*	*2.8*	*1.8*	*1.1*	...	...	...	...	...	...
8	*11.3*	*7.2*	*4.5*	*2.8*	*1.8*	*1.1*	...	...	...	...	...	...
9	*11.3*	*7.2*	*4.5*	*2.8*	*1.8*	*1.1*	...	...	...	...	...	...
10	*11.3*	*7.2*	*4.5*	*2.8*	*1.8*	*1.1*	...	...	...	...	...	...
11	*11.3*	*7.2*	*4.5*	*2.8*	*1.8*	*1.1*	...	...	...	...	...	...
12	*11.3*	*7.2*	*4.5*	*2.8*	*1.8*	*1.1*	...	...	...	...	...	...
13	*9.3*	*6.3*	*4.2*	*2.8*	...	...	...	...	...	...	...	...
14	*9.3*	*6.3*	*4.2*	*2.8*	*1.9*	*1.2*	...	...	...	...	...	...
15	*9.3*	*6.3*	*4.2*	*2.8*	*1.9*	*1.2*	...	...	...	...	...	...
16	*9.3*	*6.3*	*4.2*	*2.8*	*1.9*	*1.2*	...	...	...	...	...	...
17	*9.3*	*6.3*	*4.2*	*2.8*	*1.9*	*1.2*	...	...	...	...	...	...
18	*9.3*	*6.3*	*4.2*	*2.8*	*1.9*	*1.2*	...	...	...	...	...	...
19	*9.3*	*6.3*	*4.2*	*2.8*	*1.9*	*1.2*	...	...	...	...	...	...
20	*9.3*	*6.3*	*4.2*	*2.8*	*1.9*	*1.2*	...	...	...	...	...	...
21	*9.3*	*6.3*	*4.2*	*2.8*	*1.9*	*1.2*	...	...	...	...	...	...
22	*9.3*	*6.3*	*4.2*	*2.8*	*1.9*	*1.2*	...	...	...	...	...	...
23	*9.3*	*6.3*	*4.2*	*2.8*	...	...	...	...	...	...	...	...
24	*9.3*	*6.3*	*4.2*	*2.8*	...	...	...	...	...	...	...	...
25	*9.3*	*6.3*	*4.2*	*2.8*	...	...	...	...	...	...	...	...
26	*9.3*	*6.3*	*4.2*	*2.8*	*1.9*	*1.2*	...	...	...	...	...	...
27	*9.3*	*6.3*	*4.2*	*2.8*	*1.9*	*1.2*	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...
32	*10.8*	*8.0*	*5.7*	*3.8*	*2.4*	*1.4*	...	...	...	...	...	...
33	*10.8*	*8.0*	*5.7*	*3.8*	*2.4*	*1.4*	...	...	...	...	...	...
34	*10.8*	*8.0*	*5.7*	*3.8*	*2.4*	*1.4*	...	...	...	...	...	...
35	*10.8*	*8.0*	*5.7*	*3.8*	*2.4*	*1.4*	...	...	...	...	...	...
36	*10.8*	*8.0*	*5.7*	*3.8*	*2.4*	*1.4*	...	...	...	...	...	...
37	*10.8*	*8.0*	*5.7*	*3.8*	*2.4*	*1.4*	...	...	...	...	...	...
38	*10.8*	*8.0*	*5.7*	*3.8*	*2.4*	*1.4*	...	...	...	...	...	...
39	*11.4*	*7.8*	*5.1*	*3.2*	...	...	...	...	...	...	...	...
40	*11.4*	*7.8*	*5.1*	*3.2*	*2.0*	*1.2*	...	...	...	...	...	...
41	*11.4*	*7.8*	*5.1*	*3.2*	...	...	...	...	...	...	...	...
42	*11.4*	*7.8*	*5.1*	*3.2*	...	...	...	...	...	...	...	...
43	*11.4*	*7.8*	*5.1*	*3.2*	...	...	...	...	...	...	...	...
44	*11.4*	*7.8*	*5.1*	*3.2*	...	...	...	...	...	...	...	...
45	*11.4*	*7.8*	*5.1*	*3.2*	...	...	...	...	...	...	...	...

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/ Thickness, in.	P-No.	Group No.
1	2¼Cr–1Mo	Castings	SA–217	WC9	J21890	...	...	5A	1
2	2¼Cr–1Mo	Forgings	SA–182	F22	K21590	3	...	5A	1
3	2¼Cr–1Mo	Forgings	SA–336	F22	K21590	3	...	5A	1
4	2¼Cr–1Mo	Plate	SA–387	22	K21590	2	...	5A	1
5	2¼Cr–1Mo	Bar	SA–739	B22	K21390	...	...	5A	1
6	2¼Cr–1Mo	Forgings	SA/EN 10222–2	11CrMo9–10	...	NT	$t \le 8$	5A	1
7	2¼Cr–1Mo	Castings	SA–487	8	J22091	A	...	5C	1
8	2¼Cr–1Mo	Forgings	SA–508	22	K21590	3	...	5C	1
9	2¼Cr–1Mo	Forgings	SA–541	22	K21390	3	...	5C	1
10	2¼Cr–1Mo	Plate	SA–542	B	K21590	4	...	5C	1
11	2¼Cr–1Mo–V	Forgings	SA–182	F22V	K31835	...	...	5C	1
12	2¼Cr–1Mo–V	Forgings	SA–336	F22V	K31835	...	...	5C	1
13	2¼Cr–1Mo–V	Forgings	SA–541	22V	K31835	...	...	5C	1
14	2¼Cr–1Mo–V	Plate	SA–542	D	K31835	4a	...	5C	1
15	2¼Cr–1Mo–V	Plate	SA–832	22V	K31835	...	...	5C	1
16	3Cr–1Mo	Smls. tube	SA–213	T21	K31545	...	...	5A	1
17	3Cr–1Mo	Smls. pipe	SA–335	P21	K31545	...	...	5A	1
18	3Cr–1Mo	Forgings	SA–336	F21	K31545	1	...	5A	1
19	3Cr–1Mo	Forged pipe	SA–369	FP21	K31545	...	...	5A	1
20	3Cr–1Mo	Plate	SA–387	21	K31545	1	...	5A	1
21	3Cr–1Mo	Forgings	SA–182	F21	K31545	...	...	5A	1
22	3Cr–1Mo	Forgings	SA–336	F21	K31545	3	...	5A	1
23	3Cr–1Mo	Plate	SA–387	21	K31545	2	...	5A	1
24	3Cr–1Mo–¼V–Ti–B	Forgings	SA–182	F3V	K31830	...	...	5C	1
25	3Cr–1Mo–¼V–Ti–B	Forgings	SA–336	F3V	K31830	...	...	5C	1
26	3Cr–1Mo–¼V–Ti–B	Forgings	SA–508	3V	K31830	...	...	5C	1
27	3Cr–1Mo–¼V–Ti–B	Forgings	SA–541	3V	K31830	...	...	5C	1
28	3Cr–1Mo–¼V–Ti–B	Plate	SA–542	C	K31830	4a	...	5C	1
29	3Cr–1Mo–¼V–Ti–B	Plate	SA–832	21V	K31830	...	...	5C	1
30	3Cr–1Mo–¼V–Cb–Ca	Forgings	SA–182	F3VCb	K31390	...	...	5C	1
31	3Cr–1Mo–¼V–Cb–Ca	Forgings	SA–336	F3VCb	K31390	...	...	5C	1
32	3Cr–1Mo–¼V–Cb–Ca	Forgings	SA–508	3VCb	K31390	...	...	5C	1
33	3Cr–1Mo–¼V–Cb–Ca	Forgings	SA–541	3VCb	K31390	...	...	5C	1
34	3Cr–1Mo–¼V–Cb–Ca	Plate	SA–542	E	K31390	4a	...	5C	1
35	3Cr–1Mo–¼V–Cb–Ca	Plate	SA–832	23V	K31390	...	...	5C	1
36	5Cr–½Mo	Smls. tube	SA–213	T5	K41545	...	...	5B	1
37	5Cr–½Mo	Fittings	SA–234	WP5	K41545	...	...	5B	1
38	5Cr–½Mo	Smls. pipe	SA–335	P5	K41545	...	...	5B	1
39	5Cr–½Mo	Forged pipe	SA–369	FP5	K41545	...	...	5B	1
40	5Cr–½Mo	Plate	SA–387	5	K41545	1	...	5B	1
41	5Cr–½Mo	Forgings	SA–336	F5	K41545	...	...	5B	1
42	5Cr–½Mo	Forgings	SA–182	F5	K41545	...	...	5B	1
43	5Cr–½Mo	Plate	SA–387	5	K41545	2	...	5B	1
44	5Cr–½Mo	Forgings	SA–336	F5A	K42544	...	...	5B	1
45	5Cr–½Mo	Castings	SA–217	C5	J42045	NT	...	5B	1

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Maximum Use Temperature, °F	External Pressure Chart No.	Notes
1	70	40	1200	CS-2	T7, W5
2	75	45	1200	CS-3	T5, W5
3	75	45	1200	CS-3	T5, W5
4	75	45	1200	CS-3	T5, W5
5	75	45	1200	CS-3	T5, W5
6	75.5	45	1200	CS-3	T5, W5
7	85	55	1000	CS-3	T5, W5
8	85	55	850	CS-2	G12, T5
9	85	55	850	CS-2	G12, T5
10	85	55	850	CS-2	G12, T5
11	85	60	900	CS-2	G12, T5
12	85	60	900	CS-2	G12, T5
13	85	60	900	CS-2	G12, T5
14	85	60	900	CS-2	G12, T5
15	85	60	900	CS-2	G12, T5
16	60	30	1200	CS-2	T5
17	60	30	1200	CS-2	T5
18	60	30	1200	CS-2	T5
19	60	30	1200	CS-2	T5
20	60	30	1200	CS-2	T5
21	75	45	1200	CS-3	T6
22	75	45	1200	CS-3	T6
23	75	45	1200	CS-3	T6
24	85	60	900	CS-3	G12, T4
25	85	60	900	CS-3	G12, T4
26	85	60	900	CS-3	G12, T4
27	85	60	900	CS-3	G12, T4
28	85	60	900	CS-3	G12, T4
29	85	60	900	CS-3	G12, T4
30	85	60	900	CS-3	G12, T4
31	85	60	900	CS-3	G12, T4
32	85	60	900	CS-3	G12, T4
33	85	60	900	CS-3	G12, T4
34	85	60	900	CS-3	G12, T4
35	85	60	900	CS-3	G12, T4
36	60	30	1200	CS-2	T5
37	60	30	1200	CS-2	T5
38	60	30	1200	CS-2	T5
39	60	30	1200	CS-2	T5
40	60	30	1200	CS-2	T5
41	60	36	1200	CS-2	T5
42	70	40	1200	CS-2	T5
43	75	45	1200	CS-3	T5
44	80	50	1200	CS-3	T5
45	90	60	1200	CS-3	T5

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																
	100	**150**	**200**	**250**	**300**	**350**	**400**	**450**	**500**	**550**	**600**	**650**	**700**	**750**	**800**	**850**	**900**
1	26.7	25.3	24.7	24.2	23.9	23.6	23.4	23.2	23.0	22.7	22.5	22.2	21.9	21.6	21.2	20.7	16.0
2	30.0	28.3	27.5	26.8	26.2	25.8	25.4	25.1	24.8	24.6	24.3	24.0	23.7	23.3	22.9	*21.9*	*17.0*
3	30.0	28.3	27.5	26.8	26.2	25.8	25.4	25.1	24.8	24.6	24.3	24.0	23.7	23.3	22.9	*21.9*	*17.0*
4	30.0	28.3	27.5	26.8	26.2	25.8	25.4	25.1	24.8	24.6	24.3	24.0	23.7	23.3	22.9	*21.9*	*17.0*
5	30.0	28.3	27.5	26.8	26.2	25.8	25.4	25.1	24.8	24.6	24.3	24.0	23.7	23.3	22.9	*21.9*	*17.0*
6	30.0	28.3	27.5	26.8	26.2	25.8	25.4	...	24.8	24.6	24.4	24.1	23.8	23.4	22.9	*21.9*	*15.8*
7	35.4	34.7	33.9	33.3	32.8	32.4	32.1	31.9	31.6	31.3	31.0	30.6	30.2	29.7	29.2	*21.9*	*15.8*
8	35.4	34.7	33.9	33.3	32.8	32.4	32.1	31.9	31.6	31.3	31.0	30.6	30.2	29.7	29.2	*21.9*	...
9	35.4	34.7	33.9	33.3	32.8	32.4	32.1	31.9	31.6	31.3	31.0	30.6	30.2	29.7	29.2	*21.9*	...
10	35.4	34.7	33.9	33.3	32.8	32.4	32.1	31.9	31.6	31.3	31.0	30.6	30.2	29.7	29.2	*21.9*	...
11	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	34.9	34.2	33.4	*28.9*	*23.8*
12	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	34.9	34.2	33.4	*28.9*	*23.8*
13	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	34.9	34.2	33.4	*28.9*	*23.8*
14	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	34.9	34.2	33.4	*28.9*	*23.8*
15	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	34.9	34.2	33.4	*28.9*	*23.8*
16	20.0	19.1	18.7	18.4	18.2	18.0	18.0	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.7	*16.0*	*12.0*
17	20.0	19.1	18.7	18.4	18.2	18.0	18.0	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.7	*16.0*	*12.0*
18	20.0	19.1	18.7	18.4	18.2	18.0	18.0	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.7	*16.0*	*12.0*
19	20.0	19.1	18.7	18.4	18.2	18.0	18.0	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.7	*16.0*	*12.0*
20	20.0	19.1	18.7	18.4	18.2	18.0	18.0	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.7	*16.0*	*12.0*
21	30.0	28.3	27.5	26.8	26.2	25.8	25.4	25.1	24.8	24.6	24.3	24.0	23.7	23.3	22.9	19.0	*13.1*
22	30.0	28.3	27.5	26.8	26.2	25.8	25.4	25.1	24.8	24.6	24.3	24.0	23.7	23.3	22.9	19.0	*13.1*
23	30.0	28.3	27.5	26.8	26.2	25.8	25.4	25.1	24.8	24.6	24.3	24.0	23.7	23.3	22.9	19.0	*13.1*
24	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	34.8	34.1	33.3	*31.2*	*25.8*	*21.0*
25	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	34.8	34.1	33.3	*31.2*	*25.8*	*21.0*
26	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	34.8	34.1	33.3	*31.2*	*25.8*	*21.0*
27	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	34.8	34.1	33.3	*31.2*	*25.8*	*21.0*
28	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	34.8	34.1	33.3	*31.2*	*25.8*	*21.0*
29	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	34.8	34.1	33.3	*31.2*	*25.8*	*21.0*
30	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	34.8	34.1	33.3	*31.2*	*25.8*	*21.0*
31	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	34.8	34.1	33.3	*31.2*	*25.8*	*21.0*
32	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	34.8	34.1	33.3	*31.2*	*25.8*	*21.0*
33	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	34.8	34.1	33.3	*31.2*	*25.8*	*21.0*
34	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	34.8	34.1	33.3	*31.2*	*25.8*	*21.0*
35	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	34.8	34.1	33.3	*31.2*	*25.8*	*21.0*
36	20.0	18.7	18.1	17.7	17.4	17.3	17.2	17.1	17.1	17.0	16.8	16.6	16.3	15.9	15.4	*14.3*	*10.9*
37	20.0	18.7	18.1	17.7	17.4	17.3	17.2	17.1	17.1	17.0	16.8	16.6	16.3	15.9	15.4	*14.3*	*10.9*
38	20.0	18.7	18.1	17.7	17.4	17.3	17.2	17.1	17.1	17.0	16.8	16.6	16.3	15.9	15.4	*14.3*	*10.9*
39	20.0	18.7	18.1	17.7	17.4	17.3	17.2	17.1	17.1	17.0	16.8	16.6	16.3	15.9	15.4	*14.3*	*10.9*
40	20.0	18.7	18.1	17.7	17.4	17.3	17.2	17.1	17.1	17.0	16.8	16.6	16.3	15.9	15.4	*14.3*	*10.9*
41	24.0	22.4	21.7	21.2	20.9	20.7	20.6	20.5	20.5	20.4	20.2	19.9	19.6	19.1	18.5	*14.3*	*10.9*
42	26.7	24.9	24.1	23.6	23.2	23.0	22.9	22.8	22.7	22.6	22.4	22.1	21.7	21.2	20.5	*14.3*	*10.9*
43	30.0	28.0	27.1	26.5	26.1	25.9	25.8	25.7	25.6	25.4	25.2	24.9	24.5	23.9	23.1	*14.3*	*10.9*
44	33.3	31.1	30.1	29.5	29.0	28.8	28.6	28.5	28.4	28.3	28.0	27.7	27.2	26.5	25.7	*14.3*	*10.9*
45	37.5	37.3	36.2	35.4	34.8	34.5	34.4	34.2	34.1	33.9	33.6	33.2	32.6	31.8	30.8	*14.3*	*10.9*

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding											
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500
1	*11.4*	*7.8*	*5.1*	*3.2*	*2.0*	*1.2*	...	...	...	...	...	...
2	*11.4*	*7.8*	*5.1*	*3.2*	*2.0*	*1.2*	...	...	...	...	...	...
3	*11.4*	*7.8*	*5.1*	*3.2*	*2.0*	*1.2*	...	...	...	...	...	...
4	*11.4*	*7.8*	*5.1*	*3.2*	*2.0*	*1.2*	...	...	...	...	...	...
5	*11.4*	*7.8*	*5.1*	*3.2*	*2.0*	*1.2*	...	...	...	...	...	...
6	*11.4*	*7.8*	*5.1*	*3.2*	*2.0*	*1.2*	...	...	...	...	...	...
7	*11.4*	*7.8*	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...
16	*9.0*	*7.0*	*5.5*	*4.0*	*2.7*	*1.5*	...	...	...	...	...	...
17	*9.0*	*7.0*	*5.5*	*4.0*	*2.7*	*1.5*	...	...	...	...	...	...
18	*9.0*	*7.0*	*5.5*	*4.0*	*2.7*	*1.5*	...	...	...	...	...	...
19	*9.0*	*7.0*	*5.5*	*4.0*	*2.7*	*1.5*	...	...	...	...	...	...
20	*9.0*	*7.0*	*5.5*	*4.0*	*2.7*	*1.5*	...	...	...	...	...	...
21	*9.5*	*6.8*	*4.9*	*3.2*	*2.4*	*1.3*	...	...	...	...	...	...
22	*9.5*	*6.8*	*4.9*	*3.2*	*2.4*	*1.3*	...	...	...	...	...	...
23	*9.5*	*6.8*	*4.9*	*3.2*	*2.4*	*1.3*	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...
36	*8.0*	*5.8*	*4.2*	*2.9*	*1.8*	*1.0*	...	...	...	...	...	...
37	*8.0*	*5.8*	*4.2*	*2.9*	*1.8*	*1.0*	...	...	...	...	...	...
38	*8.0*	*5.8*	*4.2*	*2.9*	*1.8*	*1.0*	...	...	...	...	...	...
39	*8.0*	*5.8*	*4.2*	*2.9*	*1.8*	*1.0*	...	...	...	...	...	...
40	*8.0*	*5.8*	*4.2*	*2.9*	*1.8*	*1.0*	...	...	...	...	...	...
41	*8.0*	*5.8*	*4.2*	*2.9*	*1.8*	*1.0*	...	...	...	...	...	...
42	*8.0*	*5.8*	*4.2*	*2.9*	*1.8*	*1.0*	...	...	...	...	...	...
43	*8.0*	*5.8*	*4.2*	*2.9*	*1.8*	*1.0*	...	...	...	...	...	...
44	*8.0*	*5.8*	*4.2*	*2.9*	*1.8*	*1.0*	...	...	...	...	...	...
45	*8.0*	*5.8*	*4.2*	*2.9*	*1.8*	*1.0*	...	...	...	...	...	...

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/ Thickness, in.	P-No.	Group No.
1	5Cr–½Mo	Forgings	SA–182	F5a	K42544	...	...	5B	1
2	5Cr–½Mo–Si	Smls. tube	SA–213	T5b	K51545	...	...	5B	1
3	5Cr–½Mo–Si	Smls. pipe	SA–335	P5b	K51545	...	...	5B	1
4	5Cr–½Mo–Ti	Smls. tube	SA–213	T5c	K41245	...	...	5B	1
5	5Cr–½Mo–Ti	Smls. pipe	SA–335	P5c	K41245	...	...	5B	1
6	9Cr–1Mo	Smls. tube	SA–213	T9	K90941	...	...	5B	1
7	9Cr–1Mo	Fittings	SA–234	WP9	K90941	...	...	5B	1
8	9Cr–1Mo	Smls. pipe	SA–335	P9	K90941	...	...	5B	1
9	9Cr–1Mo	Forged pipe	SA–369	FP9	K90941	...	...	5B	1
10	9Cr–1Mo	Forgings	SA–182	F9	K90941	...	...	5B	1
11	9Cr–1Mo	Forgings	SA–336	F9	K90941	...	...	5B	1
12	9Cr–1Mo	Castings	SA–217	C12	J82090	NT	...	5B	1
(**21**) 13	9Cr–1Mo–V	Smls. tube	SA–213	T91 Type 1	K90901	...	...	15E	1
(**21**) 14	9Cr–1Mo–V	Smls. pipe	SA–335	P91 Type 1	K90901	...	...	15E	1
(**21**) 15	9Cr–1Mo–V	Plate	SA–387	91 Type 1	K90901	2	...	15E	1
(**21**) 16	9Cr–1Mo–V	Forgings	SA–182	F91 Type 1	K90901	...	...	15E	1
(**21**) 17	9Cr–1Mo–V	Forgings	SA–336	F91 Type 1	K90901	...	...	15E	1
18	12Cr–Al	Plate	SA–240	405	S40500	...	...	7	1
19	12Cr–Al	Smls. tube	SA–268	TP405	S40500	...	...	7	1
20	13Cr	Plate	SA–240	410S	S41008	...	...	7	1
21	13Cr	Smls. tube	SA–268	TP410	S41000	...	...	6	1
22	13Cr	Plate	SA–240	410	S41000	...	...	6	1
23	13Cr	Forgings	SA–182	F6a	S41000	1	...	6	3
24	13Cr	Forgings	SA–182	F6a	S41000	2	...	6	3
25	13Cr	Forgings	SA–336	F6	S41000	...	...	6	3
26	13Cr	Castings	SA–217	CA15	J91150	...	...	6	3
27	15Cr	Smls. tube	SA–268	TP429	S42900	...	...	6	2
28	15Cr	Plate	SA–240	429	S42900	...	...	6	2
29	17Cr	Smls. tube	SA–268	TP430	S43000	...	...	7	2
30	17Cr	Plate	SA–240	430	S43000	...	...	7	2
31	17Cr–4Ni–4Cu	Bar	SA–564	630	S17400	H1100	...	...	...
32	17Cr–4Ni–4Cu	Plate	SA–693	630	S17400	H1100	...	...	...
33	17Cr–4Ni–4Cu	Forgings	SA–705	630	S17400	H1100	...	...	...
34	26Cr–3Ni–3Mo	Plate	SA–240	26–3–3	S44660	...	$t \le {}^{2}/_{10}$	10K	1
35	26Cr–3Ni–3Mo	Smls. tube	SA–268	26–3–3	S44660	...	$t \le {}^{2}/_{10}$	10K	1
36	26Cr–3Ni–3Mo	Wld. tube	SA–268	26–3–3	S44660	...	$t \le {}^{2}/_{10}$	10K	1
37	26Cr–3Ni–3Mo	Wld. tube	SA–803	26–3–3	S44660	...	$t \le {}^{2}/_{10}$	10K	1
38	29Cr–4Mo–Ti	Smls. tube	SA–268	...	S44735	...	...	10J	1
39	Mn–¼Mo	Forgings	SA–372	D	K14508	QT	...	11A	4
40	Mn–¼Mo	Forgings	SA–372	D	K10508	...	...	11A	4
41	Mn–½Mo	Plate	SA–302	A	K12021	...	...	3	2
42	Mn–½Mo	Plate	SA–302	B	K12022	...	...	3	3
43	Mn–½Mo	Plate	SA–533	A	K12521	1	...	3	3
44	Mn–½Mo	Plate	SA–533	A	K12521	2	...	3	3
45	Mn–½Mo–¼Ni	Plate	SA–533	D	K12529	2	...	3	3

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Maximum Use Temperature, °F	External Pressure Chart No.	Notes
1	90	65	1200	CS-5	T5
2	60	30	1200	CS-2	T5
3	60	30	1200	CS-2	T5
4	60	30	1200	CS-2	T5
5	60	30	1200	CS-2	T5
6	60	30	1200	CS-2	T7
7	60	30	1200	CS-2	T7
8	60	30	1200	CS-2	T7
9	60	30	1200	CS-2	T7
10	85	55	1200	CS-3	T6
11	85	55	1200	CS-3	T6
12	90	60	1200	CS-3	T6
13	85	60	1200	CS-3	T7
14	85	60	1200	CS-3	T7
15	85	60	1200	CS-3	T7
16	90	60	1200	CS-3	T7
17	90	60	1200	CS-3	T7
18	60	25	1000	CS-1	G8, T7
19	60	30	1000	CS-2	G8, T7
20	60	30	1200	CS-2	T6
21	60	30	1200	CS-2	T6
22	65	30	1200	CS-2	T6
23	70	40	1200	CS-3	T4
24	80	55	1200	CS-3	T4
25	85	55	1200	CS-3	T4
26	90	65	1200	CS-5	T4
27	60	35	1200	CS-2	G8, T5
28	65	30	1200	CS-2	G8, T6
29	60	35	1200	CS-2	G8, T5
30	65	30	1200	CS-2	G8, T6
31	140	115	600	HT-1	G8, W1
32	140	115	600	HT-1	G8, W1
33	140	115	600	HT-1	G8, W1
34	85	65	700	HA-5	G8, H3
35	85	65	700	HA-5	G8, H3
36	85	65	700	HA-5	G6, G8, H3
37	85	65	600	HA-5	G6, G8, H3
38	75	60	800	HA-6	G8
39	105	65	650	CS-5	G9, T1, W2, W6
40	105	65	650	CS-5	G9, H2, W2, W6
41	75	45	1000	CS-3	G14, T5
42	80	50	1000	CS-3	G14, T5
43	80	50	1000	CS-5	T5
44	90	70	800	CS-5	...
45	90	70	800	CS-5	...

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900
1	37.5	37.5	37.5	37.5	37.5	37.4	37.2	37.1	36.9	36.7	36.4	36.0	35.3	34.5	33.4	*14.3*	*10.9*
2	20.0	18.7	18.1	17.7	17.4	17.3	17.2	17.1	17.1	17.0	16.8	16.6	16.3	15.9	15.4	*14.3*	*10.9*
3	20.0	18.7	18.1	17.7	17.4	17.3	17.2	17.1	17.1	17.0	16.8	16.6	16.3	15.9	15.4	*14.3*	*10.9*
4	20.0	18.7	18.1	17.7	17.4	17.3	17.2	17.1	17.1	17.0	16.8	16.6	16.3	15.9	15.4	*14.3*	*10.9*
5	20.0	18.7	18.1	17.7	17.4	17.3	17.2	17.1	17.1	17.0	16.8	16.6	16.3	15.9	15.4	*14.3*	*10.9*
6	20.0	18.7	18.1	17.7	17.4	17.3	17.2	17.1	17.1	17.0	16.8	16.6	16.3	15.9	15.4	14.8	14.1
7	20.0	18.7	18.1	17.7	17.4	17.3	17.2	17.1	17.1	17.0	16.8	16.6	16.3	15.9	15.4	14.8	14.1
8	20.0	18.7	18.1	17.7	17.4	17.3	17.2	17.1	17.1	17.0	16.8	16.6	16.3	15.9	15.4	14.8	14.1
9	20.0	18.7	18.1	17.7	17.4	17.3	17.2	17.1	17.1	17.0	16.8	16.6	16.3	15.9	15.4	14.8	14.1
10	35.4	34.2	33.1	32.4	31.9	31.7	31.5	31.4	31.3	31.1	30.8	30.4	29.9	29.2	28.2	27.1	*16.4*
11	35.4	34.2	33.1	32.4	31.9	31.7	31.5	31.4	31.3	31.1	30.8	30.4	29.9	29.2	28.2	27.1	*16.4*
12	37.5	37.3	36.2	35.4	34.8	34.5	34.4	34.2	34.1	33.9	33.6	33.2	32.6	31.8	30.8	29.6	*16.4*
13	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	34.7	33.6	32.3	30.8
14	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	34.7	33.6	32.3	30.8
15	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	34.7	33.6	32.3	30.8
16	37.5	37.5	37.3	36.8	36.5	36.5	36.5	36.5	36.5	36.5	36.3	36.0	35.4	34.7	33.6	32.3	30.8
17	37.5	37.5	37.3	36.8	36.5	36.5	36.5	36.5	36.5	36.5	36.3	36.0	35.4	34.7	33.6	32.3	30.8
18	16.7	15.8	15.3	15.0	14.8	14.6	14.5	14.4	14.3	14.2	14.0	13.8	13.5	13.1	12.6	12.0	11.3
19	20.0	18.9	18.4	18.0	17.8	17.6	17.4	17.3	17.2	17.0	16.8	16.6	16.2	15.7	15.1	14.4	13.5
20	20.0	18.9	18.4	18.0	17.8	17.6	17.4	17.3	17.2	17.0	16.8	16.6	16.2	15.7	15.1	14.4	*12.3*
21	20.0	18.9	18.4	18.0	17.8	17.6	17.4	17.3	17.2	17.0	16.8	16.6	16.2	15.7	15.1	14.4	*12.3*
22	20.0	18.9	18.4	18.0	17.8	17.6	17.4	17.3	17.2	17.0	16.8	16.6	16.2	15.7	15.1	14.4	*12.3*
23	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	*24.0*	*17.2*	*12.3*
24	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	*24.0*	*17.2*	*12.3*
25	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	*24.0*	*17.2*	*12.3*
26	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	*24.0*	*17.2*	*12.3*
27	23.3	22.1	21.5	21.0	20.7	20.5	20.3	20.2	20.1	19.9	19.6	19.3	18.9	18.3	17.6	*15.7*	*12.0*
28	20.0	18.9	18.4	18.0	17.8	17.6	17.4	17.3	17.2	17.0	16.8	16.6	16.2	15.7	15.1	14.4	*12.0*
29	23.3	22.1	21.5	21.0	20.7	20.5	20.3	20.2	20.1	19.9	19.6	19.3	18.9	18.3	17.6	*15.7*	*12.0*
30	20.0	18.9	18.4	18.0	17.8	17.6	17.4	17.3	17.2	17.0	16.8	16.6	16.2	15.7	15.1	14.4	*12.0*
31	58.3	58.3	58.3	58.3	58.3	58.3	58.3	58.3	58.3	58.3	58.3	...	...	...	...	...	...
32	58.3	58.3	58.3	58.3	58.3	58.3	58.3	58.3	58.3	58.3	58.3	...	...	...	...	...	...
33	58.3	58.3	58.3	58.3	58.3	58.3	58.3	58.3	58.3	58.3	58.3	...	...	...	...	...	...
34	35.4	35.4	35.4	35.4	35.4	35.4	34.8	34.2	33.8	33.4	33.2	33.0	32.8	...	...	...	...
35	35.4	35.4	35.4	35.4	35.4	35.4	34.8	34.2	33.8	33.4	33.2	33.0	32.8	...	...	...	...
36	30.1	30.1	30.1	30.1	30.1	30.1	29.6	29.1	28.7	28.4	28.2	28.0	27.9	...	...	...	...
37	30.1	30.1	30.1	30.1	30.1	30.1	29.6	29.1	28.7	28.4	28.2	...	...	...	...	...	...
38	31.3	31.3	31.3	31.3	29.6	28.1	26.8	25.7	24.9	24.3	23.9	23.7	23.6	23.3	22.7	...	...
39	43.3	41.8	41.2	40.4	39.4	38.2	36.9	35.7	34.7	33.9	33.5	*24.4*	...	...	...	...	...
40	43.3	41.6	40.8	40.0	39.4	38.8	38.3	37.9	37.4	36.9	36.5	35.9	...	...	...	...	...
41	30.0	28.8	28.2	27.7	27.3	26.9	26.5	26.2	25.9	25.6	25.2	24.9	24.4	23.9	23.2	*20.0*	*13.7*
42	33.3	32.0	31.4	30.8	30.3	29.9	29.5	29.1	28.8	28.4	28.0	27.6	27.1	26.5	25.7	*20.0*	*13.7*
43	33.3	32.0	31.4	30.8	30.3	29.9	29.5	29.1	28.8	28.4	28.0	27.6	27.1	26.5	25.7	*20.0*	*13.7*
44	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.2	36.0	...	...
45	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.2	36.0	...	...

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding												
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	
1	*8.0*	*5.8*	*4.2*	*2.9*	*1.8*	*1.0*	...	...	...	...	...	...	
2	*8.0*	*5.8*	*4.2*	*2.9*	*1.8*	*1.0*	...	...	...	...	...	...	
3	*8.0*	*5.8*	*4.2*	*2.9*	*1.8*	*1.0*	...	...	...	...	...	...	
4	*8.0*	*5.8*	*4.2*	*2.9*	*1.8*	*1.0*	...	...	...	...	...	...	
5	*8.0*	*5.8*	*4.2*	*2.9*	*1.8*	*1.0*	...	...	...	...	...	...	
6	*10.6*	*7.4*	*5.0*	*3.3*	*2.2*	*1.5*	...	...	...	...	...	...	
7	*10.6*	*7.4*	*5.0*	*3.3*	*2.2*	*1.5*	...	...	...	...	...	...	
8	*10.6*	*7.4*	*5.0*	*3.3*	*2.2*	*1.5*	...	...	...	...	...	...	
9	*10.6*	*7.4*	*5.0*	*3.3*	*2.2*	*1.5*	...	...	...	...	...	...	
10	*11.0*	*7.4*	*5.0*	*3.3*	*2.2*	*1.5*	...	...	...	...	...	...	
11	*11.0*	*7.4*	*5.0*	*3.3*	*2.2*	*1.5*	...	...	...	...	...	...	
12	*11.0*	*7.4*	*5.0*	*3.3*	*2.2*	*1.5*	...	...	...	...	...	...	
13	*25.9*	*16.1*	*12.2*	*8.7*	*5.7*	*3.5*	...	...	...	...	...	...	(**21**)
14	*25.9*	*16.1*	*12.2*	*8.7*	*5.7*	*3.5*	...	...	...	...	...	...	(**21**)
15	*25.9*	*16.1*	*12.2*	*8.7*	*5.7*	*3.5*	...	...	...	...	...	...	(**21**)
16	*25.9*	*16.1*	*12.2*	*8.7*	*5.7*	*3.5*	...	...	...	...	...	...	(**21**)
17	*25.9*	*16.1*	*12.2*	*8.7*	*5.7*	*3.5*	...	...	...	...	...	...	(**21**)
18	*8.4*	*4.0*	...	...	...	...	...	...	...	...	...	...	
19	*8.4*	*4.0*	...	...	...	...	...	...	...	...	...	...	
20	*8.8*	*6.4*	*4.4*	*2.9*	*1.8*	*1.0*	...	...	...	...	...	...	
21	*8.8*	*6.4*	*4.4*	*2.9*	*1.8*	*1.0*	...	...	...	...	...	...	
22	*8.8*	*6.4*	*4.4*	*2.9*	*1.8*	*1.0*	...	...	...	...	...	...	
23	*8.8*	*6.4*	*4.4*	*2.9*	*1.8*	*1.0*	...	...	...	...	...	...	
24	*8.8*	*6.4*	*4.4*	*2.9*	*1.8*	*1.0*	...	...	...	...	...	...	
25	*8.8*	*6.4*	*4.4*	*2.9*	*1.8*	*1.0*	...	...	...	...	...	...	
26	*8.8*	*6.4*	*4.4*	*2.9*	*1.8*	*1.0*	...	...	...	...	...	...	
27	*9.2*	*6.5*	*4.5*	*3.2*	*2.4*	*1.8*	...	...	...	...	...	...	
28	*9.2*	*6.5*	*4.5*	*3.2*	*2.4*	*1.8*	...	...	...	...	...	...	
29	*9.2*	*6.5*	*4.5*	*3.2*	*2.4*	*1.8*	...	...	...	...	...	...	
30	*9.2*	*6.5*	*4.5*	*3.2*	*2.4*	*1.8*	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	
41	*8.2*	*4.8*	...	...	...	...	...	...	...	...	...	...	
42	*8.2*	*4.8*	...	...	...	...	...	...	...	...	...	...	
43	*8.2*	*4.8*	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/ Thickness, in.	P-No.	Group No.
1	Mn–½Mo–¼Ni	Plate	SA–533	D	K12529	3	...	11A	4
2	Mn–½Mo–½Ni	Plate	SA–302	C	K12039	...	...	3	3
3	Mn–½Mo–½Ni	Plate	SA–533	B	K12539	1	...	3	3
4	Mn–½Mo–½Ni	Plate	SA–533	B	K12539	2	...	3	3
5	Mn–½Mo–½Ni	Plate	SA–533	B	K12539	3	...	11A	4
6	Mn–½Mo–¾Ni	Plate	SA–302	D	K12054	...	...	3	3
7	Mn–½Mo–¾Ni	Plate	SA–533	C	K12554	1	...	3	3
8	Mn–½Mo–¾Ni	Plate	SA–533	E	K12554	1	...	3	3
9	Mn–½Mo–¾Ni	Plate	SA–533	C	K12554	2	...	3	3
10	Mn–½Mo–¾Ni	Plate	SA–533	E	K12554	2	...	3	3
11	Mn–½Mo–¾Ni	Plate	SA–533	B	K12554	3	...	3	3
(**21**) 12	...	...	...	...	...	...	...	...	...
13	Mn–½Ni–V	Plate	SA–225	C	K12524	...	...	10A	1
14	Mn–V	Castings	SA–487	1	J13002	A/NT	...	10A	1
15	½Ni–½Cr–¼Mo–V	Castings	SA–487	4	J13047	A/NT	...	3	3
16	½Ni–½Mo–V	Forgings	SA–541	3	K12045	1	...	3	3
17	½Ni–½Mo–V	Forgings	SA–541	3	K12045	2	...	3	3
18	¾Ni–½Cr–½Mo–V	Forgings	SA–592	F	K11576	...	$2\frac{1}{2} < t \le 4$	11B	3
19	¾Ni–½Cr–½Mo–V	Plate	SA–517	F	K11576	...	$t \le 2\frac{1}{2}$	11B	3
20	¾Ni–½Cr–½Mo–V	Forgings	SA–592	F	K11576	...	$t \le 2\frac{1}{2}$	11B	3
21	¾Ni–½Cu–Mo	Smls. tube	SA–423	2	K11540	...	...	4	2
22	¾Ni–½Mo–⅓Cr–V	Forgings	SA–508	2	K12766	1	...	3	3
23	¾Ni–½Mo–⅓Cr–V	Forgings	SA–541	2	K12765	1	...	3	3
24	¾Ni–½Mo–⅓Cr–V	Forgings	SA–508	2	K12766	2	...	3	3
25	¾Ni–½Mo–⅓Cr–V	Forgings	SA–541	2	K12765	2	...	3	3
26	¾Ni–½Mo–Cr–V	Forgings	SA–508	3	K12042	1	...	3	3
27	¾Ni–½Mo–Cr–V	Forgings	SA–508	3	K12042	2	...	3	3
28	¾Ni–1Mo–¾Cr	Castings	SA–217	WC5	J22000	...	...	4	1
29	1Ni–½Cr–½Mo	Castings	SA–217	WC4	J12082	...	...	4	1
30	1¼Ni–1Cr–½Mo	Plate	SA–517	P	K21650	...	$2\frac{1}{2} < t \le 4$	11B	8
31	1¼Ni–1Cr–½Mo	Plate	SA–517	P	K21650	...	$t \le 2\frac{1}{2}$	11B	8
32	2Ni–1Cu	Forgings	SA–182	FR	K22035	...	...	9A	1
33	2Ni–1Cu	Smls. pipe	SA–333	9	K22035	...	...	9A	1
34	2Ni–1Cu	Smls. pipe	SA–334	9	K22035	...	...	9A	1
35	2Ni–1Cu	Forgings	SA–350	LF9	K22036	...	...	9A	1
36	2Ni–1Cu	Fittings	SA–420	WPL9	K22035	...	...	9A	1
37	2Ni–1½Cr–¼Mo–V	Forgings	SA–723	1	K23550	1	...	11B	10
38	2Ni–1½Cr–¼Mo–V	Forgings	SA–723	1	K23550	2	...	11B	10
39	2½Ni	Plate	SA–203	A	K21703	...	...	9A	1
40	2½Ni	Plate	SA–203	B	K22103	...	...	9A	1
41	2½Ni	Castings	SA–352	LC2	J22500	...	...	9A	1
42	2¾Ni–1½Cr–½Mo	Plate	SA–543	C	K34035	3	...	3	3
43	2¾Ni–1½Cr–½Mo	Plate	SA–543	C	K34035	1	...	11A	5
44	2¾Ni–1½Cr–½Mo	Plate	SA–543	C	K34035	2	...	11B	10
45	2¾Ni–1½Cr–½Mo–V	Forgings	SA–723	2	K34035	1	...	11B	10

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Maximum Use Temperature, °F	External Pressure Chart No.	Notes
1	100	83	750	CS-5	...
2	80	50	1000	CS-3	G14, T5
3	80	50	800	CS-5	...
4	90	70	800	CS-5	...
5	100	83	800	CS-5	...
6	80	50	1000	CS-3	G14, T5
7	80	50	800	CS-5	...
8	80	50	800	CS-5	...
9	90	70	800	CS-5	...
10	90	70	800	CS-5	...
11	100	83	800	CS-5	...
12	...	...	...	...	...
13	105	70	700	CS-5	T1
14	85	55	650	CS-3	T1
15	90	60	650	CS-3	...
16	80	50	800	CS-5	...
17	90	65	700	CS-5	...
18	105	90	650	CS-5	S1
19	115	100	650	HT-1	...
20	115	100	650	HT-1	...
21	60	37	650	CS-2	...
22	80	50	800	CS-5	...
23	80	50	800	CS-5	...
24	90	65	700	CS-5	...
25	90	65	700	CS-5	...
26	80	50	800	CS-5	...
27	90	65	700	CS-5	...
28	70	40	1100	CS-2	T6
29	70	40	1000	CS-2	T6
30	105	90	650	CS-5	...
31	115	100	650	HT-1	...
32	63	46	100	CS-3	...
33	63	46	100	CS-3	...
34	63	46	100	CS-3	...
35	63	46	100	CS-3	...
36	63	46	100	CS-3	...
37	115	100	650	HT-1	G10, G11, W1
38	135	120	650	HT-1	G11, W1
39	65	37	1000	CS-2	T3
40	70	40	1000	CS-2	T2
41	70	40	650	CS-2	...
42	90	70	650	CS-5	...
43	105	85	650	CS-5	...
44	115	100	650	HT-1	...
45	115	100	650	HT-1	G10, G11, W1

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900
1	41.7	41.7	41.7	41.7	41.7	41.7	41.7	41.7	41.7	41.7	41.7	41.7	41.7	41.7	...	...	...
2	33.3	32.0	31.4	30.8	30.3	29.9	29.5	29.1	28.8	28.4	28.0	27.6	27.1	26.5	25.7	*20.0*	*13.7*
3	33.3	32.0	31.4	30.8	30.3	29.9	29.5	29.1	28.8	28.4	28.0	27.6	27.1	26.5	25.7	...	...
4	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.2	36.0	...	...
5	41.7	41.7	41.7	41.7	41.7	41.7	41.7	41.7	41.7	41.7	41.7	41.7	41.7	41.7	41.7	...	...
6	33.3	32.0	31.4	30.8	30.3	29.9	29.5	29.1	28.8	28.4	28.0	27.6	27.1	26.5	25.7	*20.0*	*13.7*
7	33.3	32.0	31.4	30.8	30.3	29.9	29.5	29.1	28.8	28.4	28.0	27.6	27.1	26.5	25.7	...	...
8	33.3	32.0	31.4	30.8	30.3	29.9	29.5	29.1	28.8	28.4	28.0	27.6	27.1	26.5	25.7	...	...
9	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.2	36.0	...	...
10	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.2	36.0	...	...
11	41.7	41.7	41.7	41.7	41.7	41.7	41.7	41.7	41.7	41.7	41.7	41.7	41.7	41.7	41.7	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
13	43.8	43.3	42.5	42.1	41.6	40.9	39.9	38.6	37.3	36.0	34.9	*24.4*	*19.6*	...	...	...	...
14	35.4	35.2	34.5	33.9	33.3	32.9	32.4	32.0	31.6	31.3	30.9	*24.4*	...	...	...	...	...
15	37.5	37.5	37.5	37.0	36.3	35.8	35.5	35.2	34.6	33.7	32.4	31.0	...	...	...	...	...
16	33.3	32.6	31.7	30.8	30.2	29.9	29.6	29.3	28.9	28.1	27.0	25.8	24.9	24.9	24.9	...	...
17	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	36.5	35.1	33.6	32.3	...	...	...	...
18	43.8	43.8	43.8	43.8	43.8	43.8	43.8	43.8	43.8	43.8	43.8	43.8	...	...	...	...	...
19	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	...	...	...	...	...
20	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	...	...	...	...	...
21	24.7	23.3	22.7	22.3	22.0	21.8	21.5	21.3	21.1	20.9	20.6	20.3	...	...	...	...	...
22	33.3	32.0	31.4	30.8	30.3	29.9	29.5	29.1	28.8	28.4	28.0	27.6	27.1	26.5	25.7	...	...
23	33.3	32.0	31.4	30.8	30.3	29.9	29.5	29.1	28.8	28.4	28.0	27.6	27.1	26.5	25.7	...	...
24	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.4	36.9	36.5	35.9	35.3	...	...	...	...
25	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.4	36.9	36.5	35.9	35.3	...	...	...	...
26	33.3	32.0	31.4	30.8	30.3	29.9	29.5	29.1	28.8	28.4	28.0	27.6	27.1	26.5	25.7	...	...
27	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.4	36.9	36.5	35.9	35.3	...	...	...	...
28	26.7	25.6	25.1	24.6	24.3	23.9	23.6	23.3	23.0	22.7	22.4	22.1	21.7	21.2	20.6	19.8	*16.3*
29	26.7	25.6	25.1	24.6	24.3	23.9	23.6	23.3	23.0	22.7	22.4	22.1	21.7	21.2	20.6	19.8	*15.0*
30	43.8	43.8	43.8	43.8	43.8	43.8	43.8	43.8	43.8	43.8	43.8	43.8	...	...	...	...	...
31	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	...	...	...	...	...
32	26.3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
33	26.3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
34	26.3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
35	26.3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
36	26.3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
37	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	...	...	...	...	...
38	56.3	56.3	56.3	56.3	56.3	56.3	56.3	56.3	56.3	56.3	56.3	56.3	...	...	...	...	...
39	24.7	23.2	22.6	22.2	21.8	21.5	21.1	20.6	20.0	19.3	18.5	17.6	16.6	*13.9*	*11.4*	*9.0*	*6.5*
40	26.7	25.1	24.4	24.0	23.6	23.2	22.8	22.3	21.6	20.9	20.0	19.0	*16.9*	*13.9*	*11.4*	*9.0*	*6.5*
41	26.7	25.1	24.4	24.0	23.6	23.2	22.8	22.3	21.6	20.9	20.0	19.0	...	...	...	...	...
42	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	...	...	...	...	...
43	43.8	43.8	43.8	43.8	43.8	43.8	43.8	43.8	43.8	43.8	43.8	43.8	...	...	...	...	...
44	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	...	...	...	...	...
45	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	...	...	...	...	...

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding												
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	
1	...	...	...	...	...	...	...	...	...	...	...	...	
2	*8.2*	*4.8*	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	
6	*8.2*	*4.8*	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
13	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	
28	*11.0*	*6.9*	*4.6*	*2.8*	...	...	...	...	...	...	...	...	
29	*9.2*	*5.9*	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	
39	*4.5*	*2.5*	...	...	...	...	...	...	...	...	...	...	
40	*4.5*	*2.5*	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/ Thickness, in.	P-No.	Group No.
1	2¾Ni–1½Cr–½Mo–V	Forgings	SA–723	2	K34035	2	...	11B	10
2	3Ni–1¾Cr–½Mo	Plate	SA–543	B	K42339	3	...	3	3
3	3Ni–1¾Cr–½Mo	Plate	SA–543	B	K42339	1	...	11A	5
4	3Ni–1¾Cr–½Mo	Plate	SA–543	B	K42339	2	...	11B	10
5	3½Ni	Smls. pipe	SA–333	3	K31918	...	...	9B	1
6	3½Ni	Smls. tube	SA–334	3	K31918	...	...	9B	1
7	3½Ni	Fittings	SA–420	WPL3	...	...	...	9B	1
8	3½Ni	Plate	SA–203	D	K31718	...	...	9B	1
9	3½Ni	Forgings	SA–350	LF3	K32025	...	...	9B	1
10	3½Ni	Forgings	SA–765	III	K32026	...	...	9B	1
11	3½Ni	Plate	SA–203	E	K32018	...	...	9B	1
12	3½Ni	Castings	SA–352	LC3	J31550	...	...	9B	1
13	3½Ni	Plate	SA–203	F	...	...	$t > 2$	9B	1
14	3½Ni	Plate	SA–203	F	...	...	$t \le 2$	9B	1
15	3½Ni–1¾Cr–½Mo–V	Forgings	SA–508	4N	K22375	3	...	3	3
16	3½Ni–1¾Cr–½Mo–V	Forgings	SA–508	4N	K22375	1	...	11A	5
17	3½Ni–1¾Cr–½Mo–V	Forgings	SA–508	4N	K22375	2	...	11B	10
18	4Ni–1½Cr–½Mo–V	Forgings	SA–723	3	K44045	1	...	11B	10
19	4Ni–1½Cr–½Mo–V	Forgings	SA–723	3	K44045	2	...	11B	10
20	5Ni–¼Mo	Plate	SA–645	A	K41583	...	...	11A	2
21	7Ni	Plate	SA–553	III	K61365	...	$t \le 2$	11A	1
22	7Ni	Plate	SA–553	III	K61365	...	$t \le 2$	11A	1
23	8Ni	Plate	SA–553	II	K71340	...	...	11A	1
24	8Ni	Plate	SA–553	II	K71340	...	...	11A	1
25	9Ni	Smls. pipe	SA–333	8	K81340	...	...	11A	1
26	9Ni	Smls. pipe	SA–333	8	K81340	...	...	11A	1
27	9Ni	Smls. tube	SA–334	8	K81340	...	...	11A	1
28	9Ni	Smls. tube	SA–334	8	K81340	...	...	11A	1
29	9Ni	Plate	SA–353	...	K81340	...	...	11A	1
30	9Ni	Plate	SA–353	...	K81340	...	...	11A	1
31	9Ni	Fittings	SA–420	WPL8	K81340	...	...	11A	1
32	9Ni	Fittings	SA–420	WPL8	K81340	...	...	11A	1
33	9Ni	Forgings	SA–522	I	K81340	...	...	11A	1
34	9Ni	Forgings	SA–522	I	K81340	...	...	11A	1
35	9Ni	Plate	SA–553	I	K81340	...	...	11A	1
36	9Ni	Plate	SA–553	I	K81340	...	...	11A	1
37	16Cr–4Ni–6Mn	Plate	SA–240	201LN	S20153	...	...	8	3
38	16Cr–4Ni–6Mn	Plate	SA–240	201LN	S20153	...	...	8	3
39	16Cr–12Ni–2Mo	Forgings	SA–182	F316L	S31603	...	$t > 5$	8	1
40	16Cr–12Ni–2Mo	Forgings	SA–965	F316L	S31603	...	...	8	1
41	16Cr–12Ni–2Mo	Forgings	SA–182	F316L	S31603	...	$t \le 5$	8	1
42	16Cr–12Ni–2Mo	Smls. tube	SA–213	TP316L	S31603	...	...	8	1
43	16Cr–12Ni–2Mo	Plate	SA–240	316L	S31603	...	...	8	1
44	16Cr–12Ni–2Mo	Wld. tube	SA–249	TP316L	S31603	...	...	8	1
45	16Cr–12Ni–2Mo	Smls. pipe	SA–312	TP316L	S31603	...	...	8	1

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Maximum Use Temperature, °F	External Pressure Chart No.	Notes
1	135	120	650	HT–1	G11, W1
2	90	70	650	CS–5	...
3	105	85	650	CS–5	W7
4	115	100	650	HT–1	...
5	65	35	650	CS–2	...
6	65	35	650	CS–2	...
7	65	35	650	CS–2	...
8	65	37	1000	CS–2	T3
9	70	37.5	650	CS–2	...
10	70	37.5	650	CS–2	...
11	70	40	1000	CS–2	T3
12	70	40	650	CS–2	...
13	75	50	650	CS–3	T1
14	80	55	650	CS–3	...
15	90	70	650	CS–5	...
16	105	85	650	CS–5	W7
17	115	100	650	HT–1	...
18	115	100	650	HT–1	G10, G11, W1
19	135	120	650	HT–1	G11, W1
20	95	65	250	CS–3	W4
21	100	85	150	CS–3	W3
22	100	85	150	CS–3	W4
23	100	85	250	CS–3	W3
24	100	85	250	CS–3	W4
25	100	75	250	CS–3	W3
26	100	75	250	CS–3	W4
27	100	75	250	CS–3	W3
28	100	75	250	CS–3	W4
29	100	75	250	CS–3	W3
30	100	75	250	CS–3	W4
31	100	75	250	CS–3	W3
32	100	75	250	CS–3	W4
33	100	75	250	CS–3	G9, S2, W3
34	100	75	250	CS–3	G9, S2, W4
35	100	85	250	CS–3	W3
36	100	85	250	CS–3	W4
37	95	45	800	HA–6	...
38	95	45	800	HA–6	G2
39	65	25	850	HA–4	G2
40	65	25	850	HA–4	G2
41	70	25	850	HA–4	G2
42	70	25	850	HA–4	G2
43	70	25	850	HA–4	G2
44	70	25	850	HA–4	G2, G6
45	70	25	850	HA–4	G2

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900
1	56.3	56.3	56.3	56.3	56.3	56.3	56.3	56.3	56.3	56.3	56.3	56.3	...	...	...	...	...
2	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	...	...	...	...	...
3	43.8	43.8	43.8	43.8	43.8	43.8	43.8	43.8	43.8	43.8	43.8	43.8	...	...	...	...	...
4	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	...	...	...	...	...
5	23.3	21.9	21.4	21.0	20.6	20.3	19.9	19.5	18.9	18.3	17.5	16.7	...	...	...	...	...
6	23.3	21.9	21.4	21.0	20.6	20.3	19.9	19.5	18.9	18.3	17.5	16.7	...	...	...	...	...
7	23.3	21.9	21.4	21.0	20.6	20.3	19.9	19.5	18.9	18.3	17.5	16.7	...	...	...	...	...
8	24.7	23.2	22.6	22.2	21.8	21.5	21.1	20.6	20.0	19.3	18.5	17.6	16.6	*13.9*	*11.4*	*9.0*	*6.5*
9	25.0	23.5	22.9	22.5	22.1	21.8	21.4	20.9	20.3	19.6	18.8	17.9	...	...	...	...	...
10	25.0	23.5	22.9	22.5	22.1	21.8	21.4	20.9	20.3	19.6	18.8	17.9	...	...	...	...	...
11	26.7	25.1	24.4	24.0	23.6	23.2	22.8	22.3	21.6	20.9	20.0	19.0	18.0	*14.8*	*12.0*	*9.3*	*6.5*
12	26.7	25.1	24.4	24.0	23.6	23.2	22.8	22.3	21.6	20.9	20.0	19.0	...	...	...	...	...
13	31.3	31.3	30.5	29.9	29.5	29.0	28.5	27.8	27.1	26.1	25.0	*22.5*	...	...	...	...	...
14	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	...	...	...	...	...
15	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5	...	...	...	...	...
16	43.8	43.8	43.8	43.8	43.8	43.8	43.8	43.8	43.8	43.8	43.8	43.8	...	...	...	...	...
17	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	...	...	...	...	...
18	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	...	...	...	...	...
19	56.3	56.3	56.3	56.3	56.3	56.3	56.3	56.3	56.3	56.3	56.3	56.3	...	...	...	...	...
20	39.6	39.6	39.6	39.6	...	...	...	...	...	...	...	...	...	...	...	...	...
21	41.7	41.7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
22	39.6	39.6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
23	41.7	41.7	41.7	41.7	...	...	...	...	...	...	...	...	...	...	...	...	...
24	39.6	39.6	39.6	39.6	...	...	...	...	...	...	...	...	...	...	...	...	...
25	41.7	41.7	41.7	41.7	...	...	...	...	...	...	...	...	...	...	...	...	...
26	39.6	39.6	39.6	39.6	...	...	...	...	...	...	...	...	...	...	...	...	...
27	41.7	41.7	41.7	41.7	...	...	...	...	...	...	...	...	...	...	...	...	...
28	39.6	39.6	39.6	39.6	...	...	...	...	...	...	...	...	...	...	...	...	...
29	41.7	41.7	41.7	41.7	...	...	...	...	...	...	...	...	...	...	...	...	...
30	39.6	39.6	39.6	39.6	...	...	...	...	...	...	...	...	...	...	...	...	...
31	41.7	41.7	41.7	41.7	...	...	...	...	...	...	...	...	...	...	...	...	...
32	39.6	39.6	39.6	39.6	...	...	...	...	...	...	...	...	...	...	...	...	...
33	41.7	41.7	41.7	41.7	...	...	...	...	...	...	...	...	...	...	...	...	...
34	39.6	39.6	39.6	39.6	...	...	...	...	...	...	...	...	...	...	...	...	...
35	41.7	41.7	41.7	41.7	...	...	...	...	...	...	...	...	...	...	...	...	...
36	39.6	39.6	39.6	39.6	...	...	...	...	...	...	...	...	...	...	...	...	...
37	30.0	...	24.2	...	21.9	...	20.7	...	20.0	...	19.1	18.6	18.0	17.3	16.7	...	...
38	30.0	...	30.0	...	29.6	...	28.0	...	27.0	...	25.8	25.1	24.3	23.4	22.6	...	...
39	16.7	16.7	16.7	16.7	16.7	16.4	15.7	15.2	14.8	14.4	14.0	13.7	13.5	13.2	12.9	12.7	...
40	16.7	16.7	16.7	16.7	16.7	16.4	15.7	15.2	14.8	14.4	14.0	13.7	13.5	13.2	12.9	12.7	...
41	16.7	16.7	16.7	16.7	16.7	16.4	15.7	15.2	14.8	14.4	14.0	13.7	13.5	13.2	12.9	12.7	...
42	16.7	16.7	16.7	16.7	16.7	16.4	15.7	15.2	14.8	14.4	14.0	13.7	13.5	13.2	12.9	12.7	...
43	16.7	16.7	16.7	16.7	16.7	16.4	15.7	15.2	14.8	14.4	14.0	13.7	13.5	13.2	12.9	12.7	...
44	14.2	14.2	14.2	14.2	14.2	13.9	13.4	12.9	12.5	12.2	11.9	11.7	11.4	11.2	11.0	10.8	...
45	16.7	16.7	16.7	16.7	16.7	16.4	15.7	15.2	14.8	14.4	14.0	13.7	13.5	13.2	12.9	12.7	...

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding											
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500
1	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...
8	*4.5*	*2.5*	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...
11	*4.5*	*2.5*	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/ Thickness, in.	P-No.	Group No.
1	16Cr–12Ni–2Mo	Wld. pipe	SA–312	TP316L	S31603	...	...	8	1
2	16Cr–12Ni–2Mo	Fittings	SA–403	316L	S31603	CR	...	8	1
3	16Cr–12Ni–2Mo	Wld. fittings	SA–403	316L	S31603	WP–W	...	8	1
4	16Cr–12Ni–2Mo	Wld. fittings	SA–403	316L	S31603	WP–WX	...	8	1
5	16Cr–12Ni–2Mo	Wld. pipe	SA–688	TP316L	S31603	...	...	8	1
6	16Cr–12Ni–2Mo	Castings	SA–351	CF8M	J92900	...	...	8	1
7	16Cr–12Ni–2Mo	Forgings	SA–182	F316	S31600	...	$t > 5$	8	1
8	16Cr–12Ni–2Mo	Forgings	SA–965	F316	S31600	...	...	8	1
9	16Cr–12Ni–2Mo	Forgings	SA–182	F316H	S31609	...	$t > 5$	8	1
10	16Cr–12Ni–2Mo	Forgings	SA–965	F316H	S31609	...	...	8	1
11	16Cr–12Ni–2Mo	Forgings	SA–182	F316	S31600	...	$t \le 5$	8	1
12	16Cr–12Ni–2Mo	Smls. tube	SA–213	TP316	S31600	...	...	8	1
13	16Cr–12Ni–2Mo	Plate	SA–240	316	S31600	...	...	8	1
14	16Cr–12Ni–2Mo	Wld. tube	SA–249	TP316	S31600	...	...	8	1
15	16Cr–12Ni–2Mo	Smls. pipe	SA–312	TP316	S31600	...	...	8	1
16	16Cr–12Ni–2Mo	Wld. pipe	SA–312	TP316	S31600	...	...	8	1
17	16Cr–12Ni–2Mo	Smls. pipe	SA–376	TP316	S31600	...	...	8	1
18	16Cr–12Ni–2Mo	Fittings	SA–403	316	S31600	WP–S	...	8	1
19	16Cr–12Ni–2Mo	Wld. tube	SA–688	TP316	S31600	...	...	8	1
20	16Cr–12Ni–2Mo	Forgings	SA–182	F316H	S31609	...	$t \le 5$	8	1
21	16Cr–12Ni–2Mo	Smls. tube	SA–213	TP316H	S31609	...	...	8	1
22	16Cr–12Ni–2Mo	Wld. tube	SA–249	TP316H	S31609	...	...	8	1
23	16Cr–12Ni–2Mo	Smls. pipe	SA–312	TP316H	S31609	...	...	8	1
24	16Cr–12Ni–2Mo	Wld. pipe	SA–312	TP316H	S31609	...	...	8	1
25	16Cr–12Ni–2Mo	Smls. pipe	SA–376	TP316H	S31609	...	...	8	1
26	16Cr–12Ni–2Mo	Plate	SA/EN 10028–7	X2CrNiMo17–12–2	...	...	≤3	8	1
27	16Cr–12Ni–2Mo	Plate	SA/EN 10028–7	X5CrNiMo17–12–2	...	...	≤3	8	1
28	16Cr–12Ni–2Mo–N	Smls. tube	SA–213	TP316N	S31651	...	$t \le 5$	8	1
29	16Cr–12Ni–2Mo–N	Plate	SA–240	316N	S31651	...	$t \le 5$	8	1
30	16Cr–12Ni–2Mo–N	Wld. tube	SA–249	TP316N	S31651	...	...	8	1
31	16Cr–12Ni–2Mo–N	Smls. pipe	SA–312	TP316N	S31651	...	$t \le 5$	8	1
32	16Cr–12Ni–2Mo–N	Wld. pipe	SA–312	TP316N	S31651	...	$t \le 5$	8	1
33	16Cr–12Ni–2Mo–N	Smls. pipe	SA–376	TP316N	S31651	...	...	8	1
34	16Cr–12Ni–2Mo–N	Fittings	SA–403	316N	S31651	CR	...	8	1
35	16Cr–12Ni–2Mo–N	Wld. fittings	SA–403	316N	S31651	WP–W	...	8	1
36	16Cr–12Ni–2Mo–N	Wld. fittings	SA–403	316N	S31651	WP–WX	...	8	1
37	16Cr–12Ni–2Mo–N	Forgings	SA–965	F316N	S31651	...	...	8	1
38	16Cr–12Ni–2Mo–N	Plate	SA/EN 10028–7	X2CrNiMoN17–11–2	...	...	≤3	8	1
39	16Cr–12Ni–2Mo–N	Plate	SA/EN 10028–7	X2CrNiMoN17–13–3	...	...	≤3	8	1
40	17.5Cr–17.5Ni–5.3Si	Plate	SA–240	...	S30601	...	...	8	1
41	18Cr–3Ni–12Mn	Plate	SA–240	XM–29	S24000	...	$t > {}^{3}/_{16}$	8	3
42	18Cr–3Ni–12Mn	Plate	SA–240	XM–29	S24000	...	$t \le {}^{3}/_{16}$	8	3
43	18Cr–5Ni–3Mo	Smls. tube	SA–789	...	S31500	...	...	10H	1
44	18Cr–5Ni–3Mo	Wld. tube	SA–789	...	S31500	...	...	10H	1
45	18Cr–5Ni–3Mo	Smls. pipe	SA–790	...	S31500	...	...	10H	1

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Maximum Use Temperature, °F	External Pressure Chart No.	Notes
1	70	25	850	HA–4	G2, G6
2	70	25	850	HA–4	G2, G6
3	70	25	850	HA–4	G2, G6
4	70	25	850	HA–4	G2, G6
5	70	25	850	HA–4	G2, G6
6	70	30	1500	HA–2	G2, G3, G4, G8, T10
7	70	30	1500	HA–2	G2, T10
8	70	30	1500	HA–2	G2, G3, G4, T10
9	70	30	1500	HA–2	G2, T10
10	70	30	1500	HA–2	G2, T10
11	75	30	1500	HA–2	G2, G3, T10
12	75	30	1500	HA–2	G2, G3, T10
13	75	30	1500	HA–2	G2, G3, G4, T10
14	75	30	1500	HA–2	G2, G3, G6, T10
15	75	30	1500	HA–2	G2, G3, G4, T10
16	75	30	1500	HA–2	G2, G3, G4, G6, T10
17	75	30	1500	HA–2	G2, G3, G4, T10
18	75	30	1500	HA–2	G2, T10
19	75	30	1500	HA–2	G2, G3, G6, T10
20	75	30	1500	HA–2	G2, T10
21	75	30	1500	HA–2	G2, T10
22	75	30	1500	HA–2	G2, G6, T10
23	75	30	1500	HA–2	G2, T10
24	75	30	1500	HA–2	G2, G6, T10
25	75	30	1500	HA–2	G2, G4, T10
26	75	32	850	HA–4	G2, G16
27	75	32	1022	HA–2	G2, G3, G4, G16
28	80	35	1200	HA–2	G2, T9
29	80	35	1200	HA–2	G2, T9
30	80	35	1200	HA–2	G2, G6, T9
31	80	35	1200	HA–2	G2, T9
32	80	35	1200	HA–2	G2, G6, T9
33	80	35	1200	HA–2	G2, G4, T9
34	80	35	1200	HA–2	G2, G6, T9
35	80	35	1200	HA–2	G2, G6, T9
36	80	35	1200	HA–2	G2, G6, T9
37	80	35	1200	HA–2	G2, T9
38	84	41	800	HA–2	G2, G16
39	84	41	800	HA–2	G2, G16
40	78	37	400	HA–1	...
41	100	55	800	HA–6	G2
42	100	60	800	HA–6	G2
43	92	64	650	HA–5	G8
44	92	64	650	HA–5	G6, G8
45	92	64	650	HA–5	G8

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900
1	14.2	14.2	14.2	14.2	14.2	13.9	13.4	12.9	12.5	12.2	11.9	11.7	11.4	11.2	11.0	10.8	...
2	14.2	14.2	14.2	14.2	14.2	13.9	13.4	12.9	12.5	12.2	11.9	11.7	11.4	11.2	11.0	10.8	...
3	14.2	14.2	14.2	14.2	14.2	13.9	13.4	12.9	12.5	12.2	11.9	11.7	11.4	11.2	11.0	10.8	...
4	14.2	14.2	14.2	14.2	14.2	13.9	13.4	12.9	12.5	12.2	11.9	11.7	11.4	11.2	11.0	10.8	...
5	14.2	14.2	14.2	14.2	14.2	13.9	13.4	12.9	12.5	12.2	11.9	11.7	11.4	11.2	11.0	10.8	...
6	20.0	20.0	20.0	20.0	20.0	20.0	19.3	18.6	18.0	17.4	17.0	16.6	16.3	16.1	15.9	15.7	15.6
7	20.0	20.0	20.0	20.0	20.0	20.0	19.3	18.6	18.0	17.4	17.0	16.6	16.3	16.1	15.9	15.7	15.6
8	20.0	20.0	20.0	20.0	20.0	20.0	19.3	18.6	18.0	17.4	17.0	16.6	16.3	16.1	15.9	15.7	15.6
9	20.0	20.0	20.0	20.0	20.0	20.0	19.3	18.6	18.0	17.4	17.0	16.6	16.3	16.1	15.9	15.7	15.6
10	20.0	20.0	20.0	20.0	20.0	20.0	19.3	18.6	18.0	17.4	17.0	16.6	16.3	16.1	15.9	15.7	15.6
11	20.0	20.0	20.0	20.0	20.0	20.0	19.3	18.6	18.0	17.4	17.0	16.6	16.3	16.1	15.9	15.7	15.6
12	20.0	20.0	20.0	20.0	20.0	20.0	19.3	18.6	18.0	17.4	17.0	16.6	16.3	16.1	15.9	15.7	15.6
13	20.0	20.0	20.0	20.0	20.0	20.0	19.3	18.6	18.0	17.4	17.0	16.6	16.3	16.1	15.9	15.7	15.6
14	17.0	17.0	17.0	17.0	17.0	17.0	16.4	15.8	15.3	14.8	14.5	14.1	13.9	13.7	13.5	13.4	13.2
15	20.0	20.0	20.0	20.0	20.0	20.0	19.3	18.6	18.0	17.4	17.0	16.6	16.3	16.1	15.9	15.7	15.6
16	17.0	17.0	17.0	17.0	17.0	17.0	16.4	15.8	15.3	14.8	14.5	14.1	13.9	13.7	13.5	13.4	13.2
17	20.0	20.0	20.0	20.0	20.0	20.0	19.3	18.6	18.0	17.4	17.0	16.6	16.3	16.1	15.9	15.7	15.6
18	20.0	20.0	20.0	20.0	20.0	20.0	19.3	18.6	18.0	17.4	17.0	16.6	16.3	16.1	15.9	15.7	15.6
19	17.0	17.0	17.0	17.0	17.0	17.0	16.4	15.8	15.3	14.8	14.5	14.1	13.9	13.7	13.5	13.4	13.2
20	20.0	20.0	20.0	20.0	20.0	20.0	19.3	18.6	18.0	17.4	17.0	16.6	16.3	16.1	15.9	15.7	15.6
21	20.0	20.0	20.0	20.0	20.0	20.0	19.3	18.6	18.0	17.4	17.0	16.6	16.3	16.1	15.9	15.7	15.6
22	17.0	17.0	17.0	17.0	17.0	17.0	16.4	15.8	15.3	14.8	14.5	14.1	13.9	13.7	13.5	13.4	13.2
23	20.0	20.0	20.0	20.0	20.0	20.0	19.3	18.6	18.0	17.4	17.0	16.6	16.3	16.1	15.9	15.7	15.6
24	17.0	17.0	17.0	17.0	17.0	17.0	16.4	15.8	15.3	14.8	14.5	14.1	13.9	13.7	13.5	13.4	13.2
25	20.0	20.0	20.0	20.0	20.0	20.0	19.3	18.6	18.0	17.4	17.0	16.6	16.3	16.1	15.9	15.7	15.6
26	21.3	21.3	21.3	21.3	21.3	20.9	20.1	19.5	18.8	18.3	17.9	17.6	17.2	16.9	16.6	16.2	...
27	21.3	21.3	21.3	21.3	21.3	21.3	20.5	19.8	19.1	18.6	18.1	17.7	17.4	17.2	16.9	16.7	16.6
28	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.0	22.3	21.6	21.0	20.5	20.0	19.6	19.2	18.8	18.5
29	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.0	22.3	21.6	21.0	20.5	20.0	19.6	19.2	18.8	18.5
30	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.5	18.9	18.4	17.9	17.4	17.0	16.7	16.3	16.0	15.7
31	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.0	22.3	21.6	21.0	20.5	20.0	19.6	19.2	18.8	18.5
32	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.5	18.9	18.4	17.9	17.4	17.0	16.7	16.3	16.0	15.7
33	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.0	22.3	21.6	21.0	20.5	20.0	19.6	19.2	18.8	18.5
34	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.5	18.9	18.4	17.9	17.4	17.0	16.7	16.3	16.0	15.7
35	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.5	18.9	18.4	17.9	17.4	17.0	16.7	16.3	16.0	15.7
36	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.5	18.9	18.4	17.9	17.4	17.0	16.7	16.3	16.0	15.7
37	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.0	22.3	21.6	21.0	20.5	20.0	19.6	19.2	18.8	18.5
38	27.1	27.1	27.1	27.1	27.1	26.7	25.6	24.6	23.7	23.0	22.3	21.7	21.1	20.6	20.1	...	...
39	27.1	27.1	27.1	27.1	27.1	26.7	25.6	24.6	23.7	23.0	22.3	21.7	21.1	20.6	20.1	...	...
40	24.7	24.7	24.7	24.7	24.4	23.2	22.2	...	...	...	...	...	...	...	...	...	...
41	36.7	36.7	36.7	36.6	33.8	31.5	29.6	28.2	27.2	26.4	25.9	25.4	25.0	24.5	24.0	...	...
42	40.0	40.0	40.0	39.9	36.8	34.3	32.3	30.8	29.6	28.8	28.2	27.7	27.3	26.8	26.2	...	...
43	38.3	38.3	38.3	38.3	38.3	38.3	38.3	38.3	38.3	38.3	38.3	38.3	...	...	...	...	...
44	32.6	32.6	32.6	32.6	32.6	32.6	32.6	32.6	32.6	32.6	32.6	32.6	...	...	...	...	...
45	38.3	38.3	38.3	38.3	38.3	38.3	38.3	38.3	38.3	38.3	38.3	38.3	...	...	...	...	...

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding											
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500
1	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...
6	15.4	15.3	15.1	*12.4*	*9.8*	*7.4*	*5.6*	*4.2*	*3.2*	*2.4*	*1.8*	*1.4*
7	15.4	15.3	15.1	*12.4*	*9.8*	*7.4*	*5.6*	*4.2*	*3.2*	*2.4*	*1.8*	*1.4*
8	15.4	15.3	15.1	*12.4*	*9.8*	*7.4*	*5.6*	*4.2*	*3.2*	*2.4*	*1.8*	*1.4*
9	15.4	15.3	15.1	*12.4*	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*
10	15.4	15.3	15.1	*12.4*	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*
11	15.4	15.3	15.1	*12.4*	*9.8*	*7.4*	*5.6*	*4.2*	*3.2*	*2.4*	*1.8*	*1.4*
12	15.4	15.3	15.1	*12.4*	*9.8*	*7.4*	*5.6*	*4.2*	*3.2*	*2.4*	*1.8*	*1.4*
13	15.4	15.3	15.1	*12.4*	*9.8*	*7.4*	*5.6*	*4.2*	*3.2*	*2.4*	*1.8*	*1.4*
14	13.1	13.0	12.9	*10.5*	*8.3*	*6.3*	*4.7*	*3.6*	*2.7*	*2.0*	*1.5*	*1.2*
15	15.4	15.3	15.1	*12.4*	*9.8*	*7.4*	*5.6*	*4.2*	*3.2*	*2.4*	*1.8*	*1.4*
16	13.1	13.0	12.9	*10.5*	*8.3*	*6.3*	*4.7*	*3.6*	*2.7*	*2.0*	*1.5*	*1.2*
17	15.4	15.3	15.1	*12.4*	*9.8*	*7.4*	*5.6*	*4.2*	*3.2*	*2.4*	*1.8*	*1.4*
18	15.4	15.3	15.1	*12.4*	*9.8*	*7.4*	*5.6*	*4.2*	*3.2*	*2.4*	*1.8*	*1.4*
19	13.1	13.0	12.9	*10.5*	*8.3*	*6.3*	*4.7*	*3.6*	*2.7*	*2.0*	*1.5*	*1.2*
20	15.4	15.3	15.1	*12.4*	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*
21	15.4	15.3	15.1	*12.4*	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*
22	13.1	13.0	12.9	*10.5*	*8.3*	*6.3*	*4.7*	*3.5*	*2.6*	*1.9*	*1.4*	*1.1*
23	15.4	15.3	15.1	*12.4*	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*
24	13.1	13.0	12.9	*10.5*	*8.3*	*6.3*	*4.7*	*3.5*	*2.6*	*1.9*	*1.4*	*1.1*
25	15.4	15.3	15.1	*12.4*	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*
26	...	...	...	...	...	...	...	...	...	...	...	...
27	16.4	16.3	16.1	...	...	...	...	...	...	...	...	...
28	18.1	17.8	*15.8*	*12.3*	*9.8*	*7.4*	...	...	...	...	...	...
29	18.1	17.8	*15.8*	*12.3*	*9.8*	*7.4*	...	...	...	...	...	...
30	15.4	15.1	*13.4*	*10.5*	*8.3*	*6.3*	...	...	...	...	...	...
31	18.1	17.8	*15.8*	*12.3*	*9.8*	*7.4*	...	...	...	...	...	...
32	15.4	15.1	*13.4*	*10.5*	*8.3*	*6.3*	...	...	...	...	...	...
33	18.1	17.8	*15.8*	*12.3*	*9.8*	*7.4*	...	...	...	...	...	...
34	15.4	15.1	*13.4*	*10.5*	*8.3*	*6.3*	...	...	...	...	...	...
35	15.4	15.1	*13.4*	*10.5*	*8.3*	*6.3*	...	...	...	...	...	...
36	15.4	15.1	*13.4*	*10.5*	*8.3*	*6.3*	...	...	...	...	...	...
37	18.1	17.8	*15.8*	*12.3*	*9.8*	*7.4*	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/ Thickness, in.	P-No.	Group No.
1	18Cr–5Ni–3Mo	Wld. pipe	SA–790	...	S31500	...	...	10H	1
2	18Cr–8Ni	Forgings	SA–182	F304L	S30403	...	$t > 5$	8	1
3	18Cr–8Ni	Forgings	SA–965	F304L	S30403	...	...	8	1
4	18Cr–8Ni	Forgings	SA–182	F304L	S30403	...	$t \le 5$	8	1
5	18Cr–8Ni	Smls. tube	SA–213	TP304L	S30403	...	...	8	1
6	18Cr–8Ni	Plate	SA–240	304L	S30403	...	...	8	1
7	18Cr–8Ni	Wld. tube	SA–249	TP304L	S30403	...	...	8	1
8	18Cr–8Ni	Smls. pipe	SA–312	TP304L	S30403	...	...	8	1
9	18Cr–8Ni	Wld. pipe	SA–312	TP304L	S30403	...	...	8	1
10	18Cr–8Ni	Fittings	SA–403	304L	S30403	WP–S	...	8	1
11	18Cr–8Ni	Wld. tube	SA–688	TP304L	S30403	...	...	8	1
12	18Cr–8Ni	Castings	SA–351	CF3	J92500	...	...	8	1
13	18Cr–8Ni	Castings	SA–351	CF10	J92590	...	...	8	1
14	18Cr–8Ni	Castings	SA–351	CF8	J92600	...	...	8	1
15	18Cr–8Ni	Forgings	SA–182	F304	S30400	...	$t > 5$	8	1
16	18Cr–8Ni	Smls. pipe	SA–376	TP304	S30400	...	...	8	1
17	18Cr–8Ni	Forgings	SA–965	F304	S30400	...	...	8	1
18	18Cr–8Ni	Forgings	SA–182	F304H	S30409	...	$t > 5$	8	1
19	18Cr–8Ni	Forgings	SA–965	F304H	S30409	...	...	8	1
20	18Cr–8Ni	Plate	SA/EN 10028–7	X2CrNi18–9	...	...	≤3	8	1
21	18Cr–8Ni	Plate	SA–240	302	S30200	...	...	8	1
22	18Cr–8Ni	Forgings	SA–182	F304	S30400	...	$t \le 5$	8	1
23	18Cr–8Ni	Smls. tube	SA–213	TP304	S30400	...	...	8	1
24	18Cr–8Ni	Plate	SA–240	304	S30400	...	...	8	1
25	18Cr–8Ni	Wld. tube	SA–249	TP304	S30400	...	...	8	1
26	18Cr–8Ni	Smls. pipe	SA–312	TP304	S30400	...	...	8	1
27	18Cr–8Ni	Wld. pipe	SA–312	TP304	S30400	...	...	8	1
28	18Cr–8Ni	Smls. pipe	SA–376	TP304	S30400	...	...	8	1
29	18Cr–8Ni	Fittings	SA–403	304	S30400	CR	...	8	1
30	18Cr–8Ni	Fittings	SA–403	304	S30400	WP–S	...	8	1
31	18Cr–8Ni	Wld. fittings	SA–403	304	S30400	WP–W	...	8	1
32	18Cr–8Ni	Wld. fittings	SA–403	304	S30400	WP–WX	...	8	1
33	18Cr–8Ni	Wld. tube	SA–688	TP304	S30400	...	...	8	1
34	18Cr–8Ni	Forgings	SA–182	F304H	S30409	...	$t \le 5$	8	1
35	18Cr–8Ni	Smls. tube	SA–213	TP304H	S30409	...	...	8	1
36	18Cr–8Ni	Plate	SA–240	304H	S30409	...	...	8	1
37	18Cr–8Ni	Wld. tube	SA–249	TP304H	S30409	...	...	8	1
38	18Cr–8Ni	Smls. pipe	SA–312	TP304H	S30409	...	...	8	1
39	18Cr–8Ni	Wld. pipe	SA–312	TP304H	S30409	...	...	8	1
40	18Cr–8Ni	Smls. pipe	SA–376	TP304H	S30409	...	...	8	1
41	18Cr–8Ni	Fittings	SA–403	304H	S30409	CR	...	8	1
42	18Cr–8Ni	Fittings	SA–403	304H	S30409	WP–S	...	8	1
43	18Cr–8Ni	Wld. fittings	SA–403	304H	S30409	WP–W	...	8	1
44	18Cr–8Ni	Wld. fittings	SA–403	304H	S30409	WP–WX	...	8	1
45	18Cr–8Ni	Plate	SA/EN 10028–7	X5CrNi18–10	...	...	≤3	8	1

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Maximum Use Temperature, °F	External Pressure Chart No.	Notes
1	92	64	650	HA–5	G6, G8
2	65	25	1200	HA–3	G2, T9
3	65	25	1200	HA–3	G2, T9
4	70	25	1200	HA–3	G2, T9
5	70	25	1200	HA–3	G2, T9
6	70	25	1200	HA–3	G2, T9
7	70	25	1200	HA–3	G2, G6, T9
8	70	25	1200	HA–3	G2, T9
9	70	25	1200	HA–3	G2, G6, T9
10	70	25	1200	HA–3	G2, T9
11	70	25	1200	HA–3	G2, G6, T9
12	70	30	800	HA–3	G2, G8
13	70	30	1500	HA–3	G2, G4, G8, T8
14	70	30	1500	HA–1	G2, G3, G4, G8, T8
15	70	30	1500	HA–1	G2, G3, G4, T9
16	70	30	1500	HA–1	G2, G3, G4, S3, T9
17	70	30	1500	HA–1	G2, G3, G4, T9
18	70	30	1500	HA–1	G2, T9
19	70	30	1500	HA–1	G2, T9
20	72.5	29	1022	HA–3	G2, G16, T9
21	75	30	750	HA–1	G2, G3
22	75	30	1500	HA–1	G2, G3, G4, T9
23	75	30	1500	HA–1	G2, G3, T9
24	75	30	1500	HA–1	G2, G3, G4, T9
25	75	30	1500	HA–1	G2, G3, G6, T9
26	75	30	1500	HA–1	G2, G3, G4, T9
27	75	30	1500	HA–1	G2, G3, G4, G6, T9
28	75	30	1500	HA–1	G2, G3, G4, S4, T9
29	75	30	1500	HA–1	G2, G6, T9
30	75	30	1500	HA–1	G2, T9
31	75	30	1500	HA–1	G2, G6, T9
32	75	30	1500	HA–1	G2, G6, T9
33	75	30	1500	HA–1	G2, G3, G6, T9
34	75	30	1500	HA–1	G2, T9
35	75	30	1500	HA–1	G2, T9
36	75	30	1500	HA–1	G2, T9
37	75	30	1500	HA–1	G2, G6, T9
38	75	30	1500	HA–1	G2, T9
39	75	30	1500	HA–1	G2, G6, T9
40	75	30	1500	HA–1	G2, G4, T9
41	75	30	1500	HA–1	G2, G6, T9
42	75	30	1500	HA–1	G2, T9
43	75	30	1500	HA–1	G2, G6, T9
44	75	30	1500	HA–1	G2, G6, T9
45	75	31	1022	HA–1	G2, G3, G4, G16, T9

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900
1	32.6	32.6	32.6	32.6	32.6	32.6	32.6	32.6	32.6	32.6	32.6	32.6	...	...	...	...	...
2	16.7	16.7	16.7	16.7	16.7	16.5	15.8	15.2	14.7	14.3	14.0	13.7	13.5	13.3	13.0	12.8	12.6
3	16.7	16.7	16.7	16.7	16.7	16.5	15.8	15.2	14.7	14.3	14.0	13.7	13.5	13.3	13.0	12.8	12.6
4	16.7	16.7	16.7	16.7	16.7	16.5	15.8	15.2	14.7	14.3	14.0	13.7	13.5	13.3	13.0	12.8	12.6
5	16.7	16.7	16.7	16.7	16.7	16.5	15.8	15.2	14.7	14.3	14.0	13.7	13.5	13.3	13.0	12.8	12.6
6	16.7	16.7	16.7	16.7	16.7	16.5	15.8	15.2	14.7	14.3	14.0	13.7	13.5	13.3	13.0	12.8	12.6
7	16.7	16.7	16.7	16.7	16.7	16.5	15.8	15.2	14.7	14.3	14.0	13.7	13.5	13.3	13.0	12.8	12.6
8	16.7	16.7	16.7	16.7	16.7	16.5	15.8	15.2	14.7	14.3	14.0	13.7	13.5	13.3	13.0	12.8	12.6
9	14.2	14.2	14.2	14.2	14.2	14.0	13.4	12.9	12.5	12.2	11.9	11.7	11.4	11.3	11.1	10.9	10.7
10	16.7	16.7	16.7	16.7	16.7	16.5	15.8	15.2	14.7	14.3	14.0	13.7	13.5	13.3	13.0	12.8	12.6
11	14.2	14.2	14.2	14.2	14.2	14.0	13.4	12.9	12.5	12.2	11.9	11.7	11.4	11.3	11.1	10.9	10.7
12	20.0	20.0	20.0	20.0	20.0	19.3	18.6	18.0	17.5	17.0	16.6	16.2	15.8	15.5	15.2	...	...
13	20.0	20.0	20.0	20.0	20.0	19.3	18.6	18.0	17.5	17.0	16.6	16.2	15.8	15.5	15.2	14.9	14.6
14	20.0	20.0	20.0	20.0	20.0	19.3	18.6	18.0	17.5	17.0	16.6	16.2	15.8	15.5	15.2	14.9	14.6
15	20.0	20.0	20.0	20.0	20.0	19.3	18.6	18.0	17.5	17.0	16.6	16.2	15.8	15.5	15.2	14.9	14.6
16	20.0	20.0	20.0	20.0	20.0	19.3	18.6	18.0	17.5	17.0	16.6	16.2	15.8	15.5	15.2	14.9	14.6
17	20.0	20.0	20.0	20.0	20.0	19.3	18.6	18.0	17.5	17.0	16.6	16.2	15.8	15.5	15.2	14.9	14.6
18	20.0	20.0	20.0	20.0	20.0	19.3	18.6	18.0	17.5	17.0	16.6	16.2	15.8	15.5	15.2	14.9	14.6
19	20.0	20.0	20.0	20.0	20.0	19.3	18.6	18.0	17.5	17.0	16.6	16.2	15.8	15.5	15.2	14.9	14.6
20	19.3	19.3	19.3	19.3	19.3	19.1	18.3	17.7	17.1	16.6	16.2	15.9	15.6	15.4	15.2	14.9	14.6
21	20.0	20.0	20.0	20.0	20.0	19.3	18.6	18.0	17.5	17.0	16.6	16.2	15.8	15.5	...	...	...
22	20.0	20.0	20.0	20.0	20.0	19.3	18.6	18.0	17.5	17.0	16.6	16.2	15.8	15.5	15.2	14.9	14.6
23	20.0	20.0	20.0	20.0	20.0	19.3	18.6	18.0	17.5	17.0	16.6	16.2	15.8	15.5	15.2	14.9	14.6
24	20.0	20.0	20.0	20.0	20.0	19.3	18.6	18.0	17.5	17.0	16.6	16.2	15.8	15.5	15.2	14.9	14.6
25	17.0	17.0	17.0	17.0	17.0	16.4	15.8	15.3	14.8	14.4	14.1	13.8	13.5	13.2	12.9	12.6	12.4
26	20.0	20.0	20.0	20.0	20.0	19.3	18.6	18.0	17.5	17.0	16.6	16.2	15.8	15.5	15.2	14.9	14.6
27	17.0	17.0	17.0	17.0	17.0	16.4	15.8	15.3	14.8	14.4	14.1	13.8	13.5	13.2	12.9	12.6	12.4
28	20.0	20.0	20.0	20.0	20.0	19.3	18.6	18.0	17.5	17.0	16.6	16.2	15.8	15.5	15.2	14.9	14.6
29	17.0	17.0	17.0	17.0	17.0	16.4	15.8	15.3	14.8	14.4	14.1	13.8	13.5	13.2	12.9	12.6	12.4
30	20.0	20.0	20.0	20.0	20.0	19.3	18.6	18.0	17.5	17.0	16.6	16.2	15.8	15.5	15.2	14.9	14.6
31	17.0	17.0	17.0	17.0	17.0	16.4	15.8	15.3	14.8	14.4	14.1	13.8	13.5	13.2	12.9	12.6	12.4
32	17.0	17.0	17.0	17.0	17.0	16.4	15.8	15.3	14.8	14.4	14.1	13.8	13.5	13.2	12.9	12.6	12.4
33	17.0	17.0	17.0	17.0	17.0	16.4	15.8	15.3	14.8	14.4	14.1	13.8	13.5	13.2	12.9	12.6	12.4
34	20.0	20.0	20.0	20.0	20.0	19.3	18.6	18.0	17.5	17.0	16.6	16.2	15.8	15.5	15.2	14.9	14.6
35	20.0	20.0	20.0	20.0	20.0	19.3	18.6	18.0	17.5	17.0	16.6	16.2	15.8	15.5	15.2	14.9	14.6
36	20.0	20.0	20.0	20.0	20.0	19.3	18.6	18.0	17.5	17.0	16.6	16.2	15.8	15.5	15.2	14.9	14.6
37	17.0	17.0	17.0	17.0	17.0	16.4	15.8	15.3	14.8	14.4	14.1	13.8	13.5	13.2	12.9	12.6	12.4
38	20.0	20.0	20.0	20.0	20.0	19.3	18.6	18.0	17.5	17.0	16.6	16.2	15.8	15.5	15.2	14.9	14.6
39	17.0	17.0	17.0	17.0	17.0	16.4	15.8	15.3	14.8	14.4	14.1	13.8	13.5	13.2	12.9	12.6	12.4
40	20.0	20.0	20.0	20.0	20.0	19.3	18.6	18.0	17.5	17.0	16.6	16.2	15.8	15.5	15.2	14.9	14.6
41	17.0	17.0	17.0	17.0	17.0	16.4	15.8	15.3	14.8	14.4	14.1	13.8	13.5	13.2	12.9	12.6	12.4
42	20.0	20.0	20.0	20.0	20.0	19.3	18.6	18.0	17.5	17.0	16.6	16.2	15.8	15.5	15.2	14.9	14.6
43	17.0	17.0	17.0	17.0	17.0	16.4	15.8	15.3	14.8	14.4	14.1	13.8	13.5	13.2	12.9	12.6	12.4
44	17.0	17.0	17.0	17.0	17.0	16.4	15.8	15.3	14.8	14.4	14.1	13.8	13.5	13.2	12.9	12.6	12.4
45	20.3	20.3	20.3	20.3	20.3	19.6	18.9	18.3	17.7	17.2	16.8	16.4	16.1	15.7	15.4	15.1	14.8

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding											
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500
1	...	...	...	...	...	...	...	...	...	...	...	...
2	12.3	12.0	*6.3*	*5.1*	*4.0*	*3.2*	...	...	...	...	...	...
3	12.3	12.0	*6.3*	*5.1*	*4.0*	*3.2*	...	...	...	...	...	...
4	12.3	12.0	*6.3*	*5.1*	*4.0*	*3.2*	...	...	...	...	...	...
5	12.3	12.0	*6.3*	*5.1*	*4.0*	*3.2*	...	...	...	...	...	...
6	12.3	12.0	*6.3*	*5.1*	*4.0*	*3.2*	...	...	...	...	...	...
7	12.3	12.0	*6.3*	*5.1*	*4.0*	*3.2*	...	...	...	...	...	...
8	12.3	12.0	*6.3*	*5.1*	*4.0*	*3.2*	...	...	...	...	...	...
9	10.5	10.2	*5.4*	*4.3*	*3.4*	*2.7*	...	...	...	...	...	...
10	12.3	12.0	*6.3*	*5.1*	*4.0*	*3.2*	...	...	...	...	...	...
11	10.5	10.2	*5.4*	*4.3*	*3.4*	*2.7*	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...
13	14.3	*12.2*	*9.5*	*7.5*	*6.0*	*4.8*	*3.9*	*3.3*	*2.7*	*2.3*	*2.0*	*1.7*
14	14.3	*12.2*	*9.5*	*7.5*	*6.0*	*4.8*	*3.9*	*3.3*	*2.7*	*2.3*	*2.0*	*1.7*
15	14.3	14.0	*12.4*	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*
16	14.3	14.0	*12.4*	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*
17	14.3	14.0	*12.4*	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*
18	14.3	14.0	*12.4*	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*
19	14.3	14.0	*12.4*	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*
20	14.3	13.9	*6.3*	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...
22	14.3	14.0	*12.4*	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*
23	14.3	14.0	*12.4*	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*
24	14.3	14.0	*12.4*	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*
25	12.1	11.9	*10.5*	*8.3*	*6.6*	*5.2*	*4.0*	*3.1*	*2.5*	*2.0*	*1.6*	*1.2*
26	14.3	14.0	*12.4*	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*
27	12.1	11.9	*10.5*	*8.3*	*6.6*	*5.2*	*4.0*	*3.1*	*2.5*	*2.0*	*1.6*	*1.2*
28	14.3	14.0	*12.4*	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*
29	12.1	11.9	*10.5*	*8.3*	*6.6*	*5.2*	*4.0*	*3.1*	*2.5*	*2.0*	*1.6*	*1.2*
30	14.3	14.0	*12.4*	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*
31	12.1	11.9	*10.5*	*8.3*	*6.6*	*5.2*	*4.0*	*3.1*	*2.5*	*2.0*	*1.6*	*1.2*
32	12.1	11.9	*10.5*	*8.3*	*6.6*	*5.2*	*4.0*	*3.1*	*2.5*	*2.0*	*1.6*	*1.2*
33	12.1	11.9	*10.5*	*8.3*	*6.6*	*5.2*	*4.0*	*3.1*	*2.5*	*2.0*	*1.6*	*1.2*
34	14.3	14.0	*12.4*	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*
35	14.3	14.0	*12.4*	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*
36	14.3	14.0	*12.4*	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*
37	12.1	11.9	*10.5*	*8.3*	*6.6*	*5.2*	*4.0*	*3.1*	*2.5*	*2.0*	*1.6*	*1.2*
38	14.3	14.0	*12.4*	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*
39	12.1	11.9	*10.5*	*8.3*	*6.6*	*5.2*	*4.0*	*3.1*	*2.5*	*2.0*	*1.6*	*1.2*
40	14.3	14.0	*12.4*	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*
41	12.1	11.9	*10.5*	*8.3*	*6.6*	*5.2*	*4.0*	*3.1*	*2.5*	*2.0*	*1.6*	*1.2*
42	14.3	14.0	*12.4*	*9.8*	*7.7*	*6.1*	*4.7*	*3.7*	*2.9*	*2.3*	*1.8*	*1.4*
43	12.1	11.9	*10.5*	*8.3*	*6.6*	*5.2*	*4.0*	*3.1*	*2.5*	*2.0*	*1.6*	*1.2*
44	12.1	11.9	*10.5*	*8.3*	*6.6*	*5.2*	*4.0*	*3.1*	*2.5*	*2.0*	*1.6*	*1.2*
45	14.5	14.2	*12.4*	...	...	...	...	...	...	...	...	...

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/ Thickness, in.	P-No.	Group No.
1	18Cr–8Ni–N	Smls. tube	SA–213	TP304N	S30451	...	...	8	1
2	18Cr–8Ni–N	Plate	SA–240	304N	S30451	...	...	8	1
3	18Cr–8Ni–N	Wld. tube	SA–249	TP304N	S30451	...	...	8	1
4	18Cr–8Ni–N	Smls. pipe	SA–312	TP304N	S30451	...	...	8	1
5	18Cr–8Ni–N	Wld. pipe	SA–312	TP304N	S30451	...	...	8	1
6	18Cr–8Ni–N	Smls. pipe	SA–376	TP304N	S30451	...	...	8	1
7	18Cr–8Ni–N	Fittings	SA–403	304N	S30451	CR	...	8	1
8	18Cr–8Ni–N	Wld. fittings	SA–403	304N	S30451	WP–W	...	8	1
9	18Cr–8Ni–N	Wld. fittings	SA–403	304N	S30451	WP–WX	...	8	1
10	18Cr–8Ni–N	Forgings	SA–965	F304N	S30451	...	...	...	...
11	18Cr–8Ni–N	Plate	SA/EN 10028–7	X2CrNiN18–10	...	...	≤3	8	1
12	18Cr–8Ni–N	Plate	SA/EN 10028–7	X5CrNiN19–9	...	...	≤3	8	1
13	18Cr–10Ni–Cb	Castings	SA–351	CF8C	J92710	...	...	8	1
14	18Cr–10Ni–Cb	Forgings	SA–182	F347	S34700	...	$t > 5$	8	1
15	18Cr–10Ni–Cb	Forgings	SA–965	F347	S34700	...	...	8	1
16	18Cr–10Ni–Cb	Forgings	SA–182	F347H	S34709	...	$t > 5$	8	1
17	18Cr–10Ni–Cb	Forgings	SA–965	F347H	S34709	...	...	8	1
18	18Cr–10Ni–Cb	Forgings	SA–182	F348	S34800	...	$t > 5$	8	1
19	18Cr–10Ni–Cb	Forgings	SA–182	F348H	S34809	...	$t > 5$	8	1
20	18Cr–10Ni–Cb	Forgings	SA–182	F347	S34700	...	$t \le 5$	8	1
21	18Cr–10Ni–Cb	Smls. tube	SA–213	TP347	S34700	...	...	8	1
22	18Cr–10Ni–Cb	Plate	SA–240	347	S34700	...	...	8	1
23	18Cr–10Ni–Cb	Wld. tube	SA–249	TP347	S34700	...	...	8	1
24	18Cr–10Ni–Cb	Smls. pipe	SA–312	TP347	S34700	...	...	8	1
25	18Cr–10Ni–Cb	Wld. pipe	SA–312	TP347	S34700	...	...	8	1
26	18Cr–10Ni–Cb	Smls. pipe	SA–376	TP347	S34700	...	...	8	1
27	18Cr–10Ni–Cb	Fittings	SA–403	347	S34700	CR	...	8	1
28	18Cr–10Ni–Cb	Fittings	SA–403	347	S34700	WP–S	...	8	1
29	18Cr–10Ni–Cb	Wld. fittings	SA–403	347	S34700	WP–W	...	8	1
30	18Cr–10Ni–Cb	Wld. fittings	SA–403	347	S34700	WP–WX	...	8	1
31	18Cr–10Ni–Cb	Forgings	SA–182	F347H	S34709	...	$t \le 5$	8	1
32	18Cr–10Ni–Cb	Smls. tube	SA–213	TP347H	S34709	...	...	8	1
33	18Cr–10Ni–Cb	Plate	SA–240	347H	S34709	...	...	8	1
34	18Cr–10Ni–Cb	Wld. tube	SA–249	TP347H	S34709	...	...	8	1
35	18Cr–10Ni–Cb	Smls. pipe	SA–312	TP347H	S34709	...	...	8	1
36	18Cr–10Ni–Cb	Wld. pipe	SA–312	TP347H	S34709	...	...	8	1
37	18Cr–10Ni–Cb	Smls. pipe	SA–376	TP347H	S34709	...	...	8	1
38	18Cr–10Ni–Cb	Fittings	SA–403	347H	S34709	CR	...	8	1
39	18Cr–10Ni–Cb	Fittings	SA–403	347H	S34709	WP–S	...	8	1
40	18Cr–10Ni–Cb	Wld. fittings	SA–403	347H	S34709	WP–W	...	8	1
41	18Cr–10Ni–Cb	Wld. fittings	SA–403	347H	S34709	WP–WX	...	8	1
42	18Cr–10Ni–Cb	Forgings	SA–182	F348	S34800	...	$t \le 5$	8	1
43	18Cr–10Ni–Cb	Smls. tube	SA–213	TP348	S34800	...	...	8	1
44	18Cr–10Ni–Cb	Plate	SA–240	348	S34800	...	...	8	1
45	18Cr–10Ni–Cb	Wld. tube	SA–249	TP348	S34800	...	...	8	1

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Maximum Use Temperature, °F	External Pressure Chart No.	Notes
1	80	35	1200	HA–1	G2, T9
2	80	35	1200	HA–1	G2, T9
3	80	35	1200	HA–1	G2, G6, T9
4	80	35	1200	HA–1	G2, T9
5	80	35	1200	HA–1	G2, G6, T9
6	80	35	1200	HA–1	G2, G4, T9
7	80	35	1200	HA–1	G2, G6, T9
8	80	35	1200	HA–1	G2, G6, T9
9	80	35	1200	HA–1	G2, G6, T9
10	80	35	1200	HA–1	G2, T9
11	80	39	800	HA–1	G2, G16
12	80	39	1022	HA–1	G2, G16, T9
13	70	30	1500	HA–2	G2, G3, G8, T8
14	70	30	1500	HA–2	G2, G3, T8
15	70	30	1500	HA–2	G2, G3, G4, T8
16	70	30	1500	HA–2	G1, G2, T9
17	70	30	1500	HA–2	G1, G2, G3, T9
18	70	30	1500	HA–2	G2, G3, T8
19	70	30	1500	HA–2	G2, T9
20	75	30	1500	HA–2	G2, G3, G4, T8
21	75	30	1500	HA–2	G2, G3, G4, T8
22	75	30	1500	HA–2	G2, G3, T8
23	75	30	1500	HA–2	G2, G3, G6, T8
24	75	30	1500	HA–2	G2, G3, T8
25	75	30	1500	HA–2	G2, G3, G6, T8
26	75	30	1500	HA–2	G2, G3, G4, T8
27	75	30	1500	HA–2	G2, G6, T8
28	75	30	1500	HA–2	G2, T8
29	75	30	1500	HA–2	G2, G6, T8
30	75	30	1500	HA–2	G2, G6, T8
31	75	30	1500	HA–2	G1, G2, T9
32	75	30	1500	HA–2	G1, G2, T9
33	75	30	1500	HA–2	G1, G2, T9
34	75	30	1500	HA–2	G2, G6, T9
35	75	30	1500	HA–2	G1, G2, T9
36	75	30	1500	HA–2	G1, G2, G6, T9
37	75	30	1500	HA–2	G1, G2, T9
38	75	30	1500	HA–2	G1, G2, G6, T9
39	75	30	1500	HA–2	G1, G2, T9
40	75	30	1500	HA–2	G1, G2, G6, T9
41	75	30	1500	HA–2	G1, G2, G6, T9
42	75	30	1500	HA–2	G2, G3, T8
43	75	30	1500	HA–2	G2, G3, T8
44	75	30	1500	HA–2	G2, G3, T8
45	75	30	1500	HA–2	G2, G3, G6, T8

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900
1	23.3	23.3	23.3	23.3	22.5	21.3	20.3	19.5	18.9	18.3	17.9	17.5	17.2	16.9	16.6	16.3	16.0
2	23.3	23.3	23.3	23.3	22.5	21.3	20.3	19.5	18.9	18.3	17.9	17.5	17.2	16.9	16.6	16.3	16.0
3	19.8	19.8	19.8	19.8	19.2	18.1	17.3	16.6	16.0	15.6	15.2	14.9	14.6	14.4	14.1	13.8	13.6
4	23.3	23.3	23.3	23.3	22.5	21.3	20.3	19.5	18.9	18.3	17.9	17.5	17.2	16.9	16.6	16.3	16.0
5	19.8	19.8	19.8	19.8	19.2	18.1	17.3	16.6	16.0	15.6	15.2	14.9	14.6	14.4	14.1	13.8	13.6
6	23.3	23.3	23.3	23.3	22.5	21.3	20.3	19.5	18.9	18.3	17.9	17.5	17.2	16.9	16.6	16.3	16.0
7	19.8	19.8	19.8	19.8	19.2	18.1	17.3	16.6	16.0	15.6	15.2	14.9	14.6	14.4	14.1	13.8	13.6
8	19.8	19.8	19.8	19.8	19.2	18.1	17.3	16.6	16.0	15.6	15.2	14.9	14.6	14.4	14.1	13.8	13.6
9	19.8	19.8	19.8	19.8	19.2	18.1	17.3	16.6	16.0	15.6	15.2	14.9	14.6	14.4	14.1	13.8	13.6
10	23.3	23.3	23.3	23.3	22.5	21.3	20.3	19.5	18.9	18.3	17.9	17.5	17.2	16.9	16.6	16.3	16.0
11	26.1	26.1	26.1	26.1	26.0	25.2	24.3	23.5	22.8	22.2	21.6	21.1	20.7	20.2	19.8	...	...
12	26.1	26.1	26.1	26.1	25.2	23.9	22.7	21.9	21.1	20.5	20.0	19.6	19.3	18.9	18.6	18.2	17.8
13	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.8	19.3	19.0	18.7	18.5	18.3	18.2	18.1
14	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.8	19.3	19.0	18.7	18.5	18.3	18.2	18.1
15	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.8	19.3	19.0	18.7	18.5	18.3	18.2	18.1
16	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.8	19.3	19.0	18.7	18.5	18.3	18.2	18.1
17	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.8	19.3	19.0	18.7	18.5	18.3	18.2	18.1
18	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.8	19.3	19.0	18.7	18.5	18.3	18.2	18.1
19	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.8	19.3	19.0	18.7	18.5	18.3	18.2	18.1
20	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.8	19.3	19.0	18.7	18.5	18.3	18.2	18.1
21	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.8	19.3	19.0	18.7	18.5	18.3	18.2	18.1
22	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.8	19.3	19.0	18.7	18.5	18.3	18.2	18.1
23	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.8	16.4	16.1	15.9	15.7	15.6	15.5	15.4
24	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.8	19.3	19.0	18.7	18.5	18.3	18.2	18.1
25	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.8	16.4	16.1	15.9	15.7	15.6	15.5	15.4
26	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.8	19.3	19.0	18.7	18.5	18.3	18.2	18.1
27	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.8	16.4	16.1	15.9	15.7	15.6	15.5	15.4
28	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.8	19.3	19.0	18.7	18.5	18.3	18.2	18.1
29	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.8	16.4	16.1	15.9	15.7	15.6	15.5	15.4
30	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.8	16.4	16.1	15.9	15.7	15.6	15.5	15.4
31	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.8	19.3	19.0	18.7	18.5	18.3	18.2	18.1
32	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.8	19.3	19.0	18.7	18.5	18.3	18.2	18.1
33	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.8	19.3	19.0	18.7	18.5	18.3	18.2	18.1
34	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.8	16.4	16.1	15.9	15.7	15.6	15.5	15.4
35	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.8	19.3	19.0	18.7	18.5	18.3	18.2	18.1
36	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.8	16.4	16.1	15.9	15.7	15.6	15.5	15.4
37	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.8	19.3	19.0	18.7	18.5	18.3	18.2	18.1
38	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.8	16.4	16.1	15.9	15.7	15.6	15.5	15.4
39	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.8	19.3	19.0	18.7	18.5	18.3	18.2	18.1
40	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.8	16.4	16.1	15.9	15.7	15.6	15.5	15.4
41	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.8	16.4	16.1	15.9	15.7	15.6	15.5	15.4
42	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.8	19.3	19.0	18.7	18.5	18.3	18.2	18.1
43	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.8	19.3	19.0	18.7	18.5	18.3	18.2	18.1
44	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.8	19.3	19.0	18.7	18.5	18.3	18.2	18.1
45	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.8	16.4	16.1	15.9	15.7	15.6	15.5	15.4

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding											
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500
1	15.6	15.2	*12.4*	*9.8*	*7.7*	*6.1*	...	...	...	...	...	...
2	15.6	15.2	*12.4*	*9.8*	*7.7*	*6.1*	...	...	...	...	...	...
3	13.3	13.0	*10.5*	*8.3*	*6.6*	*5.2*	...	...	...	...	...	...
4	15.6	15.2	*12.4*	*9.8*	*7.7*	*6.1*	...	...	...	...	...	...
5	13.3	13.0	*10.5*	*8.3*	*6.6*	*5.2*	...	...	...	...	...	...
6	15.6	15.2	*12.4*	*9.8*	*7.7*	*6.1*	...	...	...	...	...	...
7	13.3	13.0	*10.5*	*8.3*	*6.6*	*5.2*	...	...	...	...	...	...
8	13.3	13.0	*10.5*	*8.3*	*6.6*	*5.2*	...	...	...	...	...	...
9	13.3	13.0	*10.5*	*8.3*	*6.6*	*5.2*	...	...	...	...	...	...
10	15.6	15.2	*12.4*	*9.8*	*7.7*	*6.1*	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...
12	17.4	17.0	*12.4*	...	...	...	...	...	...	...	...	...
13	18.1	*16.0*	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*
14	18.1	*16.0*	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*
15	18.1	*16.0*	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*
16	18.1	18.1	*17.4*	*14.1*	*10.5*	*7.9*	*5.9*	*4.4*	*3.2*	*2.5*	*1.8*	*1.3*
17	18.1	18.1	*17.4*	*14.1*	*10.5*	*7.9*	*5.9*	*4.4*	*3.2*	*2.5*	*1.8*	*1.3*
18	18.1	*16.0*	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*
19	18.1	18.1	*17.4*	*14.1*	*10.5*	*7.9*	*5.9*	*4.4*	*3.2*	*2.5*	*1.8*	*1.3*
20	18.1	*16.0*	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*
21	18.1	*16.0*	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*
22	18.1	*16.0*	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*
23	15.4	*13.6*	*10.3*	*7.8*	*5.2*	*3.8*	*2.8*	*1.9*	*1.3*	*1.0*	*0.76*	*0.68*
24	18.1	*16.0*	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*
25	15.4	*13.6*	*10.3*	*7.8*	*5.2*	*3.8*	*2.8*	*1.9*	*1.3*	*1.0*	*0.76*	*0.68*
26	18.1	*16.0*	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*
27	15.4	*13.6*	*10.3*	*7.8*	*5.2*	*3.8*	*2.8*	*1.9*	*1.3*	*1.0*	*0.76*	*0.68*
28	18.1	*16.0*	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*
29	15.4	*13.6*	*10.3*	*7.8*	*5.2*	*3.8*	*2.8*	*1.9*	*1.3*	*1.0*	*0.76*	*0.68*
30	15.4	*13.6*	*10.3*	*7.8*	*5.2*	*3.8*	*2.8*	*1.9*	*1.3*	*1.0*	*0.76*	*0.68*
31	18.1	18.1	*17.4*	*14.1*	*10.5*	*7.9*	*5.9*	*4.4*	*3.2*	*2.5*	*1.8*	*1.3*
32	18.1	18.1	*17.4*	*14.1*	*10.5*	*7.9*	*5.9*	*4.4*	*3.2*	*2.5*	*1.8*	*1.3*
33	18.1	18.1	*17.4*	*14.1*	*10.5*	*7.9*	*5.9*	*4.4*	*3.2*	*2.5*	*1.8*	*1.3*
34	15.4	15.4	*14.8*	*12.0*	*8.9*	*6.7*	*5.0*	*3.7*	*2.7*	*2.1*	*1.6*	*1.1*
35	18.1	18.1	*17.4*	*14.1*	*10.5*	*7.9*	*5.9*	*4.4*	*3.2*	*2.5*	*1.8*	*1.3*
36	15.4	15.4	*14.8*	*12.0*	*8.9*	*6.7*	*5.0*	*3.7*	*2.7*	*2.1*	*1.6*	*1.1*
37	18.1	18.1	*17.4*	*14.1*	*10.5*	*7.9*	*5.9*	*4.4*	*3.2*	*2.5*	*1.8*	*1.3*
38	15.4	15.4	*14.8*	*12.0*	*8.9*	*6.7*	*5.0*	*3.7*	*2.7*	*2.1*	*1.6*	*1.1*
39	18.1	18.1	*17.4*	*14.1*	*10.5*	*7.9*	*5.9*	*4.4*	*3.2*	*2.5*	*1.8*	*1.3*
40	15.4	15.4	*14.8*	*12.0*	*8.9*	*6.7*	*5.0*	*3.7*	*2.7*	*2.1*	*1.6*	*1.1*
41	15.4	15.4	*14.8*	*12.0*	*8.9*	*6.7*	*5.0*	*3.7*	*2.7*	*2.1*	*1.6*	*1.1*
42	18.1	*16.0*	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*
43	18.1	*16.0*	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*
44	18.1	*16.0*	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*
45	15.4	*13.6*	*10.3*	*7.8*	*5.2*	*3.8*	*2.8*	*1.9*	*1.3*	*1.0*	*0.76*	*0.68*

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/ Thickness, in.	P-No.	Group No.
1	18Cr–10Ni–Cb	Smls. pipe	SA–312	TP348	S34800	...	...	8	1
2	18Cr–10Ni–Cb	Wld. pipe	SA–312	TP348	S34800	...	...	8	1
3	18Cr–10Ni–Cb	Smls. pipe	SA–376	TP348	S34800	...	...	8	1
4	18Cr–10Ni–Cb	Fittings	SA–403	348	S34800	CR	...	8	1
5	18Cr–10Ni–Cb	Fittings	SA–403	348	S34800	WP–S	...	8	1
6	18Cr–10Ni–Cb	Wld. fittings	SA–403	348	S34800	WP–W	...	8	1
7	18Cr–10Ni–Cb	Wld. fittings	SA–403	348	S34800	WP–WX	...	8	1
8	18Cr–10Ni–Cb	Forgings	SA–182	F348H	S34809	...	$t \le 5$	8	1
9	18Cr–10Ni–Cb	Smls. tube	SA–213	TP348H	S34809	...	...	8	1
10	18Cr–10Ni–Cb	Wld. tube	SA–249	TP348H	S34809	...	...	8	1
11	18Cr–10Ni–Cb	Smls. pipe	SA–312	TP348H	S34809	...	...	8	1
12	18Cr–10Ni–Cb	Wld. pipe	SA–312	TP348H	S34809	...	...	8	1
13	18Cr–10Ni–Cb	Fittings	SA–403	348H	S34809	CR	...	8	1
14	18Cr–10Ni–Cb	Fittings	SA–403	348H	S34809	WP–S	...	8	1
15	18Cr–10Ni–Cb	Wld. fittings	SA–403	348H	S34809	WP–W	...	8	1
16	18Cr–10Ni–Cb	Wld. fittings	SA–403	348H	S34809	WP–WX	...	8	1
17	18Cr–10Ni–Ti	Smls. pipe	SA–312	TP321	S32100	...	$t > 3/8$	8	1
18	18Cr–10Ni–Ti	Smls. pipe	SA–376	TP321	S32100	...	$t > 3/8$	8	1
19	18Cr–10Ni–Ti	Smls. pipe	SA–312	TP321H	S32109	...	$t > 3/16$	8	1
20	18Cr–10Ni–Ti	Smls. pipe	SA–376	TP321H	S32109	...	$t > 3/8$	8	1
21	18Cr–10Ni–Ti	Forgings	SA–182	F321	S32100	...	$t > 5$	8	1
22	18Cr–10Ni–Ti	Forgings	SA–965	F321	S32100	...	...	8	1
23	18Cr–10Ni–Ti	Forgings	SA–182	F321H	S32109	...	$t > 5$	8	1
24	18Cr–10Ni–Ti	Forgings	SA–965	F321H	S32109	...	...	8	1
25	18Cr–10Ni–Ti	Plate	SA/EN 10028–7	X6CrNiTi18–10	...	...	≤3	8	1
26	18Cr–10Ni–Ti	Forgings	SA–182	F321	S32100	...	$t \le 5$	8	1
27	18Cr–10Ni–Ti	Smls. tube	SA–213	TP321	S32100	...	...	8	1
28	18Cr–10Ni–Ti	Plate	SA–240	321	S32100	...	...	8	1
29	18Cr–10Ni–Ti	Wld. tube	SA–249	TP321	S32100	...	...	8	1
30	18Cr–10Ni–Ti	Smls. pipe	SA–312	TP321	S32100	...	$t \le 3/8$	8	1
31	18Cr–10Ni–Ti	Wld. pipe	SA–312	TP321	S32100	...	...	8	1
32	18Cr–10Ni–Ti	Smls. pipe	SA–376	TP321	S32100	...	$t \le 3/8$	8	1
33	18Cr–10Ni–Ti	Fittings	SA–403	321	S32100	CR	...	8	1
34	18Cr–10Ni–Ti	Fittings	SA–403	321	S32100	WP–S	...	8	1
35	18Cr–10Ni–Ti	Wld. fittings	SA–403	321	S32100	WP–W	...	8	1
36	18Cr–10Ni–Ti	Wld. fittings	SA–403	321	S32100	WP–WX	...	8	1
37	18Cr–10Ni–Ti	Forgings	SA–182	F321H	S32109	...	$t \le 5$	8	1
38	18Cr–10Ni–Ti	Smls. tube	SA–213	TP321H	S32109	...	...	8	1
39	18Cr–10Ni–Ti	Plate	SA–240	321H	S32109	...	...	8	1
40	18Cr–10Ni–Ti	Wld. tube	SA–249	TP321H	S32109	...	...	8	1
41	18Cr–10Ni–Ti	Smls. pipe	SA–312	TP321H	S32109	...	$t \le 3/16$	8	1
42	18Cr–10Ni–Ti	Wld. pipe	SA–312	TP321H	S32109	...	$t \le 3/16$	8	1
43	18Cr–10Ni–Ti	Smls. pipe	SA–376	TP321H	S32109	...	$t \le 3/8$	8	1
44	18Cr–10Ni–Ti	Fittings	SA–403	321H	S32109	CR	...	8	1
45	18Cr–10Ni–Ti	Fittings	SA–403	321H	S32109	WP–S	...	8	1

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Maximum Use Temperature, °F	External Pressure Chart No.	Notes
1	75	30	1500	HA–2	G2, G3, T8
2	75	30	1500	HA–2	G2, G3, G6, T8
3	75	30	1500	HA–2	G2, G3, G4, T8
4	75	30	1500	HA–2	G1, G2, G6, T8
5	75	30	1500	HA–2	G1, G2, T8
6	75	30	1500	HA–2	G1, G2, G6, T8
7	75	30	1500	HA–2	G1, G2, G6, T8
8	75	30	1500	HA–2	G2, T9
9	75	30	1500	HA–2	G1, G2, T9
10	75	30	1500	HA–2	G2, G6, T9
11	75	30	1500	HA–2	G1, G2, T9
12	75	30	1500	HA–2	G1, G2, G6, T9
13	75	30	1500	HA–2	G1, G2, G6, T9
14	75	30	1500	HA–2	G1, G2, T9
15	75	30	1500	HA–2	G1, G2, G6, T9
16	75	30	1500	HA–2	G1, G2, G6, T9
17	70	25	1500	HA–2	G2, G3, T9
18	70	25	1500	HA–2	G2, G3, G4, T9
19	70	25	1500	HA–2	G2, T9
20	70	25	1500	HA–2	G1, G2, T9
21	70	30	1500	HA–2	G2, G3, T8
22	70	30	1500	HA–2	G2, G3, T8
23	70	30	1500	HA–2	G1, G2, T9
24	70	30	1500	HA–2	G1, G2, G3, T9
25	73	29	1022	HA–2	G2, G3, G16, T9
26	75	30	1500	HA–2	G2, G3, T8
27	75	30	1500	HA–2	G2, G3, T8
28	75	30	1500	HA–2	G2, G3, T8
29	75	30	1500	HA–2	G2, G3, G6, T8
30	75	30	1500	HA–2	G2, G3, T8
31	75	30	1500	HA–2	G2, G3, G6, T8
32	75	30	1500	HA–2	G2, G3, G4, T8
33	75	30	1500	HA–2	G2, G6, T8
34	75	30	1500	HA–2	G2, T8
35	75	30	1500	HA–2	G2, G6, T8
36	75	30	1500	HA–2	G2, G6, T8
37	75	30	1500	HA–2	G1, G2, T9
38	75	30	1500	HA–2	G1, G2, T9
39	75	30	1500	HA–2	G1, G2, T9
40	75	30	1500	HA–2	G2, G6, T9
41	75	30	1500	HA–2	G2, T9
42	75	30	1500	HA–2	G2, G6, T9
43	75	30	1500	HA–2	G1, G2, T9
44	75	30	1500	HA–2	G1, G2, G6, T9
45	75	30	1500	HA–2	G1, G2, T9

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900
1	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.8	19.3	19.0	18.7	18.5	18.3	18.2	18.1
2	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.8	16.4	16.1	15.9	15.7	15.6	15.5	15.4
3	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.8	19.3	19.0	18.7	18.5	18.3	18.2	18.1
4	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.8	16.4	16.1	15.9	15.7	15.6	15.5	15.4
5	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.8	19.3	19.0	18.7	18.5	18.3	18.2	18.1
6	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.8	16.4	16.1	15.9	15.7	15.6	15.5	15.4
7	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.8	16.4	16.1	15.9	15.7	15.6	15.5	15.4
8	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.8	19.3	19.0	18.7	18.5	18.3	18.2	18.1
9	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.8	19.3	19.0	18.7	18.5	18.3	18.2	18.1
10	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.8	16.4	16.1	15.9	15.7	15.6	15.5	15.4
11	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.8	19.3	19.0	18.7	18.5	18.3	18.2	18.1
12	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.8	16.4	16.1	15.9	15.7	15.6	15.5	15.4
13	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.8	16.4	16.1	15.9	15.7	15.6	15.5	15.4
14	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.8	19.3	19.0	18.7	18.5	18.3	18.2	18.1
15	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.8	16.4	16.1	15.9	15.7	15.6	15.5	15.4
16	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.8	16.4	16.1	15.9	15.7	15.6	15.5	15.4
17	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.6	16.1	15.6	15.2	14.9	14.6	14.3	14.1	13.9	13.8
18	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.6	16.1	15.6	15.2	14.9	14.6	14.3	14.1	13.9	13.8
19	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.6	16.1	15.6	15.2	14.9	14.6	14.3	14.1	13.9	13.8
20	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.6	16.1	15.6	15.2	14.9	14.6	14.3	14.1	13.9	13.8
21	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.3	18.8	18.3	17.9	17.5	17.2	16.9	16.7	16.5
22	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.3	18.8	18.3	17.9	17.5	17.2	16.9	16.7	16.5
23	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.3	18.8	18.3	17.9	17.5	17.2	16.9	16.7	16.5
24	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.3	18.8	18.3	17.9	17.5	17.2	16.9	16.7	16.5
25	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	18.7	18.1	17.7	17.2	16.9	16.6	16.4	16.2	16.0
26	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.3	18.8	18.3	17.9	17.5	17.2	16.9	16.7	16.5
27	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.3	18.8	18.3	17.9	17.5	17.2	16.9	16.7	16.5
28	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.3	18.8	18.3	17.9	17.5	17.2	16.9	16.7	16.5
29	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.4	16.0	15.5	15.2	14.9	14.6	14.4	14.2	14.1
30	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.3	18.8	18.3	17.9	17.5	17.2	16.9	16.7	16.5
31	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.4	16.0	15.5	15.2	14.9	14.6	14.4	14.2	14.1
32	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.3	18.8	18.3	17.9	17.5	17.2	16.9	16.7	16.5
33	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.4	16.0	15.5	15.2	14.9	14.6	14.4	14.2	14.1
34	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.3	18.8	18.3	17.9	17.5	17.2	16.9	16.7	16.5
35	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.4	16.0	15.5	15.2	14.9	14.6	14.4	14.2	14.1
36	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.4	16.0	15.5	15.2	14.9	14.6	14.4	14.2	14.1
37	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.3	18.8	18.3	17.9	17.5	17.2	16.9	16.7	16.5
38	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.3	18.8	18.3	17.9	17.5	17.2	16.9	16.7	16.5
39	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.3	18.8	18.3	17.9	17.5	17.2	16.9	16.7	16.5
40	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.4	16.0	15.5	15.2	14.9	14.6	14.4	14.2	14.1
41	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.3	18.8	18.3	17.9	17.5	17.2	16.9	16.7	16.5
42	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.4	16.0	15.5	15.2	14.9	14.6	14.4	14.2	14.1
43	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.3	18.8	18.3	17.9	17.5	17.2	16.9	16.7	16.5
44	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.4	16.0	15.5	15.2	14.9	14.6	14.4	14.2	14.1
45	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.3	18.8	18.3	17.9	17.5	17.2	16.9	16.7	16.5

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding											
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500
1	18.1	*16.0*	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*
2	15.4	*13.6*	*10.3*	*7.8*	*5.2*	*3.8*	*2.8*	*1.9*	*1.3*	*1.0*	*0.76*	*0.68*
3	18.1	*16.0*	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*
4	15.4	*13.6*	*10.3*	*7.8*	*5.2*	*3.8*	*2.8*	*1.9*	*1.3*	*1.0*	*0.76*	*0.68*
5	18.1	*16.0*	*12.1*	*9.1*	*6.1*	*4.4*	*3.3*	*2.2*	*1.5*	*1.2*	*0.90*	*0.80*
6	15.4	*13.6*	*10.3*	*7.8*	*5.2*	*3.8*	*2.8*	*1.9*	*1.3*	*1.0*	*0.76*	*0.68*
7	15.4	*13.6*	*10.3*	*7.8*	*5.2*	*3.8*	*2.8*	*1.9*	*1.3*	*1.0*	*0.76*	*0.68*
8	18.1	18.1	*17.4*	*14.1*	*10.5*	*7.9*	*5.9*	*4.4*	*3.2*	*2.5*	*1.8*	*1.3*
9	18.1	18.1	*17.4*	*14.1*	*10.5*	*7.9*	*5.9*	*4.4*	*3.2*	*2.5*	*1.8*	*1.3*
10	15.4	15.4	*14.8*	*12.0*	*8.9*	*6.7*	*5.0*	*3.7*	*2.7*	*2.1*	*1.6*	*1.1*
11	18.1	18.1	*17.4*	*14.1*	*10.5*	*7.9*	*5.9*	*4.4*	*3.2*	*2.5*	*1.8*	*1.3*
12	15.4	15.4	*14.8*	*12.0*	*8.9*	*6.7*	*5.0*	*3.7*	*2.7*	*2.1*	*1.6*	*1.1*
13	15.4	15.4	*14.8*	*12.0*	*8.9*	*6.7*	*5.0*	*3.7*	*2.7*	*2.1*	*1.6*	*1.1*
14	18.1	18.1	*17.4*	*14.1*	*10.5*	*7.9*	*5.9*	*4.4*	*3.2*	*2.5*	*1.8*	*1.3*
15	15.4	15.4	*14.8*	*12.0*	*8.9*	*6.7*	*5.0*	*3.7*	*2.7*	*2.1*	*1.6*	*1.1*
16	15.4	15.4	*14.8*	*12.0*	*8.9*	*6.7*	*5.0*	*3.7*	*2.7*	*2.1*	*1.6*	*1.1*
17	13.6	13.5	*9.6*	*6.9*	*5.0*	*3.6*	*2.6*	*1.7*	*1.1*	*0.80*	*0.50*	*0.30*
18	13.6	13.5	*9.6*	*6.9*	*5.0*	*3.6*	*2.6*	*1.7*	*1.1*	*0.80*	*0.50*	*0.30*
19	13.6	13.5	*12.3*	*9.1*	*6.9*	*5.4*	*4.1*	*3.2*	*2.5*	*1.9*	*1.5*	*1.1*
20	13.6	13.5	*12.3*	*9.1*	*6.9*	*5.4*	*4.1*	*3.2*	*2.5*	*1.9*	*1.5*	*1.1*
21	16.4	*16.2*	*9.6*	*6.9*	*5.0*	*3.6*	*2.6*	*1.7*	*1.1*	*0.80*	*0.50*	*0.30*
22	16.4	*16.2*	*9.6*	*6.9*	*5.0*	*3.6*	*2.6*	*1.7*	*1.1*	*0.80*	*0.50*	*0.30*
23	16.4	16.2	*12.3*	*9.1*	*6.9*	*5.4*	*4.1*	*3.2*	*2.5*	*1.9*	*1.5*	*1.1*
24	16.4	16.2	*12.3*	*9.1*	*6.9*	*5.4*	*4.1*	*3.2*	*2.5*	*1.9*	*1.5*	*1.1*
25	15.8	15.7	*9.6*	...	...	...	...	...	...	...	...	...
26	16.4	*16.2*	*9.6*	*6.9*	*5.0*	*3.6*	*2.6*	*1.7*	*1.1*	*0.80*	*0.50*	*0.30*
27	16.4	*16.2*	*9.6*	*6.9*	*5.0*	*3.6*	*2.6*	*1.7*	*1.1*	*0.80*	*0.50*	*0.30*
28	16.4	*16.2*	*9.6*	*6.9*	*5.0*	*3.6*	*2.6*	*1.7*	*1.1*	*0.80*	*0.50*	*0.30*
29	13.9	*13.8*	*8.2*	*5.9*	*4.3*	*3.1*	*2.2*	*1.4*	*0.94*	*0.68*	*0.43*	*0.26*
30	16.4	*16.2*	*9.6*	*6.9*	*5.0*	*3.6*	*2.6*	*1.7*	*1.1*	*0.80*	*0.50*	*0.30*
31	13.9	*13.8*	*8.2*	*5.9*	*4.3*	*3.1*	*2.2*	*1.4*	*0.94*	*0.68*	*0.43*	*0.26*
32	16.4	*16.2*	*9.6*	*6.9*	*5.0*	*3.6*	*2.6*	*1.7*	*1.1*	*0.80*	*0.50*	*0.30*
33	13.9	*13.8*	*8.2*	*5.9*	*4.3*	*3.1*	*2.2*	*1.4*	*0.94*	*0.68*	*0.43*	*0.26*
34	16.4	*16.2*	*9.6*	*6.9*	*5.0*	*3.6*	*2.6*	*1.7*	*1.1*	*0.80*	*0.50*	*0.30*
35	13.9	*13.8*	*8.2*	*5.9*	*4.3*	*3.1*	*2.2*	*1.4*	*0.94*	*0.68*	*0.43*	*0.26*
36	13.9	*13.8*	*8.2*	*5.9*	*4.3*	*3.1*	*2.2*	*1.4*	*0.94*	*0.68*	*0.43*	*0.26*
37	16.4	16.2	*12.3*	*9.1*	*6.9*	*5.4*	*4.1*	*3.2*	*2.5*	*1.9*	*1.5*	*1.1*
38	16.4	16.2	*12.3*	*9.1*	*6.9*	*5.4*	*4.1*	*3.2*	*2.5*	*1.9*	*1.5*	*1.1*
39	16.4	16.2	*12.3*	*9.1*	*6.9*	*5.4*	*4.1*	*3.2*	*2.5*	*1.9*	*1.5*	*1.1*
40	13.9	13.8	*10.5*	*7.7*	*5.9*	*4.6*	*3.5*	*2.7*	*2.1*	*1.6*	*1.3*	*0.94*
41	16.4	16.2	*12.3*	*9.1*	*6.9*	*5.4*	*4.1*	*3.2*	*2.5*	*1.9*	*1.5*	*1.1*
42	13.9	13.8	*10.5*	*7.7*	*5.9*	*4.6*	*3.5*	*2.7*	*2.1*	*1.6*	*1.3*	*0.94*
43	16.4	16.2	*12.3*	*9.1*	*6.9*	*5.4*	*4.1*	*3.2*	*2.5*	*1.9*	*1.5*	*1.1*
44	13.9	13.8	*10.5*	*7.7*	*5.9*	*4.6*	*3.5*	*2.7*	*2.1*	*1.6*	*1.3*	*0.94*
45	16.4	16.2	*12.3*	*9.1*	*6.9*	*5.4*	*4.1*	*3.2*	*2.5*	*1.9*	*1.5*	*1.1*

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/ Thickness, in.	P-No.	Group No.
1	18Cr–10Ni–Ti	Wld. fittings	SA–403	321H	S32109	WP–W	...	8	1
2	18Cr–10Ni–Ti	Wld. fittings	SA–403	321H	S32109	WP–WX	...	8	1
3	18Cr–13Ni–3Mo	Plate	SA–240	317	S31700	...	$t \le 5$	8	1
4	18Cr–13Ni–3Mo	Wld. tube	SA–249	TP317	S31700	...	...	8	1
5	18Cr–13Ni–3Mo	Smls. pipe	SA–312	TP317	S31700	...	$t \le 5$	8	1
6	18Cr–13Ni–3Mo	Wld. pipe	SA–312	TP317	S31700	...	$t \le 5$	8	1
7	18Cr–13Ni–3Mo	Fittings	SA–403	317	S31700	WP–S	...	8	1
8	18Cr–13Ni–3Mo	Plate	SA–240	317L	S31703	...	...	8	1
9	18Cr–13Ni–3Mo	Fittings	SA–403	317L	S31703	WP–S	...	8	1
10	18Cr–18Ni–2Si	Smls. tube	SA–213	XM–15	S38100	...	$t \le 5$	8	1
11	18Cr–18Ni–2Si	Plate	SA–240	XM–15	S38100	...	$t \le 5$	8	1
12	18Cr–18Ni–2Si	Wld. tube	SA–249	TPXM–15	S38100	...	$t \le 5$	8	1
13	18Cr–18Ni–2Si	Smls. pipe	SA–312	TPXM–15	S38100	...	$t \le 5$	8	1
14	18Cr–18Ni–2Si	Wld. pipe	SA–312	TPXM–15	S38100	...	$t \le 5$	8	1
15	21Cr–6Ni–9Mn	Forgings	SA–182	FXM–11	S21904	...	...	8	3
16	21Cr–6Ni–9Mn	Smls. pipe	SA–312	TPXM–11	S21904	...	...	8	3
17	21Cr–6Ni–9Mn	Wld. pipe	SA–312	TPXM–11	S21904	...	...	8	3
18	21Cr–6Ni–9Mn	Plate	SA–666	XM–11	S21904	...	...	8	3
19	21Cr–6Ni–9Mn	Forgings	SA–965	FXM–11	S21904	...	...	8	3
20	22Cr–5Ni–3Mo–N	Forgings	SA–182	F51	S31803	...	...	10H	1
21	22Cr–5Ni–3Mo–N	Plate	SA–240	...	S31803	...	...	10H	1
22	22Cr–5Ni–3Mo–N	Smls. tube	SA–789	...	S31803	...	...	10H	1
23	22Cr–5Ni–3Mo–N	Wld. tube	SA–789	...	S31803	...	...	10H	1
24	22Cr–5Ni–3Mo–N	Smls. pipe	SA–790	...	S31803	...	...	10H	1
25	22Cr–5Ni–3Mo–N	Wld. pipe	SA–790	...	S31803	...	...	10H	1
26	22Cr–5Ni–3Mo–N	Plate	SA–240	...	S32205	...	...	10H	1
27	22Cr–5Ni–3Mo–N	Smls. pipe	SA–790	...	S32205	...	...	10H	1
28	22Cr–5Ni–3Mo–N	Wld. pipe	SA–790	...	S32205	...	...	10H	1
29	22Cr–5Ni–3Mo–N	Forgings	SA–182	F60	S32205	...	...	10H	1
30	22Cr–5Ni–3Mo–N	Smls. tube	SA–789	...	S32205	...	O.D. ≤ 8	10H	1
31	22Cr–5Ni–3Mo–N	Wld. tube	SA–789	...	S32205	...	O.D. ≤ 8	10H	1
32	22Cr–13Ni–5Mn	Forgings	SA–182	FXM–19	S20910	...	...	8	3
33	22Cr–13Ni–5Mn	Plate	SA–240	XM–19	S20910	...	...	8	3
34	22Cr–13Ni–5Mn	Wld. tube	SA–249	TPXM–19	S20910	...	...	8	3
35	22Cr–13Ni–5Mn	Smls. pipe	SA–312	TPXM–19	S20910	...	...	8	3
36	22Cr–13Ni–5Mn	Wld. pipe	SA–312	TPXM–19	S20910	...	...	8	3
37	22Cr–13Ni–5Mn	Fittings	SA–403	XM–19	S20910	CR	...	8	3
38	22Cr–13Ni–5Mn	Wld. fittings	SA–403	XM–19	S20910	WP–W	...	8	3
39	22Cr–13Ni–5Mn	Wld. fittings	SA–403	XM–19	S20910	WP–WX	...	8	3
40	22Cr–13Ni–5Mn	Bar	SA–479	XM–19	S20910	...	...	8	3
41	22Cr–13Ni–5Mn	Forgings	SA–965	FXM–19	S20910	...	...	8	3
42	23Cr–4Ni–Mo–Cu–N	Plate	SA–240	...	S32304	...	...	10H	1
43	23Cr–12Ni	Fittings	SA–403	309	S30900	...	...	8	2
44	23Cr–12Ni	Fittings	SA–403	309	S30900	WP–S	...	8	2
45	23Cr–12Ni	Wld. fittings	SA–403	309	S30900	WP–W	...	8	2

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Maximum Use Temperature, °F	External Pressure Chart No.	Notes
1	75	30	1500	HA–2	G1, G2, G6, T9
2	75	30	1500	HA–2	G1, G2, G6, T9
3	75	30	1500	HA–2	G2, G3, T10
4	75	30	1500	HA–2	G2, G3, G6, T10
5	75	30	1500	HA–2	G2, G3, T10
6	75	30	1500	HA–2	G2, G3, G6, T10
7	75	30	1500	HA–2	G2, T10
8	75	30	850	HA–4	G2
9	75	30	850	HA–4	G2
10	75	30	1000	HA–2	G2, G3
11	75	30	1000	HA–2	G2, G3
12	75	30	1000	HA–2	G2, G3, G6
13	75	30	1000	HA–2	G2, G3
14	75	30	1000	HA–2	G2, G3, G6
15	90	50	600	HA–6	G2
16	90	50	600	HA–6	G2
17	90	50	600	HA–6	G2, G6
18	90	50	600	HA–6	G2
19	90	50	600	HA–6	G2
20	90	65	400	HA–5	G8
21	90	65	400	HA–5	G8
22	90	65	400	HA–5	G8
23	90	65	400	HA–5	G6, G8
24	90	65	400	HA–5	G8
25	90	65	400	HA–5	G6, G8
26	95	65	400	HA–5	G8
27	95	65	400	HA–5	G8
28	95	65	400	HA–5	G6, G8
29	95	70	400	HA–5	G8
30	95	70	400	HA–5	G8
31	95	70	400	HA–5	G6, G8
32	100	55	1200	HA–6	G2, T10
33	100	55	1200	HA–6	G2, T10
34	100	55	1200	HA–6	G2, G6, T10
35	100	55	1200	HA–6	G2, T10
36	100	55	1200	HA–6	G2, G6, T10
37	100	55	1200	HA–6	G2, G6, T10
38	100	55	1200	HA–6	G2, G6, T10
39	100	55	1200	HA–6	G2, G6, T10
40	100	55	1200	HA–6	G2, T10
41	100	55	1200	HA–6	G2, T10
42	87	58	600	HA–6	G2, G8
43	75	30	1500	HA–2	G2, G6, T7
44	75	30	1500	HA–2	G2, T7
45	75	30	1500	HA–2	G2, G6, T7

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900
1	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.4	16.0	15.5	15.2	14.9	14.6	14.4	14.2	14.1
2	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.4	16.0	15.5	15.2	14.9	14.6	14.4	14.2	14.1
3	20.0	20.0	20.0	20.0	20.0	20.0	19.3	18.6	18.0	17.4	17.0	16.6	16.3	16.1	15.9	15.7	15.6
4	17.0	17.0	17.0	17.0	17.0	17.0	16.4	15.8	15.3	14.8	14.5	14.1	13.9	13.7	13.5	13.4	13.2
5	20.0	20.0	20.0	20.0	20.0	20.0	19.3	18.6	18.0	17.4	17.0	16.6	16.3	16.1	15.9	15.7	15.6
6	17.0	17.0	17.0	17.0	17.0	17.0	16.4	15.8	15.3	14.8	14.5	14.1	13.9	13.7	13.5	13.4	13.2
7	20.0	20.0	20.0	20.0	20.0	20.0	19.3	18.6	18.0	17.4	17.0	16.6	16.3	16.1	15.9	15.7	15.6
8	20.0	20.0	20.0	20.0	20.0	19.6	18.9	18.2	17.7	17.3	16.9	16.5	16.2	15.8	15.5	15.2	...
9	20.0	20.0	20.0	20.0	20.0	19.6	18.9	18.2	17.7	17.3	16.9	16.5	16.2	15.8	15.5	15.2	...
10	20.0	20.0	20.0	20.0	20.0	19.3	18.6	18.0	17.5	17.0	16.6	16.2	15.8	15.5	15.2	14.9	14.6
11	20.0	20.0	20.0	20.0	20.0	19.3	18.6	18.0	17.5	17.0	16.6	16.2	15.8	15.5	15.2	14.9	14.6
12	17.0	17.0	17.0	17.0	17.0	16.4	15.8	15.3	14.8	14.4	14.1	13.8	13.5	13.2	12.9	12.6	12.4
13	20.0	20.0	20.0	20.0	20.0	19.3	18.6	18.0	17.5	17.0	16.6	16.2	15.8	15.5	15.2	14.9	14.6
14	17.0	17.0	17.0	17.0	17.0	16.4	15.8	15.3	14.8	14.4	14.1	13.8	13.5	13.2	12.9	12.6	12.4
15	33.3	33.3	33.3	32.0	29.7	27.9	26.4	25.3	24.4	23.7	23.1	...	...	...	...	...	...
16	33.3	33.3	33.3	32.0	29.7	27.9	26.4	25.3	24.4	23.7	23.1	...	...	...	...	...	...
17	28.3	28.3	28.3	27.2	25.3	23.7	22.5	21.5	20.7	20.1	19.7	...	...	...	...	...	...
18	33.3	33.3	33.3	32.0	29.7	27.9	26.4	25.3	24.4	23.7	23.1	...	...	...	...	...	...
19	33.3	33.3	33.3	32.0	29.7	27.9	26.4	25.3	24.4	23.7	23.1	...	...	...	...	...	...
20	37.5	37.5	37.5	37.0	35.8	34.9	34.2	...	...	...	...	...	...	...	...	...	...
21	37.5	37.5	37.5	37.0	35.8	34.9	34.2	...	...	...	...	...	...	...	...	...	...
22	37.5	37.5	37.5	37.0	35.8	34.9	34.2	...	...	...	...	...	...	...	...	...	...
23	31.9	31.9	31.9	31.5	30.5	29.7	29.0	...	...	...	...	...	...	...	...	...	...
24	37.5	37.5	37.5	37.0	35.8	34.9	34.2	...	...	...	...	...	...	...	...	...	...
25	31.9	31.9	31.9	31.9	31.9	31.9	31.9	...	...	...	...	...	...	...	...	...	...
26	39.6	...	38.5	...	35.8	...	34.2	...	...	...	...	...	...	...	...	...	...
27	39.6	...	38.5	...	35.8	...	34.2	...	...	...	...	...	...	...	...	...	...
28	33.6	...	32.7	...	30.5	...	29.0	...	...	...	...	...	...	...	...	...	...
29	39.6	...	39.6	...	38.6	...	36.8	...	...	...	...	...	...	...	...	...	...
30	39.6	...	39.6	...	38.6	...	36.8	...	...	...	...	...	...	...	...	...	...
31	33.6	...	33.6	...	32.8	...	31.3	...	...	...	...	...	...	...	...	...	...
32	36.7	36.7	36.7	36.7	36.7	36.7	36.7	35.8	35.0	34.3	33.7	33.1	32.6	32.2	31.8	31.4	31.1
33	36.7	36.7	36.7	36.7	36.7	36.7	36.7	35.8	35.0	34.3	33.7	33.1	32.6	32.2	31.8	31.4	31.1
34	31.2	31.2	31.2	31.2	31.2	31.2	31.2	30.4	29.7	29.1	28.6	28.2	27.7	27.4	27.0	26.7	26.4
35	36.7	36.7	36.7	36.7	36.7	36.7	36.7	35.8	35.0	34.3	33.7	33.1	32.6	32.2	31.8	31.4	31.1
36	31.2	31.2	31.2	31.2	31.2	31.2	31.2	30.4	29.7	29.1	28.6	28.2	27.7	27.4	27.0	26.7	26.4
37	31.2	31.2	31.2	31.2	31.2	31.2	31.2	30.4	29.7	29.1	28.6	28.2	27.7	27.4	27.0	26.7	26.4
38	31.2	31.2	31.2	31.2	31.2	31.2	31.2	30.4	29.7	29.1	28.6	28.2	27.7	27.4	27.0	26.7	26.4
39	31.2	31.2	31.2	31.2	31.2	31.2	31.2	30.4	29.7	29.1	28.6	28.2	27.7	27.4	27.0	26.7	26.4
40	36.7	36.7	36.7	36.7	36.7	36.7	36.7	35.8	35.0	34.3	33.7	33.1	32.6	32.2	31.8	31.4	31.1
41	36.7	36.7	36.7	36.7	36.7	36.7	36.7	35.8	35.0	34.3	33.7	33.1	32.6	32.2	31.8	31.4	31.1
42	36.3	35.0	33.2	31.9	30.9	30.1	29.6	29.3	28.9	28.5	28.1	...	...	...	...	...	...
43	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.9	16.5	16.2	15.9	15.7	15.5	15.3	15.1	14.8	14.6
44	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.9	19.4	19.1	18.8	18.5	18.2	18.0	17.7	17.5	17.2
45	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.9	16.5	16.2	15.9	15.7	15.5	15.3	15.1	14.8	14.6

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding											
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500
1	13.9	13.8	*10.5*	*7.7*	*5.9*	*4.6*	*3.5*	*2.7*	*2.1*	*1.6*	*1.3*	*0.94*
2	13.9	13.8	*10.5*	*7.7*	*5.9*	*4.6*	*3.5*	*2.7*	*2.1*	*1.6*	*1.3*	*0.94*
3	15.4	15.3	15.1	*12.4*	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*
4	13.1	13.0	12.9	*10.5*	*8.3*	*6.3*	*4.7*	*3.5*	*2.6*	*1.9*	*1.5*	*1.1*
5	15.4	15.3	15.1	*12.4*	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*
6	13.1	13.0	12.9	*10.5*	*8.3*	*6.3*	*4.7*	*3.5*	*2.6*	*1.9*	*1.5*	*1.1*
7	15.4	15.3	15.1	*12.4*	*9.8*	*7.4*	*5.5*	*4.1*	*3.1*	*2.3*	*1.7*	*1.3*
8	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...
10	14.3	14.0	...	...	...	...	...	...	...	...	...	...
11	14.3	14.0	...	...	...	...	...	...	...	...	...	...
12	12.1	11.9	...	...	...	...	...	...	...	...	...	...
13	14.3	14.0	...	...	...	...	...	...	...	...	...	...
14	12.1	11.9	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...
32	30.7	30.3	29.7	*20.4*	*13.0*	*8.3*	...	...	...	...	...	...
33	30.7	30.3	29.7	*20.4*	*13.0*	*8.3*	...	...	...	...	...	...
34	26.1	25.7	25.2	*17.3*	*11.1*	*7.1*	...	...	...	...	...	...
35	30.7	30.3	29.7	*20.4*	*13.0*	*8.3*	...	...	...	...	...	...
36	26.1	25.7	25.2	*17.3*	*11.1*	*7.1*	...	...	...	...	...	...
37	26.1	25.7	25.2	*17.3*	*11.1*	*7.1*	...	...	...	...	...	...
38	26.1	25.7	25.2	*17.3*	*11.1*	*7.1*	...	...	...	...	...	...
39	26.1	25.7	25.2	*17.3*	*11.1*	*7.1*	...	...	...	...	...	...
40	30.7	30.3	29.7	*20.4*	*13.0*	*8.3*	...	...	...	...	...	...
41	30.7	30.3	29.7	*20.4*	*13.0*	*8.3*	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...
43	*13.5*	*8.4*	*6.0*	*4.3*	*3.1*	*2.1*	*1.3*	*0.68*	*0.43*	*0.34*	*0.26*	*0.17*
44	*15.9*	*9.9*	*7.1*	*5.0*	*3.6*	*2.5*	*1.5*	*0.80*	*0.50*	*0.40*	*0.30*	*0.20*
45	*13.5*	*8.4*	*6.0*	*4.3*	*3.1*	*2.1*	*1.3*	*0.68*	*0.43*	*0.34*	*0.26*	*0.17*

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/ Thickness, in.	P-No.	Group No.
1	23Cr–12Ni	Wld. fittings	SA–403	309	S30900	WP–WX	...	8	2
2	23Cr–12Ni	Smls. tube	SA–213	TP309S	S30908	...	...	8	2
3	23Cr–12Ni	Plate	SA–240	309S	S30908	...	...	8	2
4	23Cr–12Ni	Wld. tube	SA–249	TP309S	S30908	...	...	8	2
5	23Cr–12Ni	Smls. pipe	SA–312	TP309S	S30908	...	...	8	2
6	23Cr–12Ni	Wld. pipe	SA–312	TP309S	S30908	...	...	8	2
7	23Cr–12Ni	Wld. pipe	SA–813	TP309S	S30908	...	...	8	2
8	23Cr–12Ni	Wld. pipe	SA–814	TP309S	S30908	...	...	8	2
9	23Cr–12Ni	Smls. tube	SA–213	TP309H	S30909	...	...	8	2
10	23Cr–12Ni	Plate	SA–240	309H	S30909	...	...	8	2
11	23Cr–12Ni	Wld. tube	SA–249	TP309H	S30909	...	...	8	2
12	23Cr–12Ni	Smls. pipe	SA–312	TP309H	S30909	...	...	8	2
13	23Cr–12Ni	Wld. pipe	SA–312	TP309H	S30909	...	...	8	2
14	23Cr–12Ni	Bar	SA–479	309H	S30909	...	...	8	2
15	23Cr–12Ni–Cb	Smls. tube	SA–213	TP309Cb	S30940	...	...	8	2
16	23Cr–12Ni–Cb	Plate	SA–240	309Cb	S30940	...	...	8	2
17	23Cr–12Ni–Cb	Wld. tube	SA–249	TP309Cb	S30940	...	...	8	2
18	23Cr–12Ni–Cb	Smls. pipe	SA–312	TP309Cb	S30940	...	...	8	2
19	23Cr–12Ni–Cb	Wld. pipe	SA–312	TP309Cb	S30940	...	...	8	2
20	23Cr–12Ni–Cb	Wld. pipe	SA–813	TP309Cb	S30940	...	...	8	2
21	23Cr–12Ni–Cb	Wld. pipe	SA–814	TP309Cb	S30940	...	...	8	2
22	24Cr–22Ni–6Mo–2W–Cu–N	Forgings	SA–182	F58	S31266	...	...	45	...
23	24Cr–22Ni–6Mo–2W–Cu–N	Smls. tube	SA–213	...	S31266	...	...	45	...
24	24Cr–22Ni–6Mo–2W–Cu–N	Plate	SA–240	...	S31266	...	...	45	...
25	24Cr–22Ni–6Mo–2W–Cu–N	Wld. tube	SA–249	...	S31266	...	...	45	...
26	24Cr–22Ni–6Mo–2W–Cu–N	Smls. pipe	SA–312	...	S31266	...	...	45	...
27	24Cr–22Ni–6Mo–2W–Cu–N	Wld. pipe	SA–312	...	S31266	...	...	45	...
28	24Cr–22Ni–6Mo–2W–Cu–N	Wld. pipe	SA–358	...	S31266	...	...	45	...
29	24Cr–22Ni–6Mo–2W–Cu–N	Smls. fittings	SA–403	...	S31266	...	...	45	...
30	24Cr–22Ni–6Mo–2W–Cu–N	Wld. fittings	SA–403	...	S31266	...	...	45	...
31	24Cr–22Ni–6Mo–2W–Cu–N	Bar, shapes	SA–479	...	S31266	...	...	45	...
32	24Cr–22Ni–6Mo–2W–Cu–N	Wld. pipe	SA–813	...	S31266	...	...	45	...
33	25Cr–5Ni–3Mo–2Cu	Plate	SA–240	255	S32550	...	...	10H	1
34	25Cr–6Ni–Mo–N	Plate	SA–240	...	S31200	...	...	10H	1
35	25Cr–12Ni	Castings	SA–351	CH8	J93400	...	...	8	2
36	25Cr–12Ni	Castings	SA–351	CH20	J93402	...	...	8	2
37	25Cr–20Ni	Castings	SA–351	CK20	J94202	...	...	8	2
38	25Cr–20Ni	Forgings	SA–182	F310	S31000	...	$t \le 5$	8	2
39	25Cr–20Ni	Forgings	SA–965	F310	S31000	...	...	8	2
40	25Cr–20Ni	Smls. tube	SA–213	TP310S	S31008	...	...	8	2
41	25Cr–20Ni	Plate	SA–240	310S	S31008	...	...	8	2
42	25Cr–20Ni	Wld. tube	SA–249	TP310S	S31008	...	...	8	2
43	25Cr–20Ni	Smls. pipe	SA–312	TP310S	S31008	...	...	8	2
44	25Cr–20Ni	Wld. pipe	SA–312	TP310S	S31008	...	...	8	2
45	25Cr–20Ni	Fittings	SA–403	310S	S31008	CR	...	8	2

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Maximum Use Temperature, °F	External Pressure Chart No.	Notes
1	75	30	1500	HA–2	G2, G6, T7
2	75	30	1500	HA–2	G2, G3, T7
3	75	30	1500	HA–2	G2, G3, T7
4	75	30	1500	HA–2	G2, G6, T7
5	75	30	1500	HA–2	G2, G3, T7
6	75	30	1500	HA–2	G2, G3, G6, T7
7	75	30	1500	HA–2	G2, G3, G6, T7
8	75	30	1500	HA–2	G2, G3, G6, T7
9	75	30	1500	HA–2	G2, T8
10	75	30	1500	HA–2	G2, G4, T8
11	75	30	1500	HA–2	G2, G6, T8
12	75	30	1500	HA–2	G2, T8
13	75	30	1500	HA–2	G2, G6, T8
14	75	30	1500	HA–2	G2, T8
15	75	30	1500	HA–2	G2, G3, T7
16	75	30	1500	HA–2	G2, G3, T7
17	75	30	1500	HA–2	G2, G3, G6, T7
18	75	30	1500	HA–2	G2, G3, T7
19	75	30	1500	HA–2	G2, G3, G6, T7
20	75	30	1500	HA–2	G2, G3, G6, T7
21	75	30	1500	HA–2	G2, G3, G6, T7
22	109	61	800	HA–10	G2, G8
23	109	61	800	HA–10	G2, G8
24	109	61	800	HA–10	G2, G8
25	109	61	800	HA–10	G2, G6, G8
26	109	61	800	HA–10	G2, G8
27	109	61	800	HA–10	G2, G6, G8
28	109	61	800	HA–10	G2, G6, G8
29	109	61	800	HA–10	G2, G8
30	109	61	800	HA–10	G2, G6, G8
31	109	61	800	HA–10	G2, G8
32	109	61	800	HA–10	G2, G6, G8
33	110	80	500	HA–5	G8
34	100	65	650	HA–5	G2, G8
35	65	28	1500	HA–3	G2, G3, G4, G8, T8
36	70	30	1500	HA–2	G2, T8
37	65	28	1500	HA–3	G2, T8
38	75	30	1500	HA–2	G2, G3, G5, G7, T7
39	75	30	1500	HA–2	G2, G3, G5, G7, T7
40	75	30	1500	HA–2	G2, G3, G5, G7, T7
41	75	30	1500	HA–2	G2, G3, G5, G7, T7
42	75	30	1500	HA–2	G2, G3, G5, G6, G7, T7
43	75	30	1500	HA–2	G2, G3, G5, G7, T7
44	75	30	100	HA–2	G2, G3, G5, G6, G7
45	75	30	1500	HA–2	G2, G6, T7

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900
1	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.9	16.5	16.2	15.9	15.7	15.5	15.3	15.1	14.8	14.6
2	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.9	19.4	19.1	18.8	18.5	18.2	18.0	17.7	17.5	17.2
3	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.9	19.4	19.1	18.8	18.5	18.2	18.0	17.7	17.5	17.2
4	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.9	16.5	16.2	15.9	15.7	15.5	15.3	15.1	14.8	14.6
5	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.9	19.4	19.1	18.8	18.5	18.2	18.0	17.7	17.5	17.2
6	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.9	16.5	16.2	15.9	15.7	15.5	15.3	15.1	14.8	14.6
7	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.9	16.5	16.2	15.9	15.7	15.5	15.3	15.1	14.8	14.6
8	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.9	16.5	16.2	15.9	15.7	15.5	15.3	15.1	14.8	14.6
9	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.9	19.4	19.1	18.8	18.5	18.2	18.0	17.7	17.5	17.2
10	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.9	19.4	19.1	18.8	18.5	18.2	18.0	17.7	17.5	17.2
11	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.9	16.5	16.2	15.9	15.7	15.5	15.3	15.1	14.8	14.6
12	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.9	19.4	19.1	18.8	18.5	18.2	18.0	17.7	17.5	17.2
13	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.9	16.5	16.2	15.9	15.7	15.5	15.3	15.1	14.8	14.6
14	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.9	19.4	19.1	18.8	18.5	18.2	18.0	17.7	17.5	17.2
15	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.9	19.4	19.1	18.8	18.5	18.2	18.0	17.7	17.5	17.2
16	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.9	19.4	19.1	18.8	18.5	18.2	18.0	17.7	17.5	17.2
17	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.9	16.5	16.2	15.9	15.7	15.5	15.3	15.1	14.8	14.6
18	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.9	19.4	19.1	18.8	18.5	18.2	18.0	17.7	17.5	17.2
19	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.9	16.5	16.2	15.9	15.7	15.5	15.3	15.1	14.8	14.6
20	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.9	16.5	16.2	15.9	15.7	15.5	15.3	15.1	14.8	14.6
21	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.9	16.5	16.2	15.9	15.7	15.5	15.3	15.1	14.8	14.6
22	40.7	40.7	40.7	40.7	40.7	40.7	40.7	40.7	40.7	40.7	40.7	40.6	40.4	40.3	40.1	...	...
23	40.7	40.7	40.7	40.7	40.7	40.7	40.7	40.7	40.7	40.7	40.7	40.6	40.4	40.3	40.1	...	...
24	40.7	40.7	40.7	40.7	40.7	40.7	40.7	40.7	40.7	40.7	40.7	40.6	40.4	40.3	40.1	...	...
25	34.6	34.6	34.6	34.6	34.6	34.6	34.6	34.6	34.6	34.6	34.6	34.5	34.4	34.2	34.1	...	...
26	40.7	40.7	40.7	40.7	40.7	40.7	40.7	40.7	40.7	40.7	40.7	40.6	40.4	40.3	40.1	...	...
27	34.6	34.6	34.6	34.6	34.6	34.6	34.6	34.6	34.6	34.6	34.6	34.5	34.4	34.2	34.1	...	...
28	34.6	34.6	34.6	34.6	34.6	34.6	34.6	34.6	34.6	34.6	34.6	34.5	34.4	34.2	34.1	...	...
29	40.7	40.7	40.7	40.7	40.7	40.7	40.7	40.7	40.7	40.7	40.7	40.6	40.4	40.3	40.1	...	...
30	34.6	34.6	34.6	34.6	34.6	34.6	34.6	34.6	34.6	34.6	34.6	34.5	34.4	34.2	34.1	...	...
31	40.7	40.7	40.7	40.7	40.7	40.7	40.7	40.7	40.7	40.7	40.7	40.6	40.4	40.3	40.1	...	...
32	34.6	34.6	34.6	34.6	34.6	34.6	34.6	34.6	34.6	34.6	34.6	34.5	34.4	34.2	34.1	...	...
33	45.8	45.8	45.8	44.7	42.9	41.4	40.3	39.6	39.1	...	...	...	...	...	...	...	...
34	41.7	41.7	41.7	41.7	41.7	41.7	41.7	41.7	40.9	40.1	39.2	38.0	...	...	...	...	...
35	18.7	18.7	18.7	18.7	18.7	18.6	18.2	17.9	17.7	17.4	17.1	16.7	16.3	15.9	15.4	14.9	14.4
36	20.0	20.0	20.0	20.0	20.0	19.9	19.5	19.2	18.9	18.6	18.3	17.9	17.5	17.0	16.5	16.0	15.4
37	18.7	18.7	18.7	18.7	18.7	18.6	18.2	17.9	17.7	17.4	17.1	16.7	16.3	15.9	15.4	14.9	14.4
38	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.8	19.3	18.9	18.5	18.2	17.9	17.7	17.4	17.2	16.9
39	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.8	19.3	18.9	18.5	18.2	17.9	17.7	17.4	17.2	16.9
40	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.8	19.3	18.9	18.5	18.2	17.9	17.7	17.4	17.2	16.9
41	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.8	19.3	18.9	18.5	18.2	17.9	17.7	17.4	17.2	16.9
42	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.8	16.4	16.0	15.7	15.5	15.2	15.0	14.8	14.6	14.4
43	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.8	19.3	18.9	18.5	18.2	17.9	17.7	17.4	17.2	16.9
44	17.0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
45	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.8	16.4	16.0	15.7	15.5	15.2	15.0	14.8	14.6	14.4

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding											
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500
1	*13.5*	*8.4*	*6.0*	*4.3*	*3.1*	*2.1*	*1.3*	*0.68*	*0.43*	*0.34*	*0.26*	*0.17*
2	*15.9*	*9.9*	*7.1*	*5.0*	*3.6*	*2.5*	*1.5*	*0.80*	*0.50*	*0.40*	*0.30*	*0.20*
3	*15.9*	*9.9*	*7.1*	*5.0*	*3.6*	*2.5*	*1.5*	*0.80*	*0.50*	*0.40*	*0.30*	*0.20*
4	*13.5*	*8.4*	*6.0*	*4.3*	*3.1*	*2.1*	*1.3*	*0.68*	*0.43*	*0.34*	*0.26*	*0.17*
5	*15.9*	*9.9*	*7.1*	*5.0*	*3.6*	*2.5*	*1.5*	*0.80*	*0.50*	*0.40*	*0.30*	*0.20*
6	*13.5*	*8.4*	*6.0*	*4.3*	*3.1*	*2.1*	*1.3*	*0.68*	*0.43*	*0.34*	*0.26*	*0.17*
7	*13.5*	*8.4*	*6.0*	*4.3*	*3.1*	*2.1*	*1.3*	*0.68*	*0.43*	*0.34*	*0.26*	*0.17*
8	*13.5*	*8.4*	*6.0*	*4.3*	*3.1*	*2.1*	*1.3*	*0.68*	*0.43*	*0.34*	*0.26*	*0.17*
9	16.9	*13.8*	*10.3*	*7.6*	*5.5*	*4.0*	*3.0*	*2.2*	*1.7*	*1.3*	*0.97*	*0.75*
10	16.9	*13.8*	*10.3*	*7.6*	*5.5*	*4.0*	*3.0*	*2.2*	*1.7*	*1.3*	*0.97*	*0.75*
11	14.4	*11.7*	*8.8*	*6.5*	*4.7*	*3.4*	*2.6*	*1.9*	*1.4*	*1.1*	*0.82*	*0.64*
12	16.9	*13.8*	*10.3*	*7.6*	*5.5*	*4.0*	*3.0*	*2.2*	*1.7*	*1.3*	*0.97*	*0.75*
13	14.4	*11.7*	*8.8*	*6.5*	*4.7*	*3.4*	*2.6*	*1.9*	*1.4*	*1.1*	*0.82*	*0.64*
14	16.9	*13.8*	*10.3*	*7.6*	*5.5*	*4.0*	*3.0*	*2.2*	*1.7*	*1.3*	*0.97*	*0.75*
15	*15.9*	*9.9*	*7.1*	*5.0*	*3.6*	*2.5*	*1.5*	*0.80*	*0.50*	*0.40*	*0.30*	*0.20*
16	*15.9*	*9.9*	*7.1*	*5.0*	*3.6*	*2.5*	*1.5*	*0.80*	*0.50*	*0.40*	*0.30*	*0.20*
17	*13.5*	*8.4*	*6.0*	*4.3*	*3.1*	*2.1*	*1.3*	*0.68*	*0.43*	*0.34*	*0.26*	*0.17*
18	*15.9*	*9.9*	*7.1*	*5.0*	*3.6*	*2.5*	*1.5*	*0.80*	*0.50*	*0.40*	*0.30*	*0.20*
19	*13.5*	*8.4*	*6.0*	*4.3*	*3.1*	*2.1*	*1.3*	*0.68*	*0.43*	*0.34*	*0.26*	*0.17*
20	*13.5*	*8.4*	*6.0*	*4.3*	*3.1*	*2.1*	*1.3*	*0.68*	*0.43*	*0.34*	*0.26*	*0.17*
21	*13.5*	*8.4*	*6.0*	*4.3*	*3.1*	*2.1*	*1.3*	*0.68*	*0.43*	*0.34*	*0.26*	*0.17*
22	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...
35	13.9	*11.1*	*8.5*	*6.5*	*5.0*	*3.8*	*2.9*	*2.3*	*1.8*	*1.3*	*0.90*	*0.80*
36	14.9	*11.1*	*8.5*	*6.5*	*5.0*	*3.8*	*2.9*	*2.3*	*1.8*	*1.3*	*0.90*	*0.80*
37	13.9	*11.3*	*9.8*	*8.5*	*7.3*	*6.0*	*4.8*	*3.5*	*2.4*	*1.6*	*1.1*	*0.80*
38	*15.9*	*9.9*	*7.1*	*5.0*	*3.6*	*2.5*	*1.5*	*0.80*	*0.50*	*0.40*	*0.30*	*0.20*
39	*15.9*	*9.9*	*7.1*	*5.0*	*3.6*	*2.5*	*1.5*	*0.80*	*0.50*	*0.40*	*0.30*	*0.20*
40	*15.9*	*9.9*	*7.1*	*5.0*	*3.6*	*2.5*	*1.5*	*0.80*	*0.50*	*0.40*	*0.30*	*0.20*
41	*15.9*	*9.9*	*7.1*	*5.0*	*3.6*	*2.5*	*1.5*	*0.80*	*0.50*	*0.40*	*0.30*	*0.20*
42	*13.5*	*8.4*	*6.0*	*4.3*	*3.1*	*2.1*	*1.3*	*0.68*	*0.43*	*0.34*	*0.26*	*0.17*
43	*15.9*	*9.9*	*7.1*	*5.0*	*3.6*	*2.5*	*1.5*	*0.80*	*0.50*	*0.40*	*0.30*	*0.20*
44	...	...	...	...	...	...	...	...	...	...	...	...
45	*13.5*	*8.4*	*6.0*	*4.3*	*3.1*	*2.1*	*1.3*	*0.68*	*0.43*	*0.34*	*0.26*	*0.17*

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/ Thickness, in.	P-No.	Group No.
1	25Cr–20Ni	Fittings	SA–403	310S	S31008	WP–S	...	8	2
2	25Cr–20Ni	Wld. fittings	SA–403	310S	S31008	WP–W	...	8	2
3	25Cr–20Ni	Wld. fittings	SA–403	310S	S31008	WP–WX	...	8	2
4	25Cr–20Ni	Wld. pipe	SA–813	TP310S	S31008	...	...	8	2
5	25Cr–20Ni	Wld. pipe	SA–814	TP310S	S31008	...	...	8	2
6	25Cr–20Ni	Smls. tube	SA–213	TP310H	S31009	...	...	8	2
7	25Cr–20Ni	Plate	SA–240	310H	S31009	...	...	8	2
8	25Cr–20Ni	Wld. tube	SA–249	TP310H	S31009	...	...	8	2
9	25Cr–20Ni	Smls. pipe	SA–312	TP310H	S31009	...	...	8	2
10	25Cr–20Ni	Wld. pipe	SA–312	TP310H	S31009	...	...	8	2
11	25Cr–20Ni–Cb	Wld. tube	SA–249	TP310Cb	S31040	...	...	8	2
12	25Cr–20Ni–Cb	Wld. pipe	SA–312	TP310Cb	S31040	...	...	8	2
13	25Cr–20Ni–Cb	Wld. pipe	SA–813	TP310Cb	S31040	...	...	8	2
14	25Cr–20Ni–Cb	Wld. pipe	SA–814	TP310Cb	S31040	...	...	8	2
15	25Cr–22Ni–2Mo–N	Forgings	SA–182	F310MoLN	S31050	...	...	8	2
16	25Cr–22Ni–2Mo–N	Smls. tube	SA–213	TP310MoLN	S31050	...	0.25 < *t* ≤ 1.25	8	2
17	25Cr–22Ni–2Mo–N	Wld. tube	SA–249	TP310MoLN	S31050	...	0.25 < *t* ≤ 1.25	8	2
18	25Cr–22Ni–2Mo–N	Wld. pipe	SA–312	TP310MoLN	S31050	...	0.25 < *t* ≤ 1.25	8	2
19	25Cr–22Ni–2Mo–N	Plate	SA–240	310MoLN	S31050	...	...	8	2
20	25Cr–22Ni–2Mo–N	Smls. tube	SA–213	TP310MoLN	S31050	...	*t* ≤ 0.25	8	2
21	25Cr–22Ni–2Mo–N	Wld. tube	SA–249	TP310MoLN	S31050	...	*t* ≤ 0.25	8	2
22	25Cr–22Ni–2Mo–N	Wld. pipe	SA–312	TP310MoLN	S31050	...	*t* ≤ 0.25	8	2
23	29Cr–6.5Ni–2Mo–N	Plate, sheet, strip	SA–240	...	S32906	...	*t* ≥ 0.40	10H	1
24	29Cr–6.5Ni–2Mo–N	Bar	SA–479	...	S32906	...	...	10H	1
25	29Cr–6.5Ni–2Mo–N	Smls. tube	SA–789	...	S32906	...	*t* ≥ 0.40	10H	1
26	29Cr–6.5Ni–2Mo–N	Smls. pipe	SA–790	...	S32906	...	*t* ≥ 0.40	10H	1
27	29Cr–6.5Ni–2Mo–N	Plate, sheet, strip	SA–240	...	S32906	...	*t* < 0.40	10H	1
28	29Cr–6.5Ni–2Mo–N	Smls. tube	SA–789	...	S32906	...	*t* < 0.40	10H	1
29	29Cr–6.5Ni–2Mo–N	Smls. pipe	SA–790	...	S32906	...	*t* < 0.40	10H	1

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Maximum Use Temperature, °F	External Pressure Chart No.	Notes
1	75	30	1500	HA–2	G2, T7
2	75	30	1500	HA–2	G2, G6, T7
3	75	30	1500	HA–2	G2, G6, T7
4	75	30	1500	HA–2	G2, G3, G5, G6, G7, T7
5	75	30	1500	HA–2	G2, G3, G5, G6, G7, T7
6	75	30	1500	HA–2	G2, T8
7	75	30	1500	HA–2	G2, T8
8	75	30	1500	HA–2	G2, G6, T8
9	75	30	1500	HA–2	G2, T8
10	75	30	1500	HA–2	G2, G6, T8
11	75	30	1500	HA–2	G2, G3, G5, G6, G7, T7
12	75	30	1500	HA–2	G2, G3, G5, G6, G7, T7
13	75	30	1500	HA–2	G2, G3, G5, G6, G7, T7
14	75	30	1500	HA–2	G2, G3, G5, G6, G7, T7
15	78	37	900	HA–2	...
16	78	37	900	HA–2	...
17	78	37	900	HA–2	G6
18	78	37	900	HA–2	G6
19	80	35	600	HA–2	...
20	84	39	900	HA–2	...
21	84	39	900	HA–2	G6
22	84	39	900	HA–2	G6
23	109	80	600	HA–5	G8
24	109	80	600	HA–5	G8
25	109	80	600	HA–5	G8
26	109	80	600	HA–5	G8
27	116	94	600	HA–5	G8
28	116	94	600	HA–5	G8
29	116	94	600	HA–5	G8

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900
1	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.8	19.3	18.9	18.5	18.2	17.9	17.7	17.4	17.2	16.9
2	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.8	16.4	16.0	15.7	15.5	15.2	15.0	14.8	14.6	14.4
3	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.8	16.4	16.0	15.7	15.5	15.2	15.0	14.8	14.6	14.4
4	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.8	16.4	16.0	15.7	15.5	15.2	15.0	14.8	14.6	14.4
5	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.8	16.4	16.0	15.7	15.5	15.2	15.0	14.8	14.6	14.4
6	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.8	19.3	18.9	18.5	18.2	17.9	17.7	17.4	17.2	16.9
7	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.8	19.3	18.9	18.5	18.2	17.9	17.7	17.4	17.2	16.9
8	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.8	16.4	16.0	15.7	15.5	15.2	15.0	14.8	14.6	14.4
9	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.8	19.3	18.9	18.5	18.2	17.9	17.7	17.4	17.2	16.9
10	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.8	16.4	16.0	15.7	15.5	15.2	15.0	14.8	14.6	14.4
11	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.8	16.4	16.0	15.7	15.5	15.2	15.0	14.8	14.6	14.4
12	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.8	16.4	16.0	15.7	15.5	15.2	15.0	14.8	14.6	14.4
13	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.8	16.4	16.0	15.7	15.5	15.2	15.0	14.8	14.6	14.4
14	17.0	17.0	17.0	17.0	17.0	17.0	17.0	16.8	16.4	16.0	15.7	15.5	15.2	15.0	14.8	14.6	14.4
15	24.7	24.7	24.7	24.7	24.7	24.7	24.0	23.3	22.7	22.1	21.5	21.0	20.4	19.9	19.4	18.9	18.5
16	24.7	24.7	24.7	24.7	24.7	24.7	24.0	23.3	22.7	22.1	21.5	21.0	20.4	19.9	19.4	18.9	18.5
17	21.0	21.0	21.0	21.0	21.0	21.0	20.4	19.8	19.3	18.8	18.3	17.8	17.4	16.9	16.5	16.1	15.7
18	21.0	21.0	21.0	21.0	21.0	21.0	20.4	19.8	19.3	18.8	18.3	17.8	17.4	16.9	16.5	16.1	15.7
19	23.3	23.3	23.3	23.3	23.3	23.3	22.7	22.0	21.4	20.9	20.3	...	...	...	...	...	...
20	26.0	26.0	26.0	26.0	26.0	26.0	25.3	24.5	23.9	23.3	22.7	22.1	21.5	21.0	20.5	20.0	19.5
21	22.1	22.1	22.1	22.1	22.1	22.1	21.5	20.9	20.3	19.8	19.3	18.8	18.3	17.8	17.4	17.0	16.6
22	22.1	22.1	22.1	22.1	22.1	22.1	21.5	20.9	20.3	19.8	19.3	18.8	18.3	17.8	17.4	17.0	16.6
23	45.4	45.4	45.4	43.5	41.6	40.6	40.0	...	37.9	36.8	36.8	...	...	...	...	...	...
24	45.4	45.4	45.4	43.5	41.6	40.6	40.0	...	37.9	36.8	36.8	...	...	...	...	...	...
25	45.4	45.4	45.4	43.5	41.6	40.6	40.0	...	37.9	36.8	36.8	...	...	...	...	...	...
26	45.4	45.4	45.4	43.5	41.6	40.6	40.0	...	37.9	36.8	36.8	...	...	...	...	...	...
27	48.3	48.3	48.3	48.3	48.3	47.7	47.0	...	44.6	43.3	43.3	...	...	...	...	...	...
28	48.3	48.3	48.3	48.3	48.3	47.7	47.0	...	44.6	43.3	43.3	...	...	...	...	...	...
29	48.3	48.3	48.3	48.3	48.3	47.7	47.0	...	44.6	43.3	43.3	...	...	...	...	...	...

Table 5A (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding											
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500
1	*15.9*	*9.9*	*7.1*	*5.0*	*3.6*	*2.5*	*1.5*	*0.80*	*0.50*	*0.40*	*0.30*	*0.20*
2	*13.5*	*8.4*	*6.0*	*4.3*	*3.1*	*2.1*	*1.3*	*0.68*	*0.43*	*0.34*	*0.26*	*0.17*
3	*13.5*	*8.4*	*6.0*	*4.3*	*3.1*	*2.1*	*1.3*	*0.68*	*0.43*	*0.34*	*0.26*	*0.17*
4	*13.5*	*8.4*	*6.0*	*4.3*	*3.1*	*2.1*	*1.3*	*0.68*	*0.43*	*0.34*	*0.26*	*0.17*
5	*13.5*	*8.4*	*6.0*	*4.3*	*3.1*	*2.1*	*1.3*	*0.68*	*0.43*	*0.34*	*0.26*	*0.17*
6	16.7	*13.8*	*10.3*	*7.6*	*5.5*	*4.0*	*3.0*	*2.2*	*1.7*	*1.3*	*0.97*	*0.75*
7	16.7	*13.8*	*10.3*	*7.6*	*5.5*	*4.0*	*3.0*	*2.2*	*1.7*	*1.3*	*0.97*	*0.75*
8	14.2	*11.7*	*8.8*	*6.5*	*4.7*	*3.4*	*2.6*	*1.9*	*1.4*	*1.1*	*0.82*	*0.64*
9	16.7	*13.8*	*10.3*	*7.6*	*5.5*	*4.0*	*3.0*	*2.2*	*1.7*	*1.3*	*0.97*	*0.75*
10	14.2	*11.7*	*8.8*	*6.5*	*4.7*	*3.4*	*2.6*	*1.9*	*1.4*	*1.1*	*0.82*	*0.64*
11	*13.5*	*8.4*	*6.0*	*4.3*	*3.1*	*2.1*	*1.3*	*0.68*	*0.43*	*0.34*	*0.26*	*0.17*
12	*13.5*	*8.4*	*6.0*	*4.3*	*3.1*	*2.1*	*1.3*	*0.68*	*0.43*	*0.34*	*0.26*	*0.17*
13	*13.5*	*8.4*	*6.0*	*4.3*	*3.1*	*2.1*	*1.3*	*0.68*	*0.43*	*0.34*	*0.26*	*0.17*
14	*13.5*	*8.4*	*6.0*	*4.3*	*3.1*	*2.1*	*1.3*	*0.68*	*0.43*	*0.34*	*0.26*	*0.17*
15	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...

NOTES TO TABLE 5A

GENERAL NOTES

(a) The following abbreviations are used: NT, Normalized and tempered; QT, Quenched and tempered; Smls., Seamless; Temp., Temperature; and Wld., Welded.

(b) An alternative typeface is used for stress values obtained from time–dependent properties (see Notes T1 through T10).

(c) Where specifications, grades, classes, and types are listed in this Table, and where the material specification in Section II, Part A or Part B is a dual–unit specification (e.g., SA–516/SA–516M), the values listed in this Table shall be applicable to either the customary U.S. version of the material specification or the SI units version of the material specification. For example, the values listed for SA–516 Grade 70 shall be used when SA–516M Grade 485 is used in construction.

(d) The values in this Table may be interpolated to determine values for intermediate temperatures. The values at intermediate temperatures shall be rounded to the same number of decimal places as the value at the higher temperature between which values are being interpolated. The rounding rule is: when the next digit beyond the last place to be retained is less than 5, retain unchanged the digit in the last place retained; when the digit next beyond the last place to be retained is 5 or greater, increase by 1 the digit in the last place retained.

(e) The properties of steels are influenced by the processing history, heat treatment, melting practice, and level of residual elements. See Nonmandatory Appendix A for more information.

(f) Where a size limit appears in the Size/Thickness column, the limit applies to the dimension appropriate to the product form: wall thickness of tubing, pipe, pipe fittings, and hollow forgings; thickness of plate, flat bar and forgings, and polygonal bar; diameter of solid bar and bolting; and thickest cross–section of other pressure parts, e.g., castings and forgings.

NOTES – GENERAL REQUIREMENTS

G1 For temperatures above 1000°F, these stress values may be used only if the material is heat treated by heating to a minimum temperature of 2000°F, and quenching in water or rapidly cooling by other means.

G2 Due to the relatively low yield strength of these materials, these higher stress values were established at temperatures where the short–time tensile properties govern to permit the use of these alloys where slightly greater deformation is acceptable. The stress values in this range exceed $66\frac{2}{3}$% but do not exceed 90% of the yield strength at temperature. Use of these stresses may result in dimensional changes due to permanent strain. These stress values are not recommended for the flanges of gasketed joints or other applications where slight amounts of distortion can cause leakage or malfunction. Table Y–2 lists multiplying factors that, when applied to the yield strength values shown in Table Y–1, will give allowable stress values that will result in lower levels of permanent strain.

G3 At temperatures over 1000°F, these stress values apply only when the carbon is 0.04% or higher. This note is applicable only when stresses above 1000°F are published.

G4 For temperatures above 1000°F, these stress values may be used only if the material has been heat treated by heating to a minimum temperature of 1900°F and quenching in water or rapidly cooling by other means. This note is applicable only when stresses above 1000°F are published.

G5 These stress values at temperatures of 1050°F and above should be used only when assurance is provided that the steel has a predominant grain size not finer than ASTM No. 6. This note is applicable only when stresses above 1000°F are published.

G6 A quality factor of 0.85 has been applied in arriving at the maximum allowable stress values for this material.

G7 These stress values shall be considered basic values to be used when no effort is made to control or check the grain size of the steel.

G8 This steel may be expected to develop embrittlement after service at moderately elevated temperature; see Nonmandatory Appendix A, A–207 and A–208.

G9 The tensile strength shall not be in excess of 20,000 psi above the specified minimum.

G10 All forgings shall have a maximum tensile strength not in excess of 25 ksi above the specified minimum.

G11 SA–723 is exempt from the requirement in Section VIII, Division 2, 6.7.6.3(b) that the average of the individual Brinell hardness numbers shall not be more than 10% below or 25% above the number corresponding to the tensile strength.

G12 See Section VIII, Division 2, 3.4.

G13 Upon prolonged exposure to temperatures above 800°F, the carbide phase of carbon steel may be converted to graphite. See Nonmandatory Appendix A, A–201 and A–202.

G14 Upon prolonged exposure to temperatures above 875°F, the carbide phase of carbon–molybdenum steel may be converted to graphite. See Nonmandatory Appendix A, A–201 and A–202.

G15 This material may be susceptible to temper embrittlement. See Nonmandatory Appendix A, A–203.

G16 These stresses apply to all product forms (C, H, and P) as defined in SA/EN 10028–7.

NOTES – HEAT TREATMENT REQUIREMENTS

H1 Annealed.

H2 Normalized, normalized and tempered, or quenched and tempered.

H3 For applications involving consideration of heat treatment after forming or welding, see Section VIII, Division 2, Table 6.15 for P–No. 10K, Group No. 1 materials.

H4 Liquid quenched and tempered.

NOTES – SIZE REQUIREMENTS

S1 The maximum thickness of forgings shall not exceed $3\frac{3}{4}$ in. (4 in. as heat treated).

S2 The maximum section thickness shall not exceed 3 in. for double–normalized–and–tempered forgings, or 5 in. for quenched–and–tempered forgings.

S3 Both NPS 8 and larger, and schedule 140 and heavier.

S4 Either NPS 8 and larger and less than schedule 140 wall, or less than NPS 8 and all wall thicknesses.

NOTES TO TABLE 5A (CONT'D)

NOTES – TIME–DEPENDENT PROPERTIES

T1 Allowable stresses for temperatures of 650°F and above are values obtained from time–dependent properties.
T2 Allowable stresses for temperatures of 700°F and above are values obtained from time–dependent properties.
T3 Allowable stresses for temperatures of 750°F and above are values obtained from time–dependent properties.
T4 Allowable stresses for temperatures of 800°F and above are values obtained from time–dependent properties.
T5 Allowable stresses for temperatures of 850°F and above are values obtained from time–dependent properties.
T6 Allowable stresses for temperatures of 900°F and above are values obtained from time–dependent properties.
T7 Allowable stresses for temperatures of 950°F and above are values obtained from time–dependent properties.
T8 Allowable stresses for temperatures of 1000°F and above are values obtained from time–dependent properties.
T9 Allowable stresses for temperatures of 1050°F and above are values obtained from time–dependent properties.
T10 Allowable stresses for temperatures of 1100°F and above are values obtained from time–dependent properties.

NOTES – WELDING REQUIREMENTS

W1 Not for welded construction.
W2 Welding is not permitted when carbon content exceeds 0.35% by ladle analysis except for limited types of welding, as allowed in Section VIII, Division 2, Part 6.
W3 Nonwelded, or welded if the tensile strength of the Section IX reduced section tension test is not less than 100 ksi.
W4 Welded, with the tensile strength of the Section IX reduced section tension test less than 100 ksi but not less than 95 ksi.
W5 In welded construction, for temperatures above 850°F, the weld metal shall have a carbon content of greater than 0.05%.
W6 Section IX, QW–250 Variables QW–404.12, QW–406.3, QW–407.2, and QW–409.1 shall also apply to this material. These variables shall be applied in accordance with the rules for welding of Section VIII, Division 2, Part 6.
W7 The following, in addition to the variables in Section IX, QW–250, shall be considered as essential variables requiring requalification of the welding procedure:

(a) An increase in the maximum or a decrease in the minimum specified preheat or interpass temperatures. The specified range of preheat temperatures shall not exceed 150°F.

(b) A change in the thickness T of the welding procedure qualification test plate as follows:

(1) For welded joints that are quenched and tempered after welding, any increase in thickness (the minimum thickness qualified in all cases is $\frac{1}{4}$ in.).

(2) For welded joints that are not quenched and tempered after welding, any change as follows:

(-a) for T less than $\frac{5}{8}$ in., any decrease in thickness (the maximum thickness qualified is $2T$);

(-b) for T equal to $\frac{5}{8}$ in. and over, any departure from the range of $\frac{5}{8}$ in. to $2T$.

(21)

Table 5B
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Alloy Desig./UNS No.	Class/Condition/ Temper
1	...	Drawn smls. tube	SB–210	Alclad 3003	O
2	...	Drawn smls. tube	SB–210	Alclad 3003	H113
3	...	Smls. extr. tube	SB–241	Alclad 3003	O
4	...	Smls. extr. tube	SB–241	Alclad 3003	H112
(21) 5	...	Plate, sheet	SB–209	A93003	O
(21) 6	...	Plate, sheet	SB–209	A93003	H112
(21) 7	...	Plate, sheet	SB–209	A93003	H112
(21) 8	...	Plate, sheet	SB–209	A93003	H112
9	...	Drawn smls. tube	SB–210	A93003	O
10	...	Drawn smls. tube	SB–210	A93003	H113
11	...	Bar, rod, shapes	SB–221	A93003	O
12	...	Bar, rod, shapes	SB–221	A93003	H112
13	...	Smls. extr. tube	SB–241	A93003	O
14	...	Smls. pipe	SB–241	A93003	H112
15	...	Smls. extr. tube	SB–241	A93003	H112
16	...	Plate, sheet	SB–209	A93004	O
17	...	Plate, sheet	SB–209	A93004	H112
18	...	Plate, sheet	SB–209	A95052	O
19	...	Plate, sheet	SB–209	A95052	H112
20	...	Plate, sheet	SB–209	A95052	H112
21	...	Plate, sheet	SB–209	A95083	O
22	...	Plate, sheet	SB–209	A95083	O
23	...	Plate, sheet	SB–209	A95083	O
24	...	Plate, sheet	SB–209	A95083	O
25	...	Plate, sheet	SB–209	A95083	O
26	...	Plate, sheet	SB–209	A95083	H112
27	...	Plate, sheet	SB–209	A95083	H112
28	...	Bar, rod, shapes	SB–221	A95083	H111
29	...	Smls. extr. tube	SB–241	A95083	H111
30	...	Plate, sheet	SB–209	A95086	O
31	...	Plate, sheet	SB–209	A95086	H112
32	...	Plate, sheet	SB–209	A95086	H112
33	...	Plate, sheet	SB–209	A95086	H112
34	...	Plate, sheet	SB–209	A95086	H112
35	...	Plate, sheet	SB–209	A95454	O
36	...	Plate, sheet	SB–209	A95454	H112
37	...	Plate, sheet	SB–209	A95454	H112
38	...	Bar, rod, shapes	SB–221	A95454	O
39	...	Bar, rod, shapes	SB–221	A95454	H112
40	...	Smls. extr. tube	SB–241	A95454	O
41	...	Smls. extr. tube	SB–241	A95454	H112
42	...	Plate, sheet	SB–209	A96061	T4
43	...	Plate, sheet	SB–209	A96061	T451
44	...	Plate, sheet	SB–209	A96061	T6
45	...	Plate, sheet	SB–209	A96061	T651

Table 5B
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Nonferrous Materials

Line No.	Size/ Thickness, in.	P-No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Maximum Use Temperature, °F	External Pressure Chart No.	Notes
1	0.010 ≤ *t* ≤ 0.5	21	13	4.5	400	NFA–7	G4, T3
2	0.050 ≤ *t* ≤ 0.5	21	13	4.5	400	NFA–7	G4, T3, W2
3	...	21	13	4.5	400	NFA–7	G4, T3
4	...	21	13	4.5	400	NFA–7	G4, T3, W2
5	0.006 ≤ *t* ≤ 3	21	14	5	400	NFA–1	G4, T4
6	0.250 ≤ *t* < 0.5	21	17	10	400	NFA–1	G4, T2, W2
7	0.5 ≤ *t* ≤ 2	21	15	6	400	NFA–1	G4, T2, W2
8	2 < *t* ≤ 3	21	14.5	6	400	NFA–1	G4, T2, W2
9	0.010 ≤ *t* ≤ 0.5	21	14	5	400	NFA–1	G4, T2
10	0.010 ≤ *t* ≤ 0.5	21	14	5	400	NFA–1	G4, T2, W2
11	...	21	14	5	400	NFA–1	G2, G4, T2
12	...	21	14	5	400	NFA–1	G2, G4, T2, W2
13	...	21	14	5	400	NFA–1	G4, T2
14	*t* ≥ 1	21	14	5	400	NFA–1	G4, T2
15	...	21	14	5	400	NFA–1	G4, T2, W2
16	0.006 ≤ *t* ≤ 3	22	22	8.5	400	NFA–3	G4, T3
17	0.250 ≤ *t* ≤ 3	22	23	9	400	NFA–3	G4, T2, W2
18	0.051 ≤ *t* ≤ 3	22	25	9.5	400	NFA–8	G4, T2
19	0.25 ≤ *t* < 0.5	22	28	16	400	NFA–8	G4, T2, W2
20	0.5 ≤ *t* ≤ 3	22	25	9.5	400	NFA–8	G4, T2, W2
21	0.051 ≤ *t* ≤ 1.5	25	40	18	150	NFA–11	G4, G6
22	1.5 < *t* ≤ 3	25	39	17	150	NFA–11	G4, G6
23	3 < *t* ≤ 5	25	38	16	150	NFA–11	G4, G6
24	5 < *t* ≤ 7	25	37	15	150	NFA–11	G4, G6
25	7 < *t* ≤ 8	25	36	14	150	NFA–11	G4, G6
26	0.25 ≤ *t* ≤ 1.5	25	40	18	150	NFA–11	G4, G6, W2
27	1.5 < *t* ≤ 3	25	39	17	150	NFA–11	G4, G6, W2
28	*t* ≤ 5	25	40	24	150	NFA–11	G2, G4, G6, W2
29	...	25	40	24	150	NFA–11	G4, G6, W2
30	0.051 ≤ *t* ≤ 2	25	35	14	150	NFA–9	G4, G6
31	0.063 ≤ *t* < 0.5	25	36	18	150	NFA–9	G4, G6, W2
32	0.5 ≤ *t* < 1	25	35	16	150	NFA–9	G4, G6, W2
33	1 < *t* ≤ 2	25	35	14	150	NFA–9	G4, G6, W2
34	2 < *t* ≤ 3	25	34	14	150	NFA–9	G4, G6, W2
35	0.051 ≤ *t* ≤ 3	22	31	12	400	NFA–6	G4, T1
36	0.250 ≤ *t* < 0.5	22	32	18	400	NFA–6	G4, T2, W2
37	0.5 ≤ *t* ≤ 3	22	31	12	400	NFA–6	G4, T1, W2
38	*t* ≤ 5	22	31	12	400	NFA–6	G2, G4, T1
39	*t* ≤ 5	22	31	12	400	NFA–6	G2, G4, T1, W2
40	*t* ≤ 5	22	31	12	400	NFA–6	G4, T1
41	*t* ≤ 5	22	31	12	400	NFA–6	G4, T1, W2
42	0.051 ≤ *t* < 0.25	23	30	16	400	NFA–13	G4, G8, T4, W3
43	0.25 ≤ *t* ≤ 3	23	30	16	400	NFA–13	G4, G8, T4, W3
44	0.051 ≤ *t* < 0.25	23	42	35	400	NFA–12	G4, G8, T2, W3
45	0.25 ≤ *t* ≤ 4	23	42	35	400	NFA–12,13	G4, G8, T2, W3, W4

Table 5B
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Nonferrous Materials

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900
1	3.0	2.9	2.8	2.7	2.5	*1.9*	*1.5*	...	...	...	...	...	...	...	...	...	...
2	3.0	2.9	2.8	2.7	2.5	*1.9*	*1.5*	...	...	...	...	...	...	...	...	...	...
3	3.0	2.9	2.8	2.7	2.5	*1.9*	*1.5*	...	...	...	...	...	...	...	...	...	...
4	3.0	2.9	2.8	2.7	2.5	*1.9*	*1.5*	...	...	...	...	...	...	...	...	...	...
5	3.3	3.2	3.1	3.0	2.8	2.6	*2.3*	...	...	...	...	...	...	...	...	...	...
6	6.7	6.4	6.3	6.0	*2.7*	*1.9*	*1.5*	...	...	...	...	...	...	...	...	...	...
7	4.0	3.9	3.8	3.6	*2.7*	*1.9*	*1.5*	...	...	...	...	...	...	...	...	...	...
8	4.0	3.8	3.8	3.6	*2.7*	*1.9*	*1.5*	...	...	...	...	...	...	...	...	...	...
9	3.3	3.2	3.1	3.0	*2.7*	*1.9*	*1.5*	...	...	...	...	...	...	...	...	...	...
10	3.3	3.2	3.1	3.0	*2.7*	*1.9*	*1.5*	...	...	...	...	...	...	...	...	...	...
11	3.3	3.2	3.1	3.0	*2.7*	*1.9*	*1.5*	...	...	...	...	...	...	...	...	...	...
12	3.3	3.2	3.1	3.0	*2.7*	*1.9*	*1.5*	...	...	...	...	...	...	...	...	...	...
13	3.3	3.2	3.1	3.0	*2.7*	*1.9*	*1.5*	...	...	...	...	...	...	...	...	...	...
14	3.3	3.2	3.1	3.0	*2.7*	*1.9*	*1.5*	...	...	...	...	...	...	...	...	...	...
15	3.3	3.2	3.1	3.0	*2.7*	*1.9*	*1.5*	...	...	...	...	...	...	...	...	...	...
16	5.7	5.7	5.7	5.7	5.7	*3.8*	*2.3*	...	...	...	...	...	...	...	...	...	...
17	6.0	6.0	6.0	6.0	*5.7*	*3.8*	*2.3*	...	...	...	...	...	...	...	...	...	...
18	6.3	6.3	6.3	6.3	*6.1*	*4.1*	*2.3*	...	...	...	...	...	...	...	...	...	...
19	10.7	10.7	10.7	10.7	*6.1*	*4.1*	*2.3*	...	...	...	...	...	...	...	...	...	...
20	6.3	6.3	6.3	6.3	*6.1*	*4.1*	*2.3*	...	...	...	...	...	...	...	...	...	...
21	12.0	12.0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
22	11.3	11.3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
23	10.7	10.7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
24	10.0	10.0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
25	9.3	9.3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
26	12.0	12.0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
27	11.3	11.3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
28	16.0	16.0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
29	16.0	16.0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
30	9.3	9.3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
31	12.0	12.0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
32	10.7	10.7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
33	9.3	9.3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
34	9.3	9.3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
35	8.0	8.0	8.0	*7.5*	*5.5*	*4.1*	*3.0*	...	...	...	...	...	...	...	...	...	...
36	12.0	12.0	12.0	12.0	*5.5*	*4.1*	*3.0*	...	...	...	...	...	...	...	...	...	...
37	8.0	8.0	8.0	*7.5*	*5.5*	*4.1*	*3.0*	...	...	...	...	...	...	...	...	...	...
38	8.0	8.0	8.0	*7.5*	*5.5*	*4.1*	*3.0*	...	...	...	...	...	...	...	...	...	...
39	8.0	8.0	8.0	*7.5*	*5.5*	*4.1*	*3.0*	...	...	...	...	...	...	...	...	...	...
40	8.0	8.0	8.0	*7.5*	*5.5*	*4.1*	*3.0*	...	...	...	...	...	...	...	...	...	...
41	8.0	8.0	8.0	*7.5*	*5.5*	*4.1*	*3.0*	...	...	...	...	...	...	...	...	...	...
42	10.7	10.5	10.4	10.2	10.2	10.2	*5.2*	...	...	...	...	...	...	...	...	...	...
43	10.7	10.5	10.4	10.2	10.2	10.2	*5.2*	...	...	...	...	...	...	...	...	...	...
44	17.5	17.5	17.5	17.5	*16.7*	*10.7*	*5.2*	...	...	...	...	...	...	...	...	...	...
45	17.5	17.5	17.5	17.5	*16.7*	*10.7*	*5.2*	...	...	...	...	...	...	...	...	...	...

Table 5B
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Nonferrous Materials

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding															
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	

Table 5B (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Alloy Desig./UNS No.	Class/Condition/ Temper
1	...	Plate, sheet	SB–209	A96061	T651
2	...	Plate, sheet	SB–209	A96061	T6 wld.
3	...	Drawn smls. tube	SB–210	A96061	T4
4	...	Drawn smls. tube	SB–210	A96061	T6
5	...	Drawn smls. tube	SB–210	A96061	T6 wld.
6	...	Bar, rod, shapes	SB–221	A96061	T4
7	...	Bar, rod, shapes	SB–221	A96061	T6
8	...	Bar, rod, shapes	SB–221	A96061	T6 wld.
9	...	Smls. extr. tube/pipe	SB–241	A96061	T4
10	...	Smls. extr. tube/pipe	SB–241	A96061	T6
11	...	Smls. drawn pipe	SB–241	A96061	T6
12	...	Smls. drawn pipe	SB–241	A96061	T6
13	...	Smls. extr. tube/pipe	SB–241	A96061	T6 wld.
14	...	Smls. drawn pipe	SB–241	A96061	T6 wld.
15	...	Shapes	SB–308	A96061	T6
16	...	Shapes	SB–308	A96061	T6 wld.
17	...	Drawn smls. tube	SB–210	A96063	T6
18	...	Bar, rod, shapes	SB–221	A96063	T5
19	...	Bar, rod, shapes	SB–221	A96063	T5
20	...	Bar, rod, shapes	SB–221	A96063	T6
21	...	Smls. extr. tube	SB–241	A96063	T5
22	...	Smls. extr. tube	SB–241	A96063	T5
23	...	Smls. extr. tube	SB–241	A96063	T6
24	...	Bar, rod	SB–187	C10200	O60
25	...	Bar, rod	SB–187	C11000	O60
26	...	Smls. tube	SB–111	C28000	O61
27	...	Smls. tube	SB–111	C44300	O61
28	...	Smls. tube	SB–111	C44400	O61
29	...	Smls. tube	SB–111	C44500	O61
(**21**) 30	...	Plate	SB–171	C46400	M10, M20, O20, O25
(**21**) 31	...	Plate	SB–171	C46400	M10, M20, O20, O25
32	...	Smls. tube	SB–111	C60800	O61
33	...	Plate, sheet	SB–169	C61400	O25 or O60
34	...	Plate, sheet	SB–169	C61400	O25 or O60
35	...	Plate, sheet	SB–169	C61400	O25 or O60
36	...	Plate, sheet	SB–96	C65500	O61
(**21**) 37	...	Plate	SB–171	C70600	M10, M20, O20, O25
38	...	Condenser tubes	SB–111	C70600	O61
39	...	Smls. U–bend tube	SB–395	C70600	O61
(**21**) 40	...	Plate	SB–171	C70620	M10, M20, O20, O25
(**21**) 41	...	Condenser tubes	SB–111	C70620	O61
(**21**) 42	...	Smls. U–bend tube	SB–395	C70620	O61
(**21**) 43	...	Plate	SB–171	C71500	M10, M20, O20, O25
(**21**) 44	...	Plate	SB–171	C71500	M10, M20, O20, O25
45	...	Condenser tubes	SB–111	C71500	O61

Table 5B (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Nonferrous Materials

Line No.	Size/ Thickness, in.	P-No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Maximum Use Temperature, °F	External Pressure Chart No.	Notes
1	$4 < t \le 6$	23	40	35	400	NFA–12,13	G4, G8, T3, W3, W4
2	...	23	24	...	400	NFA–12	G4, G8, T4
3	$0.025 \le t \le 0.5$	23	30	16	400	NFA–13	G4, T4, W3
4	$0.025 \le t \le 0.5$	23	42	35	400	NFA–12,13	G4, T2, W3, W4
5	...	23	24	...	400	NFA–13	G4, T4, W4
6	...	23	26	16	400	NFA–13	G2, G4, G8, T4, W3
7	...	23	38	35	400	NFA–12,13	G2, G4, G8, T3, W3, W4
8	...	23	24	...	400	NFA–12,13	G2, G4, G8, T4, W4
9	...	23	26	16	400	NFA–13	G4, G8, T4, W3
10	...	23	38	35	400	NFA–12,13	G4, G8, T3, W3, W4
11	NPS < 1	23	42	35	400	NFA–12,13	G4, T2, W3, W4
12	NPS ≥ 1	23	38	35	400	NFA–12,13	G4, T3, W3, W4
13	...	23	24	...	400	NFA–12,13	G4, T4, W4
14	...	23	24	...	400	NFA–12,13	G4, T4, W4
15	...	23	38	35	400	NFA–12,13	G2, G4, T3, W3, W4
16	...	23	24	...	400	NFA–12,13	G2, G4, T4, W4
17	$0.025 \le t \le 0.5$	23	33	28	400	NFA–1	G4, T1, W3
18	$t \le 0.5$	23	22	16	400	NFA–1	G2, G4, T1, W3
19	$0.501 \le t \le 1$	23	21	15	400	NFA–1	G2, G4, T1, W3
20	$t \le 1$	23	30	25	400	NFA–1	G2, G4, T1, W3
21	$t \le 0.5$	23	22	16	400	NFA–1	G4, T1, W3
22	$0.501 \le t \le 1$	23	21	15	400	NFA–1	G4, T1, W3
23	$t \le 1$	23	30	25	400	NFA–1	G4, T1, W3
24	All	31	28	8	400	NFC–1	G1, G3, T3
25	All	31	28	8	400	NFC–1	G1, G3, T3
26	...	32	50	20	400	NFC–3	G3, G5, T3
27	...	32	45	15	400	NFC–2	G3, G5, T4
28	...	32	45	15	400	NFC–2	G3, G5, T4
29	...	32	45	15	400	NFC–2	G3, G5, T4
30	$3 < t \le 5$	32	50	18	400	NFC–2	G3, T3
31	$t \le 3$	32	50	20	400	NFC–2	G3, T3
32	...	35	50	19	500	NFC–3	G1, G3, G5, T3
33	$2 < t \le 5$	35	65	28	500	NFC–8	G3
34	$1/2 < t \le 2$	35	70	30	500	NFC–8	G3
35	$t \le 1/2$	35	72	32	500	NFC–8	G3
36	≤2	33	50	18	350	NFC–2	G3, G9, T3
37	$t \le 5$	34	40	15	600	NFC–3	G1, G3, T5
38	...	34	40	15	600	NFC–3	G1, G3, T5
39	...	34	40	15	600	NFC–3	G1, G3, T5
40	$t \le 5$	34	40	15	600	NFC–3	G1, G3, T5
41	...	34	40	15	600	NFC–3	G1, G3, T5
42	...	34	40	15	600	NFC–3	G1, G3, T5
43	$2 1/2 < t \le 5$	34	45	18	700	NFC–4	G1, G3
44	$t \le 2 1/2$	34	50	20	700	NFC–4	G1, G3
45	...	34	52	18	700	NFC–4	G1, G3

Table 5B (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Nonferrous Materials

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900
1	16.7	16.7	16.7	16.7	16.7	*10.7*	*5.2*	...	...	...	...	...	...	...	...	...	...
2	10.0	10.0	10.0	10.0	10.0	10.0	*5.2*	...	...	...	...	...	...	...	...	...	...
3	10.7	10.5	10.4	10.2	10.2	10.2	*5.2*	...	...	...	...	...	...	...	...	...	...
4	17.5	17.5	17.5	17.5	*16.7*	*10.7*	*5.2*	...	...	...	...	...	...	...	...	...	...
5	10.0	10.0	10.0	10.0	10.0	10.0	*5.2*	...	...	...	...	...	...	...	...	...	...
6	10.7	10.6	10.2	10.2	10.2	10.2	*5.2*	...	...	...	...	...	...	...	...	...	...
7	15.8	15.8	15.8	15.8	15.8	*10.7*	*5.2*	...	...	...	...	...	...	...	...	...	...
8	10.0	10.0	10.0	10.0	10.0	10.0	*5.2*	...	...	...	...	...	...	...	...	...	...
9	10.7	10.6	10.2	10.2	10.2	10.2	*5.2*	...	...	...	...	...	...	...	...	...	...
10	15.8	15.8	15.8	15.8	15.8	*10.7*	*5.2*	...	...	...	...	...	...	...	...	...	...
11	17.5	17.5	17.5	17.5	*16.7*	*10.7*	*5.2*	...	...	...	...	...	...	...	...	...	...
12	15.8	15.8	15.8	15.8	15.8	*10.7*	*5.2*	...	...	...	...	...	...	...	...	...	...
13	10.0	10.0	10.0	10.0	10.0	10.0	*5.2*	...	...	...	...	...	...	...	...	...	...
14	10.0	10.0	10.0	10.0	10.0	10.0	*5.2*	...	...	...	...	...	...	...	...	...	...
15	15.8	15.8	15.8	15.8	15.8	*10.7*	*5.2*	...	...	...	...	...	...	...	...	...	...
16	10.0	10.0	10.0	10.0	10.0	10.0	*5.2*	...	...	...	...	...	...	...	...	...	...
17	13.8	13.8	13.8	*9.6*	*7.3*	*3.8*	*2.0*	...	...	...	...	...	...	...	...	...	...
18	9.2	9.2	9.2	*8.8*	*4.6*	*3.4*	*2.0*	...	...	...	...	...	...	...	...	...	...
19	8.8	8.8	8.8	*8.8*	*4.6*	*3.4*	*2.0*	...	...	...	...	...	...	...	...	...	...
20	12.5	12.5	12.5	*9.6*	*7.3*	*3.8*	*2.0*	...	...	...	...	...	...	...	...	...	...
21	9.2	9.2	9.2	*8.8*	*4.6*	*3.4*	*2.0*	...	...	...	...	...	...	...	...	...	...
22	8.8	8.8	8.8	*8.8*	*4.6*	*3.4*	*2.0*	...	...	...	...	...	...	...	...	...	...
23	12.5	12.5	12.5	*9.6*	*7.3*	*3.8*	*2.0*	...	...	...	...	...	...	...	...	...	...
24	5.3	5.3	5.3	5.3	5.3	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...
25	5.3	5.3	5.3	5.3	5.3	*4.4*	*3.0*	...	...	...	...	...	...	...	...	...	...
26	13.3	13.3	13.3	13.3	13.3	*10.8*	*5.3*	...	...	...	...	...	...	...	...	...	...
27	10.0	10.0	10.0	10.0	10.0	10.0	*5.3*	...	...	...	...	...	...	...	...	...	...
28	10.0	10.0	10.0	10.0	10.0	10.0	*5.3*	...	...	...	...	...	...	...	...	...	...
29	10.0	10.0	10.0	10.0	10.0	10.0	*5.3*	...	...	...	...	...	...	...	...	...	...
30	12.0	12.0	12.0	11.9	11.9	*6.4*	*2.7*	...	...	...	...	...	...	...	...	...	...
31	13.3	13.3	13.3	13.3	13.3	*6.4*	*2.7*	...	...	...	...	...	...	...	...	...	...
32	12.7	12.7	12.7	12.7	12.7	*10.0*	*6.0*	*4.0*	*2.0*	...	...	...	...	...	...	...	...
33	18.7	18.6	18.5	18.4	18.2	18.1	17.9	17.7	17.6	...	...	...	...	...	...	...	...
34	20.0	19.9	19.8	19.7	19.5	19.4	19.2	19.0	18.8	...	...	...	...	...	...	...	...
35	21.3	21.3	21.1	20.9	20.9	20.7	20.5	20.3	20.1	...	...	...	...	...	...	...	...
36	12.0	12.0	11.9	11.9	11.9	*10.7*	...	...	...	...	...	...	...	...	...	...	...
37	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	*8.0*	*7.0*	*6.0*	...	...	...	...	...	...
38	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	*8.0*	*7.0*	*6.0*	...	...	...	...	...	...
39	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	*8.0*	*7.0*	*6.0*	...	...	...	...	...	...
40	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	*8.0*	*7.0*	*6.0*	...	...	...	...	...	...
41	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	*8.0*	*7.0*	*6.0*	...	...	...	...	...	...
42	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	*8.0*	*7.0*	*6.0*	...	...	...	...	...	...
43	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	...	...	...	...
44	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	...	...	...	...
45	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	...	...	...	...

Table 5B (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Nonferrous Materials

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding															
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	

Table 5B (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Alloy Desig./UNS No.	Class/Condition/ Temper
	1	...	Smls. U–bend tube	SB–395	C71500	O61
(**21**)	2	...	Plate	SB–171	C71520	M10, M20, O20, O25
(**21**)	3	...	Plate	SB–171	C71520	M10, M20, O20, O25
(**21**)	4	...	Condenser tubes	SB–111	C71520	O61
(**21**)	5	...	Smls. U–bend tube	SB–395	C71520	O61
(**21**)	6	99Ni	Smls. pipe & tube	SB–161	N02200	Annealed
	7	99Ni	Bar, rod	SB–160	N02200	Annealed
(**21**)	8	99Ni	Smls. pipe & tube	SB–161	N02200	Annealed
	9	99Ni	Plate, sheet, strip	SB–162	N02200	Annealed
	10	99Ni	Smls. tube	SB–163	N02200	Annealed
	11	99Ni	Plate, sheet, strip	SB–162	N02200	As rolled
	12	99Ni–Low C	Bar, rod	SB–160	N02201	Annealed
(**21**)	13	99Ni–Low C	Smls. pipe & tube	SB–161	N02201	Annealed
	14	99Ni–Low C	Bar, rod	SB–160	N02201	Hot fin.
(**21**)	15	99Ni–Low C	Smls. pipe & tube	SB–161	N02201	Annealed
	16	99Ni–Low C	Plate, sheet, strip	SB–162	N02201	Annealed
	17	99Ni–Low C	Smls. tube	SB–163	N02201	Annealed
	18	67Ni–30Cu	Bar, rod	SB–164	N04400	Annealed
	19	67Ni–30Cu	Smls. pipe & tube	SB–165	N04400	Annealed
	20	67Ni–30Cu	Forgings	SB–564	N04400	Annealed
	21	67Ni–30Cu	Plate	SB–127	N04400	Annealed
	22	67Ni–30Cu	Smls. tube	SB–163	N04400	Annealed
	23	67Ni–30Cu	Smls. pipe & tube	SB–165	N04400	Annealed
	24	67Ni–30Cu	Plate	SB–127	N04400	As rolled
	25	67Ni–30Cu	Smls. tube	SB–163	N04400	Stress rel.
	26	67Ni–30Cu–S	Bar, rod	SB–164	N04405	Annealed
	27	47Ni–22Cr–9Mo–18Fe	Plate	SB–435	N06002	Annealed
	28	47Ni–22Cr–9Mo–18Fe	Sheet	SB–435	N06002	Annealed
	29	47Ni–22Cr–9Mo–18Fe	Rod	SB–572	N06002	Solution ann.
	30	47Ni–22Cr–9Mo–18Fe	Wld. pipe	SB–619	N06002	Solution ann.
	31	47Ni–22Cr–9Mo–18Fe	Smls. pipe & tube	SB–622	N06002	Solution ann.
	32	47Ni–22Cr–9Mo–18Fe	Wld. tube	SB–626	N06002	Solution ann.
	33	47Ni–22Cr–19Fe–6Mo	Rod	SB–581	N06007	Solution ann.
	34	47Ni–22Cr–19Fe–6Mo	Plate, sheet, strip	SB–582	N06007	Solution ann.
	35	47Ni–22Cr–19Fe–6Mo	Rod	SB–581	N06007	Solution ann.
	36	47Ni–22Cr–19Fe–6Mo	Plate, sheet, strip	SB–582	N06007	Solution ann.
	37	47Ni–22Cr–19Fe–6Mo	Wld. pipe	SB–619	N06007	Solution ann.
	38	47Ni–22Cr–19Fe–6Mo	Smls. pipe & tube	SB–622	N06007	Solution ann.
	39	47Ni–22Cr–19Fe–6Mo	Wld. tube	SB–626	N06007	Solution ann.
	40	55Ni–21Cr–13.5Mo	Smls. & wld. fittings	SB–366	N06022	Solution ann.
	41	55Ni–21Cr–13.5Mo	Forgings	SB–462	N06022	Solution ann.
	42	55Ni–21Cr–13.5Mo	Forgings	SB–564	N06022	Solution ann.
	43	55Ni–21Cr–13.5Mo	Rod	SB–574	N06022	Solution ann.
	44	55Ni–21Cr–13.5Mo	Plate, sheet, strip	SB–575	N06022	Solution ann.
	45	55Ni–21Cr–13.5Mo	Wld. pipe	SB–619	N06022	Solution ann.

Table 5B (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Nonferrous Materials

Line No.	Size/ Thickness, in.	P-No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Maximum Use Temperature, °F	External Pressure Chart No.	Notes
1	...	34	52	18	700	NFC–4	G1, G3
2	$2^1/_2 < t \le 5$	34	45	18	700	NFC–4	G1, G3
3	$t \le 2^1/_2$	34	50	20	700	NFC–4	G1, G3
4	...	34	52	18	700	NFC–4	G1, G3
5	...	34	52	18	700	NFC–4	G1, G3
6	O.D. > 5	41	55	12	600	NFN–2	G3
7	...	41	55	15	600	NFN–2	G2, G3
8	O.D. ≤ 5	41	55	15	600	NFN–2	G3
9	...	41	55	15	600	NFN–2	G3
10	...	41	55	15	600	NFN–2	G3
11	...	41	55	20	600	NFN–2	G3
12	...	41	50	10	600	NFN–1	G2, G3
13	O.D. > 5	41	50	10	1200	NFN–1	G3, T9
14	...	41	50	10	600	NFN–1	G2, G3
15	O.D. ≤ 5	41	50	12	1200	NFN–1	G3, T8
16	...	41	50	12	600	NFN–1	G3
17	...	41	50	12	1200	NFN–1	G3, T8
18	...	42	70	25	900	NFN–3	G1, G2, G3, T8
19	O.D. > 5	42	70	25	900	NFN–3	G1, G3, T8
20	...	42	70	25	900	NFN–3	G1, G2, G3, T8
21	...	42	70	28	900	NFN–3	G1, G3, T8
22	...	42	70	28	900	NFN–3	G1, G3, T8
23	O.D. ≤ 5	42	70	28	900	NFN–3	G1, G3, T8
24	...	42	75	40	900	NFN–3	G1, G3, T7
25	...	42	85	55	800	NFN–3	G1, G3, T7, W1
26	...	42	70	25	900	NFN–3	G1, G2, G3, T8
27	$^3/_{16} < t \le 2^1/_2$	43	95	35	900	NFN–15	G1, G3, G13
28	$^1/_{16} < t \le {}^3/_{16}$	43	95	35	900	NFN–15	G1, G3, G13
29	$t > {}^3/_{16}$	43	95	35	900	NFN–15	G1, G2, G3, G13
30	...	43	100	40	1650	NFN–15	G1, G3, G7, G13, T10
31	...	43	100	40	1650	NFN–15	G1, G3, G13, T10
32	...	43	100	40	1650	NFN–15	G1, G3, G7, G13, T10
33	$t > {}^3/_4$	45	85	30	1000	NFN–11	G1, G2, G3
34	$t > {}^3/_4$	45	85	30	1000	NFN–11	G1, G3
35	$^5/_{16} < t \le {}^3/_4$	45	90	35	1000	NFN–11	G1, G2, G3, T10
36	$^3/_{16} < t \le {}^3/_4$	45	90	35	1000	NFN–11	G1, G3, T10
37	...	45	90	35	1000	NFN–11	G1, G3, G7, T10
38	...	45	90	35	1000	NFN–11	G1, G3, T10
39	...	45	90	35	1000	NFN–11	G1, G3, G7, T10
40	...	43	100	45	1250	NFN–10	G1, G12, T13
41	...	43	100	45	1250	NFN–10	G1, G12, T13
42	...	43	100	45	1250	NFN–10	G1, G12, T13
43	...	43	100	45	1250	NFN–10	G1, G12, T13
44	...	43	100	45	1250	NFN–10	G1, G12, T13
45	...	43	100	45	1250	NFN–10	G1, G7, G12, T13

Table 5B (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Nonferrous Materials

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900
1	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	...	...	...	...
2	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	...	...	...	...
3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	...	...	...	...
4	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	...	...	...	...
5	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	...	...	...	...
6	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	...	...	...	...	...	...
7	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	...	...	...	...	...	...
8	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	...	...	...	...	...	...
9	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	...	...	...	...	...	...
10	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	...	...	...	...	...	...
11	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	...	...	...	...	...	...
12	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	...	...	...	...	...	...
13	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	*5.8*	*4.5*
14	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	...	...	...	...	...	...
15	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	*7.2*	*5.8*	*4.5*
16	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	...	...	...	...	...	...
17	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	*7.2*	*5.8*	*4.5*
18	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	*15.0*	*11.0*	*8.0*
19	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	*15.0*	*11.0*	*8.0*
20	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	*15.0*	*11.0*	*8.0*
21	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	*15.0*	*11.0*	*8.0*
22	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	*15.0*	*11.0*	*8.0*
23	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	*15.0*	*11.0*	*8.0*
24	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	*20.9*	*14.5*	*8.5*	*4.0*
25	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	*18.0*	*12.7*	...	...
26	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	*15.0*	*11.0*	*8.0*
27	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.1	22.3	21.7	21.2	20.7	20.3	20.1	19.9	19.7	19.6
28	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.1	22.3	21.7	21.2	20.7	20.3	20.1	19.9	19.7	19.6
29	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.1	22.3	21.7	21.2	20.7	20.3	20.1	19.9	19.7	19.6
30	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.4	21.7	21.1	20.5	20.1	19.8	19.5	19.3	19.1	*16.7*
31	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.4	25.5	24.8	24.2	23.7	23.3	22.9	22.7	22.5	*19.6*
32	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.4	21.7	21.1	20.5	20.1	19.8	19.5	19.3	19.1	*16.7*
33	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.8	19.5	19.2	19.0	18.8	18.7	18.6	18.5
34	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.8	19.5	19.2	19.0	18.8	18.7	18.6	18.5
35	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.1	22.7	22.4	22.2	22.0	21.8	21.7	*20.0*
36	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.1	22.7	22.4	22.2	22.0	21.8	21.7	*20.0*
37	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.6	19.3	19.1	18.8	18.7	18.5	18.4	*17.0*
38	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.1	22.7	22.4	22.2	22.0	21.8	21.7	*20.0*
39	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.6	19.3	19.1	18.8	18.7	18.5	18.4	*17.0*
40	30.0	30.0	30.0	30.0	30.0	30.0	30.0	29.9	29.0	28.2	27.6	27.0	26.5	26.1	25.7	25.4	25.1
41	30.0	30.0	30.0	30.0	30.0	30.0	30.0	29.9	29.0	28.2	27.6	27.0	26.5	26.1	25.7	25.4	25.1
42	30.0	30.0	30.0	30.0	30.0	30.0	30.0	29.9	29.0	28.2	27.6	27.0	26.5	26.1	25.7	25.4	25.1
43	30.0	30.0	30.0	30.0	30.0	30.0	30.0	29.9	29.0	28.2	27.6	27.0	26.5	26.1	25.7	25.4	25.1
44	30.0	30.0	30.0	30.0	30.0	30.0	30.0	29.9	29.0	28.2	27.6	27.0	26.5	26.1	25.7	25.4	25.1
45	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.4	24.7	24.0	23.4	22.9	22.5	22.2	21.8	21.6	21.4

Table 5B (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Nonferrous Materials

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding															
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	*3.7*	*3.0*	*2.4*	*2.0*	*1.5*	*1.2*	...	...	...	...	...	...	...	...	...	(**21**)
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	*3.7*	*3.0*	*2.4*	*2.0*	*1.5*	*1.2*	...	...	...	...	...	...	...	...	...	(**21**)
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	*3.7*	*3.0*	*2.4*	*2.0*	*1.5*	*1.2*	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	*16.6*	*16.4*	*16.4*	*14.9*	*12.0*	*9.6*	*7.9*	*6.5*	*5.2*	*4.1*	*3.2*	*2.6*	*2.0*	*1.6*	*1.3*	
31	*19.5*	*19.3*	*19.3*	*17.5*	*14.1*	*11.3*	*9.3*	*7.7*	*6.1*	*4.8*	*3.8*	*3.0*	*2.4*	*1.9*	*1.5*	
32	*16.6*	*16.4*	*16.4*	*14.9*	*12.0*	*9.6*	*7.9*	*6.5*	*5.2*	*4.1*	*3.2*	*2.6*	*2.0*	*1.6*	*1.3*	
33	18.4	18.3	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	18.4	18.3	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	*19.5*	*18.9*	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	*19.5*	*18.9*	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	*16.6*	*16.1*	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	*19.5*	*18.9*	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	*16.6*	*16.1*	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	24.9	24.7	*24.1*	*17.5*	*12.7*	*9.6*	*7.6*	...	...	...	...	...	...	...	...	
41	24.9	24.7	*24.1*	*17.5*	*12.7*	*9.6*	*7.6*	...	...	...	...	...	...	...	...	
42	24.9	24.7	*24.1*	*17.5*	*12.7*	*9.6*	*7.6*	...	...	...	...	...	...	...	...	
43	24.9	24.7	*24.1*	*17.5*	*12.7*	*9.6*	*7.6*	...	...	...	...	...	...	...	...	
44	24.9	24.7	*24.1*	*17.5*	*12.7*	*9.6*	*7.6*	...	...	...	...	...	...	...	...	
45	21.2	21.0	*20.5*	*14.9*	*10.8*	*8.2*	*6.5*	...	...	...	...	...	...	...	...	

Table 5B (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Alloy Desig./UNS No.	Class/Condition/ Temper
1	55Ni–21Cr–13.5Mo	Smls. pipe & tube	SB–622	N06022	Solution ann.
2	55Ni–21Cr–13.5Mo	Wld. tube	SB–626	N06022	Solution ann.
3	59Ni–23Cr–16Mo	Wld. fittings	SB–366	N06059	Solution ann.
4	59Ni–23Cr–16Mo	Smls. fittings	SB–366	N06059	Solution ann.
5	59Ni–23Cr–16Mo	Forged fittings	SB–462	N06059	Solution ann.
6	59Ni–23Cr–16Mo	Forgings	SB–564	N06059	Solution ann.
7	59Ni–23Cr–16Mo	Bar, rod	SB–574	N06059	Solution ann.
8	59Ni–23Cr–16Mo	Plate, sheet, strip	SB–575	N06059	Solution ann.
9	59Ni–23Cr–16Mo	Wld. pipe	SB–619	N06059	Solution ann.
10	59Ni–23Cr–16Mo	Smls. pipe & tube	SB–622	N06059	Solution ann.
11	59Ni–23Cr–16Mo	Wld. tube	SB–626	N06059	Solution ann.
12	61Ni–16Mo–16Cr	Rod	SB–574	N06455	Solution ann.
13	61Ni–16Mo–16Cr	Plate, sheet, strip	SB–575	N06455	Solution ann.
14	61Ni–16Mo–16Cr	Wld. pipe	SB–619	N06455	Solution ann.
15	61Ni–16Mo–16Cr	Smls. pipe & tube	SB–622	N06455	Solution ann.
16	61Ni–16Mo–16Cr	Wld. tube	SB–626	N06455	Solution ann.
17	72Ni–15Cr–8Fe	Smls. pipe & tube	SB–167	N06600	Cold worked/ann.
18	72Ni–15Cr–8Fe	Smls. tube	SB–163	N06600	Annealed
19	72Ni–15Cr–8Fe	Bar, rod	SB–166	N06600	Annealed
20	72Ni–15Cr–8Fe	Smls. pipe & tube	SB–167	N06600	Cold worked/ann.
21	72Ni–15Cr–8Fe	Plate	SB–168	N06600	Annealed
22	72Ni–15Cr–8Fe	Forgings	SB–564	N06600	Annealed
23	72Ni–15Cr–8Fe	Wld. tube	SB–516	N06600	Cold drawn/ann.
24	72Ni–15Cr–8Fe	Wld. pipe	SB–517	N06600	Cold drawn/ann.
25	35Ni–19Cr–1.25Si	Bar	SB–511	N08330	Annealed
26	35Ni–19Cr–1.25Si	Smls. & wld. pipe	SB–535	N08330	Annealed
27	35Ni–19Cr–1.25Si	Plate, sheet, strip	SB–536	N08330	Annealed
28	42Fe–33Ni–21Cr	Smls. tube	SB–163	N08800	Annealed
29	42Fe–33Ni–21Cr	Smls. pipe & tube	SB–407	N08800	Annealed
30	42Fe–33Ni–21Cr	Plate	SB–409	N08800	Annealed
31	42Fe–33Ni–21Cr	Wld. pipe	SB–514	N08800	Annealed
32	42Fe–33Ni–21Cr	Wld. tube	SB–515	N08800	Annealed
33	42Fe–33Ni–21Cr	Forgings	SB–564	N08800	Annealed
34	42Fe–33Ni–21Cr	Bar, rod	SB–408	N08800	Hot fin.
35	42Fe–33Ni–21Cr	Smls. tube	SB–163	N08810	Annealed
36	42Fe–33Ni–21Cr	Smls. pipe & tube	SB–407	N08810	Annealed
37	42Fe–33Ni–21Cr	Bar, rod	SB–408	N08810	Annealed
38	42Fe–33Ni–21Cr	Plate	SB–409	N08810	Annealed
39	42Fe–33Ni–21Cr	Wld. pipe	SB–514	N08810	Annealed
40	42Fe–33Ni–21Cr	Wld. tube	SB–515	N08810	Annealed
41	42Fe–33Ni–21Cr	Forgings	SB–564	N08810	Annealed
42	42Ni–21.5Cr–3Mo–2.3Cu	Smls. tube	SB–163	N08825	Annealed
43	42Ni–21.5Cr–3Mo–2.3Cu	Smls. pipe & tube	SB–423	N08825	Annealed
44	42Ni–21.5Cr–3Mo–2.3Cu	Plate, sheet, strip	SB–424	N08825	Annealed
45	42Ni–21.5Cr–3Mo–2.3Cu	Bar, rod	SB–425	N08825	Annealed

Table 5B (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Nonferrous Materials

Line No.	Size/ Thickness, in.	P-No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Maximum Use Temperature, °F	External Pressure Chart No.	Notes
1	...	43	100	45	1250	NFN–10	G1, G12, T13
2	...	43	100	45	1250	NFN–10	G1, G7, G12, T13
3	...	43	100	45	1400	NFN–14	G1, G3, G7, G11, T14
4	...	43	100	45	1400	NFN–14	G1, G3, G11, T14
5	...	43	100	45	1400	NFN–14	G1, G3, G11, T14
6	...	43	100	45	1400	NFN–14	G1, G3, G11, T14
7	...	43	100	45	1400	NFN–14	G1, G3, G11, T14
8	...	43	100	45	1400	NFN–14	G1, G3, G11, T14
9	...	43	100	45	1400	NFN–14	G1, G3, G7, G11, T14
10	...	43	100	45	1400	NFN–14	G1, G3, G11, T14
11	...	43	100	45	1400	NFN–14	G1, G3, G7, G11, T14
12	...	43	100	40	800	NFN–14	G1, G2, G3
13	...	43	100	40	800	NFN–14	G1, G3
14	...	43	100	40	800	NFN–14	G1, G3, G7
15	...	43	100	40	800	NFN–14	G1, G3
16	...	43	100	40	800	NFN–14	G1, G3, G7
17	O.D. > 5	43	80	30	1200	NFN–4	G1, G3, T10
18	...	43	80	35	1200	NFN–4	G1, G3, T10
19	...	43	80	35	1200	NFN–4	G1, G2, G3, T10
20	O.D. ≤ 5	43	80	35	1200	NFN–4	G1, G3, T10
21	...	43	80	35	1200	NFN–4	G1, G3, T10
22	...	43	80	35	1200	NFN–4	G1, G2, G3, T10
23	O.D. ≤ $4\frac{1}{2}$	43	80	35	1200	NFN–4	G1, G3, G7, T10
24	O.D. ≤ $4\frac{1}{2}$	43	80	35	1200	NFN–4	G1, G3, G7, T10
25	...	46	70	30	1650	NFN–13	G1, G2, G3, G13, H1, T11
26	...	46	70	30	1650	NFN–13	G1, G3, G7, G10, H2, T11
27	...	46	70	30	1650	NFN–13	G1, G3, G10, H2, T11
28	...	45	75	30	1500	NFN–8	G1, G3, T12
29	...	45	75	30	1500	NFN–8	G1, G3, T12
30	...	45	75	30	1500	NFN–8	G1, G3, T12
31	...	45	75	30	1500	NFN–8	G1, G3, G7, T12
32	...	45	75	30	1500	NFN–8	G1, G3, G7, T12
33	...	45	75	30	1500	NFN–8	G1, G2, G3, T12
34	...	45	75	30	1500	NFN–8	G1, G2, G3, T12
35	...	45	65	25	1650	NFN–9	G1, G3, G13, T14
36	...	45	65	25	1650	NFN–9	G1, G3, G13, T14
37	...	45	65	25	1650	NFN–9	G1, G2, G3, G13, T14
38	...	45	65	25	1650	NFN–9	G1, G3, G13, T14
39	...	45	65	25	1650	NFN–9	G1, G3, G7, G13, T14
40	...	45	65	25	1650	NFN–9	G1, G3, G7, G13, T14
41	...	45	65	25	1650	NFN–9	G1, G2, G3, G13, T14
42	...	45	85	35	1000	NFN–7	G1, G3
43	...	45	85	35	1000	NFN–7	G1, G3
44	...	45	85	35	1000	NFN–7	G1, G3
45	...	45	85	35	1000	NFN–7	G1, G2, G3

Table 5B (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Nonferrous Materials

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900
1	30.0	30.0	30.0	30.0	30.0	30.0	30.0	29.9	29.0	28.2	27.6	27.0	26.5	26.1	25.7	25.4	25.1
2	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.4	24.7	24.0	23.4	22.9	22.5	22.2	21.8	21.6	21.4
3	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.2	24.6	23.9	23.3	22.8	22.2	21.7	21.2	20.8
4	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	29.7	28.9	28.2	27.5	26.8	26.1	25.5	25.0	24.5
5	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	29.7	28.9	28.2	27.5	26.8	26.1	25.5	25.0	24.5
6	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	29.7	28.9	28.2	27.5	26.8	26.1	25.5	25.0	24.5
7	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	29.7	28.9	28.2	27.5	26.8	26.1	25.5	25.0	24.5
8	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	29.7	28.9	28.2	27.5	26.8	26.1	25.5	25.0	24.5
9	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.2	24.6	23.9	23.3	22.8	22.2	21.7	21.2	20.8
10	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	29.7	28.9	28.2	27.5	26.8	26.1	25.5	25.0	24.5
11	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.2	24.6	23.9	23.3	22.8	22.2	21.7	21.2	20.8
12	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.5	26.1	25.8	...	...
13	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.5	26.1	25.8	...	...
14	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.5	22.2	21.9	...	...
15	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.5	26.1	25.8	...	...
16	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.7	...	...
17	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	*16.0*
18	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	*16.0*
19	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	*16.0*
20	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	*16.0*
21	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	*16.0*
22	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	*16.0*
23	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	*13.6*
24	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	*13.6*
25	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.8	19.4	18.9	18.5	18.1	17.7	17.4	17.0	16.7
26	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.8	19.4	18.9	18.5	18.1	17.7	17.4	17.0	16.7
27	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.8	19.4	18.9	18.5	18.1	17.7	17.4	17.0	16.7
28	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
29	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
30	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
31	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
32	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
33	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
34	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
35	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.5	16.1	15.7	15.3	15.0	14.7	14.5
36	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.5	16.1	15.7	15.3	15.0	14.7	14.5
37	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.5	16.1	15.7	15.3	15.0	14.7	14.5
38	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.5	16.1	15.7	15.3	15.0	14.7	14.5
39	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.0	13.7	13.3	13.0	12.8	12.5	12.3
40	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.0	13.7	13.3	13.0	12.8	12.5	12.3
41	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.5	16.1	15.7	15.3	15.0	14.7	14.5
42	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.2	23.0	22.9	22.8
43	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.2	23.0	22.9	22.8
44	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.2	23.0	22.9	22.8
45	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.2	23.0	22.9	22.8

Table 5B (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Nonferrous Materials

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding														
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
1	24.9	24.7	*24.1*	*17.5*	*12.7*	*9.6*	*7.6*	...	...	...	...	...	...	...	...
2	21.2	21.0	*20.5*	*14.9*	*10.8*	*8.2*	*6.5*	...	...	...	...	...	...	...	...
3	20.5	20.4	20.4	*16.0*	*12.4*	*9.9*	*8.0*	*6.3*	*5.0*	*4.1*	...	...	...	...	...
4	24.2	24.0	24.0	*18.8*	*14.6*	*11.6*	*9.4*	*7.4*	*5.9*	*4.8*	...	...	...	...	...
5	24.2	24.0	24.0	*18.8*	*14.6*	*11.6*	*9.4*	*7.4*	*5.9*	*4.8*	...	...	...	...	...
6	24.2	24.0	24.0	*18.8*	*14.6*	*11.6*	*9.4*	*7.4*	*5.9*	*4.8*	...	...	...	...	...
7	24.2	24.0	24.0	*18.8*	*14.6*	*11.6*	*9.4*	*7.4*	*5.9*	*4.8*	...	...	...	...	...
8	24.2	24.0	24.0	*18.8*	*14.6*	*11.6*	*9.4*	*7.4*	*5.9*	*4.8*	...	...	...	...	...
9	20.5	20.4	20.4	*16.0*	*12.4*	*9.9*	*8.0*	*6.3*	*5.0*	*4.1*	...	...	...	...	...
10	24.2	24.0	24.0	*18.8*	*14.6*	*11.6*	*9.4*	*7.4*	*5.9*	*4.8*	...	...	...	...	...
11	20.5	20.4	20.4	*16.0*	*12.4*	*9.9*	*8.0*	*6.3*	*5.0*	*4.1*	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
17	*10.6*	*7.0*	*4.5*	*3.0*	*2.2*	*2.0*	...	...	...	...	...	...	...	...	...
18	*10.6*	*7.0*	*4.5*	*3.0*	*2.2*	*2.0*	...	...	...	...	...	...	...	...	...
19	*10.6*	*7.0*	*4.5*	*3.0*	*2.2*	*2.0*	...	...	...	...	...	...	...	...	...
20	*10.6*	*7.0*	*4.5*	*3.0*	*2.2*	*2.0*	...	...	...	...	...	...	...	...	...
21	*10.6*	*7.0*	*4.5*	*3.0*	*2.2*	*2.0*	...	...	...	...	...	...	...	...	...
22	*10.6*	*7.0*	*4.5*	*3.0*	*2.2*	*2.0*	...	...	...	...	...	...	...	...	...
23	*9.0*	*6.0*	*3.8*	*2.6*	*1.9*	*1.7*	...	...	...	...	...	...	...	...	...
24	*9.0*	*6.0*	*3.8*	*2.6*	*1.9*	*1.7*	...	...	...	...	...	...	...	...	...
25	*16.1*	*12.7*	*10.0*	*7.8*	*6.0*	*4.7*	*3.8*	*3.1*	*2.4*	*1.8*	*1.5*	*1.1*	*0.90*	*0.68*	*0.48*
26	*16.1*	*12.7*	*10.0*	*7.8*	*6.0*	*4.7*	*3.8*	*3.1*	*2.4*	*1.8*	*1.5*	*1.1*	*0.90*	*0.68*	*0.48*
27	*16.1*	*12.7*	*10.0*	*7.8*	*6.0*	*4.7*	*3.8*	*3.1*	*2.4*	*1.8*	*1.5*	*1.1*	*0.90*	*0.68*	*0.48*
28	20.0	*18.9*	*14.5*	*11.1*	*8.3*	*5.6*	*3.6*	*1.7*	*1.4*	*0.94*	*0.85*	*0.68*	...	...	...
29	20.0	*18.9*	*14.5*	*11.1*	*8.3*	*5.6*	*3.6*	*1.7*	*1.4*	*0.94*	*0.85*	*0.68*	...	...	...
30	20.0	*18.9*	*14.5*	*11.1*	*8.3*	*5.6*	*3.6*	*1.7*	*1.4*	*0.94*	*0.85*	*0.68*	...	...	...
31	17.0	*16.1*	*12.3*	*9.4*	*7.1*	*4.8*	*3.1*	*1.4*	*1.2*	*0.80*	*0.72*	*0.58*	...	...	...
32	17.0	*16.1*	*12.3*	*9.4*	*7.1*	*4.8*	*3.1*	*1.4*	*1.2*	*0.80*	*0.72*	*0.58*	...	...	...
33	20.0	*18.9*	*14.5*	*11.1*	*8.3*	*5.6*	*3.6*	*1.7*	*1.4*	*0.94*	*0.85*	*0.68*	...	...	...
34	20.0	*18.9*	*14.5*	*11.1*	*8.3*	*5.6*	*3.6*	*1.7*	*1.4*	*0.94*	*0.85*	*0.68*	...	...	...
35	14.2	14.0	13.8	*11.6*	*9.3*	*7.4*	*5.9*	*4.7*	*3.8*	*3.0*	*2.4*	*1.9*	*1.5*	*1.2*	*1.0*
36	14.2	14.0	13.8	*11.6*	*9.3*	*7.4*	*5.9*	*4.7*	*3.8*	*3.0*	*2.4*	*1.9*	*1.5*	*1.2*	*1.0*
37	14.2	14.0	13.8	*11.6*	*9.3*	*7.4*	*5.9*	*4.7*	*3.8*	*3.0*	*2.4*	*1.9*	*1.5*	*1.2*	*1.0*
38	14.2	14.0	13.8	*11.6*	*9.3*	*7.4*	*5.9*	*4.7*	*3.8*	*3.0*	*2.4*	*1.9*	*1.5*	*1.2*	*1.0*
39	12.1	11.9	11.7	*9.9*	*7.9*	*6.3*	*5.0*	*4.0*	*3.2*	*2.6*	*2.0*	*1.6*	*1.3*	*1.0*	*0.83*
40	12.1	11.9	11.7	*9.9*	*7.9*	*6.3*	*5.0*	*4.0*	*3.2*	*2.6*	*2.0*	*1.6*	*1.3*	*1.0*	*0.83*
41	14.2	14.0	13.8	*11.6*	*9.3*	*7.4*	*5.9*	*4.7*	*3.8*	*3.0*	*2.4*	*1.9*	*1.5*	*1.2*	*1.0*
42	22.6	22.3	...	...	...	...	...	...	...	...	...	...	...	...	...
43	22.6	22.3	...	...	...	...	...	...	...	...	...	...	...	...	...
44	22.6	22.3	...	...	...	...	...	...	...	...	...	...	...	...	...
45	22.6	22.3	...	...	...	...	...	...	...	...	...	...	...	...	...

Table 5B (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Alloy Desig./UNS No.	Class/Condition/ Temper
1	42Ni–21.5Cr–3Mo–2.3Cu	Forgings	SB–564	N08825	Annealed
2	62Ni–28Mo–5Fe	Plate	SB–333	N10001	Solution ann.
3	62Ni–28Mo–5Fe	Wld. pipe	SB–619	N10001	Solution ann.
4	62Ni–28Mo–5Fe	Smls. pipe & tube	SB–622	N10001	Solution ann.
5	62Ni–28Mo–5Fe	Wld. tube	SB–626	N10001	Solution ann.
6	62Ni–28Mo–5Fe	Rod	SB–335	N10001	Solution ann.
7	62Ni–28Mo–5Fe	Rod	SB–335	N10001	Solution ann.
8	62Ni–28Mo–5Fe	Sheet, strip	SB–333	N10001	Solution ann.
9	70Ni–16Mo–7Cr–5Fe	Plate, sheet, strip	SB–434	N10003	Annealed
10	70Ni–16Mo–7Cr–5Fe	Rod	SB–573	N10003	Solution ann.
11	54Ni–16Mo–15Cr	Smls. fittings	SB–366	N10276	Solution ann.
12	54Ni–16Mo–15Cr	Wld. fittings	SB–366	N10276	Solution ann.
13	54Ni–16Mo–15Cr	Forgings	SB–462	N10276	Solution ann.
14	54Ni–16Mo–15Cr	Rod	SB–574	N10276	Solution ann.
15	54Ni–16Mo–15Cr	Plate, sheet, strip	SB–575	N10276	Solution ann.
16	54Ni–16Mo–15Cr	Wld. pipe	SB–619	N10276	Solution ann.
17	54Ni–16Mo–15Cr	Smls. pipe & tube	SB–622	N10276	Solution ann.
18	54Ni–16Mo–15Cr	Wld. tube	SB–626	N10276	Solution ann.
19	65Ni–28Mo–2Fe	Plate, sheet, strip	SB–333	N10665	Solution ann.
20	65Ni–28Mo–2Fe	Rod	SB–335	N10665	Solution ann.
21	65Ni–28Mo–2Fe	Smls. fittings	SB–366	N10665	Solution ann.
22	65Ni–28Mo–2Fe	Wld. fittings	SB–366	N10665	Solution ann.
23	65Ni–28Mo–2Fe	Forgings	SB–462	N10665	Solution ann.
24	65Ni–28Mo–2Fe	Wld. pipe	SB–619	N10665	Solution ann.
25	65Ni–28Mo–2Fe	Smls. pipe & tube	SB–622	N10665	Solution ann.
26	65Ni–28Mo–2Fe	Wld. tube	SB–626	N10665	Solution ann.
27	Ti	Plate, sheet, strip	SB–265	R50250	Annealed
28	Ti	Bar, billet	SB–348	R50250	Annealed
29	Ti	Forgings	SB–381	R50250	Annealed
30	Ti	Smls. tube	SB–338	R50250	Smls. ann.
31	Ti	Smls. pipe	SB–861	R50250	Smls. ann.
32	Ti	Wld. tube	SB–338	R50250	Wld. ann.
33	Ti	Wld. pipe	SB–862	R50250	Wld. ann.
34	Ti	Plate, sheet, strip	SB–265	R50400	Annealed
35	Ti	Bar, billet	SB–348	R50400	Annealed
36	Ti	Forgings	SB–381	R50400	Annealed
37	Ti	Smls. tube	SB–338	R50400	Smls. ann.
38	Ti	Smls. pipe	SB–861	R50400	Smls. ann.
39	Ti	Wld. tube	SB–338	R50400	Wld. ann.
40	Ti	Wld. pipe	SB–862	R50400	Wld. ann.
41	Ti	Plate, sheet, strip	SB–265	R50550	Annealed
42	Ti	Bar, billet	SB–348	R50550	Annealed
43	Ti	Forgings	SB–381	R50550	Annealed
44	Ti	Smls. tube	SB–338	R50550	Smls. ann.
45	Ti	Smls. pipe	SB–861	R50550	Smls. ann.

Table 5B (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Nonferrous Materials

Line No.	Size/ Thickness, in.	P-No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Maximum Use Temperature, °F	External Pressure Chart No.	Notes
1	...	45	85	35	1000	NFN–7	G1, G3
2	$^{3}/_{16} \le t \le 2^{1}/_{2}$	44	100	45	800	NFN–5	G1, G3
3	...	44	100	45	800	NFN–5	G1, G3, G7
4	...	44	100	45	800	NFN–5	G1, G3
5	...	44	100	45	800	NFN–5	G1, G3, G7
6	$1^{1}/_{2} < t \le 3^{1}/_{2}$	44	100	46	800	NFN–5	G1, G2, G3
7	$^{5}/_{16} \le t \le 1^{1}/_{2}$	44	115	46	800	NFN–5	G1, G2, G3
8	$t < {}^{3}/_{16}$	44	115	50	800	NFN–5	G1, G3
9	$t < 2^{1}/_{2}$	44	100	40	800	NFN–6	G3
10	...	44	100	40	800	NFN–6	G1, G2, G3
11	...	43	100	41	800	NFN–10	G1, G3
12	...	43	100	41	800	NFN–10	G1, G3, G7
13	...	43	100	41	800	NFN–10	G1, G3
14	...	43	100	41	1250	NFN–10	G1, G2, G3, T13
15	...	43	100	41	1250	NFN–10	G1, G3, T13
16	...	43	100	41	1250	NFN–10	G1, G3, G7, T13
17	...	43	100	41	1250	NFN–10	G1, G3, T13
18	...	43	100	41	1250	NFN–10	G1, G3, G7, T13
19	...	44	110	51	800	NFN–16	G1, G3
20	...	44	110	51	800	NFN–16	G1, G2, G3
21	...	44	110	51	800	NFN–16	G1, G3
22	...	44	110	51	800	NFN–16	G1, G3, G7
23	...	44	110	51	800	NFN–16	G1, G3
24	...	44	110	51	800	NFN–16	G1, G3, G7
25	...	44	110	51	800	NFN–16	G1, G3
26	...	44	110	51	800	NFN–16	G1, G3, G7
27	...	51	35	25	600	NFT–3	...
28	...	51	35	25	600	NFT–3	...
29	...	51	35	25	600	NFT–3	...
30	...	51	35	25	600	NFT–3	...
31	...	51	35	25	600	NFT–3	...
32	...	51	35	25	600	NFT–3	G7
33	...	51	35	25	600	NFT–3	G7
34	...	51	50	40	600	NFT–2	...
35	...	51	50	40	600	NFT–2	...
36	...	51	50	40	600	NFT–2	...
37	...	51	50	40	600	NFT–2	...
38	...	51	50	40	600	NFT–2	...
39	...	51	50	40	600	NFT–2	G7
40	...	51	50	40	600	NFT–2	G7
41	...	52	65	55	600	NFT–1	...
42	...	52	65	55	600	NFT–1	...
43	...	52	65	55	600	NFT–1	...
44	...	52	65	55	600	NFT–1	...
45	...	52	65	55	600	NFT–1	...

Table 5B (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Nonferrous Materials

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900
1	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.3	23.2	23.0	22.9	22.8
2	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	29.9	...	...
3	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.4	...	...
4	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	29.9	...	...
5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.4	...	...
6	30.7	30.7	30.7	30.7	30.7	30.7	30.7	30.7	30.7	30.7	30.7	30.7	30.7	30.7	30.5	...	...
7	30.7	30.7	30.7	30.7	30.7	30.7	30.7	30.7	30.7	30.7	30.7	30.7	30.7	30.7	30.5	...	...
8	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.2	...	...
9	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.5	26.1	25.8	25.5	25.3	24.9	...	...
10	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.5	26.1	25.8	25.5	25.3	24.9	...	...
11	27.3	27.3	27.3	27.3	27.3	27.3	27.3	27.3	26.9	26.0	25.2	24.6	24.0	23.5	23.1	...	...
12	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	22.8	22.1	21.5	20.9	20.4	20.0	19.6	...	...
13	27.3	27.3	27.3	27.3	27.3	27.3	27.3	27.3	26.9	26.0	25.2	24.6	24.0	23.5	23.1	...	...
14	27.3	27.3	27.3	27.3	27.3	27.3	27.3	27.3	26.9	26.0	25.2	24.6	24.0	23.5	23.1	22.8	22.6
15	27.3	27.3	27.3	27.3	27.3	27.3	27.3	27.3	26.9	26.0	25.2	24.6	24.0	23.5	23.1	22.8	22.6
16	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	22.8	22.1	21.5	20.9	20.4	20.0	19.6	19.4	19.2
17	27.3	27.3	27.3	27.3	27.3	27.3	27.3	27.3	26.9	26.0	25.2	24.6	24.0	23.5	23.1	22.8	22.6
18	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	22.8	22.1	21.5	20.9	20.4	20.0	19.6	19.4	19.2
19	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	...	...
20	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	...	...
21	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	...	...
22	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	...	...
23	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	...	...
24	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	...	...
25	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	...	...
26	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	...	...
27	14.6	13.4	11.7	10.2	9.0	7.8	6.8	5.9	5.2	4.7	4.4	...	...	...	...	...	...
28	14.6	13.4	11.7	10.2	9.0	7.8	6.8	5.9	5.2	4.7	4.4	...	...	...	...	...	...
29	14.6	13.4	11.7	10.2	9.0	7.8	6.8	5.9	5.2	4.7	4.4	...	...	...	...	...	...
30	14.6	13.4	11.7	10.2	9.0	7.8	6.8	5.9	5.2	4.7	4.4	...	...	...	...	...	...
31	14.6	13.4	11.7	10.2	9.0	7.8	6.8	5.9	5.2	4.7	4.4	...	...	...	...	...	...
32	12.4	11.4	9.9	8.7	7.6	6.7	5.8	5.1	4.5	4.0	3.8	...	...	...	...	...	...
33	12.4	11.4	9.9	8.7	7.6	6.7	5.8	5.1	4.5	4.0	3.8	...	...	...	...	...	...
34	20.8	20.8	20.8	19.1	17.1	15.1	13.1	11.3	9.8	8.7	8.0	...	...	...	...	...	...
35	20.8	20.8	20.8	19.1	17.1	15.1	13.1	11.3	9.8	8.7	8.0	...	...	...	...	...	...
36	20.8	20.8	20.8	19.1	17.1	15.1	13.1	11.3	9.8	8.7	8.0	...	...	...	...	...	...
37	20.8	20.8	20.8	19.1	17.1	15.1	13.1	11.3	9.8	8.7	8.0	...	...	...	...	...	...
38	20.8	20.8	20.8	19.1	17.1	15.1	13.1	11.3	9.8	8.7	8.0	...	...	...	...	...	...
39	17.7	17.7	17.7	16.2	14.5	12.8	11.1	9.6	8.4	7.4	6.8	...	...	...	...	...	...
40	17.7	17.7	17.7	16.2	14.5	12.8	11.1	9.6	8.4	7.4	6.8	...	...	...	...	...	...
41	27.1	27.1	27.1	26.5	23.8	21.3	19.1	17.0	15.0	13.2	11.4	...	...	...	...	...	...
42	27.1	27.1	27.1	26.5	23.8	21.3	19.1	17.0	15.0	13.2	11.4	...	...	...	...	...	...
43	27.1	27.1	27.1	26.5	23.8	21.3	19.1	17.0	15.0	13.2	11.4	...	...	...	...	...	...
44	27.1	27.1	27.1	26.5	23.8	21.3	19.1	17.0	15.0	13.2	11.4	...	...	...	...	...	...
45	27.1	27.1	27.1	26.5	23.8	21.3	19.1	17.0	15.0	13.2	11.4	...	...	...	...	...	...

Table 5B (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Nonferrous Materials

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding														
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
1	22.6	22.3	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
14	22.4	22.3	*18.5*	*15.0*	*12.2*	*9.8*	*7.8*	...	...	...	...	...	...	...	...
15	22.4	22.3	*18.5*	*15.0*	*12.2*	*9.8*	*7.8*	...	...	...	...	...	...	...	...
16	19.0	19.0	*15.7*	*12.8*	*10.4*	*8.3*	*6.6*	...	...	...	...	...	...	...	...
17	22.4	22.3	*18.5*	*15.0*	*12.2*	*9.8*	*7.8*	...	...	...	...	...	...	...	...
18	19.0	19.0	*15.7*	*12.8*	*10.4*	*8.3*	*6.6*	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

Table 5B (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Alloy Desig./UNS No.	Class/Condition/ Temper
1	Ti	Wld. tube	SB–338	R50550	Wld. ann.
2	Ti	Wld. pipe	SB–862	R50550	Wld. ann.
3	Ti–Pd	Plate, sheet, strip	SB–265	R52400	Annealed
4	Ti–Pd	Bar, billet	SB–348	R52400	Annealed
5	Ti–Pd	Forgings	SB–381	R52400	Annealed
6	Ti–Pd	Smls. tube	SB–338	R52400	Smls. ann.
7	Ti–Pd	Smls. pipe	SB–861	R52400	Smls. ann.
8	Ti–Pd	Wld. tube	SB–338	R52400	Wld. ann.
9	Ti–Pd	Wld. pipe	SB–862	R52400	Wld. ann.
10	Ti–Pd	Plate, sheet, strip	SB–265	R52402	Annealed
11	Ti–Pd	Smls. tube	SB–338	R52402	Annealed
12	Ti–Pd	Wld. tube	SB–338	R52402	Annealed
13	Ti–Pd	Bar, billet	SB–348	R52402	Annealed
14	Ti–Pd	Forgings	SB–381	R52402	Annealed
(**21**) 15	Ti–0.3Mo–0.8Ni	Plate, sheet, strip	SB–265	R53400	Annealed
(**21**) 16	Ti–0.3Mo–0.8Ni	Bar, billet	SB–348	R53400	Annealed
(**21**) 17	Ti–0.3Mo–0.8Ni	Forgings	SB–381	R53400	Annealed
(**21**) 18	Ti–0.3Mo–0.8Ni	Smls. tube	SB–338	R53400	Smls. ann.
(**21**) 19	Ti–0.3Mo–0.8Ni	Smls. pipe	SB–861	R53400	Smls. ann.
(**21**) 20	Ti–0.3Mo–0.8Ni	Wld. tube	SB–338	R53400	Wld. ann.
(**21**) 21	Ti–0.3Mo–0.8Ni	Wld. pipe	SB–862	R53400	Wld. ann.

Table 5B (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Nonferrous Materials

Line No.	Size/ Thickness, in.	P-No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Maximum Use Temperature, °F	External Pressure Chart No.	Notes
1	...	52	65	55	600	NFT–1	G7
2	...	52	65	55	600	NFT–1	G7
3	...	51	50	40	600	NFT–2	...
4	...	51	50	40	600	NFT–2	...
5	...	51	50	40	600	NFT–2	...
6	...	51	50	40	600	NFT–2	...
7	...	51	50	40	600	NFT–2	...
8	...	51	50	40	600	NFT–2	G7
9	...	51	50	40	600	NFT–2	G7
10	...	51	50	40	600	NFT–2	...
11	...	51	50	40	600	NFT–2	...
12	...	51	50	40	600	NFT–2	...
13	...	51	50	40	600	NFT–2	...
14	...	51	50	40	600	NFT–2	...
15	...	52	70	50	600	NFT–1	...
16	...	52	70	50	600	NFT–1	...
17	...	52	70	50	600	NFT–1	...
18	...	52	70	50	600	NFT–1	...
19	...	52	70	50	600	NFT–1	...
20	...	52	70	50	600	NFT–1	G7
21	...	52	70	50	600	NFT–1	G7

Table 5B (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Nonferrous Materials

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding																
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900
1	23.0	23.0	23.0	22.5	20.3	18.1	16.2	14.4	12.8	11.2	9.7	...	...	...	...	...	...
2	23.0	23.0	23.0	22.5	20.3	18.1	16.2	14.4	12.8	11.2	9.7	...	...	...	...	...	...
3	20.8	20.8	20.8	19.1	17.1	15.1	13.1	11.3	9.8	8.7	8.0	...	...	...	...	...	...
4	20.8	20.8	20.8	19.1	17.1	15.1	13.1	11.3	9.8	8.7	8.0	...	...	...	...	...	...
5	20.8	20.8	20.8	19.1	17.1	15.1	13.1	11.3	9.8	8.7	8.0	...	...	...	...	...	...
6	20.8	20.8	20.8	19.1	17.1	15.1	13.1	11.3	9.8	8.7	8.0	...	...	...	...	...	...
7	20.8	20.8	20.8	19.1	17.1	15.1	13.1	11.3	9.8	8.7	8.0	...	...	...	...	...	...
8	17.7	17.7	17.7	16.2	14.5	12.8	11.1	9.6	8.4	7.4	6.8	...	...	...	...	...	...
9	17.7	17.7	17.7	16.2	14.5	12.8	11.1	9.6	8.4	7.4	6.8	...	...	...	...	...	...
10	20.8	20.8	20.8	19.1	17.1	15.1	13.1	11.3	9.8	8.7	8.0	...	...	...	...	...	...
11	20.8	20.8	20.8	19.1	17.1	15.1	13.1	11.3	9.8	8.7	8.0	...	...	...	...	...	...
12	17.7	17.7	17.7	16.2	14.5	12.8	11.1	9.6	8.4	7.4	6.8	...	...	...	...	...	...
13	20.8	20.8	20.8	19.1	17.1	15.1	13.1	11.3	9.8	8.7	8.0	...	...	...	...	...	...
14	20.8	20.8	20.8	19.1	17.1	15.1	13.1	11.3	9.8	8.7	8.0	...	...	...	...	...	...
15	29.2	29.2	27.8	25.3	23.1	21.3	19.8	18.5	17.3	16.4	16.1	...	...	...	...	...	...
16	29.2	29.2	27.8	25.3	23.1	21.3	19.8	18.5	17.3	16.4	16.1	...	...	...	...	...	...
17	29.2	29.2	27.8	25.3	23.1	21.3	19.8	18.5	17.3	16.4	16.1	...	...	...	...	...	...
18	29.2	29.2	27.8	25.3	23.1	21.3	19.8	18.5	17.3	16.4	16.1	...	...	...	...	...	...
19	29.2	29.2	27.8	25.3	23.1	21.3	19.8	18.5	17.3	16.4	16.1	...	...	...	...	...	...
20	24.8	24.8	23.7	21.5	19.7	18.1	16.9	15.7	14.7	13.9	13.6	...	...	...	...	...	...
21	24.8	24.8	23.7	21.5	19.7	18.1	16.9	15.7	14.7	13.9	13.6	...	...	...	...	...	...

Table 5B (Cont'd)
Section VIII, Division 2, Class 2
Maximum Allowable Stress Values, *S*, for Nonferrous Materials

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding															
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)

NOTES TO TABLE 5B

GENERAL NOTES

(a) The following abbreviations are used: ann., annealed; extr., extruded; fin., finished; rel., relieved; Smls., Seamless; and Wld., Welded.

(b) An alternative typeface is used for stress values obtained from time–dependent properties (see Notes T1 through T14).

(c) Where specifications, grades, classes, and types are listed in this Table, and where the material specification in Section II, Part A or Part B is a dual–unit specification (e.g., SB–407/SB–407M), the values listed in this Table shall be applicable to either the customary U.S. version of the material specification or the SI units version of the material specification. For example, the values listed for SB–407 Grade N08800 shall be used when SB–407M Grade N08800 is used in construction.

(d) The values in this Table may be interpolated to determine values for intermediate temperatures. The values at intermediate temperatures shall be rounded to the same number of decimal places as the value at the higher temperature between which values are being interpolated. The rounding rule is: when the next digit beyond the last place to be retained is less than 5, retain unchanged the digit in the last place retained; when the digit next beyond the last place to be retained is 5 or greater, increase by 1 the digit in the last place retained.

(e) The properties of steels are influenced by the processing history, heat treatment, melting practice, and level of residual elements. See Nonmandatory Appendix A for more information.

(f) Where a size limit appears in the Size/Thickness column, the limit applies to the dimension appropriate to the product form: wall thickness of tubing, pipe, pipe fittings, and hollow forgings; thickness of plate, flat bar and forgings, and polygonal bar; diameter of solid bar and bolting; and thickest cross–section of other pressure parts, e.g., castings and forgings.

NOTES – GENERAL REQUIREMENTS

G1 Due to the relatively low yield strength of these materials, these higher stress values were established at temperatures where the short–time tensile properties govern to permit the use of these alloys where slightly greater deformation is acceptable. The stress values in this range exceed $66\frac{2}{3}$% but do not exceed 90% of the yield strength at temperature. Use of these stresses may result in dimensional changes due to permanent strain. These stress values are not recommended for the flanges of gasketed joints or other applications where slight amounts of distortion can cause leakage or malfunction. Table Y–2 lists multiplying factors that, when applied to the yield strength values shown in Table Y–1, will give allowable stress values that will result in lower levels of permanent strain.

G2 Use of external pressure charts for material in the form of bar stock is permitted for stiffening rings only.

G3 Maximum allowable stress values for 100°F may be used at temperatures down to –325°F without additional specification requirements.

G4 Maximum allowable stress values for 100°F may be used at temperatures down to –452°F without additional specification requirements.

G5 Maximum temperature for external pressure design not to exceed 350°F.

G6 These alloys are occasionally subject to the hazard of stress corrosion cracking. Even though they are suitable for engineering use under a wide variety of corrosive conditions, with no particular hazard with respect to stress corrosion, the supplier of the material should be consulted before applying them.

G7 A joint efficiency factor of 0.85 has been applied in arriving at the maximum allowable stress values for this material.

G8 For stress relieved tempers (T451, T4510, T4511, T651, T6510, T6511), stress values for materials in the basic temper shall be used.

G9 Copper–silicon alloys are not always suitable when exposed to certain media and high temperature, particularly steam above 212°F. The user should satisfy him/herself that the alloy selected is satisfactory for the service for which it is to be used.

G10 At temperatures over 1000°F, these stress values apply only when the carbon is 0.04% or higher.

G11 This alloy is subject to severe loss of impact strength at room temperatures after exposure in the range of 1000°F to 1400°F.

G12 Alloy N06022 in the solution annealed condition is subject to severe loss of impact strength at room temperatures after exposure in the range of 1000°F to 1250°F.

G13 Creep–fatigue, thermal ratcheting, and environmental effects are increasingly significant failure modes at temperatures in excess of 1500°F and shall be considered in the design.

NOTES – HEAT TREATMENT REQUIREMENTS

H1 For temperatures above 1000°F, these stress values may be used only if the material is annealed at a minimum temperature of 1900°F and has a carbon content of 0.04% or higher.

H2 For temperatures above 1000°F, these stress values may be used only if the material is heat treated by heating it to a minimum temperature of 1900°F and quenching in water or rapidly cooling by other means.

NOTES – TIME–DEPENDENT PROPERTIES

T1 Allowable stresses for temperatures of 250°F and above are values obtained from time–dependent properties.

T2 Allowable stresses for temperatures of 300°F and above are values obtained from time–dependent properties.

T3 Allowable stresses for temperatures of 350°F and above are values obtained from time–dependent properties.

T4 Allowable stresses for temperatures of 400°F and above are values obtained from time–dependent properties.

T5 Allowable stresses for temperatures of 500°F and above are values obtained from time–dependent properties.

T6 Allowable stresses for temperatures of 700°F and above are values obtained from time–dependent properties.

T7 Allowable stresses for temperatures of 750°F and above are values obtained from time–dependent properties.

T8 Allowable stresses for temperatures of 800°F and above are values obtained from time–dependent properties.

T9 Allowable stresses for temperatures of 850°F and above are values obtained from time–dependent properties.

T10 Allowable stresses for temperatures of 900°F and above are values obtained from time–dependent properties.

T11 Allowable stresses for temperatures of 950°F and above are values obtained from time–dependent properties.

T12 Allowable stresses for temperatures of 1000°F and above are values obtained from time–dependent properties.

T13 Allowable stresses for temperatures of 1050°F and above are values obtained from time–dependent properties.

NOTES TO TABLE 5B (CONT'D)

NOTES – TIME–DEPENDENT PROPERTIES (CONT'D)

T14 Allowable stresses for temperatures of 1100°F and above are values obtained from time–dependent properties.

NOTES – WELDING REQUIREMENTS

W1 Welding except for seal welds is not permitted.

W2 For welded construction, stress values for material at O temper shall be used.

W3 The stress values given for this material are not applicable when either welding or thermal cutting is employed.

W4 Use NFA–12 when welded with 5356 or 5556 filler metal, all thicknesses, or 4043 or 5554 filler metal, thickness ≤ $^{3}/_{8}$ in. Use NFA–13 when welded with 4043 or 5554 filler metal, thickness > $^{3}/_{8}$ in.

(21)

Table 6A
Section IV Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Cond./ Temper	Size/ Thickness, in.	P-No.	Group No.
1	Carbon steel	Bar, stay	SA–675	45	...	...	...	1	1
2	Carbon steel	Plate	SA–285	A	K01700	...	...	1	1
3	Carbon steel	Sheet	SA–414	A	K01501	...	...	1	1
4	Carbon steel	Wld. pipe & tube	SA–178	A	K01200	...	...	1	1
5	Carbon steel	Smls. pipe & tube	SA–192	...	K01201	...	...	1	1
6	Carbon steel	Smls. pipe & tube	SA–53	A	K02504	...	...	1	1
7	Carbon steel	Wld. pipe & tube	SA–53	A	K02504	...	...	1	1
8	Carbon steel	Butt–wld. pipe	SA–53	F	...	...	...	1	1
9	Carbon steel	Smls. pipe & tube	SA–106	A	K02501	...	...	1	1
10	Carbon steel	Wld. pipe & tube	SA–135	A	...	...	...	1	1
11	Carbon steel	Bar, stay	SA–675	50	...	...	...	1	1
12	Carbon steel	Plate	SA–285	B	K02200	...	...	1	1
13	Carbon steel	Sheet	SA–414	B	K02201	...	...	1	1
14	Carbon steel	Plate	SA/EN 10025–2	S235JR	...	...	$t \le 4$	1	1
15	Carbon steel	Wld. pipe & tube	SA/EN 10217–1	P235TR2	...	...	$t \le 1\frac{9}{16}$	1	1
16	Carbon steel	Bar, stay	SA–675	55	...	...	...	1	1
17	Carbon steel	Plate	SA–285	C	K02801	...	...	1	1
18	Carbon steel	Plate	SA–516	55	K01800	...	...	1	1
19	Carbon steel	Sheet	SA–414	C	K02503	...	...	1	1
20	Carbon steel	Plate	SA–36	...	K02600	...	...	1	1
21	Carbon steel	Bar, stay	SA–36	...	K02600	...	...	1	1
22	Carbon steel	Forgings	SA–181	...	K03502	60	...	1	1
23	Carbon steel	Castings	SA–216	WCA	J02502	...	...	1	1
24	Carbon steel	Forgings	SA–266	1	K03506	...	...	1	1
25	Carbon steel	Bar, stay	SA–675	60	...	...	...	1	1
26	Carbon steel	Plate	SA–515	60	K02401	...	...	1	1
27	Carbon steel	Plate	SA–516	60	K02100	...	...	1	1
28	Carbon steel	Smls. pipe & tube	SA–53	B	K03005	...	...	1	1
29	Carbon steel	Wld. pipe & tube	SA–53	B	K03005	...	...	1	1
30	Carbon steel	Smls. pipe & tube	SA–106	B	K03006	...	...	1	1
31	Carbon steel	Wld. pipe & tube	SA–135	B	...	...	...	1	1
32	Carbon steel	Sheet	SA–414	D	K02505	...	...	1	1
33	Carbon steel	Wld. pipe & tube	SA–178	C	K03503	...	...	1	1
34	Carbon steel	Smls. pipe & tube	SA–210	A–1	K02707	...	...	1	1
35	Carbon steel	Bolting	SA–307	B	...	...	...	...	...
36	Carbon steel	Bar, stay	SA–675	65	...	...	...	1	1
37	Carbon steel	Plate	SA–515	65	K02800	...	...	1	1
38	Carbon steel	Plate	SA–516	65	K02403	...	...	1	1
39	Carbon steel	Sheet	SA–414	E	K02704	...	...	1	1
40	Carbon steel	Plate	SA/CSA–G40.21	44W	...	...	...	1	1
41	Carbon steel	Plate	SA/CSA–G40.21	50W	...	...	...	1	1
(21) 42	Carbon steel	Bolting	SA–311	1018	...	A	...	...	...
43	Carbon steel	Plate	SA–455	...	K03300	...	$0.58 < t \le \frac{3}{4}$	1	2
44	Carbon steel	Bar, stay	SA–675	70	...	...	...	1	2
45	Carbon steel	Forgings	SA–105	...	K03504	...	...	1	2

Table 6A
Section IV Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	External Pressure Chart No.	Notes	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
					100	150	200	250	300	350	400	450	500
1	45	22.5	...	...	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
2	45	24	CS-1	...	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
3	45	25	CS-1	...	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
4	47	26	CS-2	G3, G4	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
5	47	26	CS-1	G3	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4
6	48	30	CS-2	G4	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6
7	48	30	CS-2	...	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2
8	48	30	CS-2	G5	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8
9	48	30	CS-2	...	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6
10	48	30	CS-2	G4	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2
11	50	25	...	...	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
12	50	27	CS-1	...	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
13	50	30	CS-2	...	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
14	52	31	CS-2	...	10.4	...	10.4	...	10.4	...	10.4	...	10.4
15	52	33	CS-2	G4	8.8	...	8.8	...	8.8	...	8.8	...	8.8
16	55	27.5	...	...	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
17	55	30	CS-2	...	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
18	55	30	CS-2	...	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
19	55	33	CS-2	...	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
20	58	36	CS-2	G1, G2	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6
21	58	36	...	G1	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6
22	60	30	CS-2	...	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
23	60	30	CS-2	G6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6
24	60	30	CS-2	...	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
25	60	30	...	...	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
26	60	32	CS-2	...	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
27	60	32	CS-2	...	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
28	60	35	CS-2	...	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
29	60	35	CS-2	G4	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
30	60	35	CS-2	...	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
31	60	35	CS-2	G4	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
32	60	35	CS-2	...	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
33	60	37	CS-1	...	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
34	60	37	CS-2	...	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
35	60	...	...	G7	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
36	65	32.5	...	...	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0
37	65	35	CS-2	...	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0
38	65	35	CS-2	...	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0
39	65	38	CS-2	...	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0
40	65	44	CS-2	...	13.0	...	13.0	...	13.0	...	13.0	...	13.0
41	65	50	CS-2	...	13.0	...	13.0	...	13.0	...	13.0	...	13.0
42	65	55	...	G8, W1, W3	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0
43	70	35	CS-2	...	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
44	70	35	...	...	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
45	70	36	CS-2	...	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0

Table 6A (Cont'd)
Section IV Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Cond./ Temper	Size/ Thickness, in.	P-No.	Group No.
1	Carbon steel	Forgings	SA–181	...	K03502	70	...	1	2
2	Carbon steel	Castings	SA–216	WCB	J03002	...	...	1	2
3	Carbon steel	Forgings	SA–266	2	K03506	...	...	1	2
4	Carbon steel	Plate	SA–515	70	K03101	...	...	1	2
5	Carbon steel	Plate	SA–516	70	K02700	...	...	1	2
6	Carbon steel	Smls. pipe & tube	SA–106	C	K03501	...	...	1	2
7	Carbon steel	Sheet	SA–414	F	K03102	...	...	1	2
8	Carbon steel	Bolting	SA–311	1018	...	A	...	...	...
9	Carbon steel	Plate	SA–455	...	K03300	...	$^3/_8 < t \le 0.58$	1	2
10	Carbon steel	Forgings	SA–266	3	K05001	...	...	1	2
11	Carbon steel	Plate	SA–455	...	K03300	...	$t \le {}^3/_8$	1	2
12	Carbon steel	Sheet	SA–414	G	K03103	...	...	1	2
13	Carbon steel	Bolting	SA–311	1035	...	A	...	...	...
14	Carbon steel	Bolting	SA–311	1035	...	A	...	...	...
15	Carbon steel	Bolting	SA–311	1045	...	A	...	...	...
16	Carbon steel	Bolting	SA–311	1045	...	A	...	...	...
17	Carbon steel	Bolting	SA–311	1050	...	A	...	...	...
18	Carbon steel	Bolting	SA–311	1050	...	A	...	...	...
19	Carbon steel	Bolting	SA–325	1	...	...	...	...	...
20	Carbon steel	Bolting	SA–311	1045	...	B	...	...	...
21	Carbon steel	Bolting	SA–354	BC	...	...	...	...	...
22	Carbon steel	Bolting	SA–354	BD	...	...	...	...	...
23	Carbon steel	Bolting	SF–568M	10.9	...	...	...	...	...
24	1Cr–0.2Mo	Bolting	SA–193	B7	G41400	...	...	...	...
25	1Cr–0.2Mo	Bolting	SA–320	L7	...	...	...	...	...
26	5Cr–$^1/_2$Mo	Bolting	SA–193	B5	K50100	...	...	...	...
27	18Cr–2Mo	Plate	SA–240	...	S44400	...	$t \le {}^3/_8$	7	2
28	18Cr–2Mo	Tube	SA–268	...	S44400	...	$t \le {}^3/_8$	7	2
(**21**) 29	18Cr–2Mo	Bar	SA–479	CS–2	S44400	...	$t \le {}^3/_8$	7	2
30	18Cr–Ti	Plate	SA–240	439	...	...	$t \le {}^3/_8$	7	2
31	18Cr–Ti	Tube	SA–268	TP439	S43035	...	$t \le {}^3/_8$	7	2
(**21**) 32	18Cr–Ti	Bar	SA–479	439	S43035	...	$t \le {}^3/_8$	7	2
33	18Cr–Ti–Co	Plate	SA–240	...	S43932	...	$t \le {}^3/_8$	7	2
(**21**) 34	29Cr–4Mo	Smls. tube	SA–268	29–4	S44700	...	...	10J	1
(**21**) 35	29Cr–4Mo	Wld. tube	SA–268	29–4	S44700	...	...	10J	1
36	$1^3/_4$Ni–$^3/_4$Cr–$^1/_4$Mo	Bolting	SA–320	L43	G43400	...	$t \le 4$	...	...
37	16Cr–12Ni–2Mo	Forgings	SA–182	F316L	S31603	...	...	8	1
38	16Cr–12Ni–2Mo	Smls. tube	SA–213	TP316L	S31603	...	...	8	1
39	16Cr–12Ni–2Mo	Plate	SA–240	316L	S31603	...	...	8	1
40	16Cr–12Ni–2Mo	Wld. tube	SA–249	TP316L	S31603	...	...	8	1
41	16Cr–12Ni–2Mo	Smls. pipe	SA–312	TP316L	S31603	...	...	8	1
42	16Cr–12Ni–2Mo	Wld. pipe	SA–312	TP316L	S31603	...	...	8	1
43	16Cr–12Ni–2Mo	Bar	SA–479	316L	S31603	...	...	8	1
44	16Cr–12Ni–2Mo	Castings	SA–351	CF3M	J92800	...	$t \ge 0.10$	8	1
45	16Cr–12Ni–2Mo	Forgings	SA–182	F316	S31600	...	...	8	1

Table 6A (Cont'd)
Section IV Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	External Pressure Chart No.	Notes	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
					100	150	200	250	300	350	400	450	500
1	70	36	CS-2	...	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
2	70	36	CS-2	G6	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2
3	70	36	CS-2	...	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
4	70	38	CS-2	...	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
5	70	38	CS-2	...	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
6	70	40	CS-2	...	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
7	70	42	CS-3	...	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
8	70	60	...	G8, W1, W2	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
9	73	37	CS-2	...	14.6	14.6	14.6	14.6	14.6	14.6	14.6	14.6	14.6
10	75	37.5	CS-2	...	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
11	75	38	CS-2	...	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
12	75	45	CS-3	...	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
13	80	70	...	G8, W1, W3	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0
14	85	75	...	G8, W1, W2	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
15	90	80	...	G8, W1, W3	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
16	95	85	...	G8, W1, W2	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0
17	95	85	...	G8, W1, W3	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0
18	100	90	...	G8, W1, W2	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
19	105	81	...	G7	20.2	20.2	20.2	20.2	20.2	20.2	20.2	20.2	20.2
20	115	100	...	G8, W1, W2	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0
21	125	109	...	G7	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
22	150	130	...	G7	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
23	150	...	...	G7	30.2	30.2	30.2	30.2	30.2	30.2	30.2	30.2	30.2
24	100	75	...	G7	18.8	18.8	18.8	18.8	18.8	18.8	18.8	18.8	18.8
25	125	105	...	G7	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
26	100	80	...	G7	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
27	60	40	CS-2	...	12.0	12.0	12.0	11.8	11.6	11.5	11.4	11.2	11.1
28	60	40	CS-2	...	12.0	12.0	12.0	11.8	11.6	11.5	11.4	11.2	11.1
29	60	45	...	...	12.0	12.0	12.0	11.8	11.6	11.5	11.4	11.2	11.1
30	60	30	...	G9	12.0	12.0	12.0	11.8	11.6	11.4	11.3	11.2	11.0
31	60	30	CS-2	G9	12.0	12.0	12.0	11.8	11.6	11.4	11.3	11.2	11.0
32	70	40	CS-2	G9	14.0	14.0	14.0	13.8	13.5	13.3	13.2	13.0	12.9
33	65	30	CS-2	G9	13.0	13.0	13.0	12.8	12.6	12.4	12.2	12.1	12.0
34	80	60	HA-6	G12	15.0	15.0	15.0	14.7	14.5	14.4	14.4	14.4	14.4
35	80	60	HA-6	G4, G12	12.8	12.8	12.7	12.5	12.3	12.2	12.2	12.2	12.2
36	125	105	...	G7	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
37	70	25	HA-4	G9, G11	14.0	14.0	13.6	13.1	12.7	12.1	11.7	11.3	10.9
38	70	25	HA-4	G9, G10, G11	14.0	14.0	13.6	13.1	12.7	12.1	11.7	11.3	10.9
39	70	25	HA-4	G9	14.0	14.0	13.6	13.1	12.7	12.1	11.7	11.3	10.9
40	70	25	HA-4	G4, G9, G10, G11	11.9	11.9	11.6	11.2	10.8	10.3	9.9	9.6	9.3
41	70	25	HA-4	G9, G11	14.0	14.0	13.6	13.1	12.7	12.1	11.7	11.3	10.9
42	70	25	HA-4	G4, G9, G11	11.9	11.9	11.6	11.2	10.8	10.3	9.9	9.6	9.3
43	70	25	HA-4	G9, G10	14.0	14.0	13.6	13.1	12.7	12.1	11.7	11.3	10.9
44	70	30	...	G6, G9	11.2	11.2	11.2	11.0	10.9	10.8	10.8	10.7	10.7
45	75	30	HA-2	G9, G11	15.0	15.0	15.0	14.8	14.6	14.4	14.3	13.8	13.3

Table 6A (Cont'd)
Section IV Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Cond./ Temper	Size/ Thickness, in.	P-No.	Group No.
1	16Cr–12Ni–2Mo	Smls. tube	SA–213	TP316	S31600	...	...	8	1
2	16Cr–12Ni–2Mo	Plate	SA–240	316	S31600	...	...	8	1
3	16Cr–12Ni–2Mo	Wld. tube	SA–249	TP316	S31600	...	...	8	1
4	16Cr–12Ni–2Mo	Smls. pipe	SA–312	TP316	S31600	...	...	8	1
5	16Cr–12Ni–2Mo	Wld. pipe	SA–312	TP316	S31600	...	...	8	1
6	16Cr–12Ni–2Mo	Bar	SA–479	316	S31600	...	...	8	1
7	16Cr–12Ni–2Mo–Ti	Plate	SA–240	316Ti	S31635	...	...	8	1
8	16Cr–12Ni–2Mo–Ti	Plate	SA/EN 10088–2	X6CrNiMoTi17–12–2	...	...	$t \le 5/16$	8	1
9	18Cr–8Ni	Forgings	SA–182	F304L	S30403	...	$t \le 5$	8	1
10	18Cr–8Ni	Smls. tube	SA–213	TP304L	S30403	...	...	8	1
11	18Cr–8Ni	Plate	SA–240	304L	S30403	...	...	8	1
12	18Cr–8Ni	Wld. tube	SA–249	TP304L	S30403	...	...	8	1
13	18Cr–8Ni	Smls. pipe	SA–312	TP304L	S30403	...	...	8	1
14	18Cr–8Ni	Wld. pipe	SA–312	TP304L	S30403	...	...	8	1
15	18Cr–8Ni	Bar	SA–479	304L	S30403	...	...	8	1
16	18Cr–8Ni	Forgings	SA–182	F304	S30400	...	$t \le 5$	8	1
17	18Cr–8Ni	Smls. tube	SA–213	TP304	S30400	...	...	8	1
18	18Cr–8Ni	Plate	SA–240	304	S30400	...	...	8	1
19	18Cr–8Ni	Wld. tube	SA–249	TP304	S30400	...	...	8	1
20	18Cr–8Ni	Smls. pipe	SA–312	TP304	S30400	...	...	8	1
21	18Cr–8Ni	Wld. pipe	SA–312	TP304	S30400	...	...	8	1
22	18Cr–8Ni	Bar	SA–479	304	S30400	...	...	8	1
23	18Cr–10Ni–Cb	Castings	SA–351	CF8C	J92710	...	$t \ge 0.10$	8	1
24	...	Plate	SA/EN 10088–2	X6CrNiMoTi17–12–2	...	...	$t < 5/16$	8	1
25	20Cr–10Ni	Bar	SA–479	ER308	S30880	...	...	...	...
26	21Cr–5Mn–1.5Ni–Cu–N	Plate	SA–240	...	S32101	...	$t > 1/4$	10H	1
27	21Cr–5Mn–1.5Ni–Cu–N	Smls. tube	SA–789	...	S32101	...	$t > 1/4$	10H	1
28	21Cr–5Mn–1.5Ni–Cu–N	Wld. tube	SA–789	...	S32101	...	$t > 1/4$	10H	1
29	21Cr–5Mn–1.5Ni–Cu–N	Smls. pipe	SA–790	...	S32101	...	$t > 1/4$	10H	1
30	21Cr–5Mn–1.5Ni–Cu–N	Wld. pipe	SA–790	...	S32101	...	$t > 1/4$	10H	1
31	21Cr–5Mn–1.5Ni–Cu–N	Plate	SA–240	...	S32101	...	$t \le 1/4$	10H	1
32	21Cr–5Mn–1.5Ni–Cu–N	Smls. tube	SA–789	...	S32101	...	$t \le 1/4$	10H	1
33	21Cr–5Mn–1.5Ni–Cu–N	Wld. tube	SA–789	...	S32101	...	$t \le 1/4$	10H	1
34	21Cr–5Mn–1.5Ni–Cu–N	Smls. pipe	SA–790	...	S32101	...	$t \le 1/4$	10H	1
35	21Cr–5Mn–1.5Ni–Cu–N	Wld. pipe	SA–790	...	S32101	...	$t \le 1/4$	10H	1
36	22Cr–5Ni–3Mo–N	Plate	SA–240	...	S31803	...	...	10H	1
37	22Cr–5Ni–3Mo–N	Smls. tube	SA–789	...	S31803	...	...	10H	1
38	22Cr–5Ni–3Mo–N	Wld. tube	SA–789	...	S31803	...	...	10H	1
39	22Cr–5Ni–3Mo–N	Smls. pipe	SA–790	...	S31803	...	...	10H	1
40	22Cr–5Ni–3Mo–N	Wld. pipe	SA–790	...	S31803	...	...	10H	1
41	23Cr–12Ni	Bar	SA–479	309S	S30908	...	...	8	2
42	23Cr–12Ni	Bar	SA–479	309H	S30909	...	...	8	2
43	25Cr–20Ni	Bar	SA–479	310S	S31008	...	...	8	2
44	44Fe–25Ni–21Cr–Mo	Plate	SA–240	904L	N08904	...	...	45	...

Table 6A (Cont'd)
Section IV Maximum Allowable Stress Values, *S*, for Ferrous Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	External Pressure Chart No.	Notes	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
					100	150	200	250	300	350	400	450	500
1	75	30	HA–2	G9, G10, G11	15.0	15.0	15.0	14.8	14.6	14.4	14.3	13.8	13.3
2	75	30	HA–2	G9	15.0	15.0	15.0	14.8	14.6	14.4	14.3	13.8	13.3
3	75	30	HA–2	G4, G9, G10, G11	12.8	12.8	12.8	12.6	12.4	12.3	12.1	11.7	11.3
4	75	30	HA–2	G9, G11	15.0	15.0	15.0	14.8	14.6	14.4	14.3	13.8	13.3
5	75	30	HA–2	G4, G9, G11	12.8	12.8	12.8	12.6	12.4	12.3	12.1	11.7	11.3
6	75	30	HA–2	G7, G9, G13	15.0	15.0	15.0	14.8	14.6	14.4	14.3	13.8	13.3
7	75	30	HA–2	G9	15.0	15.0	15.0	15.0	15.0	15.0	14.3	13.7	13.2
8	78.5	35	HA–2	G14	15.7	...	15.7	...	15.3	...	15.0	...	15.0
9	70	25	HA–3	G9, G11	14.0	13.9	13.2	12.7	12.2	12.0	11.7	11.3	10.9
10	70	25	HA–3	G9, G10, G11	14.0	13.9	13.2	12.7	12.2	12.0	11.7	11.3	10.9
11	70	25	HA–3	G9	14.0	13.9	13.2	12.7	12.2	12.0	11.7	11.3	10.9
12	70	25	HA–3	G4, G9, G10, G11	11.9	11.8	11.2	10.8	10.4	10.2	9.9	9.6	9.3
13	70	25	HA–3	G9, G11	14.0	13.9	13.2	12.7	12.2	12.0	11.7	11.3	10.9
14	70	25	HA–3	G4, G9, G11	11.9	11.8	11.2	10.8	10.4	10.2	9.9	9.6	9.3
15	70	25	HA–3	G9, G10	14.0	13.9	13.2	12.7	12.2	12.0	11.7	11.3	10.9
16	75	30	HA–1	G9, G11	15.0	15.0	14.2	13.6	13.2	13.0	12.8	12.7	12.7
17	75	30	HA–1	G9, G10, G11	15.0	15.0	14.2	13.6	13.2	13.0	12.8	12.7	12.7
18	75	30	HA–1	G9	15.0	15.0	14.2	13.6	13.2	13.0	12.8	12.7	12.7
19	75	30	HA–1	G4, G9, G10, G11	12.8	12.7	12.1	11.6	11.3	11.0	10.9	10.8	10.8
20	75	30	HA–1	G9, G11	15.0	15.0	14.2	13.6	13.2	13.0	12.8	12.7	12.7
21	75	30	HA–1	G4, G9, G11	12.8	12.7	12.1	11.6	11.3	11.0	10.9	10.8	10.8
22	75	30	HA–1	G7, G9, G13	15.0	15.0	14.2	13.6	13.2	13.0	12.8	12.7	12.7
23	70	30	...	G6, G9	11.2	11.2	10.7	10.2	9.8	9.5	9.3	9.1	9.0
24	78.5	35	HA–2	G14	15.7	...	15.7	...	15.3	...	15.0	...	15.0
25	75	30	HA–2	G7, G9, G13	15.0	15.0	14.2	13.6	13.2	13.0	12.8	12.7	12.7
26	94	65	HA–5	...	18.8	18.8	18.8	18.5	17.9	17.5	17.3	17.2	17.2
27	94	65	HA–5	...	18.8	18.8	18.8	18.5	17.9	17.5	17.3	17.2	17.2
28	94	65	HA–5	...	16.0	16.0	16.0	15.7	15.2	14.9	14.7	14.6	14.6
29	94	65	HA–5	...	18.8	18.8	18.8	18.5	17.9	17.5	17.3	17.2	17.2
30	94	65	HA–5	...	16.0	16.0	16.0	15.7	15.2	14.9	14.7	14.6	14.6
31	101	77	HA–5	...	20.2	20.2	20.2	19.8	19.3	18.8	18.6	18.5	18.5
32	101	77	HA–5	...	20.2	20.2	20.2	19.8	19.3	18.8	18.6	18.5	18.5
33	101	77	HA–5	...	17.2	17.2	17.2	16.9	16.4	16.0	15.8	15.7	15.7
34	101	77	HA–5	...	20.2	20.2	20.2	19.8	19.3	18.8	18.6	18.5	18.5
35	101	77	HA–5	...	17.2	17.2	17.2	16.9	16.4	16.0	15.8	15.7	15.7
36	90	65	HA–5	...	18.0	18.0	18.0	...	17.4	...	16.7	...	16.3
37	90	65	HA–5	...	18.0	18.0	18.0	...	17.4	...	16.7	...	16.3
38	90	65	HA–5	...	15.3	15.3	15.3	...	14.8	...	14.2	...	13.9
39	90	65	HA–5	...	18.0	18.0	18.0	...	17.4	...	16.7	...	16.3
40	90	65	HA–5	...	15.3	15.3	15.3	...	14.8	...	14.2	...	13.9
41	75	30	HA–2	G7, G9, G13	15.0	15.0	15.0	15.0	14.9	14.8	14.6	14.5	14.3
42	75	30	HA–2	G7, G9, G13	15.0	15.0	15.0	15.0	14.9	14.8	14.6	14.5	14.3
43	75	30	HA–2	G7, G9, G13	15.0	15.0	15.0	15.0	14.9	14.8	14.6	14.5	14.3
44	71	31	NFN–9	...	14.2	14.2	14.2	13.9	13.6	13.3	13.1	12.9	12.7

NOTES TO TABLE 6A

GENERAL NOTES

(a) The stress values in this Table may be interpolated to determine values for intermediate temperatures. The values at intermediate temperatures shall be rounded to the same number of decimal places as the value at the higher temperature between which values are being interpolated. The rounding rule is: when the next digit beyond the last place to be retained is less than 5, retain unchanged the digit in the last place retained; when the digit next beyond the last place to be retained is 5 or greater, increase by 1 the digit in the last place retained.

(b) Where a size limit appears in the Size/Thickness column, the limit applies to the dimension appropriate to the product form: wall thickness of tubing, pipe, pipe fittings, and hollow forgings; thickness of plate, flat bar and forgings, and polygonal bar; diameter of solid bar and bolting; and thickest cross–section of other pressure parts, e.g., castings and forgings.

(c) The following abbreviations are used: Smls., Seamless; and Wld., Welded.

NOTES – GENERAL REQUIREMENTS

G1 These allowable stress values also apply to structural shapes.

G2 SA/CSA–G40.21 as specified in ASME BPVC, Section II, Part A, grade 38W, may be used in lieu of SA–36 for plates and bars not exceeding $^{3}/_{4}$ in.

G3 Tensile value is expected minimum.

G4 The stress value includes a joint factor of 0.85.

G5 The stress value includes a joint factor of 0.60.

G6 The stress value includes a casting quality factor of 0.80. Increased casting quality factors as a result of material examination beyond the requirements of the material specifications shall not be permitted.

G7 The stress value is established from a consideration of strength only and will be satisfactory for average service. For bolted joints, where freedom from leakage over a long period of time without retightening is required, lower stress values may be necessary, as determined from the relative flexibility of the flange and bolts, and corresponding relaxation properties.

G8 For tie–rods and draw bolts on cast–iron sectional boilers subject to system pressure.

G9 The water temperature shall not exceed 210°F.

G10 Tubing material shall be fully annealed.

G11 The limitations of ASME BPVC, Section IV, HF–204.2 and HF–204.3 apply.

G12 Heat treatment after forming or fabrication is neither required nor prohibited.

G13 For arc or resistance welded studs only.

G14 For cold–rolled strips only.

NOTES – WELDING REQUIREMENTS

W1 Welding or brazing is not permitted.

W2 For tie–rods and draw bolts up to $^{7}/_{8}$ in. diameter subject to system pressure, welding is not permitted.

W3 For tie–rods and draw bolts over $^{7}/_{8}$ in. diameter up to 1¼ in. diameter subject to system pressure, welding is not permitted.

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Table 6B
Section IV Maximum Allowable Stress Values, *S*, for Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Cond./ Temper	Size/ Thickness, in.	P-No.
1	...	Castings	SB–26	...	A13560	T6	...	...
2	...	Smls. extr. tube	SB–241	...	A91100	O	...	21
3	...	Drawn smls. tube	SB–210	...	A93003	O	...	21
4	...	Plate, sheet	SB–209	...	A95052	H32 wld.	...	22
5	...	Drawn smls. tube	SB–210	...	A95052	H32 wld.	...	22
6	...	Smls. extr. tube	SB–241	...	A95052	H32 wld.	...	22
7	...	Plate, sheet	SB–209	...	A96061	T6 wld.	...	23
8	...	Plate, sheet	SB–209	...	A96061	T651 wld.	...	23
9	...	Drawn smls. tube	SB–210	...	A96061	T6	...	23
10	...	Drawn smls. tube	SB–210	...	A96061	T6 wld.	...	23
11	...	Bar, rod, wire	SB–211	...	A96061	T6 wld.	...	23
12	...	Bar, rod, wire	SB–211	...	A96061	T651 wld.	...	23
13	...	Bar, rod, shapes	SB–221	...	A96061	T6 wld.	...	23
14	...	Smls. extr. tube	SB–241	...	A96061	T6 wld.	...	23
15	...	Smls. extr. tube	SB–241	...	A96063	O	...	23
(21) 16	...	Bar, rod, shapes	SB–221	...	A96063	T5	$t > 1/2$	23
(21) 17	...	Bar, rod, shapes	SB–221	...	A96063	T5	$t \le 1/2$	23
18	...	Bar, rod, shapes	SB–221	...	A96063	T6	...	23
19	...	Castings	SB/EN 1706	AlSi7Mg	AC42000	F	...	...
20	...	Castings	SB/EN 1706	AlSi10Mg(a)	AC43000	F	...	...
21	...	Castings	SB/EN 1706	AlSi12(Fe)(a)	AC44300	F	...	...
22	...	Smls. tube	SB–75	...	C10200	O60	All	31
23	...	Smls. pipe	SB–42	...	C10200	O61	All	31
24	...	Plate, sheet, strip	SB–152	...	C10200	O25	...	31
25	...	Smls. pipe	SB–42	...	C10200	H55	2 < NPS ≤ 12	31
26	...	Smls. tube	SB–75	...	C10200	H55	All	31
27	...	Smls. cond. tube	SB–111	...	C10200	H55	...	31
28	...	Smls. U–bend tube	SB–395	...	C10200	H55	...	31
29	...	Smls. pipe	SB–42	...	C10200	H80	$1/8$ < NPS ≤ 2	31
30	...	Smls. tube	SB–75	...	C10200	H80	$t < 4$	31
31	...	Smls. cond. tube	SB–111	...	C10200	H80	...	31
32	...	Plate, sheet, strip	SB–152	...	C10400	O25	...	31
33	...	Plate, sheet, strip	SB–152	...	C10500	O25	...	31
34	...	Plate, sheet, strip	SB–152	...	C10700	O25	...	31
35	...	Plate, sheet, strip	SB–152	...	C11000	O25	...	31
36	...	Smls. tube	SB–75	...	C12000	O60	All	31
37	...	Smls. pipe	SB–42	...	C12000	O61	All	31
38	...	Smls. pipe	SB–42	...	C12000	H55	2 < NPS ≤ 12	31
39	...	Smls. tube	SB–75	...	C12000	H55	All	31
40	...	Smls. cond. tube	SB–111	...	C12000	H55	...	31
41	...	Smls. U–bend tube	SB–395	...	C12000	H55	...	31
42	...	Smls. pipe	SB–42	...	C12000	H80	$1/8$ < NPS ≤ 2	31
43	...	Smls. tube	SB–75	...	C12000	H80	$t < 4$	31
44	...	Smls. cond. tube	SB–111	...	C12000	H80	...	31
(21) 45	...	Finned tube	SB–359	...	C12200	O62	...	31

Table 6B
Section IV Maximum Allowable Stress Values, *S*, for Nonferrous Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	External Pressure Chart No.	Notes	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
					100	150	200	250	300	350	400	450	500
1	34	24	...	G6, W1	5.4	5.4	5.4	5.4	...	...	...	...	...
2	11	3	NFA–7	...	2.0	2.0	2.0	1.9	1.6	...	...	...	...
3	14	5	NFA–1	...	2.8	2.8	2.6	2.3	2.1	...	...	...	...
4	25	9.5	NFA–8	...	5.0	5.0	5.0	5.0	4.8	...	...	...	...
5	25	10	NFA–12	...	5.0	5.0	5.0	5.0	4.8	...	...	...	...
6	25	10	NFA–8	...	5.0	5.0	5.0	5.0	4.8	...	...	...	...
7	24	11	NFA–12	...	4.8	4.8	4.8	4.7	4.5	...	...	...	...
8	24	11	NFA–12,13	...	4.8	4.8	4.8	4.7	4.5	...	...	...	...
9	42	35	NFA–12,13	W1	8.4	8.4	8.4	8.2	7.0	...	...	...	...
10	24	11	NFA–12,13	...	4.8	4.8	4.8	4.7	4.5	...	...	...	...
11	24	11	NFA–12	...	4.8	4.8	4.8	4.7	4.5	...	...	...	...
12	24	11	NFA–12,13	...	4.8	4.8	4.8	4.7	4.5	...	...	...	...
13	24	11	NFA–12,13	...	4.8	4.8	4.8	4.7	4.5	...	...	...	...
14	24	11	NFA–12,13	...	4.8	4.8	4.8	4.7	4.5	...	...	...	...
15	16	5	NFA–1	...	3.2	3.2	3.2	3.0	2.8	...	...	...	...
16	21	15	NFA–1	W1	4.2	4.2	4.1	3.9	3.5	...	...	...	...
17	22	16	NFA–1	W1	4.4	4.4	4.3	4.1	3.6	...	...	...	...
18	30	25	NFA–1	...	6.0	6.0	6.0	5.3	4.1	...	...	...	...
19	20.3	11.6	...	G9	1.6	1.6	1.6	1.6	1.5	...	...	...	...
20	21.8	11.6	...	G6	3.5	3.5	3.5	3.5	3.5	...	...	...	...
21	34.8	18.9	...	G8, W1	3.5	3.5	3.1	3.1	3.1	...	...	...	...
22	30	9	NFC–1	G1	6.0	5.3	5.3	5.3	5.3	...	...	...	...
23	30	9	NFC–1	G1	6.0	5.3	5.3	5.3	5.3	...	...	...	...
24	30	10	NFC–1	G1	6.0	5.9	5.9	5.7	5.4	...	...	...	...
25	36	30	NFC–3	G1, G2	7.2	7.2	7.2	7.2	7.0	6.8	6.6	...	...
26	36	30	NFC–3	G1, G2	7.2	7.2	7.2	7.2	7.0	6.8	6.6	...	...
27	36	30	NFC–6	G1, G2	7.2	7.2	7.2	7.2	7.0	6.8	6.6	...	...
28	36	30	NFC–6	G1, G2	7.2	7.2	7.2	7.2	7.0	6.8	6.6	...	...
29	45	40	NFC–4	G1, G2	9.0	9.0	9.0	9.0	8.8	8.3	...	...	...
30	45	40	NFC–4	G1, G2	9.0	9.0	9.0	9.0	8.8	8.3	...	...	...
31	45	40	NFC–4	G1, G2	9.0	9.0	9.0	9.0	8.8	8.3	...	...	...
32	30	10	NFC–1	G1	6.0	5.9	5.9	5.7	5.4	...	...	...	...
33	30	10	NFC–1	G1	6.0	5.9	5.9	5.7	5.4	...	...	...	...
34	30	10	NFC–1	G1	6.0	5.9	5.9	5.7	5.4	...	...	...	...
35	30	10	NFC–1	G1	6.0	5.9	5.9	5.7	5.4	...	...	...	...
36	30	9	NFC–1	G1	6.0	5.3	5.3	5.3	5.3	...	...	...	...
37	30	9	NFC–1	G1	6.0	5.3	5.3	5.3	5.3	...	...	...	...
38	36	30	NFC–3	G1, G2	7.2	7.2	7.2	7.2	7.0	6.8	6.6	...	...
39	36	30	NFC–3	G1, G2	7.2	7.2	7.2	7.2	7.0	6.8	6.6	...	...
40	36	30	NFC–6	G1, G2	7.2	7.2	7.2	7.2	7.0	6.8	6.6	...	...
41	36	30	NFC–6	G1, G2	7.2	7.2	7.2	7.2	7.0	6.8	6.6	...	...
42	45	40	NFC–4	G1, G2	9.0	9.0	9.0	9.0	8.8	8.3	...	...	...
43	45	40	NFC–4	G1, G2	9.0	9.0	9.0	9.0	8.8	8.3	...	...	...
44	45	40	NFC–4	G1	9.0	9.0	9.0	9.0	8.8	8.3	...	...	...
45	30	6.5	NFC–1	G1	4.3	3.8	3.8	3.8	3.8	...	...	...	...

Table 6B (Cont'd)
Section IV Maximum Allowable Stress Values, *S*, for Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Cond./ Temper	Size/ Thickness, in.	P-No.
1	...	Smls. tube	SB–75	...	C12200	O60	All	31
2	...	Smls. pipe	SB–42	...	C12200	O61	All	31
3	...	Finned tube	SB–359	...	C12200	O61	...	31
4	...	Plate, sheet, strip	SB–152	...	C12200	O25	...	31
5	...	Smls. pipe	SB–42	...	C12200	H55	2 < NPS ≤ 12	31
6	...	Smls. tube	SB–75	...	C12200	H55	All	31
7	...	Smls. cond. tube	SB–111	...	C12200	H55	...	31
8	...	Finned tube	SB–359	...	C12200	H55	...	31
9	...	Smls. U–bend tube	SB–395	...	C12200	H55	...	31
10	...	Smls. pipe	SB–42	...	C12200	H80	$\frac{1}{8}$ < NPS ≤ 2	31
11	...	Smls. tube	SB–75	...	C12200	H80	t < 4	31
12	...	Smls. cond. tube	SB–111	...	C12200	H80	...	31
13	...	Plate, sheet, strip	SB–152	...	C12300	O25	...	31
14	...	Plate, sheet, strip	SB–152	...	C14200	O25	...	31
15	...	Smls. cond. tube	SB–111	...	C14200	H55	...	31
16	...	Smls. U–bend tube	SB–395	...	C14200	H55	...	31
17	...	Smls. cond. tube	SB–111	...	C14200	H80	...	31
18	...	Smls. tube	SB–43	...	C23000	O61	...	32
19	...	Smls. cond. tube	SB–111	...	C23000	O61	...	32
20	...	Smls. U–bend tube	SB–395	...	C23000	O61	...	32
21	...	Forgings, brass	SB–283	...	C37700	M10, M11	t > $1\frac{1}{2}$	...
22	...	Plate	SB–171	...	C44300	M20, O25	t ≤ 4	32
23	...	Finned tube	SB–359	...	C44300	O61	...	32
24	...	Smls. U–bend tube	SB–395	...	C44300	O61	...	32
25	...	Plate	SB–171	...	C44400	M20, O25	t ≤ 4	32
26	...	Finned tube	SB–359	...	C44400	O61	...	32
27	...	Smls. U–bend tube	SB–395	...	C44400	O61	...	32
28	...	Plate	SB–171	...	C44500	M20, O25	t ≤ 4	32
29	...	Finned tube	SB–359	...	C44500	O61	...	32
30	...	Smls. U–bend tube	SB–395	...	C44500	O61	...	32
31	...	Plate	SB–171	...	C46400	M20, O25	t ≤ 3	32
32	...	Smls. cond. tube	SB–111	...	C60800	O61	...	35
33	...	Bar, rod	SB–98	...	C65100	O60	All	33
34	...	Bar, rod	SB–98	...	C65100	H02	t ≤ 2	33
35	...	Smls. pipe & tube	SB–315	...	C65500	O61	...	33
(**21**) 36	...	Plate, sheet	SB–96	...	C65500	O61	t ≤ 2	33
37	...	Bar, rod	SB–98	...	C65500	O60	All	33
38	...	Rod	SB–98	...	C65500	H01	...	33
39	...	Smls. pipe & tube	SB–466	...	C70600	O60	...	34
40	...	Plate	SB–171	...	C70600	M20, O25	t ≤ 5	34
41	...	Smls. cond. tube	SB–111	...	C70600	O61	...	34
42	...	Finned tube	SB–359	...	C70600	O61	...	34
43	...	Smls. U–bend tube	SB–395	...	C70600	O61	...	34
44	...	Wld. tube	SB–543	...	C70600	WO61	...	34
45	...	Smls. tube	SB–466	...	C71000	O60	...	34

Table 6B (Cont'd)
Section IV Maximum Allowable Stress Values, *S*, for Nonferrous Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	External Pressure Chart No.	Notes	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
					100	150	200	250	300	350	400	450	500
1	30	9	NFC–1	G1	6.0	5.3	5.3	5.3	5.3	...	...	...	...
2	30	9	NFC–1	G1	6.0	5.3	5.3	5.3	5.3	...	...	...	...
3	30	9	NFC–1	G1	6.0	5.3	5.3	5.3	5.3	...	...	...	...
4	30	10	NFC–1	G1	6.0	5.9	5.9	5.7	5.4	...	...	...	...
5	36	30	NFC–3	G1, G2	7.2	7.2	7.2	7.2	7.0	6.8	6.6	...	...
6	36	30	NFC–3	G1, G2	7.2	7.2	7.2	7.2	7.0	6.8	6.6	...	...
7	36	30	NFC–6	G1, G2	7.2	7.2	7.2	7.2	7.0	6.8	6.6	...	...
8	36	30	NFC–6	G1, G2	7.2	7.2	7.2	7.1	7.0	6.8	6.6	...	...
9	36	30	NFC–6	G1, G2	7.2	7.2	7.2	7.2	7.0	6.8	6.6	...	...
10	45	40	NFC–4	G1, G2	9.0	9.0	9.0	9.0	8.8	8.3	...	...	...
11	45	40	NFC–4	G1, G2	9.0	9.0	9.0	9.0	8.8	8.3	...	...	...
12	45	40	NFC–4	G1, G2	9.0	9.0	9.0	9.0	8.8	8.3	...	...	...
13	30	10	NFC–1	G1	6.0	5.9	5.9	5.7	5.4	...	...	...	...
14	30	10	NFC–1	G1	6.0	5.9	5.9	5.7	5.4	...	...	...	...
15	36	30	NFC–6	G1, G2	7.2	7.2	7.2	7.2	7.0	6.8	6.6	...	...
16	36	30	NFC–6	G1, G2	7.2	7.2	7.2	7.2	7.0	6.8	6.6	...	...
17	45	40	NFC–4	G1, G2	9.0	9.0	9.0	9.0	8.8	8.3	...	...	...
18	40	12	NFC–2	...	8.0	8.0	8.0	8.0	8.0	...	...	...	...
19	40	12	NFC–2	...	8.0	8.0	8.0	8.0	8.0	...	...	...	...
20	40	12	NFC–2	...	8.0	8.0	8.0	8.0	8.0	...	...	...	...
21	46	15	...	G3, W1	9.2	9.2	9.0	...	...	...	...	...	...
22	45	15	NFC–2	...	9.0	9.0	9.0	8.9	8.8	8.6	...	...	...
23	45	15	NFC–2	...	9.0	9.0	9.0	8.9	8.8	8.6	...	...	...
24	45	15	NFC–2	...	9.0	9.0	9.0	8.9	8.8	8.6	...	...	...
25	45	15	NFC–2	...	9.0	9.0	9.0	8.9	8.8	8.6	...	...	...
26	45	15	NFC–2	...	9.0	9.0	9.0	8.9	8.8	8.6	...	...	...
27	45	15	NFC–2	...	9.0	9.0	9.0	8.9	8.8	8.6	...	...	...
28	45	15	NFC–2	...	9.0	9.0	9.0	8.9	8.8	8.6	...	...	...
29	45	15	NFC–2	...	9.0	9.0	9.0	8.9	8.8	8.6	...	...	...
30	45	15	NFC–2	...	9.0	9.0	9.0	8.9	8.8	8.6	...	...	...
31	50	20	NFC–2	...	10.0	10.0	10.0	10.0	10.0	...	...	...	...
32	50	19	NFC–2	...	10.0	10.0	10.0	10.0	10.0	9.9	...	...	...
33	40	12	...	G4	8.0	7.9	7.9	7.8	7.8	7.7	...	...	...
34	55	20	...	G2, G4	11.0	11.0	11.0	11.0	11.0	11.0	...	...	...
35	50	15	NFC–2	G4	10.0	10.0	9.9	9.9	9.9	9.8	...	...	...
36	50	18	NFC–2	G4	10.0	10.0	10.0	10.0	10.0	9.8	...	...	...
37	52	15	...	G4	10.4	10.4	10.4	10.4	10.4	10.2	...	...	...
38	55	24	...	G2, G4	11.0	11.0	11.0	11.0	11.0	11.0	...	...	...
39	38	13	NFC–3	...	7.6	7.6	7.5	7.2	6.9	6.7	6.5	6.4	6.3
40	40	15	NFC–3	...	8.0	8.0	7.9	7.6	7.3	7.1	6.9	6.7	6.6
41	40	15	NFC–3	...	8.0	8.0	7.9	7.6	7.3	7.1	6.9	6.7	6.6
42	40	15	NFC–3	...	8.0	8.0	7.9	7.6	7.3	7.1	6.9	...	...
43	40	15	NFC–3	...	8.0	8.0	7.9	7.6	7.3	7.1	6.9	6.7	6.6
44	40	15	NFC–3	...	6.8	6.8	6.7	6.5	6.2	6.0	5.9	5.7	5.6
45	45	16	NFC–3	...	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0

Table 6B (Cont'd)
Section IV Maximum Allowable Stress Values, *S*, for Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Cond./ Temper	Size/ Thickness, in.	P-No.
1	...	Smls. cond. tube	SB–111	...	C71000	O61	...	34
2	...	Smls. U–bend tube	SB–395	...	C71000	O61	...	34
3	...	Plate	SB–171	...	C71500	M20, O25	$t \le 2^1/_2$	34
4	...	Smls. pipe & tube	SB–466	...	C71500	O60	...	34
5	...	Smls. cond. tube	SB–111	...	C71500	O61	...	34
6	...	Smls. U–bend tube	SB–395	...	C71500	O61	...	34
7	...	Castings	SB–62	...	C83600	...	...	...
8	...	Castings	SB–584	...	C84400	...	...	...
9	...	Castings	SB–584	...	C90300	...	...	...
10	...	Castings	SB–61	...	C92200	...	...	...
11	67Ni–30Cu	Bar	SB–164	...	N04400	Annealed	...	42
12	67Ni–30Cu	Smls. pipe & tube	SB–165	...	N04400	Annealed	>5 O.D.	42
13	67Ni–30Cu	Smls. pipe & tube	SB–165	...	N04400	Annealed	≤5 O.D.	42
14	67Ni–30Cu	Rod	SB–164	...	N04400	Hot worked	...	42
15	67Ni–30Cu	Smls. pipe & tube	SB–165	...	N04400	Stress rel.	...	42
16	57Ni–22Cr–14W–2Mo–La	Smls. & wld. fittings	SB–366	...	N06230	Solution ann.	...	43
17	57Ni–22Cr–14W–2Mo–La	Plate, sheet, strip	SB–435	...	N06230	Solution ann.	...	43
18	57Ni–22Cr–14W–2Mo–La	Forgings	SB–564	...	N06230	Solution ann.	...	43
19	57Ni–22Cr–14W–2Mo–La	Bar	SB–572	...	N06230	Solution ann.	...	43
20	57Ni–22Cr–14W–2Mo–La	Wld. pipe	SB–619	...	N06230	Solution ann.	...	43
21	57Ni–22Cr–14W–2Mo–La	Smls. pipe & tube	SB–622	...	N06230	Solution ann.	...	43
22	57Ni–22Cr–14W–2Mo–La	Wld. tube	SB–626	...	N06230	Solution ann.	...	43
23	33Ni–42Fe–21Cr	Plate	SB–409	...	N08800	Annealed	...	45
24	33Ni–42Fe–21Cr	Plate	SB–409	...	N08810	Annealed	...	45

Table 6B (Cont'd)
Section IV Maximum Allowable Stress Values, *S*, for Nonferrous Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	External Pressure Chart No.	Notes	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
					100	150	200	250	300	350	400	450	500
1	45	16	NFC–3	...	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
2	45	16	NFC–3	...	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
3	50	20	NFC–4	...	10.4	10.4	10.4	10.4	10.4	10.4	10.3	10.1	9.9
4	52	18	NFC–4	...	10.4	10.4	10.4	10.4	10.4	10.4	10.3	10.1	9.9
5	52	18	NFC–4	...	10.4	10.4	10.4	10.4	10.4	10.4	10.3	10.1	9.9
6	52	18	NFC–4	...	10.4	10.4	10.4	10.4	10.4	10.4	10.3	10.1	9.9
7	30	14	NFC–1	G6	4.8	4.8	4.8	4.8	4.8	4.6	4.6	4.5	4.4
8	29	13	...	G6	4.6	4.6	4.6	4.5	4.3	4.1	4.0	...	...
9	40	18	...	G6	6.4	6.4	6.4	6.4	6.4	6.4	6.4	...	...
10	34	16	NFN–1	G6	5.4	5.4	5.4	5.4	5.4	5.4	4.7	...	...
11	70	25	NFN–3	G5	14.0	14.0	14.0	14.0	13.6	13.3	13.2	13.1	13.1
12	70	25	NFN–3	G5	14.0	14.0	14.0	14.0	13.6	13.3	13.2	13.1	13.1
13	70	28	NFN–3	G5	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
14	80	40	NFN–3	G5	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0
15	85	55	NFN–3	G5	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
16	110	45	NFN–24	...	22.0	22.0	22.0	22.0	22.0	21.9	21.5	21.2	21.0
17	110	45	NFN–24	...	22.0	22.0	22.0	22.0	22.0	21.9	21.5	21.2	21.0
18	110	45	NFN–24	...	22.0	22.0	22.0	22.0	22.0	21.9	21.5	21.2	21.0
19	110	45	NFN–24	...	22.0	22.0	22.0	22.0	22.0	21.9	21.5	21.2	21.0
20	110	45	NFN–24	...	18.7	18.7	18.7	18.7	18.7	18.6	18.3	18.0	17.9
21	110	45	NFN–24	...	22.0	22.0	22.0	22.0	22.0	21.9	21.5	21.2	21.0
22	110	45	NFN–24	...	18.7	18.7	18.7	18.7	18.7	18.6	18.3	18.0	17.9
23	75	30	NFN–8	G7	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	14.9
24	65	25	NFN–9	G7	13.0	13.0	13.0	13.0	13.0	13.0	12.9	12.8	12.8

NOTES TO TABLE 6B

GENERAL NOTES

(a) The stress values in this Table may be interpolated to determine values for intermediate temperatures. The values at intermediate temperatures shall be rounded to the same number of decimal places as the value at the higher temperature between which values are being interpolated. The rounding rule is: when the next digit beyond the last place to be retained is less than 5, retain unchanged the digit in the last place retained; when the digit next beyond the last place to be retained is 5 or greater, increase by 1 the digit in the last place retained.

(b) Where a size limit appears in the Size/Thickness column, the limit applies to the dimension appropriate to the product form: wall thickness of tubing, pipe, pipe fittings, and hollow forgings; thickness of plate, flat bar and forgings, and polygonal bar; diameter of solid bar and bolting; and thickest cross–section of other pressure parts, e.g., castings and forgings.

(c) The following abbreviations are used: cond., condenser; extr., extruded; Smls., Seamless; and Wld., Welded.

NOTES – GENERAL REQUIREMENTS

G1 When material is to be welded, the phosphorous deoxidized types should be specified.

G2 When nonferrous materials conforming to Section II specifications are used in welded or brazed construction, the maximum allowable working stresses shall not exceed the values given herein for the material in the annealed condition.

G3 For use in ASME BPVC, Section IV, eq. HG–307.2(b)(2), the maximum allowable stress at room temperature (100°F max.) shall be 10.0 ksi through $1\frac{1}{2}$ in. thickness and 9.2 ksi over $1\frac{1}{2}$ in. thickness.

G4 Copper–silicon alloys are not always suitable when exposed to certain median and high temperatures, particularly steam above 212°F. Therefore, this material is limited to the construction of hot water boilers to be operated at a temperature not to exceed 200°F.

G5 To be used for HLW connections only.

G6 The stress value includes a casting quality factor of 0.8. Increased casting quality factors as a result of material examination beyond the requirement of the material specification shall not be permitted. This is not intended to apply to valves and fittings made to recognized standards.

G7 The maximum water temperature shall not exceed 210°F.

G8 The castings shall not be repaired.

G9 When proof testing is required to establish design pressure, that testing shall comply with ASME BPVC, Section IV, HG–501 and HG–502.3, except that in the equation in HG–502.3, the design factor shall be 10 in lieu of 5.

NOTES – WELDING REQUIREMENTS

W1 Welding or brazing is not permitted.

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Table 6C
Section IV Maximum Allowable Stress Values, *S*, for Lined Water Heater Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/ Grade	Alloy Desig./ UNS No.	Class/ Cond./ Temper	Size/ Thickness, in.	P-No.	Group No.
1	Carbon steel	Castings	SA–278	20	...	...	...	...	...
2	Carbon steel	Castings	SA–278	25	...	...	...	...	...
3	Carbon steel	Castings	SA–278	30	...	...	...	...	...
4	Carbon steel	Castings	SA–278	35	...	...	...	...	...
5	Carbon steel	Castings	SA–278	40	...	...	...	...	...
6	Carbon steel	Wld. tube	SA–513	1008	...	...	...	1	1
7	Carbon steel	Bar	SA–675	45	...	...	...	1	1
8	Carbon steel	Plate	SA–285	A	K01700	...	...	1	1
9	Carbon steel	Plate	SA–285 AISI C–1012	...	...	...	...	1	1
10	Carbon steel	Sheet	SA–414	A	K01501	...	...	1	1
11	Carbon steel	Sheet	SA–414 AISI C–1012	...	...	...	...	1	1
12	Carbon steel	Wld. tube	SA–513	1010	...	...	...	1	1
13	Carbon steel	Wld. tube	SA–178	E/A	K01200	...	...	1	1
14	Carbon steel	Smls. pipe	SA–53	A	K02504	...	...	1	1
15	Carbon steel	Wld. pipe	SA–53	E/A	K02504	...	...	1	1
16	Carbon steel	Smls. pipe	SA–106	A	K02501	...	...	1	1
17	Carbon steel	Wld. pipe	SA–135	E/A	...	...	...	1	1
18	Carbon steel	Wld. tube	SA–513	1015	...	...	...	1	1
19	Carbon steel	Bar	SA–675	50	...	...	...	1	1
20	Carbon steel	Plate	SA–285	B	K02200	...	...	1	1
21	Carbon steel	Plate	SA–285 AISI C–1015d	...	...	...	...	1	1
22	Carbon steel	Sheet	SA–414	B	K02201	...	...	1	1
23	Carbon steel	Sheet	SA–414 AISI C–1015d	...	...	...	...	1	1
24	Carbon steel	Bar	SA–675	55	...	...	...	1	1
25	Carbon steel	Plate	SA–285	C	K02801	...	...	1	1
26	Carbon steel	Plate	SA–516	55	K01800	...	...	1	1
27	Carbon steel	Plate	SA–285 AISI C–1023	...	...	...	...	1	1
28	Carbon steel	Sheet	SA–414	C	K02503	...	...	1	1
29	Carbon steel	Sheet	SA–414 AISI C–1023	...	...	...	...	1	1
30	Carbon steel	Plate	SA–36	...	K02600	...	...	1	1
31	Carbon steel	Bar, shapes	SA–36	...	K02600	...	...	1	1
32	Carbon steel	Forgings	SA–181	...	K03502	60	...	1	1
33	Carbon steel	Bar	SA–675	60	...	...	...	1	1
34	Carbon steel	Plate	SA–515	60	K02401	...	...	1	1
35	Carbon steel	Plate	SA–516	60	K02100	...	...	1	1
36	Carbon steel	Smls. pipe	SA–53	B	K03005	...	...	1	1
37	Carbon steel	Wld. pipe	SA–53	E/B	K03005	...	...	1	1
38	Carbon steel	Smls. pipe	SA–106	B	K03006	...	...	1	1
39	Carbon steel	Wld. pipe	SA–135	E/B	...	...	...	1	1
40	Carbon steel	Sheet	SA–414	D	K02505	...	...	1	1
41	Carbon steel	Plate	SA/CSA–G40.21	38W	...	...	...	1	1
42	Carbon steel	Wld. tube	SA–178	E/C	K03503	...	...	1	1
43	Carbon steel	Bar	SA–675	65	...	...	...	1	1
44	Carbon steel	Plate	SA–515	65	K02800	...	...	1	1
45	Carbon steel	Plate	SA–516	65	K02403	...	...	1	1

Table 6C
Section IV Maximum Allowable Stress Values, *S*, for Lined Water Heater Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	External Pressure Chart No.	Notes	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
					100	150	200	250	300	350	400	450	500
1	20	18	CI–1	W1	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
2	25	23	CI–1	W1	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3
3	30	27	CI–1	W1	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
4	35	32	CI–1	W1	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8
5	40	36	CI–1	W1	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
6	42	30	...	G1, G2	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9
7	45	23	CS–6	...	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3
8	45	24	CS–1	...	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3
9	45	25	...	...	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3
10	45	25	CS–1	...	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3
11	45	25	...	...	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3
12	45	32	...	G1, G2	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6
13	47	26	...	G1, G2	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
14	48	30	CS–2	...	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
15	48	30	CS–2	G1	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
16	48	30	CS–2	...	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
17	48	30	CS–2	G1	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
18	48	35	...	G1, G2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
19	50	25	CS–1	...	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5
20	50	27	CS–1	...	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5
21	50	30	...	...	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5
22	50	30	CS–2	...	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5
23	50	30	...	...	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5
24	55	28	CS–1	...	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8
25	55	30	CS–2	...	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8
26	55	30	CS–2	...	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8
27	55	33	...	...	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8
28	55	33	CS–2	...	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8
29	55	33	...	...	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8
30	58	36	CS–2	...	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5
31	58	36	...	...	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5
32	60	30	CS–2	...	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
33	60	30	CS–2	...	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
34	60	32	CS–2	...	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
35	60	32	CS–2	...	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
36	60	35	CS–2	...	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
37	60	35	CS–2	G1	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
38	60	35	CS–2	...	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
39	60	35	CS–2	G1	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
40	60	35	CS–2	...	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
41	60	36	CS–2	...	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5
42	60	37	...	G1	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8
43	65	33	CS–2	...	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3
44	65	35	CS–2	...	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3
45	65	35	CS–2	...	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3

Table 6C (Cont'd)
Section IV Maximum Allowable Stress Values, *S*, for Lined Water Heater Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/ Grade	Alloy Desig./ UNS No.	Class/ Cond./ Temper	Size/ Thickness, in.	P-No.	Group No.
1	Carbon steel	Sheet	SA–414	E	K02704	...	...	1	1
2	Carbon steel	Plate	SA/CSA–G40.21	44W	...	...	$t \le 8$	1	1
3	Carbon steel	Plate	SA/CSA–G40.21	50W	...	...	$t \le 6$	1	1
4	Carbon steel	Plate	SA–455	...	K03300	...	$0.58 < t \le 3/4$	1	2
5	Carbon steel	Bar	SA–675	70	...	...	...	1	2
6	Carbon steel	Forgings	SA–105	...	K03504	...	...	1	2
7	Carbon steel	Forgings	SA–181	...	K03502	70	...	1	2
8	Carbon steel	Plate	SA–515	70	K03101	...	...	1	2
9	Carbon steel	Plate	SA–516	70	K02700	...	...	1	2
10	Carbon steel	Smls. pipe	SA–106	C	K03501	...	...	1	2
11	Carbon steel	Sheet	SA–414	F	K03102	...	...	1	2
12	Carbon steel	Plate	SA–455	...	K03300	...	$3/8 < t \le 0.58$	1	2
13	Carbon steel	Plate	SA–455	...	K03300	...	$t \le 3/8$	1	2
14	Carbon steel	Sheet	SA–414	G	K03103	...	...	1	2

Table 6C (Cont'd)
Section IV Maximum Allowable Stress Values, *S*, for Lined Water Heater Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	External Pressure Chart No.	Notes	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
					100	150	200	250	300	350	400	450	500
1	65	38	CS–2	...	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3
2	65	44	CS–2	...	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3
3	65	50	CS–2	...	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3
4	70	35	CS–2	...	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5
5	70	35	CS–2	...	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5
6	70	36	CS–2	...	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5
7	70	36	CS–2	...	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5
8	70	38	CS–2	...	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5
9	70	38	CS–2	...	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5
10	70	40	CS–2	...	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5
11	70	42	CS–2	...	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5
12	73	37	CS–2	...	18.3	18.3	18.3	18.3	18.3	18.3	18.3	18.3	18.3
13	75	38	CS–2	...	18.8	18.8	18.8	18.8	18.8	18.8	18.8	18.8	18.8
14	75	45	CS–3	...	18.8	18.8	18.8	18.8	18.8	18.8	18.8	18.8	18.8

NOTES TO TABLE 6C
GENERAL NOTES

(a) The stress values in this Table may be interpolated to determine values for intermediate temperatures. The values at intermediate temperatures shall be rounded to the same number of decimal places as the value at the higher temperature between which values are being interpolated. The rounding rule is: when the next digit beyond the last place to be retained is less than 5, retain unchanged the digit in the last place retained; when the digit next beyond the last place to be retained is 5 or greater, increase by 1 the digit in the last place retained.

(b) Where a size limit appears in the Size/Thickness column, the limit applies to the dimension appropriate to the product form: wall thickness of tubing, pipe, pipe fittings, and hollow forgings; thickness of plate, flat bar and forgings, and polygonal bar; diameter of solid bar and bolting; and thickest cross–section of other pressure parts, e.g., castings and forgings.

NOTES – GENERAL REQUIREMENTS

G1 The stress value includes a joint factor of 0.85.

G2 Tensile value is expected minimum.

NOTES – WELDING REQUIREMENTS

W1 Welding or brazing is not permitted.

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Table 6D
Section IV Maximum Allowable Stress Values, *S*, for Unlined Water Heater Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/ Grade	Alloy Desig./ UNS No.	Size/ Thickness, in.	P-No.	Group No.
1	18Cr–2Mo	Plate	SA–240	...	S44400	$t \le 3/8$	7	2
2	18Cr–2Mo	Smls. tube	SA–268	...	S44400	$t \le 3/8$	7	2
3	18Cr–2Mo	Wld. tube	SA–268	...	S44400	$t \le 3/8$	7	2
4	18Cr–2Mo	Bar	SA–479	...	S44400	$t \le 3/8$	7	2
5	18Cr–Ti	Plate	SA–240	439	S43035	$t \le 3/8$	7	2
6	18Cr–Ti	Smls. tube	SA–268	TP439	S43035	$t \le 3/8$	7	2
7	18Cr–Ti	Bar	SA–479	439	S43035	$t \le 3/8$	7	2
8	29Cr–4Mo	Smls. tube	SA–268	29–4	S44700	...	10J	1
9	29Cr–4Mo	Wld. tube	SA–268	29–4	S44700	...	10J	1
10	16Cr–12Ni–2Mo	Forgings	SA–182	F316L	S31603	$t \le 1/2$	8	1
11	16Cr–12Ni–2Mo	Forgings	SA–182	F316L	S31603	$t \le 1/2$	8	1
12	16Cr–12Ni–2Mo	Smls. tube	SA–213	TP316L	S31603	$t \le 1/2$	8	1
13	16Cr–12Ni–2Mo	Smls. tube	SA–213	TP316L	S31603	$t \le 1/2$	8	1
14	16Cr–12Ni–2Mo	Plate	SA–240	316L	S31603	$t \le 1/2$	8	1
15	16Cr–12Ni–2Mo	Plate	SA–240	316L	S31603	$t \le 1/2$	8	1
16	16Cr–12Ni–2Mo	Wld. tube	SA–249	TP316L	S31603	$t \le 1/2$	8	1
17	16Cr–12Ni–2Mo	Wld. tube	SA–249	TP316L	S31603	$t \le 1/2$	8	1
18	16Cr–12Ni–2Mo	Smls. pipe	SA–312	TP316L	S31603	$t \le 1/2$	8	1
19	16Cr–12Ni–2Mo	Smls. pipe	SA–312	TP316L	S31603	$t \le 1/2$	8	1
20	16Cr–12Ni–2Mo	Wld. pipe	SA–312	TP316L	S31603	$t \le 1/2$	8	1
21	16Cr–12Ni–2Mo	Wld. pipe	SA–312	TP316L	S31603	$t \le 1/2$	8	1
22	16Cr–12Ni–2Mo	Bar	SA–479	316L	S31603	$t \le 1/2$	8	1
23	16Cr–12Ni–2Mo	Bar	SA–479	316L	S31603	$t \le 1/2$	8	1
24	16Cr–12Ni–2Mo	Forgings	SA–182	F316	S31600	$t \le 1/2$	8	1
25	16Cr–12Ni–2Mo	Forgings	SA–182	F316	S31600	$t \le 1/2$	8	1
26	16Cr–12Ni–2Mo	Smls. tube	SA–213	TP316	S31600	$t \le 1/2$	8	1
27	16Cr–12Ni–2Mo	Smls. tube	SA–213	TP316	S31600	$t \le 1/2$	8	1
28	16Cr–12Ni–2Mo	Plate	SA–240	316	S31600	$t \le 1/2$	8	1
29	16Cr–12Ni–2Mo	Plate	SA–240	316	S31600	$t \le 1/2$	8	1
30	16Cr–12Ni–2Mo	Wld. tube	SA–249	TP316	S31600	$t \le 1/2$	8	1
31	16Cr–12Ni–2Mo	Wld. tube	SA–249	TP316	S31600	$t \le 1/2$	8	1
32	16Cr–12Ni–2Mo	Smls. pipe	SA–312	TP316	S31600	$t \le 1/2$	8	1
33	16Cr–12Ni–2Mo	Smls. pipe	SA–312	TP316	S31600	$t \le 1/2$	8	1
34	16Cr–12Ni–2Mo	Wld. pipe	SA–312	TP316	S31600	$t \le 1/2$	8	1
35	16Cr–12Ni–2Mo	Wld. pipe	SA–312	TP316	S31600	$t \le 1/2$	8	1
36	16Cr–12Ni–2Mo	Bar	SA–479	316	S31600	$t \le 1/2$	8	1
37	16Cr–12Ni–2Mo	Bar	SA–479	316	S31600	$t \le 1/2$	8	1
38	18Cr–8Ni	Forgings	SA–182	F304L	S30403	$t \le 1/2$	8	1
39	18Cr–8Ni	Forgings	SA–182	F304L	S30403	$t \le 1/2$	8	1
40	18Cr–8Ni	Smls. tube	SA–213	TP304L	S30403	$t \le 1/2$	8	1
41	18Cr–8Ni	Smls. tube	SA–213	TP304L	S30403	$t \le 1/2$	8	1
42	18Cr–8Ni	Plate	SA–240	304L	S30403	$t \le 1/2$	8	1
43	18Cr–8Ni	Plate	SA–240	304L	S30403	$t \le 1/2$	8	1
44	18Cr–8Ni	Wld. tube	SA–249	TP304L	S30403	$t \le 1/2$	8	1
45	18Cr–8Ni	Wld. tube	SA–249	TP304L	S30403	$t \le 1/2$	8	1

Table 6D
Section IV Maximum Allowable Stress Values, *S*, for Unlined Water Heater Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	External Pressure Chart No.	Notes	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
					100	150	200	250	300	350	400	450	500
1	60	40	CS-2	...	15.0	15.0	15.0	14.8	14.6	14.4	14.2	14.0	13.9
2	60	40	CS-2	...	15.0	15.0	15.0	14.8	14.6	14.4	14.2	14.0	13.9
3	60	40	CS-2	G1	12.8	12.8	12.8	12.6	12.4	12.2	12.1	11.9	11.8
4	60	...	CS-2	...	15.0	15.0	15.0	15.0	14.6	14.6	14.5	14.3	13.9
5	60	30	CS-2	...	15.0	15.0	15.0	14.7	14.5	14.3	14.1	14.0	13.8
6	60	30	CS-2	...	15.0	15.0	15.0	14.7	14.5	14.3	14.1	14.0	13.8
7	70	40	CS-2	...	17.5	17.5	17.5	17.2	16.9	16.7	16.5	16.3	16.1
8	80	60	HA-6	G2	20.0	20.0	20.0	19.6	19.3	19.3	19.2	19.2	19.2
9	80	60	HA-6	G1, G2	17.0	17.0	17.0	16.7	16.4	16.4	16.3	16.3	16.3
10	70	25	HA-4	...	16.7	15.1	14.2	13.4	12.7	12.2	11.7	11.3	10.9
11	70	25	HA-4	G3	17.5	17.3	17.0	16.5	16.0	15.8	15.6	15.3	14.8
12	70	25	HA-4	...	16.7	15.1	14.2	13.4	12.7	12.2	11.7	11.3	10.9
13	70	25	HA-4	G3	17.5	17.0	16.5	15.9	15.3	15.0	14.7	14.5	14.4
14	70	25	HA-4	...	16.7	15.1	14.2	13.4	12.7	12.2	11.7	11.3	10.9
15	70	25	HA-4	G3	17.5	17.3	17.0	16.5	16.0	15.8	15.6	15.3	14.8
16	70	25	HA-4	G1	14.2	12.9	12.1	11.4	10.8	10.3	9.9	9.6	9.3
17	70	25	HA-4	G1, G3	14.9	14.7	14.5	14.0	13.6	13.4	13.2	13.0	12.5
18	70	25	HA-4	...	16.7	15.1	14.2	13.4	12.7	12.2	11.7	11.3	10.9
19	70	25	HA-4	G3	17.5	17.0	16.5	15.9	15.3	15.0	14.7	14.5	14.4
20	70	25	HA-4	G1	14.2	12.9	12.1	11.4	10.8	10.3	9.9	9.6	9.3
21	70	25	HA-4	G1, G3	14.9	14.5	14.0	13.5	13.0	12.7	12.5	12.3	12.2
22	70	25	HA-4	...	16.7	15.1	14.2	13.4	12.7	12.2	11.7	11.3	10.9
23	70	25	HA-4	G3	17.5	17.3	17.0	16.5	16.0	15.8	15.6	15.3	14.8
24	75	30	HA-2	...	18.8	18.3	17.3	16.4	15.6	14.9	14.3	13.8	13.3
25	75	30	HA-2	G3	18.8	18.8	18.8	18.5	18.2	18.1	18.0	18.0	18.0
26	75	30	HA-2	...	18.8	18.3	17.3	16.4	15.6	14.9	14.3	13.8	13.3
27	75	30	HA-2	G3	18.8	18.8	18.8	18.5	18.2	18.1	18.0	18.0	18.0
28	75	30	HA-2	...	18.8	18.3	17.3	16.4	15.6	14.9	14.3	13.8	13.3
29	75	30	HA-2	G3	18.8	18.8	18.8	18.5	18.2	18.1	18.0	18.0	18.0
30	75	30	HA-2	G1	15.9	15.5	14.7	13.9	13.3	12.7	12.1	11.7	11.3
31	75	30	HA-2	G1, G3	15.9	15.9	15.9	15.7	15.5	15.4	15.3	15.3	15.3
32	75	30	HA-2	...	18.8	18.3	17.3	16.4	15.6	14.9	14.3	13.8	13.3
33	75	30	HA-2	G3	18.8	18.8	18.8	18.5	18.2	18.1	18.0	18.0	18.0
34	75	30	HA-2	G1	15.9	15.5	14.7	13.9	13.3	12.7	12.1	11.7	11.3
35	75	30	HA-2	G1, G3	15.9	15.9	15.9	15.7	15.5	15.4	15.3	15.3	15.3
36	75	30	HA-2	...	18.8	18.3	17.3	16.4	15.6	14.9	14.3	13.8	13.3
37	75	30	HA-2	G3	18.8	18.8	18.8	18.5	18.2	18.1	18.0	18.0	18.0
38	70	25	HA-3	...	16.7	15.1	14.3	13.5	12.8	12.2	11.7	11.3	10.9
39	70	25	HA-3	G3	17.5	17.0	16.5	15.9	15.3	15.0	14.7	14.5	14.4
40	70	25	HA-3	...	16.7	15.1	14.3	13.5	12.8	12.2	11.7	11.3	10.9
41	70	25	HA-3	G3	17.5	17.0	16.5	15.9	15.3	15.0	14.7	14.5	14.4
42	70	25	HA-3	...	16.7	15.1	14.3	13.5	12.8	12.2	11.7	11.3	10.9
43	70	25	HA-3	G3	17.5	17.0	16.5	15.9	15.3	15.0	14.7	14.5	14.4
44	70	25	HA-3	G1	14.2	12.9	12.1	11.4	10.9	10.4	9.9	9.6	9.3
45	70	25	HA-3	G1, G3	14.9	14.5	14.0	13.5	13.0	12.7	12.5	12.3	12.2

Table 6D (Cont'd)
Section IV Maximum Allowable Stress Values, *S*, for Unlined Water Heater Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/ Grade	Alloy Desig./ UNS No.	Size/ Thickness, in.	P-No.	Group No.
1	18Cr–8Ni	Smls. pipe	SA–312	TP304L	S30403	$t \le 1/2$	8	1
2	18Cr–8Ni	Smls. pipe	SA–312	TP304L	S30403	$t \le 1/2$	8	1
3	18Cr–8Ni	Wld. pipe	SA–312	TP304L	S30403	$t \le 1/2$	8	1
4	18Cr–8Ni	Wld. pipe	SA–312	TP304L	S30403	$t \le 1/2$	8	1
5	18Cr–8Ni	Bar	SA–479	304L	S30403	$t \le 1/2$	8	1
6	18Cr–8Ni	Bar	SA–479	304L	S30403	$t \le 1/2$	8	1
7	18Cr–8Ni	Forgings	SA–182	F304	S30400	...	8	1
8	18Cr–8Ni	Forgings	SA–182	F304	S30400	...	8	1
9	18Cr–8Ni	Smls. tube	SA–213	TP304	S30400	$t \le 1/2$	8	1
10	18Cr–8Ni	Smls. tube	SA–213	TP304	S30400	$t \le 1/2$	8	1
11	18Cr–8Ni	Plate	SA–240	304	S30400	$t \le 1/2$	8	1
12	18Cr–8Ni	Plate	SA–240	304	S30400	$t \le 1/2$	8	1
13	18Cr–8Ni	Wld. tube	SA–249	TP304	S30400	$t \le 1/2$	8	1
14	18Cr–8Ni	Wld. tube	SA–249	TP304	S30400	$t \le 1/2$	8	1
15	18Cr–8Ni	Smls. pipe	SA–312	TP304	S30400	$t \le 1/2$	8	1
16	18Cr–8Ni	Smls. pipe	SA–312	TP304	S30400	$t \le 1/2$	8	1
17	18Cr–8Ni	Wld. pipe	SA–312	TP304	S30400	$t \le 1/2$	8	1
18	18Cr–8Ni	Wld. pipe	SA–312	TP304	S30400	$t \le 1/2$	8	1
19	18Cr–8Ni	Bar	SA–479	304	S30400	$t \le 1/2$	8	1
20	18Cr–8Ni	Bar	SA–479	304	S30400	$t \le 1/2$	8	1
21	22Cr–5Ni–3Mo–N	Plate	SA–240	...	S31803	...	10H	1
22	22Cr–5Ni–3Mo–N	Smls. tube	SA–789	...	S31803	...	10H	1
23	22Cr–5Ni–3Mo–N	Wld. tube	SA–789	...	S31803	...	10H	1
24	22Cr–5Ni–3Mo–N	Smls. pipe	SA–790	...	S31803	...	10H	1
25	22Cr–5Ni–3Mo–N	Wld. pipe	SA–790	...	S31803	...	10H	1

Table 6D (Cont'd)
Section IV Maximum Allowable Stress Values, *S*, for Unlined Water Heater Materials

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	External Pressure Chart No.	Notes	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
					100	150	200	250	300	350	400	450	500
1	70	25	HA–3	...	16.7	15.1	14.3	13.5	12.8	12.2	11.7	11.3	10.9
2	70	25	HA–3	G3	17.5	17.0	16.5	15.9	15.3	15.0	14.7	14.5	14.4
3	70	25	HA–3	G1	14.2	12.9	12.1	11.4	10.9	10.4	9.9	9.6	9.3
4	70	25	HA–3	G1, G3	14.9	14.5	14.0	13.5	13.0	12.7	12.5	12.3	12.2
5	70	25	HA–3	...	16.7	15.1	14.3	13.5	12.8	12.2	11.7	11.3	10.9
6	70	25	HA–3	G3	17.5	17.0	16.5	15.9	15.3	15.0	14.7	14.5	14.4
7	75	30	HA–1	...	18.8	18.3	16.7	15.8	14.9	14.4	13.8	13.4	12.9
8	75	30	HA–1	G3	18.8	18.3	17.8	17.2	16.6	16.3	16.0	15.9	15.9
9	75	30	HA–1	...	18.8	18.3	16.7	15.7	14.9	14.4	13.8	13.4	12.9
10	75	30	HA–1	G3	18.8	18.3	17.8	17.2	16.6	16.3	16.0	15.9	15.9
11	75	30	HA–1	...	18.8	18.3	16.7	15.8	14.9	14.4	13.8	13.4	12.9
12	75	30	HA–1	G3	18.8	18.3	17.8	17.2	16.6	16.3	16.0	15.9	15.9
13	75	30	HA–1	G1	15.9	15.5	14.2	13.4	12.7	12.2	11.7	11.4	11.0
14	75	30	HA–1	G1, G3	15.9	15.5	15.1	14.6	14.1	13.8	13.6	13.5	13.5
15	75	30	HA–1	...	18.8	18.3	16.7	15.8	14.9	14.4	13.8	13.4	12.9
16	75	30	HA–1	G3	18.8	18.3	17.8	17.2	16.6	16.3	16.0	15.9	15.9
17	75	30	HA–1	G1	15.9	15.5	14.2	13.4	12.7	12.2	11.7	11.4	11.0
18	75	30	HA–1	G1, G3	15.9	15.5	15.1	14.6	14.1	13.8	13.6	13.5	13.5
19	75	30	HA–1	...	18.8	18.3	16.7	15.8	14.9	14.4	13.8	13.4	12.9
20	75	30	HA–1	G3	18.8	18.3	17.8	17.2	16.6	16.3	16.0	15.9	15.9
21	90	65	HA–5	...	22.5	22.5	22.5	22.1	21.7	21.3	20.9	20.6	20.4
22	90	65	HA–5	...	22.5	22.5	22.5	22.1	21.7	21.3	20.9	20.6	20.4
23	90	65	HA–5	G1	19.1	19.1	19.1	18.8	18.4	18.1	17.8	17.5	17.3
24	90	65	HA–5	...	22.5	22.5	22.5	22.1	21.7	21.3	20.9	20.6	20.4
25	90	65	HA–5	G1	19.1	19.1	19.1	18.8	18.4	18.1	17.8	17.5	17.3

NOTES TO TABLE 6D
GENERAL NOTES

(a) The following abbreviations are used: Smls., Seamless; and Wld., Welded.

(b) The stress values in this Table may be interpolated to determine values for intermediate temperatures. The values at intermediate temperatures shall be rounded to the same number of decimal places as the value at the higher temperature between which values are being interpolated. The rounding rule is: when the next digit beyond the last place to be retained is less than 5, retain unchanged the digit in the last place retained; when the digit next beyond the last place to be retained is 5 or greater, increase by 1 the digit in the last place retained.

(c) The properties of steels are influenced by the processing history, heat treatment, melting practice, and level of residual elements. See Nonmandatory Appendix A for more information.

(d) Where a size limit appears in the Size/Thickness column, the limit applies to the dimension appropriate to the product form: wall thickness of tubing, pipe, pipe fittings, and hollow forgings; thickness of plate, flat bar and forgings, and polygonal bar; diameter of solid bar and bolting; and thickest cross–section of other pressure parts, e.g., castings and forgings.

NOTES – GENERAL REQUIREMENTS

G1 The stress value includes a joint factor of 0.85.

G2 Heat treatment after forming or fabrication is neither required nor prohibited.

G3 Due to the relatively low yield strength of these materials, these higher stress values were established at temperatures where the short–time tensile properties govern to permit the use of these alloys where slightly greater deformation is acceptable. The stress values in this range exceed $66\frac{2}{3}\%$ but do not exceed 90% of the yield strength at temperature. Use of these stresses may result in dimensional changes due to permanent strain. These stress values are not recommended for the flanges of gasketed joints or other applications where slight amounts of distortion can cause leakage or malfunction.

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Table U
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
	Ferrous Materials							
1	Carbon steel	Sheet	SA–1008	CS–A	...	...	...	40
2	Carbon steel	Sheet	SA–1008	CS–B	...	...	...	40
3	Carbon steel	Bar	SA–675	45	...	...	...	45
4	Carbon steel	Wld. pipe	SA–134	A283A	...	...	...	45
5	Carbon steel	Plate	SA–283	A	...	...	...	45
6	Carbon steel	Plate	SA–285	A	K01700	...	...	45
7	Carbon steel	Wld. pipe	SA–672	A45	K01700	...	...	45
8	Carbon steel	Sheet	SA–414	A	K01501	...	...	45
9	Carbon steel	Wld. tube	SA–178	A	K01200	...	...	47
10	Carbon steel	Smls. tube	SA–179	...	K01200	...	...	47
11	Carbon steel	Smls. tube	SA–192	...	K01201	...	...	47
12	Carbon steel	Wld. tube	SA–214	...	K01807	...	...	47
13	Carbon steel	Smls. tube	SA–556	A2	K01807	...	...	47
14	Carbon steel	Wld. tube	SA–557	A2	K01807	...	...	47
15	Carbon steel	Wld. pipe	SA–53	E/A	K02504	...	...	48
16	Carbon steel	Smls. pipe	SA–53	S/A	K02504	...	...	48
17	Carbon steel	Smls. pipe	SA–106	A	K02501	...	...	48
18	Carbon steel	Wld. pipe	SA–135	A	...	...	...	48
19	Carbon steel	Forged pipe	SA–369	FPA	K02501	...	...	48
20	Carbon steel	Wld. pipe	SA–587	...	K11500	...	...	48
21	Carbon steel	Bar	SA–675	50	...	...	...	50
22	Carbon steel	Wld. pipe	SA–134	A283B	...	...	...	50
23	Carbon steel	Plate	SA–283	B	...	...	...	50
24	Carbon steel	Plate	SA–285	B	K02200	...	...	50
25	Carbon steel	Wld. pipe	SA–672	A50	K02200	...	...	50
26	Carbon steel	Sheet	SA–414	B	K02201	...	...	50
27	Carbon steel	Plate	SA/EN 10028–3	P275NH	...	...	$6 < t \le 10$	51
28	Carbon steel	Plate	SA/EN 10028–2	P235GH	...	...	$\le 2^1/_4$	52
29	Carbon steel	Plate	SA/EN 10028–3	P275NH	...	...	$4 < t \le 6$	52
30	Carbon steel	Smls. tube	SA/EN 10216–2	P235GH	...	...	$t \le 2^1/_2$	52
(21) 31	Carbon steel	Sheet, strip	SA–1011	36	SS	Type 1	$t \le 0.23$	53
32	Carbon steel	Plate	SA/EN 10028–3	P275NH	...	...	$2^1/_4 < t \le 4$	53.5
33	Carbon steel	Bar	SA–675	55	...	...	...	55
34	Carbon steel	Wld. pipe	SA–134	A283C	K02401	...	...	55
35	Carbon steel	Plate	SA–283	C	K02401	...	...	55
36	Carbon steel	Plate	SA–285	C	K02801	...	...	55
37	Carbon steel	Smls. & wld. pipe	SA–333	1	K03008	...	...	55
38	Carbon steel	Smls. & wld. tube	SA–334	1	K03008	...	...	55
39	Carbon steel	Plate	SA–516	55	K01800	...	...	55
40	Carbon steel	Smls. pipe	SA–524	II	K02104	...	...	55
41	Carbon steel	Wld. pipe	SA–671	CA55	K02801	...	...	55
42	Carbon steel	Wld. pipe	SA–671	CE55	K02202	...	...	55
43	Carbon steel	Wld. pipe	SA–672	A55	K02801	...	...	55
44	Carbon steel	Wld. pipe	SA–672	B55	K02001	...	...	55
45	Carbon steel	Wld. pipe	SA–672	C55	K01800	...	...	55

Table U
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
													Ferrous Materials	
1	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	39.5	36.8	33.5	29.9	26.2	23.1
2	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	39.5	36.8	33.5	29.9	26.2	23.1
3	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	44.4	41.3	37.7	33.6	29.5	25.9
4	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	44.4	41.3	37.7	33.6	29.5	25.9
5	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	44.4	41.3	37.7	33.6	29.5	25.9
6	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	44.4	41.3	37.7	33.6	29.5	25.9
7	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	44.4	41.3	37.7	33.6	29.5	25.9
8	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	44.4	41.3	37.7	33.6	29.5	25.9
9	47.0	47.0	47.0	47.0	47.0	47.0	47.0	47.0	46.4	43.2	39.3	35.1	30.8	27.1
10	47.0	47.0	47.0	47.0	47.0	47.0	47.0	47.0	46.4	43.2	39.3	35.1	30.8	27.1
11	47.0	47.0	47.0	47.0	47.0	47.0	47.0	47.0	46.4	43.2	39.3	35.1	30.8	27.1
12	47.0	47.0	47.0	47.0	47.0	47.0	47.0	47.0	46.4	43.2	39.3	35.1	30.8	27.1
13	47.0	47.0	47.0	47.0	47.0	47.0	47.0	47.0	46.4	43.2	39.3	35.1	30.8	27.1
14	47.0	47.0	47.0	47.0	47.0	47.0	47.0	47.0	46.4	43.2	39.3	35.1	30.8	27.1
15	48.0	48.0	48.0	48.0	48.0	48.0	48.0	48.0	47.4	44.1	40.2	35.8	31.5	27.7
16	48.0	48.0	48.0	48.0	48.0	48.0	48.0	48.0	47.4	44.1	40.2	35.8	31.5	27.7
17	48.0	48.0	48.0	48.0	48.0	48.0	48.0	48.0	47.4	44.1	40.2	35.8	31.5	27.7
18	48.0	48.0	48.0	48.0	48.0	48.0	48.0	48.0	47.4	44.1	40.2	35.8	31.5	27.7
19	48.0	48.0	48.0	48.0	48.0	48.0	48.0	48.0	47.4	44.1	40.2	35.8	31.5	27.7
20	48.0	48.0	48.0	48.0	48.0	48.0	48.0	48.0	47.4	44.1	40.2	35.8	31.5	27.7
21	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	49.4	45.9	41.8	37.3	32.8	28.8
22	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	49.4	45.9	41.8	37.3	32.8	28.8
23	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	49.4	45.9	41.8	37.3	32.8	28.8
24	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	49.4	45.9	41.8	37.3	32.8	28.8
25	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	49.4	45.9	41.8	37.3	32.8	28.8
26	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	49.4	45.9	41.8	37.3	32.8	28.8
27	51.0	51.0	51.0	51.0	51.0	51.0	51.0	51.0	50.3	46.8	42.6	38.0	33.3	29.1
28	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	51.4	47.8	43.5	38.8	34.1	30.0
29	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	51.7	48.1	43.9	39.1	34.3	29.9
30	52.2	52.2	52.2	52.2	52.2	52.2	52.2	52.2	51.6	48.0	43.7	39.0	34.3	30.1
31	53.0	53.0	53.0	53.0	53.0	52.9	...	...	...	...	...	...	...	...
32	53.5	53.5	53.5	53.5	53.5	53.5	53.5	53.5	53.1	49.5	45.1	40.2	35.2	30.8
33	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	54.3	50.5	46.0	41.1	36.1	31.7
34	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	54.3	50.5	46.0	41.1	36.1	31.7
35	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	54.3	50.5	46.0	41.1	36.1	31.7
36	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	54.3	50.5	46.0	41.1	36.1	31.7
37	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	54.3	50.5	46.0	41.1	36.1	31.7
38	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	54.3	50.5	46.0	41.1	36.1	31.7
39	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	54.3	50.5	46.0	41.1	36.1	31.7
40	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	54.3	50.5	46.0	41.1	36.1	31.7
41	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	54.3	50.5	46.0	41.1	36.1	31.7
42	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	54.3	50.5	46.0	41.1	36.1	31.7
43	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	54.3	50.5	46.0	41.1	36.1	31.7
44	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	54.3	50.5	46.0	41.1	36.1	31.7
45	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	54.3	50.5	46.0	41.1	36.1	31.7

Table U
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding												
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
	Ferrous Materials												
1	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	... (21)
32	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...

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Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
		Ferrous Materials (Cont'd)							
	1	Carbon steel	Wld. pipe	SA–672	E55	K02202	...	...	55
	2	Carbon steel	Sheet	SA–414	C	K02503	...	...	55
(**21**)	3	Carbon steel	Sheet, strip	SA–1011	40	SS	...	$t \le 0.23$	55
(**21**)	4	Carbon steel	Sheet, strip	SA–1011	45	HSLAS	2	...	55
	5	Carbon steel	Plate	SA/EN 10028–3	P275NH	...	...	$\le 2^1/_4$	56.5
	6	Carbon steel	Plate, sheet, bar	SA–36	...	K02600	...	...	58
	7	Carbon steel	Plate, sheet	SA–662	A	K01701	...	...	58
(**21**)	8	Carbon steel	Sheet, strip	SA–1011	36	SS	Type 2	$t \le 0.23$	58
	9	Carbon steel	Plate	SA/EN 10028–2	P265GH	...	...	$\le 2^1/_4$	59.5
	10	Carbon steel	Smls. tube	SA/EN 10216–2	P265GH	...	...	$t \le 2^1/_2$	59.5
	11	Carbon steel	Plate, bar, shapes	SA/IS 2062	E250A	...	...	...	59.5
(**21**)	12	Carbon steel	Plate, bar, shapes	SA/IS 2062	E250BR	...	...	...	59.5
(**21**)	13	Carbon steel	Plate, bar, shapes	SA/IS 2062	E250BO	...	...	...	59.5
	14	Carbon steel	Plate, bar, shapes	SA/IS 2062	E250C	...	...	...	59.5
	15	Carbon steel	Forgings	SA–181	...	K03502	60	...	60
	16	Carbon steel	Castings	SA–216	WCA	J02502	...	...	60
	17	Carbon steel	Forgings	SA–266	1	K03506	...	...	60
	18	Carbon steel	Bolting	SA–307	A	...	...	$^1/_4 \le t \le 4$	60
	19	Carbon steel	Bolting	SA–307	B	...	...	...	60
	20	Carbon steel	Forgings	SA–350	LF1	K03009	1	...	60
	21	Carbon steel	Castings	SA–352	LCA	J02504	...	...	60
	22	Carbon steel	Cast pipe	SA–660	WCA	J02504	...	...	60
	23	Carbon steel	Bar	SA–675	60	...	...	...	60
	24	Carbon steel	Forgings	SA–765	I	K03046	...	...	60
	25	Carbon steel	Plate	SA–515	60	K02401	...	...	60
	26	Carbon steel	Plate	SA–516	60	K02100	...	...	60
	27	Carbon steel	Wld. pipe	SA–671	CB60	K02401	...	...	60
	28	Carbon steel	Wld. pipe	SA–671	CC60	K02100	...	...	60
	29	Carbon steel	Wld. pipe	SA–671	CE60	K02402	...	...	60
	30	Carbon steel	Wld. pipe	SA–672	B60	K02401	...	...	60
	31	Carbon steel	Wld. pipe	SA–672	C60	K02100	...	...	60
	32	Carbon steel	Wld. pipe	SA–672	E60	K02402	...	...	60
	33	Carbon steel	Wld. pipe	SA–134	A283D	K02702	...	...	60
	34	Carbon steel	Plate	SA–283	D	K02702	...	...	60
	35	Carbon steel	Wld. pipe	SA–53	E/B	K03005	...	...	60
	36	Carbon steel	Smls. pipe	SA–53	S/B	K03005	...	...	60
	37	Carbon steel	Smls. pipe	SA–106	B	K03006	...	...	60
	38	Carbon steel	Wld. pipe	SA–135	B	...	...	...	60
	39	Carbon steel	Smls. & wld. ftgs.	SA–234	WPB	K03006	...	...	60
	40	Carbon steel	Smls. & wld. pipe	SA–333	6	K03006	...	...	60
	41	Carbon steel	Smls. & wld. tube	SA–334	6	K03006	...	...	60
	42	Carbon steel	Forged pipe	SA–369	FPB	K03006	...	...	60
	43	Carbon steel	Forgings	SA–372	A	K03002	...	...	60
	44	Carbon steel	Sheet	SA–414	D	K02505	...	...	60
	45	Carbon steel	Smls. & wld. ftgs.	SA–420	WPL6	...	...	...	60

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
												Ferrous Materials (Cont'd)		
1	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	54.3	50.5	46.0	41.1	36.1	31.7
2	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	54.3	50.5	46.0	41.1	36.1	31.7
3	55.0	55.0	55.0	55.0	55.0	54.9	...	...	...	...	...	...	...	...
4	55.0	55.0	55.0	55.0	55.0	54.9	...	...	...	...	...	...	...	...
5	56.5	56.5	56.5	56.5	56.5	56.5	56.5	56.5	56.0	52.1	47.5	42.4	37.1	32.4
6	58.0	58.0	58.0	58.0	58.0	58.0	58.0	58.0	57.3	53.3	48.5	43.3	38.0	33.4
7	58.0	58.0	58.0	58.0	58.0	58.0	58.0	58.0	57.3	53.3	48.5	43.3	38.0	33.4
8	58.0	58.0	58.0	58.0	58.0	58.0	...	...	...	...	...	...	...	...
9	59.5	59.5	59.5	59.5	59.5	59.5	59.5	59.5	58.8	54.7	49.8	44.4	39.0	34.3
10	59.5	59.5	59.5	59.5	59.5	59.5	59.5	59.5	58.7	54.6	49.8	44.4	39.0	34.3
11	59.5	59.5	59.5	59.5	59.5	59.5	59.5	59.5	...	...	...	...	...	...
12	59.5	59.5	59.5	59.5	59.5	59.5	59.5	59.5	...	...	...	...	...	...
13	59.5	59.5	59.5	59.5	59.5	59.5	59.5	59.5	...	...	...	...	...	...
14	59.5	59.5	59.5	59.5	59.5	59.5	59.5	59.5	...	...	...	...	...	...
15	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	59.3	55.1	50.2	44.8	39.4	34.6
16	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	59.3	55.1	50.2	44.8	39.4	34.6
17	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	59.3	55.1	50.2	44.8	39.4	34.6
18	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	59.3	55.1	50.2	44.8	39.4	34.6
19	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	59.3	55.1	50.2	44.8	39.4	34.6
20	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	59.3	55.1	50.2	44.8	39.4	34.6
21	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	59.3	55.1	50.2	44.8	39.4	34.6
22	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	59.3	55.1	50.2	44.8	39.4	34.6
23	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	59.3	55.1	50.2	44.8	39.4	34.6
24	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	59.3	55.1	50.2	44.8	39.4	34.6
25	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	59.3	55.1	50.2	44.8	39.4	34.6
26	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	59.3	55.1	50.2	44.8	39.4	34.6
27	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	59.3	55.1	50.2	44.8	39.4	34.6
28	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	59.3	55.1	50.2	44.8	39.4	34.6
29	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	59.3	55.1	50.2	44.8	39.4	34.6
30	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	59.3	55.1	50.2	44.8	39.4	34.6
31	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	59.3	55.1	50.2	44.8	39.4	34.6
32	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	59.3	55.1	50.2	44.8	39.4	34.6
33	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	59.3	55.1	50.2	44.8	39.4	34.6
34	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	59.3	55.1	50.2	44.8	39.4	34.6
35	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	59.3	55.1	50.2	44.8	39.4	34.6
36	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	59.3	55.1	50.2	44.8	39.4	34.6
37	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	59.3	55.1	50.2	44.8	39.4	34.6
38	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	59.3	55.1	50.2	44.8	39.4	34.6
39	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	59.3	55.1	50.2	44.8	39.4	34.6
40	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	59.3	55.1	50.2	44.8	39.4	34.6
41	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	59.3	55.1	50.2	44.8	39.4	34.6
42	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	59.3	55.1	50.2	44.8	39.4	34.6
43	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	59.3	55.1	50.2	44.8	39.4	34.6
44	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	59.3	55.1	50.2	44.8	39.4	34.6
45	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	59.3	55.1	50.2	44.8	39.4	34.6

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Ferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
4	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
5	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
9	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
13	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
		Ferrous Materials (Cont'd)							
	1	Carbon steel	Smls. pipe	SA–524	I	K02104	...	...	60
	2	Carbon steel	Bar	SA–696	B	K03200	...	...	60
	3	Carbon steel	Forgings	SA–727	...	K02506	...	...	60
	4	Carbon steel	Wld. tube	SA–178	C	K03503	...	...	60
	5	Carbon steel	Smls. tube	SA–210	A–1	K02707	...	...	60
	6	Carbon steel	Smls. tube	SA–556	B2	K02707	...	...	60
	7	Carbon steel	Wld. tube	SA–557	B2	K03007	...	...	60
	8	Carbon steel	Plate, bar	SA/CSA–G40.21	38W	...	...	...	60
(**21**)	9	Carbon steel	Plate, sheet, bar	SA–572	42	...	...	$t \le 6$	60
(**21**)	10	Carbon steel	Sheet, strip	SA–1011	45	HSLAS	1	...	60
(**21**)	11	Carbon steel	Sheet, strip	SA–1011	45	SS	...	$t \le 0.23$	60
(**21**)	12	Carbon steel	Sheet, strip	SA–1011	50	HSLAS	2	...	60
	13	Carbon steel	Plate	SA/AS 1548	PT430	...	...	≤6	62.5
	14	Carbon steel	Plate	SA/EN 10028–2	P295GH	...	...	$6 < t \le 10$	62.5
	15	Carbon steel	Plate	SA/EN 10028–2	P295GH	...	...	$4 < t \le 6$	64
	16	Carbon steel	Bar	SA–675	65	...	...	...	65
	17	Carbon steel	Castings	SA–352	LCB	J03003	...	...	65
	18	Carbon steel	Plate	SA–515	65	K02800	...	...	65
	19	Carbon steel	Plate	SA–516	65	K02403	...	...	65
	20	Carbon steel	Wld. pipe	SA–671	CB65	K02800	...	...	65
	21	Carbon steel	Wld. pipe	SA–671	CC65	K02403	...	...	65
	22	Carbon steel	Wld. pipe	SA–672	B65	K02800	...	...	65
	23	Carbon steel	Wld. pipe	SA–672	C65	K02403	...	...	65
	24	Carbon steel	Sheet	SA–414	E	K02704	...	...	65
	25	Carbon steel	Plate	SA–662	B	K02203	...	...	65
	26	Carbon steel	Plate	SA–537	...	K12437	1	$2\frac{1}{2} < t \le 4$	65
	27	Carbon steel	Wld. pipe	SA–691	CMSH–70	K12437	...	$2\frac{1}{2} < t \le 4$	65
	28	Carbon steel	Plate, bar	SA/CSA–G40.21	44W	...	...	$t \le 8$	65
	29	Carbon steel	Plate, bar	SA/CSA–G40.21	50W	...	...	$t \le 6$	65
(**21**)	30	Carbon steel	Plate, sheet, bar	SA–572	50	...	...	$t \le 4$	65
(**21**)	31	Carbon steel	Round bar	SA–572	50	...	...	$t \le 11$	65
(**21**)	32	Carbon steel	Sheet, strip	SA–1011	50	SS	...	$t \le 0.23$	65
(**21**)	33	Carbon steel	Sheet, strip	SA–1011	50	HSLAS	1	...	65
(**21**)	34	Carbon steel	Sheet, strip	SA–1011	55	HSLAS	2	...	65
	35	Carbon steel	Plate	SA/AS 1548	PT460	...	...	≤6	66.5
	36	Carbon steel	Plate	SA/EN 10028–2	P295GH	...	...	≤4	66.5
	37	Carbon steel	Forgings	SA/EN 10222–2	P280GH	...	N, NT, or QT	$t \le 6.3$	66.5
	38	Carbon steel	Plate	SA/EN 10028–2	P355GH	...	...	$6 < t \le 10$	68
(**21**)	39	Carbon steel	Plate	SA/GB 713	Q345R	...	...	$6 < t \le 10$	68
	40	Carbon steel	Plate	SA/EN 10025–2	S355J2+N	...	...	$0.12 < t \le 3.15$	68
	41	Carbon steel	Plate	SA/EN 10028–2	P355GH	...	...	$4 < t \le 6$	69.5
	42	Carbon steel	Plate	SA/GB 713	Q345R	...	...	$4 < t \le 6$	69.5
	43	Carbon steel	Plate	SA–455	...	K03300	...	$0.58 < t \le \frac{3}{4}$	70
	44	Carbon steel	Bar	SA–675	70	...	...	...	70
	45	Carbon steel	Forgings	SA–105	...	K03504	...	...	70

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
														Ferrous Materials (Cont'd)
1	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	59.3	55.1	50.2	44.8	39.4	34.6
2	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	59.3	55.1	50.2	44.8	39.4	34.6
3	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	59.3	55.1	50.2	44.8	39.4	34.6
4	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	59.3	55.1	50.2	44.8	39.4	34.6
5	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	59.3	55.1	50.2	44.8	39.4	34.6
6	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	59.3	55.1	50.2	44.8	39.4	34.6
7	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	59.3	55.1	50.2	44.8	39.4	34.6
8	60.0	58.0	58.0	58.0	58.0	58.0	58.0	58.0	57.3	53.3	48.5	43.3	38.0	33.4
9	60.0	60.0	60.0	60.0	60.0	60.0	...	...	...	...	...	...	...	...
10	60.0	60.0	60.0	60.0	60.0	60.0	...	...	...	...	...	...	...	...
11	60.0	60.0	60.0	60.0	60.0	60.0	...	...	...	...	...	...	...	...
12	60.0	60.0	60.0	60.0	60.0	60.0	...	...	...	...	...	...	...	...
13	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	61.7	57.4	52.3	46.7	41.0	36.0
14	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	61.7	57.4	52.3	46.7	41.0	36.0
15	64.0	64.0	64.0	64.0	64.0	64.0	64.0	64.0	63.2	58.8	53.5	47.5	42.0	36.9
16	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	64.2	59.7	54.4	48.5	42.6	37.5
17	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	64.2	59.7	54.4	48.5	42.6	37.5
18	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	64.2	59.7	54.4	48.5	42.6	37.5
19	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	64.2	59.7	54.4	48.5	42.6	37.5
20	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	64.2	59.7	54.4	48.5	42.6	37.5
21	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	64.2	59.7	54.4	48.5	42.6	37.5
22	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	64.2	59.7	54.4	48.5	42.6	37.5
23	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	64.2	59.7	54.4	48.5	42.6	37.5
24	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	64.2	59.7	54.4	48.5	42.6	37.5
25	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	64.2	59.7	54.4	48.5	42.6	37.5
26	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	64.2	59.7	54.4	48.5	42.6	37.5
27	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	64.2	59.7	54.4	48.5	42.6	37.5
28	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	64.2	59.8	54.5	48.6	42.7	37.4
29	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	64.2	59.8	54.5	48.6	42.7	37.4
30	65.0	65.0	65.0	65.0	65.0	65.0	...	...	...	...	...	...	...	...
31	65.0	65.0	65.0	65.0	65.0	65.0	...	...	...	...	...	...	...	...
32	65.0	65.0	65.0	65.0	65.0	65.0	...	...	...	...	...	...	...	...
33	65.0	65.0	65.0	65.0	65.0	65.0	...	...	...	...	...	...	...	...
34	65.0	65.0	65.0	65.0	65.0	65.0	...	...	...	...	...	...	...	...
35	66.5	66.5	66.5	66.5	66.5	66.5	66.5	66.5	65.7	61.1	55.6	49.6	43.6	38.3
36	66.5	66.5	66.5	66.5	66.5	66.5	66.5	66.5	65.7	61.1	55.6	49.6	43.6	38.3
37	66.7	66.7	66.7	66.7	66.7	66.7	66.7	66.7	65.7	61.2	55.8	49.8	43.6	38.1
38	68.0	68.0	68.0	68.0	68.0	68.0	68.0	68.0	65.5	62.2	57.5	51.7	45.0	37.7
39	68.2	68.2	68.2	68.2	68.2	68.2	68.2	68.2	67.3	62.5	56.9	50.7	44.5	39.4
40	68.2	...	...	...	...	...	...	...	...	...	...	...	...	...
41	69.5	69.5	69.5	69.5	69.5	69.5	69.5	69.5	66.9	63.5	58.8	52.8	45.9	38.5
42	69.6	69.6	69.6	69.6	69.6	69.6	69.6	69.6	68.7	63.9	58.1	51.7	45.5	40.2
43	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
44	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
45	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Ferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
10	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
11	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
12	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
13	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
31	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
32	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
33	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
34	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
35	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
	Ferrous Materials (Cont'd)							
1	Carbon steel	Forgings	SA–181	...	K03502	70	...	70
2	Carbon steel	Castings	SA–216	WCB	J03002	...	...	70
3	Carbon steel	Forgings	SA–266	2	K03506	...	...	70
4	Carbon steel	Forgings	SA–266	4	K03017	...	...	70
5	Carbon steel	Forgings	SA–350	LF2	K03011	...	...	70
6	Carbon steel	Forgings	SA–508	1	K13502	...	...	70
7	Carbon steel	Forgings	SA–508	1A	K13502	...	...	70
8	Carbon steel	Forgings	SA–541	1	K03506	...	...	70
9	Carbon steel	Forgings	SA–541	1A	K03020	...	...	70
10	Carbon steel	Cast pipe	SA–660	WCB	J03003	...	...	70
11	Carbon steel	Forgings	SA–765	II	K03047	...	...	70
12	Carbon steel	Plate	SA–515	70	K03101	...	...	70
13	Carbon steel	Plate	SA–516	70	K02700	...	...	70
14	Carbon steel	Wld. pipe	SA–671	CB70	K03101	...	...	70
15	Carbon steel	Wld. pipe	SA–671	CC70	K02700	...	...	70
16	Carbon steel	Wld. pipe	SA–672	B70	K03101	...	...	70
17	Carbon steel	Wld. pipe	SA–672	C70	K02700	...	...	70
18	Carbon steel	Smls. pipe	SA–106	C	K03501	...	...	70
19	Carbon steel	Wld. tube	SA–178	D	...	...	...	70
20	Carbon steel	Smls. tube	SA–210	C	K03501	...	...	70
21	Carbon steel	Castings	SA–216	WCC	J02503	...	...	70
22	Carbon steel	Smls. & wld. ftgs.	SA–234	WPC	K03501	...	...	70
23	Carbon steel	Castings	SA–352	LCC	J02505	...	...	70
24	Carbon steel	Castings	SA–487	16	...	A	...	70
25	Carbon steel	Plate	SA–537	...	K12437	3	$4 < t \le 6$	70
26	Carbon steel	Smls. tube	SA–556	C2	K03006	...	...	70
27	Carbon steel	Tube	SA–557	C2	K03505	...	...	70
28	Carbon steel	Cast pipe	SA–660	WCC	J02505	...	...	70
29	Carbon steel	Bar	SA–696	C	K03200	...	...	70
30	Carbon steel	Sheet	SA–414	F	K03102	...	...	70
31	Carbon steel	Plate	SA–662	C	K02007	...	...	70
32	Carbon steel	Plate	SA–537	...	K12437	2	$4 < t \le 6$	70
33	Carbon steel	Plate	SA–738	C	K02008	...	$4 < t \le 6$	70
34	Carbon steel	Plate	SA–537	...	K12437	1	$\le 2\frac{1}{2}$	70
35	Carbon steel	Wld. pipe	SA–671	CD70	K12437	...	$\le 2\frac{1}{2}$	70
36	Carbon steel	Wld. pipe	SA–672	D70	K12437	...	$\le 2\frac{1}{2}$	70
37	Carbon steel	Wld. pipe	SA–691	CMSH–70	K12437	...	$\le 2\frac{1}{2}$	70
38	Carbon steel	Plate	SA–841	A	...	1	≤4	70
(**21**) 39	Carbon steel	Plate, sheet, bar	SA–572	55	...	...	$t \le 2$	70
(**21**) 40	Carbon steel	Round bar	SA–572	55	...	...	$t \le 3\frac{1}{2}$	70
(**21**) 41	Carbon steel	Sheet, strip	SA–1011	55	HSLAS	1	...	70
(**21**) 42	Carbon steel	Sheet, strip	SA–1011	60	HSLAS	2	...	70
43	Carbon steel	Forgings	SA/EN 10222–2	P305GH	...	N or NT	$t \le 6.3$	71
44	Carbon steel	Plate	SA/EN 10028–2	P355GH	...	...	$2.5 < t \le 4$	71
45	Carbon steel	Plate	SA/GB 713	Q345R	...	...	$1.5 < t \le 4$	71

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
												Ferrous Materials (Cont'd)		
1	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
2	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
3	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
4	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
5	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
6	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
7	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
8	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
9	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
10	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
11	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
12	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
13	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
14	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
15	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
16	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
17	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
18	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
19	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
20	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
21	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
22	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
23	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
24	70.0	69.5	65.7	63.3	62.6	62.6	62.6	62.6	62.3	59.2	...	...	...	...
25	70.0	70.0	69.1	68.4	68.4	68.4	68.4	68.4	67.7	65.4	...	...	...	...
26	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
27	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
28	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
29	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
30	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
31	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
32	70.0	70.0	69.1	68.4	68.4	68.4	68.4	68.4	67.7	65.4	...	...	...	...
33	70.0	70.0	69.1	68.4	68.4	68.4	68.4	68.4	67.7	65.4	...	...	...	...
34	70.0	70.0	69.1	68.4	68.4	68.4	68.4	68.4	67.7	65.4	...	...	...	...
35	70.0	70.0	69.1	68.4	68.4	68.4	68.4	68.4	67.7	65.4	...	...	...	...
36	70.0	70.0	69.1	68.4	68.4	68.4	68.4	68.4	67.7	65.4	...	...	...	...
37	70.0	70.0	69.1	68.4	68.4	68.4	68.4	68.4	67.7	65.4	...	...	...	...
38	70.0	70.0	70.0	70.0	70.0	69.9	68.4	...	...	...	...	...	...	...
39	70.0	70.0	70.0	70.0	70.0	70.0	...	...	...	...	...	...	...	...
40	70.0	70.0	70.0	70.0	70.0	70.0	...	...	...	...	...	...	...	...
41	70.0	70.0	70.0	70.0	70.0	70.0	...	...	...	...	...	...	...	...
42	70.0	70.0	70.0	70.0	70.0	70.0	...	...	...	...	...	...	...	...
43	71.1	71.1	71.1	71.1	71.1	71.1	71.1	71.1	70.0	65.2	59.4	53.0	46.5	40.6
44	71.0	71.0	71.0	71.0	71.0	71.0	71.0	71.0	68.3	64.8	60.0	53.9	46.9	39.3
45	71.1	71.1	71.1	71.1	71.1	71.1	71.1	71.1	70.1	65.2	59.3	52.8	46.4	41.0

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Ferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
40	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
41	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
42	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
	Ferrous Materials (Cont'd)							
1	Carbon steel	Plate	SA/GB 713	Q345R	...	...	$^5/_8 < t \le 1.5$	72.5
2	Carbon steel	Plate	SA–455	...	K03300	...	$^3/_8 < t \le ^5/_8$	73
3	Carbon steel	Forgings	SA/EN 10222–2	P305GH	...	QT	$t \le 2.8$	74
4	Carbon steel	Plate	SA/EN 10028–2	P355GH	...	...	≤2.5	74
5	Carbon steel	Plate	SA/GB 713	Q345R	...	...	$^1/_8 \le t \le ^5/_8$	74
6	Carbon steel	Plate	SA/EN 10025–2	S355J2+N	...	...	$t < 0.12$	74
7	Carbon steel	Forgings	SA–266	3	K05001	...	...	75
8	Carbon steel	Plate	SA–455	...	K03300	...	$\le^3/_8$	75
9	Carbon steel	Plate	SA–299	A	K02803	...	>1	75
10	Carbon steel	Wld. pipe	SA–671	CK75	K02803	...	>1	75
11	Carbon steel	Wld. pipe	SA–672	N75	K02803	...	>1	75
12	Carbon steel	Wld. pipe	SA–691	CMS–75	K02803	...	>1	75
13	Carbon steel	Plate	SA–299	A	K02803	...	≤1	75
14	Carbon steel	Wld. pipe	SA–691	CMS–75	K02803	...	≤1	75
15	Carbon steel	Forgings	SA–372	B	K04001	...	...	75
16	Carbon steel	Sheet	SA–414	G	K03103	...	...	75
17	Carbon steel	Plate	SA–738	A	K12447	...	...	75
18	Carbon steel	Plate	SA–537	...	K12437	3	$2^1/_2 < t \le 4$	75
19	Carbon steel	Plate	SA–537	...	K12437	2	$2^1/_2 < t \le 4$	75
20	Carbon steel	Wld. pipe	SA–691	CMSH–80	K12437	...	$2^1/_2 < t \le 4$	75
21	Carbon steel	Plate	SA–738	C	K02008	...	$2^1/_2 < t \le 4$	75
(**21**) 22	Carbon steel	Plate, sheet, bar	SA–572	60	...	...	$t \le 1^1/_4$	75
(**21**) 23	Carbon steel	Round bar	SA–572	60	...	...	$t \le 3^1/_2$	75
(**21**) 24	Carbon steel	Sheet, strip	SA–1011	60	HSLAS	1	...	75
25	Carbon steel	Plate	SA–299	B	K02803	...	>1	80
26	Carbon steel	Plate	SA–299	B	K02803	...	≤1	80
27	Carbon steel	Forgings	SA–765	IV	K02009	...	...	80
28	Carbon steel	Plate	SA–537	...	K12437	3	$\le2^1/_2$	80
29	Carbon steel	Plate	SA–537	...	K12437	2	$\le2^1/_2$	80
30	Carbon steel	Wld. pipe	SA–671	CD80	K12437	...	$\le2^1/_2$	80
31	Carbon steel	Wld. pipe	SA–672	D80	K12437	...	$\le2^1/_2$	80
32	Carbon steel	Wld. pipe	SA–691	CMSH–80	K12437	...	$\le2^1/_2$	80
33	Carbon steel	Plate	SA–738	C	K02008	...	$\le2^1/_2$	80
34	Carbon steel	Plate	SA–841	B	...	2	≤4	80
(**21**) 35	Carbon steel	Plate, sheet, bar	SA–572	65	...	...	$t \le 1^1/_4$	80
36	Carbon steel	Plate	SA–612	...	K02900	...	$^1/_2 < t \le 1$	81
37	Carbon steel	Plate	SA–841	F	...	6	$t \le 1.25$	82
38	Carbon steel	Plate	SA–612	...	K02900	...	$\le^1/_2$	83
39	Carbon steel	Plate	SA–738	B	K12007	...	...	85
40	Carbon steel	Plate	SA–841	F	...	7	$t \le 1$	86
41	Carbon steel	Forgings	SA–372	C	K04801	...	...	90
42	Carbon steel	Bolting	SA–449	...	K04200	...	$1^1/_2 < t \le 3$	90
43	Carbon steel	Plate	SA–724	A	K11831	...	...	90
44	Carbon steel	Plate	SA–724	C	K12037	...	...	90
45	Carbon steel	Plate	SA–724	B	K12031	...	...	95

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
														Ferrous Materials (Cont'd)
1	72.5	72.5	72.5	72.5	72.5	72.5	72.5	72.5	71.6	66.5	60.5	53.9	47.4	41.9
2	73.0	73.0	73.0	73.0	73.0	73.0	73.0	73.0	72.1	67.1	61.1	54.5	47.9	42.1
3	74.0	74.0	74.0	74.0	74.0	74.0	74.0	74.0	72.9	67.9	61.8	55.2	48.4	42.2
4	74.0	74.0	74.0	74.0	74.0	74.0	74.0	74.0	71.1	67.5	62.4	56.1	48.8	40.9
5	74.0	74.0	74.0	74.0	74.0	74.0	74.0	74.0	73.0	67.9	61.7	55.0	48.3	42.7
6	74.0	...	...	...	...	...	...	...	...	...	...	...	...	...
7	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	74.1	68.9	62.8	56.0	49.2	43.2
8	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	74.1	68.9	62.8	56.0	49.2	43.2
9	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	74.1	68.9	62.8	56.0	49.2	43.2
10	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	74.1	68.9	62.8	56.0	49.2	43.2
11	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	74.1	68.9	62.8	56.0	49.2	43.2
12	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	74.1	68.9	62.8	56.0	49.2	43.2
13	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	74.1	68.9	62.8	56.0	49.2	43.2
14	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	74.1	68.9	62.8	56.0	49.2	43.2
15	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	74.1	68.9	62.8	56.0	49.2	43.2
16	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	74.1	68.9	62.8	56.0	49.2	43.2
17	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	74.1	68.9	62.8	56.0	49.2	43.2
18	75.0	75.0	74.0	73.3	73.2	73.2	73.2	73.2	72.5	70.1	...	...	...	...
19	75.0	75.0	74.0	73.3	73.2	73.2	73.2	73.2	72.5	70.1	...	...	...	...
20	75.0	75.0	74.0	73.3	73.2	73.2	73.2	73.2	72.5	70.1	...	...	...	...
21	75.0	75.0	74.0	73.3	73.2	73.2	73.2	73.2	72.5	70.1	...	...	...	...
22	75.0	75.0	75.0	75.0	75.0	75.0	...	...	...	...	...	...	...	...
23	75.0	75.0	75.0	75.0	75.0	75.0	...	...	...	...	...	...	...	...
24	75.0	75.0	75.0	75.0	75.0	75.0	...	...	...	...	...	...	...	...
25	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	79.0	73.5	66.9	59.7	52.5	46.1
26	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	79.0	73.5	66.9	59.7	52.5	46.1
27	80.0	80.0	80.0	79.1	79.1	79.1	78.8	77.7	...	...	...	...	...	...
28	80.0	80.0	78.9	78.2	78.1	78.1	78.1	78.1	77.4	74.8	...	...	...	...
29	80.0	80.0	78.9	78.2	78.1	78.1	78.1	78.1	77.4	74.8	...	...	...	...
30	80.0	80.0	78.9	78.2	78.1	78.1	78.1	78.1	77.4	74.8	...	...	...	...
31	80.0	80.0	78.9	78.2	78.1	78.1	78.1	78.1	77.4	74.8	...	...	...	...
32	80.0	80.0	78.9	78.2	78.1	78.1	78.1	78.1	77.4	74.8	...	...	...	...
33	80.0	80.0	78.9	78.2	78.1	78.1	78.1	78.1	77.4	74.8	...	...	...	...
34	80.0	80.0	80.0	80.0	80.0	79.9	78.2	...	...	...	...	...	...	...
35	80.0	80.0	80.0	80.0	80.0	79.9	...	...	...	...	...	...	...	...
36	81.0	81.0	79.4	79.4	79.4	79.4	79.4	79.4	...	...	...	...	...	...
37	82.0	82.0	82.0	82.0	82.0	81.8	80.2	...	...	...	...	...	...	...
38	83.0	83.0	81.3	81.3	81.3	81.3	81.3	81.3	...	...	...	...	...	...
39	85.0	85.0	85.0	85.0	85.0	84.2	83.0	81.0	78.3	74.6	...	...	...	...
40	86.0	86.0	86.0	86.0	86.0	85.8	84.2	...	...	...	...	...	...	...
41	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	88.9	82.7	75.3	67.2	59.0	51.9
42	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	88.9	82.7	75.3	67.2	59.0	51.9
43	90.0	90.0	88.8	87.9	87.9	87.9	87.9	87.9	87.0	84.1	...	...	...	...
44	90.0	90.0	88.8	87.9	87.9	87.9	87.9	87.9	87.0	84.1	...	...	...	...
45	95.0	95.0	93.7	92.8	92.8	92.8	92.8	92.8	91.9	88.8	...	...	...	...

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Ferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
23	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
24	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
25	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
		Ferrous Materials (Cont'd)							
	1	Carbon steel	Bolting	SA–325	...	...	...	...	105
(**21**)	2	Carbon steel	Bolting	SA–325	1	K02706	...	$1\frac{1}{8} \le t \le 1\frac{1}{2}$	105
	3	Carbon steel	Bolting	SA–449	...	K04200	...	$1 < t < 1\frac{1}{2}$	105
	4	Carbon steel	Bolting	SA–354	BC	K04100	...	$2\frac{1}{2} < t \le 4$	115
(**21**)	5	Carbon steel	Bolting	SA–325	1	K02706	...	$\frac{1}{2} \le t \le 1$	120
	6	Carbon steel	Bolting	SA–449	...	K04200	...	≤1	120
	7	Carbon steel	Bolting	SA–354	BC	K04100	...	$\frac{1}{4} < t \le 2\frac{1}{2}$	125
	8	Carbon steel	Bolting	SA–354	BD	K04100	...	$2\frac{1}{2} < t \le 4$	140
	9	Carbon steel	Bolting	SA–354	BD	K04100	...	$\frac{1}{4} < t \le 2\frac{1}{2}$	150
	10	Ductile cast iron	Castings	SA–874	...	...	...	$12 < t < 21$	43.5
	11	Ductile cast iron	Castings	SA/JIS G5504	FCD 300 LT	...	...	$12 < t < 21$	43.5
	12	C–Mn–Si–Cb	Plate	SA–737	B	K12001	...	...	70
	13	C–Mn–Si–Cb	Plate	SA/AS 1548	PT490	...	...	≤6	71
(**21**)	14	C–Mn–Si–Cb	Plate	SA/GB 713	Q370R	...	Normalized	$2.5 < t \le 4$	74
	15	C–Mn–Si–Cb	Plate	SA/GB 713	Q370R	...	Normalized	$1.5 < t \le 2.5$	75.5
	16	C–Mn–Si–Cb	Plate	SA/GB 713	Q370R	...	Normalized	$0.4 < t \le 1.5$	77
	17	C–Mn–Si–V	Plate	SA–737	C	K12202	...	...	80
	18	C–Mn–Si–V–Cb	Plate	SA–656	T3	...	...	≤2	60
	19	C–Mn–Si–V–Cb	Plate	SA–656	T7	...	...	≤2	60
	20	C–Mn–Si–V–Cb	Plate	SA–656	T3	...	...	$\le 1\frac{1}{2}$	70
	21	C–Mn–Si–V–Cb	Plate	SA–656	T7	...	...	$\le 1\frac{1}{2}$	70
	22	C–Mn–Si–V–Cb	Plate	SA–656	T3	...	...	≤1	80
	23	C–Mn–Si–V–Cb	Plate	SA–656	T7	...	...	≤1	80
	24	C–Mn–Si–V–Cb	Plate	SA–656	T3	...	...	$\le \frac{3}{4}$	90
	25	C–Mn–Si–V–Cb	Plate	SA–656	T7	...	...	$\le \frac{3}{4}$	90
	26	C–Mn–Ti	Plate, sheet	SA–562	...	K11224	...	...	55
	27	C–Si–Ti	Forgings	SA–836	...	...	1	...	55
	28	C–$\frac{1}{4}$Mo	Bolting	SA–320	L7A	G40370	...	$\le 2\frac{1}{2}$	125
	29	C–$\frac{1}{4}$Mo	Bolting	SA–574	4037	G40370	...	$\ge \frac{5}{8}$	170
	30	C–$\frac{1}{4}$Mo	Bolting	SA–574	4042	G40420	...	$\ge \frac{5}{8}$	170
	31	C–$\frac{1}{4}$Mo	Bolting	SA–574	4140	G41400	...	$\ge \frac{5}{8}$	170
	32	C–$\frac{1}{4}$Mo	Bolting	SA–574	4037	G40370	...	$\le \frac{1}{2}$	180
	33	C–$\frac{1}{4}$Mo	Bolting	SA–574	4042	G40420	...	$\le \frac{1}{2}$	180
	34	C–0.3Mo	Smls. tube	SA/EN 10216–2	16Mo3	...	...	$t \le 2\frac{1}{2}$	65.5
	35	C–$\frac{1}{2}$Mo	Smls. tube	SA–209	T1b	K11422	...	...	53
	36	C–$\frac{1}{2}$Mo	Wld. tube	SA–250	T1b	K11422	...	...	53
	37	C–$\frac{1}{2}$Mo	Smls. tube	SA–209	T1	K11522	...	...	55
	38	C–$\frac{1}{2}$Mo	Smls. & wld. ftgs.	SA–234	WP1	K12821	...	...	55
	39	C–$\frac{1}{2}$Mo	Wld. tube	SA–250	T1	K11522	...	...	55
	40	C–$\frac{1}{2}$Mo	Smls. pipe	SA–335	P1	K11522	...	...	55
	41	C–$\frac{1}{2}$Mo	Forged pipe	SA–369	FP1	K11522	...	...	55
	42	C–$\frac{1}{2}$Mo	Smls. tube	SA–209	T1a	K12023	...	...	60
	43	C–$\frac{1}{2}$Mo	Wld. tube	SA–250	T1a	K12023	...	...	60
	44	C–$\frac{1}{2}$Mo	Castings	SA–217	WC1	J12524	...	...	65
	45	C–$\frac{1}{2}$Mo	Castings	SA–352	LC1	J12522	...	...	65

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
												Ferrous Materials (Cont'd)		
1	105.0	105.0	103.6	102.6	102.5	102.5	102.5	102.5	101.5	98.1	91.5	80.3	62.5	35.8
2	105.0	105.0	103.6	102.6	102.5	102.5	102.5	102.5	101.5	98.1	91.5	80.3	62.5	35.8
3	105.0	105.0	103.6	102.6	102.5	102.5	102.5	102.5	101.5	98.1	91.5	80.3	62.5	35.8
4	115.0	115.0	115.0	115.0	115.0	115.0	115.0	113.6	105.7	96.2	85.8	75.4	66.3	...
5	120.0	120.0	118.4	117.3	117.2	117.2	117.2	117.2	116.1	112.1	104.6	91.8	71.5	41.0
6	120.0	120.0	118.4	117.3	117.2	117.2	117.2	117.2	116.1	112.1	104.6	91.8	71.5	41.0
7	125.0	125.0	125.0	125.0	125.0	125.0	125.0	125.0	123.5	114.8	104.6	93.3	82.0	72.1
8	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	138.3	128.6	117.1	104.5	91.8	80.7
9	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	147.8	137.3	124.9	111.3	97.6	85.5
10	43.5	43.4	41.3	39.9	39.1	38.4	37.6	...	...	...	...	...	...	...
11	43.5	43.4	41.3	39.9	39.1	38.4	37.6	...	...	...	...	...	...	...
12	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.4	66.7	63.0	58.2	52.7	47.0	...
13	71.0	71.0	71.0	71.0	71.0	71.0	71.0	70.4	67.7	63.9	59.1	53.5	47.6	42.2
14	74.0	74.0	74.0	74.0	74.0	74.0	74.0	74.0	70.9	66.4	61.1	55.4	49.6	44.0
15	75.4	75.4	75.4	75.4	75.4	75.4	75.4	75.4	72.3	67.7	62.3	56.5	50.6	45.0
16	76.9	76.9	76.9	76.9	76.9	76.9	76.9	76.9	73.7	69.0	63.5	57.6	51.5	45.9
17	80.0	80.0	80.0	80.0	80.0	80.0	80.0	79.4	76.3	72.0	66.5	60.3	53.7	...
18	60.0	60.0	60.0	60.0	60.0	60.0	60.0	...	...	...	...	...	...	...
19	60.0	60.0	60.0	60.0	60.0	60.0	60.0	...	...	...	...	...	...	...
20	70.0	70.0	70.0	70.0	70.0	70.0	70.0	...	...	...	...	...	...	...
21	70.0	70.0	70.0	70.0	70.0	70.0	70.0	...	...	...	...	...	...	...
22	80.0	80.0	80.0	80.0	80.0	80.0	80.0	...	...	...	...	...	...	...
23	80.0	80.0	80.0	80.0	80.0	80.0	80.0	...	...	...	...	...	...	...
24	90.0	90.0	90.0	90.0	90.0	90.0	90.0	...	...	...	...	...	...	...
25	90.0	90.0	90.0	90.0	90.0	90.0	90.0	...	...	...	...	...	...	...
26	55.0	44.4	41.5	39.5	38.1	36.9	36.3	35.6	34.8	...	...	...	...	...
27	55.0	54.3	50.7	48.3	46.6	45.1	44.3	43.5	42.5	...	...	...	...	...
28	125.0	125.0	125.0	125.0	125.0	125.0	125.0	125.0	123.5	114.8	104.6	93.3	82.0	72.1
29	170.0	170.0	170.0	170.0	170.0	170.0	170.0	170.0	170.0	170.0	166.0	158.1	148.4	137.2
30	170.0	170.0	170.0	170.0	170.0	170.0	170.0	170.0	170.0	170.0	166.0	158.1	148.4	137.2
31	170.0	170.0	170.0	170.0	170.0	170.0	170.0	170.0	170.0	170.0	166.0	158.1	148.4	137.2
32	180.0	180.0	180.0	180.0	180.0	180.0	180.0	180.0	180.0	180.0	175.8	167.4	157.2	145.3
33	180.0	180.0	180.0	180.0	180.0	180.0	180.0	180.0	180.0	180.0	175.8	167.4	157.2	145.3
34	65.3	65.3	65.3	65.3	65.3	65.3	65.3	65.3	65.3	65.3	63.7	60.7	57.0	52.7
35	53.0	53.0	53.0	53.0	53.0	53.0	53.0	53.0	53.0	53.0	51.8	49.3	46.3	42.8
36	53.0	53.0	53.0	53.0	53.0	53.0	53.0	53.0	53.0	53.0	51.8	49.3	46.3	42.8
37	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	53.7	51.1	48.0	44.4
38	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	53.7	51.1	48.0	44.4
39	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	53.7	51.1	48.0	44.4
40	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	53.7	51.1	48.0	44.4
41	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	53.7	51.1	48.0	44.4
42	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	58.6	55.8	52.4	48.4
43	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	58.6	55.8	52.4	48.4
44	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	63.5	60.4	56.8	52.5
45	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	63.5	60.4	56.8	52.5

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Ferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
3	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
6	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
	Ferrous Materials (Cont'd)							
1	C–½Mo	Cast pipe	SA–426	CP1	J12521	...	...	65
2	C–½Mo	Plate	SA–204	A	K11820	...	...	65
3	C–½Mo	Wld. pipe	SA–672	L65	K11820	...	...	65
4	C–½Mo	Wld. pipe	SA–691	CM–65	K11820	...	...	65
5	C–½Mo	Forgings	SA–182	F1	K12822	...	...	70
6	C–½Mo	Plate	SA–204	B	K12020	...	...	70
7	C–½Mo	Forgings	SA–336	F1	K12520	...	...	70
8	C–½Mo	Wld. pipe	SA–672	L70	K12020	...	...	70
9	C–½Mo	Wld. pipe	SA–691	CM–70	K12020	...	...	70
10	C–½Mo	Plate	SA–204	C	K12320	...	...	75
11	C–½Mo	Wld. pipe	SA–672	L75	K12320	...	...	75
12	C–½Mo	Wld. pipe	SA–691	CM–75	K12320	...	...	75
13	½Cr–1/5Mo	Forgings	SA–372	G	K13049	55	...	85
14	½Cr–1/5Mo	Forgings	SA–372	H	K13547	55	...	85
15	½Cr–1/5Mo	Forgings	SA–372	G	K13049	65	...	105
16	½Cr–1/5Mo	Forgings	SA–372	H	K13547	65	...	105
17	½Cr–1/5Mo	Forgings	SA–372	G	K13547	70	...	120
18	½Cr–1/5Mo	Forgings	SA–372	H	K13547	70	...	120
19	½Cr–1/5Mo–V	Plate	SA–517	B	K11630	...	≤1¼	115
20	½Cr–¼Mo–Si	Plate	SA–517	A	K11856	...	≤1¼	115
21	½Cr–¼Mo–Si	Forgings	SA–592	A	K11856	...	≤2½	115
22	½Cr–½Mo	Smls. pipe	SA–335	P2	K11547	...	...	55
23	½Cr–½Mo	Forged pipe	SA–369	FP2	K11547	...	...	55
24	½Cr–½Mo	Plate	SA–387	2	K12143	1	...	55
25	½Cr–½Mo	Wld. pipe	SA–691	½CR	K12143	...	...	55
26	½Cr–½Mo	Smls. tube	SA–213	T2	K11547	...	...	60
27	½Cr–½Mo	Cast pipe	SA–426	CP2	J11547	...	...	60
28	½Cr–½Mo	Forgings	SA–182	F2	K12122	...	...	70
29	½Cr–½Mo	Plate	SA–387	2	K12143	2	...	70
30	½Cr–½Mo	Wld. pipe	SA–691	½CR	K12143	...	...	70
31	¾Cr–½Ni–Cu	Wld. tube	SA–423	1	K11535	...	...	60
32	¾Cr–¾Ni–Cu–Al	Pipe	SA–333	4	K11267	...	...	60
33	1Cr–1/5Mo	Forgings	SA–372	E	K13047	55	...	85
34	1Cr–1/5Mo	Forgings	SA–372	F	G41350	55	...	85
35	1Cr–1/5Mo	Forgings	SA–372	J	K13548	55	...	85
36	1Cr–1/5Mo	Bolting	SA–193	B7	G41400	...	$4 < t \le 7$	100
37	1Cr–1/5Mo	Bolting	SA–193	B7M	G41400	...	≤2½	100
38	1Cr–1/5Mo	Bolting	SA–320	L7M	G41400	...	≤2½	100
39	1Cr–1/5Mo	Forgings	SA–372	F	G41350	65	...	105
40	1Cr–1/5Mo	Bolting	SA–193	B7	G41400	...	$2½ < t \le 4$	115
41	1Cr–1/5Mo	Forgings	SA–372	E	K13047	70	...	120
42	1Cr–1/5Mo	Forgings	SA–372	F	G41350	70	...	120
43	1Cr–1/5Mo	Forgings	SA–372	J	K13548	70	...	120
44	1Cr–1/5Mo	Bolting	SA–193	B7	G41400	...	≤2½	125
45	1Cr–1/5Mo	Bolting	SA–320	L7	G41400	...	≤2½	125

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
												Ferrous Materials (Cont'd)		
1	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	63.5	60.4	56.8	52.5
2	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	63.5	60.4	56.8	52.5
3	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	63.5	60.4	56.8	52.5
4	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	63.5	60.4	56.8	52.5
5	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	68.4	65.1	61.1	56.5
6	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	68.4	65.1	61.1	56.5
7	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	68.4	65.1	61.1	56.5
8	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	68.4	65.1	61.1	56.5
9	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	68.4	65.1	61.1	56.5
10	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	73.2	69.7	65.5	60.5
11	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	73.2	69.7	65.5	60.5
12	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	73.2	69.7	65.5	60.5
13	85.0	85.0	85.0	85.0	85.0	85.0	85.0	82.2	78.2	73.8	68.9	63.8	58.7	53.6
14	85.0	85.0	85.0	85.0	85.0	85.0	85.0	82.2	78.2	73.8	68.9	63.8	58.7	53.6
15	105.0	105.0	105.0	105.0	105.0	105.0	105.0	102.0	96.6	91.1	85.2	78.9	72.5	66.3
16	105.0	105.0	105.0	105.0	105.0	105.0	105.0	102.0	96.6	91.1	85.2	78.9	72.5	66.3
17	120.0	120.0	120.0	120.0	120.0	120.0	119.2	115.2	110.3	104.4	97.7	90.4	82.9	75.5
18	120.0	120.0	120.0	120.0	120.0	120.0	119.2	115.2	110.3	104.4	97.7	90.4	82.9	75.5
19	115.0	115.0	115.0	115.0	115.0	115.0	114.8	112.6	109.6	106.0	101.6	96.6	90.8	84.4
20	115.0	115.0	115.0	115.0	115.0	115.0	114.8	112.6	109.6	106.0	101.6	96.6	90.8	84.4
21	115.0	115.0	115.0	115.0	115.0	115.0	114.8	112.6	109.6	106.0	101.6	96.6	90.8	84.4
22	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	53.7	51.1	48.0	44.4
23	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	53.7	51.1	48.0	44.4
24	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	53.7	51.1	48.0	44.4
25	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	53.7	51.1	48.0	44.4
26	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	58.6	55.8	52.4	48.4
27	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	58.6	55.8	52.4	48.4
28	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	68.4	65.1	61.1	56.5
29	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	68.4	65.1	61.1	56.5
30	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	68.4	65.1	61.1	56.5
31	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	...	...	...
32	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	...	...	...
33	85.0	85.0	85.0	85.0	85.0	85.0	85.0	82.2	78.2	73.8	68.9	63.8	58.7	53.6
34	85.0	85.0	85.0	85.0	85.0	85.0	85.0	82.2	78.2	73.8	68.9	63.8	58.7	53.6
35	85.0	85.0	85.0	85.0	85.0	85.0	85.0	82.2	78.2	73.8	68.9	63.8	58.7	53.6
36	100.0	100.0	100.0	100.0	100.0	100.0	100.0	95.7	91.4	86.7	81.4	75.7	69.4	62.7
37	100.0	100.0	100.0	100.0	100.0	100.0	100.0	95.7	91.4	86.7	81.4	75.7	69.4	62.7
38	100.0	100.0	100.0	100.0	100.0	100.0	100.0	95.7	91.4	86.7	81.4	75.7	69.4	62.7
39	105.0	105.0	105.0	105.0	105.0	105.0	105.0	102.0	96.6	91.1	85.2	78.9	72.5	66.3
40	115.0	115.0	115.0	115.0	115.0	115.0	114.5	110.1	105.1	99.7	93.6	87.0	79.8	72.1
41	120.0	120.0	120.0	120.0	120.0	120.0	119.2	115.2	110.3	104.4	97.7	90.4	82.9	75.5
42	120.0	120.0	120.0	120.0	120.0	120.0	119.2	115.2	110.3	104.4	97.7	90.4	82.9	75.5
43	120.0	120.0	120.0	120.0	120.0	120.0	119.2	115.2	110.3	104.4	97.7	90.4	82.9	75.5
44	125.0	125.0	125.0	125.0	125.0	125.0	124.4	119.6	114.3	108.4	101.8	94.6	86.8	78.4
45	125.0	125.0	125.0	125.0	125.0	125.0	124.4	119.6	114.3	108.4	101.8	94.6	86.8	78.4

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding												
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
	Ferrous Materials (Cont'd)												
1	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...

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Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
	Ferrous Materials (Cont'd)							
1	1Cr–½Mo	Forgings	SA–372	J	G41370	110	...	135
2	1Cr–½Mo	Plate	SA–387	12	K11757	1	...	55
3	1Cr–½Mo	Wld. pipe	SA–691	1CR	K11757	...	...	55
4	1Cr–½Mo	Cast pipe	SA–426	CP12	J11562	...	...	60
5	1Cr–½Mo	Forgings	SA–182	F12	K11562	1	...	60
6	1Cr–½Mo	Smls. tube	SA–213	T12	K11562	...	...	60
7	1Cr–½Mo	Smls. & wld. ftgs.	SA–234	WP12	K12062	1	...	60
8	1Cr–½Mo	Smls. pipe	SA–335	P12	K11562	...	...	60
9	1Cr–½Mo	Forged pipe	SA–369	FP12	K11562	...	...	60
10	1Cr–½Mo	Forgings	SA/EN 10222–2	13CrMo4–5	...	NT or QT	$10 < t \le 20$	61
11	1Cr–½Mo	Plate	SA/EN 10028–2	13CrMo4–5	...	...	$6 < t \le 10$	61
12	1Cr–½Mo	Plate	SA/EN 10028–2	13CrMo4–5	...	...	$4 < t \le 6$	62.5
13	1Cr–½Mo	Plate	SA/EN 10028–2	13CrMo4–5	...	...	$2.5 < t \le 4$	64
14	1Cr–½Mo	Smls. tube	SA/EN 10216–2	13CrMo4–5	...	...	$t \le 2\frac{1}{2}$	64
(**21**) 15	1Cr–½Mo	Plate	SA/GB 713	15CrMoR	...	...	$4 < t \le 8$	64
16	1Cr–½Mo	Forgings	SA/EN 10222–2	13CrMo4–5	...	NT or QT	$t \le 10$	64
17	1Cr–½Mo	Plate	SA–387	12	K11757	2	...	65
18	1Cr–½Mo	Wld. pipe	SA–691	1CR	K11757	...	...	65
19	1Cr–½Mo	Plate	SA/EN 10028–2	13CrMo4–5	...	...	$t \le 2.5$	65.5
20	1Cr–½Mo	Plate	SA/GB 713	15CrMoR	...	...	$0.25 \le t \le 4$	65.5
21	1Cr–½Mo	Forgings	SA–182	F12	K11564	2	...	70
22	1Cr–½Mo	Forgings	SA–336	F12	K11564	...	...	70
23	1Cr–½Mo–V	Bolting	SA–193	B16	K14072	...	$4 < t \le 8$	100
24	1Cr–½Mo–V	Bolting	SA–193	B16	K14072	...	$2\frac{1}{2} < t \le 4$	110
25	1Cr–½Mo–V	Bolting	SA–540	B21	K14073	5	$2 < t \le 8$	115
26	1Cr–½Mo–V	Bolting	SA–540	B21	K14073	5	≤2	120
27	1Cr–½Mo–V	Bolting	SA–193	B16	K14072	...	$\le 2\frac{1}{2}$	125
28	1Cr–½Mo–V	Bolting	SA–540	B21	K14073	4	≤6	135
29	1Cr–½Mo–V	Bolting	SA–540	B21	K14073	3	≤6	145
30	1Cr–½Mo–V	Bolting	SA–540	B21	K14073	2	≤4	155
31	1Cr–½Mo–V	Bolting	SA–540	B21	K14073	1	≤4	165
32	1Cr–¼Si–V	Wire	SA–231	...	...	Oil	0.020	300
33	1Cr–¼Si–V	Wire	SA–232	...	...	Oil	0.020	300
34	1Cr–¼Si–V	Wire	SA–231	...	...	Oil	0.032	290
35	1Cr–¼Si–V	Wire	SA–232	...	...	Oil	0.032	290
36	1Cr–¼Si–V	Wire	SA–231	...	...	Oil	0.041	280
37	1Cr–¼Si–V	Wire	SA–232	...	...	Oil	0.041	280
38	1Cr–¼Si–V	Wire	SA–231	...	...	Oil	0.054	270
39	1Cr–¼Si–V	Wire	SA–232	...	...	Oil	0.054	270
40	1Cr–¼Si–V	Wire	SA–231	...	...	Oil	0.062	265
41	1Cr–¼Si–V	Wire	SA–232	...	...	Oil	0.062	265
42	1Cr–¼Si–V	Wire	SA–231	...	...	Oil	0.080	255
43	1Cr–¼Si–V	Wire	SA–232	...	...	Oil	0.080	255
44	1Cr–¼Si–V	Wire	SA–231	...	...	Oil	0.105	245
45	1Cr–¼Si–V	Wire	SA–232	...	...	Oil	0.105	245

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
												Ferrous Materials (Cont'd)		
1	135.0	135.0	135.0	135.0	135.0	135.0	134.1	129.7	124.0	117.4	109.9	101.7	93.3	85.0
2	55.0	54.0	52.9	52.9	52.9	52.9	52.9	52.9	52.9	52.9	52.9	51.4	48.9	45.8
3	55.0	54.0	52.9	52.9	52.9	52.9	52.9	52.9	52.9	52.9	52.9	51.4	48.9	45.8
4	60.0	58.9	57.7	57.7	57.7	57.7	57.7	57.7	57.7	57.7	57.7	56.1	53.3	50.0
5	60.0	58.9	57.7	57.7	57.7	57.7	57.7	57.7	57.7	57.7	57.7	56.1	53.3	50.0
6	60.0	58.9	57.7	57.7	57.7	57.7	57.7	57.7	57.7	57.7	57.7	56.1	53.3	50.0
7	60.0	58.9	57.7	57.7	57.7	57.7	57.7	57.7	57.7	57.7	57.7	56.1	53.3	50.0
8	60.0	58.9	57.7	57.7	57.7	57.7	57.7	57.7	57.7	57.7	57.7	56.1	53.3	50.0
9	60.0	58.9	57.7	57.7	57.7	57.7	57.7	57.7	57.7	57.7	57.7	56.1	53.3	50.0
10	60.9	60.2	58.5	58.1	58.1	58.1	58.1	58.1	58.1	58.1	57.8	56.5	54.1	50.2
11	60.9	59.8	58.8	58.6	58.6	58.5	58.5	58.5	58.5	58.5	58.3	57.0	54.5	49.9
12	62.4	61.2	60.2	60.0	59.9	59.9	59.9	59.9	59.9	59.9	59.6	58.4	55.8	51.1
13	63.8	62.7	61.6	61.4	61.3	61.3	61.3	61.3	61.3	61.3	61.0	59.7	57.1	52.3
14	63.8	63.8	63.8	63.8	63.8	63.8	63.8	63.8	63.8	63.8	62.0	59.3	55.9	51.9
15	63.8	62.7	61.6	61.4	61.3	61.3	61.3	61.3	61.3	61.3	61.0	59.7	57.1	52.3
16	63.8	63.0	61.3	60.8	60.8	60.8	60.8	60.8	60.8	60.8	60.5	59.2	56.7	52.6
17	65.0	63.8	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	60.8	57.8	54.2
18	65.0	63.8	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	60.8	57.8	54.2
19	65.3	64.1	63.0	62.8	62.7	62.7	62.7	62.7	62.7	62.7	62.4	61.1	58.4	53.5
20	65.3	64.1	63.0	62.8	62.7	62.7	62.7	62.7	62.7	62.7	62.4	61.1	58.4	53.5
21	70.0	68.7	67.3	67.3	67.3	67.3	67.3	67.3	67.3	67.3	67.3	65.5	62.2	58.3
22	70.0	68.7	67.3	67.3	67.3	67.3	67.3	67.3	67.3	67.3	67.3	65.5	62.2	58.3
23	100.0	100.0	100.0	100.0	100.0	100.0	98.7	95.8	92.5	88.8	84.7	80.2	75.5	70.4
24	110.0	110.0	110.0	110.0	110.0	110.0	108.5	105.4	101.8	97.7	93.1	88.2	83.0	77.4
25	115.0	115.0	115.0	115.0	115.0	115.0	113.9	109.8	106.3	101.8	97.2	91.7	87.0	81.6
26	120.0	120.0	120.0	120.0	120.0	120.0	118.8	114.6	110.9	106.3	101.4	95.7	90.8	85.1
27	125.0	125.0	125.0	125.0	125.0	125.0	125.0	125.0	125.0	125.0	125.0	99.7	94.6	88.7
28	135.0	135.0	135.0	135.0	135.0	135.0	135.0	135.0	124.7	119.5	114.0	107.7	102.2	95.8
29	145.0	145.0	145.0	145.0	145.0	145.0	143.6	138.4	134.0	128.4	122.5	115.6	109.7	102.9
30	155.0	155.0	155.0	155.0	155.0	155.0	153.5	148.0	143.2	137.3	130.9	123.6	117.3	110.0
31	165.0	165.0	165.0	165.0	165.0	165.0	163.4	157.5	152.5	146.1	139.4	131.6	124.9	117.1
32	300	...	...	...	...	...	...	...	...	...	...	...	...	...
33	300	...	...	...	...	...	...	...	...	...	...	...	...	...
34	290	...	...	...	...	...	...	...	...	...	...	...	...	...
35	290	...	...	...	...	...	...	...	...	...	...	...	...	...
36	280	...	...	...	...	...	...	...	...	...	...	...	...	...
37	280	...	...	...	...	...	...	...	...	...	...	...	...	...
38	270	...	...	...	...	...	...	...	...	...	...	...	...	...
39	270	...	...	...	...	...	...	...	...	...	...	...	...	...
40	265	...	...	...	...	...	...	...	...	...	...	...	...	...
41	265	...	...	...	...	...	...	...	...	...	...	...	...	...
42	255	...	...	...	...	...	...	...	...	...	...	...	...	...
43	255	...	...	...	...	...	...	...	...	...	...	...	...	...
44	245	...	...	...	...	...	...	...	...	...	...	...	...	...
45	245	...	...	...	...	...	...	...	...	...	...	...	...	...

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Ferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
	Ferrous Materials (Cont'd)							
1	1Cr–¼Si–V	Wire	SA–231	...	...	Oil	0.135	235
2	1Cr–¼Si–V	Wire	SA–232	...	...	Oil	0.135	235
3	1Cr–¼Si–V	Wire	SA–231	...	...	Oil	0.162	225
4	1Cr–¼Si–V	Wire	SA–232	...	...	Oil	0.162	225
5	1Cr–¼Si–V	Wire	SA–231	...	...	Oil	0.192	220
6	1Cr–¼Si–V	Wire	SA–232	...	...	Oil	0.192	220
7	1Cr–¼Si–V	Wire	SA–231	...	...	Oil	0.244	210
8	1Cr–¼Si–V	Wire	SA–232	...	...	Oil	0.244	210
9	1Cr–¼Si–V	Wire	SA–231	...	...	Oil	0.283	205
10	1Cr–¼Si–V	Wire	SA–232	...	...	Oil	0.283	205
11	1Cr–¼Si–V	Wire	SA–231	...	...	Oil	0.312	203
12	1Cr–¼Si–V	Wire	SA–232	...	...	Oil	0.312	203
13	1Cr–¼Si–V	Wire	SA–231	...	...	Oil	0.375	200
14	1Cr–¼Si–V	Wire	SA–232	...	...	Oil	0.375	200
15	1Cr–¼Si–V	Wire	SA–231	...	...	Oil	0.438	195
16	1Cr–¼Si–V	Wire	SA–232	...	...	Oil	0.438	195
17	1Cr–¼Si–V	Wire	SA–231	...	...	Oil	0.500	190
18	1Cr–¼Si–V	Wire	SA–232	...	...	Oil	0.500	190
19	1Cr–V	Smls. tube	SA–213	T17	K12047	...	...	60
20	1¼Cr–½Mo	Castings	SA–217	WC6	J12072	...	...	70
21	1¼Cr–½Mo	Cast pipe	SA–426	CP11	J12072	...	...	70
22	1¼Cr–½Mo	Bar	SA–739	B11	K11797	...	...	70
23	1¼Cr–½Mo–Si	Forgings	SA–182	F11	K11597	1	...	60
24	1¼Cr–½Mo–Si	Smls. tube	SA–213	T11	K11597	...	...	60
25	1¼Cr–½Mo–Si	Smls. & wld. ftgs.	SA–234	WP11	...	1	...	60
26	1¼Cr–½Mo–Si	Smls. pipe	SA–335	P11	K11597	...	...	60
27	1¼Cr–½Mo–Si	Forgings	SA–336	F11	K11597	1	...	60
28	1¼Cr–½Mo–Si	Forged pipe	SA–369	FP11	K11597	...	...	60
29	1¼Cr–½Mo–Si	Plate	SA–387	11	K11789	1	...	60
30	1¼Cr–½Mo–Si	Wld. pipe	SA–691	1¼CR	K11789	...	...	60
31	1¼Cr–½Mo–Si	Forgings	SA–182	F11	K11572	2	...	70
32	1¼Cr–½Mo–Si	Forgings	SA–336	F11	K11572	2	...	70
33	1¼Cr–½Mo–Si	Plate	SA/EN 10028–2	13CrMoSi5–5	...	QT	$4 < t \le 10$	71
34	1¼Cr–½Mo–Si	Plate	SA/EN 10028–2	13CrMoSi5–5	...	QT	$2.25 < t \le 4$	72.5
35	1¼Cr–½Mo–Si	Plate	SA/EN 10028–2	13CrMoSi5–5	...	QT	≤2.25	74
36	1¼Cr–½Mo–Si	Forgings	SA–336	F11	K11572	3	...	75
37	1¼Cr–½Mo–Si	Plate	SA–387	11	K11789	2	...	75
38	1¼Cr–½Mo–Si	Wld. pipe	SA–691	1¼CR	K11789	...	...	75
39	1¾Cr–½Mo–Cu	Forgings	SA–592	E	K11695	...	$2\frac{1}{2} < t \le 4$	105
40	1¾Cr–½Mo–Cu	Forgings	SA–592	E	K11695	...	≤2½	115
41	1¾Cr–½Mo–Ti	Plate	SA–517	E	K21604	...	$2\frac{1}{2} < t \le 6$	105
42	1¾Cr–½Mo–Ti	Plate	SA–517	E	K21604	...	≤2½	115
43	2¼Cr–1Mo	Forgings	SA–182	F22	K21590	1	...	60
44	2¼Cr–1Mo	Smls. tube	SA–213	T22	K21590	...	...	60
45	2¼Cr–1Mo	Smls. & wld. ftgs.	SA–234	WP22	K21590	1	...	60

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
														Ferrous Materials (Cont'd)
1	235	...	...	...	...	...	...	...	...	...	...	...	...	...
2	235	...	...	...	...	...	...	...	...	...	...	...	...	...
3	225	...	...	...	...	...	...	...	...	...	...	...	...	...
4	225	...	...	...	...	...	...	...	...	...	...	...	...	...
5	220	...	...	...	...	...	...	...	...	...	...	...	...	...
6	220	...	...	...	...	...	...	...	...	...	...	...	...	...
7	210	...	...	...	...	...	...	...	...	...	...	...	...	...
8	210	...	...	...	...	...	...	...	...	...	...	...	...	...
9	205	...	...	...	...	...	...	...	...	...	...	...	...	...
10	205	...	...	...	...	...	...	...	...	...	...	...	...	...
11	203	...	...	...	...	...	...	...	...	...	...	...	...	...
12	203	...	...	...	...	...	...	...	...	...	...	...	...	...
13	200	...	...	...	...	...	...	...	...	...	...	...	...	...
14	200	...	...	...	...	...	...	...	...	...	...	...	...	...
15	195	...	...	...	...	...	...	...	...	...	...	...	...	...
16	195	...	...	...	...	...	...	...	...	...	...	...	...	...
17	190	...	...	...	...	...	...	...	...	...	...	...	...	...
18	190	...	...	...	...	...	...	...	...	...	...	...	...	...
19	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	58.3	55.8	52.6	48.8
20	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	68.0	65.1	61.4	56.9
21	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	68.0	65.1	61.4	56.9
22	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	68.0	65.1	61.4	56.9
23	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	58.3	55.8	52.6	48.8
24	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	58.3	55.8	52.6	48.8
25	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	58.3	55.8	52.6	48.8
26	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	58.3	55.8	52.6	48.8
27	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	58.3	55.8	52.6	48.8
28	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	58.3	55.8	52.6	48.8
29	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	58.3	55.8	52.6	48.8
30	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	58.3	55.8	52.6	48.8
31	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	68.0	65.1	61.4	56.9
32	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	68.0	65.1	61.4	56.9
33	71.1	71.1	70.3	70.3	70.3	70.3	70.3	70.3	70.3	69.3	66.9	63.9	60.4	56.2
34	72.5	72.5	71.8	71.8	71.8	71.8	71.8	71.8	71.8	70.8	68.3	65.3	61.6	57.4
35	74.0	74.0	73.2	73.2	73.2	73.2	73.2	73.2	73.2	72.2	69.7	66.6	62.8	58.5
36	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	72.8	69.7	65.7	61.0
37	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	72.8	69.7	65.7	61.0
38	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	72.8	69.7	65.7	61.0
39	105.0	105.0	105.0	105.0	105.0	105.0	105.0	104.6	102.7	100.4	97.7	94.8	91.5	88.1
40	115.0	115.0	115.0	115.0	115.0	115.0	115.0	114.6	112.5	110.0	107.0	103.8	100.2	96.5
41	105.0	105.0	105.0	105.0	105.0	105.0	105.0	104.6	102.7	100.4	97.7	94.8	91.5	88.1
42	115.0	115.0	115.0	115.0	115.0	115.0	115.0	114.6	112.5	110.0	107.0	103.8	100.2	96.5
43	60.0	59.9	58.2	58.2	58.2	58.2	58.2	58.2	58.2	58.2	58.2	58.2	57.5	53.9
44	60.0	59.9	58.2	58.2	58.2	58.2	58.2	58.2	58.2	58.2	58.2	58.2	57.5	53.9
45	60.0	59.9	58.2	58.2	58.2	58.2	58.2	58.2	58.2	58.2	58.2	58.2	57.5	53.9

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding												
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
	Ferrous Materials (Cont'd)												
1	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...
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22	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...

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Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
	Ferrous Materials (Cont'd)							
1	2¼Cr–1Mo	Smls. pipe	SA–335	P22	K21590	...	...	60
2	2¼Cr–1Mo	Forgings	SA–336	F22	K21590	1	...	60
3	2¼Cr–1Mo	Forged pipe	SA–369	FP22	K21590	...	...	60
4	2¼Cr–1Mo	Plate	SA–387	22	K21590	1	...	60
5	2¼Cr–1Mo	Wld. pipe	SA–691	2¼CR	K21590	...	...	60
6	2¼Cr–1Mo	Plate	SA/EN 10028–2	10CrMo9–10	...	...	$6 < t \le 10$	65.5
7	2¼Cr–1Mo	Forgings	SA/EN 10222–2	11CrMo9–10	...	NT or QT	$8 < t \le 20$	65.5
8	2¼Cr–1Mo	Plate	SA/EN 10028–2	10CrMo9–10	...	...	$4 < t \le 6$	66.5
9	2¼Cr–1Mo	Plate	SA/EN 10028–2	10CrMo9–10	...	...	$2.5 < t \le 4$	68
10	2¼Cr–1Mo	Plate	SA/EN 10028–2	10CrMo9–10	...	...	$t \le 2.5$	69.5
11	2¼Cr–1Mo	Smls. tube	SA/EN 10216–2	10CrMo9–10	...	...	$t \le 2\frac{1}{2}$	69.5
12	2¼Cr–1Mo	Castings	SA–217	WC9	J21890	...	...	70
13	2¼Cr–1Mo	Cast pipe	SA–426	CP22	J21890	...	...	70
14	2¼Cr–1Mo	Forgings	SA–182	F22	K21590	3	...	75
15	2¼Cr–1Mo	Forgings	SA–336	F22	K21590	3	...	75
16	2¼Cr–1Mo	Plate	SA–387	22	K21590	2	...	75
17	2¼Cr–1Mo	Wld. pipe	SA–691	2¼CR	K21590	...	...	75
18	2¼Cr–1Mo	Bar	SA–739	B22	K21390	...	...	75
19	2¼Cr–1Mo	Forgings	SA/EN 10222–2	11CrMo9–10	...	NT	$t \le 8$	75.5
20	2¼Cr–1Mo	Castings	SA–487	8	J22091	A	...	85
21	2¼Cr–1Mo	Forgings	SA–508	22	K21590	3	...	85
22	2¼Cr–1Mo	Forgings	SA–541	22	K21390	3	...	85
23	2¼Cr–1Mo	Plate	SA–542	B	K21590	4	...	85
24	2¼Cr–1Mo	Forgings	SA–541	22	K21390	4	...	105
25	2¼Cr–1Mo–V	Forgings	SA–182	F22V	K31835	...	...	85
26	2¼Cr–1Mo–V	Forgings	SA–336	F22V	K31835	...	...	85
27	2¼Cr–1Mo–V	Forgings	SA–541	22V	K31835	...	...	85
28	2¼Cr–1Mo–V	Plate	SA–542	D	K31835	4a	...	85
29	2¼Cr–1Mo–V	Plate	SA–832	22V	K31835	...	...	85
30	3Cr–1Mo	Smls. tube	SA–213	T21	K31545	...	...	60
31	3Cr–1Mo	Smls. pipe	SA–335	P21	K31545	...	...	60
32	3Cr–1Mo	Forgings	SA–336	F21	K31545	1	...	60
33	3Cr–1Mo	Forged pipe	SA–369	FP21	K31545	...	...	60
34	3Cr–1Mo	Plate	SA–387	21	K31545	1	...	60
35	3Cr–1Mo	Cast pipe	SA–426	CP21	J31545	...	...	60
36	3Cr–1Mo	Forgings	SA–182	F21	K31545	...	...	75
37	3Cr–1Mo	Forgings	SA–336	F21	K31545	3	...	75
38	3Cr–1Mo	Plate	SA–387	21	K31545	2	...	75
39	3Cr–1Mo–¼V–Ti–B	Forgings	SA–182	F3V	K31830	...	...	85
40	3Cr–1Mo–¼V–Ti–B	Forgings	SA–336	F3V	K31830	...	...	85
41	3Cr–1Mo–¼V–Ti–B	Forgings	SA–508	3V	K31830	...	...	85
42	3Cr–1Mo–¼V–Ti–B	Forgings	SA–541	3V	K31830	...	...	85
43	3Cr–1Mo–¼V–Ti–B	Plate	SA–542	C	K31830	4a	...	85
44	3Cr–1Mo–¼V–Ti–B	Plate	SA–832	21V	K31830	...	...	85
45	3Cr–1Mo–¼V–Cb–Ca	Forgings	SA–182	F3VCb	...	...	...	85

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
													Ferrous Materials (Cont'd)	
1	60.0	59.9	58.2	58.2	58.2	58.2	58.2	58.2	58.2	58.2	58.2	58.2	57.5	53.9
2	60.0	59.9	58.2	58.2	58.2	58.2	58.2	58.2	58.2	58.2	58.2	58.2	57.5	53.9
3	60.0	59.9	58.2	58.2	58.2	58.2	58.2	58.2	58.2	58.2	58.2	58.2	57.5	53.9
4	60.0	59.9	58.2	58.2	58.2	58.2	58.2	58.2	58.2	58.2	58.2	58.2	57.5	53.9
5	60.0	59.9	58.2	58.2	58.2	58.2	58.2	58.2	58.2	58.2	58.2	58.2	57.5	53.9
6	65.3	65.3	63.5	62.9	62.6	62.1	61.6	61.0	60.0	58.8	57.1	54.8	51.9	48.2
7	65.3	65.3	64.0	63.0	62.7	62.4	62.0	61.4	60.4	59.0	57.2	54.9	52.1	48.8
8	66.7	66.7	65.0	64.3	64.0	63.5	63.0	62.3	61.4	60.1	58.3	56.1	53.1	49.3
9	68.2	68.2	66.4	65.7	65.4	64.9	64.4	63.7	62.7	61.4	59.6	57.3	54.2	50.4
10	69.6	69.6	67.8	67.1	66.7	66.2	65.8	65.0	64.1	62.7	60.9	58.5	55.4	51.4
11	69.6	69.6	67.8	67.1	66.7	66.2	65.7	65.0	64.0	62.7	60.9	58.5	55.4	51.5
12	70.0	70.0	69.0	67.9	67.6	67.3	66.8	66.0	64.6	62.7	60.1	56.9	52.8	48.1
13	70.0	70.0	69.0	67.9	67.6	67.3	66.8	66.0	64.6	62.7	60.1	56.9	52.8	48.1
14	75.0	75.0	73.0	72.2	71.9	71.4	70.8	70.1	69.0	67.5	65.6	63.0	59.7	55.4
15	75.0	75.0	73.0	72.2	71.9	71.4	70.8	70.1	69.0	67.5	65.6	63.0	59.7	55.4
16	75.0	75.0	73.0	72.2	71.9	71.4	70.8	70.1	69.0	67.5	65.6	63.0	59.7	55.4
17	75.0	75.0	73.0	72.2	71.9	71.4	70.8	70.1	69.0	67.5	65.6	63.0	59.7	55.4
18	75.0	75.0	73.0	72.2	71.9	71.4	70.8	70.1	69.0	67.5	65.6	63.0	59.7	55.4
19	75.4	75.4	74.0	72.8	72.4	72.1	71.6	70.9	69.8	68.2	66.1	63.4	60.2	56.4
20	85.0	85.0	83.0	82.2	82.1	81.7	81.1	80.0	78.4	76.1	73.0	69.0	64.1	58.2
21	85.0	85.0	84.9	84.9	83.5	81.7	81.0	80.3	79.1	76.5	71.4	...	...	...
22	85.0	85.0	84.9	84.9	83.5	81.7	81.0	80.3	79.1	76.5	71.4	...	...	...
23	85.0	85.0	84.9	84.9	83.5	81.7	81.0	80.3	79.1	76.5	71.4	...	...	...
24	105.0	105.0	105.0	105.0	104.3	103.0	102.1	100.9	99.4	97.5	95.0	92.1	88.5	84.4
25	85.0	85.0	85.0	85.0	85.0	82.8	81.3	79.6	77.7	75.6	73.4	71.0	...	...
26	85.0	85.0	85.0	85.0	85.0	82.8	81.3	79.6	77.7	75.6	73.4	71.0	...	...
27	85.0	85.0	85.0	85.0	85.0	82.8	81.3	79.6	77.7	75.6	73.4	71.0	...	...
28	85.0	85.0	85.0	85.0	85.0	82.8	81.3	79.6	77.7	75.6	73.4	71.0	...	...
29	85.0	85.0	85.0	85.0	85.0	82.8	81.3	79.6	77.7	75.6	73.4	71.0	...	...
30	60.0	59.9	58.2	58.2	58.2	58.2	58.2	58.2	58.2	58.2	58.2	58.2	57.5	53.9
31	60.0	59.9	58.2	58.2	58.2	58.2	58.2	58.2	58.2	58.2	58.2	58.2	57.5	53.9
32	60.0	59.9	58.2	58.2	58.2	58.2	58.2	58.2	58.2	58.2	58.2	58.2	57.5	53.9
33	60.0	59.9	58.2	58.2	58.2	58.2	58.2	58.2	58.2	58.2	58.2	58.2	57.5	53.9
34	60.0	59.9	58.2	58.2	58.2	58.2	58.2	58.2	58.2	58.2	58.2	58.2	57.5	53.9
35	60.0	59.9	58.2	58.2	58.2	58.2	58.2	58.2	58.2	58.2	58.2	58.2	57.5	53.9
36	75.0	75.0	73.0	72.2	71.9	71.4	70.8	70.1	69.0	67.5	65.6	63.0	59.7	55.4
37	75.0	75.0	73.0	72.2	71.9	71.4	70.8	70.1	69.0	67.5	65.6	63.0	59.7	55.4
38	75.0	75.0	73.0	72.2	71.9	71.4	70.8	70.1	69.0	67.5	65.6	63.0	59.7	55.4
39	85.0	85.0	81.5	79.0	77.5	76.4	75.7	75.0	74.1	72.9	71.4	69.8	...	...
40	85.0	85.0	81.5	79.0	77.5	76.4	75.7	75.0	74.1	72.9	71.4	69.8	...	...
41	85.0	85.0	81.5	79.0	77.5	76.4	75.7	75.0	74.1	72.9	71.4	69.8	...	...
42	85.0	85.0	81.5	79.0	77.5	76.4	75.7	75.0	74.1	72.9	71.4	69.8	...	...
43	85.0	85.0	81.5	79.0	77.5	76.4	75.7	75.0	74.1	72.9	71.4	69.8	...	...
44	85.0	85.0	81.5	79.0	77.5	76.4	75.7	75.0	74.1	72.9	71.4	69.8	...	...
45	85.0	85.0	81.5	79.0	77.5	76.4	75.7	75.0	74.1	72.9	71.4	69.8	...	...

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding												
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
	Ferrous Materials (Cont'd)												
1	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...

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Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
	Ferrous Materials (Cont'd)							
1	3Cr–1Mo–¼V–Cb–Ca	Forgings	SA–336	F3VCb	...	...	...	85
2	3Cr–1Mo–¼V–Cb–Ca	Forgings	SA–508	3VCb	...	...	...	85
3	3Cr–1Mo–¼V–Cb–Ca	Forgings	SA–541	3VCb	...	...	...	85
4	3Cr–1Mo–¼V–Cb–Ca	Plate	SA–542	E	...	4a	...	85
5	3Cr–1Mo–¼V–Cb–Ca	Plate	SA–832	23V	...	...	...	85
6	5Cr–½Mo	Smls. tube	SA–213	T5	K41545	...	...	60
7	5Cr–½Mo	Smls. & wld. ftgs.	SA–234	WP5	K41545	...	...	60
8	5Cr–½Mo	Smls. pipe	SA–335	P5	K41545	...	...	60
9	5Cr–½Mo	Forged pipe	SA–369	FP5	K41545	...	...	60
10	5Cr–½Mo	Plate	SA–387	5	K41545	1	...	60
11	5Cr–½Mo	Wld. pipe	SA–691	5CR	K41545	...	...	60
12	5Cr–½Mo	Forgings	SA–336	F5	K41545	...	...	60
13	5Cr–½Mo	Forgings	SA–182	F5	K41545	...	...	70
14	5Cr–½Mo	Plate	SA–387	5	K41545	2	...	75
15	5Cr–½Mo	Forgings	SA–336	F5A	K42544	...	...	80
16	5Cr–½Mo	Castings	SA–217	C5	J42045	...	...	90
17	5Cr–½Mo	Cast pipe	SA–426	CP5	J42045	...	...	90
18	5Cr–½Mo	Forgings	SA–182	F5a	K42544	...	...	90
19	5Cr–½Mo	Bolting	SA–193	B5	K50100	...	≤4	100
20	5Cr–½Mo–Si	Smls. tube	SA–213	T5b	K51545	...	...	60
21	5Cr–½Mo–Si	Smls. pipe	SA–335	P5b	K51545	...	...	60
22	5Cr–½Mo–Ti	Smls. tube	SA–213	T5c	K41245	...	...	60
23	5Cr–½Mo–Ti	Smls. pipe	SA–335	P5c	K41245	...	...	60
24	9Cr–1Mo	Smls. tube	SA–213	T9	K90941	...	...	60
25	9Cr–1Mo	Fittings	SA–234	WP9	K90941	...	...	60
26	9Cr–1Mo	Smls. pipe	SA–335	P9	K90941	...	...	60
27	9Cr–1Mo	Forged pipe	SA–369	FP9	K90941	...	...	60
28	9Cr–1Mo	Forgings	SA–182	F9	K90941	...	...	85
29	9Cr–1Mo	Forgings	SA–336	F9	K90941	...	...	85
30	9Cr–1Mo	Castings	SA–217	C12	J82090	...	...	90
31	9Cr–1Mo	Cast pipe	SA–426	CP9	J82090	...	...	90
(**21**) 32	9Cr–1Mo–V	Smls. tube	SA–213	T91 Types 1 & 2	K90901	...	...	85
(**21**) 33	9Cr–1Mo–V	Fittings	SA–234	WP91 Types 1 & 2	K90901	...	...	85
(**21**) 34	9Cr–1Mo–V	Smls. pipe	SA–335	P91 Types 1 & 2	K90901	...	...	90
(**21**) 35	9Cr–1Mo–V	Forged pipe	SA–369	FP91 Types 1 & 2	K90901	...	...	85
(**21**) 36	9Cr–1Mo–V	Plate	SA–387	91 Types 1 & 2	K90901	2	...	85
(**21**) 37	9Cr–1Mo–V	Forgings	SA–182	F91 Types 1 & 2	K90901	...	...	90
(**21**) 38	9Cr–1Mo–V	Forgings	SA–336	F91 Types 1 & 2	K90901	...	...	90
39	11Cr–Ti	Plate	SA–240	...	S40910	...	...	55
40	11Cr–Ti	Plate	SA–240	...	S40920	...	...	55
41	11Cr–Ti	Plate	SA–240	...	S40930	...	...	55
42	11Cr–Ti	Smls. & wld. tube	SA–268	TP409	S40900	...	...	55
43	12Cr	Plate	SA–1010	40	S41003	...	≤¾	66
44	12Cr	Bar	SA–479	403	S40300	A	...	70
45	12Cr	Bar	SA–479	403	S40300	1	...	70

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
												Ferrous Materials (Cont'd)		
1	85.0	85.0	81.5	79.0	77.5	76.4	75.7	75.0	74.1	72.9	71.4	69.8	...	...
2	85.0	85.0	81.5	79.0	77.5	76.4	75.7	75.0	74.1	72.9	71.4	69.8	...	...
3	85.0	85.0	81.5	79.0	77.5	76.4	75.7	75.0	74.1	72.9	71.4	69.8	...	...
4	85.0	85.0	81.5	79.0	77.5	76.4	75.7	75.0	74.1	72.9	71.4	69.8	...	...
5	85.0	85.0	81.5	79.0	77.5	76.4	75.7	75.0	74.1	72.9	71.4	69.8	...	...
6	60.0	59.9	58.1	57.7	57.5	56.7	55.8	54.6	52.9	50.9	48.5	45.6	42.5	39.0
7	60.0	59.9	58.1	57.7	57.5	56.7	55.8	54.6	52.9	50.9	48.5	45.6	42.5	39.0
8	60.0	59.9	58.1	57.7	57.5	56.7	55.8	54.6	52.9	50.9	48.5	45.6	42.5	39.0
9	60.0	59.9	58.1	57.7	57.5	56.7	55.8	54.6	52.9	50.9	48.5	45.6	42.5	39.0
10	60.0	59.9	58.1	57.7	57.5	56.7	55.8	54.6	52.9	50.9	48.5	45.6	42.5	39.0
11	60.0	59.9	58.1	57.7	57.5	56.7	55.8	54.6	52.9	50.9	48.5	45.6	42.5	39.0
12	60.0	59.9	58.1	57.7	57.5	56.7	55.8	54.6	52.9	50.9	48.5	45.6	42.5	39.0
13	70.0	69.9	67.8	67.3	67.1	66.1	65.1	63.7	61.8	59.4	56.5	53.2	49.5	45.5
14	75.0	74.8	72.7	72.1	71.9	70.8	69.7	68.2	66.2	63.6	60.6	57.0	53.1	48.7
15	80.0	79.8	77.5	76.9	76.7	75.5	74.4	72.8	70.6	67.9	64.6	60.9	56.6	52.0
16	90.0	89.8	87.2	86.5	86.2	85.0	83.7	81.9	79.4	76.4	72.7	68.5	63.7	58.5
17	90.0	89.8	87.2	86.5	86.2	85.0	83.7	81.9	79.4	76.4	72.7	68.5	63.7	58.5
18	90.0	89.8	87.2	86.5	86.2	85.0	83.7	81.9	79.4	76.4	72.7	68.5	63.7	58.5
19	100.0	99.6	96.8	95.7	95.5	94.1	92.6	91.1	88.0	85.3	81.2	76.5	71.7	66.0
20	60.0	59.9	58.1	57.7	57.5	56.7	55.8	54.6	52.9	50.9	48.5	45.6	42.5	39.0
21	60.0	59.9	58.1	57.7	57.5	56.7	55.8	54.6	52.9	50.9	48.5	45.6	42.5	39.0
22	60.0	59.9	58.1	57.7	57.5	56.7	55.8	54.6	52.9	50.9	48.5	45.6	42.5	39.0
23	60.0	59.9	58.1	57.7	57.5	56.7	55.8	54.6	52.9	50.9	48.5	45.6	42.5	39.0
24	60.0	59.9	58.1	57.7	57.5	56.7	55.8	54.6	52.9	50.9	48.5	45.6	42.5	39.0
25	60.0	59.9	58.1	57.7	57.5	56.7	55.8	54.6	52.9	50.9	48.5	45.6	42.5	39.0
26	60.0	59.9	58.1	57.7	57.5	56.7	55.8	54.6	52.9	50.9	48.5	45.6	42.5	39.0
27	60.0	59.9	58.1	57.7	57.5	56.7	55.8	54.6	52.9	50.9	48.5	45.6	42.5	39.0
28	85.0	84.8	82.3	81.7	81.4	80.3	79.0	77.3	75.0	72.1	68.7	64.7	60.1	55.2
29	85.0	84.8	82.3	81.7	81.4	80.3	79.0	77.3	75.0	72.1	68.7	64.7	60.1	55.2
30	90.0	89.8	87.2	86.5	86.2	85.0	83.7	81.9	79.4	76.4	72.7	68.5	63.7	58.5
31	90.0	89.8	87.2	86.5	86.2	85.0	83.7	81.9	79.4	76.4	72.7	68.5	63.7	58.5
32	85.0	85.0	85.0	84.7	84.4	83.1	81.8	80.0	77.6	74.7	71.1	66.9	62.2	57.0
33	85.0	85.0	85.0	84.7	84.4	83.1	81.8	80.0	77.6	74.7	71.1	66.9	62.2	57.0
34	90.0	90.0	90.0	89.7	89.4	88.0	86.6	84.7	82.2	79.1	75.3	70.8	65.9	60.4
35	85.0	85.0	85.0	84.7	84.4	83.1	81.8	80.0	77.6	74.7	71.1	66.9	62.2	57.0
36	85.0	85.0	85.0	84.7	84.4	83.1	81.8	80.0	77.6	74.7	71.1	66.9	62.2	57.0
37	90.0	90.0	90.0	89.7	89.4	88.0	86.6	84.7	82.2	79.1	75.3	70.8	65.9	60.4
38	90.0	90.0	90.0	89.7	89.4	88.0	86.6	84.7	82.2	79.1	75.3	70.8	65.9	60.4
39	55.0	55.0	53.9	53.0	52.1	50.9	49.9	48.6	47.1	45.2	42.9	40.3	37.4	34.1
40	55.0	55.0	53.9	53.0	52.1	50.9	49.9	48.6	47.1	45.2	42.9	40.3	37.4	34.1
41	55.0	55.0	53.9	53.0	52.1	50.9	49.9	48.6	47.1	45.2	42.9	40.3	37.4	34.1
42	55.0	55.0	53.9	53.0	52.1	50.9	49.9	48.6	47.1	45.2	42.9	40.3	37.4	34.1
43	66.0	66.0	66.0	64.3	62.1	59.8	58.5	56.9	55.0	52.6	49.7	46.1	41.8	36.7
44	70.0	70.0	68.6	67.4	66.4	64.7	63.5	61.9	59.9	57.5	54.6	51.3	47.6	43.5
45	70.0	70.0	68.6	67.4	66.4	64.7	63.5	61.9	59.9	57.5	54.6	51.3	47.6	43.5

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Ferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
33	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
34	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
35	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
36	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
37	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
38	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
	Ferrous Materials (Cont'd)							
1	12Cr	Plate	SA–1010	50	S41003	...	≤3/4	70
2	12Cr–Al	Plate	SA–240	405	S40500	...	...	60
3	12Cr–Al	Smls. & wld. tube	SA–268	TP405	S40500	...	...	60
4	12Cr–Al	Bar	SA–479	405	S40500	...	...	60
5	12Cr–Al	Bar	SA/JIS G4303	SUS405	...	...	...	60
6	12Cr–Ti	Smls. & wld. tube	SA–268	...	S40800	...	...	55
7	12Cr–9Ni–2Cu–1Ti	Bar	SA–564	XM–16	S45500	H1000	...	205
8	12Cr–9Ni–2Cu–1Ti	Forgings	SA–705	XM–16	S45500	H1000	$t \geq 1/2$	205
9	12Cr–9Ni–2Cu–1Ti	Bar	SA–564	XM–16	S45500	H950	...	220
10	12Cr–9Ni–2Cu–1Ti	Forgings	SA–705	XM–16	S45500	H950	$t \geq 1/2$	220
11	12Cr–9Ni–2Cu–1Ti	Bar	SA–564	XM–16	S45500	H900	...	235
12	12Cr–9Ni–2Cu–1Ti	Forgings	SA–705	XM–16	S45500	H900	$t \geq 1/2$	235
13	13Cr	Plate	SA–240	410S	S41008	...	...	60
14	13Cr	Smls. & wld. tube	SA–268	TP410	S41000	...	...	60
15	13Cr	Plate	SA–240	410	S41000	...	...	65
16	13Cr	Forgings	SA–182	F6a	S41000	1	...	70
17	13Cr	Bar	SA–479	410	S41000	...	...	70
18	13Cr	Bar	SA–479	410	S41000	A	...	70
19	13Cr	Bar	SA–479	410	S41000	1	...	70
20	13Cr	Forgings	SA–182	F6a	S41000	2	...	85
21	13Cr	Castings	SA–217	CA15	J91150	...	...	90
22	13Cr	Cast pipe	SA–426	CPCA15	J91150	...	...	90
23	13Cr	Bar	SA/EN 10088–3	X12Cr13	...	QT650	$t \leq 6.25$	94.5
24	13Cr	Bolting	SA–193	B6	S41000	...	≤4	110
25	13Cr–4Ni	Castings	SA–487	CA6NM	J91540	A	...	110
26	13Cr–4Ni	Forgings	SA–182	F6NM	S41500	...	...	115
27	13Cr–4Ni	Bar	SA–479	...	S41500	...	...	115
28	13Cr–8Ni–2Mo	Bar	SA–564	XM–13	S13800	H1150M	...	125
29	13Cr–8Ni–2Mo	Forgings	SA–705	XM–13	S13800	H1150M	...	125
30	13Cr–8Ni–2Mo	Bar	SA–564	XM–13	S13800	H1150	...	135
31	13Cr–8Ni–2Mo	Forgings	SA–705	XM–13	S13800	H1150	...	135
32	13Cr–8Ni–2Mo	Bar	SA–564	XM–13	S13800	H1100	...	150
33	13Cr–8Ni–2Mo	Forgings	SA–705	XM–13	S13800	H1100	...	150
34	13Cr–8Ni–2Mo	Bar	SA–564	XM–13	S13800	H1050	...	175
35	13Cr–8Ni–2Mo	Forgings	SA–705	XM–13	S13800	H1050	...	175
36	13Cr–8Ni–2Mo	Bar	SA–564	XM–13	S13800	H1025	...	185
37	13Cr–8Ni–2Mo	Forgings	SA–705	XM–13	S13800	H1025	...	185
38	13Cr–8Ni–2Mo	Bar	SA–564	XM–13	S13800	H1000	...	205
39	13Cr–8Ni–2Mo	Forgings	SA–705	XM–13	S13800	H1000	...	205
40	13Cr–8Ni–2Mo	Bar	SA–564	XM–13	S13800	H950	...	220
41	13Cr–8Ni–2Mo	Forgings	SA–705	XM–13	S13800	H950	...	220
42	15Cr	Smls. & wld. tube	SA–268	TP429	S42900	...	...	60
43	15Cr	Plate	SA–240	429	S42900	...	...	65
44	15Cr–5Ni–3Cu	Bar	SA–564	XM–12	S15500	H1150M	...	115
45	15Cr–5Ni–3Cu	Forgings	SA–705	XM–12	S15500	H1150M	...	115

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
														Ferrous Materials (Cont'd)
1	70.0	70.0	70.0	68.2	65.8	63.4	62.0	60.4	58.3	55.8	52.7	48.9	44.3	38.9
2	60.0	60.0	58.8	57.8	56.9	55.5	54.4	53.1	51.4	49.3	46.8	44.0	40.8	37.2
3	60.0	60.0	58.8	57.8	56.9	55.5	54.4	53.1	51.4	49.3	46.8	44.0	40.8	37.2
4	60.0	60.0	58.8	57.8	56.9	55.5	54.4	53.1	51.4	49.3	46.8	44.0	40.8	37.2
5	60.0	60.0	58.8	57.8	56.9	55.5	54.4	53.1	51.4	49.3	46.8	44.0	40.8	37.2
6	55.0	55.0	53.9	53.0	52.1	50.9	49.9	48.6	47.1	45.2	42.9	40.3	37.4	34.1
7	205.0	...	...	...	...	...	...	...	...	...	...	...	...	...
8	205.0	...	...	...	...	...	...	...	...	...	...	...	...	...
9	220.0	...	...	...	...	...	...	...	...	...	...	...	...	...
10	220.0	...	...	...	...	...	...	...	...	...	...	...	...	...
11	235.0	...	...	...	...	...	...	...	...	...	...	...	...	...
12	235.0	...	...	...	...	...	...	...	...	...	...	...	...	...
13	60.0	60.0	58.8	57.8	56.9	55.5	54.4	53.1	51.4	49.3	46.8	44.0	40.8	37.2
14	60.0	60.0	58.8	57.8	56.9	55.5	54.4	53.1	51.4	49.3	46.8	44.0	40.8	37.2
15	65.0	65.0	63.7	62.6	61.6	60.1	59.0	57.5	55.6	53.4	50.7	47.7	44.2	40.3
16	70.0	70.0	68.6	67.4	66.4	64.7	63.5	61.9	59.9	57.5	54.6	51.3	47.6	43.5
17	70.0	70.0	68.6	67.4	66.4	64.7	63.5	61.9	59.9	57.5	54.6	51.3	47.6	43.5
18	70.0	70.0	68.6	67.4	66.4	64.7	63.5	61.9	59.9	57.5	54.6	51.3	47.6	43.5
19	70.0	70.0	68.6	67.4	66.4	64.7	63.5	61.9	59.9	57.5	54.6	51.3	47.6	43.5
20	85.0	85.0	83.3	81.8	80.6	78.6	77.1	75.2	72.8	69.8	66.3	62.3	57.8	52.8
21	90.0	90.0	88.2	86.7	85.3	83.2	81.6	79.6	77.0	73.9	70.2	66.0	61.2	55.9
22	90.0	90.0	88.2	86.7	85.3	83.2	81.6	79.6	77.0	73.9	70.2	66.0	61.2	55.9
23	94.3	94.3	92.3	90.7	89.3	87.2	85.6	83.4	80.7	77.4	73.5	69.0	64.1	58.7
24	110.0	110.0	109.0	107.0	105.0	102.0	100.0	97.7	94.6	90.9	86.4	81.1	75.1	68.4
25	110.0	110.0	108.0	105.3	103.1	100.7	99.4	97.8	95.9	93.5	90.5	86.7	81.7	75.4
26	115.0	115.0	115.0	113.7	109.5	105.1	102.8	100.3	97.6	94.7	91.4	...	...	...
27	115.0	115.0	115.0	113.7	109.5	105.1	102.8	100.3	97.6	94.7	91.4	...	...	...
28	125.0	...	...	...	...	...	...	...	...	...	...	...	...	...
29	125.0	...	...	...	...	...	...	...	...	...	...	...	...	...
30	135.0	...	...	...	...	...	...	...	...	...	...	...	...	...
31	135.0	...	...	...	...	...	...	...	...	...	...	...	...	...
32	150.0	...	...	...	...	...	...	...	...	...	...	...	...	...
33	150.0	...	...	...	...	...	...	...	...	...	...	...	...	...
34	175.0	...	...	...	...	...	...	...	...	...	...	...	...	...
35	175.0	...	...	...	...	...	...	...	...	...	...	...	...	...
36	185.0	...	...	...	...	...	...	...	...	...	...	...	...	...
37	185.0	...	...	...	...	...	...	...	...	...	...	...	...	...
38	205.0	...	...	...	...	...	...	...	...	...	...	...	...	...
39	205.0	...	...	...	...	...	...	...	...	...	...	...	...	...
40	220.0	...	...	...	...	...	...	...	...	...	...	...	...	...
41	220.0	...	...	...	...	...	...	...	...	...	...	...	...	...
42	60.0	60.0	58.8	57.8	56.9	55.5	54.4	53.1	51.4	49.3	46.8	44.0	40.8	37.2
43	65.0	65.0	63.7	62.6	61.6	60.1	59.0	57.5	55.6	53.4	50.7	47.7	44.2	40.3
44	115.0	...	...	...	...	...	...	...	...	...	...	...	...	...
45	115.0	...	...	...	...	...	...	...	...	...	...	...	...	...

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding												
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
	Ferrous Materials (Cont'd)												
1	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...

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Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
	Ferrous Materials (Cont'd)							
1	15Cr–5Ni–3Cu	Bar	SA–564	XM–12	S15500	H1150	...	135
2	15Cr–5Ni–3Cu	Forgings	SA–705	XM–12	S15500	H1150	...	135
3	15Cr–5Ni–3Cu	Bar	SA–564	XM–12	S15500	H1100	...	140
4	15Cr–5Ni–3Cu	Forgings	SA–705	XM–12	S15500	H1100	...	140
5	15Cr–5Ni–3Cu	Bar	SA–564	XM–12	S15500	H1075	...	145
6	15Cr–5Ni–3Cu	Forgings	SA–705	XM–12	S15500	H1075	...	145
7	15Cr–5Ni–3Cu	Bar	SA–564	XM–12	S15500	H1025	...	155
8	15Cr–5Ni–3Cu	Forgings	SA–705	XM–12	S15500	H1025	...	155
9	15Cr–5Ni–3Cu	Bar	SA–564	XM–12	S15500	H925	...	170
10	15Cr–5Ni–3Cu	Forgings	SA–705	XM–12	S15500	H925	...	170
11	15Cr–5Ni–3Cu	Bar	SA–564	XM–12	S15500	H900	...	190
12	15Cr–5Ni–3Cu	Forgings	SA–705	XM–12	S15500	H900	...	190
13	15Cr–6Ni–Cu–Mo	Bar	SA–564	XM–25	S45000	H1150	...	125
14	15Cr–6Ni–Cu–Mo	Forgings	SA–705	XM–25	S45000	H1150	$t \geq 1/2$	125
15	15Cr–6Ni–Cu–Mo	Bar	SA–564	XM–25	S45000	H1100	...	130
16	15Cr–6Ni–Cu–Mo	Forgings	SA–705	XM–25	S45000	H1100	$t \geq 1/2$	130
17	15Cr–6Ni–Cu–Mo	Bar	SA–564	XM–25	S45000	H1050	...	145
18	15Cr–6Ni–Cu–Mo	Forgings	SA–705	XM–25	S45000	H1050	$t \geq 1/2$	145
19	15Cr–6Ni–Cu–Mo	Bar	SA–564	XM–25	S45000	H1025	...	150
20	15Cr–6Ni–Cu–Mo	Forgings	SA–705	XM–25	S45000	H1025	$t \geq 1/2$	150
21	15Cr–6Ni–Cu–Mo	Bar	SA–564	XM–25	S45000	H1000	...	160
22	15Cr–6Ni–Cu–Mo	Forgings	SA–705	XM–25	S45000	H1000	$t \geq 1/2$	160
23	15Cr–6Ni–Cu–Mo	Bar	SA–564	XM–25	S45000	H950	...	170
24	15Cr–6Ni–Cu–Mo	Forgings	SA–705	XM–25	S45000	H950	...	170
25	15Cr–6Ni–Cu–Mo	Bar	SA–564	XM–25	S45000	H900	...	180
26	15Cr–6Ni–Cu–Mo	Forgings	SA–705	XM–25	S45000	H900	...	180
27	17Cr	Smls. & wld. tube	SA–268	TP430	S43000	...	...	60
28	17Cr	Plate	SA–240	430	S43000	...	...	65
29	17Cr	Bar	SA–479	430	S43000	...	...	70
30	17Cr–4Ni–4Cu	Bar	SA–564	630	S17400	H1150M	...	115
31	17Cr–4Ni–4Cu	Forgings	SA–705	630	S17400	H1150M	...	115
32	17Cr–4Ni–4Cu	Bar	SA–564	630	S17400	H1150	...	135
33	17Cr–4Ni–4Cu	Plate	SA–693	630	S17400	H1150	...	135
34	17Cr–4Ni–4Cu	Forgings	SA–705	630	S17400	H1150	...	135
35	17Cr–4Ni–4Cu	Bar	SA–564	630	S17400	H1100	...	140
36	17Cr–4Ni–4Cu	Plate	SA–693	630	S17400	H1100	...	140
37	17Cr–4Ni–4Cu	Forgings	SA–705	630	S17400	H1100	...	140
38	17Cr–4Ni–4Cu	Bar	SA–564	630	S17400	H1075	...	145
39	17Cr–4Ni–4Cu	Plate	SA–693	630	S17400	H1075	...	145
40	17Cr–4Ni–4Cu	Forgings	SA–705	630	S17400	H1075	...	145
41	17Cr–4Ni–4Cu	Bar	SA–564	630	S17400	H1025	...	155
42	17Cr–4Ni–4Cu	Forgings	SA–705	630	S17400	H1025	...	155
43	17Cr–4Ni–4Cu	Forgings	SA–705	630	S17400	H925	...	170
44	17Cr–4Ni–4Cu	Forgings	SA–705	630	S17400	H900	...	190
45	17Cr–7Ni–1Al	Forgings	SA–705	631	S17700	TH1050	...	170

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
														Ferrous Materials (Cont'd)
1	135.0	...	...	...	...	...	...	...	...	...	...	...	...	...
2	135.0	...	...	...	...	...	...	...	...	...	...	...	...	...
3	140.0	140.0	140.0	137.0	133.0	131.0	...	...	...	...	...	...	...	...
4	140.0	140.0	140.0	137.0	133.0	131.0	...	...	...	...	...	...	...	...
5	145.0	145.0	143.5	139.1	135.3	131.7	129.3	127.8	...	...	...	...	...	...
6	145.0	145.0	143.5	139.1	135.3	131.7	129.3	127.8	...	...	...	...	...	...
7	155.0	155.0	153.4	148.7	144.6	140.8	138.2	136.6	...	...	...	...	...	...
8	155.0	155.0	153.4	148.7	144.6	140.8	138.2	136.6	...	...	...	...	...	...
9	170.0	170.0	168.2	163.1	158.6	154.4	151.6	149.8	...	...	...	...	...	...
10	170.0	170.0	168.2	163.1	158.6	154.4	151.6	149.8	...	...	...	...	...	...
11	190.0	190.0	188.0	182.3	177.3	172.6	169.5	167.4	...	...	...	...	...	...
12	190.0	190.0	188.0	182.3	177.3	172.6	169.5	167.4	...	...	...	...	...	...
13	125.0	...	...	...	...	...	...	...	...	...	...	...	...	...
14	125.0	...	...	...	...	...	...	...	...	...	...	...	...	...
15	130.0	...	...	...	...	...	...	...	...	...	...	...	...	...
16	130.0	...	...	...	...	...	...	...	...	...	...	...	...	...
17	145.0	...	...	...	...	...	...	...	...	...	...	...	...	...
18	145.0	...	...	...	...	...	...	...	...	...	...	...	...	...
19	150.0	...	...	...	...	...	...	...	...	...	...	...	...	...
20	150.0	...	...	...	...	...	...	...	...	...	...	...	...	...
21	160.0	...	...	...	...	...	...	...	...	...	...	...	...	...
22	160.0	...	...	...	...	...	...	...	...	...	...	...	...	...
23	170.0	...	...	...	...	...	...	...	...	...	...	...	...	...
24	170.0	...	...	...	...	...	...	...	...	...	...	...	...	...
25	180.0	...	...	...	...	...	...	...	...	...	...	...	...	...
26	180.0	...	...	...	...	...	...	...	...	...	...	...	...	...
27	60.0	60.0	58.8	57.8	56.9	55.5	54.4	53.1	51.4	49.3	46.8	44.0	40.8	37.2
28	65.0	65.0	63.7	62.6	61.6	60.1	59.0	57.5	55.6	53.4	50.7	47.7	44.2	40.3
29	70.0	70.0	68.6	67.4	66.4	64.7	63.5	61.9	59.9	57.5	54.6	51.3	47.6	43.5
30	115.0	115.0	115.0	111.8	109.5	107.9	106.9	105.5	103.5	100.6	96.8	91.6	84.8	76.4
31	115.0	115.0	115.0	111.8	109.5	107.9	106.9	105.5	103.5	100.6	96.8	91.6	84.8	76.4
32	135.0	135.0	135.0	131.2	128.6	126.7	125.5	123.8	121.5	118.1	113.6	107.5	99.6	89.7
33	135.0	135.0	135.0	131.2	128.6	126.7	125.5	123.8	121.5	118.1	113.6	107.5	99.6	89.7
34	135.0	135.0	135.0	131.2	128.6	126.7	125.5	123.8	121.5	118.1	113.6	107.5	99.6	89.7
35	140.0	140.0	140.0	136.1	133.4	131.4	130.1	128.4	126.0	122.5	117.8	111.5	103.3	93.0
36	140.0	140.0	140.0	136.1	133.4	131.4	130.1	128.4	126.0	122.5	117.8	111.5	103.3	93.0
37	140.0	140.0	140.0	136.1	133.4	131.4	130.1	128.4	126.0	122.5	117.8	111.5	103.3	93.0
38	145.0	145.0	145.0	140.9	138.2	136.1	134.8	133.0	130.5	126.9	122.0	115.4	107.0	96.3
39	145.0	145.0	145.0	140.9	138.2	136.1	134.8	133.0	130.5	126.9	122.0	115.4	107.0	96.3
40	145.0	145.0	145.0	140.9	138.2	136.1	134.8	133.0	130.5	126.9	122.0	115.4	107.0	96.3
41	155.0	155.0	155.0	150.7	147.7	145.5	...	...	...	...	...	...	...	...
42	155.0	155.0	155.0	150.7	147.7	145.5	144.1	142.2	...	...	...	...	...	...
43	170.0	170.0	170.0	165.2	162.0	159.5	158.0	144.9	...	...	...	...	...	...
44	190.0	190.0	190.0	184.7	181.1	178.3	176.6	174.3	...	...	...	...	...	...
45	170.0	...	...	...	...	...	...	...	...	...	...	...	...	...

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding												
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
	Ferrous Materials (Cont'd)												
1	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...

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Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
	Ferrous Materials (Cont'd)							
1	17Cr–7Ni–1Al	Forgings	SA–705	631	S17700	RH950	...	185
2	18Cr–2Mo	Plate	SA–240	...	S44400	...	...	60
3	18Cr–2Mo	Smls. & wld. tube	SA–268	...	S44400	...	...	60
4	18Cr–Ti	Smls. & wld. tube	SA–268	TP439	S43035	...	...	60
5	18Cr–Ti	Wld. tube	SA–803	TP439	S43035	...	...	60
6	18Cr–Ti	Smls. & wld. pipe	SA–731	TP439	S43035	...	...	60
7	18Cr–Ti	Smls. & wld. tube	SA–268	TP430 Ti	S43036	...	...	60
8	18Cr–Ti	Bar	SA–479	439	S43035	...	...	70
9	26Cr–3Ni–3Mo	Plate	SA–240	26–3–3	S44660	...	$\leq 2/10$	85
10	26Cr–3Ni–3Mo	Smls. & wld. tube	SA–268	26–3–3	S44660	...	$\leq 2/10$	85
11	26Cr–3Ni–3Mo	Wld. tube	SA–803	26–3–3	S44660	...	$\leq 2/10$	85
12	27Cr	Smls. tube	SA–268	TP446–1	S44600	...	...	70
13	27Cr–1Mo	Forgings	SA–182	FXM–27Cb	S44627	...	...	60
14	27Cr–1Mo	Plate	SA–240	XM–27	S44627	...	...	65
15	27Cr–1Mo	Smls. & wld. tube	SA–268	TPXM–27	S44627	...	...	65
16	27Cr–1Mo	Bar	SA–479	XM–27	S44627	...	...	65
17	27Cr–1Mo	Smls. & wld. pipe	SA–731	TPXM–27	S44627	...	...	65
18	27Cr–1Mo–Ti	Smls. & wld. pipe	SA–731	TPXM–33	S44626	...	...	65
19	27Cr–1Mo–Ti	Plate	SA–240	XM–33	S44626	...	...	68
20	27Cr–1Mo–Ti	Smls. & wld. tube	SA–268	TPXM–33	S44626	...	...	68
21	29Cr–4Mo	Bar	SA–479	...	S44700	...	...	70
22	29Cr–4Mo	Plate	SA–240	...	S44700	...	...	80
23	29Cr–4Mo	Smls. & wld. tube	SA–268	29–4	S44700	...	...	80
24	29Cr–4Mo–2Ni	Bar	SA–479	...	S44800	...	...	70
25	29Cr–4Mo–2Ni	Plate	SA–240	...	S44800	...	...	80
26	29Cr–4Mo–2Ni	Smls. & wld. tube	SA–268	29–4–2	S44800	...	...	80
27	29Cr–4Mo–Ti	Smls. & wld. tube	SA–268	...	S44735	...	...	75
28	Mn–$^1/_4$Mo	Forgings	SA–372	D	K14508	...	...	105
29	Mn–$^1/_4$Mo–V	Castings	SA–487	2	J13005	A	...	85
30	Mn–$^1/_4$Mo–V	Castings	SA–487	2	J13005	B	...	90
31	Mn–$^1/_2$Mo	Plate	SA–302	A	K12021	...	...	75
32	Mn–$^1/_2$Mo	Wld. pipe	SA–672	H75	K12021	...	...	75
33	Mn–$^1/_2$Mo	Plate	SA–302	B	K12022	...	...	80
34	Mn–$^1/_2$Mo	Plate	SA–533	A	K12521	1	...	80
35	Mn–$^1/_2$Mo	Plate	SA–533	A	K12521	2	...	90
36	Mn–$^1/_2$Mo	Plate	SA–533	A	K12521	3	...	100
37	Mn–$^1/_2$Mo–$^1/_4$Ni	Plate	SA–533	D	K12529	1	...	80
38	Mn–$^1/_2$Mo–$^1/_4$Ni	Plate	SA–533	D	K12529	2	...	90
39	Mn–$^1/_2$Mo–$^1/_4$Ni	Plate	SA–533	D	K12529	3	...	100
40	Mn–$^1/_2$Mo–$^1/_2$Ni	Plate	SA–302	C	K12039	...	...	80
41	Mn–$^1/_2$Mo–$^1/_2$Ni	Plate	SA–533	B	K12539	1	...	80
42	Mn–$^1/_2$Mo–$^1/_2$Ni	Wld. pipe	SA–672	H80	K12039	...	...	80
43	Mn–$^1/_2$Mo–$^1/_2$Ni	Wld. pipe	SA–672	J80	K12539	...	...	80
44	Mn–$^1/_2$Mo–$^1/_2$Ni	Plate	SA–533	B	K12539	2	...	90
45	Mn–$^1/_2$Mo–$^1/_2$Ni	Wld. pipe	SA–672	J90	K12539	...	...	90

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
														Ferrous Materials (Cont'd)
1	185.0	...	...	...	...	...	...	...	...	...	...	...	...	...
2	60.0	60.0	58.2	56.8	55.5	53.9	52.9	51.8	50.4	48.9	47.1	44.9	42.2	38.9
3	60.0	60.0	58.2	56.8	55.5	53.9	52.9	51.8	50.4	48.9	47.1	44.9	42.2	38.9
4	60.0	60.0	57.9	56.4	55.2	53.8	53.0	51.9	50.7	49.2	47.3	45.0	42.3	39.0
5	60.0	60.0	57.9	56.4	55.2	53.8	53.0	51.9	50.7	49.2	47.3	45.0	42.3	39.0
6	60.0	60.0	57.9	56.4	55.2	53.8	53.0	51.9	50.7	49.2	47.3	45.0	42.3	39.0
7	60.0	60.0	57.9	56.4	55.2	53.8	53.0	51.9	50.7	49.2	47.3	45.0	42.3	39.0
8	70.0	70.0	67.6	65.8	64.4	62.8	61.8	60.6	59.1	57.3	55.2	52.5	49.3	45.4
9	85.0	85.0	84.8	83.7	83.2	82.8	82.4	81.8	...	...	...	...	...	...
10	85.0	85.0	84.8	83.7	83.2	82.8	82.4	81.8	...	...	...	...	...	...
11	85.0	85.0	84.8	83.7	83.2	82.8	82.4	81.8	...	...	...	...	...	...
12	70.0	70.0	67.6	65.8	64.4	62.8	61.8	60.6	59.1	57.3	55.2	52.5	49.3	45.4
13	60.0	60.0	58.1	56.5	56.5	56.5	56.5	...	...	...	...	...	...	...
14	65.0	65.0	64.0	63.5	63.5	63.5	63.5	63.5	63.5	63.5	63.5	63.5	63.5	63.5
15	65.0	65.0	64.0	63.5	63.5	63.5	63.5	63.5	63.5	63.5	63.5	63.5	63.5	63.5
16	65.0	65.0	64.0	63.5	63.5	63.5	63.5	63.5	63.5	63.5	63.5	63.5	63.5	63.5
17	65.0	65.0	64.0	63.5	63.5	63.5	63.5	63.5	63.5	63.5	63.5	63.5	63.5	63.5
18	65.0	65.0	64.6	63.6	62.9	61.7	60.7	59.3	57.3	54.5	...	...	...	...
19	68.0	68.0	67.6	66.5	65.8	64.5	63.5	62.0	59.9	57.0	...	...	...	...
20	68.0	68.0	67.6	66.5	65.8	64.5	63.5	62.0	59.9	57.0	...	...	...	...
21	70.0	69.8	67.6	67.2	67.2	67.2	67.2	67.2	67.2	...	...	...	...	...
22	80.0	79.8	77.2	76.8	76.8	76.8	76.8	76.8	76.8	...	...	...	...	...
23	80.0	79.8	77.2	76.8	76.8	76.8	76.8	76.8	76.8	...	...	...	...	...
24	70.0	68.7	67.6	67.1	66.2	65.3	64.8	64.3	63.5	...	...	...	...	...
25	80.0	78.6	77.3	76.7	75.7	74.6	74.1	73.5	72.6	...	...	...	...	...
26	80.0	78.6	77.3	76.7	75.7	74.6	74.1	73.5	72.6	...	...	...	...	...
27	75.0	73.7	72.5	71.9	70.9	69.9	69.5	68.9	68.0	...	...	...	...	...
28	105.0	105.0	105.0	105.0	105.0	105.0	105.0	105.0	102.7	95.5	87.3	79.1	72.3	68.7
29	85.0	85.0	85.0	84.6	84.6	84.6	84.5	84.5	...	...	...	...	...	...
30	90.0	90.0	90.0	89.5	89.5	89.5	89.5	89.5	...	...	...	...	...	...
31	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	72.4	68.6	63.7	57.9
32	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	72.4	68.6	63.7	57.9
33	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	77.3	73.1	68.0	61.7
34	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	77.3	73.1	68.0	61.7
35	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	86.9	82.3	76.4	69.4
36	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	96.6	91.4	84.9	77.1
37	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	77.3	73.1	68.0	61.7
38	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	86.9	82.3	76.4	69.4
39	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	96.6	91.4	84.9	77.1
40	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	77.3	73.1	68.0	61.7
41	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	77.3	73.1	68.0	61.7
42	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	77.3	73.1	68.0	61.7
43	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	77.3	73.1	68.0	61.7
44	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	86.9	82.3	76.4	69.4
45	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	86.9	82.3	76.4	69.4

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding												
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
	Ferrous Materials (Cont'd)												
1	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...

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Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
		Ferrous Materials (Cont'd)							
	1	Mn–½Mo–½Ni	Plate	SA–533	B	K12539	3	...	100
	2	Mn–½Mo–½Ni	Wld. pipe	SA–672	J100	K12539	...	...	100
	3	Mn–½Mo–¾Ni	Plate	SA–302	D	K12054	...	...	80
	4	Mn–½Mo–¾Ni	Plate	SA–533	C	K12554	1	...	80
	5	Mn–½Mo–¾Ni	Plate	SA–533	E	K12554	1	...	80
	6	Mn–½Mo–¾Ni	Plate	SA–533	C	K12554	2	...	90
	7	Mn–½Mo–¾Ni	Plate	SA–533	E	K12554	2	...	90
	8	Mn–½Mo–¾Ni	Plate	SA–533	C	K12554	3	...	100
(**21**)	9	...	...	...	...	...	...	...	...
	10	Mn–½Ni–V	Plate	SA–225	C	K12524	...	...	105
	11	Mn–V	Castings	SA–487	1	J13002	A	...	85
	12	Mn–V	Castings	SA–487	1	J13002	B	...	90
	13	1½Si–½Mo	Smls. pipe	SA–335	P15	K11578	...	...	60
	14	½Ni–½Cr–¼Mo–V	Castings	SA–487	4	J13047	A	...	90
	15	½Ni–½Cr–¼Mo–V	Castings	SA–487	4	J13047	B	...	105
	16	½Ni–½Cr–¼Mo–V	Castings	SA–487	4	J13047	E	...	115
	17	½Ni–½Mo–V	Forgings	SA–541	3	K12045	1	...	80
	18	½Ni–½Mo–V	Forgings	SA–541	3	K12045	2	...	90
	19	¾Ni–½Cr–½Mo–V	Forgings	SA–592	F	K11576	...	2½ < t ≤ 4	105
	20	¾Ni–½Cr–½Mo–V	Plate	SA–517	F	K11576	...	≤2½	115
	21	¾Ni–½Cr–½Mo–V	Forgings	SA–592	F	K11576	...	≤2½	115
	22	¾Ni–½Cu–Mo	Smls. & wld. tube	SA–423	2	K11540	...	...	60
	23	¾Ni–½Mo–⅓Cr–V	Forgings	SA–508	2	K12766	1	...	80
	24	¾Ni–½Mo–⅓Cr–V	Forgings	SA–541	2	K12765	1	...	80
	25	¾Ni–½Mo–⅓Cr–V	Forgings	SA–508	2	K12766	2	...	90
	26	¾Ni–½Mo–⅓Cr–V	Forgings	SA–541	2	K12765	2	...	90
	27	¾Ni–½Mo–Cr–V	Forgings	SA–508	3	K12042	1	...	80
	28	¾Ni–½Mo–Cr–V	Forgings	SA–508	3	K12042	2	...	90
	29	¾Ni–1Mo–¾Cr	Castings	SA–217	WC5	J22000	...	...	70
	30	1Ni–½Cr–½Mo	Castings	SA–217	WC4	J12082	...	...	70
	31	1¼Ni–1Cr–½Mo	Plate	SA–517	P	K21650	...	2½ < t ≤ 4	105
	32	1¼Ni–1Cr–½Mo	Plate	SA–517	P	K21650	...	≤2½	115
	33	1½Ni	Forgings	SA–350	LF5	K13050	1	...	60
	34	1½Ni	Forgings	SA–350	LF5	K13050	2	...	70
	35	1¾Ni–¾Cr–¼Mo	Forgings	SA–372	L	K24055	...	...	155
	36	1¾Ni–¾Cr–¼Mo	Bolting	SA–574	4340	G43400	...	≥⅝	170
	37	1¾Ni–¾Cr–¼Mo	Bolting	SA–574	4340	G43400	...	≤½	180
	38	2Ni–¾Cr–¼Mo	Bolting	SA–540	B23	H43400	5	6 < t ≤ 9½	115
	39	2Ni–¾Cr–¼Mo	Bolting	SA–540	B23	H43400	5	≤6	120
	40	2Ni–¾Cr–¼Mo	Bolting	SA–540	B23	H43400	4	≤9½	135
	41	2Ni–¾Cr–¼Mo	Bolting	SA–540	B23	H43400	3	≤9½	145
	42	2Ni–¾Cr–¼Mo	Bolting	SA–540	B23	H43400	2	≤9½	155
	43	2Ni–¾Cr–¼Mo	Bolting	SA–540	B23	H43400	1	≤8	165
(**21**)	44	2Ni–¾Cr–⅓Mo	Bolting	SA–540	B24	K24064	5	6 < t ≤ 9½	115
(**21**)	45	2Ni–¾Cr–⅓Mo	Bolting	SA–540	B24	K24064	5	≤6	120

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
												Ferrous Materials (Cont'd)		
1	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	96.6	91.4	84.9	77.1
2	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	96.6	91.4	84.9	77.1
3	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	77.3	73.1	68.0	61.7
4	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	77.3	73.1	68.0	61.7
5	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	77.3	73.1	68.0	61.7
6	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	86.9	82.3	76.4	69.4
7	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	86.9	82.3	76.4	69.4
8	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	96.6	91.4	84.9	77.1
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...
10	105.0	105.0	105.0	105.0	105.0	105.0	105.0	105.0	104.3	96.2	...	...	...	...
11	85.0	...	...	...	...	...	...	...	...	...	...	...	...	...
12	90.0	...	...	...	...	...	...	...	...	...	...	...	...	...
13	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	57.9	54.9	51.0	46.3
14	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	...	...	...	...	...	...
15	105.0	105.0	105.0	105.0	105.0	105.0	105.0	105.0	...	...	...	...	...	...
16	115.0	115.0	115.0	115.0	115.0	115.0	115.0	115.0	...	...	...	...	...	...
17	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	77.3	73.1	68.0	61.7
18	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	88.7	86.3	82.9	78.5	73.0	66.4
19	105.0	105.0	105.0	105.0	105.0	105.0	104.8	102.8	100.1	96.8	92.8	88.2	82.9	77.0
20	115.0	115.0	115.0	115.0	115.0	115.0	114.8	112.6	109.6	106.0	101.6	96.6	90.8	84.4
21	115.0	115.0	115.0	115.0	115.0	115.0	114.8	112.6	109.6	106.0	101.6	96.6	90.8	84.4
22	60.0	...	...	...	...	...	...	...	...	...	...	...	...	...
23	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	77.3	73.1	68.0	61.7
24	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	77.3	73.1	68.0	61.7
25	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	86.9	82.3	76.4	69.4
26	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	86.9	82.3	76.4	69.4
27	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	77.3	73.1	68.0	61.7
28	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	86.9	82.3	76.4	69.4
29	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	67.6	64.0	59.5	54.0
30	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	67.6	64.0	59.5	54.0
31	105.0	105.0	105.0	105.0	105.0	105.0	104.8	102.8	100.1	96.8	92.8	88.2	82.9	77.0
32	115.0	115.0	115.0	115.0	115.0	115.0	114.8	112.6	109.6	106.0	101.6	96.6	90.8	84.4
33	60.0	...	...	...	...	...	...	...	...	...	...	...	...	...
34	70.0	...	...	...	...	...	...	...	...	...	...	...	...	...
35	155.0	155.0	155.0	155.0	155.0	155.0	155.0	155.0	155.0	153.1	147.1	141.7	137.7	136.4
36	170.0	170.0	170.0	170.0	170.0	170.0	167.4	163.4	158.4	152.7	146.8	141.3	137.3	136.0
37	180.0	180.0	180.0	180.0	180.0	180.0	177.3	173.0	167.7	161.7	155.4	149.7	145.4	144.0
38	115.0	115.0	115.0	115.0	115.0	115.0	113.2	110.5	107.1	103.3	99.3	95.6	92.9	92.0
39	120.0	120.0	120.0	120.0	120.0	120.0	118.2	115.3	111.8	107.8	103.6	99.8	96.9	96.0
40	135.0	135.0	135.0	135.0	135.0	135.0	132.9	129.7	125.8	121.3	116.6	112.2	109.0	108.0
41	145.0	145.0	145.0	145.0	145.0	145.0	142.8	139.3	135.1	130.3	125.2	120.6	117.1	116.0
42	155.0	155.0	155.0	155.0	155.0	155.0	152.6	149.0	144.4	139.2	133.9	128.9	125.2	124.0
43	165.0	165.0	165.0	165.0	165.0	165.0	165.0	158.6	153.7	148.2	142.5	137.2	133.3	132.0
44	115.0	115.0	115.0	115.0	115.0	115.0	113.2	110.5	107.1	103.3	99.3	95.6	92.9	92.0
45	120.0	120.0	120.0	120.0	120.0	120.0	118.2	115.3	111.8	107.8	103.6	99.8	96.9	96.0

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Ferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
10	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
45	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)

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Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
		Ferrous Materials (Cont'd)							
(**21**)	1	2Ni–$^3/_4$Cr–$^1/_3$Mo	Bolting	SA–540	B24	K24064	4	≤9$^1/_2$	135
(**21**)	2	2Ni–$^3/_4$Cr–$^1/_3$Mo	Bolting	SA–540	B24	K24064	3	≤9$^1/_2$	145
(**21**)	3	2Ni–$^3/_4$Cr–$^1/_3$Mo	Bolting	SA–540	B24	K24064	2	≤9$^1/_2$	155
(**21**)	4	2Ni–$^3/_4$Cr–$^1/_3$Mo	Bolting	SA–540	B24	K24064	1	≤8	165
	5	2Ni–1Cu	Forgings	SA–182	FR	K22035	...	...	63
	6	2Ni–1Cu	Fittings	SA–234	WPR	K22035	...	...	63
	7	2Ni–1Cu	Smls. & wld. pipe	SA–333	9	K22035	...	...	63
	8	2Ni–1Cu	Tube	SA–334	9	K22035	...	...	63
	9	2Ni–1Cu	Forgings	SA–350	LF9	K22036	...	...	63
	10	2Ni–1Cu	Smls. & wld. ftgs.	SA–420	WPL9	K22035	...	...	63
	11	2Ni–1$^1/_2$Cr–$^1/_4$Mo–V	Forgings	SA–723	1	K23550	1	...	115
	12	2Ni–1$^1/_2$Cr–$^1/_4$Mo–V	Forgings	SA–723	1	K23550	2	...	135
(**21**)	13	2Ni–1$^1/_2$Cr–$^1/_4$Mo–V	Forgings	SA–723	1	K23550	2a	...	145
	14	2Ni–1$^1/_2$Cr–$^1/_4$Mo–V	Forgings	SA–723	1	K23550	3	...	155
	15	2Ni–1$^1/_2$Cr–$^1/_4$Mo–V	Forgings	SA–723	1	K23550	4	...	175
	16	2Ni–1$^1/_2$Cr–$^1/_4$Mo–V	Forgings	SA–723	1	K23550	5	...	190
	17	2$^1/_2$Ni	Pipe	SA–333	7	K21903	...	...	65
	18	2$^1/_2$Ni	Tube	SA–334	7	K21903	...	...	65
	19	2$^1/_2$Ni	Plate	SA–203	A	K21703	...	...	65
	20	2$^1/_2$Ni	Plate	SA–203	B	K22103	...	...	70
	21	2$^1/_2$Ni	Castings	SA–352	LC2	J22500	...	...	70
	22	2$^3/_4$Ni–1$^1/_2$Cr–$^1/_2$Mo	Plate	SA–543	C	...	3	...	90
	23	2$^3/_4$Ni–1$^1/_2$Cr–$^1/_2$Mo	Plate	SA–543	C	...	1	...	105
	24	2$^3/_4$Ni–1$^1/_2$Cr–$^1/_2$Mo	Plate	SA–543	C	...	2	...	115
	25	2$^3/_4$Ni–1$^1/_2$Cr–$^1/_2$Mo–V	Forgings	SA–723	2	K34035	1	...	115
	26	2$^3/_4$Ni–1$^1/_2$Cr–$^1/_2$Mo–V	Forgings	SA–723	2	K34035	2	...	135
(**21**)	27	2$^3/_4$Ni–1$^1/_2$Cr–$^1/_2$Mo–V	Forgings	SA–723	2	K34035	2a	...	145
	28	2$^3/_4$Ni–1$^1/_2$Cr–$^1/_2$Mo–V	Forgings	SA–723	2	K34035	3	...	155
	29	2$^3/_4$Ni–1$^1/_2$Cr–$^1/_2$Mo–V	Forgings	SA–723	2	K34035	4	...	175
	30	2$^3/_4$Ni–1$^1/_2$Cr–$^1/_2$Mo–V	Forgings	SA–723	2	K34035	5	...	190
	31	3Ni–1$^3/_4$Cr–$^1/_2$Mo	Plate	SA–543	B	K42339	3	...	90
(**21**)	32	3Ni–1$^3/_4$Cr–$^1/_2$Mo	Forgings	SA–372	M	K42365	85	...	105
	33	3Ni–1$^3/_4$Cr–$^1/_2$Mo	Plate	SA–543	B	K42339	1	...	105
	34	3Ni–1$^3/_4$Cr–$^1/_2$Mo	Plate	SA–543	B	K42339	2	...	115
(**21**)	35	3Ni–1$^3/_4$Cr–$^1/_2$Mo	Forgings	SA–372	M	K42365	100	...	120
	36	3$^1/_2$Ni	Pipe	SA–333	3	K31918	...	...	65
	37	3$^1/_2$Ni	Tube	SA–334	3	K31918	...	...	65
	38	3$^1/_2$Ni	Fittings	SA–420	WPL3	...	...	...	65
	39	3$^1/_2$Ni	Plate	SA–203	D	K31718	...	...	65
	40	3$^1/_2$Ni	Forgings	SA–350	LF3	K32025	...	...	70
	41	3$^1/_2$Ni	Forgings	SA–765	III	K32026	...	...	70
	42	3$^1/_2$Ni	Plate	SA–203	E	K32018	...	...	70
	43	3$^1/_2$Ni	Castings	SA–352	LC3	J31550	...	...	70
	44	3$^1/_2$Ni	Plate	SA–203	F	...	...	>2	75
	45	3$^1/_2$Ni	Plate	SA–203	F	...	...	≤2	80

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
												Ferrous Materials (Cont'd)		
1	135.0	135.0	135.0	135.0	135.0	135.0	132.9	129.7	125.8	121.3	116.6	112.2	109.0	108.0
2	145.0	145.0	145.0	145.0	145.0	145.0	142.8	139.3	135.1	130.3	125.2	120.6	117.1	116.0
3	155.0	155.0	155.0	155.0	155.0	155.0	152.6	149.0	144.4	139.2	133.9	128.9	125.2	124.0
4	165.0	165.0	165.0	165.0	165.0	165.0	165.0	158.6	153.7	148.2	142.5	137.2	133.3	132.0
5	63.0	...	...	...	...	...	...	...	...	...	...	...	...	...
6	63.0	...	...	...	...	...	...	...	...	...	...	...	...	...
7	63.0	...	...	...	...	...	...	...	...	...	...	...	...	...
8	63.0	...	...	...	...	...	...	...	...	...	...	...	...	...
9	63.0	...	...	...	...	...	...	...	...	...	...	...	...	...
10	63.0	...	...	...	...	...	...	...	...	...	...	...	...	...
11	115.0	115.0	115.0	115.0	115.0	115.0	113.2	110.5	107.1	103.3	...	...	...	...
12	135.0	135.0	135.0	135.0	135.0	135.0	132.9	129.7	125.8	121.3	...	...	...	...
13	145.0	145.0	145.0	145.0	145.0	145.0	142.7	139.3	135.1	130.3	...	...	...	...
14	155.0	155.0	155.0	155.0	155.0	155.0	152.6	149.0	144.4	139.2	...	...	...	...
15	175.0	175.0	175.0	175.0	175.0	175.0	172.3	168.2	163.1	157.2	...	...	...	...
16	190.0	190.0	190.0	190.0	190.0	190.0	187.1	182.6	177.0	170.7	...	...	...	...
17	65.0	65.0	65.0	65.0	65.0	65.0	65.0	61.7	57.6	53.7	50.1	46.5	42.2	36.3
18	65.0	65.0	65.0	65.0	65.0	65.0	65.0	61.7	57.6	53.7	50.1	46.5	42.2	36.3
19	65.0	65.0	65.0	65.0	65.0	65.0	65.0	61.7	57.6	53.7	50.1	46.5	42.2	36.3
20	70.0	70.0	70.0	70.0	70.0	70.0	70.0	66.5	62.0	57.9	54.0	50.1	45.5	39.1
21	70.0	70.0	70.0	70.0	70.0	70.0	70.0	66.5	62.0	57.9	54.0	50.1	45.5	39.1
22	90.0	90.0	90.0	89.1	88.5	87.3	86.2	84.7	82.6	79.9	76.5	72.5	67.7	62.1
23	105.0	105.0	105.0	103.9	103.3	101.9	100.6	98.8	96.4	93.2	89.3	84.5	78.9	72.5
24	115.0	115.0	115.0	113.8	113.1	111.6	110.2	108.2	105.5	102.1	97.8	92.6	86.5	79.4
25	115.0	115.0	115.0	115.0	115.0	115.0	113.2	110.5	107.1	103.3	...	...	...	...
26	135.0	135.0	135.0	135.0	135.0	135.0	132.9	129.7	125.8	121.3	...	...	...	...
27	145.0	145.0	145.0	145.0	145.0	145.0	142.7	139.3	135.1	130.3	...	...	...	...
28	155.0	155.0	155.0	155.0	155.0	155.0	152.6	149.0	144.4	139.2	...	...	...	...
29	175.0	175.0	175.0	175.0	175.0	175.0	172.3	168.2	163.1	157.2	...	...	...	...
30	190.0	190.0	190.0	190.0	190.0	190.0	187.1	182.6	177.0	170.7	...	...	...	...
31	90.0	90.0	90.0	89.1	88.5	87.3	86.2	84.7	82.6	79.9	76.5	72.5	67.7	62.1
32	105.0	105.0	105.0	103.9	103.3	101.9	100.6	98.8	96.4	93.2	89.3	84.5	78.9	72.5
33	105.0	105.0	105.0	103.9	103.3	101.9	100.6	98.8	96.4	93.2	89.3	84.5	78.9	72.5
34	115.0	115.0	115.0	113.8	113.1	111.6	110.2	108.2	105.5	102.1	97.8	92.6	86.5	79.4
35	120.0	120.0	120.0	118.8	118.0	116.4	115.0	112.9	110.1	106.5	102.0	96.6	90.2	82.8
36	65.0	65.0	65.0	65.0	65.0	65.0	65.0	61.7	57.6	53.7	50.1	46.5	42.2	36.3
37	65.0	65.0	65.0	65.0	65.0	65.0	65.0	61.7	57.6	53.7	50.1	46.5	42.2	36.3
38	65.0	65.0	65.0	65.0	65.0	65.0	65.0	61.7	57.6	53.7	50.1	46.5	42.2	36.3
39	65.0	65.0	65.0	65.0	65.0	65.0	65.0	61.7	57.6	53.7	50.1	46.5	42.2	36.3
40	70.0	70.0	70.0	70.0	70.0	70.0	70.0	66.5	62.0	57.9	54.0	50.1	45.5	39.1
41	70.0	70.0	70.0	70.0	70.0	70.0	70.0	66.5	62.0	57.9	54.0	50.1	45.5	39.1
42	70.0	70.0	70.0	70.0	70.0	70.0	70.0	66.5	62.0	57.9	54.0	50.1	45.5	39.1
43	70.0	70.0	70.0	70.0	70.0	70.0	70.0	66.5	62.0	57.9	54.0	50.1	45.5	39.1
44	75.0	75.0	75.0	75.0	75.0	75.0	75.0	71.2	66.5	62.0	57.9	53.7	48.7	41.9
45	80.0	80.0	80.0	80.0	80.0	80.0	80.0	76.0	70.9	66.1	61.7	57.2	52.0	44.7

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Ferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
2	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
3	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
4	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
5	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
28	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
33	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
		Ferrous Materials (Cont'd)							
	1	3½Ni–1¾Cr–½Mo–V	Forgings	SA–508	4N	K22375	3	...	90
	2	3½Ni–1¾Cr–½Mo–V	Forgings	SA–508	4N	K22375	1	...	105
	3	3½Ni–1¾Cr–½Mo–V	Forgings	SA–508	4N	K22375	2	...	115
	4	4Ni–1½Cr–½Mo–V	Forgings	SA–723	3	K44045	1	...	115
	5	4Ni–1½Cr–½Mo–V	Forgings	SA–723	3	K44045	2	...	135
	6	4Ni–1½Cr–½Mo–V	Forgings	SA–723	3	K44045	3	...	155
(**21**)	7	4Ni–1½Cr–½Mo–V	Forgings	SA–723	3	K44045	2a	...	145
	8	4Ni–1½Cr–½Mo–V	Forgings	SA–723	3	K44045	4	...	175
	9	4Ni–1½Cr–½Mo–V	Forgings	SA–723	3	K44045	5	...	190
	10	5Ni–¼Mo	Plate	SA–645	A	K41583	...	...	95
	11	7Ni	Plate	SA–553	III	K61365	...	≤2	100
	12	8Ni	Forgings	SA–522	II	K71340	...	...	100
	13	8Ni	Plate	SA–553	II	K71340	...	...	100
	14	9Ni	Plate	SA/EN 10028–4	X8Ni9	...	NNT640	≤2	93
	15	9Ni	Plate	SA/EN 10028–4	X8Ni9	...	QT640	≤2	93
	16	9Ni	Plate	SA/EN 10028–4	X7Ni9	...	QT	≤2	98.5
	17	9Ni	Plate	SA/EN 10028–4	X8Ni9	...	QT680	≤2	98.5
	18	9Ni	Smls. & wld. pipe	SA–333	8	K81340	...	...	100
	19	9Ni	Smls. & wld. tube	SA–334	8	K81340	...	...	100
	20	9Ni	Plate	SA–353	...	K81340	...	...	100
	21	9Ni	Smls. & wld. ftgs.	SA–420	WPL8	K81340	...	...	100
	22	9Ni	Forgings	SA–522	I	K81340	...	...	100
	23	9Ni	Plate	SA–553	I	K81340	...	...	100
	24	25Ni–15Cr–2Ti	Bolting	SA–453	660	S66286	A	...	130
	25	25Ni–15Cr–2Ti	Bolting	SA–453	660	S66286	B	...	130
(**21**)	26	25Ni–15Cr–2Ti	Forgings, bar	SA–638	660	S66286	1	...	130
(**21**)	27	25Ni–15Cr–2Ti	Forgings, bar	SA–638	660	S66286	2	...	130
	28	27Ni–22Cr–7Mo–Mn–Cu–N	Forgings	SA–182	...	S31277	...	...	112
	29	27Ni–22Cr–7Mo–Mn–Cu–N	Smls. tube	SA–213	...	S31277	...	...	112
	30	27Ni–22Cr–7Mo–Mn–Cu–N	Plate	SA–240	...	S31277	...	...	112
	31	27Ni–22Cr–7Mo–Mn–Cu–N	Wld. tube	SA–249	...	S31277	...	...	112
	32	29Ni–20Cr–3Cu–2Mo	Castings	SA–351	CN7M	J95150	...	...	62
	33	14Cr–16Ni–6Si–Cu–Mo	Smls. tube	SA–213	...	S38815	...	...	78
	34	14Cr–16Ni–6Si–Cu–Mo	Plate	SA–240	...	S38815	...	...	78
	35	14Cr–16Ni–6Si–Cu–Mo	Wld. tube	SA–249	...	S38815	...	...	78
	36	14Cr–16Ni–6Si–Cu–Mo	Wld. pipe	SA–312	...	S38815	...	...	78
	37	14Cr–16Ni–6Si–Cu–Mo	Smls. & wld. fittings	SA–403	...	S38815	...	...	78
	38	14Cr–16Ni–6Si–Cu–Mo	Bar	SA–479	...	S38815	...	...	78
	39	16Cr–4Ni–6Mn	Plate	SA–240	201LN	S20153	...	...	95
	40	16Cr–9Mn–2Ni–N	Plate	SA–240	204	S20400	...	...	95
(**21**)	41	16Cr–12Ni–2Mo	Forgings	SA–182	F316L	S31603	...	>5	65
(**21**)	42	16Cr–12Ni–2Mo	Forgings	SA–965	F316L	S31603	...	...	65
(**21**)	43	16Cr–12Ni–2Mo	Forgings	SA–182	F316L	S31603	...	≤5	70
(**21**)	44	16Cr–12Ni–2Mo	Smls. tube	SA–213	TP316L	S31603	...	...	70
(**21**)	45	16Cr–12Ni–2Mo	Plate	SA–240	316L	S31603	...	...	70

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
														Ferrous Materials (Cont'd)
1	90.0	90.0	90.0	89.1	88.5	87.3	86.2	84.7	82.6	79.9	76.5	72.5	67.7	62.1
2	105.0	105.0	105.0	103.9	103.3	101.9	100.6	98.8	96.4	93.2	89.3	84.5	78.9	72.5
3	115.0	115.0	115.0	113.8	113.1	111.6	110.2	108.2	105.5	102.1	97.8	92.6	86.5	79.4
4	115.0	115.0	115.0	115.0	115.0	115.0	113.2	110.5	107.1	103.3	...	...	...	...
5	135.0	135.0	135.0	135.0	135.0	135.0	132.9	129.7	125.8	121.3	...	...	...	...
6	155.0	155.0	155.0	155.0	155.0	155.0	152.6	149.0	144.4	139.2	...	...	...	...
7	145.0	145.0	145.0	145.0	145.0	145.0	142.7	139.3	135.1	130.3	...	...	...	...
8	175.0	175.0	175.0	175.0	175.0	175.0	172.3	168.2	163.1	157.2	...	...	...	...
9	190.0	190.0	190.0	190.0	190.0	190.0	187.1	182.6	177.0	170.7	...	...	...	...
10	95.0	...	...	...	...	...	...	...	...	...	...	...	...	...
11	100.0	90.2	...	...	...	...	...	...	...	...	...	...	...	...
12	100.0	100.0	99.5	...	...	...	...	...	...	...	...	...	...	...
13	100.0	100.0	99.5	...	...	...	...	...	...	...	...	...	...	...
14	92.8	92.8	92.4	...	...	...	...	...	...	...	...	...	...	...
15	92.8	92.8	92.4	...	...	...	...	...	...	...	...	...	...	...
16	98.6	98.6	98.2	...	...	...	...	...	...	...	...	...	...	...
17	98.6	98.6	98.2	...	...	...	...	...	...	...	...	...	...	...
18	100.0	100.0	99.5	...	...	...	...	...	...	...	...	...	...	...
19	100.0	100.0	99.5	...	...	...	...	...	...	...	...	...	...	...
20	100.0	100.0	99.5	...	...	...	...	...	...	...	...	...	...	...
21	100.0	100.0	99.5	...	...	...	...	...	...	...	...	...	...	...
22	100.0	100.0	99.5	...	...	...	...	...	...	...	...	...	...	...
23	100.0	100.0	99.5	...	...	...	...	...	...	...	...	...	...	...
24	130.0	130.0	130.0	129.7	127.1	124.8	123.7	122.6	121.3	119.8	118.3	116.4	114.4	112.1
25	130.0	130.0	130.0	129.7	127.1	124.8	123.7	122.6	121.3	119.8	118.3	116.4	114.4	112.1
26	130.0	130.0	130.0	130.0	127.6	125.2	124.0	122.7	121.3	119.8	118.1	116.3	114.4	112.1
27	130.0	130.0	130.0	130.0	127.6	125.2	124.0	122.7	121.3	119.8	118.1	116.3	114.4	112.1
28	112.0	103.3	97.6	93.4	90.3	87.6	86.3	85.2	84.2	83.6	...	...	...	...
29	112.0	103.3	97.6	93.4	90.3	87.6	86.3	85.2	84.2	83.6	...	...	...	...
30	112.0	103.3	97.6	93.4	90.3	87.6	86.3	85.2	84.2	83.6	...	...	...	...
31	112.0	103.3	97.6	93.4	90.3	87.6	86.3	85.2	84.2	83.6	...	...	...	...
32	62.0	52.4	47.7	44.6	42.4	40.6	39.9	39.2	...	...	...	...	...	...
33	78.0	78.0	77.8	75.3	73.5	72.4	72.2	72.1	72.0	71.9	...	...	...	...
34	78.0	78.0	77.8	75.3	73.5	72.4	72.2	72.1	72.0	71.9	...	...	...	...
35	78.0	78.0	77.8	75.3	73.5	72.4	72.2	72.1	72.0	71.9	...	...	...	...
36	78.0	78.0	77.8	75.3	73.5	72.4	72.2	72.1	72.0	71.9	...	...	...	...
37	78.0	78.0	77.8	75.3	73.5	72.4	72.2	72.1	72.0	71.9	...	...	...	...
38	78.0	78.0	77.8	75.3	73.5	72.4	72.2	72.1	72.0	71.9	...	...	...	...
39	95.0	82.9	74.2	70.3	69.1	68.7	68.4	67.9	67.0	65.9	64.5	63.0	61.7	60.9
40	95.0	82.6	72.2	66.2	63.5	62.7	62.6	62.6	62.3	61.8	60.8	59.2	56.8	53.4
41	65.0	63.2	59.5	57.8	57.3	57.3	57.2	57.1	56.7	56.2	55.4	54.4	53.0	51.4
42	65.0	63.2	59.5	57.8	57.3	57.3	57.2	57.1	56.7	56.2	55.4	54.4	53.0	51.4
43	70.0	68.1	64.0	62.2	61.8	61.7	61.6	61.5	61.1	60.5	59.7	58.6	57.1	55.4
44	70.0	68.1	64.0	62.2	61.8	61.7	61.6	61.5	61.1	60.5	59.7	58.6	57.1	55.4
45	70.0	68.1	64.0	62.2	61.8	61.7	61.6	61.5	61.1	60.5	59.7	58.6	57.1	55.4

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Ferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
27	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
28	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	50.1	48.6	46.7	44.6	...	...	...	...	...	...	...	...	...	(**21**)
42	50.1	48.6	46.7	44.6	...	...	...	...	...	...	...	...	...	(**21**)
43	54.0	52.3	50.3	48.0	...	...	...	...	...	...	...	...	...	(**21**)
44	54.0	52.3	50.3	48.0	...	...	...	...	...	...	...	...	...	(**21**)
45	54.0	52.3	50.3	48.0	...	...	...	...	...	...	...	...	...	(**21**)

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Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
		Ferrous Materials (Cont'd)							
(**21**)	1	16Cr–12Ni–2Mo	Wld. tube	SA–249	TP316L	S31603	...	...	70
(**21**)	2	16Cr–12Ni–2Mo	Smls. & wld. pipe	SA–312	TP316L	S31603	...	...	70
(**21**)	3	16Cr–12Ni–2Mo	Wld. pipe	SA–358	316L	S31603	1	...	70
(**21**)	4	16Cr–12Ni–2Mo	Wld. pipe	SA–358	316L	S31603	3	...	70
(**21**)	5	16Cr–12Ni–2Mo	Wld. pipe	SA–358	316L	S31603	4	...	70
(**21**)	6	16Cr–12Ni–2Mo	Smls. & wld. ftgs.	SA–403	316L	S31603	...	...	70
(**21**)	7	16Cr–12Ni–2Mo	Wld. pipe	SA–409	TP316L	S31603	...	...	70
(**21**)	8	16Cr–12Ni–2Mo	Bar	SA–479	316L	S31603	Annealed	...	70
(**21**)	9	16Cr–12Ni–2Mo	Wld. tube	SA–688	TP316L	S31603	...	...	70
(**21**)	10	16Cr–12Ni–2Mo	Wld. pipe	SA–813	TP316L	S31603	...	...	70
(**21**)	11	16Cr–12Ni–2Mo	Wld. pipe	SA–814	TP316L	S31603	...	...	70
	12	16Cr–12Ni–2Mo	Bar	SA/JIS G4303	SUS316L	...	...	...	70
	13	16Cr–12Ni–2Mo	Castings	SA–351	CF3M	J92800	...	...	70
	14	16Cr–12Ni–2Mo	Cast pipe	SA–451	CPF3M	J92800	...	...	70
	15	16Cr–12Ni–2Mo	Castings	SA–351	CF8M	J92900	...	...	70
	16	16Cr–12Ni–2Mo	Cast pipe	SA–451	CPF8M	J92900	...	...	70
(**21**)	17	16Cr–12Ni–2Mo	Forgings	SA–182	F316	S31600	...	>5	70
(**21**)	18	16Cr–12Ni–2Mo	Forgings	SA–965	F316	S31600	...	...	70
	19	16Cr–12Ni–2Mo	Forgings	SA–182	F316H	S31609	...	>5	70
	20	16Cr–12Ni–2Mo	Forgings	SA–965	F316H	S31609	...	...	70
(**21**)	21	16Cr–12Ni–2Mo	Forgings	SA–182	F316	S31600	...	≤5	75
(**21**)	22	16Cr–12Ni–2Mo	Bolting	SA–193	B8M	S31600	1	...	75
(**21**)	23	16Cr–12Ni–2Mo	Bolting	SA–193	B8MA	S31600	1A	...	75
(**21**)	24	16Cr–12Ni–2Mo	Smls. tube	SA–213	TP316	S31600	...	...	75
(**21**)	25	16Cr–12Ni–2Mo	Plate	SA–240	316	S31600	...	...	75
(**21**)	26	16Cr–12Ni–2Mo	Wld. tube	SA–249	TP316	S31600	...	...	75
(**21**)	27	16Cr–12Ni–2Mo	Smls. & wld. pipe	SA–312	TP316	S31600	...	...	75
(**21**)	28	16Cr–12Ni–2Mo	Bolting	SA–320	B8M	S31600	1	...	75
(**21**)	29	16Cr–12Ni–2Mo	Bolting	SA–320	B8MA	S31600	1A	...	75
(**21**)	30	16Cr–12Ni–2Mo	Wld. pipe	SA–358	316	S31600	1	...	75
(**21**)	31	16Cr–12Ni–2Mo	Wld. pipe	SA–358	316	S31600	3	...	75
(**21**)	32	16Cr–12Ni–2Mo	Wld. pipe	SA–358	316	S31600	4	...	75
(**21**)	33	16Cr–12Ni–2Mo	Smls. pipe	SA–376	TP316	S31600	...	...	75
(**21**)	34	16Cr–12Ni–2Mo	Smls. & wld. ftgs.	SA–403	316	S31600	...	...	75
(**21**)	35	16Cr–12Ni–2Mo	Wld. pipe	SA–409	TP316	S31600	...	...	75
(**21**)	36	16Cr–12Ni–2Mo	Bar	SA–479	316	S31600	Annealed	...	75
(**21**)	37	16Cr–12Ni–2Mo	Wld. tube	SA–688	TP316	S31600	...	...	75
(**21**)	38	16Cr–12Ni–2Mo	Wld. pipe	SA–813	TP316	S31600	...	...	75
(**21**)	39	16Cr–12Ni–2Mo	Wld. pipe	SA–814	TP316	S31600	...	...	75
	40	16Cr–12Ni–2Mo	Bar	SA/JIS G4303	SUS316	...	...	...	75
	41	16Cr–12Ni–2Mo	Plate	SA/EN 10028–7	X2CrNiMo17–12–2	...	...	≤3	75
	42	16Cr–12Ni–2Mo	Plate	SA/EN 10028–7	X5CrNiMo17–12–2	...	...	≤3	75
	43	16Cr–12Ni–2Mo	Forgings	SA–182	F316H	S31609	...	≤5	75
	44	16Cr–12Ni–2Mo	Smls. tube	SA–213	TP316H	S31609	...	...	75
	45	16Cr–12Ni–2Mo	Plate	SA–240	316H	S31609	...	...	75

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
														Ferrous Materials (Cont'd)
1	70.0	68.1	64.0	62.2	61.8	61.7	61.6	61.5	61.1	60.5	59.7	58.6	57.1	55.4
2	70.0	68.1	64.0	62.2	61.8	61.7	61.6	61.5	61.1	60.5	59.7	58.6	57.1	55.4
3	70.0	68.1	64.0	62.2	61.8	61.7	61.6	61.5	61.1	60.5	59.7	58.6	57.1	55.4
4	70.0	68.1	64.0	62.2	61.8	61.7	61.6	61.5	61.1	60.5	59.7	58.6	57.1	55.4
5	70.0	68.1	64.0	62.2	61.8	61.7	61.6	61.5	61.1	60.5	59.7	58.6	57.1	55.4
6	70.0	68.1	64.0	62.2	61.8	61.7	61.6	61.5	61.1	60.5	59.7	58.6	57.1	55.4
7	70.0	68.1	64.0	62.2	61.8	61.7	61.6	61.5	61.1	60.5	59.7	58.6	57.1	55.4
8	70.0	68.1	64.0	62.2	61.8	61.7	61.6	61.5	61.1	60.5	59.7	58.6	57.1	55.4
9	70.0	68.1	64.0	62.2	61.8	61.7	61.6	61.5	61.1	60.5	59.7	58.6	57.1	55.4
10	70.0	68.1	64.0	62.2	61.8	61.7	61.6	61.5	61.1	60.5	59.7	58.6	57.1	55.4
11	70.0	68.1	64.0	62.2	61.8	61.7	61.6	61.5	61.1	60.5	59.7	58.6	57.1	55.4
12	70.0	68.1	64.0	62.2	61.8	61.7	61.6	61.5	61.1	60.5	59.7	58.6	57.1	55.4
13	70.0	70.0	68.0	67.2	67.2	67.2	67.2	67.2	66.8	66.2	65.2	63.9	62.3	60.2
14	70.0	70.0	68.0	67.2	67.2	67.2	67.2	67.2	66.8	66.2	65.2	63.9	62.3	60.2
15	70.0	70.0	68.0	67.2	67.2	67.2	67.2	67.2	66.8	66.2	65.2	63.9	62.3	60.2
16	70.0	70.0	68.0	67.2	67.2	67.2	67.2	67.2	66.8	66.2	65.2	63.9	62.3	60.2
17	70.0	70.0	68.0	67.1	67.0	67.0	67.0	67.0	66.7	66.1	65.1	63.8	62.1	60.0
18	70.0	70.0	68.0	67.1	67.0	67.0	67.0	67.0	66.7	66.1	65.1	63.8	62.1	60.0
19	70.0	70.0	68.0	67.1	67.0	67.0	67.0	67.0	66.7	66.1	65.1	63.8	62.1	60.0
20	70.0	70.0	68.0	67.1	67.0	67.0	67.0	67.0	66.7	66.1	65.1	63.8	62.1	60.0
21	75.0	75.0	72.9	71.9	71.8	71.8	71.8	71.8	71.5	70.8	69.7	68.3	66.5	64.3
22	75.0	75.0	72.9	71.9	71.8	71.8	71.8	71.8	71.5	70.8	69.7	68.3	66.5	64.3
23	75.0	75.0	72.9	71.9	71.8	71.8	71.8	71.8	71.5	70.8	69.7	68.3	66.5	64.3
24	75.0	75.0	72.9	71.9	71.8	71.8	71.8	71.8	71.5	70.8	69.7	68.3	66.5	64.3
25	75.0	75.0	72.9	71.9	71.8	71.8	71.8	71.8	71.5	70.8	69.7	68.3	66.5	64.3
26	75.0	75.0	72.9	71.9	71.8	71.8	71.8	71.8	71.5	70.8	69.7	68.3	66.5	64.3
27	75.0	75.0	72.9	71.9	71.8	71.8	71.8	71.8	71.5	70.8	69.7	68.3	66.5	64.3
28	75.0	75.0	72.9	71.9	71.8	71.8	71.8	71.8	71.5	70.8	69.7	68.3	66.5	64.3
29	75.0	75.0	72.9	71.9	71.8	71.8	71.8	71.8	71.5	70.8	69.7	68.3	66.5	64.3
30	75.0	75.0	72.9	71.9	71.8	71.8	71.8	71.8	71.5	70.8	69.7	68.3	66.5	64.3
31	75.0	75.0	72.9	71.9	71.8	71.8	71.8	71.8	71.5	70.8	69.7	68.3	66.5	64.3
32	75.0	75.0	72.9	71.9	71.8	71.8	71.8	71.8	71.5	70.8	69.7	68.3	66.5	64.3
33	75.0	75.0	72.9	71.9	71.8	71.8	71.8	71.8	71.5	70.8	69.7	68.3	66.5	64.3
34	75.0	75.0	72.9	71.9	71.8	71.8	71.8	71.8	71.5	70.8	69.7	68.3	66.5	64.3
35	75.0	75.0	72.9	71.9	71.8	71.8	71.8	71.8	71.5	70.8	69.7	68.3	66.5	64.3
36	75.0	75.0	72.9	71.9	71.8	71.8	71.8	71.8	71.5	70.8	69.7	68.3	66.5	64.3
37	75.0	75.0	72.9	71.9	71.8	71.8	71.8	71.8	71.5	70.8	69.7	68.3	66.5	64.3
38	75.0	75.0	72.9	71.9	71.8	71.8	71.8	71.8	71.5	70.8	69.7	68.3	66.5	64.3
39	75.0	75.0	72.9	71.9	71.8	71.8	71.8	71.8	71.5	70.8	69.7	68.3	66.5	64.3
40	75.0	75.0	72.9	71.9	71.8	71.8	71.8	71.8	71.5	70.8	69.7	68.3	66.5	64.3
41	75.4	72.9	69.5	67.1	66.2	66.2	66.2	66.2	66.0	65.3	64.3	62.9	61.4	59.8
42	75.4	75.1	73.5	72.4	72.0	72.0	72.0	72.0	71.9	71.2	70.1	68.7	66.8	64.7
43	75.0	75.0	72.9	71.9	71.8	71.8	71.8	71.8	71.5	70.8	69.7	68.3	66.5	64.3
44	75.0	75.0	72.9	71.9	71.8	71.8	71.8	71.8	71.5	70.8	69.7	68.3	66.5	64.3
45	75.0	75.0	72.9	71.9	71.8	71.8	71.8	71.8	71.5	70.8	69.7	68.3	66.5	64.3

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Ferrous Materials (Cont'd)													
1	54.0	52.3	50.3	48.0	...	...	...	...	...	...	...	...	...	(**21**)
2	54.0	52.3	50.3	48.0	...	...	...	...	...	...	...	...	...	(**21**)
3	54.0	52.3	50.3	48.0	...	...	...	...	...	...	...	...	...	(**21**)
4	54.0	52.3	50.3	48.0	...	...	...	...	...	...	...	...	...	(**21**)
5	54.0	52.3	50.3	48.0	...	...	...	...	...	...	...	...	...	(**21**)
6	54.0	52.3	50.3	48.0	...	...	...	...	...	...	...	...	...	(**21**)
7	54.0	52.3	50.3	48.0	...	...	...	...	...	...	...	...	...	(**21**)
8	54.0	52.3	50.3	48.0	...	...	...	...	...	...	...	...	...	(**21**)
9	54.0	52.3	50.3	48.0	...	...	...	...	...	...	...	...	...	(**21**)
10	54.0	52.3	50.3	48.0	...	...	...	...	...	...	...	...	...	(**21**)
11	54.0	52.3	50.3	48.0	...	...	...	...	...	...	...	...	...	(**21**)
12	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	56.3	52.2	48.3	44.5	40.9	37.4	34.0	30.8	27.8	24.9	...	...	...	(**21**)
18	56.3	52.2	48.3	44.5	40.9	37.4	34.0	30.8	27.8	24.9	...	...	...	(**21**)
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	60.3	55.9	51.7	47.7	43.8	40.0	36.5	33.1	29.8	26.7	...	...	...	(**21**)
22	60.3	55.9	51.7	47.7	43.8	40.0	36.5	33.1	29.8	26.7	...	...	...	(**21**)
23	60.3	55.9	51.7	47.7	43.8	40.0	36.5	33.1	29.8	26.7	...	...	...	(**21**)
24	60.3	55.9	51.7	47.7	43.8	40.0	36.5	33.1	29.8	26.7	...	...	...	(**21**)
25	60.3	55.9	51.7	47.7	43.8	40.0	36.5	33.1	29.8	26.7	...	...	...	(**21**)
26	60.3	55.9	51.7	47.7	43.8	40.0	36.5	33.1	29.8	26.7	...	...	...	(**21**)
27	60.3	55.9	51.7	47.7	43.8	40.0	36.5	33.1	29.8	26.7	...	...	...	(**21**)
28	60.3	55.9	51.7	47.7	43.8	40.0	36.5	33.1	29.8	26.7	...	...	...	(**21**)
29	60.3	55.9	51.7	47.7	43.8	40.0	36.5	33.1	29.8	26.7	...	...	...	(**21**)
30	60.3	55.9	51.7	47.7	43.8	40.0	36.5	33.1	29.8	26.7	...	...	...	(**21**)
31	60.3	55.9	51.7	47.7	43.8	40.0	36.5	33.1	29.8	26.7	...	...	...	(**21**)
32	60.3	55.9	51.7	47.7	43.8	40.0	36.5	33.1	29.8	26.7	...	...	...	(**21**)
33	60.3	55.9	51.7	47.7	43.8	40.0	36.5	33.1	29.8	26.7	...	...	...	(**21**)
34	60.3	55.9	51.7	47.7	43.8	40.0	36.5	33.1	29.8	26.7	...	...	...	(**21**)
35	60.3	55.9	51.7	47.7	43.8	40.0	36.5	33.1	29.8	26.7	...	...	...	(**21**)
36	60.3	55.9	51.7	47.7	43.8	40.0	36.5	33.1	29.8	26.7	...	...	...	(**21**)
37	60.3	55.9	51.7	47.7	43.8	40.0	36.5	33.1	29.8	26.7	...	...	...	(**21**)
38	60.3	55.9	51.7	47.7	43.8	40.0	36.5	33.1	29.8	26.7	...	...	...	(**21**)
39	60.3	55.9	51.7	47.7	43.8	40.0	36.5	33.1	29.8	26.7	...	...	...	(**21**)
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
	Ferrous Materials (Cont'd)							
1	16Cr–12Ni–2Mo	Wld. tube	SA–249	TP316H	S31609	...	...	75
2	16Cr–12Ni–2Mo	Smls. & wld. pipe	SA–312	TP316H	S31609	...	...	75
3	16Cr–12Ni–2Mo	Wld. pipe	SA–358	316H	S31609	1	...	75
4	16Cr–12Ni–2Mo	Wld. pipe	SA–358	316H	S31609	3	...	75
5	16Cr–12Ni–2Mo	Wld. pipe	SA–358	316H	S31609	4	...	75
6	16Cr–12Ni–2Mo	Smls. pipe	SA–376	TP316H	S31609	...	...	75
7	16Cr–12Ni–2Mo	Smls. & wld. ftgs.	SA–403	316H	S31609	...	...	75
8	16Cr–12Ni–2Mo	Bar	SA–479	316H	S31609	...	...	75
9	16Cr–12Ni–2Mo	Wld. pipe	SA–813	TP316H	S31609	...	...	75
10	16Cr–12Ni–2Mo	Wld. pipe	SA–814	TP316H	S31609	...	...	75
11	16Cr–12Ni–2Mo	Bar	SA–276	316	S31600	S	$2\frac{1}{2} < t \le 3$	80
12	16Cr–12Ni–2Mo	Bolting	SA–193	B8M2	S31600	...	$2\frac{1}{2} < t \le 3$	80
13	16Cr–12Ni–2Mo	Bolting	SA–193	B8M	S31600	2	$1\frac{1}{4} < t \le 1\frac{1}{2}$	90
14	16Cr–12Ni–2Mo	Bolting	SA–320	B8M	S31600	2	$1\frac{1}{4} < t \le 1\frac{1}{2}$	90
15	16Cr–12Ni–2Mo	Bolting	SA–193	B8M2	S31600	...	$2 < t \le 2\frac{1}{2}$	90
16	16Cr–12Ni–2Mo	Bar	SA–276	316	S31600	S	$2 < t \le 2\frac{1}{2}$	90
17	16Cr–12Ni–2Mo	Bar	SA–276	316	S31600	B	$1\frac{1}{2} < t \le 1\frac{3}{4}$	95
18	16Cr–12Ni–2Mo	Bolting	SA–193	B8M	S31600	2	$1 < t \le 1\frac{1}{4}$	95
19	16Cr–12Ni–2Mo	Bolting	SA–320	B8M	S31600	2	$1 < t \le 1\frac{1}{4}$	95
20	16Cr–12Ni–2Mo	Bolting	SA–193	B8M2	S31600	...	≤2	95
21	16Cr–12Ni–2Mo	Bar	SA–276	316	S31600	S	$t \le 2$	95
22	16Cr–12Ni–2Mo	Bar	SA–276	316	S31600	B	$1\frac{1}{4} < t \le 1\frac{1}{2}$	100
23	16Cr–12Ni–2Mo	Bolting	SA–193	B8M	S31600	2	$\frac{3}{4} < t \le 1$	100
24	16Cr–12Ni–2Mo	Bolting	SA–320	B8M	S31600	2	$\frac{3}{4} < t \le 1$	100
25	16Cr–12Ni–2Mo	Bar	SA–276	316	S31600	B	$1 < t \le 1\frac{1}{4}$	105
26	16Cr–12Ni–2Mo	Bolting	SA–193	B8M	S31600	2	$\le\frac{3}{4}$	110
27	16Cr–12Ni–2Mo	Bolting	SA–320	B8M	S31600	2	$\le\frac{3}{4}$	110
28	16Cr–12Ni–2Mo	Bar	SA–276	316	S31600	B	$\frac{3}{4} < t \le 1$	115
29	16Cr–12Ni–2Mo	Bar	SA–276	316	S31600	B	$t \le \frac{1}{4}$	125
30	16Cr–12Ni–2Mo–Cb	Plate	SA–240	316Cb	S31640	...	...	75
31	16Cr–12Ni–2Mo–N	Forgings	SA–182	F316LN	S31653	...	>5	70
32	16Cr–12Ni–2Mo–N	Forgings	SA–965	F316LN	S31653	...	...	70
33	16Cr–12Ni–2Mo–N	Forgings	SA–182	F316LN	S31653	...	≤5	75
34	16Cr–12Ni–2Mo–N	Smls. tube	SA–213	TP316LN	S31653	...	...	75
35	16Cr–12Ni–2Mo–N	Plate	SA–240	316LN	S31653	...	...	75
36	16Cr–12Ni–2Mo–N	Wld. tube	SA–249	TP316LN	S31653	...	...	75
37	16Cr–12Ni–2Mo–N	Smls. & wld. pipe	SA–312	TP316LN	S31653	...	...	75
38	16Cr–12Ni–2Mo–N	Wld. pipe	SA–358	316LN	S31653	1	...	75
39	16Cr–12Ni–2Mo–N	Wld. pipe	SA–358	316LN	S31653	3	...	75
40	16Cr–12Ni–2Mo–N	Wld. pipe	SA–358	316LN	S31653	4	...	75
41	16Cr–12Ni–2Mo–N	Smls. pipe	SA–376	TP316LN	S31653	...	...	75
42	16Cr–12Ni–2Mo–N	Fittings	SA–403	316LN	S31653	...	...	75
43	16Cr–12Ni–2Mo–N	Bar	SA–479	316LN	S31653	...	...	75
44	16Cr–12Ni–2Mo–N	Wld. tube	SA–688	TP316LN	S31653	...	...	75
45	16Cr–12Ni–2Mo–N	Forgings	SA–182	F316N	S31651	...	...	80

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
														Ferrous Materials (Cont'd)
1	75.0	75.0	72.9	71.9	71.8	71.8	71.8	71.8	71.5	70.8	69.7	68.3	66.5	64.3
2	75.0	75.0	72.9	71.9	71.8	71.8	71.8	71.8	71.5	70.8	69.7	68.3	66.5	64.3
3	75.0	75.0	72.9	71.9	71.8	71.8	71.8	71.8	71.5	70.8	69.7	68.3	66.5	64.3
4	75.0	75.0	72.9	71.9	71.8	71.8	71.8	71.8	71.5	70.8	69.7	68.3	66.5	64.3
5	75.0	75.0	72.9	71.9	71.8	71.8	71.8	71.8	71.5	70.8	69.7	68.3	66.5	64.3
6	75.0	75.0	72.9	71.9	71.8	71.8	71.8	71.8	71.5	70.8	69.7	68.3	66.5	64.3
7	75.0	75.0	72.9	71.9	71.8	71.8	71.8	71.8	71.5	70.8	69.7	68.3	66.5	64.3
8	75.0	75.0	72.9	71.9	71.8	71.8	71.8	71.8	71.5	70.8	69.7	68.3	66.5	64.3
9	75.0	75.0	72.9	71.9	71.8	71.8	71.8	71.8	71.5	70.8	69.7	68.3	66.5	64.3
10	75.0	75.0	72.9	71.9	71.8	71.8	71.8	71.8	71.5	70.8	69.7	68.3	66.5	64.3
11	80.0	80.0	77.8	76.7	76.6	76.6	...	...	...	...	...	...	...	...
12	80.0	80.0	77.2	74.4	74.4	74.4	74.4	74.4	73.9	73.5	72.2	70.4	68.6	66.9
13	90.0	90.0	86.8	83.7	83.7	83.7	83.7	83.7	83.2	82.7	81.2	79.2	77.2	75.2
14	90.0	90.0	86.8	83.7	83.7	83.7	83.7	83.7	83.2	82.7	81.2	79.2	77.2	75.2
15	90.0	90.0	86.8	83.7	83.7	83.7	83.7	83.7	83.2	82.7	81.2	79.2	77.2	75.2
16	90.0	90.0	87.5	86.3	86.2	86.2	...	...	...	...	...	...	...	...
17	95.0	95.0	92.3	91.1	90.9	90.9	...	...	...	...	...	...	...	...
18	95.0	95.0	91.6	88.3	88.3	88.3	88.3	88.3	87.8	87.3	85.7	83.6	81.5	79.4
19	95.0	95.0	91.6	88.3	88.3	88.3	88.3	88.3	87.8	87.3	85.7	83.6	81.5	79.4
20	95.0	95.0	91.6	88.3	88.3	88.3	88.3	88.3	87.8	87.3	85.7	83.6	81.5	79.4
21	95.0	95.0	92.3	91.1	90.9	90.9	...	...	...	...	...	...	...	...
22	100.0	100.0	97.2	95.9	95.7	95.7	...	...	...	...	...	...	...	...
23	100.0	100.0	98.6	96.3	95.7	95.7	95.7	95.7	95.3	94.4	93.0	91.1	88.7	85.7
24	100.0	100.0	98.6	96.3	95.7	95.7	95.7	95.7	95.3	94.4	93.0	91.1	88.7	85.7
25	105.0	105.0	102.1	100.7	100.5	100.5	...	...	...	...	...	...	...	...
26	110.0	110.0	108.4	105.9	105.3	105.3	105.3	105.3	104.8	103.8	102.3	100.2	97.6	94.3
27	110.0	110.0	108.4	105.9	105.3	105.3	105.3	105.3	104.8	103.8	102.3	100.2	97.6	94.3
28	115.0	115.0	111.8	110.2	110.1	110.1	...	...	...	...	...	...	...	...
29	125.0	125.0	121.5	119.8	119.7	119.7	...	...	...	...	...	...	...	...
30	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	...	...	...
31	70.0	70.0	66.0	62.6	60.3	59.0	58.6	58.3	57.9	57.6	57.1	56.4	55.6	54.6
32	70.0	70.0	66.0	62.6	60.3	59.0	58.6	58.3	57.9	57.6	57.1	56.4	55.6	54.6
33	75.0	75.0	70.7	67.1	64.6	63.3	62.8	62.4	62.1	61.7	61.1	60.4	59.6	58.4
34	75.0	75.0	70.7	67.1	64.6	63.3	62.8	62.4	62.1	61.7	61.1	60.4	59.6	58.4
35	75.0	75.0	70.7	67.1	64.6	63.3	62.8	62.4	62.1	61.7	61.1	60.4	59.6	58.4
36	75.0	75.0	70.7	67.1	64.6	63.3	62.8	62.4	62.1	61.7	61.1	60.4	59.6	58.4
37	75.0	75.0	70.7	67.1	64.6	63.3	62.8	62.4	62.1	61.7	61.1	60.4	59.6	58.4
38	75.0	75.0	70.7	67.1	64.6	63.3	62.8	62.4	62.1	61.7	61.1	60.4	59.6	58.4
39	75.0	75.0	70.7	67.1	64.6	63.3	62.8	62.4	62.1	61.7	61.1	60.4	59.6	58.4
40	75.0	75.0	70.7	67.1	64.6	63.3	62.8	62.4	62.1	61.7	61.1	60.4	59.6	58.4
41	75.0	75.0	70.7	67.1	64.6	63.3	62.8	62.4	62.1	61.7	61.1	60.4	59.6	58.4
42	75.0	75.0	70.7	67.1	64.6	63.3	62.8	62.4	62.1	61.7	61.1	60.4	59.6	58.4
43	75.0	75.0	70.7	67.1	64.6	63.3	62.8	62.4	62.1	61.7	61.1	60.4	59.6	58.4
44	75.0	75.0	70.7	67.1	64.6	63.3	62.8	62.4	62.1	61.7	61.1	60.4	59.6	58.4
45	80.0	80.0	77.0	75.1	74.4	74.3	74.3	74.3	74.2	73.9	73.3	72.4	71.1	69.3

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding												
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
	Ferrous Materials (Cont'd)												
1	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...

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Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
	Ferrous Materials (Cont'd)							
1	16Cr–12Ni–2Mo–N	Smls. tube	SA–213	TP316N	S31651	...	...	80
2	16Cr–12Ni–2Mo–N	Plate	SA–240	316N	S31651	...	...	80
3	16Cr–12Ni–2Mo–N	Wld. tube	SA–249	TP316N	S31651	...	...	80
4	16Cr–12Ni–2Mo–N	Smls. & wld. pipe	SA–312	TP316N	S31651	...	...	80
5	16Cr–12Ni–2Mo–N	Wld. pipe	SA–358	316N	S31651	1	...	80
6	16Cr–12Ni–2Mo–N	Wld. pipe	SA–358	316N	S31651	3	...	80
7	16Cr–12Ni–2Mo–N	Wld. pipe	SA–358	316N	S31651	4	...	80
8	16Cr–12Ni–2Mo–N	Smls. pipe	SA–376	TP316N	S31651	...	...	80
9	16Cr–12Ni–2Mo–N	Smls. & wld. ftgs.	SA–403	316N	S31651	...	...	80
10	16Cr–12Ni–2Mo–N	Bar	SA–479	316N	S31651	...	...	80
11	16Cr–12Ni–2Mo–N	Wld. tube	SA–688	TP316N	S31651	...	...	80
12	16Cr–12Ni–2Mo–N	Wld. pipe	SA–813	TP316N	S31651	...	...	80
13	16Cr–12Ni–2Mo–N	Wld. pipe	SA–814	TP316N	S31651	...	...	80
14	16Cr–12Ni–2Mo–N	Forgings	SA–965	F316N	S31651	...	...	80
15	16Cr–12Ni–2Mo–N	Plate	SA/EN 10028–7	X2CrNiMoN17–11–2	...	...	≤3	84
16	16Cr–12Ni–2Mo–N	Plate	SA/EN 10028–7	X2CrNiMoN17–13–3	...	...	≤3	84
17	16Cr–12Ni–2Mo–Ti	Plate	SA–240	316Ti	S31635	...	...	75
18	17Cr–4Ni–6Mn	Plate	SA–240	201–1	S20100	...	...	75
19	17Cr–4Ni–6Mn	Plate	SA–666	201–1	S20100	...	...	75
20	17Cr–4Ni–6Mn	Plate	SA–240	201–2	S20100	...	...	95
21	17Cr–4Ni–6Mn	Plate	SA–666	201–2	S20100	...	...	95
22	17Cr–7Ni	Plate, sheet, strip	SA–240	301	S30100	...	...	75
23	17.5Cr–17.5Ni–5.3Si	Plate	SA–240	...	S30601	Solution ann.	...	78
24	18Cr–3Ni–12Mn	Plate	SA–240	XM–29	S24000	...	...	100
25	18Cr–3Ni–12Mn	Wld. tube	SA–249	XM–29	S24000	...	...	100
26	18Cr–3Ni–12Mn	Wld. pipe	SA–312	XM–29	S24000	...	...	100
27	18Cr–3Ni–12Mn	Bar	SA–479	XM–29	S24000	...	...	100
28	18Cr–3Ni–12Mn	Wld. tube	SA–688	TPXM–29	S24000	...	...	100
29	18Cr–5Ni–3Mo	Smls. & wld. tube	SA–789	...	S31500	...	...	92
30	18Cr–5Ni–3Mo	Smls. & wld. pipe	SA–790	...	S31500	...	...	92
(**21**) 31	18Cr–8Ni	Forgings	SA–182	F304L	S30403	...	>5	65
(**21**) 32	18Cr–8Ni	Forgings	SA–965	F304L	S30403	...	...	65
(**21**) 33	18Cr–8Ni	Forgings	SA–182	F304L	S30403	...	≤5	70
(**21**) 34	18Cr–8Ni	Smls. tube	SA–213	TP304L	S30403	...	...	70
(**21**) 35	18Cr–8Ni	Plate	SA–240	304L	S30403	...	...	70
(**21**) 36	18Cr–8Ni	Wld. tube	SA–249	TP304L	S30403	...	...	70
(**21**) 37	18Cr–8Ni	Smls. & wld. pipe	SA–312	TP304L	S30403	...	...	70
(**21**) 38	18Cr–8Ni	Wld. pipe	SA–358	304L	S30403	1	...	70
(**21**) 39	18Cr–8Ni	Wld. pipe	SA–358	304L	S30403	3	...	70
(**21**) 40	18Cr–8Ni	Wld. pipe	SA–358	304L	S30403	4	...	70
(**21**) 41	18Cr–8Ni	Smls. & wld. ftgs.	SA–403	304L	S30403	...	...	70
(**21**) 42	18Cr–8Ni	Wld. pipe	SA–409	TP304L	S30403	...	...	70
(**21**) 43	18Cr–8Ni	Bar	SA–479	304L	S30403	Annealed	...	70
(**21**) 44	18Cr–8Ni	Wld. tube	SA–688	TP304L	S30403	...	...	70
45	18Cr–8Ni	Wld. pipe	SA–813	TP304L	S30403	...	...	70

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
												Ferrous Materials (Cont'd)		
1	80.0	80.0	77.0	75.1	74.4	74.3	74.3	74.3	74.2	73.9	73.3	72.4	71.1	69.3
2	80.0	80.0	77.0	75.1	74.4	74.3	74.3	74.3	74.2	73.9	73.3	72.4	71.1	69.3
3	80.0	80.0	77.0	75.1	74.4	74.3	74.3	74.3	74.2	73.9	73.3	72.4	71.1	69.3
4	80.0	80.0	77.0	75.1	74.4	74.3	74.3	74.3	74.2	73.9	73.3	72.4	71.1	69.3
5	80.0	80.0	77.0	75.1	74.4	74.3	74.3	74.3	74.2	73.9	73.3	72.4	71.1	69.3
6	80.0	80.0	77.0	75.1	74.4	74.3	74.3	74.3	74.2	73.9	73.3	72.4	71.1	69.3
7	80.0	80.0	77.0	75.1	74.4	74.3	74.3	74.3	74.2	73.9	73.3	72.4	71.1	69.3
8	80.0	80.0	77.0	75.1	74.4	74.3	74.3	74.3	74.2	73.9	73.3	72.4	71.1	69.3
9	80.0	80.0	77.0	75.1	74.4	74.3	74.3	74.3	74.2	73.9	73.3	72.4	71.1	69.3
10	80.0	80.0	77.0	75.1	74.4	74.3	74.3	74.3	74.2	73.9	73.3	72.4	71.1	69.3
11	80.0	80.0	77.0	75.1	74.4	74.3	74.3	74.3	74.2	73.9	73.3	72.4	71.1	69.3
12	80.0	80.0	77.0	75.1	74.4	74.3	74.3	74.3	74.2	73.9	73.3	72.4	71.1	69.3
13	80.0	80.0	77.0	75.1	74.4	74.3	74.3	74.3	74.2	73.9	73.3	72.4	71.1	69.3
14	80.0	80.0	77.0	75.1	74.4	74.3	74.3	74.3	74.2	73.9	73.3	72.4	71.1	69.3
15	84.1	83.5	79.5	75.4	72.5	70.9	70.4	70.0	69.7	69.2	68.6	67.8	66.7	65.6
16	84.1	83.5	79.5	75.4	72.5	70.9	70.4	70.0	69.7	69.2	68.6	67.8	66.7	65.6
17	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	...	...	...
18	75.0	65.6	60.3	58.4	...	...	...	...	...	...	...	...	...	...
19	75.0	65.6	60.3	58.4	...	...	...	...	...	...	...	...	...	...
20	95.0	83.1	76.4	74.0	...	...	...	...	...	...	...	...	...	...
21	95.0	83.1	76.4	74.0	...	...	...	...	...	...	...	...	...	...
22	75.0	61.1	55.1	53.9	53.9	53.9	53.9	53.7	52.5	51.2	49.9	49.2	...	...
23	78.0	78.0	74.0	70.0	66.0	...	...	...	...	...	...	...	...	...
24	100.0	97.7	91.1	87.3	85.1	83.3	82.0	80.5	78.5	76.3	73.8	71.4	69.4	68.3
25	100.0	97.7	91.1	87.3	85.1	83.3	82.0	80.5	78.5	76.3	73.8	71.4	69.4	68.3
26	100.0	97.7	91.1	87.3	85.1	83.3	82.0	80.5	78.5	76.3	73.8	71.4	69.4	68.3
27	100.0	97.7	91.1	87.3	85.1	83.3	82.0	80.5	78.5	76.3	73.8	71.4	69.4	68.3
28	100.0	97.7	91.1	87.3	85.1	83.3	82.0	80.5	78.5	76.3	73.8	71.4	69.4	68.3
29	92.0	88.8	85.4	84.8	84.8	84.8	84.8	84.8	84.8	...	...	...	...	...
30	92.0	88.8	85.4	84.8	84.8	84.8	84.8	84.8	84.8	...	...	...	...	...
31	65.0	61.3	56.9	54.5	53.4	52.9	52.6	52.4	52.0	51.4	50.7	49.8	48.6	47.1
32	65.0	61.3	56.9	54.5	53.4	52.9	52.6	52.4	52.0	51.4	50.7	49.8	48.6	47.1
33	70.0	66.1	61.2	58.7	57.5	56.9	56.7	56.4	56.0	55.4	54.6	53.6	52.3	50.7
34	70.0	66.1	61.2	58.7	57.5	56.9	56.7	56.4	56.0	55.4	54.6	53.6	52.3	50.7
35	70.0	66.1	61.2	58.7	57.5	56.9	56.7	56.4	56.0	55.4	54.6	53.6	52.3	50.7
36	70.0	66.1	61.2	58.7	57.5	56.9	56.7	56.4	56.0	55.4	54.6	53.6	52.3	50.7
37	70.0	66.1	61.2	58.7	57.5	56.9	56.7	56.4	56.0	55.4	54.6	53.6	52.3	50.7
38	70.0	66.1	61.2	58.7	57.5	56.9	56.7	56.4	56.0	55.4	54.6	53.6	52.3	50.7
39	70.0	66.1	61.2	58.7	57.5	56.9	56.7	56.4	56.0	55.4	54.6	53.6	52.3	50.7
40	70.0	66.1	61.2	58.7	57.5	56.9	56.7	56.4	56.0	55.4	54.6	53.6	52.3	50.7
41	70.0	66.1	61.2	58.7	57.5	56.9	56.7	56.4	56.0	55.4	54.6	53.6	52.3	50.7
42	70.0	66.1	61.2	58.7	57.5	56.9	56.7	56.4	56.0	55.4	54.6	53.6	52.3	50.7
43	70.0	66.1	61.2	58.7	57.5	56.9	56.7	56.4	56.0	55.4	54.6	53.6	52.3	50.7
44	70.0	66.1	61.2	58.7	57.5	56.9	56.7	56.4	56.0	55.4	54.6	53.6	52.3	50.7
45	70.0	66.1	61.2	58.7	57.5	56.9	56.7	56.4	56.0	55.4	54.6	53.6	52.3	50.7

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Ferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	46.6	45.6	44.7	43.7	...	...	...	...	...	...	...	...	...	(**21**)
32	46.6	45.6	44.7	43.7	...	...	...	...	...	...	...	...	...	(**21**)
33	50.2	49.1	48.1	47.0	...	...	...	...	...	...	...	...	...	(**21**)
34	50.2	49.1	48.1	47.0	...	...	...	...	...	...	...	...	...	(**21**)
35	50.2	49.1	48.1	47.0	...	...	...	...	...	...	...	...	...	(**21**)
36	50.2	49.1	48.1	47.0	...	...	...	...	...	...	...	...	...	(**21**)
37	50.2	49.1	48.1	47.0	...	...	...	...	...	...	...	...	...	(**21**)
38	50.2	49.1	48.1	47.0	...	...	...	...	...	...	...	...	...	(**21**)
39	50.2	49.1	48.1	47.0	...	...	...	...	...	...	...	...	...	(**21**)
40	50.2	49.1	48.1	47.0	...	...	...	...	...	...	...	...	...	(**21**)
41	50.2	49.1	48.1	47.0	...	...	...	...	...	...	...	...	...	(**21**)
42	50.2	49.1	48.1	47.0	...	...	...	...	...	...	...	...	...	(**21**)
43	50.2	49.1	48.1	47.0	...	...	...	...	...	...	...	...	...	(**21**)
44	50.2	49.1	48.1	47.0	...	...	...	...	...	...	...	...	...	(**21**)
45	50.2	49.1	48.1	47.0	...	...	...	...	...	...	...	...	...	

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Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
		Ferrous Materials (Cont'd)							
(**21**)	1	18Cr–8Ni	Wld. pipe	SA–814	TP304L	S30403	...	...	70
	2	18Cr–8Ni	Bar	SA/JIS G4303	SUS304L	...	...	...	70
(**21**)	3	18Cr–8Ni	Forgings	SA–182	F304	S30400	...	>5	70
	4	18Cr–8Ni	Forgings	SA–182	F304H	S30409	...	>5	70
	5	18Cr–8Ni	Castings	SA–351	CF3	J92500	...	...	70
	6	18Cr–8Ni	Castings	SA–351	CF8	J92600	...	...	70
(**21**)	7	18Cr–8Ni	Smls. pipe	SA–376	TP304	S30400	...	...	70
	8	18Cr–8Ni	Cast pipe	SA–451	CPF3	J92500	...	...	70
	9	18Cr–8Ni	Cast pipe	SA–451	CPF8	J92600	...	...	70
(**21**)	10	18Cr–8Ni	Forgings	SA–965	F304	S30400	...	...	70
	11	18Cr–8Ni	Forgings	SA–965	F304H	S30409	...	...	70
	12	18Cr–8Ni	Plate	SA/EN 10028–7	X2CrNi18–9	...	...	≤3	72.5
(**21**)	13	18Cr–8Ni	Forgings	SA–182	F304	S30400	...	≤5	75
	14	18Cr–8Ni	Forgings	SA–182	F304H	S30409	...	≤5	75
(**21**)	15	18Cr–8Ni	Bolting	SA–193	B8	S30400	1	...	75
(**21**)	16	18Cr–8Ni	Bolting	SA–193	B8A	S30400	1A	...	75
(**21**)	17	18Cr–8Ni	Smls. tube	SA–213	TP304	S30400	...	...	75
	18	18Cr–8Ni	Smls. tube	SA–213	TP304H	S30409	...	...	75
	19	18Cr–8Ni	Plate	SA–240	302	S30200	...	...	75
(**21**)	20	18Cr–8Ni	Plate	SA–240	304	S30400	...	...	75
	21	18Cr–8Ni	Plate	SA–240	304H	S30409	...	...	75
(**21**)	22	18Cr–8Ni	Wld. tube	SA–249	TP304	S30400	...	...	75
	23	18Cr–8Ni	Wld. tube	SA–249	TP304H	S30409	...	...	75
(**21**)	24	18Cr–8Ni	Smls. & wld. pipe	SA–312	TP304	S30400	...	...	75
	25	18Cr–8Ni	Smls. & wld. pipe	SA–312	TP304H	S30409	...	...	75
(**21**)	26	18Cr–8Ni	Bolting	SA–320	B8	S30400	1	...	75
(**21**)	27	18Cr–8Ni	Bolting	SA–320	B8A	S30400	1A	...	75
(**21**)	28	18Cr–8Ni	Wld. pipe	SA–358	304	S30400	1	...	75
(**21**)	29	18Cr–8Ni	Wld. pipe	SA–358	304	S30400	3	...	75
(**21**)	30	18Cr–8Ni	Wld. pipe	SA–358	304	S30400	4	...	75
	31	18Cr–8Ni	Wld. pipe	SA–358	304H	S30409	1	...	75
	32	18Cr–8Ni	Wld. pipe	SA–358	304H	S30409	3	...	75
	33	18Cr–8Ni	Wld. pipe	SA–358	304H	S30409	4	...	75
	34	18Cr–8Ni	Wld. pipe	SA–358	304LN	S30453	1	...	75
	35	18Cr–8Ni	Wld. pipe	SA–358	304LN	S30453	3	...	75
	36	18Cr–8Ni	Wld. pipe	SA–358	304LN	S30453	4	...	75
(**21**)	37	18Cr–8Ni	Smls. pipe	SA–376	TP304	S30400	...	...	75
	38	18Cr–8Ni	Smls. pipe	SA–376	TP304H	S30409	...	...	75
(**21**)	39	18Cr–8Ni	Smls. & wld. ftgs.	SA–403	304	S30400	...	...	75
	40	18Cr–8Ni	Smls. & wld. ftgs.	SA–403	304H	S30409	...	...	75
(**21**)	41	18Cr–8Ni	Wld. pipe	SA–409	TP304	S30400	...	...	75
	42	18Cr–8Ni	Bar	SA–479	302	S30200	...	...	75
(**21**)	43	18Cr–8Ni	Bar	SA–479	304	S30400	Annealed	...	75
	44	18Cr–8Ni	Bar	SA–479	304H	S30409	...	...	75
	45	18Cr–8Ni	Wld. tube	SA–688	TP304	S30400	...	...	75

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
														Ferrous Materials (Cont'd)
1	70.0	66.1	61.2	58.7	57.5	56.9	56.7	56.4	56.0	55.4	54.6	53.6	52.3	50.7
2	70.0	66.1	61.2	58.7	57.5	56.9	56.7	56.4	56.0	55.4	54.6	53.6	52.3	50.7
3	70.0	66.3	61.8	59.7	59.2	59.2	59.2	59.2	59.0	58.6	57.9	56.8	55.4	53.6
4	70.0	66.3	61.8	59.7	59.2	59.2	59.2	59.2	59.0	58.6	57.9	56.8	55.4	53.6
5	70.0	66.3	61.8	59.7	59.2	59.2	59.2	59.2	59.0	58.6	57.9	56.8	55.4	53.6
6	70.0	66.3	61.8	59.7	59.2	59.2	59.2	59.2	59.0	58.6	57.9	56.8	55.4	53.6
7	70.0	66.3	61.8	59.7	59.2	59.2	59.2	59.2	59.0	58.6	57.9	56.8	55.4	53.6
8	70.0	66.3	61.8	59.7	59.2	59.2	59.2	59.2	59.0	58.6	57.9	56.8	55.4	53.6
9	70.0	66.3	61.8	59.7	59.2	59.2	59.2	59.2	59.0	58.6	57.9	56.8	55.4	53.6
10	70.0	66.3	61.8	59.7	59.2	59.2	59.2	59.2	59.0	58.6	57.9	56.8	55.4	53.6
11	70.0	66.3	61.8	59.7	59.2	59.2	59.2	59.2	59.0	58.6	57.9	56.8	55.4	53.6
12	72.5	68.1	63.9	60.8	59.3	58.8	58.7	58.5	58.1	57.5	56.6	55.4	54.0	52.7
13	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
14	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
15	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
16	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
17	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
18	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
19	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
20	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
21	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
22	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
23	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
24	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
25	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
26	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
27	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
28	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
29	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
30	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
31	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
32	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
33	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
34	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
35	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
36	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
37	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
38	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
39	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
40	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
41	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
42	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
43	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
44	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
45	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Ferrous Materials (Cont'd)													
1	50.2	49.1	48.1	47.0	...	...	...	...	...	...	...	...	...	(**21**)
2	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	52.4	50.1	47.4	44.2	40.6	36.7	32.7	28.8	25.3	22.4	...	...	...	(**21**)
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	52.4	50.1	47.4	44.2	40.6	36.7	32.7	28.8	25.3	22.4	...	...	...	(**21**)
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	52.4	50.1	47.4	44.2	40.6	36.7	32.7	28.8	25.3	22.4	...	...	...	(**21**)
11	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	56.1	53.7	50.8	47.3	43.5	39.3	35.0	30.9	27.1	24.0	...	...	...	(**21**)
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	56.1	53.7	50.8	47.3	43.5	39.3	35.0	30.9	27.1	24.0	...	...	...	(**21**)
16	56.1	53.7	50.8	47.3	43.5	39.3	35.0	30.9	27.1	24.0	...	...	...	(**21**)
17	56.1	53.7	50.8	47.3	43.5	39.3	35.0	30.9	27.1	24.0	...	...	...	(**21**)
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	56.1	53.7	50.8	47.3	43.5	39.3	35.0	30.9	27.1	24.0	...	...	...	(**21**)
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	56.1	53.7	50.8	47.3	43.5	39.3	35.0	30.9	27.1	24.0	...	...	...	(**21**)
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	56.1	53.7	50.8	47.3	43.5	39.3	35.0	30.9	27.1	24.0	...	...	...	(**21**)
25	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	56.1	53.7	50.8	47.3	43.5	39.3	35.0	30.9	27.1	24.0	...	...	...	(**21**)
27	56.1	53.7	50.8	47.3	43.5	39.3	35.0	30.9	27.1	24.0	...	...	...	(**21**)
28	56.1	53.7	50.8	47.3	43.5	39.3	35.0	30.9	27.1	24.0	...	...	...	(**21**)
29	56.1	53.7	50.8	47.3	43.5	39.3	35.0	30.9	27.1	24.0	...	...	...	(**21**)
30	56.1	53.7	50.8	47.3	43.5	39.3	35.0	30.9	27.1	24.0	...	...	...	(**21**)
31	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	56.1	53.7	50.8	47.3	43.5	39.3	35.0	30.9	27.1	24.0	...	...	...	(**21**)
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	56.1	53.7	50.8	47.3	43.5	39.3	35.0	30.9	27.1	24.0	...	...	...	(**21**)
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	56.1	53.7	50.8	47.3	43.5	39.3	35.0	30.9	27.1	24.0	...	...	...	(**21**)
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	56.1	53.7	50.8	47.3	43.5	39.3	35.0	30.9	27.1	24.0	...	...	...	(**21**)
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	56.1	53.7	50.8	47.3	43.5	39.3	35.0	30.9	27.1	24.0	...	...	...	

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Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
		Ferrous Materials (Cont'd)							
(**21**)	1	18Cr–8Ni	Wld. pipe	SA–813	TP304	S30400	...	...	75
	2	18Cr–8Ni	Wld. pipe	SA–813	TP304H	S30409	...	...	75
(**21**)	3	18Cr–8Ni	Wld. pipe	SA–814	TP304	S30400	...	...	75
	4	18Cr–8Ni	Wld. pipe	SA–814	TP304H	S30409	...	...	75
	5	18Cr–8Ni	Bar	SA/JIS G4303	SUS302	...	...	...	75
	6	18Cr–8Ni	Bar	SA/JIS G4303	SUS304	...	...	...	75
	7	18Cr–8Ni	Plate	SA/EN 10028–7	X5CrNi18–10	...	...	≤3	75
	8	18Cr–8Ni	Castings	SA–351	CF3A	J92500	...	...	77
	9	18Cr–8Ni	Castings	SA–351	CF8A	J92600	...	...	77
	10	18Cr–8Ni	Cast pipe	SA–451	CPF3A	J92500	...	...	77
	11	18Cr–8Ni	Cast pipe	SA–451	CPF8A	J92600	...	...	77
	12	18Cr–8Ni	Bolting	SA–320	B8	S30400	2	$1\frac{1}{4} < t \le 1\frac{1}{2}$	100
	13	18Cr–8Ni	Bolting	SA–320	B8	S30400	2	$1 < t \le 1\frac{1}{4}$	105
	14	18Cr–8Ni	Bolting	SA–320	B8	S30400	2	$\frac{3}{4} < t \le 1$	115
	15	18Cr–8Ni	Bolting	SA–320	B8	S30400	2	$t \le \frac{3}{4}$	125
	16	18Cr–8Ni–N	Forgings	SA–182	F304LN	S30453	...	>5	70
	17	18Cr–8Ni–N	Forgings	SA–965	F304LN	S30453	...	...	70
	18	18Cr–8Ni–N	Forgings	SA–182	F304LN	S30453	...	≤5	75
	19	18Cr–8Ni–N	Bolting	SA–193	B8NA	S30451	1A	...	75
	20	18Cr–8Ni–N	Smls. tube	SA–213	TP304LN	S30453	...	...	75
	21	18Cr–8Ni–N	Plate	SA–240	304LN	S30453	...	...	75
	22	18Cr–8Ni–N	Wld. tube	SA–249	TP304LN	S30453	...	...	75
	23	18Cr–8Ni–N	Smls. & wld. pipe	SA–312	TP304LN	S30453	...	...	75
	24	18Cr–8Ni–N	Smls. pipe	SA–376	TP304LN	S30453	...	...	75
	25	18Cr–8Ni–N	Smls. & wld. ftgs.	SA–403	304LN	S30453	WP	...	75
	26	18Cr–8Ni–N	Bar	SA–479	304LN	S30453	...	...	75
	27	18Cr–8Ni–N	Wld. tube	SA–688	TP304LN	S30453	...	...	75
	28	18Cr–8Ni–N	Wld. pipe	SA–813	TP304LN	S30453	...	...	75
	29	18Cr–8Ni–N	Wld. pipe	SA–814	TP304LN	S30453	...	...	75
	30	18Cr–8Ni–N	Forgings	SA–182	F304N	S30451	...	...	80
	31	18Cr–8Ni–N	Smls. tube	SA–213	TP304N	S30451	...	...	80
	32	18Cr–8Ni–N	Plate	SA–240	304N	S30451	...	...	80
	33	18Cr–8Ni–N	Wld. tube	SA–249	TP304N	S30451	...	...	80
	34	18Cr–8Ni–N	Smls. & wld. pipe	SA–312	TP304N	S30451	...	...	80
	35	18Cr–8Ni–N	Wld. pipe	SA–358	304N	S30451	1	...	80
	36	18Cr–8Ni–N	Wld. pipe	SA–358	304N	S30451	3	...	80
	37	18Cr–8Ni–N	Wld. pipe	SA–358	304N	S30451	4	...	80
	38	18Cr–8Ni–N	Smls. pipe	SA–376	TP304N	S30451	...	...	80
	39	18Cr–8Ni–N	Smls. & wld. ftgs.	SA–403	304N	S30451	...	...	80
	40	18Cr–8Ni–N	Bar	SA–479	304N	S30451	...	...	80
	41	18Cr–8Ni–N	Wld. tube	SA–688	TP304N	S30451	...	...	80
	42	18Cr–8Ni–N	Wld. pipe	SA–813	TP304N	S30451	...	...	80
	43	18Cr–8Ni–N	Wld. pipe	SA–814	TP304N	S30451	...	...	80
	44	18Cr–8Ni–N	Forgings	SA–965	F304N	S30451	...	...	80
	45	18Cr–8Ni–N	Plate	SA/EN 10028–7	X2CrNiN18–10	...	...	≤3	80

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
														Ferrous Materials (Cont'd)
1	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
2	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
3	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
4	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
5	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
6	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
7	75.4	71.1	67.0	64.4	63.5	63.5	63.5	63.5	63.5	63.2	62.3	61.1	59.5	57.8
8	77.0	72.9	68.0	65.7	65.1	65.1	65.1	65.1	65.0	64.5	63.6	62.5	60.9	58.9
9	77.0	72.9	68.0	65.7	65.1	65.1	65.1	65.1	65.0	64.5	63.6	62.5	60.9	58.9
10	77.0	72.9	68.0	65.7	65.1	65.1	65.1	65.1	65.0	64.5	63.6	62.5	60.9	58.9
11	77.0	72.9	68.0	65.7	65.1	65.1	65.1	65.1	65.0	64.5	63.6	62.5	60.9	58.9
12	100.0	...	...	...	...	...	...	...	...	...	...	...	...	...
13	105.0	...	...	...	...	...	...	...	...	...	...	...	...	...
14	115.0	...	...	...	...	...	...	...	...	...	...	...	...	...
15	125.0	...	...	...	...	...	...	...	...	...	...	...	...	...
16	70.0	66.3	61.8	59.7	59.2	59.2	59.2	59.2	59.0	58.6	57.9	56.8	55.4	53.6
17	70.0	66.3	61.8	59.7	59.2	59.2	59.2	59.2	59.0	58.6	57.9	56.8	55.4	53.6
18	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
19	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
20	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
21	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
22	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
23	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
24	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
25	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
26	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
27	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
28	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
29	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
30	80.0	80.0	76.1	73.2	71.2	69.7	69.1	68.6	67.9	67.3	66.5	65.5	64.4	63.0
31	80.0	80.0	76.1	73.2	71.2	69.7	69.1	68.6	67.9	67.3	66.5	65.5	64.4	63.0
32	80.0	80.0	76.1	73.2	71.2	69.7	69.1	68.6	67.9	67.3	66.5	65.5	64.4	63.0
33	80.0	80.0	76.1	73.2	71.2	69.7	69.1	68.6	67.9	67.3	66.5	65.5	64.4	63.0
34	80.0	80.0	76.1	73.2	71.2	69.7	69.1	68.6	67.9	67.3	66.5	65.5	64.4	63.0
35	80.0	80.0	76.1	73.2	71.2	69.7	69.1	68.6	67.9	67.3	66.5	65.5	64.4	63.0
36	80.0	80.0	76.1	73.2	71.2	69.7	69.1	68.6	67.9	67.3	66.5	65.5	64.4	63.0
37	80.0	80.0	76.1	73.2	71.2	69.7	69.1	68.6	67.9	67.3	66.5	65.5	64.4	63.0
38	80.0	80.0	76.1	73.2	71.2	69.7	69.1	68.6	67.9	67.3	66.5	65.5	64.4	63.0
39	80.0	80.0	76.1	73.2	71.2	69.7	69.1	68.6	67.9	67.3	66.5	65.5	64.4	63.0
40	80.0	80.0	76.1	73.2	71.2	69.7	69.1	68.6	67.9	67.3	66.5	65.5	64.4	63.0
41	80.0	80.0	76.1	73.2	71.2	69.7	69.1	68.6	67.9	67.3	66.5	65.5	64.4	63.0
42	80.0	80.0	76.1	73.2	71.2	69.7	69.1	68.6	67.9	67.3	66.5	65.5	64.4	63.0
43	80.0	80.0	76.1	73.2	71.2	69.7	69.1	68.6	67.9	67.3	66.5	65.5	64.4	63.0
44	80.0	80.0	76.1	73.2	71.2	69.7	69.1	68.6	67.9	67.3	66.5	65.5	64.4	63.0
45	79.8	75.3	70.9	68.1	67.1	67.1	67.1	67.1	67.1	66.9	65.9	64.6	62.9	61.2

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Ferrous Materials (Cont'd)													
1	56.1	53.7	50.8	47.3	43.5	39.3	35.0	30.9	27.1	24.0	...	...	...	(**21**)
2	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	56.1	53.7	50.8	47.3	43.5	39.3	35.0	30.9	27.1	24.0	...	...	...	(**21**)
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
		Ferrous Materials (Cont'd)							
	1	18Cr–8Ni–N	Plate	SA/EN 10028–7	X5CrNiN19–9	...	...	≤3	80
	2	18Cr–8Ni–Se	Bolting	SA–320	B8F	S30323	1	...	75
	3	18Cr–8Ni–Se	Bolting	SA–320	B8FA	S30323	1A	...	75
	4	18Cr–8Ni–4Si–N	Bar	SA–479	...	S21800	...	...	95
	5	18Cr–9Ni–3Cu–Cb–N	Smls. tube	SA–213	...	S30432	...	...	86
	6	18Cr–10Ni–Cb	Forgings	SA–965	F348H	S34809	...	...	65
	7	18Cr–10Ni–Cb	Castings	SA–351	CF8C	J92710	...	...	70
	8	18Cr–10Ni–Cb	Cast pipe	SA–451	CPF8C	J92710	...	...	70
(**21**)	9	18Cr–10Ni–Cb	Forgings	SA–182	F347	S34700	...	>5	70
(**21**)	10	18Cr–10Ni–Cb	Forgings	SA–965	F347	S34700	...	...	70
	11	18Cr–10Ni–Cb	Forgings	SA–182	F347H	S34709	...	>5	70
	12	18Cr–10Ni–Cb	Forgings	SA–965	F347H	S34709	...	...	70
(**21**)	13	18Cr–10Ni–Cb	Forgings	SA–182	F348	S34800	...	>5	70
(**21**)	14	18Cr–10Ni–Cb	Forgings	SA–965	F348	S34800	...	...	70
	15	18Cr–10Ni–Cb	Forgings	SA–182	F348H	S34809	...	>5	70
(**21**)	16	18Cr–10Ni–Cb	Forgings	SA–182	F347	S34700	...	≤5	75
(**21**)	17	18Cr–10Ni–Cb	Bolting	SA–193	B8C	S34700	1	...	75
(**21**)	18	18Cr–10Ni–Cb	Smls. tube	SA–213	TP347	S34700	...	...	75
(**21**)	19	18Cr–10Ni–Cb	Plate	SA–240	347	S34700	...	...	75
(**21**)	20	18Cr–10Ni–Cb	Wld. tube	SA–249	TP347	S34700	...	...	75
(**21**)	21	18Cr–10Ni–Cb	Smls. & wld. pipe	SA–312	TP347	S34700	...	...	75
(**21**)	22	18Cr–10Ni–Cb	Bolting	SA–320	B8C	S34700	1	...	75
(**21**)	23	18Cr–10Ni–Cb	Bolting	SA–320	B8CA	S34700	1A	...	75
(**21**)	24	18Cr–10Ni–Cb	Wld. pipe	SA–358	347	S34700	1	...	75
(**21**)	25	18Cr–10Ni–Cb	Wld. pipe	SA–358	347	S34700	3	...	75
(**21**)	26	18Cr–10Ni–Cb	Wld. pipe	SA–358	347	S34700	4	...	75
(**21**)	27	18Cr–10Ni–Cb	Smls. pipe	SA–376	TP347	S34700	...	...	75
(**21**)	28	18Cr–10Ni–Cb	Smls. & wld. ftgs.	SA–403	347	S34700	...	...	75
(**21**)	29	18Cr–10Ni–Cb	Wld. pipe	SA–409	TP347	S34700	...	...	75
(**21**)	30	18Cr–10Ni–Cb	Bar	SA–479	347	S34700	...	...	75
(**21**)	31	18Cr–10Ni–Cb	Wld. pipe	SA–813	TP347	S34700	...	...	75
	32	18Cr–10Ni–Cb	Bar	SA/JIS G4303	SUS347	...	...	...	75
	33	18Cr–10Ni–Cb	Forgings	SA–182	F347H	S34709	...	≤5	75
	34	18Cr–10Ni–Cb	Smls. tube	SA–213	TP347H	S34709	...	...	75
	35	18Cr–10Ni–Cb	Plate	SA–240	347H	S34709	...	...	75
	36	18Cr–10Ni–Cb	Wld. tube	SA–249	TP347H	S34709	...	...	75
	37	18Cr–10Ni–Cb	Smls. & wld. pipe	SA–312	TP347H	S34709	...	...	75
	38	18Cr–10Ni–Cb	Smls. pipe	SA–376	TP347H	S34709	...	...	75
	39	18Cr–10Ni–Cb	Smls. & wld. ftgs.	SA–403	347H	S34709	...	...	75
	40	18Cr–10Ni–Cb	Bar	SA–479	347H	S34709	...	...	75
	41	18Cr–10Ni–Cb	Wld. pipe	SA–813	TP347H	S34709	...	...	75
	42	18Cr–10Ni–Cb	Wld. pipe	SA–814	TP347H	S34709	...	...	75
	43	18Cr–10Ni–Cb	Smls. tube	SA–213	TP347LN	S34751	...	...	75
	44	18Cr–10Ni–Cb	Smls. pipe	SA–312	TP347LN	S34751	...	...	75
(**21**)	45	18Cr–10Ni–Cb	Forgings	SA–182	F348	S34800	...	≤5	75

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
												Ferrous Materials (Cont'd)		
1	79.8	79.2	76.2	73.1	70.8	69.4	68.9	68.4	67.8	67.1	66.3	65.3	64.1	62.9
2	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
3	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
4	95.0	93.9	87.0	82.1	79.3	77.9	77.5	77.1	76.7	76.2	75.5	74.7	73.6	72.5
5	86.0	85.8	82.1	80.2	79.5	79.1	79.0	78.7	78.3	77.7	76.8	75.7	74.3	71.9
6	65.0	62.2	57.1	53.9	52.0	51.2	51.0	51.0	51.0	51.0	50.9	50.7	50.4	49.8
7	70.0	66.9	61.5	58.0	56.0	55.1	55.0	54.9	54.9	54.9	54.8	54.6	54.2	53.6
8	70.0	67.0	61.5	58.0	56.0	55.1	54.9	54.9	54.9	54.9	54.8	54.6	54.3	53.7
9	70.0	66.9	61.5	58.0	56.0	55.1	55.0	54.9	54.9	54.9	54.8	54.6	54.2	53.6
10	70.0	66.9	61.5	58.0	56.0	55.1	55.0	54.9	54.9	54.9	54.8	54.6	54.2	53.6
11	70.0	67.0	61.5	58.0	56.0	55.1	54.9	54.9	54.9	54.9	54.8	54.6	54.3	53.7
12	70.0	67.0	61.5	58.0	56.0	55.1	54.9	54.9	54.9	54.9	54.8	54.6	54.3	53.7
13	70.0	66.9	61.5	58.0	56.0	55.1	55.0	54.9	54.9	54.9	54.8	54.6	54.2	53.6
14	70.0	66.9	61.5	58.0	56.0	55.1	55.0	54.9	54.9	54.9	54.8	54.6	54.2	53.6
15	70.0	67.0	61.5	58.0	56.0	55.1	54.9	54.9	54.9	54.9	54.8	54.6	54.3	53.7
16	75.0	71.7	65.9	62.1	60.0	59.1	58.9	58.8	58.8	58.8	58.7	58.5	58.1	57.5
17	75.0	71.8	65.9	62.1	60.0	59.0	58.9	58.8	58.8	58.8	58.7	58.5	58.2	57.5
18	75.0	71.7	65.9	62.1	60.0	59.1	58.9	58.8	58.8	58.8	58.7	58.5	58.1	57.5
19	75.0	71.7	65.9	62.1	60.0	59.1	58.9	58.8	58.8	58.8	58.7	58.5	58.1	57.5
20	75.0	71.7	65.9	62.1	60.0	59.1	58.9	58.8	58.8	58.8	58.7	58.5	58.1	57.5
21	75.0	71.7	65.9	62.1	60.0	59.1	58.9	58.8	58.8	58.8	58.7	58.5	58.1	57.5
22	75.0	71.8	65.9	62.1	60.0	59.0	58.9	58.8	58.8	58.8	58.7	58.5	58.2	57.5
23	75.0	71.8	65.9	62.1	60.0	59.0	58.9	58.8	58.8	58.8	58.7	58.5	58.2	57.5
24	75.0	71.8	65.9	62.1	60.0	59.0	58.9	58.8	58.8	58.8	58.7	58.5	58.2	57.5
25	75.0	71.8	65.9	62.1	60.0	59.0	58.9	58.8	58.8	58.8	58.7	58.5	58.2	57.5
26	75.0	71.8	65.9	62.1	60.0	59.0	58.9	58.8	58.8	58.8	58.7	58.5	58.2	57.5
27	75.0	71.7	65.9	62.1	60.0	59.1	58.9	58.8	58.8	58.8	58.7	58.5	58.1	57.5
28	75.0	71.7	65.9	62.1	60.0	59.1	58.9	58.8	58.8	58.8	58.7	58.5	58.1	57.5
29	75.0	71.8	65.9	62.1	60.0	59.0	58.9	58.8	58.8	58.8	58.7	58.5	58.2	57.5
30	75.0	71.7	65.9	62.1	60.0	59.1	58.9	58.8	58.8	58.8	58.7	58.5	58.1	57.5
31	75.0	71.8	65.9	62.1	60.0	59.0	58.9	58.8	58.8	58.8	58.7	58.5	58.2	57.5
32	75.0	71.7	65.9	62.1	60.0	59.1	58.9	58.8	58.8	58.8	58.7	58.5	58.1	57.5
33	75.0	71.8	65.9	62.1	60.0	59.0	58.9	58.8	58.8	58.8	58.7	58.5	58.2	57.5
34	75.0	71.8	65.9	62.1	60.0	59.0	58.9	58.8	58.8	58.8	58.7	58.5	58.2	57.5
35	75.0	71.8	65.9	62.1	60.0	59.0	58.9	58.8	58.8	58.8	58.7	58.5	58.2	57.5
36	75.0	71.8	65.9	62.1	60.0	59.0	58.9	58.8	58.8	58.8	58.7	58.5	58.2	57.5
37	75.0	71.8	65.9	62.1	60.0	59.0	58.9	58.8	58.8	58.8	58.7	58.5	58.2	57.5
38	75.0	71.8	65.9	62.1	60.0	59.0	58.9	58.8	58.8	58.8	58.7	58.5	58.2	57.5
39	75.0	71.8	65.9	62.1	60.0	59.0	58.9	58.8	58.8	58.8	58.7	58.5	58.2	57.5
40	75.0	71.8	65.9	62.1	60.0	59.0	58.9	58.8	58.8	58.8	58.7	58.5	58.2	57.5
41	75.0	71.8	65.9	62.1	60.0	59.0	58.9	58.8	58.8	58.8	58.7	58.5	58.2	57.5
42	75.0	71.8	65.9	62.1	60.0	59.0	58.9	58.8	58.8	58.8	58.7	58.5	58.2	57.5
43	75.0	73.1	66.9	62.3	59.3	57.7	57.4	57.2	57.1	57.0	56.9	56.6	56.2	55.4
44	75.0	73.1	66.9	62.3	59.3	57.7	57.4	57.2	57.1	57.0	56.9	56.6	56.2	55.4
45	75.0	71.7	65.9	62.1	60.0	59.1	58.9	58.8	58.8	58.8	58.7	58.5	58.1	57.5

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Ferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	52.2	49.7	46.8	43.7	40.3	36.8	33.2	29.7	26.2	22.8	...	...	...	(**21**)
10	52.2	49.7	46.8	43.7	40.3	36.8	33.2	29.7	26.2	22.8	...	...	...	(**21**)
11	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	52.2	49.7	46.8	43.7	40.3	36.8	33.2	29.7	26.2	22.8	...	...	...	(**21**)
14	52.2	49.7	46.8	43.7	40.3	36.8	33.2	29.7	26.2	22.8	...	...	...	(**21**)
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	55.9	53.2	50.1	46.8	43.2	39.4	35.6	31.8	28.1	24.5	...	...	...	(**21**)
17	55.9	53.2	50.1	46.8	43.2	39.4	35.6	31.8	28.1	24.5	...	...	...	(**21**)
18	55.9	53.2	50.1	46.8	43.2	39.4	35.6	31.8	28.1	24.5	...	...	...	(**21**)
19	55.9	53.2	50.1	46.8	43.2	39.4	35.6	31.8	28.1	24.5	...	...	...	(**21**)
20	55.9	53.2	50.1	46.8	43.2	39.4	35.6	31.8	28.1	24.5	...	...	...	(**21**)
21	55.9	53.2	50.1	46.8	43.2	39.4	35.6	31.8	28.1	24.5	...	...	...	(**21**)
22	55.9	53.2	50.1	46.8	43.2	39.4	35.6	31.8	28.1	24.5	...	...	...	(**21**)
23	55.9	53.2	50.1	46.8	43.2	39.4	35.6	31.8	28.1	24.5	...	...	...	(**21**)
24	55.9	53.2	50.1	46.8	43.2	39.4	35.6	31.8	28.1	24.5	...	...	...	(**21**)
25	55.9	53.2	50.1	46.8	43.2	39.4	35.6	31.8	28.1	24.5	...	...	...	(**21**)
26	55.9	53.2	50.1	46.8	43.2	39.4	35.6	31.8	28.1	24.5	...	...	...	(**21**)
27	55.9	53.2	50.1	46.8	43.2	39.4	35.6	31.8	28.1	24.5	...	...	...	(**21**)
28	55.9	53.2	50.1	46.8	43.2	39.4	35.6	31.8	28.1	24.5	...	...	...	(**21**)
29	55.9	53.2	50.1	46.8	43.2	39.4	35.6	31.8	28.1	24.5	...	...	...	(**21**)
30	55.9	53.2	50.1	46.8	43.2	39.4	35.6	31.8	28.1	24.5	...	...	...	(**21**)
31	55.9	53.2	50.1	46.8	43.2	39.4	35.6	31.8	28.1	24.5	...	...	...	(**21**)
32	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	55.9	53.2	50.1	46.8	43.2	39.4	35.6	31.8	28.1	24.5	...	...	...	(**21**)

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Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
		Ferrous Materials (Cont'd)							
(**21**)	1	18Cr–10Ni–Cb	Smls. tube	SA–213	TP348	S34800	...	...	75
(**21**)	2	18Cr–10Ni–Cb	Plate	SA–240	348	S34800	...	...	75
(**21**)	3	18Cr–10Ni–Cb	Wld. tube	SA–249	TP348	S34800	...	...	75
(**21**)	4	18Cr–10Ni–Cb	Smls. & wld. pipe	SA–312	TP348	S34800	...	...	75
(**21**)	5	18Cr–10Ni–Cb	Wld. pipe	SA–358	348	S34800	1	...	75
(**21**)	6	18Cr–10Ni–Cb	Wld. pipe	SA–358	348	S34800	3	...	75
(**21**)	7	18Cr–10Ni–Cb	Wld. pipe	SA–358	348	S34800	4	...	75
(**21**)	8	18Cr–10Ni–Cb	Smls. pipe	SA–376	TP348	S34800	...	...	75
(**21**)	9	18Cr–10Ni–Cb	Smls. & wld. ftgs.	SA–403	348	S34800	...	...	75
(**21**)	10	18Cr–10Ni–Cb	Wld. pipe	SA–409	TP348	S34800	...	...	75
(**21**)	11	18Cr–10Ni–Cb	Bar	SA–479	348	S34800	...	...	75
(**21**)	12	18Cr–10Ni–Cb	Wld. pipe	SA–813	TP348	S34800	...	...	75
(**21**)	13	18Cr–10Ni–Cb	Wld. pipe	SA–814	TP348	S34800	...	...	75
	14	18Cr–10Ni–Cb	Forgings	SA–182	F348H	S34809	...	≤5	75
	15	18Cr–10Ni–Cb	Smls. tube	SA–213	TP348H	S34809	...	...	75
	16	18Cr–10Ni–Cb	Plate	SA–240	348H	S34809	...	...	75
	17	18Cr–10Ni–Cb	Wld. tube	SA–249	TP348H	S34809	...	...	75
	18	18Cr–10Ni–Cb	Smls. & wld. pipe	SA–312	TP348H	S34809	...	...	75
	19	18Cr–10Ni–Cb	Smls. & wld. ftgs.	SA–403	348H	S34809	...	...	75
	20	18Cr–10Ni–Cb	Bar	SA–479	348H	S34809	...	...	75
	21	18Cr–10Ni–Cb	Wld. pipe	SA–813	TP348H	S34809	...	...	75
	22	18Cr–10Ni–Cb	Wld. pipe	SA–814	TP348H	S34809	...	...	75
	23	18Cr–10Ni–Cb	Smls. tube	SA–213	TP347HFG	S34710	...	...	80
	24	18Cr–10Ni–Cb	Bolting	SA–320	B8C	S34700	2	$1\frac{1}{4} < t \le 1\frac{1}{2}$	100
	25	18Cr–10Ni–Cb	Bolting	SA–320	B8C	S34700	2	$1 < t \le 1\frac{1}{4}$	105
	26	18Cr–10Ni–Cb	Bolting	SA–320	B8C	S34700	2	$\frac{3}{4} < t \le 1$	115
	27	18Cr–10Ni–Cb	Bolting	SA–320	B8C	S34700	2	$t \le \frac{3}{4}$	125
(**21**)	28	18Cr–10Ni–Ti	Smls. & wld. pipe	SA–312	TP321	S32100	...	$>\frac{3}{8}$	70
(**21**)	29	18Cr–10Ni–Ti	Smls. pipe	SA–376	TP321	S32100	...	$>\frac{3}{8}$	70
	30	18Cr–10Ni–Ti	Smls. & wld. pipe	SA–312	TP321H	S32109	...	$>\frac{3}{16}$	70
	31	18Cr–10Ni–Ti	Smls. pipe	SA–376	TP321H	S32109	...	$>\frac{3}{8}$	70
(**21**)	32	18Cr–10Ni–Ti	Forgings	SA–182	F321	S32100	...	>5	70
(**21**)	33	18Cr–10Ni–Ti	Forgings	SA–965	F321	S32100	...	...	70
	34	18Cr–10Ni–Ti	Forgings	SA–182	F321H	S32109	...	>5	70
	35	18Cr–10Ni–Ti	Forgings	SA–965	F321H	S32109	...	...	70
	36	18Cr–10Ni–Ti	Plate	SA/EN 10028–7	X6CrNiTi18–10	...	...	≤3	73
(**21**)	37	18Cr–10Ni–Ti	Forgings	SA–182	F321	S32100	...	≤5	75
(**21**)	38	18Cr–10Ni–Ti	Bolting	SA–193	B8T	S32100	1	...	75
(**21**)	39	18Cr–10Ni–Ti	Smls. tube	SA–213	TP321	S32100	...	...	75
(**21**)	40	18Cr–10Ni–Ti	Plate	SA–240	321	S32100	...	...	75
(**21**)	41	18Cr–10Ni–Ti	Wld. tube	SA–249	TP321	S32100	...	...	75
(**21**)	42	18Cr–10Ni–Ti	Smls. & wld. pipe	SA–312	TP321	S32100	...	$\le\frac{3}{8}$	75
(**21**)	43	18Cr–10Ni–Ti	Bolting	SA–320	B8T	S32100	1	...	75
(**21**)	44	18Cr–10Ni–Ti	Bolting	SA–320	B8TA	S32100	1A	...	75
	45	18Cr–10Ni–Ti	Wld. pipe	SA–358	321	S32100	1	...	75

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
														Ferrous Materials (Cont'd)
1	75.0	71.7	65.9	62.1	60.0	59.1	58.9	58.8	58.8	58.8	58.7	58.5	58.1	57.5
2	75.0	71.7	65.9	62.1	60.0	59.1	58.9	58.8	58.8	58.8	58.7	58.5	58.1	57.5
3	75.0	71.7	65.9	62.1	60.0	59.1	58.9	58.8	58.8	58.8	58.7	58.5	58.1	57.5
4	75.0	71.7	65.9	62.1	60.0	59.1	58.9	58.8	58.8	58.8	58.7	58.5	58.1	57.5
5	75.0	71.8	65.9	62.1	60.0	59.0	58.9	58.8	58.8	58.8	58.7	58.5	58.2	57.5
6	75.0	71.8	65.9	62.1	60.0	59.0	58.9	58.8	58.8	58.8	58.7	58.5	58.2	57.5
7	75.0	71.8	65.9	62.1	60.0	59.0	58.9	58.8	58.8	58.8	58.7	58.5	58.2	57.5
8	75.0	71.7	65.9	62.1	60.0	59.1	58.9	58.8	58.8	58.8	58.7	58.5	58.1	57.5
9	75.0	71.7	65.9	62.1	60.0	59.1	58.9	58.8	58.8	58.8	58.7	58.5	58.1	57.5
10	75.0	71.8	65.9	62.1	60.0	59.0	58.9	58.8	58.8	58.8	58.7	58.5	58.2	57.5
11	75.0	71.7	65.9	62.1	60.0	59.1	58.9	58.8	58.8	58.8	58.7	58.5	58.1	57.5
12	75.0	71.8	65.9	62.1	60.0	59.0	58.9	58.8	58.8	58.8	58.7	58.5	58.2	57.5
13	75.0	71.8	65.9	62.1	60.0	59.0	58.9	58.8	58.8	58.8	58.7	58.5	58.2	57.5
14	75.0	71.8	65.9	62.1	60.0	59.0	58.9	58.8	58.8	58.8	58.7	58.5	58.2	57.5
15	75.0	71.8	65.9	62.1	60.0	59.0	58.9	58.8	58.8	58.8	58.7	58.5	58.2	57.5
16	75.0	71.8	65.9	62.1	60.0	59.0	58.9	58.8	58.8	58.8	58.7	58.5	58.2	57.5
17	75.0	71.8	65.9	62.1	60.0	59.0	58.9	58.8	58.8	58.8	58.7	58.5	58.2	57.5
18	75.0	71.8	65.9	62.1	60.0	59.0	58.9	58.8	58.8	58.8	58.7	58.5	58.2	57.5
19	75.0	71.8	65.9	62.1	60.0	59.0	58.9	58.8	58.8	58.8	58.7	58.5	58.2	57.5
20	75.0	71.8	65.9	62.1	60.0	59.0	58.9	58.8	58.8	58.8	58.7	58.5	58.2	57.5
21	75.0	71.8	65.9	62.1	60.0	59.0	58.9	58.8	58.8	58.8	58.7	58.5	58.2	57.5
22	75.0	71.8	65.9	62.1	60.0	59.0	58.9	58.8	58.8	58.8	58.7	58.5	58.2	57.5
23	80.0	77.7	72.8	69.6	67.7	66.7	66.4	66.2	66.0	65.8	65.4	64.9	64.3	63.3
24	100.0	...	...	...	...	...	...	...	...	...	...	...	...	...
25	105.0	...	...	...	...	...	...	...	...	...	...	...	...	...
26	115.0	...	...	...	...	...	...	...	...	...	...	...	...	...
27	125.0	...	...	...	...	...	...	...	...	...	...	...	...	...
28	70.0	66.4	62.4	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1	59.6
29	70.0	66.4	62.4	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1	59.6
30	70.0	66.4	62.4	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1	59.6
31	70.0	66.4	62.4	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1	59.6
32	70.0	66.4	62.4	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1	59.6
33	70.0	66.4	62.4	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1	59.6
34	70.0	66.4	62.4	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1	59.6
35	70.0	66.4	62.4	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1	59.6
36	72.5	68.5	65.4	63.5	62.8	62.8	62.8	62.8	62.8	62.8	62.8	62.8	62.6	62.1
37	75.0	71.1	66.9	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	63.8
38	75.0	71.1	66.9	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	63.8
39	75.0	71.1	66.9	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	63.8
40	75.0	71.1	66.9	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	63.8
41	75.0	71.1	66.9	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	63.8
42	75.0	71.1	66.9	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	63.8
43	75.0	71.1	66.9	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	63.8
44	75.0	71.1	66.9	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	63.8
45	75.0	71.1	66.9	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	63.8

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Ferrous Materials (Cont'd)													
1	55.9	53.2	50.1	46.8	43.2	39.4	35.6	31.8	28.1	24.5	...	...	...	(**21**)
2	55.9	53.2	50.1	46.8	43.2	39.4	35.6	31.8	28.1	24.5	...	...	...	(**21**)
3	55.9	53.2	50.1	46.8	43.2	39.4	35.6	31.8	28.1	24.5	...	...	...	(**21**)
4	55.9	53.2	50.1	46.8	43.2	39.4	35.6	31.8	28.1	24.5	...	...	...	(**21**)
5	55.9	53.2	50.1	46.8	43.2	39.4	35.6	31.8	28.1	24.5	...	...	...	(**21**)
6	55.9	53.2	50.1	46.8	43.2	39.4	35.6	31.8	28.1	24.5	...	...	...	(**21**)
7	55.9	53.2	50.1	46.8	43.2	39.4	35.6	31.8	28.1	24.5	...	...	...	(**21**)
8	55.9	53.2	50.1	46.8	43.2	39.4	35.6	31.8	28.1	24.5	...	...	...	(**21**)
9	55.9	53.2	50.1	46.8	43.2	39.4	35.6	31.8	28.1	24.5	...	...	...	(**21**)
10	55.9	53.2	50.1	46.8	43.2	39.4	35.6	31.8	28.1	24.5	...	...	...	(**21**)
11	55.9	53.2	50.1	46.8	43.2	39.4	35.6	31.8	28.1	24.5	...	...	...	(**21**)
12	55.9	53.2	50.1	46.8	43.2	39.4	35.6	31.8	28.1	24.5	...	...	...	(**21**)
13	55.9	53.2	50.1	46.8	43.2	39.4	35.6	31.8	28.1	24.5	...	...	...	(**21**)
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	57.6	55.6	53.1	50.4	47.4	44.2	40.8	37.3	33.8	30.2	...	...	...	(**21**)
29	57.6	55.6	53.1	50.4	47.4	44.2	40.8	37.3	33.8	30.2	...	...	...	(**21**)
30	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	57.6	55.6	53.1	50.4	47.4	44.2	40.8	37.3	33.8	30.2	...	...	...	(**21**)
33	57.6	55.6	53.1	50.4	47.4	44.2	40.8	37.3	33.8	30.2	...	...	...	(**21**)
34	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	61.8	59.5	56.9	54.0	50.8	47.4	43.7	40.0	36.2	32.4	...	...	...	(**21**)
38	61.8	59.5	56.9	54.0	50.8	47.4	43.7	40.0	36.2	32.4	...	...	...	(**21**)
39	61.8	59.5	56.9	54.0	50.8	47.4	43.7	40.0	36.2	32.4	...	...	...	(**21**)
40	61.8	59.5	56.9	54.0	50.8	47.4	43.7	40.0	36.2	32.4	...	...	...	(**21**)
41	61.8	59.5	56.9	54.0	50.8	47.4	43.7	40.0	36.2	32.4	...	...	...	(**21**)
42	61.8	59.5	56.9	54.0	50.8	47.4	43.7	40.0	36.2	32.4	...	...	...	(**21**)
43	61.8	59.5	56.9	54.0	50.8	47.4	43.7	40.0	36.2	32.4	...	...	...	(**21**)
44	61.8	59.5	56.9	54.0	50.8	47.4	43.7	40.0	36.2	32.4	...	...	...	(**21**)
45	61.8	59.5	56.9	54.0	50.8	47.4	43.7	40.0	36.2	32.4	...	...	...	

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Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
		Ferrous Materials (Cont'd)							
(**21**)	1	18Cr–10Ni–Ti	Wld. pipe	SA–358	321	S32100	3	...	75
(**21**)	2	18Cr–10Ni–Ti	Wld. pipe	SA–358	321	S32100	4	...	75
(**21**)	3	18Cr–10Ni–Ti	Smls. pipe	SA–376	TP321	S32100	...	$\leq 3/8$	75
(**21**)	4	18Cr–10Ni–Ti	Smls. & wld. ftgs.	SA–403	321	S32100	...	...	75
(**21**)	5	18Cr–10Ni–Ti	Wld. pipe	SA–409	TP321	S32100	...	...	75
(**21**)	6	18Cr–10Ni–Ti	Bar	SA–479	321	S32100	...	...	75
(**21**)	7	18Cr–10Ni–Ti	Wld. pipe	SA–813	TP321	S32100	...	...	75
(**21**)	8	18Cr–10Ni–Ti	Wld. pipe	SA–814	TP321	S32100	...	...	75
	9	18Cr–10Ni–Ti	Bar	SA/JIS G4303	SUS321	...	...	...	75
	10	18Cr–10Ni–Ti	Forgings	SA–182	F321H	S32109	...	≤5	75
	11	18Cr–10Ni–Ti	Smls. tube	SA–213	TP321H	S32109	...	...	75
	12	18Cr–10Ni–Ti	Plate	SA–240	321H	S32109	...	...	75
	13	18Cr–10Ni–Ti	Wld. tube	SA–249	TP321H	S32109	...	...	75
	14	18Cr–10Ni–Ti	Smls. & wld. pipe	SA–312	TP321H	S32109	...	$\leq 3/16$	75
	15	18Cr–10Ni–Ti	Smls. pipe	SA–376	TP321H	S32109	...	$\leq 3/8$	75
	16	18Cr–10Ni–Ti	Smls. & wld. ftgs.	SA–403	321H	S32109	...	...	75
	17	18Cr–10Ni–Ti	Bar	SA–479	321H	S32109	...	...	75
	18	18Cr–10Ni–Ti	Wld. pipe	SA–813	TP321H	S32109	...	...	75
	19	18Cr–10Ni–Ti	Wld. pipe	SA–814	TP321H	S32109	...	...	75
	20	18Cr–10Ni–Ti	Bolting	SA–320	B8T	S32100	2	$1\frac{1}{4} < t \leq 1\frac{1}{2}$	100
	21	18Cr–10Ni–Ti	Bolting	SA–320	B8T	S32100	2	$1 < t \leq 1\frac{1}{4}$	105
	22	18Cr–10Ni–Ti	Bolting	SA–320	B8T	S32100	2	$\frac{3}{4} < t \leq 1$	115
	23	18Cr–10Ni–Ti	Bolting	SA–320	B8T	S32100	2	$t \leq \frac{3}{4}$	125
	24	18Cr–11Ni	Plate	SA–240	305	S30500	...	...	75
(**21**)	25	18Cr–13Ni–3Mo	Forgings	SA–182	F317L	S31703	...	>5	65
(**21**)	26	18Cr–13Ni–3Mo	Forgings	SA–182	F317L	S31703	...	≤5	70
(**21**)	27	18Cr–13Ni–3Mo	Forgings	SA–182	F317	S31700	...	≤5	75
(**21**)	28	18Cr–13Ni–3Mo	Plate	SA–240	317	S31700	...	...	75
(**21**)	29	18Cr–13Ni–3Mo	Plate	SA–240	317L	S31703	...	...	75
(**21**)	30	18Cr–13Ni–3Mo	Wld. tube	SA–249	TP317	S31700	...	...	75
(**21**)	31	18Cr–13Ni–3Mo	Wld. tube	SA–249	TP317L	S31703	...	...	75
(**21**)	32	18Cr–13Ni–3Mo	Smls. & wld. pipe	SA–312	TP317	S31700	...	...	75
(**21**)	33	18Cr–13Ni–3Mo	Smls. & wld. pipe	SA–312	TP317L	S31703	...	...	75
(**21**)	34	18Cr–13Ni–3Mo	Smls. & wld. ftgs.	SA–403	317	S31700	...	...	75
(**21**)	35	18Cr–13Ni–3Mo	Fittings	SA–403	317L	S31703	...	...	75
	36	18Cr–15Ni–4Si	Forgings	SA–182	...	S30600	Solution ann.	...	78
	37	18Cr–15Ni–4Si	Plate	SA–240	...	S30600	Solution ann.	≤2	78
	38	18Cr–15Ni–4Si	Smls. & wld. pipe	SA–312	...	S30600	Solution ann.	...	78
	39	18Cr–15Ni–4Si	Bar	SA–479	...	S30600	Solution ann.	≤4	78
	40	18Cr–18Ni–2Si	Smls. tube	SA–213	XM–15	S38100	...	...	75
	41	18Cr–18Ni–2Si	Plate	SA–240	XM–15	S38100	...	...	75
	42	18Cr–18Ni–2Si	Wld. tube	SA–249	TPXM–15	S38100	...	...	75
	43	18Cr–18Ni–2Si	Wld. pipe	SA–312	TPXM–15	S38100	...	...	75
	44	18Cr–20Ni–5.5Si	Smls. tube	SA–213	...	S32615	Solution ann.	...	80
	45	18Cr–20Ni–5.5Si	Plate	SA–240	...	S32615	Solution ann.	...	80

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
													Ferrous Materials (Cont'd)	
1	75.0	71.1	66.9	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	63.8
2	75.0	71.1	66.9	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	63.8
3	75.0	71.1	66.9	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	63.8
4	75.0	71.1	66.9	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	63.8
5	75.0	71.1	66.9	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	63.8
6	75.0	71.1	66.9	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	63.8
7	75.0	71.1	66.9	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	63.8
8	75.0	71.1	66.9	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	63.8
9	75.0	71.1	66.9	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	63.8
10	75.0	71.1	66.9	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	63.8
11	75.0	71.1	66.9	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	63.8
12	75.0	71.1	66.9	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	63.8
13	75.0	71.1	66.9	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	63.8
14	75.0	71.1	66.9	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	63.8
15	75.0	71.1	66.9	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	63.8
16	75.0	71.1	66.9	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	63.8
17	75.0	71.1	66.9	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	63.8
18	75.0	71.1	66.9	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	63.8
19	75.0	71.1	66.9	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	65.5	63.8
20	50.0	...	...	...	...	...	...	...	...	...	...	...	...	...
21	65.0	...	...	...	...	...	...	...	...	...	...	...	...	...
22	80.0	...	...	...	...	...	...	...	...	...	...	...	...	...
23	100.0	...	...	...	...	...	...	...	...	...	...	...	...	...
24	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
25	65.0	63.2	59.5	57.8	57.3	57.3	57.2	57.1	56.7	56.2	55.4	54.4	53.0	51.4
26	70.0	68.1	64.0	62.2	61.8	61.7	61.6	61.5	61.1	60.5	59.7	58.6	57.1	55.4
27	75.0	75.0	72.9	71.9	71.8	71.8	71.8	71.8	71.5	70.8	69.7	68.3	66.5	64.3
28	75.0	75.0	72.9	71.9	71.8	71.8	71.8	71.8	71.5	70.8	69.7	68.3	66.5	64.3
29	75.0	72.9	68.6	66.7	66.2	66.1	66.1	65.9	65.5	64.9	64.0	62.7	61.2	59.3
30	75.0	75.0	72.9	71.9	71.8	71.8	71.8	71.8	71.5	70.8	69.7	68.3	66.5	64.3
31	75.0	72.9	68.6	66.7	66.2	66.1	66.1	65.9	65.5	64.9	64.0	62.7	61.2	59.3
32	75.0	75.0	72.9	71.9	71.8	71.8	71.8	71.8	71.5	70.8	69.7	68.3	66.5	64.3
33	75.0	72.9	68.6	66.7	66.2	66.1	66.1	65.9	65.5	64.9	64.0	62.7	61.2	59.3
34	75.0	75.0	72.9	71.9	71.8	71.8	71.8	71.8	71.5	70.8	69.7	68.3	66.5	64.3
35	75.0	72.9	68.6	66.7	66.2	66.1	66.1	65.9	65.5	64.9	64.0	62.7	61.2	59.3
36	78.0	74.6	68.6	...	...	...	...	...	...	...	...	...	...	...
37	78.0	74.6	68.6	...	...	...	...	...	...	...	...	...	...	...
38	78.0	74.6	68.6	...	...	...	...	...	...	...	...	...	...	...
39	78.0	74.6	68.6	...	...	...	...	...	...	...	...	...	...	...
40	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
41	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
42	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
43	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
44	80.0	79.6	76.0	73.6	...	...	...	...	...	...	...	...	...	...
45	80.0	79.6	76.0	73.6	...	...	...	...	...	...	...	...	...	...

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Ferrous Materials (Cont'd)													
1	61.8	59.5	56.9	54.0	50.8	47.4	43.7	40.0	36.2	32.4	...	...	...	(**21**)
2	61.8	59.5	56.9	54.0	50.8	47.4	43.7	40.0	36.2	32.4	...	...	...	(**21**)
3	61.8	59.5	56.9	54.0	50.8	47.4	43.7	40.0	36.2	32.4	...	...	...	(**21**)
4	61.8	59.5	56.9	54.0	50.8	47.4	43.7	40.0	36.2	32.4	...	...	...	(**21**)
5	61.8	59.5	56.9	54.0	50.8	47.4	43.7	40.0	36.2	32.4	...	...	...	(**21**)
6	61.8	59.5	56.9	54.0	50.8	47.4	43.7	40.0	36.2	32.4	...	...	...	(**21**)
7	61.8	59.5	56.9	54.0	50.8	47.4	43.7	40.0	36.2	32.4	...	...	...	(**21**)
8	61.8	59.5	56.9	54.0	50.8	47.4	43.7	40.0	36.2	32.4	...	...	...	(**21**)
9	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	50.1	48.6	46.7	44.6	...	...	...	...	...	...	...	...	...	(**21**)
26	54.0	52.3	50.3	48.0	...	...	...	...	...	...	...	...	...	(**21**)
27	60.3	55.9	51.7	47.7	43.8	40.0	36.5	33.1	29.8	26.7	...	...	...	(**21**)
28	60.3	55.9	51.7	47.7	43.8	40.0	36.5	33.1	29.8	26.7	...	...	...	(**21**)
29	57.8	56.1	53.9	51.4	...	...	...	...	...	...	...	...	...	(**21**)
30	60.3	55.9	51.7	47.7	43.8	40.0	36.5	33.1	29.8	26.7	...	...	...	(**21**)
31	57.8	56.1	53.9	51.4	...	...	...	...	...	...	...	...	...	(**21**)
32	60.3	55.9	51.7	47.7	43.8	40.0	36.5	33.1	29.8	26.7	...	...	...	(**21**)
33	57.8	56.1	53.9	51.4	...	...	...	...	...	...	...	...	...	(**21**)
34	60.3	55.9	51.7	47.7	43.8	40.0	36.5	33.1	29.8	26.7	...	...	...	(**21**)
35	57.8	56.1	53.9	51.4	...	...	...	...	...	...	...	...	...	(**21**)
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
	Ferrous Materials (Cont'd)							
1	18Cr–20Ni–5.5Si	Smls. & wld. pipe	SA–312	...	S32615	Solution ann.	...	80
2	18Cr–20Ni–5.5Si	Bar	SA–479	...	S32615	Solution ann.	...	80
3	19Cr–9Ni–½Mo	Castings	SA–351	CF10	J92590	...	...	70
4	19Cr–9Ni–Mo–W	Bolting	SA–453	651	S63198	B	...	95
5	19Cr–9Ni–Mo–W	Bolting	SA–453	651	S63198	A	...	100
6	19Cr–9Ni–2Mo	Castings	SA–351	CF10M	...	...	...	70
7	19Cr–10Ni–3Mo	Castings	SA–351	CG8M	J93000	...	...	75
8	19Cr–15Ni–4Mo	Smls. tube	SA–213	...	S31725	...	...	75
9	19Cr–15Ni–4Mo	Plate	SA–240	...	S31725	...	...	75
10	19Cr–15Ni–4Mo	Wld. tube	SA–249	...	S31725	...	...	75
11	19Cr–15Ni–4Mo	Smls. & wld. pipe	SA–312	...	S31725	...	...	75
12	19Cr–15Ni–4Mo	Wld. pipe	SA–358	...	S31725	...	...	75
13	19Cr–15Ni–4Mo	Smls. pipe	SA–376	...	S31725	...	...	75
14	19Cr–15Ni–4Mo	Wld. pipe	SA–409	...	S31725	...	...	75
15	19Cr–15Ni–4Mo	Bar	SA–479	...	S31725	...	...	75
16	20Cr–3Ni–1.5Mo–N	Plate	SA–240	...	S32003	...	>3/16	95
17	20Cr–3Ni–1.5Mo–N	Wld. pipe	SA–790	...	S32003	...	...	95
18	20Cr–3Ni–1.5Mo–N	Sheet	SA–240	...	S32003	...	≤3/16	100
19	20Cr–3Ni–1.5Mo–N	Smls. & wld. tube	SA–789	...	S32003	...	...	100
20	20Cr–10Ni	Bar	SA–479	ER308	S30880	...	...	75
21	20Cr–18Ni–6Mo	Castings	SA–351	CK3MCuN	J93254	...	...	80
22	20Cr–18Ni–6Mo	Forgings	SA–182	F44	S31254	...	...	94
23	20Cr–18Ni–6Mo	Smls. tube	SA–213	...	S31254	...	t > 0.187	95
24	20Cr–18Ni–6Mo	Wld. tube	SA–249	...	S31254	...	t > 0.187	95
25	20Cr–18Ni–6Mo	Smls. & wld. pipe	SA–312	...	S31254	...	t > 0.187	95
26	20Cr–18Ni–6Mo	Wld. pipe	SA–358	...	S31254	...	t ≥ 0.187	95
27	20Cr–18Ni–6Mo	Smls. tube	SA–213	...	S31254	...	t ≤ 0.187	98
28	20Cr–18Ni–6Mo	Wld. tube	SA–249	...	S31254	...	t ≤ 0.187	98
29	20Cr–18Ni–6Mo	Smls. & wld. pipe	SA–312	...	S31254	...	t ≤ 0.187	98
30	20Cr–18Ni–6Mo	Plate	SA–240	...	S31254	...	t ≤ 0.187	100
31	20Cr–18Ni–6Mo	Wld. pipe	SA–358	...	S31254	...	t < 0.187	100
32	21Cr–5Mn–1.5Ni–Cu–N	Plate	SA–240	...	S32101	...	>3/16	94
33	21Cr–5Mn–1.5Ni–Cu–N	Bar	SA–479	...	S32101	...	...	94
34	21Cr–5Mn–1.5Ni–Cu–N	Smls. & wld. tube	SA–789	...	S32101	...	>0.187	94
35	21Cr–5Mn–1.5Ni–Cu–N	Smls. & wld. pipe	SA–790	...	S32101	...	>0.187	94
36	21Cr–5Mn–1.5Ni–Cu–N	Fittings	SA–815	...	S32101	...	...	94
37	21Cr–5Mn–1.5Ni–Cu–N	Sheet, strip	SA–240	...	S32101	...	≤3/16	101
38	21Cr–5Mn–1.5Ni–Cu–N	Smls. & wld. tube	SA–789	...	S32101	...	≤0.187	101
39	21Cr–5Mn–1.5Ni–Cu–N	Smls. & wld. pipe	SA–790	...	S32101	...	≤0.187	101
40	21Cr–6Ni–9Mn	Forgings	SA–182	FXM–11	S21904	...	...	90
41	21Cr–6Ni–9Mn	Smls. & wld. pipe	SA–312	TPXM–11	S21904	...	...	90
42	21Cr–6Ni–9Mn	Plate	SA–666	XM–11	S21904	...	...	90
43	21Cr–6Ni–9Mn	Forgings	SA–965	FXM–11	S21904	...	...	90
44	21Cr–11Ni–N	Forgings	SA–182	F45	S30815	...	...	87
45	21Cr–11Ni–N	Smls. tube	SA–213	...	S30815	...	...	87

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
														Ferrous Materials (Cont'd)
1	80.0	79.6	76.0	73.6	...	...	...	...	...	...	...	...	...	...
2	80.0	79.6	76.0	73.6	...	...	...	...	...	...	...	...	...	...
3	70.0	66.4	62.1	60.1	59.4	59.3	59.2	59.1	58.8	58.4	57.7	56.8	55.6	54.0
4	95.0	93.7	88.4	85.1	83.2	82.2	81.8	81.3	80.7	79.9	78.8	77.3	75.4	73.0
5	100.0	98.6	93.0	89.6	87.6	86.5	86.1	85.6	84.9	84.1	82.9	81.4	79.4	76.8
6	70.0	69.9	68.2	67.7	67.4	66.6	66.0	65.3	64.5	63.7	62.8	61.9	61.0	60.0
7	75.0	72.8	68.8	66.8	66.1	66.0	66.0	66.0	65.9	65.5	65.0	64.0	62.7	60.8
8	75.0	72.7	68.5	66.6	66.1	66.1	66.1	65.9	65.6	64.9	64.0	62.8	61.2	59.2
9	75.0	72.7	68.5	66.6	66.1	66.1	66.1	65.9	65.6	64.9	64.0	62.8	61.2	59.2
10	75.0	72.7	68.5	66.6	66.1	66.1	66.1	65.9	65.6	64.9	64.0	62.8	61.2	59.2
11	75.0	72.7	68.5	66.6	66.1	66.1	66.1	65.9	65.6	64.9	64.0	62.8	61.2	59.2
12	75.0	72.7	68.5	66.6	66.1	66.1	66.1	65.9	65.6	64.9	64.0	62.8	61.2	59.2
13	75.0	72.7	68.5	66.6	66.1	66.1	66.1	65.9	65.6	64.9	64.0	62.8	61.2	59.2
14	75.0	72.7	68.5	66.6	66.1	66.1	66.1	65.9	65.6	64.9	64.0	62.8	61.2	59.2
15	75.0	72.7	68.5	66.6	66.1	66.1	66.1	65.9	65.6	64.9	64.0	62.8	61.2	59.2
16	95.0	92.1	86.6	85.8	85.8	85.8	85.8	85.8	85.8	85.8	85.8	...	...	...
17	95.0	92.1	86.6	85.8	85.8	85.8	85.8	85.8	85.8	85.8	85.8	...	...	...
18	100.0	97.0	91.2	90.3	90.3	90.3	90.3	90.3	90.3	90.3	90.3	...	...	...
19	100.0	97.0	91.2	90.3	90.3	90.3	90.3	90.3	90.3	90.3	90.3	...	...	...
20	75.0	71.0	66.2	64.0	63.4	63.4	63.4	63.4	63.3	62.8	62.0	60.8	59.3	57.4
21	80.0	80.0	76.0	72.5	70.0	68.4	68.0	67.7	67.4	67.0	66.4	...	...	...
22	94.0	94.0	89.4	85.2	82.2	80.4	79.9	79.5	79.2	78.7	78.0	...	...	...
23	95.0	95.0	90.4	86.1	83.1	81.3	80.8	80.3	80.0	79.5	78.8	...	...	...
24	95.0	95.0	90.4	86.1	83.1	81.3	80.8	80.3	80.0	79.5	78.8	...	...	...
25	95.0	95.0	90.4	86.1	83.1	81.3	80.8	80.3	80.0	79.5	78.8	...	...	...
26	95.0	95.0	90.4	86.1	83.1	81.3	80.8	80.3	80.0	79.5	78.8	...	...	...
27	98.0	98.0	93.2	88.8	85.7	83.8	83.3	82.9	82.6	82.0	81.3	...	...	...
28	98.0	98.0	93.2	88.8	85.7	83.8	83.3	82.9	82.6	82.0	81.3	...	...	...
29	98.0	98.0	93.2	88.8	85.7	83.8	83.3	82.9	82.6	82.0	81.3	...	...	...
30	100.0	100.0	95.1	90.6	87.5	85.6	85.0	84.6	84.2	83.3	83.0	...	...	...
31	100.0	100.0	95.1	90.6	87.5	85.6	85.0	84.6	84.2	83.3	83.0	...	...	...
32	94.0	94.0	89.5	86.5	86.3	86.3	86.3	...	...	...	...	...	...	...
33	94.0	94.0	89.5	86.5	86.3	86.3	86.3	...	...	...	...	...	...	...
34	94.0	94.0	89.5	86.5	86.3	86.3	86.3	...	...	...	...	...	...	...
35	94.0	94.0	89.5	86.5	86.3	86.3	86.3	...	...	...	...	...	...	...
36	94.0	94.0	89.5	86.5	86.3	86.3	86.3	...	...	...	...	...	...	...
37	101.0	101.0	96.2	92.9	92.7	92.7	92.7	...	...	...	...	...	...	...
38	101.0	101.0	96.2	92.9	92.7	92.7	92.7	...	...	...	...	...	...	...
39	101.0	101.0	96.2	92.9	92.7	92.7	92.7	...	...	...	...	...	...	...
40	90.0	90.0	84.1	79.7	76.9	75.3	74.6	74.0	73.2	72.3	71.1	69.6	67.8	65.7
41	90.0	90.0	84.1	79.7	76.9	75.3	74.6	74.0	73.2	72.3	71.1	69.6	67.8	65.7
42	90.0	90.0	84.1	79.7	76.9	75.3	74.6	74.0	73.2	72.3	71.1	69.6	67.8	65.7
43	90.0	90.0	84.1	79.7	76.9	75.3	74.6	74.0	73.2	72.3	71.1	69.6	67.8	65.7
44	87.0	86.4	81.6	78.5	76.4	74.8	74.1	73.5	72.8	72.0	71.1	70.1	68.9	67.5
45	87.0	86.4	81.6	78.5	76.4	74.8	74.1	73.5	72.8	72.0	71.1	70.1	68.9	67.5

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding												
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
	Ferrous Materials (Cont'd)												
1	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...

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Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
	Ferrous Materials (Cont'd)							
1	21Cr–11Ni–N	Plate	SA–240	...	S30815	...	...	87
2	21Cr–11Ni–N	Wld. tube	SA–249	...	S30815	...	...	87
3	21Cr–11Ni–N	Smls. & wld. pipe	SA–312	...	S30815	...	...	87
4	21Cr–11Ni–N	Bar	SA–479	...	S30815	...	...	87
5	22Cr–2Ni–Mo–N	Forgings	SA–182	F66	S32202	...	...	94
6	22Cr–2Ni–Mo–N	Plate	SA–240	...	S32202	...	...	94
7	22Cr–2Ni–Mo–N	Bar	SA–479	...	S32202	...	...	94
8	22Cr–2Ni–Mo–N	Smls. & wld. tube	SA–789	...	S32202	...	...	94
9	22Cr–2Ni–Mo–N	Smls. & wld. pipe	SA–790	...	S32202	...	...	94
10	22Cr–2Ni–Mo–N	Smls. & wld. ftgs.	SA–815	...	S32202	...	...	94
11	22Cr–5Ni–3Mo–N	Castings	SA–995	4A	J92205	...	...	90
12	22Cr–5Ni–3Mo–N	Forgings	SA–182	F51	S31803	...	...	90
13	22Cr–5Ni–3Mo–N	Plate	SA–240	...	S31803	...	...	90
14	22Cr–5Ni–3Mo–N	Bar	SA–479	...	S31803	...	...	90
15	22Cr–5Ni–3Mo–N	Smls. & wld. tube	SA–789	...	S31803	...	...	90
16	22Cr–5Ni–3Mo–N	Smls. & wld. pipe	SA–790	...	S31803	...	...	90
17	22Cr–5Ni–3Mo–N	Smls. & wld. ftgs.	SA–815	...	S31803	...	...	90
18	22Cr–5Ni–3Mo–N	Forgings	SA–182	F60	S32205	...	...	95
19	22Cr–5Ni–3Mo–N	Plate	SA–240	...	S32205	...	...	95
20	22Cr–5Ni–3Mo–N	Bar	SA–479	...	S32205	...	...	95
21	22Cr–5Ni–3Mo–N	Smls. & wld. tube	SA–789	...	S32205	...	...	95
22	22Cr–5Ni–3Mo–N	Smls. & wld. pipe	SA–790	...	S32205	...	...	95
23	22Cr–5Ni–3Mo–N	Smls. & wld. ftgs.	SA–815	...	S32205	...	...	95
24	22Cr–13Ni–5Mn	Castings	SA–351	CG6MMN	J93790	...	...	85
(**21**) 25	22Cr–13Ni–5Mn	Forgings	SA–182	FXM–19	S20910	...	...	100
(**21**) 26	22Cr–13Ni–5Mn	Bolting	SA–193	B8R	S20910	Annealed	...	100
(**21**) 27	22Cr–13Ni–5Mn	Bolting	SA–193	B8RA	S20910	Annealed	...	100
(**21**) 28	22Cr–13Ni–5Mn	Smls. tube	SA–213	XM–19	S20910	...	...	100
(**21**) 29	22Cr–13Ni–5Mn	Plate	SA–240	XM–19	S20910	...	...	100
(**21**) 30	22Cr–13Ni–5Mn	Wld. tube	SA–249	TPXM–19	S20910	...	...	100
(**21**) 31	22Cr–13Ni–5Mn	Smls. & wld. pipe	SA–312	TPXM–19	S20910	...	...	100
(**21**) 32	22Cr–13Ni–5Mn	Wld. pipe	SA–358	XM–19	S20910	1	...	100
(**21**) 33	22Cr–13Ni–5Mn	Wld. pipe	SA–358	XM–19	S20910	3	...	100
(**21**) 34	22Cr–13Ni–5Mn	Wld. pipe	SA–358	XM–19	S20910	4	...	100
(**21**) 35	22Cr–13Ni–5Mn	Smls. & wld. ftgs.	SA–403	XM–19	S20910	...	...	100
(**21**) 36	22Cr–13Ni–5Mn	Bar	SA–479	XM–19	S20910	Annealed	...	100
(**21**) 37	22Cr–13Ni–5Mn	Bar	SA–479	XM–19	S20910	Hot rolled	$3 < t \le 8$	100
(**21**) 38	22Cr–13Ni–5Mn	Wld. pipe	SA–813	TPXM–19	S20910	...	...	100
(**21**) 39	22Cr–13Ni–5Mn	Wld. pipe	SA–814	TPXM–19	S20910	...	...	100
(**21**) 40	22Cr–13Ni–5Mn	Forgings	SA–965	FXM–19	S20910	...	...	100
(**21**) 41	22Cr–13Ni–5Mn	Bar	SA–479	XM–19	S20910	Hot rolled	$2 < t \le 3$	115
(**21**) 42	22Cr–13Ni–5Mn	Bar	SA–479	XM–19	S20910	Hot rolled	≤2	135
43	23Cr–4Ni–Mo–Cu–N	Plate	SA–240	...	S32304	...	...	87
44	23Cr–4Ni–Mo–Cu–N	Smls. & wld. tube	SA–789	...	S32304	...	>1	87
45	23Cr–4Ni–Mo–Cu–N	Smls. & wld. pipe	SA–790	...	S32304	...	...	87

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
														Ferrous Materials (Cont'd)
1	87.0	86.4	81.6	78.5	76.4	74.8	74.1	73.5	72.8	72.0	71.1	70.1	68.9	67.5
2	87.0	86.4	81.6	78.5	76.4	74.8	74.1	73.5	72.8	72.0	71.1	70.1	68.9	67.5
3	87.0	86.4	81.6	78.5	76.4	74.8	74.1	73.5	72.8	72.0	71.1	70.1	68.9	67.5
4	87.0	86.4	81.6	78.5	76.4	74.8	74.1	73.5	72.8	72.0	71.1	70.1	68.9	67.5
5	94.0	93.2	87.0	86.3	86.3	86.3	...	...	...	...	...	...	...	...
6	94.0	93.2	87.0	86.3	86.3	86.3	...	...	...	...	...	...	...	...
7	94.0	93.2	87.0	86.3	86.3	86.3	...	...	...	...	...	...	...	...
8	94.0	93.2	87.0	86.3	86.3	86.3	...	...	...	...	...	...	...	...
9	94.0	93.2	87.0	86.3	86.3	86.3	...	...	...	...	...	...	...	...
10	94.0	93.2	87.0	86.3	86.3	86.3	...	...	...	...	...	...	...	...
11	90.0	90.0	86.2	85.2	85.2	...	...	...	...	...	...	...	...	...
12	90.0	90.0	86.8	83.5	81.6	80.7	80.5	...	...	...	...	...	...	...
13	90.0	90.0	86.8	83.5	81.6	80.7	80.5	...	...	...	...	...	...	...
14	90.0	90.0	86.8	83.5	81.6	80.7	80.5	...	...	...	...	...	...	...
15	90.0	90.0	86.8	83.5	81.6	80.7	80.5	...	...	...	...	...	...	...
16	90.0	90.0	86.8	83.5	81.6	80.7	80.5	...	...	...	...	...	...	...
17	90.0	90.0	86.8	83.5	81.6	80.7	80.5	...	...	...	...	...	...	...
18	95.0	95.0	91.7	88.2	86.1	85.2	85.0	...	...	...	...	...	...	...
19	95.0	95.0	91.7	88.2	86.1	85.2	85.0	...	...	...	...	...	...	...
20	95.0	95.0	91.7	88.2	86.1	85.2	85.0	...	...	...	...	...	...	...
21	95.0	95.0	91.7	88.2	86.1	85.2	85.0	...	...	...	...	...	...	...
22	95.0	95.0	91.7	88.2	86.1	85.2	85.0	...	...	...	...	...	...	...
23	95.0	95.0	91.7	88.2	86.1	85.2	85.0	...	...	...	...	...	...	...
24	85.0	84.6	80.1	77.3	75.6	74.5	74.0	73.5	72.9	72.1	71.2	70.1	68.7	67.0
25	100.0	99.4	94.2	91.1	89.1	87.7	87.0	86.4	85.6	84.8	83.8	82.6	81.3	79.7
26	100.0	99.4	94.2	91.1	89.1	87.7	87.0	86.4	85.6	84.8	83.8	82.6	81.3	79.7
27	100.0	99.4	94.2	91.1	89.1	87.7	87.0	86.4	85.6	84.8	83.8	82.6	81.3	79.7
28	100.0	99.4	94.2	91.1	89.1	87.7	87.0	86.4	85.6	84.8	83.8	82.6	81.3	79.7
29	100.0	99.4	94.2	91.1	89.1	87.7	87.0	86.4	85.6	84.8	83.8	82.6	81.3	79.7
30	100.0	99.4	94.2	91.1	89.1	87.7	87.0	86.4	85.6	84.8	83.8	82.6	81.3	79.7
31	100.0	99.4	94.2	91.1	89.1	87.7	87.0	86.4	85.6	84.8	83.8	82.6	81.3	79.7
32	100.0	99.4	94.2	91.1	89.1	87.7	87.0	86.4	85.6	84.8	83.8	82.6	81.3	79.7
33	100.0	99.4	94.2	91.1	89.1	87.7	87.0	86.4	85.6	84.8	83.8	82.6	81.3	79.7
34	100.0	99.4	94.2	91.1	89.1	87.7	87.0	86.4	85.6	84.8	83.8	82.6	81.3	79.7
35	100.0	99.4	94.2	91.1	89.1	87.7	87.0	86.4	85.6	84.8	83.8	82.6	81.3	79.7
36	100.0	99.4	94.2	91.1	89.1	87.7	87.0	86.4	85.6	84.8	83.8	82.6	81.3	79.7
37	100.0	99.4	94.2	91.1	89.1	87.7	87.0	86.4	85.6	84.8	83.8	82.6	81.3	79.7
38	100.0	99.4	94.2	91.1	89.1	87.7	87.0	86.4	85.6	84.8	83.8	82.6	81.3	79.7
39	100.0	99.4	94.2	91.1	89.1	87.7	87.0	86.4	85.6	84.8	83.8	82.6	81.3	79.7
40	100.0	99.4	94.2	91.1	89.1	87.7	87.0	86.4	85.6	84.8	83.8	82.6	81.3	79.7
41	115.0	114.3	108.4	104.7	102.5	100.8	100.1	99.3	98.4	97.5	96.3	95.0	93.5	91.7
42	135.0	134.1	127.2	123.0	120.3	118.4	117.5	116.6	115.6	114.4	113.1	111.5	109.7	107.6
43	87.0	83.9	78.7	76.0	74.6	73.5	72.9	72.1	71.2	70.3	...	...	...	...
44	87.0	83.9	78.7	76.0	74.6	73.5	72.9	72.1	71.2	70.3	...	...	...	...
45	87.0	83.9	78.7	76.0	74.6	73.5	72.9	72.1	71.2	70.3	...	...	...	...

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Ferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	77.3	75.6	73.5	71.0	...	...	...	...	...	...	...	...	...	(**21**)
26	77.3	75.6	73.5	71.0	...	...	...	...	...	...	...	...	...	(**21**)
27	77.3	75.6	73.5	71.0	...	...	...	...	...	...	...	...	...	(**21**)
28	77.3	75.6	73.5	71.0	...	...	...	...	...	...	...	...	...	(**21**)
29	77.3	75.6	73.5	71.0	...	...	...	...	...	...	...	...	...	(**21**)
30	77.3	75.6	73.5	71.0	...	...	...	...	...	...	...	...	...	(**21**)
31	77.3	75.6	73.5	71.0	...	...	...	...	...	...	...	...	...	(**21**)
32	77.3	75.6	73.5	71.0	...	...	...	...	...	...	...	...	...	(**21**)
33	77.3	75.6	73.5	71.0	...	...	...	...	...	...	...	...	...	(**21**)
34	77.3	75.6	73.5	71.0	...	...	...	...	...	...	...	...	...	(**21**)
35	77.3	75.6	73.5	71.0	...	...	...	...	...	...	...	...	...	(**21**)
36	77.3	75.6	73.5	71.0	...	...	...	...	...	...	...	...	...	(**21**)
37	77.3	75.6	73.5	71.0	...	...	...	...	...	...	...	...	...	(**21**)
38	77.3	75.6	73.5	71.0	...	...	...	...	...	...	...	...	...	(**21**)
39	77.3	75.6	73.5	71.0	...	...	...	...	...	...	...	...	...	(**21**)
40	77.3	75.6	73.5	71.0	...	...	...	...	...	...	...	...	...	(**21**)
41	88.9	86.9	84.5	81.7	...	...	...	...	...	...	...	...	...	(**21**)
42	104.4	102.0	99.2	95.9	...	...	...	...	...	...	...	...	...	(**21**)
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
		Ferrous Materials (Cont'd)							
	1	23Cr–4Ni–Mo–Cu–N	Smls. & wld. tube	SA–789	...	S32304	...	≤1	100
	2	23Cr–12Ni	Smls. & wld. ftgs.	SA–403	309	S30900	...	...	75
(**21**)	3	23Cr–12Ni	Smls. tube	SA–213	TP309S	S30908	...	...	75
(**21**)	4	23Cr–12Ni	Plate	SA–240	309S	S30908	...	...	75
(**21**)	5	23Cr–12Ni	Wld. tube	SA–249	TP309S	S30908	...	...	75
(**21**)	6	23Cr–12Ni	Smls. & wld. pipe	SA–312	TP309S	S30908	...	...	75
(**21**)	7	23Cr–12Ni	Wld. pipe	SA–358	309S	S30908	1	...	75
(**21**)	8	23Cr–12Ni	Wld. pipe	SA–358	309S	S30908	3	...	75
(**21**)	9	23Cr–12Ni	Wld. pipe	SA–358	309S	S30908	4	...	75
(**21**)	10	23Cr–12Ni	Bar	SA–479	309S	S30908	...	...	75
(**21**)	11	23Cr–12Ni	Wld. pipe	SA–813	TP309S	S30908	...	...	75
(**21**)	12	23Cr–12Ni	Wld. pipe	SA–814	TP309S	S30908	...	...	75
	13	23Cr–12Ni	Bar	SA/JIS G4303	SUS309S	...	...	...	75
	14	23Cr–12Ni	Smls. tube	SA–213	TP309H	S30909	...	...	75
	15	23Cr–12Ni	Plate	SA–240	309H	S30909	...	...	75
	16	23Cr–12Ni	Wld. tube	SA–249	TP309H	S30909	...	...	75
	17	23Cr–12Ni	Smls. & wld. pipe	SA–312	TP309H	S30909	...	...	75
	18	23Cr–12Ni	Bar	SA–479	309H	S30909	...	...	75
	19	23Cr–12Ni–Cb	Smls. tube	SA–213	TP309Cb	S30940	...	...	75
	20	23Cr–12Ni–Cb	Plate	SA–240	309Cb	S30940	...	...	75
	21	23Cr–12Ni–Cb	Wld. tube	SA–249	TP309Cb	S30940	...	...	75
	22	23Cr–12Ni–Cb	Smls. & wld. pipe	SA–312	TP309Cb	S30940	...	...	75
	23	23Cr–12Ni–Cb	Bar	SA–479	309Cb	S30940	...	...	75
	24	23Cr–12Ni–Cb	Wld. pipe	SA–813	TP309Cb	S30940	...	...	75
	25	23Cr–12Ni–Cb	Wld. pipe	SA–814	TP309Cb	S30940	...	...	75
(**21**)	26	23Cr–25Ni–5.5Mo–N	Forgings	SA–182	...	S32053	...	...	93
(**21**)	27	23Cr–25Ni–5.5Mo–N	Bolting	SA–193	...	S32053	...	...	93
(**21**)	28	23Cr–25Ni–5.5Mo–N	Plate	SA–240	...	S32053	...	...	93
(**21**)	29	23Cr–25Ni–5.5Mo–N	Wld. tube	SA–249	...	S32053	...	...	93
(**21**)	30	23Cr–25Ni–5.5Mo–N	Smls. & wld. pipe	SA–312	...	S32053	...	...	93
(**21**)	31	23Cr–25Ni–5.5Mo–N	Wld. pipe	SA–358	...	S32053	...	...	93
(**21**)	32	23Cr–25Ni–5.5Mo–N	Fittings	SA–403	...	S32053	...	...	93
(**21**)	33	23Cr–25Ni–5.5Mo–N	Wld. pipe	SA–409	...	S32053	...	...	93
(**21**)	34	23Cr–25Ni–5.5Mo–N	Bar	SA–479	...	S32053	...	...	93
(**21**)	35	23Cr–25Ni–5.5Mo–N	Wld. pipe	SA–813	...	S32053	...	...	93
(**21**)	36	23Cr–25Ni–5.5Mo–N	Wld. pipe	SA–814	...	S32053	...	...	93
	37	24Cr–10Ni–4Mo–N	Castings	SA–995	2A	J93345	...	...	95
	38	24Cr–22Ni–6Mo–2W–Cu–N	Forgings	SA–182	F58	S31266	...	...	109
	39	24Cr–22Ni–6Mo–2W–Cu–N	Smls. tube	SA–213	...	S31266	...	...	109
	40	24Cr–22Ni–6Mo–2W–Cu–N	Plate	SA–240	...	S31266	...	...	109
	41	24Cr–22Ni–6Mo–2W–Cu–N	Wld. tube	SA–249	...	S31266	...	...	109
	42	24Cr–22Ni–6Mo–2W–Cu–N	Smls. & wld. pipe	SA–312	...	S31266	...	...	109
	43	24Cr–22Ni–6Mo–2W–Cu–N	Wld. pipe	SA–358	...	S31266	...	...	109
	44	24Cr–22Ni–6Mo–2W–Cu–N	Smls. & wld. fittings	SA–403	...	S31266	...	...	109
	45	24Cr–22Ni–6Mo–2W–Cu–N	Bar, shapes	SA–479	...	S31266	...	...	109

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
														Ferrous Materials (Cont'd)
1	100.0	96.5	90.6	87.6	86.1	84.9	84.2	83.4	...	...	...	...	...	...
2	75.0	75.0	74.7	73.0	71.6	70.2	69.3	68.3	67.2	65.8	64.2	62.5	60.4	58.2
3	75.0	75.0	74.7	73.0	71.6	70.2	69.3	68.3	67.2	65.8	64.2	62.5	60.4	58.2
4	75.0	75.0	74.7	73.0	71.6	70.2	69.3	68.3	67.2	65.8	64.2	62.5	60.4	58.2
5	75.0	75.0	74.7	73.0	71.6	70.2	69.3	68.3	67.2	65.8	64.2	62.5	60.4	58.2
6	75.0	75.0	74.7	73.0	71.6	70.2	69.3	68.3	67.2	65.8	64.2	62.5	60.4	58.2
7	75.0	75.0	74.7	73.0	71.6	70.2	69.3	68.3	67.2	65.8	64.2	62.5	60.4	58.2
8	75.0	75.0	74.7	73.0	71.6	70.2	69.3	68.3	67.2	65.8	64.2	62.5	60.4	58.2
9	75.0	75.0	74.7	73.0	71.6	70.2	69.3	68.3	67.2	65.8	64.2	62.5	60.4	58.2
10	75.0	75.0	74.7	73.0	71.6	70.2	69.3	68.3	67.2	65.8	64.2	62.5	60.4	58.2
11	75.0	75.0	74.7	73.0	71.6	70.2	69.3	68.3	67.2	65.8	64.2	62.5	60.4	58.2
12	75.0	75.0	74.7	73.0	71.6	70.2	69.3	68.3	67.2	65.8	64.2	62.5	60.4	58.2
13	75.0	75.0	74.7	73.0	71.6	70.2	69.3	68.3	67.2	65.8	64.2	62.5	60.4	58.2
14	75.0	75.0	74.7	73.0	71.6	70.2	69.3	68.3	67.2	65.8	64.2	62.5	60.4	58.2
15	75.0	75.0	74.7	73.0	71.6	70.2	69.3	68.3	67.2	65.8	64.2	62.5	60.4	58.2
16	75.0	75.0	74.7	73.0	71.6	70.2	69.3	68.3	67.2	65.8	64.2	62.5	60.4	58.2
17	75.0	75.0	74.7	73.0	71.6	70.2	69.3	68.3	67.2	65.8	64.2	62.5	60.4	58.2
18	75.0	75.0	74.7	73.0	71.6	70.2	69.3	68.3	67.2	65.8	64.2	62.5	60.4	58.2
19	75.0	75.0	74.7	73.0	71.6	70.2	69.3	68.3	67.2	65.8	64.2	62.5	60.4	58.2
20	75.0	75.0	74.7	73.0	71.6	70.2	69.3	68.3	67.2	65.8	64.2	62.5	60.4	58.2
21	75.0	75.0	74.7	73.0	71.6	70.2	69.3	68.3	67.2	65.8	64.2	62.5	60.4	58.2
22	75.0	75.0	74.7	73.0	71.6	70.2	69.3	68.3	67.2	65.8	64.2	62.5	60.4	58.2
23	75.0	75.0	74.7	73.0	71.6	70.2	69.3	68.3	67.2	65.8	64.2	62.5	60.4	58.2
24	75.0	75.0	74.7	73.0	71.6	70.2	69.3	68.3	67.2	65.8	64.2	62.5	60.4	58.2
25	75.0	75.0	74.7	73.0	71.6	70.2	69.3	68.3	67.2	65.8	64.2	62.5	60.4	58.2
26	93.0	93.0	87.8	83.7	80.5	78.1	77.2	76.5	...	...	...	...	...	...
27	93.0	93.0	87.8	83.7	80.5	78.1	77.2	76.5	...	...	...	...	...	...
28	93.0	93.0	87.8	83.7	80.5	78.1	77.2	76.5	...	...	...	...	...	...
29	93.0	93.0	87.8	83.7	80.5	78.1	77.2	76.5	...	...	...	...	...	...
30	93.0	93.0	87.8	83.7	80.5	78.1	77.2	76.5	...	...	...	...	...	...
31	93.0	93.0	87.8	83.7	80.5	78.1	77.2	76.5	...	...	...	...	...	...
32	93.0	93.0	87.8	83.7	80.5	78.1	77.2	76.5	...	...	...	...	...	...
33	93.0	93.0	87.8	83.7	80.5	78.1	77.2	76.5	...	...	...	...	...	...
34	93.0	93.0	87.8	83.7	80.5	78.1	77.2	76.5	...	...	...	...	...	...
35	93.0	93.0	87.8	83.7	80.5	78.1	77.2	76.5	...	...	...	...	...	...
36	93.0	93.0	87.8	83.7	80.5	78.1	77.2	76.5	...	...	...	...	...	...
37	95.0	94.9	87.8	84.6	84.6	84.6	84.6	81.3	...	...	...	...	...	...
38	109.0	107.7	101.3	96.9	94.0	92.1	91.3	90.6	89.8	88.9	...	...	...	...
39	109.0	107.7	101.3	96.9	94.0	92.1	91.3	90.6	89.8	88.9	...	...	...	...
40	109.0	107.7	101.3	96.9	94.0	92.1	91.3	90.6	89.8	88.9	...	...	...	...
41	109.0	107.7	101.3	96.9	94.0	92.1	91.3	90.6	89.8	88.9	...	...	...	...
42	109.0	107.7	101.3	96.9	94.0	92.1	91.3	90.6	89.8	88.9	...	...	...	...
43	109.0	107.7	101.3	96.9	94.0	92.1	91.3	90.6	89.8	88.9	...	...	...	...
44	109.0	107.7	101.3	96.9	94.0	92.1	91.3	90.6	89.8	88.9	...	...	...	...
45	109.0	107.7	101.3	96.9	94.0	92.1	91.3	90.6	89.8	88.9	...	...	...	...

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Ferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	55.2	52.2	49.1	45.7	42.3	38.8	35.2	31.6	28.0	24.5	...	...	...	(**21**)
4	55.2	52.2	49.1	45.7	42.3	38.8	35.2	31.6	28.0	24.5	...	...	...	(**21**)
5	55.2	52.2	49.1	45.7	42.3	38.8	35.2	31.6	28.0	24.5	...	...	...	(**21**)
6	55.2	52.2	49.1	45.7	42.3	38.8	35.2	31.6	28.0	24.5	...	...	...	(**21**)
7	55.2	52.2	49.1	45.7	42.3	38.8	35.2	31.6	28.0	24.5	...	...	...	(**21**)
8	55.2	52.2	49.1	45.7	42.3	38.8	35.2	31.6	28.0	24.5	...	...	...	(**21**)
9	55.2	52.2	49.1	45.7	42.3	38.8	35.2	31.6	28.0	24.5	...	...	...	(**21**)
10	55.2	52.2	49.1	45.7	42.3	38.8	35.2	31.6	28.0	24.5	...	...	...	(**21**)
11	55.2	52.2	49.1	45.7	42.3	38.8	35.2	31.6	28.0	24.5	...	...	...	(**21**)
12	55.2	52.2	49.1	45.7	42.3	38.8	35.2	31.6	28.0	24.5	...	...	...	(**21**)
13	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
27	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
28	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
29	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
30	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
31	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
32	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
33	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
34	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
35	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
36	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
		Ferrous Materials (Cont'd)							
	1	24Cr–22Ni–6Mo–2W–Cu–N	Wld. pipe	SA–813	...	S31266	...	...	109
	2	25Cr–4Ni–4Mo–Ti	Plate	SA–240	...	S44635	...	...	90
	3	25Cr–4Ni–4Mo–Ti	Wld. tube	SA–268	...	S44635	...	...	90
	4	25Cr–5Ni–3Mo–2Cu	Castings	SA–995	1B	J93372	...	...	100
	5	25Cr–5Ni–3Mo–2Cu	Plate	SA–240	...	S32550	...	...	110
	6	25Cr–5Ni–3Mo–2Cu	Bar	SA–479	...	S32550	...	...	110
	7	25Cr–5Ni–3Mo–2Cu	Smls. & wld. tube	SA–789	...	S32550	...	...	110
	8	25Cr–5Ni–3Mo–2Cu	Smls. & wld. pipe	SA–790	...	S32550	...	...	110
(**21**)	9	25Cr–6Ni–Mo–N	Forgings	SA–182	...	S32506	...	...	90
(**21**)	10	25Cr–6Ni–Mo–N	Plate, sheet	SA–240	...	S32506	...	...	90
(**21**)	11	25Cr–6Ni–Mo–N	Bar	SA–479	...	S32506	...	...	90
(**21**)	12	25Cr–6Ni–Mo–N	Smls. tube	SA–789	...	S32506	...	...	90
(**21**)	13	25Cr–6Ni–Mo–N	Wld. tube	SA–789	...	S32506	...	...	90
(**21**)	14	25Cr–6Ni–Mo–N	Smls. pipe	SA–790	...	S32506	...	...	90
(**21**)	15	25Cr–6Ni–Mo–N	Wld. pipe	SA–790	...	S32506	...	...	90
	16	25Cr–6Ni–Mo–N	Plate	SA–240	...	S31200	...	...	100
	17	25Cr–6.5Ni–3Mo–N	Smls. & wld. tube	SA–789	...	S31260	...	...	100
	18	25Cr–6.5Ni–3Mo–N	Smls. & wld. pipe	SA–790	...	S31260	...	...	100
	19	25Cr–6.5Ni–3Mo–N	Plate	SA–240	...	S31260	...	...	100
	20	25Cr–7Ni–3Mo–W–Cu–N	Forgings	SA–182	F54	S39274	...	...	116
	21	25Cr–7Ni–3Mo–W–Cu–N	Smls. & wld. tube	SA–789	...	S39274	...	...	116
	22	25Cr–7Ni–3Mo–W–Cu–N	Smls. & wld. pipe	SA–790	...	S39274	...	...	116
	23	25Cr–7Ni–4Mo–N	Forgings	SA–182	F53	S32750	...	...	116
	24	25Cr–7Ni–4Mo–N	Plate	SA–240	...	S32750	...	...	116
(**21**)	25	25Cr–7Ni–4Mo–N	Smls. & wld. tube	SA–789	...	S32750	...	...	116
(**21**)	26	25Cr–7Ni–4Mo–N	Smls. & wld. pipe	SA–790	...	S32750	...	...	116
	27	25Cr–7.5Ni–3.5Mo–N–Cu–W	Castings	SA–995	CD3MWCuN	J93380	...	...	100
	28	25Cr–7.5Ni–3.5Mo–N–Cu–W	Forgings	SA–182	F55	S32760	...	...	109
	29	25Cr–7.5Ni–3.5Mo–N–Cu–W	Plate	SA–240	...	S32760	...	...	109
	30	25Cr–7.5Ni–3.5Mo–N–Cu–W	Bar	SA–479	...	S32760	Annealed	...	109
	31	25Cr–7.5Ni–3.5Mo–N–Cu–W	Smls. & wld. tube	SA–789	...	S32760	...	...	109
	32	25Cr–7.5Ni–3.5Mo–N–Cu–W	Smls. & wld. pipe	SA–790	...	S32760	...	...	109
	33	25Cr–7.5Ni–3.5Mo–N–Cu–W	Smls. & wld. ftgs.	SA–815	...	S32760	...	...	109
	34	25Cr–12Ni	Castings	SA–351	CH8	J93400	...	...	65
	35	25Cr–12Ni	Cast pipe	SA–451	CPH8	J93400	...	...	65
	36	25Cr–12Ni	Castings	SA–351	CH20	J93402	...	...	70
	37	25Cr–12Ni	Cast pipe	SA–451	CPH20	J93402	...	...	70
	38	25Cr–20Ni	Castings	SA–351	CK20	J94202	...	...	65
	39	25Cr–20Ni	Cast pipe	SA–451	CPK20	J94202	...	...	65
	40	25Cr–20Ni	Forgings	SA–182	F310	S31000	...	≤5	75
	41	25Cr–20Ni	Forgings	SA–965	F310	S31000	...	...	75
(**21**)	42	25Cr–20Ni	Smls. tube	SA–213	TP310S	S31008	...	...	75
(**21**)	43	25Cr–20Ni	Plate	SA–240	310S	S31008	...	...	75
(**21**)	44	25Cr–20Ni	Wld. tube	SA–249	TP310S	S31008	...	...	75
	45	25Cr–20Ni	Smls. & wld. pipe	SA–312	TP310S	S31008	...	...	75

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
														Ferrous Materials (Cont'd)
1	109.0	107.7	101.3	96.9	94.0	92.1	91.3	90.6	89.8	88.9	...	...	...	...
2	90.0	87.1	82.1	78.8	77.0	76.3	75.7	...	...	...	...	...	...	...
3	90.0	87.1	82.1	78.8	77.0	76.3	75.7	...	...	...	...	...	...	...
4	100.0	...	...	...	...	...	...	...	...	...	...	...	...	...
5	110.0	109.6	103.4	100.1	98.7	...	...	...	...	...	...	...	...	...
6	110.0	109.6	103.4	100.1	98.7	...	...	...	...	...	...	...	...	...
7	110.0	109.6	103.4	100.1	98.7	...	...	...	...	...	...	...	...	...
8	110.0	109.6	103.4	100.1	98.7	...	...	...	...	...	...	...	...	...
9	90.0	89.8	85.3	84.4	84.4	84.4	...	...	...	...	...	...	...	...
10	90.0	89.8	85.3	84.4	84.4	84.4	...	...	...	...	...	...	...	...
11	90.0	89.8	85.3	84.4	84.4	84.4	...	...	...	...	...	...	...	...
12	90.0	89.8	85.3	84.4	84.4	84.4	...	...	...	...	...	...	...	...
13	90.0	89.8	85.3	84.4	84.4	84.4	...	...	...	...	...	...	...	...
14	90.0	89.8	85.3	84.4	84.4	84.4	...	...	...	...	...	...	...	...
15	90.0	89.8	85.3	84.4	84.4	84.4	...	...	...	...	...	...	...	...
16	100.0	100.0	94.8	92.0	91.5	91.5	...	...	...	...	...	...	...	...
17	100.0	99.9	94.9	92.5	92.2	92.2	92.2	...	...	...	...	...	...	...
18	100.0	99.9	94.9	92.5	92.2	92.2	92.2	...	...	...	...	...	...	...
19	100.0	99.9	94.9	92.5	92.2	92.2	92.2	...	...	...	...	...	...	...
20	116.0	116.0	110.5	109.9	109.9	109.9	109.9	109.9	109.9	...	...	...	...	...
21	116.0	116.0	110.5	109.9	109.9	109.9	109.9	109.9	109.9	...	...	...	...	...
22	116.0	116.0	110.5	109.9	109.9	109.9	109.9	109.9	109.9	...	...	...	...	...
23	116.0	115.5	109.1	105.4	103.6	103.0	...	...	...	...	...	...	...	...
24	116.0	115.5	109.1	105.4	103.6	103.0	...	...	...	...	...	...	...	...
25	116.0	115.5	109.1	105.4	103.6	103.0	...	...	...	...	...	...	...	...
26	116.0	115.5	109.1	105.4	103.6	103.0	...	...	...	...	...	...	...	...
27	100.0	99.5	94.3	93.1	93.1	93.1	...	...	...	...	...	...	...	...
28	109.0	96.1	92.9	92.9	92.9	92.9	...	...	...	...	...	...	...	...
29	109.0	96.1	92.9	92.9	92.9	92.9	...	...	...	...	...	...	...	...
30	109.0	96.1	92.9	92.9	92.9	92.9	...	...	...	...	...	...	...	...
31	109.0	96.1	92.9	92.9	92.9	92.9	...	...	...	...	...	...	...	...
32	109.0	96.1	92.9	92.9	92.9	92.9	...	...	...	...	...	...	...	...
33	109.0	96.1	92.9	92.9	92.9	92.9	...	...	...	...	...	...	...	...
34	65.0	59.5	55.4	53.9	53.8	53.8	53.7	53.3	52.6	51.6	50.2	48.5	46.3	43.8
35	65.0	59.5	55.4	53.9	53.8	53.8	53.7	53.3	52.6	51.6	50.2	48.5	46.3	43.8
36	70.0	64.0	59.6	58.1	57.9	57.9	57.8	57.4	56.7	55.6	54.1	52.2	49.9	47.2
37	70.0	64.0	59.6	58.1	57.9	57.9	57.8	57.4	56.7	55.6	54.1	52.2	49.9	47.2
38	65.0	59.5	55.4	53.9	53.8	53.8	53.7	53.3	52.6	51.6	50.2	48.5	46.3	43.8
39	65.0	59.5	55.4	53.9	53.8	53.8	53.7	53.3	52.6	51.6	50.2	48.5	46.3	43.8
40	75.0	74.2	70.8	69.6	69.5	69.5	69.5	69.3	68.8	68.0	66.9	65.5	63.8	61.6
41	75.0	74.2	70.8	69.6	69.5	69.5	69.5	69.3	68.8	68.0	66.9	65.5	63.8	61.6
42	75.0	74.2	70.8	69.6	69.5	69.5	69.5	69.3	68.8	68.0	66.9	65.5	63.8	61.6
43	75.0	74.2	70.8	69.6	69.5	69.5	69.5	69.3	68.8	68.0	66.9	65.5	63.8	61.6
44	75.0	74.2	70.8	69.6	69.5	69.5	69.5	69.3	68.8	68.0	66.9	65.5	63.8	61.6
45	75.0	74.2	70.8	69.6	69.5	69.5	69.5	69.3	68.8	68.0	66.9	65.5	63.8	61.6

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Ferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
10	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
11	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
12	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
13	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
14	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
15	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
26	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
27	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	58.2	55.2	51.7	48.0	43.9	39.7	35.3	30.8	26.5	22.3	...	...	...	(**21**)
43	58.2	55.2	51.7	48.0	43.9	39.7	35.3	30.8	26.5	22.3	...	...	...	(**21**)
44	58.2	55.2	51.7	48.0	43.9	39.7	35.3	30.8	26.5	22.3	...	...	...	(**21**)
45	58.2	55.2	51.7	48.0	43.9	39.7	35.3	30.8	26.5	22.3	...	...	...	

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Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
		Ferrous Materials (Cont'd)							
(**21**)	1	25Cr–20Ni	Wld. pipe	SA–358	310S	S31008	1	...	75
(**21**)	2	25Cr–20Ni	Wld. pipe	SA–358	310S	S31008	3	...	75
(**21**)	3	25Cr–20Ni	Wld. pipe	SA–358	310S	S31008	4	...	75
(**21**)	4	25Cr–20Ni	Smls. & wld. ftgs.	SA–403	310S	S31008	...	...	75
(**21**)	5	25Cr–20Ni	Bar	SA–479	310S	S31008	...	...	75
(**21**)	6	25Cr–20Ni	Wld. pipe	SA–813	TP310S	S31008	...	...	75
(**21**)	7	25Cr–20Ni	Wld. pipe	SA–814	TP310S	S31008	...	...	75
	8	25Cr–20Ni	Bar	SA/JIS G4303	SUS310S	...	...	...	75
	9	25Cr–20Ni	Smls. tube	SA–213	TP310H	S31009	...	...	75
	10	25Cr–20Ni	Plate	SA–240	310H	S31009	...	...	75
	11	25Cr–20Ni	Wld. tube	SA–249	TP310H	S31009	...	...	75
	12	25Cr–20Ni	Smls. & wld. pipe	SA–312	TP310H	S31009	...	...	75
	13	25Cr–20Ni	Bar	SA–479	310H	S31009	...	...	75
	14	25Cr–20Ni–Cb	Smls. tube	SA–213	TP310Cb	S31040	...	...	75
	15	25Cr–20Ni–Cb	Plate	SA–240	310Cb	S31040	...	...	75
	16	25Cr–20Ni–Cb	Wld. tube	SA–249	TP310Cb	S31040	...	...	75
	17	25Cr–20Ni–Cb	Smls. & wld. pipe	SA–312	TP310Cb	S31040	...	...	75
	18	25Cr–20Ni–Cb	Bar	SA–479	310Cb	S31040	...	...	75
	19	25Cr–20Ni–Cb	Wld. pipe	SA–813	TP310Cb	S31040	...	...	75
	20	25Cr–20Ni–Cb	Wld. pipe	SA–814	TP310Cb	S31040	...	...	75
	21	25Cr–20Ni–Cb–N	Smls. tube	SA–213	TP310HCbN	S31042	...	...	95
	22	25Cr–22Ni–2Mo–N	Forgings	SA–182	F310MoLN	S31050	...	...	78
	23	25Cr–22Ni–2Mo–N	Smls. tube	SA–213	TP310MoLN	S31050	...	0.250 < t ≤ 1.250	78
	24	25Cr–22Ni–2Mo–N	Plate	SA–240	310MoLN	S31050	...	t > 0.250	78
	25	25Cr–22Ni–2Mo–N	Wld. tube	SA–249	TP310MoLN	S31050	...	0.250 < t ≤ 1.250	78
	26	25Cr–22Ni–2Mo–N	Wld. pipe	SA–312	TP310MoLN	S31050	...	0.250 < t ≤ 1.250	78
	27	25Cr–22Ni–2Mo–N	Smls. tube	SA–213	TP310MoLN	S31050	...	≤0.250, wall	84
	28	25Cr–22Ni–2Mo–N	Plate	SA–240	310MoLN	S31050	...	t ≤ 0.250	84
	29	25Cr–22Ni–2Mo–N	Wld. tube	SA–249	TP310MoLN	S31050	...	≤0.250, wall	84
	30	25Cr–22Ni–2Mo–N	Wld. pipe	SA–312	TP310MoLN	S31050	...	≤0.250, wall	84
	31	26Cr–4Ni–Mo	Plate	SA–240	329	S32900	...	...	90
	32	26Cr–4Ni–Mo	Smls. & wld. tube	SA–789	...	S32900	...	...	90
	33	26Cr–4Ni–Mo	Smls. & wld. pipe	SA–790	...	S32900	...	...	90
	34	26Cr–4Ni–Mo–N	Plate	SA–240	...	S32950	...	...	100
	35	26Cr–4Ni–Mo–N	Smls. & wld. tube	SA–789	...	S32950	...	...	100
	36	26Cr–4Ni–Mo–N	Smls. & wld. pipe	SA–790	...	S32950	...	...	100
	37	29Cr–6.5Ni–2Mo–N	Plate, sheet, strip	SA–240	...	S32906	...	≥0.40	109
	38	29Cr–6.5Ni–2Mo–N	Bar	SA–479	...	S32906	...	...	109
	39	29Cr–6.5Ni–2Mo–N	Smls. tube	SA–789	...	S32906	...	≥0.40	109
	40	29Cr–6.5Ni–2Mo–N	Smls. pipe	SA–790	...	S32906	...	≥0.40	109
	41	29Cr–6.5Ni–2Mo–N	Plate, sheet, strip	SA–240	...	S32906	...	<0.40	116
	42	29Cr–6.5Ni–2Mo–N	Smls. tube	SA–789	...	S32906	...	<0.40	116
	43	29Cr–6.5Ni–2Mo–N	Smls. pipe	SA–790	...	S32906	...	<0.40	116

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
														Ferrous Materials (Cont'd)
1	75.0	74.2	70.8	69.6	69.5	69.5	69.5	69.3	68.8	68.0	66.9	65.5	63.8	61.6
2	75.0	74.2	70.8	69.6	69.5	69.5	69.5	69.3	68.8	68.0	66.9	65.5	63.8	61.6
3	75.0	74.2	70.8	69.6	69.5	69.5	69.5	69.3	68.8	68.0	66.9	65.5	63.8	61.6
4	75.0	74.2	70.8	69.6	69.5	69.5	69.5	69.3	68.8	68.0	66.9	65.5	63.8	61.6
5	75.0	74.2	70.8	69.6	69.5	69.5	69.5	69.3	68.8	68.0	66.9	65.5	63.8	61.6
6	75.0	74.2	70.8	69.6	69.5	69.5	69.5	69.3	68.8	68.0	66.9	65.5	63.8	61.6
7	75.0	74.2	70.8	69.6	69.5	69.5	69.5	69.3	68.8	68.0	66.9	65.5	63.8	61.6
8	75.0	74.2	70.8	69.6	69.5	69.5	69.5	69.3	68.8	68.0	66.9	65.5	63.8	61.6
9	75.0	74.2	70.8	69.6	69.5	69.5	69.5	69.3	68.8	68.0	66.9	65.5	63.8	61.6
10	75.0	74.2	70.8	69.6	69.5	69.5	69.5	69.3	68.8	68.0	66.9	65.5	63.8	61.6
11	75.0	74.2	70.8	69.6	69.5	69.5	69.5	69.3	68.8	68.0	66.9	65.5	63.8	61.6
12	75.0	74.2	70.8	69.6	69.5	69.5	69.5	69.3	68.8	68.0	66.9	65.5	63.8	61.6
13	75.0	74.2	70.8	69.6	69.5	69.5	69.5	69.3	68.8	68.0	66.9	65.5	63.8	61.6
14	75.0	74.2	70.8	69.6	69.5	69.5	69.5	69.3	68.8	68.0	66.9	65.5	63.8	61.6
15	75.0	74.2	70.8	69.6	69.5	69.5	69.5	69.3	68.8	68.0	66.9	65.5	63.8	61.6
16	75.0	74.2	70.8	69.6	69.5	69.5	69.5	69.3	68.8	68.0	66.9	65.5	63.8	61.6
17	75.0	74.2	70.8	69.6	69.5	69.5	69.5	69.3	68.8	68.0	66.9	65.5	63.8	61.6
18	75.0	74.2	70.8	69.6	69.5	69.5	69.5	69.3	68.8	68.0	66.9	65.5	63.8	61.6
19	75.0	74.2	70.8	69.6	69.5	69.5	69.5	69.3	68.8	68.0	66.9	65.5	63.8	61.6
20	75.0	74.2	70.8	69.6	69.5	69.5	69.5	69.3	68.8	68.0	66.9	65.5	63.8	61.6
21	95.0	94.0	89.0	86.0	84.5	83.8	83.6	83.4	83.0	82.6	82.0	81.1	80.0	78.6
22	78.0	77.0	72.9	70.1	68.1	66.6	66.0	65.4	64.9	64.3	63.6	62.8	61.5	59.7
23	78.0	77.0	72.9	70.1	68.1	66.6	66.0	65.4	64.9	64.3	63.6	62.8	61.5	59.7
24	78.0	77.0	72.9	70.1	68.1	66.6	66.0	65.4	64.9	64.3	63.6	62.8	61.5	59.7
25	78.0	77.0	72.9	70.1	68.1	66.6	66.0	65.4	64.9	64.3	63.6	62.8	61.5	59.7
26	78.0	77.0	72.9	70.1	68.1	66.6	66.0	65.4	64.9	64.3	63.6	62.8	61.5	59.7
27	84.0	83.0	78.5	75.5	73.3	71.7	71.0	70.4	69.9	69.3	68.5	67.6	66.2	64.3
28	84.0	83.0	78.5	75.5	73.3	71.7	71.0	70.4	69.9	69.3	68.5	67.6	66.2	64.3
29	84.0	83.0	78.5	75.5	73.3	71.7	71.0	70.4	69.9	69.3	68.5	67.6	66.2	64.3
30	84.0	83.0	78.5	75.5	73.3	71.7	71.0	70.4	69.9	69.3	68.5	67.6	66.2	64.3
31	90.0	90.0	86.7	84.9	84.9	84.9	84.9	84.9	...	...	...	...	...	...
32	90.0	90.0	86.7	84.9	84.9	84.9	84.9	84.9	...	...	...	...	...	...
33	90.0	90.0	86.7	84.9	84.9	84.9	84.9	84.9	...	...	...	...	...	...
34	100.0	99.7	94.6	92.5	92.5	92.5	92.5	92.5	...	...	...	...	...	...
35	100.0	99.7	94.6	92.5	92.5	92.5	92.5	92.5	...	...	...	...	...	...
36	100.0	99.7	94.6	92.5	92.5	92.5	92.5	92.5	...	...	...	...	...	...
37	109.0	108.9	103.6	100.5	99.1	99.1	...	...	...	...	...	...	...	...
38	109.0	108.9	103.6	100.5	99.1	99.1	...	...	...	...	...	...	...	...
39	109.0	108.9	103.6	100.5	99.1	99.1	...	...	...	...	...	...	...	...
40	109.0	108.9	103.6	100.5	99.1	99.1	...	...	...	...	...	...	...	...
41	116.0	115.9	110.3	106.9	105.5	105.5	...	...	...	...	...	...	...	...
42	116.0	115.9	110.3	106.9	105.5	105.5	...	...	...	...	...	...	...	...
43	116.0	115.9	110.3	106.9	105.5	105.5	...	...	...	...	...	...	...	...

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Ferrous Materials (Cont'd)													
1	58.2	55.2	51.7	48.0	43.9	39.7	35.3	30.8	26.5	22.3	...	...	...	(**21**)
2	58.2	55.2	51.7	48.0	43.9	39.7	35.3	30.8	26.5	22.3	...	...	...	(**21**)
3	58.2	55.2	51.7	48.0	43.9	39.7	35.3	30.8	26.5	22.3	...	...	...	(**21**)
4	58.2	55.2	51.7	48.0	43.9	39.7	35.3	30.8	26.5	22.3	...	...	...	(**21**)
5	58.2	55.2	51.7	48.0	43.9	39.7	35.3	30.8	26.5	22.3	...	...	...	(**21**)
6	58.2	55.2	51.7	48.0	43.9	39.7	35.3	30.8	26.5	22.3	...	...	...	(**21**)
7	58.2	55.2	51.7	48.0	43.9	39.7	35.3	30.8	26.5	22.3	...	...	...	(**21**)
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
	Nonferrous Materials							
1	...	Plate, sheet	SB–209	...	Alclad 3003	O	0.006–0.499	13
2	...	Plate, sheet	SB–209	...	Alclad 3003	O	0.500–3.000	14
3	...	Plate, sheet	SB–209	...	Alclad 3003	H112	0.250–0.499	16
4	...	Plate, sheet	SB–209	...	Alclad 3003	H112	0.500–2.000	15
5	...	Plate, sheet	SB–209	...	Alclad 3003	H112	2.001–3.000	14.5
6	...	Plate, sheet	SB–209	...	Alclad 3003	H12	0.017–0.499	16
7	...	Plate, sheet	SB–209	...	Alclad 3003	H12	0.500–2.000	17
8	...	Plate, sheet	SB–209	...	Alclad 3003	H14	0.009–0.499	19
9	...	Plate, sheet	SB–209	...	Alclad 3003	H14	0.500–1.000	20
10	...	Drawn smls. tube	SB–210	...	Alclad 3003	O	0.010–0.500	13
11	...	Drawn smls. tube	SB–210	...	Alclad 3003	H113	0.050–0.500	13
12	...	Drawn smls. tube	SB–210	...	Alclad 3003	H14	0.010–0.500	19
13	...	Drawn smls. tube	SB–210	...	Alclad 3003	H18	0.010–0.500	26
14	...	Cond. & heat exch. tubes	SB–234	...	Alclad 3003	H14	0.010–0.200	19
15	...	Cond. & heat exch. tubes	SB–234	...	Alclad 3003	H25	0.010–0.200	21
16	...	Smls. extr. tube	SB–241	...	Alclad 3003	O	...	13
17	...	Smls. extr. tube	SB–241	...	Alclad 3003	H112	...	13
18	...	Plate, sheet	SB–209	...	Alclad 3004	O	0.006–0.499	21
19	...	Plate, sheet	SB–209	...	Alclad 3004	O	0.500–3.000	22
20	...	Plate, sheet	SB–209	...	Alclad 3004	H112	0.250–0.499	22
21	...	Plate, sheet	SB–209	...	Alclad 3004	H112	0.500–3.000	23
22	...	Plate, sheet	SB–209	...	Alclad 3004	H32	0.017–0.499	27
23	...	Plate, sheet	SB–209	...	Alclad 3004	H32	0.500–2.000	28
24	...	Plate, sheet	SB–209	...	Alclad 3004	H34	0.009–0.499	31
25	...	Plate, sheet	SB–209	...	Alclad 3004	H34	0.500–1.000	32
26	...	Plate, sheet	SB–209	...	Alclad 6061	T4	0.010–0.249	27
27	...	Plate, sheet	SB–209	...	Alclad 6061	T451	0.250–0.499	27
28	...	Plate, sheet	SB–209	...	Alclad 6061	T451	0.500–3.000	30
29	...	Plate, sheet	SB–209	...	Alclad 6061	T4 wld.	0.010–0.249	24
30	...	Plate, sheet	SB–209	...	Alclad 6061	T451 wld.	0.250–3.000	24
31	...	Plate, sheet	SB–209	...	Alclad 6061	T6	0.010–0.249	38
32	...	Plate, sheet	SB–209	...	Alclad 6061	T651	0.250–0.499	38
33	...	Plate, sheet	SB–209	...	Alclad 6061	T651	0.500–4.000	42
34	...	Plate, sheet	SB–209	...	Alclad 6061	T651	4.001–5.000	40
35	...	Plate, sheet	SB–209	...	Alclad 6061	T6 wld.	0.010–0.249	24
36	...	Plate, sheet	SB–209	...	Alclad 6061	T651 wld.	0.250–5.000	24
37	...	Castings	SB/EN 1706	...	AC–42000–S	T6	...	32
38	...	Plate, sheet	SB–209	...	A91060	O	0.006–3.000	8
39	...	Plate, sheet	SB–209	...	A91060	H112	0.250–0.499	11
40	...	Plate, sheet	SB–209	...	A91060	H112	0.500–1.000	10
41	...	Plate, sheet	SB–209	...	A91060	H112	1.001–3.000	9
42	...	Plate, sheet	SB–209	...	A91060	H12	0.017–2.000	11
43	...	Plate, sheet	SB–209	...	A91060	H14	0.009–1.000	12
44	...	Drawn smls. tube	SB–210	...	A91060	O	0.018–0.500	8.5
45	...	Drawn smls. tube	SB–210	...	A91060	H14	0.018–0.500	12

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
														Nonferrous Materials
1	13.0	12.0	9.7	7.5	...	...	...	...	...	...	...	...	...	...
2	14.0	12.9	10.5	8.0	...	...	...	...	...	...	...	...	...	...
3	16.0	14.6	12.2	9.3	...	...	...	...	...	...	...	...	...	...
4	15.0	13.8	11.3	8.6	...	...	...	...	...	...	...	...	...	...
5	14.5	13.4	10.8	8.3	...	...	...	...	...	...	...	...	...	...
6	16.0	15.8	13.6	11.0	...	...	...	...	...	...	...	...	...	...
7	17.0	16.8	14.5	11.7	...	...	...	...	...	...	...	...	...	...
8	19.0	19.0	16.7	12.9	...	...	...	...	...	...	...	...	...	...
9	20.0	20.0	17.5	13.5	...	...	...	...	...	...	...	...	...	...
10	13.0	12.0	9.7	7.5	...	...	...	...	...	...	...	...	...	...
11	13.0	12.0	9.7	7.5	...	...	...	...	...	...	...	...	...	...
12	19.0	19.0	16.7	12.9	...	...	...	...	...	...	...	...	...	...
13	26.0	25.6	22.2	14.7	...	...	...	...	...	...	...	...	...	...
14	19.0	19.0	16.7	12.9	...	...	...	...	...	...	...	...	...	...
15	21.0	21.0	18.3	13.4	...	...	...	...	...	...	...	...	...	...
16	13.0	12.0	9.7	7.5	...	...	...	...	...	...	...	...	...	...
17	13.0	12.0	9.7	7.5	...	...	...	...	...	...	...	...	...	...
18	21.0	21.0	19.2	11.9	...	...	...	...	...	...	...	...	...	...
19	22.0	22.0	20.1	12.4	...	...	...	...	...	...	...	...	...	...
20	22.0	22.0	20.1	12.4	...	...	...	...	...	...	...	...	...	...
21	23.0	23.0	20.6	13.9	...	...	...	...	...	...	...	...	...	...
22	27.0	27.0	24.7	18.2	...	...	...	...	...	...	...	...	...	...
23	28.0	28.0	25.6	18.9	...	...	...	...	...	...	...	...	...	...
24	31.0	31.0	27.9	20.1	...	...	...	...	...	...	...	...	...	...
25	32.0	32.0	28.8	20.8	...	...	...	...	...	...	...	...	...	...
26	27.0	27.0	25.5	16.0	...	...	...	...	...	...	...	...	...	...
27	27.0	27.0	25.5	16.0	...	...	...	...	...	...	...	...	...	...
28	30.0	30.0	28.3	17.8	...	...	...	...	...	...	...	...	...	...
29	24.0	24.0	23.0	15.0	...	...	...	...	...	...	...	...	...	...
30	24.0	24.0	23.0	15.0	...	...	...	...	...	...	...	...	...	...
31	38.0	38.0	31.7	17.5	...	...	...	...	...	...	...	...	...	...
32	38.0	38.0	31.7	17.5	...	...	...	...	...	...	...	...	...	...
33	42.0	42.0	35.1	19.3	...	...	...	...	...	...	...	...	...	...
34	40.0	40.0	33.4	18.4	...	...	...	...	...	...	...	...	...	...
35	24.0	24.0	23.2	15.5	...	...	...	...	...	...	...	...	...	...
36	24.0	24.0	23.2	15.5	...	...	...	...	...	...	...	...	...	...
37	32.0	32.0	29.3	...	...	...	...	...	...	...	...	...	...	...
38	8.0	6.8	5.3	3.8	...	...	...	...	...	...	...	...	...	...
39	11.0	9.4	7.2	5.3	...	...	...	...	...	...	...	...	...	...
40	10.0	8.5	6.6	4.8	...	...	...	...	...	...	...	...	...	...
41	9.0	7.7	5.9	4.4	...	...	...	...	...	...	...	...	...	...
42	11.0	10.3	8.2	6.0	...	...	...	...	...	...	...	...	...	...
43	12.0	12.0	10.3	6.9	...	...	...	...	...	...	...	...	...	...
44	8.5	7.2	5.6	4.1	...	...	...	...	...	...	...	...	...	...
45	12.0	12.0	10.3	6.9	...	...	...	...	...	...	...	...	...	...

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding												
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
	Nonferrous Materials												
1	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...

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Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
	Nonferrous Materials (Cont'd)							
1	...	Drawn smls. tube	SB–210	...	A91060	H113	0.018–0.500	8.5
2	...	Bar, rod, shapes	SB–221	...	A91060	O	...	8.5
3	...	Bar, rod, shapes	SB–221	...	A91060	H112	...	8.5
4	...	Cond. & heat exch. tubes	SB–234	...	A91060	H14	0.010–0.200	12
5	...	Smls. extr. tube	SB–241	...	A91060	O	...	8.5
6	...	Smls. extr. tube	SB–241	...	A91060	H112	...	8.5
7	...	Plate, sheet	SB–209	...	A91100	O	0.006–3.000	11
8	...	Plate, sheet	SB–209	...	A91100	H112	0.250–0.499	13
9	...	Plate, sheet	SB–209	...	A91100	H112	0.500–2.000	12
10	...	Plate, sheet	SB–209	...	A91100	H112	2.001–3.000	11.5
11	...	Plate, sheet	SB–209	...	A91100	H12	0.017–2.000	14
12	...	Plate, sheet	SB–209	...	A91100	H14	0.009–1.000	16
13	...	Bar, rod, shapes	SB–221	...	A91100	O	...	11
14	...	Bar, rod, shapes	SB–221	...	A91100	H112	...	11
15	...	Smls. extr. tube	SB–241	...	A91100	O	...	11
16	...	Smls. extr. tube	SB–241	...	A91100	H112	...	11
17	...	Plate, sheet	SB–209	...	A93003	O	0.006–3.000	14
18	...	Plate, sheet	SB–209	...	A93003	H112	0.250–0.499	17
19	...	Plate, sheet	SB–209	...	A93003	H112	0.500–2.000	15
20	...	Plate, sheet	SB–209	...	A93003	H112	2.001–3.000	14.5
21	...	Plate, sheet	SB–209	...	A93003	H12	0.017–2.000	17
22	...	Plate, sheet	SB–209	...	A93003	H14	0.009–1.000	20
23	...	Drawn smls. tube	SB–210	...	A93003	O	0.010–0.500	14
24	...	Drawn smls. tube	SB–210	...	A93003	H113	0.010–0.500	14
25	...	Drawn smls. tube	SB–210	...	A93003	H12	0.010–0.500	17
26	...	Drawn smls. tube	SB–210	...	A93003	H14	0.010–0.500	20
27	...	Drawn smls. tube	SB–210	...	A93003	H18	0.010–0.500	27
28	...	Bar, rod, shapes	SB–221	...	A93003	O	...	14
29	...	Bar, rod, shapes	SB–221	...	A93003	H112	...	14
30	...	Cond. & heat exch. tubes	SB–234	...	A93003	H14	0.010–0.200	20
31	...	Cond. & heat exch. tubes	SB–234	...	A93003	H25	0.010–0.200	22
32	...	Smls. extr. tube	SB–241	...	A93003	O	...	14
33	...	Smls. extr. tube	SB–241	...	A93003	H112	...	14
34	...	Smls. pipe	SB–241	...	A93003	H112	≥1.000	14
35	...	Smls. pipe	SB–241	...	A93003	H18	<1.000	27
36	...	Die forgings	SB–247	...	A93003	H112	≤4.000	14
37	...	Die forgings	SB–247	...	A93003	H112 wld.	≤4.000	14
38	...	Plate, sheet	SB–209	...	A93004	O	0.006–3.000	22
39	...	Plate, sheet	SB–209	...	A93004	H112	0.250–3.000	23
40	...	Plate, sheet	SB–209	...	A93004	H32	0.017–2.000	28
41	...	Plate, sheet	SB–209	...	A93004	H34	0.009–1.000	32
42	...	Plate, sheet	SB–209	...	A95052	O	0.006–3.000	25
43	...	Plate, sheet	SB–209	...	A95052	H112	0.250–0.499	28
44	...	Plate, sheet	SB–209	...	A95052	H112	0.500–3.000	25
45	...	Plate, sheet	SB–209	...	A95052	H32	0.017–2.000	31

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
														Nonferrous Materials (Cont'd)
1	8.5	7.2	5.6	4.1	...	...	...	...	...	...	...	...	...	...
2	8.5	7.2	5.6	4.1	...	...	...	...	...	...	...	...	...	...
3	8.5	7.2	5.6	4.1	...	...	...	...	...	...	...	...	...	...
4	12.0	12.0	10.3	6.9	...	...	...	...	...	...	...	...	...	...
5	8.5	7.2	5.6	4.1	...	...	...	...	...	...	...	...	...	...
6	8.5	7.2	5.6	4.1	...	...	...	...	...	...	...	...	...	...
7	11.0	10.2	8.0	5.3	...	...	...	...	...	...	...	...	...	...
8	13.0	12.1	9.5	6.6	...	...	...	...	...	...	...	...	...	...
9	12.0	11.2	8.8	6.0	...	...	...	...	...	...	...	...	...	...
10	11.5	10.7	8.4	5.9	...	...	...	...	...	...	...	...	...	...
11	14.0	13.9	11.7	9.1	...	...	...	...	...	...	...	...	...	...
12	16.0	16.0	13.2	9.7	...	...	...	...	...	...	...	...	...	...
13	11.0	10.2	8.0	5.3	...	...	...	...	...	...	...	...	...	...
14	11.0	10.2	8.0	5.3	...	...	...	...	...	...	...	...	...	...
15	11.0	10.2	8.0	5.3	...	...	...	...	...	...	...	...	...	...
16	11.0	10.2	8.0	5.3	...	...	...	...	...	...	...	...	...	...
17	14.0	12.9	10.5	8.0	...	...	...	...	...	...	...	...	...	...
18	17.0	15.5	13.0	9.9	...	...	...	...	...	...	...	...	...	...
19	15.0	13.8	11.3	8.6	...	...	...	...	...	...	...	...	...	...
20	14.5	13.3	10.9	8.3	...	...	...	...	...	...	...	...	...	...
21	17.0	16.8	14.5	11.7	...	...	...	...	...	...	...	...	...	...
22	20.0	20.0	17.5	13.5	...	...	...	...	...	...	...	...	...	...
23	14.0	12.9	10.5	8.0	...	...	...	...	...	...	...	...	...	...
24	14.0	12.9	10.5	8.0	...	...	...	...	...	...	...	...	...	...
25	17.0	16.8	14.5	11.7	...	...	...	...	...	...	...	...	...	...
26	20.0	20.0	17.5	13.5	...	...	...	...	...	...	...	...	...	...
27	27.0	26.5	23.0	15.3	...	...	...	...	...	...	...	...	...	...
28	14.0	12.9	10.5	8.0	...	...	...	...	...	...	...	...	...	...
29	14.0	12.9	10.5	8.0	...	...	...	...	...	...	...	...	...	...
30	20.0	20.0	17.5	13.5	...	...	...	...	...	...	...	...	...	...
31	22.0	22.0	19.1	14.1	...	...	...	...	...	...	...	...	...	...
32	14.0	12.9	10.5	8.0	...	...	...	...	...	...	...	...	...	...
33	14.0	12.9	10.5	8.0	...	...	...	...	...	...	...	...	...	...
34	14.0	12.9	10.5	8.0	...	...	...	...	...	...	...	...	...	...
35	27.0	26.5	23.0	15.3	...	...	...	...	...	...	...	...	...	...
36	14.0	12.9	10.5	8.0	...	...	...	...	...	...	...	...	...	...
37	14.0	13.0	10.6	8.4	...	...	...	...	...	...	...	...	...	...
38	22.0	22.0	20.1	12.4	...	...	...	...	...	...	...	...	...	...
39	23.0	23.0	20.6	13.9	...	...	...	...	...	...	...	...	...	...
40	28.0	28.0	25.6	18.9	...	...	...	...	...	...	...	...	...	...
41	32.0	32.0	28.8	20.8	...	...	...	...	...	...	...	...	...	...
42	25.0	25.0	23.9	17.3	...	...	...	...	...	...	...	...	...	...
43	28.0	28.0	26.7	19.4	...	...	...	...	...	...	...	...	...	...
44	25.0	25.0	23.9	17.3	...	...	...	...	...	...	...	...	...	...
45	31.0	31.0	28.0	21.2	...	...	...	...	...	...	...	...	...	...

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding												
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
	Nonferrous Materials (Cont'd)												
1	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...

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Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
	Nonferrous Materials (Cont'd)							
1	...	Plate, sheet	SB–209	...	A95052	H34	0.009–1.000	34
2	...	Drawn smls. tube	SB–210	...	A95052	O	0.010–0.450	25
3	...	Drawn smls. tube	SB–210	...	A95052	H32	0.010–0.450	31
4	...	Drawn smls. tube	SB–210	...	A95052	H34	0.010–0.450	34
5	...	Cond. & heat exch. tubes	SB–234	...	A95052	H32	0.010–0.200	31
6	...	Cond. & heat exch. tubes	SB–234	...	A95052	H34	0.010–0.200	34
7	...	Smls. extr. tube	SB–241	...	A95052	O	...	25
8	...	Plate, sheet	SB–209	...	A95083	O	0.051–1.500	40
9	...	Plate, sheet	SB–209	...	A95083	O	1.501–3.000	39
10	...	Plate, sheet	SB–209	...	A95083	O	3.001–5.000	38
11	...	Plate, sheet	SB–209	...	A95083	O	5.001–7.000	37
12	...	Plate, sheet	SB–209	...	A95083	O	7.001–8.000	36
13	...	Plate, sheet	SB–209	...	A95083	H112	0.250–1.500	40
14	...	Plate, sheet	SB–209	...	A95083	H112	1.501–3.000	39
15	...	Plate, sheet	SB–209	...	A95083	H32	0.125–1.500	44
16	...	Plate, sheet	SB–209	...	A95083	H32	1.501–3.000	41
17	...	Bar, rod, shapes	SB–221	...	A95083	O	≤5.000	39
18	...	Bar, rod, shapes	SB–221	...	A95083	H111	≤5.000	40
19	...	Bar, rod, shapes	SB–221	...	A95083	H112	≤5.000	39
20	...	Smls. extr. tube	SB–241	...	A95083	O	...	39
21	...	Smls. extr. tube	SB–241	...	A95083	H111	...	40
22	...	Smls. extr. tube	SB–241	...	A95083	H112	...	39
23	...	Die & hand forgings	SB–247	...	A95083	H111	≤4.000	39
24	...	Die & hand forgings	SB–247	...	A95083	H112	≤4.000	39
25	...	Die & hand forgings	SB–247	...	A95083	H111 wld.	≤4.000	38
26	...	Die & hand forgings	SB–247	...	A95083	H112 wld.	≤4.000	38
27	...	Plate, sheet	SB–928	...	A95083	H321	0.125–1.500	44
28	...	Plate, sheet	SB–928	...	A95083	H321	1.501–3.000	41
29	...	Plate, sheet	SB–209	...	A95086	O	0.020–2.000	35
30	...	Plate, sheet	SB–209	...	A95086	H112	0.188–0.499	36
31	...	Plate, sheet	SB–209	...	A95086	H112	0.500–2.000	35
32	...	Plate, sheet	SB–209	...	A95086	H112	2.001–3.000	34
33	...	Plate, sheet	SB–209	...	A95086	H32	0.020–2.000	40
34	...	Plate, sheet	SB–209	...	A95086	H34	0.009–1.000	44
35	...	Bar, rod, shapes	SB–221	...	A95086	H112	≤5.000	35
36	...	Smls. extr. tube	SB–241	...	A95086	O	...	35
37	...	Smls. extr. tube	SB–241	...	A95086	H111	...	36
38	...	Smls. extr. tube	SB–241	...	A95086	H112	...	35
39	...	Plate, sheet	SB–928	...	A95086	H116	0.063–2.000	40
40	...	Plate, sheet	SB–209	...	A95154	O	0.020–3.000	30
41	...	Plate, sheet	SB–209	...	A95154	H112	0.250–0.499	32
42	...	Plate, sheet	SB–209	...	A95154	H112	0.500–3.000	30
43	...	Plate, sheet	SB–209	...	A95154	H32	0.020–2.000	36
44	...	Plate, sheet	SB–209	...	A95154	H34	0.009–1.000	39
45	...	Drawn smls. tube	SB–210	...	A95154	O	0.010–0.450	30

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
														Nonferrous Materials (Cont'd)
1	34.0	34.0	33.1	25.4	...	...	...	...	...	...	...	...	...	...
2	25.0	25.0	23.9	17.3	...	...	...	...	...	...	...	...	...	...
3	31.0	31.0	28.0	21.2	...	...	...	...	...	...	...	...	...	...
4	34.0	34.0	33.1	25.4	...	...	...	...	...	...	...	...	...	...
5	31.0	31.0	28.0	21.2	...	...	...	...	...	...	...	...	...	...
6	34.0	34.0	33.1	25.4	...	...	...	...	...	...	...	...	...	...
7	25.0	25.0	23.9	17.3	...	...	...	...	...	...	...	...	...	...
8	40.0	...	...	...	...	...	...	...	...	...	...	...	...	...
9	39.0	...	...	...	...	...	...	...	...	...	...	...	...	...
10	38.0	...	...	...	...	...	...	...	...	...	...	...	...	...
11	37.0	...	...	...	...	...	...	...	...	...	...	...	...	...
12	36.0	...	...	...	...	...	...	...	...	...	...	...	...	...
13	40.0	...	...	...	...	...	...	...	...	...	...	...	...	...
14	39.0	...	...	...	...	...	...	...	...	...	...	...	...	...
15	44.0	...	...	...	...	...	...	...	...	...	...	...	...	...
16	41.0	...	...	...	...	...	...	...	...	...	...	...	...	...
17	39.0	...	...	...	...	...	...	...	...	...	...	...	...	...
18	40.0	...	...	...	...	...	...	...	...	...	...	...	...	...
19	39.0	...	...	...	...	...	...	...	...	...	...	...	...	...
20	39.0	...	...	...	...	...	...	...	...	...	...	...	...	...
21	40.0	...	...	...	...	...	...	...	...	...	...	...	...	...
22	39.0	...	...	...	...	...	...	...	...	...	...	...	...	...
23	39.0	...	...	...	...	...	...	...	...	...	...	...	...	...
24	39.0	...	...	...	...	...	...	...	...	...	...	...	...	...
25	38.0	...	...	...	...	...	...	...	...	...	...	...	...	...
26	38.0	...	...	...	...	...	...	...	...	...	...	...	...	...
27	44.0	...	...	...	...	...	...	...	...	...	...	...	...	...
28	41.0	...	...	...	...	...	...	...	...	...	...	...	...	...
29	35.0	...	...	...	...	...	...	...	...	...	...	...	...	...
30	36.0	...	...	...	...	...	...	...	...	...	...	...	...	...
31	35.0	...	...	...	...	...	...	...	...	...	...	...	...	...
32	34.0	...	...	...	...	...	...	...	...	...	...	...	...	...
33	40.0	...	...	...	...	...	...	...	...	...	...	...	...	...
34	44.0	...	...	...	...	...	...	...	...	...	...	...	...	...
35	35.0	...	...	...	...	...	...	...	...	...	...	...	...	...
36	35.0	...	...	...	...	...	...	...	...	...	...	...	...	...
37	36.0	...	...	...	...	...	...	...	...	...	...	...	...	...
38	35.0	...	...	...	...	...	...	...	...	...	...	...	...	...
39	40.0	...	...	...	...	...	...	...	...	...	...	...	...	...
40	30.0	...	...	...	...	...	...	...	...	...	...	...	...	...
41	32.0	...	...	...	...	...	...	...	...	...	...	...	...	...
42	30.0	...	...	...	...	...	...	...	...	...	...	...	...	...
43	36.0	...	...	...	...	...	...	...	...	...	...	...	...	...
44	39.0	...	...	...	...	...	...	...	...	...	...	...	...	...
45	30.0	...	...	...	...	...	...	...	...	...	...	...	...	...

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding												
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
	Nonferrous Materials (Cont'd)												
1	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...

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Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
	Nonferrous Materials (Cont'd)							
1	...	Drawn smls. tube	SB–210	...	A95154	H34	0.010–0.450	39
2	...	Bar, rod, shapes	SB–221	...	A95154	O	...	30
3	...	Bar, rod, shapes	SB–221	...	A95154	H112	...	30
4	...	Plate, sheet	SB–209	...	A95254	O	0.051–3.000	30
5	...	Plate, sheet	SB–209	...	A95254	H112	0.250–0.499	32
6	...	Plate, sheet	SB–209	...	A95254	H112	0.500–3.000	30
7	...	Plate, sheet	SB–209	...	A95254	H32	0.051–2.000	36
8	...	Plate, sheet	SB–209	...	A95254	H34	0.051–1.000	39
9	...	Plate, sheet	SB–209	...	A95454	O	0.020–3.000	31
10	...	Plate, sheet	SB–209	...	A95454	H112	0.250–0.499	32
11	...	Plate, sheet	SB–209	...	A95454	H112	0.500–3.000	31
12	...	Plate, sheet	SB–209	...	A95454	H32	0.020–2.000	36
13	...	Plate, sheet	SB–209	...	A95454	H34	0.020–1.000	39
14	...	Bar, rod, shapes	SB–221	...	A95454	O	≤5.000	31
15	...	Bar, rod, shapes	SB–221	...	A95454	H111	≤5.000	33
16	...	Bar, rod, shapes	SB–221	...	A95454	H112	≤5.000	31
17	...	Cond. & heat exch. tubes	SB–234	...	A95454	H32	0.010–0.200	36
18	...	Cond. & heat exch. tubes	SB–234	...	A95454	H34	0.010–0.200	39
19	...	Smls. extr. tube	SB–241	...	A95454	O	...	31
20	...	Smls. extr. tube	SB–241	...	A95454	H111	...	33
21	...	Smls. extr. tube	SB–241	...	A95454	H112	...	31
(**21**) 22	...	Plate, sheet	SB–209	...	A95456	O	0.051–1.500	42
(**21**) 23	...	Plate, sheet	SB–209	...	A95456	O	1.501–3.000	41
(**21**) 24	...	Plate, sheet	SB–209	...	A95456	O	3.001–5.000	40
(**21**) 25	...	Plate, sheet	SB–209	...	A95456	O	5.001–7.000	39
(**21**) 26	...	Plate, sheet	SB–209	...	A95456	O	7.001–8.000	38
(**21**) 27	...	Plate, sheet	SB–209	...	A95456	H112	0.250–1.500	42
(**21**) 28	...	Plate, sheet	SB–209	...	A95456	H112	1.501–3.000	41
(**21**) 29	...	Plate, sheet	SB–209	...	A95456	H32	0.188–0.499	46
(**21**) 30	...	Plate, sheet	SB–209	...	A95456	H32	0.500–1.500	44
(**21**) 31	...	Plate, sheet	SB–209	...	A95456	H32	1.501–3.000	41
(**21**) 32	...	Bar, rod, shapes	SB–221	...	A95456	O	≤5.000	41
(**21**) 33	...	Bar, rod, shapes	SB–221	...	A95456	H111	≤5.000	42
(**21**) 34	...	Bar, rod, shapes	SB–221	...	A95456	H112	≤5.000	41
(**21**) 35	...	Smls. extr. tube	SB–241	...	A95456	O	...	41
(**21**) 36	...	Smls. extr. tube	SB–241	...	A95456	H111	...	42
(**21**) 37	...	Smls. extr. tube	SB–241	...	A95456	H112	...	41
(**21**) 38	...	Plate, sheet	SB–928	...	A95456	H321	0.188–0.499	46
(**21**) 39	...	Plate, sheet	SB–928	...	A95456	H321	0.500–1.500	44
(**21**) 40	...	Plate, sheet	SB–928	...	A95456	H321	1.501–3.000	41
41	...	Plate, sheet	SB–209	...	A96061	T4	0.006–0.249	30
42	...	Plate, sheet	SB–209	...	A96061	T451	0.250–3.000	30
43	...	Plate, sheet	SB–209	...	A96061	T6	0.006–0.249	42
44	...	Plate, sheet	SB–209	...	A96061	T651	0.250–4.000	42
45	...	Plate, sheet	SB–209	...	A96061	T651	4.001–6.000	40

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
														Nonferrous Materials (Cont'd)
1	39.0	...	...	...	...	...	...	...	...	...	...	...	...	...
2	30.0	...	...	...	...	...	...	...	...	...	...	...	...	...
3	30.0	...	...	...	...	...	...	...	...	...	...	...	...	...
4	30.0	...	...	...	...	...	...	...	...	...	...	...	...	...
5	32.0	...	...	...	...	...	...	...	...	...	...	...	...	...
6	30.0	...	...	...	...	...	...	...	...	...	...	...	...	...
7	36.0	...	...	...	...	...	...	...	...	...	...	...	...	...
8	39.0	...	...	...	...	...	...	...	...	...	...	...	...	...
9	31.0	31.0	28.1	21.6	...	...	...	...	...	...	...	...	...	...
10	32.0	32.0	29.0	22.2	...	...	...	...	...	...	...	...	...	...
11	31.0	31.0	28.1	21.6	...	...	...	...	...	...	...	...	...	...
12	36.0	36.0	32.1	24.3	...	...	...	...	...	...	...	...	...	...
13	39.0	39.0	33.8	24.3	...	...	...	...	...	...	...	...	...	...
14	31.0	31.0	28.1	21.6	...	...	...	...	...	...	...	...	...	...
15	33.0	33.0	29.9	23.0	...	...	...	...	...	...	...	...	...	...
16	31.0	31.0	28.1	21.6	...	...	...	...	...	...	...	...	...	...
17	36.0	36.0	32.1	24.3	...	...	...	...	...	...	...	...	...	...
18	39.0	39.0	33.8	24.3	...	...	...	...	...	...	...	...	...	...
19	31.0	31.0	28.1	21.6	...	...	...	...	...	...	...	...	...	...
20	33.0	33.0	29.9	23.0	...	...	...	...	...	...	...	...	...	...
21	31.0	31.0	28.1	21.6	...	...	...	...	...	...	...	...	...	...
22	42.0	42.0	...	...	...	...	...	...	...	...	...	...	...	...
23	41.0	41.0	...	...	...	...	...	...	...	...	...	...	...	...
24	40.0	40.0	...	...	...	...	...	...	...	...	...	...	...	...
25	39.0	39.0	...	...	...	...	...	...	...	...	...	...	...	...
26	38.0	38.0	...	...	...	...	...	...	...	...	...	...	...	...
27	42.0	42.0	...	...	...	...	...	...	...	...	...	...	...	...
28	41.0	41.0	...	...	...	...	...	...	...	...	...	...	...	...
29	46.0	46.0	...	...	...	...	...	...	...	...	...	...	...	...
30	44.0	44.0	...	...	...	...	...	...	...	...	...	...	...	...
31	41.0	41.0	...	...	...	...	...	...	...	...	...	...	...	...
32	41.0	41.0	...	...	...	...	...	...	...	...	...	...	...	...
33	42.0	42.0	...	...	...	...	...	...	...	...	...	...	...	...
34	41.0	41.0	...	...	...	...	...	...	...	...	...	...	...	...
35	41.0	41.0	...	...	...	...	...	...	...	...	...	...	...	...
36	42.0	42.0	...	...	...	...	...	...	...	...	...	...	...	...
37	41.0	41.0	...	...	...	...	...	...	...	...	...	...	...	...
38	46.0	46.0	...	...	...	...	...	...	...	...	...	...	...	...
39	44.0	44.0	...	...	...	...	...	...	...	...	...	...	...	...
40	41.0	41.0	...	...	...	...	...	...	...	...	...	...	...	...
41	30.0	30.0	28.3	17.7	...	...	...	...	...	...	...	...	...	...
42	30.0	30.0	28.3	17.7	...	...	...	...	...	...	...	...	...	...
43	42.0	42.0	35.1	19.3	...	...	...	...	...	...	...	...	...	...
44	42.0	42.0	35.1	19.3	...	...	...	...	...	...	...	...	...	...
45	40.0	40.0	33.4	18.4	...	...	...	...	...	...	...	...	...	...

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Nonferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
23	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
24	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
25	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
26	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
27	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
28	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
29	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
30	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
31	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
32	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
33	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
34	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
35	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
36	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
37	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
38	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
39	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
40	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
	Nonferrous Materials (Cont'd)							
1	...	Plate, sheet	SB–209	...	A96061	T4 wld.	0.006–0.249	24
2	...	Plate, sheet	SB–209	...	A96061	T451 wld.	0.250–3.000	24
3	...	Plate, sheet	SB–209	...	A96061	T6 wld.	0.006–0.249	24
4	...	Plate, sheet	SB–209	...	A96061	T651 wld.	0.250–6.000	24
5	...	Drawn smls. tube	SB–210	...	A96061	T4	0.025–0.500	30
6	...	Drawn smls. tube	SB–210	...	A96061	T6	0.025–0.500	42
7	...	Drawn smls. tube	SB–210	...	A96061	T4 wld.	0.025–0.500	24
8	...	Drawn smls. tube	SB–210	...	A96061	T6 wld.	0.025–0.500	24
9	...	Bar, rod, wire	SB–211	...	A96061	T6	0.125–8.000	42
10	...	Bar, rod, wire	SB–211	...	A96061	T651	0.125–8.000	42
11	...	Bar, rod, wire	SB–211	...	A96061	T6 wld.	0.125–8.000	24
12	...	Bar, rod, wire	SB–211	...	A96061	T651 wld.	0.125–8.000	24
13	...	Bar, rod, shapes	SB–221	...	A96061	T4	...	26
14	...	Bar, rod, shapes	SB–221	...	A96061	T6	...	38
15	...	Bar, rod, shapes	SB–221	...	A96061	T4 wld.	...	24
16	...	Bar, rod, shapes	SB–221	...	A96061	T6 wld.	...	24
17	...	Cond. & heat exch. tubes	SB–234	...	A96061	T4	0.025–0.200	30
18	...	Cond. & heat exch. tubes	SB–234	...	A96061	T6	0.025–0.200	42
19	...	Cond. & heat exch. tubes	SB–234	...	A96061	T4 wld.	0.025–0.200	24
20	...	Cond. & heat exch. tubes	SB–234	...	A96061	T6 wld.	0.025–0.200	24
21	...	Smls. extr. tube	SB–241	...	A96061	T4	...	26
22	...	Smls. extr. tube	SB–241	...	A96061	T6	...	38
23	...	Smls. extr. tube	SB–241	...	A96061	T4 wld.	...	24
24	...	Smls. extr. tube	SB–241	...	A96061	T6 wld.	...	24
25	...	Smls. pipe	SB–241	...	A96061	T6 drawn	<1.000	42
26	...	Smls. pipe	SB–241	...	A96061	T6	≥1.000	38
27	...	Smls. pipe	SB–241	...	A96061	T6 wld.	...	24
28	...	Die forgings	SB–247	...	A96061	T6	≤4.000	38
29	...	Hand forgings	SB–247	...	A96061	T6	≤4.000	37
30	...	Hand forgings	SB–247	...	A96061	T6	4.001–8.000	35
31	...	Die & hand forgings	SB–247	...	A96061	T6 wld.	≤8.000	24
32	...	Shapes	SB–308	...	A96061	T6	...	38
33	...	Shapes	SB–308	...	A96061	T6 wld.	...	24
34	...	Drawn smls. tube	SB–210	...	A96063	T6	0.025–0.500	33
35	...	Drawn smls. tube	SB–210	...	A96063	T6 wld.	0.025–0.500	17
36	...	Bar, rod, shapes	SB–221	...	A96063	T1	≤5.000	17
37	...	Bar, rod, shapes	SB–221	...	A96063	T1	0.501–1.000	16
38	...	Bar, rod, shapes	SB–221	...	A96063	T5	≤0.500	22
39	...	Bar, rod, shapes	SB–221	...	A96063	T5	0.501–1.000	21
40	...	Bar, rod, shapes	SB–221	...	A96063	T6	≤1.000	30
41	...	Bar, rod, shapes	SB–221	...	A96063	T6 wld.	≤1.000	17
42	...	Smls. extr. tube	SB–241	...	A96063	O	...	16
43	...	Smls. extr. tube	SB–241	...	A96063	T1	≤0.500	17
44	...	Smls. extr. tube	SB–241	...	A96063	T1	0.501–1.000	16
45	...	Smls. extr. tube	SB–241	...	A96063	T5	≤0.500	22

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
														Nonferrous Materials (Cont'd)
1	24.0	24.0	23.2	15.5	...	...	...	...	...	...	...	...	...	...
2	24.0	24.0	23.2	15.5	...	...	...	...	...	...	...	...	...	...
3	24.0	24.0	23.2	15.5	...	...	...	...	...	...	...	...	...	...
4	24.0	24.0	23.2	15.5	...	...	...	...	...	...	...	...	...	...
5	30.0	30.0	28.3	17.7	...	...	...	...	...	...	...	...	...	...
6	42.0	42.0	35.1	19.3	...	...	...	...	...	...	...	...	...	...
7	24.0	24.0	23.2	15.5	...	...	...	...	...	...	...	...	...	...
8	24.0	24.0	23.2	15.5	...	...	...	...	...	...	...	...	...	...
9	42.0	42.0	35.1	19.3	...	...	...	...	...	...	...	...	...	...
10	42.0	42.0	35.1	19.3	...	...	...	...	...	...	...	...	...	...
11	24.0	24.0	23.2	15.5	...	...	...	...	...	...	...	...	...	...
12	24.0	24.0	23.2	15.5	...	...	...	...	...	...	...	...	...	...
13	26.0	26.0	24.6	15.4	...	...	...	...	...	...	...	...	...	...
14	38.0	38.0	31.7	17.5	...	...	...	...	...	...	...	...	...	...
15	24.0	24.0	23.2	15.5	...	...	...	...	...	...	...	...	...	...
16	24.0	24.0	23.2	15.5	...	...	...	...	...	...	...	...	...	...
17	30.0	30.0	28.3	17.7	...	...	...	...	...	...	...	...	...	...
18	42.0	42.0	35.1	19.3	...	...	...	...	...	...	...	...	...	...
19	24.0	24.0	23.2	15.5	...	...	...	...	...	...	...	...	...	...
20	24.0	24.0	23.2	15.5	...	...	...	...	...	...	...	...	...	...
21	26.0	26.0	24.6	15.4	...	...	...	...	...	...	...	...	...	...
22	38.0	38.0	31.7	17.5	...	...	...	...	...	...	...	...	...	...
23	24.0	24.0	23.2	15.5	...	...	...	...	...	...	...	...	...	...
24	24.0	24.0	23.2	15.5	...	...	...	...	...	...	...	...	...	...
25	42.0	42.0	35.1	19.3	...	...	...	...	...	...	...	...	...	...
26	38.0	38.0	31.7	17.5	...	...	...	...	...	...	...	...	...	...
27	24.0	24.0	23.2	15.5	...	...	...	...	...	...	...	...	...	...
28	38.0	38.0	31.7	17.5	...	...	...	...	...	...	...	...	...	...
29	37.0	37.0	33.0	18.5	...	...	...	...	...	...	...	...	...	...
30	35.0	35.0	33.1	20.7	...	...	...	...	...	...	...	...	...	...
31	24.0	24.0	23.2	15.5	...	...	...	...	...	...	...	...	...	...
32	38.0	38.0	31.7	17.5	...	...	...	...	...	...	...	...	...	...
33	24.0	24.0	23.2	15.5	...	...	...	...	...	...	...	...	...	...
34	33.0	33.0	22.2	9.6	...	...	...	...	...	...	...	...	...	...
35	17.0	17.0	15.4	3.9	...	...	...	...	...	...	...	...	...	...
36	17.0	17.0	17.0	8.7	...	...	...	...	...	...	...	...	...	...
37	16.0	16.0	16.0	8.7	...	...	...	...	...	...	...	...	...	...
38	22.0	21.4	18.2	8.7	...	...	...	...	...	...	...	...	...	...
39	21.0	20.5	17.3	8.7	...	...	...	...	...	...	...	...	...	...
40	30.0	29.9	20.4	9.0	...	...	...	...	...	...	...	...	...	...
41	17.0	17.0	15.4	3.9	...	...	...	...	...	...	...	...	...	...
42	16.0	16.0	16.0	...	...	...	...	...	...	...	...	...	...	...
43	17.0	17.0	17.0	...	...	...	...	...	...	...	...	...	...	...
44	16.0	16.0	16.0	...	...	...	...	...	...	...	...	...	...	...
45	22.0	21.4	18.2	8.7	...	...	...	...	...	...	...	...	...	...

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding												
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
	Nonferrous Materials (Cont'd)												
1	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...

INTENTIONALLY LEFT BLANK

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
		Nonferrous Materials (Cont'd)							
	1	...	Smls. extr. tube	SB–241	...	A96063	T5	0.501–1.000	21
	2	...	Smls. extr. tube/pipe	SB–241	...	A96063	T6	≤1.000	30
	3	...	Smls. extr. tube	SB–241	...	A96063	T5 wld.	≤1.000	17
	4	...	Smls. extr. tube/pipe	SB–241	...	A96063	T6 wld.	≤1.000	17
	5	...	Smls. pipe	SB–241	...	A96063	O	...	16
(**21**)	6	AlSil2Fe	Castings	SB/EN 1706	...	AC44300	...	...	35
	7	...	Rod	SB–187	...	C10200	O60	All	28
	8	...	Smls. tube	SB–75	...	C10200	O60	All	30
	9	...	Smls. pipe	SB–42	...	C10200	O61	All	30
	10	...	Plate, sheet, strip	SB–152	...	C10200	H00	...	30
	11	...	Plate, sheet, strip	SB–152	...	C10200	H01	...	30
	12	...	Plate, sheet, strip	SB–152	...	C10200	H02	...	30
	13	...	Plate, sheet, strip	SB–152	...	C10200	H03	...	30
	14	...	Plate, sheet, strip	SB–152	...	C10200	H04	...	30
(**21**)	15	...	Plate, sheet, strip	SB–152	...	C10200	M20, O25	...	30
	16	...	Smls. pipe	SB–42	...	C10200	H55	2 < NPS ≤ 12	36
	17	...	Smls. tube	SB–75	...	C10200	H55	All	36
	18	...	Smls. cond. tube	SB–111	...	C10200	H55	...	36
	19	...	Smls. U–bend tube	SB–395	...	C10200	H55	...	36
	20	...	Smls. pipe	SB–42	...	C10200	H80	$^1/_8$ < NPS ≤ 2	45
	21	...	Smls. tube	SB–75	...	C10200	H80	<4	45
	22	...	Smls. cond. tube	SB–111	...	C10200	H80	...	45
	23	...	Plate, sheet, strip	SB–152	...	C10400	H00	...	30
	24	...	Plate, sheet, strip	SB–152	...	C10400	H01	...	30
	25	...	Plate, sheet, strip	SB–152	...	C10400	H02	...	30
	26	...	Plate, sheet, strip	SB–152	...	C10400	H03	...	30
	27	...	Plate, sheet, strip	SB–152	...	C10400	H04	...	30
(**21**)	28	...	Plate, sheet, strip	SB–152	...	C10400	M20, O25	...	30
	29	...	Plate, sheet, strip	SB–152	...	C10500	H00	...	30
	30	...	Plate, sheet, strip	SB–152	...	C10500	H01	...	30
	31	...	Plate, sheet, strip	SB–152	...	C10500	H02	...	30
	32	...	Plate, sheet, strip	SB–152	...	C10500	H03	...	30
	33	...	Plate, sheet, strip	SB–152	...	C10500	H04	...	30
(**21**)	34	...	Plate, sheet, strip	SB–152	...	C10500	M20, O25	...	30
	35	...	Plate, sheet, strip	SB–152	...	C10700	H00	...	30
	36	...	Plate, sheet, strip	SB–152	...	C10700	H01	...	30
	37	...	Plate, sheet, strip	SB–152	...	C10700	H02	...	30
	38	...	Plate, sheet, strip	SB–152	...	C10700	H03	...	30
	39	...	Plate, sheet, strip	SB–152	...	C10700	H04	...	30
	40	...	Plate, sheet, strip	SB–152	...	C10700	M20, O25	...	30
	41	...	Bar, rod	SB–187	...	C11000	H04	All	28
	42	...	Bar, rod	SB–187	...	C11000	O60	All	28
	43	...	Plate, sheet, strip, bar	SB–152	...	C11000	H00	...	30
	44	...	Plate, sheet, strip, bar	SB–152	...	C11000	H01	...	30
	45	...	Plate, sheet, strip, bar	SB–152	...	C11000	H02	...	30

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
														Nonferrous Materials (Cont'd)
1	21.0	20.5	17.3	8.7	...	...	...	...	...	...	...	...	...	...
2	30.0	30.0	20.2	8.7	...	...	...	...	...	...	...	...	...	...
3	17.0	17.0	15.4	3.9	...	...	...	...	...	...	...	...	...	...
4	17.0	17.0	15.4	3.9	...	...	...	...	...	...	...	...	...	...
5	16.0	16.0	16.0	...	...	...	...	...	...	...	...	...	...	...
6	34.8	30.5	30.5	...	...	...	...	...	...	...	...	...	...	...
7	28.0	27.4	25.4	23.3	...	...	...	...	...	...	...	...	...	...
8	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
9	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
10	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
11	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
12	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
13	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
14	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
15	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
16	36.0	36.0	34.9	32.9	...	...	...	...	...	...	...	...	...	...
17	36.0	36.0	34.9	32.9	...	...	...	...	...	...	...	...	...	...
18	36.0	36.0	34.9	32.9	...	...	...	...	...	...	...	...	...	...
19	36.0	36.0	34.9	32.9	...	...	...	...	...	...	...	...	...	...
20	45.0	45.0	43.9	38.2	...	...	...	...	...	...	...	...	...	...
21	45.0	45.0	43.9	38.2	...	...	...	...	...	...	...	...	...	...
22	45.0	45.0	43.9	38.2	...	...	...	...	...	...	...	...	...	...
23	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
24	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
25	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
26	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
27	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
28	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
29	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
30	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
31	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
32	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
33	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
34	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
35	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
36	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
37	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
38	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
39	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
40	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
41	28.0	27.4	25.4	23.3	...	...	...	...	...	...	...	...	...	...
42	28.0	27.4	25.4	23.3	...	...	...	...	...	...	...	...	...	...
43	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
44	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
45	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Nonferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
7	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
29	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
35	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
		Nonferrous Materials (Cont'd)							
	1	...	Plate, sheet, strip, bar	SB–152	...	C11000	H03	...	30
	2	...	Plate, sheet, strip, bar	SB–152	...	C11000	H04	...	30
(**21**)	3	...	Plate, sheet, strip, bar	SB–152	...	C11000	M20, O25	...	30
	4	...	Smls. tube	SB–75	...	C12000	O50	All	30
	5	...	Smls. tube	SB–75	...	C12000	O60	All	30
	6	...	Smls. pipe	SB–42	...	C12000	O61	All	30
	7	...	Smls. pipe	SB–42	...	C12000	H55	2 < NPS ≤ 12	36
	8	...	Smls. tube	SB–75	...	C12000	H55	All	36
	9	...	Smls. cond. tube	SB–111	...	C12000	H55	...	36
	10	...	Smls. U–bend tube	SB–395	...	C12000	H55	...	36
	11	...	Smls. pipe	SB–42	...	C12000	H80	$^1/_8$ < NPS ≤ 2	45
	12	...	Smls. tube	SB–75	...	C12000	H80	<4	45
	13	...	Smls. cond. tube	SB–111	...	C12000	H80	...	45
	14	...	Smls. tube	SB–75	...	C12200	O50	All	30
	15	...	Smls. tube	SB–75	...	C12200	O60	All	30
	16	...	Smls. pipe	SB–42	...	C12200	O61	All	30
	17	...	Finned tube	SB–359	...	C12200	O61	...	30
	18	...	Wld. cond. tube	SB–543	...	C12200	WO61	...	30
(**21**)	19	...	Finned tube	SB–359	...	C12200	O62	...	30
	20	...	Plate, sheet, strip	SB–152	...	C12200	H00	...	30
	21	...	Plate, sheet, strip	SB–152	...	C12200	H01	...	30
	22	...	Plate, sheet, strip	SB–152	...	C12200	H02	...	30
	23	...	Plate, sheet, strip	SB–152	...	C12200	H03	...	30
	24	...	Plate, sheet, strip	SB–152	...	C12200	H04	...	30
(**21**)	25	...	Plate, sheet, strip	SB–152	...	C12200	M20, O25	...	30
	26	...	Wld. cond. tube	SB–543	...	C12200	WC55	...	32
	27	...	Smls. pipe	SB–42	...	C12200	H55	2 < NPS ≤ 12	36
	28	...	Smls. tube	SB–75	...	C12200	H55	All	36
	29	...	Smls. cond. tube	SB–111	...	C12200	H55	...	36
	30	...	Finned tube	SB–359	...	C12200	H55	...	36
	31	...	Smls. U–bend tube	SB–395	...	C12200	H55	...	36
	32	...	Smls. pipe	SB–42	...	C12200	H80	$^1/_8$ < NPS ≤ 2	45
	33	...	Smls. cond. tube	SB–75	...	C12200	H80	<4	45
	34	...	Smls. tube	SB–111	...	C12200	H80	...	45
	35	...	Plate, sheet, strip, bar	SB–152	...	C12300	H00	...	30
	36	...	Plate, sheet, strip, bar	SB–152	...	C12300	H01	...	30
	37	...	Plate, sheet, strip, bar	SB–152	...	C12300	H02	...	30
	38	...	Plate, sheet, strip, bar	SB–152	...	C12300	H03	...	30
	39	...	Plate, sheet, strip, bar	SB–152	...	C12300	H04	...	30
(**21**)	40	...	Plate, sheet, strip, bar	SB–152	...	C12300	M20, O25	...	30
(**21**)	41	...	Plate, sheet, strip	SB–152	...	C14200	M20, O25	...	30
	42	...	Smls. cond. tube	SB–111	...	C14200	H55	...	36
	43	...	Smls. U–bend tube	SB–395	...	C14200	H55	...	36
	44	...	Smls. cond. tube	SB–111	...	C14200	H80	...	45
	45	...	Smls. cond. tube	SB–111	...	C19200	O61	...	38

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
														Nonferrous Materials (Cont'd)
1	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
2	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
3	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
4	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
5	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
6	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
7	36.0	36.0	34.9	32.9	...	...	...	...	...	...	...	...	...	...
8	36.0	36.0	34.9	32.9	...	...	...	...	...	...	...	...	...	...
9	36.0	36.0	34.9	32.9	...	...	...	...	...	...	...	...	...	...
10	36.0	36.0	34.9	32.9	...	...	...	...	...	...	...	...	...	...
11	45.0	45.0	43.9	38.2	...	...	...	...	...	...	...	...	...	...
12	45.0	45.0	43.9	38.2	...	...	...	...	...	...	...	...	...	...
13	45.0	45.0	43.9	38.2	...	...	...	...	...	...	...	...	...	...
14	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
15	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
16	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
17	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
18	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
19	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
20	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
21	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
22	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
23	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
24	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
25	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
26	32.0	32.0	31.0	29.3	...	...	...	...	...	...	...	...	...	...
27	36.0	36.0	34.9	32.9	...	...	...	...	...	...	...	...	...	...
28	36.0	36.0	34.9	32.9	...	...	...	...	...	...	...	...	...	...
29	36.0	36.0	34.9	32.9	...	...	...	...	...	...	...	...	...	...
30	36.0	36.0	34.9	32.9	...	...	...	...	...	...	...	...	...	...
31	36.0	36.0	34.9	32.9	...	...	...	...	...	...	...	...	...	...
32	45.0	45.0	43.9	38.2	...	...	...	...	...	...	...	...	...	...
33	45.0	45.0	43.9	38.2	...	...	...	...	...	...	...	...	...	...
34	45.0	45.0	43.9	38.2	...	...	...	...	...	...	...	...	...	...
35	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
36	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
37	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
38	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
39	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
40	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
41	30.0	29.4	27.2	25.0	...	...	...	...	...	...	...	...	...	...
42	36.0	36.0	34.9	32.9	...	...	...	...	...	...	...	...	...	...
43	36.0	36.0	34.9	32.9	...	...	...	...	...	...	...	...	...	...
44	45.0	45.0	43.9	38.2	...	...	...	...	...	...	...	...	...	...
45	38.0	35.9	32.6	29.7	...	...	...	...	...	...	...	...	...	...

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Nonferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
26	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
41	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
		Nonferrous Materials (Cont'd)							
	1	...	Smls. U-bend tube	SB-395	...	C19200	O61	...	38
	2	...	Wld. cond. tube	SB-543	...	C19400	WO61	...	45
	3	...	Wld. cond. tube	SB-543	...	C19400	WC55	...	45
	4	...	Smls. pipe	SB-43	...	C23000	O61 and H58	...	40
	5	...	Smls. cond. tube	SB-111	...	C23000	O61	...	40
	6	...	Smls. tube	SB-135	...	C23000	O50 and O60	...	40
	7	...	Smls. U-bend tube	SB-395	...	C23000	O61	...	40
	8	...	Wld. cond. tube	SB-543	...	C23000	WO61 and WC55	...	40
	9	...	Smls. tube	SB-111	...	C28000	O25	...	50
	10	...	Plate	SB-171	...	C36500	O25 and M20	>3.5 to ≤ 5	40
	11	...	Plate	SB-171	...	C36500	O25 and M20	>2 to ≤ 3.5	45
	12	...	Plate	SB-171	...	C36500	O25 and M20	≤2	50
(**21**)	13	...	Plate	SB-171	...	C44300	M10, M20	≤4	45
(**21**)	14	...	Plate	SB-171	...	C44300	O20, O25	≤4	45
	15	...	Smls. cond. tube	SB-111	...	C44300	O61	...	45
	16	...	Finned tube	SB-359	...	C44300	O61	...	45
	17	...	Smls. U-bend tube	SB-395	...	C44300	O61	...	45
	18	...	Wld. cond. tube	SB-543	...	C44300	WO61	...	45
(**21**)	19	...	Plate	SB-171	...	C44400	M10, M20	≤4	45
(**21**)	20	...	Plate	SB-171	...	C44400	O20, O25	≤4	45
	21	...	Smls. cond. tube	SB-111	...	C44400	O61	...	45
	22	...	Finned tube	SB-359	...	C44400	O61	...	45
	23	...	Smls. U-bend tube	SB-395	...	C44400	O61	...	45
	24	...	Wld. cond. tube	SB-543	...	C44400	WO61	...	45
(**21**)	25	...	Plate	SB-171	...	C44500	M10, M20	≤4	45
(**21**)	26	...	Plate	SB-171	...	C44500	O20, O25	≤4	45
	27	...	Smls. cond. tube	SB-111	...	C44500	O61	...	45
	28	...	Finned tube	SB-359	...	C44500	O61	...	45
	29	...	Smls. U-bend tube	SB-395	...	C44500	O61	...	45
	30	...	Wld. cond. tube	SB-543	...	C44500	WO61	...	45
(**21**)	31	...	Plate	SB-171	...	C46400	M10, M20, O20, O25	≤5	50
(**21**)	32	...	Plate	SB-171	...	C46500	M10, M20, O20, O25	≤5	50
	33	...	Smls. cond. tube	SB-111	...	C60800	O61	...	50
	34	...	Smls. U-bend tube	SB-395	...	C60800	O61	...	50
	35	...	Plate, sheet	SB-169	...	C61400	O25 or O60	$2 < t \le 5$	65
(**21**)	36	...	Plate	SB-171	...	C61400	M10, M20, O20, O25	$2 < t \le 5$	65
	37	...	Plate, sheet	SB-169	...	C61400	O25 or O60	$\frac{1}{2} < t \le 2$	70
(**21**)	38	...	Plate	SB-171	...	C61400	M10, M20, O20, O25	≤2	70
	39	...	Plate, sheet	SB-169	...	C61400	O25 or O60	$\le \frac{1}{2}$	72
	40	...	Plate	SB-171	...	C63000	M10, M20, O20, O25	$3.5 < t \le 5$	80
(**21**)	41	...	Bar, rod	SB-150	...	C63000	M20, M30	>4	80
(**21**)	42	...	Bar, rod	SB-150	...	C63000	O20, O25, O30	>4	80
(**21**)	43	...	Bar, rod	SB-150	...	C63000	HR50	>4	80
	44	...	Plate	SB-171	...	C63000	M10, M20, O20, O25	$2 < t \le 3.5$	85
(**21**)	45	...	Bar, rod	SB-150	...	C63000	HR50	$2 < t \le 4$	85

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
														Nonferrous Materials (Cont'd)
1	38.0	35.9	32.6	29.7	...	...	...	...	...	...	...	...	...	...
2	45.0	45.0	41.7	38.6	...	...	...	...	...	...	...	...	...	...
3	45.0	45.0	41.7	38.6	...	...	...	...	...	...	...	...	...	...
4	40.0	40.0	40.0	39.6	36.4	...	...	...	...	...	...	...	...	...
5	40.0	40.0	40.0	39.6	36.4	...	...	...	...	...	...	...	...	...
6	40.0	40.0	40.0	39.6	36.4	...	...	...	...	...	...	...	...	...
7	40.0	40.0	40.0	39.6	36.4	...	...	...	...	...	...	...	...	...
8	40.0	40.0	40.0	39.6	36.4	...	...	...	...	...	...	...	...	...
9	50.0	50.0	50.0	48.9	...	...	...	...	...	...	...	...	...	...
10	40.0	40.0	40.0	39.1	...	...	...	...	...	...	...	...	...	...
11	45.0	45.0	45.0	44.0	...	...	...	...	...	...	...	...	...	...
12	50.0	50.0	50.0	48.9	...	...	...	...	...	...	...	...	...	...
13	45.0	44.8	43.8	42.1	...	...	...	...	...	...	...	...	...	...
14	45.0	44.8	43.8	42.1	...	...	...	...	...	...	...	...	...	...
15	45.0	44.8	43.8	42.1	...	...	...	...	...	...	...	...	...	...
16	45.0	44.8	43.8	42.1	...	...	...	...	...	...	...	...	...	...
17	45.0	44.8	43.8	42.1	...	...	...	...	...	...	...	...	...	...
18	45.0	44.8	43.8	42.1	...	...	...	...	...	...	...	...	...	...
19	45.0	44.8	43.8	42.1	...	...	...	...	...	...	...	...	...	...
20	45.0	44.8	43.8	42.1	...	...	...	...	...	...	...	...	...	...
21	45.0	44.8	43.8	42.1	...	...	...	...	...	...	...	...	...	...
22	45.0	44.8	43.8	42.1	...	...	...	...	...	...	...	...	...	...
23	45.0	44.8	43.8	42.1	...	...	...	...	...	...	...	...	...	...
24	45.0	44.8	43.8	42.1	...	...	...	...	...	...	...	...	...	...
25	45.0	44.8	43.8	42.1	...	...	...	...	...	...	...	...	...	...
26	45.0	44.8	43.8	42.1	...	...	...	...	...	...	...	...	...	...
27	45.0	44.8	43.8	42.1	...	...	...	...	...	...	...	...	...	...
28	45.0	44.8	43.8	42.1	...	...	...	...	...	...	...	...	...	...
29	45.0	44.8	43.8	42.1	...	...	...	...	...	...	...	...	...	...
30	45.0	44.8	43.8	42.1	...	...	...	...	...	...	...	...	...	...
31	50.0	50.0	50.0	47.7	43.4	...	...	...	...	...	...	...	...	...
32	50.0	50.0	50.0	47.7	43.4	...	...	...	...	...	...	...	...	...
33	50.0	50.0	50.0	47.3	38.5	...	...	...	...	...	...	...	...	...
34	50.0	50.0	50.0	47.3	38.5	...	...	...	...	...	...	...	...	...
35	65.0	65.0	65.0	63.7	59.4	...	...	...	...	...	...	...	...	...
36	65.0	65.0	65.0	63.7	59.4	...	...	...	...	...	...	...	...	...
37	70.0	70.0	70.0	68.6	63.9	...	...	...	...	...	...	...	...	...
38	70.0	70.0	70.0	68.6	63.9	...	...	...	...	...	...	...	...	...
39	72.0	72.0	72.0	70.6	65.8	...	...	...	...	...	...	...	...	...
40	80.0	80.0	80.0	80.0	80.0	70.1	60.5	48.8	...	...	...	...	...	...
41	80.0	80.0	80.0	80.0	80.0	70.1	60.5	48.8	...	...	...	...	...	...
42	80.0	80.0	80.0	80.0	80.0	70.1	60.5	48.8	...	...	...	...	...	...
43	80.0	80.0	80.0	80.0	80.0	70.1	60.5	48.8	...	...	...	...	...	...
44	85.0	85.0	85.0	85.0	85.0	74.5	64.3	51.9	...	...	...	...	...	...
45	85.0	85.0	85.0	85.0	85.0	74.5	64.3	51.9	...	...	...	...	...	...

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Nonferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
14	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
20	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
26	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
27	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
32	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
33	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
42	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
43	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)

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Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
		Nonferrous Materials (Cont'd)							
(**21**)	1	...	Bar, rod	SB–150	...	C63000	M20, M30	$2 < t \le 4$	85
(**21**)	2	...	Bar, rod	SB–150	...	C63000	O20, O25, O30	$2 < t \le 4$	85
	3	...	Plate	SB–171	...	C63000	O25 or M20	≤2	90
(**21**)	4	...	Bar, rod	SB–150	...	C63000	HR50	$1 < t \le 2$	90
(**21**)	5	...	Bar, rod	SB–150	...	C63000	HR50	$\frac{1}{2} < t \le 1$	100
(**21**)	6	...	Forgings	SB–283	...	C64200	M10	$>1\frac{1}{2}$	68
(**21**)	7	...	Forgings	SB–283	...	C64200	M10	$\le 1\frac{1}{2}$	70
(**21**)	8	...	Bar, rod	SB–150	...	C64200	M10, M20, M30	>4	70
(**21**)	9	...	Bar, rod	SB–150	...	C64200	M10, M20, M30	$3 < t \le 4$	70
(**21**)	10	...	Bar, rod	SB–150	...	C64200	HR50	$2 < t \le 3$	75
(**21**)	11	...	Bar, rod	SB–150	...	C64200	HR50	$1 < t \le 2$	80
(**21**)	12	...	Bar, rod	SB–150	...	C64200	HR50	$\frac{1}{2} < t \le 1$	85
(**21**)	13	...	Bar, rod	SB–150	...	C64200	HR50	$\le \frac{1}{2}$	90
	14	...	Bar, rod	SB–98	...	C65100	O60	All	40
	15	...	Bar, rod	SB–98	...	C65100	H02	≤2	55
	16	...	Rod	SB–98	...	C65100	H06	$\frac{1}{2} < t \le 1\frac{1}{2}$	75
	17	...	Rod	SB–98	...	C65100	H06	$t \le \frac{1}{2}$	85
	18	...	Plate, sheet	SB–96	...	C65500	O61	≤2	50
	19	...	Smls. pipe & tube	SB–315	...	C65500	O61	...	50
	20	...	Bar, rod	SB–98	...	C65500	O60	All	52
	21	...	Rod	SB–98	...	C65500	H01	All	55
	22	...	Bar, rod	SB–98	...	C65500	H02	≤2	70
	23	...	Rod	SB–98	...	C66100	O60	All	52
	24	...	Rod	SB–98	...	C66100	H01	All	55
	25	...	Rod	SB–98	...	C66100	H02	≤2	70
(**21**)	26	...	Smls. cond. tube	SB–111	...	C68700	O61	...	50
(**21**)	27	...	Smls. U–bend tube	SB–395	...	C68700	O61	...	50
(**21**)	28	...	Wld. cond. tube	SB–543	...	C68700	WO61	...	50
(**21**)	29	...	Smls. cond. tube	SB–111	...	C70400	O61	...	38
(**21**)	30	...	Wld. tube	SB–543	...	C70400	WO61	...	38
(**21**)	31	...	Smls. cond. tube	SB–111	...	C70400	H55	...	40
	32	...	Smls. pipe & tube	SB–466	...	C70600	O60	...	38
	33	...	Wld. pipe	SB–467	...	C70600	WO61	$>4\frac{1}{2}$	38
	34	...	Bar, rod	SB–151	...	C70600	O60	All	38
(**21**)	35	...	Plate, sheet	SB–171	...	C70600	M10, M20	≤5	40
(**21**)	36	...	Plate, sheet	SB–171	...	C70600	O20, O25	≤5	40
	37	...	Smls. cond. tube	SB–111	...	C70600	O61	...	40
	38	...	Finned tube	SB–359	...	C70600	O61	...	40
	39	...	Smls. U–bend tube	SB–395	...	C70600	O61	...	40
	40	...	Wld. pipe	SB–467	...	C70600	WO61	$\le 4\frac{1}{2}$	40
	41	...	Wld. tube	SB–543	...	C70600	WO61	...	40
	42	...	Finned wld. tube	SB–956	...	C70600	WO61	...	40
	43	...	Wld. pipe	SB–467	...	C70600	WM50	$\le 4\frac{1}{2}$	45
	44	...	Smls. tube	SB–111	...	C70600	H55	...	45
	45	...	Smls. pipe & tube	SB–466	...	C70600	H55	...	45

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
														Nonferrous Materials (Cont'd)
1	85.0	85.0	85.0	85.0	85.0	74.5	64.3	51.9	...	...	...	...	...	...
2	85.0	85.0	85.0	85.0	85.0	74.5	64.3	51.9	...	...	...	...	...	...
3	90.0	90.0	90.0	90.0	90.0	78.9	68.1	54.9	...	...	...	...	...	...
4	90.0	90.0	90.0	90.0	90.0	78.9	68.1	54.9	...	...	...	...	...	...
5	100.0	100.0	100.0	100.0	100.0	87.6	75.6	61.0	...	...	...	...	...	...
6	68.0	68.0	68.0	68.0	68.0	...	...	...	...	...	...	...	...	...
7	70.0	70.0	70.0	70.0	70.0	...	...	...	...	...	...	...	...	...
8	70.0	70.0	70.0	70.0	70.0	...	...	...	...	...	...	...	...	...
9	70.0	70.0	70.0	70.0	70.0	...	...	...	...	...	...	...	...	...
10	75.0	75.0	75.0	75.0	75.0	...	...	...	...	...	...	...	...	...
11	80.0	80.0	80.0	80.0	80.0	...	...	...	...	...	...	...	...	...
12	85.0	85.0	85.0	85.0	85.0	...	...	...	...	...	...	...	...	...
13	90.0	90.0	90.0	90.0	90.0	...	...	...	...	...	...	...	...	...
14	40.0	40.0	40.0	40.0	36.8	...	...	...	...	...	...	...	...	...
15	55.0	55.0	55.0	52.1	45.0	...	...	...	...	...	...	...	...	...
16	75.0	75.0	75.0	71.1	66.0	...	...	...	...	...	...	...	...	...
17	85.0	85.0	85.0	80.6	74.8	...	...	...	...	...	...	...	...	...
18	50.0	50.0	50.0	47.5	42.9	...	...	...	...	...	...	...	...	...
19	50.0	50.0	50.0	47.5	42.9	...	...	...	...	...	...	...	...	...
20	52.0	52.0	52.0	49.4	44.6	...	...	...	...	...	...	...	...	...
21	55.0	55.0	55.0	54.9	50.2	...	...	...	...	...	...	...	...	...
22	70.0	70.0	70.0	70.0	67.1	...	...	...	...	...	...	...	...	...
23	52.0	52.0	52.0	49.4	44.6	...	...	...	...	...	...	...	...	...
24	55.0	55.0	55.0	54.9	50.2	...	...	...	...	...	...	...	...	...
25	70.0	70.0	70.0	70.0	67.1	...	...	...	...	...	...	...	...	...
26	50.0	50.0	50.0	50.0	49.7	...	...	...	...	...	...	...	...	...
27	50.0	50.0	50.0	50.0	49.7	...	...	...	...	...	...	...	...	...
28	50.0	50.0	50.0	50.0	49.7	...	...	...	...	...	...	...	...	...
29	38.0	38.0	36.7	34.9	...	...	...	...	...	...	...	...	...	...
30	38.0	38.0	36.7	34.9	...	...	...	...	...	...	...	...	...	...
31	40.0	40.0	38.6	36.8	...	...	...	...	...	...	...	...	...	...
32	38.0	37.6	34.7	32.6	31.4	30.9	...	...	...	...	...	...	...	...
33	38.0	37.6	34.7	32.6	31.4	30.9	...	...	...	...	...	...	...	...
34	38.0	37.6	34.7	32.6	31.4	30.9	...	...	...	...	...	...	...	...
35	40.0	39.6	36.5	34.3	33.0	32.6	...	...	...	...	...	...	...	...
36	40.0	39.6	36.5	34.3	33.0	32.6	...	...	...	...	...	...	...	...
37	40.0	39.6	36.5	34.3	33.0	32.6	...	...	...	...	...	...	...	...
38	40.0	39.6	36.5	34.3	33.0	32.6	...	...	...	...	...	...	...	...
39	40.0	39.6	36.5	34.3	33.0	32.6	...	...	...	...	...	...	...	...
40	40.0	39.6	36.5	34.3	33.0	32.6	...	...	...	...	...	...	...	...
41	40.0	39.6	36.5	34.3	33.0	32.6	...	...	...	...	...	...	...	...
42	40.0	39.6	36.5	34.3	33.0	32.6	...	...	...	...	...	...	...	...
43	45.0	44.5	41.1	38.6	37.1	36.6	...	...	...	...	...	...	...	...
44	45.0	44.5	41.1	38.6	37.1	36.6	...	...	...	...	...	...	...	...
45	45.0	44.5	41.1	38.6	37.1	36.6	...	...	...	...	...	...	...	...

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Nonferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
2	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
3	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
5	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
6	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
7	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
8	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
9	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
10	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
11	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
12	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
13	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
27	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
28	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
29	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
30	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
31	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
32	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
36	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
		Nonferrous Materials (Cont'd)							
	1	...	Wld. tube	SB–543	...	C70600	WC55	...	45
	2	...	Finned wld. tube	SB–956	...	C70600	WC55	...	45
	3	...	Wld. pipe	SB–467	...	C70600	Wld. fr. cold rld. strip	≤4 1/2	54
	4	...	Smls. pipe & tube	SB–466	...	C70620	O60	...	38
	5	...	Wld. pipe	SB–467	...	C70620	WO61	>4 1/2	38
	6	...	Bar, rod	SB–151	...	C70620	O60	All	38
(**21**)	7	...	Forgings	SB–283	...	C70620	M10	>6	40
	8	...	Plate, sheet	SB–171	...	C70620	M20	≤5	40
(**21**)	9	...	Forgings	SB–283	...	C70620	O20	...	40
	10	...	Plate, sheet	SB–171	...	C70620	O25	≤5	40
	11	...	Smls. cond. tube	SB–111	...	C70620	O61	...	40
	12	...	Finned tube	SB–359	...	C70620	O61	...	40
	13	...	Smls. U–bend tube	SB–395	...	C70620	O61	...	40
	14	...	Wld. pipe	SB–467	...	C70620	WO61	≤4 1/2	40
	15	...	Wld. tube	SB–543	...	C70620	WO61	...	40
	16	...	Finned wld. tube	SB–956	...	C70620	WO61	...	40
(**21**)	17	...	Forgings	SB–283	...	C70620	M10	≤6	45
	18	...	Wld. pipe	SB–467	...	C70620	WO61	≤4 1/2	45
	19	...	Smls. tube	SB–111	...	C70620	H55	...	45
	20	...	Smls. pipe & tube	SB–466	...	C70620	H55	...	45
	21	...	Wld. tube	SB–543	...	C70620	WC55	...	45
	22	...	Finned wld. tube	SB–956	...	C70620	WC55	...	45
	23	...	Wld. pipe	SB–467	...	C70620	Wld. fr. cold rld. strip	≤4 1/2	54
(**21**)	24	...	Smls. tube	SB–466	...	C71000	O60	...	45
(**21**)	25	...	Smls. cond. tube	SB–111	...	C71000	O61	...	45
(**21**)	26	...	Finned tube	SB–359	...	C71000	O61	...	45
(**21**)	27	...	Smls. tube	SB–395	...	C71000	O61	...	45
	28	...	Wld. pipe	SB–467	...	C71500	WO61	>4 1/2	45
(**21**)	29	...	Plate, sheet	SB–171	...	C71500	M10, M20, O20, O25	2.5 < t ≤ 5	45
(**21**)	30	...	Plate, sheet	SB–171	...	C71500	M10, M20, O20, O25	≤2.5	50
	31	...	Wld. pipe	SB–467	...	C71500	WO61	≤4 1/2	50
	32	...	Smls. pipe & tube	SB–466	...	C71500	O60	...	52
	33	...	Smls. cond. tube	SB–111	...	C71500	O61	...	52
	34	...	Finned tube	SB–359	...	C71500	O61	...	52
	35	...	Smls. U–bend tube	SB–395	...	C71500	O61	...	52
	36	...	Wld. tube	SB–543	...	C71500	WO61	...	52
	37	...	Finned wld. tube	SB–956	...	C71500	WO61	...	52
	38	...	Smls. cond. tube	SB–111	...	C71500	HR50	...	72
	39	...	Wld. pipe	SB–467	...	C71520	WO61	>4 1/2	45
	40	...	Forgings	SB–283	...	C71520	M10	>6	45
	41	...	Forgings	SB–283	...	C71520	O20	...	45
	42	...	Plate, sheet	SB–171	...	C71520	O25	2.5 < t ≤ 5	45
	43	...	Forgings	SB–283	...	C71520	M10	≤6	50
	44	...	Plate, sheet	SB–171	...	C71520	O25	≤2.5	50
	45	...	Wld. pipe	SB–467	...	C71520	WO61	≤4 1/2	50

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
														Nonferrous Materials (Cont'd)
1	45.0	44.5	41.1	38.6	37.1	36.6	...	...	...	...	...	...	...	...
2	45.0	44.5	41.1	38.6	37.1	36.6	...	...	...	...	...	...	...	...
3	54.0	53.4	49.3	46.3	44.6	44.0	...	...	...	...	...	...	...	...
4	38.0	37.6	34.7	32.6	31.4	30.9	...	...	...	...	...	...	...	...
5	38.0	37.6	34.7	32.6	31.4	30.9	...	...	...	...	...	...	...	...
6	38.0	37.6	34.7	32.6	31.4	30.9	...	...	...	...	...	...	...	...
7	40.0	39.6	36.5	34.3	33.0	32.6	...	...	...	...	...	...	...	...
8	40.0	39.6	36.5	34.3	33.0	32.6	...	...	...	...	...	...	...	...
9	40.0	39.6	36.5	34.3	33.0	32.6	...	...	...	...	...	...	...	...
10	40.0	39.6	36.5	34.3	33.0	32.6	...	...	...	...	...	...	...	...
11	40.0	39.6	36.5	34.3	33.0	32.6	...	...	...	...	...	...	...	...
12	40.0	39.6	36.5	34.3	33.0	32.6	...	...	...	...	...	...	...	...
13	40.0	39.6	36.5	34.3	33.0	32.6	...	...	...	...	...	...	...	...
14	40.0	39.6	36.5	34.3	33.0	32.6	...	...	...	...	...	...	...	...
15	40.0	39.6	36.5	34.3	33.0	32.6	...	...	...	...	...	...	...	...
16	40.0	39.6	36.5	34.3	33.0	32.6	...	...	...	...	...	...	...	...
17	45.0	44.5	41.1	38.6	37.1	36.6	...	...	...	...	...	...	...	...
18	45.0	44.5	41.1	38.6	37.1	36.6	...	...	...	...	...	...	...	...
19	45.0	44.5	41.1	38.6	37.1	36.6	...	...	...	...	...	...	...	...
20	45.0	44.5	41.1	38.6	37.1	36.6	...	...	...	...	...	...	...	...
21	45.0	44.5	41.1	38.6	37.1	36.6	...	...	...	...	...	...	...	...
22	45.0	44.5	41.1	38.6	37.1	36.6	...	...	...	...	...	...	...	...
23	54.0	53.4	49.3	46.3	44.6	44.0	...	...	...	...	...	...	...	...
24	45.0	45.0	43.8	42.5	41.4	40.0	39.2	38.2	...	...	...	...	...	...
25	45.0	45.0	43.8	42.5	41.4	40.0	39.2	38.2	...	...	...	...	...	...
26	45.0	45.0	43.8	42.5	41.4	40.0	39.2	38.2	...	...	...	...	...	...
27	45.0	45.0	43.8	42.5	41.4	40.0	39.2	38.2	...	...	...	...	...	...
28	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	...	...	...	...	...	...
29	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	...	...	...	...	...	...
30	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	...	...	...	...	...	...
31	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	...	...	...	...	...	...
32	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	...	...	...	...	...	...
33	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	...	...	...	...	...	...
34	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	...	...	...	...	...	...
35	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	...	...	...	...	...	...
36	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	...	...	...	...	...	...
37	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	...	...	...	...	...	...
38	72.0	72.0	72.0	68.9	66.1	64.6	64.0	62.8	60.2	...	...	...	...	...
39	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	...	...	...	...	...	...
40	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	...	...	...	...	...	...
41	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	...	...	...	...	...	...
42	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	...	...	...	...	...	...
43	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	...	...	...	...	...	...
44	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	...	...	...	...	...	...
45	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	...	...	...	...	...	...

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Nonferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
10	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
25	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
26	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
27	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
28	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
30	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
31	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
		Nonferrous Materials (Cont'd)							
	1	...	Smls. pipe & tube	SB–466	...	C71520	O60	...	52
	2	...	Smls. cond. tube	SB–111	...	C71520	O61	...	52
	3	...	Finned tube	SB–359	...	C71520	O61	...	52
	4	...	Smls. pipe & tube	SB–395	...	C71500	O61	...	52
	5	...	Wld. tube	SB–543	...	C71520	WO61	...	52
	6	...	Finned wld. tube	SB–956	...	C71520	WO61	...	52
	7	...	Smls. cond. tube	SB–111	...	C71520	HR50	...	72
	8	...	Smls. U–bend tube	SB–395	...	C71520	HR50	...	72
(**21**)	9	...	Castings	SB–62	...	C83600	M01	...	30
(**21**)	10	...	Castings	SB–61	...	C92200	M01	...	34
(**21**)	11	...	Castings	SB–584	...	C92200	M01	...	34
(**21**)	12	...	Castings	SB–584	...	C93700	M01	...	30
	13	...	Castings	SB–148	...	C95200	M01	...	65
	14	...	Castings	SB–271	...	C95200	M02	...	65
	15	...	Castings	SB–505	...	C95200	M07	...	68
	16	...	Castings	SB–148	...	C95400	M01	...	75
	17	...	Castings	SB–271	...	C95400	M02	...	75
	18	...	Castings	SB–148	...	C95800	M01	...	85
	19	...	Castings	SB–148	...	C95820	M01	...	94
(**21**)	20	...	Castings	SB–369	...	C96200	M01	...	45
(**21**)	21	...	Castings	SB–584	...	C97600	M01	...	40
	22	99Ni	Plate, sheet, strip	SB–162	...	N02200	As rolled	...	55
	23	99Ni	Smls. pipe & tube	SB–161	...	N02200	Stress rel.	...	65
	24	99Ni	Smls. tube	SB–163	...	N02200	Stress rel.	...	65
(**21**)	25	99Ni–Low C	Smls. pipe & tube	SB–161	...	N02201	Annealed	>5 O.D.	50
(**21**)	26	99Ni–Low C	Smls. & wld. ftgs.	SB–366	...	N02201	Annealed	...	50
(**21**)	27	99Ni–Low C	Bar, rod	SB–160	...	N02201	Hot rolled/ann.	...	50
(**21**)	28	99Ni–Low C	Smls. pipe & tube	SB–161	...	N02201	Annealed	≤5 O.D.	50
(**21**)	29	99Ni–Low C	Smls. tube	SB–163	...	N02201	Annealed	...	50
(**21**)	30	99Ni–Low C	Plate, sheet, strip	SB–162	...	N02201	Hot rolled/ann.	...	50
	31	67Ni–30Cu	Bar	SB–164	...	N04400	Annealed	...	70
	32	67Ni–30Cu	Smls. pipe & tube	SB–165	...	N04400	Annealed	>5 O.D.	70
	33	67Ni–30Cu	Forgings	SB–564	...	N04400	Annealed	...	70
	34	67Ni–30Cu	Plate	SB–127	...	N04400	Annealed	...	70
	35	67Ni–30Cu	Smls. tube	SB–163	...	N04400	Annealed	≤3	70
	36	67Ni–30Cu	Smls. pipe & tube	SB–165	...	N04400	Annealed	≤5 O.D.	70
	37	67Ni–30Cu	Smls. & wld. ftgs.	SB–366	...	N04400	Annealed	...	70
	38	67Ni–30Cu	Plate	SB–127	...	N04400	As rolled	...	75
	39	67Ni–30Cu	Rounds	SB–164	...	N04400	Hot worked	$12 < t \le 14$	75
	40	67Ni–30Cu	Rounds	SB–164	...	N04400	Hot worked	$t \le 12$	80
	41	67Ni–30Cu	Rounds	SB–164	...	N04400	CW & SR	$t < 1/2$	84
	42	67Ni–30Cu	Rounds	SB–164	...	N04400	CW & SR	$3 1/2 < t \le 4$	84
	43	67Ni–30Cu	Smls. tube	SB–163	...	N04400	Stress rel.	...	85
	44	67Ni–30Cu	Smls. pipe & tube	SB–165	...	N04400	Stress rel.	...	85
	45	67Ni–30Cu	Rounds	SB–164	...	N04400	CW & SR	$1/2 \le t \le 3 1/2$	87

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
														Nonferrous Materials (Cont'd)
1	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	...	...	...	...	...	...
2	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	...	...	...	...	...	...
3	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	...	...	...	...	...	...
4	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	...	...	...	...	...	...
5	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	...	...	...	...	...	...
6	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	...	...	...	...	...	...
7	72.0	72.0	72.0	68.9	66.1	64.6	64.0	62.8	60.2	...	...	...	...	...
8	72.0	72.0	72.0	68.9	66.1	64.6	64.0	62.8	60.2	...	...	...	...	...
9	30.0	30.0	29.3	28.3	27.7	27.5	...	...	...	...	...	...	...	...
10	34.0	34.0	34.0	33.1	29.5	20.5	...	...	...	...	...	...	...	...
11	34.0	34.0	34.0	33.1	29.5	20.5	...	...	...	...	...	...	...	...
12	30.0	29.6	27.7	26.0	24.5	20.5	...	...	...	...	...	...	...	...
13	65.0	65.0	65.0	62.1	56.5	48.6	...	...	...	...	...	...	...	...
14	65.0	65.0	65.0	62.1	56.5	48.6	...	...	...	...	...	...	...	...
15	68.0	68.0	68.0	65.0	59.2	50.9	...	...	...	...	...	...	...	...
16	75.0	75.0	75.0	75.0	75.0	...	...	...	...	...	...	...	...	...
17	75.0	75.0	75.0	75.0	75.0	...	...	...	...	...	...	...	...	...
18	85.0	84.8	80.2	76.8	...	...	...	...	...	...	...	...	...	...
19	94.0	93.7	88.7	84.9	81.7	...	...	...	...	...	...	...	...	...
20	45.0	44.8	41.0	38.8	37.3	...	...	...	...	...	...	...	...	...
21	40.0	39.5	38.5	...	...	...	...	...	...	...	...	...	...	...
22	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	...	...	...
23	65.0	65.0	65.0	65.0	64.1	61.8	59.8	...	...	...	...	...	...	...
24	65.0	65.0	65.0	65.0	64.1	61.8	59.8	...	...	...	...	...	...	...
25	50.0	50.0	50.0	49.8	47.8	45.6	44.4	43.2	42.2	40.8	38.4	35.9	33.3	30.7
26	50.0	50.0	50.0	49.8	47.8	45.6	44.4	43.2	42.2	40.8	38.4	35.9	33.3	30.7
27	50.0	50.0	50.0	49.8	47.8	45.6	44.4	43.2	42.2	40.8	38.4	35.9	33.3	30.7
28	50.0	50.0	50.0	49.8	47.8	45.6	44.4	43.2	42.2	40.8	38.4	35.9	33.3	30.7
29	50.0	50.0	50.0	49.8	47.8	45.6	44.4	43.2	42.2	40.8	38.4	35.9	33.3	30.7
30	50.0	50.0	50.0	49.8	47.8	45.6	44.4	43.2	42.2	40.8	38.4	35.9	33.3	30.7
31	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.7	67.3	64.1	60.3	56.4	52.9	50.5
32	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.7	67.3	64.1	60.3	56.4	52.9	50.5
33	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.7	67.3	64.1	60.3	56.4	52.9	50.5
34	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.7	67.3	64.1	60.3	56.4	52.9	50.5
35	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.7	67.3	64.1	60.3	56.4	52.9	50.5
36	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.7	67.3	64.1	60.3	56.4	52.9	50.5
37	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.7	67.3	64.1	60.3	56.4	52.9	50.5
38	75.0	75.0	75.0	75.0	75.0	75.0	74.9	72.3	69.0	65.1	60.8	56.6	53.1	50.8
39	75.0	75.0	75.0	75.0	75.0	75.0	74.9	72.3	69.0	65.1	...	...	...	...
40	80.0	80.0	80.0	80.0	79.9	78.7	77.3	75.3	72.4	68.6	...	...	...	...
41	84.0	84.0	84.0	84.0	83.9	82.6	81.2	79.0	76.0	72.0	...	...	...	...
42	84.0	84.0	84.0	84.0	83.9	82.6	81.2	79.0	76.0	72.0	...	...	...	...
43	85.0	85.0	85.0	84.9	84.9	83.7	82.2	79.9	76.8	72.9	68.6	64.2	60.2	57.5
44	85.0	85.0	85.0	84.9	84.9	83.7	82.2	79.9	76.8	72.9	68.6	64.2	60.2	57.5
45	87.0	87.0	87.0	87.0	86.9	85.6	84.1	81.9	78.7	74.6	...	...	...	...

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Nonferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
10	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
11	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
12	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
13	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
21	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	28.3	26.0	24.1	22.7	...	...	...	...	...	...	...	...	...	(**21**)
26	28.3	26.0	24.1	22.7	...	...	...	...	...	...	...	...	...	(**21**)
27	28.3	26.0	24.1	22.7	...	...	...	...	...	...	...	...	...	(**21**)
28	28.3	26.0	24.1	22.7	...	...	...	...	...	...	...	...	...	(**21**)
29	28.3	26.0	24.1	22.7	...	...	...	...	...	...	...	...	...	(**21**)
30	28.3	26.0	24.1	22.7	...	...	...	...	...	...	...	...	...	(**21**)
31	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
		Nonferrous Materials (Cont'd)							
	1	67Ni–30Cu	Rounds	SB–164	...	N04400	Cold worked	$t < 1/2$	110
	2	67Ni–30Cu–S	Bar	SB–164	...	N04405	Annealed	...	70
	3	67Ni–30Cu–S	Bar	SB–164	...	N04405	Hot worked	...	75
	4	67Ni–28Cu–3Al	Bolting	SF–468	...	N05500	Ann./aged	0.250–1.500	130
(**21**)	5	47Ni–22Cr–9Mo–18Fe	Plate	SB–435	...	N06002	Annealed	$>3/16$	95
(**21**)	6	47Ni–22Cr–9Mo–18Fe	Sheet	SB–435	...	N06002	Solution ann.	$\leq 3/16$	95
(**21**)	7	47Ni–22Cr–9Mo–18Fe	Rod	SB–572	...	N06002	Annealed	...	95
(**21**)	8	47Ni–22Cr–9Mo–18Fe	Smls. & wld. ftgs.	SB–366	...	N06002	Annealed	...	100
(**21**)	9	47Ni–22Cr–9Mo–18Fe	Sheet	SB–435	...	N06002	Annealed	$1/16 < t \leq 3/16$	100
(**21**)	10	47Ni–22Cr–9Mo–18Fe	Wld. pipe	SB–619	...	N06002	Solution ann.	...	100
(**21**)	11	47Ni–22Cr–9Mo–18Fe	Smls. pipe & tube	SB–622	...	N06002	Solution ann.	...	100
(**21**)	12	47Ni–22Cr–9Mo–18Fe	Wld. tube	SB–626	...	N06002	Solution ann.	...	100
	13	47Ni–22Cr–19Fe–6Mo	Rod	SB–581	...	N06007	Solution ann.	$>3/4$	85
	14	47Ni–22Cr–19Fe–6Mo	Plate, sheet, strip	SB–582	...	N06007	Solution ann.	$>3/4$	85
	15	47Ni–22Cr–19Fe–6Mo	Smls. & wld. ftgs.	SB–366	...	N06007	Annealed	...	90
	16	47Ni–22Cr–19Fe–6Mo	Rod	SB–581	...	N06007	Solution ann.	$\leq 3/4$	90
	17	47Ni–22Cr–19Fe–6Mo	Plate, sheet, strip	SB–582	...	N06007	Solution ann.	$\leq 3/4$	90
	18	47Ni–22Cr–19Fe–6Mo	Wld. pipe	SB–619	...	N06007	Solution ann.	...	90
	19	47Ni–22Cr–19Fe–6Mo	Smls. pipe & tube	SB–622	...	N06007	Solution ann.	...	90
	20	47Ni–22Cr–19Fe–6Mo	Wld. tube	SB–626	...	N06007	Solution ann.	...	90
(**21**)	21	55Ni–21Cr–13.5Mo	Smls. & wld. ftgs.	SB–366	...	N06022	Solution ann.	...	100
(**21**)	22	55Ni–21Cr–13.5Mo	Forgings	SB–462	...	N06022	Solution ann.	...	100
(**21**)	23	55Ni–21Cr–13.5Mo	Forgings	SB–564	...	N06022	Solution ann.	...	100
(**21**)	24	55Ni–21Cr–13.5Mo	Rod	SB–574	...	N06022	Solution ann.	...	100
(**21**)	25	55Ni–21Cr–13.5Mo	Plate, sheet, strip	SB–575	...	N06022	Solution ann.	...	100
(**21**)	26	55Ni–21Cr–13.5Mo	Wld. pipe	SB–619	...	N06022	Solution ann.	...	100
(**21**)	27	55Ni–21Cr–13.5Mo	Smls. pipe & tube	SB–622	...	N06022	Solution ann.	...	100
(**21**)	28	55Ni–21Cr–13.5Mo	Wld. tube	SB–626	...	N06022	Solution ann.	...	100
	29	60Ni–25Cr–9.5Fe–2.1Al	Smls. tube	SB–163	...	N06025	Annealed	...	98
	30	60Ni–25Cr–9.5Fe–2.1Al	Plate, sheet, strip	SB–168	...	N06025	Annealed	...	98
	31	60Ni–25Cr–9.5Fe–2.1Al	Wrought fittings	SB–366	...	N06025	Annealed	...	98
	32	60Ni–25Cr–9.5Fe–2.1Al	Forgings	SB–462	...	N06025	Annealed	$t \leq 4$	98
	33	60Ni–25Cr–9.5Fe–2.1Al	Wld. tube	SB–516	...	N06025	Annealed	...	98
	34	60Ni–25Cr–9.5Fe–2.1Al	Wld. pipe	SB–517	...	N06025	Annealed	...	98
	35	60Ni–25Cr–9.5Fe–2.1Al	Forgings	SB–564	...	N06025	Annealed	$t \leq 4$	98
	36	60Ni–25Cr–9.5Fe–2.1Al	Bar	SB–166	...	N06025	HW or CW ann.	$t \leq 4$	98
	37	60Ni–25Cr–9.5Fe–2.1Al	Smls. pipe & tube	SB–167	...	N06025	HW or CW ann.	...	98
	38	40Ni–29Cr–15Fe–5Mo	Smls. & wld. ftgs.	SB–366	...	N06030	Solution ann.	...	85
	39	40Ni–29Cr–15Fe–5Mo	Forgings	SB–462	...	N06030	Solution ann.	...	85
	40	40Ni–29Cr–15Fe–5Mo	Rod	SB–581	...	N06030	Solution ann.	...	85
	41	40Ni–29Cr–15Fe–5Mo	Plate, sheet, strip	SB–582	...	N06030	Solution ann.	...	85
	42	40Ni–29Cr–15Fe–5Mo	Wld. pipe	SB–619	...	N06030	Solution ann.	...	85
	43	40Ni–29Cr–15Fe–5Mo	Smls. pipe & tube	SB–622	...	N06030	Solution ann.	...	85
	44	40Ni–29Cr–15Fe–5Mo	Wld. tube	SB–626	...	N06030	Solution ann.	...	85
	45	58Ni–33Cr–8Mo	Smls. & wld. ftgs.	SB–366	...	N06035	Solution ann.	...	85

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
														Nonferrous Materials (Cont'd)
1	110.0	110.0	110.0	110.0	109.9	108.2	106.3	103.5	99.6	94.3	...	...	...	...
2	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.7	67.3	64.1	60.3	56.4	52.9	50.5
3	75.0	75.0	75.0	75.0	75.0	75.0	74.9	72.3	69.0	65.1	60.8	56.6	53.1	50.8
4	130.0	130.0	130.0	130.0	130.0	129.7	128.1	126.3	...	...	...	...	...	...
5	95.0	95.0	93.8	91.4	89.0	86.4	85.1	83.7	82.5	81.3	80.2	79.3	78.6	78.1
6	95.0	95.0	93.8	91.4	89.0	86.4	85.1	83.7	82.5	81.3	80.2	79.3	78.6	78.1
7	95.0	95.0	93.8	91.4	89.0	86.4	85.1	83.7	82.5	81.3	80.2	79.3	78.6	78.1
8	100.0	100.0	98.8	96.3	93.7	91.0	89.6	88.2	86.8	85.6	84.5	83.5	82.8	82.2
9	100.0	100.0	98.8	96.3	93.7	91.0	89.6	88.2	86.8	85.6	84.5	83.5	82.8	82.2
10	100.0	100.0	98.8	96.3	93.7	91.0	89.6	88.2	86.8	85.6	84.5	83.5	82.8	82.2
11	100.0	100.0	98.8	96.3	93.7	91.0	89.6	88.2	86.8	85.6	84.5	83.5	82.8	82.2
12	100.0	100.0	98.8	96.3	93.7	91.0	89.6	88.2	86.8	85.6	84.5	83.5	82.8	82.2
13	85.0	85.0	83.7	82.7	81.4	79.8	79.0	78.3	77.7	77.2	76.5	75.7	74.1	71.5
14	85.0	85.0	83.7	82.7	81.4	79.8	79.0	78.3	77.7	77.2	76.5	75.7	74.1	71.5
15	90.0	90.0	88.6	87.6	86.2	84.5	83.7	82.9	82.3	81.7	81.1	80.1	78.5	75.7
16	90.0	90.0	88.6	87.6	86.2	84.5	83.7	82.9	82.3	81.7	81.1	80.1	78.5	75.7
17	90.0	90.0	88.6	87.6	86.2	84.5	83.7	82.9	82.3	81.7	81.1	80.1	78.5	75.7
18	90.0	90.0	88.6	87.6	86.2	84.5	83.7	82.9	82.3	81.7	81.1	80.1	78.5	75.7
19	90.0	90.0	88.6	87.6	86.2	84.5	83.7	82.9	82.3	81.7	81.1	80.1	78.5	75.7
20	90.0	90.0	88.6	87.6	86.2	84.5	83.7	82.9	82.3	81.7	81.1	80.1	78.5	75.7
21	100.0	100.0	98.5	95.3	92.9	91.1	90.4	89.7	89.1	88.4	87.8	87.1	86.3	85.4
22	100.0	100.0	98.5	95.3	92.9	91.1	90.4	89.7	89.1	88.4	87.8	87.1	86.3	85.4
23	100.0	100.0	98.5	95.3	92.9	91.1	90.4	89.7	89.1	88.4	87.8	87.1	86.3	85.4
24	100.0	100.0	98.5	95.3	92.9	91.1	90.4	89.7	89.1	88.4	87.8	87.1	86.3	85.4
25	100.0	100.0	98.5	95.3	92.9	91.1	90.4	89.7	89.1	88.4	87.8	87.1	86.3	85.4
26	100.0	100.0	98.5	95.3	92.9	91.1	90.4	89.7	89.1	88.4	87.8	87.1	86.3	85.4
27	100.0	100.0	98.5	95.3	92.9	91.1	90.4	89.7	89.1	88.4	87.8	87.1	86.3	85.4
28	100.0	100.0	98.5	95.3	92.9	91.1	90.4	89.7	89.1	88.4	87.8	87.1	86.3	85.4
29	98.0	98.0	98.0	97.9	97.9	97.9	97.9	97.9	97.9	97.9	97.3	96.0	94.3	92.1
30	98.0	98.0	98.0	97.9	97.9	97.9	97.9	97.9	97.9	97.9	97.3	96.0	94.3	92.1
31	98.0	98.0	98.0	97.9	97.9	97.9	97.9	97.9	97.9	97.9	97.3	96.0	94.3	92.1
32	98.0	98.0	98.0	97.9	97.9	97.9	97.9	97.9	97.9	97.9	97.3	96.0	94.3	92.1
33	98.0	98.0	98.0	97.9	97.9	97.9	97.9	97.9	97.9	97.9	97.3	96.0	94.3	92.1
34	98.0	98.0	98.0	97.9	97.9	97.9	97.9	97.9	97.9	97.9	97.3	96.0	94.3	92.1
35	98.0	98.0	98.0	97.9	97.9	97.9	97.9	97.9	97.9	97.9	97.3	96.0	94.3	92.1
36	98.0	98.0	98.0	97.9	97.9	97.9	97.9	97.9	97.9	97.9	97.3	96.0	94.3	92.1
37	98.0	98.0	98.0	97.9	97.9	97.9	97.9	97.9	97.9	97.9	97.3	96.0	94.3	92.1
38	85.0	85.0	81.5	78.8	76.7	75.0	74.3	73.6	73.0	72.4	71.7	70.9	69.9	68.5
39	85.0	85.0	81.5	78.8	76.7	75.0	74.3	73.6	73.0	72.4	71.7	70.9	69.9	68.5
40	85.0	85.0	81.5	78.8	76.7	75.0	74.3	73.6	73.0	72.4	71.7	70.9	69.9	68.5
41	85.0	85.0	81.5	78.8	76.7	75.0	74.3	73.6	73.0	72.4	71.7	70.9	69.9	68.5
42	85.0	85.0	81.5	78.8	76.7	75.0	74.3	73.6	73.0	72.4	71.7	70.9	69.9	68.5
43	85.0	85.0	81.5	78.8	76.7	75.0	74.3	73.6	73.0	72.4	71.7	70.9	69.9	68.5
44	85.0	85.0	81.5	78.8	76.7	75.0	74.3	73.6	73.0	72.4	71.7	70.9	69.9	68.5
45	85.0	85.0	83.7	79.6	76.7	74.8	74.0	73.3	72.6	71.8	70.9	69.8	68.6	67.2

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Nonferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	75.1	73.1	70.6	67.7	64.3	60.4	56.1	51.4	46.3	41.1	35.8	30.6	25.6	(**21**)
6	75.1	73.1	70.6	67.7	64.3	60.4	56.1	51.4	46.3	41.1	35.8	30.6	25.6	(**21**)
7	75.1	73.1	70.6	67.7	64.3	60.4	56.1	51.4	46.3	41.1	35.8	30.6	25.6	(**21**)
8	79.0	76.9	74.3	71.2	67.6	63.6	59.0	54.1	48.8	43.3	37.7	32.2	27.0	(**21**)
9	79.0	76.9	74.3	71.2	67.6	63.6	59.0	54.1	48.8	43.3	37.7	32.2	27.0	(**21**)
10	79.0	76.9	74.3	71.2	67.6	63.6	59.0	54.1	48.8	43.3	37.7	32.2	27.0	(**21**)
11	79.0	76.9	74.3	71.2	67.6	63.6	59.0	54.1	48.8	43.3	37.7	32.2	27.0	(**21**)
12	79.0	76.9	74.3	71.2	67.6	63.6	59.0	54.1	48.8	43.3	37.7	32.2	27.0	(**21**)
13	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	83.4	82.3	81.1	79.7	78.2	...	...	...	...	...	...	...	...	(**21**)
22	83.4	82.3	81.1	79.7	78.2	...	...	...	...	...	...	...	...	(**21**)
23	83.4	82.3	81.1	79.7	78.2	...	...	...	...	...	...	...	...	(**21**)
24	83.4	82.3	81.1	79.7	78.2	...	...	...	...	...	...	...	...	(**21**)
25	83.4	82.3	81.1	79.7	78.2	...	...	...	...	...	...	...	...	(**21**)
26	83.4	82.3	81.1	79.7	78.2	...	...	...	...	...	...	...	...	(**21**)
27	83.4	82.3	81.1	79.7	78.2	...	...	...	...	...	...	...	...	(**21**)
28	83.4	82.3	81.1	79.7	78.2	...	...	...	...	...	...	...	...	(**21**)
29	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
	Nonferrous Materials (Cont'd)							
1	58Ni–33Cr–8Mo	Forgings	SB–462	...	N06035	Solution ann.	...	85
2	58Ni–33Cr–8Mo	Forgings	SB–564	...	N06035	Solution ann.	...	85
3	58Ni–33Cr–8Mo	Rod	SB–574	...	N06035	Solution ann.	...	85
4	58Ni–33Cr–8Mo	Plate, sheet, strip	SB–575	...	N06035	Solution ann.	...	85
5	58Ni–33Cr–8Mo	Wld. pipe	SB–619	...	N06035	Solution ann.	...	85
6	58Ni–33Cr–8Mo	Smls. pipe & tube	SB–622	...	N06035	Solution ann.	...	85
7	58Ni–33Cr–8Mo	Wld. tube	SB–626	...	N06035	Solution ann.	...	85
8	46Ni–27Cr–23Fe–2.75Si	Rod	SB–166	...	N06045	...	...	90
9	46Ni–27Cr–23Fe–2.75Si	Smls. pipe & tube	SB–167	...	N06045	...	...	90
10	46Ni–27Cr–23Fe–2.75Si	Plate, sheet, strip	SB–168	...	N06045	...	...	90
11	46Ni–27Cr–23Fe–2.75Si	Smls. & wld. ftgs.	SB–366	...	N06045	...	...	90
12	46Ni–27Cr–23Fe–2.75Si	Wld. tube	SB–516	...	N06045	...	...	90
13	46Ni–27Cr–23Fe–2.75Si	Wld. pipe	SB–517	...	N06045	...	...	90
14	46Ni–27Cr–23Fe–2.75Si	Forgings	SB–564	...	N06045	...	...	90
15	59Ni–23Cr–16Mo	Fittings	SB–366	CR5923	N06059	Annealed	...	100
16	59Ni–23Cr–16Mo	Fittings	SB–366	WP5923	N06059	Annealed	...	100
17	59Ni–23Cr–16Mo	Wld. fittings	SB–366	WP5923W	N06059	Annealed	...	100
18	59Ni–23Cr–16Mo	Fittings	SB–366	WP5923WX	N06059	Annealed	...	100
(**21**) 19	59Ni–23Cr–16Mo	Forged fittings	SB–462	...	N06059	Solution ann.	...	100
20	59Ni–23Cr–16Mo	Forgings	SB–564	...	N06059	Solution ann.	...	100
21	59Ni–23Cr–16Mo	Rod	SB–574	...	N06059	Solution ann.	...	100
22	59Ni–23Cr–16Mo	Plate, sheet, strip	SB–575	...	N06059	Solution ann.	...	100
23	59Ni–23Cr–16Mo	Wld. pipe	SB–619	...	N06059	Solution ann.	...	100
24	59Ni–23Cr–16Mo	Smls. pipe & tube	SB–622	...	N06059	Solution ann.	...	100
25	59Ni–23Cr–16Mo	Wld. tube	SB–626	...	N06059	Solution ann.	...	100
26	59Ni–23Cr–16Mo–1.6Cu	Fittings	SB–366	...	N06200	Solution ann.	...	100
27	59Ni–23Cr–16Mo–1.6Cu	Forgings	SB–462	...	N06200	Solution ann.	...	100
28	59Ni–23Cr–16Mo–1.6Cu	Forgings	SB–564	...	N06200	Solution ann.	...	100
29	59Ni–23Cr–16Mo–1.6Cu	Rod	SB–574	...	N06200	Solution ann.	...	100
30	59Ni–23Cr–16Mo–1.6Cu	Plate, sheet, strip	SB–575	...	N06200	Solution ann.	...	100
31	59Ni–23Cr–16Mo–1.6Cu	Wld. pipe	SB–619	...	N06200	Solution ann.	...	100
32	59Ni–23Cr–16Mo–1.6Cu	Smls. pipe & tube	SB–622	...	N06200	Solution ann.	...	100
33	59Ni–23Cr–16Mo–1.6Cu	Wld. tube	SB–626	...	N06200	Solution ann.	...	100
34	60Ni–19Cr–19Mo–1.8Ta	Smls. & wld. ftgs.	SB–366	...	N06210	Solution ann.	...	100
35	60Ni–19Cr–19Mo–1.8Ta	Forgings	SB–564	...	N06210	Solution ann.	...	100
36	60Ni–19Cr–19Mo–1.8Ta	Rod	SB–574	...	N06210	Solution ann.	...	100
37	60Ni–19Cr–19Mo–1.8Ta	Plate, sheet, strip	SB–575	...	N06210	Solution ann.	...	100
38	60Ni–19Cr–19Mo–1.8Ta	Wld. pipe	SB–619	...	N06210	Solution ann.	...	100
39	60Ni–19Cr–19Mo–1.8Ta	Smls. pipe & tube	SB–622	...	N06210	Solution ann.	...	100
40	60Ni–19Cr–19Mo–1.8Ta	Wld. tube	SB–626	...	N06210	Solution ann.	...	100
41	57Ni–22Cr–14W–2Mo–La	Plate, sheet, strip	SB–435	...	N06230	Solution ann.	...	110
42	57Ni–22Cr–14W–2Mo–La	Forgings	SB–564	...	N06230	Solution ann.	...	110
43	57Ni–22Cr–14W–2Mo–La	Bar	SB–572	...	N06230	Solution ann.	...	110
44	57Ni–22Cr–14W–2Mo–La	Wld. pipe	SB–619	...	N06230	Solution ann.	...	110
45	57Ni–22Cr–14W–2Mo–La	Smls. pipe & tube	SB–622	...	N06230	Solution ann.	...	110

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
														Nonferrous Materials (Cont'd)
1	85.0	85.0	83.7	79.6	76.7	74.8	74.0	73.3	72.6	71.8	70.9	69.8	68.6	67.2
2	85.0	85.0	83.7	79.6	76.7	74.8	74.0	73.3	72.6	71.8	70.9	69.8	68.6	67.2
3	85.0	85.0	83.7	79.6	76.7	74.8	74.0	73.3	72.6	71.8	70.9	69.8	68.6	67.2
4	85.0	85.0	83.7	79.6	76.7	74.8	74.0	73.3	72.6	71.8	70.9	69.8	68.6	67.2
5	85.0	85.0	83.7	79.6	76.7	74.8	74.0	73.3	72.6	71.8	70.9	69.8	68.6	67.2
6	85.0	85.0	83.7	79.6	76.7	74.8	74.0	73.3	72.6	71.8	70.9	69.8	68.6	67.2
7	85.0	85.0	83.7	79.6	76.7	74.8	74.0	73.3	72.6	71.8	70.9	69.8	68.6	67.2
8	90.0	90.0	87.1	82.3	79.1	77.2	76.6	76.0	75.4	74.8	74.0	72.9	71.6	70.1
9	90.0	90.0	87.1	82.3	79.1	77.2	76.6	76.0	75.4	74.8	74.0	72.9	71.6	70.1
10	90.0	90.0	87.1	82.3	79.1	77.2	76.6	76.0	75.4	74.8	74.0	72.9	71.6	70.1
11	90.0	90.0	87.1	82.3	79.1	77.2	76.6	76.0	75.4	74.8	74.0	72.9	71.6	70.1
12	90.0	90.0	87.1	82.3	79.1	77.2	76.6	76.0	75.4	74.8	74.0	72.9	71.6	70.1
13	90.0	90.0	87.1	82.3	79.1	77.2	76.6	76.0	75.4	74.8	74.0	72.9	71.6	70.1
14	90.0	90.0	87.1	82.3	79.1	77.2	76.6	76.0	75.4	74.8	74.0	72.9	71.6	70.1
15	100.0	100.0	100.0	97.9	94.4	91.2	89.7	88.3	87.1	86.1	85.3	84.7	84.2	83.8
16	100.0	100.0	100.0	97.9	94.4	91.2	89.7	88.3	87.1	86.1	85.3	84.7	84.2	83.8
17	100.0	100.0	100.0	97.9	94.4	91.2	89.7	88.3	87.1	86.1	85.3	84.7	84.2	83.8
18	100.0	100.0	100.0	97.9	94.4	91.2	89.7	88.3	87.1	86.1	85.3	84.7	84.2	83.8
19	100.0	100.0	100.0	97.9	94.4	91.2	89.7	88.3	87.1	86.1	85.3	84.7	84.2	83.8
20	100.0	100.0	100.0	97.9	94.4	91.2	89.7	88.3	87.1	86.1	85.3	84.7	84.2	83.8
21	100.0	100.0	100.0	97.9	94.4	91.2	89.7	88.3	87.1	86.1	85.3	84.7	84.2	83.8
22	100.0	100.0	100.0	97.9	94.4	91.2	89.7	88.3	87.1	86.1	85.3	84.7	84.2	83.8
23	100.0	100.0	100.0	97.9	94.4	91.2	89.7	88.3	87.1	86.1	85.3	84.7	84.2	83.8
24	100.0	100.0	100.0	97.9	94.4	91.2	89.7	88.3	87.1	86.1	85.3	84.7	84.2	83.8
25	100.0	100.0	100.0	97.9	94.4	91.2	89.7	88.3	87.1	86.1	85.3	84.7	84.2	83.8
26	100.0	100.0	100.0	96.7	93.7	91.7	91.0	90.2	89.3	88.3	87.2	86.0	84.9	84.1
27	100.0	100.0	100.0	96.7	93.7	91.7	91.0	90.2	89.3	88.3	87.2	86.0	84.9	84.1
28	100.0	100.0	100.0	96.7	93.7	91.7	91.0	90.2	89.3	88.3	87.2	86.0	84.9	84.1
29	100.0	100.0	100.0	96.7	93.7	91.7	91.0	90.2	89.3	88.3	87.2	86.0	84.9	84.1
30	100.0	100.0	100.0	96.7	93.7	91.7	91.0	90.2	89.3	88.3	87.2	86.0	84.9	84.1
31	100.0	100.0	100.0	96.7	93.7	91.7	91.0	90.2	89.3	88.3	87.2	86.0	84.9	84.1
32	100.0	100.0	100.0	96.7	93.7	91.7	91.0	90.2	89.3	88.3	87.2	86.0	84.9	84.1
33	100.0	100.0	100.0	96.7	93.7	91.7	91.0	90.2	89.3	88.3	87.2	86.0	84.9	84.1
34	100.0	100.0	99.8	96.7	94.2	92.2	91.4	90.7	90.0	89.4	88.9	88.4	87.8	87.3
35	100.0	100.0	99.8	96.7	94.2	92.2	91.4	90.7	90.0	89.4	88.9	88.4	87.8	87.3
36	100.0	100.0	99.8	96.7	94.2	92.2	91.4	90.7	90.0	89.4	88.9	88.4	87.8	87.3
37	100.0	100.0	99.8	96.7	94.2	92.2	91.4	90.7	90.0	89.4	88.9	88.4	87.8	87.3
38	100.0	100.0	99.8	96.7	94.2	92.2	91.4	90.7	90.0	89.4	88.9	88.4	87.8	87.3
39	100.0	100.0	99.8	96.7	94.2	92.2	91.4	90.7	90.0	89.4	88.9	88.4	87.8	87.3
40	100.0	100.0	99.8	96.7	94.2	92.2	91.4	90.7	90.0	89.4	88.9	88.4	87.8	87.3
41	110.0	110.0	110.0	107.7	104.8	102.9	102.3	101.9	101.5	101.3	101.0	100.7	100.4	99.8
42	110.0	110.0	110.0	107.7	104.8	102.9	102.3	101.9	101.5	101.3	101.0	100.7	100.4	99.8
43	110.0	110.0	110.0	107.7	104.8	102.9	102.3	101.9	101.5	101.3	101.0	100.7	100.4	99.8
44	110.0	110.0	110.0	107.7	104.8	102.9	102.3	101.9	101.5	101.3	101.0	100.7	100.4	99.8
45	110.0	110.0	110.0	107.7	104.8	102.9	102.3	101.9	101.5	101.3	101.0	100.7	100.4	99.8

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding												
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
	Nonferrous Materials (Cont'd)												
1	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	... (**21**)
20	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...

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Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
		Nonferrous Materials (Cont'd)							
	1	57Ni–22Cr–14W–2Mo–La	Wld. tube	SB–626	...	N06230	Solution ann.	...	110
	2	61Ni–16Mo–16Cr	Smls. & wld. ftgs.	SB–366	...	N06455	Annealed	...	100
	3	61Ni–16Mo–16Cr	Rod	SB–574	...	N06455	Solution ann.	...	100
	4	61Ni–16Mo–16Cr	Plate, sheet, strip	SB–575	...	N06455	Solution ann.	...	100
	5	61Ni–16Mo–16Cr	Wld. pipe	SB–619	...	N06455	Solution ann.	...	100
	6	61Ni–16Mo–16Cr	Smls. pipe & tube	SB–622	...	N06455	Solution ann.	...	100
	7	61Ni–16Mo–16Cr	Wld. tube	SB–626	...	N06455	Solution ann.	...	100
(**21**)	8	72Ni–15Cr–8Fe	Smls. pipe & tube	SB–167	...	N06600	Hot fin./ann.	>5	75
(**21**)	9	72Ni–15Cr–8Fe	Smls. & wld. ftgs.	SB–366	...	N06600	Annealed	...	80
(**21**)	10	72Ni–15Cr–8Fe	Smls. pipe & tube	SB–167	...	N06600	Hot fin./ann.	≤5	80
(**21**)	11	72Ni–15Cr–8Fe	Smls. tube	SB–163	...	N06600	Annealed	≤3	80
(**21**)	12	72Ni–15Cr–8Fe	Bar	SB–166	...	N06600	Annealed	...	80
(**21**)	13	72Ni–15Cr–8Fe	Plate	SB–168	...	N06600	Annealed	...	80
(**21**)	14	72Ni–15Cr–8Fe	Wld. tube	SB–516	...	N06600	Annealed	...	80
(**21**)	15	72Ni–15Cr–8Fe	Forgings	SB–564	...	N06600	...	...	80
(**21**)	16	72Ni–15Cr–8Fe	Smls. pipe & tube	SB–167	...	N06600	Cold drawn/ann.	...	80
(**21**)	17	72Ni–15Cr–8Fe	Wld. pipe	SB–517	...	N06600	Cold drawn/ann.	...	80
(**21**)	18	72Ni–15Cr–8Fe	Bar, rod	SB–166	...	N06600	Hot fin.	...	85
(**21**)	19	72Ni–15Cr–8Fe	Plate, sheet, strip	SB–168	...	N06600	Hot rolled	...	85
	20	72Ni–15Cr–8Fe	Rounds	SB–166	...	N06600	Hot worked	$t > 3$	85
	21	72Ni–15Cr–8Fe	Rounds	SB–166	...	N06600	Hot worked	$\frac{1}{2} < t \leq 3$	90
	22	72Ni–15Cr–8Fe	Rounds	SB–166	...	N06600	Hot worked	$\frac{1}{4} \leq t \leq \frac{1}{2}$	95
	23	60Ni–23Cr–Fe	Smls. tube	SB–163	...	N06601	Annealed	≤3 O.D.	80
	24	60Ni–23Cr–Fe	Bar	SB–166	...	N06601	Annealed	...	80
	25	60Ni–23Cr–Fe	Smls. pipe & tube	SB–167	...	N06601	Annealed	...	80
	26	60Ni–23Cr–Fe	Plate, sheet, strip	SB–168	...	N06601	Annealed	...	80
	27	52Ni–22Cr–13Co–9Mo	Bar, rod	SB–166	...	N06617	Annealed	...	95
	28	52Ni–22Cr–13Co–9Mo	Smls. pipe & tube	SB–167	...	N06617	Annealed	...	95
	29	52Ni–22Cr–13Co–9Mo	Plate, sheet, strip	SB–168	...	N06617	Annealed	...	95
	30	52Ni–22Cr–13Co–9Mo	Forgings	SB–564	...	N06617	Annealed	...	95
(**21**)	31	60Ni–22Cr–9Mo–3.5Cb	Plate, sheet, strip	SB–443	2	N06625	Solution ann.	...	100
(**21**)	32	60Ni–22Cr–9Mo–3.5Cb	Smls. pipe & tube	SB–444	2	N06625	Solution ann.	...	100
(**21**)	33	60Ni–22Cr–9Mo–3.5Cb	Bar	SB–446	2	N06625	Solution ann.	...	100
(**21**)	34	60Ni–22Cr–9Mo–3.5Cb	Smls. & wld. ftgs.	SB–366	...	N06625	Annealed	...	110
(**21**)	35	60Ni–22Cr–9Mo–3.5Cb	Bar	SB–446	1	N06625	Annealed	$4 < t \leq 10$	110
(**21**)	36	60Ni–22Cr–9Mo–3.5Cb	Forgings	SB–564	...	N06625	Annealed	$4 < t \leq 10$	110
(**21**)	37	60Ni–22Cr–9Mo–3.5Cb	Plate, sheet	SB–443	1	N06625	Hot rolled/ann.	≤2.75	110
(**21**)	38	60Ni–22Cr–9Mo–3.5Cb	Sheet, strip	SB–443	1	N06625	Cold rolled/ann.	...	120
	39	60Ni–22Cr–9Mo–3.5Cb	Smls. pipe	SB–444	1	N06625	Annealed	...	120
	40	60Ni–22Cr–9Mo–3.5Cb	Bar	SB–446	1	N06625	Annealed	≤4	120
	41	60Ni–22Cr–9Mo–3.5Cb	Forgings	SB–564	...	N06625	Annealed	≤4	120
	42	60Ni–22Cr–9Mo–3.5Cb	Wld. tube	SB–704	...	N06625	Annealed	...	120
	43	60Ni–22Cr–9Mo–3.5Cb	Wld. pipe	SB–705	...	N06625	Annealed	...	120
	44	Ni–Cr–Mo–W	Forgings	SB–564	...	N06686	Solution ann.	...	100

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
														Nonferrous Materials (Cont'd)
1	110.0	110.0	110.0	107.7	104.8	102.9	102.3	101.9	101.5	101.3	101.0	100.7	100.4	99.8
2	100.0	100.0	100.0	100.0	98.9	97.7	97.1	96.3	95.4	94.5	93.5	92.6	92.0	92.0
3	100.0	100.0	100.0	100.0	98.9	97.7	97.1	96.3	95.4	94.5	93.5	92.6	92.0	92.0
4	100.0	100.0	100.0	100.0	98.9	97.7	97.1	96.3	95.4	94.5	93.5	92.6	92.0	92.0
5	100.0	100.0	100.0	100.0	98.9	97.7	97.1	96.3	95.4	94.5	93.5	92.6	92.0	92.0
6	100.0	100.0	100.0	100.0	98.9	97.7	97.1	96.3	95.4	94.5	93.5	92.6	92.0	92.0
7	100.0	100.0	100.0	100.0	98.9	97.7	97.1	96.3	95.4	94.5	93.5	92.6	92.0	92.0
8	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	73.4	74.2	72.2	69.8
9	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	78.3	79.1	77.1	74.5
10	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	78.3	79.1	77.1	74.5
11	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	78.3	79.1	77.1	74.5
12	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	78.3	79.1	77.1	74.5
13	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	78.3	79.1	77.1	74.5
14	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	78.3	79.1	77.1	74.5
15	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	78.3	79.1	77.1	74.5
16	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	78.3	79.1	77.1	74.5
17	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	78.3	75.3	77.1	74.5
18	85.0	85.0	85.0	85.0	85.0	85.0	85.0	85.0	85.0	85.0	85.0	85.0	83.0	79.8
19	85.0	85.0	85.0	85.0	85.0	85.0	85.0	85.0	85.0	85.0	85.0	85.0	83.0	79.8
20	85.0	85.0	85.0	85.0	85.0	85.0	85.0	85.0	85.0	85.0	...	...	...	...
21	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	...	...	...	...
22	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	...	...	...	...
23	80.0	80.0	80.0	80.0	80.0	80.0	80.0	79.7	79.2	78.6	77.8	76.7	75.5	73.9
24	80.0	80.0	80.0	80.0	80.0	80.0	80.0	79.7	79.2	78.6	77.8	76.7	75.5	73.9
25	80.0	80.0	80.0	80.0	80.0	80.0	80.0	79.7	79.2	78.6	77.8	76.7	75.5	73.9
26	80.0	80.0	80.0	80.0	80.0	80.0	80.0	79.7	79.2	78.6	77.8	76.7	75.5	73.9
27	95.0	95.0	95.0	95.0	95.0	93.2	92.3	91.4	90.6	89.9	89.2	88.5	87.8	87.1
28	95.0	95.0	95.0	95.0	95.0	93.2	92.3	91.4	90.6	89.9	89.2	88.5	87.8	87.1
29	95.0	95.0	95.0	95.0	95.0	93.2	92.3	91.4	90.6	89.9	89.2	88.5	87.8	87.1
30	95.0	95.0	95.0	95.0	95.0	93.2	92.3	91.4	90.6	89.9	89.2	88.5	87.8	87.1
31	100.0	100.0	100.0	100.0	99.5	99.3	99.3	99.3	99.3	99.3	99.3	99.2	98.5	97.3
32	100.0	100.0	100.0	100.0	99.5	99.3	99.3	99.3	99.3	99.3	99.3	99.2	98.5	97.3
33	100.0	100.0	100.0	100.0	99.5	99.3	99.3	99.3	99.3	99.3	99.3	99.2	98.5	97.3
34	110.0	110.0	108.0	108.0	108.0	108.0	108.0	108.0	108.0	108.0	108.0	108.0	107.0	106.0
35	110.0	110.0	108.0	108.0	108.0	108.0	108.0	108.0	108.0	108.0	108.0	108.0	107.0	106.0
36	110.0	110.0	108.0	108.0	108.0	108.0	108.0	108.0	108.0	108.0	108.0	108.0	107.0	106.0
37	110.0	110.0	108.0	108.0	108.0	108.0	108.0	108.0	108.0	108.0	108.0	108.0	107.0	106.0
38	120.0	120.0	118.0	118.0	118.0	118.0	118.0	118.0	118.0	118.0	118.0	118.0	117.0	116.0
39	120.0	120.0	118.0	118.0	118.0	118.0	118.0	118.0	118.0	118.0	118.0	118.0	117.0	116.0
40	120.0	120.0	118.0	118.0	118.0	118.0	118.0	118.0	118.0	118.0	118.0	118.0	117.0	116.0
41	120.0	120.0	118.0	118.0	118.0	118.0	118.0	118.0	118.0	118.0	118.0	118.0	117.0	116.0
42	120.0	120.0	118.0	118.0	118.0	118.0	118.0	118.0	118.0	118.0	118.0	118.0	117.0	116.0
43	120.0	120.0	118.0	118.0	118.0	118.0	118.0	118.0	118.0	118.0	118.0	118.0	117.0	116.0
44	100.0	100.0	98.8	95.3	92.7	90.8	89.9	89.1	88.2	87.1	85.9	84.5	82.8	80.9

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Nonferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	67.0	63.6	59.8	55.5	...	...	...	...	...	...	...	...	...	(**21**)
9	71.4	67.9	63.8	59.2	...	...	...	...	...	...	...	...	...	(**21**)
10	71.4	67.9	63.8	59.2	...	...	...	...	...	...	...	...	...	(**21**)
11	71.4	67.9	63.8	59.2	...	...	...	...	...	...	...	...	...	(**21**)
12	71.4	67.9	63.8	59.2	...	...	...	...	...	...	...	...	...	(**21**)
13	71.4	67.9	63.8	59.2	...	...	...	...	...	...	...	...	...	(**21**)
14	71.4	67.9	63.8	59.2	...	...	...	...	...	...	...	...	...	(**21**)
15	71.4	67.9	63.8	59.2	...	...	...	...	...	...	...	...	...	(**21**)
16	71.4	67.9	63.8	59.2	...	...	...	...	...	...	...	...	...	(**21**)
17	71.4	67.9	63.8	59.2	...	...	...	...	...	...	...	...	...	(**21**)
18	76.0	71.6	66.5	61.0	...	...	...	...	...	...	...	...	...	(**21**)
19	76.0	71.6	66.5	61.0	...	...	...	...	...	...	...	...	...	(**21**)
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	95.5	93.2	90.3	86.6	82.3	77.3	69.5	62.8	55.5	47.9	40.0	...	...	(**21**)
32	95.5	93.2	90.3	86.6	82.3	77.3	71.6	65.4	58.6	51.4	40.0	...	...	(**21**)
33	95.5	93.2	90.3	86.6	82.3	77.3	71.6	65.4	58.6	51.4	40.0	...	...	(**21**)
34	104.0	102.0	98.4	94.1	89.1	83.2	76.5	69.1	61.1	52.7	44.0	...	...	(**21**)
35	104.0	102.0	98.4	94.1	89.1	83.2	76.5	69.1	61.1	52.7	44.0	...	...	(**21**)
36	104.0	102.0	98.4	94.1	89.1	83.2	76.5	69.1	61.1	52.7	44.0	...	...	(**21**)
37	104.0	102.0	98.4	94.1	89.1	83.2	76.5	69.1	61.1	52.7	44.0	...	...	(**21**)
38	114.0	111.0	107.0	103.0	97.2	90.7	83.4	75.4	66.7	57.5	48.0	...	...	(**21**)
39	114.0	111.0	107.0	103.0	97.2	90.7	83.4	75.4	66.7	57.5	48.0	...	...	
40	114.0	111.0	107.0	103.0	97.2	90.7	83.4	75.4	66.7	57.5	48.0	...	...	
41	114.0	111.0	107.0	103.0	97.2	90.7	83.4	75.4	66.7	57.5	48.0	...	...	
42	114.0	111.0	107.0	103.0	97.2	90.7	83.4	75.4	66.7	57.5	48.0	...	...	
43	114.0	111.0	107.0	103.0	97.2	90.7	83.4	75.4	66.7	57.5	48.0	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
	Nonferrous Materials (Cont'd)							
1	Ni–Cr–Mo–W	Rod	SB–574	...	N06686	Solution ann.	...	100
2	Ni–Cr–Mo–W	Plate, sheet, strip	SB–575	...	N06686	Solution ann.	...	100
3	Ni–Cr–Mo–W	Wld. pipe	SB–619	...	N06686	Solution ann.	...	100
4	Ni–Cr–Mo–W	Smls. pipe & tube	SB–622	...	N06686	Solution ann.	...	100
5	Ni–Cr–Mo–W	Wld. tube	SB–626	...	N06686	Solution ann.	...	100
6	58Ni–29Cr–9Fe	Smls. pipe & tube	SB–167	...	N06690	Hot worked/ann.	>5 O.D.	75
7	58Ni–29Cr–9Fe	Smls. tube	SB–163	...	N06690	Annealed	...	85
8	58Ni–29Cr–9Fe	Bar, rod	SB–166	...	N06690	Annealed	...	85
9	58Ni–29Cr–9Fe	Plate, sheet, strip	SB–168	...	N06690	Annealed	...	85
10	58Ni–29Cr–9Fe	Forgings	SB–564	...	N06690	Annealed	...	85
11	58Ni–29Cr–9Fe	Smls. pipe & tube	SB–167	...	N06690	Cold worked/ann.	...	85
12	58Ni–29Cr–9Fe	Smls. pipe & tube	SB–167	...	N06690	Hot worked/ann.	≤5 O.D.	85
13	49Ni–25Cr–18Fe–6Mo	Plate, sheet, strip	SB–582	...	N06975	Solution ann.	...	85
14	49Ni–25Cr–18Fe–6Mo	Wld. pipe	SB–619	...	N06975	Solution ann.	...	85
15	49Ni–25Cr–18Fe–6Mo	Smls. pipe & tube	SB–622	...	N06975	Solution ann.	...	85
16	49Ni–25Cr–18Fe–6Mo	Wld. tube	SB–626	...	N06975	Solution ann.	...	85
17	47Ni–22Cr–20Fe–7Mo	Rod	SB–581	...	N06985	Annealed	>3/4	85
18	47Ni–22Cr–20Fe–7Mo	Plate, sheet, strip	SB–582	...	N06985	Annealed	>3/4	85
19	47Ni–22Cr–20Fe–7Mo	Smls. & wld. ftgs.	SB–366	...	N06985	Annealed	...	90
20	47Ni–22Cr–20Fe–7Mo	Rod	SB–581	...	N06985	Annealed	≤3/4	90
21	47Ni–22Cr–20Fe–7Mo	Plate, sheet, strip	SB–582	...	N06985	Annealed	≤3/4	90
22	47Ni–22Cr–20Fe–7Mo	Wld. pipe	SB–619	...	N06985	Annealed	...	90
23	47Ni–22Cr–20Fe–7Mo	Smls. pipe & tube	SB–622	...	N06985	Annealed	...	90
24	47Ni–22Cr–20Fe–7Mo	Wld. tube	SB–626	...	N06985	Annealed	...	90
25	35Ni–35Fe–20Cr–Cb	Forgings	SB–462	...	N08020	Annealed	...	80
26	35Ni–35Fe–20Cr–Cb	Plate	SB–463	...	N08020	Annealed	...	80
27	35Ni–35Fe–20Cr–Cb	Bar	SB–473	...	N08020	Annealed	...	80
28	35Ni–35Fe–20Cr–Cb	Smls. pipe & tube	SB–729	...	N08020	Annealed	...	80
29	35Ni–35Fe–20Cr–Cb	Wld. pipe	SB–464	...	N08020	Wld. ann.	...	80
30	35Ni–35Fe–20Cr–Cb	Wld. tube	SB–468	...	N08020	Wld. ann.	...	80
31	35Ni–35Fe–20Cr–Cb	Smls. & wld. ftgs.	SB–366	...	N08020	Annealed	...	85
(**21**) 32	...	...	...	...	...	...	...	...
33	37Ni–33Fe–23Cr–4Mo–Cu	Wld. pipe	SB–464	...	N08024	Wld. ann.	...	80
34	37Ni–33Fe–23Cr–4Mo–Cu	Wld. tube	SB–468	...	N08024	Wld. ann.	...	80
(**21**) 35	...	...	...	...	...	...	...	...
36	35Ni–30Fe–24Cr–6Mo–Cu	Wld. pipe	SB–464	...	N08026	Wld. ann.	...	80
37	35Ni–30Fe–24Cr–6Mo–Cu	Wld. tube	SB–468	...	N08026	Wld. ann.	...	80
38	31Ni–31Fe–29Cr–Mo	Smls. tube	SB–668	...	N08028	Annealed	...	73
39	31Ni–31Fe–29Cr–Mo	Plate, sheet, strip	SB–709	...	N08028	Annealed	...	73
40	31Ni–33Fe–27Cr–6.5Mo–Cu–N	Smls. & wld. ftgs.	SB–366	...	N08031	...	...	94
41	31Ni–33Fe–27Cr–6.5Mo–Cu–N	Forgings	SB–564	...	N08031	...	...	94
42	31Ni–33Fe–27Cr–6.5Mo–Cu–N	Rod	SB–581	...	N08031	...	...	94
43	31Ni–33Fe–27Cr–6.5Mo–Cu–N	Wld. pipe	SB–619	...	N08031	...	...	94
44	31Ni–33Fe–27Cr–6.5Mo–Cu–N	Smls. pipe & tube	SB–622	...	N08031	...	...	94
45	31Ni–33Fe–27Cr–6.5Mo–Cu–N	Plate, sheet, strip	SB–625	...	N08031	...	...	94

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
														Nonferrous Materials (Cont'd)
1	100.0	100.0	98.8	95.3	92.7	90.8	89.9	89.1	88.2	87.1	85.9	84.5	82.8	80.9
2	100.0	100.0	98.8	95.3	92.7	90.8	89.9	89.1	88.2	87.1	85.9	84.5	82.8	80.9
3	100.0	100.0	98.8	95.3	92.7	90.8	89.9	89.1	88.2	87.1	85.9	84.5	82.8	80.9
4	100.0	100.0	98.8	95.3	92.7	90.8	89.9	89.1	88.2	87.1	85.9	84.5	82.8	80.9
5	100.0	100.0	98.8	95.3	92.7	90.8	89.9	89.1	88.2	87.1	85.9	84.5	82.8	80.9
6	75.0	75.0	73.8	72.5	71.4	70.7	70.5	70.3	70.2	69.9	69.5	68.9	67.9	66.4
7	85.0	85.0	84.0	82.0	80.8	80.2	80.0	79.8	79.6	79.3	78.7	78.0	76.9	75.3
8	85.0	85.0	84.0	82.0	80.8	80.2	80.0	79.8	79.6	79.3	78.7	78.0	76.9	75.3
9	85.0	85.0	84.0	82.0	80.8	80.2	80.0	79.8	79.6	79.3	78.7	78.0	76.9	75.3
10	85.0	85.0	84.0	82.0	80.8	80.2	80.0	79.8	79.6	79.3	78.7	78.0	76.9	75.3
11	85.0	84.9	83.7	82.2	81.0	80.2	79.9	79.7	79.5	79.2	78.8	78.1	76.9	75.2
12	85.0	84.9	83.7	82.2	81.0	80.2	79.9	79.7	79.5	79.2	78.8	78.1	76.9	75.2
13	85.0	85.0	85.0	83.5	81.7	80.3	79.7	79.1	78.5	78.0	77.3	76.6	75.7	74.4
14	85.0	85.0	85.0	83.5	81.7	80.3	79.7	79.1	78.5	78.0	77.3	76.6	75.7	74.4
15	85.0	85.0	85.0	83.5	81.7	80.3	79.7	79.1	78.5	78.0	77.3	76.6	75.7	74.4
16	85.0	85.0	85.0	83.5	81.7	80.3	79.7	79.1	78.5	78.0	77.3	76.6	75.7	74.4
17	85.0	85.0	83.8	80.4	77.9	76.2	75.6	75.0	74.4	73.8	73.0	72.1	70.9	69.5
18	85.0	85.0	83.8	80.4	77.9	76.2	75.6	75.0	74.4	73.8	73.0	72.1	70.9	69.5
19	90.0	90.0	88.7	85.1	82.5	80.7	80.0	79.4	78.8	78.1	77.3	76.3	75.1	73.6
20	90.0	90.0	88.7	85.1	82.5	80.7	80.0	79.4	78.8	78.1	77.3	76.3	75.1	73.6
21	90.0	90.0	88.7	85.1	82.5	80.7	80.0	79.4	78.8	78.1	77.3	76.3	75.1	73.6
22	90.0	90.0	88.7	85.1	82.5	80.7	80.0	79.4	78.8	78.1	77.3	76.3	75.1	73.6
23	90.0	90.0	88.7	85.1	82.5	80.7	80.0	79.4	78.8	78.1	77.3	76.3	75.1	73.6
24	90.0	90.0	88.7	85.1	82.5	80.7	80.0	79.4	78.8	78.1	77.3	76.3	75.1	73.6
25	80.0	80.0	79.2	77.6	77.3	77.3	77.0	76.7	76.3	76.3	...	...	...	...
26	80.0	80.0	79.2	77.6	77.3	77.3	77.0	76.7	76.3	76.3	...	...	...	...
27	80.0	80.0	79.2	77.6	77.3	77.3	77.0	76.7	76.3	76.3	...	...	...	...
28	80.0	80.0	79.2	77.6	77.3	77.3	77.0	76.7	76.3	76.3	...	...	...	...
29	80.0	80.0	79.2	77.6	77.3	77.3	77.0	76.7	76.3	76.3	...	...	...	...
30	80.0	80.0	79.2	77.6	77.3	77.3	77.0	76.7	76.3	76.3	...	...	...	...
31	85.0	85.0	84.1	82.4	82.2	82.1	81.9	81.5	81.1	81.1	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...
33	80.0	80.0	79.0	76.8	74.8	72.9	72.1	71.4	70.8	70.3	69.9	69.5	69.2	68.6
34	80.0	80.0	79.0	76.8	74.8	72.9	72.1	71.4	70.8	70.3	69.9	69.5	69.2	68.6
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...
36	80.0	80.0	78.6	76.2	74.1	72.1	71.1	70.1	69.1	68.1	67.2	66.4	65.7	65.0
37	80.0	80.0	78.6	76.2	74.1	72.1	71.1	70.1	69.1	68.1	67.2	66.4	65.7	65.0
38	73.0	73.0	70.4	67.6	65.4	63.6	62.9	62.1	61.4	60.7	59.9	59.0	58.1	57.1
39	73.0	73.0	70.4	67.6	65.4	63.6	62.9	62.1	61.4	60.7	59.9	59.0	58.1	57.1
40	94.0	94.0	90.5	85.8	81.6	78.1	76.7	75.6	74.7	74.0	73.2	72.2	...	...
41	94.0	94.0	90.5	85.8	81.6	78.1	76.7	75.6	74.7	74.0	73.2	72.2	...	...
42	94.0	94.0	90.5	85.8	81.6	78.1	76.7	75.6	74.7	74.0	73.2	72.2	...	...
43	94.0	94.0	90.5	85.8	81.6	78.1	76.7	75.6	74.7	74.0	73.2	72.2	...	...
44	94.0	94.0	90.5	85.8	81.6	78.1	76.7	75.6	74.7	74.0	73.2	72.2	...	...
45	94.0	94.0	90.5	85.8	81.6	78.1	76.7	75.6	74.7	74.0	73.2	72.2	...	...

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Nonferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
33	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
	Nonferrous Materials (Cont'd)							
1	31Ni–33Fe–27Cr–6.5Mo–Cu–N	Wld. tube	SB–626	...	N08031	...	...	94
2	37Ni–33Fe–25Cr	Condenser tube	SB–163	...	N08120	Solution ann.	...	90
3	37Ni–33Fe–25Cr	Smls. & wld. ftgs.	SB–366	...	N08120	Solution ann.	...	90
4	37Ni–33Fe–25Cr	Smls. pipe & tube	SB–407	...	N08120	Solution ann.	...	90
5	37Ni–33Fe–25Cr	Bar, rod	SB–408	...	N08120	Solution ann.	...	90
6	37Ni–33Fe–25Cr	Plate, sheet, strip	SB–409	...	N08120	Solution ann.	...	90
7	37Ni–33Fe–25Cr	Wld. pipe	SB–514	...	N08120	Solution ann.	...	90
8	37Ni–33Fe–25Cr	Wld. tube	SB–515	...	N08120	Solution ann.	...	90
9	37Ni–33Fe–25Cr	Forgings	SB–564	...	N08120	Solution ann.	...	90
10	26Ni–43Fe–22Cr–5Mo	Wld. pipe	SB–619	...	N08320	Solution ann.	...	75
11	26Ni–43Fe–22Cr–5Mo	Plate, sheet, strip	SB–620	...	N08320	Solution ann.	...	75
12	26Ni–43Fe–22Cr–5Mo	Rod	SB–621	...	N08320	Solution ann.	...	75
13	26Ni–43Fe–22Cr–5Mo	Smls. pipe & tube	SB–622	...	N08320	Solution ann.	...	75
14	26Ni–43Fe–22Cr–5Mo	Wld. tube	SB–626	...	N08320	Solution ann.	...	75
(**21**) 15	35Ni–19Cr–1¼Si	Bar	SB–511	...	N08330	...	...	70
(**21**) 16	35Ni–19Cr–1¼Si	Pipe	SB–535	...	N08330	...	...	70
(**21**) 17	35Ni–19Cr–1¼Si	Plate	SB–536	...	N08330	...	...	70
(**21**) 18	35Ni–19Cr–1¼Si	Smls. & wld. ftgs.	SB–366	...	N08330	Annealed	...	70
(**21**) 19	35Ni–19Cr–1¼Si	Smls. & wld. pipe	SB–535	...	N08330	Annealed	...	70
(**21**) 20	35Ni–19Cr–1¼Si	Plate, sheet, strip	SB–536	...	N08330	Annealed	...	70
(**21**) 21	35Ni–19Cr–1¼Si	Wld. pipe	SB–710	...	N08330	Annealed	...	70
(**21**) 22	35Ni–23Cr–7.5Mo–N	Plate, sheet, strip	SB–625	...	N08354	Solution ann.	...	95
(**21**) 23	35Ni–23Cr–7.5Mo–N	Bar, wire	SB–649	...	N08354	Solution ann.	...	95
(**21**) 24	35Ni–23Cr–7.5Mo–N	Wld. pipe	SB–673	...	N08354	Solution ann.	...	95
(**21**) 25	35Ni–23Cr–7.5Mo–N	Wld. tube	SB–674	...	N08354	Solution ann.	...	95
(**21**) 26	35Ni–23Cr–7.5Mo–N	Smls. pipe & tube	SB–677	...	N08354	Solution ann.	...	95
27	46Fe–24Ni–21Cr–6Mo–N	Forgings	SB–462	...	N08367	Solution ann.	...	95
28	46Fe–24Ni–21Cr–6Mo–N	Forgings	SB–564	...	N08367	Solution ann.	...	95
29	46Fe–24Ni–21Cr–6Mo–N	Wld. pipe	SB–675	...	N08367	Solution ann.	>3/16	95
30	46Fe–24Ni–21Cr–6Mo–N	Wld. tube	SB–676	...	N08367	Solution ann.	>3/16	95
31	46Fe–24Ni–21Cr–6Mo–N	Plate, sheet, strip	SB–688	...	N08367	Solution ann.	>3/16	95
32	46Fe–24Ni–21Cr–6Mo–N	Smls. pipe & tube	SB–690	...	N08367	Solution ann.	>3/16	95
33	46Fe–24Ni–21Cr–6Mo–N	Bar, rod, wire	SB–691	...	N08367	Solution ann.	...	95
34	46Fe–24Ni–21Cr–6Mo–N	Wld. pipe	SB–804	...	N08367	Solution ann.	>3/16	95
35	46Fe–24Ni–21Cr–6Mo–N	Wld. pipe	SB–675	...	N08367	Solution ann.	≤3/16	100
36	46Fe–24Ni–21Cr–6Mo–N	Wld. tube	SB–676	...	N08367	Solution ann.	≤3/16	100
37	46Fe–24Ni–21Cr–6Mo–N	Plate, sheet, strip	SB–688	...	N08367	Solution ann.	≤3/16	100
38	46Fe–24Ni–21Cr–6Mo–N	Smls. pipe & tube	SB–690	...	N08367	Solution ann.	≤3/16	100
39	46Fe–24Ni–21Cr–6Mo–N	Wld. pipe	SB–804	...	N08367	Solution ann.	≤3/16	100
40	46Fe–24Ni–21Cr–6Mo–N	Castings	SA–351	CN3MN	J94651	Solution ann.	...	80
41	25Ni–47Fe–21Cr–5Mo	Plate, sheet, strip	SB–599	...	N08700	Solution ann.	...	80
42	25Ni–47Fe–21Cr–5Mo	Bar, wire	SB–672	...	N08700	Solution ann.	...	80
43	32Ni–45Fe–20Cr–Cb	Castings	SA–351	CT15C	...	As cast	...	63
44	33Ni–42Fe–21Cr	Smls. tube	SB–163	...	N08800	Annealed	...	75
45	33Ni–42Fe–21Cr	Smls. & wld. ftgs.	SB–366	...	N08800	Annealed	...	75

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
														Nonferrous Materials (Cont'd)
1	94.0	94.0	90.5	85.8	81.6	78.1	76.7	75.6	74.7	74.0	73.2	72.2	...	...
2	90.0	90.0	87.5	84.7	83.1	82.2	82.0	81.8	81.6	81.3	80.9	80.3	79.5	78.3
3	90.0	90.0	87.5	84.7	83.1	82.2	82.0	81.8	81.6	81.3	80.9	80.3	79.5	78.3
4	90.0	90.0	87.5	84.7	83.1	82.2	82.0	81.8	81.6	81.3	80.9	80.3	79.5	78.3
5	90.0	90.0	87.5	84.7	83.1	82.2	82.0	81.8	81.6	81.3	80.9	80.3	79.5	78.3
6	90.0	90.0	87.5	84.7	83.1	82.2	82.0	81.8	81.6	81.3	80.9	80.3	79.5	78.3
7	90.0	90.0	87.5	84.7	83.1	82.2	82.0	81.8	81.6	81.3	80.9	80.3	79.5	78.3
8	90.0	90.0	87.5	84.7	83.1	82.2	82.0	81.8	81.6	81.3	80.9	80.3	79.5	78.3
9	90.0	90.0	87.5	84.7	83.1	82.2	82.0	81.8	81.6	81.3	80.9	80.3	79.5	78.3
10	75.0	75.0	74.2	71.7	70.4	70.0	69.9	69.9	69.8	69.5	...	...	...	...
11	75.0	75.0	74.2	71.7	70.4	70.0	69.9	69.9	69.8	69.5	...	...	...	...
12	75.0	75.0	74.2	71.7	70.4	70.0	69.9	69.9	69.8	69.5	...	...	...	...
13	75.0	75.0	74.2	71.7	70.4	70.0	69.9	69.9	69.8	69.5	...	...	...	...
14	75.0	75.0	74.2	71.7	70.4	70.0	69.9	69.9	69.8	69.5	...	...	...	...
15	70.0	70.0	70.0	68.6	68.0	68.0	68.0	68.0	68.0	68.0	68.0	67.9	66.7	64.9
16	70.0	70.0	70.0	68.6	68.0	68.0	68.0	68.0	68.0	68.0	68.0	67.9	66.7	64.9
17	70.0	70.0	70.0	68.6	68.0	68.0	68.0	68.0	68.0	68.0	68.0	67.9	66.7	64.9
18	70.0	70.0	70.0	68.6	68.0	68.0	68.0	68.0	68.0	68.0	68.0	67.9	66.7	64.9
19	70.0	70.0	70.0	68.6	68.0	68.0	68.0	68.0	68.0	68.0	68.0	67.9	66.7	64.9
20	70.0	70.0	70.0	68.6	68.0	68.0	68.0	68.0	68.0	68.0	68.0	67.9	66.7	64.9
21	70.0	70.0	70.0	68.6	68.0	68.0	68.0	68.0	68.0	68.0	68.0	67.9	66.7	64.9
22	92.8	92.8	87.5	83.4	80.6	78.8	78.1	77.4	76.7	76.0	...	...	...	...
23	92.8	92.8	87.5	83.4	80.6	78.8	78.1	77.4	76.7	76.0	...	...	...	...
24	92.8	92.8	87.5	83.4	80.6	78.8	78.1	77.4	76.7	76.0	...	...	...	...
25	92.8	92.8	87.5	83.4	80.6	78.8	78.1	77.4	76.7	76.0	...	...	...	...
26	92.8	92.8	87.5	83.4	80.6	78.8	78.1	77.4	76.7	76.0	...	...	...	...
27	95.0	95.0	89.8	85.9	83.3	81.5	80.8	80.2	79.7	79.2	78.7	78.0	...	...
28	95.0	95.0	89.8	85.9	83.3	81.5	80.8	80.2	79.7	79.2	78.7	78.0	...	...
29	95.0	95.0	89.8	85.9	83.3	81.5	80.8	80.2	79.7	79.2	78.7	78.0	...	...
30	95.0	95.0	89.8	85.9	83.3	81.5	80.8	80.2	79.7	79.2	78.7	78.0	...	...
31	95.0	95.0	89.8	85.9	83.3	81.5	80.8	80.2	79.7	79.2	78.7	78.0	...	...
32	95.0	95.0	89.8	85.9	83.3	81.5	80.8	80.2	79.7	79.2	78.7	78.0	...	...
33	95.0	95.0	89.8	85.9	83.3	81.5	80.8	80.2	79.7	79.2	78.7	78.0	...	...
34	95.0	95.0	89.8	85.9	83.3	81.5	80.8	80.2	79.7	79.2	78.7	78.0	...	...
35	100.0	100.0	94.5	90.5	87.7	85.8	85.1	84.4	83.9	83.4	82.8	82.2	...	...
36	100.0	100.0	94.5	90.5	87.7	85.8	85.1	84.4	83.9	83.4	82.8	82.2	...	...
37	100.0	100.0	94.5	90.5	87.7	85.8	85.1	84.4	83.9	83.4	82.8	82.2	...	...
38	100.0	100.0	94.5	90.5	87.7	85.8	85.1	84.4	83.9	83.4	82.8	82.2	...	...
39	100.0	100.0	94.5	90.5	87.7	85.8	85.1	84.4	83.9	83.4	82.8	82.2	...	...
40	80.0	75.5	69.6	65.7	63.0	60.8	59.8	58.9	58.0	57.2	56.5	55.9	55.3	54.8
41	80.0	80.0	79.2	77.2	75.2	75.0	74.8	...	...	...	...	...	...	...
42	80.0	80.0	79.2	77.2	75.2	75.0	74.8	...	...	...	...	...	...	...
43	63.0	63.0	63.0	63.0	63.0	63.0	63.0	63.0	63.0	63.0	63.0	...	...	...
44	75.0	75.0	75.0	75.0	74.7	74.6	74.6	74.5	74.2	73.9	73.3	72.5	71.4	70.0
45	75.0	75.0	75.0	75.0	74.7	74.6	74.6	74.5	74.2	73.9	73.3	72.5	71.4	70.0

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Nonferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	62.2	59.5	56.4	52.9	49.1	44.9	40.5	35.9	31.3	26.9	22.7	19.0	16.1	(**21**)
16	62.2	59.5	56.4	52.9	49.1	44.9	40.5	35.9	31.3	26.9	22.7	19.0	16.1	(**21**)
17	62.2	59.5	56.4	52.9	49.1	44.9	40.5	35.9	31.3	26.9	22.7	19.0	16.1	(**21**)
18	62.2	59.5	56.4	52.9	49.1	44.9	40.5	35.9	31.3	26.9	22.7	19.0	16.1	(**21**)
19	62.2	59.5	56.4	52.9	49.1	44.9	40.5	35.9	31.3	26.9	22.7	19.0	16.1	(**21**)
20	62.2	59.5	56.4	52.9	49.1	44.9	40.5	35.9	31.3	26.9	22.7	19.0	16.1	(**21**)
21	62.2	59.5	56.4	52.9	49.1	44.9	40.5	35.9	31.3	26.9	22.7	19.0	16.1	(**21**)
22	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
23	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
24	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
25	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
26	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
27	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	66.0	62.3	57.9	53.0	47.7	42.3	36.9	32.0	28.1	25.6	...	...	...	
45	66.0	62.3	57.9	53.0	47.7	42.3	36.9	32.0	28.1	25.6	...	...	...	

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Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
		Nonferrous Materials (Cont'd)							
(**21**)	1	33Ni–42Fe–21Cr	Smls. pipe & tube	SB–407	...	N08800	Annealed	...	75
(**21**)	2	33Ni–42Fe–21Cr	Bar	SB–408	...	N08800	Annealed	...	75
(**21**)	3	33Ni–42Fe–21Cr	Plate	SB–409	...	N08800	Annealed	...	75
(**21**)	4	33Ni–42Fe–21Cr	Wld. pipe	SB–514	...	N08800	Annealed	...	75
(**21**)	5	33Ni–42Fe–21Cr	Wld. tube	SB–515	...	N08800	Annealed	...	75
(**21**)	6	33Ni–42Fe–21Cr	Forgings	SB–564	...	N08800	Annealed	...	75
	7	33Ni–42Fe–21Cr	Smls. tube	SB–163	...	N08800	Cold worked	...	83
	8	32Ni–44Fe–21Cr	Smls. tube	SB–163	...	N08801	Ann./stabilized	...	65
	9	32Ni–44Fe–21Cr	Smls. pipe & tube	SB–407	...	N08801	Ann./stabilized	...	65
(**21**)	10	33Ni–42Fe–21Cr	Smls. tube	SB–163	...	N08810	Annealed	...	65
(**21**)	11	33Ni–42Fe–21Cr	Smls. pipe & tube	SB–407	...	N08810	Annealed	...	65
(**21**)	12	33Ni–42Fe–21Cr	Bar	SB–408	...	N08810	Annealed	...	65
(**21**)	13	33Ni–42Fe–21Cr	Plate	SB–409	...	N08810	Annealed	...	65
(**21**)	14	33Ni–42Fe–21Cr	Wld. pipe	SB–514	...	N08810	Annealed	...	65
(**21**)	15	33Ni–42Fe–21Cr	Wld. tube	SB–515	...	N08810	Annealed	...	65
(**21**)	16	33Ni–42Fe–21Cr	Forgings	SB–564	...	N08810	Annealed	...	65
(**21**)	17	33Ni–42Fe–21Cr	Smls. tube	SB–163	...	N08811	Annealed	...	65
(**21**)	18	33Ni–42Fe–21Cr	Smls. tube	SB–163	...	N08811	Annealed	...	65
(**21**)	19	33Ni–42Fe–21Cr	Smls. pipe & tube	SB–407	...	N08811	Annealed	...	65
(**21**)	20	33Ni–42Fe–21Cr	Smls. pipe & tube	SB–407	...	N08811	Annealed	...	65
(**21**)	21	33Ni–42Fe–21Cr	Bar	SB–408	...	N08811	Annealed	...	65
(**21**)	22	33Ni–42Fe–21Cr	Bar	SB–408	...	N08811	Annealed	...	65
(**21**)	23	32Ni–44Fe–21Cr	Plate	SB–409	...	N08811	Annealed	...	65
(**21**)	24	33Ni–42Fe–21Cr	Plate	SB–409	...	N08811	Annealed	...	65
(**21**)	25	33Ni–42Fe–21Cr	Wld. tube	SB–515	...	N08811	Annealed	...	65
(**21**)	26	33Ni–42Fe–21Cr	Wld. tube	SB–515	...	N08811	Annealed	...	65
(**21**)	27	33Ni–42Fe–21Cr	Forgings	SB–564	...	N08811	Annealed	...	65
(**21**)	28	33Ni–42Fe–21Cr	Forgings	SB–564	...	N08811	Annealed	...	65
	29	42Ni–21.5Cr–3Mo–2.3Cu	Smls. tube	SB–163	...	N08825	Annealed	...	85
	30	42Ni–21.5Cr–3Mo–2.3Cu	Smls. & wld. ftgs.	SB–366	...	N08825	Annealed	...	85
	31	42Ni–21.5Cr–3Mo–2.3Cu	Smls. pipe & tube	SB–423	...	N08825	Cold worked/ann.	...	85
	32	42Ni–21.5Cr–3Mo–2.3Cu	Plate	SB–424	...	N08825	Annealed	...	85
	33	42Ni–21.5Cr–3Mo–2.3Cu	Bar, rod	SB–425	...	N08825	Annealed	...	85
	34	42Ni–21.5Cr–3Mo–2.3Cu	Forgings	SB–564	...	N08825	Annealed	...	85
	35	42Ni–21.5Cr–3Mo–2.3Cu	Wld. tube	SB–704	...	N08825	Annealed	...	85
	36	42Ni–21.5Cr–3Mo–2.3Cu	Wld. pipe	SB–705	...	N08825	Annealed	...	85
	37	44Fe–25Ni–21Cr–Mo	Forgings	SA–182	...	N08904	Annealed	...	71
	38	44Fe–25Ni–21Cr–Mo	Plate, sheet, strip	SA–240	...	N08904	Annealed	...	71
	39	44Fe–25Ni–21Cr–Mo	Wld. tube	SA–249	...	N08904	Annealed	...	71
	40	44Fe–25Ni–21Cr–Mo	Smls. & wld. pipe	SA–312	...	N08904	Annealed	...	71
	41	44Fe–25Ni–21Cr–Mo	Fittings	SA–403	...	N08904	Annealed	...	71
	42	44Fe–25Ni–21Cr–Mo	Bar, wire	SB–649	...	N08904	Annealed	...	71
	43	44Fe–25Ni–21Cr–Mo	Smls. tube	SB–677	...	N08904	Annealed	...	71
	44	25Ni–20Cr–6Mo–Cu–N	Plate, sheet, strip	SB–625	...	N08925	Annealed	...	87
	45	25Ni–20Cr–6Mo–Cu–N	Bar, wire	SB–649	...	N08925	Annealed	...	87

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
														Nonferrous Materials (Cont'd)
1	75.0	75.0	75.0	75.0	74.7	74.6	74.6	74.5	74.2	73.9	73.3	72.5	71.4	70.0
2	75.0	75.0	75.0	75.0	74.7	74.6	74.6	74.5	74.2	73.9	73.3	72.5	71.4	70.0
3	75.0	75.0	75.0	75.0	74.7	74.6	74.6	74.5	74.2	73.9	73.3	72.5	71.4	70.0
4	75.0	75.0	75.0	75.0	74.7	74.6	74.6	74.5	74.2	73.9	73.3	72.5	71.4	70.0
5	75.0	75.0	75.0	75.0	74.7	74.6	74.6	74.5	74.2	73.9	73.3	72.5	71.4	70.0
6	75.0	75.0	75.0	75.0	74.7	74.6	74.6	74.5	74.2	73.9	73.3	72.5	71.4	70.0
7	83.0	83.0	83.0	82.5	80.7	80.0	79.9	...	...	...	...	...	...	...
8	65.0	65.0	65.0	64.6	64.0	63.8	63.8	63.8	63.8	63.8	63.8	63.6	63.1	62.3
9	65.0	65.0	65.0	64.6	64.0	63.8	63.8	63.8	63.8	63.8	63.8	63.6	63.1	62.3
10	65.0	65.0	65.0	64.6	64.0	63.8	63.8	63.8	63.8	63.8	63.8	63.6	63.1	62.3
11	65.0	65.0	65.0	64.6	64.0	63.8	63.8	63.8	63.8	63.8	63.8	63.6	63.1	62.3
12	65.0	65.0	65.0	64.6	64.0	63.8	63.8	63.8	63.8	63.8	63.8	63.6	63.1	62.3
13	65.0	65.0	65.0	64.6	64.0	63.8	63.8	63.8	63.8	63.8	63.8	63.6	63.1	62.3
14	65.0	65.0	65.0	64.6	64.0	63.8	63.8	63.8	63.8	63.8	63.8	63.6	63.1	62.3
15	65.0	65.0	65.0	64.6	64.0	63.8	63.8	63.8	63.8	63.8	63.8	63.6	63.1	62.3
16	65.0	65.0	65.0	64.6	64.0	63.8	63.8	63.8	63.8	63.8	63.8	63.6	63.1	62.3
17	65.0	65.0	65.0	64.6	64.0	63.8	63.8	63.8	63.8	63.8	63.8	63.6	63.1	62.3
18	65.0	65.0	65.0	64.6	64.0	63.8	63.8	63.8	63.8	63.8	63.8	63.6	63.1	62.3
19	65.0	65.0	65.0	64.6	64.0	63.8	63.8	63.8	63.8	63.8	63.8	63.6	63.1	62.3
20	65.0	65.0	65.0	64.6	64.0	63.8	63.8	63.8	63.8	63.8	63.8	63.6	63.1	62.3
21	65.0	65.0	65.0	64.6	64.0	63.8	63.8	63.8	63.8	63.8	63.8	63.6	63.1	62.3
22	65.0	65.0	65.0	64.6	64.0	63.8	63.8	63.8	63.8	63.8	63.8	63.6	63.1	62.3
23	65.0	65.0	65.0	64.6	64.0	63.8	63.8	63.8	63.8	63.8	63.8	63.6	63.1	62.3
24	65.0	65.0	65.0	64.6	64.0	63.8	63.8	63.8	63.8	63.8	63.8	63.6	63.1	62.3
25	65.0	65.0	65.0	64.6	64.0	63.8	63.8	63.8	63.8	63.8	63.8	63.6	63.1	62.3
26	65.0	65.0	65.0	64.6	64.0	63.8	63.8	63.8	63.8	63.8	63.8	63.6	63.1	62.3
27	65.0	65.0	65.0	64.6	64.0	63.8	63.8	63.8	63.8	63.8	63.8	63.6	63.1	62.3
28	65.0	65.0	65.0	64.6	64.0	63.8	63.8	63.8	63.8	63.8	63.8	63.6	63.1	62.3
29	85.0	85.0	85.0	85.0	85.0	85.0	84.6	84.2	83.7	83.1	82.4	81.5	80.4	79.0
30	85.0	85.0	85.0	85.0	85.0	85.0	84.6	84.2	83.7	83.1	82.4	81.5	80.4	79.0
31	85.0	85.0	85.0	85.0	85.0	85.0	84.6	84.2	83.7	83.1	82.4	81.5	80.4	79.0
32	85.0	85.0	85.0	85.0	85.0	85.0	84.6	84.2	83.7	83.1	82.4	81.5	80.4	79.0
33	85.0	85.0	85.0	85.0	85.0	85.0	84.6	84.2	83.7	83.1	82.4	81.5	80.4	79.0
34	85.0	85.0	85.0	85.0	85.0	85.0	84.6	84.2	83.7	83.1	82.4	81.5	80.4	79.0
35	85.0	85.0	85.0	85.0	85.0	85.0	84.6	84.2	83.7	83.1	82.4	81.5	80.4	79.0
36	85.0	85.0	85.0	85.0	85.0	85.0	84.6	84.2	83.7	83.1	82.4	81.5	80.4	79.0
37	71.0	71.0	67.8	65.4	63.6	62.2	61.6	61.0	60.5	...	...	...	...	...
38	71.0	71.0	67.8	65.4	63.6	62.2	61.6	61.0	60.5	...	...	...	...	...
39	71.0	71.0	67.8	65.4	63.6	62.2	61.6	61.0	60.5	...	...	...	...	...
40	71.0	71.0	67.8	65.4	63.6	62.2	61.6	61.0	60.5	...	...	...	...	...
41	71.0	71.0	67.8	65.4	63.6	62.2	61.6	61.0	60.5	...	...	...	...	...
42	71.0	71.0	67.8	65.4	63.6	62.2	61.6	61.0	60.5	...	...	...	...	...
43	71.0	71.0	67.8	65.4	63.6	62.2	61.6	61.0	60.5	...	...	...	...	...
44	87.0	87.0	83.8	80.4	77.4	74.9	73.8	72.7	71.5	70.2	...	...	...	...
45	87.0	87.0	83.8	80.4	77.4	74.9	73.8	72.7	71.5	70.2	...	...	...	...

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Nonferrous Materials (Cont'd)													
1	66.0	62.3	57.9	53.0	47.7	42.3	36.9	32.0	28.1	25.6	...	...	...	(**21**)
2	66.0	62.3	57.9	53.0	47.7	42.3	36.9	32.0	28.1	25.6	...	...	...	(**21**)
3	66.0	62.3	57.9	53.0	47.7	42.3	36.9	32.0	28.1	25.6	...	...	...	(**21**)
4	66.0	62.3	57.9	53.0	47.7	42.3	36.9	32.0	28.1	25.6	...	...	...	(**21**)
5	66.0	62.3	57.9	53.0	47.7	42.3	36.9	32.0	28.1	25.6	...	...	...	(**21**)
6	66.0	62.3	57.9	53.0	47.7	42.3	36.9	32.0	28.1	25.6	...	...	...	(**21**)
7	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	60.0	57.7	55.1	52.2	49.0	45.5	41.8	38.0	34.1	30.2	26.3	22.5	19.0	(**21**)
11	60.0	57.7	55.1	52.2	49.0	45.5	41.8	38.0	34.1	30.2	26.3	22.5	19.0	(**21**)
12	60.0	57.7	55.1	52.2	49.0	45.5	41.8	38.0	34.1	30.2	26.3	22.5	19.0	(**21**)
13	60.0	57.7	55.1	52.2	49.0	45.5	41.8	38.0	34.1	30.2	26.3	22.5	19.0	(**21**)
14	60.0	57.7	55.1	52.2	49.0	45.5	41.8	38.0	34.1	30.2	26.3	22.5	19.0	(**21**)
15	60.0	57.7	55.1	52.2	49.0	45.5	41.8	38.0	34.1	30.2	26.3	22.5	19.0	(**21**)
16	60.0	57.7	55.1	52.2	49.0	45.5	41.8	38.0	34.1	30.2	26.3	22.5	19.0	(**21**)
17	60.0	57.7	55.1	52.2	49.0	45.5	41.8	38.0	34.1	30.2	26.3	22.5	19.0	(**21**)
18	60.0	57.7	55.1	52.2	49.0	45.5	41.8	38.0	34.1	30.2	26.3	22.5	19.0	(**21**)
19	60.0	57.7	55.1	52.2	49.0	45.5	41.8	38.0	34.1	30.2	26.3	22.5	19.0	(**21**)
20	60.0	57.7	55.1	52.2	49.0	45.5	41.8	38.0	34.1	30.2	26.3	22.5	19.0	(**21**)
21	60.0	57.7	55.1	52.2	49.0	45.5	41.8	38.0	34.1	30.2	26.3	22.5	19.0	(**21**)
22	60.0	57.7	55.1	52.2	49.0	45.5	41.8	38.0	34.1	30.2	26.3	22.5	19.0	(**21**)
23	60.0	57.7	55.1	52.2	49.0	45.5	41.8	38.0	34.1	30.2	26.3	22.5	19.0	(**21**)
24	60.0	57.7	55.1	52.2	49.0	45.5	41.8	38.0	34.1	30.2	26.3	22.5	19.0	(**21**)
25	60.0	57.7	55.1	52.2	49.0	45.5	41.8	38.0	34.1	30.2	26.3	22.5	19.0	(**21**)
26	60.0	57.7	55.1	52.2	49.0	45.5	41.8	38.0	34.1	30.2	26.3	22.5	19.0	(**21**)
27	60.0	57.7	55.1	52.2	49.0	45.5	41.8	38.0	34.1	30.2	26.3	22.5	19.0	(**21**)
28	60.0	57.7	55.1	52.2	49.0	45.5	41.8	38.0	34.1	30.2	26.3	22.5	19.0	(**21**)
29	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
		Nonferrous Materials (Cont'd)							
	1	25Ni–20Cr–6Mo–Cu–N	Wld. pipe	SB–673	...	N08925	Annealed	...	87
	2	25Ni–20Cr–6Mo–Cu–N	Wld. tube	SB–674	...	N08925	Annealed	...	87
	3	25Ni–20Cr–6Mo–Cu–N	Smls. pipe & tube	SB–677	...	N08925	Annealed	...	87
	4	62Ni–28Mo–5Fe	Plate	SB–333	...	N10001	Annealed	...	100
	5	62Ni–28Mo–5Fe	Smls. & wld. ftgs.	SB–366	...	N10001	Annealed	...	100
	6	62Ni–28Mo–5Fe	Wld. pipe	SB–619	...	N10001	Solution ann.	...	100
	7	62Ni–28Mo–5Fe	Smls. pipe & tube	SB–622	...	N10001	Solution ann.	...	100
	8	62Ni–28Mo–5Fe	Wld. tube	SB–626	...	N10001	Solution ann.	...	100
	9	62Ni–28Mo–5Fe	Rod	SB–335	...	N10001	Annealed	...	100
	10	62Ni–28Mo–5Fe	Sheet, strip	SB–333	...	N10001	Annealed	...	115
(**21**)	11	70Ni–16Mo–7Cr–5Fe	Smls. & wld. ftgs.	SB–366	...	N10003	Annealed	...	100
(**21**)	12	70Ni–16Mo–7Cr–5Fe	Plate, sheet, strip	SB–434	...	N10003	Annealed	...	100
(**21**)	13	70Ni–16Mo–7Cr–5Fe	Rod	SB–573	...	N10003	Annealed	...	100
	14	62Ni–25Mo–8Cr–2Fe	Smls. & wld. ftgs.	SB–366	...	N10242	Annealed	...	105
	15	62Ni–25Mo–8Cr–2Fe	Plate, sheet, strip	SB–434	...	N10242	Annealed	...	105
	16	62Ni–25Mo–8Cr–2Fe	Forgings	SB–564	...	N10242	Annealed	...	105
	17	62Ni–25Mo–8Cr–2Fe	Rod	SB–573	...	N10242	Annealed	...	105
	18	62Ni–25Mo–8Cr–2Fe	Wld. pipe	SB–619	...	N10242	Solution ann.	...	105
	19	62Ni–25Mo–8Cr–2Fe	Smls. pipe & tube	SB–622	...	N10242	Solution ann.	...	105
	20	62Ni–25Mo–8Cr–2Fe	Wld. tube	SB–626	...	N10242	Solution ann.	...	105
(**21**)	21	54Ni–16Mo–15Cr	Smls. & wld. ftgs.	SB–366	...	N10276	Solution ann.	...	100
(**21**)	22	54Ni–16Mo–15Cr	Forgings	SB–462	...	N10276	Solution ann.	...	100
(**21**)	23	54Ni–16Mo–15Cr	Forgings	SB–564	...	N10276	Solution ann.	...	100
(**21**)	24	54Ni–16Mo–15Cr	Rod	SB–574	...	N10276	Solution ann.	...	100
(**21**)	25	54Ni–16Mo–15Cr	Plate, sheet, strip	SB–575	...	N10276	Solution ann.	...	100
(**21**)	26	54Ni–16Mo–15Cr	Wld. pipe	SB–619	...	N10276	Solution ann.	...	100
(**21**)	27	54Ni–16Mo–15Cr	Smls. pipe & tube	SB–622	...	N10276	Solution ann.	...	100
(**21**)	28	54Ni–16Mo–15Cr	Wld. tube	SB–626	...	N10276	Solution ann.	...	100
	29	62Ni–22Mo–15Cr	Smls. & wld. ftgs.	SB–366	...	N10362	Solution ann.	...	105
	30	62Ni–22Mo–15Cr	Forgings	SB–462	...	N10362	Solution ann.	...	105
	31	62Ni–22Mo–15Cr	Forgings	SB–564	...	N10362	Solution ann.	...	105
	32	62Ni–22Mo–15Cr	Rod	SB–574	...	N10362	Solution ann.	...	105
	33	62Ni–22Mo–15Cr	Plate, sheet, strip	SB–575	...	N10362	Solution ann.	...	105
	34	62Ni–22Mo–15Cr	Wld. pipe	SB–619	...	N10362	Solution ann.	...	105
	35	62Ni–22Mo–15Cr	Smls. pipe & tube	SB–622	...	N10362	Solution ann.	...	105
	36	62Ni–22Mo–15Cr	Wld. tube	SB–626	...	N10362	Solution ann.	...	105
	37	Ni–28Mo–3Fe–1.3Cr–0.25Al	Plate, sheet, strip	SB–333	...	N10629	...	...	110
	38	Ni–28Mo–3Fe–1.3Cr–0.25Al	Rod	SB–335	...	N10629	...	...	110
	39	Ni–28Mo–3Fe–1.3Cr–0.25Al	Smls. & wld. ftgs.	SB–366	...	N10629	...	...	110
	40	Ni–28Mo–3Fe–1.3Cr–0.25Al	Forgings	SB–564	...	N10629	...	...	110
	41	Ni–28Mo–3Fe–1.3Cr–0.25Al	Wld. pipe	SB–619	...	N10629	...	...	110
	42	Ni–28Mo–3Fe–1.3Cr–0.25Al	Smls. pipe & tube	SB–622	...	N10629	...	...	110
	43	Ni–28Mo–3Fe–1.3Cr–0.25Al	Wld. tube	SB–626	...	N10629	...	...	110
	44	65Ni–28Mo–2Fe	Smls. & wld. ftgs.	SB–366	...	N10665	Annealed	...	110
	45	65Ni–28Mo–2Fe	Wld. pipe	SB–619	...	N10665	Annealed	...	110

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
														Nonferrous Materials (Cont'd)
1	87.0	87.0	83.8	80.4	77.4	74.9	73.8	72.7	71.5	70.2	...	...	...	...
2	87.0	87.0	83.8	80.4	77.4	74.9	73.8	72.7	71.5	70.2	...	...	...	...
3	87.0	87.0	83.8	80.4	77.4	74.9	73.8	72.7	71.5	70.2	...	...	...	...
4	100.0	100.0	100.0	98.4	97.4	96.8	96.4	96.0	95.6	95.2	...	...	...	...
5	100.0	100.0	100.0	98.4	97.4	96.8	96.4	96.0	95.6	95.2	...	...	...	...
6	100.0	100.0	100.0	98.4	97.4	96.8	96.4	96.0	95.6	95.2	...	...	...	...
7	100.0	100.0	100.0	98.4	97.4	96.8	96.4	96.0	95.6	95.2	...	...	...	...
8	100.0	100.0	100.0	98.4	97.4	96.8	96.4	96.0	95.6	95.2	...	...	...	...
9	100.0	100.0	100.0	98.4	97.4	96.8	96.4	96.0	95.6	95.2	...	...	...	...
10	115.0	115.0	115.0	113.1	112.0	111.3	110.9	110.4	109.9	109.5	...	...	...	...
11	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	99.7	98.0	96.0	93.6
12	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	99.7	98.0	96.0	93.6
13	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	99.7	98.0	96.0	93.6
14	105.0	105.0	105.0	105.0	105.0	104.4	104.2	103.9	103.7	103.5	103.3	103.2	103.1	103.1
15	105.0	105.0	105.0	105.0	105.0	104.4	104.2	103.9	103.7	103.5	103.3	103.2	103.1	103.1
16	105.0	105.0	105.0	105.0	105.0	104.4	104.2	103.9	103.7	103.5	103.3	103.2	103.1	103.1
17	105.0	105.0	105.0	105.0	105.0	104.4	104.2	103.9	103.7	103.5	103.3	103.2	103.1	103.1
18	105.0	105.0	105.0	105.0	105.0	104.4	104.2	103.9	103.7	103.5	103.3	103.2	103.1	103.1
19	105.0	105.0	105.0	105.0	105.0	104.4	104.2	103.9	103.7	103.5	103.3	103.2	103.1	103.1
20	105.0	105.0	105.0	105.0	105.0	104.4	104.2	103.9	103.7	103.5	103.3	103.2	103.1	103.1
21	100.0	100.0	100.0	97.7	95.7	93.9	93.1	92.4	91.7	90.9	90.2	89.4	88.5	87.6
22	100.0	100.0	100.0	97.7	95.7	93.9	93.1	92.4	91.7	90.9	90.2	89.4	88.5	87.6
23	100.0	100.0	100.0	97.7	95.7	93.9	93.1	92.4	91.7	90.9	90.2	89.4	88.5	87.6
24	100.0	100.0	100.0	97.7	95.7	93.9	93.1	92.4	91.7	90.9	90.2	89.4	88.5	87.6
25	100.0	100.0	100.0	97.7	95.7	93.9	93.1	92.4	91.7	90.9	90.2	89.4	88.5	87.6
26	100.0	100.0	100.0	97.7	95.7	93.9	93.1	92.4	91.7	90.9	90.2	89.4	88.5	87.6
27	100.0	100.0	100.0	97.7	95.7	93.9	93.1	92.4	91.7	90.9	90.2	89.4	88.5	87.6
28	100.0	100.0	100.0	97.7	95.7	93.9	93.1	92.4	91.7	90.9	90.2	89.4	88.5	87.6
29	105.0	105.0	105.0	103.0	101.0	99.5	99.2	99.0	98.7	98.3	...	...	...	...
30	105.0	105.0	105.0	103.0	101.0	99.5	99.2	99.0	98.7	98.3	...	...	...	...
31	105.0	105.0	105.0	103.0	101.0	99.5	99.2	99.0	98.7	98.3	...	...	...	...
32	105.0	105.0	105.0	103.0	101.0	99.5	99.2	99.0	98.7	98.3	...	...	...	...
33	105.0	105.0	105.0	103.0	101.0	99.5	99.2	99.0	98.7	98.3	...	...	...	...
34	105.0	105.0	105.0	103.0	101.0	99.5	99.2	99.0	98.7	98.3	...	...	...	...
35	105.0	105.0	105.0	103.0	101.0	99.5	99.2	99.0	98.7	98.3	...	...	...	...
36	105.0	105.0	105.0	103.0	101.0	99.5	99.2	99.0	98.7	98.3	...	...	...	...
37	110.0	110.0	110.0	110.0	108.7	107.1	106.4	105.8	105.2	104.7	104.2	103.8	103.0	...
38	110.0	110.0	110.0	110.0	108.7	107.1	106.4	105.8	105.2	104.7	104.2	103.8	103.0	...
39	110.0	110.0	110.0	110.0	108.7	107.1	106.4	105.8	105.2	104.7	104.2	103.8	103.0	...
40	110.0	110.0	110.0	110.0	108.7	107.1	106.4	105.8	105.2	104.7	104.2	103.8	103.0	...
41	110.0	110.0	110.0	110.0	108.7	107.1	106.4	105.8	105.2	104.7	104.2	103.8	103.0	...
42	110.0	110.0	110.0	110.0	108.7	107.1	106.4	105.8	105.2	104.7	104.2	103.8	103.0	...
43	110.0	110.0	110.0	110.0	108.7	107.1	106.4	105.8	105.2	104.7	104.2	103.8	103.0	...
44	110.0	110.0	110.0	110.0	110.0	109.2	108.7	108.1	107.6	107.0	106.5	105.9	105.5	105.3
45	110.0	110.0	110.0	110.0	110.0	109.2	108.7	108.1	107.6	107.0	106.5	105.9	105.5	105.3

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Nonferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	90.9	87.8	84.3	80.5	76.4	...	...	...	...	...	...	...	...	(**21**)
12	90.9	87.8	84.3	80.5	76.4	...	...	...	...	...	...	...	...	(**21**)
13	90.9	87.8	84.3	80.5	76.4	...	...	...	...	...	...	...	...	(**21**)
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	86.2	84.7	82.9	80.9	78.6	...	...	...	...	...	...	...	...	(**21**)
22	86.2	84.7	82.9	80.9	78.6	...	...	...	...	...	...	...	...	(**21**)
23	86.2	84.7	82.9	80.9	78.6	...	...	...	...	...	...	...	...	(**21**)
24	86.2	84.7	82.9	80.9	78.6	...	...	...	...	...	...	...	...	(**21**)
25	86.2	84.7	82.9	80.9	78.6	...	...	...	...	...	...	...	...	(**21**)
26	86.2	84.7	82.9	80.9	78.6	...	...	...	...	...	...	...	...	(**21**)
27	86.2	84.7	82.9	80.9	78.6	...	...	...	...	...	...	...	...	(**21**)
28	86.2	84.7	82.9	80.9	78.6	...	...	...	...	...	...	...	...	(**21**)
29	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
	Nonferrous Materials (Cont'd)							
1	65Ni–28Mo–2Fe	Wld. tube	SB–626	...	N10665	Annealed	...	110
2	65Ni–28Mo–2Fe	Plate, sheet, strip	SB–333	...	N10665	Solution ann.	...	110
3	65Ni–28Mo–2Fe	Rod	SB–335	...	N10665	Solution ann.	...	110
4	65Ni–28Mo–2Fe	Forgings	SB–462	...	N10665	Solution ann.	...	110
5	65Ni–28Mo–2Fe	Forgings	SB–564	...	N10665	Solution ann.	...	110
6	65Ni–28Mo–2Fe	Wld. pipe	SB–619	...	N10665	Solution ann.	...	110
7	65Ni–28Mo–2Fe	Smls. pipe & tube	SB–622	...	N10665	Solution ann.	...	110
8	65Ni–28Mo–2Fe	Wld. tube	SB–626	...	N10665	Solution ann.	...	110
9	65Ni–29.5Mo–2Fe–2Cr	Plate, sheet, strip	SB–333	...	N10675	Solution ann.	...	110
10	65Ni–29.5Mo–2Fe–2Cr	Rod	SB–335	...	N10675	Solution ann.	...	110
11	65Ni–29.5Mo–2Fe–2Cr	Smls. & wld. ftgs.	SB–366	...	N10675	Solution ann.	...	110
12	65Ni–29.5Mo–2Fe–2Cr	Forgings	SB–462	...	N10675	Solution ann.	...	110
13	65Ni–29.5Mo–2Fe–2Cr	Forgings	SB–564	...	N10675	Solution ann.	...	110
14	65Ni–29.5Mo–2Fe–2Cr	Wld. pipe	SB–619	...	N10675	Solution ann.	...	110
15	65Ni–29.5Mo–2Fe–2Cr	Smls. pipe & tube	SB–622	...	N10675	Solution ann.	...	110
16	65Ni–29.5Mo–2Fe–2Cr	Wld. tube	SB–626	...	N10675	Solution ann.	...	110
17	37Ni–30Co–28Cr–2.7Si	Plate, sheet, strip	SB–435	...	N12160	Solution ann.	...	90
18	37Ni–30Co–28Cr–2.7Si	Forgings	SB–564	...	N12160	Solution ann.	...	90
19	37Ni–30Co–28Cr–2.7Si	Rod	SB–572	...	N12160	Solution ann.	...	90
20	37Ni–30Co–28Cr–2.7Si	Wld. pipe	SB–619	...	N12160	Solution ann.	...	90
21	37Ni–30Co–28Cr–2.7Si	Smls. pipe & tube	SB–622	...	N12160	Solution ann.	...	90
22	37Ni–30Co–28Cr–2.7Si	Wld. tube	SB–626	...	N12160	Solution ann.	...	90
23	33Cr–31Ni–32Fe–1.5Mo–0.6Cu–N	Smls. & wld. ftgs.	SB–366	...	R20033	...	...	109
24	33Cr–31Ni–32Fe–1.5Mo–0.6Cu–N	Forgings	SB–564	...	R20033	...	...	109
25	33Cr–31Ni–32Fe–1.5Mo–0.6Cu–N	Wld. pipe	SB–619	...	R20033	...	...	109
26	33Cr–31Ni–32Fe–1.5Mo–0.6Cu–N	Smls. pipe & tube	SB–622	...	R20033	...	...	109
27	33Cr–31Ni–32Fe–1.5Mo–0.6Cu–N	Plate, sheet, strip	SB–625	...	R20033	...	...	109
28	33Cr–31Ni–32Fe–1.5Mo–0.6Cu–N	Wld. tube	SB–626	...	R20033	...	...	109
29	33Cr–31Ni–32Fe–1.5Mo–0.6Cu–N	Rod	SB–649	...	R20033	...	...	109
30	21Ni–30Fe–22Cr–18Co–3Mo–3W	Plate, sheet, strip	SB–435	...	R30556	Annealed	...	100
31	21Ni–30Fe–22Cr–18Co–3Mo–3W	Rod	SB–572	...	R30556	Annealed	...	100
32	21Ni–30Fe–22Cr–18Co–3Mo–3W	Wld. pipe	SB–619	...	R30556	Annealed	...	100
33	21Ni–30Fe–22Cr–18Co–3Mo–3W	Smls. pipe & tube	SB–622	...	R30556	Annealed	...	100
34	21Ni–30Fe–22Cr–18Co–3Mo–3W	Wld. tube	SB–626	...	R30556	Annealed	...	100
35	Co–26Cr–9Ni–5Mo–3Fe–2W	Rod	SB–815	...	R31233	Solution ann.	...	130
36	Co–26Cr–9Ni–5Mo–3Fe–2W	Plate, sheet, strip	SB–818	...	R31233	Solution ann.	...	130
37	Ti	Plate, sheet, strip	SB–265	1	R50250	Annealed	...	35
38	Ti	Smls. & wld. tube	SB–338	1	R50250	Annealed	...	35
39	Ti	Bar, billet	SB–348	1	R50250	Annealed	...	35
40	Ti	Smls. & wld. ftgs.	SB–363	WPT1	R50250	Annealed	...	35
41	Ti	Forgings	SB–381	F–1	R50250	Annealed	...	35
42	Ti	Smls. pipe	SB–861	1	R50250	Annealed	...	35
43	Ti	Wld. pipe	SB–862	1	R50250	Annealed	...	35
44	Ti	Castings	SB–367	C–2	R50400	...	...	50
45	Ti	Forgings	SB–381	F–2	R50400	Annealed	...	50

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
														Nonferrous Materials (Cont'd)
1	110.0	110.0	110.0	110.0	110.0	109.2	108.7	108.1	107.6	107.0	106.5	105.9	105.5	105.3
2	110.0	110.0	110.0	110.0	110.0	109.2	108.7	108.1	107.6	107.0	106.5	105.9	105.5	105.3
3	110.0	110.0	110.0	110.0	110.0	109.2	108.7	108.1	107.6	107.0	106.5	105.9	105.5	105.3
4	110.0	110.0	110.0	110.0	110.0	109.2	108.7	108.1	107.6	107.0	106.5	105.9	105.5	105.3
5	110.0	110.0	110.0	110.0	110.0	109.2	108.7	108.1	107.6	107.0	106.5	105.9	105.5	105.3
6	110.0	110.0	110.0	110.0	110.0	109.2	108.7	108.1	107.6	107.0	106.5	105.9	105.5	105.3
7	110.0	110.0	110.0	110.0	110.0	109.2	108.7	108.1	107.6	107.0	106.5	105.9	105.5	105.3
8	110.0	110.0	110.0	110.0	110.0	109.2	108.7	108.1	107.6	107.0	106.5	105.9	105.5	105.3
9	110.0	110.0	110.0	110.0	108.7	107.1	106.4	105.8	105.2	104.7	104.2	103.8	103.3	102.8
10	110.0	110.0	110.0	110.0	108.7	107.1	106.4	105.8	105.2	104.7	104.2	103.8	103.3	102.8
11	110.0	110.0	110.0	110.0	108.7	107.1	106.4	105.8	105.2	104.7	104.2	103.8	103.3	102.8
12	110.0	110.0	110.0	110.0	108.7	107.1	106.4	105.8	105.2	104.7	104.2	103.8	103.3	102.8
13	110.0	110.0	110.0	110.0	108.7	107.1	106.4	105.8	105.2	104.7	104.2	103.8	103.3	102.8
14	110.0	110.0	110.0	110.0	108.7	107.1	106.4	105.8	105.2	104.7	104.2	103.8	103.3	102.8
15	110.0	110.0	110.0	110.0	108.7	107.1	106.4	105.8	105.2	104.7	104.2	103.8	103.3	102.8
16	110.0	110.0	110.0	110.0	108.7	107.1	106.4	105.8	105.2	104.7	104.2	103.8	103.3	102.8
17	90.0	90.0	90.0	87.8	85.5	83.3	82.2	81.1	80.0	78.9	77.8	76.6	75.4	74.1
18	90.0	90.0	90.0	87.8	85.5	83.3	82.2	81.1	80.0	78.9	77.8	76.6	75.4	74.1
19	90.0	90.0	90.0	87.8	85.5	83.3	82.2	81.1	80.0	78.9	77.8	76.6	75.4	74.1
20	90.0	90.0	90.0	87.8	85.5	83.3	82.2	81.1	80.0	78.9	77.8	76.6	75.4	74.1
21	90.0	90.0	90.0	87.8	85.5	83.3	82.2	81.1	80.0	78.9	77.8	76.6	75.4	74.1
22	90.0	90.0	90.0	87.8	85.5	83.3	82.2	81.1	80.0	78.9	77.8	76.6	75.4	74.1
23	109.0	109.0	103.2	97.8	93.7	90.6	89.3	88.2	87.1	86.0	84.9	83.5	...	...
24	109.0	109.0	103.2	97.8	93.7	90.6	89.3	88.2	87.1	86.0	84.9	83.5	...	...
25	109.0	109.0	103.2	97.8	93.7	90.6	89.3	88.2	87.1	86.0	84.9	83.5	...	...
26	109.0	109.0	103.2	97.8	93.7	90.6	89.3	88.2	87.1	86.0	84.9	83.5	...	...
27	109.0	109.0	103.2	97.8	93.7	90.6	89.3	88.2	87.1	86.0	84.9	83.5	...	...
28	109.0	109.0	103.2	97.8	93.7	90.6	89.3	88.2	87.1	86.0	84.9	83.5	...	...
29	109.0	109.0	103.2	97.8	93.7	90.6	89.3	88.2	87.1	86.0	84.9	83.5	...	...
30	100.0	100.0	97.9	94.7	92.5	91.1	90.5	90.1	89.7	89.3	88.8	88.2	87.5	86.6
31	100.0	100.0	97.9	94.7	92.5	91.1	90.5	90.1	89.7	89.3	88.8	88.2	87.5	86.6
32	100.0	100.0	97.9	94.7	92.5	91.1	90.5	90.1	89.7	89.3	88.8	88.2	87.5	86.6
33	100.0	100.0	97.9	94.7	92.5	91.1	90.5	90.1	89.7	89.3	88.8	88.2	87.5	86.6
34	100.0	100.0	97.9	94.7	92.5	91.1	90.5	90.1	89.7	89.3	88.8	88.2	87.5	86.6
35	130.0	130.0	130.0	130.0	130.0	130.0	130.0	128.3	126.6	125.2	124.1	123.0	121.9	120.4
36	130.0	130.0	130.0	130.0	130.0	130.0	130.0	128.3	126.6	125.2	124.1	123.0	121.9	120.4
37	35.0	28.9	23.1	19.3	16.3	12.5	...	...	...	...	...	...	...	...
38	35.0	28.9	23.1	19.3	16.3	12.5	...	...	...	...	...	...	...	...
39	35.0	28.9	23.1	19.3	16.3	12.5	...	...	...	...	...	...	...	...
40	35.0	28.9	23.1	19.3	16.3	12.5	...	...	...	...	...	...	...	...
41	35.0	28.9	23.1	19.3	16.3	12.5	...	...	...	...	...	...	...	...
42	35.0	28.9	23.1	19.3	16.3	12.5	...	...	...	...	...	...	...	...
43	35.0	28.9	23.1	19.3	16.3	12.5	...	...	...	...	...	...	...	...
44	50.0	41.3	34.1	28.4	23.8	...	...	...	...	...	...	...	...	...
45	50.0	43.6	36.2	30.9	26.6	22.8	...	...	...	...	...	...	...	...

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding												
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
	Nonferrous Materials (Cont'd)												
1	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...

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Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
	Nonferrous Materials (Cont'd)							
1	Ti	Plate, sheet, strip	SB–265	2H	R50400	Annealed	...	58
2	Ti	Smls. & wld. tube	SB–338	2H	R50400	Annealed	...	58
3	Ti	Bar, billet	SB–348	2H	R50400	Annealed	...	58
4	Ti	Smls. fittings	SB–363	WPT2H	R50400	Annealed	...	58
5	Ti	Wld. fittings	SB–363	WPT2HW	R50400	Annealed	...	58
6	Ti	Forgings	SB–381	F–2H	R50400	Annealed	...	58
7	Ti	Smls. pipe	SB–861	2H	R50400	Annealed	...	58
8	Ti	Wld. pipe	SB–862	2H	R50400	Annealed	...	58
9	Ti	Castings	SB–367	C–3	R50550	...	...	65
10	Ti	Plate, sheet, strip	SB–265	3	R50550	Annealed	...	65
11	Ti	Smls. & wld. tube	SB–338	3	R50550	Annealed	...	65
12	Ti	Bar, billet	SB–348	3	R50550	Annealed	...	65
13	Ti	Smls. & wld. ftgs.	SB–363	WPT3	R50550	Annealed	...	65
14	Ti	Forgings	SB–381	F–3	R50550	Annealed	...	65
15	Ti	Smls. pipe	SB–861	3	R50550	Annealed	...	65
16	Ti	Wld. pipe	SB–862	3	R50550	Annealed	...	65
17	Ti–Pd	Plate, sheet, strip	SB–265	11	R52250	Annealed	...	35
18	Ti–Pd	Plate, sheet, strip	SB–265	17	R52252	Annealed	...	35
19	Ti–Ru	Plate, sheet, strip	SB–265	27	R52254	Annealed	...	35
20	Ti–Pd	Plate, sheet, strip	SB–265	7	R52400	Annealed	...	50
21	Ti–0.15Pd	Plate, sheet, strip	SB–265	7H	R52400	Annealed	...	58
22	Ti–0.15Pd	Smls. & wld. tube	SB–338	7H	R52400	Annealed	...	58
23	Ti–0.15Pd	Bar, billet	SB–348	7H	R52400	Annealed	...	58
24	Ti–0.15Pd	Smls. fittings	SB–363	WPT7H	R52400	Annealed	...	58
25	Ti–0.15Pd	Wld. fittings	SB–363	WPT7HW	R52400	Annealed	...	58
26	Ti–0.15Pd	Forgings	SB–381	F–7H	R52400	Annealed	...	58
27	Ti–0.15Pd	Smls. pipe	SB–861	7H	R52400	Annealed	...	58
28	Ti–0.15Pd	Wld. pipe	SB–862	7H	R52400	Annealed	...	58
29	Ti–Pd	Plate, sheet, strip	SB–265	16	R52402	Annealed	...	50
30	Ti–Pd	Bar, billet	SB–348	16	R52402	Annealed	...	50
31	Ti–Pd	Forgings	SB–381	F–16	R52402	Annealed	...	50
32	Ti–0.05Pd	Plate, sheet, strip	SB–265	16H	R52402	Annealed	...	58
33	Ti–0.05Pd	Smls. & wld. tube	SB–338	16H	R52402	Annealed	...	58
34	Ti–0.05Pd	Bar, billet	SB–348	16H	R52402	Annealed	...	58
35	Ti–0.05Pd	Smls. fittings	SB–363	WPT16H	R52402	Annealed	...	58
36	Ti–0.05Pd	Wld. fittings	SB–363	WPT16HW	R52402	Annealed	...	58
37	Ti–0.05Pd	Forgings	SB–381	F–16H	R52402	Annealed	...	58
38	Ti–0.05Pd	Smls. pipe	SB–861	16H	R52402	Annealed	...	58
39	Ti–0.05Pd	Wld. pipe	SB–862	16H	R52402	Annealed	...	58
40	Ti–Ru	Plate, sheet, strip	SB–265	26	R52404	Annealed	...	50
41	Ti–Ru	Smls. & wld. tube	SB–338	26	R52404	Annealed	...	50
42	Ti–Ru	Bar, billet	SB–348	26	R52404	Annealed	...	50
43	Ti–Ru	Smls. fittings	SB–363	WPT26	R52404	Annealed	...	50
44	Ti–Ru	Wld. fittings	SB–363	WPT26W	R52404	Annealed	...	50
45	Ti–Ru	Forgings	SB–381	F–26	R52404	Annealed	...	50

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
														Nonferrous Materials (Cont'd)
1	58.0	50.5	42.0	35.8	30.9	26.5	...	...	...	...	...	...	...	...
2	58.0	50.5	42.0	35.8	30.9	26.5	...	...	...	...	...	...	...	...
3	58.0	50.5	42.0	35.8	30.9	26.5	...	...	...	...	...	...	...	...
4	58.0	50.5	42.0	35.8	30.9	26.5	...	...	...	...	...	...	...	...
5	58.0	50.5	42.0	35.8	30.9	26.5	...	...	...	...	...	...	...	...
6	58.0	50.5	42.0	35.8	30.9	26.5	...	...	...	...	...	...	...	...
7	58.0	50.5	42.0	35.8	30.9	26.5	...	...	...	...	...	...	...	...
8	58.0	50.5	42.0	35.8	30.9	26.5	...	...	...	...	...	...	...	...
9	65.0	55.2	44.6	36.2	29.8	...	...	...	...	...	...	...	...	...
10	65.0	55.2	44.6	36.2	29.8	25.8	...	...	...	...	...	...	...	...
11	65.0	55.2	44.6	36.2	29.8	25.8	...	...	...	...	...	...	...	...
12	65.0	55.2	44.6	36.2	29.8	25.8	...	...	...	...	...	...	...	...
13	65.0	55.2	44.6	36.2	29.8	25.8	...	...	...	...	...	...	...	...
14	65.0	55.2	44.6	36.2	29.8	25.8	...	...	...	...	...	...	...	...
15	65.0	55.2	44.6	36.2	29.8	25.8	...	...	...	...	...	...	...	...
16	65.0	55.2	44.6	36.2	29.8	25.8	...	...	...	...	...	...	...	...
17	35.0	28.9	23.1	19.3	16.3	12.5	...	...	...	...	...	...	...	...
18	35.0	29.2	23.2	19.2	16.4	12.4	...	...	...	...	...	...	...	...
19	35.0	28.9	23.1	19.3	16.3	12.5	...	...	...	...	...	...	...	...
20	50.0	43.6	36.2	30.9	26.6	22.8	...	...	...	...	...	...	...	...
21	58.0	50.5	42.0	35.8	30.9	26.5	...	...	...	...	...	...	...	...
22	58.0	50.5	42.0	35.8	30.9	26.5	...	...	...	...	...	...	...	...
23	58.0	50.5	42.0	35.8	30.9	26.5	...	...	...	...	...	...	...	...
24	58.0	50.5	42.0	35.8	30.9	26.5	...	...	...	...	...	...	...	...
25	58.0	50.5	42.0	35.8	30.9	26.5	...	...	...	...	...	...	...	...
26	58.0	50.5	42.0	35.8	30.9	26.5	...	...	...	...	...	...	...	...
27	58.0	50.5	42.0	35.8	30.9	26.5	...	...	...	...	...	...	...	...
28	58.0	50.5	42.0	35.8	30.9	26.5	...	...	...	...	...	...	...	...
29	50.0	43.6	36.0	30.8	26.4	22.8	...	...	...	...	...	...	...	...
30	50.0	43.6	36.0	30.8	26.4	22.8	...	...	...	...	...	...	...	...
31	50.0	43.6	36.0	30.8	26.4	22.8	...	...	...	...	...	...	...	...
32	58.0	50.5	42.0	35.8	30.9	26.5	...	...	...	...	...	...	...	...
33	58.0	50.5	42.0	35.8	30.9	26.5	...	...	...	...	...	...	...	...
34	58.0	50.5	42.0	35.8	30.9	26.5	...	...	...	...	...	...	...	...
35	58.0	50.5	42.0	35.8	30.9	26.5	...	...	...	...	...	...	...	...
36	58.0	50.5	42.0	35.8	30.9	26.5	...	...	...	...	...	...	...	...
37	58.0	50.5	42.0	35.8	30.9	26.5	...	...	...	...	...	...	...	...
38	58.0	50.5	42.0	35.8	30.9	26.5	...	...	...	...	...	...	...	...
39	58.0	50.5	42.0	35.8	30.9	26.5	...	...	...	...	...	...	...	...
40	50.0	43.6	36.0	30.8	26.4	22.8	...	...	...	...	...	...	...	...
41	50.0	43.6	36.0	30.8	26.4	22.8	...	...	...	...	...	...	...	...
42	50.0	43.6	36.0	30.8	26.4	22.8	...	...	...	...	...	...	...	...
43	50.0	43.6	36.0	30.8	26.4	22.8	...	...	...	...	...	...	...	...
44	50.0	43.6	36.0	30.8	26.4	22.8	...	...	...	...	...	...	...	...
45	50.0	43.6	36.0	30.8	26.4	22.8	...	...	...	...	...	...	...	...

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding												
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
	Nonferrous Materials (Cont'd)												
1	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...

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Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
	Nonferrous Materials (Cont'd)							
1	Ti–Ru	Smls. pipe	SB–861	26	R52404	Annealed	...	50
2	Ti–Ru	Wld. pipe	SB–862	26	R52404	Annealed	...	50
3	Ti–0.10Ru	Plate, sheet, strip	SB–265	26H	R52404	Annealed	...	58
4	Ti–0.10Ru	Smls. & wld. tube	SB–338	26H	R52404	Annealed	...	58
5	Ti–0.10Ru	Bar, billet	SB–348	26H	R52404	Annealed	...	58
6	Ti–0.10Ru	Smls. fittings	SB–363	WPT26H	R52404	Annealed	...	58
7	Ti–0.10Ru	Wld. fittings	SB–363	WPT26HW	R52404	Annealed	...	58
8	Ti–0.10Ru	Forgings	SB–381	F–26H	R52404	Annealed	...	58
9	Ti–0.10Ru	Smls. pipe	SB–861	26H	R52404	Annealed	...	58
10	Ti–0.10Ru	Wld. pipe	SB–862	26H	R52404	Annealed	...	58
11	Ti–0.3Mo–0.8Ni	Forgings	SB–381	F–12	R53400	Annealed	...	70
12	Ti–4Al–2.5V–1.5Fe	Plate, sheet, strip	SB–265	38	R54250	Annealed	...	130
13	Ti–4Al–2.5V–1.5Fe	Smls. tube	SB–338	38	R54250	Annealed	...	130
14	Ti–4Al–2.5V–1.5Fe	Wld. tube	SB–338	38	R54250	Annealed	...	130
15	Ti–4Al–2.5V–1.5Fe	Bar, billet	SB–348	38	R54250	Annealed	...	130
16	Ti–4Al–2.5V–1.5Fe	Smls. fittings	SB–363	WPT38	R54250	Annealed	...	130
17	Ti–4Al–2.5V–1.5Fe	Wld. fittings	SB–363	WPT38W	R54250	Annealed	...	130
18	Ti–4Al–2.5V–1.5Fe	Forgings	SB–381	F–38	R54250	Annealed	...	130
19	Ti–4Al–2.5V–1.5Fe	Smls. pipe	SB–861	38	R54250	Annealed	...	130
20	Ti–4Al–2.5V–1.5Fe	Wld. pipe	SB–862	38	R54250	Annealed	...	130
21	Ti–3Al–2.5V	Plate, sheet, strip	SB–265	9	R56320	Annealed	...	90
22	Ti–3Al–2.5V	Smls. & wld. tube	SB–338	9	R56320	Annealed	...	90
23	Ti–3Al–2.5V	Bar, billet	SB–348	9	R56320	Annealed	...	90
24	Ti–3Al–2.5V	Smls. fittings	SB–363	WPT9	R56320	Annealed	...	90
25	Ti–3Al–2.5V	Wld. fittings	SB–363	WPT9W	R56320	Annealed	...	90
26	Ti–3Al–2.5V	Forgings	SB–381	F–9	R56320	Annealed	...	90
27	Ti–3Al–2.5V	Smls. pipe	SB–861	9	R56320	Annealed	...	90
28	Ti–3Al–2.5V	Wld. pipe	SB–862	9	R56320	Annealed	...	90
29	Ti–3Al–2.5V–0.1Ru	Plate, sheet, strip	SB–265	28	R56323	Annealed	...	90
30	Ti–3Al–2.5V–0.1Ru	Smls. & wld. tube	SB–338	28	R56323	Annealed	...	90
31	Ti–3Al–2.5V–0.1Ru	Bar, billet	SB–348	28	R56323	Annealed	...	90
32	Ti–3Al–2.5V–0.1Ru	Smls. fittings	SB–363	WPT28	R56323	Annealed	...	90
33	Ti–3Al–2.5V–0.1Ru	Wld. fittings	SB–363	WPT28W	R56323	Annealed	...	90
34	Ti–3Al–2.5V–0.1Ru	Forgings	SB–381	F–28	R56323	Annealed	...	90
35	Ti–3Al–2.5V–0.1Ru	Smls. pipe	SB–861	28	R56323	Annealed	...	90
36	Ti–3Al–2.5V–0.1Ru	Wld. pipe	SB–862	28	R56323	Annealed	...	90
37	99.2Zr	Forgings	SB–493	...	R60702	Annealed	...	55
38	99.2Zr	Smls. & wld. tube	SB–523	...	R60702	Annealed	...	55
39	99.2Zr	Bar, wire	SB–550	...	R60702	Annealed	...	55
40	99.2Zr	Plate, sheet, strip	SB–551	...	R60702	Annealed	...	55
41	99.2Zr	Smls. fittings	SB–653	PZ–2	R60702	Annealed	...	55
42	99.2Zr	Wld. fittings	SB–653	PZ–2W	R60702	Annealed	...	55
43	99.2Zr	Smls. & wld. pipe	SB–658	...	R60702	Annealed	...	55

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
														Nonferrous Materials (Cont'd)
1	50.0	43.6	36.0	30.8	26.4	22.8	...	...	...	...	...	...	...	...
2	50.0	43.6	36.0	30.8	26.4	22.8	...	...	...	...	...	...	...	...
3	58.0	50.5	42.0	35.8	30.9	26.5	...	...	...	...	...	...	...	...
4	58.0	50.5	42.0	35.8	30.9	26.5	...	...	...	...	...	...	...	...
5	58.0	50.5	42.0	35.8	30.9	26.5	...	...	...	...	...	...	...	...
6	58.0	50.5	42.0	35.8	30.9	26.5	...	...	...	...	...	...	...	...
7	58.0	50.5	42.0	35.8	30.9	26.5	...	...	...	...	...	...	...	...
8	58.0	50.5	42.0	35.8	30.9	26.5	...	...	...	...	...	...	...	...
9	58.0	50.5	42.0	35.8	30.9	26.5	...	...	...	...	...	...	...	...
10	58.0	50.5	42.0	35.8	30.9	26.5	...	...	...	...	...	...	...	...
11	70.0	65.4	56.8	50.0	45.7	43.2	...	...	...	...	...	...	...	...
12	130.0	129.1	118.1	108.6	101.4	96.9	95.4	...	...	...	...	...	...	...
13	130.0	129.1	118.1	108.6	101.4	96.9	95.4	...	...	...	...	...	...	...
14	130.0	129.1	118.1	108.6	101.4	96.9	95.4	...	...	...	...	...	...	...
15	130.0	129.1	118.1	108.6	101.4	96.9	95.4	...	...	...	...	...	...	...
16	130.0	129.1	118.1	108.6	101.4	96.9	95.4	...	...	...	...	...	...	...
17	130.0	129.1	118.1	108.6	101.4	96.9	95.4	...	...	...	...	...	...	...
18	130.0	129.1	118.1	108.6	101.4	96.9	95.4	...	...	...	...	...	...	...
19	130.0	129.1	118.1	108.6	101.4	96.9	95.4	...	...	...	...	...	...	...
20	130.0	129.1	118.1	108.6	101.4	96.9	95.4	...	...	...	...	...	...	...
21	90.0	86.6	79.1	70.5	63.4	60.3	...	...	...	...	...	...	...	...
22	90.0	86.6	79.1	70.5	63.4	60.3	...	...	...	...	...	...	...	...
23	90.0	86.6	79.1	70.5	63.4	60.3	...	...	...	...	...	...	...	...
24	90.0	86.6	79.1	70.5	63.4	60.3	...	...	...	...	...	...	...	...
25	90.0	86.6	79.1	70.5	63.4	60.3	...	...	...	...	...	...	...	...
26	90.0	86.6	79.1	70.5	63.4	60.3	...	...	...	...	...	...	...	...
27	90.0	86.6	79.1	70.5	63.4	60.3	...	...	...	...	...	...	...	...
28	90.0	86.6	79.1	70.5	63.4	60.3	...	...	...	...	...	...	...	...
29	90.0	86.6	79.1	70.5	63.4	60.3	...	...	...	...	...	...	...	...
30	90.0	86.6	79.1	70.5	63.4	60.3	...	...	...	...	...	...	...	...
31	90.0	86.6	79.1	70.5	63.4	60.3	...	...	...	...	...	...	...	...
32	90.0	86.6	79.1	70.5	63.4	60.3	...	...	...	...	...	...	...	...
33	90.0	86.6	79.1	70.5	63.4	60.3	...	...	...	...	...	...	...	...
34	90.0	86.6	79.1	70.5	63.4	60.3	...	...	...	...	...	...	...	...
35	90.0	86.6	79.1	70.5	63.4	60.3	...	...	...	...	...	...	...	...
36	90.0	86.6	79.1	70.5	63.4	60.3	...	...	...	...	...	...	...	...
37	55.0	47.9	39.0	31.9	26.6	23.1	21.8	20.8	19.9	19.2	...	...	...	...
38	55.0	47.9	39.0	31.9	26.6	23.1	21.8	20.8	19.9	19.2	...	...	...	...
39	55.0	47.9	39.0	31.9	26.6	23.1	21.8	20.8	19.9	19.2	...	...	...	...
40	55.0	47.9	39.0	31.9	26.6	23.1	21.8	20.8	19.9	19.2	...	...	...	...
41	55.0	47.9	39.0	31.9	26.6	23.1	21.8	20.8	19.9	19.2	...	...	...	...
42	55.0	47.9	39.0	31.9	26.6	23.1	21.8	20.8	19.9	19.2	...	...	...	...
43	55.0	47.9	39.0	31.9	26.6	23.1	21.8	20.8	19.9	19.2	...	...	...	...

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding												
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
	Nonferrous Materials (Cont'd)												
1	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...

NOTES TO TABLE U
GENERAL NOTES

(a) The following abbreviations are used: ann., annealed; cond., condenser; CW, cold worked; fin., finished; fr., from; ftgs., fittings; HW, Hot worked; N, Normalized; NT, Normalized and tempered; QT, Quenched and tempered; rel., relieved; rld., rolled; Smls., Seamless; Sol., Solution; SR, stress relieved; Str., Strength; treat., treated; and Wld., Welded.

(b) The tabulated values of tensile strength are those which the Committee believes are suitable for use in design calculations. At temperatures above room temperature, the values of tensile strength tend toward an average or expected value which may be as much as 10% above the tensile strength trend curve adjusted to the minimum specified room temperature tensile strength. The tensile strength values do not correspond exactly to "average" as this term is applied to a statistical treatment of a homogeneous set of data. Neither the ASME Material Specifications nor the rules of Sections I, III, VIII, or XII require elevated temperature testing for tensile strengths of production material for use in Code components. It is not intended that results of such tests, if performed, be compared with these tabulated tensile strength values for ASME Code acceptance/rejection purposes for materials. If some elevated temperature test results on production material appear lower than the tabulated values by a large amount (more than the typical variability of material and suggesting the possibility of some error), further investigation by retest or other means should be considered.

(c) Notes limiting applications of these materials appear in Tables 1A, 1B, 2A, 2B, 3, 4, 5A, and 5B.

(d) Where specifications, grades, classes, and types are listed in this Table, and where the material specification in Section II, Part A or Part B is a dual–unit specification (e.g., SA–516/SA–516M), the values listed in this Table shall be applicable to either the customary U.S. version of the material specification or the SI units version of the material specification. For example, the values listed for SA–516 Grade 70 shall be used when SA–516M Grade 485 is used in construction.

(e) The values in this Table may be interpolated to determine values for intermediate temperatures. The values at intermediate temperatures shall be rounded to the same number of decimal places as the value at the higher temperature between which values are being interpolated. The rounding rule is: when the next digit beyond the last place to be retained is less than 5, retain unchanged the digit in the last place retained; when the digit next beyond the last place to be retained is 5 or greater, increase by 1 the digit in the last place retained.

(f) Where a size limit appears in the Size/Thickness column, the limit applies to the dimension appropriate to the product form: wall thickness of tubing, pipe, pipe fittings, and hollow forgings; thickness of plate, flat bar and forgings, and polygonal bar; diameter of solid bar and bolting; and thickest cross–section of other pressure parts, e.g., castings and forgings.

(21)

Table Y-1
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
	Ferrous Materials					
1	Carbon steel	Sheet	SA–1008	CS–A	...	...
2	Carbon steel	Sheet	SA–1008	CS–B	...	...
3	Carbon steel	Bar	SA–675	45	...	...
4	Carbon steel	Wld. pipe	SA–134	A283A	...	...
5	Carbon steel	Plate	SA–283	A	...	...
6	Carbon steel	Plate	SA–285	A	K01700	...
7	Carbon steel	Wld. pipe	SA–672	A45	K01700	...
8	Carbon steel	Sheet	SA–414	A	K01501	...
9	Carbon steel	Wld. tube	SA–178	A	K01200	...
10	Carbon steel	Smls. tube	SA–179	...	K01200	...
11	Carbon steel	Smls. tube	SA–192	...	K01201	...
12	Carbon steel	Wld. tube	SA–214	...	K01807	...
13	Carbon steel	Smls. tube	SA–556	A2	K01807	...
14	Carbon steel	Wld. tube	SA–557	A2	K01807	...
15	Carbon steel	Wld. pipe	SA–53	E/A	K02504	...
16	Carbon steel	Smls. pipe	SA–53	S/A	K02504	...
17	Carbon steel	Smls. pipe	SA–106	A	K02501	...
18	Carbon steel	Wld. pipe	SA–135	A	...	...
19	Carbon steel	Forged pipe	SA–369	FPA	K02501	...
20	Carbon steel	Wld. pipe	SA–587	...	K11500	...
21	Carbon steel	Bar	SA–675	50	...	...
22	Carbon steel	Wld. pipe	SA–134	A283B	...	...
23	Carbon steel	Plate	SA–283	B	...	...
24	Carbon steel	Plate	SA–285	B	K02200	...
25	Carbon steel	Wld. pipe	SA–672	A50	K02200	...
26	Carbon steel	Sheet	SA–414	B	K02201	...
27	Carbon steel	Plate	SA/EN 10028–3	P275NH	...	...
28	Carbon steel	Plate	SA/EN 10028–2	P235GH	...	...
29	Carbon steel	Smls. tube	SA/EN 10216–2	P235GH	...	...
30	Carbon steel	Plate	SA/EN 10028–3	P275NH	...	...
31	Carbon steel	Smls. tube	SA/EN 10216–2	P235GH	...	...
32	Carbon steel	Smls. tube	SA/EN 10216–2	P235GH	...	...
(21) 33	Carbon steel	Sheet, strip	SA–1011	36	SS	Type 1
34	Carbon steel	Plate	SA/EN 10028–3	P275NH	...	...
35	Carbon steel	Bar	SA–675	55	...	...
36	Carbon steel	Wld. pipe	SA–134	A283C	K02401	...
37	Carbon steel	Plate	SA–283	C	K02401	...
38	Carbon steel	Plate	SA–285	C	K02801	...
39	Carbon steel	Smls. & wld. pipe	SA–333	1	K03008	...
40	Carbon steel	Smls. & wld. tube	SA–334	1	K03008	...
41	Carbon steel	Plate	SA–516	55	K01800	...
42	Carbon steel	Smls. pipe	SA–524	II	K02104	...
43	Carbon steel	Wld. pipe	SA–671	CA55	K02801	...
44	Carbon steel	Wld. pipe	SA–671	CE55	K02202	...
45	Carbon steel	Wld. pipe	SA–672	A55	K02801	...

Table Y-1
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Ferrous Materials
1	...	40	20	...
2	...	40	20	...
3	...	45	22.5	...
4	...	45	24	...
5	...	45	24	...
6	...	45	24	...
7	...	45	24	...
8	...	45	25	...
9	...	47	26	...
10	...	47	26	...
11	...	47	26	...
12	...	47	26	...
13	...	47	26	...
14	...	47	26	...
15	...	48	30	...
16	...	48	30	...
17	...	48	30	...
18	...	48	30	...
19	...	48	30	...
20	...	48	30	...
21	...	50	25	...
22	...	50	27	...
23	...	50	27	...
24	...	50	27	...
25	...	50	27	...
26	...	50	30	...
27	$6 < t \le 10$	51	31	...
28	$\le 2\frac{1}{4}$	52	31	...
29	$1\frac{5}{8} < t \le 2\frac{1}{2}$	52	31	...
30	$4 < t \le 6$	52	32.5	...
31	$\frac{5}{8} < t \le 1\frac{5}{8}$	52	32.5	...
32	$t \le \frac{5}{8}$	52	34	...
33	$t \le 0.23$	53	36	...
34	$2\frac{1}{4} < t \le 4$	53.5	34	...
35	...	55	27.5	...
36	...	55	30	...
37	...	55	30	...
38	...	55	30	...
39	...	55	30	...
40	...	55	30	...
41	...	55	30	...
42	...	55	30	...
43	...	55	30	...
44	...	55	30	...
45	...	55	30	...

Table Y-1
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Ferrous Materials								
1	20.0	18.8	18.3	18.0	17.7	...	17.1	...	16.3
2	20.0	18.8	18.3	18.0	17.7	...	17.1	...	16.3
3	22.5	21.1	20.6	20.2	19.9	...	19.2	...	18.3
4	24.0	22.6	22.0	21.6	21.2	...	20.5	...	19.6
5	24.0	22.6	22.0	21.6	21.2	...	20.5	...	19.6
6	24.0	22.6	22.0	21.6	21.2	...	20.5	...	19.6
7	24.0	22.6	22.0	21.6	21.2	...	20.5	...	19.6
8	25.0	23.5	22.9	22.5	22.1	...	21.4	...	20.4
9	26.0	24.4	23.8	23.4	23.0	...	22.2	...	21.2
10	26.0	24.4	23.8	23.4	23.0	...	22.2	...	21.2
11	26.0	24.4	23.8	23.4	23.0	...	22.2	...	21.2
12	26.0	24.4	23.8	23.4	23.0	...	22.2	...	21.2
13	26.0	24.4	23.8	23.4	23.0	...	22.2	...	21.2
14	26.0	24.4	23.8	23.4	23.0	...	22.2	...	21.2
15	30.0	28.2	27.5	27.0	26.5	...	25.6	...	24.4
16	30.0	28.2	27.5	27.0	26.5	...	25.6	...	24.4
17	30.0	28.2	27.5	27.0	26.5	...	25.6	...	24.4
18	30.0	28.2	27.5	27.0	26.5	...	25.6	...	24.4
19	30.0	28.2	27.5	27.0	26.5	...	25.6	...	24.4
20	30.0	28.2	27.5	27.0	26.5	...	25.6	...	24.4
21	25.0	23.5	22.9	22.5	22.1	...	21.4	...	20.4
22	27.0	25.4	24.7	24.3	23.9	...	23.1	...	22.0
23	27.0	25.4	24.7	24.3	23.9	...	23.1	...	22.0
24	27.0	25.4	24.7	24.3	23.9	...	23.1	...	22.0
25	27.0	25.4	24.7	24.3	23.9	...	23.1	...	22.0
26	30.0	28.2	27.5	27.0	26.5	...	25.6	...	24.4
27	31.0	29.3	28.6	...	27.6	...	26.6	...	25.4
28	31.0	...	28.4	...	27.4	...	26.5	...	25.3
29	31.2	29.3	28.6	28.0	27.6	27.1	26.6	26.1	25.4
30	32.5	30.7	29.9	...	28.9	...	27.9	...	26.6
31	32.6	30.7	29.9	29.3	28.9	28.4	27.9	27.3	26.6
32	34.1	32.0	31.2	30.6	30.2	29.7	29.1	28.5	27.8
33	36.0	33.8	33.1	32.4	31.6	31.2	30.8	30.2	29.3
34	34.0	32.0	31.1	...	30.1	...	29.1	...	...
35	27.5	25.8	25.2	24.7	24.3	...	23.5	...	22.4
36	30.0	28.2	27.5	27.0	26.5	...	25.6	...	24.4
37	30.0	28.2	27.5	27.0	26.5	...	25.6	...	24.4
38	30.0	28.2	27.5	27.0	26.5	...	25.6	...	24.4
39	30.0	28.2	27.5	27.0	26.5	...	25.6	...	24.4
40	30.0	28.2	27.5	27.0	26.5	...	25.6	...	24.4
41	30.0	28.2	27.5	27.0	26.5	...	25.6	...	24.4
42	30.0	28.2	27.5	27.0	26.5	...	25.6	...	24.4
43	30.0	28.2	27.5	27.0	26.5	...	25.6	...	24.4
44	30.0	28.2	27.5	27.0	26.5	...	25.6	...	24.4
45	30.0	28.2	27.5	27.0	26.5	...	25.6	...	24.4

Table Y-1
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Ferrous Materials
1	...	15.3	14.8	14.3	13.8	13.4	13.0	12.6	12.3	11.9
2	...	15.3	14.8	14.3	13.8	13.4	13.0	12.6	12.3	11.9
3	...	17.2	16.7	16.1	15.6	15.1	14.6	14.2	13.8	13.4
4	...	18.4	17.8	17.2	16.6	16.1	15.6	15.2	14.7	14.3
5	...	18.4	17.8	17.2	16.6	16.1	15.6	15.2	14.7	14.3
6	...	18.4	17.8	17.2	16.6	16.1	15.6	15.2	14.7	14.3
7	...	18.4	17.8	17.2	16.6	16.1	15.6	15.2	14.7	14.3
8	...	19.2	18.5	17.9	17.3	16.8	16.3	15.8	15.4	14.9
9	...	19.9	19.3	18.6	18.0	17.4	16.9	16.4	16.0	15.5
10	...	19.9	19.3	18.6	18.0	17.4	16.9	16.4	16.0	15.5
11	...	19.9	19.3	18.6	18.0	17.4	16.9	16.4	16.0	15.5
12	...	19.9	19.3	18.6	18.0	17.4	16.9	16.4	16.0	15.5
13	...	19.9	19.3	18.6	18.0	17.4	16.9	16.4	16.0	15.5
14	...	19.9	19.3	18.6	18.0	17.4	16.9	16.4	16.0	15.5
15	...	23.0	22.2	21.5	20.8	20.1	19.5	19.0	18.4	17.8
16	...	23.0	22.2	21.5	20.8	20.1	19.5	19.0	18.4	17.8
17	...	23.0	22.2	21.5	20.8	20.1	19.5	19.0	18.4	17.8
18	...	23.0	22.2	21.5	20.8	20.1	19.5	19.0	18.4	17.8
19	...	23.0	22.2	21.5	20.8	20.1	19.5	19.0	18.4	17.8
20	...	23.0	22.2	21.5	20.8	20.1	19.5	19.0	18.4	17.8
21	...	19.2	18.5	17.9	17.3	16.8	16.3	15.8	15.4	14.9
22	...	20.7	20.0	19.3	18.7	18.1	17.6	17.1	16.6	16.0
23	...	20.7	20.0	19.3	18.7	18.1	17.6	17.1	16.6	16.0
24	...	20.7	20.0	19.3	18.7	18.1	17.6	17.1	16.6	16.0
25	...	20.7	20.0	19.3	18.7	18.1	17.6	17.1	16.6	16.0
26	...	23.0	22.2	21.5	20.8	20.1	19.5	19.0	18.4	17.8
27	...	23.9	23.1	22.3	21.6	20.9	20.3	19.7	19.2	18.5
28	...	23.8	...	22.2	21.5	20.8	20.2	19.6	19.0	18.4
29	24.7	23.9	23.1	22.3	21.6	20.9	20.3	19.7	19.2	18.5
30	...	25.0	24.2	23.4	22.6	21.9	21.2	20.6	20.0	19.4
31	25.8	25.0	24.2	23.4	22.6	21.9	21.2	20.6	20.0	19.4
32	27.0	26.1	25.3	24.4	23.6	22.8	22.2	21.5	20.9	20.3
33	28.3	27.7	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...
35	...	21.1	20.4	19.7	19.0	18.4	17.9	17.4	16.9	16.3
36	...	23.0	22.2	21.5	20.8	20.1	19.5	19.0	18.4	17.8
37	...	23.0	22.2	21.5	20.8	20.1	19.5	19.0	18.4	17.8
38	...	23.0	22.2	21.5	20.8	20.1	19.5	19.0	18.4	17.8
39	...	23.0	22.2	21.5	20.8	20.1	19.5	19.0	18.4	17.8
40	...	23.0	22.2	21.5	20.8	20.1	19.5	19.0	18.4	17.8
41	...	23.0	22.2	21.5	20.8	20.1	19.5	19.0	18.4	17.8
42	...	23.0	22.2	21.5	20.8	20.1	19.5	19.0	18.4	17.8
43	...	23.0	22.2	21.5	20.8	20.1	19.5	19.0	18.4	17.8
44	...	23.0	22.2	21.5	20.8	20.1	19.5	19.0	18.4	17.8
45	...	23.0	22.2	21.5	20.8	20.1	19.5	19.0	18.4	17.8

Table Y-1
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding												
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
	Ferrous Materials												
1	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	... (**21**)
34	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
		Ferrous Materials (Cont'd)					
	1	Carbon steel	Wld. pipe	SA–672	B55	K02001	...
	2	Carbon steel	Wld. pipe	SA–672	C55	K01800	...
	3	Carbon steel	Wld. pipe	SA–672	E55	K02202	...
	4	Carbon steel	Sheet	SA–414	C	K02503	...
(**21**)	5	Carbon steel	Sheet, strip	SA–1011	40	SS	...
(**21**)	6	Carbon steel	Sheet, strip	SA–1011	45	HSLAS	2
	7	Carbon steel	Plate	SA/EN 10028–3	P275NH	...	...
	8	Carbon steel	Plate	SA/EN 10028–3	P275NH	...	...
	9	Carbon steel	Plate	SA/EN 10028–3	P275NH	...	...
	10	Carbon steel	Plate, sheet, bar	SA–36	...	K02600	...
	11	Carbon steel	Plate, sheet	SA–662	A	K01701	...
(**21**)	12	Carbon steel	Sheet, strip	SA–1011	36	SS	Type 2
	13	Carbon steel	Plate, bar, shapes	SA/IS 2062	E250A	...	...
(**21**)	14	Carbon steel	Plate, bar, shapes	SA/IS 2062	E250BR	...	...
(**21**)	15	Carbon steel	Plate, bar, shapes	SA/IS 2062	E250BO	...	...
	16	Carbon steel	Plate, bar, shapes	SA/IS 2062	E250C	...	...
	17	Carbon steel	Plate, bar, shapes	SA/IS 2062	E250A	...	...
(**21**)	18	Carbon steel	Plate, bar, shapes	SA/IS 2062	E250BR	...	...
(**21**)	19	Carbon steel	Plate, bar, shapes	SA/IS 2062	E250BO	...	...
	20	Carbon steel	Plate, bar, shapes	SA/IS 2062	E250C	...	...
	21	Carbon steel	Plate	SA/EN 10028–2	P265GH	...	...
	22	Carbon steel	Smls. tube	SA/EN 10216–2	P265GH	...	...
	23	Carbon steel	Plate, bar, shapes	SA/IS 2062	E250A	...	...
(**21**)	24	Carbon steel	Plate, bar, shapes	SA/IS 2062	E250BR	...	...
(**21**)	25	Carbon steel	Plate, bar, shapes	SA/IS 2062	E250BO	...	...
	26	Carbon steel	Plate, bar, shapes	SA/IS 2062	E250C	...	...
	27	Carbon steel	Smls. tube	SA/EN 10216–2	P265GH	...	...
	28	Carbon steel	Smls. tube	SA/EN 10216–2	P265GH	...	...
	29	Carbon steel	Forgings	SA–181	...	K03502	60
	30	Carbon steel	Castings	SA–216	WCA	J02502	...
	31	Carbon steel	Forgings	SA–266	1	K03506	...
	32	Carbon steel	Forgings	SA–350	LF1	K03009	1
	33	Carbon steel	Castings	SA–352	LCA	J02504	...
	34	Carbon steel	Cast pipe	SA–660	WCA	J02504	...
	35	Carbon steel	Bar	SA–675	60	...	...
	36	Carbon steel	Forgings	SA–765	I	K03046	...
	37	Carbon steel	Plate	SA–515	60	K02401	...
	38	Carbon steel	Plate	SA–516	60	K02100	...
	39	Carbon steel	Wld. pipe	SA–671	CB60	K02401	...
	40	Carbon steel	Wld. pipe	SA–671	CC60	K02100	...
	41	Carbon steel	Wld. pipe	SA–671	CE60	K02402	...
	42	Carbon steel	Wld. pipe	SA–672	B60	K02401	...
	43	Carbon steel	Wld. pipe	SA–672	C60	K02100	...
	44	Carbon steel	Wld. pipe	SA–672	E60	K02402	...
	45	Carbon steel	Wld. pipe	SA–134	A283D	K02702	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Ferrous Materials (Cont'd)
1	...	55	30	...
2	...	55	30	...
3	...	55	30	...
4	...	55	33	...
5	$t \le 0.23$	55	40	...
6	...	55	45	...
7	$1\frac{1}{2} < t \le 2\frac{1}{4}$	56.5	37	...
8	$\frac{5}{8} < t \le 1\frac{1}{2}$	56.5	38.5	...
9	$\le \frac{5}{8}$	56.5	40	...
10	...	58	36	...
11	...	58	40	...
12	$t \le 0.23$	58	36	...
13	$t > 1\frac{1}{2}$	59.5	33.4	...
14	$t > 1\frac{1}{2}$	59.5	33.4	...
15	$t > 1\frac{1}{2}$	59.5	33.4	...
16	$t > 1\frac{1}{2}$	59.5	33.4	...
17	$\frac{3}{4} < t \le 1\frac{1}{2}$	59.5	34.8	...
18	$\frac{3}{4} < t \le 1\frac{1}{2}$	59.5	34.8	...
19	$\frac{3}{4} < t \le 1\frac{1}{2}$	59.5	34.8	...
20	$\frac{3}{4} < t \le 1\frac{1}{2}$	59.5	34.8	...
21	$\le 2\frac{1}{4}$	59.5	35.5	...
22	$1\frac{5}{8} < t \le 2\frac{1}{2}$	59.5	35.5	...
23	$\le \frac{3}{4}$	59.5	36.3	...
24	$\le \frac{3}{4}$	59.5	36.3	...
25	$\le \frac{3}{4}$	59.5	36.3	...
26	$\le \frac{3}{4}$	59.5	36.3	...
27	$\frac{5}{8} < t \le 1\frac{5}{8}$	59.5	37	...
28	$t \le \frac{5}{8}$	59.5	38.5	...
29	...	60	30	...
30	...	60	30	...
31	...	60	30	...
32	...	60	30	...
33	...	60	30	...
34	...	60	30	...
35	...	60	30	...
36	...	60	30	...
37	...	60	32	...
38	...	60	32	...
39	...	60	32	...
40	...	60	32	...
41	...	60	32	...
42	...	60	32	...
43	...	60	32	...
44	...	60	32	...
45	...	60	33	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Ferrous Materials (Cont'd)								
1	30.0	28.2	27.5	27.0	26.5	...	25.6	...	24.4
2	30.0	28.2	27.5	27.0	26.5	...	25.6	...	24.4
3	30.0	28.2	27.5	27.0	26.5	...	25.6	...	24.4
4	33.0	31.0	30.2	29.7	29.2	...	28.2	...	26.9
5	40.0	37.6	36.6	36.0	35.4	34.6	34.2	33.6	32.6
6	45.0	42.3	41.4	40.4	39.5	38.9	38.5	37.7	36.7
7	37.0	34.7	33.9	...	32.7	...	31.6	...	30.1
8	38.5	36.2	35.3	...	34.1	...	32.9	...	31.3
9	40.0	37.4	36.5	...	35.3	...	34.1	...	32.5
10	36.0	33.8	33.0	32.4	31.8	...	30.8	...	29.3
11	40.0	37.6	36.6	36.0	35.4	...	34.2	...	32.6
12	36.0	33.8	33.1	32.4	31.6	31.2	30.8	30.2	29.3
13	33.4	...	30.5	...	29.5	...	28.5	...	27.2
14	33.4	...	30.5	...	29.5	...	28.5	...	27.2
15	33.4	...	30.5	...	29.5	...	28.5	...	27.2
16	33.4	...	30.5	...	29.5	...	28.5	...	27.2
17	34.8	...	31.8	...	30.8	...	29.8	...	28.4
18	34.8	...	31.8	...	30.8	...	29.8	...	28.4
19	34.8	...	31.8	...	30.8	...	29.8	...	28.4
20	34.8	...	31.8	...	30.8	...	29.8	...	28.4
21	35.5	...	32.5	...	31.4	...	30.3	...	28.9
22	35.5	33.4	32.6	31.9	31.4	30.9	30.4	29.7	29.0
23	36.3	...	33.1	...	32.1	...	31.0	...	29.6
24	36.3	...	33.1	...	32.1	...	31.0	...	29.6
25	36.3	...	33.1	...	32.1	...	31.0	...	29.6
26	36.3	...	33.1	...	32.1	...	31.0	...	29.6
27	37.0	34.8	33.9	33.3	32.7	32.2	31.6	30.9	30.1
28	38.4	36.1	35.2	34.6	34.0	33.5	32.8	32.1	31.3
29	30.0	28.2	27.5	27.0	26.5	...	25.6	...	24.4
30	30.0	28.2	27.5	27.0	26.5	...	25.6	...	24.4
31	30.0	28.2	27.5	27.0	26.5	...	25.6	...	24.4
32	30.0	28.2	27.5	27.0	26.5	...	25.6	...	24.4
33	30.0	28.2	27.5	27.0	26.5	...	25.6	...	24.4
34	30.0	28.2	27.5	27.0	26.5	...	25.6	...	24.4
35	30.0	28.2	27.5	27.0	26.5	...	25.6	...	24.4
36	30.0	28.2	27.5	27.0	26.5	...	25.6	...	24.4
37	32.0	30.1	29.3	28.8	28.3	...	27.3	...	26.1
38	32.0	30.1	29.3	28.8	28.3	...	27.3	...	26.1
39	32.0	30.1	29.3	28.8	28.3	...	27.3	...	26.1
40	32.0	30.1	29.3	28.8	28.3	...	27.3	...	26.1
41	32.0	30.1	29.3	28.8	28.3	...	27.3	...	26.1
42	32.0	30.1	29.3	28.8	28.3	...	27.3	...	26.1
43	32.0	30.1	29.3	28.8	28.3	...	27.3	...	26.1
44	32.0	30.1	29.3	28.8	28.3	...	27.3	...	26.1
45	33.0	31.0	30.2	29.7	29.2	...	28.2	...	26.9

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Ferrous Materials (Cont'd)
1	...	23.0	22.2	21.5	20.8	20.1	19.5	19.0	18.4	17.8
2	...	23.0	22.2	21.5	20.8	20.1	19.5	19.0	18.4	17.8
3	...	23.0	22.2	21.5	20.8	20.1	19.5	19.0	18.4	17.8
4	...	25.3	24.5	23.6	22.8	22.1	21.5	20.9	20.3	19.6
5	31.4	30.7	...	...	...	...	...	...	...	...
6	35.4	34.6	...	...	...	...	...	...	...	...
7	...	28.3	27.4	26.5	25.6	24.8	24.1	23.4	22.7	22.0
8	...	29.5	28.5	27.5	26.6	25.8	25.0	24.3	23.6	22.9
9	...	30.6	29.6	28.6	27.6	26.7	25.9	25.2	24.5	23.7
10	...	27.6	26.7	25.8	24.9	24.1	23.4	22.8	22.1	21.4
11	...	30.7	29.6	28.6	27.7	26.8	26.0	25.3	24.6	23.8
12	28.3	27.7	...	...	...	...	...	...	...	...
13	...	25.6	24.7	23.8	...	...	...	...	...	...
14	...	25.6	24.7	23.8	...	...	...	...	...	...
15	...	25.6	24.7	23.8	...	...	...	...	...	...
16	...	25.6	24.7	23.8	...	...	...	...	...	...
17	...	26.7	25.8	24.9	...	...	...	...	...	...
18	...	26.7	25.8	24.9	...	...	...	...	...	...
19	...	26.7	25.8	24.9	...	...	...	...	...	...
20	...	26.7	25.8	24.9	...	...	...	...	...	...
21	...	27.2	26.3	25.4	24.6	23.8	23.1	22.4	21.8	21.1
22	28.1	27.2	26.3	25.4	24.6	23.8	23.1	22.5	21.8	21.1
23	...	27.8	26.8	25.9	...	...	...	...	...	...
24	...	27.8	26.8	25.9	...	...	...	...	...	...
25	...	27.8	26.8	25.9	...	...	...	...	...	...
26	...	27.8	26.8	25.9	...	...	...	...	...	...
27	29.3	28.4	27.4	26.5	25.6	24.8	24.1	23.4	22.7	22.0
28	30.4	29.5	28.5	27.5	26.6	25.8	25.0	24.3	23.6	22.8
29	...	23.0	22.2	21.5	20.8	20.1	19.5	19.0	18.4	17.8
30	...	23.0	22.2	21.5	20.8	20.1	19.5	19.0	18.4	17.8
31	...	23.0	22.2	21.5	20.8	20.1	19.5	19.0	18.4	17.8
32	...	23.0	22.2	21.5	20.8	20.1	19.5	19.0	18.4	17.8
33	...	23.0	22.2	21.5	20.8	20.1	19.5	19.0	18.4	17.8
34	...	23.0	22.2	21.5	20.8	20.1	19.5	19.0	18.4	17.8
35	...	23.0	22.2	21.5	20.8	20.1	19.5	19.0	18.4	17.8
36	...	23.0	22.2	21.5	20.8	20.1	19.5	19.0	18.4	17.8
37	...	24.5	23.7	22.9	22.2	21.5	20.8	20.2	19.7	19.0
38	...	24.5	23.7	22.9	22.2	21.5	20.8	20.2	19.7	19.0
39	...	24.5	23.7	22.9	22.2	21.5	20.8	20.2	19.7	19.0
40	...	24.5	23.7	22.9	22.2	21.5	20.8	20.2	19.7	19.0
41	...	24.5	23.7	22.9	22.2	21.5	20.8	20.2	19.7	19.0
42	...	24.5	23.7	22.9	22.2	21.5	20.8	20.2	19.7	19.0
43	...	24.5	23.7	22.9	22.2	21.5	20.8	20.2	19.7	19.0
44	...	24.5	23.7	22.9	22.2	21.5	20.8	20.2	19.7	19.0
45	...	25.3	24.5	23.6	22.8	22.1	21.5	20.9	20.3	19.6

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Ferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
6	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
7	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
13	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
15	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
19	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
25	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
26	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
	Ferrous Materials (Cont'd)					
1	Carbon steel	Plate	SA–283	D	K02702	...
2	Carbon steel	Wld. pipe	SA–53	E/B	K03005	...
3	Carbon steel	Smls. pipe	SA–53	S/B	K03005	...
4	Carbon steel	Smls. pipe	SA–106	B	K03006	...
5	Carbon steel	Wld. pipe	SA–135	B	...	...
6	Carbon steel	Smls. & wld. fittings	SA–234	WPB	K03006	...
7	Carbon steel	Smls. & wld. pipe	SA–333	6	K03006	...
8	Carbon steel	Smls. & wld. tube	SA–334	6	K03006	...
9	Carbon steel	Forged pipe	SA–369	FPB	K03006	...
10	Carbon steel	Forgings	SA–372	A	K03002	...
11	Carbon steel	Sheet	SA–414	D	K02505	...
12	Carbon steel	Smls. & wld. fittings	SA–420	WPL6	...	...
13	Carbon steel	Smls. pipe	SA–524	I	K02104	...
14	Carbon steel	Bar	SA–696	B	K03200	...
15	Carbon steel	Bolting	SA–307	A	...	...
16	Carbon steel	Bolting	SA–307	B	...	...
17	Carbon steel	Forgings	SA–727	...	K02506	...
18	Carbon steel	Wld. tube	SA–178	C	K03503	...
19	Carbon steel	Smls. tube	SA–210	A–1	K02707	...
20	Carbon steel	Smls. tube	SA–556	B2	K02707	...
21	Carbon steel	Wld. tube	SA–557	B2	K03007	...
22	Carbon steel	Plate, bar	SA/CSA–G40.21	38W	...	...
(**21**) 23	Carbon steel	Plate, sheet, bar	SA–572	42	...	...
(**21**) 24	Carbon steel	Sheet, strip	SA–1011	45	HSLAS	1
(**21**) 25	Carbon steel	Sheet, strip	SA–1011	45	SS	...
(**21**) 26	Carbon steel	Sheet, strip	SA–1011	50	HSLAS	2
27	Carbon steel	Plate	SA/EN 10028–2	P295GH	...	...
28	Carbon steel	Plate	SA/AS 1548	PT430	...	...
29	Carbon steel	Plate	SA/AS 1548	PT430	...	...
30	Carbon steel	Plate	SA/AS 1548	PT430	...	...
31	Carbon steel	Plate	SA/AS 1548	PT430	...	...
32	Carbon steel	Plate	SA/EN 10028–2	P295GH	...	...
33	Carbon steel	Bar	SA–675	65	...	...
34	Carbon steel	Castings	SA–352	LCB	J03003	...
35	Carbon steel	Plate	SA–515	65	K02800	...
36	Carbon steel	Plate	SA–516	65	K02403	...
37	Carbon steel	Wld. pipe	SA–671	CB65	K02800	...
38	Carbon steel	Wld. pipe	SA–671	CC65	K02403	...
39	Carbon steel	Wld. pipe	SA–672	B65	K02800	...
40	Carbon steel	Wld. pipe	SA–672	C65	K02403	...
41	Carbon steel	Sheet	SA–414	E	K02704	...
42	Carbon steel	Plate	SA–662	B	K02203	...
43	Carbon steel	Plate, bar	SA/CSA–G40.21	44W	...	...
44	Carbon steel	Plate, bar	SA/CSA–G40.21	44W	...	...
45	Carbon steel	Plate	SA–537	...	K12437	1

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Ferrous Materials (Cont'd)
1	...	60	33	...
2	...	60	35	...
3	...	60	35	...
4	...	60	35	...
5	...	60	35	...
6	...	60	35	...
7	...	60	35	...
8	...	60	35	...
9	...	60	35	...
10	...	60	35	...
11	...	60	35	...
12	...	60	35	...
13	...	60	35	...
14	...	60	35	...
15	$\frac{1}{4} \le t \le 4$	60	36	...
16	...	60	36	...
17	...	60	36	...
18	...	60	37	...
19	...	60	37	...
20	...	60	37	...
21	...	60	37	...
22	...	60	38	...
23	$t \le 6$	60	42	...
24	...	60	45	...
25	$t \le 0.23$	60	45	...
26	...	60	50	...
27	$6 < t \le 10$	62.5	32	...
28	$3\frac{1}{4} < t \le 6$	62.5	36.5	...
29	$1\frac{1}{2} < t \le 3\frac{1}{4}$	62.5	39	...
30	$\frac{5}{8} < t \le 1\frac{1}{2}$	62.5	40.5	...
31	$\le\frac{5}{8}$	62.5	43.5	...
32	$4 < t \le 6$	64	34	...
33	...	65	32.5	...
34	...	65	35	...
35	...	65	35	...
36	...	65	35	...
37	...	65	35	...
38	...	65	35	...
39	...	65	35	...
40	...	65	35	...
41	...	65	38	...
42	...	65	40	...
43	$2\frac{1}{2} < t \le 8$	65	40	...
44	$t \le 2\frac{1}{2}$	65	44	...
45	$2\frac{1}{2} < t \le 4$	65	45	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Ferrous Materials (Cont'd)								
1	33.0	31.0	30.2	29.7	29.2	...	28.2	...	26.9
2	35.0	32.9	32.1	31.5	31.0	...	29.9	...	28.5
3	35.0	32.9	32.1	31.5	31.0	...	29.9	...	28.5
4	35.0	32.9	32.1	31.5	31.0	...	29.9	...	28.5
5	35.0	32.9	32.1	31.5	31.0	...	29.9	...	28.5
6	35.0	32.9	32.1	31.5	31.0	...	29.9	...	28.5
7	35.0	32.9	32.1	31.5	31.0	...	29.9	...	28.5
8	35.0	32.9	32.1	31.5	31.0	...	29.9	...	28.5
9	35.0	32.9	32.1	31.5	31.0	...	29.9	...	28.5
10	35.0	32.9	32.1	31.5	31.0	...	29.9	...	28.5
11	35.0	32.9	32.1	31.5	31.0	...	29.9	...	28.5
12	35.0	32.9	32.1	31.5	31.0	...	29.9	...	28.5
13	35.0	32.9	32.1	31.5	31.0	...	29.9	...	28.5
14	35.0	32.9	32.1	31.5	31.0	...	29.9	...	28.5
15	36.0	33.8	33.0	32.4	31.8	...	30.8	...	29.3
16	36.0	33.8	33.0	32.4	31.8	...	30.8	...	29.3
17	36.0	33.8	33.0	32.4	31.8	...	30.8	...	29.3
18	37.0	34.8	33.9	33.3	32.7	...	31.6	...	30.2
19	37.0	34.8	33.9	33.3	32.7	...	31.6	...	30.2
20	37.0	34.8	33.9	33.3	32.7	...	31.6	...	30.2
21	37.0	34.8	33.9	33.3	32.7	...	31.6	...	30.2
22	38.0	35.7	34.8	34.2	33.6	...	32.5	...	31.0
23	42.0	39.5	38.5	37.8	37.2	36.4	35.9	35.2	34.2
24	45.0	42.3	41.3	40.5	39.9	39.0	38.5	37.8	36.7
25	45.0	42.3	41.3	40.5	39.9	39.0	38.5	37.8	36.7
26	50.0	46.3	44.2	42.2	40.5	39.1	37.6	36.5	35.4
27	32.0	30.1	29.3	28.8	28.3	...	27.3	...	26.1
28	36.5	...	33.4	...	32.3	...	31.2	...	29.7
29	39.0	...	35.7	...	34.5	...	33.3	...	31.8
30	40.5	...	37.1	...	35.8	...	34.6	...	33.0
31	43.5	...	39.9	...	38.5	...	37.2	...	35.4
32	34.0	32.0	31.1	30.6	30.1	...	29.1	...	27.7
33	32.5	30.5	29.8	29.2	28.8	...	27.8	...	26.5
34	35.0	32.9	32.1	31.5	31.0	...	29.9	...	28.5
35	35.0	32.9	32.1	31.5	31.0	...	29.9	...	28.5
36	35.0	32.9	32.1	31.5	31.0	...	29.9	...	28.5
37	35.0	32.9	32.1	31.5	31.0	...	29.9	...	28.5
38	35.0	32.9	32.1	31.5	31.0	...	29.9	...	28.5
39	35.0	32.9	32.1	31.5	31.0	...	29.9	...	28.5
40	35.0	32.9	32.1	31.5	31.0	...	29.9	...	28.5
41	38.0	35.7	34.8	34.2	33.6	...	32.5	...	31.0
42	40.0	37.6	36.6	36.0	35.4	...	34.2	...	32.6
43	40.0	37.8	36.8	36.1	35.4	34.8	34.1	...	32.5
44	44.0	41.6	40.5	39.7	39.0	38.2	37.5	...	35.8
45	45.0	42.3	41.2	40.5	39.8	...	38.4	...	36.7

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Ferrous Materials (Cont'd)
1	...	25.3	24.5	23.6	22.8	22.1	21.5	20.9	20.3	19.6
2	...	26.8	25.9	25.1	24.2	23.5	22.8	22.1	21.5	20.8
3	...	26.8	25.9	25.1	24.2	23.5	22.8	22.1	21.5	20.8
4	...	26.8	25.9	25.1	24.2	23.5	22.8	22.1	21.5	20.8
5	...	26.8	25.9	25.1	24.2	23.5	22.8	22.1	21.5	20.8
6	...	26.8	25.9	25.1	24.2	23.5	22.8	22.1	21.5	20.8
7	...	26.8	25.9	25.1	24.2	23.5	22.8	22.1	21.5	20.8
8	...	26.8	25.9	25.1	24.2	23.5	22.8	22.1	21.5	20.8
9	...	26.8	25.9	25.1	24.2	23.5	22.8	22.1	21.5	20.8
10	...	26.8	25.9	25.1	24.2	23.5	22.8	22.1	21.5	20.8
11	...	26.8	25.9	25.1	24.2	23.5	22.8	22.1	21.5	20.8
12	...	26.8	25.9	25.1	24.2	23.5	22.8	22.1	21.5	20.8
13	...	26.8	25.9	25.1	24.2	23.5	22.8	22.1	21.5	20.8
14	...	26.8	25.9	25.1	24.2	23.5	22.8	22.1	21.5	20.8
15	...	27.6	26.7	25.8	...	...	...	...	...	...
16	...	27.6	26.7	25.8	...	...	...	...	...	...
17	...	27.6	26.7	25.8	24.9	24.1	23.4	22.8	22.1	21.4
18	...	28.4	27.4	26.5	25.6	24.8	24.1	23.4	22.7	22.0
19	...	28.4	27.4	26.5	25.6	24.8	24.1	23.4	22.7	22.0
20	...	28.4	27.4	26.5	25.6	24.8	24.1	23.4	22.7	22.0
21	...	28.4	27.4	26.5	25.6	24.8	24.1	23.4	22.7	22.0
22	...	29.1	28.2	27.2	26.3	25.5	24.7	24.0	23.3	21.4
23	33.0	32.2	...	...	...	...	...	...	...	...
24	35.4	34.5	...	...	...	...	...	...	...	...
25	35.4	34.5	...	...	...	...	...	...	...	...
26	34.6	33.7	...	...	...	...	...	...	...	...
27	...	24.5	23.7	22.9	22.2	21.5	20.8	20.2	19.7	19.0
28	...	28.0	27.1	26.1	25.3	24.5	23.7	23.1	22.4	21.7
29	...	29.9	28.9	27.9	27.0	26.1	25.4	24.7	24.0	23.2
30	...	31.0	30.0	29.0	28.0	27.1	26.3	25.6	24.9	24.1
31	...	33.3	32.2	31.1	30.1	29.2	28.3	27.5	26.7	25.9
32	...	26.1	25.2	24.3	23.5	22.8	22.1	21.5	20.9	20.2
33	...	24.9	24.1	23.3	22.5	21.8	21.1	20.5	20.0	19.3
34	...	26.8	25.9	25.1	24.2	23.5	22.8	22.1	21.5	20.8
35	...	26.8	25.9	25.1	24.2	23.5	22.8	22.1	21.5	20.8
36	...	26.8	25.9	25.1	24.2	23.5	22.8	22.1	21.5	20.8
37	...	26.8	25.9	25.1	24.2	23.5	22.8	22.1	21.5	20.8
38	...	26.8	25.9	25.1	24.2	23.5	22.8	22.1	21.5	20.8
39	...	26.8	25.9	25.1	24.2	23.5	22.8	22.1	21.5	20.8
40	...	26.8	25.9	25.1	24.2	23.5	22.8	22.1	21.5	20.8
41	...	29.1	28.2	27.2	26.3	25.5	24.7	24.0	23.3	22.6
42	...	30.7	29.6	28.6	27.7	26.8	26.0	25.3	24.6	23.8
43	31.6	30.7	29.7	28.7	27.7	26.8	26.0	25.2	24.5	23.8
44	34.8	33.7	32.7	31.6	30.5	29.5	28.6	27.7	26.9	26.2
45	...	34.5	33.4	32.2	31.2	30.2	29.3	28.4	27.6	26.7

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Ferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
24	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
25	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
26	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
27	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
		Ferrous Materials (Cont'd)					
	1	Carbon steel	Wld. pipe	SA–691	CMSH–70	K12437	...
	2	Carbon steel	Plate, bar	SA/CSA–G40.21	50W	...	...
	3	Carbon steel	Plate, bar	SA/CSA–G40.21	50W	...	...
(**21**)	4	Carbon steel	Plate, sheet, bar	SA–572	50	...	...
(**21**)	5	Carbon steel	Round bar	SA–572	50	...	...
(**21**)	6	Carbon steel	Sheet, strip	SA–1011	50	SS	...
(**21**)	7	Carbon steel	Sheet, strip	SA–1011	50	HSLAS	1
(**21**)	8	Carbon steel	Sheet, strip	SA–1011	55	HSLAS	2
	9	Carbon steel	Forgings	SA/EN 10222–2	P280GH	...	NT or QT
	10	Carbon steel	Plate	SA/EN 10028–2	P295GH	...	...
	11	Carbon steel	Plate	SA/AS 1548	PT460	...	...
	12	Carbon steel	Plate	SA/AS 1548	PT460	...	...
	13	Carbon steel	Forgings	SA/EN 10222–2	P280GH	...	Normalized
	14	Carbon steel	Plate	SA/EN 10028–2	P295GH	...	...
	15	Carbon steel	Plate	SA/EN 10028–2	P295GH	...	...
	16	Carbon steel	Plate	SA/AS 1548	PT460	...	...
	17	Carbon steel	Plate	SA/EN 10028–2	P295GH	...	...
	18	Carbon steel	Plate	SA/AS 1548	PT460	...	...
(**21**)	19	Carbon steel	Plate	SA/GB 713	Q345R	...	...
	20	Carbon steel	Plate	SA/EN 10028–2	P355GH	...	...
	21	Carbon steel	Plate	SA/EN 10025–2	S355J2+N	...	...
	22	Carbon steel	Plate	SA/EN 10025–2	S355J2+N	...	...
	23	Carbon steel	Plate	SA/EN 10025–2	S355J2+N	...	...
	24	Carbon steel	Plate	SA/EN 10025–2	S355J2+N	...	...
	25	Carbon steel	Plate	SA/GB 713	Q345R	...	...
	26	Carbon steel	Plate	SA/EN 10028–2	P355GH	...	...
	27	Carbon steel	Plate	SA–455	...	K03300	...
	28	Carbon steel	Bar	SA–675	70	...	...
	29	Carbon steel	Forgings	SA–105	...	K03504	...
	30	Carbon steel	Forgings	SA–181	...	K03502	70
	31	Carbon steel	Castings	SA–216	WCB	J03002	...
	32	Carbon steel	Forgings	SA–266	2	K03506	...
	33	Carbon steel	Forgings	SA–266	4	K03017	...
	34	Carbon steel	Forgings	SA–350	LF2	K03011	...
	35	Carbon steel	Forgings	SA–508	1	K13502	...
	36	Carbon steel	Forgings	SA–508	1A	K13502	...
	37	Carbon steel	Forgings	SA–541	1	K03506	...
	38	Carbon steel	Forgings	SA–541	1A	K03020	...
	39	Carbon steel	Cast pipe	SA–660	WCB	J03003	...
	40	Carbon steel	Forgings	SA–765	II	K03047	...
	41	Carbon steel	Plate	SA–515	70	K03101	...
	42	Carbon steel	Plate	SA–516	70	K02700	...
	43	Carbon steel	Wld. pipe	SA–671	CB70	K03101	...
	44	Carbon steel	Wld. pipe	SA–671	CC70	K02700	...
	45	Carbon steel	Wld. pipe	SA–672	B70	K03101	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Ferrous Materials (Cont'd)
1	$2\frac{1}{2} < t \le 4$	65	45	...
2	$2\frac{1}{2} < t \le 6$	65	46	...
3	$t \le 2\frac{1}{2}$	65	50	...
4	$t \le 4$	65	50	...
5	$t \le 11$	65	50	...
6	$t \le 0.23$	65	50	...
7	...	65	50	...
8	...	65	55	...
9	$1.4 < t \le 6.3$	66.5	37	...
10	$2\frac{1}{4} < t \le 4$	66.5	37.5	...
11	$3\frac{1}{4} < t \le 6$	66.5	38.5	...
12	$1\frac{1}{2} < t \le 3\frac{1}{4}$	66.5	40	...
13	$t \le 1.4$	66.5	40.5	...
14	$1\frac{1}{2} < t \le 2\frac{1}{4}$	66.5	41.5	...
15	$\frac{5}{8} < t \le 1\frac{1}{2}$	66.5	42	...
16	$\frac{5}{8} < t \le 1\frac{1}{2}$	66.5	43	...
17	$\le\frac{5}{8}$	66.5	43	...
18	$\le\frac{5}{8}$	66.5	44	...
19	$6 < t \le 10$	68	38.5	...
20	$6 < t \le 10$	68	40.5	...
21	$2.48 < t \le 3.15$	68	47	...
22	$1.57 < t \le 2.48$	68	48.5	...
23	$0.63 < t \le 1.57$	68	50	...
24	$0.12 \le t \le 0.63$	68	51.5	...
25	$4 < t \le 6$	69.5	41.5	...
26	$4 < t \le 6$	69.5	43	...
27	$0.58 < t \le \frac{3}{4}$	70	35	...
28	...	70	35	...
29	...	70	36	...
30	...	70	36	...
31	...	70	36	...
32	...	70	36	...
33	...	70	36	...
34	...	70	36	...
35	...	70	36	...
36	...	70	36	...
37	...	70	36	...
38	...	70	36	...
39	...	70	36	...
40	...	70	36	...
41	...	70	38	...
42	...	70	38	...
43	...	70	38	...
44	...	70	38	...
45	...	70	38	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Ferrous Materials (Cont'd)								
1	45.0	42.3	41.2	40.5	39.8	...	38.4	...	36.7
2	46.0	43.4	42.4	41.5	40.7	40.0	39.2	...	37.4
3	50.0	47.2	46.0	45.1	44.3	43.5	42.6	...	40.6
4	50.0	46.3	44.2	42.2	40.5	39.1	37.6	36.5	35.4
5	50.0	46.3	44.2	42.2	40.5	39.1	37.6	36.5	35.4
6	50.0	46.3	44.2	42.2	40.5	39.1	37.6	36.5	35.4
7	50.0	46.3	44.2	42.2	40.5	39.1	37.6	36.5	35.4
8	55.0	51.0	48.6	46.4	44.5	42.8	41.3	40.2	38.9
9	37.0	34.6	33.7	33.0	32.5	32.0	31.4	...	29.9
10	37.5	35.2	34.4	33.7	33.2	...	32.0	...	30.6
11	38.5	...	35.3	...	34.1	...	32.9	...	31.4
12	40.0	...	36.6	...	35.4	...	34.2	...	32.6
13	40.6	38.0	37.0	36.3	35.7	35.1	34.4	...	32.9
14	41.5	39.0	38.0	37.3	36.7	...	35.5	...	33.8
15	42.0	39.5	38.5	37.8	37.2	...	35.9	...	34.2
16	43.0	...	39.4	...	38.0	...	36.7	...	35.0
17	43.0	40.4	39.4	38.7	38.0	...	36.7	...	35.0
18	44.0	...	40.3	...	38.9	...	37.6	...	35.9
19	38.4	36.1	35.2	34.6	34.1	33.5	32.9	...	31.4
20	40.6	...	37.1	...	35.9	...	34.7	...	33.1
21	47.1	...	...	...	...	...	...	...	...
22	48.6	...	...	...	...	...	...	...	...
23	50.0	...	...	...	...	...	...	...	...
24	51.5	...	...	...	...	...	...	...	...
25	41.3	38.8	37.9	37.2	36.6	36.0	35.4	34.5	33.7
26	42.8	...	39.1	...	37.9	...	36.6	...	34.9
27	35.0	32.9	32.1	31.5	31.0	...	29.9	...	28.5
28	35.0	32.9	32.1	31.5	31.0	...	29.9	...	28.5
29	36.0	33.8	33.0	32.4	31.8	...	30.8	...	29.3
30	36.0	33.8	33.0	32.4	31.8	...	30.8	...	29.3
31	36.0	33.8	33.0	32.4	31.8	...	30.8	...	29.3
32	36.0	33.8	33.0	32.4	31.8	...	30.8	...	29.3
33	36.0	33.8	33.0	32.4	31.8	...	30.8	...	29.3
34	36.0	33.8	33.0	32.4	31.8	...	30.8	...	29.3
35	36.0	33.8	33.0	32.4	31.8	...	30.8	...	29.3
36	36.0	33.8	33.0	32.4	31.8	...	30.8	...	29.3
37	36.0	33.8	33.0	32.4	31.8	...	30.8	...	29.3
38	36.0	33.8	33.0	32.4	31.8	...	30.8	...	29.3
39	36.0	33.8	33.0	32.4	31.8	...	30.8	...	29.3
40	36.0	33.8	33.0	32.4	31.8	...	30.8	...	29.3
41	38.0	35.7	34.8	34.2	33.6	...	32.5	...	31.0
42	38.0	35.7	34.8	34.2	33.6	...	32.5	...	31.0
43	38.0	35.7	34.8	34.2	33.6	...	32.5	...	31.0
44	38.0	35.7	34.8	34.2	33.6	...	32.5	...	31.0
45	38.0	35.7	34.8	34.2	33.6	...	32.5	...	31.0

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Ferrous Materials (Cont'd)
1	...	34.5	33.4	32.2	31.2	30.2	29.3	28.4	27.6	26.7
2	36.4	35.3	34.1	33.0	31.9	30.9	29.9	29.0	28.2	27.4
3	39.5	38.3	37.1	35.9	34.7	33.5	32.5	31.5	30.6	29.8
4	34.6	33.7	...	...	...	...	...	...	...	...
5	34.6	33.7	...	...	...	...	...	...	...	...
6	34.6	33.7	...	...	...	...	...	...	...	...
7	34.6	33.7	...	...	...	...	...	...	...	...
8	37.8	37.1	...	...	...	...	...	...	...	...
9	29.1	28.2	27.2	26.3	25.4	24.6	23.8	23.2	22.5	21.9
10	...	28.7	27.8	26.9	26.0	25.1	24.4	23.7	23.0	22.3
11	...	29.5	28.5	27.6	26.7	25.8	25.0	24.3	23.6	22.9
12	...	30.7	29.6	28.6	27.7	26.8	26.0	25.3	24.6	23.8
13	31.9	30.9	29.9	28.9	27.9	27.0	26.2	25.4	24.8	24.1
14	...	31.8	30.8	29.7	28.7	27.8	27.0	26.2	25.5	24.7
15	...	32.2	31.1	30.1	29.1	28.2	27.3	26.5	25.8	25.0
16	...	33.0	31.9	30.8	29.8	28.8	28.0	27.2	26.4	25.6
17	...	33.0	31.9	30.8	29.8	28.8	28.0	27.2	26.4	25.6
18	...	33.7	32.6	31.5	30.5	29.5	28.6	27.8	27.0	26.2
19	30.5	29.5	28.5	27.5	26.6	25.8	25.0	24.3	23.6	22.8
20	...	31.1	30.1	29.0	28.1	27.2	26.4	25.7	25.0	24.2
21	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...
25	32.7	31.7	30.7	29.6	28.6	27.7	26.9	26.1	25.3	24.5
26	...	32.8	31.7	30.6	29.6	28.6	27.8	27.0	26.3	25.5
27	...	26.8	25.9	25.1	24.2	23.5	22.8	22.1	21.5	20.8
28	...	26.8	25.9	25.1	24.2	23.5	22.8	22.1	21.5	20.8
29	...	27.6	26.7	25.8	24.9	24.1	23.4	22.8	22.1	21.4
30	...	27.6	26.7	25.8	24.9	24.1	23.4	22.8	22.1	21.4
31	...	27.6	26.7	25.8	24.9	24.1	23.4	22.8	22.1	21.4
32	...	27.6	26.7	25.8	24.9	24.1	23.4	22.8	22.1	21.4
33	...	27.6	26.7	25.8	24.9	24.1	23.4	22.8	22.1	21.4
34	...	27.6	26.7	25.8	24.9	24.1	23.4	22.8	22.1	21.4
35	...	27.6	26.7	25.8	24.9	24.1	23.4	22.8	22.1	21.4
36	...	27.6	26.7	25.8	24.9	24.1	23.4	22.8	22.1	21.4
37	...	27.6	26.7	25.8	24.9	24.1	23.4	22.8	22.1	21.4
38	...	27.6	26.7	25.8	24.9	24.1	23.4	22.8	22.1	21.4
39	...	27.6	26.7	25.8	24.9	24.1	23.4	22.8	22.1	21.4
40	...	27.6	26.7	25.8	24.9	24.1	23.4	22.8	22.1	21.4
41	...	29.1	28.2	27.2	26.3	25.5	24.7	24.0	23.3	22.6
42	...	29.1	28.2	27.2	26.3	25.5	24.7	24.0	23.3	22.6
43	...	29.1	28.2	27.2	26.3	25.5	24.7	24.0	23.3	22.6
44	...	29.1	28.2	27.2	26.3	25.5	24.7	24.0	23.3	22.6
45	...	29.1	28.2	27.2	26.3	25.5	24.7	24.0	23.3	22.6

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Ferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
5	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
6	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
7	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
8	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
9	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
	Ferrous Materials (Cont'd)					
1	Carbon steel	Wld. pipe	SA–672	C70	K02700	...
2	Carbon steel	Smls. pipe	SA–106	C	K03501	...
3	Carbon steel	Wld. tube	SA–178	D	...	...
4	Carbon steel	Smls. tube	SA–210	C	K03501	...
5	Carbon steel	Castings	SA–216	WCC	J02503	...
6	Carbon steel	Smls. & wld. fittings	SA–234	WPC	K03501	...
7	Carbon steel	Castings	SA–352	LCC	J02505	...
8	Carbon steel	Castings	SA–487	16	...	A
9	Carbon steel	Plate	SA–537	...	K12437	3
10	Carbon steel	Smls. tube	SA–556	C2	K03006	...
11	Carbon steel	Tube	SA–557	C2	K03505	...
12	Carbon steel	Cast pipe	SA–660	WCC	J02505	...
13	Carbon steel	Bar	SA–696	C	K03200	...
14	Carbon steel	Sheet	SA–414	F	K03102	...
15	Carbon steel	Plate	SA–662	C	K02007	...
16	Carbon steel	Plate	SA–537	...	K12437	2
17	Carbon steel	Plate	SA–738	C	K02008	...
18	Carbon steel	Plate	SA–537	...	K12437	1
19	Carbon steel	Wld. pipe	SA–671	CD70	K12437	...
20	Carbon steel	Wld. pipe	SA–672	D70	K12437	...
21	Carbon steel	Wld. pipe	SA–691	CMSH–70	K12437	...
22	Carbon steel	Plate	SA–841	A	...	1
(**21**) 23	Carbon steel	Plate, sheet, bar	SA–572	55	...	...
(**21**) 24	Carbon steel	Round bar	SA–572	55	...	...
(**21**) 25	Carbon steel	Sheet, strip	SA–1011	55	HSLAS	1
(**21**) 26	Carbon steel	Sheet, strip	SA–1011	60	HSLAS	2
27	Carbon steel	Forgings	SA/EN 10222–2	P305GH	...	NT
28	Carbon steel	Forgings	SA/EN 10222–2	P305GH	...	Normalized
29	Carbon steel	Plate	SA/GB 713	Q345R	...	...
30	Carbon steel	Plate	SA/EN 10028–2	P355GH	...	...
31	Carbon steel	Plate	SA/GB 713	Q345R	...	...
32	Carbon steel	Plate	SA/GB 713	Q345R	...	...
33	Carbon steel	Plate	SA–455	...	K03300	...
34	Carbon steel	Forgings	SA/EN 10222–2	P305GH	...	QT
35	Carbon steel	Plate	SA/EN 10028–2	P355GH	...	...
36	Carbon steel	Plate	SA/EN 10028–2	P355GH	...	...
37	Carbon steel	Plate	SA/GB 713	Q345R	...	...
38	Carbon steel	Plate	SA/EN 10025–2	S355J2+N	...	...
39	Carbon steel	Plate	SA/EN 10028–2	P355GH	...	...
40	Carbon steel	Forgings	SA–266	3	K05001	...
41	Carbon steel	Plate	SA–455	...	K03300	...
42	Carbon steel	Plate	SA–299	A	K02803	...
43	Carbon steel	Wld. pipe	SA–671	CK75	K02803	...
44	Carbon steel	Wld. pipe	SA–672	N75	K02803	...
45	Carbon steel	Wld. pipe	SA–691	CMS–75	K02803	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Ferrous Materials (Cont'd)
1	...	70	38	...
2	...	70	40	...
3	...	70	40	...
4	...	70	40	...
5	...	70	40	...
6	...	70	40	...
7	...	70	40	...
8	...	70	40	...
9	$4 < t \le 6$	70	40	...
10	...	70	40	...
11	...	70	40	...
12	...	70	40	...
13	...	70	40	...
14	...	70	42	...
15	...	70	43	...
16	$4 < t \le 6$	70	46	...
17	$4 < t \le 6$	70	46	...
18	$\le 2\frac{1}{2}$	70	50	...
19	$\le 2\frac{1}{2}$	70	50	...
20	$\le 2\frac{1}{2}$	70	50	...
21	$\le 2\frac{1}{2}$	70	50	...
22	≤ 4	70	50	...
23	$t \le 2$	70	55	...
24	$t \le 3\frac{1}{2}$	70	55	...
25	...	70	55	...
26	...	70	60	...
27	$1.4 < t \le 6.3$	71	40.5	...
28	$t \le 1.4$	71	44	...
29	$2\frac{1}{4} < t \le 4$	71	44	...
30	$2.5 < t \le 4$	71	45.5	...
31	$1.5 < t \le 2\frac{1}{4}$	71	45.5	...
32	$\frac{5}{8} < t \le 1.5$	72.5	47	...
33	$\frac{3}{8} < t \le \frac{5}{8}$	73	37	...
34	$t \le 2.8$	74	41.5	...
35	$1.5 < t \le 2.5$	74	48.5	...
36	$\frac{5}{8} < t \le 1.5$	74	50	...
37	$\frac{1}{8} \le t \le \frac{5}{8}$	74	50	...
38	$t < 0.12$	74	51.5	...
39	$\le \frac{5}{8}$	74	51.5	...
40	...	75	37.5	...
41	$\le \frac{3}{8}$	75	38	...
42	>1	75	40	...
43	>1	75	40	...
44	>1	75	40	...
45	>1	75	40	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Ferrous Materials (Cont'd)								
1	38.0	35.7	34.8	34.2	33.6	...	32.5	...	31.0
2	40.0	37.6	36.6	36.0	35.4	...	34.2	...	32.6
3	40.0	37.6	36.6	36.0	35.4	...	34.2	...	32.6
4	40.0	37.6	36.6	36.0	35.4	...	34.2	...	32.6
5	40.0	37.6	36.6	36.0	35.4	...	34.2	...	32.6
6	40.0	37.6	36.6	36.0	35.4	...	34.2	...	32.6
7	40.0	37.6	36.6	36.0	35.4	...	34.2	...	32.6
8	40.0	37.2	35.7	34.4	33.4	...	31.8	...	30.5
9	40.0	37.1	35.3	33.8	32.4	...	30.0	...	28.3
10	40.0	37.6	36.6	36.0	35.4	...	34.2	...	32.6
11	40.0	37.6	36.6	36.0	35.4	...	34.2	...	32.6
12	40.0	37.6	36.6	36.0	35.4	...	34.2	...	32.6
13	40.0	37.6	36.6	36.0	35.4	...	34.2	...	32.6
14	42.0	39.5	38.5	37.8	37.2	...	35.9	...	34.2
15	43.0	40.4	39.4	38.7	38.0	...	36.7	...	35.0
16	46.0	42.6	40.6	38.8	37.2	...	34.6	...	32.5
17	46.0	42.6	40.6	38.8	37.2	...	34.6	...	32.5
18	50.0	46.3	44.2	42.2	40.5	...	37.6	...	35.4
19	50.0	46.3	44.2	42.2	40.5	...	37.6	...	35.4
20	50.0	46.3	44.2	42.2	40.5	...	37.6	...	35.4
21	50.0	46.3	44.2	42.2	40.5	...	37.6	...	35.4
22	50.0	...	46.1	...	43.8	...	42.3	...	41.3
23	55.0	51.0	48.6	46.4	44.5	42.8	41.3	40.2	38.9
24	55.0	51.0	48.6	46.4	44.5	42.8	41.3	40.2	38.9
25	55.0	51.0	48.6	46.4	44.5	42.8	41.3	40.2	38.9
26	60.0	55.8	53.0	50.7	48.6	46.6	45.1	43.9	42.4
27	40.6	38.0	37.0	36.3	35.7	35.1	34.4	...	32.9
28	44.2	41.4	40.3	39.5	38.9	38.2	37.5	...	35.8
29	44.2	41.5	40.6	39.8	39.2	38.6	37.8	37.0	36.1
30	45.7	...	41.7	...	40.4	...	39.1	...	37.3
31	45.7	42.9	41.9	41.1	40.5	39.8	39.1	38.2	37.3
32	47.1	44.3	43.2	42.4	41.8	41.1	40.3	39.4	38.5
33	37.0	34.8	33.9	33.3	32.7	...	31.6	...	30.2
34	41.3	38.7	37.7	36.9	36.3	35.7	35.1	...	33.4
35	48.6	...	44.4	...	43.0	...	41.6	...	39.6
36	50.0	...	45.7	...	44.3	...	42.8	...	40.8
37	50.0	47.0	45.9	45.0	44.3	43.6	42.8	41.9	40.8
38	51.5	...	...	...	...	...	...	...	...
39	51.5	...	47.0	...	45.6	...	44.1	...	42.0
40	37.5	35.2	34.4	33.7	33.2	...	32.0	...	30.6
41	38.0	35.7	34.8	34.2	33.6	...	32.5	...	31.0
42	40.0	37.6	36.6	36.0	35.4	...	34.2	...	32.6
43	40.0	37.6	36.6	36.0	35.4	...	34.2	...	32.6
44	40.0	37.6	36.6	36.0	35.4	...	34.2	...	32.6
45	40.0	37.6	36.6	36.0	35.4	...	34.2	...	32.6

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Ferrous Materials (Cont'd)
1	...	29.1	28.2	27.2	26.3	25.5	24.7	24.0	23.3	22.6
2	...	30.7	29.6	28.6	27.7	26.8	26.0	25.3	24.6	23.8
3	...	30.7	29.6	28.6	27.7	26.8	26.0	25.3	24.6	23.8
4	...	30.7	29.6	28.6	27.7	26.8	26.0	25.3	24.6	23.8
5	...	30.7	29.6	28.6	27.7	26.8	26.0	25.3	24.6	23.8
6	...	30.7	29.6	28.6	27.7	26.8	26.0	25.3	24.6	23.8
7	...	30.7	29.6	28.6	27.7	26.8	26.0	25.3	24.6	23.8
8	...	29.3	28.7	28.0	27.1	26.2	...	...	...	...
9	...	27.0	26.4	25.8	25.2	24.4	...	...	...	...
10	...	30.7	29.6	28.6	27.7	26.8	26.0	25.3	24.6	23.8
11	...	30.7	29.6	28.6	27.7	26.8	26.0	25.3	24.6	23.8
12	...	30.7	29.6	28.6	27.7	26.8	26.0	25.3	24.6	23.8
13	...	30.7	29.6	28.6	27.7	26.8	26.0	25.3	24.6	23.8
14	...	32.2	31.1	30.1	29.1	28.2	27.3	26.5	25.8	25.0
15	...	33.0	31.9	30.8	29.8	28.8	28.0	27.2	26.4	25.6
16	...	31.0	30.3	29.7	28.9	28.1	...	...	...	...
17	...	31.0	30.3	29.7	28.9	28.1	...	...	...	...
18	...	33.7	33.0	32.3	31.5	30.5	...	...	...	...
19	...	33.7	33.0	32.3	31.5	30.5	...	...	...	...
20	...	33.7	33.0	32.3	31.5	30.5	...	...	...	...
21	...	33.7	33.0	32.3	31.5	30.5	...	...	...	...
22	...	40.1	39.3	38.1	36.7	34.9	...	...	...	...
23	37.8	37.1	...	...	...	...	...	...	...	...
24	37.8	37.1	...	...	...	...	...	...	...	...
25	37.8	37.1	...	...	...	...	...	...	...	...
26	41.2	40.5	...	...	...	...	...	...	...	...
27	31.9	30.9	29.9	28.9	27.9	27.0	26.2	25.4	24.8	24.1
28	34.8	33.7	32.6	31.4	30.4	29.4	28.5	27.7	27.0	26.2
29	35.0	33.9	32.8	31.7	30.6	29.7	28.8	27.9	27.1	26.2
30	...	35.0	33.8	32.7	31.6	30.6	29.7	28.9	28.1	27.2
31	36.2	35.1	33.9	32.7	31.6	30.6	29.7	28.8	28.0	27.1
32	37.3	36.2	35.0	33.8	32.6	31.6	30.6	29.8	28.9	28.0
33	...	28.4	27.4	26.5	25.6	24.8	24.1	23.4	22.7	22.0
34	32.5	31.5	30.4	29.4	28.4	27.5	26.6	25.9	25.2	24.5
35	...	37.2	36.0	34.7	33.6	32.5	31.6	30.7	29.9	28.9
36	...	38.3	37.0	35.8	34.6	33.5	32.5	31.6	30.8	29.8
37	39.6	38.4	37.1	35.9	34.7	33.5	32.5	31.6	30.7	29.7
38	...	...	...	...	...	...	...	...	...	...
39	...	39.4	38.1	36.8	35.6	34.5	33.5	32.5	31.6	30.6
40	...	28.7	27.8	26.9	26.0	25.1	24.4	23.7	23.0	22.3
41	...	29.1	28.2	27.2	26.3	25.5	24.7	24.0	23.3	22.6
42	...	30.7	29.6	28.6	27.7	26.8	26.0	25.3	24.6	23.8
43	...	30.7	29.6	28.6	27.7	26.8	26.0	25.3	24.6	23.8
44	...	30.7	29.6	28.6	27.7	26.8	26.0	25.3	24.6	23.8
45	...	30.7	29.6	28.6	27.7	26.8	26.0	25.3	24.6	23.8

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Ferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
24	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
25	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
26	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
27	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
		Ferrous Materials (Cont'd)					
	1	Carbon steel	Plate	SA–299	A	K02803	...
	2	Carbon steel	Wld. pipe	SA–691	CMS–75	K02803	...
	3	Carbon steel	Forgings	SA–372	B	K04001	...
	4	Carbon steel	Sheet	SA–414	G	K03103	...
	5	Carbon steel	Plate	SA–738	A	K12447	...
	6	Carbon steel	Plate	SA–537	...	K12437	3
	7	Carbon steel	Plate	SA–537	...	K12437	2
	8	Carbon steel	Wld. pipe	SA–691	CMSH–80	K12437	...
	9	Carbon steel	Plate	SA–738	C	K02008	...
(**21**)	10	Carbon steel	Plate, sheet, bar	SA–572	60	...	...
(**21**)	11	Carbon steel	Round bar	SA–572	60	...	...
(**21**)	12	Carbon steel	Sheet, strip	SA–1011	60	HSLAS	1
	13	Carbon steel	Plate	SA–299	B	K02803	...
	14	Carbon steel	Plate	SA–299	B	K02803	...
	15	Carbon steel	Forgings	SA–765	IV	K02009	...
	16	Carbon steel	Plate	SA–537	...	K12437	3
	17	Carbon steel	Plate	SA–537	...	K12437	2
	18	Carbon steel	Wld. pipe	SA–671	CD80	K12437	...
	19	Carbon steel	Wld. pipe	SA–672	D80	K12437	...
	20	Carbon steel	Wld. pipe	SA–691	CMSH–80	K12437	...
	21	Carbon steel	Plate	SA–738	C	K02008	...
	22	Carbon steel	Plate	SA–841	B	...	2
(**21**)	23	Carbon steel	Plate, sheet, bar	SA–572	65	...	...
	24	Carbon steel	Plate	SA–612	...	K02900	...
	25	Carbon steel	Plate	SA–841	F	...	6
	26	Carbon steel	Plate	SA–612	...	K02900	...
	27	Carbon steel	Plate	SA–738	B	K12007	...
	28	Carbon steel	Plate	SA–841	F	...	7
	29	Carbon steel	Forgings	SA–372	C	K04801	...
	30	Carbon steel	Bolting	SA–449	...	K04200	...
	31	Carbon steel	Plate	SA–724	A	K11831	...
	32	Carbon steel	Plate	SA–724	C	K12037	...
	33	Carbon steel	Plate	SA–724	B	K12031	...
	34	Carbon steel	Bolting	SA–325	...	...	...
(**21**)	35	Carbon steel	Bolting	SA–325	1	K02706	...
	36	Carbon steel	Bolting	SA–449	...	K04200	...
	37	Carbon steel	Bolting	SA–354	BC	K04100	...
(**21**)	38	Carbon steel	Bolting	SA–325	1	K02706	...
	39	Carbon steel	Bolting	SA–449	...	K04200	...
	40	Carbon steel	Bolting	SA–354	BC	K04100	...
	41	Carbon steel	Bolting	SA–354	BD	K04100	...
	42	Carbon steel	Bolting	SA–354	BD	K04100	...
	43	Carbon steel	Flat wire	SA–905	...	...	2
	44	Carbon steel	Flat wire	SA–905	...	...	2
	45	Carbon steel	Flat wire	SA–905	...	...	2

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Ferrous Materials (Cont'd)
1	≤1	75	42	...
2	≤1	75	42	...
3	...	75	45	...
4	...	75	45	...
5	...	75	45	...
6	$2\frac{1}{2} < t \le 4$	75	50	...
7	$2\frac{1}{2} < t \le 4$	75	55	...
8	$2\frac{1}{2} < t \le 4$	75	55	...
9	$2\frac{1}{2} < t \le 4$	75	55	...
10	$t \le 1\frac{1}{4}$	75	60	...
11	$t \le 3\frac{1}{2}$	75	60	...
12	...	75	60	...
13	>1	80	45	...
14	≤1	80	47	...
15	...	80	50	...
16	$\le 2\frac{1}{2}$	80	55	...
17	$\le 2\frac{1}{2}$	80	60	...
18	$\le 2\frac{1}{2}$	80	60	...
19	$\le 2\frac{1}{2}$	80	60	...
20	$\le 2\frac{1}{2}$	80	60	...
21	$\le 2\frac{1}{2}$	80	60	...
22	≤4	80	60	...
23	$t \le 1\frac{1}{4}$	80	65	...
24	$\frac{1}{2} < t \le 1$	81	50	...
25	$t \le 1.25$	82	70	...
26	$\le \frac{1}{2}$	83	50	...
27	...	85	60	...
28	$t \le 1$	86	75	...
29	...	90	55	...
30	$1\frac{1}{2} < t \le 3$	90	58	...
31	...	90	70	...
32	...	90	70	...
33	...	95	75	...
34	...	105	81	...
35	$1\frac{1}{8} \le t \le 1\frac{1}{2}$	105	81	...
36	$1 < t < 1\frac{1}{2}$	105	81	...
37	$2\frac{1}{2} < t \le 4$	115	99	...
38	$\frac{1}{2} \le t \le 1$	120	92	...
39	≤1	120	92	...
40	$\frac{1}{4} < t \le 2\frac{1}{2}$	125	109	...
41	$2\frac{1}{2} < t \le 4$	140	115	...
42	$\frac{1}{4} < t \le 2\frac{1}{2}$	150	130	...
43	0.059	246	210	(1)
44	0.051	250	214	(1)
45	0.040	256	221	(1)

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Ferrous Materials (Cont'd)								
1	42.0	39.5	38.5	37.8	37.2	...	35.9	...	34.2
2	42.0	39.5	38.5	37.8	37.2	...	35.9	...	34.2
3	45.0	42.3	41.2	40.5	39.8	...	38.4	...	36.7
4	45.0	42.3	41.2	40.5	39.8	...	38.4	...	36.7
5	45.0	42.3	41.2	40.5	39.8	...	38.4	...	36.7
6	50.0	46.3	44.2	42.2	40.5	...	37.6	...	35.4
7	55.0	51.0	48.6	46.4	44.5	...	41.3	...	38.9
8	55.0	51.0	48.6	46.4	44.5	...	41.3	...	38.9
9	55.0	51.0	48.6	46.4	44.5	...	41.3	...	38.9
10	60.0	55.8	53.0	50.7	48.6	46.6	45.1	43.9	42.4
11	60.0	55.8	53.0	50.7	48.6	46.6	45.1	43.9	42.4
12	60.0	55.8	53.0	50.7	48.6	46.6	45.1	43.9	42.4
13	45.0	...	41.2	...	39.8	...	38.4	...	36.7
14	47.0	...	43.1	...	41.6	...	40.2	...	38.3
15	50.0	47.6	45.8	44.5	43.5	...	41.4	...	39.7
16	55.0	51.0	48.6	46.4	44.5	...	41.3	...	38.9
17	60.0	55.6	53.0	50.7	48.6	...	45.1	...	42.4
18	60.0	55.6	53.0	50.7	48.6	...	45.1	...	42.4
19	60.0	55.6	53.0	50.7	48.6	...	45.1	...	42.4
20	60.0	55.6	53.0	50.7	48.6	...	45.1	...	42.4
21	60.0	55.6	53.0	50.7	48.6	...	45.1	...	42.4
22	60.0	...	55.3	...	52.8	...	50.7	...	49.6
23	65.0	60.4	57.4	54.9	52.6	50.5	48.8	47.5	45.9
24	50.0	...	44.1	...	40.6	...	37.5	...	35.3
25	70.0	67.1	64.8	...	61.2	...	59.3	...	58.0
26	50.0	...	44.1	...	40.6	...	37.5	...	35.3
27	60.0	56.9	55.2	53.6	52.3	...	49.9	...	48.0
28	75.0	71.9	69.5	...	65.6	...	63.5	...	62.1
29	55.0	51.7	50.4	49.4	48.7	...	47.0	...	44.8
30	58.0	...	53.1	...	51.3	...	49.6	...	47.3
31	70.0	64.9	61.8	59.1	56.7	...	52.6	...	49.5
32	70.0	64.9	61.8	59.1	56.7	...	52.6	...	49.5
33	75.0	69.5	66.3	63.3	60.7	...	56.3	...	53.1
34	81.0	...	71.6	...	65.6	...	60.8	...	57.3
35	81.0	...	71.6	...	65.6	...	60.8	...	57.3
36	81.0	...	71.6	...	65.6	...	60.8	...	57.3
37	99.0	...	90.7	...	87.6	...	84.6	...	80.7
38	92.0	...	81.3	...	74.5	...	69.1	...	65.1
39	92.0	...	81.3	...	74.5	...	69.1	...	65.1
40	109.0	...	99.9	...	96.4	...	93.1	...	88.8
41	115.0	...	105.4	...	101.7	...	98.3	...	93.7
42	130.0	...	119.1	...	115.0	...	111.0	...	105.9
43	210.0	...	...	...	...	...	...	...	...
44	214.0	...	...	...	...	...	...	...	...
45	221.0	...	...	...	...	...	...	...	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Ferrous Materials (Cont'd)
1	...	32.2	31.1	30.1	29.1	28.2	27.3	26.5	25.8	25.0
2	...	32.2	31.1	30.1	29.1	28.2	27.3	26.5	25.8	25.0
3	...	34.5	33.4	32.2	31.2	30.2	29.3	28.4	27.6	26.7
4	...	34.5	33.4	32.2	31.2	30.2	29.3	28.4	27.6	26.7
5	...	34.5	33.4	32.2	31.2	30.2	29.3	28.4	27.6	26.7
6	...	33.7	33.0	32.3	31.5	30.5	...	...	...	...
7	...	37.1	36.3	35.5	34.6	33.5	...	...	...	...
8	...	37.1	36.3	35.5	34.6	33.5	...	...	...	...
9	...	37.1	36.3	35.5	34.6	33.5	...	...	...	...
10	41.2	40.5	...	...	...	...	...	...	...	...
11	41.2	40.5	...	...	...	...	...	...	...	...
12	41.2	40.5	...	...	...	...	...	...	...	...
13	...	34.5	33.4	32.2	31.2	30.2	29.3	28.4	27.6	26.7
14	...	36.0	34.8	33.7	32.5	31.5	30.6	29.7	28.9	27.9
15	...	38.2	37.7	37.1	...	...	...	...	...	...
16	...	37.1	36.3	35.5	34.6	33.5	...	...	...	...
17	...	40.5	39.6	38.7	37.7	36.6	...	...	...	...
18	...	40.5	39.6	38.7	37.7	36.6	...	...	...	...
19	...	40.5	39.6	38.7	37.7	36.6	...	...	...	...
20	...	40.5	39.6	38.7	37.7	36.6	...	...	...	...
21	...	40.5	39.6	38.7	37.7	36.6	...	...	...	...
22	...	48.2	47.1	45.7	44.0	41.9	...	...	...	...
23	44.7	43.9	...	...	...	...	...	...	...	...
24	...	33.9	33.0	32.1	...	...	...	...	...	...
25	...	56.1	55.0	...	...	...	...	...	...	...
26	...	33.9	33.0	32.1	...	...	...	...	...	...
27	...	46.3	45.4	44.5	43.5	42.4	...	...	...	...
28	...	60.1	58.9	...	...	...	...	...	...	...
29	...	42.2	40.8	39.4	38.1	36.9	35.8	34.8	33.8	32.7
30	...	44.5	43.0	41.5	40.2	38.9	37.7	36.7	...	...
31	...	47.2	46.2	45.2	44.0	42.7	...	...	...	...
32	...	47.2	46.2	45.2	44.0	42.7	...	...	...	...
33	...	50.6	49.5	48.4	47.2	45.7	...	...	...	...
34	...	54.6	53.4	52.3	51.0	49.4	47.4	44.8	41.4	36.9
35	...	54.6	53.4	52.3	51.0	49.4	47.4	44.8	41.4	36.9
36	...	54.6	53.4	52.3	51.0	49.4	47.4	44.8	41.4	36.9
37	...	75.9	73.4	70.9	68.5	66.4	64.4	62.6	60.8	58.8
38	...	62.0	60.7	59.3	57.9	56.1	53.9	50.9	47.0	41.9
39	...	62.0	60.7	59.3	57.9	56.1	53.9	50.9	47.0	41.9
40	...	83.6	80.8	78.1	75.5	73.1	70.9	68.9	66.9	64.8
41	...	88.2	85.2	82.3	79.6	77.1	74.8	72.7	70.6	68.4
42	...	99.6	96.2	93.0	89.8	87.0	84.3	81.9	79.5	76.9
43	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Ferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
11	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
12	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
13	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
24	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
	Ferrous Materials (Cont'd)					
1	Carbon steel	Flat wire	SA–905	...	...	2
2	Carbon steel	Flat wire	SA–905	...	...	2
3	Carbon steel	Flat wire	SA–905	...	...	1
4	Carbon steel	Flat wire	SA–905	...	...	1
5	Carbon steel	Flat wire	SA–905	...	...	1
6	Carbon steel	Flat wire	SA–905	...	...	1
7	Carbon steel	Flat wire	SA–905	...	...	1
8	Ductile cast iron	Castings	SA–874	...	...	...
9	Ductile cast iron	Castings	SA/JIS G5504	FCD 300 LT	...	...
10	C–Mn–Si–Cb	Plate	SA–737	B	K12001	...
11	C–Mn–Si–Cb	Plate	SA/AS 1548	PT490	...	...
12	C–Mn–Si–Cb	Plate	SA/AS 1548	PT490	...	...
13	C–Mn–Si–Cb	Plate	SA/AS 1548	PT490	...	...
14	C–Mn–Si–Cb	Plate	SA/AS 1548	PT490	...	...
(**21**) 15	C–Mn–Si–Cb	Plate	SA/GB 713	Q370R	...	Normalized
16	C–Mn–Si–Cb	Plate	SA/GB 713	Q370R	...	Normalized
17	C–Mn–Si–Cb	Plate	SA/GB 713	Q370R	...	Normalized
18	C–Mn–Si–Cb	Plate	SA/GB 713	Q370R	...	Normalized
19	C–Mn–Si–V	Plate	SA–737	C	K12202	...
20	C–Mn–Si–V–Cb	Plate	SA–656	T3	...	...
21	C–Mn–Si–V–Cb	Plate	SA–656	T7	...	...
22	C–Mn–Si–V–Cb	Plate	SA–656	T3	...	...
23	C–Mn–Si–V–Cb	Plate	SA–656	T7	...	...
24	C–Mn–Si–V–Cb	Plate	SA–656	T3	...	...
25	C–Mn–Si–V–Cb	Plate	SA–656	T7	...	...
26	C–Mn–Si–V–Cb	Plate	SA–656	T3	...	...
27	C–Mn–Si–V–Cb	Plate	SA–656	T7	...	...
28	C–Mn–Ti	Plate, sheet	SA–562	...	K11224	...
29	C–Si–Ti	Forgings	SA–836	...	...	1
30	C–¼Mo	Bolting	SA–320	L7A	G40370	...
31	C–¼Mo	Bolting	SA–574	4037	G40370	...
32	C–¼Mo	Bolting	SA–574	4042	G40420	...
33	C–¼Mo	Bolting	SA–574	4140	G41400	...
34	C–¼Mo	Bolting	SA–574	4037	G40370	...
35	C–¼Mo	Bolting	SA–574	4042	G40420	...
36	C–0.3Mo	Smls. tube	SA/EN 10216–2	16Mo3	...	...
37	C–0.3Mo	Smls. tube	SA/EN 10216–2	16Mo3	...	...
38	C–0.3Mo	Smls. tube	SA/EN 10216–2	16Mo3	...	...
39	C–½Mo	Smls. tube	SA–209	T1b	K11422	...
40	C–½Mo	Wld. tube	SA–250	T1b	K11422	...
41	C–½Mo	Smls. tube	SA–209	T1	K11522	...
42	C–½Mo	Smls. & wld. fittings	SA–234	WP1	K12821	...
43	C–½Mo	Wld. tube	SA–250	T1	K11522	...
44	C–½Mo	Smls. pipe	SA–335	P1	K11522	...
45	C–½Mo	Forged pipe	SA–369	FP1	K11522	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Ferrous Materials (Cont'd)
1	0.030	262	226	(1)
2	0.020	268	232	(1)
3	0.059	275	239	(1)
4	0.051	280	243	(1)
5	0.040	285	250	(1)
6	0.030	290	255	(1)
7	0.020	296	260	(1)
8	$12 < t < 21$	43.5	29	...
9	$12 < t < 21$	43.5	29	...
10	...	70	50	...
11	$3\frac{1}{4} < t \le 6$	71	46.5	...
12	$1\frac{1}{2} < t \le 3\frac{1}{4}$	71	48	...
13	$\frac{5}{8} < t \le 1\frac{1}{2}$	71	49.5	...
14	$\le\frac{5}{8}$	71	52	...
15	$2.5 < t \le 4$	74	48	...
16	$1.5 < t \le 2.5$	75.5	49.5	...
17	$0.6 < t \le 1.5$	77	52	...
18	$0.4 \le t \le 0.6$	77	53.5	...
19	...	80	60	...
20	≤2	60	50	...
21	≤2	60	50	...
22	$\le1\frac{1}{2}$	70	60	...
23	$\le1\frac{1}{2}$	70	60	...
24	≤1	80	70	...
25	≤1	80	70	...
26	$\le\frac{3}{4}$	90	80	...
27	$\le\frac{3}{4}$	90	80	...
28	...	55	30	...
29	...	55	25	...
30	$\le2\frac{1}{2}$	125	105	...
31	$\ge\frac{5}{8}$	170	135	...
32	$\ge\frac{5}{8}$	170	135	...
33	$\ge\frac{5}{8}$	170	135	...
34	$\le\frac{1}{2}$	180	140	...
35	$\le\frac{1}{2}$	180	140	...
36	$1\frac{5}{8} < t \le 2\frac{1}{2}$	65.5	37.5	...
37	$\frac{5}{8} < t \le 1\frac{5}{8}$	65.5	39	...
38	$t \le \frac{5}{8}$	65.5	40.5	...
39	...	53	28	...
40	...	53	28	...
41	...	55	30	...
42	...	55	30	...
43	...	55	30	...
44	...	55	30	...
45	...	55	30	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Ferrous Materials (Cont'd)								
1	226.0	...	...	...	...	...	...	...	...
2	232.0	...	...	...	...	...	...	...	...
3	239.0	...	224.0	...	...	...	...	...	...
4	243.0	...	228.0	...	...	...	...	...	...
5	250.0	...	234.0	...	...	...	...	...	...
6	255.0	...	239.0	...	...	...	...	...	...
7	260.0	...	244.0	...	...	...	...	...	...
8	29.0	...	25.4	...	24.1	...	23.5	...	23.1
9	29.0	...	25.4	...	24.1	...	23.5	...	23.1
10	50.0	47.9	45.8	43.6	41.4	...	37.7	...	35.3
11	46.5	...	42.6	...	38.5	...	35.0	...	32.8
12	48.0	...	44.0	...	39.7	...	36.2	...	33.9
13	49.5	...	45.4	...	41.0	...	37.3	...	34.9
14	52.0	...	47.7	...	43.0	...	39.2	...	36.7
15	47.9	46.2	44.0	41.7	39.5	37.6	36.0	...	33.8
16	49.3	47.4	45.3	43.0	40.7	38.7	37.1	...	34.8
17	52.2	50.2	48.0	45.5	43.1	41.0	39.3	...	36.9
18	53.7	51.6	49.3	46.8	44.3	42.1	40.3	...	37.9
19	60.0	57.5	55.0	52.3	49.7	...	45.2	...	42.3
20	50.0	...	45.8	...	41.4	...	37.7	...	35.3
21	50.0	...	45.8	...	41.4	...	37.7	...	35.3
22	60.0	...	55.0	...	49.7	...	45.2	...	42.3
23	60.0	...	55.0	...	49.7	...	45.2	...	42.3
24	70.0	...	64.2	...	57.9	...	52.7	...	49.4
25	70.0	...	64.2	...	57.9	...	52.7	...	49.4
26	80.0	...	73.4	...	66.2	...	60.3	...	56.5
27	80.0	...	73.4	...	66.2	...	60.3	...	56.5
28	30.0	27.3	25.8	24.7	24.0	...	23.4	...	23.4
29	25.0	22.7	21.5	20.6	20.0	...	19.5	...	19.5
30	105.0	...	96.2	...	92.9	...	89.7	...	85.6
31	135.0	...	126.9	...	121.7	...	117.6	...	114.0
32	135.0	...	126.9	...	121.7	...	117.6	...	114.0
33	135.0	...	126.9	...	121.7	...	117.6	...	114.0
34	140.0	...	131.6	...	126.2	...	121.9	...	118.2
35	140.0	...	131.6	...	126.2	...	121.9	...	118.2
36	37.7	36.3	35.4	34.7	34.0	33.4	32.8	32.3	31.8
37	39.2	37.7	36.8	36.0	35.3	34.7	34.1	33.6	33.1
38	40.6	39.1	38.2	37.4	36.6	36.0	35.4	34.8	34.3
39	28.0	26.9	26.3	25.8	25.2	...	24.4	...	23.6
40	28.0	26.9	26.3	25.8	25.2	...	24.4	...	23.6
41	30.0	28.9	28.2	27.6	27.1	...	26.1	...	25.3
42	30.0	28.9	28.2	27.6	27.1	...	26.1	...	25.3
43	30.0	28.9	28.2	27.6	27.1	...	26.1	...	25.3
44	30.0	28.9	28.2	27.6	27.1	...	26.1	...	25.3
45	30.0	28.9	28.2	27.6	27.1	...	26.1	...	25.3

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Ferrous Materials (Cont'd)
1	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...
8	...	22.5	22.1	...	...	...	...	...	...	...
9	...	22.5	22.1	...	...	...	...	...	...	...
10	...	33.9	33.4	32.9	32.2	31.2	29.9	28.1	25.9	25.9
11	...	31.6	31.1	30.6	29.9	29.0	27.8	26.1	24.1	21.6
12	...	32.6	32.1	31.6	30.9	30.0	28.7	27.0	24.8	22.3
13	...	33.6	33.1	32.6	31.9	30.9	29.6	27.8	25.6	22.0
14	...	35.3	34.8	34.2	33.5	32.5	31.1	29.2	26.9	24.1
15	33.1	32.6	32.1	31.5	30.7	29.7	28.5	27.0	25.3	23.7
16	34.1	33.6	33.1	32.5	31.7	30.6	29.3	27.8	26.1	24.6
17	36.1	35.6	35.0	34.4	33.5	32.4	31.0	29.4	27.7	26.0
18	37.1	36.5	36.0	35.3	34.5	33.3	31.9	30.2	28.4	26.7
19	...	40.7	40.1	39.5	38.6	37.5	35.9	33.7	31.0	31.0
20	...	33.9	33.4	...	...	...	...	...	...	...
21	...	33.9	33.4	...	...	...	...	...	...	...
22	...	40.7	40.1	...	...	...	...	...	...	...
23	...	40.7	40.1	...	...	...	...	...	...	...
24	...	47.5	46.8	...	...	...	...	...	...	...
25	...	47.5	46.8	...	...	...	...	...	...	...
26	...	54.3	53.5	...	...	...	...	...	...	...
27	...	54.3	53.5	...	...	...	...	...	...	...
28	...	23.4	23.4	23.3	22.9	...	...	...	...	...
29	...	19.5	19.5	19.4	19.1	...	...	...	...	...
30	...	80.5	77.8	75.2	72.7	70.4	68.3	66.4	64.5	62.4
31	...	110.4	108.4	106.2	103.7	100.9	97.7	94.1	90.0	85.5
32	...	110.4	108.4	106.2	103.7	100.9	97.7	94.1	90.0	85.5
33	...	110.4	108.4	106.2	103.7	100.9	97.7	94.1	90.0	85.5
34	...	114.5	112.4	110.1	107.6	104.6	101.3	97.5	93.3	88.6
35	...	114.5	112.4	110.1	107.6	104.6	101.3	97.5	93.3	88.6
36	31.3	30.8	30.3	29.7	29.0	28.2	27.3	26.3	25.1	23.9
37	32.5	32.0	31.4	30.8	30.1	29.3	28.3	27.3	26.1	24.8
38	33.8	33.2	32.6	31.9	31.2	30.4	29.4	28.3	27.1	25.7
39	...	22.9	22.5	22.0	21.5	20.9	20.3	19.5	18.7	17.7
40	...	22.9	22.5	22.0	21.5	20.9	20.3	19.5	18.7	17.7
41	...	24.5	24.1	23.6	23.1	22.4	21.7	20.9	20.0	19.0
42	...	24.5	24.1	23.6	23.1	22.4	21.7	20.9	20.0	19.0
43	...	24.5	24.1	23.6	23.1	22.4	21.7	20.9	20.0	19.0
44	...	24.5	24.1	23.6	23.1	22.4	21.7	20.9	20.0	19.0
45	...	24.5	24.1	23.6	23.1	22.4	21.7	20.9	20.0	19.0

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding												
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
	Ferrous Materials (Cont'd)												
1	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	... (**21**)
16	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
	Ferrous Materials (Cont'd)					
1	C–½Mo	Smls. tube	SA–209	T1a	K12023	...
2	C–½Mo	Wld. tube	SA–250	T1a	K12023	...
3	C–½Mo	Castings	SA–217	WC1	J12524	...
4	C–½Mo	Castings	SA–352	LC1	J12522	...
5	C–½Mo	Cast pipe	SA–426	CP1	J12521	...
6	C–½Mo	Plate	SA–204	A	K11820	...
7	C–½Mo	Wld. pipe	SA–672	L65	K11820	...
8	C–½Mo	Wld. pipe	SA–691	CM–65	K11820	...
9	C–½Mo	Forgings	SA–182	F1	K12822	...
10	C–½Mo	Plate	SA–204	B	K12020	...
11	C–½Mo	Forgings	SA–336	F1	K12520	...
12	C–½Mo	Wld. pipe	SA–672	L70	K12020	...
13	C–½Mo	Wld. pipe	SA–691	CM–70	K12020	...
14	C–½Mo	Plate	SA–204	C	K12320	...
15	C–½Mo	Wld. pipe	SA–672	L75	K12320	...
16	C–½Mo	Wld. pipe	SA–691	CM–75	K12320	...
17	½Cr–⅕Mo	Forgings	SA–372	G	K13049	55
18	½Cr–⅕Mo	Forgings	SA–372	H	K13547	55
19	½Cr–⅕Mo	Forgings	SA–372	G	K13049	65
20	½Cr–⅕Mo	Forgings	SA–372	H	K13547	65
21	½Cr–⅕Mo	Forgings	SA–372	G	K13049	70
22	½Cr–⅕Mo	Forgings	SA–372	H	K13547	70
23	½Cr–⅕Mo–V	Plate	SA–517	B	K11630	...
24	½Cr–¼Mo–Si	Plate	SA–517	A	K11856	...
25	½Cr–¼Mo–Si	Forgings	SA–592	A	K11856	...
26	½Cr–½Mo	Smls. pipe	SA–335	P2	K11547	...
27	½Cr–½Mo	Forged pipe	SA–369	FP2	K11547	...
28	½Cr–½Mo	Plate	SA–387	2	K12143	1
29	½Cr–½Mo	Wld. pipe	SA–691	½CR	K12143	...
30	½Cr–½Mo	Smls. tube	SA–213	T2	K11547	...
31	½Cr–½Mo	Cast pipe	SA–426	CP2	J11547	...
32	½Cr–½Mo	Forgings	SA–182	F2	K12122	...
33	½Cr–½Mo	Plate	SA–387	2	K12143	2
34	½Cr–½Mo	Wld. pipe	SA–691	½CR	K12143	...
35	¾Cr–½Ni–Cu	Wld. tube	SA–423	1	K11535	...
36	¾Cr–¾Ni–Cu–Al	Pipe	SA–333	4	K11267	...
37	1Cr–⅕Mo	Forgings	SA–372	E	K13047	55
38	1Cr–⅕Mo	Forgings	SA–372	F	G41350	55
39	1Cr–⅕Mo	Forgings	SA–372	J	K13548	55
40	1Cr–⅕Mo	Bolting	SA–193	B7	G41400	...
41	1Cr–⅕Mo	Bolting	SA–193	B7M	G41400	...
42	1Cr–⅕Mo	Bolting	SA–320	L7M	G41400	...
43	1Cr–⅕Mo	Forgings	SA–372	F	G41350	65
44	1Cr–⅕Mo	Bolting	SA–193	B7	G41400	...
45	1Cr–⅕Mo	Forgings	SA–372	E	K13047	70

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Ferrous Materials (Cont'd)
1	...	60	32	...
2	...	60	32	...
3	...	65	35	...
4	...	65	35	...
5	...	65	35	...
6	...	65	37	...
7	...	65	37	...
8	...	65	37	...
9	...	70	40	...
10	...	70	40	...
11	...	70	40	...
12	...	70	40	...
13	...	70	40	...
14	...	75	43	...
15	...	75	43	...
16	...	75	43	...
17	...	85	55	...
18	...	85	55	...
19	...	105	65	...
20	...	105	65	...
21	...	120	70	...
22	...	120	70	...
23	$\leq 1\frac{1}{4}$	115	100	...
24	$\leq 1\frac{1}{4}$	115	100	...
25	$\leq 2\frac{1}{2}$	115	100	...
26	...	55	30	...
27	...	55	30	...
28	...	55	33	...
29	...	55	33	...
30	...	60	30	...
31	...	60	30	...
32	...	70	40	...
33	...	70	45	...
34	...	70	45	...
35	...	60	37	...
36	...	60	35	...
37	...	85	55	...
38	...	85	55	...
39	...	85	55	...
40	$4 < t \leq 7$	100	75	...
41	$\leq 2\frac{1}{2}$	100	80	...
42	$\leq 2\frac{1}{2}$	100	80	...
43	...	105	65	...
44	$2\frac{1}{2} < t \leq 4$	115	95	...
45	...	120	70	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Ferrous Materials (Cont'd)								
1	32.0	30.8	30.1	29.4	28.9	...	27.9	...	27.0
2	32.0	30.8	30.1	29.4	28.9	...	27.9	...	27.0
3	35.0	33.7	32.9	32.2	31.6	...	30.5	...	29.5
4	35.0	33.7	32.9	32.2	31.6	...	30.5	...	29.5
5	35.0	33.7	32.9	32.2	31.6	...	30.5	...	29.5
6	37.0	35.6	34.8	34.0	33.4	...	32.2	...	31.2
7	37.0	35.6	34.8	34.0	33.4	...	32.2	...	31.2
8	37.0	35.6	34.8	34.0	33.4	...	32.2	...	31.2
9	40.0	38.5	37.6	36.8	36.1	...	34.8	...	33.8
10	40.0	38.5	37.6	36.8	36.1	...	34.8	...	33.8
11	40.0	38.5	37.6	36.8	36.1	...	34.8	...	33.8
12	40.0	38.5	37.6	36.8	36.1	...	34.8	...	33.8
13	40.0	38.5	37.6	36.8	36.1	...	34.8	...	33.8
14	43.0	41.4	40.4	39.6	38.8	...	37.4	...	36.3
15	43.0	41.4	40.4	39.6	38.8	...	37.4	...	36.3
16	43.0	41.4	40.4	39.6	38.8	...	37.4	...	36.3
17	55.0	52.7	51.4	50.3	49.4	...	47.8	...	46.3
18	55.0	52.7	51.4	50.3	49.4	...	47.8	...	46.3
19	65.0	62.3	60.8	59.5	58.4	...	56.5	...	54.8
20	65.0	62.3	60.8	59.5	58.4	...	56.5	...	54.8
21	70.0	66.9	65.2	63.9	62.8	...	60.9	...	59.1
22	70.0	66.9	65.2	63.9	62.8	...	60.9	...	59.1
23	100.0	97.2	95.5	93.9	92.4	...	89.9	...	87.6
24	100.0	97.2	95.5	93.9	92.4	...	89.9	...	87.6
25	100.0	97.2	95.5	93.9	92.4	...	89.9	...	87.6
26	30.0	28.9	28.2	27.6	27.1	...	26.1	...	25.3
27	30.0	28.9	28.2	27.6	27.1	...	26.1	...	25.3
28	33.0	31.8	31.0	30.4	29.8	...	28.7	...	27.9
29	33.0	31.8	31.0	30.4	29.8	...	28.7	...	27.9
30	30.0	28.9	28.2	27.6	27.1	...	26.1	...	25.3
31	30.0	28.9	28.2	27.6	27.1	...	26.1	...	25.3
32	40.0	38.5	37.6	36.8	36.1	...	34.8	...	33.8
33	45.0	43.3	42.3	41.4	40.6	...	39.2	...	38.0
34	45.0	43.3	42.3	41.4	40.6	...	39.2	...	38.0
35	37.0	35.0	34.1	33.5	33.0	...	32.3	...	31.6
36	35.0	33.1	32.3	31.7	31.3	...	30.6	...	29.9
37	55.0	52.7	51.4	50.3	49.4	...	47.8	...	46.3
38	55.0	52.7	51.4	50.3	49.4	...	47.8	...	46.3
39	55.0	52.7	51.4	50.3	49.4	...	47.8	...	46.3
40	75.0	...	69.9	...	67.2	...	65.3	...	63.2
41	80.0	...	74.6	...	71.7	...	69.7	...	67.4
42	80.0	...	74.6	...	71.7	...	69.7	...	67.4
43	65.0	62.3	60.8	59.5	58.4	...	56.5	...	54.8
44	95.0	...	88.5	...	85.1	...	82.7	...	80.1
45	70.0	66.9	65.2	63.9	62.8	...	60.9	...	59.1

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Ferrous Materials (Cont'd)
1	...	26.2	25.7	25.2	24.6	23.9	23.2	22.3	21.3	20.3
2	...	26.2	25.7	25.2	24.6	23.9	23.2	22.3	21.3	20.3
3	...	28.6	28.1	27.5	26.9	26.2	25.3	24.4	23.3	22.2
4	...	28.6	28.1	27.5	26.9	26.2	25.3	24.4	23.3	22.2
5	...	28.6	28.1	27.5	26.9	26.2	25.3	24.4	23.3	22.2
6	...	30.2	29.7	29.1	28.4	27.7	26.8	25.8	24.7	23.4
7	...	30.2	29.7	29.1	28.4	27.7	26.8	25.8	24.7	23.4
8	...	30.2	29.7	29.1	28.4	27.7	26.8	25.8	24.7	23.4
9	...	32.7	32.1	31.5	30.7	29.9	28.9	27.9	26.7	25.3
10	...	32.7	32.1	31.5	30.7	29.9	28.9	27.9	26.7	25.3
11	...	32.7	32.1	31.5	30.7	29.9	28.9	27.9	26.7	25.3
12	...	32.7	32.1	31.5	30.7	29.9	28.9	27.9	26.7	25.3
13	...	32.7	32.1	31.5	30.7	29.9	28.9	27.9	26.7	25.3
14	...	35.2	34.5	33.8	33.0	32.1	31.1	30.0	28.7	27.2
15	...	35.2	34.5	33.8	33.0	32.1	31.1	30.0	28.7	27.2
16	...	35.2	34.5	33.8	33.0	32.1	31.1	30.0	28.7	27.2
17	...	44.7	43.6	42.2	40.6	38.7	36.3	33.6	30.4	26.7
18	...	44.7	43.6	42.2	40.6	38.7	36.3	33.6	30.4	26.7
19	...	52.8	51.5	49.9	48.0	45.7	43.0	39.7	35.9	31.5
20	...	52.8	51.5	49.9	48.0	45.7	43.0	39.7	35.9	31.5
21	...	56.8	55.4	53.7	51.7	49.2	46.3	42.8	38.7	33.9
22	...	56.8	55.4	53.7	51.7	49.2	46.3	42.8	38.7	33.9
23	...	85.5	84.3	83.0	81.4	79.5	77.1	74.2	70.5	66.1
24	...	85.5	84.3	83.0	81.4	79.5	77.1	74.2	70.5	66.1
25	...	85.5	84.3	83.0	81.4	79.5	77.1	74.2	70.5	66.1
26	...	24.5	24.1	23.6	23.1	22.4	21.7	20.9	20.0	19.0
27	...	24.5	24.1	23.6	23.1	22.4	21.7	20.9	20.0	19.0
28	...	27.0	26.5	26.0	25.4	24.7	23.9	23.0	22.0	20.9
29	...	27.0	26.5	26.0	25.4	24.7	23.9	23.0	22.0	20.9
30	...	24.5	24.1	23.6	23.1	22.4	21.7	20.9	20.0	19.0
31	...	24.5	24.1	23.6	23.1	22.4	21.7	20.9	20.0	19.0
32	...	32.7	32.1	31.5	30.7	29.9	28.9	27.9	26.7	25.3
33	...	36.8	36.1	35.4	34.6	33.6	32.6	31.4	30.0	28.5
34	...	36.8	36.1	35.4	34.6	33.6	32.6	31.4	30.0	28.5
35	...	30.9	30.5	30.0	29.5	28.8	28.0	27.0	25.6	23.7
36	...	29.2	28.8	28.4	27.9	27.3	26.5	25.5	24.2	22.4
37	...	44.7	43.6	42.2	40.6	38.7	36.3	33.6	30.4	26.7
38	...	44.7	43.6	42.2	40.6	38.7	36.3	33.6	30.4	26.7
39	...	44.7	43.6	42.2	40.6	38.7	36.3	33.6	30.4	26.7
40	...	60.9	59.3	57.6	55.4	52.8	49.7	45.8	41.5	36.4
41	...	65.0	63.2	61.4	59.1	56.3	53.0	48.8	44.2	38.8
42	...	65.0	63.2	61.4	59.1	56.3	53.0	48.8	44.2	38.8
43	...	52.8	51.5	49.9	48.0	45.7	43.0	39.7	35.9	31.5
44	...	77.1	75.1	73.0	70.2	66.9	62.9	58.0	52.5	46.1
45	...	56.8	55.4	53.7	51.7	49.2	46.3	42.8	38.7	33.9

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding												
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
	Ferrous Materials (Cont'd)												
1	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
	Ferrous Materials (Cont'd)					
1	1Cr–1/5Mo	Forgings	SA–372	F	G41350	70
2	1Cr–1/5Mo	Forgings	SA–372	J	K13548	70
3	1Cr–1/5Mo	Bolting	SA–193	B7	G41400	...
4	1Cr–1/5Mo	Bolting	SA–320	L7	G41400	...
5	1Cr–1/5Mo	Forgings	SA–372	J	G41370	110
6	1Cr–1/5Mo	Bolting	SA–574	4137	G41370	...
7	1Cr–1/5Mo	Bolting	SA–574	4137	G41370	...
8	1Cr–1/2Mo	Plate	SA–387	12	K11757	1
9	1Cr–1/2Mo	Wld. pipe	SA–691	1CR	K11757	...
10	1Cr–1/2Mo	Cast pipe	SA–426	CP12	J11562	...
11	1Cr–1/2Mo	Forgings	SA–182	F12	K11562	1
12	1Cr–1/2Mo	Smls. tube	SA–213	T12	K11562	...
13	1Cr–1/2Mo	Smls. & wld. fittings	SA–234	WP12	K12062	1
14	1Cr–1/2Mo	Smls. pipe	SA–335	P12	K11562	...
15	1Cr–1/2Mo	Forged pipe	SA–369	FP12	K11562	...
16	1Cr–1/2Mo	Forgings	SA/EN 10222–2	13CrMo4–5	...	NT or QT
17	1Cr–1/2Mo	Plate	SA/EN 10028–2	13CrMo4–5	...	...
18	1Cr–1/2Mo	Plate	SA/EN 10028–2	13CrMo4–5	...	...
(**21**) 19	1Cr–1/2Mo	Plate	SA/GB 713	15CrMoR	...	NT
20	1Cr–1/2Mo	Forgings	SA/EN 10222–2	13CrMo4–5	...	NT or QT
21	1Cr–1/2Mo	Plate	SA/EN 10028–2	13CrMo4–5	...	...
22	1Cr–1/2Mo	Forgings	SA/EN 10222–2	13CrMo4–5	...	NT or QT
23	1Cr–1/2Mo	Smls. tube	SA/EN 10216–2	13CrMo4–5	...	...
24	1Cr–1/2Mo	Forgings	SA/EN 10222–2	13CrMo4–5	...	NT
25	1Cr–1/2Mo	Smls. tube	SA/EN 10216–2	13CrMo4–5	...	...
26	1Cr–1/2Mo	Forgings	SA/EN 10222–2	13CrMo4–5	...	NT
27	1Cr–1/2Mo	Plate	SA–387	12	K11757	2
28	1Cr–1/2Mo	Wld. pipe	SA–691	1CR	K11757	...
29	1Cr–1/2Mo	Plate	SA/GB 713	15CrMoR	...	NT
30	1Cr–1/2Mo	Plate	SA/EN 10028–2	13CrMo4–5	...	...
31	1Cr–1/2Mo	Plate	SA/GB 713	15CrMoR	...	NT
32	1Cr–1/2Mo	Plate	SA/EN 10028–2	13CrMo4–5	...	...
33	1Cr–1/2Mo	Forgings	SA–182	F12	K11564	2
34	1Cr–1/2Mo	Forgings	SA–336	F12	K11564	...
35	1Cr–1/2Mo–V	Bolting	SA–193	B16	K14072	...
36	1Cr–1/2Mo–V	Bolting	SA–193	B16	K14072	...
37	1Cr–1/2Mo–V	Bolting	SA–540	B21	K14073	5
38	1Cr–1/2Mo–V	Bolting	SA–540	B21	K14073	5
39	1Cr–1/2Mo–V	Bolting	SA–193	B16	K14072	...
40	1Cr–1/2Mo–V	Bolting	SA–540	B21	K14073	4
41	1Cr–1/2Mo–V	Bolting	SA–540	B21	K14073	3
42	1Cr–1/2Mo–V	Bolting	SA–540	B21	K14073	2
43	1Cr–1/2Mo–V	Bolting	SA–540	B21	K14073	1
44	1Cr–1Mn–1/4Mo	Bolting	SA–540	B22	K41420	5
45	1Cr–1Mn–1/4Mo	Bolting	SA–540	B22	K41420	5

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Ferrous Materials (Cont'd)
1	...	120	70	...
2	...	120	70	...
3	≤2 1/2	125	105	...
4	≤2 1/2	125	105	...
5	...	135	110	...
6	≥5/8	170	135	...
7	≤1/2	180	140	...
8	...	55	33	...
9	...	55	33	...
10	...	60	30	...
11	...	60	32	...
12	...	60	32	...
13	...	60	32	...
14	...	60	32	...
15	...	60	32	...
16	$10 < t \le 20$	61	35	...
17	$6 < t \le 10$	61	35.5	...
18	$4 < t \le 6$	62.5	37	...
19	$4 < t \le 8$	64	37	...
20	$4 < t \le 10$	64	38.5	...
21	$2.5 < t \le 4$	64	39	...
22	$2.8 < t \le 4$	64	40	...
23	$1\frac{5}{8} < t \le 2\frac{1}{2}$	64	40.5	...
24	$1.4 < t \le 2.8$	64	41.5	...
25	$t \le 1\frac{5}{8}$	64	42	...
26	$t \le 1.4$	64	43	...
27	...	65	40	...
28	...	65	40	...
29	$2.5 < t \le 4$	65.5	40	...
30	$\frac{5}{8} < t \le 2.5$	65.5	42	...
31	$0.25 \le t \le 2.5$	65.5	43	...
32	$t \le \frac{5}{8}$	65.5	43.5	...
33	...	70	40	...
34	...	70	40	...
35	$4 < t \le 8$	100	85	...
36	$2\frac{1}{2} < t \le 4$	110	95	...
37	$2 < t \le 8$	115	100	...
38	≤2	120	105	...
39	≤2 1/2	125	105	...
40	≤6	135	120	...
41	≤6	145	130	...
42	≤4	155	140	...
43	≤4	165	150	...
44	$2 < t \le 4$	115	100	...
45	≤2	120	105	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Ferrous Materials (Cont'd)								
1	70.0	66.9	65.2	63.9	62.8	...	60.9	...	59.1
2	70.0	66.9	65.2	63.9	62.8	...	60.9	...	59.1
3	105.0	...	98.0	...	94.1	...	91.5	...	88.5
4	105.0	...	98.0	...	94.1	...	91.5	...	88.5
5	110.0	105.1	102.5	100.4	98.6	...	95.6	...	92.8
6	135.0	129.0	125.8	123.2	121.0	...	117.3	...	113.9
7	140.0	133.8	130.5	127.8	125.5	...	121.7	...	118.1
8	33.0	31.0	29.8	28.9	28.1	...	26.8	...	25.9
9	33.0	31.0	29.8	28.9	28.1	...	26.8	...	25.9
10	30.0	28.1	27.1	26.2	25.5	...	24.4	...	23.5
11	32.0	30.0	28.9	28.0	27.2	...	26.0	...	25.1
12	32.0	30.0	28.9	28.0	27.2	...	26.0	...	25.1
13	32.0	30.0	28.9	28.0	27.2	...	26.0	...	25.1
14	32.0	30.0	28.9	28.0	27.2	...	26.0	...	25.1
15	32.0	30.0	28.9	28.0	27.2	...	26.0	...	25.1
16	34.8	32.8	31.6	30.6	29.7	29.0	28.3	...	27.4
17	35.5	33.3	32.1	31.1	30.2	29.5	28.9	28.4	27.9
18	37.0	34.7	33.5	32.4	31.5	30.7	30.0	29.5	29.0
19	32.6	30.6	29.5	28.6	27.8	27.1	26.5	...	25.6
20	38.4	36.2	34.9	33.8	32.8	32.0	31.3	...	30.2
21	39.2	36.7	35.4	34.3	33.3	32.5	31.8	31.3	30.7
22	39.9	37.6	36.3	35.1	34.1	33.2	32.5	...	31.4
23	40.6	38.6	37.5	36.5	35.6	34.9	34.2	33.6	33.0
24	41.3	38.9	37.6	36.4	35.3	34.4	33.6	...	32.5
25	42.1	40.0	38.8	37.8	36.9	36.1	35.4	34.8	34.2
26	42.8	40.3	38.9	37.6	36.5	35.6	34.8	...	33.6
27	40.0	37.5	36.2	35.0	34.0	...	32.5	...	31.4
28	40.0	37.5	36.2	35.0	34.0	...	32.5	...	31.4
29	39.9	37.4	36.1	34.9	33.9	33.1	32.4	...	31.3
30	42.1	39.4	38.0	36.8	35.8	34.9	34.2	33.6	33.0
31	42.8	40.1	38.7	37.5	36.4	35.5	34.7	...	33.6
32	43.5	40.8	39.4	38.1	37.0	36.1	35.3	34.7	34.1
33	40.0	37.5	36.2	35.0	34.0	...	32.5	...	31.4
34	40.0	37.5	36.2	35.0	34.0	...	32.5	...	31.4
35	85.0	...	82.0	...	79.9	...	77.8	...	75.7
36	95.0	...	91.7	...	89.3	...	86.9	...	84.6
37	100.0	...	96.7	...	93.8	...	91.5	...	89.0
38	105.0	...	101.3	...	98.7	...	96.1	...	93.5
39	105.0	...	101.3	...	98.7	...	96.1	...	93.5
40	120.0	...	116.0	...	112.6	...	109.8	...	106.8
41	130.0	...	125.7	...	121.9	...	119.0	...	115.7
42	140.0	...	135.4	...	131.3	...	128.1	...	124.6
43	150.0	...	145.1	...	140.7	...	137.3	...	133.5
44	100.0	...	95.4	...	92.7	...	89.4	...	86.7
45	105.0	...	100.2	...	97.2	...	93.9	...	90.9

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Ferrous Materials (Cont'd)
1	...	56.8	55.4	53.7	51.7	49.2	46.3	42.8	38.7	33.9
2	...	56.8	55.4	53.7	51.7	49.2	46.3	42.8	38.7	33.9
3	...	85.3	83.0	80.6	77.6	73.9	69.5	64.1	58.1	50.9
4	...	85.3	83.0	80.6	77.6	73.9	69.5	64.1	58.1	50.9
5	...	89.3	87.1	84.4	81.2	77.4	72.7	67.3	60.8	53.3
6	...	109.6	106.9	103.6	99.7	95.0	89.2	82.6	74.6	65.4
7	...	113.7	110.9	107.4	103.3	98.5	92.5	85.7	77.4	67.8
8	...	25.1	24.8	24.4	24.0	23.6	23.1	22.5	21.7	20.9
9	...	25.1	24.8	24.4	24.0	23.6	23.1	22.5	21.7	20.9
10	...	22.9	22.5	22.2	21.9	21.4	21.0	20.4	19.8	19.0
11	...	24.4	24.0	23.7	23.3	22.9	22.4	21.8	21.1	20.2
12	...	24.4	24.0	23.7	23.3	22.9	22.4	21.8	21.1	20.2
13	...	24.4	24.0	23.7	23.3	22.9	22.4	21.8	21.1	20.2
14	...	24.4	24.0	23.7	23.3	22.9	22.4	21.8	21.1	20.2
15	...	24.4	24.0	23.7	23.3	22.9	22.4	21.8	21.1	20.2
16	27.0	26.6	26.3	25.9	25.5	25.0	24.4	23.7	23.0	22.2
17	27.5	27.1	26.7	26.3	25.9	25.4	24.8	24.2	23.4	22.5
18	28.6	28.2	27.8	27.4	26.9	26.4	25.8	25.1	24.3	23.4
19	25.2	24.9	24.5	24.2	23.8	23.3	22.8	22.2	21.5	20.7
20	29.8	29.4	29.0	28.6	28.1	27.6	26.9	26.2	25.4	24.5
21	30.3	29.8	29.4	29.0	28.5	28.0	27.4	26.6	25.8	24.8
22	30.9	30.5	30.1	29.7	29.2	28.6	27.9	27.2	26.3	25.5
23	32.4	31.8	31.3	30.7	30.0	29.3	28.5	27.6	26.6	25.4
24	32.1	31.6	31.2	30.8	30.3	29.7	29.0	28.2	27.3	26.4
25	33.6	33.0	32.4	31.8	31.1	30.3	29.5	28.6	27.5	26.3
26	33.2	32.7	32.3	31.8	31.3	30.7	30.0	29.2	28.3	27.3
27	...	30.5	30.1	29.6	29.1	28.6	28.0	27.2	26.3	25.3
28	...	30.5	30.1	29.6	29.1	28.6	28.0	27.2	26.3	25.3
29	30.8	30.4	30.0	29.5	29.1	28.5	27.9	27.1	26.3	25.3
30	32.5	32.1	31.6	31.2	30.6	30.1	29.4	28.6	27.7	26.6
31	33.1	32.6	32.2	31.7	31.2	30.6	29.9	29.1	28.2	27.1
32	33.6	33.2	32.7	32.2	31.7	31.1	30.4	29.6	28.6	27.6
33	...	30.5	30.1	29.6	29.1	28.6	28.0	27.2	26.3	25.3
34	...	30.5	30.1	29.6	29.1	28.6	28.0	27.2	26.3	25.3
35	...	73.5	72.3	71.0	69.6	67.9	65.9	63.6	60.8	57.4
36	...	82.1	80.8	79.4	77.7	75.9	73.7	71.1	68.0	64.2
37	...	86.5	85.2	83.6	81.9	79.8	77.4	74.7	71.6	67.8
38	...	90.8	89.3	87.7	85.9	83.9	81.5	78.6	75.2	71.0
39	...	90.8	89.3	87.7	85.9	83.9	81.5	78.6	75.2	71.0
40	...	103.8	102.2	100.3	98.3	95.8	92.9	89.6	85.9	81.4
41	...	112.5	110.8	108.7	106.5	103.7	100.6	97.1	93.1	88.1
42	...	121.1	119.3	117.0	114.7	111.7	108.4	104.6	100.2	94.9
43	...	129.8	127.8	125.4	122.9	119.7	116.1	112.1	107.4	101.7
44	...	82.8	80.2	77.7	...	...	...	...	...	...
45	...	87.0	84.3	81.6	...	...	...	...	...	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding												
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
	Ferrous Materials (Cont'd)												
1	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	... (**21**)
20	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
	Ferrous Materials (Cont'd)					
1	1Cr–1Mn–¼Mo	Bolting	SA–540	B22	K41420	4
2	1Cr–1Mn–¼Mo	Bolting	SA–540	B22	K41420	3
3	1Cr–1Mn–¼Mo	Bolting	SA–540	B22	K41420	2
4	1Cr–1Mn–¼Mo	Bolting	SA–540	B22	K41420	1
5	1Cr–V	Smls. tube	SA–213	T17	K12047	...
6	1¼Cr–½Mo	Castings	SA–217	WC6	J12072	...
7	1¼Cr–½Mo	Cast pipe	SA–426	CP11	J12072	...
8	1¼Cr–½Mo	Bar	SA–739	B11	K11797	...
9	1¼Cr–½Mo–Si	Forgings	SA–182	F11	K11597	1
10	1¼Cr–½Mo–Si	Smls. tube	SA–213	T11	K11597	...
11	1¼Cr–½Mo–Si	Smls. & wld. fittings	SA–234	WP11	...	1
12	1¼Cr–½Mo–Si	Smls. pipe	SA–335	P11	K11597	...
13	1¼Cr–½Mo–Si	Forgings	SA–336	F11	K11597	1
14	1¼Cr–½Mo–Si	Forged pipe	SA–369	FP11	K11597	...
15	1¼Cr–½Mo–Si	Plate	SA–387	11	K11789	1
16	1¼Cr–½Mo–Si	Wld. pipe	SA–691	1¼CR	K11789	...
17	1¼Cr–½Mo–Si	Forgings	SA–182	F11	K11572	2
18	1¼Cr–½Mo–Si	Forgings	SA–336	F11	K11572	2
19	1¼Cr–½Mo–Si	Plate	SA/EN 10028–2	13CrMoSi5–5	...	QT
20	1¼Cr–½Mo–Si	Plate	SA/EN 10028–2	13CrMoSi5–5	...	QT
21	1¼Cr–½Mo–Si	Plate	SA/EN 10028–2	13CrMoSi5–5	...	QT
22	1¼Cr–½Mo–Si	Forgings	SA–336	F11	K11572	3
23	1¼Cr–½Mo–Si	Plate	SA–387	11	K11789	2
24	1¼Cr–½Mo–Si	Wld. pipe	SA–691	1¼CR	K11789	...
25	1¾Cr–½Mo–Cu	Forgings	SA–592	E	K11695	...
26	1¾Cr–½Mo–Cu	Forgings	SA–592	E	K11695	...
27	1¾Cr–½Mo–Ti	Plate	SA–517	E	K21604	...
28	1¾Cr–½Mo–Ti	Plate	SA–517	E	K21604	...
29	2¼Cr–1Mo	Forgings	SA–182	F22	K21590	1
30	2¼Cr–1Mo	Smls. tube	SA–213	T22	K21590	...
31	2¼Cr–1Mo	Smls. & wld. fittings	SA–234	WP22	K21590	1
32	2¼Cr–1Mo	Smls. pipe	SA–335	P22	K21590	...
33	2¼Cr–1Mo	Forgings	SA–336	F22	K21590	1
34	2¼Cr–1Mo	Forged pipe	SA–369	FP22	K21590	...
35	2¼Cr–1Mo	Plate	SA–387	22	K21590	1
36	2¼Cr–1Mo	Wld. pipe	SA–691	2¼CR	K21590	...
37	2¼Cr–1Mo	Plate	SA/EN 10028–2	10CrMo9–10	...	...
38	2¼Cr–1Mo	Forgings	SA/EN 10222–2	11CrMo9–10	...	NT or QT
39	2¼Cr–1Mo	Plate	SA/EN 10028–2	10CrMo9–10	...	...
40	2¼Cr–1Mo	Plate	SA/EN 10028–2	10CrMo9–10	...	...
41	2¼Cr–1Mo	Smls. tube	SA/EN 10216–2	10CrMo9–10	...	...
42	2¼Cr–1Mo	Smls. tube	SA/EN 10216–2	10CrMo9–10	...	...
43	2¼Cr–1Mo	Plate	SA/EN 10028–2	10CrMo9–10	...	...
44	2¼Cr–1Mo	Plate	SA/EN 10028–2	10CrMo9–10	...	...
45	2¼Cr–1Mo	Plate	SA/EN 10028–2	10CrMo9–10	...	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Ferrous Materials (Cont'd)
1	≤4	135	120	...
2	≤4	145	130	...
3	≤3	155	140	...
4	≤1½	165	150	...
5	...	60	30	...
6	...	70	40	...
7	...	70	40	...
8	...	70	45	...
9	...	60	30	...
10	...	60	30	...
11	...	60	30	...
12	...	60	30	...
13	...	60	30	...
14	...	60	30	...
15	...	60	35	...
16	...	60	35	...
17	...	70	40	...
18	...	70	40	...
19	$4 < t \le 10$	71	55	...
20	$2.25 < t \le 4$	72.5	56.5	...
21	≤2.25	74	58	...
22	...	75	45	...
23	...	75	45	...
24	...	75	45	...
25	$2\frac{1}{2} < t \le 4$	105	90	...
26	≤2½	115	100	...
27	$2\frac{1}{2} < t \le 6$	105	90	...
28	≤2½	115	100	...
29	...	60	30	...
30	...	60	30	...
31	...	60	30	...
32	...	60	30	...
33	...	60	30	...
34	...	60	30	...
35	...	60	30	...
36	...	60	30	...
37	$6 < t \le 10$	65.5	36.5	...
38	$8 < t \le 20$	65.5	38.5	...
39	$4 < t \le 6$	66.5	37.5	...
40	$2.5 < t \le 4$	68	40.5	...
41	$1\frac{5}{8} < t \le 2\frac{1}{2}$	69.5	39	...
42	$t \le 1\frac{5}{8}$	69.5	40.5	...
43	$1.5 < t \le 2.5$	69.5	42	...
44	$\frac{5}{8} < t \le 1.5$	69.5	43.5	...
45	$t \le \frac{5}{8}$	69.5	45	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Ferrous Materials (Cont'd)								
1	120.0	...	114.6	...	110.7	...	107.7	...	104.1
2	130.0	...	124.1	...	120.5	...	116.4	...	112.9
3	140.0	...	133.8	...	129.3	...	125.4	...	121.5
4	150.0	...	143.4	...	138.6	...	134.4	...	130.2
5	30.0	28.5	27.7	27.0	26.3	...	25.3	...	24.4
6	40.0	38.0	36.9	36.0	35.1	...	33.7	...	32.5
7	40.0	38.0	36.9	36.0	35.1	...	33.7	...	32.5
8	45.0	42.8	41.5	40.5	39.5	...	37.9	...	36.5
9	30.0	28.5	27.7	27.0	26.3	...	25.3	...	24.4
10	30.0	28.5	27.7	27.0	26.3	...	25.3	...	24.4
11	30.0	28.5	27.7	27.0	26.3	...	25.3	...	24.4
12	30.0	28.5	27.7	27.0	26.3	...	25.3	...	24.4
13	30.0	28.5	27.7	27.0	26.3	...	25.3	...	24.4
14	30.0	28.5	27.7	27.0	26.3	...	25.3	...	24.4
15	35.0	33.3	32.3	31.5	30.7	...	29.5	...	28.4
16	35.0	33.3	32.3	31.5	30.7	...	29.5	...	28.4
17	40.0	38.0	36.9	36.0	35.1	...	33.7	...	32.5
18	40.0	38.0	36.9	36.0	35.1	...	33.7	...	32.5
19	55.0	53.8	53.0	52.2	51.3	50.5	49.6	48.7	47.8
20	56.5	55.3	54.5	53.6	52.7	51.8	50.9	50.0	49.1
21	58.0	56.7	55.9	55.1	54.2	53.2	52.3	51.3	50.4
22	45.0	42.8	41.5	40.5	39.5	...	37.9	...	36.5
23	45.0	42.8	41.5	40.5	39.5	...	37.9	...	36.5
24	45.0	42.8	41.5	40.5	39.5	...	37.9	...	36.5
25	90.0	87.5	86.0	84.5	83.2	...	81.0	...	79.2
26	100.0	97.2	95.5	93.9	92.5	...	90.0	...	88.0
27	90.0	87.5	86.0	84.5	83.2	...	81.0	...	79.2
28	100.0	97.2	95.5	93.9	92.5	...	90.0	...	88.0
29	30.0	28.6	28.0	27.6	27.2	...	26.9	...	26.9
30	30.0	28.6	28.0	27.6	27.2	...	26.9	...	26.9
31	30.0	28.6	28.0	27.6	27.2	...	26.9	...	26.9
32	30.0	28.6	28.0	27.6	27.2	...	26.9	...	26.9
33	30.0	28.6	28.0	27.6	27.2	...	26.9	...	26.9
34	30.0	28.6	28.0	27.6	27.2	...	26.9	...	26.9
35	30.0	28.6	28.0	27.6	27.2	...	26.9	...	26.9
36	30.0	28.6	28.0	27.6	27.2	...	26.9	...	26.9
37	36.3	34.2	33.2	32.4	31.7	31.2	30.7	30.4	30.0
38	38.4	36.3	35.3	34.4	33.6	33.0	32.5	...	31.8
39	37.7	35.6	34.5	33.7	33.0	32.4	31.9	31.6	31.2
40	40.6	38.3	37.2	36.3	35.5	34.9	34.4	34.0	33.6
41	39.2	37.0	35.9	35.0	34.3	33.7	33.2	32.8	32.4
42	40.6	38.4	37.2	36.3	35.5	34.9	34.4	34.0	33.6
43	42.1	39.7	38.5	37.6	36.8	36.1	35.6	35.2	34.8
44	43.5	41.1	39.8	38.9	38.0	37.4	36.9	36.5	36.1
45	45.0	42.4	41.2	40.1	39.3	38.6	38.1	37.7	37.3

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Ferrous Materials (Cont'd)
1	...	99.3	96.3	93.3	...	...	...	...	...	...
2	...	107.8	104.1	101.1	...	...	...	...	...	...
3	...	116.1	112.1	108.9	...	...	...	...	...	...
4	...	124.2	118.2	114.0	...	...	...	...	...	...
5	...	23.5	23.1	22.6	22.2	21.6	21.0	20.4	19.6	18.8
6	...	31.4	30.8	30.2	29.6	28.8	28.1	27.2	26.2	25.0
7	...	31.4	30.8	30.2	29.6	28.8	28.1	27.2	26.2	25.0
8	...	35.3	34.6	34.0	33.2	32.5	31.6	30.6	29.4	28.2
9	...	23.5	23.1	22.6	22.2	21.6	21.0	20.4	19.6	18.8
10	...	23.5	23.1	22.6	22.2	21.6	21.0	20.4	19.6	18.8
11	...	23.5	23.1	22.6	22.2	21.6	21.0	20.4	19.6	18.8
12	...	23.5	23.1	22.6	22.2	21.6	21.0	20.4	19.6	18.8
13	...	23.5	23.1	22.6	22.2	21.6	21.0	20.4	19.6	18.8
14	...	23.5	23.1	22.6	22.2	21.6	21.0	20.4	19.6	18.8
15	...	27.4	26.9	26.4	25.9	25.2	24.5	23.8	22.9	21.9
16	...	27.4	26.9	26.4	25.9	25.2	24.5	23.8	22.9	21.9
17	...	31.4	30.8	30.2	29.6	28.8	28.1	27.2	26.2	25.0
18	...	31.4	30.8	30.2	29.6	28.8	28.1	27.2	26.2	25.0
19	46.9	45.9	45.0	44.0	43.0	42.0	40.8	39.6	38.2	36.6
20	48.1	47.2	46.2	45.2	44.2	43.1	41.9	40.7	39.2	37.6
21	49.4	48.5	47.5	46.5	45.4	44.3	43.1	41.7	40.3	38.6
22	...	35.3	34.6	34.0	33.2	32.5	31.6	30.6	29.4	28.2
23	...	35.3	34.6	34.0	33.2	32.5	31.6	30.6	29.4	28.2
24	...	35.3	34.6	34.0	33.2	32.5	31.6	30.6	29.4	28.2
25	...	77.7	77.0	76.3	75.6	74.7	73.7	72.5	71.0	69.2
26	...	86.3	85.6	84.8	84.0	83.0	81.9	80.5	78.9	76.8
27	...	77.7	77.0	76.3	75.6	74.7	73.7	72.5	71.0	69.2
28	...	86.3	85.6	84.8	84.0	83.0	81.9	80.5	78.9	76.8
29	...	26.9	26.9	26.9	26.8	26.6	26.2	25.6	24.8	23.7
30	...	26.9	26.9	26.9	26.8	26.6	26.2	25.6	24.8	23.7
31	...	26.9	26.9	26.9	26.8	26.6	26.2	25.6	24.8	23.7
32	...	26.9	26.9	26.9	26.8	26.6	26.2	25.6	24.8	23.7
33	...	26.9	26.9	26.9	26.8	26.6	26.2	25.6	24.8	23.7
34	...	26.9	26.9	26.9	26.8	26.6	26.2	25.6	24.8	23.7
35	...	26.9	26.9	26.9	26.8	26.6	26.2	25.6	24.8	23.7
36	...	26.9	26.9	26.9	26.8	26.6	26.2	25.6	24.8	23.7
37	29.7	29.4	29.1	28.7	28.2	27.7	27.0	26.1	25.1	24.0
38	31.5	31.2	30.9	30.5	30.0	29.3	28.6	27.7	26.6	25.5
39	30.9	30.6	30.3	29.9	29.4	28.8	28.0	27.2	26.1	25.0
40	33.3	33.0	32.6	32.2	31.6	31.0	30.2	29.3	28.2	26.9
41	32.1	31.7	31.4	30.9	30.4	29.8	29.1	28.2	27.1	25.8
42	33.3	32.9	32.5	32.1	31.6	30.9	30.2	29.3	28.2	26.8
43	34.5	34.2	33.8	33.3	32.8	32.1	31.3	30.3	29.2	27.8
44	35.7	35.3	34.9	34.5	33.9	33.2	32.4	31.4	30.2	28.8
45	36.9	36.5	36.1	35.6	35.0	34.3	33.4	32.4	31.2	29.8

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding												
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
	Ferrous Materials (Cont'd)												
1	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
	Ferrous Materials (Cont'd)					
1	2¼Cr–1Mo	Castings	SA–217	WC9	J21890	...
2	2¼Cr–1Mo	Cast pipe	SA–426	CP22	J21890	...
3	2¼Cr–1Mo	Forgings	SA–182	F22	K21590	3
4	2¼Cr–1Mo	Forgings	SA–336	F22	K21590	3
5	2¼Cr–1Mo	Plate	SA–387	22	K21590	2
6	2¼Cr–1Mo	Wld. pipe	SA–691	2¼CR	K21590	...
7	2¼Cr–1Mo	Bar	SA–739	B22	K21390	...
8	2¼Cr–1Mo	Forgings	SA/EN 10222–2	11CrMo9–10	...	NT
9	2¼Cr–1Mo	Castings	SA–487	8	J22091	A
10	2¼Cr–1Mo	Forgings	SA–508	22	K21590	3
11	2¼Cr–1Mo	Forgings	SA–541	22	K21390	3
12	2¼Cr–1Mo	Plate	SA–542	B	K21590	4
13	2¼Cr–1Mo	Forgings	SA–541	22	K21390	4
14	2¼Cr–1Mo–V	Forgings	SA–182	F22V	K31835	...
15	2¼Cr–1Mo–V	Forgings	SA–336	F22V	K31835	...
16	2¼Cr–1Mo–V	Forgings	SA–541	22V	K31835	...
17	2¼Cr–1Mo–V	Plate	SA–542	D	K31835	4a
18	2¼Cr–1Mo–V	Plate	SA–832	22V	K31835	...
19	3Cr–1Mo	Smls. tube	SA–213	T21	K31545	...
20	3Cr–1Mo	Smls. pipe	SA–335	P21	K31545	...
21	3Cr–1Mo	Forgings	SA–336	F21	K31545	1
22	3Cr–1Mo	Forged pipe	SA–369	FP21	K31545	...
23	3Cr–1Mo	Plate	SA–387	21	K31545	1
24	3Cr–1Mo	Cast pipe	SA–426	CP21	J31545	...
25	3Cr–1Mo	Forgings	SA–182	F21	K31545	...
26	3Cr–1Mo	Forgings	SA–336	F21	K31545	3
27	3Cr–1Mo	Plate	SA–387	21	K31545	2
28	3Cr–1Mo–¼V–Ti–B	Forgings	SA–182	F3V	K31830	...
29	3Cr–1Mo–¼V–Ti–B	Forgings	SA–336	F3V	K31830	...
(**21**) 30	3Cr–1Mo–¼V–Ti–B	Forgings	SA–508	3V	K31830	...
31	3Cr–1Mo–¼V–Ti–B	Forgings	SA–541	3V	K31830	...
32	3Cr–1Mo–¼V–Ti–B	Plate	SA–542	C	K31830	4a
33	3Cr–1Mo–¼V–Ti–B	Plate	SA–832	21V	K31830	...
34	3Cr–1Mo–¼V–Cb–Ca	Forgings	SA–182	F3VCb	...	...
35	3Cr–1Mo–¼V–Cb–Ca	Forgings	SA–336	F3VCb	...	...
36	3Cr–1Mo–¼V–Cb–Ca	Forgings	SA–508	3VCb	...	...
37	3Cr–1Mo–¼V–Cb–Ca	Forgings	SA–541	3VCb	...	...
38	3Cr–1Mo–¼V–Cb–Ca	Plate	SA–542	E	...	4a
39	3Cr–1Mo–¼V–Cb–Ca	Plate	SA–832	23V	...	...
40	5Cr–½Mo	Smls. tube	SA–213	T5	K41545	...
41	5Cr–½Mo	Smls. & wld. fittings	SA–234	WP5	K41545	...
42	5Cr–½Mo	Smls. pipe	SA–335	P5	K41545	...
43	5Cr–½Mo	Forged pipe	SA–369	FP5	K41545	...
44	5Cr–½Mo	Plate	SA–387	5	K41545	1
45	5Cr–½Mo	Wld. pipe	SA–691	5CR	K41545	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Ferrous Materials (Cont'd)
1	...	70	40	...
2	...	70	40	...
3	...	75	45	...
4	...	75	45	...
5	...	75	45	...
6	...	75	45	...
7	...	75	45	...
8	$t \le 8$	75.5	45	...
9	...	85	55	...
10	...	85	55	...
11	...	85	55	...
12	...	85	55	...
13	...	105	85	...
14	...	85	60	...
15	...	85	60	...
16	...	85	60	...
17	...	85	60	...
18	...	85	60	...
19	...	60	30	...
20	...	60	30	...
21	...	60	30	...
22	...	60	30	...
23	...	60	30	...
24	...	60	30	...
25	...	75	45	...
26	...	75	45	...
27	...	75	45	...
28	...	85	60	...
29	...	85	60	...
30	...	90	60	...
31	...	85	60	...
32	...	85	60	...
33	...	85	60	...
34	...	85	60	...
35	...	85	60	...
36	...	85	60	...
37	...	85	60	...
38	...	85	60	...
39	...	85	60	...
40	...	60	30	...
41	...	60	30	...
42	...	60	30	...
43	...	60	30	...
44	...	60	30	...
45	...	60	30	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Ferrous Materials (Cont'd)								
1	40.0	37.9	37.0	36.3	35.8	...	35.1	...	34.4
2	40.0	37.9	37.0	36.3	35.8	...	35.1	...	34.4
3	45.0	42.5	41.2	40.2	39.4	...	38.1	...	37.3
4	45.0	42.5	41.2	40.2	39.4	...	38.1	...	37.3
5	45.0	42.5	41.2	40.2	39.4	...	38.1	...	37.3
6	45.0	42.5	41.2	40.2	39.4	...	38.1	...	37.3
7	45.0	42.5	41.2	40.2	39.4	...	38.1	...	37.3
8	45.0	42.5	41.3	40.2	39.3	38.6	38.1	...	37.2
9	55.0	52.1	50.8	49.9	49.2	...	48.2	...	47.4
10	55.0	...	53.1	...	51.8	...	50.6	...	49.5
11	55.0	...	53.1	...	51.8	...	50.6	...	49.5
12	55.0	...	53.1	...	51.8	...	50.6	...	49.5
13	85.0	...	81.6	...	79.6	...	78.0	...	76.7
14	60.0	...	59.5	...	58.6	...	57.4	...	56.0
15	60.0	...	59.5	...	58.6	...	57.4	...	56.0
16	60.0	...	59.5	...	58.6	...	57.4	...	56.0
17	60.0	...	59.5	...	58.6	...	57.4	...	56.0
18	60.0	...	59.5	...	58.6	...	57.4	...	56.0
19	30.0	28.6	28.0	27.6	27.2	...	26.9	...	26.9
20	30.0	28.6	28.0	27.6	27.2	...	26.9	...	26.9
21	30.0	28.6	28.0	27.6	27.2	...	26.9	...	26.9
22	30.0	28.6	28.0	27.6	27.2	...	26.9	...	26.9
23	30.0	28.6	28.0	27.6	27.2	...	26.9	...	26.9
24	30.0	28.6	28.0	27.6	27.2	...	26.9	...	26.9
25	45.0	42.5	41.2	40.2	39.4	...	38.1	...	37.3
26	45.0	42.5	41.2	40.2	39.4	...	38.1	...	37.3
27	45.0	42.5	41.2	40.2	39.4	...	38.1	...	37.3
28	60.0	57.4	56.0	54.8	53.8	...	52.6	...	52.0
29	60.0	57.4	56.0	54.8	53.8	...	52.6	...	52.0
30	60.0	57.4	56.0	54.8	53.8	...	52.6	...	52.0
31	60.0	57.4	56.0	54.8	53.8	...	52.6	...	52.0
32	60.0	57.4	56.0	54.8	53.8	...	52.6	...	52.0
33	60.0	57.4	56.0	54.8	53.8	...	52.6	...	52.0
34	60.0	57.4	56.0	54.8	53.8	...	52.6	...	52.0
35	60.0	57.4	56.0	54.8	53.8	...	52.6	...	52.0
36	60.0	57.4	56.0	54.8	53.8	...	52.6	...	52.0
37	60.0	57.4	56.0	54.8	53.8	...	52.6	...	52.0
38	60.0	57.4	56.0	54.8	53.8	...	52.6	...	52.0
39	60.0	57.4	56.0	54.8	53.8	...	52.6	...	52.0
40	30.0	28.0	27.1	26.5	26.1	...	25.8	...	25.6
41	30.0	28.0	27.1	26.5	26.1	...	25.8	...	25.6
42	30.0	28.0	27.1	26.5	26.1	...	25.8	...	25.6
43	30.0	28.0	27.1	26.5	26.1	...	25.8	...	25.6
44	30.0	28.0	27.1	26.5	26.1	...	25.8	...	25.6
45	30.0	28.0	27.1	26.5	26.1	...	25.8	...	25.6

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Ferrous Materials (Cont'd)
1	...	33.7	33.3	32.9	32.4	31.8	31.1	30.2	29.1	27.6
2	...	33.7	33.3	32.9	32.4	31.8	31.1	30.2	29.1	27.6
3	...	36.5	36.1	35.6	35.0	34.3	33.5	32.4	31.2	29.7
4	...	36.5	36.1	35.6	35.0	34.3	33.5	32.4	31.2	29.7
5	...	36.5	36.1	35.6	35.0	34.3	33.5	32.4	31.2	29.7
6	...	36.5	36.1	35.6	35.0	34.3	33.5	32.4	31.2	29.7
7	...	36.5	36.1	35.6	35.0	34.3	33.5	32.4	31.2	29.7
8	36.9	36.5	36.1	35.6	35.0	34.3	33.4	32.4	31.2	29.8
9	...	46.4	45.9	45.3	44.6	43.8	42.8	41.6	40.0	38.0
10	...	48.2	47.5	46.8	46.0	45.2	44.2	...	...	...
11	...	48.2	47.5	46.8	46.0	45.2	44.2	...	...	...
12	...	48.2	47.5	46.8	46.0	45.2	44.2	...	...	...
13	...	75.2	74.4	73.4	72.3	71.0	69.4	67.6	65.4	63.0
14	...	54.2	53.3	52.3	51.2	50.1	49.0	47.8	...	...
15	...	54.2	53.3	52.3	51.2	50.1	49.0	47.8	...	...
16	...	54.2	53.3	52.3	51.2	50.1	49.0	47.8	...	...
17	...	54.2	53.3	52.3	51.2	50.1	49.0	47.8	...	...
18	...	54.2	53.3	52.3	51.2	50.1	49.0	47.8	...	...
19	...	26.9	26.9	26.9	26.8	26.6	26.2	25.6	24.8	23.7
20	...	26.9	26.9	26.9	26.8	26.6	26.2	25.6	24.8	23.7
21	...	26.9	26.9	26.9	26.8	26.6	26.2	25.6	24.8	23.7
22	...	26.9	26.9	26.9	26.8	26.6	26.2	25.6	24.8	23.7
23	...	26.9	26.9	26.9	26.8	26.6	26.2	25.6	24.8	23.7
24	...	26.9	26.9	26.9	26.8	26.6	26.2	25.6	24.8	23.7
25	...	36.5	36.1	35.6	35.0	34.3	33.5	32.4	31.2	29.7
26	...	36.5	36.1	35.6	35.0	34.3	33.5	32.4	31.2	29.7
27	...	36.5	36.1	35.6	35.0	34.3	33.5	32.4	31.2	29.7
28	...	51.7	51.4	51.2	50.8	50.3	49.5	48.5	...	...
29	...	51.7	51.4	51.2	50.8	50.3	49.5	48.5	...	...
30	...	51.7	51.4	51.2	50.8	50.3	49.5	48.5	...	...
31	...	51.7	51.4	51.2	50.8	50.3	49.5	48.5	...	...
32	...	51.7	51.4	51.2	50.8	50.3	49.5	48.5	...	...
33	...	51.7	51.4	51.2	50.8	50.3	49.5	48.5	...	...
34	...	51.7	51.4	51.2	50.8	50.3	49.5	48.5	...	...
35	...	51.7	51.4	51.2	50.8	50.3	49.5	48.5	...	...
36	...	51.7	51.4	51.2	50.8	50.3	49.5	48.5	...	...
37	...	51.7	51.4	51.2	50.8	50.3	49.5	48.5	...	...
38	...	51.7	51.4	51.2	50.8	50.3	49.5	48.5	...	...
39	...	51.7	51.4	51.2	50.8	50.3	49.5	48.5	...	...
40	...	25.2	24.9	24.5	23.9	23.1	22.2	21.1	19.8	18.5
41	...	25.2	24.9	24.5	23.9	23.1	22.2	21.1	19.8	18.5
42	...	25.2	24.9	24.5	23.9	23.1	22.2	21.1	19.8	18.5
43	...	25.2	24.9	24.5	23.9	23.1	22.2	21.1	19.8	18.5
44	...	25.2	24.9	24.5	23.9	23.1	22.2	21.1	19.8	18.5
45	...	25.2	24.9	24.5	23.9	23.1	22.2	21.1	19.8	18.5

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding												
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
	Ferrous Materials (Cont'd)												
1	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	... (**21**)
31	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
	Ferrous Materials (Cont'd)					
1	5Cr–½Mo	Forgings	SA–336	F5	K41545	...
2	5Cr–½Mo	Forgings	SA–182	F5	K41545	...
3	5Cr–½Mo	Plate	SA–387	5	K41545	2
4	5Cr–½Mo	Forgings	SA–336	F5A	K42544	...
5	5Cr–½Mo	Castings	SA–217	C5	J42045	...
6	5Cr–½Mo	Cast pipe	SA–426	CP5	J42045	...
7	5Cr–½Mo	Forgings	SA–182	F5a	K42544	...
8	5Cr–½Mo	Bolting	SA–193	B5	K50100	...
9	5Cr–½Mo–Si	Smls. tube	SA–213	T5b	K51545	...
10	5Cr–½Mo–Si	Smls. pipe	SA–335	P5b	K51545	...
11	5Cr–½Mo–Ti	Smls. tube	SA–213	T5c	K41245	...
12	5Cr–½Mo–Ti	Smls. pipe	SA–335	P5c	K41245	...
13	9Cr–1Mo	Smls. tube	SA–213	T9	K90941	...
14	9Cr–1Mo	Fittings	SA–234	WP9	K90941	...
15	9Cr–1Mo	Smls. pipe	SA–335	P9	K90941	...
16	9Cr–1Mo	Forged pipe	SA–369	FP9	K90941	...
17	9Cr–1Mo	Forgings	SA–182	F9	K90941	...
18	9Cr–1Mo	Forgings	SA–336	F9	K90941	...
19	9Cr–1Mo	Castings	SA–217	C12	J82090	...
20	9Cr–1Mo	Cast pipe	SA–426	CP9	J82090	...
(**21**) 21	9Cr–1Mo–V	Smls. tube	SA–213	T91 Types 1 & 2	K90901	...
(**21**) 22	9Cr–1Mo–V	Fittings	SA–234	WP91 Types 1 & 2	K90901	...
(**21**) 23	9Cr–1Mo–V	Smls. pipe	SA–335	P91 Types 1 & 2	K90901	...
(**21**) 24	9Cr–1Mo–V	Forged pipe	SA–369	FP91 Types 1 & 2	K90901	...
(**21**) 25	9Cr–1Mo–V	Plate	SA–387	91 Types 1 & 2	K90901	2
(**21**) 26	9Cr–1Mo–V	Forgings	SA–182	F91 Types 1 & 2	K90901	...
(**21**) 27	9Cr–1Mo–V	Forgings	SA–336	F91 Types 1 & 2	K90901	...
28	11Cr–Ti	Plate	SA–240	...	S40910	...
29	11Cr–Ti	Plate	SA–240	...	S40920	...
30	11Cr–Ti	Plate	SA–240	...	S40930	...
31	11Cr–Ti	Smls. & wld. tube	SA–268	TP409	S40900	...
32	12Cr	Plate	SA–1010	40	S41003	...
33	12Cr	Bar	SA–479	403	S40300	A
34	12Cr	Bar	SA–479	403	S40300	1
35	12Cr	Plate	SA–1010	50	S41003	...
36	12Cr–Al	Plate	SA–240	405	S40500	...
37	12Cr–Al	Bar	SA–479	405	S40500	...
38	12Cr–Al	Bar	SA/JIS G4303	SUS405	...	...
39	12Cr–Al	Smls. & wld. tube	SA–268	TP405	S40500	...
40	12Cr–1Mo–V–W	Bolting	SA–437	B4C	K91352	...
41	12Cr–1Mo–V–W	Bolting	SA–437	B4B	K91352	...
42	12Cr–9Ni–2Cu–1Ti	Bar	SA–564	XM–16	S45500	H1000
43	12Cr–9Ni–2Cu–1Ti	Forgings	SA–705	XM–16	S45500	H1000
44	12Cr–9Ni–2Cu–1Ti	Bar	SA–564	XM–16	S45500	H950
45	12Cr–9Ni–2Cu–1Ti	Forgings	SA–705	XM–16	S45500	H950

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Ferrous Materials (Cont'd)
1	...	60	36	...
2	...	70	40	...
3	...	75	45	...
4	...	80	50	...
5	...	90	60	...
6	...	90	60	...
7	...	90	65	...
8	≤4	100	80	...
9	...	60	30	...
10	...	60	30	...
11	...	60	30	...
12	...	60	30	...
13	...	60	30	...
14	...	60	30	...
15	...	60	30	...
16	...	60	30	...
17	...	85	55	...
18	...	85	55	...
19	...	90	60	...
20	...	90	60	...
21	...	85	60	...
22	...	85	60	...
23	...	85	60	...
24	...	85	60	...
25	...	85	60	...
26	...	90	60	...
27	...	90	60	...
28	...	55	25	...
29	...	55	25	...
30	...	55	25	...
31	...	55	25	...
32	≤3/4	66	40	...
33	...	70	40	...
34	...	70	40	...
35	≤3/4	70	50	...
36	...	60	25	...
37	...	60	25	...
38	...	60	25	...
39	...	60	30	...
40	...	115	85	...
41	...	145	105	...
42	...	205	185	...
43	≥1/2	205	185	...
44	...	220	205	...
45	≥1/2	220	205	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Ferrous Materials (Cont'd)								
1	36.0	33.6	32.5	31.8	31.4	...	30.9	...	30.7
2	40.0	37.3	36.2	35.4	34.8	...	34.4	...	34.1
3	45.0	42.0	40.7	39.8	39.2	...	38.7	...	38.4
4	50.0	46.7	45.2	44.2	43.6	...	42.9	...	42.6
5	60.0	56.0	54.2	53.0	52.3	...	51.5	...	51.2
6	60.0	56.0	54.2	53.0	52.3	...	51.5	...	51.2
7	65.0	60.7	58.8	57.5	56.6	...	55.8	...	55.4
8	80.0	...	71.1	...	68.9	...	68.7	...	68.7
9	30.0	28.0	27.1	26.5	26.1	...	25.8	...	25.6
10	30.0	28.0	27.1	26.5	26.1	...	25.8	...	25.6
11	30.0	28.0	27.1	26.5	26.1	...	25.8	...	25.6
12	30.0	28.0	27.1	26.5	26.1	...	25.8	...	25.6
13	30.0	28.0	27.1	26.5	26.1	...	25.8	...	25.6
14	30.0	28.0	27.1	26.5	26.1	...	25.8	...	25.6
15	30.0	28.0	27.1	26.5	26.1	...	25.8	...	25.6
16	30.0	28.0	27.1	26.5	26.1	...	25.8	...	25.6
17	55.0	51.3	49.7	48.6	47.9	...	47.2	...	46.9
18	55.0	51.3	49.7	48.6	47.9	...	47.2	...	46.9
19	60.0	56.0	54.2	53.0	52.3	...	51.5	...	51.2
20	60.0	56.0	54.2	53.0	52.3	...	51.5	...	51.2
21	60.0	57.1	55.9	55.2	54.8	...	54.7	...	54.7
22	60.0	57.1	55.9	55.2	54.8	...	54.7	...	54.7
23	60.0	57.1	55.9	55.2	54.8	...	54.7	...	54.7
24	60.0	57.1	55.9	55.2	54.8	...	54.7	...	54.7
25	60.0	57.1	55.9	55.2	54.8	...	54.7	...	54.7
26	60.0	57.1	55.9	55.2	54.8	...	54.7	...	54.7
27	60.0	57.1	55.9	55.2	54.8	...	54.7	...	54.7
28	25.0	23.0	21.7	20.6	19.6	...	18.1	...	17.3
29	25.0	23.0	21.7	20.6	19.6	...	18.1	...	17.3
30	25.0	23.0	21.7	20.6	19.6	...	18.1	...	17.3
31	25.0	23.0	21.7	20.6	19.6	...	18.1	...	17.3
32	40.0	...	40.0	...	36.7	...	33.9	...	32.3
33	40.0	37.8	36.8	36.0	35.5	...	34.9	...	34.4
34	40.0	37.8	36.8	36.0	35.5	...	34.9	...	34.4
35	50.0	...	50.0	...	45.9	...	42.4	...	40.3
36	25.0	23.6	23.0	22.5	22.2	...	21.8	...	21.5
37	25.0	23.6	23.0	22.5	22.2	...	21.8	...	21.5
38	25.0	23.6	23.0	22.5	22.2	...	21.8	...	21.5
39	30.0	28.4	27.6	27.0	26.6	...	26.2	...	25.8
40	85.0	...	81.6	...	78.9	...	76.8	...	75.0
41	105.0	...	100.5	...	97.2	...	94.8	...	92.7
42	185.0	...	...	...	...	...	...	...	...
43	185.0	...	...	...	...	...	...	...	...
44	205.0	...	...	...	...	...	...	...	...
45	205.0	...	...	...	...	...	...	...	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Ferrous Materials (Cont'd)
1	...	30.3	29.9	29.3	28.6	27.7	26.6	25.3	23.8	22.2
2	...	33.6	33.2	32.6	31.8	30.8	29.6	28.1	26.5	24.6
3	...	37.8	37.4	36.7	35.8	34.6	33.3	31.6	29.8	27.7
4	...	42.0	41.5	40.8	39.8	38.5	36.9	35.1	33.1	30.8
5	...	50.5	49.8	48.9	47.7	46.2	44.3	42.2	39.7	36.9
6	...	50.5	49.8	48.9	47.7	46.2	44.3	42.2	39.7	36.9
7	...	54.7	54.0	53.0	51.7	50.0	48.0	45.7	43.0	40.0
8	...	68.6	67.9	66.7	65.1	62.9	60.3	57.1	53.6	49.7
9	...	25.2	24.9	24.5	23.9	23.1	22.2	21.1	19.8	18.5
10	...	25.2	24.9	24.5	23.9	23.1	22.2	21.1	19.8	18.5
11	...	25.2	24.9	24.5	23.9	23.1	22.2	21.1	19.8	18.5
12	...	25.2	24.9	24.5	23.9	23.1	22.2	21.1	19.8	18.5
13	...	25.2	24.9	24.5	23.9	23.1	22.2	21.1	19.8	18.5
14	...	25.2	24.9	24.5	23.9	23.1	22.2	21.1	19.8	18.5
15	...	25.2	24.9	24.5	23.9	23.1	22.2	21.1	19.8	18.5
16	...	25.2	24.9	24.5	23.9	23.1	22.2	21.1	19.8	18.5
17	...	46.2	45.7	44.8	43.7	42.3	40.6	38.6	36.4	33.9
18	...	46.2	45.7	44.8	43.7	42.3	40.6	38.6	36.4	33.9
19	...	50.5	49.8	48.9	47.7	46.2	44.3	42.2	39.7	36.9
20	...	50.5	49.8	48.9	47.7	46.2	44.3	42.2	39.7	36.9
21	...	54.5	54.0	53.2	52.0	50.4	48.5	46.1	43.4	40.2
22	...	54.5	54.0	53.2	52.0	50.4	48.5	46.1	43.4	40.2
23	...	54.5	54.0	53.2	52.0	50.4	48.5	46.1	43.4	40.2
24	...	54.5	54.0	53.2	52.0	50.4	48.5	46.1	43.4	40.2
25	...	54.5	54.0	53.2	52.0	50.4	48.5	46.1	43.4	40.2
26	...	54.5	54.0	53.2	52.0	50.4	48.5	46.1	43.4	40.2
27	...	54.5	54.0	53.2	52.0	50.4	48.5	46.1	43.4	40.2
28	...	17.0	16.9	16.9	16.8	16.6	16.3	15.9	15.3	14.5
29	...	17.0	16.9	16.9	16.8	16.6	16.3	15.9	15.3	14.5
30	...	17.0	16.9	16.9	16.8	16.6	16.3	15.9	15.3	14.5
31	...	17.0	16.9	16.9	16.8	16.6	16.3	15.9	15.3	14.5
32	...	31.1	30.4	29.4	28.1	26.5	24.7	22.9	21.5	21.2
33	...	33.7	33.1	32.4	31.4	30.2	28.8	27.1	25.2	23.0
34	...	33.7	33.1	32.4	31.4	30.2	28.8	27.1	25.2	23.0
35	...	38.9	38.0	36.8	35.1	33.1	30.9	28.6	26.9	26.5
36	...	21.0	20.7	20.2	19.6	18.9	18.0	16.9	15.7	14.4
37	...	21.0	20.7	20.2	19.6	18.9	18.0	16.9	15.7	14.4
38	...	21.0	20.7	20.2	19.6	18.9	18.0	16.9	15.7	14.4
39	...	25.3	24.8	24.3	23.6	22.7	21.6	20.3	18.9	17.2
40	...	73.8	72.9	72.0	...	...	...	...	...	...
41	...	90.6	89.7	89.1	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Ferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
22	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
23	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
24	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
25	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
26	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
27	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
28	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
	Ferrous Materials (Cont'd)					
1	12Cr–9Ni–2Cu–1Ti	Bar	SA–564	XM–16	S45500	H900
2	12Cr–9Ni–2Cu–1Ti	Forgings	SA–705	XM–16	S45500	H900
3	12Cr–Ti	Smls. & wld. tube	SA–268	...	S40800	...
4	13Cr	Plate	SA–240	410S	S41008	...
5	13Cr	Smls. & wld. tube	SA–268	TP410	S41000	...
6	13Cr	Plate	SA–240	410	S41000	...
7	13Cr	Forgings	SA–182	F6a	S41000	1
8	13Cr	Bar	SA–479	410	S41000	...
9	13Cr	Bar	SA–479	410	S41000	A
10	13Cr	Bar	SA–479	410	S41000	1
11	13Cr	Forgings	SA–182	F6a	S41000	2
12	13Cr	Castings	SA–217	CA15	J91150	...
13	13Cr	Cast pipe	SA–426	CPCA15	J91150	...
14	13Cr	Bar	SA/EN 10088–3	X12Cr13	...	QT650
15	13Cr	Bolting	SA–193	B6	S41000	...
16	13Cr–4Ni	Castings	SA–487	CA6NM	J91540	A
17	13Cr–4Ni	Forgings	SA–182	F6NM	S41500	...
18	13Cr–4Ni	Bar	SA–479	...	S41500	...
19	13Cr–8Ni–2Mo	Bar	SA–564	XM–13	S13800	H1150M
20	13Cr–8Ni–2Mo	Forgings	SA–705	XM–13	S13800	H1150M
21	13Cr–8Ni–2Mo	Bar	SA–564	XM–13	S13800	H1150
22	13Cr–8Ni–2Mo	Forgings	SA–705	XM–13	S13800	H1150
23	13Cr–8Ni–2Mo	Bar	SA–564	XM–13	S13800	H1100
24	13Cr–8Ni–2Mo	Forgings	SA–705	XM–13	S13800	H1100
25	13Cr–8Ni–2Mo	Bar	SA–564	XM–13	S13800	H1050
26	13Cr–8Ni–2Mo	Forgings	SA–705	XM–13	S13800	H1050
27	13Cr–8Ni–2Mo	Bar	SA–564	XM–13	S13800	H1025
28	13Cr–8Ni–2Mo	Forgings	SA–705	XM–13	S13800	H1025
29	13Cr–8Ni–2Mo	Bar	SA–564	XM–13	S13800	H1000
30	13Cr–8Ni–2Mo	Forgings	SA–705	XM–13	S13800	H1000
31	13Cr–8Ni–2Mo	Bar	SA–564	XM–13	S13800	H950
32	13Cr–8Ni–2Mo	Forgings	SA–705	XM–13	S13800	H950
33	15Cr	Smls. & wld. tube	SA–268	TP429	S42900	...
34	15Cr	Plate	SA–240	429	S42900	...
35	15Cr–5Ni–3Cu	Bar	SA–564	XM–12	S15500	H1150M
36	15Cr–5Ni–3Cu	Forgings	SA–705	XM–12	S15500	H1150M
37	15Cr–5Ni–3Cu	Bar	SA–564	XM–12	S15500	H1150
38	15Cr–5Ni–3Cu	Forgings	SA–705	XM–12	S15500	H1150
39	15Cr–5Ni–3Cu	Bar	SA–564	XM–12	S15500	H1100
40	15Cr–5Ni–3Cu	Forgings	SA–705	XM–12	S15500	H1100
41	15Cr–5Ni–3Cu	Bar	SA–564	XM–12	S15500	H1075
42	15Cr–5Ni–3Cu	Forgings	SA–705	XM–12	S15500	H1075
43	15Cr–5Ni–3Cu	Bar	SA–564	XM–12	S15500	H1025
44	15Cr–5Ni–3Cu	Forgings	SA–705	XM–12	S15500	H1025
45	15Cr–5Ni–3Cu	Bar	SA–564	XM–12	S15500	H925

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Ferrous Materials (Cont'd)
1	...	235	220	...
2	≥1/2	235	220	...
3	...	55	30	...
4	...	60	30	...
5	...	60	30	...
6	...	65	30	...
7	...	70	40	...
8	...	70	40	...
9	...	70	40	...
10	...	70	40	...
11	...	85	55	...
12	...	90	65	...
13	...	90	65	...
14	$t \le 6.25$	94.5	65.5	...
15	≤4	110	85	...
16	...	110	80	...
17	...	115	90	...
18	...	115	90	...
19	...	125	85	...
20	...	125	85	...
21	...	135	90	...
22	...	135	90	...
23	...	150	135	...
24	...	150	135	...
25	...	175	165	...
26	...	175	165	...
27	...	185	175	...
28	...	185	175	...
29	...	205	190	...
30	...	205	190	...
31	...	220	205	...
32	...	220	205	...
33	...	60	35	...
34	...	65	30	...
35	...	115	75	...
36	...	115	75	...
37	...	135	105	...
38	...	135	105	...
39	...	140	115	...
40	...	140	115	...
41	...	145	125	...
42	...	145	125	...
43	...	155	145	...
44	...	155	145	...
45	...	170	155	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Ferrous Materials (Cont'd)								
1	220.0	...	...	...	...	...	...	...	...
2	220.0	...	...	...	...	...	...	...	...
3	30.0	28.4	27.6	27.0	26.6	...	26.2	...	25.8
4	30.0	28.4	27.6	27.0	26.6	...	26.2	...	25.8
5	30.0	28.4	27.6	27.0	26.6	...	26.2	...	25.8
6	30.0	28.4	27.6	27.0	26.6	...	26.2	...	25.8
7	40.0	37.8	36.8	36.0	35.5	...	34.9	...	34.4
8	40.0	37.8	36.8	36.0	35.5	...	34.9	...	34.4
9	40.0	37.8	36.8	36.0	35.5	...	34.9	...	34.4
10	40.0	37.8	36.8	36.0	35.5	...	34.9	...	34.4
11	55.0	52.0	50.6	49.6	48.8	...	48.0	...	47.3
12	65.0	61.4	59.8	58.6	57.7	...	56.7	...	55.9
13	65.0	61.4	59.8	58.6	57.7	...	56.7	...	55.9
14	65.3	62.0	60.4	59.1	58.1	57.3	56.8	...	56.0
15	85.0	...	78.0	...	75.0	...	73.6	...	72.8
16	80.0	76.9	75.3	73.9	72.9	...	71.3	...	70.3
17	90.0	87.7	86.5	85.5	84.6	...	82.8	...	80.8
18	90.0	87.7	86.5	85.5	84.6	...	82.8	...	80.8
19	85.0	...	...	...	...	...	...	...	...
20	85.0	...	...	...	...	...	...	...	...
21	90.0	...	...	...	...	...	...	...	...
22	90.0	...	...	...	...	...	...	...	...
23	135.0	...	...	...	...	...	...	...	...
24	135.0	...	...	...	...	...	...	...	...
25	165.0	...	...	...	...	...	...	...	...
26	165.0	...	...	...	...	...	...	...	...
27	175.0	...	...	...	...	...	...	...	...
28	175.0	...	...	...	...	...	...	...	...
29	190.0	...	...	...	...	...	...	...	...
30	190.0	...	...	...	...	...	...	...	...
31	205.0	...	...	...	...	...	...	...	...
32	205.0	...	...	...	...	...	...	...	...
33	35.0	33.1	32.2	31.5	31.1	...	30.5	...	30.1
34	30.0	28.4	27.6	27.0	26.6	...	26.2	...	25.8
35	75.0	...	...	...	...	...	...	...	...
36	75.0	...	...	...	...	...	...	...	...
37	105.0	...	...	...	...	...	...	...	...
38	105.0	...	...	...	...	...	...	...	...
39	115.0	...	107.1	...	103.2	...	100.5	...	98.1
40	115.0	...	107.1	...	103.2	...	100.5	...	98.1
41	125.0	119.1	116.4	114.1	112.3	110.7	109.2	107.9	106.6
42	125.0	119.1	116.4	114.1	112.3	110.7	109.2	107.9	106.6
43	145.0	138.2	135.0	132.4	130.2	128.4	126.7	125.2	123.7
44	145.0	138.2	135.0	132.4	130.2	128.4	126.7	125.2	123.7
45	155.0	147.7	144.3	141.5	139.2	137.2	135.5	133.8	132.2

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Ferrous Materials (Cont'd)
1	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...
3	...	25.3	24.8	24.3	23.6	22.7	21.6	20.3	18.9	17.2
4	...	25.3	24.8	24.3	23.6	22.7	21.6	20.3	18.9	17.2
5	...	25.3	24.8	24.3	23.6	22.7	21.6	20.3	18.9	17.2
6	...	25.3	24.8	24.3	23.6	22.7	21.6	20.3	18.9	17.2
7	...	33.7	33.1	32.4	31.4	30.2	28.8	27.1	25.2	23.0
8	...	33.7	33.1	32.4	31.4	30.2	28.8	27.1	25.2	23.0
9	...	33.7	33.1	32.4	...	...	...	...	...	...
10	...	33.7	33.1	32.4	...	...	...	...	...	...
11	...	46.3	45.5	44.5	43.2	41.6	39.6	37.3	34.6	31.6
12	...	54.7	53.8	52.6	51.0	49.1	46.8	44.0	40.9	37.3
13	...	54.7	53.8	52.6	...	...	...	...	...	...
14	55.6	55.0	54.2	53.0	51.4	49.4	47.0	44.2	41.0	37.7
15	...	71.7	70.7	69.4	67.6	65.2	62.3	58.7	54.6	49.9
16	...	69.1	68.2	67.0	65.4	63.4	...	...	...	...
17	...	78.5	77.2	75.7	...	...	...	...	...	...
18	...	78.5	77.2	75.7	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...
33	...	29.5	29.0	28.3	27.5	26.4	25.2	23.7	22.0	20.1
34	...	25.3	24.8	24.3	23.6	22.7	21.6	20.3	18.9	17.2
35	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...
39	96.8	...	...	...	...	...	...	...	...	...
40	96.8	...	...	...	...	...	...	...	...	...
41	105.2	103.7	101.5	99.8	...	...	...	...	...	...
42	105.2	103.7	101.5	99.8	...	...	...	...	...	...
43	122.1	120.3	117.7	115.8	...	...	...	...	...	...
44	122.1	120.3	117.7	115.8	...	...	...	...	...	...
45	130.5	128.6	125.9	123.8	...	...	...	...	...	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding												
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
	Ferrous Materials (Cont'd)												
1	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
	Ferrous Materials (Cont'd)					
1	15Cr–5Ni–3Cu	Forgings	SA–705	XM–12	S15500	H925
2	15Cr–5Ni–3Cu	Bar	SA–564	XM–12	S15500	H900
3	15Cr–5Ni–3Cu	Forgings	SA–705	XM–12	S15500	H900
4	15Cr–6Ni–Cu–Mo	Bar	SA–564	XM–25	S45000	H1150
5	15Cr–6Ni–Cu–Mo	Forgings	SA–705	XM–25	S45000	H1150
6	15Cr–6Ni–Cu–Mo	Bar	SA–564	XM–25	S45000	H1100
7	15Cr–6Ni–Cu–Mo	Forgings	SA–705	XM–25	S45000	H1100
8	15Cr–6Ni–Cu–Mo	Bar	SA–564	XM–25	S45000	H1050
9	15Cr–6Ni–Cu–Mo	Forgings	SA–705	XM–25	S45000	H1050
10	15Cr–6Ni–Cu–Mo	Bar	SA–564	XM–25	S45000	H1025
11	15Cr–6Ni–Cu–Mo	Forgings	SA–705	XM–25	S45000	H1025
12	15Cr–6Ni–Cu–Mo	Bar	SA–564	XM–25	S45000	H1000
13	15Cr–6Ni–Cu–Mo	Forgings	SA–705	XM–25	S45000	H1000
14	15Cr–6Ni–Cu–Mo	Bar	SA–564	XM–25	S45000	H950
15	15Cr–6Ni–Cu–Mo	Forgings	SA–705	XM–25	S45000	H950
16	15Cr–6Ni–Cu–Mo	Bar	SA–564	XM–25	S45000	H900
17	15Cr–6Ni–Cu–Mo	Forgings	SA–705	XM–25	S45000	H900
18	17Cr	Smls. & wld. tube	SA–268	TP430	S43000	...
19	17Cr	Plate	SA–240	430	S43000	...
20	17Cr	Bar	SA–479	430	S43000	...
21	17Cr–4Ni–4Cu	Bar	SA–564	630	S17400	H1150M
22	17Cr–4Ni–4Cu	Forgings	SA–705	630	S17400	H1150M
23	17Cr–4Ni–4Cu	Bar	SA–564	630	S17400	H1150
24	17Cr–4Ni–4Cu	Plate	SA–693	630	S17400	H1150
25	17Cr–4Ni–4Cu	Forgings	SA–705	630	S17400	H1150
26	17Cr–4Ni–4Cu	Bar	SA–564	630	S17400	H1100
27	17Cr–4Ni–4Cu	Plate	SA–693	630	S17400	H1100
28	17Cr–4Ni–4Cu	Forgings	SA–705	630	S17400	H1100
29	17Cr–4Ni–4Cu	Bar	SA–564	630	S17400	H1075
30	17Cr–4Ni–4Cu	Plate	SA–693	630	S17400	H1075
31	17Cr–4Ni–4Cu	Forgings	SA–705	630	S17400	H1075
32	17Cr–4Ni–4Cu	Bar	SA–564	630	S17400	H1025
33	17Cr–4Ni–4Cu	Forgings	SA–705	630	S17400	H1025
34	17Cr–4Ni–4Cu	Forgings	SA–705	630	S17400	H925
35	17Cr–4Ni–4Cu	Forgings	SA–705	630	S17400	H900
36	17Cr–7Ni–1Al	Forgings	SA–705	631	S17700	TH1050
37	17Cr–7Ni–1Al	Forgings	SA–705	631	S17700	RH950
38	18Cr–2Mo	Plate	SA–240	...	S44400	...
39	18Cr–2Mo	Smls. & wld. tube	SA–268	...	S44400	...
40	18Cr–Ti	Smls. & wld. tube	SA–268	TP439	S43035	...
41	18Cr–Ti	Wld. tube	SA–803	TP439	S43035	...
42	18Cr–Ti	Smls. & wld. pipe	SA–731	TP439	S43035	...
43	18Cr–Ti	Smls. & wld. tube	SA–268	TP430 Ti	S43036	...
44	18Cr–Ti	Bar	SA–479	439	S43035	...
45	26Cr–3Ni–3Mo	Plate	SA–240	26–3–3	S44660	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Ferrous Materials (Cont'd)
1	...	170	155	...
2	...	190	170	...
3	...	190	170	...
4	...	125	75	...
5	≥1/2	125	75	...
6	...	130	105	...
7	≥1/2	130	105	...
8	...	145	135	...
9	≥1/2	145	135	...
10	...	150	140	...
11	≥1/2	150	140	...
12	...	160	150	...
13	≥1/2	160	150	...
14	...	170	160	...
15	≥1/2	170	160	...
16	...	180	170	...
17	≥1/2	180	170	...
18	...	60	35	...
19	...	65	30	...
20	...	70	40	...
21	...	115	75	...
22	...	115	75	...
23	...	135	105	...
24	...	135	105	...
25	...	135	105	...
26	...	140	115	...
27	...	140	115	...
28	...	140	115	...
29	...	145	125	...
30	...	145	125	...
31	...	145	125	...
32	...	155	145	...
33	...	155	145	...
34	...	170	155	...
35	...	190	170	...
36	...	170	140	...
37	...	185	150	...
38	...	60	40	...
39	...	60	40	...
40	...	60	30	...
41	...	60	30	...
42	...	60	30	...
43	...	60	35	...
44	...	70	40	...
45	≤2/10	85	65	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Ferrous Materials (Cont'd)								
1	155.0	147.7	144.3	141.5	139.2	137.2	135.5	133.8	132.2
2	170.0	162.0	158.2	155.2	152.7	150.5	148.6	146.8	145.0
3	170.0	162.0	158.2	155.2	152.7	150.5	148.6	146.8	145.0
4	75.0	...	...	...	...	...	...	...	...
5	75.0	...	...	...	...	...	...	...	...
6	105.0	...	...	...	...	...	...	...	...
7	105.0	...	...	...	...	...	...	...	...
8	135.0	...	...	...	...	...	...	...	...
9	135.0	...	...	...	...	...	...	...	...
10	140.0	...	...	...	...	...	...	...	...
11	140.0	...	...	...	...	...	...	...	...
12	150.0	...	...	...	...	...	...	...	...
13	150.0	...	...	...	...	...	...	...	...
14	160.0	...	...	...	...	...	...	...	...
15	160.0	...	...	...	...	...	...	...	...
16	170.0	...	...	...	...	...	...	...	...
17	170.0	...	...	...	...	...	...	...	...
18	35.0	33.1	32.2	31.5	31.1	...	30.5	...	30.1
19	30.0	28.4	27.6	27.0	26.6	...	26.2	...	25.8
20	40.0	37.8	36.8	36.0	35.5	...	34.9	...	34.4
21	75.0	71.2	69.4	67.8	66.4	...	64.1	...	62.1
22	75.0	71.2	69.4	67.8	66.4	...	64.1	...	62.1
23	105.0	99.7	97.1	94.9	93.0	...	89.7	...	87.0
24	105.0	99.7	97.1	94.9	93.0	...	89.7	...	87.0
25	105.0	99.7	97.1	94.9	93.0	...	89.7	...	87.0
26	115.0	109.2	106.3	103.9	101.8	...	98.3	...	95.2
27	115.0	109.2	106.3	103.9	101.8	...	98.3	...	95.2
28	115.0	109.2	106.3	103.9	101.8	...	98.3	...	95.2
29	125.0	118.7	115.6	113.0	110.7	...	106.8	...	103.5
30	125.0	118.7	115.6	113.0	110.7	...	106.8	...	103.5
31	125.0	118.7	115.6	113.0	110.7	...	106.8	...	103.5
32	145.0	...	134.1	...	128.4	...	123.9	...	120.1
33	145.0	137.7	134.1	131.0	128.4	...	123.9	...	120.1
34	155.0	147.2	143.3	140.1	137.3	...	132.4	...	128.4
35	170.0	161.5	157.2	153.6	150.5	...	145.2	...	140.8
36	140.0	...	...	...	...	...	...	...	...
37	150.0	...	...	...	...	...	...	...	...
38	40.0	36.5	34.8	33.5	32.4	...	30.8	...	29.4
39	40.0	36.5	34.8	33.5	32.4	...	30.8	...	29.4
40	30.0	27.4	25.9	24.6	23.5	...	21.9	...	20.9
41	30.0	27.4	25.9	24.6	23.5	...	21.9	...	20.9
42	30.0	27.4	25.9	24.6	23.5	...	21.9	...	20.9
43	35.0	...	30.2	...	27.4	...	25.5	...	24.4
44	40.0	36.5	34.6	32.8	31.3	...	29.1	...	27.9
45	65.0	60.6	58.3	56.4	54.7	...	52.3	...	50.6

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Ferrous Materials (Cont'd)
1	130.5	128.6	125.9	123.8	...	...	...	...	...	...
2	143.1	141.0	138.0	135.7	...	...	...	...	...	...
3	143.1	141.0	138.0	135.7	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...
18	...	29.5	29.0	28.3	27.5	26.4	25.2	23.7	22.0	20.1
19	...	25.3	24.8	24.3	23.6	22.7	21.6	20.3	18.9	17.2
20	...	33.7	33.1	32.4	31.4	30.2	28.8	27.1	25.2	23.0
21	...	60.5	...	...	...	...	...	...	...	...
22	...	60.5	...	...	...	...	...	...	...	...
23	...	84.7	83.6	82.5	81.1	79.4	76.9	73.2	67.9	60.2
24	...	84.7	83.6	82.5	81.1	79.4	76.9	73.2	67.9	60.2
25	...	84.7	83.6	82.5	81.1	79.4	76.9	73.2	67.9	60.2
26	...	92.7	91.5	90.3	88.9	86.9	84.2	80.2	74.4	66.0
27	...	92.7	91.5	90.3	88.9	86.9	84.2	80.2	74.4	66.0
28	...	92.7	91.5	90.3	88.9	86.9	84.2	80.2	74.4	66.0
29	...	100.8	99.5	98.2	96.6	94.5	91.5	87.2	80.8	71.7
30	...	100.8	99.5	98.2	96.6	94.5	91.5	87.2	80.8	71.7
31	...	100.8	99.5	98.2	96.6	94.5	91.5	87.2	80.8	71.7
32	118.4	...	...	...	...	...	...	...	...	...
33	118.4	116.9	115.4	113.9	...	...	...	...	...	...
34	...	125.0	123.4	121.7	...	...	...	...	...	...
35	...	137.1	135.3	133.5	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...
38	...	28.0	27.3	26.6	25.9	25.1	24.2	23.2	22.1	20.7
39	...	28.0	27.3	26.6	25.9	25.1	24.2	23.2	22.1	20.7
40	...	20.5	20.3	20.2	20.1	19.8	19.4	18.8	17.9	16.6
41	...	20.5	20.3	20.2	20.1	19.8	19.4	18.8	17.9	16.6
42	...	20.5	20.3	20.2	20.1	19.8	19.4	18.8	17.9	16.6
43	...	23.9	23.7	23.6	23.4	23.1	22.6	21.9	20.9	...
44	...	27.3	27.1	26.9	26.7	26.4	25.9	25.0	23.8	22.2
45	...	49.7	49.5	49.3	...	...	...	...	...	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding												
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
	Ferrous Materials (Cont'd)												
1	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
	Ferrous Materials (Cont'd)					
1	26Cr–3Ni–3Mo	Smls. & wld. tube	SA–268	26–3–3	S44660	...
2	26Cr–3Ni–3Mo	Wld. tube	SA–803	26–3–3	S44660	...
3	27Cr	Smls. tube	SA–268	TP446–1	S44600	...
4	27Cr–1Mo	Forgings	SA–182	FXM–27Cb	S44627	...
5	27Cr–1Mo	Plate	SA–240	XM–27	S44627	...
6	27Cr–1Mo	Smls. & wld. tube	SA–268	TPXM–27	S44627	...
7	27Cr–1Mo	Bar	SA–479	XM–27	S44627	...
8	27Cr–1Mo	Smls. & wld. pipe	SA–731	TPXM–27	S44627	...
9	27Cr–1Mo–Ti	Smls. & wld. pipe	SA–731	TPXM–33	S44626	...
10	27Cr–1Mo–Ti	Plate	SA–240	XM–33	S44626	...
11	27Cr–1Mo–Ti	Smls. & wld. tube	SA–268	TPXM–33	S44626	...
12	29Cr–4Mo	Bar	SA–479	...	S44700	...
13	29Cr–4Mo	Plate	SA–240	...	S44700	...
14	29Cr–4Mo	Smls. & wld. tube	SA–268	29–4	S44700	...
15	29Cr–4Mo–2Ni	Bar	SA–479	...	S44800	...
16	29Cr–4Mo–2Ni	Plate	SA–240	...	S44800	...
17	29Cr–4Mo–2Ni	Smls. & wld. tube	SA–268	29–4–2	S44800	...
18	29Cr–4Mo–Ti	Smls. & wld. tube	SA–268	...	S44735	...
19	Mn–¼Mo	Forgings	SA–372	D	K14508	...
20	Mn–¼Mo–V	Castings	SA–487	2	J13005	A
21	Mn–¼Mo–V	Castings	SA–487	2	J13005	B
22	Mn–½Mo	Plate	SA–302	A	K12021	...
23	Mn–½Mo	Wld. pipe	SA–672	H75	K12021	...
24	Mn–½Mo	Plate	SA–302	B	K12022	...
25	Mn–½Mo	Plate	SA–533	A	K12521	1
26	Mn–½Mo	Plate	SA–533	A	K12521	2
27	Mn–½Mo	Plate	SA–533	A	K12521	3
28	Mn–½Mo–¼Ni	Plate	SA–533	D	K12529	1
29	Mn–½Mo–¼Ni	Plate	SA–533	D	K12529	2
30	Mn–½Mo–¼Ni	Plate	SA–533	D	K12529	3
31	Mn–½Mo–½Ni	Plate	SA–302	C	K12039	...
32	Mn–½Mo–½Ni	Plate	SA–533	B	K12539	1
33	Mn–½Mo–½Ni	Wld. pipe	SA–672	H80	K12039	...
34	Mn–½Mo–½Ni	Wld. pipe	SA–672	J80	K12539	...
35	Mn–½Mo–½Ni	Plate	SA–533	B	K12539	2
36	Mn–½Mo–½Ni	Wld. pipe	SA–672	J90	K12539	...
37	Mn–½Mo–½Ni	Plate	SA–533	B	K12539	3
38	Mn–½Mo–½Ni	Wld. pipe	SA–672	J100	K12539	...
39	Mn–½Mo–¾Ni	Plate	SA–302	D	K12054	...
40	Mn–½Mo–¾Ni	Plate	SA–533	C	K12554	1
41	Mn–½Mo–¾Ni	Plate	SA–533	E	K12554	1
42	Mn–½Mo–¾Ni	Plate	SA–533	C	K12554	2
43	Mn–½Mo–¾Ni	Plate	SA–533	E	K12554	2
44	Mn–½Mo–¾Ni	Plate	SA–533	C	K12554	3
(**21**) 45	...	...	...	...	...	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Ferrous Materials (Cont'd)
1	≤ 2/10	85	65	...
2	≤ 2/10	85	65	...
3	...	70	40	...
4	...	60	35	...
5	...	65	40	...
6	...	65	40	...
7	...	65	40	...
8	...	65	40	...
9	...	65	40	...
10	...	68	45	...
11	...	68	45	...
12	...	70	55	...
13	...	80	60	...
14	...	80	60	...
15	...	70	55	...
16	...	80	60	...
17	...	80	60	...
18	...	75	60	...
19	...	105	65	...
20	...	85	53	...
21	...	90	65	...
22	...	75	45	...
23	...	75	45	...
24	...	80	50	...
25	...	80	50	...
26	...	90	70	...
27	...	100	83	...
28	...	80	50	...
29	...	90	70	...
30	...	100	83	...
31	...	80	50	...
32	...	80	50	...
33	...	80	50	...
34	...	80	50	...
35	...	90	70	...
36	...	90	70	...
37	...	100	83	...
38	...	100	83	...
39	...	80	50	...
40	...	80	50	...
41	...	80	50	...
42	...	90	70	...
43	...	90	70	...
44	...	100	83	...
45	...	...	...	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Ferrous Materials (Cont'd)								
1	65.0	60.6	58.3	56.4	54.7	...	52.3	...	50.6
2	65.0	60.6	58.3	56.4	54.7	...	52.3	...	50.6
3	40.0	36.5	34.6	32.8	31.3	...	29.1	...	27.9
4	35.0	32.1	30.3	28.8	27.6	...	25.7	...	24.8
5	40.0	36.6	34.5	32.8	31.3	...	29.3	...	28.3
6	40.0	36.6	34.5	32.8	31.3	...	29.3	...	28.3
7	40.0	36.6	34.5	32.8	31.3	...	29.3	...	28.3
8	40.0	36.6	34.5	32.8	31.3	...	29.3	...	28.3
9	40.0	36.9	35.1	33.4	31.9	...	29.4	...	27.7
10	45.0	41.5	39.5	37.6	35.9	...	33.1	...	31.1
11	45.0	41.5	39.5	37.6	35.9	...	33.1	...	31.1
12	55.0	50.8	48.4	46.4	44.7	...	42.6	...	41.6
13	60.0	55.4	52.8	50.6	48.8	...	46.4	...	45.4
14	60.0	55.4	52.8	50.6	48.8	...	46.4	...	45.4
15	55.0	49.0	45.8	43.0	40.7	...	36.9	...	34.3
16	60.0	53.4	49.9	47.0	44.4	...	40.2	...	37.4
17	60.0	53.4	49.9	47.0	44.4	...	40.2	...	37.4
18	60.0	53.4	49.9	47.0	44.4	...	40.2	...	37.4
19	65.0	62.8	61.5	60.4	59.6	...	58.6	...	58.2
20	53.0	51.2	50.4	49.4	48.2	...	45.2	...	42.4
21	65.0	62.8	61.8	60.6	59.1	...	55.4	...	52.0
22	45.0	43.3	42.3	41.6	40.9	...	39.8	...	38.8
23	45.0	43.3	42.3	41.6	40.9	...	39.8	...	38.8
24	50.0	48.1	47.0	46.2	45.5	...	44.2	...	43.2
25	50.0	48.1	47.0	46.2	45.5	...	44.2	...	43.2
26	70.0	67.3	65.9	64.7	63.7	...	61.9	...	60.4
27	83.0	79.8	78.1	76.7	75.5	...	73.4	...	71.6
28	50.0	48.1	47.0	46.2	45.5	...	44.2	...	43.2
29	70.0	67.3	65.9	64.7	63.7	...	61.9	...	60.4
30	83.0	79.8	78.1	76.7	75.5	...	73.4	...	71.6
31	50.0	48.1	47.0	46.2	45.5	...	44.2	...	43.2
32	50.0	48.1	47.0	46.2	45.5	...	44.2	...	43.2
33	50.0	48.1	47.0	46.2	45.5	...	44.2	...	43.2
34	50.0	48.1	47.0	46.2	45.5	...	44.2	...	43.2
35	70.0	67.3	65.9	64.7	63.7	...	61.9	...	60.4
36	70.0	67.3	65.9	64.7	63.7	...	61.9	...	60.4
37	83.0	79.8	78.1	76.7	75.5	...	73.4	...	71.6
38	83.0	79.8	78.1	76.7	75.5	...	73.4	...	71.6
39	50.0	48.1	47.0	46.2	45.5	...	44.2	...	43.2
40	50.0	48.1	47.0	46.2	45.5	...	44.2	...	43.2
41	50.0	48.1	47.0	46.2	45.5	...	44.2	...	43.2
42	70.0	67.3	65.9	64.7	63.7	...	61.9	...	60.4
43	70.0	67.3	65.9	64.7	63.7	...	61.9	...	60.4
44	83.0	79.8	78.1	76.7	75.5	...	73.4	...	71.6
45	...	...	...	...	...	...	...	...	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Ferrous Materials (Cont'd)
1	...	49.7	49.5	49.3	...	...	...	...	...	...
2	...	49.7	49.5	49.3	...	...	...	...	...	...
3	...	27.3	27.1	26.9	26.7	26.4	25.9	25.0	23.8	22.2
4	...	24.6	24.6	...	...	...	...	...	...	...
5	...	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0
6	...	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0
7	...	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0
8	...	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0
9	...	26.7	26.4	26.4	...	...	...	...	...	...
10	...	30.0	29.7	29.6	...	...	...	...	...	...
11	...	30.0	29.7	29.6	...	...	...	...	...	...
12	...	41.3	41.1	40.6	39.7	...	...	...	...	...
13	...	45.0	44.8	44.3	43.3	...	...	...	...	...
14	...	45.0	44.8	44.3	43.3	...	...	...	...	...
15	...	32.9	32.6	32.4	32.1	...	...	...	...	...
16	...	35.9	35.6	35.3	35.0	...	...	...	...	...
17	...	35.9	35.6	35.3	35.0	...	...	...	...	...
18	...	35.9	35.6	35.3	35.0	...	...	...	...	...
19	...	57.6	57.0	56.0	54.7	53.0	50.9	48.5	45.8	43.1
20	...	40.9	40.5	39.8	...	...	...	...	...	...
21	...	50.2	49.7	48.8	...	...	...	...	...	...
22	...	37.9	37.3	36.7	35.8	34.8	33.3	31.4	28.9	25.5
23	...	37.9	37.3	36.7	35.8	34.8	33.3	31.4	28.9	25.5
24	...	42.1	41.5	40.7	39.8	38.6	37.0	34.9	32.1	28.4
25	...	42.1	41.5	40.7	39.8	38.6	37.0	34.9	32.1	28.4
26	...	58.9	58.0	57.0	55.7	54.1	51.9	48.9	45.0	39.7
27	...	69.8	68.8	67.6	66.1	64.1	61.5	58.0	53.3	47.1
28	...	42.1	41.5	40.7	39.8	38.6	37.0	34.9	32.1	28.4
29	...	58.9	58.0	57.0	55.7	54.1	51.9	48.9	45.0	39.7
30	...	69.8	68.8	67.6	66.1	64.1	61.5	58.0	53.3	47.1
31	...	42.1	41.5	40.7	39.8	38.6	37.0	34.9	32.1	28.4
32	...	42.1	41.5	40.7	39.8	38.6	37.0	34.9	32.1	28.4
33	...	42.1	41.5	40.7	39.8	38.6	37.0	34.9	32.1	28.4
34	...	42.1	41.5	40.7	39.8	38.6	37.0	34.9	32.1	28.4
35	...	58.9	58.0	57.0	55.7	54.1	51.9	48.9	45.0	39.7
36	...	58.9	58.0	57.0	55.7	54.1	51.9	48.9	45.0	39.7
37	...	69.8	68.8	67.6	66.1	64.1	61.5	58.0	53.3	47.1
38	...	69.8	68.8	67.6	66.1	64.1	61.5	58.0	53.3	47.1
39	...	42.1	41.5	40.7	39.8	38.6	37.0	34.9	32.1	28.4
40	...	42.1	41.5	40.7	39.8	38.6	37.0	34.9	32.1	28.4
41	...	42.1	41.5	40.7	39.8	38.6	37.0	34.9	32.1	28.4
42	...	58.9	58.0	57.0	55.7	54.1	51.9	48.9	45.0	39.7
43	...	58.9	58.0	57.0	55.7	54.1	51.9	48.9	45.0	39.7
44	...	69.8	68.8	67.6	66.1	64.1	61.5	58.0	53.3	47.1
45	...	...	...	...	...	...	...	...	...	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding												
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
	Ferrous Materials (Cont'd)												
1	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	... (**21**)

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
	Ferrous Materials (Cont'd)					
1	Mn–½Ni–V	Plate	SA–225	C	K12524	...
2	Mn–V	Castings	SA–487	1	J13002	A
3	Mn–V	Castings	SA–487	1	J13002	B
4	1½Si–½Mo	Smls. pipe	SA–335	P15	K11578	...
5	½Ni–½Cr–¼Mo–V	Castings	SA–487	4	J13047	A
6	½Ni–½Cr–¼Mo–V	Castings	SA–487	4	J13047	B
7	½Ni–½Cr–¼Mo–V	Castings	SA–487	4	J13047	E
8	½Ni–½Mo–V	Forgings	SA–541	3	K12045	1
9	½Ni–½Mo–V	Forgings	SA–541	3	K12045	2
10	¾Ni–½Cr–½Mo–V	Forgings	SA–592	F	K11576	...
11	¾Ni–½Cr–½Mo–V	Plate	SA–517	F	K11576	...
12	¾Ni–½Cr–½Mo–V	Forgings	SA–592	F	K11576	...
13	¾Ni–½Cu–Mo	Smls. & wld. tube	SA–423	2	K11540	...
14	¾Ni–½Mo–⅓Cr–V	Forgings	SA–508	2	K12766	1
15	¾Ni–½Mo–⅓Cr–V	Forgings	SA–541	2	K12765	1
16	¾Ni–½Mo–⅓Cr–V	Forgings	SA–508	2	K12766	2
17	¾Ni–½Mo–⅓Cr–V	Forgings	SA–541	2	K12765	2
18	¾Ni–½Mo–Cr–V	Forgings	SA–508	3	K12042	1
19	¾Ni–½Mo–Cr–V	Forgings	SA–508	3	K12042	2
20	¾Ni–1Cu–¾Cr	Plate	SA–736	A	K12042	2
21	¾Ni–1Cu–¾Cr	Plate	SA–736	A	K12042	2
22	¾Ni–1Cu–¾Cr	Plate	SA–736	A	K12042	2
23	¾Ni–1Cu–¾Cr	Plate	SA–736	A	K12042	3
24	¾Ni–1Cu–¾Cr	Plate	SA–736	A	K12042	3
25	¾Ni–1Cu–¾Cr	Plate	SA–736	A	K12042	1
26	¾Ni–1Mo–¾Cr	Castings	SA–217	WC5	J22000	...
27	1Ni–½Cr–½Mo	Castings	SA–217	WC4	J12082	...
28	1¼Ni–1Cr–½Mo	Plate	SA–517	P	K21650	...
29	1¼Ni–1Cr–½Mo	Plate	SA–517	P	K21650	...
30	1½Ni	Forgings	SA–350	LF5	K13050	1
31	1½Ni	Forgings	SA–350	LF5	K13050	2
32	1¾Ni–¾Cr–¼Mo	Bolting	SA–320	L43	G43400	...
33	1¾Ni–¾Cr–¼Mo	Forgings	SA–372	L	K24055	...
34	1¾Ni–¾Cr–¼Mo	Bolting	SA–574	4340	G43400	...
35	1¾Ni–¾Cr–¼Mo	Bolting	SA–574	4340	G43400	...
36	2Ni–¾Cr–¼Mo	Bolting	SA–540	B23	H43400	5
37	2Ni–¾Cr–¼Mo	Bolting	SA–540	B23	H43400	5
38	2Ni–¾Cr–¼Mo	Bolting	SA–540	B23	H43400	4
39	2Ni–¾Cr–¼Mo	Bolting	SA–540	B23	H43400	3
40	2Ni–¾Cr–¼Mo	Bolting	SA–540	B23	H43400	2
41	2Ni–¾Cr–¼Mo	Bolting	SA–540	B23	H43400	1
(**21**) 42	2Ni–¾Cr–⅓Mo	Bolting	SA–540	B24	K24064	5
(**21**) 43	2Ni–¾Cr–⅓Mo	Bolting	SA–540	B24	K24064	5
(**21**) 44	2Ni–¾Cr–⅓Mo	Bolting	SA–540	B24	K24064	4
(**21**) 45	2Ni–¾Cr–⅓Mo	Bolting	SA–540	B24	K24064	3

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Ferrous Materials (Cont'd)
1	...	105	70	...
2	...	85	55	...
3	...	90	65	...
4	...	60	30	...
5	...	90	60	...
6	...	105	85	...
7	...	115	95	...
8	...	80	50	...
9	...	90	65	...
10	$2^1/_2 < t \le 4$	105	90	...
11	$\le 2^1/_2$	115	100	...
12	$\le 2^1/_2$	115	100	...
13	...	60	37	...
14	...	80	50	...
15	...	80	50	...
16	...	90	65	...
17	...	90	65	...
18	...	80	50	...
19	...	90	65	...
20	$2 < t \le 4$	65	55	...
21	$1 < t \le 2$	72	60	...
22	≤ 1	72	65	...
23	$2 < t \le 4$	75	65	...
24	≤ 2	85	75	...
25	$\le 3/_4$	90	80	...
26	...	70	40	...
27	...	70	40	...
28	$2^1/_2 < t \le 4$	105	90	...
29	$\le 2^1/_2$	115	100	...
30	...	60	30	...
31	...	70	37.5	...
32	≤ 4	125	105	...
33	...	155	135	...
34	$\ge 5/_8$	170	135	...
35	$\le 1/_2$	180	140	...
36	$6 < t \le 9^1/_2$	115	100	...
37	≤ 6	120	105	...
38	$\le 9^1/_2$	135	120	...
39	$\le 9^1/_2$	145	130	...
40	$\le 9^1/_2$	155	140	...
41	≤ 8	165	150	...
42	$6 < t \le 9^1/_2$	115	100	...
43	≤ 6	120	105	...
44	$\le 9^1/_2$	135	120	...
45	$\le 9^1/_2$	145	130	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Ferrous Materials (Cont'd)								
1	70.0	64.9	63.7	63.1	62.4	...	59.8	...	56.0
2	55.0	...	...	...	...	...	...	...	...
3	65.0	...	...	...	...	...	...	...	...
4	30.0	28.8	28.2	27.7	27.3	...	26.5	...	25.9
5	60.0	58.7	57.0	55.5	54.4	...	53.3	...	51.9
6	85.0	83.1	80.7	78.6	77.1	...	75.5	...	73.6
7	95.0	92.9	90.2	87.9	86.2	...	84.4	...	82.2
8	50.0	48.1	47.0	46.2	45.5	...	44.2	...	43.2
9	65.0	63.0	61.9	60.9	60.2	...	58.9	...	58.0
10	90.0	87.5	86.0	84.5	83.2	...	80.9	...	78.9
11	100.0	97.2	95.5	93.9	92.4	...	89.9	...	87.6
12	100.0	97.2	95.5	93.9	92.4	...	89.9	...	87.6
13	37.0	...	...	...	...	...	...	...	...
14	50.0	48.1	47.0	46.2	45.5	...	44.2	...	43.2
15	50.0	48.1	47.0	46.2	45.5	...	44.2	...	43.2
16	65.0	62.5	61.2	60.1	59.1	...	57.5	...	56.1
17	65.0	62.5	61.2	60.1	59.1	...	57.5	...	56.1
18	50.0	48.1	47.0	46.2	45.5	...	44.2	...	43.2
19	65.0	62.5	61.2	60.1	59.1	...	57.5	...	56.1
20	55.0	...	51.8	...	49.6	...	48.1	...	46.5
21	60.0	...	56.5	...	54.1	...	52.4	...	50.7
22	65.0	...	61.1	...	58.6	...	56.8	...	54.9
23	65.0	...	61.1	...	58.6	...	56.8	...	54.9
24	75.0	...	70.6	...	67.6	...	65.6	...	63.4
25	80.0	...	75.3	...	72.6	...	69.4	...	67.6
26	40.0	38.4	37.6	37.0	36.4	...	35.4	...	34.5
27	40.0	38.4	37.6	37.0	36.4	...	35.4	...	34.5
28	90.0	87.5	86.0	84.5	83.2	...	80.9	...	78.9
29	100.0	97.2	95.5	93.9	92.4	...	89.9	...	87.6
30	30.0	...	...	...	...	...	...	...	...
31	37.5	...	...	...	...	...	...	...	...
32	105.0	...	99.0	...	95.7	...	91.8	...	88.5
33	135.0	132.1	129.7	127.7	126.2	125.0	124.0	123.2	122.4
34	135.0	...	129.6	...	126.3	...	124.1	...	122.4
35	140.0	...	134.4	...	131.0	...	128.7	...	126.9
36	100.0	...	96.0	...	93.5	...	91.9	...	90.6
37	105.0	...	100.8	...	98.2	...	96.5	...	95.2
38	120.0	...	115.2	...	112.2	...	110.3	...	108.8
39	130.0	...	124.8	...	121.6	...	119.5	...	117.8
40	140.0	...	134.4	...	131.0	...	128.7	...	126.9
41	150.0	...	144.0	...	140.3	...	137.9	...	136.0
42	100.0	...	96.0	...	93.5	...	91.9	...	90.6
43	105.0	...	100.8	...	98.2	...	96.5	...	95.2
44	120.0	...	115.2	...	112.2	...	110.3	...	108.8
45	130.0	...	124.8	...	121.6	...	119.5	...	117.8

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Ferrous Materials (Cont'd)
1	...	52.4	51.0	49.9	48.7	46.7	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...
4	...	25.2	24.9	24.4	23.9	23.2	22.2	21.0	19.3	17.0
5	...	48.6	46.5	44.8	...	...	...	...	...	...
6	...	68.9	65.8	63.4	...	...	...	...	...	...
7	...	77.0	73.6	70.9	...	...	...	...	...	...
8	...	42.1	41.5	40.7	39.8	38.6	37.0	34.9	32.1	28.4
9	...	57.1	56.6	56.0	55.3	54.4	53.4	52.1	50.5	48.6
10	...	76.9	75.9	74.7	73.3	71.5	69.4	66.8	63.5	59.5
11	...	85.5	84.3	83.0	81.4	79.5	77.1	74.2	70.5	66.1
12	...	85.5	84.3	83.0	81.4	79.5	77.1	74.2	70.5	66.1
13	...	...	...	...	...	...	...	...	...	...
14	...	42.1	41.5	40.7	39.8	38.6	37.0	34.9	32.1	28.4
15	...	42.1	41.5	40.7	39.8	38.6	37.0	34.9	32.1	28.4
16	...	54.7	53.9	52.9	51.8	50.2	48.2	45.4	41.7	36.9
17	...	54.7	53.9	52.9	51.8	50.2	48.2	45.4	41.7	36.9
18	...	42.1	41.5	40.7	39.8	38.6	37.0	34.9	32.1	28.4
19	...	54.7	53.9	52.9	51.8	50.2	48.2	45.4	41.7	36.9
20	...	45.0	44.1	...	...	...	...	...	...	...
21	...	49.1	48.1	...	...	...	...	...	...	...
22	...	53.2	52.1	...	...	...	...	...	...	...
23	...	53.2	52.1	...	...	...	...	...	...	...
24	...	61.4	60.2	...	...	...	...	...	...	...
25	...	65.5	64.2	...	...	...	...	...	...	...
26	...	33.7	33.2	32.6	31.8	30.9	29.6	27.9	25.7	22.7
27	...	33.7	33.2	32.6	31.8	30.9	29.6	27.9	25.7	22.7
28	...	76.9	75.9	74.7	73.3	71.5	69.4	66.8	63.5	59.5
29	...	85.5	84.3	83.0	81.4	79.5	77.1	74.2	70.5	66.1
30	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...
32	...	84.3	82.1	79.2	...	...	...	...	...	...
33	121.4	120.0	118.3	116.1	113.3	110.1	106.4	102.5	98.7	95.2
34	...	120.0	118.3	116.1	113.4	110.1	106.4	102.5	98.6	95.2
35	...	124.5	122.7	120.4	117.6	114.2	110.4	106.3	102.3	98.7
36	...	88.9	87.6	86.0	84.0	81.6	78.8	75.9	73.1	70.5
37	...	93.4	92.0	90.3	88.2	85.6	82.8	79.7	76.7	74.0
38	...	106.7	105.2	103.2	100.8	97.9	94.6	91.1	87.7	84.6
39	...	115.6	113.9	111.8	109.2	106.0	102.5	98.7	95.0	91.6
40	...	124.5	122.7	120.4	117.6	114.2	110.4	106.3	102.3	98.7
41	...	133.4	131.4	129.0	126.0	122.3	118.3	113.9	109.6	105.7
42	...	88.9	87.6	86.0	84.0	81.6	78.8	75.9	73.1	70.5
43	...	93.4	92.0	90.3	88.2	85.6	82.8	79.7	76.7	74.0
44	...	106.7	105.2	103.2	100.8	97.9	94.6	91.1	87.7	84.6
45	...	115.6	113.9	111.8	109.2	106.0	102.5	98.7	95.0	91.6

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Ferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
43	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
44	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
45	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
		Ferrous Materials (Cont'd)					
(**21**)	1	2Ni–$\frac{3}{4}$Cr–$\frac{1}{3}$Mo	Bolting	SA–540	B24	K24064	2
(**21**)	2	2Ni–$\frac{3}{4}$Cr–$\frac{1}{3}$Mo	Bolting	SA–540	B24	K24064	1
	3	2Ni–1Cu	Forgings	SA–182	FR	K22035	...
	4	2Ni–1Cu	Fittings	SA–234	WPR	K22035	...
	5	2Ni–1Cu	Smls. & wld. pipe	SA–333	9	K22035	...
	6	2Ni–1Cu	Tube	SA–334	9	K22035	...
	7	2Ni–1Cu	Forgings	SA–350	LF9	K22036	...
	8	2Ni–1Cu	Smls. & wld. fittings	SA–420	WPL9	K22035	...
	9	2Ni–1$\frac{1}{2}$Cr–$\frac{1}{4}$Mo–V	Forgings	SA–723	1	K23550	1
	10	2Ni–1$\frac{1}{2}$Cr–$\frac{1}{4}$Mo–V	Forgings	SA–723	1	K23550	2
	11	2Ni–1$\frac{1}{2}$Cr–$\frac{1}{4}$Mo–V	Forgings	SA–723	1	K23550	2a
	12	2Ni–1$\frac{1}{2}$Cr–$\frac{1}{4}$Mo–V	Forgings	SA–723	1	K23550	3
	13	2Ni–1$\frac{1}{2}$Cr–$\frac{1}{4}$Mo–V	Forgings	SA–723	1	K23550	4
	14	2Ni–1$\frac{1}{2}$Cr–$\frac{1}{4}$Mo–V	Forgings	SA–723	1	K23550	5
	15	2$\frac{1}{2}$Ni	Pipe	SA–333	7	K21903	...
	16	2$\frac{1}{2}$Ni	Tube	SA–334	7	K21903	...
	17	2$\frac{1}{2}$Ni	Plate	SA–203	A	K21703	...
	18	2$\frac{1}{2}$Ni	Plate	SA–203	B	K22103	...
	19	2$\frac{1}{2}$Ni	Castings	SA–352	LC2	J22500	...
	20	2$\frac{3}{4}$Ni–1$\frac{1}{2}$Cr–$\frac{1}{2}$Mo	Plate	SA–543	C	...	3
	21	2$\frac{3}{4}$Ni–1$\frac{1}{2}$Cr–$\frac{1}{2}$Mo	Plate	SA–543	C	...	1
	22	2$\frac{3}{4}$Ni–1$\frac{1}{2}$Cr–$\frac{1}{2}$Mo	Plate	SA–543	C	...	2
	23	2$\frac{3}{4}$Ni–1$\frac{1}{2}$Cr–$\frac{1}{2}$Mo–V	Forgings	SA–723	2	K34035	1
	24	2$\frac{3}{4}$Ni–1$\frac{1}{2}$Cr–$\frac{1}{2}$Mo–V	Forgings	SA–723	2	K34035	2
	25	2$\frac{3}{4}$Ni–1$\frac{1}{2}$Cr–$\frac{1}{2}$Mo–V	Forgings	SA–723	2	K34035	2a
	26	2$\frac{3}{4}$Ni–1$\frac{1}{2}$Cr–$\frac{1}{2}$Mo–V	Forgings	SA–723	2	K34035	3
	27	2$\frac{3}{4}$Ni–1$\frac{1}{2}$Cr–$\frac{1}{2}$Mo–V	Forgings	SA–723	2	K34035	4
	28	2$\frac{3}{4}$Ni–1$\frac{1}{2}$Cr–$\frac{1}{2}$Mo–V	Forgings	SA–723	2	K34035	5
	29	3Ni–1$\frac{3}{4}$Cr–$\frac{1}{2}$Mo	Plate	SA–543	B	K42339	3
(**21**)	30	3Ni–1$\frac{3}{4}$Cr–$\frac{1}{2}$Mo	Forgings	SA–372	M	K42365	85
	31	3Ni–1$\frac{3}{4}$Cr–$\frac{1}{2}$Mo	Plate	SA–543	B	K42339	1
	32	3Ni–1$\frac{3}{4}$Cr–$\frac{1}{2}$Mo	Forgings	SA–508	5	K42365	2
	33	3Ni–1$\frac{3}{4}$Cr–$\frac{1}{2}$Mo	Plate	SA–543	B	K42339	2
(**21**)	34	3Ni–1$\frac{3}{4}$Cr–$\frac{1}{2}$Mo	Forgings	SA–372	M	K42365	100
	35	3$\frac{1}{2}$Ni	Pipe	SA–333	3	K31918	...
	36	3$\frac{1}{2}$Ni	Tube	SA–334	3	K31918	...
	37	3$\frac{1}{2}$Ni	Fittings	SA–420	WPL3	...	...
	38	3$\frac{1}{2}$Ni	Plate	SA–203	D	K31718	...
	39	3$\frac{1}{2}$Ni	Forgings	SA–350	LF3	K32025	...
	40	3$\frac{1}{2}$Ni	Forgings	SA–765	III	K32026	...
	41	3$\frac{1}{2}$Ni	Plate	SA–203	E	K32018	...
	42	3$\frac{1}{2}$Ni	Castings	SA–352	LC3	J31550	...
	43	3$\frac{1}{2}$Ni	Plate	SA–203	F	...	...
	44	3$\frac{1}{2}$Ni	Plate	SA–203	F	...	...
	45	3$\frac{1}{2}$Ni–1$\frac{3}{4}$Cr–$\frac{1}{2}$Mo–V	Forgings	SA–508	4N	K22375	3

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Ferrous Materials (Cont'd)
1	≤9½	155	140	...
2	≤8	165	150	...
3	...	63	46	...
4	...	63	46	...
5	...	63	46	...
6	...	63	46	...
7	...	63	46	...
8	...	63	46	...
9	...	115	100	...
10	...	135	120	...
11	...	145	130	...
12	...	155	140	...
13	...	175	160	...
14	...	190	180	...
15	...	65	35	...
16	...	65	35	...
17	...	65	37	...
18	...	70	40	...
19	...	70	40	...
20	...	90	70	...
21	...	105	85	...
22	...	115	100	...
23	...	115	100	...
24	...	135	120	...
25	...	145	130	...
26	...	155	140	...
27	...	175	160	...
28	...	190	180	...
29	...	90	70	...
30	...	105	85	...
31	...	105	85	...
32	...	115	100	...
33	...	115	100	...
34	...	120	100	...
35	...	65	35	...
36	...	65	35	...
37	...	65	35	...
38	...	65	37	...
39	...	70	37.5	...
40	...	70	37.5	...
41	...	70	40	...
42	...	70	40	...
43	>2	75	50	...
44	≤2	80	55	...
45	...	90	70	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Ferrous Materials (Cont'd)								
1	140.0	...	134.4	...	131.0	...	128.7	...	126.9
2	150.0	...	144.0	...	140.3	...	137.9	...	136.0
3	46.0	...	...	...	...	...	...	...	...
4	46.0	...	...	...	...	...	...	...	...
5	46.0	...	...	...	...	...	...	...	...
6	46.0	...	...	...	...	...	...	...	...
7	46.0	...	...	...	...	...	...	...	...
8	46.0	...	...	...	...	...	...	...	...
9	100.0	97.5	96.0	94.6	93.5	...	91.9	...	90.6
10	120.0	117.0	115.2	113.6	112.2	...	110.3	...	108.8
11	130.0	...	125.0	...	122.0	...	120.0	...	118.0
12	140.0	136.5	134.4	132.5	131.0	...	128.7	...	126.9
13	160.0	156.0	153.6	151.4	149.7	...	147.1	...	145.0
14	180.0	175.5	172.8	170.4	168.4	...	165.5	...	163.2
15	35.0	32.9	32.1	31.4	30.9	...	29.9	...	28.4
16	35.0	32.9	32.1	31.4	30.9	...	29.9	...	28.4
17	37.0	34.8	33.9	33.2	32.7	...	31.6	...	30.0
18	40.0	37.6	36.6	35.9	35.4	...	34.2	...	32.5
19	40.0	37.6	36.6	35.9	35.4	...	34.2	...	32.5
20	70.0	67.3	65.9	64.8	63.9	...	62.5	...	61.4
21	85.0	81.8	80.1	78.7	77.5	...	75.8	...	74.5
22	100.0	96.2	94.2	92.5	91.2	...	89.2	...	87.7
23	100.0	97.5	96.0	94.6	93.5	...	91.9	...	90.6
24	120.0	117.0	115.2	113.6	112.2	...	110.3	...	108.8
25	130.0	...	125.0	...	122.0	...	120.0	...	118.0
26	140.0	136.5	134.4	132.5	131.0	...	128.7	...	126.9
27	160.0	156.0	153.6	151.4	149.7	...	147.1	...	145.0
28	180.0	175.5	172.8	170.4	168.4	...	165.5	...	163.2
29	70.0	67.3	65.9	64.8	63.9	...	62.5	...	61.4
30	85.0	81.8	80.1	78.7	77.5	76.6	75.8	75.2	74.5
31	85.0	81.8	80.1	78.7	77.5	...	75.8	...	74.5
32	100.0	96.2	94.2	92.6	91.2	90.1	89.2	88.5	87.6
33	100.0	96.2	94.2	92.5	91.2	...	89.2	...	87.7
34	100.0	96.2	94.2	92.5	91.2	90.1	89.2	88.4	87.7
35	35.0	32.9	32.1	31.4	30.9	...	29.9	...	28.4
36	35.0	32.9	32.1	31.4	30.9	...	29.9	...	28.4
37	35.0	32.9	32.1	31.4	30.9	...	29.9	...	28.4
38	37.0	34.8	33.9	33.2	32.7	...	31.6	...	30.0
39	37.5	35.3	34.3	33.7	33.2	...	32.0	...	30.4
40	37.5	35.3	34.3	33.7	33.2	...	32.0	...	30.4
41	40.0	37.6	36.6	35.9	35.4	...	34.2	...	32.5
42	40.0	37.6	36.6	35.9	35.4	...	34.2	...	32.5
43	50.0	47.0	45.8	44.9	44.2	...	42.7	...	40.6
44	55.0	51.7	50.4	49.4	48.6	...	47.0	...	44.6
45	70.0	67.3	65.9	64.8	63.9	...	62.5	...	61.4

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Ferrous Materials (Cont'd)
1	...	124.5	122.7	120.4	117.6	114.2	110.4	106.3	102.3	98.7
2	...	133.4	131.4	129.0	126.0	122.3	118.3	113.9	109.6	105.7
3	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...
9	...	88.9	87.6	86.0	84.0	81.6	80.9	79.4	77.8	...
10	...	106.7	105.2	103.2	100.8	97.9	97.1	95.2	93.4	...
11	...	116.0	114.0	112.0	109.0	106.0	...	...	...	...
12	...	124.5	122.7	120.4	117.6	114.2	113.3	111.1	108.9	...
13	...	142.2	140.2	137.6	134.3	130.5	129.5	127.0	124.5	...
14	...	160.0	157.7	154.8	151.1	146.8	145.6	142.8	140.0	...
15	...	26.3	25.0	23.6	22.1	20.5	19.0	17.5	16.0	14.6
16	...	26.3	25.0	23.6	22.1	20.5	19.0	17.5	16.0	14.6
17	...	27.8	26.4	24.9	23.4	21.7	20.1	18.4	16.9	15.4
18	...	30.0	28.6	27.0	25.3	23.5	21.7	19.9	18.3	16.7
19	...	30.0	28.6	27.0	25.3	23.5	21.7	19.9	18.3	16.7
20	...	60.2	59.5	58.7	57.6	56.2	54.6	52.6	50.2	47.3
21	...	73.1	72.3	71.2	69.9	68.3	66.3	63.9	60.9	57.5
22	...	86.0	85.0	83.8	82.2	80.3	78.0	75.1	71.7	67.6
23	...	88.9	87.6	86.0	84.0	81.6	80.9	79.4	77.8	...
24	...	106.7	105.2	103.2	100.8	97.9	97.1	95.2	93.4	...
25	...	116.0	114.0	112.0	109.0	106.0	...	...	...	...
26	...	124.5	122.7	120.4	117.6	114.2	113.3	111.1	108.9	...
27	...	142.2	140.2	137.6	134.3	130.5	129.5	127.0	124.5	...
28	...	160.0	157.7	154.8	151.1	146.8	145.6	142.8	140.0	...
29	...	60.2	59.5	58.7	57.6	56.2	54.6	52.6	50.2	47.3
30	73.9	73.1	72.3	71.2	69.9	68.3	66.3	63.9	60.9	57.5
31	...	73.1	72.3	71.2	69.9	68.3	66.3	63.9	60.9	57.5
32	86.9	86.0	85.1	83.8	82.2	80.4	78.0	75.2	71.6	67.6
33	...	86.0	85.0	83.8	82.2	80.3	78.0	75.1	71.7	67.6
34	86.9	86.0	85.0	83.8	82.2	80.3	78.0	75.1	71.7	67.6
35	...	26.3	25.0	23.6	22.1	20.5	19.0	17.5	16.0	14.6
36	...	26.3	25.0	23.6	22.1	20.5	19.0	17.5	16.0	14.6
37	...	26.3	25.0	23.6	22.1	20.5	19.0	17.5	16.0	14.6
38	...	27.8	26.4	24.9	23.4	21.7	20.1	18.4	16.9	15.4
39	...	28.2	26.8	25.3	23.7	22.0	20.3	18.7	17.1	15.6
40	...	28.2	26.8	25.3	23.7	22.0	20.3	18.7	17.1	15.6
41	...	30.0	28.6	27.0	25.3	23.5	21.7	19.9	18.3	16.7
42	...	30.0	28.6	27.0	25.3	23.5	21.7	19.9	18.3	16.7
43	...	37.5	35.7	33.7	31.6	29.4	27.1	24.9	22.8	20.8
44	...	41.3	39.3	37.1	34.7	32.3	29.8	27.4	25.1	22.9
45	...	60.2	59.5	58.7	57.6	56.2	54.6	52.6	50.2	47.3

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Ferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
2	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
3	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
31	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
35	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
	Ferrous Materials (Cont'd)					
1	3½Ni–1¾Cr–½Mo–V	Forgings	SA–541	4N	K42343	3
2	3½Ni–1¾Cr–½Mo–V	Forgings	SA–508	4N	K22375	1
3	3½Ni–1¾Cr–½Mo–V	Forgings	SA–541	5	K42348	1
4	3½Ni–1¾Cr–½Mo–V	Forgings	SA–508	4N	K22375	2
5	3½Ni–1¾Cr–½Mo–V	Forgings	SA–541	4N	K42343	2
6	3½Ni–1¾Cr–½Mo–V	Forgings	SA–541	5	K42348	2
7	4Ni–1½Cr–½Mo–V	Forgings	SA–723	3	K44045	1
8	4Ni–1½Cr–½Mo–V	Forgings	SA–723	3	K44045	2
9	4Ni–1½Cr–½Mo–V	Forgings	SA–723	3	K44045	2a
10	4Ni–1½Cr–½Mo–V	Forgings	SA–723	3	K44045	3
11	4Ni–1½Cr–½Mo–V	Forgings	SA–723	3	K44045	4
12	4Ni–1½Cr–½Mo–V	Forgings	SA–723	3	K44045	5
13	5Ni–¼Mo	Plate	SA–645	A	K41583	...
14	7Ni	Plate	SA–553	III	K61365	...
15	8Ni	Forgings	SA–522	II	K71340	...
16	8Ni	Plate	SA–553	II	K71340	...
17	9Ni	Plate	SA/EN 10028–4	X8Ni9	...	NNT640
18	9Ni	Plate	SA/EN 10028–4	X8Ni9	...	QT640
19	9Ni	Plate	SA/EN 10028–4	X7Ni9	...	QT
20	9Ni	Plate	SA/EN 10028–4	X8Ni9	...	QT680
21	9Ni	Smls. & wld. pipe	SA–333	8	K81340	...
22	9Ni	Smls. & wld. tube	SA–334	8	K81340	...
23	9Ni	Plate	SA–353	...	K81340	...
24	9Ni	Smls. & wld. fittings	SA–420	WPL8	K81340	...
25	9Ni	Forgings	SA–522	I	K81340	...
26	9Ni	Plate	SA–553	I	K81340	...
27	25Ni–15Cr–2Ti	Bolting	SA–453	660	S66286	A
28	25Ni–15Cr–2Ti	Bolting	SA–453	660	S66286	B
(**21**) 29	25Ni–15Cr–2Ti	Forgings, bar	SA–638	660	S66286	1
(**21**) 30	25Ni–15Cr–2Ti	Forgings, bar	SA–638	660	S66286	2
31	27Ni–22Cr–7Mo–Mn–Cu–N	Forgings	SA–182	...	S31277	...
32	27Ni–22Cr–7Mo–Mn–Cu–N	Smls. tube	SA–213	...	S31277	...
33	27Ni–22Cr–7Mo–Mn–Cu–N	Plate	SA–240	...	S31277	...
34	27Ni–22Cr–7Mo–Mn–Cu–N	Wld. tube	SA–249	...	S31277	...
35	29Ni–20Cr–3Cu–2Mo	Castings	SA–351	CN7M	J95150	...
36	14Cr–16Ni–6Si–Cu–Mo	Smls. tube	SA–213	...	S38815	...
37	14Cr–16Ni–6Si–Cu–Mo	Plate	SA–240	...	S38815	...
38	14Cr–16Ni–6Si–Cu–Mo	Wld. tube	SA–249	...	S38815	...
39	14Cr–16Ni–6Si–Cu–Mo	Wld. pipe	SA–312	...	S38815	...
40	14Cr–16Ni–6Si–Cu–Mo	Smls. & wld. fittings	SA–403	...	S38815	...
41	14Cr–16Ni–6Si–Cu–Mo	Bar	SA–479	...	S38815	...
42	16Cr–4Ni–6Mn	Plate	SA–240	201LN	S20153	...
43	16Cr–9Mn–2Ni–N	Plate	SA–240	204	S20400	...
(**21**) 44	16Cr–12Ni–2Mo	Forgings	SA–182	F316L	S31603	...
(**21**) 45	16Cr–12Ni–2Mo	Forgings	SA–965	F316L	S31603	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Ferrous Materials (Cont'd)
1	...	90	70	...
2	...	105	85	...
3	...	105	85	...
4	...	115	100	...
5	...	115	100	...
6	...	115	100	...
7	...	115	100	...
8	...	135	120	...
9	...	145	130	...
10	...	155	140	...
11	...	175	160	...
12	...	190	180	...
13	...	95	65	...
14	≤2	100	85	...
15	...	100	75	...
16	...	100	85	...
17	≤2	93	69.5	...
18	≤2	93	69.5	...
19	≤2	98.5	83.5	...
20	≤2	98.5	83.5	...
21	...	100	75	...
22	...	100	75	...
23	...	100	75	...
24	...	100	75	...
25	...	100	75	...
26	...	100	85	...
27	...	130	85	...
28	...	130	85	...
29	...	130	85	...
30	...	130	85	...
31	...	112	52	...
32	...	112	52	...
33	...	112	52	...
34	...	112	52	...
35	...	62	25	...
36	...	78	37	...
37	...	78	37	...
38	...	78	37	...
39	...	78	37	...
40	...	78	37	...
41	...	78	37	...
42	...	95	45	...
43	...	95	48	...
44	>5	65	25	...
45	...	65	25	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Ferrous Materials (Cont'd)								
1	70.0	...	65.9	...	63.9	...	62.5	...	61.4
2	85.0	81.8	80.1	78.7	77.5	...	75.8	...	74.5
3	85.0	...	80.1	...	77.5	...	75.8	...	74.5
4	100.0	96.2	94.2	92.5	91.2	...	89.2	...	87.7
5	100.0	...	94.2	...	91.2	...	89.2	...	87.7
6	100.0	...	94.2	...	91.2	...	89.2	...	87.7
7	100.0	97.5	96.0	94.6	93.5	...	91.9	...	90.6
8	120.0	117.0	115.2	113.6	112.2	...	110.3	...	108.8
9	130.0	...	125.0	...	122.0	...	120.0	...	118.0
10	140.0	136.5	134.4	132.5	131.0	...	128.7	...	126.9
11	160.0	156.0	153.6	151.4	149.7	...	147.1	...	145.0
12	180.0	175.5	172.8	170.4	168.4	...	165.5	...	163.2
13	65.0	...	...	...	...	...	...	...	...
14	85.0	80.9	...	...	...	...	...	...	...
15	75.0	72.8	72.0	70.5	67.0	...	...	...	...
16	85.0	82.5	81.6	79.9	75.9	...	...	...	...
17	69.6	67.6	66.9	65.4	62.1	...	...	...	...
18	69.6	67.6	66.9	65.4	62.1	...	...	...	...
19	83.4	81.0	80.1	78.4	74.4	...	...	...	...
20	83.4	81.0	80.1	78.4	74.4	...	...	...	...
21	75.0	72.8	72.0	70.5	67.0	...	...	...	...
22	75.0	72.8	72.0	70.5	67.0	...	...	...	...
23	75.0	72.8	72.0	70.5	67.0	...	...	...	...
24	75.0	72.8	72.0	70.5	67.0	...	...	...	...
25	75.0	72.8	72.0	70.5	67.0	...	...	...	...
26	85.0	82.5	81.6	79.9	75.9	...	...	...	...
27	85.0	...	83.3	...	82.0	...	80.8	...	79.3
28	85.0	...	83.3	...	82.0	...	80.8	...	79.3
29	85.0	...	83.3	...	82.0	...	80.7	...	79.4
30	85.0	...	83.3	...	82.0	...	80.7	...	79.4
31	52.0	50.5	48.2	45.6	43.2	41.2	39.7	38.8	38.3
32	52.0	50.5	48.2	45.6	43.2	41.2	39.7	38.8	38.3
33	52.0	50.5	48.2	45.6	43.2	41.2	39.7	38.8	38.3
34	52.0	50.5	48.2	45.6	43.2	41.2	39.7	38.8	38.3
35	25.0	...	21.6	...	19.4	...	17.6	...	16.2
36	37.0	...	31.2	...	27.8	...	25.6	...	24.4
37	37.0	...	31.2	...	27.8	...	25.6	...	24.4
38	37.0	...	31.2	...	27.8	...	25.6	...	24.4
39	37.0	...	31.2	...	27.8	...	25.6	...	24.4
40	37.0	...	31.2	...	27.8	...	25.6	...	24.4
41	37.0	...	31.2	...	27.8	...	25.6	...	24.4
42	45.0	...	36.3	...	32.9	...	31.1	...	30.0
43	48.0	40.3	36.4	33.1	30.5	...	26.8	...	24.8
44	25.0	22.7	21.3	20.1	19.0	...	17.5	...	16.4
45	25.0	22.7	21.3	20.1	19.0	...	17.5	...	16.4

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Ferrous Materials (Cont'd)
1	...	60.2	59.5	58.7	...	...	...	...	...	...
2	...	73.1	72.3	71.2	69.9	68.3	66.3	63.9	60.9	57.5
3	...	73.1	72.3	71.2	...	...	...	...	...	...
4	...	86.0	85.0	83.8	82.2	80.3	78.0	75.1	71.7	67.6
5	...	86.0	85.0	83.9	...	...	...	...	...	...
6	...	86.0	85.0	83.9	...	...	...	...	...	...
7	...	88.9	87.6	86.0	84.0	81.6	80.9	79.4	77.8	...
8	...	106.7	105.2	103.2	100.8	97.9	97.1	95.2	93.4	...
9	...	116.0	114.0	112.0	109.0	106.0	...	...	...	...
10	...	124.5	122.7	120.4	117.6	114.2	113.3	111.1	108.9	...
11	...	142.2	140.2	137.6	134.3	130.5	129.5	127.0	124.5	...
12	...	160.0	157.7	154.8	151.1	146.8	145.6	142.8	140.0	...
13	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...
27	...	77.9	77.2	76.4	75.7	74.9	74.0	73.2	72.3	71.5
28	...	77.9	77.2	76.4	75.7	74.9	74.0	73.2	72.3	71.5
29	...	77.9	77.2	76.4	75.7	74.9	74.0	73.2	...	...
30	...	77.9	77.2	76.4	75.7	74.9	74.0	73.2	...	...
31	38.1	38.1	38.0	37.9	37.7	37.4	...	...	...	...
32	38.1	38.1	38.0	37.9	37.7	37.4	...	...	...	...
33	38.1	38.1	38.0	37.9	37.7	37.4	...	...	...	...
34	38.1	38.1	38.0	37.9	37.7	37.4	...	...	...	...
35	...	15.0	14.5	14.0	...	...	...	...	...	...
36	...	24.0	24.0	24.0	24.0	24.0	...	...	...	...
37	...	24.0	24.0	24.0	24.0	24.0	...	...	...	...
38	...	24.0	24.0	24.0	24.0	24.0	...	...	...	...
39	...	24.0	24.0	24.0	24.0	24.0	...	...	...	...
40	...	24.0	24.0	24.0	24.0	24.0	...	...	...	...
41	...	24.0	24.0	24.0	24.0	24.0	...	...	...	...
42	...	28.7	27.9	27.0	26.0	25.1	24.2	23.6	23.6	23.6
43	...	23.8	23.5	23.2	23.0	22.7	22.2	21.5	20.5	19.1
44	...	15.6	15.3	15.0	14.7	14.4	14.1	13.8	13.5	13.2
45	...	15.6	15.3	15.0	14.7	14.4	14.1	13.8	13.5	13.2

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Ferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
30	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
31	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	13.1	13.0	12.8	12.5	...	...	...	...	...	...	...	...	...	(**21**)
45	13.1	13.0	12.8	12.5	...	...	...	...	...	...	...	...	...	(**21**)

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
		Ferrous Materials (Cont'd)					
(**21**)	1	16Cr–12Ni–2Mo	Forgings	SA–182	F316L	S31603	...
(**21**)	2	16Cr–12Ni–2Mo	Smls. tube	SA–213	TP316L	S31603	...
(**21**)	3	16Cr–12Ni–2Mo	Plate	SA–240	316L	S31603	...
(**21**)	4	16Cr–12Ni–2Mo	Wld. tube	SA–249	TP316L	S31603	...
(**21**)	5	16Cr–12Ni–2Mo	Smls. & wld. pipe	SA–312	TP316L	S31603	...
(**21**)	6	16Cr–12Ni–2Mo	Wld. pipe	SA–358	316L	S31603	1
(**21**)	7	16Cr–12Ni–2Mo	Wld. pipe	SA–358	316L	S31603	3
(**21**)	8	16Cr–12Ni–2Mo	Wld. pipe	SA–358	316L	S31603	4
(**21**)	9	16Cr–12Ni–2Mo	Smls. & wld. fittings	SA–403	316L	S31603	...
(**21**)	10	16Cr–12Ni–2Mo	Wld. pipe	SA–409	TP316L	S31603	...
(**21**)	11	16Cr–12Ni–2Mo	Bar	SA–479	316L	S31603	Annealed
(**21**)	12	16Cr–12Ni–2Mo	Wld. tube	SA–688	TP316L	S31603	...
(**21**)	13	16Cr–12Ni–2Mo	Wld. pipe	SA–813	TP316L	S31603	...
(**21**)	14	16Cr–12Ni–2Mo	Wld. pipe	SA–814	TP316L	S31603	...
	15	16Cr–12Ni–2Mo	Bar	SA/JIS G4303	SUS316L	...	...
	16	16Cr–12Ni–2Mo	Castings	SA–351	CF3M	J92800	...
	17	16Cr–12Ni–2Mo	Cast pipe	SA–451	CPF3M	J92800	...
	18	16Cr–12Ni–2Mo	Castings	SA–351	CF8M	J92900	...
	19	16Cr–12Ni–2Mo	Cast pipe	SA–451	CPF8M	J92900	...
(**21**)	20	16Cr–12Ni–2Mo	Forgings	SA–182	F316	S31600	...
(**21**)	21	16Cr–12Ni–2Mo	Forgings	SA–965	F316	S31600	...
	22	16Cr–12Ni–2Mo	Forgings	SA–182	F316H	S31609	...
	23	16Cr–12Ni–2Mo	Forgings	SA–965	F316H	S31609	...
(**21**)	24	16Cr–12Ni–2Mo	Forgings	SA–182	F316	S31600	...
(**21**)	25	16Cr–12Ni–2Mo	Bolting	SA–193	B8M	S31600	1
(**21**)	26	16Cr–12Ni–2Mo	Bolting	SA–193	B8MA	S31600	1A
(**21**)	27	16Cr–12Ni–2Mo	Smls. tube	SA–213	TP316	S31600	...
(**21**)	28	16Cr–12Ni–2Mo	Plate	SA–240	316	S31600	...
(**21**)	29	16Cr–12Ni–2Mo	Wld. tube	SA–249	TP316	S31600	...
(**21**)	30	16Cr–12Ni–2Mo	Smls. & wld. pipe	SA–312	TP316	S31600	...
(**21**)	31	16Cr–12Ni–2Mo	Bolting	SA–320	B8M	S31600	1
(**21**)	32	16Cr–12Ni–2Mo	Bolting	SA–320	B8MA	S31600	1A
(**21**)	33	16Cr–12Ni–2Mo	Wld. pipe	SA–358	316	S31600	1
(**21**)	34	16Cr–12Ni–2Mo	Wld. pipe	SA–358	316	S31600	3
(**21**)	35	16Cr–12Ni–2Mo	Wld. pipe	SA–358	316	S31600	4
(**21**)	36	16Cr–12Ni–2Mo	Smls. pipe	SA–376	TP316	S31600	...
(**21**)	37	16Cr–12Ni–2Mo	Smls. & wld. fittings	SA–403	316	S31600	...
(**21**)	38	16Cr–12Ni–2Mo	Wld. pipe	SA–409	TP316	S31600	...
(**21**)	39	16Cr–12Ni–2Mo	Bar	SA–479	316	S31600	Annealed
(**21**)	40	16Cr–12Ni–2Mo	Wld. tube	SA–688	TP316	S31600	...
(**21**)	41	16Cr–12Ni–2Mo	Wld. pipe	SA–813	TP316	S31600	...
(**21**)	42	16Cr–12Ni–2Mo	Wld. pipe	SA–814	TP316	S31600	...
	43	16Cr–12Ni–2Mo	Bar	SA/JIS G4303	SUS316	...	...
	44	16Cr–12Ni–2Mo	Forgings	SA–182	F316H	S31609	...
	45	16Cr–12Ni–2Mo	Smls. tube	SA–213	TP316H	S31609	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Ferrous Materials (Cont'd)
1	≤5	70	25	...
2	...	70	25	...
3	...	70	25	...
4	...	70	25	...
5	...	70	25	...
6	...	70	25	...
7	...	70	25	...
8	...	70	25	...
9	...	70	25	...
10	...	70	25	...
11	...	70	25	...
12	...	70	25	...
13	...	70	25	...
14	...	70	25	...
15	...	70	25	...
16	...	70	30	...
17	...	70	30	...
18	...	70	30	...
19	...	70	30	...
20	>5	70	30	...
21	...	70	30	...
22	>5	70	30	...
23	...	70	30	...
24	≤5	75	30	...
25	...	75	30	...
26	...	75	30	...
27	...	75	30	...
28	...	75	30	...
29	...	75	30	...
30	...	75	30	...
31	...	75	30	...
32	...	75	30	...
33	...	75	30	...
34	...	75	30	...
35	...	75	30	...
36	...	75	30	...
37	...	75	30	...
38	...	75	30	...
39	...	75	30	...
40	...	75	30	...
41	...	75	30	...
42	...	75	30	...
43	...	75	30	...
44	≤5	75	30	...
45	...	75	30	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Ferrous Materials (Cont'd)								
1	25.0	22.7	21.3	20.1	19.0	...	17.5	...	16.4
2	25.0	22.7	21.3	20.1	19.0	...	17.5	...	16.4
3	25.0	22.7	21.3	20.1	19.0	...	17.5	...	16.4
4	25.0	22.7	21.3	20.1	19.0	...	17.5	...	16.4
5	25.0	22.7	21.3	20.1	19.0	...	17.5	...	16.4
6	25.0	22.7	21.3	20.1	19.0	...	17.5	...	16.4
7	25.0	22.7	21.3	20.1	19.0	...	17.5	...	16.4
8	25.0	22.7	21.3	20.1	19.0	...	17.5	...	16.4
9	25.0	22.7	21.3	20.1	19.0	...	17.5	...	16.4
10	25.0	22.7	21.3	20.1	19.0	...	17.5	...	16.4
11	25.0	22.7	21.3	20.1	19.0	...	17.5	...	16.4
12	25.0	22.7	21.3	20.1	19.0	...	17.5	...	16.4
13	25.0	22.7	21.3	20.1	19.0	...	17.5	...	16.4
14	25.0	22.7	21.3	20.1	19.0	...	17.5	...	16.4
15	25.0	22.7	21.3	20.1	19.0	...	17.5	...	16.4
16	30.0	27.3	25.8	24.5	23.3	...	21.4	...	19.9
17	30.0	27.3	25.8	24.5	23.3	...	21.4	...	19.9
18	30.0	27.3	25.8	24.5	23.3	...	21.4	...	19.9
19	30.0	27.3	25.8	24.5	23.3	...	21.4	...	19.9
20	30.0	27.4	25.9	24.6	23.4	...	21.4	...	20.0
21	30.0	27.4	25.9	24.6	23.4	...	21.4	...	20.0
22	30.0	27.4	25.9	24.6	23.4	...	21.4	...	20.0
23	30.0	27.4	25.9	24.6	23.4	...	21.4	...	20.0
24	30.0	27.4	25.9	24.6	23.4	...	21.4	...	20.0
25	30.0	...	25.9	...	23.4	...	21.4	...	20.0
26	30.0	...	25.9	...	23.4	...	21.4	...	20.0
27	30.0	27.4	25.9	24.6	23.4	...	21.4	...	20.0
28	30.0	27.4	25.9	24.6	23.4	...	21.4	...	20.0
29	30.0	27.4	25.9	24.6	23.4	...	21.4	...	20.0
30	30.0	27.4	25.9	24.6	23.4	...	21.4	...	20.0
31	30.0	...	25.9	...	23.4	...	21.4	...	20.0
32	30.0	...	25.9	...	23.4	...	21.4	...	20.0
33	30.0	27.4	25.9	24.6	23.4	...	21.4	...	20.0
34	30.0	27.4	25.9	24.6	23.4	...	21.4	...	20.0
35	30.0	27.4	25.9	24.6	23.4	...	21.4	...	20.0
36	30.0	27.4	25.9	24.6	23.4	...	21.4	...	20.0
37	30.0	27.4	25.9	24.6	23.4	...	21.4	...	20.0
38	30.0	27.4	25.9	24.6	23.4	...	21.4	...	20.0
39	30.0	27.4	25.9	24.6	23.4	...	21.4	...	20.0
40	30.0	27.4	25.9	24.6	23.4	...	21.4	...	20.0
41	30.0	27.4	25.9	24.6	23.4	...	21.4	...	20.0
42	30.0	27.4	25.9	24.6	23.4	...	21.4	...	20.0
43	30.0	27.4	25.9	24.6	23.4	...	21.4	...	20.0
44	30.0	27.4	25.9	24.6	23.4	...	21.4	...	20.0
45	30.0	27.4	25.9	24.6	23.4	...	21.4	...	20.0

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Ferrous Materials (Cont'd)
1	...	15.6	15.3	15.0	14.7	14.4	14.1	13.8	13.5	13.2
2	...	15.6	15.3	15.0	14.7	14.4	14.1	13.8	13.5	13.2
3	...	15.6	15.3	15.0	14.7	14.4	14.1	13.8	13.5	13.2
4	...	15.6	15.3	15.0	14.7	14.4	14.1	13.8	13.5	13.2
5	...	15.6	15.3	15.0	14.7	14.4	14.1	13.8	13.5	13.2
6	...	15.6	15.3	15.0	14.7	14.4	14.1	13.8	13.5	13.2
7	...	15.6	15.3	15.0	14.7	14.4	14.1	13.8	13.5	13.2
8	...	15.6	15.3	15.0	14.7	14.4	14.1	13.8	13.5	13.2
9	...	15.6	15.3	15.0	14.7	14.4	14.1	13.8	13.5	13.2
10	...	15.6	15.3	15.0	14.7	14.4	14.1	13.8	13.5	13.2
11	...	15.6	15.3	15.0	14.7	14.4	14.1	13.8	13.5	13.2
12	...	15.6	15.3	15.0	14.7	14.4	14.1	13.8	13.5	13.2
13	...	15.6	15.3	15.0	14.7	14.4	14.1	13.8	13.5	13.2
14	...	15.6	15.3	15.0	14.7	14.4	14.1	13.8	13.5	13.2
15	...	15.6	15.3	15.0	14.7	14.4	14.1	13.8	13.5	13.2
16	...	18.8	18.4	18.1	17.8	17.6	17.4	17.3	17.1	17.0
17	...	18.8	18.4	18.1	17.8	17.6	17.4	17.3	17.1	17.0
18	...	18.8	18.4	18.1	17.8	17.6	17.4	17.3	17.1	17.0
19	...	18.8	18.4	18.1	17.8	17.6	17.4	17.3	17.1	17.0
20	...	18.9	18.5	18.2	17.9	17.7	17.5	17.3	17.1	17.0
21	...	18.9	18.5	18.2	17.9	17.7	17.5	17.3	17.1	17.0
22	...	18.9	18.5	18.2	17.9	17.7	17.5	17.3	17.1	17.0
23	...	18.9	18.5	18.2	17.9	17.7	17.5	17.3	17.1	17.0
24	...	18.9	18.5	18.2	17.9	17.7	17.5	17.3	17.1	17.0
25	...	18.9	18.5	18.2	17.9	17.7	17.5	17.3	17.1	17.0
26	...	18.9	18.5	18.2	17.9	17.7	17.5	17.3	17.1	17.0
27	...	18.9	18.5	18.2	17.9	17.7	17.5	17.3	17.1	17.0
28	...	18.9	18.5	18.2	17.9	17.7	17.5	17.3	17.1	17.0
29	...	18.9	18.5	18.2	17.9	17.7	17.5	17.3	17.1	17.0
30	...	18.9	18.5	18.2	17.9	17.7	17.5	17.3	17.1	17.0
31	...	18.9	18.5	18.2	17.9	17.7	17.5	17.3	17.1	17.0
32	...	18.9	18.5	18.2	17.9	17.7	17.5	17.3	17.1	17.0
33	...	18.9	18.5	18.2	17.9	17.7	17.5	17.3	17.1	17.0
34	...	18.9	18.5	18.2	17.9	17.7	17.5	17.3	17.1	17.0
35	...	18.9	18.5	18.2	17.9	17.7	17.5	17.3	17.1	17.0
36	...	18.9	18.5	18.2	17.9	17.7	17.5	17.3	17.1	17.0
37	...	18.9	18.5	18.2	17.9	17.7	17.5	17.3	17.1	17.0
38	...	18.9	18.5	18.2	17.9	17.7	17.5	17.3	17.1	17.0
39	...	18.9	18.5	18.2	17.9	17.7	17.5	17.3	17.1	17.0
40	...	18.9	18.5	18.2	17.9	17.7	17.5	17.3	17.1	17.0
41	...	18.9	18.5	18.2	17.9	17.7	17.5	17.3	17.1	17.0
42	...	18.9	18.5	18.2	17.9	17.7	17.5	17.3	17.1	17.0
43	...	18.9	18.5	18.2	17.9	17.7	17.5	17.3	17.1	17.0
44	...	18.9	18.5	18.2	17.9	17.7	17.5	17.3	17.1	17.0
45	...	18.9	18.5	18.2	17.9	17.7	17.5	17.3	17.1	17.0

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Ferrous Materials (Cont'd)													
1	13.1	13.0	12.8	12.5	...	...	...	...	...	...	...	...	...	(**21**)
2	13.1	13.0	12.8	12.5	...	...	...	...	...	...	...	...	...	(**21**)
3	13.1	13.0	12.8	12.5	...	...	...	...	...	...	...	...	...	(**21**)
4	13.1	13.0	12.8	12.5	...	...	...	...	...	...	...	...	...	(**21**)
5	13.1	13.0	12.8	12.5	...	...	...	...	...	...	...	...	...	(**21**)
6	13.1	13.0	12.8	12.5	...	...	...	...	...	...	...	...	...	(**21**)
7	13.1	13.0	12.8	12.5	...	...	...	...	...	...	...	...	...	(**21**)
8	13.1	13.0	12.8	12.5	...	...	...	...	...	...	...	...	...	(**21**)
9	13.1	13.0	12.8	12.5	...	...	...	...	...	...	...	...	...	(**21**)
10	13.1	13.0	12.8	12.5	...	...	...	...	...	...	...	...	...	(**21**)
11	13.1	13.0	12.8	12.5	...	...	...	...	...	...	...	...	...	(**21**)
12	13.1	13.0	12.8	12.5	...	...	...	...	...	...	...	...	...	(**21**)
13	13.1	13.0	12.8	12.5	...	...	...	...	...	...	...	...	...	(**21**)
14	13.1	13.0	12.8	12.5	...	...	...	...	...	...	...	...	...	(**21**)
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	16.5	16.3	16.1	15.9	15.7	15.5	15.3	15.0	14.6	14.3	...	...	...	(**21**)
21	16.5	16.3	16.1	15.9	15.7	15.5	15.3	15.0	14.6	14.3	...	...	...	(**21**)
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	16.5	16.3	16.1	15.9	15.7	15.5	15.3	15.0	14.6	14.3	...	...	...	(**21**)
25	16.5	16.3	16.1	15.9	15.7	15.5	15.3	15.0	14.6	14.3	...	...	...	(**21**)
26	16.5	16.3	16.1	15.9	15.7	15.5	15.3	15.0	14.6	14.3	...	...	...	(**21**)
27	16.5	16.3	16.1	15.9	15.7	15.5	15.3	15.0	14.6	14.3	...	...	...	(**21**)
28	16.5	16.3	16.1	15.9	15.7	15.5	15.3	15.0	14.6	14.3	...	...	...	(**21**)
29	16.5	16.3	16.1	15.9	15.7	15.5	15.3	15.0	14.6	14.3	...	...	...	(**21**)
30	16.5	16.3	16.1	15.9	15.7	15.5	15.3	15.0	14.6	14.3	...	...	...	(**21**)
31	16.5	16.3	16.1	15.9	15.7	15.5	15.3	15.0	14.6	14.3	...	...	...	(**21**)
32	16.5	16.3	16.1	15.9	15.7	15.5	15.3	15.0	14.6	14.3	...	...	...	(**21**)
33	16.5	16.3	16.1	15.9	15.7	15.5	15.3	15.0	14.6	14.3	...	...	...	(**21**)
34	16.5	16.3	16.1	15.9	15.7	15.5	15.3	15.0	14.6	14.3	...	...	...	(**21**)
35	16.5	16.3	16.1	15.9	15.7	15.5	15.3	15.0	14.6	14.3	...	...	...	(**21**)
36	16.5	16.3	16.1	15.9	15.7	15.5	15.3	15.0	14.6	14.3	...	...	...	(**21**)
37	16.5	16.3	16.1	15.9	15.7	15.5	15.3	15.0	14.6	14.3	...	...	...	(**21**)
38	16.5	16.3	16.1	15.9	15.7	15.5	15.3	15.0	14.6	14.3	...	...	...	(**21**)
39	16.5	16.3	16.1	15.9	15.7	15.5	15.3	15.0	14.6	14.3	...	...	...	(**21**)
40	16.5	16.3	16.1	15.9	15.7	15.5	15.3	15.0	14.6	14.3	...	...	...	(**21**)
41	16.5	16.3	16.1	15.9	15.7	15.5	15.3	15.0	14.6	14.3	...	...	...	(**21**)
42	16.5	16.3	16.1	15.9	15.7	15.5	15.3	15.0	14.6	14.3	...	...	...	(**21**)
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
	Ferrous Materials (Cont'd)					
1	16Cr–12Ni–2Mo	Plate	SA–240	316H	S31609	...
2	16Cr–12Ni–2Mo	Wld. tube	SA–249	TP316H	S31609	...
3	16Cr–12Ni–2Mo	Smls. & wld. pipe	SA–312	TP316H	S31609	...
4	16Cr–12Ni–2Mo	Wld. pipe	SA–358	316H	S31609	1
5	16Cr–12Ni–2Mo	Wld. pipe	SA–358	316H	S31609	3
6	16Cr–12Ni–2Mo	Wld. pipe	SA–358	316H	S31609	4
7	16Cr–12Ni–2Mo	Smls. pipe	SA–376	TP316H	S31609	...
8	16Cr–12Ni–2Mo	Smls. & wld. fittings	SA–403	316H	S31609	...
9	16Cr–12Ni–2Mo	Bar	SA–479	316H	S31609	...
10	16Cr–12Ni–2Mo	Wld. pipe	SA–813	TP316H	S31609	...
11	16Cr–12Ni–2Mo	Wld. pipe	SA–814	TP316H	S31609	...
12	16Cr–12Ni–2Mo	Plate	SA/EN 10028–7	X2CrNiMo17–12–2	...	...
13	16Cr–12Ni–2Mo	Plate	SA/EN 10028–7	X5CrNiMo17–12–2	...	...
14	16Cr–12Ni–2Mo	Bolting	SA–193	B8M2	S31600	...
15	16Cr–12Ni–2Mo	Bar	SA–276	316	S31600	S
16	16Cr–12Ni–2Mo	Bolting	SA–193	B8M	S31600	2
17	16Cr–12Ni–2Mo	Bolting	SA–320	B8M	S31600	2
18	16Cr–12Ni–2Mo	Bolting	SA–193	B8M2	S31600	...
19	16Cr–12Ni–2Mo	Bar	SA–276	316	S31600	S
20	16Cr–12Ni–2Mo	Bar	SA–276	316	S31600	B
21	16Cr–12Ni–2Mo	Bolting	SA–193	B8M	S31600	2
22	16Cr–12Ni–2Mo	Bolting	SA–320	B8M	S31600	2
23	16Cr–12Ni–2Mo	Bolting	SA–193	B8M2	S31600	...
24	16Cr–12Ni–2Mo	Bar	SA–276	316	S31600	S
25	16Cr–12Ni–2Mo	Bar	SA–276	316	S31600	B
26	16Cr–12Ni–2Mo	Bolting	SA–193	B8M	S31600	2
27	16Cr–12Ni–2Mo	Bolting	SA–320	B8M	S31600	2
28	16Cr–12Ni–2Mo	Bar	SA–276	316	S31600	B
29	16Cr–12Ni–2Mo	Bolting	SA–193	B8M	S31600	2
30	16Cr–12Ni–2Mo	Bolting	SA–320	B8M	S31600	2
31	16Cr–12Ni–2Mo	Bar	SA–276	316	S31600	B
32	16Cr–12Ni–2Mo	Bar	SA–276	316	S31600	B
33	16Cr–12Ni–2Mo–Cb	Plate	SA–240	316Cb	S31640	...
34	16Cr–12Ni–2Mo–N	Forgings	SA–182	F316LN	S31653	...
35	16Cr–12Ni–2Mo–N	Forgings	SA–965	F316LN	S31653	...
36	16Cr–12Ni–2Mo–N	Forgings	SA–182	F316LN	S31653	...
37	16Cr–12Ni–2Mo–N	Bolting	SA–193	B8MNA	S31651	1A
38	16Cr–12Ni–2Mo–N	Smls. tube	SA–213	TP316LN	S31653	...
39	16Cr–12Ni–2Mo–N	Plate	SA–240	316LN	S31653	...
40	16Cr–12Ni–2Mo–N	Wld. tube	SA–249	TP316LN	S31653	...
41	16Cr–12Ni–2Mo–N	Smls. & wld. pipe	SA–312	TP316LN	S31653	...
42	16Cr–12Ni–2Mo–N	Wld. pipe	SA–358	316LN	S31653	1
43	16Cr–12Ni–2Mo–N	Wld. pipe	SA–358	316LN	S31653	3
44	16Cr–12Ni–2Mo–N	Wld. pipe	SA–358	316LN	S31653	4
45	16Cr–12Ni–2Mo–N	Smls. pipe	SA–376	TP316LN	S31653	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Ferrous Materials (Cont'd)
1	...	75	30	...
2	...	75	30	...
3	...	75	30	...
4	...	75	30	...
5	...	75	30	...
6	...	75	30	...
7	...	75	30	...
8	...	75	30	...
9	...	75	30	...
10	...	75	30	...
11	...	75	30	...
12	≤3	75	32	...
13	≤3	75	32	...
14	$2\frac{1}{2} < t \le 3$	80	55	...
15	$2\frac{1}{2} < t \le 3$	80	55	...
16	$1\frac{1}{4} < t \le 1\frac{1}{2}$	90	50	...
17	$1\frac{1}{4} < t \le 1\frac{1}{2}$	90	50	...
18	$2 < t \le 2\frac{1}{2}$	90	65	...
19	$2 < t \le 2\frac{1}{2}$	90	65	...
20	$1\frac{1}{2} < t \le 1\frac{3}{4}$	95	45	...
21	$1 < t \le 1\frac{1}{4}$	95	65	...
22	$1 < t \le 1\frac{1}{4}$	95	65	...
23	≤2	95	75	...
24	≤2	95	75	...
25	$1\frac{1}{4} < t \le 1\frac{1}{2}$	100	50	...
26	$\frac{3}{4} < t \le 1$	100	80	...
27	$\frac{3}{4} < t \le 1$	100	80	...
28	$1 < t \le 1\frac{1}{4}$	105	65	...
29	$\le\frac{3}{4}$	110	95	...
30	$\le\frac{3}{4}$	110	95	...
31	$\frac{3}{4} < t \le 1$	115	80	...
32	$\le\frac{3}{4}$	125	100	...
33	...	75	30	...
34	>5	70	30	...
35	...	70	30	...
36	≤5	75	30	...
37	...	75	30	...
38	...	75	30	...
39	...	75	30	...
40	...	75	30	...
41	...	75	30	...
42	...	75	30	...
43	...	75	30	...
44	...	75	30	...
45	...	75	30	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Ferrous Materials (Cont'd)								
1	30.0	27.4	25.9	24.6	23.4	...	21.4	...	20.0
2	30.0	27.4	25.9	24.6	23.4	...	21.4	...	20.0
3	30.0	27.4	25.9	24.6	23.4	...	21.4	...	20.0
4	30.0	27.4	25.9	24.6	23.4	...	21.4	...	20.0
5	30.0	27.4	25.9	24.6	23.4	...	21.4	...	20.0
6	30.0	27.4	25.9	24.6	23.4	...	21.4	...	20.0
7	30.0	27.4	25.9	24.6	23.4	...	21.4	...	20.0
8	30.0	27.4	25.9	24.6	23.4	...	21.4	...	20.0
9	30.0	27.4	25.9	24.6	23.4	...	21.4	...	20.0
10	30.0	27.4	25.9	24.6	23.4	...	21.4	...	20.0
11	30.0	27.4	25.9	24.6	23.4	...	21.4	...	20.0
12	31.9	28.9	27.2	25.7	24.4	...	22.3	...	20.9
13	31.9	29.1	27.6	26.2	24.9	...	22.8	...	21.2
14	55.0	...	51.7	...	48.8	...	46.5	...	45.3
15	55.0	...	51.7	...	48.8	...	46.5	...	45.3
16	50.0	...	47.0	...	44.4	...	42.3	...	41.2
17	50.0	...	47.0	...	44.4	...	42.3	...	41.2
18	65.0	...	61.1	...	57.7	...	54.9	...	53.5
19	65.0	...	61.1	...	57.7	...	54.9	...	53.5
20	45.0	...	42.3	...	39.9	...	38.0	...	37.0
21	65.0	...	61.1	...	57.7	...	54.9	...	53.5
22	65.0	...	61.1	...	57.7	...	54.9	...	53.5
23	75.0	...	70.5	...	66.5	...	63.4	...	61.7
24	75.0	...	70.5	...	66.5	...	63.4	...	61.7
25	50.0	...	47.0	...	44.4	...	42.3	...	41.2
26	80.0	...	69.1	...	65.5	...	59.6	...	55.0
27	80.0	...	69.1	...	65.5	...	59.6	...	55.0
28	65.0	...	61.1	...	57.7	...	54.9	...	53.5
29	95.0	...	79.2	...	71.1	...	65.5	...	61.5
30	95.0	...	79.2	...	71.1	...	65.5	...	61.5
31	80.0	...	75.2	...	71.0	...	67.6	...	65.8
32	100.0	...	94.0	...	88.7	...	84.5	...	82.3
33	30.0	28.0	26.5	25.1	23.8	...	21.5	...	19.8
34	30.0	27.1	25.5	24.1	22.9	...	21.0	...	19.5
35	30.0	27.1	25.5	24.1	22.9	...	21.0	...	19.5
36	30.0	27.1	25.5	24.1	22.9	...	21.0	...	19.5
37	30.0	27.9	26.6	25.5	24.4	...	22.6	...	21.2
38	30.0	27.1	25.5	24.1	22.9	...	21.0	...	19.5
39	30.0	27.1	25.5	24.1	22.9	...	21.0	...	19.5
40	30.0	27.1	25.5	24.1	22.9	...	21.0	...	19.5
41	30.0	27.1	25.5	24.1	22.9	...	21.0	...	19.5
42	30.0	27.1	25.5	24.1	22.9	...	21.0	...	19.5
43	30.0	27.1	25.5	24.1	22.9	...	21.0	...	19.5
44	30.0	27.1	25.5	24.1	22.9	...	21.0	...	19.5
45	30.0	27.1	25.5	24.1	22.9	...	21.0	...	19.5

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Ferrous Materials (Cont'd)
1	...	18.9	18.5	18.2	17.9	17.7	17.5	17.3	17.1	17.0
2	...	18.9	18.5	18.2	17.9	17.7	17.5	17.3	17.1	17.0
3	...	18.9	18.5	18.2	17.9	17.7	17.5	17.3	17.1	17.0
4	...	18.9	18.5	18.2	17.9	17.7	17.5	17.3	17.1	17.0
5	...	18.9	18.5	18.2	17.9	17.7	17.5	17.3	17.1	17.0
6	...	18.9	18.5	18.2	17.9	17.7	17.5	17.3	17.1	17.0
7	...	18.9	18.5	18.2	17.9	17.7	17.5	17.3	17.1	17.0
8	...	18.9	18.5	18.2	17.9	17.7	17.5	17.3	17.1	17.0
9	...	18.9	18.5	18.2	17.9	17.7	17.5	17.3	17.1	17.0
10	...	18.9	18.5	18.2	17.9	17.7	17.5	17.3	17.1	17.0
11	...	18.9	18.5	18.2	17.9	17.7	17.5	17.3	17.1	17.0
12	...	19.9	19.5	19.2	18.8	18.4	18.0	17.6	17.2	16.9
13	...	20.1	19.7	19.3	19.1	18.8	18.6	18.4	18.2	18.1
14	...	44.4	43.9	43.2	42.7	42.1	41.5	40.9	40.3	39.6
15	...	44.4	...	...	...	...	...	...	...	...
16	...	40.4	39.9	39.3	38.8	38.3	37.7	37.2	36.7	36.0
17	...	40.4	39.9	39.3	38.8	38.3	37.7	37.2	36.7	36.0
18	...	52.5	51.8	51.0	50.4	49.7	49.0	48.4	47.6	46.8
19	...	52.5	...	...	...	...	...	...	...	...
20	...	36.3	...	...	...	...	...	...	...	...
21	...	52.5	51.8	51.0	50.4	49.7	49.0	48.4	47.6	46.8
22	...	52.5	51.8	51.0	50.4	49.7	49.0	48.4	47.6	46.8
23	...	60.5	59.8	58.9	58.1	57.4	56.6	55.8	55.0	54.0
24	...	60.5	...	...	...	...	...	...	...	...
25	...	40.4	...	...	...	...	...	...	...	...
26	...	51.7	49.3	48.4	47.7	47.1	46.6	46.1	45.7	45.3
27	...	51.7	49.3	48.4	47.7	47.1	46.6	46.1	45.7	45.3
28	...	52.5	...	...	...	...	...	...	...	...
29	...	58.3	57.0	55.7	54.5	53.4	52.3	51.3	50.2	49.2
30	...	58.3	57.0	55.7	54.5	53.4	52.3	51.3	50.2	49.2
31	...	64.6	...	...	...	...	...	...	...	...
32	...	80.7	...	...	...	...	...	...	...	...
33	...	18.7	18.3	18.0	17.8	17.6	17.5	17.4	17.3	17.1
34	...	18.3	17.8	17.3	16.9	16.5	16.1	15.8	15.5	15.3
35	...	18.3	17.8	17.3	16.9	16.5	16.1	15.8	15.5	15.3
36	...	18.3	17.8	17.3	16.9	16.5	16.1	15.8	15.5	15.3
37	...	20.1	19.5	19.1	18.7	18.3	17.9	17.6	17.2	17.0
38	...	18.3	17.8	17.3	16.9	16.5	16.1	15.8	15.5	15.3
39	...	18.3	17.8	17.3	16.9	16.5	16.1	15.8	15.5	15.3
40	...	18.3	17.8	17.3	16.9	16.5	16.1	15.8	15.5	15.3
41	...	18.3	17.8	17.3	16.9	16.5	16.1	15.8	15.5	15.3
42	...	18.3	17.8	17.3	16.9	16.5	16.1	15.8	15.5	15.3
43	...	18.3	17.8	17.3	16.9	16.5	16.1	15.8	15.5	15.3
44	...	18.3	17.8	17.3	16.9	16.5	16.1	15.8	15.5	15.3
45	...	18.3	17.8	17.3	16.9	16.5	16.1	15.8	15.5	15.3

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding												
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
	Ferrous Materials (Cont'd)												
1	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
		Ferrous Materials (Cont'd)					
	1	16Cr–12Ni–2Mo–N	Fittings	SA–403	316LN	S31653	...
	2	16Cr–12Ni–2Mo–N	Bar	SA–479	316LN	S31653	...
	3	16Cr–12Ni–2Mo–N	Wld. tube	SA–688	TP316LN	S31653	...
	4	16Cr–12Ni–2Mo–N	Forgings	SA–182	F316N	S31651	...
	5	16Cr–12Ni–2Mo–N	Smls. tube	SA–213	TP316N	S31651	...
	6	16Cr–12Ni–2Mo–N	Plate	SA–240	316N	S31651	...
	7	16Cr–12Ni–2Mo–N	Wld. tube	SA–249	TP316N	S31651	...
	8	16Cr–12Ni–2Mo–N	Smls. & wld. pipe	SA–312	TP316N	S31651	...
	9	16Cr–12Ni–2Mo–N	Wld. pipe	SA–358	316N	S31651	1
	10	16Cr–12Ni–2Mo–N	Wld. pipe	SA–358	316N	S31651	3
	11	16Cr–12Ni–2Mo–N	Wld. pipe	SA–358	316N	S31651	4
	12	16Cr–12Ni–2Mo–N	Smls. pipe	SA–376	TP316N	S31651	...
	13	16Cr–12Ni–2Mo–N	Smls. & wld. fittings	SA–403	316N	S31651	...
	14	16Cr–12Ni–2Mo–N	Bar	SA–479	316N	S31651	...
	15	16Cr–12Ni–2Mo–N	Wld. tube	SA–688	TP316N	S31651	...
	16	16Cr–12Ni–2Mo–N	Wld. pipe	SA–813	TP316N	S31651	...
	17	16Cr–12Ni–2Mo–N	Wld. pipe	SA–814	TP316N	S31651	...
	18	16Cr–12Ni–2Mo–N	Forgings	SA–965	F316N	S31651	...
	19	16Cr–12Ni–2Mo–N	Plate	SA/EN 10028–7	X2CrNiMoN17–11–2	...	...
	20	16Cr–12Ni–2Mo–N	Plate	SA/EN 10028–7	X2CrNiMoN17–13–3	...	...
(**21**)	21	16Cr–12Ni–2Mo–Ti	Plate	SA–240	316Ti	S31635	...
	22	17Cr–4Ni–6Mn	Plate	SA–240	201–1	S20100	...
	23	17Cr–4Ni–6Mn	Plate	SA–666	201–1	S20100	...
	24	17Cr–4Ni–6Mn	Plate	SA–240	201–2	S20100	...
	25	17Cr–4Ni–6Mn	Plate	SA–666	201–2	S20100	...
	26	17Cr–7Ni	Plate, sheet, strip	SA–240	301	S30100	...
	27	17.5Cr–17.5Ni–5.3Si	Plate	SA–240	...	S30601	Solution ann.
	28	18Cr–3Ni–12Mn	Plate	SA–240	XM–29	S24000	...
	29	18Cr–3Ni–12Mn	Wld. tube	SA–249	XM–29	S24000	...
	30	18Cr–3Ni–12Mn	Wld. pipe	SA–312	XM–29	S24000	...
	31	18Cr–3Ni–12Mn	Bar	SA–479	XM–29	S24000	...
	32	18Cr–3Ni–12Mn	Wld. tube	SA–688	TPXM–29	S24000	...
	33	18Cr–5Ni–3Mo	Smls. & wld. tube	SA–789	...	S31500	...
	34	18Cr–5Ni–3Mo	Smls. & wld. pipe	SA–790	...	S31500	...
(**21**)	35	18Cr–8Ni	Forgings	SA–182	F304L	S30403	...
(**21**)	36	18Cr–8Ni	Forgings	SA–965	F304L	S30403	...
(**21**)	37	18Cr–8Ni	Forgings	SA–182	F304L	S30403	...
(**21**)	38	18Cr–8Ni	Smls. tube	SA–213	TP304L	S30403	...
(**21**)	39	18Cr–8Ni	Plate	SA–240	304L	S30403	...
(**21**)	40	18Cr–8Ni	Wld. tube	SA–249	TP304L	S30403	...
(**21**)	41	18Cr–8Ni	Smls. & wld. pipe	SA–312	TP304L	S30403	...
(**21**)	42	18Cr–8Ni	Wld. pipe	SA–358	304L	S30403	1
(**21**)	43	18Cr–8Ni	Wld. pipe	SA–358	304L	S30403	3
(**21**)	44	18Cr–8Ni	Wld. pipe	SA–358	304L	S30403	4
(**21**)	45	18Cr–8Ni	Smls. & wld. fittings	SA–403	304L	S30403	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Ferrous Materials (Cont'd)
1	...	75	30	...
2	...	75	30	...
3	...	75	30	...
4	...	80	35	...
5	...	80	35	...
6	...	80	35	...
7	...	80	35	...
8	...	80	35	...
9	...	80	35	...
10	...	80	35	...
11	...	80	35	...
12	...	80	35	...
13	...	80	35	...
14	...	80	35	...
15	...	80	35	...
16	...	80	35	...
17	...	80	35	...
18	...	80	35	...
19	≤3	84	41	...
20	≤3	84	41	...
21	...	75	30	...
22	...	75	38	...
23	...	75	38	...
24	...	95	45	...
25	...	95	45	...
26	...	75	30	...
27	...	78	37	...
28	...	100	55	...
29	...	100	55	...
30	...	100	55	...
31	...	100	55	...
32	...	100	55	...
33	...	92	64	...
34	...	92	64	...
35	>5	65	25	...
36	...	65	25	...
37	≤5	70	25	...
38	...	70	25	...
39	...	70	25	...
40	...	70	25	...
41	...	70	25	...
42	...	70	25	...
43	...	70	25	...
44	...	70	25	...
45	...	70	25	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Ferrous Materials (Cont'd)								
1	30.0	27.1	25.5	24.1	22.9	...	21.0	...	19.5
2	30.0	27.1	25.5	24.1	22.9	...	21.0	...	19.5
3	30.0	27.1	25.5	24.1	22.9	...	21.0	...	19.5
4	35.0	32.5	31.0	29.7	28.5	...	26.4	...	24.7
5	35.0	32.5	31.0	29.7	28.5	...	26.4	...	24.7
6	35.0	32.5	31.0	29.7	28.5	...	26.4	...	24.7
7	35.0	32.5	31.0	29.7	28.5	...	26.4	...	24.7
8	35.0	32.5	31.0	29.7	28.5	...	26.4	...	24.7
9	35.0	32.5	31.0	29.7	28.5	...	26.4	...	24.7
10	35.0	32.5	31.0	29.7	28.5	...	26.4	...	24.7
11	35.0	32.5	31.0	29.7	28.5	...	26.4	...	24.7
12	35.0	32.5	31.0	29.7	28.5	...	26.4	...	24.7
13	35.0	32.5	31.0	29.7	28.5	...	26.4	...	24.7
14	35.0	32.5	31.0	29.7	28.5	...	26.4	...	24.7
15	35.0	32.5	31.0	29.7	28.5	...	26.4	...	24.7
16	35.0	32.5	31.0	29.7	28.5	...	26.4	...	24.7
17	35.0	32.5	31.0	29.7	28.5	...	26.4	...	24.7
18	35.0	32.5	31.0	29.7	28.5	...	26.4	...	24.7
19	40.6	37.6	34.5	32.8	31.0	...	28.4	...	26.4
20	40.6	37.6	34.5	32.8	31.0	...	28.4	...	26.4
21	30.0	28.0	26.5	25.1	23.8	...	21.5	...	19.8
22	38.0	31.8	28.9	26.6	25.0	...	22.7	...	...
23	38.0	31.8	28.9	26.6	25.0	...	22.7	...	...
24	45.0	37.7	34.2	31.5	29.6	...	26.9	...	...
25	45.0	37.7	34.2	31.5	29.6	...	26.9	...	...
26	30.0	...	24.2	...	21.6	...	20.2	...	19.5
27	37.0	...	30.4	...	27.1	...	24.7	...	22.7
28	55.0	48.3	44.2	40.6	37.5	...	32.9	...	30.2
29	55.0	48.3	44.2	40.6	37.5	...	32.9	...	30.2
30	55.0	48.3	44.2	40.6	37.5	...	32.9	...	30.2
31	55.0	48.3	44.2	40.6	37.5	...	32.9	...	30.2
32	55.0	48.3	44.2	40.6	37.5	...	32.9	...	30.2
33	64.0	55.6	52.3	50.2	49.0	...	47.7	...	46.6
34	64.0	55.6	52.3	50.2	49.0	...	47.7	...	46.6
35	25.0	22.7	21.4	20.2	19.2	...	17.5	...	16.4
36	25.0	22.7	21.4	20.2	19.2	...	17.5	...	16.4
37	25.0	22.7	21.4	20.2	19.2	...	17.5	...	16.4
38	25.0	22.7	21.4	20.2	19.2	...	17.5	...	16.4
39	25.0	22.7	21.4	20.2	19.2	...	17.5	...	16.4
40	25.0	22.7	21.4	20.2	19.2	...	17.5	...	16.4
41	25.0	22.7	21.4	20.2	19.2	...	17.5	...	16.4
42	25.0	22.7	21.4	20.2	19.2	...	17.5	...	16.4
43	25.0	22.7	21.4	20.2	19.2	...	17.5	...	16.4
44	25.0	22.7	21.4	20.2	19.2	...	17.5	...	16.4
45	25.0	22.7	21.4	20.2	19.2	...	17.5	...	16.4

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Ferrous Materials (Cont'd)
1	...	18.3	17.8	17.3	16.9	16.5	16.1	15.8	15.5	15.3
2	...	18.3	17.8	17.3	16.9	16.5	16.1	15.8	15.5	15.3
3	...	18.3	17.8	17.3	16.9	16.5	16.1	15.8	15.5	15.3
4	...	23.4	22.8	22.3	21.8	21.3	20.9	20.5	20.1	19.8
5	...	23.4	22.8	22.3	21.8	21.3	20.9	20.5	20.1	19.8
6	...	23.4	22.8	22.3	21.8	21.3	20.9	20.5	20.1	19.8
7	...	23.4	22.8	22.3	21.8	21.3	20.9	20.5	20.1	19.8
8	...	23.4	22.8	22.3	21.8	21.3	20.9	20.5	20.1	19.8
9	...	23.4	22.8	22.3	21.8	21.3	20.9	20.5	20.1	19.8
10	...	23.4	22.8	22.3	21.8	21.3	20.9	20.5	20.1	19.8
11	...	23.4	22.8	22.3	21.8	21.3	20.9	20.5	20.1	19.8
12	...	23.4	22.8	22.3	21.8	21.3	20.9	20.5	20.1	19.8
13	...	23.4	22.8	22.3	21.8	21.3	20.9	20.5	20.1	19.8
14	...	23.4	22.8	22.3	21.8	21.3	20.9	20.5	20.1	19.8
15	...	23.4	22.8	22.3	21.8	21.3	20.9	20.5	20.1	19.8
16	...	23.4	22.8	22.3	21.8	21.3	20.9	20.5	20.1	19.8
17	...	23.4	22.8	22.3	21.8	21.3	20.9	20.5	20.1	19.8
18	...	23.4	22.8	22.3	21.8	21.3	20.9	20.5	20.1	19.8
19	...	24.8	24.1	23.5	22.9	22.3	...	...	...	...
20	...	24.8	24.1	23.5	22.9	22.3	...	...	...	...
21	...	18.7	18.3	18.0	17.8	17.6	17.5	17.4	17.3	17.1
22	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...
26	...	18.8	18.3	17.8	17.3	16.7	16.2	15.8	...	...
27	...	...	...	...	...	...	...	...	...	...
28	...	28.7	28.2	27.8	27.3	26.6	25.9	25.1	24.2	23.4
29	...	28.7	28.2	27.8	27.3	26.6	25.9	25.1	24.2	23.4
30	...	28.7	28.2	27.8	27.3	26.6	25.9	25.1	24.2	23.4
31	...	28.7	28.2	27.8	27.3	26.6	25.9	25.1	24.2	23.4
32	...	28.7	28.2	27.8	27.3	26.6	25.9	25.1	24.2	23.4
33	...	45.2	44.4	43.6	42.8	42.3	...	...	...	...
34	...	45.2	44.4	43.6	42.8	42.3	...	...	...	...
35	...	15.5	15.2	15.0	14.7	14.5	14.3	14.0	13.7	13.3
36	...	15.5	15.2	15.0	14.7	14.5	14.3	14.0	13.7	13.3
37	...	15.5	15.2	15.0	14.7	14.5	14.3	14.0	13.7	13.3
38	...	15.5	15.2	15.0	14.7	14.5	14.3	14.0	13.7	13.3
39	...	15.5	15.2	15.0	14.7	14.5	14.3	14.0	13.7	13.3
40	...	15.5	15.2	15.0	14.7	14.5	14.3	14.0	13.7	13.3
41	...	15.5	15.2	15.0	14.7	14.5	14.3	14.0	13.7	13.3
42	...	15.5	15.2	15.0	14.7	14.5	14.3	14.0	13.7	13.3
43	...	15.5	15.2	15.0	14.7	14.5	14.3	14.0	13.7	13.3
44	...	15.5	15.2	15.0	14.7	14.5	14.3	14.0	13.7	13.3
45	...	15.5	15.2	15.0	14.7	14.5	14.3	14.0	13.7	13.3

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Ferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	16.5	16.3	16.1	15.9	15.7	15.5	15.3	15.0	14.6	14.3	...	...	...	(**21**)
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	13.2	12.3	12.0	11.6	...	...	...	...	...	...	...	...	...	(**21**)
36	13.2	12.3	12.0	11.6	...	...	...	...	...	...	...	...	...	(**21**)
37	13.2	12.3	12.0	11.6	...	...	...	...	...	...	...	...	...	(**21**)
38	13.2	12.3	12.0	11.6	...	...	...	...	...	...	...	...	...	(**21**)
39	13.2	12.3	12.0	11.6	...	...	...	...	...	...	...	...	...	(**21**)
40	13.2	12.3	12.0	11.6	...	...	...	...	...	...	...	...	...	(**21**)
41	13.2	12.3	12.0	11.6	...	...	...	...	...	...	...	...	...	(**21**)
42	13.2	12.3	12.0	11.6	...	...	...	...	...	...	...	...	...	(**21**)
43	13.2	12.3	12.0	11.6	...	...	...	...	...	...	...	...	...	(**21**)
44	13.2	12.3	12.0	11.6	...	...	...	...	...	...	...	...	...	(**21**)
45	13.2	12.3	12.0	11.6	...	...	...	...	...	...	...	...	...	(**21**)

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
		Ferrous Materials (Cont'd)					
(**21**)	1	18Cr–8Ni	Wld. pipe	SA–409	TP304L	S30403	...
(**21**)	2	18Cr–8Ni	Bar	SA–479	304L	S30403	Annealed
(**21**)	3	18Cr–8Ni	Wld. tube	SA–688	TP304L	S30403	...
(**21**)	4	18Cr–8Ni	Wld. pipe	SA–813	TP304L	S30403	...
(**21**)	5	18Cr–8Ni	Wld. pipe	SA–814	TP304L	S30403	...
	6	18Cr–8Ni	Bar	SA/JIS G4303	SUS304L	...	...
(**21**)	7	18Cr–8Ni	Forgings	SA–182	F304	S30400	...
	8	18Cr–8Ni	Forgings	SA–182	F304H	S30409	...
	9	18Cr–8Ni	Castings	SA–351	CF3	J92500	...
	10	18Cr–8Ni	Castings	SA–351	CF8	J92600	...
(**21**)	11	18Cr–8Ni	Smls. pipe	SA–376	TP304	S30400	...
	12	18Cr–8Ni	Cast pipe	SA–451	CPF3	J92500	...
	13	18Cr–8Ni	Cast pipe	SA–451	CPF8	J92600	...
(**21**)	14	18Cr–8Ni	Forgings	SA–965	F304	S30400	...
	15	18Cr–8Ni	Forgings	SA–965	F304H	S30409	...
	16	18Cr–8Ni	Plate	SA/EN 10028–7	X2CrNi18–9	...	...
(**21**)	17	18Cr–8Ni	Forgings	SA–182	F304	S30400	...
	18	18Cr–8Ni	Forgings	SA–182	F304H	S30409	...
(**21**)	19	18Cr–8Ni	Bolting	SA–193	B8	S30400	1
(**21**)	20	18Cr–8Ni	Bolting	SA–193	B8A	S30400	1A
(**21**)	21	18Cr–8Ni	Smls. tube	SA–213	TP304	S30400	...
	22	18Cr–8Ni	Smls. tube	SA–213	TP304H	S30409	...
	23	18Cr–8Ni	Plate	SA–240	302	S30200	...
(**21**)	24	18Cr–8Ni	Plate	SA–240	304	S30400	...
	25	18Cr–8Ni	Plate	SA–240	304H	S30409	...
(**21**)	26	18Cr–8Ni	Wld. tube	SA–249	TP304	S30400	...
	27	18Cr–8Ni	Wld. tube	SA–249	TP304H	S30409	...
(**21**)	28	18Cr–8Ni	Smls. & wld. pipe	SA–312	TP304	S30400	...
	29	18Cr–8Ni	Smls. & wld. pipe	SA–312	TP304H	S30409	...
(**21**)	30	18Cr–8Ni	Bolting	SA–320	B8	S30400	1
(**21**)	31	18Cr–8Ni	Bolting	SA–320	B8A	S30400	1A
(**21**)	32	18Cr–8Ni	Wld. pipe	SA–358	304	S30400	1
(**21**)	33	18Cr–8Ni	Wld. pipe	SA–358	304	S30400	3
(**21**)	34	18Cr–8Ni	Wld. pipe	SA–358	304	S30400	4
	35	18Cr–8Ni	Wld. pipe	SA–358	304H	S30409	1
	36	18Cr–8Ni	Wld. pipe	SA–358	304H	S30409	3
	37	18Cr–8Ni	Wld. pipe	SA–358	304H	S30409	4
	38	18Cr–8Ni	Wld. pipe	SA–358	304LN	S30453	1
	39	18Cr–8Ni	Wld. pipe	SA–358	304LN	S30453	3
	40	18Cr–8Ni	Wld. pipe	SA–358	304LN	S30453	4
(**21**)	41	18Cr–8Ni	Smls. pipe	SA–376	TP304	S30400	...
	42	18Cr–8Ni	Smls. pipe	SA–376	TP304H	S30409	...
(**21**)	43	18Cr–8Ni	Smls. & wld. fittings	SA–403	304	S30400	...
	44	18Cr–8Ni	Smls. & wld. fittings	SA–403	304H	S30409	...
(**21**)	45	18Cr–8Ni	Wld. pipe	SA–409	TP304	S30400	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Ferrous Materials (Cont'd)
1	...	70	25	...
2	...	70	25	...
3	...	70	25	...
4	...	70	25	...
5	...	70	25	...
6	...	70	25	...
7	>5	70	30	...
8	>5	70	30	...
9	...	70	30	...
10	...	70	30	...
11	...	70	30	...
12	...	70	30	...
13	...	70	30	...
14	...	70	30	...
15	...	70	30	...
16	≤3	72.5	29	...
17	≤5	75	30	...
18	≤5	75	30	...
19	...	75	30	...
20	...	75	30	...
21	...	75	30	...
22	...	75	30	...
23	...	75	30	...
24	...	75	30	...
25	...	75	30	...
26	...	75	30	...
27	...	75	30	...
28	...	75	30	...
29	...	75	30	...
30	...	75	30	...
31	...	75	30	...
32	...	75	30	...
33	...	75	30	...
34	...	75	30	...
35	...	75	30	...
36	...	75	30	...
37	...	75	30	...
38	...	75	30	...
39	...	75	30	...
40	...	75	30	...
41	...	75	30	...
42	...	75	30	...
43	...	75	30	...
44	...	75	30	...
45	...	75	30	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Ferrous Materials (Cont'd)								
1	25.0	22.7	21.4	20.2	19.2	...	17.5	...	16.4
2	25.0	22.7	21.4	20.2	19.2	...	17.5	...	16.4
3	25.0	22.7	21.4	20.2	19.2	...	17.5	...	16.4
4	25.0	22.7	21.4	20.2	19.2	...	17.5	...	16.4
5	25.0	22.7	21.4	20.2	19.2	...	17.5	...	16.4
6	25.0	22.7	21.4	20.2	19.2	...	17.5	...	16.4
7	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
8	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
9	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
10	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
11	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
12	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
13	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
14	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
15	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
16	29.0	...	24.8	...	22.3	...	20.3	...	19.0
17	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
18	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
19	30.0	...	25.0	...	22.4	...	20.7	...	19.4
20	30.0	...	25.0	...	22.4	...	20.7	...	19.4
21	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
22	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
23	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
24	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
25	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
26	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
27	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
28	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
29	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
30	30.0	...	25.0	...	22.4	...	20.7	...	19.4
31	30.0	...	25.0	...	22.4	...	20.7	...	19.4
32	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
33	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
34	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
35	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
36	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
37	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
38	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
39	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
40	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
41	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
42	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
43	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
44	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
45	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Ferrous Materials (Cont'd)
1	...	15.5	15.2	15.0	14.7	14.5	14.3	14.0	13.7	13.3
2	...	15.5	15.2	15.0	14.7	14.5	14.3	14.0	13.7	13.3
3	...	15.5	15.2	15.0	14.7	14.5	14.3	14.0	13.7	13.3
4	...	15.5	15.2	15.0	14.7	14.5	14.3	14.0	13.7	13.3
5	...	15.5	15.2	15.0	14.7	14.5	14.3	14.0	13.7	13.3
6	...	15.5	15.2	15.0	14.7	14.5	14.3	14.0	13.7	13.3
7	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
8	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
9	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
10	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
11	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
12	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
13	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
14	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
15	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
16	...	18.0	17.7	17.4	17.1	16.8	16.6	16.3	15.9	15.4
17	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
18	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
19	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
20	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
21	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
22	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
23	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
24	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
25	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
26	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
27	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
28	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
29	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
30	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
31	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
32	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
33	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
34	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
35	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
36	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
37	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
38	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
39	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
40	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
41	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
42	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
43	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
44	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
45	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Ferrous Materials (Cont'd)													
1	13.2	12.3	12.0	11.6	...	...	...	...	...	...	...	...	...	(**21**)
2	13.2	12.3	12.0	11.6	...	...	...	...	...	...	...	...	...	(**21**)
3	13.2	12.3	12.0	11.6	...	...	...	...	...	...	...	...	...	(**21**)
4	13.2	12.3	12.0	11.6	...	...	...	...	...	...	...	...	...	(**21**)
5	13.2	12.3	12.0	11.6	...	...	...	...	...	...	...	...	...	(**21**)
6	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	15.2	14.9	14.5	14.0	13.5	12.9	12.3	11.5	10.7	9.7	...	...	...	(**21**)
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	15.2	14.9	14.5	14.0	13.5	12.9	12.3	11.5	10.7	9.7	...	...	...	(**21**)
12	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	15.2	14.9	14.5	14.0	13.5	12.9	12.3	11.5	10.7	9.7	...	...	...	(**21**)
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	15.2	14.9	14.5	14.0	13.5	12.9	12.3	11.5	10.7	9.7	...	...	...	(**21**)
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	15.2	14.9	14.5	14.0	13.5	12.9	12.3	11.5	10.7	9.7	...	...	...	(**21**)
20	15.2	14.9	14.5	14.0	13.5	12.9	12.3	11.5	10.7	9.7	...	...	...	(**21**)
21	15.2	14.9	14.5	14.0	13.5	12.9	12.3	11.5	10.7	9.7	...	...	...	(**21**)
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	15.2	14.9	14.5	14.0	13.5	12.9	12.3	11.5	10.7	9.7	...	...	...	(**21**)
25	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	15.2	14.9	14.5	14.0	13.5	12.9	12.3	11.5	10.7	9.7	...	...	...	(**21**)
27	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	15.2	14.9	14.5	14.0	13.5	12.9	12.3	11.5	10.7	9.7	...	...	...	(**21**)
29	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	15.2	14.9	14.5	14.0	13.5	12.9	12.3	11.5	10.7	9.7	...	...	...	(**21**)
31	15.2	14.9	14.5	14.0	13.5	12.9	12.3	11.5	10.7	9.7	...	...	...	(**21**)
32	15.2	14.9	14.5	14.0	13.5	12.9	12.3	11.5	10.7	9.7	...	...	...	(**21**)
33	15.2	14.9	14.5	14.0	13.5	12.9	12.3	11.5	10.7	9.7	...	...	...	(**21**)
34	15.2	14.9	14.5	14.0	13.5	12.9	12.3	11.5	10.7	9.7	...	...	...	(**21**)
35	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	15.2	14.9	14.5	14.0	13.5	12.9	12.3	11.5	10.7	9.7	...	...	...	(**21**)
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	15.2	14.9	14.5	14.0	13.5	12.9	12.3	11.5	10.7	9.7	...	...	...	(**21**)
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	15.2	14.9	14.5	14.0	13.5	12.9	12.3	11.5	10.7	9.7	...	...	...	(**21**)

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
		Ferrous Materials (Cont'd)					
	1	18Cr–8Ni	Bar	SA–479	302	S30200	...
(**21**)	2	18Cr–8Ni	Bar	SA–479	304	S30400	Annealed
	3	18Cr–8Ni	Bar	SA–479	304H	S30409	...
(**21**)	4	18Cr–8Ni	Wld. tube	SA–688	TP304	S30400	...
(**21**)	5	18Cr–8Ni	Wld. pipe	SA–813	TP304	S30400	...
	6	18Cr–8Ni	Wld. pipe	SA–813	TP304H	S30409	...
(**21**)	7	18Cr–8Ni	Wld. pipe	SA–814	TP304	S30400	...
	8	18Cr–8Ni	Wld. pipe	SA–814	TP304H	S30409	...
	9	18Cr–8Ni	Bar	SA/JIS G4303	SUS302	...	...
	10	18Cr–8Ni	Bar	SA/JIS G4303	SUS304	...	...
	11	18Cr–8Ni	Plate	SA/EN 10028–7	X5CrNi18–10	...	...
	12	18Cr–8Ni	Castings	SA–351	CF3A	J92500	...
	13	18Cr–8Ni	Castings	SA–351	CF8A	J92600	...
	14	18Cr–8Ni	Cast pipe	SA–451	CPF3A	J92500	...
	15	18Cr–8Ni	Cast pipe	SA–451	CPF8A	J92600	...
	16	18Cr–8Ni	Bolting	SA–193	B8	S30400	2
	17	18Cr–8Ni	Bolting	SA–320	B8	S30400	2
	18	18Cr–8Ni	Bolting	SA–193	B8	S30400	2
	19	18Cr–8Ni	Bolting	SA–320	B8	S30400	2
	20	18Cr–8Ni	Bolting	SA–193	B8	S30400	2
	21	18Cr–8Ni	Bolting	SA–320	B8	S30400	2
	22	18Cr–8Ni	Bolting	SA–193	B8	S30400	2
	23	18Cr–8Ni	Bolting	SA–320	B8	S30400	2
	24	18Cr–8Ni–N	Forgings	SA–182	F304LN	S30453	...
	25	18Cr–8Ni–N	Forgings	SA–965	F304LN	S30453	...
	26	18Cr–8Ni–N	Forgings	SA–182	F304LN	S30453	...
	27	18Cr–8Ni–N	Bolting	SA–193	B8NA	S30451	1A
	28	18Cr–8Ni–N	Smls. tube	SA–213	TP304LN	S30453	...
	29	18Cr–8Ni–N	Plate	SA–240	304LN	S30453	...
	30	18Cr–8Ni–N	Wld. tube	SA–249	TP304LN	S30453	...
	31	18Cr–8Ni–N	Smls. & wld. pipe	SA–312	TP304LN	S30453	...
	32	18Cr–8Ni–N	Smls. pipe	SA–376	TP304LN	S30453	...
	33	18Cr–8Ni–N	Smls. & wld. fittings	SA–403	304LN	S30453	WP
	34	18Cr–8Ni–N	Bar	SA–479	304LN	S30453	...
	35	18Cr–8Ni–N	Wld. tube	SA–688	TP304LN	S30453	...
	36	18Cr–8Ni–N	Wld. pipe	SA–813	TP304LN	S30453	...
	37	18Cr–8Ni–N	Wld. pipe	SA–814	TP304LN	S30453	...
	38	18Cr–8Ni–N	Forgings	SA–182	F304N	S30451	...
	39	18Cr–8Ni–N	Smls. tube	SA–213	TP304N	S30451	...
	40	18Cr–8Ni–N	Plate	SA–240	304N	S30451	...
	41	18Cr–8Ni–N	Wld. tube	SA–249	TP304N	S30451	...
	42	18Cr–8Ni–N	Smls. & wld. pipe	SA–312	TP304N	S30451	...
	43	18Cr–8Ni–N	Wld. pipe	SA–358	304N	S30451	1
	44	18Cr–8Ni–N	Wld. pipe	SA–358	304N	S30451	3
	45	18Cr–8Ni–N	Wld. pipe	SA–358	304N	S30451	4

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Ferrous Materials (Cont'd)
1	...	75	30	...
2	...	75	30	...
3	...	75	30	...
4	...	75	30	...
5	...	75	30	...
6	...	75	30	...
7	...	75	30	...
8	...	75	30	...
9	...	75	30	...
10	...	75	30	...
11	≤3	75	31	...
12	...	77	35	...
13	...	77	35	...
14	...	77	35	...
15	...	77	35	...
16	$1\frac{1}{4} < t \le 1\frac{1}{2}$	100	50	...
17	$1\frac{1}{4} < t \le 1\frac{1}{2}$	100	50	...
18	$1 < t \le 1\frac{1}{4}$	105	65	...
19	$1 < t \le 1\frac{1}{4}$	105	65	...
20	$\frac{3}{4} < t \le 1$	115	80	...
21	$\frac{3}{4} < t \le 1$	115	80	...
22	$\le\frac{3}{4}$	125	100	...
23	$\le\frac{3}{4}$	125	100	...
24	>5	70	30	...
25	...	70	30	...
26	≤5	75	30	...
27	...	75	30	...
28	...	75	30	...
29	...	75	30	...
30	...	75	30	...
31	...	75	30	...
32	...	75	30	...
33	...	75	30	...
34	...	75	30	...
35	...	75	30	...
36	...	75	30	...
37	...	75	30	...
38	...	80	35	...
39	...	80	35	...
40	...	80	35	...
41	...	80	35	...
42	...	80	35	...
43	...	80	35	...
44	...	80	35	...
45	...	80	35	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Ferrous Materials (Cont'd)								
1	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
2	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
3	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
4	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
5	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
6	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
7	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
8	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
9	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
10	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
11	30.5	...	25.4	...	22.8	...	21.0	...	19.7
12	35.0	31.2	29.2	27.5	26.2	...	24.1	...	22.6
13	35.0	31.2	29.2	27.5	26.2	...	24.1	...	22.6
14	35.0	31.2	29.2	27.5	26.2	...	24.1	...	22.6
15	35.0	31.2	29.2	27.5	26.2	...	24.1	...	22.6
16	50.0	44.5	41.7	39.3	37.3	...	34.5	...	32.3
17	50.0	44.5	41.7	39.3	37.3	...	34.5	...	32.3
18	65.0	57.9	54.2	51.1	48.5	...	44.9	...	42.0
19	65.0	57.9	54.2	51.1	48.5	...	44.9	...	42.0
20	80.0	71.2	66.7	62.9	59.7	...	55.2	...	51.7
21	80.0	71.2	66.7	62.9	59.7	...	55.2	...	51.7
22	100.0	89.0	83.3	78.7	74.7	...	69.0	...	64.7
23	100.0	89.0	83.3	78.7	74.7	...	69.0	...	64.7
24	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
25	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
26	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
27	30.0	...	25.0	...	22.4	...	20.7	...	19.4
28	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
29	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
30	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
31	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
32	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
33	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
34	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
35	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
36	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
37	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
38	35.0	30.9	28.6	26.7	25.0	...	22.6	...	21.0
39	35.0	30.9	28.6	26.7	25.0	...	22.6	...	21.0
40	35.0	30.9	28.6	26.7	25.0	...	22.6	...	21.0
41	35.0	30.9	28.6	26.7	25.0	...	22.6	...	21.0
42	35.0	30.9	28.6	26.7	25.0	...	22.6	...	21.0
43	35.0	30.9	28.6	26.7	25.0	...	22.6	...	21.0
44	35.0	30.9	28.6	26.7	25.0	...	22.6	...	21.0
45	35.0	30.9	28.6	26.7	25.0	...	22.6	...	21.0

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Ferrous Materials (Cont'd)
1	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
2	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
3	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
4	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
5	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
6	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
7	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
8	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
9	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
10	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
11	...	18.7	18.3	17.9	17.5	17.1	16.8	16.4	16.1	15.8
12	...	21.5	21.0	20.5	20.1	19.7	19.3	18.9	18.5	18.1
13	...	21.5	21.0	20.5	20.1	19.7	19.3	18.9	18.5	18.1
14	...	21.5	21.0	20.5	20.1	19.7	19.3	18.9	18.5	18.1
15	...	21.5	21.0	20.5	20.1	19.7	19.3	18.9	18.5	18.1
16	...	30.7	30.0	29.3	28.7	28.2	27.5	27.0	26.5	25.8
17	...	30.7	30.0	29.3	28.7	28.2	27.5	27.0	26.5	25.8
18	...	39.9	39.0	38.1	37.3	36.6	35.8	35.1	34.5	33.6
19	...	39.9	39.0	38.1	37.3	36.6	35.8	35.1	34.5	33.6
20	...	49.1	48.0	46.9	45.9	45.1	44.0	43.2	42.4	41.3
21	...	49.1	48.0	46.9	45.9	45.1	44.0	43.2	42.4	41.3
22	...	61.3	60.0	58.7	57.3	56.3	55.0	54.0	53.0	51.7
23	...	61.3	60.0	58.7	57.3	56.3	55.0	54.0	53.0	51.7
24	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
25	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
26	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
27	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
28	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
29	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
30	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
31	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
32	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
33	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
34	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
35	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
36	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
37	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
38	...	19.9	19.5	19.1	18.8	18.5	18.1	17.7	17.3	16.9
39	...	19.9	19.5	19.1	18.8	18.5	18.1	17.7	17.3	16.9
40	...	19.9	19.5	19.1	18.8	18.5	18.1	17.7	17.3	16.9
41	...	19.9	19.5	19.1	18.8	18.5	18.1	17.7	17.3	16.9
42	...	19.9	19.5	19.1	18.8	18.5	18.1	17.7	17.3	16.9
43	...	19.9	19.5	19.1	18.8	18.5	18.1	17.7	17.3	16.9
44	...	19.9	19.5	19.1	18.8	18.5	18.1	17.7	17.3	16.9
45	...	19.9	19.5	19.1	18.8	18.5	18.1	17.7	17.3	16.9

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Ferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	15.2	14.9	14.5	14.0	13.5	12.9	12.3	11.5	10.7	9.7	...	...	...	(**21**)
3	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	15.2	14.9	14.5	14.0	13.5	12.9	12.3	11.5	10.7	9.7	...	...	...	(**21**)
5	15.2	14.9	14.5	14.0	13.5	12.9	12.3	11.5	10.7	9.7	...	...	...	(**21**)
6	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	15.2	14.9	14.5	14.0	13.5	12.9	12.3	11.5	10.7	9.7	...	...	...	(**21**)
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
		Ferrous Materials (Cont'd)					
	1	18Cr–8Ni–N	Smls. pipe	SA–376	TP304N	S30451	...
	2	18Cr–8Ni–N	Smls. & wld. fittings	SA–403	304N	S30451	...
	3	18Cr–8Ni–N	Bar	SA–479	304N	S30451	...
	4	18Cr–8Ni–N	Wld. tube	SA–688	TP304N	S30451	...
	5	18Cr–8Ni–N	Wld. pipe	SA–813	TP304N	S30451	...
	6	18Cr–8Ni–N	Wld. pipe	SA–814	TP304N	S30451	...
	7	18Cr–8Ni–N	Forgings	SA–965	F304N	S30451	...
	8	18Cr–8Ni–N	Plate	SA/EN 10028–7	X2CrNiN18–10	...	...
	9	18Cr–8Ni–N	Plate	SA/EN 10028–7	X5CrNiN19–9	...	...
	10	18Cr–8Ni–Se	Bolting	SA–320	B8F	S30323	1
	11	18Cr–8Ni–Se	Bolting	SA–320	B8FA	S30323	1A
	12	18Cr–8Ni–4Si–N	Bolting	SA–193	B8S	S21800	...
	13	18Cr–8Ni–4Si–N	Bolting	SA–193	B8SA	S21800	...
	14	18Cr–8Ni–4Si–N	Bar	SA–479	...	S21800	...
	15	18Cr–9Ni–3Cu–Cb–N	Smls. tube	SA–213	...	S30432	...
	16	18Cr–10Ni–Cb	Forgings	SA–965	F348H	S34809	...
	17	18Cr–10Ni–Cb	Castings	SA–351	CF8C	J92710	...
	18	18Cr–10Ni–Cb	Cast pipe	SA–451	CPF8C	J92710	...
(**21**)	19	18Cr–10Ni–Cb	Forgings	SA–182	F347	S34700	...
(**21**)	20	18Cr–10Ni–Cb	Forgings	SA–965	F347	S34700	...
	21	18Cr–10Ni–Cb	Forgings	SA–182	F347H	S34709	...
	22	18Cr–10Ni–Cb	Forgings	SA–965	F347H	S34709	...
(**21**)	23	18Cr–10Ni–Cb	Forgings	SA–182	F348	S34800	...
(**21**)	24	18Cr–10Ni–Cb	Forgings	SA–965	F348	S34800	...
	25	18Cr–10Ni–Cb	Forgings	SA–182	F348H	S34809	...
(**21**)	26	18Cr–10Ni–Cb	Forgings	SA–182	F347	S34700	...
(**21**)	27	18Cr–10Ni–Cb	Bolting	SA–193	B8C	S34700	1
(**21**)	28	18Cr–10Ni–Cb	Smls. tube	SA–213	TP347	S34700	...
(**21**)	29	18Cr–10Ni–Cb	Plate	SA–240	347	S34700	...
(**21**)	30	18Cr–10Ni–Cb	Wld. tube	SA–249	TP347	S34700	...
(**21**)	31	18Cr–10Ni–Cb	Smls. & wld. pipe	SA–312	TP347	S34700	...
(**21**)	32	18Cr–10Ni–Cb	Bolting	SA–320	B8C	S34700	1
(**21**)	33	18Cr–10Ni–Cb	Bolting	SA–320	B8CA	S34700	1A
(**21**)	34	18Cr–10Ni–Cb	Wld. pipe	SA–358	347	S34700	1
(**21**)	35	18Cr–10Ni–Cb	Wld. pipe	SA–358	347	S34700	3
(**21**)	36	18Cr–10Ni–Cb	Wld. pipe	SA–358	347	S34700	4
(**21**)	37	18Cr–10Ni–Cb	Smls. pipe	SA–376	TP347	S34700	...
(**21**)	38	18Cr–10Ni–Cb	Smls. & wld. fittings	SA–403	347	S34700	...
(**21**)	39	18Cr–10Ni–Cb	Wld. pipe	SA–409	TP347	S34700	...
(**21**)	40	18Cr–10Ni–Cb	Bar	SA–479	347	S34700	...
(**21**)	41	18Cr–10Ni–Cb	Wld. pipe	SA–813	TP347	S34700	...
	42	18Cr–10Ni–Cb	Bar	SA/JIS G4303	SUS347	...	...
	43	18Cr–10Ni–Cb	Forgings	SA–182	F347H	S34709	...
	44	18Cr–10Ni–Cb	Smls. tube	SA–213	TP347H	S34709	...
	45	18Cr–10Ni–Cb	Plate	SA–240	347H	S34709	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Ferrous Materials (Cont'd)
1	...	80	35	...
2	...	80	35	...
3	...	80	35	...
4	...	80	35	...
5	...	80	35	...
6	...	80	35	...
7	...	80	35	...
8	≤3	80	39	...
9	≤3	80	39	...
10	...	75	30	...
11	...	75	30	...
12	...	95	50	...
13	...	95	50	...
14	...	95	50	...
15	...	86	34	...
16	...	65	25	...
17	...	70	30	...
18	...	70	30	...
19	>5	70	30	...
20	...	70	30	...
21	>5	70	30	...
22	...	70	30	...
23	>5	70	30	...
24	...	70	30	...
25	>5	70	30	...
26	≤5	75	30	...
27	...	75	30	...
28	...	75	30	...
29	...	75	30	...
30	...	75	30	...
31	...	75	30	...
32	...	75	30	...
33	...	75	30	...
34	...	75	30	...
35	...	75	30	...
36	...	75	30	...
37	...	75	30	...
38	...	75	30	...
39	...	75	30	...
40	...	75	30	...
41	...	75	30	...
42	...	75	30	...
43	≤5	75	30	...
44	...	75	30	...
45	...	75	30	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Ferrous Materials (Cont'd)								
1	35.0	30.9	28.6	26.7	25.0	...	22.6	...	21.0
2	35.0	30.9	28.6	26.7	25.0	...	22.6	...	21.0
3	35.0	30.9	28.6	26.7	25.0	...	22.6	...	21.0
4	35.0	30.9	28.6	26.7	25.0	...	22.6	...	21.0
5	35.0	30.9	28.6	26.7	25.0	...	22.6	...	21.0
6	35.0	30.9	28.6	26.7	25.0	...	22.6	...	21.0
7	35.0	30.9	28.6	26.7	25.0	...	22.6	...	21.0
8	39.2	35.9	32.6	31.0	29.3	...	27.0	...	25.3
9	39.2	34.5	32.0	29.9	28.0	...	25.3	...	23.4
10	30.0	...	25.0	...	22.4	...	20.7	...	19.4
11	30.0	...	25.0	...	22.4	...	20.7	...	19.4
12	50.0	42.6	38.8	35.7	33.2	...	29.7	...	27.6
13	50.0	42.6	38.8	35.7	33.2	...	29.7	...	27.6
14	50.0	42.6	38.8	35.7	33.2	...	29.7	...	27.6
15	34.0	...	29.7	...	27.4	...	25.7	...	24.4
16	25.0	23.8	23.0	22.2	21.4	...	20.0	...	18.8
17	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
18	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
19	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
20	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
21	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
22	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
23	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
24	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
25	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
26	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
27	30.0	...	27.6	...	25.7	...	24.0	...	22.5
28	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
29	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
30	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
31	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
32	30.0	...	27.6	...	25.7	...	24.0	...	22.5
33	30.0	...	27.6	...	25.7	...	24.0	...	22.5
34	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
35	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
36	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
37	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
38	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
39	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
40	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
41	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
42	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
43	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
44	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
45	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Ferrous Materials (Cont'd)
1	...	19.9	19.5	19.1	18.8	18.5	18.1	17.7	17.3	16.9
2	...	19.9	19.5	19.1	18.8	18.5	18.1	17.7	17.3	16.9
3	...	19.9	19.5	19.1	18.8	18.5	18.1	17.7	17.3	16.9
4	...	19.9	19.5	19.1	18.8	18.5	18.1	17.7	17.3	16.9
5	...	19.9	19.5	19.1	18.8	18.5	18.1	17.7	17.3	16.9
6	...	19.9	19.5	19.1	18.8	18.5	18.1	17.7	17.3	16.9
7	...	19.9	19.5	19.1	18.8	18.5	18.1	17.7	17.3	16.9
8	...	24.0	23.5	23.0	22.5	22.0	...	...	...	...
9	...	22.3	21.8	21.4	21.0	20.7	20.2	19.8	19.4	18.9
10	...	18.4	18.0	17.6	17.2	16.9	...	...	...	...
11	...	18.4	18.0	17.6	17.2	16.9	...	...	...	...
12	...	26.4	25.9	25.6	25.4	25.2	25.0	24.9	24.9	24.9
13	...	26.4	25.9	25.6	25.4	25.2	25.0	24.9	24.9	24.9
14	...	26.4	25.9	25.6	25.4	25.2	25.0	24.9	24.9	24.9
15	...	23.4	23.0	22.6	22.3	21.9	21.6	21.3	21.0	20.7
16	...	17.9	17.6	17.3	17.1	17.0	16.9	16.8	16.8	16.7
17	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
18	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
19	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
20	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
21	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
22	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
23	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
24	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
25	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
26	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
27	...	21.5	21.1	20.7	20.5	20.4	20.3	20.2	20.1	20.1
28	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
29	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
30	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
31	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
32	...	21.5	21.1	20.7	20.5	20.4	20.3	20.2	20.1	20.1
33	...	21.5	21.1	20.7	20.5	20.4	20.3	20.2	20.1	20.1
34	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
35	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
36	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
37	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
38	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
39	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
40	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
41	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
42	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
43	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
44	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
45	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Ferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	19.7	19.4	19.0	18.5	17.8	17.0	15.9	14.7	13.3	11.7	...	...	...	(**21**)
20	19.7	19.4	19.0	18.5	17.8	17.0	15.9	14.7	13.3	11.7	...	...	...	(**21**)
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	19.7	19.4	19.0	18.5	17.8	17.0	15.9	14.7	13.3	11.7	...	...	...	(**21**)
24	19.7	19.4	19.0	18.5	17.8	17.0	15.9	14.7	13.3	11.7	...	...	...	(**21**)
25	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	19.7	19.4	19.0	18.5	17.8	17.0	15.9	14.7	13.3	11.7	...	...	...	(**21**)
27	19.7	19.4	19.0	18.5	17.8	17.0	15.9	14.7	13.3	11.7	...	...	...	(**21**)
28	19.7	19.4	19.0	18.5	17.8	17.0	15.9	14.7	13.3	11.7	...	...	...	(**21**)
29	19.7	19.4	19.0	18.5	17.8	17.0	15.9	14.7	13.3	11.7	...	...	...	(**21**)
30	19.7	19.4	19.0	18.5	17.8	17.0	15.9	14.7	13.3	11.7	...	...	...	(**21**)
31	19.7	19.4	19.0	18.5	17.8	17.0	15.9	14.7	13.3	11.7	...	...	...	(**21**)
32	19.7	19.4	19.0	18.5	17.8	17.0	15.9	14.7	13.3	11.7	...	...	...	(**21**)
33	19.7	19.4	19.0	18.5	17.8	17.0	15.9	14.7	13.3	11.7	...	...	...	(**21**)
34	19.7	19.4	19.0	18.5	17.8	17.0	15.9	14.7	13.3	11.7	...	...	...	(**21**)
35	19.7	19.4	19.0	18.5	17.8	17.0	15.9	14.7	13.3	11.7	...	...	...	(**21**)
36	19.7	19.4	19.0	18.5	17.8	17.0	15.9	14.7	13.3	11.7	...	...	...	(**21**)
37	19.7	19.4	19.0	18.5	17.8	17.0	15.9	14.7	13.3	11.7	...	...	...	(**21**)
38	19.7	19.4	19.0	18.5	17.8	17.0	15.9	14.7	13.3	11.7	...	...	...	(**21**)
39	19.7	19.4	19.0	18.5	17.8	17.0	15.9	14.7	13.3	11.7	...	...	...	(**21**)
40	19.7	19.4	19.0	18.5	17.8	17.0	15.9	14.7	13.3	11.7	...	...	...	(**21**)
41	19.7	19.4	19.0	18.5	17.8	17.0	15.9	14.7	13.3	11.7	...	...	...	(**21**)
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
		Ferrous Materials (Cont'd)					
	1	18Cr–10Ni–Cb	Wld. tube	SA–249	TP347H	S34709	...
	2	18Cr–10Ni–Cb	Smls. & wld. pipe	SA–312	TP347H	S34709	...
	3	18Cr–10Ni–Cb	Smls. pipe	SA–376	TP347H	S34709	...
	4	18Cr–10Ni–Cb	Smls. & wld. fittings	SA–403	347H	S34709	...
	5	18Cr–10Ni–Cb	Bar	SA–479	347H	S34709	...
	6	18Cr–10Ni–Cb	Wld. pipe	SA–813	TP347H	S34709	...
	7	18Cr–10Ni–Cb	Wld. pipe	SA–814	TP347H	S34709	...
	8	18Cr–10Ni–Cb	Smls. tube	SA–213	TP347LN	S34751	...
	9	18Cr–10Ni–Cb	Smls. pipe	SA–312	TP347LN	S34751	...
(**21**)	10	18Cr–10Ni–Cb	Forgings	SA–182	F348	S34800	...
(**21**)	11	18Cr–10Ni–Cb	Smls. tube	SA–213	TP348	S34800	...
(**21**)	12	18Cr–10Ni–Cb	Plate	SA–240	348	S34800	...
(**21**)	13	18Cr–10Ni–Cb	Wld. tube	SA–249	TP348	S34800	...
(**21**)	14	18Cr–10Ni–Cb	Smls. & wld. pipe	SA–312	TP348	S34800	...
(**21**)	15	18Cr–10Ni–Cb	Wld. pipe	SA–358	348	S34800	1
(**21**)	16	18Cr–10Ni–Cb	Wld. pipe	SA–358	348	S34800	3
(**21**)	17	18Cr–10Ni–Cb	Wld. pipe	SA–358	348	S34800	4
(**21**)	18	18Cr–10Ni–Cb	Smls. pipe	SA–376	TP348	S34800	...
(**21**)	19	18Cr–10Ni–Cb	Smls. & wld. fittings	SA–403	348	S34800	...
(**21**)	20	18Cr–10Ni–Cb	Wld. pipe	SA–409	TP348	S34800	...
(**21**)	21	18Cr–10Ni–Cb	Bar	SA–479	348	S34800	...
(**21**)	22	18Cr–10Ni–Cb	Wld. pipe	SA–813	TP348	S34800	...
(**21**)	23	18Cr–10Ni–Cb	Wld. pipe	SA–814	TP348	S34800	...
	24	18Cr–10Ni–Cb	Forgings	SA–182	F348H	S34809	...
	25	18Cr–10Ni–Cb	Smls. tube	SA–213	TP348H	S34809	...
	26	18Cr–10Ni–Cb	Plate	SA–240	348H	S34809	...
	27	18Cr–10Ni–Cb	Wld. tube	SA–249	TP348H	S34809	...
	28	18Cr–10Ni–Cb	Smls. & wld. pipe	SA–312	TP348H	S34809	...
	29	18Cr–10Ni–Cb	Smls. & wld. fittings	SA–403	348H	S34809	...
	30	18Cr–10Ni–Cb	Bar	SA–479	348H	S34809	...
	31	18Cr–10Ni–Cb	Wld. pipe	SA–813	TP348H	S34809	...
	32	18Cr–10Ni–Cb	Wld. pipe	SA–814	TP348H	S34809	...
	33	18Cr–10Ni–Cb	Smls. tube	SA–213	TP347HFG	S34710	...
	34	18Cr–10Ni–Cb	Bolting	SA–193	B8C	S34700	2
	35	18Cr–10Ni–Cb	Bolting	SA–320	B8C	S34700	2
	36	18Cr–10Ni–Cb	Bolting	SA–193	B8C	S34700	2
	37	18Cr–10Ni–Cb	Bolting	SA–320	B8C	S34700	2
	38	18Cr–10Ni–Cb	Bolting	SA–193	B8C	S34700	2
	39	18Cr–10Ni–Cb	Bolting	SA–320	B8C	S34700	2
	40	18Cr–10Ni–Cb	Bolting	SA–193	B8C	S34700	2
	41	18Cr–10Ni–Cb	Bolting	SA–320	B8C	S34700	2
(**21**)	42	18Cr–10Ni–Ti	Smls. & wld. pipe	SA–312	TP321	S32100	...
(**21**)	43	18Cr–10Ni–Ti	Smls. pipe	SA–376	TP321	S32100	...
	44	18Cr–10Ni–Ti	Smls. & wld. pipe	SA–312	TP321H	S32109	...
	45	18Cr–10Ni–Ti	Smls. pipe	SA–376	TP321H	S32109	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Ferrous Materials (Cont'd)
1	...	75	30	...
2	...	75	30	...
3	...	75	30	...
4	...	75	30	...
5	...	75	30	...
6	...	75	30	...
7	...	75	30	...
8	...	75	30	...
9	...	75	30	...
10	≤5	75	30	...
11	...	75	30	...
12	...	75	30	...
13	...	75	30	...
14	...	75	30	...
15	...	75	30	...
16	...	75	30	...
17	...	75	30	...
18	...	75	30	...
19	...	75	30	...
20	...	75	30	...
21	...	75	30	...
22	...	75	30	...
23	...	75	30	...
24	≤5	75	30	...
25	...	75	30	...
26	...	75	30	...
27	...	75	30	...
28	...	75	30	...
29	...	75	30	...
30	...	75	30	...
31	...	75	30	...
32	...	75	30	...
33	...	80	30	...
34	$1\frac{1}{4} < t \le 1\frac{1}{2}$	100	50	...
35	$1\frac{1}{4} < t \le 1\frac{1}{2}$	100	50	...
36	$1 < t \le 1\frac{1}{4}$	105	65	...
37	$1 < t \le 1\frac{1}{4}$	105	65	...
38	$\frac{3}{4} < t \le 1$	115	80	...
39	$\frac{3}{4} < t \le 1$	115	80	...
40	$\le\frac{3}{4}$	125	100	...
41	$\le\frac{3}{4}$	125	100	...
42	$>\frac{3}{8}$	70	25	...
43	$>\frac{3}{8}$	70	25	...
44	$>\frac{3}{16}$	70	25	...
45	$>\frac{3}{8}$	70	25	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Ferrous Materials (Cont'd)								
1	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
2	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
3	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
4	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
5	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
6	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
7	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
8	30.0	...	26.5	...	24.0	...	21.9	...	20.4
9	30.0	...	26.5	...	24.0	...	21.9	...	20.4
10	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
11	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
12	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
13	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
14	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
15	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
16	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
17	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
18	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
19	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
20	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
21	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
22	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
23	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
24	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
25	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
26	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
27	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
28	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
29	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
30	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
31	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
32	30.0	28.6	27.6	26.6	25.7	...	24.0	...	22.6
33	30.0	...	27.1	...	25.3	...	23.9	...	22.8
34	50.0	...	46.0	...	42.8	...	40.0	...	37.7
35	50.0	...	46.0	...	42.8	...	40.0	...	37.7
36	65.0	...	59.8	...	55.7	...	52.0	...	49.0
37	65.0	...	59.8	...	55.7	...	52.0	...	49.0
38	80.0	...	73.6	...	68.5	...	64.0	...	60.3
39	80.0	...	73.6	...	68.5	...	64.0	...	60.3
40	100.0	...	92.0	...	85.7	...	80.0	...	75.3
41	100.0	...	92.0	...	85.7	...	80.0	...	75.3
42	25.0	23.4	22.5	21.5	20.7	...	19.2	...	17.9
43	25.0	23.4	22.5	21.5	20.7	...	19.2	...	17.9
44	25.0	23.4	22.5	21.5	20.7	...	19.2	...	17.9
45	25.0	23.4	22.5	21.5	20.7	...	19.2	...	17.9

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Ferrous Materials (Cont'd)
1	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
2	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
3	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
4	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
5	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
6	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
7	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
8	...	19.4	19.1	18.9	18.7	18.7	18.6	18.6	18.6	18.6
9	...	19.4	19.1	18.9	18.7	18.7	18.6	18.6	18.6	18.6
10	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
11	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
12	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
13	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
14	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
15	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
16	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
17	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
18	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
19	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
20	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
21	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
22	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
23	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
24	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
25	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
26	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
27	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
28	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
29	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
30	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
31	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
32	...	21.5	21.1	20.7	20.5	20.3	20.2	20.2	20.1	20.1
33	...	21.9	21.5	21.2	20.9	20.6	20.4	20.2	19.9	19.7
34	...	35.8	35.2	34.5	34.2	33.8	33.7	33.7	33.5	33.5
35	...	35.8	35.2	34.5	34.2	33.8	33.7	33.7	33.5	33.5
36	...	46.6	45.7	44.9	44.4	44.0	43.8	43.8	43.6	43.6
37	...	46.6	45.7	44.9	44.4	44.0	43.8	43.8	43.6	43.6
38	...	57.3	56.3	55.2	54.7	54.1	53.9	53.9	53.6	53.6
39	...	57.3	56.3	55.2	54.7	54.1	53.9	53.9	53.6	53.6
40	...	71.7	70.3	69.0	68.3	67.7	67.3	67.3	67.0	67.0
41	...	71.7	70.3	69.0	68.3	67.7	67.3	67.3	67.0	67.0
42	...	16.9	16.5	16.2	15.9	15.7	15.5	15.3	15.2	15.0
43	...	16.9	16.5	16.2	15.9	15.7	15.5	15.3	15.2	15.0
44	...	16.9	16.5	16.2	15.9	15.7	15.5	15.3	15.2	15.0
45	...	16.9	16.5	16.2	15.9	15.7	15.5	15.3	15.2	15.0

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Ferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	19.7	19.4	19.0	18.5	17.8	17.0	15.9	14.7	13.3	11.7	...	...	...	(**21**)
11	19.7	19.4	19.0	18.5	17.8	17.0	15.9	14.7	13.3	11.7	...	...	...	(**21**)
12	19.7	19.4	19.0	18.5	17.8	17.0	15.9	14.7	13.3	11.7	...	...	...	(**21**)
13	19.7	19.4	19.0	18.5	17.8	17.0	15.9	14.7	13.3	11.7	...	...	...	(**21**)
14	19.7	19.4	19.0	18.5	17.8	17.0	15.9	14.7	13.3	11.7	...	...	...	(**21**)
15	19.7	19.4	19.0	18.5	17.8	17.0	15.9	14.7	13.3	11.7	...	...	...	(**21**)
16	19.7	19.4	19.0	18.5	17.8	17.0	15.9	14.7	13.3	11.7	...	...	...	(**21**)
17	19.7	19.4	19.0	18.5	17.8	17.0	15.9	14.7	13.3	11.7	...	...	...	(**21**)
18	19.7	19.4	19.0	18.5	17.8	17.0	15.9	14.7	13.3	11.7	...	...	...	(**21**)
19	19.7	19.4	19.0	18.5	17.8	17.0	15.9	14.7	13.3	11.7	...	...	...	(**21**)
20	19.7	19.4	19.0	18.5	17.8	17.0	15.9	14.7	13.3	11.7	...	...	...	(**21**)
21	19.7	19.4	19.0	18.5	17.8	17.0	15.9	14.7	13.3	11.7	...	...	...	(**21**)
22	19.7	19.4	19.0	18.5	17.8	17.0	15.9	14.7	13.3	11.7	...	...	...	(**21**)
23	19.7	19.4	19.0	18.5	17.8	17.0	15.9	14.7	13.3	11.7	...	...	...	(**21**)
24	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	14.8	14.6	14.2	13.9	13.5	13.0	12.5	11.9	11.2	10.4	...	...	...	(**21**)
43	14.8	14.6	14.2	13.9	13.5	13.0	12.5	11.9	11.2	10.4	...	...	...	(**21**)
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
		Ferrous Materials (Cont'd)					
(**21**)	1	18Cr–10Ni–Ti	Forgings	SA–182	F321	S32100	...
(**21**)	2	18Cr–10Ni–Ti	Forgings	SA–965	F321	S32100	...
	3	18Cr–10Ni–Ti	Forgings	SA–182	F321H	S32109	...
	4	18Cr–10Ni–Ti	Forgings	SA–965	F321H	S32109	...
	5	18Cr–10Ni–Ti	Plate	SA/EN 10028–7	X6CrNiTi18–10	...	...
(**21**)	6	18Cr–10Ni–Ti	Forgings	SA–182	F321	S32100	...
(**21**)	7	18Cr–10Ni–Ti	Bolting	SA–193	B8T	S32100	1
(**21**)	8	18Cr–10Ni–Ti	Smls. tube	SA–213	TP321	S32100	...
(**21**)	9	18Cr–10Ni–Ti	Plate	SA–240	321	S32100	...
(**21**)	10	18Cr–10Ni–Ti	Wld. tube	SA–249	TP321	S32100	...
(**21**)	11	18Cr–10Ni–Ti	Smls. & wld. pipe	SA–312	TP321	S32100	...
(**21**)	12	18Cr–10Ni–Ti	Bolting	SA–320	B8T	S32100	1
(**21**)	13	18Cr–10Ni–Ti	Bolting	SA–320	B8TA	S32100	1A
(**21**)	14	18Cr–10Ni–Ti	Wld. pipe	SA–358	321	S32100	1
(**21**)	15	18Cr–10Ni–Ti	Wld. pipe	SA–358	321	S32100	3
(**21**)	16	18Cr–10Ni–Ti	Wld. pipe	SA–358	321	S32100	4
(**21**)	17	18Cr–10Ni–Ti	Smls. pipe	SA–376	TP321	S32100	...
(**21**)	18	18Cr–10Ni–Ti	Smls. & wld. fittings	SA–403	321	S32100	...
(**21**)	19	18Cr–10Ni–Ti	Wld. pipe	SA–409	TP321	S32100	...
(**21**)	20	18Cr–10Ni–Ti	Bar	SA–479	321	S32100	...
(**21**)	21	18Cr–10Ni–Ti	Wld. pipe	SA–813	TP321	S32100	...
(**21**)	22	18Cr–10Ni–Ti	Wld. pipe	SA–814	TP321	S32100	...
	23	18Cr–10Ni–Ti	Bar	SA/JIS G4303	SUS321	...	...
	24	18Cr–10Ni–Ti	Forgings	SA–182	F321H	S32109	...
	25	18Cr–10Ni–Ti	Smls. tube	SA–213	TP321H	S32109	...
	26	18Cr–10Ni–Ti	Plate	SA–240	321H	S32109	...
	27	18Cr–10Ni–Ti	Wld. tube	SA–249	TP321H	S32109	...
	28	18Cr–10Ni–Ti	Smls. & wld. pipe	SA–312	TP321H	S32109	...
	29	18Cr–10Ni–Ti	Smls. pipe	SA–376	TP321H	S32109	...
	30	18Cr–10Ni–Ti	Smls. & wld. fittings	SA–403	321H	S32109	...
	31	18Cr–10Ni–Ti	Bar	SA–479	321H	S32109	...
	32	18Cr–10Ni–Ti	Wld. pipe	SA–813	TP321H	S32109	...
	33	18Cr–10Ni–Ti	Wld. pipe	SA–814	TP321H	S32109	...
	34	18Cr–10Ni–Ti	Bolting	SA–193	B8T	S32100	2
	35	18Cr–10Ni–Ti	Bolting	SA–320	B8T	S32100	2
	36	18Cr–10Ni–Ti	Bolting	SA–193	B8T	S32100	2
	37	18Cr–10Ni–Ti	Bolting	SA–320	B8T	S32100	2
	38	18Cr–10Ni–Ti	Bolting	SA–193	B8T	S32100	2
	39	18Cr–10Ni–Ti	Bolting	SA–320	B8T	S32100	2
	40	18Cr–10Ni–Ti	Bolting	SA–193	B8T	S32100	2
	41	18Cr–10Ni–Ti	Bolting	SA–320	B8T	S32100	2
	42	18Cr–11Ni	Bolting	SA–193	B8P	S30500	1
	43	18Cr–11Ni	Plate	SA–240	305	S30500	...
	44	18Cr–11Ni	Bolting	SA–193	B8P	S30500	2
	45	18Cr–11Ni	Bolting	SA–193	B8P	S30500	2

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Ferrous Materials (Cont'd)
1	>5	70	30	...
2	...	70	30	...
3	>5	70	30	...
4	...	70	30	...
5	≤3	73	29	...
6	≤5	75	30	...
7	...	75	30	...
8	...	75	30	...
9	...	75	30	...
10	...	75	30	...
11	≤3/8	75	30	...
12	...	75	30	...
13	...	75	30	...
14	...	75	30	...
15	...	75	30	...
16	...	75	30	...
17	≤3/8	75	30	...
18	...	75	30	...
19	...	75	30	...
20	...	75	30	...
21	...	75	30	...
22	...	75	30	...
23	...	75	30	...
24	≤5	75	30	...
25	...	75	30	...
26	...	75	30	...
27	...	75	30	...
28	≤3/16	75	30	...
29	≤3/8	75	30	...
30	...	75	30	...
31	...	75	30	...
32	...	75	30	...
33	...	75	30	...
34	$1\frac{1}{4} < t \le 1\frac{1}{2}$	100	50	...
35	$1\frac{1}{4} < t \le 1\frac{1}{2}$	100	50	...
36	$1 < t \le 1\frac{1}{4}$	105	65	...
37	$1 < t \le 1\frac{1}{4}$	105	65	...
38	$\frac{3}{4} < t \le 1$	115	80	...
39	$\frac{3}{4} < t \le 1$	115	80	...
40	≤3/4	125	100	...
41	≤3/4	125	100	...
42	...	75	30	...
43	...	75	30	...
44	$1\frac{1}{4} < t \le 1\frac{1}{2}$	100	50	...
45	$1 < t \le 1\frac{1}{4}$	105	65	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Ferrous Materials (Cont'd)								
1	30.0	28.1	27.0	25.8	24.8	...	23.0	...	21.5
2	30.0	28.1	27.0	25.8	24.8	...	23.0	...	21.5
3	30.0	28.1	27.0	25.8	24.8	...	23.0	...	21.5
4	30.0	28.1	27.0	25.8	24.8	...	23.0	...	21.5
5	29.0	27.2	26.1	25.0	24.0	...	22.2	...	20.8
6	30.0	28.1	27.0	25.8	24.8	...	23.0	...	21.5
7	30.0	...	27.0	...	24.8	...	23.0	...	21.5
8	30.0	28.1	27.0	25.8	24.8	...	23.0	...	21.5
9	30.0	28.1	27.0	25.8	24.8	...	23.0	...	21.5
10	30.0	28.1	27.0	25.8	24.8	...	23.0	...	21.5
11	30.0	28.1	27.0	25.8	24.8	...	23.0	...	21.5
12	30.0	...	27.0	...	24.8	...	23.0	...	21.5
13	30.0	...	27.0	...	24.8	...	23.0	...	21.5
14	30.0	28.1	27.0	25.8	24.8	...	23.0	...	21.5
15	30.0	28.1	27.0	25.8	24.8	...	23.0	...	21.5
16	30.0	28.1	27.0	25.8	24.8	...	23.0	...	21.5
17	30.0	28.1	27.0	25.8	24.8	...	23.0	...	21.5
18	30.0	28.1	27.0	25.8	24.8	...	23.0	...	21.5
19	30.0	28.1	27.0	25.8	24.8	...	23.0	...	21.5
20	30.0	28.1	27.0	25.8	24.8	...	23.0	...	21.5
21	30.0	28.1	27.0	25.8	24.8	...	23.0	...	21.5
22	30.0	28.1	27.0	25.8	24.8	...	23.0	...	21.5
23	30.0	28.1	27.0	25.8	24.8	...	23.0	...	21.5
24	30.0	28.1	27.0	25.8	24.8	...	23.0	...	21.5
25	30.0	28.1	27.0	25.8	24.8	...	23.0	...	21.5
26	30.0	28.1	27.0	25.8	24.8	...	23.0	...	21.5
27	30.0	28.1	27.0	25.8	24.8	...	23.0	...	21.5
28	30.0	28.1	27.0	25.8	24.8	...	23.0	...	21.5
29	30.0	28.1	27.0	25.8	24.8	...	23.0	...	21.5
30	30.0	28.1	27.0	25.8	24.8	...	23.0	...	21.5
31	30.0	28.1	27.0	25.8	24.8	...	23.0	...	21.5
32	30.0	28.1	27.0	25.8	24.8	...	23.0	...	21.5
33	30.0	28.1	27.0	25.8	24.8	...	23.0	...	21.5
34	50.0	...	45.0	...	41.3	...	38.3	...	35.8
35	50.0	...	45.0	...	41.3	...	38.3	...	35.8
36	65.0	...	58.5	...	53.7	...	49.8	...	46.6
37	65.0	...	58.5	...	53.7	...	49.8	...	46.6
38	80.0	...	72.0	...	66.1	...	61.3	...	57.3
39	80.0	...	72.0	...	66.1	...	61.3	...	57.3
40	100.0	...	90.0	...	82.7	...	76.7	...	71.7
41	100.0	...	90.0	...	82.7	...	76.7	...	71.7
42	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
43	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
44	50.0	44.5	41.7	39.3	37.3	...	34.5	...	32.3
45	65.0	57.9	54.2	51.1	48.5	...	44.9	...	42.0

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Ferrous Materials (Cont'd)
1	...	20.3	19.8	19.4	19.1	18.8	18.6	18.4	18.2	18.0
2	...	20.3	19.8	19.4	19.1	18.8	18.6	18.4	18.2	18.0
3	...	20.3	19.8	19.4	19.1	18.8	18.6	18.4	18.2	18.0
4	...	20.3	19.8	19.4	19.1	18.8	18.6	18.4	18.2	18.0
5	...	19.6	19.2	18.8	18.5	18.2	18.0	17.8	17.6	17.4
6	...	20.3	19.8	19.4	19.1	18.8	18.6	18.4	18.2	18.0
7	...	20.3	19.8	19.4	19.1	18.8	18.6	18.4	18.2	18.0
8	...	20.3	19.8	19.4	19.1	18.8	18.6	18.4	18.2	18.0
9	...	20.3	19.8	19.4	19.1	18.8	18.6	18.4	18.2	18.0
10	...	20.3	19.8	19.4	19.1	18.8	18.6	18.4	18.2	18.0
11	...	20.3	19.8	19.4	19.1	18.8	18.6	18.4	18.2	18.0
12	...	20.3	19.8	19.4	19.1	18.8	18.6	18.4	18.2	18.0
13	...	20.3	19.8	19.4	19.1	18.8	18.6	18.4	18.2	18.0
14	...	20.3	19.8	19.4	19.1	18.8	18.6	18.4	18.2	18.0
15	...	20.3	19.8	19.4	19.1	18.8	18.6	18.4	18.2	18.0
16	...	20.3	19.8	19.4	19.1	18.8	18.6	18.4	18.2	18.0
17	...	20.3	19.8	19.4	19.1	18.8	18.6	18.4	18.2	18.0
18	...	20.3	19.8	19.4	19.1	18.8	18.6	18.4	18.2	18.0
19	...	20.3	19.8	19.4	19.1	18.8	18.6	18.4	18.2	18.0
20	...	20.3	19.8	19.4	19.1	18.8	18.6	18.4	18.2	18.0
21	...	20.3	19.8	19.4	19.1	18.8	18.6	18.4	18.2	18.0
22	...	20.3	19.8	19.4	19.1	18.8	18.6	18.4	18.2	18.0
23	...	20.3	19.8	19.4	19.1	18.8	18.6	18.4	18.2	18.0
24	...	20.3	19.8	19.4	19.1	18.8	18.6	18.4	18.2	18.0
25	...	20.3	19.8	19.4	19.1	18.8	18.6	18.4	18.2	18.0
26	...	20.3	19.8	19.4	19.1	18.8	18.6	18.4	18.2	18.0
27	...	20.3	19.8	19.4	19.1	18.8	18.6	18.4	18.2	18.0
28	...	20.3	19.8	19.4	19.1	18.8	18.6	18.4	18.2	18.0
29	...	20.3	19.8	19.4	19.1	18.8	18.6	18.4	18.2	18.0
30	...	20.3	19.8	19.4	19.1	18.8	18.6	18.4	18.2	18.0
31	...	20.3	19.8	19.4	19.1	18.8	18.6	18.4	18.2	18.0
32	...	20.3	19.8	19.4	19.1	18.8	18.6	18.4	18.2	18.0
33	...	20.3	19.8	19.4	19.1	18.8	18.6	18.4	18.2	18.0
34	...	33.8	33.0	32.3	31.8	31.3	31.0	30.7	30.3	30.0
35	...	33.8	33.0	32.3	31.8	31.3	31.0	30.7	30.3	30.0
36	...	44.0	42.9	42.0	41.4	40.7	40.3	39.9	39.4	39.0
37	...	44.0	42.9	42.0	41.4	40.7	40.3	39.9	39.4	39.0
38	...	54.1	52.8	51.7	50.9	50.1	49.6	49.1	48.5	48.0
39	...	54.1	52.8	51.7	50.9	50.1	49.6	49.1	48.5	48.0
40	...	67.7	66.0	64.7	63.7	62.7	62.0	61.3	60.7	60.0
41	...	67.7	66.0	64.7	63.7	62.7	62.0	61.3	60.7	60.0
42	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
43	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
44	...	30.7	30.0	29.3	28.7	28.2	27.5	27.0	26.5	25.8
45	...	39.9	39.0	38.1	37.3	36.6	35.8	35.1	34.5	33.6

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Ferrous Materials (Cont'd)													
1	17.8	17.5	17.1	16.7	16.2	15.6	15.0	14.3	13.4	12.5	...	...	...	(**21**)
2	17.8	17.5	17.1	16.7	16.2	15.6	15.0	14.3	13.4	12.5	...	...	...	(**21**)
3	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	17.8	17.5	17.1	16.7	16.2	15.6	15.0	14.3	13.4	12.5	...	...	...	(**21**)
7	17.8	17.5	17.1	16.7	16.2	15.6	15.0	14.3	13.4	12.5	...	...	...	(**21**)
8	17.8	17.5	17.1	16.7	16.2	15.6	15.0	14.3	13.4	12.5	...	...	...	(**21**)
9	17.8	17.5	17.1	16.7	16.2	15.6	15.0	14.3	13.4	12.5	...	...	...	(**21**)
10	17.8	17.5	17.1	16.7	16.2	15.6	15.0	14.3	13.4	12.5	...	...	...	(**21**)
11	17.8	17.5	17.1	16.7	16.2	15.6	15.0	14.3	13.4	12.5	...	...	...	(**21**)
12	17.8	17.5	17.1	16.7	16.2	15.6	15.0	14.3	13.4	12.5	...	...	...	(**21**)
13	17.8	17.5	17.1	16.7	16.2	15.6	15.0	14.3	13.4	12.5	...	...	...	(**21**)
14	17.8	17.5	17.1	16.7	16.2	15.6	15.0	14.3	13.4	12.5	...	...	...	(**21**)
15	17.8	17.5	17.1	16.7	16.2	15.6	15.0	14.3	13.4	12.5	...	...	...	(**21**)
16	17.8	17.5	17.1	16.7	16.2	15.6	15.0	14.3	13.4	12.5	...	...	...	(**21**)
17	17.8	17.5	17.1	16.7	16.2	15.6	15.0	14.3	13.4	12.5	...	...	...	(**21**)
18	17.8	17.5	17.1	16.7	16.2	15.6	15.0	14.3	13.4	12.5	...	...	...	(**21**)
19	17.8	17.5	17.1	16.7	16.2	15.6	15.0	14.3	13.4	12.5	...	...	...	(**21**)
20	17.8	17.5	17.1	16.7	16.2	15.6	15.0	14.3	13.4	12.5	...	...	...	(**21**)
21	17.8	17.5	17.1	16.7	16.2	15.6	15.0	14.3	13.4	12.5	...	...	...	(**21**)
22	17.8	17.5	17.1	16.7	16.2	15.6	15.0	14.3	13.4	12.5	...	...	...	(**21**)
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
		Ferrous Materials (Cont'd)					
	1	18Cr–11Ni	Bolting	SA–193	B8P	S30500	2
	2	18Cr–11Ni	Bolting	SA–193	B8P	S30500	2
(**21**)	3	18Cr–13Ni–3Mo	Forgings	SA–182	F317L	S31703	...
(**21**)	4	18Cr–13Ni–3Mo	Forgings	SA–182	F317L	S31703	...
(**21**)	5	18Cr–13Ni–3Mo	Forgings	SA–182	F317	S31700	...
(**21**)	6	18Cr–13Ni–3Mo	Plate	SA–240	317	S31700	...
(**21**)	7	18Cr–13Ni–3Mo	Plate	SA–240	317L	S31703	...
(**21**)	8	18Cr–13Ni–3Mo	Wld. tube	SA–249	TP317	S31700	...
(**21**)	9	18Cr–13Ni–3Mo	Wld. tube	SA–249	TP317L	S31703	...
(**21**)	10	18Cr–13Ni–3Mo	Smls. & wld. pipe	SA–312	TP317	S31700	...
(**21**)	11	18Cr–13Ni–3Mo	Smls. & wld. pipe	SA–312	TP317L	S31703	...
(**21**)	12	18Cr–13Ni–3Mo	Smls. & wld. fittings	SA–403	317	S31700	...
(**21**)	13	18Cr–13Ni–3Mo	Fittings	SA–403	317L	S31703	...
	14	18Cr–15Ni–4Si	Forgings	SA–182	...	S30600	Solution ann.
	15	18Cr–15Ni–4Si	Plate	SA–240	...	S30600	Solution ann.
	16	18Cr–15Ni–4Si	Smls. & wld. pipe	SA–312	...	S30600	Solution ann.
	17	18Cr–15Ni–4Si	Bar	SA–479	...	S30600	Solution ann.
	18	18Cr–18Ni–2Si	Smls. tube	SA–213	XM–15	S38100	...
	19	18Cr–18Ni–2Si	Plate	SA–240	XM–15	S38100	...
	20	18Cr–18Ni–2Si	Wld. tube	SA–249	TPXM–15	S38100	...
	21	18Cr–18Ni–2Si	Wld. pipe	SA–312	TPXM–15	S38100	...
	22	18Cr–20Ni–5.5Si	Smls. tube	SA–213	...	S32615	Solution ann.
	23	18Cr–20Ni–5.5Si	Plate	SA–240	...	S32615	Solution ann.
	24	18Cr–20Ni–5.5Si	Smls. & wld. pipe	SA–312	...	S32615	Solution ann.
	25	18Cr–20Ni–5.5Si	Bar	SA–479	...	S32615	Solution ann.
	26	19Cr–9Ni–½Mo	Castings	SA–351	CF10	J92590	...
	27	19Cr–9Ni–Mo–W	Bolting	SA–453	651	S63198	B
	28	19Cr–9Ni–Mo–W	Bolting	SA–453	651	S63198	B
	29	19Cr–9Ni–Mo–W	Bolting	SA–453	651	S63198	A
	30	19Cr–9Ni–Mo–W	Bolting	SA–453	651	S63198	A
	31	19Cr–9Ni–2Mo	Castings	SA–351	CF10M	...	...
	32	19Cr–10Ni–3Mo	Castings	SA–351	CG8M	J93000	...
	33	19Cr–15Ni–4Mo	Smls. tube	SA–213	...	S31725	...
	34	19Cr–15Ni–4Mo	Plate	SA–240	...	S31725	...
	35	19Cr–15Ni–4Mo	Wld. tube	SA–249	...	S31725	...
	36	19Cr–15Ni–4Mo	Smls. & wld. pipe	SA–312	...	S31725	...
	37	19Cr–15Ni–4Mo	Wld. pipe	SA–358	...	S31725	...
	38	19Cr–15Ni–4Mo	Smls. pipe	SA–376	...	S31725	...
	39	19Cr–15Ni–4Mo	Wld. pipe	SA–409	...	S31725	...
	40	19Cr–15Ni–4Mo	Bar	SA–479	...	S31725	...
	41	20Cr–3Ni–1.5Mo–N	Plate	SA–240	...	S32003	...
	42	20Cr–3Ni–1.5Mo–N	Wld. pipe	SA–790	...	S32003	...
	43	20Cr–3Ni–1.5Mo–N	Sheet	SA–240	...	S32003	...
	44	20Cr–3Ni–1.5Mo–N	Smls. & wld. tube	SA–789	...	S32003	...
	45	20Cr–10Ni	Bar	SA–479	ER308	S30880	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Ferrous Materials (Cont'd)
1	$^3/_4 < t \leq 1$	115	80	...
2	$\leq ^3/_4$	125	100	...
3	>5	65	25	...
4	≤5	70	25	...
5	≤5	75	30	...
6	...	75	30	...
7	...	75	30	...
8	...	75	30	...
9	...	75	30	...
10	...	75	30	...
11	...	75	30	...
12	...	75	30	...
13	...	75	30	...
14	...	78	35	...
15	≤2	78	35	...
16	...	78	35	...
17	≤4	78	35	...
18	...	75	30	...
19	...	75	30	...
20	...	75	30	...
21	...	75	30	...
22	...	80	32	...
23	...	80	32	...
24	...	80	32	...
25	...	80	32	...
26	...	70	30	...
27	>3	95	50	...
28	≤3	95	60	...
29	>3	100	60	...
30	≤3	100	70	...
31	...	70	30	...
32	...	75	35	...
33	...	75	30	...
34	...	75	30	...
35	...	75	30	...
36	...	75	30	...
37	...	75	30	...
38	...	75	30	...
39	...	75	30	...
40	...	75	30	...
41	$> ^3/_{16}$	95	65	...
42	...	95	65	...
43	$\leq ^3/_{16}$	100	70	...
44	...	100	70	...
45	...	75	30	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Ferrous Materials (Cont'd)								
1	80.0	71.2	66.7	62.9	59.7	...	55.2	...	51.7
2	100.0	89.0	83.3	78.7	74.7	...	69.0	...	64.7
3	25.0	22.7	21.3	20.1	19.0	...	17.5	...	16.4
4	25.0	22.7	21.3	20.1	19.0	...	17.5	...	16.4
5	30.0	27.4	25.9	24.6	23.4	...	21.4	...	20.0
6	30.0	27.4	25.9	24.6	23.4	...	21.4	...	20.0
7	30.0	27.3	25.5	24.1	22.8	...	21.0	...	19.7
8	30.0	27.4	25.9	24.6	23.4	...	21.4	...	20.0
9	30.0	27.3	25.5	24.1	22.8	...	21.0	...	19.7
10	30.0	27.4	25.9	24.6	23.4	...	21.4	...	20.0
11	30.0	27.3	25.5	24.1	22.8	...	21.0	...	19.7
12	30.0	27.4	25.9	24.6	23.4	...	21.4	...	20.0
13	30.0	27.3	25.5	24.1	22.8	...	21.0	...	19.7
14	35.0	...	26.9	...	24.2	...	...	...	...
15	35.0	...	26.9	...	24.2	...	...	...	...
16	35.0	...	26.9	...	24.2	...	...	...	...
17	35.0	...	26.9	...	24.2	...	...	...	...
18	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
19	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
20	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
21	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4
22	32.0	...	26.4	...	24.8	...	23.1	...	...
23	32.0	...	26.4	...	24.8	...	23.1	...	...
24	32.0	...	26.4	...	24.8	...	23.1	...	...
25	32.0	...	26.4	...	24.8	...	23.1	...	...
26	30.0	26.7	25.0	23.6	22.4	...	20.6	...	19.3
27	50.0	...	46.4	...	44.3	...	42.5	...	41.1
28	60.0	...	55.7	...	53.1	...	51.1	...	49.4
29	60.0	...	55.7	...	53.1	...	51.1	...	49.4
30	70.0	...	65.0	...	62.0	...	59.6	...	57.6
31	30.0	27.7	26.2	24.8	23.5	...	21.4	...	19.9
32	35.0	30.5	28.1	26.2	24.5	...	22.1	...	20.5
33	30.0	27.0	25.3	24.0	22.8	...	21.0	...	19.7
34	30.0	27.0	25.3	24.0	22.8	...	21.0	...	19.7
35	30.0	27.0	25.3	24.0	22.8	...	21.0	...	19.7
36	30.0	27.0	25.3	24.0	22.8	...	21.0	...	19.7
37	30.0	27.0	25.3	24.0	22.8	...	21.0	...	19.7
38	30.0	27.0	25.3	24.0	22.8	...	21.0	...	19.7
39	30.0	27.0	25.3	24.0	22.8	...	21.0	...	19.7
40	30.0	27.0	25.3	24.0	22.8	...	21.0	...	19.7
41	65.0	...	55.8	...	50.6	...	47.6	...	46.0
42	65.0	...	55.8	...	50.6	...	47.6	...	46.0
43	70.0	...	60.1	...	54.5	...	51.3	...	49.5
44	70.0	...	60.1	...	54.5	...	51.3	...	49.5
45	30.0	26.7	25.0	23.6	22.4	...	20.7	...	19.4

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Ferrous Materials (Cont'd)
1	...	49.1	48.0	46.9	45.9	45.1	44.0	43.2	42.4	41.3
2	...	61.3	60.0	58.7	57.3	56.3	55.0	54.0	53.0	51.7
3	...	15.6	15.3	15.0	14.7	14.4	14.1	13.8	13.5	13.2
4	...	15.6	15.3	15.0	14.7	14.4	14.1	13.8	13.5	13.2
5	...	18.9	18.5	18.2	17.9	17.7	17.5	17.3	17.1	17.0
6	...	18.9	18.5	18.2	17.9	17.7	17.5	17.3	17.1	17.0
7	...	18.7	18.3	18.0	17.6	17.2	16.9	16.5	16.1	15.8
8	...	18.9	18.5	18.2	17.9	17.7	17.5	17.3	17.1	17.0
9	...	18.7	18.3	18.0	17.6	17.2	16.9	16.5	16.1	15.8
10	...	18.9	18.5	18.2	17.9	17.7	17.5	17.3	17.1	17.0
11	...	18.7	18.3	18.0	17.6	17.2	16.9	16.5	16.1	15.8
12	...	18.9	18.5	18.2	17.9	17.7	17.5	17.3	17.1	17.0
13	...	18.7	18.3	18.0	17.6	17.2	16.9	16.5	16.1	15.8
14	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...
18	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
19	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
20	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
21	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5
22	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...
26	...	18.4	17.9	17.6	17.2	16.9	16.6	16.3	15.9	15.6
27	...	39.9	39.4	38.9	38.3	37.8	37.3	36.7	36.0	35.4
28	...	47.9	47.3	46.6	46.0	45.4	44.7	44.0	43.3	42.4
29	...	47.9	47.3	46.6	46.0	45.4	44.7	44.0	43.3	42.4
30	...	55.9	55.1	54.4	53.7	52.9	52.2	51.3	50.5	49.5
31	...	18.8	18.5	18.1	17.9	17.6	17.4	17.2	17.0	16.9
32	...	19.4	19.0	18.7	18.4	18.2	18.0	17.7	17.4	17.0
33	...	18.7	18.3	18.0	17.6	17.3	16.9	16.6	16.2	15.9
34	...	18.7	18.3	18.0	17.6	17.3	16.9	16.6	16.2	15.9
35	...	18.7	18.3	18.0	17.6	17.3	16.9	16.6	16.2	15.9
36	...	18.7	18.3	18.0	17.6	17.3	16.9	16.6	16.2	15.9
37	...	18.7	18.3	18.0	17.6	17.3	16.9	16.6	16.2	15.9
38	...	18.7	18.3	18.0	17.6	17.3	16.9	16.6	16.2	15.9
39	...	18.7	18.3	18.0	17.6	17.3	16.9	16.6	16.2	15.9
40	...	18.7	18.3	18.0	17.6	17.3	16.9	16.6	16.2	15.9
41	...	44.6	43.6	42.6	41.6	40.9	40.9	...	...	...
42	...	44.6	43.6	42.6	41.6	40.9	40.9	...	...	...
43	...	48.0	47.0	45.9	44.8	44.0	44.0	...	...	...
44	...	48.0	47.0	45.9	44.8	44.0	44.0	...	...	...
45	...	18.4	18.0	17.6	17.2	16.9	16.5	16.2	15.9	15.5

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Ferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	13.1	13.0	12.8	12.5	...	...	...	...	...	...	...	...	...	(**21**)
4	13.1	13.0	12.8	12.5	...	...	...	...	...	...	...	...	...	(**21**)
5	16.5	16.3	16.1	15.9	15.7	15.5	15.3	15.0	14.6	14.3	...	...	...	(**21**)
6	16.5	16.3	16.1	15.9	15.7	15.5	15.3	15.0	14.6	14.3	...	...	...	(**21**)
7	15.7	15.6	15.3	15.1	...	...	...	...	...	...	...	...	...	(**21**)
8	16.5	16.3	16.1	15.9	15.7	15.5	15.3	15.0	14.6	14.3	...	...	...	(**21**)
9	15.7	15.6	15.3	15.1	...	...	...	...	...	...	...	...	...	(**21**)
10	16.5	16.3	16.1	15.9	15.7	15.5	15.3	15.0	14.6	14.3	...	...	...	(**21**)
11	15.7	15.6	15.3	15.1	...	...	...	...	...	...	...	...	...	(**21**)
12	16.5	16.3	16.1	15.9	15.7	15.5	15.3	15.0	14.6	14.3	...	...	...	(**21**)
13	15.7	15.6	15.3	15.1	...	...	...	...	...	...	...	...	...	(**21**)
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
	Ferrous Materials (Cont'd)					
1	20Cr–18Ni–6Mo	Castings	SA–351	CK3MCuN	J93254	...
2	20Cr–18Ni–6Mo	Forgings	SA–182	F44	S31254	...
3	20Cr–18Ni–6Mo	Smls. tube	SA–213	...	S31254	...
4	20Cr–18Ni–6Mo	Wld. tube	SA–249	...	S31254	...
5	20Cr–18Ni–6Mo	Smls. & wld. pipe	SA–312	...	S31254	...
6	20Cr–18Ni–6Mo	Wld. pipe	SA–358	...	S31254	...
7	20Cr–18Ni–6Mo	Smls. tube	SA–213	...	S31254	...
8	20Cr–18Ni–6Mo	Wld. tube	SA–249	...	S31254	...
9	20Cr–18Ni–6Mo	Smls. & wld. pipe	SA–312	...	S31254	...
10	20Cr–18Ni–6Mo	Plate	SA–240	...	S31254	...
11	20Cr–18Ni–6Mo	Wld. pipe	SA–358	...	S31254	...
12	21Cr–5Mn–1.5Ni–Cu–N	Plate	SA–240	...	S32101	...
13	21Cr–5Mn–1.5Ni–Cu–N	Bar	SA–479	...	S32101	...
14	21Cr–5Mn–1.5Ni–Cu–N	Smls. & wld. tube	SA–789	...	S32101	...
15	21Cr–5Mn–1.5Ni–Cu–N	Smls. & wld. pipe	SA–790	...	S32101	...
16	21Cr–5Mn–1.5Ni–Cu–N	Fittings	SA–815	...	S32101	...
17	21Cr–5Mn–1.5Ni–Cu–N	Sheet, strip	SA–240	...	S32101	...
18	21Cr–5Mn–1.5Ni–Cu–N	Smls. & wld. tube	SA–789	...	S32101	...
19	21Cr–5Mn–1.5Ni–Cu–N	Smls. & wld. pipe	SA–790	...	S32101	...
20	21Cr–6Ni–9Mn	Forgings	SA–182	FXM–11	S21904	...
21	21Cr–6Ni–9Mn	Smls. & wld. pipe	SA–312	TPXM–11	S21904	...
22	21Cr–6Ni–9Mn	Plate	SA–666	XM–11	S21904	...
23	21Cr–6Ni–9Mn	Forgings	SA–965	FXM–11	S21904	...
24	21Cr–11Ni–N	Forgings	SA–182	F45	S30815	...
25	21Cr–11Ni–N	Smls. tube	SA–213	...	S30815	...
26	21Cr–11Ni–N	Plate	SA–240	...	S30815	...
27	21Cr–11Ni–N	Wld. tube	SA–249	...	S30815	...
28	21Cr–11Ni–N	Smls. & wld. pipe	SA–312	...	S30815	...
29	21Cr–11Ni–N	Bar	SA–479	...	S30815	...
30	22Cr–2Ni–Mo–N	Forgings	SA–182	F66	S32202	...
31	22Cr–2Ni–Mo–N	Plate	SA–240	...	S32202	...
32	22Cr–2Ni–Mo–N	Bar	SA–479	...	S32202	...
33	22Cr–2Ni–Mo–N	Smls. & wld. tube	SA–789	...	S32202	...
34	22Cr–2Ni–Mo–N	Smls. & wld. pipe	SA–790	...	S32202	...
35	22Cr–2Ni–Mo–N	Smls. & wld. fittings	SA–815	...	S32202	...
36	22Cr–5Ni–3Mo–N	Castings	SA–995	4A	J92205	...
37	22Cr–5Ni–3Mo–N	Forgings	SA–182	F51	S31803	...
38	22Cr–5Ni–3Mo–N	Plate	SA–240	...	S31803	...
39	22Cr–5Ni–3Mo–N	Bar	SA–479	...	S31803	...
40	22Cr–5Ni–3Mo–N	Smls. & wld. tube	SA–789	...	S31803	...
41	22Cr–5Ni–3Mo–N	Smls. & wld. pipe	SA–790	...	S31803	...
42	22Cr–5Ni–3Mo–N	Smls. & wld. fittings	SA–815	...	S31803	...
43	22Cr–5Ni–3Mo–N	Plate	SA–240	...	S32205	...
44	22Cr–5Ni–3Mo–N	Bar	SA–479	...	S32205	...
45	22Cr–5Ni–3Mo–N	Smls. & wld. pipe	SA–790	...	S32205	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Ferrous Materials (Cont'd)
1	...	80	38	...
2	...	94	44	...
3	$t > 0.187$	95	45	...
4	$t > 0.187$	95	45	...
5	$t > 0.187$	95	45	...
6	$t \geq 0.187$	95	45	...
7	$t \leq 0.187$	98	45	...
8	$t \leq 0.187$	98	45	...
9	$t \leq 0.187$	98	45	...
10	$t \leq 0.187$	100	45	...
11	$t < 0.187$	100	45	...
12	$>3/16$	94	65	...
13	...	94	65	...
14	$>3/16$	94	65	...
15	$>3/16$	94	65	...
16	...	94	65	...
17	$\leq 3/16$	101	77	...
18	$\leq 3/16$	101	77	...
19	$\leq 3/16$	101	77	...
20	...	90	50	...
21	...	90	50	...
22	...	90	50	...
23	...	90	50	...
24	...	87	45	...
25	...	87	45	...
26	...	87	45	...
27	...	87	45	...
28	...	87	45	...
29	...	87	45	...
30	...	94	65	...
31	...	94	65	...
32	...	94	65	...
33	...	94	65	...
34	...	94	65	...
35	...	94	65	...
36	...	90	60	...
37	...	90	65	...
38	...	90	65	...
39	...	90	65	...
40	...	90	65	...
41	...	90	65	...
42	...	90	65	...
43	...	95	65	...
44	...	95	65	...
45	...	95	65	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Ferrous Materials (Cont'd)								
1	38.0	33.3	31.0	29.2	27.8	...	25.6	...	24.2
2	44.0	38.5	35.9	33.8	32.1	...	29.7	...	28.0
3	45.0	39.4	36.7	34.6	32.8	...	30.4	...	28.6
4	45.0	39.4	36.7	34.6	32.8	...	30.4	...	28.6
5	45.0	39.4	36.7	34.6	32.8	...	30.4	...	28.6
6	45.0	39.4	36.7	34.6	32.9	...	30.4	...	28.6
7	45.0	39.4	36.7	34.6	32.8	...	30.4	...	28.6
8	45.0	39.4	36.7	34.6	32.8	...	30.4	...	28.6
9	45.0	39.4	36.7	34.6	32.8	...	30.4	...	28.6
10	45.0	39.4	36.7	34.6	32.9	...	30.4	...	28.6
11	45.0	39.4	36.7	34.6	32.9	...	30.4	...	28.6
12	65.0	...	57.6	...	51.4	...	49.4	...	48.4
13	65.0	...	57.6	...	51.4	...	49.4	...	48.4
14	65.0	...	57.6	...	51.4	...	49.4	...	48.4
15	65.0	...	57.6	...	51.4	...	49.4	...	48.4
16	65.0	...	57.6	...	51.4	...	49.4	...	48.4
17	77.0	...	68.2	...	60.9	...	58.5	...	57.3
18	77.0	...	68.2	...	60.9	...	58.5	...	57.3
19	77.0	...	68.2	...	60.9	...	58.5	...	57.3
20	50.0	42.5	38.6	35.5	33.0	...	29.4	...	27.1
21	50.0	42.5	38.6	35.5	33.0	...	29.4	...	27.1
22	50.0	42.5	38.6	35.5	33.0	...	29.4	...	27.1
23	50.0	42.5	38.6	35.5	33.0	...	29.4	...	27.1
24	45.0	40.2	37.5	35.1	33.0	...	29.9	...	27.8
25	45.0	40.2	37.5	35.1	33.0	...	29.9	...	27.8
26	45.0	40.2	37.5	35.1	33.0	...	29.9	...	27.8
27	45.0	40.2	37.5	35.1	33.0	...	29.9	...	27.8
28	45.0	40.2	37.5	35.1	33.0	...	29.9	...	27.8
29	45.0	40.2	37.5	35.1	33.0	...	29.9	...	27.8
30	65.0	59.6	55.5	52.0	49.3	47.5	46.5	45.9	45.5
31	65.0	59.6	55.5	52.0	49.3	47.5	46.5	45.9	45.5
32	65.0	59.6	55.5	52.0	49.3	47.5	46.5	45.9	45.5
33	65.0	59.6	55.5	52.0	49.3	47.5	46.5	45.9	45.5
34	65.0	59.6	55.5	52.0	49.3	47.5	46.5	45.9	45.5
35	65.0	59.6	55.5	52.0	49.3	47.5	46.5	45.9	45.5
36	60.0	60.0	53.9	...	47.9	...	44.5	...	42.3
37	65.0	60.5	57.8	55.5	53.7	...	51.2	...	49.6
38	65.0	60.5	57.8	55.5	53.7	...	51.2	...	49.6
39	65.0	60.5	57.8	55.5	53.7	...	51.2	...	49.6
40	65.0	60.5	57.8	55.5	53.7	...	51.2	...	49.6
41	65.0	60.5	57.8	55.5	53.7	...	51.2	...	49.6
42	65.0	60.5	57.8	55.5	53.7	...	51.2	...	49.6
43	65.0	60.5	57.8	55.5	53.7	...	51.2	...	49.6
44	65.0	60.5	57.8	55.5	53.7	...	51.2	...	49.6
45	65.0	60.5	57.8	55.5	53.7	...	51.2	...	49.6

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Ferrous Materials (Cont'd)
1	...	23.2	22.8	22.6	22.4	22.3	22.1	...	...	...
2	...	26.8	26.4	26.2	26.0	25.8	25.6	...	...	...
3	...	27.4	27.0	26.8	26.6	26.4	26.2	...	...	...
4	...	27.4	27.0	26.8	26.6	26.4	26.2	...	...	...
5	...	27.4	27.0	26.8	26.6	26.4	26.2	...	...	...
6	...	27.4	27.0	26.8	26.6	26.4	26.2	...	...	...
7	...	27.4	27.0	26.8	26.6	26.4	26.2	...	...	...
8	...	27.4	27.0	26.8	26.6	26.4	26.2	...	...	...
9	...	27.4	27.0	26.8	26.6	26.4	26.2	...	...	...
10	...	27.4	27.0	26.8	26.6	26.4	26.2	...	...	...
11	...	27.4	27.0	26.8	26.6	26.4	26.2	...	...	...
12	...	46.0	45.5	...	...	...	...	...	...	...
13	...	46.0	45.5	...	...	...	...	...	...	...
14	...	46.0	45.5	...	...	...	...	...	...	...
15	...	46.0	45.5	...	...	...	...	...	...	...
16	...	46.0	45.5	...	...	...	...	...	...	...
17	...	54.5	53.9	...	...	...	...	...	...	...
18	...	54.5	53.9	...	...	...	...	...	...	...
19	...	54.5	53.9	...	...	...	...	...	...	...
20	...	25.7	25.3	25.0	24.8	24.6	24.4	24.1	23.5	22.6
21	...	25.7	25.3	25.0	24.8	24.6	24.4	24.1	23.5	22.6
22	...	25.7	25.3	25.0	24.8	24.6	24.4	24.1	23.5	22.6
23	...	25.7	25.3	25.0	24.8	24.6	24.4	24.1	23.5	22.6
24	...	26.5	26.1	25.8	25.5	25.2	25.0	24.7	24.3	23.9
25	...	26.5	26.1	25.8	25.5	25.2	25.0	24.7	24.3	23.9
26	...	26.5	26.1	25.8	25.5	25.2	25.0	24.7	24.3	23.9
27	...	26.5	26.1	25.8	25.5	25.2	25.0	24.7	24.3	23.9
28	...	26.5	26.1	25.8	25.5	25.2	25.0	24.7	24.3	23.9
29	...	26.5	26.1	25.8	25.5	25.2	25.0	24.7	24.3	23.9
30	44.9	43.9	42.5	...	...	...	...	...	...	...
31	44.9	43.9	42.5	...	...	...	...	...	...	...
32	44.9	43.9	42.5	...	...	...	...	...	...	...
33	44.9	43.9	42.5	...	...	...	...	...	...	...
34	44.9	43.9	42.5	...	...	...	...	...	...	...
35	44.9	43.9	42.5	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...
37	...	47.9	46.9	...	...	...	...	...	...	...
38	...	47.9	46.9	...	...	...	...	...	...	...
39	...	47.9	46.9	...	...	...	...	...	...	...
40	...	47.9	46.9	...	...	...	...	...	...	...
41	...	47.9	46.9	...	...	...	...	...	...	...
42	...	47.9	46.9	...	...	...	...	...	...	...
43	...	47.9	46.9	...	...	...	...	...	...	...
44	...	47.9	46.9	...	...	...	...	...	...	...
45	...	47.9	46.9	...	...	...	...	...	...	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding												
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
	Ferrous Materials (Cont'd)												
1	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
		Ferrous Materials (Cont'd)					
	1	22Cr–5Ni–3Mo–N	Smls. & wld. fittings	SA–815	...	S32205	...
	2	22Cr–5Ni–3Mo–N	Forgings	SA–182	F60	S32205	...
	3	22Cr–5Ni–3Mo–N	Smls. & wld. tube	SA–789	...	S32205	...
	4	22Cr–13Ni–5Mn	Castings	SA–351	CG6MMN	J93790	...
(**21**)	5	22Cr–13Ni–5Mn	Forgings	SA–182	FXM–19	S20910	...
(**21**)	6	22Cr–13Ni–5Mn	Bolting	SA–193	B8R	S20910	Annealed
(**21**)	7	22Cr–13Ni–5Mn	Bolting	SA–193	B8RA	S20910	Annealed
(**21**)	8	22Cr–13Ni–5Mn	Smls. tube	SA–213	XM–19	S20910	...
(**21**)	9	22Cr–13Ni–5Mn	Plate	SA–240	XM–19	S20910	...
(**21**)	10	22Cr–13Ni–5Mn	Wld. tube	SA–249	TPXM–19	S20910	...
(**21**)	11	22Cr–13Ni–5Mn	Smls. & wld. pipe	SA–312	TPXM–19	S20910	...
(**21**)	12	22Cr–13Ni–5Mn	Wld. pipe	SA–358	XM–19	S20910	1
(**21**)	13	22Cr–13Ni–5Mn	Wld. pipe	SA–358	XM–19	S20910	3
(**21**)	14	22Cr–13Ni–5Mn	Wld. pipe	SA–358	XM–19	S20910	4
(**21**)	15	22Cr–13Ni–5Mn	Smls. & wld. fittings	SA–403	XM–19	S20910	...
(**21**)	16	22Cr–13Ni–5Mn	Bar	SA–479	XM–19	S20910	Annealed
(**21**)	17	22Cr–13Ni–5Mn	Wld. pipe	SA–813	TPXM–19	S20910	...
(**21**)	18	22Cr–13Ni–5Mn	Wld. pipe	SA–814	TPXM–19	S20910	...
(**21**)	19	22Cr–13Ni–5Mn	Forgings	SA–965	FXM–19	S20910	...
	20	22Cr–13Ni–5Mn	Bar	SA–479	XM–19	S20910	Hot rolled
	21	22Cr–13Ni–5Mn	Bar	SA–479	XM–19	S20910	Hot rolled
	22	22Cr–13Ni–5Mn	Bar	SA–479	XM–19	S20910	Hot rolled
	23	23Cr–4Ni–Mo–Cu–N	Plate	SA–240	...	S32304	...
	24	23Cr–4Ni–Mo–Cu–N	Smls. & wld. tube	SA–789	...	S32304	...
	25	23Cr–4Ni–Mo–Cu–N	Smls. & wld. pipe	SA–790	...	S32304	...
	26	23Cr–4Ni–Mo–Cu–N	Smls. & wld. tube	SA–789	...	S32304	...
	27	23Cr–12Ni	Smls. & wld. fittings	SA–403	309	S30900	...
(**21**)	28	23Cr–12Ni	Smls. tube	SA–213	TP309S	S30908	...
(**21**)	29	23Cr–12Ni	Plate	SA–240	309S	S30908	...
(**21**)	30	23Cr–12Ni	Wld. tube	SA–249	TP309S	S30908	...
(**21**)	31	23Cr–12Ni	Smls. & wld. pipe	SA–312	TP309S	S30908	...
(**21**)	32	23Cr–12Ni	Wld. pipe	SA–358	309S	S30908	1
(**21**)	33	23Cr–12Ni	Wld. pipe	SA–358	309S	S30908	3
(**21**)	34	23Cr–12Ni	Wld. pipe	SA–358	309S	S30908	4
(**21**)	35	23Cr–12Ni	Bar	SA–479	309S	S30908	...
(**21**)	36	23Cr–12Ni	Wld. pipe	SA–813	TP309S	S30908	...
(**21**)	37	23Cr–12Ni	Wld. pipe	SA–814	TP309S	S30908	...
	38	23Cr–12Ni	Bar	SA/JIS G4303	SUS309S	...	...
	39	23Cr–12Ni	Smls. tube	SA–213	TP309H	S30909	...
	40	23Cr–12Ni	Plate	SA–240	309H	S30909	...
	41	23Cr–12Ni	Wld. tube	SA–249	TP309H	S30909	...
	42	23Cr–12Ni	Smls. & wld. pipe	SA–312	TP309H	S30909	...
	43	23Cr–12Ni	Bar	SA–479	309H	S30909	...
	44	23Cr–12Ni–Cb	Smls. tube	SA–213	TP309Cb	S30940	...
	45	23Cr–12Ni–Cb	Plate	SA–240	309Cb	S30940	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Ferrous Materials (Cont'd)
1	...	95	65	...
2	...	95	70	...
3	...	95	70	...
4	...	85	42.5	...
5	...	100	55	...
6	...	100	55	...
7	...	100	55	...
8	...	100	55	...
9	...	100	55	...
10	...	100	55	...
11	...	100	55	...
12	...	100	55	...
13	...	100	55	...
14	...	100	55	...
15	...	100	55	...
16	...	100	55	...
17	...	100	55	...
18	...	100	55	...
19	...	100	55	...
20	$3 < t \le 8$	100	60	...
21	$2 < t \le 3$	115	75	...
22	≤2	135	105	...
23	...	87	58	...
24	>1	87	58	...
25	...	87	58	...
26	≤1	100	65	...
27	...	75	30	...
28	...	75	30	...
29	...	75	30	...
30	...	75	30	...
31	...	75	30	...
32	...	75	30	...
33	...	75	30	...
34	...	75	30	...
35	...	75	30	...
36	...	75	30	...
37	...	75	30	...
38	...	75	30	...
39	...	75	30	...
40	...	75	30	...
41	...	75	30	...
42	...	75	30	...
43	...	75	30	...
44	...	75	30	...
45	...	75	30	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Ferrous Materials (Cont'd)								
1	65.0	60.5	57.8	55.5	53.7	...	51.2	...	49.6
2	70.0	65.1	62.2	59.8	57.9	...	55.2	...	53.4
3	70.0	65.1	62.2	59.8	57.9	...	55.2	...	53.4
4	42.5	38.4	36.4	34.8	33.4	...	31.5	...	30.0
5	55.0	49.8	47.1	45.0	43.3	...	40.7	...	38.8
6	55.0	49.8	47.1	45.0	43.3	...	40.7	...	38.8
7	55.0	49.8	47.1	45.0	43.3	...	40.7	...	38.8
8	55.0	49.8	47.1	45.0	43.3	...	40.7	...	38.8
9	55.0	49.8	47.1	45.0	43.3	...	40.7	...	38.8
10	55.0	49.8	47.1	45.0	43.3	...	40.7	...	38.8
11	55.0	49.8	47.1	45.0	43.3	...	40.7	...	38.8
12	55.0	49.8	47.1	45.0	43.3	...	40.7	...	38.8
13	55.0	49.8	47.1	45.0	43.3	...	40.7	...	38.8
14	55.0	49.8	47.1	45.0	43.3	...	40.7	...	38.8
15	55.0	49.8	47.1	45.0	43.3	...	40.7	...	38.8
16	55.0	49.8	47.1	45.0	43.3	...	40.7	...	38.8
17	55.0	49.8	47.1	45.0	43.3	...	40.7	...	38.8
18	55.0	49.8	47.1	45.0	43.3	...	40.7	...	38.8
19	55.0	49.8	47.1	45.0	43.3	...	40.7	...	38.8
20	60.0	...	51.4	...	47.2	...	44.4	...	42.4
21	75.0	...	64.2	...	59.0	...	55.5	...	53.0
22	105.0	...	89.9	...	82.6	...	77.8	...	74.2
23	58.0	52.6	49.8	47.8	46.3	...	44.5	...	43.4
24	58.0	52.6	49.8	47.8	46.3	...	44.5	...	43.4
25	58.0	52.6	49.8	47.8	46.3	...	44.5	...	43.4
26	65.0	58.9	55.9	53.6	51.9	...	49.6	...	48.6
27	30.0	27.6	26.3	25.1	24.2	...	22.7	...	21.6
28	30.0	27.6	26.3	25.1	24.2	...	22.7	...	21.6
29	30.0	27.6	26.3	25.1	24.2	...	22.7	...	21.6
30	30.0	27.6	26.3	25.1	24.2	...	22.7	...	21.6
31	30.0	27.6	26.3	25.1	24.2	...	22.7	...	21.6
32	30.0	27.6	26.3	25.1	24.2	...	22.7	...	21.6
33	30.0	27.6	26.3	25.1	24.2	...	22.7	...	21.6
34	30.0	27.6	26.3	25.1	24.2	...	22.7	...	21.6
35	30.0	27.6	26.3	25.1	24.2	...	22.7	...	21.6
36	30.0	27.6	26.3	25.1	24.2	...	22.7	...	21.6
37	30.0	27.6	26.3	25.1	24.2	...	22.7	...	21.6
38	30.0	27.6	26.3	25.1	24.2	...	22.7	...	21.6
39	30.0	27.6	26.3	25.1	24.2	...	22.7	...	21.6
40	30.0	27.6	26.3	25.1	24.2	...	22.7	...	21.6
41	30.0	27.6	26.3	25.1	24.2	...	22.7	...	21.6
42	30.0	27.6	26.3	25.1	24.2	...	22.7	...	21.6
43	30.0	27.6	26.3	25.1	24.2	...	22.7	...	21.6
44	30.0	27.6	26.3	25.1	24.2	...	22.7	...	21.6
45	30.0	27.6	26.3	25.1	24.2	...	22.7	...	21.6

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Ferrous Materials (Cont'd)
1	...	47.9	46.9	...	...	...	...	...	...	...
2	...	51.6	50.5	...	...	...	...	...	...	...
3	...	51.6	50.5	...	...	...	...	...	...	...
4	...	28.9	28.4	28.0	27.6	27.3	27.0	26.7	26.4	26.0
5	...	37.4	36.8	36.3	35.8	35.3	34.9	34.5	34.1	33.7
6	...	37.4	36.8	36.3	35.8	35.3	34.9	34.5	34.1	33.7
7	...	37.4	36.8	36.3	35.8	35.3	34.9	34.5	34.1	33.7
8	...	37.4	36.8	36.3	35.8	35.3	34.9	34.5	34.1	33.7
9	...	37.4	36.8	36.3	35.8	35.3	34.9	34.5	34.1	33.7
10	...	37.4	36.8	36.3	35.8	35.3	34.9	34.5	34.1	33.7
11	...	37.4	36.8	36.3	35.8	35.3	34.9	34.5	34.1	33.7
12	...	37.4	36.8	36.3	35.8	35.3	34.9	34.5	34.1	33.7
13	...	37.4	36.8	36.3	35.8	35.3	34.9	34.5	34.1	33.7
14	...	37.4	36.8	36.3	35.8	35.3	34.9	34.5	34.1	33.7
15	...	37.4	36.8	36.3	35.8	35.3	34.9	34.5	34.1	33.7
16	...	37.4	36.8	36.3	35.8	35.3	34.9	34.5	34.1	33.7
17	...	37.4	36.8	36.3	35.8	35.3	34.9	34.5	34.1	33.7
18	...	37.4	36.8	36.3	35.8	35.3	34.9	34.5	34.1	33.7
19	...	37.4	36.8	36.3	35.8	35.3	34.9	34.5	34.1	33.7
20	...	40.8	40.1	39.5	39.0	38.5	38.1	37.7	37.2	36.7
21	...	51.0	50.2	49.4	48.8	48.2	47.6	47.1	46.6	45.9
22	...	71.4	70.3	69.2	68.3	67.5	66.7	66.0	65.2	64.2
23	...	42.1	41.3	40.4	39.4	38.6	...	...	...	...
24	...	42.1	41.3	40.4	39.4	38.6	...	...	...	...
25	...	42.1	41.3	40.4	39.4	38.6	...	...	...	...
26	...	47.2	46.3	45.3	...	...	...	...	...	...
27	...	20.8	20.5	20.2	20.0	19.7	19.4	19.1	18.8	18.4
28	...	20.8	20.5	20.2	20.0	19.7	19.4	19.1	18.8	18.4
29	...	20.8	20.5	20.2	20.0	19.7	19.4	19.1	18.8	18.4
30	...	20.8	20.5	20.2	20.0	19.7	19.4	19.1	18.8	18.4
31	...	20.8	20.5	20.2	20.0	19.7	19.4	19.1	18.8	18.4
32	...	20.8	20.5	20.2	20.0	19.7	19.4	19.1	18.8	18.4
33	...	20.8	20.5	20.2	20.0	19.7	19.4	19.1	18.8	18.4
34	...	20.8	20.5	20.2	20.0	19.7	19.4	19.1	18.8	18.4
35	...	20.8	20.5	20.2	20.0	19.7	19.4	19.1	18.8	18.4
36	...	20.8	20.5	20.2	20.0	19.7	19.4	19.1	18.8	18.4
37	...	20.8	20.5	20.2	20.0	19.7	19.4	19.1	18.8	18.4
38	...	20.8	20.5	20.2	20.0	19.7	19.4	19.1	18.8	18.4
39	...	20.8	20.5	20.2	20.0	19.7	19.4	19.1	18.8	18.4
40	...	20.8	20.5	20.2	20.0	19.7	19.4	19.1	18.8	18.4
41	...	20.8	20.5	20.2	20.0	19.7	19.4	19.1	18.8	18.4
42	...	20.8	20.5	20.2	20.0	19.7	19.4	19.1	18.8	18.4
43	...	20.8	20.5	20.2	20.0	19.7	19.4	19.1	18.8	18.4
44	...	20.8	20.5	20.2	20.0	19.7	19.4	19.1	18.8	18.4
45	...	20.8	20.5	20.2	20.0	19.7	19.4	19.1	18.8	18.4

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Ferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	32.9	32.4	31.7	30.9	...	...	...	...	...	...	...	...	...	(**21**)
6	32.9	32.4	31.7	30.9	...	...	...	...	...	...	...	...	...	(**21**)
7	32.9	32.4	31.7	30.9	...	...	...	...	...	...	...	...	...	(**21**)
8	32.9	32.4	31.7	30.9	...	...	...	...	...	...	...	...	...	(**21**)
9	32.9	32.4	31.7	30.9	...	...	...	...	...	...	...	...	...	(**21**)
10	32.9	32.4	31.7	30.9	...	...	...	...	...	...	...	...	...	(**21**)
11	32.9	32.4	31.7	30.9	...	...	...	...	...	...	...	...	...	(**21**)
12	32.9	32.4	31.7	30.9	...	...	...	...	...	...	...	...	...	(**21**)
13	32.9	32.4	31.7	30.9	...	...	...	...	...	...	...	...	...	(**21**)
14	32.9	32.4	31.7	30.9	...	...	...	...	...	...	...	...	...	(**21**)
15	32.9	32.4	31.7	30.9	...	...	...	...	...	...	...	...	...	(**21**)
16	32.9	32.4	31.7	30.9	...	...	...	...	...	...	...	...	...	(**21**)
17	32.9	32.4	31.7	30.9	...	...	...	...	...	...	...	...	...	(**21**)
18	32.9	32.4	31.7	30.9	...	...	...	...	...	...	...	...	...	(**21**)
19	32.9	32.4	31.7	30.9	...	...	...	...	...	...	...	...	...	(**21**)
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	17.6	17.2	16.7	16.2	15.6	15.0	14.3	13.5	12.5	11.5	...	...	...	(**21**)
29	17.6	17.2	16.7	16.2	15.6	15.0	14.3	13.5	12.5	11.5	...	...	...	(**21**)
30	17.6	17.2	16.7	16.2	15.6	15.0	14.3	13.5	12.5	11.5	...	...	...	(**21**)
31	17.6	17.2	16.7	16.2	15.6	15.0	14.3	13.5	12.5	11.5	...	...	...	(**21**)
32	17.6	17.2	16.7	16.2	15.6	15.0	14.3	13.5	12.5	11.5	...	...	...	(**21**)
33	17.6	17.2	16.7	16.2	15.6	15.0	14.3	13.5	12.5	11.5	...	...	...	(**21**)
34	17.6	17.2	16.7	16.2	15.6	15.0	14.3	13.5	12.5	11.5	...	...	...	(**21**)
35	17.6	17.2	16.7	16.2	15.6	15.0	14.3	13.5	12.5	11.5	...	...	...	(**21**)
36	17.6	17.2	16.7	16.2	15.6	15.0	14.3	13.5	12.5	11.5	...	...	...	(**21**)
37	17.6	17.2	16.7	16.2	15.6	15.0	14.3	13.5	12.5	11.5	...	...	...	(**21**)
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
		Ferrous Materials (Cont'd)					
	1	23Cr–12Ni–Cb	Wld. tube	SA–249	TP309Cb	S30940	...
	2	23Cr–12Ni–Cb	Smls. & wld. pipe	SA–312	TP309Cb	S30940	...
	3	23Cr–12Ni–Cb	Bar	SA–479	309Cb	S30940	...
	4	23Cr–12Ni–Cb	Wld. pipe	SA–813	TP309Cb	S30940	...
	5	23Cr–12Ni–Cb	Wld. pipe	SA–814	TP309Cb	S30940	...
(**21**)	6	23Cr–25Ni–5.5Mo–N	Forgings	SA–182	...	S32053	...
(**21**)	7	23Cr–25Ni–5.5Mo–N	Bolting	SA–193	...	S32053	...
(**21**)	8	23Cr–25Ni–5.5Mo–N	Plate	SA–240	...	S32053	...
(**21**)	9	23Cr–25Ni–5.5Mo–N	Wld. tube	SA–249	...	S32053	...
(**21**)	10	23Cr–25Ni–5.5Mo–N	Smls. & wld. pipe	SA–312	...	S32053	...
(**21**)	11	23Cr–25Ni–5.5Mo–N	Wld. pipe	SA–358	...	S32053	...
(**21**)	12	23Cr–25Ni–5.5Mo–N	Fittings	SA–403	...	S32053	...
(**21**)	13	23Cr–25Ni–5.5Mo–N	Wld. pipe	SA–409	...	S32053	...
(**21**)	14	23Cr–25Ni–5.5Mo–N	Bar	SA–479	...	S32053	...
(**21**)	15	23Cr–25Ni–5.5Mo–N	Wld. pipe	SA–813	...	S32053	...
(**21**)	16	23Cr–25Ni–5.5Mo–N	Wld. pipe	SA–814	...	S32053	...
	17	24Cr–10Ni–4Mo–N	Castings	SA–995	2A	J93345	...
	18	24Cr–22Ni–6Mo–2W–Cu–N	Forgings	SA–182	F58	S31266	...
	19	24Cr–22Ni–6Mo–2W–Cu–N	Smls. tube	SA–213	...	S31266	...
	20	24Cr–22Ni–6Mo–2W–Cu–N	Plate	SA–240	...	S31266	...
	21	24Cr–22Ni–6Mo–2W–Cu–N	Wld. tube	SA–249	...	S31266	...
	22	24Cr–22Ni–6Mo–2W–Cu–N	Smls. & wld. pipe	SA–312	...	S31266	...
	23	24Cr–22Ni–6Mo–2W–Cu–N	Wld. pipe	SA–358	...	S31266	...
	24	24Cr–22Ni–6Mo–2W–Cu–N	Smls. & wld. fittings	SA–403	...	S31266	...
	25	24Cr–22Ni–6Mo–2W–Cu–N	Bar, shapes	SA–479	...	S31266	...
	26	24Cr–22Ni–6Mo–2W–Cu–N	Wld. pipe	SA–813	...	S31266	...
	27	25Cr–4Ni–4Mo–Ti	Plate	SA–240	...	S44635	...
	28	25Cr–4Ni–4Mo–Ti	Wld. tube	SA–268	...	S44635	...
	29	25Cr–5Ni–3Mo–2Cu	Castings	SA–995	1B	J93372	...
	30	25Cr–5Ni–3Mo–2Cu	Plate	SA–240	...	S32550	...
	31	25Cr–5Ni–3Mo–2Cu	Bar	SA–479	...	S32550	...
	32	25Cr–5Ni–3Mo–2Cu	Smls. & wld. tube	SA–789	...	S32550	...
	33	25Cr–5Ni–3Mo–2Cu	Smls. & wld. pipe	SA–790	...	S32550	...
(**21**)	34	25Cr–6Ni–Mo–N	Forgings	SA–182	...	S32506	...
(**21**)	35	25Cr–6Ni–Mo–N	Plate, sheet	SA–240	...	S32506	...
(**21**)	36	25Cr–6Ni–Mo–N	Bar	SA–479	...	S32506	...
(**21**)	37	25Cr–6Ni–Mo–N	Smls. tube	SA–789	...	S32506	...
(**21**)	38	25Cr–6Ni–Mo–N	Wld. tube	SA–789	...	S32506	...
(**21**)	39	25Cr–6Ni–Mo–N	Smls. pipe	SA–790	...	S32506	...
(**21**)	40	25Cr–6Ni–Mo–N	Wld. pipe	SA–790	...	S32506	...
	41	25Cr–6Ni–Mo–N	Plate	SA–240	...	S31200	...
	42	25Cr–6.5Ni–3Mo–N	Smls. & wld. tube	SA–789	...	S31260	...
	43	25Cr–6.5Ni–3Mo–N	Smls. & wld. pipe	SA–790	...	S31260	...
	44	25Cr–6.5Ni–3Mo–N	Plate	SA–240	...	S31260	...
	45	25Cr–7Ni–3Mo–W–Cu–N	Forgings	SA–182	F54	S39274	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Ferrous Materials (Cont'd)
1	...	75	30	...
2	...	75	30	...
3	...	75	30	...
4	...	75	30	...
5	...	75	30	...
6	...	93	43	...
7	...	93	43	...
8	...	93	43	...
9	...	93	43	...
10	...	93	43	...
11	...	93	43	...
12	...	93	43	...
13	...	93	43	...
14	...	93	43	...
15	...	93	43	...
16	...	93	43	...
17	...	95	65	...
18	...	109	61	...
19	...	109	61	...
20	...	109	61	...
21	...	109	61	...
22	...	109	61	...
23	...	109	61	...
24	...	109	61	...
25	...	109	61	...
26	...	109	61	...
27	...	90	75	...
28	...	90	75	...
29	...	100	70	...
30	...	110	80	...
31	...	110	80	...
32	...	110	80	...
33	...	110	80	...
34	...	90	65	...
35	...	90	65	...
36	...	90	65	...
37	...	90	65	...
38	...	90	65	...
39	...	90	65	...
40	...	90	65	...
41	...	100	65	...
42	...	100	65	...
43	...	100	65	...
44	...	100	70	...
45	...	116	80	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Ferrous Materials (Cont'd)								
1	30.0	27.6	26.3	25.1	24.2	...	22.7	...	21.6
2	30.0	27.6	26.3	25.1	24.2	...	22.7	...	21.6
3	30.0	27.6	26.3	25.1	24.2	...	22.7	...	21.6
4	30.0	27.6	26.3	25.1	24.2	...	22.7	...	21.6
5	30.0	27.6	26.3	25.1	24.2	...	22.7	...	21.6
6	43.0	...	36.3	...	32.8	...	30.5	...	29.0
7	43.0	...	36.3	...	32.8	...	30.5	...	29.0
8	43.0	...	36.3	...	32.8	...	30.5	...	29.0
9	43.0	...	36.3	...	32.8	...	30.5	...	29.0
10	43.0	...	36.3	...	32.8	...	30.5	...	29.0
11	43.0	...	36.3	...	32.8	...	30.5	...	29.0
12	43.0	...	36.3	...	32.8	...	30.5	...	29.0
13	43.0	...	36.3	...	32.8	...	30.5	...	29.0
14	43.0	...	36.3	...	32.8	...	30.5	...	29.0
15	43.0	...	36.3	...	32.8	...	30.5	...	29.0
16	43.0	...	36.3	...	32.8	...	30.5	...	29.0
17	65.0	56.6	52.4	49.2	46.8	...	43.9	...	42.5
18	61.0	56.2	53.7	51.7	50.0	48.7	47.6	46.8	46.1
19	61.0	56.2	53.7	51.7	50.0	48.7	47.6	46.8	46.1
20	61.0	56.2	53.7	51.7	50.0	48.7	47.6	46.8	46.1
21	61.0	56.2	53.7	51.7	50.0	48.7	47.6	46.8	46.1
22	61.0	56.2	53.7	51.7	50.0	48.7	47.6	46.8	46.1
23	61.0	56.2	53.7	51.7	50.0	48.7	47.6	46.8	46.1
24	61.0	56.2	53.7	51.7	50.0	48.7	47.6	46.8	46.1
25	61.0	56.2	53.7	51.7	50.0	48.7	47.6	46.8	46.1
26	61.0	56.2	53.7	51.7	50.0	48.7	47.6	46.8	46.1
27	75.0	66.1	62.0	58.7	55.8	...	51.0	...	47.5
28	75.0	66.1	62.0	58.7	55.8	...	51.0	...	47.5
29	70.0	...	...	...	...	...	...	...	...
30	80.0	73.8	70.2	67.0	64.3	...	60.5	...	58.7
31	80.0	73.8	70.2	67.0	64.3	...	60.5	...	58.7
32	80.0	73.8	70.2	67.0	64.3	...	60.5	...	58.7
33	80.0	73.8	70.2	67.0	64.3	...	60.5	...	58.7
34	65.0	...	57.4	...	52.8	...	50.1	...	49.0
35	65.0	...	57.4	...	52.8	...	50.1	...	49.0
36	65.0	...	57.4	...	52.8	...	50.1	...	49.0
37	65.0	...	57.4	...	52.8	...	50.1	...	49.0
38	65.0	...	57.4	...	52.8	...	50.1	...	49.0
39	65.0	...	57.4	...	52.8	...	50.1	...	49.0
40	65.0	...	57.4	...	52.8	...	50.1	...	49.0
41	65.0	58.6	55.3	52.6	50.4	...	47.5	...	45.5
42	65.0	59.5	56.6	54.2	52.3	...	49.5	...	47.9
43	65.0	59.5	56.6	54.2	52.3	...	49.5	...	47.9
44	70.0	64.1	61.0	58.4	56.3	...	53.3	...	51.5
45	80.0	70.6	66.9	64.2	62.1	...	59.3	...	58.2

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Ferrous Materials (Cont'd)
1	...	20.8	20.5	20.2	20.0	19.7	19.4	19.1	18.8	18.4
2	...	20.8	20.5	20.2	20.0	19.7	19.4	19.1	18.8	18.4
3	...	20.8	20.5	20.2	20.0	19.7	19.4	19.1	18.8	18.4
4	...	20.8	20.5	20.2	20.0	19.7	19.4	19.1	18.8	18.4
5	...	20.8	20.5	20.2	20.0	19.7	19.4	19.1	18.8	18.4
6	...	27.8	27.3	26.9	...	...	...	...	...	...
7	...	27.8	27.3	26.9	...	...	...	...	...	...
8	...	27.8	27.3	26.9	...	...	...	...	...	...
9	...	27.8	27.3	26.9	...	...	...	...	...	...
10	...	27.8	27.3	26.9	...	...	...	...	...	...
11	...	27.8	27.3	26.9	...	...	...	...	...	...
12	...	27.8	27.3	26.9	...	...	...	...	...	...
13	...	27.8	27.3	26.9	...	...	...	...	...	...
14	...	27.8	27.3	26.9	...	...	...	...	...	...
15	...	27.8	27.3	26.9	...	...	...	...	...	...
16	...	27.8	27.3	26.9	...	...	...	...	...	...
17	...	41.4	40.6	39.3	...	...	...	...	...	...
18	45.7	45.3	45.1	44.9	44.7	44.5	...	...	...	...
19	45.7	45.3	45.1	44.9	44.7	44.5	...	...	...	...
20	45.7	45.3	45.1	44.9	44.7	44.5	...	...	...	...
21	45.7	45.3	45.1	44.9	44.7	44.5	...	...	...	...
22	45.7	45.3	45.1	44.9	44.7	44.5	...	...	...	...
23	45.7	45.3	45.1	44.9	44.7	44.5	...	...	...	...
24	45.7	45.3	45.1	44.9	44.7	44.5	...	...	...	...
25	45.7	45.3	45.1	44.9	44.7	44.5	...	...	...	...
26	45.7	45.3	45.1	44.9	44.7	44.5	...	...	...	...
27	...	45.0	43.5	...	...	...	...	...	...	...
28	...	45.0	43.5	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...
30	...	58.4	58.2	57.4	55.4	51.5	...	...	...	...
31	...	58.4	58.2	57.4	55.4	51.5	...	...	...	...
32	...	58.4	58.2	57.4	55.4	51.5	...	...	...	...
33	...	58.4	58.2	57.4	55.4	51.5	...	...	...	...
34	...	48.4	...	...	...	...	...	...	...	...
35	...	48.4	...	...	...	...	...	...	...	...
36	...	48.4	...	...	...	...	...	...	...	...
37	...	48.4	...	...	...	...	...	...	...	...
38	...	48.4	...	...	...	...	...	...	...	...
39	...	48.4	...	...	...	...	...	...	...	...
40	...	48.4	...	...	...	...	...	...	...	...
41	...	43.6	42.2	...	...	...	...	...	...	...
42	...	46.8	46.3	45.8	45.2	...	...	...	...	...
43	...	46.8	46.3	45.8	45.2	...	...	...	...	...
44	...	50.4	49.9	49.4	48.7	...	...	...	...	...
45	...	58.2	58.2	58.2	58.2	...	...	...	...	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Ferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
7	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
8	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
9	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
10	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
11	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
12	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
13	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
14	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
15	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
16	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
35	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
36	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
37	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
38	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
39	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
40	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
		Ferrous Materials (Cont'd)					
	1	25Cr–7Ni–3Mo–W–Cu–N	Smls. & wld. tube	SA–789	...	S39274	...
	2	25Cr–7Ni–3Mo–W–Cu–N	Smls. & wld. pipe	SA–790	...	S39274	...
	3	25Cr–7Ni–4Mo–N	Forgings	SA–182	F53	S32750	...
	4	25Cr–7Ni–4Mo–N	Plate	SA–240	...	S32750	...
(**21**)	5	25Cr–7Ni–4Mo–N	Smls. & wld. tube	SA–789	...	S32750	...
(**21**)	6	25Cr–7Ni–4Mo–N	Smls. & wld. pipe	SA–790	...	S32750	...
	7	25Cr–7.5Ni–3.5Mo–N–Cu–W	Castings	SA–995	CD3MWCuN	J93380	...
	8	25Cr–7.5Ni–3.5Mo–N–Cu–W	Forgings	SA–182	F55	S32760	...
	9	25Cr–7.5Ni–3.5Mo–N–Cu–W	Plate	SA–240	...	S32760	...
	10	25Cr–7.5Ni–3.5Mo–N–Cu–W	Bar	SA–479	...	S32760	Annealed
	11	25Cr–7.5Ni–3.5Mo–N–Cu–W	Smls. & wld. tube	SA–789	...	S32760	...
	12	25Cr–7.5Ni–3.5Mo–N–Cu–W	Smls. & wld. pipe	SA–790	...	S32760	...
	13	25Cr–7.5Ni–3.5Mo–N–Cu–W	Smls. & wld. fittings	SA–815	...	S32760	...
	14	25Cr–12Ni	Castings	SA–351	CH8	J93400	...
	15	25Cr–12Ni	Cast pipe	SA–451	CPH8	J93400	...
	16	25Cr–12Ni	Castings	SA–351	CH20	J93402	...
	17	25Cr–12Ni	Cast pipe	SA–451	CPH20	J93402	...
	18	25Cr–20Ni	Castings	SA–351	CK20	J94202	...
	19	25Cr–20Ni	Cast pipe	SA–451	CPK20	J94202	...
	20	25Cr–20Ni	Forgings	SA–182	F310	S31000	...
	21	25Cr–20Ni	Forgings	SA–965	F310	S31000	...
(**21**)	22	25Cr–20Ni	Smls. tube	SA–213	TP310S	S31008	...
(**21**)	23	25Cr–20Ni	Plate	SA–240	310S	S31008	...
(**21**)	24	25Cr–20Ni	Wld. tube	SA–249	TP310S	S31008	...
(**21**)	25	25Cr–20Ni	Smls. & wld. pipe	SA–312	TP310S	S31008	...
(**21**)	26	25Cr–20Ni	Wld. pipe	SA–358	310S	S31008	1
(**21**)	27	25Cr–20Ni	Wld. pipe	SA–358	310S	S31008	3
(**21**)	28	25Cr–20Ni	Wld. pipe	SA–358	310S	S31008	4
(**21**)	29	25Cr–20Ni	Smls. & wld. fittings	SA–403	310S	S31008	...
(**21**)	30	25Cr–20Ni	Bar	SA–479	310S	S31008	...
(**21**)	31	25Cr–20Ni	Wld. pipe	SA–813	TP310S	S31008	...
(**21**)	32	25Cr–20Ni	Wld. pipe	SA–814	TP310S	S31008	...
	33	25Cr–20Ni	Bar	SA/JIS G4303	SUS310S	...	...
	34	25Cr–20Ni	Smls. tube	SA–213	TP310H	S31009	...
	35	25Cr–20Ni	Plate	SA–240	310H	S31009	...
	36	25Cr–20Ni	Wld. tube	SA–249	TP310H	S31009	...
	37	25Cr–20Ni	Smls. & wld. pipe	SA–312	TP310H	S31009	...
	38	25Cr–20Ni	Bar	SA–479	310H	S31009	...
	39	25Cr–20Ni–Cb	Smls. tube	SA–213	TP310Cb	S31040	...
	40	25Cr–20Ni–Cb	Plate	SA–240	310Cb	S31040	...
	41	25Cr–20Ni–Cb	Wld. tube	SA–249	TP310Cb	S31040	...
	42	25Cr–20Ni–Cb	Smls. & wld. pipe	SA–312	TP310Cb	S31040	...
	43	25Cr–20Ni–Cb	Bar	SA–479	310Cb	S31040	...
	44	25Cr–20Ni–Cb	Wld. pipe	SA–813	TP310Cb	S31040	...
	45	25Cr–20Ni–Cb	Wld. pipe	SA–814	TP310Cb	S31040	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Ferrous Materials (Cont'd)
1	...	116	80	...
2	...	116	80	...
3	...	116	80	...
4	...	116	80	...
5	...	116	80	...
6	...	116	80	...
7	...	100	65	...
8	...	109	80	...
9	...	109	80	...
10	...	109	80	...
11	...	109	80	...
12	...	109	80	...
13	...	109	80	...
14	...	65	28	...
15	...	65	28	...
16	...	70	30	...
17	...	70	30	...
18	...	65	28	...
19	...	65	28	...
20	≤5	75	30	...
21	...	75	30	...
22	...	75	30	...
23	...	75	30	...
24	...	75	30	...
25	...	75	30	...
26	...	75	30	...
27	...	75	30	...
28	...	75	30	...
29	...	75	30	...
30	...	75	30	...
31	...	75	30	...
32	...	75	30	...
33	...	75	30	...
34	...	75	30	...
35	...	75	30	...
36	...	75	30	...
37	...	75	30	...
38	...	75	30	...
39	...	75	30	...
40	...	75	30	...
41	...	75	30	...
42	...	75	30	...
43	...	75	30	...
44	...	75	30	...
45	...	75	30	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Ferrous Materials (Cont'd)								
1	80.0	70.6	66.9	64.2	62.1	...	59.3	...	58.2
2	80.0	70.6	66.9	64.2	62.1	...	59.3	...	58.2
3	80.0	74.0	70.5	67.4	64.7	...	60.7	...	58.3
4	80.0	74.0	70.5	67.4	64.7	...	60.7	...	58.3
5	80.0	74.0	70.5	67.4	64.7	...	60.7	...	58.3
6	80.0	74.0	70.5	67.4	64.7	...	60.7	...	58.3
7	65.0	57.9	54.1	52.2	50.2	49.4	48.5	48.1	47.7
8	80.0	...	64.6	...	59.9	...	58.7	...	58.2
9	80.0	...	64.6	...	59.9	...	58.7	...	58.2
10	80.0	...	64.6	...	59.9	...	58.7	...	58.2
11	80.0	...	64.6	...	59.9	...	58.7	...	58.2
12	80.0	...	64.6	...	59.9	...	58.7	...	58.2
13	80.0	...	64.6	...	59.9	...	58.7	...	58.2
14	28.0	24.4	22.9	21.8	21.1	...	20.2	...	19.6
15	28.0	24.4	22.9	21.8	21.1	...	20.2	...	19.6
16	30.0	26.1	24.5	23.4	22.6	...	21.7	...	21.0
17	30.0	26.1	24.5	23.4	22.6	...	21.7	...	21.0
18	28.0	24.4	22.9	21.8	21.1	...	20.2	...	19.6
19	28.0	24.4	22.9	21.8	21.1	...	20.2	...	19.6
20	30.0	27.9	26.5	25.3	24.2	...	22.6	...	21.4
21	30.0	27.9	26.5	25.3	24.2	...	22.6	...	21.4
22	30.0	27.9	26.5	25.3	24.2	...	22.6	...	21.4
23	30.0	27.9	26.5	25.3	24.2	...	22.6	...	21.4
24	30.0	27.9	26.5	25.3	24.2	...	22.6	...	21.4
25	30.0	27.9	26.5	25.3	24.2	...	22.6	...	21.4
26	30.0	27.9	26.5	25.3	24.2	...	22.6	...	21.4
27	30.0	27.9	26.5	25.3	24.2	...	22.6	...	21.4
28	30.0	27.9	26.5	25.3	24.2	...	22.6	...	21.4
29	30.0	27.9	26.5	25.3	24.2	...	22.6	...	21.4
30	30.0	27.9	26.5	25.3	24.2	...	22.6	...	21.4
31	30.0	27.9	26.5	25.3	24.2	...	22.6	...	21.4
32	30.0	27.9	26.5	25.3	24.2	...	22.6	...	21.4
33	30.0	27.9	26.5	25.3	24.2	...	22.6	...	21.4
34	30.0	27.9	26.5	25.3	24.2	...	22.6	...	21.4
35	30.0	27.9	26.5	25.3	24.2	...	22.6	...	21.4
36	30.0	27.9	26.5	25.3	24.2	...	22.6	...	21.4
37	30.0	27.9	26.5	25.3	24.2	...	22.6	...	21.4
38	30.0	27.9	26.5	25.3	24.2	...	22.6	...	21.4
39	30.0	27.9	26.5	25.3	24.2	...	22.6	...	21.4
40	30.0	27.9	26.5	25.3	24.2	...	22.6	...	21.4
41	30.0	27.9	26.5	25.3	24.2	...	22.6	...	21.4
42	30.0	27.9	26.5	25.3	24.2	...	22.6	...	21.4
43	30.0	27.9	26.5	25.3	24.2	...	22.6	...	21.4
44	30.0	27.9	26.5	25.3	24.2	...	22.6	...	21.4
45	30.0	27.9	26.5	25.3	24.2	...	22.6	...	21.4

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Ferrous Materials (Cont'd)
1	...	58.2	58.2	58.2	58.2	...	...	...	...	...
2	...	58.2	58.2	58.2	58.2	...	...	...	...	...
3	...	57.2	57.0	57.0	57.0	...	...	...	...	...
4	...	57.2	57.0	57.0	57.0	...	...	...	...	...
5	...	57.2	57.0	57.0	57.0	...	...	...	...	...
6	...	57.2	57.0	57.0	57.0	...	...	...	...	...
7	47.3	47.0	...	...	...	...	...	...	...	...
8	...	56.0	...	...	...	...	...	...	...	...
9	...	56.0	...	...	...	...	...	...	...	...
10	...	56.0	...	...	...	...	...	...	...	...
11	...	56.0	...	...	...	...	...	...	...	...
12	...	56.0	...	...	...	...	...	...	...	...
13	...	56.0	...	...	...	...	...	...	...	...
14	...	19.0	18.6	18.1	17.6	17.1	16.6	16.0	15.4	14.8
15	...	19.0	18.6	18.1	17.6	17.1	16.6	16.0	15.4	14.8
16	...	20.3	19.9	19.4	18.9	18.3	17.7	17.1	16.5	15.9
17	...	20.3	19.9	19.4	18.9	18.3	17.7	17.1	16.5	15.9
18	...	19.0	18.6	18.1	17.6	17.1	16.6	16.0	15.4	14.8
19	...	19.0	18.6	18.1	17.6	17.1	16.6	16.0	15.4	14.8
20	...	20.6	20.2	19.9	19.6	19.4	19.1	18.8	18.5	18.2
21	...	20.6	20.2	19.9	19.6	19.4	19.1	18.8	18.5	18.2
22	...	20.6	20.2	19.9	19.6	19.4	19.1	18.8	18.5	18.2
23	...	20.6	20.2	19.9	19.6	19.4	19.1	18.8	18.5	18.2
24	...	20.6	20.2	19.9	19.6	19.4	19.1	18.8	18.5	18.2
25	...	20.6	20.2	19.9	19.6	19.4	19.1	18.8	18.5	18.2
26	...	20.6	20.2	19.9	19.6	19.4	19.1	18.8	18.5	18.2
27	...	20.6	20.2	19.9	19.6	19.4	19.1	18.8	18.5	18.2
28	...	20.6	20.2	19.9	19.6	19.4	19.1	18.8	18.5	18.2
29	...	20.6	20.2	19.9	19.6	19.4	19.1	18.8	18.5	18.2
30	...	20.6	20.2	19.9	19.6	19.4	19.1	18.8	18.5	18.2
31	...	20.6	20.2	19.9	19.6	19.4	19.1	18.8	18.5	18.2
32	...	20.6	20.2	19.9	19.6	19.4	19.1	18.8	18.5	18.2
33	...	20.6	20.2	19.9	19.6	19.4	19.1	18.8	18.5	18.2
34	...	20.6	20.2	19.9	19.6	19.4	19.1	18.8	18.5	18.2
35	...	20.6	20.2	19.9	19.6	19.4	19.1	18.8	18.5	18.2
36	...	20.6	20.2	19.9	19.6	19.4	19.1	18.8	18.5	18.2
37	...	20.6	20.2	19.9	19.6	19.4	19.1	18.8	18.5	18.2
38	...	20.6	20.2	19.9	19.6	19.4	19.1	18.8	18.5	18.2
39	...	20.6	20.2	19.9	19.6	19.4	19.1	18.8	18.5	18.2
40	...	20.6	20.2	19.9	19.6	19.4	19.1	18.8	18.5	18.2
41	...	20.6	20.2	19.9	19.6	19.4	19.1	18.8	18.5	18.2
42	...	20.6	20.2	19.9	19.6	19.4	19.1	18.8	18.5	18.2
43	...	20.6	20.2	19.9	19.6	19.4	19.1	18.8	18.5	18.2
44	...	20.6	20.2	19.9	19.6	19.4	19.1	18.8	18.5	18.2
45	...	20.6	20.2	19.9	19.6	19.4	19.1	18.8	18.5	18.2

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Ferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
6	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
7	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	17.6	17.0	16.3	15.4	14.5	13.4	12.1	10.7	9.2	7.4	...	...	...	(**21**)
23	17.6	17.0	16.3	15.4	14.5	13.4	12.1	10.7	9.2	7.4	...	...	...	(**21**)
24	17.6	17.0	16.3	15.4	14.5	13.4	12.1	10.7	9.2	7.4	...	...	...	(**21**)
25	17.6	17.0	16.3	15.4	14.5	13.4	12.1	10.7	9.2	7.4	...	...	...	(**21**)
26	17.6	17.0	16.3	15.4	14.5	13.4	12.1	10.7	9.2	7.4	...	...	...	(**21**)
27	17.6	17.0	16.3	15.4	14.5	13.4	12.1	10.7	9.2	7.4	...	...	...	(**21**)
28	17.6	17.0	16.3	15.4	14.5	13.4	12.1	10.7	9.2	7.4	...	...	...	(**21**)
29	17.6	17.0	16.3	15.4	14.5	13.4	12.1	10.7	9.2	7.4	...	...	...	(**21**)
30	17.6	17.0	16.3	15.4	14.5	13.4	12.1	10.7	9.2	7.4	...	...	...	(**21**)
31	17.6	17.0	16.3	15.4	14.5	13.4	12.1	10.7	9.2	7.4	...	...	...	(**21**)
32	17.6	17.0	16.3	15.4	14.5	13.4	12.1	10.7	9.2	7.4	...	...	...	(**21**)
33	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
	Ferrous Materials (Cont'd)					
1	25Cr–20Ni–Cb–N	Smls. tube	SA–213	TP310HCbN	S31042	...
2	25Cr–22Ni–2Mo–N	Forgings	SA–182	F310MoLN	S31050	...
3	25Cr–22Ni–2Mo–N	Smls. tube	SA–213	TP310MoLN	S31050	...
4	25Cr–22Ni–2Mo–N	Plate	SA–240	310MoLN	S31050	...
5	25Cr–22Ni–2Mo–N	Wld. tube	SA–249	TP310MoLN	S31050	...
6	25Cr–22Ni–2Mo–N	Wld. pipe	SA–312	TP310MoLN	S31050	...
7	25Cr–22Ni–2Mo–N	Smls. tube	SA–213	TP310MoLN	S31050	...
8	25Cr–22Ni–2Mo–N	Plate	SA–240	310MoLN	S31050	...
9	25Cr–22Ni–2Mo–N	Wld. tube	SA–249	TP310MoLN	S31050	...
10	25Cr–22Ni–2Mo–N	Wld. pipe	SA–312	TP310MoLN	S31050	...
11	26Cr–4Ni–Mo	Plate	SA–240	329	S32900	...
12	26Cr–4Ni–Mo	Smls. & wld. tube	SA–789	...	S32900	...
13	26Cr–4Ni–Mo	Smls. & wld. pipe	SA–790	...	S32900	...
14	26Cr–4Ni–Mo–N	Plate	SA–240	...	S32950	...
15	26Cr–4Ni–Mo–N	Smls. & wld. tube	SA–789	...	S32950	...
16	26Cr–4Ni–Mo–N	Smls. & wld. pipe	SA–790	...	S32950	...
17	29Cr–6.5Ni–2Mo–N	Plate, sheet, strip	SA–240	...	S32906	...
18	29Cr–6.5Ni–2Mo–N	Bar	SA–479	...	S32906	...
19	29Cr–6.5Ni–2Mo–N	Smls. tube	SA–789	...	S32906	...
20	29Cr–6.5Ni–2Mo–N	Smls. pipe	SA–790	...	S32906	...
21	29Cr–6.5Ni–2Mo–N	Plate, sheet, strip	SA–240	...	S32906	...
22	29Cr–6.5Ni–2Mo–N	Smls. tube	SA–789	...	S32906	...
23	29Cr–6.5Ni–2Mo–N	Smls. pipe	SA–790	...	S32906	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Ferrous Materials (Cont'd)
1	...	95	43	...
2	...	78	37	...
3	0.250 < t ≤ 1.250	78	37	...
4	t > 0.250	78	37	...
5	0.250 < t ≤ 1.250	78	37	...
6	0.250 < t ≤ 1.250	78	37	...
7	≤0.250, wall	84	39	...
8	t ≤ 0.250	84	39	...
9	≤0.250, wall	84	39	...
10	≤0.250, wall	84	39	...
11	...	90	70	...
12	...	90	70	...
13	...	90	70	...
14	...	100	70	...
15	...	100	70	...
16	...	100	70	...
17	≥0.40	109	80	...
18	...	109	80	...
19	≥0.40	109	80	...
20	≥0.40	109	80	...
21	<0.40	116	94	...
22	<0.40	116	94	...
23	<0.40	116	94	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Ferrous Materials (Cont'd)								
1	43.0	...	36.0	...	32.5	...	30.2	...	28.8
2	37.0	33.4	31.5	29.9	28.6	...	26.7	...	25.2
3	37.0	33.4	31.5	29.9	28.6	...	26.7	...	25.2
4	37.0	33.4	31.5	29.9	28.6	...	26.7	...	25.2
5	37.0	33.4	31.5	29.9	28.6	...	26.7	...	25.2
6	37.0	33.4	31.5	29.9	28.6	...	26.7	...	25.2
7	39.0	35.2	33.2	31.5	30.2	...	28.1	...	26.5
8	39.0	35.2	33.2	31.5	30.2	...	28.1	...	26.5
9	39.0	35.2	33.2	31.5	30.2	...	28.1	...	26.5
10	39.0	35.2	33.2	31.5	30.2	...	28.1	...	26.5
11	70.0	65.3	62.4	59.8	57.6	...	53.9	...	51.3
12	70.0	65.3	62.4	59.8	57.6	...	53.9	...	51.3
13	70.0	65.3	62.4	59.8	57.6	...	53.9	...	51.3
14	70.0	64.9	62.0	59.5	57.3	...	53.8	...	51.3
15	70.0	64.9	62.0	59.5	57.3	...	53.8	...	51.3
16	70.0	64.9	62.0	59.5	57.3	...	53.8	...	51.3
17	80.0	...	68.9	...	63.2	...	59.4	...	57.1
18	80.0	...	68.9	...	63.2	...	59.4	...	57.1
19	80.0	...	68.9	...	63.2	...	59.4	...	57.1
20	80.0	...	68.9	...	63.2	...	59.4	...	57.1
21	94.0	...	81.0	...	74.3	...	69.8	...	67.1
22	94.0	...	81.0	...	74.3	...	69.8	...	67.1
23	94.0	...	81.0	...	74.3	...	69.8	...	67.1

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Ferrous Materials (Cont'd)
1	...	27.8	27.4	27.1	26.8	26.4	26.1	25.7	25.3	24.9
2	...	23.9	23.3	22.7	22.1	21.6	21.0	20.6	20.2	19.9
3	...	23.9	23.3	22.7	22.1	21.6	21.0	20.6	20.2	19.9
4	...	23.9	23.3	22.7	22.1	21.6	21.0	20.6	20.2	19.9
5	...	23.9	23.3	22.7	22.1	21.6	21.0	20.6	20.2	19.9
6	...	23.9	23.3	22.7	22.1	21.6	21.0	20.6	20.2	19.9
7	...	25.2	24.6	23.9	23.3	22.7	22.2	21.7	21.3	21.0
8	...	25.2	24.6	23.9	23.3	22.7	22.2	21.7	21.3	21.0
9	...	25.2	24.6	23.9	23.3	22.7	22.2	21.7	21.3	21.0
10	...	25.2	24.6	23.9	23.3	22.7	22.2	21.7	21.3	21.0
11	...	49.6	49.1	48.8	...	...	...	...	...	...
12	...	49.6	49.1	48.8	...	...	...	...	...	...
13	...	49.6	49.1	48.8	...	...	...	...	...	...
14	...	49.6	49.1	48.6	...	...	...	...	...	...
15	...	49.6	49.1	48.6	...	...	...	...	...	...
16	...	49.6	49.1	48.6	...	...	...	...	...	...
17	...	55.9	...	...	...	...	...	...	...	...
18	...	55.9	...	...	...	...	...	...	...	...
19	...	55.9	...	...	...	...	...	...	...	...
20	...	55.9	...	...	...	...	...	...	...	...
21	...	65.7	...	...	...	...	...	...	...	...
22	...	65.7	...	...	...	...	...	...	...	...
23	...	65.7	...	...	...	...	...	...	...	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding												
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
	Ferrous Materials (Cont'd)												
1	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
	Nonferrous Materials					
1	...	Plate, sheet	SB–209	...	Alclad 3003	O
2	...	Plate, sheet	SB–209	...	Alclad 3003	O
3	...	Plate, sheet	SB–209	...	Alclad 3003	H112
4	...	Plate, sheet	SB–209	...	Alclad 3003	H112
5	...	Plate, sheet	SB–209	...	Alclad 3003	H112
6	...	Plate, sheet	SB–209	...	Alclad 3003	H12
7	...	Plate, sheet	SB–209	...	Alclad 3003	H12
8	...	Plate, sheet	SB–209	...	Alclad 3003	H14
9	...	Plate, sheet	SB–209	...	Alclad 3003	H14
10	...	Drawn smls. tube	SB–210	...	Alclad 3003	O
11	...	Drawn smls. tube	SB–210	...	Alclad 3003	H113
12	...	Drawn smls. tube	SB–210	...	Alclad 3003	H14
13	...	Drawn smls. tube	SB–210	...	Alclad 3003	H18
14	...	Cond. & heat exch. tubes	SB–234	...	Alclad 3003	H14
15	...	Cond. & heat exch. tubes	SB–234	...	Alclad 3003	H25
16	...	Smls. extr. tube	SB–241	...	Alclad 3003	O
17	...	Smls. extr. tube	SB–241	...	Alclad 3003	H112
18	...	Plate, sheet	SB–209	...	Alclad 3004	O
19	...	Plate, sheet	SB–209	...	Alclad 3004	O
20	...	Plate, sheet	SB–209	...	Alclad 3004	H112
21	...	Plate, sheet	SB–209	...	Alclad 3004	H112
22	...	Plate, sheet	SB–209	...	Alclad 3004	H32
23	...	Plate, sheet	SB–209	...	Alclad 3004	H32
24	...	Plate, sheet	SB–209	...	Alclad 3004	H34
25	...	Plate, sheet	SB–209	...	Alclad 3004	H34
26	...	Plate, sheet	SB–209	...	Alclad 6061	T4
27	...	Plate, sheet	SB–209	...	Alclad 6061	T451
28	...	Plate, sheet	SB–209	...	Alclad 6061	T451
29	...	Plate, sheet	SB–209	...	Alclad 6061	T6
30	...	Plate, sheet	SB–209	...	Alclad 6061	T651
31	...	Plate, sheet	SB–209	...	Alclad 6061	T651
32	...	Plate, sheet	SB–209	...	Alclad 6061	T651
33	...	Castings	SB/EN 1706	...	AC–42000–S	T6
34	...	Plate, sheet	SB–209	...	A91060	O
35	...	Plate, sheet	SB–209	...	A91060	H112
36	...	Plate, sheet	SB–209	...	A91060	H112
37	...	Plate, sheet	SB–209	...	A91060	H112
38	...	Plate, sheet	SB–209	...	A91060	H12
39	...	Plate, sheet	SB–209	...	A91060	H14
40	...	Drawn smls. tube	SB–210	...	A91060	O
41	...	Drawn smls. tube	SB–210	...	A91060	H14
42	...	Drawn smls. tube	SB–210	...	A91060	H113
43	...	Bar, rod, shapes	SB–221	...	A91060	O
44	...	Bar, rod, shapes	SB–221	...	A91060	H112
45	...	Cond. & heat exch. tubes	SB–234	...	A91060	H14

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Nonferrous Materials
1	0.006–0.499	13	4.5	...
2	0.500–3.000	14	5	...
3	0.250–0.499	16	9	...
4	0.500–2.000	15	6	...
5	2.001–3.000	14.5	6	...
6	0.017–0.499	16	11	...
7	0.500–2.000	17	12	...
8	0.009–0.499	19	16	...
9	0.500–1.000	20	17	...
10	0.010–0.500	13	4.5	...
11	0.050–0.500	13	4.5	...
12	0.010–0.500	19	16	...
13	0.010–0.500	26	23	...
14	0.010–0.200	19	16	...
15	0.010–0.200	21	18	...
16	...	13	4.5	...
17	...	13	4.5	...
18	0.006–0.499	21	8	...
19	0.500–3.000	22	8.5	...
20	0.250–0.499	22	8.5	...
21	0.500–3.000	23	9	...
22	0.017–0.499	27	20	...
23	0.500–2.000	28	21	...
24	0.009–0.499	31	24	...
25	0.500–1.000	32	25	...
26	0.010–0.249	27	14	...
27	0.250–0.499	27	14	...
28	0.500–3.000	30	16	...
29	0.010–0.249	38	32	...
30	0.250–0.499	38	32	...
31	0.500–4.000	42	35	...
32	4.001–5.000	40	35	...
33	...	32	26	...
34	0.006–3.000	8	2.5	...
35	0.250–0.499	11	7	...
36	0.500–1.000	10	5	...
37	1.001–3.000	9	4	...
38	0.017–2.000	11	9	...
39	0.009–1.000	12	10	...
40	0.018–0.500	8.5	2.5	...
41	0.018–0.500	12	10	...
42	0.018–0.500	8.5	2.5	...
43	...	8.5	2.5	...
44	...	8.5	2.5	...
45	0.010–0.200	12	10	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Nonferrous Materials								
1	4.5	4.3	4.2	4.0	3.8	3.5	3.2	...	...
2	5.0	4.8	4.7	4.5	4.2	3.9	3.6	...	...
3	9.0	8.7	8.4	8.0	7.5	7.0	6.5	...	...
4	6.0	5.8	5.6	5.4	5.0	4.7	4.3	...	...
5	6.0	5.8	5.6	5.4	5.0	4.7	4.3	...	...
6	11.0	10.9	10.3	9.1	7.9	6.8	5.4	...	...
7	12.0	11.9	11.2	9.9	8.6	7.4	5.9	...	...
8	16.0	15.4	14.5	13.1	11.3	9.2	7.2	...	...
9	17.0	16.4	15.4	13.9	12.0	9.8	7.6	...	...
10	4.5	4.3	4.2	4.0	3.8	3.5	3.2	...	...
11	4.5	4.3	4.2	4.0	3.8	3.5	3.2	...	...
12	16.0	15.4	14.5	13.1	11.3	9.2	7.2	...	...
13	23.0	20.6	18.3	16.0	13.4	10.4	7.5	...	...
14	16.0	15.4	14.5	13.1	11.3	9.2	7.2	...	...
15	18.0	17.0	15.6	13.9	11.9	9.6	7.3	...	...
16	4.5	4.3	4.2	4.0	3.8	3.5	3.2	...	...
17	4.5	4.3	4.2	4.0	3.8	3.5	3.2	...	...
18	8.0	8.0	8.0	8.0	8.0	8.0	7.6	...	...
19	8.5	8.5	8.5	8.5	8.5	8.5	8.1	...	...
20	8.5	8.5	8.5	8.5	8.5	8.5	8.1	...	...
21	9.0	9.0	9.0	9.0	9.0	8.9	8.5	...	...
22	20.0	20.0	20.0	19.7	18.5	16.1	12.2	...	...
23	21.0	21.0	21.0	20.7	19.4	16.9	12.8	...	...
24	24.0	24.0	24.0	23.5	21.1	16.6	12.3	...	...
25	25.0	25.0	25.0	24.5	22.0	17.3	12.8	...	...
26	14.0	13.7	13.6	13.3	13.3	13.3	10.2	...	...
27	14.0	13.7	13.6	13.3	13.3	13.3	10.2	...	...
28	16.0	15.7	15.5	15.2	15.2	15.2	11.6	...	...
29	32.0	31.5	31.3	29.8	25.3	18.2	12.2	...	...
30	32.0	31.5	31.3	29.8	25.3	18.2	12.2	...	...
31	35.0	34.4	34.2	32.5	27.7	19.9	13.3	...	...
32	35.0	34.4	34.2	32.5	27.7	19.9	13.3	...	...
33	26.2	25.8	24.4	24.4	...	...	...	...	...
34	2.5	2.5	2.4	2.2	1.9	1.8	1.6	...	...
35	7.0	7.0	6.8	6.0	5.3	4.9	4.6	...	...
36	5.0	5.0	4.8	4.4	3.8	3.5	3.2	...	...
37	4.0	4.0	3.8	3.5	3.0	2.8	2.6	...	...
38	9.0	8.3	7.7	7.0	6.2	5.4	4.3	...	...
39	10.0	9.6	9.3	8.6	7.5	6.2	4.5	...	...
40	2.5	2.5	2.4	2.2	1.9	1.8	1.6	...	...
41	10.0	9.6	9.3	8.6	7.5	6.2	4.5	...	...
42	2.5	2.5	2.4	2.2	1.9	1.8	1.6	...	...
43	2.5	2.5	2.4	2.2	1.9	1.8	1.6	...	...
44	2.5	2.5	2.4	2.2	1.9	1.8	1.6	...	...
45	10.0	9.6	9.3	8.6	7.5	6.2	4.5	...	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Nonferrous Materials
1	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding												
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
	Nonferrous Materials												
1	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
	Nonferrous Materials (Cont'd)					
1	...	Smls. extr. tube	SB–241	...	A91060	O
2	...	Smls. extr. tube	SB–241	...	A91060	H112
3	...	Plate, sheet	SB–209	...	A91100	O
4	...	Plate, sheet	SB–209	...	A91100	H112
5	...	Plate, sheet	SB–209	...	A91100	H112
6	...	Plate, sheet	SB–209	...	A91100	H112
7	...	Plate, sheet	SB–209	...	A91100	H12
8	...	Plate, sheet	SB–209	...	A91100	H14
9	...	Bar, rod, shapes	SB–221	...	A91100	O
10	...	Bar, rod, shapes	SB–221	...	A91100	H112
11	...	Smls. extr. tube	SB–241	...	A91100	O
12	...	Smls. extr. tube	SB–241	...	A91100	H112
13	...	Plate, sheet	SB–209	...	A93003	O
14	...	Plate, sheet	SB–209	...	A93003	H112
15	...	Plate, sheet	SB–209	...	A93003	H112
16	...	Plate, sheet	SB–209	...	A93003	H112
17	...	Plate, sheet	SB–209	...	A93003	H12
18	...	Plate, sheet	SB–209	...	A93003	H14
19	...	Drawn smls. tube	SB–210	...	A93003	O
20	...	Drawn smls. tube	SB–210	...	A93003	H113
21	...	Drawn smls. tube	SB–210	...	A93003	H12
22	...	Drawn smls. tube	SB–210	...	A93003	H14
23	...	Drawn smls. tube	SB–210	...	A93003	H18
24	...	Bar, rod, shapes	SB–221	...	A93003	O
25	...	Bar, rod, shapes	SB–221	...	A93003	H112
26	...	Cond. & heat exch. tubes	SB–234	...	A93003	H14
27	...	Cond. & heat exch. tubes	SB–234	...	A93003	H25
28	...	Smls. extr. tube	SB–241	...	A93003	O
29	...	Smls. extr. tube	SB–241	...	A93003	H112
30	...	Smls. pipe	SB–241	...	A93003	H112
31	...	Smls. pipe	SB–241	...	A93003	H18
32	...	Die forgings	SB–247	...	A93003	H112
33	...	Plate, sheet	SB–209	...	A93004	O
34	...	Plate, sheet	SB–209	...	A93004	H112
35	...	Plate, sheet	SB–209	...	A93004	H32
36	...	Plate, sheet	SB–209	...	A93004	H34
37	...	Plate, sheet	SB–209	...	A95052	O
38	...	Plate, sheet	SB–209	...	A95052	H112
39	...	Plate, sheet	SB–209	...	A95052	H112
40	...	Plate, sheet	SB–209	...	A95052	H32
41	...	Plate, sheet	SB–209	...	A95052	H34
42	...	Drawn smls. tube	SB–210	...	A95052	O
43	...	Drawn smls. tube	SB–210	...	A95052	H32
44	...	Drawn smls. tube	SB–210	...	A95052	H34
45	...	Cond. & heat exch. tubes	SB–234	...	A95052	H32

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Nonferrous Materials (Cont'd)
1	...	8.5	2.5	...
2	...	8.5	2.5	...
3	0.006–3.000	11	3.5	...
4	0.250–0.499	13	7	...
5	0.500–2.000	12	5	...
6	2.001–3.000	11.5	4	...
7	0.017–2.000	14	11	...
8	0.009–1.000	16	14	...
9	...	11	3	...
10	...	11	3	...
11	...	11	3	...
12	...	11	3	...
13	0.006–3.000	14	5	...
14	0.250–0.499	17	10	...
15	0.500–2.000	15	6	...
16	2.001–3.000	14.5	6	...
17	0.017–2.000	17	12	...
18	0.009–1.000	20	17	...
19	0.010–0.500	14	5	...
20	0.010–0.500	14	5	...
21	0.010–0.500	17	12	...
22	0.010–0.500	20	17	...
23	0.010–0.500	27	24	...
24	...	14	5	...
25	...	14	5	...
26	0.010–0.200	20	17	...
27	0.010–0.200	22	19	...
28	...	14	5	...
29	...	14	5	...
30	≥1.000	14	5	...
31	<1.000	27	24	...
32	≤4.000	14	5	...
33	0.006–3.000	22	8.5	...
34	0.250–3.000	23	9	...
35	0.017–2.000	28	21	...
36	0.009–1.000	32	25	...
37	0.006–3.000	25	9.5	...
38	0.250–0.499	28	16	...
39	0.500–3.000	25	9.5	...
40	0.017–2.000	31	23	...
41	0.009–1.000	34	26	...
42	0.010–0.450	25	10	...
43	0.010–0.450	31	23	...
44	0.010–0.450	34	26	...
45	0.010–0.200	31	23	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Nonferrous Materials (Cont'd)								
1	2.5	2.5	2.4	2.2	1.9	1.8	1.6	...	...
2	2.5	2.5	2.4	2.2	1.9	1.8	1.6	...	...
3	3.5	3.5	3.5	3.4	3.2	2.8	2.4	...	...
4	7.0	7.0	7.0	6.8	6.3	5.6	4.8	...	...
5	5.0	5.0	5.0	4.9	4.6	4.0	3.4	...	...
6	4.0	4.0	4.0	3.9	3.6	3.2	2.7	...	...
7	11.0	10.7	10.2	9.4	8.2	6.9	5.5	...	...
8	14.0	13.5	12.7	11.4	9.9	8.0	6.1	...	...
9	3.0	3.0	3.0	2.9	2.7	2.4	2.1	...	...
10	3.0	3.0	3.0	2.9	2.7	2.4	2.1	...	...
11	3.0	3.0	3.0	2.9	2.7	2.4	2.1	...	...
12	3.0	3.0	3.0	2.9	2.7	2.4	2.1	...	...
13	5.0	5.0	5.0	4.9	4.6	4.3	3.7	...	...
14	10.0	9.7	9.4	8.9	8.4	7.8	7.2	...	...
15	6.0	5.8	5.6	5.4	5.0	4.7	4.3	...	...
16	6.0	5.8	5.6	5.4	5.0	4.7	4.3	...	...
17	12.0	11.9	11.2	9.9	8.6	7.4	5.9	...	...
18	17.0	16.4	15.4	13.9	12.0	9.8	7.6	...	...
19	5.0	5.0	5.0	4.9	4.6	4.3	3.7	...	...
20	5.0	5.0	5.0	4.9	4.6	4.3	3.7	...	...
21	12.0	11.9	11.2	9.9	8.6	7.4	5.9	...	...
22	17.0	16.4	15.4	13.9	12.0	9.8	7.6	...	...
23	24.0	21.5	19.1	16.6	14.0	10.8	7.8	...	...
24	5.0	5.0	5.0	4.9	4.6	4.3	3.7	...	...
25	5.0	5.0	5.0	4.9	4.6	4.3	3.7	...	...
26	17.0	16.4	15.4	13.9	12.0	9.8	7.6	...	...
27	19.0	17.9	16.5	14.7	12.6	10.1	7.7	...	...
28	5.0	5.0	5.0	4.9	4.6	4.3	3.7	...	...
29	5.0	5.0	5.0	4.9	4.6	4.3	3.7	...	...
30	5.0	5.0	5.0	4.9	4.6	4.3	3.7	...	...
31	24.0	21.5	19.1	16.6	14.0	10.8	7.8	...	...
32	5.0	5.0	5.0	4.9	4.6	4.3	3.7	...	...
33	8.5	8.5	8.5	8.5	8.5	8.5	8.1	...	...
34	9.0	9.0	9.0	9.0	9.0	8.9	8.5	...	...
35	21.0	21.0	21.0	20.7	19.4	16.9	12.8	...	...
36	25.0	25.0	25.0	24.5	22.0	17.3	12.8	...	...
37	9.5	9.5	9.5	9.5	9.5	9.4	8.6	...	...
38	16.0	16.0	16.0	16.0	16.0	15.8	14.5	...	...
39	9.5	9.5	9.5	9.5	9.5	9.4	8.6	...	...
40	23.0	23.0	22.8	22.0	20.0	16.6	12.2	...	...
41	26.0	26.0	25.8	25.1	22.5	17.6	12.2	...	...
42	10.0	10.0	10.0	10.0	10.0	9.9	9.1	...	...
43	23.0	23.0	22.8	22.0	20.0	16.6	12.2	...	...
44	26.0	26.0	25.8	25.1	22.5	17.6	12.2	...	...
45	23.0	23.0	22.8	22.0	20.0	16.6	12.2	...	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Nonferrous Materials (Cont'd)
1	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding												
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
	Nonferrous Materials (Cont'd)												
1	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
	Nonferrous Materials (Cont'd)					
1	...	Cond. & heat exch. tubes	SB–234	...	A95052	H34
2	...	Smls. extr. tube	SB–241	...	A95052	O
3	...	Plate, sheet	SB–209	...	A95083	O
4	...	Plate, sheet	SB–209	...	A95083	O
5	...	Plate, sheet	SB–209	...	A95083	O
6	...	Plate, sheet	SB–209	...	A95083	O
7	...	Plate, sheet	SB–209	...	A95083	O
8	...	Plate, sheet	SB–209	...	A95083	H112
9	...	Plate, sheet	SB–209	...	A95083	H112
10	...	Plate, sheet	SB–209	...	A95083	H32
11	...	Plate, sheet	SB–209	...	A95083	H32
12	...	Bar, rod, shapes	SB–221	...	A95083	O
13	...	Bar, rod, shapes	SB–221	...	A95083	H111
14	...	Bar, rod, shapes	SB–221	...	A95083	H112
15	...	Smls. extr. tube	SB–241	...	A95083	O
16	...	Smls. extr. tube	SB–241	...	A95083	H111
17	...	Smls. extr. tube	SB–241	...	A95083	H112
18	...	Die & hand forgings	SB–247	...	A95083	H111
19	...	Die & hand forgings	SB–247	...	A95083	H112
20	...	Plate, sheet	SB–928	...	A95083	H321
21	...	Plate, sheet	SB–928	...	A95083	H321
22	...	Plate, sheet	SB–209	...	A95086	O
23	...	Plate, sheet	SB–209	...	A95086	H112
24	...	Plate, sheet	SB–209	...	A95086	H112
25	...	Plate, sheet	SB–209	...	A95086	H112
26	...	Plate, sheet	SB–209	...	A95086	H112
27	...	Plate, sheet	SB–209	...	A95086	H32
28	...	Plate, sheet	SB–209	...	A95086	H34
29	...	Bar, rod, shapes	SB–221	...	A95086	H112
30	...	Smls. extr. tube	SB–241	...	A95086	O
31	...	Smls. extr. tube	SB–241	...	A95086	H111
32	...	Smls. extr. tube	SB–241	...	A95086	H112
33	...	Plate, sheet	SB–928	...	A95086	H116
34	...	Plate, sheet	SB–209	...	A95154	O
35	...	Plate, sheet	SB–209	...	A95154	H112
36	...	Plate, sheet	SB–209	...	A95154	H112
37	...	Plate, sheet	SB–209	...	A95154	H32
38	...	Plate, sheet	SB–209	...	A95154	H34
39	...	Drawn smls. tube	SB–210	...	A95154	O
40	...	Drawn smls. tube	SB–210	...	A95154	H34
41	...	Bar, rod, shapes	SB–221	...	A95154	O
42	...	Bar, rod, shapes	SB–221	...	A95154	H112
43	...	Plate, sheet	SB–209	...	A95254	O
44	...	Plate, sheet	SB–209	...	A95254	H112
45	...	Plate, sheet	SB–209	...	A95254	H112

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Nonferrous Materials (Cont'd)
1	0.010–0.200	34	26	...
2	...	25	10	...
3	0.051–1.500	40	18	...
4	1.501–3.000	39	17	...
5	3.001–5.000	38	16	...
6	5.001–7.000	37	15	...
7	7.001–8.000	36	14	...
8	0.250–1.500	40	18	...
9	1.501–3.000	39	17	...
10	0.125–1.500	44	31	...
11	1.501–3.000	41	29	...
12	≤5.000	39	16	...
13	≤5.000	40	24	...
14	≤5.000	39	16	...
15	...	39	16	...
16	...	40	24	...
17	...	39	16	...
18	≤4.000	39	20	...
19	≤4.000	39	16	...
20	0.125–1.500	44	31	...
21	1.501–3.000	41	29	...
22	0.020–2.000	35	14	...
23	0.188–0.499	36	18	...
24	0.500–1.000	35	16	...
25	1.001–2.000	35	14	...
26	2.001–3.000	34	14	...
27	0.020–2.000	40	28	...
28	0.009–1.000	44	34	...
29	≤5.000	35	14	...
30	...	35	14	...
31	...	36	21	...
32	...	35	14	...
33	0.063–2.000	40	28	...
34	0.020–3.000	30	11	...
35	0.250–0.499	32	18	...
36	0.500–3.000	30	11	...
37	0.020–2.000	36	26	...
38	0.009–1.000	39	29	...
39	0.010–0.450	30	11	...
40	0.010–0.450	39	29	...
41	...	30	11	...
42	...	30	11	...
43	0.051–3.000	30	11	...
44	0.250–0.499	32	18	...
45	0.500–3.000	30	11	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Nonferrous Materials (Cont'd)								
1	26.0	26.0	25.8	25.1	22.5	17.6	12.2	...	...
2	10.0	10.0	10.0	10.0	10.0	9.9	9.1	...	...
3	18.0	18.0	...	...	...	...	...	...	...
4	17.0	17.0	...	...	...	...	...	...	...
5	16.0	16.0	...	...	...	...	...	...	...
6	15.0	15.0	...	...	...	...	...	...	...
7	14.0	14.0	...	...	...	...	...	...	...
8	18.0	18.0	...	...	...	...	...	...	...
9	17.0	17.0	...	...	...	...	...	...	...
10	31.0	31.0	...	...	...	...	...	...	...
11	29.0	29.0	...	...	...	...	...	...	...
12	16.0	16.0	...	...	...	...	...	...	...
13	24.0	24.0	...	...	...	...	...	...	...
14	16.0	16.0	...	...	...	...	...	...	...
15	16.0	16.0	...	...	...	...	...	...	...
16	24.0	24.0	...	...	...	...	...	...	...
17	16.0	16.0	...	...	...	...	...	...	...
18	20.0	20.0	...	...	...	...	...	...	...
19	16.0	16.0	...	...	...	...	...	...	...
20	31.0	31.0	...	...	...	...	...	...	...
21	29.0	29.0	...	...	...	...	...	...	...
22	14.0	14.0	...	...	...	...	...	...	...
23	18.0	18.0	...	...	...	...	...	...	...
24	16.0	16.0	...	...	...	...	...	...	...
25	14.0	14.0	...	...	...	...	...	...	...
26	14.0	14.0	...	...	...	...	...	...	...
27	28.0	28.0	...	...	...	...	...	...	...
28	34.0	34.0	...	...	...	...	...	...	...
29	14.0	14.0	...	...	...	...	...	...	...
30	14.0	14.0	...	...	...	...	...	...	...
31	21.0	21.0	...	...	...	...	...	...	...
32	14.0	14.0	...	...	...	...	...	...	...
33	28.0	28.0	...	...	...	...	...	...	...
34	11.0	11.0	...	...	...	...	...	...	...
35	18.0	18.0	...	...	...	...	...	...	...
36	11.0	11.0	...	...	...	...	...	...	...
37	26.0	26.0	...	...	...	...	...	...	...
38	29.0	29.0	...	...	...	...	...	...	...
39	11.0	11.0	...	...	...	...	...	...	...
40	29.0	29.0	...	...	...	...	...	...	...
41	11.0	11.0	...	...	...	...	...	...	...
42	11.0	11.0	...	...	...	...	...	...	...
43	11.0	11.0	...	...	...	...	...	...	...
44	18.0	18.0	...	...	...	...	...	...	...
45	11.0	11.0	...	...	...	...	...	...	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Nonferrous Materials (Cont'd)
1	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding												
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
	Nonferrous Materials (Cont'd)												
1	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
	Nonferrous Materials (Cont'd)					
1	...	Plate, sheet	SB–209	...	A95254	H32
2	...	Plate, sheet	SB–209	...	A95254	H34
3	...	Plate, sheet	SB–209	...	A95454	O
4	...	Plate, sheet	SB–209	...	A95454	H112
5	...	Plate, sheet	SB–209	...	A95454	H112
6	...	Plate, sheet	SB–209	...	A95454	H32
7	...	Plate, sheet	SB–209	...	A95454	H34
8	...	Bar, rod, shapes	SB–221	...	A95454	O
9	...	Bar, rod, shapes	SB–221	...	A95454	H111
10	...	Bar, rod, shapes	SB–221	...	A95454	H112
11	...	Cond. & heat exch. tubes	SB–234	...	A95454	H32
12	...	Cond. & heat exch. tubes	SB–234	...	A95454	H34
13	...	Smls. extr. tube	SB–241	...	A95454	O
14	...	Smls. extr. tube	SB–241	...	A95454	H111
15	...	Smls. extr. tube	SB–241	...	A95454	H112
(**21**) 16	...	Plate, sheet	SB–209	...	A95456	O
(**21**) 17	...	Plate, sheet	SB–209	...	A95456	O
(**21**) 18	...	Plate, sheet	SB–209	...	A95456	O
(**21**) 19	...	Plate, sheet	SB–209	...	A95456	O
(**21**) 20	...	Plate, sheet	SB–209	...	A95456	O
(**21**) 21	...	Plate, sheet	SB–209	...	A95456	H112
(**21**) 22	...	Plate, sheet	SB–209	...	A95456	H112
(**21**) 23	...	Plate, sheet	SB–209	...	A95456	H32
(**21**) 24	...	Plate, sheet	SB–209	...	A95456	H32
(**21**) 25	...	Plate, sheet	SB–209	...	A95456	H32
(**21**) 26	...	Bar, rod, shapes	SB–221	...	A95456	O
(**21**) 27	...	Bar, rod, shapes	SB–221	...	A95456	H111
(**21**) 28	...	Bar, rod, shapes	SB–221	...	A95456	H112
(**21**) 29	...	Smls. extr. tube	SB–241	...	A95456	O
(**21**) 30	...	Smls. extr. tube	SB–241	...	A95456	H111
(**21**) 31	...	Smls. extr. tube	SB–241	...	A95456	H112
(**21**) 32	...	Plate, sheet	SB–928	...	A95456	H321
(**21**) 33	...	Plate, sheet	SB–928	...	A95456	H321
(**21**) 34	...	Plate, sheet	SB–928	...	A95456	H321
35	...	Plate, sheet	SB–209	...	A96061	T4
36	...	Plate, sheet	SB–209	...	A96061	T451
37	...	Plate, sheet	SB–209	...	A96061	T6
38	...	Plate, sheet	SB–209	...	A96061	T651
39	...	Plate, sheet	SB–209	...	A96061	T651
40	...	Drawn smls. tube	SB–210	...	A96061	T4
41	...	Drawn smls. tube	SB–210	...	A96061	T6
42	...	Bar, rod, wire	SB–211	...	A96061	T6
43	...	Bar, rod, wire	SB–211	...	A96061	T651
44	...	Bar, rod, shapes	SB–221	...	A96061	T4
45	...	Bar, rod, shapes	SB–221	...	A96061	T6

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Nonferrous Materials (Cont'd)
1	0.051–2.000	36	26	...
2	0.051–1.000	39	29	...
3	0.020–3.000	31	12	...
4	0.250–0.499	32	18	...
5	0.500–3.000	31	12	...
6	0.020–2.000	36	26	...
7	0.020–1.000	39	29	...
8	≤5.000	31	12	...
9	≤5.000	33	19	...
10	≤5.000	31	12	...
11	0.010–0.200	36	26	...
12	0.010–0.200	39	29	...
13	...	31	12	...
14	...	33	19	...
15	...	31	12	...
16	0.051–1.500	42	19	...
17	1.501–3.000	41	18	...
18	3.001–5.000	40	17	...
19	5.001–7.000	39	16	...
20	7.001–8.000	38	15	...
21	0.250–1.500	42	19	...
22	1.501–3.000	41	18	...
23	0.188–0.499	46	33	...
24	0.500–1.500	44	31	...
25	1.501–3.000	41	29	...
26	≤5.000	41	19	...
27	≤5.000	42	26	...
28	≤5.000	41	19	...
29	...	41	19	...
30	...	42	26	...
31	...	41	19	...
32	0.188–0.499	46	33	...
33	0.500–1.500	44	31	...
34	1.501–3.000	41	29	...
35	0.006–0.249	30	16	...
36	0.250–3.000	30	16	...
37	0.006–0.249	42	35	...
38	0.250–4.000	42	35	...
39	4.001–6.000	40	35	...
40	0.025–0.500	30	16	...
41	0.025–0.500	42	35	...
42	$1/8 < t \le 8$	42	35	...
43	$1/8 < t \le 8$	42	35	...
44	...	26	16	...
45	...	38	35	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Nonferrous Materials (Cont'd)								
1	26.0	26.0	...	...	...	...	...	...	...
2	29.0	29.0	...	...	...	...	...	...	...
3	12.0	12.0	12.0	12.0	11.9	11.5	10.6	...	...
4	18.0	18.0	18.0	18.0	17.8	17.2	15.9	...	...
5	12.0	12.0	12.0	12.0	11.9	11.5	10.6	...	...
6	26.0	25.9	25.7	25.0	23.7	21.4	18.1	...	...
7	29.0	28.6	27.5	25.9	23.9	21.4	18.1	...	...
8	12.0	12.0	12.0	12.0	11.9	11.5	10.6	...	...
9	19.0	19.0	19.0	19.0	18.8	18.2	16.8	...	...
10	12.0	12.0	12.0	12.0	11.9	11.5	10.6	...	...
11	26.0	25.9	25.7	25.0	23.7	21.4	18.1	...	...
12	29.0	28.6	27.5	25.9	23.9	21.4	18.1	...	...
13	12.0	12.0	12.0	12.0	11.9	11.5	10.6	...	...
14	19.0	19.0	19.0	19.0	18.8	18.2	16.8	...	...
15	12.0	12.0	12.0	12.0	11.9	11.5	10.6	...	...
16	19.0	19.0	...	...	...	...	...	...	...
17	18.0	18.0	...	...	...	...	...	...	...
18	17.0	17.0	...	...	...	...	...	...	...
19	16.0	16.0	...	...	...	...	...	...	...
20	15.0	15.0	...	...	...	...	...	...	...
21	19.0	19.0	...	...	...	...	...	...	...
22	18.0	18.0	...	...	...	...	...	...	...
23	33.0	33.0	...	...	...	...	...	...	...
24	31.0	31.0	...	...	...	...	...	...	...
25	29.0	29.0	...	...	...	...	...	...	...
26	19.0	19.0	...	...	...	...	...	...	...
27	26.0	26.0	...	...	...	...	...	...	...
28	19.0	19.0	...	...	...	...	...	...	...
29	19.0	19.0	...	...	...	...	...	...	...
30	26.0	26.0	...	...	...	...	...	...	...
31	19.0	19.0	...	...	...	...	...	...	...
32	33.0	33.0	...	...	...	...	...	...	...
33	31.0	31.0	...	...	...	...	...	...	...
34	29.0	29.0	...	...	...	...	...	...	...
35	16.0	15.7	15.5	15.2	15.2	15.2	11.6	...	...
36	16.0	15.7	15.5	15.2	15.2	15.2	11.6	...	...
37	35.0	34.4	34.2	32.5	27.7	19.9	13.3	...	...
38	35.0	34.4	34.2	32.5	27.7	19.9	13.3	...	...
39	35.0	34.4	34.2	32.5	27.7	19.9	13.3	...	...
40	16.0	15.7	15.5	15.2	15.2	15.2	11.6	...	...
41	35.0	34.4	34.2	32.5	27.7	19.9	13.3	...	...
42	35.0	34.6	33.7	32.4	27.4	20.0	13.3	...	...
43	35.0	34.6	33.7	32.4	27.4	20.0	13.3	...	...
44	16.0	15.7	15.5	15.2	15.2	15.2	11.6	...	...
45	35.0	34.4	34.2	32.5	27.7	19.9	13.3	...	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Nonferrous Materials (Cont'd)
1	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Nonferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
17	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
18	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
19	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
20	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
21	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
22	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
23	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
24	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
25	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
26	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
27	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
28	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
29	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
30	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
31	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
32	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
33	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
34	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
35	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
	Nonferrous Materials (Cont'd)					
1	...	Cond. & heat exch. tubes	SB–234	...	A96061	T4
2	...	Cond. & heat exch. tubes	SB–234	...	A96061	T6
3	...	Smls. extr. tube	SB–241	...	A96061	T4
4	...	Smls. extr. tube	SB–241	...	A96061	T6
5	...	Smls. pipe	SB–241	...	A96061	T6 drawn
6	...	Smls. pipe	SB–241	...	A96061	T6
7	...	Die forgings	SB–247	...	A96061	T6
8	...	Hand forgings	SB–247	...	A96061	T6
9	...	Hand forgings	SB–247	...	A96061	T6
10	...	Shapes	SB–308	...	A96061	T6
11	...	Drawn smls. tube	SB–210	...	A96063	T6
12	...	Bar, rod, shapes	SB–221	...	A96063	T1
13	...	Bar, rod, shapes	SB–221	...	A96063	T1
14	...	Bar, rod, shapes	SB–221	...	A96063	T5
15	...	Bar, rod, shapes	SB–221	...	A96063	T5
16	...	Bar, rod, shapes	SB–221	...	A96063	T6
17	...	Smls. extr. tube	SB–241	...	A96063	O
18	...	Smls. extr. tube	SB–241	...	A96063	T1
19	...	Smls. extr. tube	SB–241	...	A96063	T1
20	...	Smls. extr. tube	SB–241	...	A96063	T5
21	...	Smls. extr. tube	SB–241	...	A96063	T5
22	...	Smls. extr. tube	SB–241	...	A96063	T6
23	...	Smls. pipe	SB–241	...	A96063	O
(**21**) 24	AlSil2Fe	Castings	SB/EN 1706	...	AC44300	...
25	...	Rod	SB–187	...	C10200	O60
26	...	Smls. pipe	SB–42	...	C10200	O61
27	...	Smls. tube	SB–75	...	C10200	O60
28	...	Plate, sheet, strip	SB–152	...	C10200	H00
29	...	Plate, sheet, strip	SB–152	...	C10200	H01
30	...	Plate, sheet, strip	SB–152	...	C10200	H02
31	...	Plate, sheet, strip	SB–152	...	C10200	H03
32	...	Plate, sheet, strip	SB–152	...	C10200	H04
(**21**) 33	...	Plate, sheet, strip	SB–152	...	C10200	M20, O25
34	...	Smls. pipe	SB–42	...	C10200	H55
35	...	Smls. tube	SB–75	...	C10200	H55
36	...	Smls. cond. tube	SB–111	...	C10200	H55
37	...	Smls. U–bend tube	SB–395	...	C10200	H55
38	...	Smls. pipe	SB–42	...	C10200	H80
39	...	Smls. tube	SB–75	...	C10200	H80
40	...	Smls. cond. tube	SB–111	...	C10200	H80
41	...	Plate, sheet, strip	SB–152	...	C10400	H00
42	...	Plate, sheet, strip	SB–152	...	C10400	H01
43	...	Plate, sheet, strip	SB–152	...	C10400	H02
44	...	Plate, sheet, strip	SB–152	...	C10400	H03
45	...	Plate, sheet, strip	SB–152	...	C10400	H04

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Nonferrous Materials (Cont'd)
1	0.025–0.200	30	16	...
2	0.025–0.200	42	35	...
3	...	26	16	...
4	...	38	35	...
5	<1.000	42	35	...
6	≥1.000	38	35	...
7	≤4.000	38	35	...
8	≤4.000	37	33	...
9	4.001–8.000	35	32	...
10	...	38	35	...
11	0.025–0.500	33	28	...
12	≤0.500	17	9	...
13	0.501–1.000	16	8	...
14	≤0.500	22	16	...
15	0.501–1.000	21	15	...
16	≤1.000	30	25	...
17	...	16	5	...
18	≤0.500	17	9	...
19	0.501–1.000	16	8	...
20	≤0.500	22	16	...
21	0.501–1.000	21	15	...
22	≤1.000	30	25	...
23	...	16	5	...
24	...	35	19	...
25	All	28	8	...
26	All	30	9	...
27	All	30	9	...
28	...	30	10	...
29	...	30	10	...
30	...	30	10	...
31	...	30	10	...
32	...	30	10	...
33	...	30	10	...
34	2 < NPS ≤ 12	36	30	...
35	All	36	30	...
36	...	36	30	...
37	...	36	30	...
38	$\frac{1}{8}$ < NPS ≤ 2	45	40	...
39	<4	45	40	...
40	...	45	40	...
41	...	30	10	...
42	...	30	10	...
43	...	30	10	...
44	...	30	10	...
45	...	30	10	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Nonferrous Materials (Cont'd)								
1	16.0	15.7	15.5	15.2	15.2	15.2	11.6	...	...
2	35.0	34.4	34.2	32.5	27.7	19.9	13.3	...	...
3	16.0	15.7	15.5	15.2	15.2	15.2	11.6	...	...
4	35.0	34.4	34.2	32.5	27.7	19.9	13.3	...	...
5	35.0	34.4	34.2	32.5	27.7	19.9	13.3	...	...
6	35.0	34.4	34.2	32.5	27.7	19.9	13.3	...	...
7	35.0	34.4	34.2	32.5	27.7	19.9	13.3	...	...
8	33.0	32.5	32.2	30.6	26.1	18.7	12.6	...	...
9	32.0	31.4	31.1	30.5	30.5	30.5	23.2	...	...
10	35.0	34.4	34.2	32.5	27.7	19.9	13.3	...	...
11	28.0	26.9	26.4	24.2	18.4	9.8	5.7	...	...
12	9.0	9.0	9.0	8.9	8.9	8.9	5.1	...	...
13	8.0	8.0	8.0	7.9	7.9	7.9	5.1	...	...
14	16.0	15.5	15.1	15.0	13.2	8.9	5.1	...	...
15	15.0	14.5	14.2	14.0	12.5	8.9	5.1	...	...
16	25.0	24.1	23.5	21.5	16.3	8.7	5.1	...	...
17	5.0	4.9	4.8	4.5	4.2	3.7	...	...	...
18	9.0	9.0	9.0	8.9	8.9	8.9	...	...	...
19	8.0	8.0	8.0	7.9	7.9	7.9	...	...	...
20	16.0	15.5	15.1	15.0	13.2	8.9	5.1	...	...
21	15.0	14.5	14.2	14.0	12.5	8.9	5.1	...	...
22	25.0	24.0	23.5	21.6	16.4	8.7	5.1	...	...
23	5.0	4.9	4.8	4.5	4.2	3.7	...	...	...
24	18.9	15.5	13.2	12.5	12.5	...	...	...	...
25	8.0	7.0	7.0	7.0	7.0	6.8	6.5	6.1	...
26	9.0	7.9	7.9	7.9	7.9	7.6	7.3	6.9	...
27	9.0	7.9	7.9	7.9	7.9	7.6	7.3	6.9	...
28	10.0	8.8	8.8	8.8	8.8	8.5	8.1	7.7	...
29	10.0	8.8	8.8	8.8	8.8	8.5	8.1	7.7	...
30	10.0	8.8	8.8	8.8	8.8	8.5	8.1	7.7	...
31	10.0	8.8	8.8	8.8	8.8	8.5	8.1	7.7	...
32	10.0	8.8	8.8	8.8	8.8	8.5	8.1	7.7	...
33	10.0	8.8	8.8	8.8	8.8	8.5	8.1	7.7	...
34	30.0	29.7	29.0	28.1	27.0	25.7	24.4	23.0	...
35	30.0	29.7	29.0	28.1	27.0	25.7	24.4	23.0	...
36	30.0	29.7	29.0	28.1	27.0	25.7	24.4	23.0	...
37	30.0	29.7	29.0	28.1	27.0	25.7	24.4	23.0	...
38	40.0	38.3	37.6	36.9	35.7	33.7	30.5	25.5	...
39	40.0	38.3	37.6	36.9	35.7	33.7	30.5	25.5	...
40	40.0	38.3	37.6	36.9	35.7	33.7	30.5	25.5	...
41	10.0	8.8	8.8	8.8	8.8	8.5	8.1	7.7	...
42	10.0	8.8	8.8	8.8	8.8	8.5	8.1	7.7	...
43	10.0	8.8	8.8	8.8	8.8	8.5	8.1	7.7	...
44	10.0	8.8	8.8	8.8	8.8	8.5	8.1	7.7	...
45	10.0	8.8	8.8	8.8	8.8	8.5	8.1	7.7	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Nonferrous Materials (Cont'd)
1	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Nonferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
25	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
34	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
		Nonferrous Materials (Cont'd)					
(**21**)	1	...	Plate, sheet, strip	SB–152	...	C10400	M20, O25
	2	...	Plate, sheet, strip	SB–152	...	C10500	H00
	3	...	Plate, sheet, strip	SB–152	...	C10500	H01
	4	...	Plate, sheet, strip	SB–152	...	C10500	H02
	5	...	Plate, sheet, strip	SB–152	...	C10500	H03
	6	...	Plate, sheet, strip	SB–152	...	C10500	H04
(**21**)	7	...	Plate, sheet, strip	SB–152	...	C10500	M20, O25
	8	...	Plate, sheet, strip	SB–152	...	C10700	H00
	9	...	Plate, sheet, strip	SB–152	...	C10700	H01
	10	...	Plate, sheet, strip	SB–152	...	C10700	H02
	11	...	Plate, sheet, strip	SB–152	...	C10700	H03
	12	...	Plate, sheet, strip	SB–152	...	C10700	H04
(**21**)	13	...	Plate, sheet, strip	SB–152	...	C10700	M20, O25
	14	...	Bar, rod	SB–187	...	C11000	H04
	15	...	Bar, rod	SB–187	...	C11000	O60
(**21**)	16	...	Plate, sheet, strip, bar	SB–152	...	C11000	M20, O25
	17	...	Smls. tube	SB–75	...	C12000	O50
	18	...	Smls. tube	SB–75	...	C12000	O60
	19	...	Smls. pipe	SB–42	...	C12000	O61
	20	...	Smls. pipe	SB–42	...	C12000	H55
	21	...	Smls. tube	SB–75	...	C12000	H55
	22	...	Smls. cond. tube	SB–111	...	C12000	H55
	23	...	Smls. U–bend tube	SB–395	...	C12000	H55
	24	...	Smls. pipe	SB–42	...	C12000	H80
	25	...	Smls. tube	SB–75	...	C12000	H80
	26	...	Smls. cond. tube	SB–111	...	C12000	H80
(**21**)	27	...	Finned tube	SB–359	...	C12200	O62
	28	...	Smls. tube	SB–75	...	C12200	O50
	29	...	Smls. tube	SB–75	...	C12200	O60
	30	...	Smls. pipe	SB–42	...	C12200	O61
	31	...	Finned tube	SB–359	...	C12200	O61
	32	...	Wld. cond. tube	SB–543	...	C12200	WO61
	33	...	Plate, sheet, strip	SB–152	...	C12200	H00
	34	...	Plate, sheet, strip	SB–152	...	C12200	H01
	35	...	Plate, sheet, strip	SB–152	...	C12200	H02
	36	...	Plate, sheet, strip	SB–152	...	C12200	H03
	37	...	Plate, sheet, strip	SB–152	...	C12200	H04
(**21**)	38	...	Plate, sheet, strip	SB–152	...	C12200	M20, O25
	39	...	Wld. cond. tube	SB–543	...	C12200	WC55
	40	...	Smls. pipe	SB–42	...	C12200	H55
	41	...	Smls. tube	SB–75	...	C12200	H55
	42	...	Smls. cond. tube	SB–111	...	C12200	H55
	43	...	Finned tube	SB–359	...	C12200	H55
	44	...	Smls. U–bend tube	SB–395	...	C12200	H55
	45	...	Smls. pipe	SB–42	...	C12200	H80

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Nonferrous Materials (Cont'd)
1	...	30	10	...
2	...	30	10	...
3	...	30	10	...
4	...	30	10	...
5	...	30	10	...
6	...	30	10	...
7	...	30	10	...
8	...	30	10	...
9	...	30	10	...
10	...	30	10	...
11	...	30	10	...
12	...	30	10	...
13	...	30	10	...
14	All	28	8	...
15	All	28	8	...
16	...	30	10	...
17	All	30	9	...
18	All	30	9	...
19	All	30	9	...
20	2 < NPS ≤ 12	36	30	...
21	All	36	30	...
22	...	36	30	...
23	...	36	30	...
24	$\frac{1}{8}$ < NPS ≤ 2	45	40	...
25	<4	45	40	...
26	...	45	40	...
27	...	30	6.5	...
28	All	30	9	...
29	All	30	9	...
30	All	30	9	...
31	...	30	9	...
32	...	30	9	...
33	...	30	10	...
34	...	30	10	...
35	...	30	10	...
36	...	30	10	...
37	...	30	10	...
38	...	30	10	...
39	...	32	15	...
40	2 < NPS ≤ 12	36	30	...
41	All	36	30	...
42	...	36	30	...
43	...	36	30	...
44	...	36	30	...
45	$\frac{1}{8}$ < NPS ≤ 3	45	40	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Nonferrous Materials (Cont'd)								
1	10.0	8.8	8.8	8.8	8.8	8.5	8.1	7.7	...
2	10.0	8.8	8.8	8.8	8.8	8.5	8.1	7.7	...
3	10.0	8.8	8.8	8.8	8.8	8.5	8.1	7.7	...
4	10.0	8.8	8.8	8.8	8.8	8.5	8.1	7.7	...
5	10.0	8.8	8.8	8.8	8.8	8.5	8.1	7.7	...
6	10.0	8.8	8.8	8.8	8.8	8.5	8.1	7.7	...
7	10.0	8.8	8.8	8.8	8.8	8.5	8.1	7.7	...
8	10.0	8.8	8.8	8.8	8.8	8.5	8.1	7.7	...
9	10.0	8.8	8.8	8.8	8.8	8.5	8.1	7.7	...
10	10.0	8.8	8.8	8.8	8.8	8.5	8.1	7.7	...
11	10.0	8.8	8.8	8.8	8.8	8.5	8.1	7.7	...
12	10.0	8.8	8.8	8.8	8.8	8.5	8.1	7.7	...
13	10.0	8.8	8.8	8.8	8.8	8.5	8.1	7.7	...
14	8.0	6.8	6.5	6.4	6.3	6.1	5.8	5.6	...
15	8.0	7.0	7.0	7.0	7.0	6.8	6.5	6.1	...
16	10.0	8.8	8.8	8.8	8.8	8.5	8.1	7.7	...
17	9.0	7.9	7.9	7.9	7.9	7.6	7.3	6.9	...
18	9.0	7.9	7.9	7.9	7.9	7.6	7.3	6.9	...
19	9.0	7.9	7.9	7.9	7.9	7.6	7.3	6.9	...
20	30.0	29.7	29.0	28.1	27.0	25.7	24.4	23.0	...
21	30.0	29.7	29.0	28.1	27.0	25.7	24.4	23.0	...
22	30.0	29.7	29.0	28.1	27.0	25.7	24.4	23.0	...
23	30.0	29.7	29.0	28.1	27.0	25.7	24.4	23.0	...
24	40.0	38.3	37.6	36.9	35.7	33.7	30.5	25.5	...
25	40.0	38.3	37.6	36.9	35.7	33.7	30.5	25.5	...
26	40.0	38.3	37.6	36.9	35.7	33.7	30.5	25.5	...
27	6.5	5.7	5.7	5.7	5.7	5.5	5.3	5.0	...
28	9.0	7.9	7.9	7.9	7.9	7.6	7.3	6.9	...
29	9.0	7.9	7.9	7.9	7.9	7.6	7.3	6.9	...
30	9.0	7.9	7.9	7.9	7.9	7.6	7.3	6.9	...
31	9.0	7.9	7.9	7.9	7.9	7.6	7.3	6.9	...
32	9.0	7.9	7.9	7.9	7.9	7.6	7.3	6.9	...
33	10.0	8.8	8.8	8.8	8.8	8.5	8.1	7.7	...
34	10.0	8.8	8.8	8.8	8.8	8.5	8.1	7.7	...
35	10.0	8.8	8.8	8.8	8.8	8.5	8.1	7.7	...
36	10.0	8.8	8.8	8.8	8.8	8.5	8.1	7.7	...
37	10.0	8.8	8.8	8.8	8.8	8.5	8.1	7.7	...
38	10.0	8.8	8.8	8.8	8.8	8.5	8.1	7.7	...
39	15.0	14.8	14.5	14.1	13.5	12.9	12.2	11.5	...
40	30.0	29.7	29.0	28.1	27.0	25.7	24.4	23.0	...
41	30.0	29.7	29.0	28.1	27.0	25.7	24.4	23.0	...
42	30.0	29.7	29.0	28.1	27.0	25.7	24.4	23.0	...
43	30.0	29.7	29.0	28.1	27.0	25.7	24.4	23.0	...
44	30.0	29.7	29.0	28.1	27.0	25.7	24.4	23.0	...
45	40.0	38.3	37.6	36.9	35.7	33.7	30.5	25.5	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Nonferrous Materials (Cont'd)
1	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Nonferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
2	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
28	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
		Nonferrous Materials (Cont'd)					
	1	...	Smls. cond. tube	SB–75	...	C12200	H80
	2	...	Smls. tube	SB–111	...	C12200	H80
	3	...	Plate, sheet, strip, bar	SB–152	...	C12300	H00
	4	...	Plate, sheet, strip, bar	SB–152	...	C12300	H01
	5	...	Plate, sheet, strip, bar	SB–152	...	C12300	H02
	6	...	Plate, sheet, strip, bar	SB–152	...	C12300	H03
	7	...	Plate, sheet, strip, bar	SB–152	...	C12300	H04
(**21**)	8	...	Plate, sheet, strip, bar	SB–152	...	C12300	M20, O25
(**21**)	9	...	Plate, sheet, strip	SB–152	...	C14200	M20, O25
	10	...	Smls. cond. tube	SB–111	...	C14200	H55
	11	...	Smls. U–bend tube	SB–395	...	C14200	H55
	12	...	Smls. cond. tube	SB–111	...	C14200	H80
	13	...	Smls. cond. tube	SB–111	...	C19200	O61
	14	...	Smls. U–bend tube	SB–395	...	C19200	O61
	15	...	Wld. cond. tube	SB–543	...	C19400	WO61
	16	...	Wld. cond. tube	SB–543	...	C19400	WC55
	17	...	Smls. pipe	SB–43	...	C23000	O61 and H58
	18	...	Smls. cond. tube	SB–111	...	C23000	O61
	19	...	Smls. tube	SB–135	...	C23000	O50 and O60
	20	...	Smls. U–bend tube	SB–395	...	C23000	O61
	21	...	Wld. cond. tube	SB–543	...	C23000	WO61 and WC55
	22	...	Smls. tube	SB–111	...	C28000	O25
	23	...	Plate	SB–171	...	C36500	O25 and M20
	24	...	Plate	SB–171	...	C36500	O25 and M20
	25	...	Plate	SB–171	...	C36500	O25 and M20
(**21**)	26	...	Plate	SB–171	...	C44300	M10, M20
(**21**)	27	...	Plate	SB–171	...	C44300	O20, O25
	28	...	Smls. cond. tube	SB–111	...	C44300	O61
	29	...	Finned tube	SB–359	...	C44300	O61
	30	...	Smls. U–bend tube	SB–395	...	C44300	O61
	31	...	Wld. cond. tube	SB–543	...	C44300	WO61
(**21**)	32	...	Plate	SB–171	...	C44400	M10, M20
(**21**)	33	...	Plate	SB–171	...	C44400	O20, O25
	34	...	Smls. cond. tube	SB–111	...	C44400	O61
	35	...	Finned tube	SB–359	...	C44400	O61
	36	...	Smls. U–bend tube	SB–395	...	C44400	O61
	37	...	Wld. cond. tube	SB–543	...	C44400	WO61
(**21**)	38	...	Plate	SB–171	...	C44500	M10, M20
(**21**)	39	...	Plate	SB–171	...	C44500	O20, O25
	40	...	Smls. cond. tube	SB–111	...	C44500	O61
	41	...	Finned tube	SB–359	...	C44500	O61
	42	...	Smls. U–bend tube	SB–395	...	C44500	O61
	43	...	Wld. cond. tube	SB–543	...	C44500	WO61
(**21**)	44	...	Plate	SB–171	...	C46400	M10, M20
(**21**)	45	...	Plate	SB–171	...	C46400	O20, O25

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Nonferrous Materials (Cont'd)
1	<4	45	40	...
2	...	45	40	...
3	...	30	10	...
4	...	30	10	...
5	...	30	10	...
6	...	30	10	...
7	...	30	10	...
8	...	30	10	...
9	...	30	10	...
10	...	36	30	...
11	...	36	30	...
12	...	45	40	...
13	...	38	12	...
14	...	38	12	...
15	...	45	15	...
16	...	45	22	...
17	...	40	12	...
18	...	40	12	...
19	...	40	12	...
20	...	40	12	...
21	...	40	12	...
22	...	50	20	...
23	>3.5 to ≤ 5	40	12	...
24	>2 to ≤ 3.5	45	15	...
25	≤2	50	20	...
26	≤4	45	15	...
27	≤4	45	15	...
28	...	45	15	...
29	...	45	15	...
30	...	45	15	...
31	...	45	15	...
32	≤4	45	15	...
33	≤4	45	15	...
34	...	45	15	...
35	...	45	15	...
36	...	45	15	...
37	...	45	15	...
38	≤4	45	15	...
39	≤4	45	15	...
40	...	45	15	...
41	...	45	15	...
42	...	45	15	...
43	...	45	15	...
44	$3 < t \leq 5$	50	18	...
45	≤3	50	20	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Nonferrous Materials (Cont'd)								
1	40.0	38.3	37.6	36.9	35.7	33.7	30.5	25.5	...
2	40.0	38.3	37.6	36.9	35.7	33.7	30.5	25.5	...
3	10.0	8.8	8.8	8.8	8.8	8.5	8.1	7.7	...
4	10.0	8.8	8.8	8.8	8.8	8.5	8.1	7.7	...
5	10.0	8.8	8.8	8.8	8.8	8.5	8.1	7.7	...
6	10.0	8.8	8.8	8.8	8.8	8.5	8.1	7.7	...
7	10.0	8.8	8.8	8.8	8.8	8.5	8.1	7.7	...
8	10.0	8.8	8.8	8.8	8.8	8.5	8.1	7.7	...
9	10.0	8.5	8.1	8.0	7.8	7.6	7.3	7.0	...
10	30.0	29.7	29.0	28.1	27.0	25.7	24.4	23.0	...
11	30.0	29.7	29.0	28.1	27.0	25.7	24.4	23.0	...
12	40.0	38.3	37.6	36.9	35.7	33.7	30.5	25.5	...
13	12.0	10.7	10.1	9.6	9.3	9.0	8.8	8.5	...
14	12.0	10.7	10.1	9.6	9.3	9.0	8.8	8.5	...
15	15.0	14.8	14.6	14.3	13.8	13.4	12.8	12.3	...
16	22.0	21.8	21.4	20.9	20.3	19.6	18.8	18.0	...
17	12.0	12.0	12.0	12.0	12.0	12.0	11.9	11.6	11.0
18	12.0	12.0	12.0	12.0	12.0	12.0	11.9	11.6	11.0
19	12.0	12.0	12.0	12.0	12.0	12.0	11.9	11.6	11.0
20	12.0	12.0	12.0	12.0	12.0	12.0	11.9	11.6	11.0
21	12.0	12.0	12.0	12.0	12.0	12.0	11.9	11.6	11.0
22	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.8	...
23	12.0	12.0	12.0	12.0	12.0	12.0	12.0	11.9	...
24	15.0	15.0	15.0	15.0	15.0	15.0	15.0	14.8	...
25	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.8	...
26	15.0	15.0	15.0	15.0	15.0	15.0	14.9	14.7	...
27	15.0	15.0	15.0	15.0	15.0	15.0	14.9	14.7	...
28	15.0	15.0	15.0	15.0	15.0	15.0	14.9	14.7	...
29	15.0	15.0	15.0	15.0	15.0	15.0	14.9	14.7	...
30	15.0	15.0	15.0	15.0	15.0	15.0	14.9	14.7	...
31	15.0	15.0	15.0	15.0	15.0	15.0	14.9	14.7	...
32	15.0	15.0	15.0	15.0	15.0	15.0	14.9	14.7	...
33	15.0	15.0	15.0	15.0	15.0	15.0	14.9	14.7	...
34	15.0	15.0	15.0	15.0	15.0	15.0	14.9	14.7	...
35	15.0	15.0	15.0	15.0	15.0	15.0	14.9	14.7	...
36	15.0	15.0	15.0	15.0	15.0	15.0	14.9	14.7	...
37	15.0	15.0	15.0	15.0	15.0	15.0	14.9	14.7	...
38	15.0	15.0	15.0	15.0	15.0	15.0	14.9	14.7	...
39	15.0	15.0	15.0	15.0	15.0	15.0	14.9	14.7	...
40	15.0	15.0	15.0	15.0	15.0	15.0	14.9	14.7	...
41	15.0	15.0	15.0	15.0	15.0	15.0	14.9	14.7	...
42	15.0	15.0	15.0	15.0	15.0	15.0	14.9	14.7	...
43	15.0	15.0	15.0	15.0	15.0	15.0	14.9	14.7	...
44	18.0	18.0	18.0	18.0	18.0	18.0	17.7	17.3	16.6
45	20.0	20.0	20.0	20.0	20.0	20.0	19.7	19.2	18.4

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Nonferrous Materials (Cont'd)
1	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Nonferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
9	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
10	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
27	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
28	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
33	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
34	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
39	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
45	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
		Nonferrous Materials (Cont'd)					
(**21**)	1	...	Plate	SB–171	...	C46500	M10, M20
(**21**)	2	...	Plate	SB–171	...	C46500	O20, O25
	3	...	Smls. cond. tube	SB–111	...	C60800	O61
	4	...	Smls. U–bend tube	SB–395	...	C60800	O61
	5	...	Plate, sheet	SB–169	...	C61400	O25 or O60
(**21**)	6	...	Plate	SB–171	...	C61400	M10, M20, O20, O25
(**21**)	7	...	Rod	SB–150	...	C61400	HR50
	8	...	Plate, sheet	SB–169	...	C61400	O25 or O60
(**21**)	9	...	Plate	SB–171	...	C61400	M10, M20, O20, O25
(**21**)	10	...	Rod	SB–150	...	C61400	HR50
	11	...	Plate, sheet	SB–169	...	C61400	O25 or O60
(**21**)	12	...	Rod	SB–150	...	C61400	HR50
(**21**)	13	...	Rod	SB–150	...	C61400	HR50
(**21**)	14	...	Plate	SB–171	...	C63000	M10, M20, O20, O25
(**21**)	15	...	Bar, rod	SB–150	...	C63000	M20, M30
(**21**)	16	...	Bar, rod	SB–150	...	C63000	O20, O25, O30
(**21**)	17	...	Bar, rod	SB–150	...	C63000	HR50
(**21**)	18	...	Plate	SB–171	...	C63000	M10, M20, O20, O25
(**21**)	19	...	Bar, rod	SB–150	...	C63000	HR50
(**21**)	20	...	Bar, rod	SB–150	...	C63000	M20, M30
(**21**)	21	...	Bar, rod	SB–150	...	C63000	O20, O25, O30
(**21**)	22	...	Plate	SB–171	...	C63000	M10, M20, O20, O25
(**21**)	23	...	Bar, rod	SB–150	...	C63000	HR50
(**21**)	24	...	Bar, rod	SB–150	...	C63000	HR50
(**21**)	25	...	Forgings	SB–283	...	C64200	M10
(**21**)	26	...	Forgings	SB–283	...	C64200	M10
(**21**)	27	...	Bar, rod	SB–150	...	C64200	M10, M20, M30
	28	...	Bar, rod	SB–150	...	C64200	M30
(**21**)	29	...	Bar, rod	SB–150	...	C64200	M10, M20, M30
(**21**)	30	...	Bar, rod	SB–150	...	C64200	HR50
(**21**)	31	...	Bar, rod	SB–150	...	C64200	HR50
(**21**)	32	...	Bar, rod	SB–150	...	C64200	HR50
(**21**)	33	...	Bar, rod	SB–150	...	C64200	HR50
	34	...	Bar, rod	SB–98	...	C65100	O60
	35	...	Bar, rod	SB–98	...	C65100	H02
	36	...	Rod	SB–98	...	C65100	H06
	37	...	Rod	SB–98	...	C65100	H06
	38	...	Rod	SB–98	...	C65100	H06
	39	...	Smls. pipe & tube	SB–315	...	C65500	O61
	40	...	Plate, sheet	SB–96	...	C65500	O61
	41	...	Bar, rod	SB–98	...	C65500	O60
	42	...	Rod	SB–98	...	C65500	H01
	43	...	Bar, rod	SB–98	...	C65500	H02
	44	...	Rod	SB–98	...	C66100	O60
	45	...	Rod	SB–98	...	C66100	H01

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Nonferrous Materials (Cont'd)
1	3 < t ≤ 5	50	18	...
2	≤3	50	20	...
3	...	50	19	...
4	...	50	19	...
5	2 < t ≤ 5	65	28	...
6	2 < t ≤ 5	65	28	...
7	2 < t ≤ 3	70	30	...
8	½ < t ≤ 2	70	30	...
9	≤2	70	30	...
10	1 < t ≤ 2	70	32	...
11	≤½	72	32	...
12	½ < t ≤ 1	75	35	...
13	≤½	80	40	...
14	3.5 < t ≤ 5	80	30	...
15	>4	80	40	...
16	>4	80	40	...
17	>4	80	40	...
18	2 < t ≤ 3.5	85	33	...
19	2 < t ≤ 4	85	42.5	...
20	2 < t ≤ 4	85	42.5	...
21	2 < t ≤ 4	85	42.5	...
22	≤2	90	36	...
23	1 < t ≤ 2	90	45	...
24	½ < t ≤ 1	100	50	...
25	>1½	68	23	...
26	≤1½	70	25	...
27	>4	70	25	...
28	>4	70	25	...
29	3 < t ≤ 4	70	30	...
30	2 < t ≤ 3	75	35	...
31	1 < t ≤ 2	80	42	...
32	½ < t ≤ 1	85	45	...
33	≤½	90	45	...
34	All	40	12	...
35	≤2	55	20	...
36	1 < t ≤ 1½	75	40	...
37	½ < t ≤ 1	75	45	...
38	t ≤ ½	85	55	...
39	...	50	15	...
40	≤2	50	18	...
41	All	52	15	...
42	All	55	24	...
43	≤2	70	38	...
44	All	52	15	...
45	All	55	24	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Nonferrous Materials (Cont'd)								
1	18.0	18.0	18.0	18.0	18.0	18.0	17.7	17.3	16.6
2	20.0	20.0	20.0	20.0	20.0	20.0	19.7	19.2	18.4
3	19.0	18.3	18.3	18.3	18.0	17.5	17.0	16.5	16.0
4	19.0	18.3	18.3	18.3	18.0	17.5	17.0	16.5	16.0
5	28.0	27.9	27.7	27.5	27.4	27.2	26.9	26.6	26.3
6	28.0	27.9	27.7	27.5	27.4	27.2	26.9	26.6	26.3
7	30.0	29.9	29.7	29.5	29.3	29.1	28.8	28.5	28.2
8	30.0	29.9	29.7	29.5	29.3	29.1	28.8	28.5	28.2
9	30.0	29.9	29.7	29.5	29.3	29.1	28.8	28.5	28.2
10	32.0	31.9	31.7	31.5	31.3	31.0	30.7	30.4	30.1
11	32.0	31.9	31.7	31.4	31.3	31.1	30.8	30.4	30.1
12	35.0	34.9	34.7	34.4	34.2	34.0	33.6	33.3	32.9
13	40.0	39.9	39.6	39.3	39.1	38.8	38.4	38.0	37.6
14	30.0	30.0	30.0	30.0	30.0	30.0	30.0	29.8	29.5
15	40.0	40.0	40.0	40.0	40.0	40.0	40.0	39.8	39.4
16	40.0	40.0	40.0	40.0	40.0	40.0	40.0	39.8	39.4
17	40.0	40.0	40.0	40.0	40.0	40.0	40.0	39.8	39.4
18	33.0	33.0	33.0	33.0	33.0	33.0	33.0	32.8	32.5
19	42.5	42.5	42.5	42.5	42.5	42.5	42.5	42.2	41.8
20	42.5	42.5	42.5	42.5	42.5	42.5	42.5	42.2	41.8
21	42.5	42.5	42.5	42.5	42.5	42.5	42.5	42.2	41.8
22	36.0	36.0	36.0	36.0	36.0	36.0	36.0	35.8	35.4
23	45.0	45.0	45.0	45.0	45.0	45.0	45.0	44.7	44.3
24	50.0	50.0	50.0	50.0	50.0	50.0	50.0	49.7	49.2
25	23.0	21.6	21.2	21.2	21.2	21.2	21.2	21.2	21.2
26	25.0	23.5	23.1	23.0	23.0	23.0	23.0	23.0	23.0
27	25.0	23.5	23.1	23.0	23.0	23.0	23.0	23.0	23.0
28	25.0	...	...	...	...	...	...	...	...
29	30.0	28.2	27.7	27.6	27.6	27.6	27.6	27.6	27.6
30	35.0	32.9	32.3	32.2	32.2	32.2	32.2	32.2	32.2
31	42.0	39.4	38.8	38.7	38.7	38.7	38.7	38.7	38.7
32	45.0	42.3	41.6	41.4	41.4	41.4	41.4	41.4	41.4
33	45.0	42.3	41.6	41.4	41.4	41.4	41.4	41.4	41.4
34	12.0	11.9	11.8	11.8	11.7	11.5	11.4	11.2	10.9
35	20.0	20.0	19.8	19.4	18.8	18.0	17.2	16.2	15.3
36	40.0	39.3	38.4	37.5	36.3	35.0	33.5	31.7	29.4
37	45.0	44.2	43.2	42.1	40.9	39.4	37.7	35.6	33.1
38	55.0	54.0	52.8	51.5	50.0	48.2	46.1	43.5	40.5
39	15.0	15.0	14.9	14.9	14.8	14.7	14.6	14.5	14.2
40	18.0	18.0	17.9	17.9	17.8	17.7	17.6	17.3	17.0
41	15.0	15.0	14.9	14.9	14.8	14.7	14.6	14.5	14.2
42	24.0	23.5	23.0	22.5	22.0	21.5	21.0	20.6	20.1
43	38.0	37.6	37.2	36.6	35.8	34.5	32.6	29.9	26.4
44	15.0	15.0	14.9	14.9	14.8	14.7	14.6	14.5	14.2
45	24.0	23.5	23.0	22.5	22.0	21.5	21.0	20.6	20.1

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Nonferrous Materials (Cont'd)
1	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...
14	29.0	27.9	26.1	23.1	...	...	...	...	...	...
15	38.7	37.2	34.7	30.8	...	...	...	...	...	...
16	38.7	37.2	34.7	30.8	...	...	...	...	...	...
17	38.7	37.2	34.7	30.8	...	...	...	...	...	...
18	31.9	30.7	28.7	25.4	...	...	...	...	...	...
19	41.1	39.6	36.9	32.7	...	...	...	...	...	...
20	41.1	39.6	36.9	32.7	...	...	...	...	...	...
21	41.1	39.6	36.9	32.7	...	...	...	...	...	...
22	34.8	33.5	31.3	27.7	...	...	...	...	...	...
23	43.5	41.9	39.1	34.6	...	...	...	...	...	...
24	48.3	46.5	43.4	38.5	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Nonferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
2	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
3	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
7	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
10	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
11	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
13	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
14	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
15	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
16	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
17	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
18	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
19	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
20	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
21	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
22	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
23	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
24	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
25	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
26	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
27	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
28	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
30	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
31	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
32	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
33	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
34	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
		Nonferrous Materials (Cont'd)					
	1	...	Rod	SB–98	...	C66100	H02
(**21**)	2	...	Smls. cond. tube	SB–111	...	C68700	O61
(**21**)	3	...	Smls. U–bend tube	SB–395	...	C68700	O61
(**21**)	4	...	Wld. cond. tube	SB–543	...	C68700	WO61
(**21**)	5	...	Smls. cond. tube	SB–111	...	C70400	O61
(**21**)	6	...	Wld. tube	SB–543	...	C70400	WO61
(**21**)	7	...	Smls. cond. tube	SB–111	...	C70400	H55
	8	...	Smls. pipe & tube	SB–466	...	C70600	O60
	9	...	Wld. pipe	SB–467	...	C70600	WO61
	10	...	Bar, rod	SB–151	...	C70600	O60
(**21**)	11	...	Plate, sheet	SB–171	...	C70600	M10, M20
(**21**)	12	...	Plate, sheet	SB–171	...	C70600	O20, O25
	13	...	Smls. cond. tube	SB–111	...	C70600	O61
	14	...	Finned tube	SB–359	...	C70600	O61
	15	...	Smls. U–bend tube	SB–395	...	C70600	O61
	16	...	Wld. pipe	SB–467	...	C70600	WO61
	17	...	Wld. tube	SB–543	...	C70600	WO61
	18	...	Finned wld. tube	SB–956	...	C70600	WO61
	19	...	Wld. pipe	SB–467	...	C70600	WM50
	20	...	Smls. tube	SB–111	...	C70600	H55
	21	...	Smls. pipe & tube	SB–466	...	C70600	H55
	22	...	Wld. tube	SB–543	...	C70600	WC55
	23	...	Finned wld. tube	SB–956	...	C70600	WC55
	24	...	Wld. pipe	SB–467	...	C70600	Wld. fr. cold rld. strip
	25	...	Smls. pipe & tube	SB–466	...	C70620	O60
	26	...	Wld. pipe	SB–467	...	C70620	WO61
	27	...	Bar, rod	SB–151	...	C70620	O60
(**21**)	28	...	Forgings	SB–283	...	C70620	M10
(**21**)	29	...	Plate, sheet	SB–171	...	C70620	M10, M20
(**21**)	30	...	Forgings	SB–283	...	C70620	O20
(**21**)	31	...	Plate, sheet	SB–171	...	C70620	O20, O25
	32	...	Smls. cond. tube	SB–111	...	C70620	O61
	33	...	Finned tube	SB–359	...	C70620	O61
	34	...	Smls. U–bend tube	SB–395	...	C70620	O61
	35	...	Wld. pipe	SB–467	...	C70620	WO61
	36	...	Wld. tube	SB–543	...	C70620	WO61
	37	...	Finned wld. tube	SB–956	...	C70620	WO61
(**21**)	38	...	Forgings	SB–283	...	C70620	M10
	39	...	Wld. pipe	SB–467	...	C70620	WM50
	40	...	Smls. tube	SB–111	...	C70620	H55
	41	...	Smls. pipe & tube	SB–466	...	C70620	H55
	42	...	Wld. tube	SB–543	...	C70620	WC55
	43	...	Finned wld. tube	SB–956	...	C70620	WC55
	44	...	Wld. pipe	SB–467	...	C70620	Wld. fr. cold rld. strip
(**21**)	45	...	Smls. tube	SB–466	...	C71000	O60

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Nonferrous Materials (Cont'd)
1	≤2	70	38	...
2	...	50	18	...
3	...	50	18	...
4	...	50	18	...
5	...	38	12	...
6	...	38	12	...
7	...	40	30	...
8	...	38	13	...
9	>4½	38	13	...
10	All	38	15	...
11	≤5	40	15	...
12	≤5	40	15	...
13	...	40	15	...
14	...	40	15	...
15	...	40	15	...
16	≤4½	40	15	...
17	...	40	15	...
18	...	40	15	...
19	≤4½	45	30	...
20	...	45	35	...
21	...	45	35	...
22	...	45	35	...
23	...	45	35	...
24	≤4½	54	45	...
25	...	38	13	...
26	>4½	38	13	...
27	All	38	15	...
28	>6	40	15	...
29	≤5	40	15	...
30	...	40	15	...
31	≤5	40	15	...
32	...	40	15	...
33	...	40	15	...
34	...	40	15	...
35	≤4½	40	15	...
36	...	40	15	...
37	...	40	15	...
38	≤6	45	18	...
39	≤4½	45	30	...
40	...	45	35	...
41	...	45	35	...
42	...	45	35	...
43	...	45	35	...
44	≤4½	54	45	...
45	...	45	16	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Nonferrous Materials (Cont'd)								
1	38.0	37.6	37.2	36.6	35.8	34.5	32.6	29.9	26.4
2	18.0	17.8	17.7	17.6	17.4	17.3	17.1	16.8	...
3	18.0	17.8	17.7	17.6	17.4	17.3	17.1	16.8	...
4	18.0	17.8	17.7	17.6	17.4	17.3	17.1	16.8	...
5	11.9	11.6	11.3	11.1	11.0	10.9	...	...	...
6	11.9	11.6	11.3	11.1	11.0	10.9	...	...	...
7	29.8	28.9	28.3	27.8	27.5	27.3	...	...	...
8	13.0	12.6	12.3	12.0	11.7	11.5	11.3	11.1	10.9
9	13.0	12.6	12.3	12.0	11.7	11.5	11.3	11.1	10.9
10	15.0	14.6	14.2	13.9	13.6	13.3	13.0	12.8	12.6
11	15.0	14.6	14.2	13.9	13.6	13.3	13.0	12.8	12.6
12	15.0	14.6	14.2	13.9	13.6	13.3	13.0	12.8	12.6
13	15.0	14.6	14.2	13.9	13.6	13.3	13.0	12.8	12.6
14	15.0	14.6	14.2	13.9	13.6	13.3	13.0	12.8	12.6
15	15.0	14.6	14.2	13.9	13.6	13.3	13.0	12.8	12.6
16	15.0	14.6	14.2	13.9	13.6	13.3	13.0	12.8	12.6
17	15.0	14.6	14.2	13.9	13.6	13.3	13.0	12.8	12.6
18	15.0	14.6	14.2	13.9	13.6	13.3	13.0	12.8	12.6
19	30.0	29.1	28.5	27.8	27.1	26.5	26.0	25.6	25.3
20	35.0	34.0	33.2	32.4	31.6	30.9	30.3	29.8	29.5
21	35.0	34.0	33.2	32.4	31.6	30.9	30.3	29.8	29.5
22	35.0	34.0	33.2	32.4	31.6	30.9	30.3	29.8	29.5
23	35.0	34.0	33.2	32.4	31.6	30.9	30.3	29.8	29.5
24	45.0	43.7	42.7	41.6	40.7	39.8	39.0	38.4	37.9
25	13.0	12.6	12.3	12.0	11.7	11.5	11.3	11.1	10.9
26	13.0	12.6	12.3	12.0	11.7	11.5	11.3	11.1	10.9
27	15.0	14.6	14.2	13.9	13.6	13.3	13.0	12.8	12.6
28	15.0	14.6	14.2	13.9	13.6	13.3	13.0	12.8	12.6
29	15.0	14.6	14.2	13.9	13.6	13.3	13.0	12.8	12.6
30	15.0	14.6	14.2	13.9	13.6	13.3	13.0	12.8	12.6
31	15.0	14.6	14.2	13.9	13.6	13.3	13.0	12.8	12.6
32	15.0	14.6	14.2	13.9	13.6	13.3	13.0	12.8	12.6
33	15.0	14.6	14.2	13.9	13.6	13.3	13.0	12.8	12.6
34	15.0	14.6	14.2	13.9	13.6	13.3	13.0	12.8	12.6
35	15.0	14.6	14.2	13.9	13.6	13.3	13.0	12.8	12.6
36	15.0	14.6	14.2	13.9	13.6	13.3	13.0	12.8	12.6
37	15.0	14.6	14.2	13.9	13.6	13.3	13.0	12.8	12.6
38	18.0	17.5	17.0	16.7	16.3	16.0	15.6	15.4	15.1
39	30.0	29.1	28.5	27.8	27.1	26.5	26.0	25.6	25.3
40	35.0	34.0	33.2	32.4	31.6	30.9	30.3	29.8	29.5
41	35.0	34.0	33.2	32.4	31.6	30.9	30.3	29.8	29.5
42	35.0	34.0	33.2	32.4	31.6	30.9	30.3	29.8	29.5
43	35.0	34.0	33.2	32.4	31.6	30.9	30.3	29.8	29.5
44	45.0	43.7	42.7	41.6	40.7	39.8	39.0	38.4	37.9
45	15.9	15.6	15.3	14.9	14.5	14.1	13.8	13.4	13.0

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Nonferrous Materials (Cont'd)
1	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...
8	10.8	10.8	...	...	...	...	...	...	...	...
9	10.8	10.8	...	...	...	...	...	...	...	...
10	12.5	12.4	...	...	...	...	...	...	...	...
11	12.5	12.4	...	...	...	...	...	...	...	...
12	12.5	12.4	...	...	...	...	...	...	...	...
13	12.5	12.4	...	...	...	...	...	...	...	...
14	12.5	12.4	...	...	...	...	...	...	...	...
15	12.5	12.4	...	...	...	...	...	...	...	...
16	12.5	12.4	...	...	...	...	...	...	...	...
17	12.5	12.4	...	...	...	...	...	...	...	...
18	12.5	12.4	...	...	...	...	...	...	...	...
19	25.0	24.9	...	...	...	...	...	...	...	...
20	29.2	29.0	...	...	...	...	...	...	...	...
21	29.2	29.0	...	...	...	...	...	...	...	...
22	29.2	29.0	...	...	...	...	...	...	...	...
23	29.2	29.0	...	...	...	...	...	...	...	...
24	37.5	37.3	...	...	...	...	...	...	...	...
25	10.8	10.8	...	...	...	...	...	...	...	...
26	10.8	10.8	...	...	...	...	...	...	...	...
27	12.5	12.4	...	...	...	...	...	...	...	...
28	12.5	12.4	...	...	...	...	...	...	...	...
29	12.5	12.4	...	...	...	...	...	...	...	...
30	12.5	12.4	...	...	...	...	...	...	...	...
31	12.5	12.4	...	...	...	...	...	...	...	...
32	12.5	12.4	...	...	...	...	...	...	...	...
33	12.5	12.4	...	...	...	...	...	...	...	...
34	12.5	12.4	...	...	...	...	...	...	...	...
35	12.5	12.4	...	...	...	...	...	...	...	...
36	12.5	12.4	...	...	...	...	...	...	...	...
37	12.5	12.4	...	...	...	...	...	...	...	...
38	15.0	14.9	...	...	...	...	...	...	...	...
39	25.0	24.9	...	...	...	...	...	...	...	...
40	29.2	29.0	...	...	...	...	...	...	...	...
41	29.2	29.0	...	...	...	...	...	...	...	...
42	29.2	29.0	...	...	...	...	...	...	...	...
43	29.2	29.0	...	...	...	...	...	...	...	...
44	37.5	37.3	...	...	...	...	...	...	...	...
45	12.7	12.5	12.2	12.0	...	...	...	...	...	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Nonferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
3	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
4	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
5	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
6	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
7	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
12	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
13	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
29	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
30	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
31	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
32	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
		Nonferrous Materials (Cont'd)					
(**21**)	1	...	Smls. cond. tube	SB–111	...	C71000	O61
(**21**)	2	...	Finned tube	SB–359	...	C71000	O61
(**21**)	3	...	Smls. tube	SB–395	...	C71000	O61
	4	...	Wld. pipe	SB–467	...	C71500	WO61
(**21**)	5	...	Plate, sheet	SB–171	...	C71500	M10, M20, O20, O25
(**21**)	6	...	Plate, sheet	SB–171	...	C71500	M10, M20, O20, O25
	7	...	Wld. pipe	SB–467	...	C71500	WO61
	8	...	Smls. pipe & tube	SB–466	...	C71500	O60
	9	...	Smls. cond. tube	SB–111	...	C71500	O61
	10	...	Finned tube	SB–359	...	C71500	O61
	11	...	Smls. U–bend tube	SB–395	...	C71500	O61
	12	...	Wld. tube	SB–543	...	C71500	WO61
	13	...	Finned wld. tube	SB–956	...	C71500	WO61
	14	...	Wld. pipe	SB–467	...	C71520	WO61
(**21**)	15	...	Forgings	SB–283	...	C71520	M10
(**21**)	16	...	Forgings	SB–283	...	C71520	O20
	17	...	Plate, sheet	SB–171	...	C71520	O25
(**21**)	18	...	Forgings	SB–283	...	C71520	M10
	19	...	Plate, sheet	SB–171	...	C71520	O25
	20	...	Wld. pipe	SB–467	...	C71520	WO61
	21	...	Smls. pipe & tube	SB–466	...	C71520	O60
	22	...	Smls. cond. tube	SB–111	...	C71520	O61
	23	...	Finned tube	SB–359	...	C71520	O61
	24	...	Smls. U–bend tube	SB–395	...	C71520	O61
	25	...	Wld. tube	SB–543	...	C71520	WO61
	26	...	Finned wld. tube	SB–956	...	C71520	WO61
(**21**)	27	...	Castings	SB–62	...	C83600	M01
(**21**)	28	...	Castings	SB–61	...	C92200	M01
(**21**)	29	...	Castings	SB–584	...	C92200	M01
(**21**)	30	...	Castings	SB–584	...	C93700	M01
	31	...	Castings	SB–148	...	C95200	M01
	32	...	Castings	SB–271	...	C95200	M02
	33	...	Castings	SB–505	...	C95200	M07
	34	...	Castings	SB–148	...	C95400	M01
	35	...	Castings	SB–271	...	C95400	M02
	36	...	Castings	SB–148	...	C95800	M01
	37	...	Castings	SB–148	...	C95820	M01
(**21**)	38	...	Castings	SB–369	...	C96200	M01
(**21**)	39	...	Castings	SB–584	...	C97600	M01
	40	99Ni	Bolting	SB–160	...	N02200	Annealed
	41	99Ni	Plate, sheet, strip	SB–162	...	N02200	As rolled
	42	99Ni	Bolting	SB–160	...	N02200	Hot fin./ann.
	43	99Ni	Bolting	SB–160	...	N02200	Cold drawn
	44	99Ni	Smls. pipe & tube	SB–161	...	N02200	Stress rel.
	45	99Ni	Smls. tube	SB–163	...	N02200	Stress rel.

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Nonferrous Materials (Cont'd)
1	...	45	16	...
2	...	45	16	...
3	...	45	16	...
4	>4½	45	15	...
5	2.5 < t ≤ 5	45	18	...
6	≤2.5	50	20	...
7	≤4½	50	20	...
8	...	52	18	...
9	...	52	18	...
10	...	52	18	...
11	...	52	18	...
12	...	52	18	...
13	...	52	18	...
14	>4½	45	15	...
15	>6	45	18	...
16	...	45	18	...
17	2.5 < t ≤ 5	45	18	...
18	≤6	50	20	...
19	≤2.5	50	20	...
20	≤4½	50	20	...
21	...	52	18	...
22	...	52	18	...
23	...	52	18	...
24	...	52	18	...
25	...	52	18	...
26	...	52	18	...
27	...	30	14	...
28	...	34	16	...
29	...	34	16	...
30	...	30	12	...
31	...	65	25	...
32	...	65	25	...
33	...	68	26	...
34	...	75	30	...
35	...	75	30	...
36	...	85	35	...
37	...	94	39	...
38	...	45	25	...
39	...	40	17	...
40	...	55	15	...
41	...	55	20	...
42	...	60	15	...
43	...	65	40	...
44	...	65	40	...
45	...	65	40	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Nonferrous Materials (Cont'd)								
1	15.9	15.6	15.3	14.9	14.5	14.1	13.8	13.4	13.0
2	15.9	15.6	15.3	14.9	14.5	14.1	13.8	13.4	13.0
3	15.9	15.6	15.3	14.9	14.5	14.1	13.8	13.4	13.0
4	15.0	14.5	14.1	13.8	13.5	13.2	12.9	12.6	12.4
5	18.0	17.4	17.0	16.6	16.2	15.8	15.5	15.2	14.9
6	20.0	19.3	18.8	18.4	18.0	17.6	17.2	16.9	16.5
7	20.0	19.3	18.8	18.4	18.0	17.6	17.2	16.9	16.5
8	18.0	17.4	17.0	16.6	16.2	15.8	15.5	15.2	14.9
9	18.0	17.4	17.0	16.6	16.2	15.8	15.5	15.2	14.9
10	18.0	17.4	17.0	16.6	16.2	15.8	15.5	15.2	14.9
11	18.0	17.4	17.0	16.6	16.2	15.8	15.5	15.2	14.9
12	18.0	17.4	17.0	16.6	16.2	15.8	15.5	15.2	14.9
13	18.0	17.4	17.0	16.6	16.2	15.8	15.5	15.2	14.9
14	15.0	14.5	14.1	13.8	13.5	13.2	12.9	12.6	12.2
15	18.0	17.4	17.0	16.6	16.2	15.8	15.5	15.2	14.9
16	18.0	17.4	17.0	16.6	16.2	15.8	15.5	15.2	14.9
17	18.0	17.4	17.0	16.6	16.2	15.8	15.5	15.2	14.9
18	20.0	19.3	18.8	18.4	18.0	17.6	17.2	16.9	16.5
19	20.0	19.3	18.8	18.4	18.0	17.6	17.2	16.9	16.5
20	20.0	19.3	18.8	18.4	18.0	17.6	17.2	16.9	16.5
21	18.0	17.4	17.0	16.6	16.2	15.8	15.5	15.2	14.9
22	18.0	17.4	17.0	16.6	16.2	15.8	15.5	15.2	14.9
23	18.0	17.4	17.0	16.6	16.2	15.8	15.5	15.2	14.9
24	18.0	17.4	17.0	16.6	16.2	15.8	15.5	15.2	14.9
25	18.0	17.4	17.0	16.6	16.2	15.8	15.5	15.2	14.9
26	18.0	17.4	17.0	16.6	16.2	15.8	15.5	15.2	14.9
27	14.0	13.1	12.6	12.1	11.7	11.3	10.9	10.5	10.1
28	16.0	15.0	14.3	13.8	13.5	13.3	13.2	13.1	13.0
29	16.0	15.0	14.3	13.8	13.5	13.3	13.2	13.1	13.0
30	12.0	11.1	10.7	10.4	10.3	10.1	10.0	9.9	9.8
31	25.0	23.5	22.8	22.2	21.7	21.4	21.3	21.2	21.2
32	25.0	23.5	22.8	22.2	21.7	21.4	21.3	21.2	21.2
33	26.0	24.5	23.7	23.0	22.6	22.3	22.1	22.1	22.1
34	30.0	29.5	29.3	29.1	28.9	28.9	28.9	28.9	28.9
35	30.0	29.5	29.3	29.1	28.9	28.9	28.9	28.9	28.9
36	35.0	34.5	34.3	34.2	34.0	33.9	33.8	...	...
37	39.0	38.5	38.2	38.1	37.9	37.8	37.6	37.5	37.2
38	25.0	24.3	23.7	23.0	22.5	22.1	21.7	21.4	21.0
39	17.0	15.3	14.3	13.6	13.1	12.8	12.6	12.4	12.3
40	15.0	15.0	15.0	15.0	15.0	15.0	15.0	14.7	14.2
41	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.6	18.9
42	15.0	15.0	15.0	15.0	15.0	15.0	15.0	14.7	14.2
43	40.0	38.7	38.4	38.3	38.3	38.3	38.2	37.9	37.5
44	40.0	38.7	38.4	38.3	38.3	38.3	38.2	37.9	37.5
45	40.0	38.7	38.4	38.3	38.3	38.3	38.2	37.9	37.5

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Nonferrous Materials (Cont'd)
1	12.7	12.5	12.2	12.0	...	...	...	...	...	...
2	12.7	12.5	12.2	12.0	...	...	...	...	...	...
3	12.7	12.5	12.2	12.0	...	...	...	...	...	...
4	12.2	12.0	11.9	11.7	...	...	...	...	...	...
5	14.6	14.4	14.2	14.1	...	...	...	...	...	...
6	16.3	16.0	15.8	15.7	...	...	...	...	...	...
7	16.3	16.0	15.8	15.7	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...
9	14.6	14.4	14.2	14.1	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...
12	14.6	14.4	14.2	14.1	...	...	...	...	...	...
13	14.6	14.4	14.2	14.1	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...
15	14.6	14.4	14.2	14.1	...	...	...	...	...	...
16	14.6	14.4	14.2	14.1	...	...	...	...	...	...
17	14.6	14.4	14.2	14.1	...	...	...	...	...	...
18	16.3	16.0	15.8	15.7	...	...	...	...	...	...
19	16.3	16.0	15.8	15.7	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...
22	14.6	14.4	14.2	14.1	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...
25	14.6	14.4	14.2	14.1	...	...	...	...	...	...
26	14.6	14.4	14.2	14.1	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...
28	12.8	12.8	...	...	...	...	...	...	...	...
29	12.8	12.8	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...
31	21.2	21.2	...	...	...	...	...	...	...	...
32	21.2	21.2	...	...	...	...	...	...	...	...
33	22.1	22.1	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...
40	13.6	12.9	...	...	...	...	...	...	...	...
41	18.1	17.2	...	...	...	...	...	...	...	...
42	13.6	12.9	...	...	...	...	...	...	...	...
43	37.0	36.4	35.7	...	...	...	...	...	...	...
44	37.0	36.4	35.7	...	...	...	...	...	...	...
45	37.0	36.4	35.7	...	...	...	...	...	...	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Nonferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
2	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
3	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
6	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
7	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
16	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
28	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
29	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
30	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
31	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
39	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
		Nonferrous Materials (Cont'd)					
(**21**)	1	99Ni–Low C	Smls. pipe & tube	SB–161	...	N02201	Annealed
(**21**)	2	99Ni–Low C	Smls. & wld. fittings	SB–366	...	N02201	Annealed
(**21**)	3	99Ni–Low C	Bar, rod	SB–160	...	N02201	Hot rolled/ann.
(**21**)	4	99Ni–Low C	Smls. pipe & tube	SB–161	...	N02201	Annealed
(**21**)	5	99Ni–Low C	Smls. tube	SB–163	...	N02201	Annealed
(**21**)	6	99Ni–Low C	Plate, sheet, strip	SB–162	...	N02201	Hot rolled/ann.
	7	67Ni–30Cu	Bar	SB–164	...	N04400	Annealed
	8	67Ni–30Cu	Smls. pipe & tube	SB–165	...	N04400	Annealed
	9	67Ni–30Cu	Forgings	SB–564	...	N04400	Annealed
	10	67Ni–30Cu	Plate	SB–127	...	N04400	Annealed
	11	67Ni–30Cu	Smls. tube	SB–163	...	N04400	Annealed
	12	67Ni–30Cu	Smls. pipe & tube	SB–165	...	N04400	Annealed
	13	67Ni–30Cu	Smls. & wld. fittings	SB–366	...	N04400	Annealed
	14	67Ni–30Cu	Plate	SB–127	...	N04400	As rolled
	15	67Ni–30Cu	Rounds	SB–164	...	N04400	Hot worked
	16	67Ni–30Cu	Rounds	SB–164	...	N04400	Hot worked
	17	67Ni–30Cu	Rounds	SB–164	...	N04400	CW & SR
	18	67Ni–30Cu	Rounds	SB–164	...	N04400	CW & SR
	19	67Ni–30Cu	Smls. tube	SB–163	...	N04400	Stress rel.
	20	67Ni–30Cu	Smls. pipe & tube	SB–165	...	N04400	Stress rel.
	21	67Ni–30Cu	Rounds	SB–164	...	N04400	CW & SR
	22	67Ni–30Cu	Rounds	SB–164	...	N04400	Cold worked
	23	67Ni–30Cu–S	Bar	SB–164	...	N04405	Annealed
	24	67Ni–30Cu–S	Bar	SB–164	...	N04405	Hot worked
	25	67Ni–28Cu–3Al	Bolting	SF–468	...	N05500	Ann./aged
	26	67Ni–28Cu–3Al	Bolting	SF–468	...	N05500	Ann./aged
(**21**)	27	47Ni–22Cr–9Mo–18Fe	Plate	SB–435	...	N06002	Annealed
(**21**)	28	47Ni–22Cr–9Mo–18Fe	Sheet	SB–435	...	N06002	Solution ann.
(**21**)	29	47Ni–22Cr–9Mo–18Fe	Rod	SB–572	...	N06002	Annealed
(**21**)	30	47Ni–22Cr–9Mo–18Fe	Smls. & wld. fittings	SB–366	...	N06002	Annealed
(**21**)	31	47Ni–22Cr–9Mo–18Fe	Sheet	SB–435	...	N06002	Annealed
(**21**)	32	47Ni–22Cr–9Mo–18Fe	Wld. pipe	SB–619	...	N06002	Solution ann.
(**21**)	33	47Ni–22Cr–9Mo–18Fe	Smls. pipe & tube	SB–622	...	N06002	Solution ann.
(**21**)	34	47Ni–22Cr–9Mo–18Fe	Wld. tube	SB–626	...	N06002	Solution ann.
	35	47Ni–22Cr–19Fe–6Mo	Rod	SB–581	...	N06007	Solution ann.
	36	47Ni–22Cr–19Fe–6Mo	Plate, sheet, strip	SB–582	...	N06007	Solution ann.
	37	47Ni–22Cr–19Fe–6Mo	Smls. & wld. fittings	SB–366	...	N06007	Annealed
	38	47Ni–22Cr–19Fe–6Mo	Rod	SB–581	...	N06007	Solution ann.
	39	47Ni–22Cr–19Fe–6Mo	Plate, sheet, strip	SB–582	...	N06007	Solution ann.
	40	47Ni–22Cr–19Fe–6Mo	Wld. pipe	SB–619	...	N06007	Solution ann.
	41	47Ni–22Cr–19Fe–6Mo	Smls. pipe & tube	SB–622	...	N06007	Solution ann.
	42	47Ni–22Cr–19Fe–6Mo	Wld. tube	SB–626	...	N06007	Solution ann.
(**21**)	43	55Ni–21Cr–13.5Mo	Smls. & wld. fittings	SB–366	...	N06022	Solution ann.
(**21**)	44	55Ni–21Cr–13.5Mo	Forgings	SB–462	...	N06022	Solution ann.
(**21**)	45	55Ni–21Cr–13.5Mo	Forgings	SB–564	...	N06022	Solution ann.

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Nonferrous Materials (Cont'd)
1	>5 O.D.	50	10	...
2	...	50	10	...
3	...	50	10	...
4	≤5 O.D.	50	12	...
5	...	50	12	...
6	...	50	12	...
7	...	70	25	...
8	>5 O.D.	70	25	...
9	...	70	25	...
10	...	70	28	...
11	≤3	70	28	...
12	≤5 O.D.	70	28	...
13	...	70	28	...
14	...	75	40	...
15	$12 < t \le 14$	75	40	...
16	≤12	80	40	...
17	$<1/2$	84	50	...
18	$3\,1/2 < t \le 4$	84	55	...
19	...	85	55	...
20	...	85	55	...
21	$1/2 \le t \le 3\,1/2$	87	60	...
22	$<1/2$	110	85	...
23	...	70	25	...
24	...	75	35	...
25	1.000–1.500	130	85	...
26	0.250–0.875	130	90	...
27	$>3/16$	95	35	...
28	$\le 3/16$	95	35	...
29	...	95	35	...
30	...	100	40	...
31	$1/16 < t \le 3/16$	100	40	...
32	...	100	40	...
33	...	100	40	...
34	...	100	40	...
35	$>3/4$	85	30	...
36	$>3/4$	85	30	...
37	...	90	35	...
38	$\le 3/4$	90	35	...
39	$\le 3/4$	90	35	...
40	...	90	35	...
41	...	90	35	...
42	...	90	35	...
43	...	100	45	...
44	...	100	45	...
45	...	100	45	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Nonferrous Materials (Cont'd)								
1	10.0	9.7	9.6	9.5	9.4	9.4	9.4	9.4	9.4
2	10.0	9.7	9.6	9.5	9.4	9.4	9.4	9.4	9.4
3	10.0	9.7	9.6	9.5	9.4	9.4	9.4	9.4	9.4
4	12.0	11.7	11.5	11.4	11.3	11.2	11.2	11.2	11.2
5	12.0	11.7	11.5	11.4	11.3	11.2	11.2	11.2	11.2
6	12.0	11.7	11.5	11.4	11.3	11.2	11.2	11.2	11.2
7	25.0	23.0	21.9	21.0	20.4	20.0	19.7	19.7	19.7
8	25.0	23.0	21.9	21.0	20.4	20.0	19.7	19.7	19.7
9	25.0	23.0	21.9	21.0	20.4	20.0	19.7	19.7	19.7
10	28.0	25.8	24.5	23.6	22.8	22.4	22.1	22.0	22.0
11	28.0	25.8	24.5	23.6	22.8	22.4	22.1	22.0	22.0
12	28.0	25.8	24.5	23.6	22.8	22.4	22.1	22.0	22.0
13	28.0	25.8	24.5	23.6	22.8	22.4	22.1	22.0	22.0
14	40.0	39.5	38.8	37.9	37.1	36.4	35.9	35.5	35.2
15	40.0	...	38.8	...	37.1	...	35.9	...	35.2
16	40.0	...	38.8	...	37.1	...	35.9	...	35.2
17	50.0	...	47.2	...	45.8	...	45.0	...	45.0
18	55.0	...	51.8	...	50.4	...	49.7	...	49.2
19	55.0	52.9	51.8	51.0	50.4	50.0	49.7	49.5	49.2
20	55.0	52.9	51.8	51.0	50.4	50.0	49.7	49.5	49.2
21	60.0	...	56.6	...	54.9	...	54.0	...	54.0
22	85.0	...	80.2	...	77.8	...	76.5	...	76.5
23	25.0	23.0	21.9	21.0	20.4	20.0	19.7	19.7	19.7
24	35.0	34.6	33.9	33.2	32.5	31.9	31.4	31.0	30.8
25	85.0	...	81.2	...	79.4	...	78.2	...	77.5
26	90.0	...	86.0	...	84.0	...	82.8	...	82.1
27	35.0	32.9	31.5	30.1	28.8	27.7	26.6	25.7	24.8
28	35.0	32.9	31.5	30.1	28.8	27.7	26.6	25.7	24.8
29	35.0	32.9	31.5	30.1	28.8	27.7	26.6	25.7	24.8
30	40.0	37.5	35.9	34.4	33.0	31.6	30.4	29.3	28.4
31	40.0	37.5	35.9	34.4	33.0	31.6	30.4	29.3	28.4
32	40.0	37.5	35.9	34.4	33.0	31.6	30.4	29.3	28.4
33	40.0	37.5	35.9	34.4	33.0	31.6	30.4	29.3	28.4
34	40.0	37.5	35.9	34.4	33.0	31.6	30.4	29.3	28.4
35	30.0	28.1	27.0	25.9	25.0	24.2	23.5	22.9	22.4
36	30.0	28.1	27.0	25.9	25.0	24.2	23.5	22.9	22.4
37	35.0	32.8	31.4	30.2	29.2	28.2	27.4	26.7	26.1
38	35.0	32.8	31.4	30.2	29.2	28.2	27.4	26.7	26.1
39	35.0	32.8	31.4	30.2	29.2	28.2	27.4	26.7	26.1
40	35.0	32.8	31.4	30.2	29.2	28.2	27.4	26.7	26.1
41	35.0	32.8	31.4	30.2	29.2	28.2	27.4	26.7	26.1
42	35.0	32.8	31.4	30.2	29.2	28.2	27.4	26.7	26.1
43	45.0	42.0	40.1	38.4	36.9	35.5	34.3	33.2	32.2
44	45.0	42.0	40.1	38.4	36.9	35.5	34.3	33.2	32.2
45	45.0	42.0	40.1	38.4	36.9	35.5	34.3	33.2	32.2

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Nonferrous Materials (Cont'd)
1	9.4	9.4	9.3	9.3	9.2	9.0	8.8	8.6	8.2	7.9
2	9.4	9.4	9.3	9.3	9.2	9.0	8.8	8.6	8.2	7.9
3	9.4	9.4	9.3	9.3	9.2	9.0	8.8	8.6	8.2	7.9
4	11.2	11.2	11.2	11.1	11.0	10.8	10.6	10.3	9.9	9.4
5	11.2	11.2	11.2	11.1	11.0	10.8	10.6	10.3	9.9	9.4
6	11.2	11.2	11.2	11.1	11.0	10.8	10.6	10.3	9.9	9.4
7	19.7	19.7	19.7	19.6	19.4	19.1	18.9	18.8	...	...
8	19.7	19.7	19.7	19.6	19.4	19.1	18.9	18.8	...	...
9	19.7	19.7	19.7	19.6	19.4	19.1	18.9	18.8	...	...
10	22.0	22.0	22.0	21.9	21.7	21.4	21.2	21.1	...	...
11	22.0	22.0	22.0	21.9	21.7	21.4	21.2	21.1	...	...
12	22.0	22.0	22.0	21.9	21.7	21.4	21.2	21.1	...	...
13	22.0	22.0	22.0	21.9	21.7	21.4	21.2	21.1	...	...
14	34.9	34.7	34.4	34.0	33.5	32.9	32.3	31.6	...	...
15	...	34.7	34.4	34.0	33.5	32.9	...	...	...	...
16	...	34.7	34.4	34.0	33.5	32.9	...	...	...	...
17	...	44.2	42.1	42.1	41.8	40.4	...	...	...	...
18	...	48.1	47.3	46.3	45.3	44.4	...	...	...	...
19	48.7	48.1	47.3	46.3	45.3	44.4	...	...	...	...
20	48.7	48.1	47.3	46.3	45.3	44.4	...	...	...	...
21	...	53.0	50.5	50.5	50.1	48.5	...	...	...	...
22	...	75.1	71.6	71.6	71.0	68.7	...	...	...	...
23	19.7	19.7	19.7	19.6	19.4	19.1	18.9	18.8	...	...
24	30.6	30.3	30.1	29.8	29.3	28.8	28.2	27.7	...	...
25	...	77.1	76.9	76.7	...	...	...	...	...	...
26	...	81.6	81.4	81.2	...	...	...	...	...	...
27	24.1	23.5	23.0	22.6	22.3	22.1	21.9	21.7	21.6	21.5
28	24.1	23.5	23.0	22.6	22.3	22.1	21.9	21.7	21.6	21.5
29	24.1	23.5	23.0	22.6	22.3	22.1	21.9	21.7	21.6	21.5
30	27.5	26.9	26.3	25.8	25.5	25.2	25.0	24.9	24.7	24.6
31	27.5	26.9	26.3	25.8	25.5	25.2	25.0	24.9	24.7	24.6
32	27.5	26.9	26.3	25.8	25.5	25.2	25.0	24.9	24.7	24.6
33	27.5	26.9	26.3	25.8	25.5	25.2	25.0	24.9	24.7	24.6
34	27.5	26.9	26.3	25.8	25.5	25.2	25.0	24.9	24.7	24.6
35	22.0	21.6	21.3	21.1	20.9	20.8	20.7	20.6	20.5	20.4
36	22.0	21.6	21.3	21.1	20.9	20.8	20.7	20.6	20.5	20.4
37	25.6	25.2	24.9	24.6	24.4	24.2	24.1	24.0	23.9	23.8
38	25.6	25.2	24.9	24.6	24.4	24.2	24.1	24.0	23.9	23.8
39	25.6	25.2	24.9	24.6	24.4	24.2	24.1	24.0	23.9	23.8
40	25.6	25.2	24.9	24.6	24.4	24.2	24.1	24.0	23.9	23.8
41	25.6	25.2	24.9	24.6	24.4	24.2	24.1	24.0	23.9	23.8
42	25.6	25.2	24.9	24.6	24.4	24.2	24.1	24.0	23.9	23.8
43	31.4	30.6	30.0	29.4	29.0	28.6	28.2	27.9	27.7	27.5
44	31.4	30.6	30.0	29.4	29.0	28.6	28.2	27.9	27.7	27.5
45	31.4	30.6	30.0	29.4	29.0	28.6	28.2	27.9	27.7	27.5

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Nonferrous Materials (Cont'd)													
1	7.3	7.0	6.7	6.4	...	...	...	...	...	...	...	...	...	(**21**)
2	7.3	7.0	6.7	6.4	...	...	...	...	...	...	...	...	...	(**21**)
3	7.3	7.0	6.7	6.4	...	...	...	...	...	...	...	...	...	(**21**)
4	8.8	8.4	8.0	7.7	...	...	...	...	...	...	...	...	...	(**21**)
5	8.8	8.4	8.0	7.7	...	...	...	...	...	...	...	...	...	(**21**)
6	8.8	8.4	8.0	7.7	...	...	...	...	...	...	...	...	...	(**21**)
7	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	21.4	21.3	21.1	20.8	20.5	20.1	19.7	19.1	18.4	17.6	16.7	15.6	14.4	(**21**)
28	21.4	21.3	21.1	20.8	20.5	20.1	19.7	19.1	18.4	17.6	16.7	15.6	14.4	(**21**)
29	21.4	21.3	21.1	20.8	20.5	20.1	19.7	19.1	18.4	17.6	16.7	15.6	14.4	(**21**)
30	24.5	24.3	24.1	23.8	23.4	23.0	22.5	21.8	21.1	20.1	19.1	17.8	16.4	(**21**)
31	24.5	24.3	24.1	23.8	23.4	23.0	22.5	21.8	21.1	20.1	19.1	17.8	16.4	(**21**)
32	24.5	24.3	24.1	23.8	23.4	23.0	22.5	21.8	21.1	20.1	19.1	17.8	16.4	(**21**)
33	24.5	24.3	24.1	23.8	23.4	23.0	22.5	21.8	21.1	20.1	19.1	17.8	16.4	(**21**)
34	24.5	24.3	24.1	23.8	23.4	23.0	22.5	21.8	21.1	20.1	19.1	17.8	16.4	(**21**)
35	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	27.0	26.8	26.6	26.4	26.2	...	...	...	...	...	...	...	...	(**21**)
44	27.0	26.8	26.6	26.4	26.2	...	...	...	...	...	...	...	...	(**21**)
45	27.0	26.8	26.6	26.4	26.2	...	...	...	...	...	...	...	...	(**21**)

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
		Nonferrous Materials (Cont'd)					
(**21**)	1	55Ni–21Cr–13.5Mo	Rod	SB–574	...	N06022	Solution ann.
(**21**)	2	55Ni–21Cr–13.5Mo	Plate, sheet, strip	SB–575	...	N06022	Solution ann.
(**21**)	3	55Ni–21Cr–13.5Mo	Wld. pipe	SB–619	...	N06022	Solution ann.
(**21**)	4	55Ni–21Cr–13.5Mo	Smls. pipe & tube	SB–622	...	N06022	Solution ann.
(**21**)	5	55Ni–21Cr–13.5Mo	Wld. tube	SB–626	...	N06022	Solution ann.
	6	60Ni–25Cr–9.5Fe–2.1Al	Smls. tube	SB–163	...	N06025	Annealed
	7	60Ni–25Cr–9.5Fe–2.1Al	Plate, sheet, strip	SB–168	...	N06025	Annealed
	8	60Ni–25Cr–9.5Fe–2.1Al	Wrought fittings	SB–366	...	N06025	Annealed
	9	60Ni–25Cr–9.5Fe–2.1Al	Forgings	SB–462	...	N06025	Annealed
	10	60Ni–25Cr–9.5Fe–2.1Al	Wld. tube	SB–516	...	N06025	Annealed
	11	60Ni–25Cr–9.5Fe–2.1Al	Wld. pipe	SB–517	...	N06025	Annealed
	12	60Ni–25Cr–9.5Fe–2.1Al	Forgings	SB–564	...	N06025	Annealed
	13	60Ni–25Cr–9.5Fe–2.1Al	Bar	SB–166	...	N06025	HW or CW ann.
	14	60Ni–25Cr–9.5Fe–2.1Al	Smls. pipe & tube	SB–167	...	N06025	HW or CW ann.
	15	40Ni–29Cr–15Fe–5Mo	Smls. & wld. fittings	SB–366	...	N06030	Solution ann.
	16	40Ni–29Cr–15Fe–5Mo	Forgings	SB–462	...	N06030	Solution ann.
	17	40Ni–29Cr–15Fe–5Mo	Rod	SB–581	...	N06030	Solution ann.
	18	40Ni–29Cr–15Fe–5Mo	Plate, sheet, strip	SB–582	...	N06030	Solution ann.
	19	40Ni–29Cr–15Fe–5Mo	Wld. pipe	SB–619	...	N06030	Solution ann.
	20	40Ni–29Cr–15Fe–5Mo	Smls. pipe & tube	SB–622	...	N06030	Solution ann.
	21	40Ni–29Cr–15Fe–5Mo	Wld. tube	SB–626	...	N06030	Solution ann.
	22	58Ni–33Cr–8Mo	Smls. & wld. fittings	SB–366	...	N06035	Solution ann.
	23	58Ni–33Cr–8Mo	Forgings	SB–462	...	N06035	Solution ann.
	24	58Ni–33Cr–8Mo	Forgings	SB–564	...	N06035	Solution ann.
	25	58Ni–33Cr–8Mo	Rod	SB–574	...	N06035	Solution ann.
	26	58Ni–33Cr–8Mo	Plate, sheet, strip	SB–575	...	N06035	Solution ann.
	27	58Ni–33Cr–8Mo	Wld. pipe	SB–619	...	N06035	Solution ann.
	28	58Ni–33Cr–8Mo	Smls. pipe & tube	SB–622	...	N06035	Solution ann.
	29	58Ni–33Cr–8Mo	Wld. tube	SB–626	...	N06035	Solution ann.
	30	46Ni–27Cr–23Fe–2.75Si	Rod	SB–166	...	N06045	Solution ann.
	31	46Ni–27Cr–23Fe–2.75Si	Smls. pipe & tube	SB–167	...	N06045	Solution ann.
	32	46Ni–27Cr–23Fe–2.75Si	Plate, sheet, strip	SB–168	...	N06045	Solution ann.
	33	46Ni–27Cr–23Fe–2.75Si	Smls. & wld. fittings	SB–366	...	N06045	Solution ann.
	34	46Ni–27Cr–23Fe–2.75Si	Wld. tube	SB–516	...	N06045	Solution ann.
	35	46Ni–27Cr–23Fe–2.75Si	Wld. pipe	SB–517	...	N06045	Solution ann.
	36	46Ni–27Cr–23Fe–2.75Si	Forgings	SB–564	...	N06045	Solution ann.
	37	59Ni–23Cr–16Mo	Fittings	SB–366	CR5923	N06059	Annealed
	38	59Ni–23Cr–16Mo	Fittings	SB–366	WP5923	N06059	Annealed
	39	59Ni–23Cr–16Mo	Wld. fittings	SB–366	WP5923W	N06059	Annealed
	40	59Ni–23Cr–16Mo	Fittings	SB–366	WP5923WX	N06059	Annealed
(**21**)	41	59Ni–23Cr–16Mo	Forged fittings	SB–462	...	N06059	Solution ann.
	42	59Ni–23Cr–16Mo	Forgings	SB–564	...	N06059	Solution ann.
	43	59Ni–23Cr–16Mo	Rod	SB–574	...	N06059	Solution ann.
	44	59Ni–23Cr–16Mo	Plate, sheet, strip	SB–575	...	N06059	Solution ann.
	45	59Ni–23Cr–16Mo	Wld. pipe	SB–619	...	N06059	Solution ann.

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Nonferrous Materials (Cont'd)
1	...	100	45	...
2	...	100	45	...
3	...	100	45	...
4	...	100	45	...
5	...	100	45	...
6	...	98	39	...
7	...	98	39	...
8	...	98	39	...
9	$t \le 4$	98	39	...
10	...	98	39	...
11	...	98	39	...
12	$t \le 4$	98	39	...
13	$t \le 4$	98	39	...
14	...	98	39	...
15	...	85	35	...
16	...	85	35	...
17	...	85	35	...
18	...	85	35	...
19	...	85	35	...
20	...	85	35	...
21	...	85	35	...
22	...	85	35	...
23	...	85	35	...
24	...	85	35	...
25	...	85	35	...
26	...	85	35	...
27	...	85	35	...
28	...	85	35	...
29	...	85	35	...
30	...	90	35	...
31	...	90	35	...
32	...	90	35	...
33	...	90	35	...
34	...	90	35	...
35	...	90	35	...
36	...	90	35	...
37	...	100	45	...
38	...	100	45	...
39	...	100	45	...
40	...	100	45	...
41	...	100	45	...
42	...	100	45	...
43	...	100	45	...
44	...	100	45	...
45	...	100	45	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Nonferrous Materials (Cont'd)								
1	45.0	42.0	40.1	38.4	36.9	35.5	34.3	33.2	32.2
2	45.0	42.0	40.1	38.4	36.9	35.5	34.3	33.2	32.2
3	45.0	42.0	40.1	38.4	36.9	35.5	34.3	33.2	32.2
4	45.0	42.0	40.1	38.4	36.9	35.5	34.3	33.2	32.2
5	45.0	42.0	40.1	38.4	36.9	35.5	34.3	33.2	32.2
6	39.0	39.0	38.7	38.1	37.3	36.4	35.5	...	33.7
7	39.0	39.0	38.7	38.1	37.3	36.4	35.5	...	33.7
8	39.0	39.0	38.7	38.1	37.3	36.4	35.5	...	33.7
9	39.0	39.0	38.7	38.1	37.3	36.4	35.5	...	33.7
10	39.0	39.0	38.7	38.1	37.3	36.4	35.5	...	33.7
11	39.0	39.0	38.7	38.1	37.3	36.4	35.5	...	33.7
12	39.0	39.0	38.7	38.1	37.3	36.4	35.5	...	33.7
13	39.0	39.0	38.7	38.1	37.3	36.4	35.5	...	33.7
14	39.0	39.0	38.7	38.1	37.3	36.4	35.5	...	33.7
15	35.0	31.7	30.0	28.6	27.5	26.6	25.8	25.1	24.6
16	35.0	31.7	30.0	28.6	27.5	26.6	25.8	25.1	24.6
17	35.0	31.7	30.0	28.6	27.5	26.6	25.8	25.1	24.6
18	35.0	31.7	30.0	28.6	27.5	26.6	25.8	25.1	24.6
19	35.0	31.7	30.0	28.6	27.5	26.6	25.8	25.1	24.6
20	35.0	31.7	30.0	28.6	27.5	26.6	25.8	25.1	24.6
21	35.0	31.7	30.0	28.6	27.5	26.6	25.8	25.1	24.6
22	35.0	...	30.6	...	27.3	...	24.7	...	22.9
23	35.0	...	30.6	...	27.3	...	24.7	...	22.9
24	35.0	...	30.6	...	27.3	...	24.7	...	22.9
25	35.0	...	30.6	...	27.3	...	24.7	...	22.9
26	35.0	...	30.6	...	27.3	...	24.7	...	22.9
27	35.0	...	30.6	...	27.3	...	24.7	...	22.9
28	35.0	...	30.6	...	27.3	...	24.7	...	22.9
29	35.0	...	30.6	...	27.3	...	24.7	...	22.9
30	35.0	...	31.4	...	28.9	...	27.1	...	26.0
31	35.0	...	31.4	...	28.9	...	27.1	...	26.0
32	35.0	...	31.4	...	28.9	...	27.1	...	26.0
33	35.0	...	31.4	...	28.9	...	27.1	...	26.0
34	35.0	...	31.4	...	28.9	...	27.1	...	26.0
35	35.0	...	31.4	...	28.9	...	27.1	...	26.0
36	35.0	...	31.4	...	28.9	...	27.1	...	26.0
37	45.0	42.8	40.4	39.1	37.8	36.9	35.8	34.8	33.9
38	45.0	42.8	40.4	39.1	37.8	36.9	35.8	34.8	33.9
39	45.0	42.8	40.4	39.1	37.8	36.9	35.8	34.8	33.9
40	45.0	42.8	40.4	39.1	37.8	36.9	35.8	34.8	33.9
41	45.0	42.8	40.4	39.1	37.8	36.9	35.8	34.8	33.9
42	45.0	42.8	40.4	39.1	37.8	36.9	35.8	34.8	33.9
43	45.0	42.8	40.4	39.1	37.8	36.9	35.8	34.8	33.9
44	45.0	42.8	40.4	39.1	37.8	36.9	35.8	34.8	33.9
45	45.0	42.8	40.4	39.1	37.8	36.9	35.8	34.8	33.9

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Nonferrous Materials (Cont'd)
1	31.4	30.6	30.0	29.4	29.0	28.6	28.2	27.9	27.7	27.5
2	31.4	30.6	30.0	29.4	29.0	28.6	28.2	27.9	27.7	27.5
3	31.4	30.6	30.0	29.4	29.0	28.6	28.2	27.9	27.7	27.5
4	31.4	30.6	30.0	29.4	29.0	28.6	28.2	27.9	27.7	27.5
5	31.4	30.6	30.0	29.4	29.0	28.6	28.2	27.9	27.7	27.5
6	32.9	32.2	31.6	31.1	30.7	30.3	30.1	29.9	29.7	29.5
7	32.9	32.2	31.6	31.1	30.7	30.3	30.1	29.9	29.7	29.5
8	32.9	32.2	31.6	31.1	30.7	30.3	30.1	29.9	29.7	29.5
9	32.9	32.2	31.6	31.1	30.7	30.3	30.1	29.9	29.7	29.5
10	32.9	32.2	31.6	31.1	30.7	30.3	30.1	29.9	29.7	29.5
11	32.9	32.2	31.6	31.1	30.7	30.3	30.1	29.9	29.7	29.5
12	32.9	32.2	31.6	31.1	30.7	30.3	30.1	29.9	29.7	29.5
13	32.9	32.2	31.6	31.1	30.7	30.3	30.1	29.9	29.7	29.5
14	32.9	32.2	31.6	31.1	30.7	30.3	30.1	29.9	29.7	29.5
15	24.1	23.6	23.2	22.8	22.3	21.9	21.5	21.1	20.9	20.7
16	24.1	23.6	23.2	22.8	22.3	21.9	21.5	21.1	20.9	20.7
17	24.1	23.6	23.2	22.8	22.3	21.9	21.5	21.1	20.9	20.7
18	24.1	23.6	23.2	22.8	22.3	21.9	21.5	21.1	20.9	20.7
19	24.1	23.6	23.2	22.8	22.3	21.9	21.5	21.1	20.9	20.7
20	24.1	23.6	23.2	22.8	22.3	21.9	21.5	21.1	20.9	20.7
21	24.1	23.6	23.2	22.8	22.3	21.9	21.5	21.1	20.9	20.7
22	...	21.9	21.6	21.3	21.1	20.8	20.6	20.2	19.8	19.3
23	...	21.9	21.6	21.3	21.1	20.8	20.6	20.2	19.8	19.3
24	...	21.9	21.6	21.3	21.1	20.8	20.6	20.2	19.8	19.3
25	...	21.9	21.6	21.3	21.1	20.8	20.6	20.2	19.8	19.3
26	...	21.9	21.6	21.3	21.1	20.8	20.6	20.2	19.8	19.3
27	...	21.9	21.6	21.3	21.1	20.8	20.6	20.2	19.8	19.3
28	...	21.9	21.6	21.3	21.1	20.8	20.6	20.2	19.8	19.3
29	...	21.9	21.6	21.3	21.1	20.8	20.6	20.2	19.8	19.3
30	...	25.4	25.3	25.1	25.0	24.9	24.7	24.5	24.3	23.9
31	...	25.4	25.3	25.1	25.0	24.9	24.7	24.5	24.3	23.9
32	...	25.4	25.3	25.1	25.0	24.9	24.7	24.5	24.3	23.9
33	...	25.4	25.3	25.1	25.0	24.9	24.7	24.5	24.3	23.9
34	...	25.4	25.3	25.1	25.0	24.9	24.7	24.5	24.3	23.9
35	...	25.4	25.3	25.1	25.0	24.9	24.7	24.5	24.3	23.9
36	...	25.4	25.3	25.1	25.0	24.9	24.7	24.5	24.3	23.9
37	33.0	32.1	31.2	30.3	29.4	28.6	27.8	27.0	26.3	25.7
38	33.0	32.1	31.2	30.3	29.4	28.6	27.8	27.0	26.3	25.7
39	33.0	32.1	31.2	30.3	29.4	28.6	27.8	27.0	26.3	25.7
40	33.0	32.1	31.2	30.3	29.4	28.6	27.8	27.0	26.3	25.7
41	33.0	32.1	31.2	30.3	29.4	28.6	27.8	27.0	26.3	25.7
42	33.0	32.1	31.2	30.3	29.4	28.6	27.8	27.0	26.3	25.7
43	33.0	32.1	31.2	30.3	29.4	28.6	27.8	27.0	26.3	25.7
44	33.0	32.1	31.2	30.3	29.4	28.6	27.8	27.0	26.3	25.7
45	33.0	32.1	31.2	30.3	29.4	28.6	27.8	27.0	26.3	25.7

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Nonferrous Materials (Cont'd)													
1	27.0	26.8	26.6	26.4	26.2	...	...	...	...	...	...	...	...	(**21**)
2	27.0	26.8	26.6	26.4	26.2	...	...	...	...	...	...	...	...	(**21**)
3	27.0	26.8	26.6	26.4	26.2	...	...	...	...	...	...	...	...	(**21**)
4	27.0	26.8	26.6	26.4	26.2	...	...	...	...	...	...	...	...	(**21**)
5	27.0	26.8	26.6	26.4	26.2	...	...	...	...	...	...	...	...	(**21**)
6	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
		Nonferrous Materials (Cont'd)					
	1	59Ni–23Cr–16Mo	Smls. pipe & tube	SB–622	...	N06059	Solution ann.
	2	59Ni–23Cr–16Mo	Wld. tube	SB–626	...	N06059	Solution ann.
	3	59Ni–23Cr–16Mo–1.6Cu	Fittings	SB–366	...	N06200	Solution ann.
	4	59Ni–23Cr–16Mo–1.6Cu	Forgings	SB–462	...	N06200	Solution ann.
	5	59Ni–23Cr–16Mo–1.6Cu	Forgings	SB–564	...	N06200	Solution ann.
	6	59Ni–23Cr–16Mo–1.6Cu	Rod	SB–574	...	N06200	Solution ann.
	7	59Ni–23Cr–16Mo–1.6Cu	Plate, sheet, strip	SB–575	...	N06200	Solution ann.
	8	59Ni–23Cr–16Mo–1.6Cu	Wld. pipe	SB–619	...	N06200	Solution ann.
	9	59Ni–23Cr–16Mo–1.6Cu	Smls. pipe & tube	SB–622	...	N06200	Solution ann.
	10	59Ni–23Cr–16Mo–1.6Cu	Wld. tube	SB–626	...	N06200	Solution ann.
	11	60Ni–19Cr–19Mo–1.8Ta	Smls. & wld. fittings	SB–366	...	N06210	Solution ann.
	12	60Ni–19Cr–19Mo–1.8Ta	Forgings	SB–564	...	N06210	Solution ann.
	13	60Ni–19Cr–19Mo–1.8Ta	Rod	SB–574	...	N06210	Solution ann.
	14	60Ni–19Cr–19Mo–1.8Ta	Plate, sheet, strip	SB–575	...	N06210	Solution ann.
	15	60Ni–19Cr–19Mo–1.8Ta	Wld. pipe	SB–619	...	N06210	Solution ann.
	16	60Ni–19Cr–19Mo–1.8Ta	Smls. pipe & tube	SB–622	...	N06210	Solution ann.
	17	60Ni–19Cr–19Mo–1.8Ta	Wld. tube	SB–626	...	N06210	Solution ann.
	18	57Ni–22Cr–14W–2Mo–La	Plate, sheet, strip	SB–435	...	N06230	Solution ann.
	19	57Ni–22Cr–14W–2Mo–La	Forgings	SB–564	...	N06230	Solution ann.
	20	57Ni–22Cr–14W–2Mo–La	Bar	SB–572	...	N06230	Solution ann.
	21	57Ni–22Cr–14W–2Mo–La	Wld. pipe	SB–619	...	N06230	Solution ann.
	22	57Ni–22Cr–14W–2Mo–La	Smls. pipe & tube	SB–622	...	N06230	Solution ann.
	23	57Ni–22Cr–14W–2Mo–La	Wld. tube	SB–626	...	N06230	Solution ann.
	24	61Ni–16Mo–16Cr	Smls. & wld. fittings	SB–366	...	N06455	Annealed
	25	61Ni–16Mo–16Cr	Rod	SB–574	...	N06455	Solution ann.
	26	61Ni–16Mo–16Cr	Plate, sheet, strip	SB–575	...	N06455	Solution ann.
	27	61Ni–16Mo–16Cr	Wld. pipe	SB–619	...	N06455	Solution ann.
	28	61Ni–16Mo–16Cr	Smls. pipe & tube	SB–622	...	N06455	Solution ann.
	29	61Ni–16Mo–16Cr	Wld. tube	SB–626	...	N06455	Solution ann.
(**21**)	30	72Ni–15Cr–8Fe	Smls. pipe & tube	SB–167	...	N06600	Hot fin./ann.
(**21**)	31	72Ni–15Cr–8Fe	Smls. & wld. fittings	SB–366	...	N06600	Annealed
(**21**)	32	72Ni–15Cr–8Fe	Smls. pipe & tube	SB–167	...	N06600	Cold drawn/ann.
(**21**)	33	72Ni–15Cr–8Fe	Smls. pipe & tube	SB–167	...	N06600	Hot fin./ann.
(**21**)	34	72Ni–15Cr–8Fe	Smls. tube	SB–163	...	N06600	Annealed
(**21**)	35	72Ni–15Cr–8Fe	Bar	SB–166	...	N06600	Annealed
(**21**)	36	72Ni–15Cr–8Fe	Plate	SB–168	...	N06600	Annealed
(**21**)	37	72Ni–15Cr–8Fe	Wld. tube	SB–516	...	N06600	Annealed
(**21**)	38	72Ni–15Cr–8Fe	Forgings	SB–564	...	N06600	...
(**21**)	39	72Ni–15Cr–8Fe	Pipe, tube	SB–167	...	N06600	Cold drawn/ann.
(**21**)	40	72Ni–15Cr–8Fe	Wld. pipe	SB–517	...	N06600	Cold drawn/ann.
(**21**)	41	72Ni–15Cr–8Fe	Smls. tube	SB–163	...	N06600	...
(**21**)	42	72Ni–15Cr–8Fe	Bar, rod	SB–166	...	N06600	Hot worked
(**21**)	43	72Ni–15Cr–8Fe	Plate, sheet, strip	SB–168	...	N06600	Hot rolled
	44	72Ni–15Cr–8Fe	Rounds	SB–166	...	N06600	Hot worked

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Nonferrous Materials (Cont'd)
1	...	100	45	...
2	...	100	45	...
3	...	100	45	...
4	...	100	45	...
5	...	100	45	...
6	...	100	45	...
7	...	100	45	...
8	...	100	45	...
9	...	100	45	...
10	...	100	45	...
11	...	100	45	...
12	...	100	45	...
13	...	100	45	...
14	...	100	45	...
15	...	100	45	...
16	...	100	45	...
17	...	100	45	...
18	...	110	45	...
19	...	110	45	...
20	...	110	45	...
21	...	110	45	...
22	...	110	45	...
23	...	110	45	...
24	...	100	40	...
25	...	100	40	...
26	...	100	40	...
27	...	100	40	...
28	...	100	40	...
29	...	100	40	...
30	>5	75	25	...
31	...	80	30	...
32	>5	80	30	...
33	≤5	80	30	...
34	≤3	80	35	...
35	...	80	35	...
36	...	80	35	...
37	...	80	35	...
38	...	80	35	...
39	≤5	80	35	...
40	...	80	35	...
41	...	80	40	...
42	>3	85	35	...
43	...	85	35	...
44	$\frac{1}{2} < t \leq 3$	90	40	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Nonferrous Materials (Cont'd)								
1	45.0	42.8	40.4	39.1	37.8	36.9	35.8	34.8	33.9
2	45.0	42.8	40.4	39.1	37.8	36.9	35.8	34.8	33.9
3	45.0	...	40.4	...	37.2	...	34.3	...	31.8
4	45.0	...	40.4	...	37.2	...	34.3	...	31.8
5	45.0	...	40.4	...	37.2	...	34.3	...	31.8
6	45.0	...	40.4	...	37.2	...	34.3	...	31.8
7	45.0	...	40.4	...	37.2	...	34.3	...	31.8
8	45.0	...	40.4	...	37.2	...	34.3	...	31.8
9	45.0	...	40.4	...	37.2	...	34.3	...	31.8
10	45.0	...	40.4	...	37.2	...	34.3	...	31.8
11	45.0	...	40.0	...	36.8	...	33.9	...	31.4
12	45.0	...	40.0	...	36.8	...	33.9	...	31.4
13	45.0	...	40.0	...	36.8	...	33.9	...	31.4
14	45.0	...	40.0	...	36.8	...	33.9	...	31.4
15	45.0	...	40.0	...	36.8	...	33.9	...	31.4
16	45.0	...	40.0	...	36.8	...	33.9	...	31.4
17	45.0	...	40.0	...	36.8	...	33.9	...	31.4
18	45.0	...	42.3	...	39.6	...	37.0	...	34.7
19	45.0	...	42.3	...	39.6	...	37.0	...	34.7
20	45.0	...	42.3	...	39.6	...	37.0	...	34.7
21	45.0	...	42.3	...	39.6	...	37.0	...	34.7
22	45.0	...	42.3	...	39.6	...	37.0	...	34.7
23	45.0	...	42.3	...	39.6	...	37.0	...	34.7
24	40.0	38.2	36.9	35.6	34.5	33.5	32.6	31.8	31.2
25	40.0	38.2	36.9	35.6	34.5	33.5	32.6	31.8	31.2
26	40.0	38.2	36.9	35.6	34.5	33.5	32.6	31.8	31.2
27	40.0	38.2	36.9	35.6	34.5	33.5	32.6	31.8	31.2
28	40.0	38.2	36.9	35.6	34.5	33.5	32.6	31.8	31.2
29	40.0	38.2	36.9	35.6	34.5	33.5	32.6	31.8	31.2
30	25.0	24.3	23.8	23.3	22.8	22.3	21.9	21.4	21.0
31	30.0	29.2	28.6	28.0	27.4	26.8	26.2	25.7	25.2
32	30.0	29.2	28.6	28.0	27.4	26.8	26.2	25.7	25.2
33	30.0	29.2	28.6	28.0	27.4	26.8	26.2	25.7	25.2
34	35.0	32.8	32.0	31.5	31.2	30.9	30.7	30.5	30.3
35	35.0	32.8	32.0	31.5	31.2	30.9	30.7	30.5	30.3
36	35.0	32.8	32.0	31.5	31.2	30.9	30.7	30.5	30.3
37	35.0	32.8	32.0	31.5	31.2	30.9	30.7	30.5	30.3
38	35.0	32.8	32.0	31.5	31.2	30.9	30.7	30.5	30.3
39	35.0	32.8	32.0	31.5	31.2	30.9	30.7	30.5	30.3
40	35.0	32.8	32.0	31.5	31.2	30.9	30.7	30.5	30.3
41	40.0	...	36.6	...	35.6	...	35.1	...	34.7
42	35.0	33.8	33.2	32.7	32.3	32.1	31.9	31.9	31.9
43	35.0	33.8	33.2	32.7	32.3	32.1	31.9	31.9	31.9
44	40.0	...	38.0	...	37.0	...	36.4	...	36.4

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Nonferrous Materials (Cont'd)
1	33.0	32.1	31.2	30.3	29.4	28.6	27.8	27.0	26.3	25.7
2	33.0	32.1	31.2	30.3	29.4	28.6	27.8	27.0	26.3	25.7
3	...	29.8	29.1	28.6	28.2	28.0	27.8	27.6	27.2	26.4
4	...	29.8	29.1	28.6	28.2	28.0	27.8	27.6	27.2	26.4
5	...	29.8	29.1	28.6	28.2	28.0	27.8	27.6	27.2	26.4
6	...	29.8	29.1	28.6	28.2	28.0	27.8	27.6	27.2	26.4
7	...	29.8	29.1	28.6	28.2	28.0	27.8	27.6	27.2	26.4
8	...	29.8	29.1	28.6	28.2	28.0	27.8	27.6	27.2	26.4
9	...	29.8	29.1	28.6	28.2	28.0	27.8	27.6	27.2	26.4
10	...	29.8	29.1	28.6	28.2	28.0	27.8	27.6	27.2	26.4
11	...	29.3	28.4	27.5	26.8	26.2	25.7	25.2	24.9	24.7
12	...	29.3	28.4	27.5	26.8	26.2	25.7	25.2	24.9	24.7
13	...	29.3	28.4	27.5	26.8	26.2	25.7	25.2	24.9	24.7
14	...	29.3	28.4	27.5	26.8	26.2	25.7	25.2	24.9	24.7
15	...	29.3	28.4	27.5	26.8	26.2	25.7	25.2	24.9	24.7
16	...	29.3	28.4	27.5	26.8	26.2	25.7	25.2	24.9	24.7
17	...	29.3	28.4	27.5	26.8	26.2	25.7	25.2	24.9	24.7
18	...	32.9	32.3	31.9	31.6	31.4	31.3	31.3	31.3	31.3
19	...	32.9	32.3	31.9	31.6	31.4	31.3	31.3	31.3	31.3
20	...	32.9	32.3	31.9	31.6	31.4	31.3	31.3	31.3	31.3
21	...	32.9	32.3	31.9	31.6	31.4	31.3	31.3	31.3	31.3
22	...	32.9	32.3	31.9	31.6	31.4	31.3	31.3	31.3	31.3
23	...	32.9	32.3	31.9	31.6	31.4	31.3	31.3	31.3	31.3
24	30.6	30.2	29.8	29.4	29.0	28.7	28.3	27.9	27.6	27.3
25	30.6	30.2	29.8	29.4	29.0	28.7	28.3	27.9	27.6	27.3
26	30.6	30.2	29.8	29.4	29.0	28.7	28.3	27.9	27.6	27.3
27	30.6	30.2	29.8	29.4	29.0	28.7	28.3	27.9	27.6	27.3
28	30.6	30.2	29.8	29.4	29.0	28.7	28.3	27.9	27.6	27.3
29	30.6	30.2	29.8	29.4	29.0	28.7	28.3	27.9	27.6	27.3
30	20.6	20.3	19.9	19.6	19.3	19.1	18.8	18.6	18.5	18.3
31	24.7	24.3	23.9	23.5	23.2	22.9	22.6	22.3	22.2	21.9
32	24.7	24.3	23.9	23.5	23.2	22.9	22.6	22.3	22.2	21.9
33	24.7	24.3	23.9	23.5	23.2	22.9	22.6	22.3	22.2	21.9
34	30.1	29.9	29.7	29.4	29.1	28.7	28.1	27.3	26.1	25.3
35	30.1	29.9	29.7	29.4	29.1	28.7	28.1	27.3	26.1	25.3
36	30.1	29.9	29.7	29.4	29.1	28.7	28.1	27.3	26.1	25.3
37	30.1	29.9	29.7	29.4	29.1	28.7	28.1	27.3	26.1	25.3
38	30.1	29.9	29.7	29.4	29.1	28.7	28.1	27.3	26.1	25.3
39	30.1	29.9	29.7	29.4	29.1	28.7	28.1	27.3	26.1	25.3
40	30.1	29.9	29.7	29.4	29.1	28.7	28.1	27.3	26.1	25.3
41	...	34.2	33.9	33.6	33.2	32.8	...	...	29.8	28.9
42	31.9	31.8	31.7	31.5	31.2	30.7	30.1	29.5	28.9	28.1
43	31.9	31.8	31.7	31.5	31.2	30.7	30.1	29.5	28.9	28.1
44	...	36.4	36.1	35.9	35.4	34.8	...	...	...	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Nonferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	18.0	17.6	17.2	16.7	...	...	...	...	...	...	...	...	...	(**21**)
31	21.6	21.1	20.6	20.1	...	...	...	...	...	...	...	...	...	(**21**)
32	21.6	21.1	20.6	20.1	...	...	...	...	...	...	...	...	...	(**21**)
33	21.6	21.1	20.6	20.1	...	...	...	...	...	...	...	...	...	(**21**)
34	24.3	23.2	21.9	20.5	...	...	...	...	...	...	...	...	...	(**21**)
35	24.3	23.2	21.9	20.5	...	...	...	...	...	...	...	...	...	(**21**)
36	24.3	23.2	21.9	20.5	...	...	...	...	...	...	...	...	...	(**21**)
37	24.3	23.2	21.9	20.5	...	...	...	...	...	...	...	...	...	(**21**)
38	24.3	23.2	21.9	20.5	...	...	...	...	...	...	...	...	...	(**21**)
39	24.3	23.2	21.9	20.5	...	...	...	...	...	...	...	...	...	(**21**)
40	24.3	23.2	21.9	20.5	...	...	...	...	...	...	...	...	...	(**21**)
41	27.8	26.5	25.1	23.5	...	...	...	...	...	...	...	...	...	(**21**)
42	27.4	26.6	25.6	24.4	...	...	...	...	...	...	...	...	...	(**21**)
43	27.4	26.6	25.6	24.4	...	...	...	...	...	...	...	...	...	(**21**)
44	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
	Nonferrous Materials (Cont'd)					
1	72Ni–15Cr–8Fe	Rounds	SB–166	...	N06600	Hot worked
2	60Ni–23Cr–Fe	Smls. tube	SB–163	...	N06601	Annealed
3	60Ni–23Cr–Fe	Bar	SB–166	...	N06601	Annealed
4	60Ni–23Cr–Fe	Smls. pipe & tube	SB–167	...	N06601	Annealed
5	60Ni–23Cr–Fe	Plate, sheet, strip	SB–168	...	N06601	Annealed
6	52Ni–22Cr–13Co–9Mo	Bar, rod	SB–166	...	N06617	Annealed
7	52Ni–22Cr–13Co–9Mo	Smls. pipe & tube	SB–167	...	N06617	Annealed
8	52Ni–22Cr–13Co–9Mo	Plate, sheet, strip	SB–168	...	N06617	Annealed
9	52Ni–22Cr–13Co–9Mo	Forgings	SB–564	...	N06617	Annealed
(**21**) 10	60Ni–22Cr–9Mo–3.5Cb	Plate, sheet, strip	SB–443	2	N06625	Cold rolled/solution ann.
(**21**) 11	60Ni–22Cr–9Mo–3.5Cb	Smls. pipe & tube	SB–444	2	N06625	Solution ann.
(**21**) 12	60Ni–22Cr–9Mo–3.5Cb	Bar	SB–446	2	N06625	Solution ann.
(**21**) 13	60Ni–22Cr–9Mo–3.5Cb	Smls. & wld. fittings	SB–366	...	N06625	Annealed
(**21**) 14	60Ni–22Cr–9Mo–3.5Cb	Bar	SB–446	1	N06625	Annealed
(**21**) 15	60Ni–22Cr–9Mo–3.5Cb	Forgings	SB–564	...	N06625	Annealed
(**21**) 16	60Ni–22Cr–9Mo–3.5Cb	Plate	SB–443	1	N06625	Cold rolled/ann.
(**21**) 17	60Ni–22Cr–9Mo–3.5Cb	Sheet, strip	SB–443	1	N06625	Cold rolled/ann.
(**21**) 18	60Ni–22Cr–9Mo–3.5Cb	Smls. pipe	SB–444	1	N06625	Annealed
(**21**) 19	60Ni–22Cr–9Mo–3.5Cb	Bar	SB–446	1	N06625	Annealed
(**21**) 20	60Ni–22Cr–9Mo–3.5Cb	Forgings	SB–564	...	N06625	Annealed
(**21**) 21	60Ni–22Cr–9Mo–3.5Cb	Wld. tube	SB–704	...	N06625	Annealed
(**21**) 22	60Ni–22Cr–9Mo–3.5Cb	Wld. pipe	SB–705	...	N06625	Annealed
23	Ni–Cr–Mo–W	Forgings	SB–564	...	N06686	Solution ann.
24	Ni–Cr–Mo–W	Rod	SB–574	...	N06686	Solution ann.
25	Ni–Cr–Mo–W	Plate, sheet, strip	SB–575	...	N06686	Solution ann.
26	Ni–Cr–Mo–W	Wld. pipe	SB–619	...	N06686	Solution ann.
27	Ni–Cr–Mo–W	Smls. pipe & tube	SB–622	...	N06686	Solution ann.
28	Ni–Cr–Mo–W	Wld. tube	SB–626	...	N06686	Solution ann.
29	58Ni–29Cr–9Fe	Smls. pipe & tube	SB–167	...	N06690	Hot worked/ann.
30	58Ni–29Cr–9Fe	Smls. pipe & tube	SB–167	...	N06690	Cold worked/ann.
31	58Ni–29Cr–9Fe	Smls. pipe & tube	SB–167	...	N06690	Hot worked/ann.
32	58Ni–29Cr–9Fe	Smls. tube	SB–163	...	N06690	Annealed
33	58Ni–29Cr–9Fe	Bar, rod	SB–166	...	N06690	Annealed
34	58Ni–29Cr–9Fe	Plate, sheet, strip	SB–168	...	N06690	Annealed
35	58Ni–29Cr–9Fe	Forgings	SB–564	...	N06690	Annealed
36	58Ni–29Cr–9Fe	Smls. pipe & tube	SB–167	...	N06690	Cold worked/ann.
37	58Ni–29Cr–9Fe	Smls. tube	SB–163	...	N06690	Annealed
38	49Ni–25Cr–18Fe–6Mo	Bolting	SB–581	...	N06975	Solution ann.
39	49Ni–25Cr–18Fe–6Mo	Plate, sheet, strip	SB–582	...	N06975	Solution ann.
40	49Ni–25Cr–18Fe–6Mo	Wld. pipe	SB–619	...	N06975	Solution ann.
41	49Ni–25Cr–18Fe–6Mo	Smls. pipe & tube	SB–622	...	N06975	Solution ann.
42	49Ni–25Cr–18Fe–6Mo	Wld. tube	SB–626	...	N06975	Solution ann.
43	47Ni–22Cr–20Fe–7Mo	Rod	SB–581	...	N06985	Annealed

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Nonferrous Materials (Cont'd)
1	$\frac{1}{4} \le t \le \frac{1}{2}$	95	45	...
2	≤3 O.D.	80	30	...
3	...	80	30	...
4	...	80	30	...
5	...	80	30	...
6	...	95	35	...
7	...	95	35	...
8	...	95	35	...
9	...	95	35	...
10	...	100	40	...
11	...	100	40	...
12	...	100	40	...
13	...	110	50	...
14	$4 < t \le 10$	110	50	...
15	$4 < t \le 10$	110	50	...
16	≤0.375	110	55	...
17	...	120	60	...
18	...	120	60	...
19	≤4	120	60	...
20	≤4	120	60	...
21	...	120	60	...
22	...	120	60	...
23	...	100	45	...
24	...	100	45	...
25	...	100	45	...
26	≤8	100	45	...
27	...	100	45	...
28	$\le 3\frac{1}{2}$	100	45	...
29	>5 O.D.	75	25	...
30	>5 O.D.	85	30	...
31	≤5 O.D.	85	30	...
32	...	85	35	...
33	...	85	35	...
34	...	85	35	...
35	...	85	35	...
36	≤5 O.D.	85	35	...
37	...	85	40	...
38	...	85	32	...
39	...	85	32	...
40	...	85	32	...
41	...	85	32	...
42	...	85	32	...
43	$>\frac{3}{4}$	85	30	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Nonferrous Materials (Cont'd)								
1	45.0	...	42.8	...	41.7	...	41.0	...	40.9
2	30.0	27.8	26.8	25.8	24.9	24.0	23.3	22.7	22.1
3	30.0	27.8	26.8	25.8	24.9	24.0	23.3	22.7	22.1
4	30.0	27.8	26.8	25.8	24.9	24.0	23.3	22.7	22.1
5	30.0	27.8	26.8	25.8	24.9	24.0	23.3	22.7	22.1
6	35.0	...	31.1	...	28.9	...	27.1	...	25.9
7	35.0	...	31.1	...	28.9	...	27.1	...	25.9
8	35.0	...	31.1	...	28.9	...	27.1	...	25.9
9	35.0	...	31.1	...	28.9	...	27.1	...	25.9
10	40.0	37.7	36.4	35.2	34.2	33.2	32.4	31.7	31.1
11	40.0	37.7	36.4	35.2	34.2	33.2	32.4	31.7	31.1
12	40.0	37.7	36.4	35.2	34.2	33.2	32.4	31.7	31.1
13	50.0	45.6	43.3	41.3	39.7	38.3	37.3	36.4	35.8
14	50.0	45.6	43.3	41.3	39.7	38.3	37.3	36.4	35.8
15	50.0	45.6	43.3	41.3	39.7	38.3	37.3	36.4	35.8
16	55.0	50.1	47.6	45.5	43.7	42.2	41.0	40.1	39.4
17	60.0	54.7	51.9	49.6	47.6	46.0	44.7	43.7	43.0
18	60.0	54.7	51.9	49.6	47.6	46.0	44.7	43.7	43.0
19	60.0	54.7	51.9	49.6	47.6	46.0	44.7	43.7	43.0
20	60.0	54.7	51.9	49.6	47.6	46.0	44.7	43.7	43.0
21	60.0	54.7	51.9	49.6	47.6	46.0	44.7	43.7	43.0
22	60.0	54.7	51.9	49.6	47.6	46.0	44.7	43.7	43.0
23	45.0	39.5	37.3	36.0	35.1	34.3	33.7	33.1	32.5
24	45.0	39.5	37.3	36.0	35.1	34.3	33.7	33.1	32.5
25	45.0	39.5	37.3	36.0	35.1	34.3	33.7	33.1	32.5
26	45.0	39.5	37.3	36.0	35.1	34.3	33.7	33.1	32.5
27	45.0	39.5	37.3	36.0	35.1	34.3	33.7	33.1	32.5
28	45.0	39.5	37.3	36.0	35.1	34.3	33.7	33.1	32.5
29	25.0	23.6	22.7	22.0	21.3	20.8	20.4	20.1	19.9
30	30.0	28.3	27.3	26.4	25.6	25.0	24.5	24.1	23.9
31	30.0	28.3	27.3	26.4	25.6	25.0	24.5	24.1	23.9
32	35.0	32.9	31.7	30.7	29.8	29.1	28.6	28.2	27.9
33	35.0	32.9	31.7	30.7	29.8	29.1	28.6	28.2	27.9
34	35.0	32.9	31.7	30.7	29.8	29.1	28.6	28.2	27.9
35	35.0	32.9	31.7	30.7	29.8	29.1	28.6	28.2	27.9
36	35.0	33.0	31.8	30.8	29.9	29.1	28.5	28.1	27.8
37	40.0	...	36.2	...	34.1	...	32.7	...	31.9
38	32.0	30.2	29.3	28.5	27.7	27.0	26.2	25.5	24.8
39	32.0	30.2	29.3	28.5	27.7	27.0	26.2	25.5	24.8
40	32.0	30.2	29.3	28.5	27.7	27.0	26.2	25.5	24.8
41	32.0	30.2	29.3	28.5	27.7	27.0	26.2	25.5	24.8
42	32.0	30.2	29.3	28.5	27.7	27.0	26.2	25.5	24.8
43	30.0	28.0	26.7	25.5	24.3	23.3	22.4	21.5	20.8

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Nonferrous Materials (Cont'd)
1	...	40.9	40.6	40.4	39.8	39.1	...	...	...	...
2	21.7	21.3	21.1	20.9	20.8	20.7	20.6	20.6	20.6	20.6
3	21.7	21.3	21.1	20.9	20.8	20.7	20.6	20.6	20.6	20.6
4	21.7	21.3	21.1	20.9	20.8	20.7	20.6	20.6	20.6	20.6
5	21.7	21.3	21.1	20.9	20.8	20.7	20.6	20.6	20.6	20.6
6	...	25.0	24.6	24.3	24.1	23.8	23.7	23.5	23.4	23.3
7	...	25.0	24.6	24.3	24.1	23.8	23.7	23.5	23.4	23.3
8	...	25.0	24.6	24.3	24.1	23.8	23.7	23.5	23.4	23.3
9	...	25.0	24.6	24.3	24.1	23.8	23.7	23.5	23.4	23.3
10	30.5	30.1	29.7	29.4	29.2	29.1	29.0	28.9	28.8	28.7
11	30.5	30.1	29.7	29.4	29.2	29.1	29.0	28.9	28.8	28.8
12	30.5	30.1	29.7	29.4	29.2	29.1	29.0	28.9	28.8	28.8
13	35.4	35.1	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0
14	35.4	35.1	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0
15	35.4	35.1	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0
16	38.9	38.6	38.5	38.5	38.5	38.5	38.5	38.5	38.5	38.5
17	42.5	42.2	42.0	42.1	42.1	42.1	42.1	42.1	42.1	42.1
18	42.5	42.2	42.0	42.1	42.1	42.1	42.1	42.1	42.1	42.1
19	42.5	42.2	42.0	42.1	42.1	42.1	42.1	42.1	42.1	42.1
20	42.5	42.2	42.0	42.1	421	42.1	42.1	42.1	42.1	42.1
21	42.5	42.2	42.0	42.1	42.1	42.1	42.1	42.1	42.1	42.1
22	42.5	42.2	42.0	42.1	42.1	42.1	42.1	42.1	42.1	42.1
23	31.8	31.2	30.6	30.2	29.9	29.8	29.8	29.8	29.8	29.4
24	31.8	31.2	30.6	30.2	29.9	29.8	29.8	29.8	29.8	29.4
25	31.8	31.2	30.6	30.2	29.9	29.8	29.8	29.8	29.8	29.4
26	31.8	31.2	30.6	30.2	29.9	29.8	29.8	29.8	29.8	29.4
27	31.8	31.2	30.6	30.2	29.9	29.8	29.8	29.8	29.8	29.4
28	31.8	31.2	30.6	30.2	29.9	29.8	29.8	29.8	29.8	29.4
29	19.8	19.7	19.7	19.7	19.7	19.7	19.6	19.6	19.5	19.4
30	23.7	23.6	23.6	23.6	23.6	23.6	23.6	23.5	23.4	23.3
31	23.7	23.6	23.6	23.6	23.6	23.6	23.6	23.5	23.4	23.3
32	27.7	27.6	27.5	27.5	27.5	27.5	27.5	27.5	27.4	27.1
33	27.7	27.6	27.5	27.5	27.5	27.5	27.5	27.5	27.4	27.1
34	27.7	27.6	27.5	27.5	27.5	27.5	27.5	27.5	27.4	27.1
35	27.7	27.6	27.5	27.5	27.5	27.5	27.5	27.5	27.4	27.1
36	27.7	27.6	27.5	27.5	27.5	27.5	27.5	27.4	27.3	27.2
37	...	31.5	31.5	31.5	31.5	31.5	...	...	...	...
38	24.1	23.4	22.9	22.5	22.2	22.0	21.9	21.9	21.9	21.9
39	24.1	23.4	22.9	22.5	22.2	22.0	21.9	21.9	21.9	21.9
40	24.1	23.4	22.9	22.5	22.2	22.0	21.9	21.9	21.9	21.9
41	24.1	23.4	22.9	22.5	22.2	22.0	21.9	21.9	21.9	21.9
42	24.1	23.4	22.9	22.5	22.2	22.0	21.9	21.9	21.9	21.9
43	20.2	19.7	19.2	18.8	18.4	18.0	17.6	17.3	17.0	16.7

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Nonferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	28.7	28.7	28.6	28.5	28.3	28.1	27.8	27.4	26.8	26.1	25.3	24.3	...	(**21**)
11	28.7	28.7	28.6	28.5	28.3	28.1	27.8	27.4	26.8	26.1	25.3	24.3	...	(**21**)
12	28.7	28.7	28.6	28.5	28.3	28.1	27.8	27.4	26.8	26.1	25.3	24.3	...	(**21**)
13	35.0	35.0	35.0	35.0	35.0	35.0	35.0	34.5	33.5	32.2	30.6	28.6	...	(**21**)
14	35.0	35.0	35.0	35.0	35.0	35.0	35.0	34.5	33.5	32.2	30.6	28.6	...	(**21**)
15	35.0	35.0	35.0	35.0	35.0	35.0	35.0	34.5	33.5	32.2	30.6	28.6	...	(**21**)
16	38.5	38.5	38.5	38.5	38.5	38.5	38.5	38.0	36.8	35.4	33.6	31.5	...	(**21**)
17	42.1	42.1	42.1	42.1	42.1	42.1	42.1	41.4	40.2	38.6	36.7	34.4	...	(**21**)
18	42.1	42.1	42.1	42.1	42.1	42.1	42.1	41.4	40.2	38.6	36.7	34.4	...	(**21**)
19	42.1	42.1	42.1	42.1	42.1	42.1	42.1	41.4	40.2	38.6	36.7	34.4	...	(**21**)
20	42.1	42.1	42.1	42.1	42.1	42.1	42.1	41.4	40.2	38.6	36.7	34.4	...	(**21**)
21	42.1	42.1	42.1	42.1	42.1	42.1	42.1	41.4	40.2	38.6	36.7	34.4	...	(**21**)
22	42.1	42.1	42.1	42.1	42.1	42.1	42.1	41.4	40.2	38.6	36.7	34.4	...	(**21**)
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
		Nonferrous Materials (Cont'd)					
	1	47Ni–22Cr–20Fe–7Mo	Plate, sheet, strip	SB–582	...	N06985	Annealed
	2	47Ni–22Cr–20Fe–7Mo	Smls. & wld. fittings	SB–366	...	N06985	Annealed
	3	47Ni–22Cr–20Fe–7Mo	Rod	SB–581	...	N06985	Annealed
	4	47Ni–22Cr–20Fe–7Mo	Plate, sheet, strip	SB–582	...	N06985	Annealed
	5	47Ni–22Cr–20Fe–7Mo	Wld. pipe	SB–619	...	N06985	Annealed
	6	47Ni–22Cr–20Fe–7Mo	Smls. pipe & tube	SB–622	...	N06985	Annealed
	7	47Ni–22Cr–20Fe–7Mo	Wld. tube	SB–626	...	N06985	Annealed
	8	35Ni–35Fe–20Cr–Cb	Forgings	SB–462	...	N08020	Annealed
	9	35Ni–35Fe–20Cr–Cb	Plate	SB–463	...	N08020	Annealed
	10	35Ni–35Fe–20Cr–Cb	Bar	SB–473	...	N08020	Annealed
	11	35Ni–35Fe–20Cr–Cb	Smls. pipe & tube	SB–729	...	N08020	Annealed
	12	35Ni–35Fe–20Cr–Cb	Wld. pipe	SB–464	...	N08020	Wld. ann.
	13	35Ni–35Fe–20Cr–Cb	Wld. tube	SB–468	...	N08020	Wld. ann.
	14	35Ni–35Fe–20Cr–Cb	Smls. & wld. fittings	SB–366	...	N08020	Annealed
(**21**)	15	...	...	...	...	...	...
	16	37Ni–33Fe–23Cr–4Mo–Cu	Wld. pipe	SB–464	...	N08024	Wld. ann.
	17	37Ni–33Fe–23Cr–4Mo–Cu	Wld. tube	SB–468	...	N08024	Wld. ann.
(**21**)	18	...	...	...	...	...	...
	19	35Ni–30Fe–24Cr–6Mo–Cu	Wld. pipe	SB–464	...	N08026	Wld. ann.
	20	35Ni–30Fe–24Cr–6Mo–Cu	Wld. tube	SB–468	...	N08026	Wld. ann.
	21	31Ni–31Fe–29Cr–Mo	Smls. tube	SB–668	...	N08028	Annealed
	22	31Ni–31Fe–29Cr–Mo	Plate, sheet, strip	SB–709	...	N08028	Annealed
	23	31Ni–33Fe–27Cr–6.5Mo–Cu–N	Smls. & wld. fittings	SB–366	...	N08031	Solution ann.
	24	31Ni–33Fe–27Cr–6.5Mo–Cu–N	Forgings	SB–564	...	N08031	Solution ann.
	25	31Ni–33Fe–27Cr–6.5Mo–Cu–N	Rod	SB–581	...	N08031	Solution ann.
	26	31Ni–33Fe–27Cr–6.5Mo–Cu–N	Wld. pipe	SB–619	...	N08031	Solution ann.
	27	31Ni–33Fe–27Cr–6.5Mo–Cu–N	Smls. pipe & tube	SB–622	...	N08031	Solution ann.
	28	31Ni–33Fe–27Cr–6.5Mo–Cu–N	Plate, sheet, strip	SB–625	...	N08031	Solution ann.
	29	31Ni–33Fe–27Cr–6.5Mo–Cu–N	Wld. tube	SB–626	...	N08031	Solution ann.
	30	37Ni–33Fe–25Cr	Condenser tube	SB–163	...	N08120	Solution ann.
	31	37Ni–33Fe–25Cr	Smls. & wld. fittings	SB–366	...	N08120	Solution ann.
	32	37Ni–33Fe–25Cr	Smls. pipe & tube	SB–407	...	N08120	Solution ann.
	33	37Ni–33Fe–25Cr	Bar, rod	SB–408	...	N08120	Solution ann.
	34	37Ni–33Fe–25Cr	Plate, sheet, strip	SB–409	...	N08120	Solution ann.
	35	37Ni–33Fe–25Cr	Wld. pipe	SB–514	...	N08120	Solution ann.
	36	37Ni–33Fe–25Cr	Wld. tube	SB–515	...	N08120	Solution ann.
	37	37Ni–33Fe–25Cr	Forgings	SB–564	...	N08120	Solution ann.
	38	26Ni–43Fe–22Cr–5Mo	Wld. pipe	SB–619	...	N08320	Solution ann.
	39	26Ni–43Fe–22Cr–5Mo	Plate, sheet, strip	SB–620	...	N08320	Solution ann.
	40	26Ni–43Fe–22Cr–5Mo	Rod	SB–621	...	N08320	Solution ann.
	41	26Ni–43Fe–22Cr–5Mo	Smls. pipe & tube	SB–622	...	N08320	Solution ann.
	42	26Ni–43Fe–22Cr–5Mo	Wld. tube	SB–626	...	N08320	Solution ann.
(**21**)	43	35Ni–19Cr–1$^1/_4$Si	Bar	SB–511	...	N08330	...
(**21**)	44	35Ni–19Cr–1$^1/_4$Si	Pipe	SB–535	...	N08330	...
(**21**)	45	35Ni–19Cr–1$^1/_4$Si	Plate	SB–536	...	N08330	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Nonferrous Materials (Cont'd)
1	>3/4	85	30	...
2	...	90	35	...
3	≤3/4	90	35	...
4	≤3/4	90	35	...
5	...	90	35	...
6	...	90	35	...
7	...	90	35	...
8	...	80	35	...
9	...	80	35	...
10	...	80	35	...
11	...	80	35	...
12	...	80	35	...
13	...	80	35	...
14	...	85	40	...
15	...	...	...	...
16	...	80	35	...
17	...	80	35	...
18	...	...	...	...
19	...	80	35	...
20	...	80	35	...
21	...	73	31	...
22	...	73	31	...
23	...	94	40	...
24	...	94	40	...
25	...	94	40	...
26	...	94	40	...
27	...	94	40	...
28	...	94	40	...
29	...	94	40	...
30	...	90	40	...
31	...	90	40	...
32	...	90	40	...
33	...	90	40	...
34	...	90	40	...
35	...	90	40	...
36	...	90	40	...
37	...	90	40	...
38	...	75	28	...
39	...	75	28	...
40	...	75	28	...
41	...	75	28	...
42	...	75	28	...
43	...	70	30	...
44	...	70	30	...
45	...	70	30	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Nonferrous Materials (Cont'd)								
1	30.0	28.0	26.7	25.5	24.3	23.3	22.4	21.5	20.8
2	35.0	32.7	31.2	29.7	28.4	27.2	26.1	25.1	24.3
3	35.0	32.7	31.2	29.7	28.4	27.2	26.1	25.1	24.3
4	35.0	32.7	31.2	29.7	28.4	27.2	26.1	25.1	24.3
5	35.0	32.7	31.2	29.7	28.4	27.2	26.1	25.1	24.3
6	35.0	32.7	31.2	29.7	28.4	27.2	26.1	25.1	24.3
7	35.0	32.7	31.2	29.7	28.4	27.2	26.1	25.1	24.3
8	35.0	32.0	30.9	30.2	29.6	29.0	28.4	27.8	27.3
9	35.0	32.0	30.9	30.2	29.6	29.0	28.4	27.8	27.3
10	35.0	32.0	30.9	30.2	29.6	29.0	28.4	27.8	27.3
11	35.0	32.0	30.9	30.2	29.6	29.0	28.4	27.8	27.3
12	35.0	32.0	30.9	30.2	29.6	29.0	28.4	27.8	27.3
13	35.0	32.0	30.9	30.2	29.6	29.0	28.4	27.8	27.3
14	40.0	36.6	35.4	34.5	33.8	33.1	32.5	31.8	31.2
15	...	...	...	...	...	...	...	...	...
16	35.0	32.2	30.9	29.8	28.8	28.0	27.2	26.3	25.5
17	35.0	32.2	30.9	29.8	28.8	28.0	27.2	26.3	25.5
18	...	...	...	...	...	...	...	...	...
19	35.0	32.6	31.1	29.7	28.4	27.3	26.3	25.3	24.4
20	35.0	32.6	31.1	29.7	28.4	27.3	26.3	25.3	24.4
21	31.0	29.4	28.4	27.4	26.5	25.6	24.8	23.9	23.2
22	31.0	29.4	28.4	27.4	26.5	25.6	24.8	23.9	23.2
23	40.0	...	33.0	...	29.7	...	27.4	...	25.9
24	40.0	...	33.0	...	29.7	...	27.4	...	25.9
25	40.0	...	33.0	...	29.7	...	27.4	...	25.9
26	40.0	...	33.0	...	29.7	...	27.4	...	25.9
27	40.0	...	33.0	...	29.7	...	27.4	...	25.9
28	40.0	...	33.0	...	29.7	...	27.4	...	25.9
29	40.0	...	33.0	...	29.7	...	27.4	...	25.9
30	40.0	...	35.3	...	32.3	...	29.9	...	27.9
31	40.0	...	35.3	...	32.3	...	29.9	...	27.9
32	40.0	...	35.3	...	32.3	...	29.9	...	27.9
33	40.0	...	35.3	...	32.3	...	29.9	...	27.9
34	40.0	...	35.3	...	32.3	...	29.9	...	27.9
35	40.0	...	35.3	...	32.3	...	29.9	...	27.9
36	40.0	...	35.3	...	32.3	...	29.9	...	27.9
37	40.0	...	35.3	...	32.3	...	29.9	...	27.9
38	28.0	26.7	25.9	25.2	24.5	23.8	23.1	22.4	21.8
39	28.0	26.7	25.9	25.2	24.5	23.8	23.1	22.4	21.8
40	28.0	26.7	25.9	25.2	24.5	23.8	23.1	22.4	21.8
41	28.0	26.7	25.9	25.2	24.5	23.8	23.1	22.4	21.8
42	28.0	26.7	25.9	25.2	24.5	23.8	23.1	22.4	21.8
43	30.0	27.7	26.5	25.5	24.7	23.9	23.2	22.6	22.0
44	30.0	27.7	26.5	25.5	24.7	23.9	23.2	22.6	22.0
45	30.0	27.7	26.5	25.5	24.7	23.9	23.2	22.6	22.0

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Nonferrous Materials (Cont'd)
1	20.2	19.7	19.2	18.8	18.4	18.0	17.6	17.3	17.0	16.7
2	23.6	23.0	22.4	21.9	21.4	21.0	20.6	20.2	19.8	19.5
3	23.6	23.0	22.4	21.9	21.4	21.0	20.6	20.2	19.8	19.5
4	23.6	23.0	22.4	21.9	21.4	21.0	20.6	20.2	19.8	19.5
5	23.6	23.0	22.4	21.9	21.4	21.0	20.6	20.2	19.8	19.5
6	23.6	23.0	22.4	21.9	21.4	21.0	20.6	20.2	19.8	19.5
7	23.6	23.0	22.4	21.9	21.4	21.0	20.6	20.2	19.8	19.5
8	26.8	26.5	26.2	26.0	25.8	25.2	...	...	...	...
9	26.8	26.5	26.2	26.0	25.8	25.2	...	...	...	...
10	26.8	26.5	26.2	26.0	25.8	25.2	...	...	...	...
11	26.8	26.5	26.2	26.0	25.8	25.2	...	...	...	...
12	26.8	26.5	26.2	26.0	25.8	25.2	...	...	...	...
13	26.8	26.5	26.2	26.0	25.8	25.2	...	...	...	...
14	30.7	30.3	30.0	29.8	29.4	28.8	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...
16	24.8	24.0	23.3	22.7	22.2	21.8	21.5	21.3	21.0	20.7
17	24.8	24.0	23.3	22.7	22.2	21.8	21.5	21.3	21.0	20.7
18	...	...	...	...	...	...	...	...	...	...
19	23.7	23.0	22.3	21.8	21.3	20.9	20.6	20.3	20.1	19.9
20	23.7	23.0	22.3	21.8	21.3	20.9	20.6	20.3	20.1	19.9
21	22.4	21.7	21.0	20.3	19.7	19.1	18.6	18.1	17.6	17.2
22	22.4	21.7	21.0	20.3	19.7	19.1	18.6	18.1	17.6	17.2
23	...	24.7	24.1	23.6	23.2	22.8	22.4	22.2	...	...
24	...	24.7	24.1	23.6	23.2	22.8	22.4	22.2	...	...
25	...	24.7	24.1	23.6	23.2	22.8	22.4	22.2	...	...
26	...	24.7	24.1	23.6	23.2	22.8	22.4	22.2	...	...
27	...	24.7	24.1	23.6	23.2	22.8	22.4	22.2	...	...
28	...	24.7	24.1	23.6	23.2	22.8	22.4	22.2	...	...
29	...	24.7	24.1	23.6	23.2	22.8	22.4	22.2	...	...
30	...	26.5	26.0	25.5	25.2	24.9	24.7	24.6	24.5	24.4
31	...	26.5	26.0	25.5	25.2	24.9	24.7	24.6	24.5	24.4
32	...	26.5	26.0	25.5	25.2	24.9	24.7	24.6	24.5	24.4
33	...	26.5	26.0	25.5	25.2	24.9	24.7	24.6	24.5	24.4
34	...	26.5	26.0	25.5	25.2	24.9	24.7	24.6	24.5	24.4
35	...	26.5	26.0	25.5	25.2	24.9	24.7	24.6	24.5	24.4
36	...	26.5	26.0	25.5	25.2	24.9	24.7	24.6	24.5	24.4
37	...	26.5	26.0	25.5	25.2	24.9	24.7	24.6	24.5	24.4
38	21.2	20.7	20.2	19.8	19.4	19.1	...	...	...	...
39	21.2	20.7	20.2	19.8	19.4	19.1	...	...	...	...
40	21.2	20.7	20.2	19.8	19.4	19.1	...	...	...	...
41	21.2	20.7	20.2	19.8	19.4	19.1	...	...	...	...
42	21.2	20.7	20.2	19.8	19.4	19.1	...	...	...	...
43	21.5	21.0	20.6	20.1	19.7	19.3	18.9	18.5	18.2	17.9
44	21.5	21.0	20.6	20.1	19.7	19.3	18.9	18.5	18.2	17.9
45	21.5	21.0	20.6	20.1	19.7	19.3	18.9	18.5	18.2	17.9

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Nonferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	17.6	17.3	16.9	16.4	16.0	15.4	14.8	14.2	13.5	12.7	11.8	10.8	9.8	(**21**)
44	17.6	17.3	16.9	16.4	16.0	15.4	14.8	14.2	13.5	12.7	11.8	10.8	9.8	(**21**)
45	17.6	17.3	16.9	16.4	16.0	15.4	14.8	14.2	13.5	12.7	11.8	10.8	9.8	(**21**)

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
		Nonferrous Materials (Cont'd)					
(**21**)	1	35Ni–19Cr–1¼Si	Smls. & wld. fittings	SB–366	...	N08330	Annealed
(**21**)	2	35Ni–19Cr–1¼Si	Smls. & wld. pipe	SB–535	...	N08330	Annealed
(**21**)	3	35Ni–19Cr–1¼Si	Plate, sheet, strip	SB–536	...	N08330	Annealed
(**21**)	4	35Ni–19Cr–1¼Si	Wld. pipe	SB–710	...	N08330	Annealed
(**21**)	5	35Ni–23Cr–7.5Mo–N	Plate, sheet, strip	SB–625	...	N08354	Solution ann.
(**21**)	6	35Ni–23Cr–7.5Mo–N	Bar, wire	SB–649	...	N08354	Solution ann.
(**21**)	7	35Ni–23Cr–7.5Mo–N	Wld. pipe	SB–673	...	N08354	Solution ann.
(**21**)	8	35Ni–23Cr–7.5Mo–N	Wld. tube	SB–674	...	N08354	Solution ann.
(**21**)	9	35Ni–23Cr–7.5Mo–N	Smls. pipe & tube	SB–677	...	N08354	Solution ann.
	10	46Fe–24Ni–21Cr–6Mo–N	Forgings	SB–462	...	N08367	Solution ann.
	11	46Fe–24Ni–21Cr–6Mo–N	Forgings	SB–564	...	N08367	Solution ann.
	12	46Fe–24Ni–21Cr–6Mo–N	Wld. pipe	SB–675	...	N08367	Solution ann.
	13	46Fe–24Ni–21Cr–6Mo–N	Wld. tube	SB–676	...	N08367	Solution ann.
	14	46Fe–24Ni–21Cr–6Mo–N	Plate, sheet, strip	SB–688	...	N08367	Solution ann.
	15	46Fe–24Ni–21Cr–6Mo–N	Smls. pipe & tube	SB–690	...	N08367	Solution ann.
	16	46Fe–24Ni–21Cr–6Mo–N	Bar, rod, wire	SB–691	...	N08367	Solution ann.
	17	46Fe–24Ni–21Cr–6Mo–N	Wld. pipe	SB–804	...	N08367	Solution ann.
	18	46Fe–24Ni–21Cr–6Mo–N	Wld. pipe	SB–675	...	N08367	Solution ann.
	19	46Fe–24Ni–21Cr–6Mo–N	Wld. tube	SB–676	...	N08367	Solution ann.
	20	46Fe–24Ni–21Cr–6Mo–N	Plate, sheet, strip	SB–688	...	N08367	Solution ann.
	21	46Fe–24Ni–21Cr–6Mo–N	Smls. pipe & tube	SB–690	...	N08367	Solution ann.
	22	46Fe–24Ni–21Cr–6Mo–N	Wld. pipe	SB–804	...	N08367	Solution ann.
	23	46Fe–24Ni–21Cr–6Mo–N	Castings	SA–351	CN3MN	J94651	Solution ann.
	24	25Ni–47Fe–21Cr–5Mo	Plate, sheet, strip	SB–599	...	N08700	Solution ann.
	25	25Ni–47Fe–21Cr–5Mo	Bar, wire	SB–672	...	N08700	Solution ann.
	26	32Ni–45Fe–20Cr–Cb	Castings	SA–351	CT15C	...	As cast
(**21**)	27	33Ni–42Fe–21Cr	Smls. tube	SB–163	...	N08800	Annealed
(**21**)	28	33Ni–42Fe–21Cr	Smls. & wld. fittings	SB–366	...	N08800	Annealed
(**21**)	29	33Ni–42Fe–21Cr	Smls. pipe & tube	SB–407	...	N08800	Annealed
(**21**)	30	33Ni–42Fe–21Cr	Bar	SB–408	...	N08800	Annealed
(**21**)	31	33Ni–42Fe–21Cr	Plate	SB–409	...	N08800	Annealed
(**21**)	32	33Ni–42Fe–21Cr	Wld. pipe	SB–514	...	N08800	Annealed
(**21**)	33	33Ni–42Fe–21Cr	Wld. tube	SB–515	...	N08800	Annealed
(**21**)	34	33Ni–42Fe–21Cr	Forgings	SB–564	...	N08800	Annealed
(**21**)	35	33Ni–42Fe–21Cr	Smls. tube	SB–163	...	N08800	Annealed
(**21**)	36	33Ni–42Fe–21Cr	Smls. tube	SB–163	...	N08800	Cold worked
	37	32Ni–44Fe–21Cr	Smls. tube	SB–163	...	N08801	Ann./stabilized
	38	32Ni–44Fe–21Cr	Smls. pipe & tube	SB–407	...	N08801	Ann./stabilized
(**21**)	39	33Ni–42Fe–21Cr	Smls. tube	SB–163	...	N08810	Annealed
(**21**)	40	33Ni–42Fe–21Cr	Smls. pipe & tube	SB–407	...	N08810	Annealed
(**21**)	41	33Ni–42Fe–21Cr	Bar	SB–408	...	N08810	Annealed
(**21**)	42	33Ni–42Fe–21Cr	Plate	SB–409	...	N08810	Annealed
(**21**)	43	33Ni–42Fe–21Cr	Wld. pipe	SB–514	...	N08810	Annealed
(**21**)	44	33Ni–42Fe–21Cr	Wld. tube	SB–515	...	N08810	Annealed
(**21**)	45	33Ni–42Fe–21Cr	Forgings	SB–564	...	N08810	Annealed

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Nonferrous Materials (Cont'd)
1	...	70	30	...
2	...	70	30	...
3	...	70	30	...
4	...	70	30	...
5	...	93	43	...
6	...	93	43	...
7	...	93	43	...
8	...	93	43	...
9	...	93	43	...
10	...	95	45	...
11	...	95	45	...
12	$>3/16$	95	45	...
13	$>3/16$	95	45	...
14	$>3/16$	95	45	...
15	$>3/16$	95	45	...
16	...	95	45	...
17	$>3/16$	95	45	...
18	$\leq 3/16$	100	45	...
19	$\leq 3/16$	100	45	...
20	$\leq 3/16$	100	45	...
21	$\leq 3/16$	100	45	...
22	$\leq 3/16$	100	45	...
23	...	80	38	...
24	...	80	35	...
25	...	80	35	...
26	...	63	25	...
27	...	75	30	...
28	...	75	30	...
29	...	75	30	...
30	...	75	30	...
31	...	75	30	...
32	...	75	30	...
33	...	75	30	...
34	...	75	30	...
35	...	75	40	...
36	...	83	47	...
37	...	65	25	...
38	...	65	25	...
39	...	65	25	...
40	...	65	25	...
41	...	65	25	...
42	...	65	25	...
43	...	65	25	...
44	...	65	25	...
45	...	65	25	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Nonferrous Materials (Cont'd)								
1	30.0	27.7	26.5	25.5	24.7	23.9	23.2	22.6	22.0
2	30.0	27.7	26.5	25.5	24.7	23.9	23.2	22.6	22.0
3	30.0	27.7	26.5	25.5	24.7	23.9	23.2	22.6	22.0
4	30.0	27.7	26.5	25.5	24.7	23.9	23.2	22.6	22.0
5	42.8	...	36.5	...	33.1	...	30.8	...	29.4
6	42.8	...	36.5	...	33.1	...	30.8	...	29.4
7	42.8	...	36.5	...	33.1	...	30.8	...	29.4
8	42.8	...	36.5	...	33.1	...	30.8	...	29.4
9	42.8	...	36.5	...	33.1	...	30.8	...	29.4
10	45.0	41.3	39.3	37.4	35.7	34.2	32.9	31.8	30.8
11	45.0	41.3	39.3	37.4	35.7	34.2	32.9	31.8	30.8
12	45.0	41.3	39.3	37.4	35.7	34.2	32.9	31.8	30.8
13	45.0	41.3	39.3	37.4	35.7	34.2	32.9	31.8	30.8
14	45.0	41.3	39.3	37.4	35.7	34.2	32.9	31.8	30.8
15	45.0	41.3	39.3	37.4	35.7	34.2	32.9	31.8	30.8
16	45.0	41.3	39.3	37.4	35.7	34.2	32.9	31.8	30.8
17	45.0	41.3	39.3	37.4	35.7	34.2	32.9	31.8	30.8
18	45.0	41.3	39.3	37.4	35.7	34.2	32.9	31.8	30.8
19	45.0	41.3	39.3	37.4	35.7	34.2	32.9	31.8	30.8
20	45.0	41.3	39.3	37.4	35.7	34.2	32.9	31.8	30.8
21	45.0	41.3	39.3	37.4	35.7	34.2	32.9	31.8	30.8
22	45.0	41.3	39.3	37.4	35.7	34.2	32.9	31.8	30.8
23	38.0	34.3	32.0	30.0	28.2	26.6	25.4	24.3	23.5
24	35.0	33.1	31.5	29.9	28.5	27.4	26.6	26.1	25.7
25	35.0	33.1	31.5	29.9	28.5	27.4	26.6	26.1	25.7
26	25.0	24.1	23.6	23.2	22.9	22.7	22.4	22.1	21.8
27	30.0	28.5	27.7	27.1	26.6	26.2	25.8	25.5	25.1
28	30.0	28.5	27.7	27.1	26.6	26.2	25.8	25.5	25.1
29	30.0	28.5	27.7	27.1	26.6	26.2	25.8	25.5	25.1
30	30.0	28.5	27.7	27.1	26.6	26.2	25.8	25.5	25.1
31	30.0	28.5	27.7	27.1	26.6	26.2	25.8	25.5	25.1
32	30.0	28.5	27.7	27.1	26.6	26.2	25.8	25.5	25.1
33	30.0	28.5	27.7	27.1	26.6	26.2	25.8	25.5	25.1
34	30.0	28.5	27.7	27.1	26.6	26.2	25.8	25.5	25.1
35	40.0	...	37.0	...	35.5	...	34.4	...	33.5
36	47.0	...	43.4	...	41.7	...	40.4	...	39.5
37	25.0	23.8	23.0	22.3	21.7	21.0	20.4	19.8	19.3
38	25.0	23.8	23.0	22.3	21.7	21.0	20.4	19.8	19.3
39	25.0	23.8	23.0	22.3	21.7	21.0	20.4	19.8	19.3
40	25.0	23.8	23.0	22.3	21.7	21.0	20.4	19.8	19.3
41	25.0	23.8	23.0	22.3	21.7	21.0	20.4	19.8	19.3
42	25.0	23.8	23.0	22.3	21.7	21.0	20.4	19.8	19.3
43	25.0	23.8	23.0	22.3	21.7	21.0	20.4	19.8	19.3
44	25.0	23.8	23.0	22.3	21.7	21.0	20.4	19.8	19.3
45	25.0	23.8	23.0	22.3	21.7	21.0	20.4	19.8	19.3

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Nonferrous Materials (Cont'd)
1	21.5	21.0	20.6	20.1	19.7	19.3	18.9	18.5	18.2	17.9
2	21.5	21.0	20.6	20.1	19.7	19.3	18.9	18.5	18.2	17.9
3	21.5	21.0	20.6	20.1	19.7	19.3	18.9	18.5	18.2	17.9
4	21.5	21.0	20.6	20.1	19.7	19.3	18.9	18.5	18.2	17.9
5	...	28.3	27.9	27.4	27.0	26.5	...	...	...	...
6	...	28.3	27.9	27.4	27.0	26.5	...	...	...	...
7	...	28.3	27.9	27.4	27.0	26.5	...	...	...	...
8	...	28.3	27.9	27.4	27.0	26.5	...	...	...	...
9	...	28.3	27.9	27.4	27.0	26.5	...	...	...	...
10	29.9	29.1	28.5	27.9	27.4	27.0	26.6	26.2	...	...
11	29.9	29.1	28.5	27.9	27.4	27.0	26.6	26.2	...	...
12	29.9	29.1	28.5	27.9	27.4	27.0	26.6	26.2	...	...
13	29.9	29.1	28.5	27.9	27.4	27.0	26.6	26.2	...	...
14	29.9	29.1	28.5	27.9	27.4	27.0	26.6	26.2	...	...
15	29.9	29.1	28.5	27.9	27.4	27.0	26.6	26.2	...	...
16	29.9	29.1	28.5	27.9	27.4	27.0	26.6	26.2	...	...
17	29.9	29.1	28.5	27.9	27.4	27.0	26.6	26.2	...	...
18	29.9	29.1	28.5	27.9	27.4	27.0	26.6	26.2	...	...
19	29.9	29.1	28.5	27.9	27.4	27.0	26.6	26.2	...	...
20	29.9	29.1	28.5	27.9	27.4	27.0	26.6	26.2	...	...
21	29.9	29.1	28.5	27.9	27.4	27.0	26.6	26.2	...	...
22	29.9	29.1	28.5	27.9	27.4	27.0	26.6	26.2	...	...
23	22.9	22.4	22.0	21.8	21.5	21.4	21.2	21.1	21.1	21.1
24	25.3	24.7	23.8	...	...	...	...	...	...	...
25	25.3	24.7	23.8	...	...	...	...	...	...	...
26	21.5	21.2	20.9	20.6	20.3	19.9	19.6	19.3	19.0	18.8
27	24.8	24.5	24.1	23.8	23.5	23.2	22.9	22.7	22.4	22.1
28	24.8	24.5	24.1	23.8	23.5	23.2	22.9	22.7	22.4	22.1
29	24.8	24.5	24.1	23.8	23.5	23.2	22.9	22.7	22.4	22.1
30	24.8	24.5	24.1	23.8	23.5	23.2	22.9	22.7	22.4	22.1
31	24.8	24.5	24.1	23.8	23.5	23.2	22.9	22.7	22.4	22.1
32	24.8	24.5	24.1	23.8	23.5	23.2	22.9	22.7	22.4	22.1
33	24.8	24.5	24.1	23.8	23.5	23.2	22.9	22.7	22.4	22.1
34	24.8	24.5	24.1	23.8	23.5	23.2	22.9	22.7	22.4	22.1
35	...	32.6	32.2	31.8	31.4	31.0	...	...	...	...
36	...	38.7	38.7	...	...	...	...	...	...	...
37	18.8	18.3	17.9	17.4	17.1	16.7	16.4	16.1	15.8	15.5
38	18.8	18.3	17.9	17.4	17.1	16.7	16.4	16.1	15.8	15.5
39	18.8	18.3	17.9	17.4	17.1	16.7	16.4	16.1	15.8	15.5
40	18.8	18.3	17.9	17.4	17.1	16.7	16.4	16.1	15.8	15.5
41	18.8	18.3	17.9	17.4	17.1	16.7	16.4	16.1	15.8	15.5
42	18.8	18.3	17.9	17.4	17.1	16.7	16.4	16.1	15.8	15.5
43	18.8	18.3	17.9	17.4	17.1	16.7	16.4	16.1	15.8	15.5
44	18.8	18.3	17.9	17.4	17.1	16.7	16.4	16.1	15.8	15.5
45	18.8	18.3	17.9	17.4	17.1	16.7	16.4	16.1	15.8	15.5

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Nonferrous Materials (Cont'd)													
1	17.6	17.3	16.9	16.4	16.0	15.4	14.8	14.2	13.5	12.7	11.8	10.8	9.8	(**21**)
2	17.6	17.3	16.9	16.4	16.0	15.4	14.8	14.2	13.5	12.7	11.8	10.8	9.8	(**21**)
3	17.6	17.3	16.9	16.4	16.0	15.4	14.8	14.2	13.5	12.7	11.8	10.8	9.8	(**21**)
4	17.6	17.3	16.9	16.4	16.0	15.4	14.8	14.2	13.5	12.7	11.8	10.8	9.8	(**21**)
5	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
6	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
7	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
8	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
9	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
10	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	21.8	21.2	20.4	19.6	18.6	17.5	16.2	14.7	13.0	11.1	...	...	...	(**21**)
28	21.8	21.2	20.4	19.6	18.6	17.5	16.2	14.7	13.0	11.1	...	...	...	(**21**)
29	21.8	21.2	20.4	19.6	18.6	17.5	16.2	14.7	13.0	11.1	...	...	...	(**21**)
30	21.8	21.2	20.4	19.6	18.6	17.5	16.2	14.7	13.0	11.1	...	...	...	(**21**)
31	21.8	21.2	20.4	19.6	18.6	17.5	16.2	14.7	13.0	11.1	...	...	...	(**21**)
32	21.8	21.2	20.4	19.6	18.6	17.5	16.2	14.7	13.0	11.1	...	...	...	(**21**)
33	21.8	21.2	20.4	19.6	18.6	17.5	16.2	14.7	13.0	11.1	...	...	...	(**21**)
34	21.8	21.2	20.4	19.6	18.6	17.5	16.2	14.7	13.0	11.1	...	...	...	(**21**)
35	29.0	28.2	27.3	26.1	24.8	23.3	21.6	19.6	17.3	14.8	...	...	...	(**21**)
36	34.1	33.1	32.0	30.7	29.2	27.4	25.3	23.0	20.4	17.4	...	...	...	(**21**)
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	14.9	14.6	14.3	13.9	13.5	13.1	12.6	12.1	11.5	10.9	10.2	9.4	8.6	(**21**)
40	14.9	14.6	14.3	13.9	13.5	13.1	12.6	12.1	11.5	10.9	10.2	9.4	8.6	(**21**)
41	14.9	14.6	14.3	13.9	13.5	13.1	12.6	12.1	11.5	10.9	10.2	9.4	8.6	(**21**)
42	14.9	14.6	14.3	13.9	13.5	13.1	12.6	12.1	11.5	10.9	10.2	9.4	8.6	(**21**)
43	14.9	14.6	14.3	13.9	13.5	13.1	12.6	12.1	11.5	10.9	10.2	9.4	8.6	(**21**)
44	14.9	14.6	14.3	13.9	13.5	13.1	12.6	12.1	11.5	10.9	10.2	9.4	8.6	(**21**)
45	14.9	14.6	14.3	13.9	13.5	13.1	12.6	12.1	11.5	10.9	10.2	9.4	8.6	(**21**)

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
		Nonferrous Materials (Cont'd)					
(**21**)	1	33Ni–42Fe–21Cr	Smls. tube	SB–163	...	N08811	Annealed
(**21**)	2	33Ni–42Fe–21Cr	Smls. tube	SB–163	...	N08811	Annealed
(**21**)	3	33Ni–42Fe–21Cr	Smls. pipe & tube	SB–407	...	N08811	Annealed
(**21**)	4	33Ni–42Fe–21Cr	Smls. pipe & tube	SB–407	...	N08811	Annealed
(**21**)	5	33Ni–42Fe–21Cr	Bar	SB–408	...	N08811	Annealed
(**21**)	6	33Ni–42Fe–21Cr	Bar	SB–408	...	N08811	Annealed
(**21**)	7	33Ni–42Fe–21Cr	Plate	SB–409	...	N08811	Annealed
(**21**)	8	33Ni–42Fe–21Cr	Plate	SB–409	...	N08811	Annealed
(**21**)	9	33Ni–42Fe–21Cr	Wld. tube	SB–515	...	N08811	Annealed
(**21**)	10	33Ni–42Fe–21Cr	Wld. tube	SB–315	...	N08811	Annealed
(**21**)	11	33Ni–42Fe–21Cr	Forgings	SB–564	...	N08811	Annealed
(**21**)	12	33Ni–42Fe–21Cr	Forgings	SB–564	...	N08811	Annealed
	13	42Ni–21.5Cr–3Mo–2.3Cu	Smls. tube	SB–163	...	N08825	Annealed
	14	42Ni–21.5Cr–3Mo–2.3Cu	Smls. & wld. fittings	SB–366	...	N08825	Annealed
	15	42Ni–21.5Cr–3Mo–2.3Cu	Smls. pipe & tube	SB–423	...	N08825	Cold worked/ann.
	16	42Ni–21.5Cr–3Mo–2.3Cu	Plate	SB–424	...	N08825	Annealed
	17	42Ni–21.5Cr–3Mo–2.3Cu	Bar, rod	SB–425	...	N08825	Annealed
	18	42Ni–21.5Cr–3Mo–2.3Cu	Forgings	SB–564	...	N08825	Annealed
	19	42Ni–21.5Cr–3Mo–2.3Cu	Wld. tube	SB–704	...	N08825	Annealed
	20	42Ni–21.5Cr–3Mo–2.3Cu	Wld. pipe	SB–705	...	N08825	Annealed
	21	44Fe–25Ni–21Cr–Mo	Forgings	SA–182	...	N08904	Annealed
	22	44Fe–25Ni–21Cr–Mo	Plate, sheet, strip	SA–240	...	N08904	Annealed
	23	44Fe–25Ni–21Cr–Mo	Wld. tube	SA–249	...	N08904	Annealed
	24	44Fe–25Ni–21Cr–Mo	Smls. & wld. pipe	SA–312	...	N08904	Annealed
	25	44Fe–25Ni–21Cr–Mo	Fittings	SA–403	...	N08904	Annealed
	26	44Fe–25Ni–21Cr–Mo	Bar, wire	SB–649	...	N08904	Annealed
	27	44Fe–25Ni–21Cr–Mo	Smls. tube	SB–677	...	N08904	Annealed
	28	25Ni–20Cr–6Mo–Cu–N	Plate, sheet, strip	SB–625	...	N08925	Annealed
	29	25Ni–20Cr–6Mo–Cu–N	Bar, wire	SB–649	...	N08925	Annealed
	30	25Ni–20Cr–6Mo–Cu–N	Wld. pipe	SB–673	...	N08925	Annealed
	31	25Ni–20Cr–6Mo–Cu–N	Wld. tube	SB–674	...	N08925	Annealed
	32	25Ni–20Cr–6Mo–Cu–N	Smls. pipe & tube	SB–677	...	N08925	Annealed
	33	62Ni–28Mo–5Fe	Plate	SB–333	...	N10001	Annealed
	34	62Ni–28Mo–5Fe	Smls. & wld. fittings	SB–366	...	N10001	Annealed
	35	62Ni–28Mo–5Fe	Wld. pipe	SB–619	...	N10001	Solution ann.
	36	62Ni–28Mo–5Fe	Smls. pipe & tube	SB–622	...	N10001	Solution ann.
	37	62Ni–28Mo–5Fe	Wld. tube	SB–626	...	N10001	Solution ann.
	38	62Ni–28Mo–5Fe	Rod	SB–335	...	N10001	Annealed
	39	62Ni–28Mo–5Fe	Rod	SB–335	...	N10001	Annealed
	40	62Ni–28Mo–5Fe	Sheet, strip	SB–333	...	N10001	Annealed
(**21**)	41	70Ni–16Mo–7Cr–5Fe	Smls. & wld. fittings	SB–366	...	N10003	Annealed
(**21**)	42	70Ni–16Mo–7Cr–5Fe	Plate, sheet, strip	SB–434	...	N10003	Annealed
(**21**)	43	70Ni–16Mo–7Cr–5Fe	Rod	SB–573	...	N10003	Annealed
	44	62Ni–25Mo–8Cr–2Fe	Smls. & wld. fittings	SB–366	...	N10242	Annealed
	45	62Ni–25Mo–8Cr–2Fe	Plate, sheet, strip	SB–434	...	N10242	Annealed

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Nonferrous Materials (Cont'd)
1	...	65	25	...
2	...	65	25	...
3	...	65	25	...
4	...	65	25	...
5	...	65	25	...
6	...	65	25	...
7	...	65	25	...
8	...	65	25	...
9	...	65	25	...
10	...	65	25	...
11	...	65	25	...
12	...	65	25	...
13	...	85	35	...
14	...	85	35	...
15	...	85	35	...
16	...	85	35	...
17	...	85	35	...
18	...	85	35	...
19	...	85	35	...
20	...	85	35	...
21	...	71	31	...
22	...	71	31	...
23	...	71	31	...
24	...	71	31	...
25	...	71	31	...
26	...	71	31	...
27	...	71	31	...
28	...	87	43	...
29	...	87	43	...
30	...	87	43	...
31	...	87	43	...
32	...	87	43	...
33	...	100	45	...
34	...	100	45	...
35	...	100	45	...
36	...	100	45	...
37	...	100	45	...
38	$>1\frac{1}{2}$	100	46	...
39	$\frac{5}{16} < t \leq 1\frac{1}{2}$	115	46	...
40	...	115	50	...
41	...	100	40	...
42	...	100	40	...
43	...	100	40	...
44	...	105	45	...
45	...	105	45	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Nonferrous Materials (Cont'd)								
1	25.0	23.8	23.0	22.3	21.7	21.0	20.4	19.8	19.3
2	25.0	23.8	23.0	22.3	21.7	21.0	20.4	19.8	19.3
3	25.0	23.8	23.0	22.3	21.7	21.0	20.4	19.8	19.3
4	25.0	23.8	23.0	22.3	21.7	21.0	20.4	19.8	19.3
5	25.0	23.8	23.0	22.3	21.7	21.0	20.4	19.8	19.3
6	25.0	23.8	23.0	22.3	21.7	21.0	20.4	19.8	19.3
7	25.0	23.8	23.0	22.3	21.7	21.0	20.4	19.8	19.3
8	25.0	23.8	23.0	22.3	21.7	21.0	20.4	19.8	19.3
9	25.0	23.8	23.0	22.3	21.7	21.0	20.4	19.8	19.3
10	25.0	23.8	23.0	22.3	21.7	21.0	20.4	19.8	19.3
11	25.0	23.8	23.0	22.3	21.7	21.0	20.4	19.8	19.3
12	25.0	23.8	23.0	22.3	21.7	21.0	20.4	19.8	19.3
13	35.0	33.0	32.1	31.2	30.5	29.7	29.1	28.4	27.8
14	35.0	33.0	32.1	31.2	30.5	29.7	29.1	28.4	27.8
15	35.0	33.0	32.1	31.2	30.5	29.7	29.1	28.4	27.8
16	35.0	33.0	32.1	31.2	30.5	29.7	29.1	28.4	27.8
17	35.0	33.0	32.1	31.2	30.5	29.7	29.1	28.4	27.8
18	35.0	33.0	32.1	31.2	30.5	29.7	29.1	28.4	27.8
19	35.0	33.0	32.1	31.2	30.5	29.7	29.1	28.4	27.8
20	35.0	33.0	32.1	31.2	30.5	29.7	29.1	28.4	27.8
21	31.0	26.8	25.1	23.8	22.7	21.7	20.8	19.9	19.0
22	31.0	26.8	25.1	23.8	22.7	21.7	20.8	19.9	19.0
23	31.0	26.8	25.1	23.8	22.7	21.7	20.8	19.9	19.0
24	31.0	26.8	25.1	23.8	22.7	21.7	20.8	19.9	19.0
25	31.0	26.8	25.1	23.8	22.7	21.7	20.8	19.9	19.0
26	31.0	26.8	25.1	23.8	22.7	21.7	20.8	19.9	19.0
27	31.0	26.8	25.1	23.8	22.7	21.7	20.8	19.9	19.0
28	43.0	37.0	34.8	33.2	31.9	30.8	29.6	28.5	27.5
29	43.0	37.0	34.8	33.2	31.9	30.8	29.6	28.5	27.5
30	43.0	37.0	34.8	33.2	31.9	30.8	29.6	28.5	27.5
31	43.0	37.0	34.8	33.2	31.9	30.8	29.6	28.5	27.5
32	43.0	37.0	34.8	33.2	31.9	30.8	29.6	28.5	27.5
33	45.0	42.2	40.8	39.6	38.6	37.7	36.9	36.2	35.6
34	45.0	42.2	40.8	39.6	38.6	37.7	36.9	36.2	35.6
35	45.0	42.2	40.8	39.6	38.6	37.7	36.9	36.2	35.6
36	45.0	42.2	40.8	39.6	38.6	37.7	36.9	36.2	35.6
37	45.0	42.2	40.8	39.6	38.6	37.7	36.9	36.2	35.6
38	46.0	43.1	41.7	40.5	39.4	38.5	37.7	37.0	36.4
39	46.0	43.1	41.7	40.5	39.4	38.5	37.7	37.0	36.4
40	50.0	46.9	45.3	44.0	42.8	41.9	41.0	40.2	39.6
41	40.0	37.8	36.3	34.9	33.7	32.6	31.7	30.9	30.2
42	40.0	37.8	36.3	34.9	33.7	32.6	31.7	30.9	30.2
43	40.0	37.8	36.3	34.9	33.7	32.6	31.7	30.9	30.2
44	45.0	...	42.3	...	39.2	...	37.0	...	35.9
45	45.0	...	42.3	...	39.2	...	37.0	...	35.9

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Nonferrous Materials (Cont'd)
1	18.8	18.3	17.9	17.4	17.1	16.7	16.4	16.1	15.8	15.5
2	18.8	18.3	17.9	17.4	17.1	16.7	16.4	16.1	15.8	15.5
3	18.8	18.3	17.9	17.4	17.1	16.7	16.4	16.1	15.8	15.5
4	18.8	18.3	17.9	17.4	17.1	16.7	16.4	16.1	15.8	15.5
5	18.8	18.3	17.9	17.4	17.1	16.7	16.4	16.1	15.8	15.5
6	18.8	18.3	17.9	17.4	17.1	16.7	16.4	16.1	15.8	15.5
7	18.8	18.3	17.9	17.4	17.1	16.7	16.4	16.1	15.8	15.5
8	18.8	18.3	17.9	17.4	17.1	16.7	16.4	16.1	15.8	15.5
9	18.8	18.3	17.9	17.4	17.1	16.7	16.4	16.1	15.8	15.5
10	18.8	18.3	17.9	17.4	17.1	16.7	16.4	16.1	15.8	15.5
11	18.8	18.3	17.9	17.4	17.1	16.7	16.4	16.1	15.8	15.5
12	18.8	18.3	17.9	17.4	17.1	16.7	16.4	16.1	15.8	15.5
13	27.2	26.7	26.3	26.0	25.7	25.6	25.4	25.3	25.1	24.8
14	27.2	26.7	26.3	26.0	25.7	25.6	25.4	25.3	25.1	24.8
15	27.2	26.7	26.3	26.0	25.7	25.6	25.4	25.3	25.1	24.8
16	27.2	26.7	26.3	26.0	25.7	25.6	25.4	25.3	25.1	24.8
17	27.2	26.7	26.3	26.0	25.7	25.6	25.4	25.3	25.1	24.8
18	27.2	26.7	26.3	26.0	25.7	25.6	25.4	25.3	25.1	24.8
19	27.2	26.7	26.3	26.0	25.7	25.6	25.4	25.3	25.1	24.8
20	27.2	26.7	26.3	26.0	25.7	25.6	25.4	25.3	25.1	24.8
21	18.4	17.8	17.4	17.1	...	...	...	...	...	...
22	18.4	17.8	17.4	17.1	...	...	...	...	...	...
23	18.4	17.8	17.4	17.1	...	...	...	...	...	...
24	18.4	17.8	17.4	17.1	...	...	...	...	...	...
25	18.4	17.8	17.4	17.1	...	...	...	...	...	...
26	18.4	17.8	17.4	17.1	...	...	...	...	...	...
27	18.4	17.8	17.4	17.1	...	...	...	...	...	...
28	26.6	25.9	25.5	25.3	25.3	25.3	...	...	...	...
29	26.6	25.9	25.5	25.3	25.3	25.3	...	...	...	...
30	26.6	25.9	25.5	25.3	25.3	25.3	...	...	...	...
31	26.6	25.9	25.5	25.3	25.3	25.3	...	...	...	...
32	26.6	25.9	25.5	25.3	25.3	25.3	...	...	...	...
33	35.0	34.6	34.1	33.8	33.4	33.2	...	...	...	...
34	35.0	34.6	34.1	33.8	33.4	33.2	...	...	...	...
35	35.0	34.6	34.1	33.8	33.4	33.2	...	...	...	...
36	35.0	34.6	34.1	33.8	33.4	33.2	...	...	...	...
37	35.0	34.6	34.1	33.8	33.4	33.2	...	...	...	...
38	35.8	35.3	34.9	34.5	34.2	33.9	...	...	...	...
39	35.8	35.3	34.9	34.5	34.2	33.9	...	...	...	...
40	38.9	38.4	37.9	37.5	37.2	36.9	...	...	...	...
41	29.6	29.1	28.6	28.3	28.0	27.7	27.5	27.4	27.2	27.1
42	29.6	29.1	28.6	28.3	28.0	27.7	27.5	27.4	27.2	27.1
43	29.6	29.1	28.6	28.3	28.0	27.7	27.5	27.4	27.2	27.1
44	...	35.5	35.4	35.2	34.8	34.3	33.6	33.0	32.5	32.4
45	...	35.5	35.4	35.2	34.8	34.3	33.6	33.0	32.5	32.4

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Nonferrous Materials (Cont'd)													
1	14.9	14.6	14.3	13.9	13.5	13.1	12.6	12.1	11.5	10.9	10.2	9.4	8.6	(**21**)
2	14.9	14.6	14.3	13.9	13.5	13.1	12.6	12.1	11.5	10.9	10.2	9.4	8.6	(**21**)
3	14.9	14.6	14.3	13.9	13.5	13.1	12.6	12.1	11.5	10.9	10.2	9.4	8.6	(**21**)
4	14.9	14.6	14.3	13.9	13.5	13.1	12.6	12.1	11.5	10.9	10.2	9.4	8.6	(**21**)
5	14.9	14.6	14.3	13.9	13.5	13.1	12.6	12.1	11.5	10.9	10.2	9.4	8.6	(**21**)
6	14.9	14.6	14.3	13.9	13.5	13.1	12.6	12.1	11.5	10.9	10.2	9.4	8.6	(**21**)
7	14.9	14.6	14.3	13.9	13.5	13.1	12.6	12.1	11.5	10.9	10.2	9.4	8.6	(**21**)
8	14.9	14.6	14.3	13.9	13.5	13.1	12.6	12.1	11.5	10.9	10.2	9.4	8.6	(**21**)
9	14.9	14.6	14.3	13.9	13.5	13.1	12.6	12.1	11.5	10.9	10.2	9.4	8.6	(**21**)
10	14.9	14.6	14.3	13.9	13.5	13.1	12.6	12.1	11.5	10.9	10.2	9.4	8.6	(**21**)
11	14.9	14.6	14.3	13.9	13.5	13.1	12.6	12.1	11.5	10.9	10.2	9.4	8.6	(**21**)
12	14.9	14.6	14.3	13.9	13.5	13.1	12.6	12.1	11.5	10.9	10.2	9.4	8.6	(**21**)
13	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	27.0	26.9	26.8	26.7	...	...	...	...	...	...	...	...	...	(**21**)
42	27.0	26.9	26.8	26.7	...	...	...	...	...	...	...	...	...	(**21**)
43	27.0	26.9	26.8	26.7	...	...	...	...	...	...	...	...	...	(**21**)
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
	Nonferrous Materials (Cont'd)					
1	62Ni–25Mo–8Cr–2Fe	Forgings	SB–564	...	N10242	Annealed
2	62Ni–25Mo–8Cr–2Fe	Rod	SB–573	...	N10242	Annealed
3	62Ni–25Mo–8Cr–2Fe	Wld. pipe	SB–619	...	N10242	Solution ann.
4	62Ni–25Mo–8Cr–2Fe	Smls. pipe & tube	SB–622	...	N10242	Solution ann.
5	62Ni–25Mo–8Cr–2Fe	Wld. tube	SB–626	...	N10242	Solution ann.
(**21**) 6	54Ni–16Mo–15Cr	Smls. & wld. fittings	SB–366	...	N10276	Solution ann.
(**21**) 7	54Ni–16Mo–15Cr	Forgings	SB–462	...	N10276	Solution ann.
(**21**) 8	54Ni–16Mo–15Cr	Forgings	SB–564	...	N10276	Solution ann.
(**21**) 9	54Ni–16Mo–15Cr	Rod	SB–574	...	N10276	Solution ann.
(**21**) 10	54Ni–16Mo–15Cr	Plate, sheet, strip	SB–575	...	N10276	Solution ann.
(**21**) 11	54Ni–16Mo–15Cr	Wld. pipe	SB–619	...	N10276	Solution ann.
(**21**) 12	54Ni–16Mo–15Cr	Smls. pipe & tube	SB–622	...	N10276	Solution ann.
(**21**) 13	54Ni–16Mo–15Cr	Wld. tube	SB–626	...	N10276	Solution ann.
14	62Ni–22Mo–15Cr	Smls. & wld. fittings	SB–366	...	N10362	Solution ann.
15	62Ni–22Mo–15Cr	Forgings	SB–462	...	N10362	Solution ann.
16	62Ni–22Mo–15Cr	Forgings	SB–564	...	N10362	Solution ann.
17	62Ni–22Mo–15Cr	Rod	SB–574	...	N10362	Solution ann.
18	62Ni–22Mo–15Cr	Plate, sheet, strip	SB–575	...	N10362	Solution ann.
19	62Ni–22Mo–15Cr	Wld. pipe	SB–619	...	N10362	Solution ann.
20	62Ni–22Mo–15Cr	Smls. pipe & tube	SB–622	...	N10362	Solution ann.
21	62Ni–22Mo–15Cr	Wld. tube	SB–626	...	N10362	Solution ann.
22	Ni–28Mo–3Fe–1.3Cr–0.25Al	Plate, sheet, strip	SB–333	...	N10629	Solution ann.
23	Ni–28Mo–3Fe–1.3Cr–0.25Al	Rod	SB–335	...	N10629	Solution ann.
24	Ni–28Mo–3Fe–1.3Cr–0.25Al	Smls. & wld. fittings	SB–366	...	N10629	Solution ann.
25	Ni–28Mo–3Fe–1.3Cr–0.25Al	Forgings	SB–564	...	N10629	Solution ann.
26	Ni–28Mo–3Fe–1.3Cr–0.25Al	Wld. pipe	SB–619	...	N10629	Solution ann.
27	Ni–28Mo–3Fe–1.3Cr–0.25Al	Smls. pipe & tube	SB–622	...	N10629	Solution ann.
28	Ni–28Mo–3Fe–1.3Cr–0.25Al	Wld. tube	SB–626	...	N10629	Solution ann.
29	65Ni–28Mo–2Fe	Smls. & wld. fittings	SB–366	...	N10665	Annealed
30	65Ni–28Mo–2Fe	Wld. pipe	SB–619	...	N10665	Annealed
31	65Ni–28Mo–2Fe	Wld. tube	SB–626	...	N10665	Annealed
32	65Ni–28Mo–2Fe	Plate, sheet, strip	SB–333	...	N10665	Solution ann.
33	65Ni–28Mo–2Fe	Rod	SB–335	...	N10665	Solution ann.
34	65Ni–28Mo–2Fe	Forgings	SB–462	...	N10665	Solution ann.
35	65Ni–28Mo–2Fe	Forgings	SB–564	...	N10665	Solution ann.
36	65Ni–28Mo–2Fe	Wld. pipe	SB–619	...	N10665	Solution ann.
37	65Ni–28Mo–2Fe	Smls. pipe & tube	SB–622	...	N10665	Solution ann.
38	65Ni–28Mo–2Fe	Wld. tube	SB–626	...	N10665	Solution ann.
39	65Ni–29.5Mo–2Fe–2Cr	Plate, sheet, strip	SB–333	...	N10675	Solution ann.
40	65Ni–29.5Mo–2Fe–2Cr	Rod	SB–335	...	N10675	Solution ann.
41	65Ni–29.5Mo–2Fe–2Cr	Smls. & wld. fittings	SB–366	...	N10675	Solution ann.
42	65Ni–29.5Mo–2Fe–2Cr	Forgings	SB–462	...	N10675	Solution ann.
43	65Ni–29.5Mo–2Fe–2Cr	Forgings	SB–564	...	N10675	Solution ann.
44	65Ni–29.5Mo–2Fe–2Cr	Wld. pipe	SB–619	...	N10675	Solution ann.
45	65Ni–29.5Mo–2Fe–2Cr	Smls. pipe & tube	SB–622	...	N10675	Solution ann.

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Nonferrous Materials (Cont'd)
1	...	105	45	...
2	...	105	45	...
3	...	105	45	...
4	...	105	45	...
5	...	105	45	...
6	...	100	41	...
7	...	100	41	...
8	...	100	41	...
9	...	100	41	...
10	...	100	41	...
11	...	100	41	...
12	...	100	41	...
13	...	100	41	...
14	...	105	45	...
15	...	105	45	...
16	...	105	45	...
17	...	105	45	...
18	...	105	45	...
19	...	105	45	...
20	...	105	45	...
21	...	105	45	...
22	...	110	51	...
23	...	110	51	...
24	...	110	51	...
25	...	110	51	...
26	...	110	51	...
27	...	110	51	...
28	...	110	51	...
29	...	110	51	...
30	...	110	51	...
31	...	110	51	...
32	...	110	51	...
33	...	110	51	...
34	...	110	51	...
35	...	110	51	...
36	...	110	51	...
37	...	110	51	...
38	...	110	51	...
39	...	110	51	...
40	...	110	51	...
41	...	110	51	...
42	...	110	51	...
43	...	110	51	...
44	...	110	51	...
45	...	110	51	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Nonferrous Materials (Cont'd)								
1	45.0	...	42.3	...	39.2	...	37.0	...	35.9
2	45.0	...	42.3	...	39.2	...	37.0	...	35.9
3	45.0	...	42.3	...	39.2	...	37.0	...	35.9
4	45.0	...	42.3	...	39.2	...	37.0	...	35.9
5	45.0	...	42.3	...	39.2	...	37.0	...	35.9
6	41.0	38.8	37.3	35.9	34.5	33.2	32.0	30.9	29.8
7	41.0	38.8	37.3	35.9	34.5	33.2	32.0	30.9	29.8
8	41.0	38.8	37.3	35.9	34.5	33.2	32.0	30.9	29.8
9	41.0	38.8	37.3	35.9	34.5	33.2	32.0	30.9	29.8
10	41.0	38.8	37.3	35.9	34.5	33.2	32.0	30.9	29.8
11	41.0	38.8	37.3	35.9	34.5	33.2	32.0	30.9	29.8
12	41.0	38.8	37.3	35.9	34.5	33.2	32.0	30.9	29.8
13	41.0	38.8	37.3	35.9	34.5	33.2	32.0	30.9	29.8
14	45.0	...	40.1	...	36.7	...	34.1	...	32.1
15	45.0	...	40.1	...	36.7	...	34.1	...	32.1
16	45.0	...	40.1	...	36.7	...	34.1	...	32.1
17	45.0	...	40.1	...	36.7	...	34.1	...	32.1
18	45.0	...	40.1	...	36.7	...	34.1	...	32.1
19	45.0	...	40.1	...	36.7	...	34.1	...	32.1
20	45.0	...	40.1	...	36.7	...	34.1	...	32.1
21	45.0	...	40.1	...	36.7	...	34.1	...	32.1
22	51.0	...	47.1	...	44.4	...	42.2	...	40.5
23	51.0	...	47.1	...	44.4	...	42.2	...	40.5
24	51.0	...	47.1	...	44.4	...	42.2	...	40.5
25	51.0	...	47.1	...	44.4	...	42.2	...	40.5
26	51.0	...	47.1	...	44.4	...	42.2	...	40.5
27	51.0	...	47.1	...	44.4	...	42.2	...	40.5
28	51.0	...	47.1	...	44.4	...	42.2	...	40.5
29	51.0	49.2	47.9	46.6	45.4	44.3	43.4	42.6	41.9
30	51.0	49.2	47.9	46.6	45.4	44.3	43.4	42.6	41.9
31	51.0	49.2	47.9	46.6	45.4	44.3	43.4	42.6	41.9
32	51.0	49.2	47.9	46.6	45.4	44.3	43.4	42.6	41.9
33	51.0	49.2	47.9	46.6	45.4	44.3	43.4	42.6	41.9
34	51.0	49.2	47.9	46.6	45.4	44.3	43.4	42.6	41.9
35	51.0	49.2	47.9	46.6	45.4	44.3	43.4	42.6	41.9
36	51.0	49.2	47.9	46.6	45.4	44.3	43.4	42.6	41.9
37	51.0	49.2	47.9	46.6	45.4	44.3	43.4	42.6	41.9
38	51.0	49.2	47.9	46.6	45.4	44.3	43.4	42.6	41.9
39	51.0	...	47.8	...	45.4	...	43.2	...	41.1
40	51.0	...	47.8	...	45.4	...	43.2	...	41.1
41	51.0	...	47.8	...	45.4	...	43.2	...	41.1
42	51.0	...	47.8	...	45.4	...	43.2	...	41.1
43	51.0	...	47.8	...	45.4	...	43.2	...	41.1
44	51.0	...	47.8	...	45.4	...	43.2	...	41.1
45	51.0	...	47.8	...	45.4	...	43.2	...	41.1

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Nonferrous Materials (Cont'd)
1	...	35.5	35.4	35.2	34.8	34.3	33.6	33.0	32.5	32.4
2	...	35.5	35.4	35.2	34.8	34.3	33.6	33.0	32.5	32.4
3	...	35.5	35.4	35.2	34.8	34.3	33.6	33.0	32.5	32.4
4	...	35.5	35.4	35.2	34.8	34.3	33.6	33.0	32.5	32.4
5	...	35.5	35.4	35.2	34.8	34.3	33.6	33.0	32.5	32.4
6	28.9	28.0	27.3	26.7	26.1	25.7	25.3	25.1	24.9	24.8
7	28.9	28.0	27.3	26.7	26.1	25.7	25.3	25.1	24.9	24.8
8	28.9	28.0	27.3	26.7	26.1	25.7	25.3	25.1	24.9	24.8
9	28.9	28.0	27.3	26.7	26.1	25.7	25.3	25.1	24.9	24.8
10	28.9	28.0	27.3	26.7	26.1	25.7	25.3	25.1	24.9	24.8
11	28.9	28.0	27.3	26.7	26.1	25.7	25.3	25.1	24.9	24.8
12	28.9	28.0	27.3	26.7	26.1	25.7	25.3	25.1	24.9	24.8
13	28.9	28.0	27.3	26.7	26.1	25.7	25.3	25.1	24.9	24.8
14	...	30.8	30.4	30.0	29.7	29.4	...	...	...	...
15	...	30.8	30.4	30.0	29.7	29.4	...	...	...	...
16	...	30.8	30.4	30.0	29.7	29.4	...	...	...	...
17	...	30.8	30.4	30.0	29.7	29.4	...	...	...	...
18	...	30.8	30.4	30.0	29.7	29.4	...	...	...	...
19	...	30.8	30.4	30.0	29.7	29.4	...	...	...	...
20	...	30.8	30.4	30.0	29.7	29.4	...	...	...	...
21	...	30.8	30.4	30.0	29.7	29.4	...	...	...	...
22	...	39.2	38.7	38.3	37.9	37.7	37.4	37.3	37.1	...
23	...	39.2	38.7	38.3	37.9	37.7	37.4	37.3	37.1	...
24	...	39.2	38.7	38.3	37.9	37.7	37.4	37.3	37.1	...
25	...	39.2	38.7	38.3	37.9	37.7	37.4	37.3	37.1	...
26	...	39.2	38.7	38.3	37.9	37.7	37.4	37.3	37.1	...
27	...	39.2	38.7	38.3	37.9	37.7	37.4	37.3	37.1	...
28	...	39.2	38.7	38.3	37.9	37.7	37.4	37.3	37.1	...
29	41.3	40.8	40.3	39.8	39.3	38.7	38.0	37.3	36.5	35.8
30	41.3	40.8	40.3	39.8	39.3	38.7	38.0	37.3	36.5	35.8
31	41.3	40.8	40.3	39.8	39.3	38.7	38.0	37.3	36.5	35.8
32	41.3	40.8	40.3	39.8	39.3	38.7	38.0	37.3	36.5	35.8
33	41.3	40.8	40.3	39.8	39.3	38.7	38.0	37.3	36.5	35.8
34	41.3	40.8	40.3	39.8	39.3	38.7	38.0	37.3	36.5	35.8
35	41.3	40.8	40.3	39.8	39.3	38.7	38.0	37.3	36.5	35.8
36	41.3	40.8	40.3	39.8	39.3	38.7	38.0	37.3	36.5	35.8
37	41.3	40.8	40.3	39.8	39.3	38.7	38.0	37.3	36.5	35.8
38	41.3	40.8	40.3	39.8	39.3	38.7	38.0	37.3	36.5	35.8
39	...	39.4	38.7	38.1	37.6	37.3	37.0	36.8	36.6	36.3
40	...	39.4	38.7	38.1	37.6	37.3	37.0	36.8	36.6	36.3
41	...	39.4	38.7	38.1	37.6	37.3	37.0	36.8	36.6	36.3
42	...	39.4	38.7	38.1	37.6	37.3	37.0	36.8	36.6	36.3
43	...	39.4	38.7	38.1	37.6	37.3	37.0	36.8	36.6	36.3
44	...	39.4	38.7	38.1	37.6	37.3	37.0	36.8	36.6	36.3
45	...	39.4	38.7	38.1	37.6	37.3	37.0	36.8	36.6	36.3

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
	Nonferrous Materials (Cont'd)													
1	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	24.6	24.5	24.5	24.5	24.4	...	...	...	...	...	...	...	...	(**21**)
7	24.6	24.5	24.5	24.5	24.4	...	...	...	...	...	...	...	...	(**21**)
8	24.6	24.5	24.5	24.5	24.4	...	...	...	...	...	...	...	...	(**21**)
9	24.6	24.5	24.5	24.5	24.4	...	...	...	...	...	...	...	...	(**21**)
10	24.6	24.5	24.5	24.5	24.4	...	...	...	...	...	...	...	...	(**21**)
11	24.6	24.5	24.5	24.5	24.4	...	...	...	...	...	...	...	...	(**21**)
12	24.6	24.5	24.5	24.5	24.4	...	...	...	...	...	...	...	...	(**21**)
13	24.6	24.5	24.5	24.5	24.4	...	...	...	...	...	...	...	...	(**21**)
14	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	...	...	...	...	...	...	...	...	...	...	...	...	...	

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
	Nonferrous Materials (Cont'd)					
1	65Ni–29.5Mo–2Fe–2Cr	Wld. tube	SB–626	...	N10675	Solution ann.
2	37Ni–30Co–28Cr–2.7Si	Plate, sheet, strip	SB–435	...	N12160	Solution ann.
3	37Ni–30Co–28Cr–2.7Si	Forgings	SB–564	...	N12160	Solution ann.
4	37Ni–30Co–28Cr–2.7Si	Bar	SB–572	...	N12160	Solution ann.
5	37Ni–30Co–28Cr–2.7Si	Wld. pipe	SB–619	...	N12160	Solution ann.
6	37Ni–30Co–28Cr–2.7Si	Smls. pipe & tube	SB–622	...	N12160	Solution ann.
7	37Ni–30Co–28Cr–2.7Si	Wld. tube	SB–626	...	N12160	Solution ann.
8	33Cr–31Ni–32Fe–1.5Mo–0.6Cu–N	Smls. & wld. fittings	SB–366	...	R20033	Solution ann.
9	33Cr–31Ni–32Fe–1.5Mo–0.6Cu–N	Forgings	SB–564	...	R20033	Solution ann.
10	33Cr–31Ni–32Fe–1.5Mo–0.6Cu–N	Wld. pipe	SB–619	...	R20033	Solution ann.
11	33Cr–31Ni–32Fe–1.5Mo–0.6Cu–N	Smls. pipe & tube	SB–622	...	R20033	Solution ann.
12	33Cr–31Ni–32Fe–1.5Mo–0.6Cu–N	Plate, sheet, strip	SB–625	...	R20033	Solution ann.
13	33Cr–31Ni–32Fe–1.5Mo–0.6Cu–N	Wld. tube	SB–626	...	R20033	Solution ann.
14	33Cr–31Ni–32Fe–1.5Mo–0.6Cu–N	Rod	SB–649	...	R20033	Solution ann.
15	21Ni–30Fe–22Cr–18Co–3Mo–3W	Plate, sheet, strip	SB–435	...	R30556	Annealed
16	21Ni–30Fe–22Cr–18Co–3Mo–3W	Rod	SB–572	...	R30556	Annealed
17	21Ni–30Fe–22Cr–18Co–3Mo–3W	Wld. pipe	SB–619	...	R30556	Annealed
18	21Ni–30Fe–22Cr–18Co–3Mo–3W	Smls. pipe & tube	SB–622	...	R30556	Annealed
19	21Ni–30Fe–22Cr–18Co–3Mo–3W	Wld. tube	SB–626	...	R30556	Annealed
20	Co–26Cr–9Ni–5Mo–3Fe–2W	Rod	SB–815	...	R31233	Solution ann.
21	Co–26Cr–9Ni–5Mo–3Fe–2W	Plate, sheet, strip	SB–818	...	R31233	Solution ann.
22	Ti	Plate, sheet, strip	SB–265	1	R50250	Annealed
23	Ti	Smls. & wld. tube	SB–338	1	R50250	Annealed
24	Ti	Bar, billet	SB–348	1	R50250	Annealed
25	Ti	Forgings	SB–381	F–1	R50250	Annealed
26	Ti	Smls. pipe	SB–861	1	R50250	Annealed
27	Ti	Wld. pipe	SB–862	1	R50250	Annealed
28	Ti	Castings	SB–367	C–2	R50400	...
29	Ti	Plate, sheet, strip	SB–265	2	R50400	Annealed
30	Ti	Smls. & wld. tube	SB–338	2	R50400	Annealed
31	Ti	Bar, billet	SB–348	2	R50400	Annealed
32	Ti	Forgings	SB–381	F–2	R50400	Annealed
33	Ti	Smls. pipe	SB–861	2	R50400	Annealed
34	Ti	Wld. pipe	SB–862	2	R50400	Annealed
35	Ti	Plate, sheet, strip	SB–265	2H	R50400	Annealed
36	Ti	Smls. & wld. tube	SB–338	2H	R50400	Annealed
37	Ti	Bar, billet	SB–348	2H	R50400	Annealed
38	Ti	Smls. fittings	SB–363	WPT2H	R50400	Annealed
39	Ti	Wld. fittings	SB–363	WPT2HW	R50400	Annealed
40	Ti	Forgings	SB–381	F–2H	R50400	Annealed
41	Ti	Smls. pipe	SB–861	2H	R50400	Annealed
42	Ti	Wld. pipe	SB–862	2H	R50400	Annealed
43	Ti	Plate, sheet, strip	SB–265	3	R50550	Annealed
44	Ti	Smls. & wld. tube	SB–338	3	R50550	Annealed
45	Ti	Bar, billet	SB–348	3	R50550	Annealed

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Nonferrous Materials (Cont'd)
1	...	110	51	...
2	...	90	35	...
3	...	90	35	...
4	...	90	35	...
5	...	90	35	...
6	...	90	35	...
7	...	90	35	...
8	...	109	55	...
9	...	109	55	...
10	...	109	55	...
11	...	109	55	...
12	...	109	55	...
13	...	109	55	...
14	...	109	55	...
15	...	100	45	...
16	...	100	45	...
17	...	100	45	...
18	...	100	45	...
19	...	100	45	...
20	...	130	55	...
21	...	130	55	...
22	...	35	20	...
23	...	35	20	...
24	...	35	20	...
25	...	35	20	...
26	...	35	20	...
27	...	35	20	...
28	...	50	40	...
29	...	50	40	...
30	...	50	40	...
31	...	50	40	...
32	...	50	40	...
33	...	50	40	...
34	...	50	40	...
35	...	58	40	...
36	...	58	40	...
37	...	58	40	...
38	...	58	40	...
39	...	58	40	...
40	...	58	40	...
41	...	58	40	...
42	...	58	40	...
43	...	65	55	...
44	...	65	55	...
45	...	65	55	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Nonferrous Materials (Cont'd)								
1	51.0	...	47.8	...	45.4	...	43.2	...	41.1
2	35.0	...	30.8	...	27.5	...	24.7	...	22.5
3	35.0	...	30.8	...	27.5	...	24.7	...	22.5
4	35.0	...	30.8	...	27.5	...	24.7	...	22.5
5	35.0	...	30.8	...	27.5	...	24.7	...	22.5
6	35.0	...	30.8	...	27.5	...	24.7	...	22.5
7	35.0	...	30.8	...	27.5	...	24.7	...	22.5
8	55.0	...	46.3	...	42.1	...	39.2	...	37.1
9	55.0	...	46.3	...	42.1	...	39.2	...	37.1
10	55.0	...	46.3	...	42.1	...	39.2	...	37.1
11	55.0	...	46.3	...	42.1	...	39.2	...	37.1
12	55.0	...	46.3	...	42.1	...	39.2	...	37.1
13	55.0	...	46.3	...	42.1	...	39.2	...	37.1
14	55.0	...	46.3	...	42.1	...	39.2	...	37.1
15	45.0	40.8	38.4	36.4	34.7	33.2	32.0	31.0	30.2
16	45.0	40.8	38.4	36.4	34.7	33.2	32.0	31.0	30.2
17	45.0	40.8	38.4	36.4	34.7	33.2	32.0	31.0	30.2
18	45.0	40.8	38.4	36.4	34.7	33.2	32.0	31.0	30.2
19	45.0	40.8	38.4	36.4	34.7	33.2	32.0	31.0	30.2
20	55.0	...	48.2	...	42.8	...	38.3	...	35.1
21	55.0	...	48.2	...	42.8	...	38.3	...	35.1
22	20.0	16.1	14.0	12.3	10.8	9.4	8.2	7.1	6.3
23	20.0	16.1	14.0	12.3	10.8	9.4	8.2	7.1	6.3
24	20.0	16.1	14.0	12.3	10.8	9.4	8.2	7.1	6.3
25	20.0	16.1	14.0	12.3	10.8	9.4	8.2	7.1	6.3
26	20.0	16.1	14.0	12.3	10.8	9.4	8.2	7.1	6.3
27	20.0	16.1	14.0	12.3	10.8	9.4	8.2	7.1	6.3
28	40.0	34.5	31.5	28.6	25.6	22.6	19.6	17.0	14.8
29	40.0	34.5	31.5	28.6	25.6	22.6	19.6	17.0	14.8
30	40.0	34.5	31.5	28.6	25.6	22.6	19.6	17.0	14.8
31	40.0	34.5	31.5	28.6	25.6	22.6	19.6	17.0	14.8
32	40.0	34.5	31.5	28.6	25.6	22.6	19.6	17.0	14.8
33	40.0	34.5	31.5	28.6	25.6	22.6	19.6	17.0	14.8
34	40.0	34.5	31.5	28.6	25.6	22.6	19.6	17.0	14.8
35	40.0	34.9	32.2	28.4	25.2	22.0	18.6	16.3	14.1
36	40.0	34.9	32.2	28.4	25.2	22.0	18.6	16.3	14.1
37	40.0	34.9	32.2	28.4	25.2	22.0	18.6	16.3	14.1
38	40.0	34.9	32.2	28.4	25.2	22.0	18.6	16.3	14.1
39	40.0	34.9	32.2	28.4	25.2	22.0	18.6	16.3	14.1
40	40.0	34.9	32.2	28.4	25.2	22.0	18.6	16.3	14.1
41	40.0	34.9	32.2	28.4	25.2	22.0	18.6	16.3	14.1
42	40.0	34.9	32.2	28.4	25.2	22.0	18.6	16.3	14.1
43	55.0	48.4	44.0	39.8	35.7	32.0	28.6	25.5	22.5
44	55.0	48.4	44.0	39.8	35.7	32.0	28.6	25.5	22.5
45	55.0	48.4	44.0	39.8	35.7	32.0	28.6	25.5	22.5

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Nonferrous Materials (Cont'd)
1	...	39.4	38.7	38.1	37.6	37.3	37.0	36.8	36.6	36.3
2	...	21.1	20.7	20.4	20.3	20.3	20.3	20.3	20.3	20.3
3	...	21.1	20.7	20.4	20.3	20.3	20.3	20.3	20.3	20.3
4	...	21.1	20.7	20.4	20.3	20.3	20.3	20.3	20.3	20.3
5	...	21.1	20.7	20.4	20.3	20.3	20.3	20.3	20.3	20.3
6	...	21.1	20.7	20.4	20.3	20.3	20.3	20.3	20.3	20.3
7	...	21.1	20.7	20.4	20.3	20.3	20.3	20.3	20.3	20.3
8	...	35.7	35.2	34.7	34.3	33.9	33.6	33.2	...	...
9	...	35.7	35.2	34.7	34.3	33.9	33.6	33.2	...	...
10	...	35.7	35.2	34.7	34.3	33.9	33.6	33.2	...	...
11	...	35.7	35.2	34.7	34.3	33.9	33.6	33.2	...	...
12	...	35.7	35.2	34.7	34.3	33.9	33.6	33.2	...	...
13	...	35.7	35.2	34.7	34.3	33.9	33.6	33.2	...	...
14	...	35.7	35.2	34.7	34.3	33.9	33.6	33.2	...	...
15	29.5	28.9	28.4	28.0	27.6	27.3	27.0	26.7	26.5	26.2
16	29.5	28.9	28.4	28.0	27.6	27.3	27.0	26.7	26.5	26.2
17	29.5	28.9	28.4	28.0	27.6	27.3	27.0	26.7	26.5	26.2
18	29.5	28.9	28.4	28.0	27.6	27.3	27.0	26.7	26.5	26.2
19	29.5	28.9	28.4	28.0	27.6	27.3	27.0	26.7	26.5	26.2
20	...	33.0	32.3	31.8	31.3	30.8	30.2	29.4	28.3	26.8
21	...	33.0	32.3	31.8	31.3	30.8	30.2	29.4	28.3	26.8
22	5.7	5.3	...	...	...	...	...	...	...	...
23	5.7	5.3	...	...	...	...	...	...	...	...
24	5.7	5.3	...	...	...	...	...	...	...	...
25	5.7	5.3	...	...	...	...	...	...	...	...
26	5.7	5.3	...	...	...	...	...	...	...	...
27	5.7	5.3	...	...	...	...	...	...	...	...
28	12.6	11.4	...	...	...	...	...	...	...	...
29	12.6	11.4	...	...	...	...	...	...	...	...
30	12.6	11.4	...	...	...	...	...	...	...	...
31	12.6	11.4	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...
33	12.6	11.4	...	...	...	...	...	...	...	...
34	12.6	11.4	...	...	...	...	...	...	...	...
35	12.6	11.4	...	...	...	...	...	...	...	...
36	12.6	11.4	...	...	...	...	...	...	...	...
37	12.6	11.4	...	...	...	...	...	...	...	...
38	12.6	11.4	...	...	...	...	...	...	...	...
39	12.6	11.4	...	...	...	...	...	...	...	...
40	12.6	11.4	...	...	...	...	...	...	...	...
41	12.6	11.4	...	...	...	...	...	...	...	...
42	12.6	11.4	...	...	...	...	...	...	...	...
43	19.8	17.1	...	...	...	...	...	...	...	...
44	19.8	17.1	...	...	...	...	...	...	...	...
45	19.8	17.1	...	...	...	...	...	...	...	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding												
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
	Nonferrous Materials (Cont'd)												
1	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
	Nonferrous Materials (Cont'd)					
1	Ti	Castings	SB–367	C–3	R50550	Annealed
2	Ti	Forgings	SB–381	F–3	R50550	Annealed
3	Ti	Smls. pipe	SB–861	3	R50550	Annealed
4	Ti	Wld. pipe	SB–862	3	R50550	Annealed
5	Ti–Pd	Plate, sheet, strip	SB–265	11	R52250	Annealed
6	Ti–Pd	Plate, sheet, strip	SB–265	17	R52252	Annealed
7	Ti–Ru	Plate, sheet, strip	SB–265	27	R52254	Annealed
8	Ti–Pd	Plate, sheet, strip	SB–265	7	R52400	Annealed
9	Ti–Pd	Smls. & wld. tube	SB–338	7	R52400	Annealed
10	Ti–Pd	Bar, billet	SB–348	7	R52400	Annealed
11	Ti–Pd	Forgings	SB–381	F–7	R52400	Annealed
12	Ti–Pd	Smls. pipe	SB–861	7	R52400	Annealed
13	Ti–Pd	Wld. pipe	SB–862	7	R52400	Annealed
14	Ti–0.15Pd	Plate, sheet, strip	SB–265	7H	R52400	Annealed
15	Ti–0.15Pd	Smls. & wld. tube	SB–338	7H	R52400	Annealed
16	Ti–0.15Pd	Bar, billet	SB–348	7H	R52400	Annealed
17	Ti–0.15Pd	Smls. fittings	SB–363	WPT7H	R52400	Annealed
18	Ti–0.15Pd	Wld. fittings	SB–363	WPT7HW	R52400	Annealed
19	Ti–0.15Pd	Forgings	SB–381	F–7H	R52400	Annealed
20	Ti–0.15Pd	Smls. pipe	SB–861	7H	R52400	Annealed
21	Ti–0.15Pd	Wld. pipe	SB–862	7H	R52400	Annealed
22	Ti–0.05Pd	Plate, sheet, strip	SB–265	16H	R52402	Annealed
23	Ti–0.05Pd	Smls. & wld. tube	SB–338	16H	R52402	Annealed
24	Ti–0.05Pd	Bar, billet	SB–348	16H	R52402	Annealed
25	Ti–0.05Pd	Smls. fittings	SB–363	WPT16H	R52402	Annealed
26	Ti–0.05Pd	Wld. fittings	SB–363	WPT16HW	R52402	Annealed
27	Ti–0.05Pd	Forgings	SB–381	F–16H	R52402	Annealed
28	Ti–0.05Pd	Smls. pipe	SB–861	16H	R52402	Annealed
29	Ti–0.05Pd	Wld. pipe	SB–862	16H	R52402	Annealed
30	Ti–Ru	Plate, sheet, strip	SB–265	26	R52404	Annealed
31	Ti–Ru	Smls. & wld. tube	SB–338	26	R52404	Annealed
32	Ti–Ru	Bar, billet	SB–348	26	R52404	Annealed
33	Ti–Ru	Smls. fittings	SB–363	WPT26	R52404	Annealed
34	Ti–Ru	Wld. fittings	SB–363	WPT26W	R52404	Annealed
35	Ti–Ru	Forgings	SB–381	F–26	R52404	Annealed
36	Ti–Ru	Smls. pipe	SB–861	26	R52404	Annealed
37	Ti–Ru	Wld. pipe	SB–862	26	R52404	Annealed
38	Ti–0.10Ru	Plate, sheet, strip	SB–265	26H	R52404	Annealed
39	Ti–0.10Ru	Smls. & wld. tube	SB–338	26H	R52404	Annealed
40	Ti–0.10Ru	Bar, billet	SB–348	26H	R52404	Annealed
41	Ti–0.10Ru	Smls. fittings	SB–363	WPT26H	R52404	Annealed
42	Ti–0.10Ru	Wld. fittings	SB–363	WPT26HW	R52404	Annealed
43	Ti–0.10Ru	Forgings	SB–381	F–26H	R52404	Annealed
44	Ti–0.10Ru	Smls. pipe	SB–861	26H	R52404	Annealed
45	Ti–0.10Ru	Wld. pipe	SB–862	26H	R52404	Annealed

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Nonferrous Materials (Cont'd)
1	...	65	55	...
2	...	65	55	...
3	...	65	55	...
4	...	65	55	...
5	...	35	20	...
6	...	35	20	...
7	...	35	20	...
8	...	50	40	...
9	...	50	40	...
10	...	50	40	...
11	...	50	40	...
12	...	50	40	...
13	...	50	40	...
14	...	58	40	...
15	...	58	40	...
16	...	58	40	...
17	...	58	40	...
18	...	58	40	...
19	...	58	40	...
20	...	58	40	...
21	...	58	40	...
22	...	58	40	...
23	...	58	40	...
24	...	58	40	...
25	...	58	40	...
26	...	58	40	...
27	...	58	40	...
28	...	58	40	...
29	...	58	40	...
30	...	50	40	...
31	...	50	40	...
32	...	50	40	...
33	...	50	40	...
34	...	50	40	...
35	...	50	40	...
36	...	50	40	...
37	...	50	40	...
38	...	58	40	...
39	...	58	40	...
40	...	58	40	...
41	...	58	40	...
42	...	58	40	...
43	...	58	40	...
44	...	58	40	...
45	...	58	40	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Nonferrous Materials (Cont'd)								
1	55.0	48.4	44.0	39.8	35.7	32.0	28.6	25.5	22.5
2	55.0	48.4	44.0	39.8	35.7	32.0	28.6	25.5	22.5
3	55.0	48.4	44.0	39.8	35.7	32.0	28.6	25.5	22.5
4	55.0	48.4	44.0	39.8	35.7	32.0	28.6	25.5	22.5
5	20.0	16.1	14.0	12.3	10.8	9.4	8.2	7.1	6.3
6	20.0	16.1	14.0	12.3	10.8	9.4	8.2	7.1	6.3
7	20.0	16.1	14.0	12.3	10.8	9.4	8.2	7.1	6.3
8	40.0	34.5	31.5	28.6	25.6	22.6	19.6	17.0	14.8
9	40.0	34.5	31.5	28.6	25.6	22.6	19.6	17.0	14.8
10	40.0	34.5	31.5	28.6	25.6	22.6	19.6	17.0	14.8
11	40.0	34.5	31.5	28.6	25.6	22.6	19.6	17.0	14.8
12	40.0	34.5	31.5	28.6	25.6	22.6	19.6	17.0	14.8
13	40.0	34.5	31.5	28.6	25.6	22.6	19.6	17.0	14.8
14	40.0	34.9	32.2	28.4	25.2	22.0	18.6	16.3	14.1
15	40.0	34.9	32.2	28.4	25.2	22.0	18.6	16.3	14.1
16	40.0	34.9	32.2	28.4	25.2	22.0	18.6	16.3	14.1
17	40.0	34.9	32.2	28.4	25.2	22.0	18.6	16.3	14.1
18	40.0	34.9	32.2	28.4	25.2	22.0	18.6	16.3	14.1
19	40.0	34.9	32.2	28.4	25.2	22.0	18.6	16.3	14.1
20	40.0	34.9	32.2	28.4	25.2	22.0	18.6	16.3	14.1
21	40.0	34.9	32.2	28.4	25.2	22.0	18.6	16.3	14.1
22	40.0	34.9	32.2	28.4	25.2	22.0	18.6	16.3	14.1
23	40.0	34.9	32.2	28.4	25.2	22.0	18.6	16.3	14.1
24	40.0	34.9	32.2	28.4	25.2	22.0	18.6	16.3	14.1
25	40.0	34.9	32.2	28.4	25.2	22.0	18.6	16.3	14.1
26	40.0	34.9	32.2	28.4	25.2	22.0	18.6	16.3	14.1
27	40.0	34.9	32.2	28.4	25.2	22.0	18.6	16.3	14.1
28	40.0	34.9	32.2	28.4	25.2	22.0	18.6	16.3	14.1
29	40.0	34.9	32.2	28.4	25.2	22.0	18.6	16.3	14.1
30	40.0	34.5	31.5	28.6	25.6	22.6	19.6	17.0	14.8
31	40.0	34.5	31.5	28.6	25.6	22.6	19.6	17.0	14.8
32	40.0	34.5	31.5	28.6	25.6	22.6	19.6	17.0	14.8
33	40.0	34.5	31.5	28.6	25.6	22.6	19.6	17.0	14.8
34	40.0	34.5	31.5	28.6	25.6	22.6	19.6	17.0	14.8
35	40.0	34.5	31.5	28.6	25.6	22.6	19.6	17.0	14.8
36	40.0	34.5	31.5	28.6	25.6	22.6	19.6	17.0	14.8
37	40.0	34.5	31.5	28.6	25.6	22.6	19.6	17.0	14.8
38	40.0	34.9	32.2	28.4	25.2	22.0	18.6	16.3	14.1
39	40.0	34.9	32.2	28.4	25.2	22.0	18.6	16.3	14.1
40	40.0	34.9	32.2	28.4	25.2	22.0	18.6	16.3	14.1
41	40.0	34.9	32.2	28.4	25.2	22.0	18.6	16.3	14.1
42	40.0	34.9	32.2	28.4	25.2	22.0	18.6	16.3	14.1
43	40.0	34.9	32.2	28.4	25.2	22.0	18.6	16.3	14.1
44	40.0	34.9	32.2	28.4	25.2	22.0	18.6	16.3	14.1
45	40.0	34.9	32.2	28.4	25.2	22.0	18.6	16.3	14.1

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Nonferrous Materials (Cont'd)
1	...	...	...	...	...	...	...	...	...	...
2	19.8	17.1	...	...	...	...	...	...	...	...
3	19.8	17.1	...	...	...	...	...	...	...	...
4	19.8	17.1	...	...	...	...	...	...	...	...
5	5.7	5.3	...	...	...	...	...	...	...	...
6	5.7	5.3	...	...	...	...	...	...	...	...
7	5.7	5.3	...	...	...	...	...	...	...	...
8	12.6	11.4	...	...	...	...	...	...	...	...
9	12.6	11.4	...	...	...	...	...	...	...	...
10	12.6	11.4	...	...	...	...	...	...	...	...
11	12.6	11.4	...	...	...	...	...	...	...	...
12	12.6	11.4	...	...	...	...	...	...	...	...
13	12.6	11.4	...	...	...	...	...	...	...	...
14	12.6	11.4	...	...	...	...	...	...	...	...
15	12.6	11.4	...	...	...	...	...	...	...	...
16	12.6	11.4	...	...	...	...	...	...	...	...
17	12.6	11.4	...	...	...	...	...	...	...	...
18	12.6	11.4	...	...	...	...	...	...	...	...
19	12.6	11.4	...	...	...	...	...	...	...	...
20	12.6	11.4	...	...	...	...	...	...	...	...
21	12.6	11.4	...	...	...	...	...	...	...	...
22	12.6	11.4	...	...	...	...	...	...	...	...
23	12.6	11.4	...	...	...	...	...	...	...	...
24	12.6	11.4	...	...	...	...	...	...	...	...
25	12.6	11.4	...	...	...	...	...	...	...	...
26	12.6	11.4	...	...	...	...	...	...	...	...
27	12.6	11.4	...	...	...	...	...	...	...	...
28	12.6	11.4	...	...	...	...	...	...	...	...
29	12.6	11.4	...	...	...	...	...	...	...	...
30	12.6	11.4	...	...	...	...	...	...	...	...
31	12.6	11.4	...	...	...	...	...	...	...	...
32	12.6	11.4	...	...	...	...	...	...	...	...
33	12.6	11.4	...	...	...	...	...	...	...	...
34	12.6	11.4	...	...	...	...	...	...	...	...
35	12.6	11.4	...	...	...	...	...	...	...	...
36	12.6	11.4	...	...	...	...	...	...	...	...
37	12.6	11.4	...	...	...	...	...	...	...	...
38	12.6	11.4	...	...	...	...	...	...	...	...
39	12.6	11.4	...	...	...	...	...	...	...	...
40	12.6	11.4	...	...	...	...	...	...	...	...
41	12.6	11.4	...	...	...	...	...	...	...	...
42	12.6	11.4	...	...	...	...	...	...	...	...
43	12.6	11.4	...	...	...	...	...	...	...	...
44	12.6	11.4	...	...	...	...	...	...	...	...
45	12.6	11.4	...	...	...	...	...	...	...	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding												
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
	Nonferrous Materials (Cont'd)												
1	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...
39	...	...	...	...	...	...	...	...	...	...	...	...	...
40	...	...	...	...	...	...	...	...	...	...	...	...	...
41	...	...	...	...	...	...	...	...	...	...	...	...	...
42	...	...	...	...	...	...	...	...	...	...	...	...	...
43	...	...	...	...	...	...	...	...	...	...	...	...	...
44	...	...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...	...	...	...	...	...	...	...

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Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
	Nonferrous Materials (Cont'd)					
1	Ti–0.3Mo–0.8Ni	Plate, sheet, strip	SB–265	12	R53400	Annealed
2	Ti–0.3Mo–0.8Ni	Smls. & wld. tube	SB–338	12	R53400	Annealed
3	Ti–0.3Mo–0.8Ni	Bar, billet	SB–348	12	R53400	Annealed
4	Ti–0.3Mo–0.8Ni	Forgings	SB–381	F–12	R53400	Annealed
5	Ti–0.3Mo–0.8Ni	Smls. pipe	SB–861	12	R53400	Annealed
6	Ti–0.3Mo–0.8Ni	Wld. pipe	SB–862	12	R53400	Annealed
7	Ti–4Al–2.5V–1.5Fe	Plate, sheet, strip	SB–265	38	R54250	Annealed
8	Ti–4Al–2.5V–1.5Fe	Smls. tube	SB–338	38	R54250	Annealed
9	Ti–4Al–2.5V–1.5Fe	Wld. tube	SB–338	38	R54250	Annealed
10	Ti–4Al–2.5V–1.5Fe	Bar, billet	SB–348	38	R54250	Annealed
11	Ti–4Al–2.5V–1.5Fe	Smls. fittings	SB–363	WPT38	R54250	Annealed
12	Ti–4Al–2.5V–1.5Fe	Wld. fittings	SB–363	WPT38W	R54250	Annealed
13	Ti–4Al–2.5V–1.5Fe	Forgings	SB–381	F–38	R54250	Annealed
14	Ti–4Al–2.5V–1.5Fe	Smls. pipe	SB–861	38	R54250	Annealed
15	Ti–4Al–2.5V–1.5Fe	Wld. pipe	SB–862	38	R54250	Annealed
16	Ti–3Al–2.5V	Plate, sheet, strip	SB–265	9	R56320	Annealed
17	Ti–3Al–2.5V	Smls. & wld. tube	SB–338	9	R56320	Annealed
18	Ti–3Al–2.5V	Bar, billet	SB–348	9	R56320	Annealed
19	Ti–3Al–2.5V	Smls. fittings	SB–363	WPT9	R56320	Annealed
20	Ti–3Al–2.5V	Wld. fittings	SB–363	WPT9W	R56320	Annealed
21	Ti–3Al–2.5V	Forgings	SB–381	F–9	R56320	Annealed
22	Ti–3Al–2.5V	Smls. pipe	SB–861	9	R56320	Annealed
23	Ti–3Al–2.5V	Wld. pipe	SB–862	9	R56320	Annealed
24	Ti–3Al–2.5V–0.1Ru	Plate, sheet, strip	SB–265	28	R56323	Annealed
25	Ti–3Al–2.5V–0.1Ru	Smls. & wld. tube	SB–338	28	R56323	Annealed
26	Ti–3Al–2.5V–0.1Ru	Bar, billet	SB–348	28	R56323	Annealed
27	Ti–3Al–2.5V–0.1Ru	Smls. fittings	SB–363	WPT28	R56323	Annealed
28	Ti–3Al–2.5V–0.1Ru	Wld. fittings	SB–363	WPT28W	R56323	Annealed
29	Ti–3Al–2.5V–0.1Ru	Forgings	SB–381	F–28	R56323	Annealed
30	Ti–3Al–2.5V–0.1Ru	Smls. pipe	SB–861	28	R56323	Annealed
31	Ti–3Al–2.5V–0.1Ru	Wld. pipe	SB–862	28	R56323	Annealed
32	99.2Zr	Forgings	SB–493	...	R60702	Annealed
33	99.2Zr	Smls. & wld. tube	SB–523	...	R60702	Annealed
34	99.2Zr	Bar, wire	SB–550	...	R60702	Annealed
35	99.2Zr	Plate, sheet, strip	SB–551	...	R60702	Annealed
36	99.2Zr	Smls. fittings	SB–653	PZ–2	R60702	Annealed
37	99.2Zr	Wld. fittings	SB–653	PZ–2W	R60702	Annealed
38	99.2Zr	Smls. & wld. pipe	SB–658	...	R60702	Annealed

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Nonferrous Materials (Cont'd)
1	...	70	50	...
2	...	70	50	...
3	...	70	50	...
4	...	70	50	...
5	...	70	50	...
6	...	70	50	...
7	...	130	115	...
8	...	130	115	...
9	...	130	115	...
10	...	130	115	...
11	...	130	115	...
12	...	130	115	...
13	...	130	115	...
14	...	130	115	...
15	...	130	115	...
16	...	90	70	...
17	...	90	70	...
18	...	90	70	...
19	...	90	70	...
20	...	90	70	...
21	...	90	70	...
22	...	90	70	...
23	...	90	70	...
24	...	90	70	...
25	...	90	70	...
26	...	90	70	...
27	...	90	70	...
28	...	90	70	...
29	...	90	70	...
30	...	90	70	...
31	...	90	70	...
32	...	55	30	...
33	...	55	30	...
34	...	55	30	...
35	...	55	30	...
36	...	55	30	...
37	...	55	30	...
38	...	55	30	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Nonferrous Materials (Cont'd)								
1	50.0	45.0	41.5	38.1	35.0	32.2	29.4	27.7	26.0
2	50.0	45.0	41.5	38.1	35.0	32.2	29.4	27.7	26.0
3	50.0	45.0	41.5	38.1	35.0	32.2	29.4	27.7	26.0
4	50.0	45.0	41.5	38.1	35.0	32.2	29.4	27.7	26.0
5	50.0	45.0	41.5	38.1	35.0	32.2	29.4	27.7	26.0
6	50.0	45.0	41.5	38.1	35.0	32.2	29.4	27.7	26.0
7	115.0	106.5	100.8	95.4	90.2	85.5	81.4	77.8	74.6
8	115.0	106.5	100.8	95.4	90.2	85.5	81.4	77.8	74.6
9	115.0	106.5	100.8	95.4	90.2	85.5	81.4	77.8	74.6
10	115.0	106.5	100.8	95.4	90.2	85.5	81.4	77.8	74.6
11	115.0	106.5	100.8	95.4	90.2	85.5	81.4	77.8	74.6
12	115.0	106.5	100.8	95.4	90.2	85.5	81.4	77.8	74.6
13	115.0	106.5	100.8	95.4	90.2	85.5	81.4	77.8	74.6
14	115.0	106.5	100.8	95.4	90.2	85.5	81.4	77.8	74.6
15	115.0	106.5	100.8	95.4	90.2	85.5	81.4	77.8	74.6
16	70.0	65.1	61.1	58.1	55.3	52.5	49.7	46.9	44.8
17	70.0	65.1	61.1	58.1	55.3	52.5	49.7	46.9	44.8
18	70.0	65.1	61.1	58.1	55.3	52.5	49.7	46.9	44.8
19	70.0	65.1	61.1	58.1	55.3	52.5	49.7	46.9	44.8
20	70.0	65.1	61.1	58.1	55.3	52.5	49.7	46.9	44.8
21	70.0	65.1	61.1	58.1	55.3	52.5	49.7	46.9	44.8
22	70.0	65.1	61.1	58.1	55.3	52.5	49.7	46.9	44.8
23	70.0	65.1	61.1	58.1	55.3	52.5	49.7	46.9	44.8
24	70.0	65.1	61.1	58.1	55.3	52.5	49.7	46.9	44.8
25	70.0	65.1	61.1	58.1	55.3	52.5	49.7	46.9	44.8
26	70.0	65.1	61.1	58.1	55.3	52.5	49.7	46.9	44.8
27	70.0	65.1	61.1	58.1	55.3	52.5	49.7	46.9	44.8
28	70.0	65.1	61.1	58.1	55.3	52.5	49.7	46.9	44.8
29	70.0	65.1	61.1	58.1	55.3	52.5	49.7	46.9	44.8
30	70.0	65.1	61.1	58.1	55.3	52.5	49.7	46.9	44.8
31	70.0	65.1	61.1	58.1	55.3	52.5	49.7	46.9	44.8
32	30.0	25.8	23.1	20.4	18.0	15.9	14.0	12.4	11.0
33	30.0	25.8	23.1	20.4	18.0	15.9	14.0	12.4	11.0
34	30.0	25.8	23.1	20.4	18.0	15.9	14.0	12.4	11.0
35	30.0	25.8	23.1	20.4	18.0	15.9	14.0	12.4	11.0
36	30.0	25.8	23.1	20.4	18.0	15.9	14.0	12.4	11.0
37	30.0	25.8	23.1	20.4	18.0	15.9	14.0	12.4	11.0
38	30.0	25.8	23.1	20.4	18.0	15.9	14.0	12.4	11.0

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Nonferrous Materials (Cont'd)
1	24.8	24.0	...	...	...	...	...	...	...	...
2	24.8	24.0	...	...	...	...	...	...	...	...
3	24.8	24.0	...	...	...	...	...	...	...	...
4	24.8	24.0	...	...	...	...	...	...	...	...
5	24.8	24.0	...	...	...	...	...	...	...	...
6	24.8	24.0	...	...	...	...	...	...	...	...
7	71.9	69.5	67.3	...	...	...	...	...	...	...
8	71.9	69.5	67.3	...	...	...	...	...	...	...
9	71.9	69.5	67.3	...	...	...	...	...	...	...
10	71.9	69.5	67.3	...	...	...	...	...	...	...
11	71.9	69.5	67.3	...	...	...	...	...	...	...
12	71.9	69.5	67.3	...	...	...	...	...	...	...
13	71.9	69.5	67.3	...	...	...	...	...	...	...
14	71.9	69.5	67.3	...	...	...	...	...	...	...
15	71.9	69.5	67.3	...	...	...	...	...	...	...
16	43.4	41.3	...	...	...	...	...	...	...	...
17	43.4	41.3	...	...	...	...	...	...	...	...
18	43.4	41.3	...	...	...	...	...	...	...	...
19	43.4	41.3	...	...	...	...	...	...	...	...
20	43.4	41.3	...	...	...	...	...	...	...	...
21	43.4	41.3	...	...	...	...	...	...	...	...
22	43.4	41.3	...	...	...	...	...	...	...	...
23	43.4	41.3	...	...	...	...	...	...	...	...
24	43.4	41.3	...	...	...	...	...	...	...	...
25	43.4	41.3	...	...	...	...	...	...	...	...
26	43.4	41.3	...	...	...	...	...	...	...	...
27	43.4	41.3	...	...	...	...	...	...	...	...
28	43.4	41.3	...	...	...	...	...	...	...	...
29	43.4	41.3	...	...	...	...	...	...	...	...
30	43.4	41.3	...	...	...	...	...	...	...	...
31	43.4	41.3	...	...	...	...	...	...	...	...
32	9.9	9.0	8.4	7.9	7.6	7.5	...	...	...	...
33	9.9	9.0	8.4	7.9	7.6	7.5	...	...	...	...
34	9.9	9.0	8.4	7.9	7.6	7.5	...	...	...	...
35	9.9	9.0	8.4	7.9	7.6	7.5	...	...	...	...
36	9.9	9.0	8.4	7.9	7.6	7.5	...	...	...	...
37	9.9	9.0	8.4	7.9	7.6	7.5	...	...	...	...
38	9.9	9.0	8.4	7.9	7.6	7.5	...	...	...	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding												
	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650
	Nonferrous Materials (Cont'd)												
1	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...	...	...	...
8	...	...	...	...	...	...	...	...	...	...	...	...	...
9	...	...	...	...	...	...	...	...	...	...	...	...	...
10	...	...	...	...	...	...	...	...	...	...	...	...	...
11	...	...	...	...	...	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...	...	...	...	...	...
13	...	...	...	...	...	...	...	...	...	...	...	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	...
15	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...
17	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...
19	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...
21	...	...	...	...	...	...	...	...	...	...	...	...	...
22	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	...	...	...
25	...	...	...	...	...	...	...	...	...	...	...	...	...
26	...	...	...	...	...	...	...	...	...	...	...	...	...
27	...	...	...	...	...	...	...	...	...	...	...	...	...
28	...	...	...	...	...	...	...	...	...	...	...	...	...
29	...	...	...	...	...	...	...	...	...	...	...	...	...
30	...	...	...	...	...	...	...	...	...	...	...	...	...
31	...	...	...	...	...	...	...	...	...	...	...	...	...
32	...	...	...	...	...	...	...	...	...	...	...	...	...
33	...	...	...	...	...	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...
35	...	...	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...
37	...	...	...	...	...	...	...	...	...	...	...	...	...
38	...	...	...	...	...	...	...	...	...	...	...	...	...

NOTES TO TABLE Y-1

GENERAL NOTES

(a) The following abbreviations are used: ann., annealed; cond., condenser; CW, cold worked; extr., extruded; fin., finished; fr., from; HW, Hot worked; NT, Normalized and tempered; QT, Quenched and tempered; rel., relieved; rld., rolled; Smls., Seamless; Sol., Solution; SR, stress relieved; treat., treated; and Wld., Welded.

(b) The tabulated values of yield strength are those which the Committee believes are suitable for use in design calculations. At temperatures above room temperature, the yield strength values correspond to the yield strength trend curve adjusted to the minimum specified room temperature yield strength. The yield strength values do not correspond exactly to "minimum" or "average" as these terms are applied to a statistical treatment of a homogeneous set of data. Neither the ASME Material Specifications nor the rules of Sections I, III, VIII, or XII require elevated temperature testing for yield strengths of production material for use in Code components. It is not intended that results of such tests, if performed, be compared with these tabulated yield strength values for ASME Code acceptance/rejection purposes for materials. If some elevated temperature test results on production material appear lower than the tabulated values by a large amount (more than the typical variability of material and suggesting the possibility of some error), further investigation by retest or other means should be considered.

(c) Notes limiting applications of these materials appear in Tables 1A, 1B, 2A, 2B, 3, 4, 5A, and 5B.

(d) These values represent yield strength design values that are appropriate for use in any section of the ASME Boiler & Pressure Vessel Code in which the material is permitted and not otherwise restricted by applicability temperature limits, application limits, or notes.

(e) Where specifications, grades, classes, and types are listed in this Table, and where the material specification in Section II, Part A or Part B is a dual–unit specification (e.g., SA–516/SA–516M), the values listed in this Table shall be applicable to either the customary U.S. version of the material specification or the SI units version of the material specification. For example, the values listed for SA–516 Grade 70 shall be used when SA–516M Grade 485 is used in construction.

(f) The values in this Table may be interpolated to determine values for intermediate temperatures. The values at intermediate temperatures shall be rounded to the same number of decimal places as the value at the higher temperature between which values are being interpolated. The rounding rule is: when the next digit beyond the last place to be retained is less than 5, retain unchanged the digit in the last place retained; when the digit next beyond the last place to be retained is 5 or greater, increase by 1 the digit in the last place retained.

(g) Where a size limit appears in the Size/Thickness column, the limit applies to the dimension appropriate to the product form: wall thickness of tubing, pipe, pipe fittings, and hollow forgings; thickness of plate, flat bar and forgings, and polygonal bar; diameter of solid bar and bolting; and thickest cross–section of other pressure parts, e.g., castings and forgings.

NOTE

(1) Strength values for intermediate thickness may be interpolated.

(21)

Table Y-2
Factors for Limiting Permanent Strain in Austenitic Stainless Steels, High-Nickel Alloy Steels, Nickel, and Nickel Alloys

Strain, %	Factors
0.10	0.90
0.09	0.89
0.08	0.88
0.07	0.86
0.06	0.83
0.05	0.80
0.04	0.77
0.03	0.73
0.02	0.69
0.01	0.63

GENERAL NOTE: This Table lists multiplying factors that, when applied to the yield strength values shown in Table Y-1, will give a value that will result in lower levels of permanent strain. If this value is less than the maximum allowable stress value listed in Table 1A, Table 1B, Table 2A, Table 2B, Table 5A, or Table 5B, or the design stress intensity value listed in Table 2A or Table 2B, the lower value shall be used.

SUBPART 2
PHYSICAL PROPERTIES TABLES

INTRODUCTION

Section II, Part D, Subpart 2 provides, to the extent possible, physical properties for most of the alloys used in Code construction. Included in this Subpart are tables of thermal expansion (instantaneous, mean, and linear), thermal conductivity and thermal diffusivity, and modulus of elasticity. These values are all listed as a function of temperature from 70°F to as high as 1,850°F. Subpart 2 also contains tables of density and Poisson's ratio for ferrous and nonferrous alloys.

All of the properties provided in Subpart 2 are considered typical. They are neither average nor minimum. Thermal–physical properties such as thermal expansion, thermal conductivity, and thermal diffusivity are affected more by alloy content than by crystal structure or heat treatment. Due to the permitted range for elements comprising alloys (specification ranges of chemical compositions), the thermal–physical properties described in Tables TE-1 through TE-5 and Table TCD should be considered to have an associated uncertainty of ±10%.

Moduli of elasticity and Poisson's ratio are also typical values, but the values of modulus of elasticity, shown as a function of temperature in Tables TM-1 through TM-5, tend to be closer to average values since their temperature dependency is factored against an "average" room-temperature value.

The physical properties listed in this Subpart are for information only, unless invoked by a Boiler & Pressure Vessel Code (Sections I, III, IV, VIII, X, XI, and XII). When a user of the Code has data supporting the use of values different from those in this Subpart, such other values may be used in lieu of the values in this Subpart.

For those alloys for which physical properties are not yet addressed in Subpart 2, the user of the Code may use other authoritative sources for the needed information. In those instances, or when alternative values are used, the user is encouraged to submit the values and supporting data to the attention of the ASME Boiler and Pressure Vessel Committee II on Materials for its consideration in improving and revising the values in Subpart 2. Information should be directed to:

Secretary
ASME Boiler and Pressure Vessel Committee II on Materials
Two Park Avenue
New York, NY 10016-5990

(21)

Table TE-1
Thermal Expansion for Ferrous Materials

	Coefficients for Carbon and Low Alloy Steels (Group 1) [Note (1)]			Coefficients for Other Alloy Steels (Group 2) [Note (2)]			Coefficients for 5Cr–1Mo and 29Cr–7Ni–2Mo–N Steels		
Temperature, °F	A	B	C	A	B	C	A	B	C
70	6.4	6.4	0	7.0	7.0	0	6.4	6.4	0
100	6.6	6.5	0.23	7.1	7.1	0.26	6.6	6.5	0.23
150	6.8	6.6	0.63	7.3	7.2	0.69	6.8	6.6	0.63
200	7.0	6.7	1.0	7.5	7.3	1.1	7.0	6.7	1.0
250	7.2	6.8	1.5	7.6	7.3	1.6	7.1	6.8	1.5
300	7.3	6.9	1.9	7.8	7.4	2.0	7.2	6.9	1.9
350	7.5	7.0	2.4	7.9	7.5	2.5	7.3	6.9	2.3
400	7.7	7.1	2.8	8.0	7.6	3.0	7.3	7.0	2.8
450	7.8	7.2	3.3	8.1	7.6	3.5	7.4	7.0	3.2
500	8.0	7.3	3.7	8.3	7.7	4.0	7.4	7.1	3.7
550	8.2	7.3	4.2	8.4	7.8	4.5	7.5	7.1	4.1
600	8.3	7.4	4.7	8.4	7.8	5.0	7.6	7.2	4.6
650	8.5	7.5	5.2	8.5	7.9	5.5	7.7	7.2	5.0
700	8.7	7.6	5.7	8.6	7.9	6.0	7.7	7.2	5.5
750	8.8	7.7	6.3	8.7	8.0	6.5	7.8	7.3	5.9
800	9.0	7.8	6.8	8.8	8.0	7.0	7.9	7.3	6.4
850	9.1	7.9	7.4	8.8	8.1	7.6	8.0	7.4	6.9
900	9.2	7.9	7.9	8.9	8.1	8.1	8.1	7.4	7.4
950	9.3	8.0	8.5	9.0	8.2	8.6	8.1	7.4	7.9
1,000	9.4	8.1	9.0	9.0	8.2	9.2	8.2	7.5	8.4
1,050	9.4	8.1	9.6	9.0	8.3	9.7	8.3	7.5	8.8
1,100	9.5	8.2	10.1	9.1	8.3	10.3	8.3	7.6	9.3
1,150	9.5	8.3	10.7	9.1	8.3	10.8	8.4	7.6	9.8
1,200	9.5	8.3	11.3	9.1	8.4	11.4	8.4	7.6	10.3
1,250	9.5	8.4	11.9	9.1	8.4	11.9	8.5	7.7	10.9
1,300	9.5	8.4	12.4	9.1	8.4	12.5	8.6	7.7	11.4
1,350	...	...	...	9.1	8.5	13.0	8.7	7.7	11.9
1,400	...	...	...	9.0	8.5	13.5	8.9	7.8	12.4
1,450	...	...	...	8.9	8.5	14.1	...	...	...
1,500	...	...	...	8.8	8.5	14.6	...	...	...

Table TE-1
Thermal Expansion for Ferrous Materials (Cont'd)

	Coefficients for 9Cr–1Mo Steels (Including Grades 9, 91, 911, and 92)			Coefficients for 5Ni–$^1/_4$Mo Steels			Coefficients for 7Ni Steels		
Temperature, °F	A	B	C	A	B	C	A	B	C
70	5.8	5.8	0	6.2	6.2	0	5.9	5.9	0
100	5.9	5.9	0.21	6.4	6.3	0.23	6.1	6.0	0.22
150	6.1	5.9	0.57	6.6	6.4	0.61	6.3	6.1	0.59
200	6.2	6.0	0.94	6.8	6.5	1.0	6.6	6.2	0.97
250	6.3	6.1	1.3	6.9	6.6	1.4	6.8	6.4	1.4
300	6.5	6.2	1.7	7.1	6.7	1.8	7.0	6.5	1.8
350	6.6	6.2	2.1	7.2	6.8	2.3	7.1	6.6	2.2
400	6.7	6.3	2.5	7.3	6.8	2.7	7.2	6.6	2.6
450	6.8	6.3	2.9	7.5	6.9	3.2	7.3	6.7	3.1
500	6.9	6.4	3.3	7.6	7.0	3.6	7.4	6.8	3.5
550	7.0	6.5	3.7	7.7	7.1	4.1	7.5	6.9	3.9
600	7.1	6.5	4.1	7.9	7.1	4.5	7.6	6.9	4.4
650	7.2	6.6	4.6	8.0	7.2	5.0	7.7	7.0	4.8
700	7.3	6.6	5.0	8.1	7.3	5.5	7.8	7.1	5.3
750	7.4	6.7	5.4	8.2	7.3	6.0	7.9	7.1	5.8
800	7.5	6.7	5.9	8.3	7.4	6.5	8.0	7.2	6.3
850	7.5	6.8	6.3	8.4	7.5	7.0	8.1	7.2	6.7
900	7.6	6.8	6.8	8.5	7.5	7.5	8.1	7.3	7.2
950	7.7	6.9	7.3	8.6	7.6	8.0	8.0	7.3	7.7
1,000	7.8	6.9	7.7	8.7	7.6	8.5	7.8	7.3	8.2
1,050	7.9	7.0	8.2	8.8	7.7	9.1	...	...	...
1,100	8.1	7.0	8.7	9.0	7.8	9.6	...	...	...
1,150	8.2	7.1	9.2	9.3	7.8	10.1	...	...	...
1,200	8.4	7.1	9.7	9.7	7.9	10.7	...	...	...
1,250	8.6	7.2	10.2	...	...	...	...	...	...
1,300	...	...	...	...	...	...	...	...	...
1,350	...	...	...	...	...	...	...	...	...
1,400	...	...	...	...	...	...	...	...	...
1,450	...	...	...	...	...	...	...	...	...
1,500	...	...	...	...	...	...	...	...	...

Table TE-1
Thermal Expansion for Ferrous Materials (Cont'd)

	Coefficients for 8Ni and 9Ni Steels			Coefficients for 12Cr, 12Cr–1Al, 13Cr, and 13Cr–4Ni Steels			Coefficients for 15Cr and 17Cr Steels		
Temperature, °F	A	B	C	A	B	C	A	B	C
70	5.5	5.5	0	5.9	5.9	0	5.3	5.3	0
100	5.7	5.6	0.20	6.1	6.0	0.22	5.4	5.4	0.19
150	6.0	5.8	0.56	6.2	6.1	0.59	5.6	5.5	0.53
200	6.3	5.9	0.92	6.4	6.2	0.97	5.7	5.5	0.86
250	6.6	6.1	1.3	6.5	6.2	1.3	5.8	5.6	1.2
300	6.8	6.2	1.7	6.6	6.3	1.7	6.0	5.7	1.6
350	6.9	6.3	2.1	6.6	6.4	2.1	6.1	5.7	1.9
400	7.0	6.4	2.5	6.7	6.4	2.5	6.2	5.8	2.3
450	7.1	6.5	3.0	6.7	6.4	2.9	6.3	5.8	2.7
500	7.1	6.6	3.4	6.8	6.5	3.3	6.4	5.9	3.0
550	7.2	6.6	3.8	6.8	6.5	3.7	6.4	6.0	3.4
600	7.2	6.7	4.2	6.9	6.5	4.2	6.5	6.0	3.8
650	7.3	6.7	4.7	6.9	6.6	4.6	6.6	6.0	4.2
700	7.4	6.8	5.1	7.0	6.6	5.0	6.6	6.1	4.6
750	7.5	6.8	5.6	7.1	6.6	5.4	6.7	6.1	5.0
800	7.6	6.9	6.0	7.1	6.7	5.8	6.7	6.2	5.4
850	7.7	6.9	6.5	7.2	6.7	6.3	6.8	6.2	5.8
900	7.6	7.0	6.9	7.2	6.7	6.7	6.8	6.2	6.2
950	7.3	7.0	7.4	7.3	6.8	7.1	6.8	6.3	6.6
1,000	6.8	7.0	7.8	7.3	6.8	7.6	6.8	6.3	7.0
1,050	...	...	...	7.4	6.8	8.0	6.9	6.3	7.4
1,100	...	...	...	7.4	6.8	8.5	6.9	6.4	7.9
1,150	...	...	...	7.4	6.9	8.9	7.0	6.4	8.3
1,200	...	...	...	7.4	6.9	9.4	7.0	6.4	8.7
1,250	...	...	...	7.4	6.9	9.8	7.1	6.4	9.1
1,300	...	...	...	7.4	6.9	10.2	7.2	6.5	9.5
1,350	...	...	...	7.4	7.0	10.7	7.4	6.5	10.0
1,400	...	...	...	7.5	7.0	11.1	7.6	6.5	10.4
1,450	...	...	...	7.5	7.0	11.6	7.9	6.6	10.9
1,500	...	...	...	7.6	7.0	12.0	8.3	6.6	11.4

Table TE-1
Thermal Expansion for Ferrous Materials (Cont'd)

	Coefficients for 27Cr Steels			Coefficients for Austenitic Stainless Steels (Group 3) [Note (3)]			Coefficients for Other Austenitic Stainless Steels (Group 4) [Note (4)]		
Temperature, °F	A	B	C	A	B	C	A	B	C
70	5.0	5.0	0	8.5	8.5	0	8.2	8.2	0
100	5.1	5.1	0.18	8.7	8.6	0.31	8.3	8.2	0.30
150	5.2	5.1	0.49	9.0	8.8	0.84	8.6	8.4	0.81
200	5.3	5.2	0.81	9.4	8.9	1.4	8.8	8.5	1.3
250	5.3	5.2	1.1	9.6	9.1	2.0	9.0	8.6	1.9
300	5.4	5.2	1.4	9.9	9.2	2.5	9.2	8.7	2.4
350	5.4	5.3	1.8	10.1	9.4	3.1	9.3	8.8	3.0
400	5.5	5.3	2.1	10.2	9.5	3.8	9.4	8.9	3.5
450	5.6	5.3	2.4	10.4	9.6	4.4	9.5	9.0	4.1
500	5.6	5.4	2.8	10.5	9.7	5.0	9.6	9.1	4.7
550	5.7	5.4	3.1	10.6	9.8	5.6	9.7	9.1	5.3
600	5.8	5.4	3.5	10.6	9.9	6.3	9.8	9.2	5.8
650	5.9	5.5	3.8	10.7	9.9	6.9	9.9	9.2	6.4
700	6.0	5.5	4.2	10.8	10.0	7.5	10.0	9.3	7.0
750	6.1	5.5	4.5	10.8	10.0	8.2	10.1	9.3	7.6
800	6.2	5.6	4.9	10.9	10.1	8.8	10.2	9.4	8.2
850	6.2	5.6	5.3	11.0	10.2	9.5	10.3	9.4	8.8
900	6.3	5.7	5.6	11.1	10.2	10.2	10.4	9.5	9.5
950	6.4	5.7	6.0	11.2	10.3	10.8	10.5	9.6	10.1
1,000	6.4	5.7	6.4	11.4	10.3	11.5	10.6	9.6	10.7
1,050	6.5	5.8	6.8	11.5	10.4	12.2	10.7	9.7	11.4
1,100	6.5	5.8	7.2	11.7	10.4	12.9	10.9	9.7	12.0
1,150	6.5	5.8	7.6	11.8	10.5	13.6	11.0	9.8	12.7
1,200	6.5	5.9	8.0	12.0	10.6	14.3	11.1	9.8	13.3
1,250	6.6	5.9	8.4	12.0	10.6	15.0	11.3	9.9	14.0
1,300	6.7	5.9	8.7	12.0	10.7	15.8	11.4	9.9	14.7
1,350	6.8	6.0	9.2	11.9	10.7	16.5	11.5	10.0	15.4
1,400	7.0	6.0	9.6	11.7	10.8	17.2	11.7	10.1	16.1
1,450	7.3	6.0	10.0	11.2	10.8	17.9	11.8	10.1	16.8
1,500	7.7	6.1	10.4	10.5	10.8	18.5	12.0	10.2	17.5

Table TE-1
Thermal Expansion for Ferrous Materials (Cont'd)

	Coefficients for Ductile Cast Iron			Coefficients for Precipitation Hardened 17Cr–4Ni–4Cu Stainless Steels, Condition 1075			Coefficients for Precipitation Hardened 17Cr–4Ni–4Cu Stainless Steels, Condition 1150		
Temperature, °F	A	B	C	A	B	C	A	B	C
70	5.7	5.7	0	6.2	6.2	0	6.4	6.4	0
100	5.8	5.8	0.21	6.2	6.2	0.22	6.5	6.4	0.23
150	6.1	5.9	0.57	6.3	6.3	0.60	6.6	6.5	0.62
200	6.3	6.0	0.94	6.3	6.3	0.98	6.8	6.6	1.0
250	6.6	6.1	1.3	6.3	6.3	1.4	6.9	6.7	1.4
300	6.9	6.3	1.7	6.4	6.4	1.8	7.1	6.7	1.9
350	7.2	6.4	2.2	6.4	6.4	2.2	7.2	6.8	2.3
400	7.4	6.6	2.6	6.5	6.5	2.6	7.3	6.9	2.7
450	7.6	6.7	3.1	6.5	6.5	3.0	7.4	6.9	3.2
500	7.7	6.8	3.5	6.5	6.5	3.4	7.5	7.0	3.6
550	7.8	6.9	4.0	6.6	6.6	3.8	7.5	7.0	4.1
600	7.9	7.0	4.5	6.6	6.6	4.2	7.5	7.1	4.5
650	7.9	7.1	4.9	6.7	6.7	4.6	7.6	7.1	5.0
700	8.0	7.1	5.4	6.7	6.7	5.1	7.6	7.2	5.4
750	8.0	7.2	5.9	6.7	6.7	5.5	7.6	7.2	5.9
800	8.1	7.3	6.4	6.8	6.8	5.9	7.6	7.2	6.3
850	8.1	7.3	6.8	...	...	...	7.7	7.2	6.8
900	8.3	7.4	7.3	...	...	...	7.8	7.3	7.2
950	8.5	7.4	7.8	...	...	...	8.0	7.3	7.7
1,000	8.7	7.5	8.4	...	...	...	8.4	7.4	8.2
1,050	...	...	...	...	...	...	...	...	...
1,100	...	...	...	...	...	...	...	...	...
1,150	...	...	...	...	...	...	...	...	...
1,200	...	...	...	...	...	...	...	...	...
1,250	...	...	...	...	...	...	...	...	...
1,300	...	...	...	...	...	...	...	...	...
1,350	...	...	...	...	...	...	...	...	...
1,400	...	...	...	...	...	...	...	...	...
1,450	...	...	...	...	...	...	...	...	...
1,500	...	...	...	...	...	...	...	...	...

GENERAL NOTE: Coefficient A is the instantaneous coefficient of thermal expansion $\times 10^{-6}$ (in./in./°F). Coefficient B is the mean coefficient of thermal expansion $\times 10^{-6}$ (in./in./°F) in going from 70°F to indicated temperature. Coefficient C is the linear thermal expansion (in./100 ft) in going from 70°F to indicated temperature.

NOTES:

(1) Group 1 alloys (by nominal composition):

Carbon steel
C–Mn–Cb
C–Mn–Si–Cb
C–Mn–Si–V
C–Mn–Ti
C–Si–Ti
C–1/4Mo
C–1/2Mo
1/2Cr–1/5Mo
1/2Cr–1/5Mo–V
1/2Cr–1/4Mo–Si
1/2Cr–1/2Mo
3/4Cr–1/2Ni–Cu
3/4Cr–3/4Ni–Cu–Al
1Cr–1/5Mo
1Cr–1/5Mo–Si
1Cr–1/2Mo
1Cr–1/2Mo–V
1 1/4Cr–1/2Mo
1 1/4Cr–1/2Mo–Si
1 3/4Cr–1/2Mo–Cu
1 3/4Cr–1/2Mo–Ti
2Cr–1/2Mo
2 1/4Cr–1Mo
3Cr–1Mo
3Cr–1Mo–1/4V–Cb–Ca
3Cr–1Mo–1/4V–Ti–B
Mn–1/4Mo
Mn–1/2Mo
Mn–1/2Mo–1/4Ni
Mn–1/2Mo–1/2Ni
Mn–1/2Mo–3/4Ni
Mn–V
1/2Ni–1/2Cr–1/4Mo
1/2Ni–1/2Cr–1/4Mo–V
1/2Ni–1/2Mo–V
3/4Ni–1/2Cr–1/2Mo–V
3/4Ni–1/2Cu–Mo
3/4Ni–1/2Mo–1/3Cr–V
3/4Ni–1/2Mo–Cr–V
3/4Ni–1Mo–3/4Cr
1Ni–1/2Cr–1/2Mo
1 1/4Ni–1Cr–1/2Mo
1 3/4Ni–3/4Cr–1/4Mo
2Ni–3/4Cr–1/4Mo
2Ni–3/4Cr–1/3Mo
2Ni–1 1/2Cr–1/4Mo–V
2 1/2Ni
2 3/4Ni–1 1/2Cr–1/2Mo–V
3 1/2Ni
3 1/2Ni–1 3/4Cr–1/2Mo–V
4Ni–1 1/2Cr–1/2Mo–V

NOTES (CONT'D):

(2) Group 2 alloys (by nominal composition):

18Cr–5Ni–3Mo–N	22Cr–5Ni–3Mo–N	25Cr–6Ni–Mo–N
22Cr–2Ni–Mo–N	23Cr–4Ni–Mo–Cu	25Cr–7Ni–4Mo–N

(3) Group 3 alloys (by nominal composition):

16Cr–12Ni–2Mo	18Cr–10Ni–Cb	18Cr–18Ni–2Si
16Cr–12Ni–2Mo–N	18Cr–10Ni–Ti	19Cr–9Ni–Mo–W
16Cr–12Ni–2Mo–Ti	18Cr–11Ni	21Cr–11Ni–N
18Cr–8Ni	18Cr–13Ni–3Mo	
18Cr–8Ni–N	18Cr–15Ni–4Si	

(4) Group 4 alloys (by nominal composition):

14Cr–16Ni–6Si–Cu–Mo	22Cr–13Ni–5Mn	25Cr–20Ni–2Mo
25Ni–15Cr–2Ti	23Cr–12Ni	31Ni–31Fe–29Cr–Mo
29Ni–20Cr–3Cu–2Mo	24Cr–22Ni–6Mo–2W–Cu–N	44Fe–25Ni–21Cr–Mo
18Cr–20Ni–5.5Si	25Cr–12Ni	47Fe–25Ni–23Cr–5.5Mo–N
20Cr–18Ni–6Mo	25Cr–20Ni	

Table TE-2
Thermal Expansion for Aluminum Alloys

	Coefficients for Aluminum Alloys		
Temperature, °F	A	B	C
70	12.1	12.1	0
100	12.6	12.4	0.45
150	13.2	12.7	1.2
200	13.5	13.0	2.0
250	13.7	13.1	2.8
300	14.0	13.3	3.7
350	14.3	13.4	4.5
400	14.7	13.6	5.4
450	15.1	13.8	6.3
500	15.3	13.9	7.2
550	15.4	14.1	8.1
600	15.2	14.2	9.0

GENERAL NOTES:

(a) Aluminum alloys represented by these thermal expansion coefficients include:

A03560	A93003	A95254
A24430	A93004	A95454
A91060	A95052	A95456
A91100	A95083	A95652
A92014	A95086	A96061
A92024	A95154	A96063

(b) Coefficient A is the instantaneous coefficient of thermal expansion $\times 10^{-6}$ (in./in./°F). Coefficient B is the mean coefficient of thermal expansion $\times 10^{-6}$ (in./in./°F) in going from 70°F to indicated temperature. Coefficient C is the linear thermal expansion (in./100 ft) in going from 70°F to indicated temperature.

Table TE-3
Thermal Expansion for Copper Alloys

	Coefficients for Copper Alloys, C1XXXX Series			Coefficients for Bronze Alloys [Note (1)]			Coefficients for Brass Alloys [Note (2)]			Coefficients for Copper–Nickel (70Cu–30Ni) [Note (3)]			Coefficients for Copper–Nickel (90Cu–10Ni) [Note (4)]		
Temperature, °F	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
70	9.3	9.3	0	9.6	9.6	0	9.3	9.3	0	8.1	8.1	0	...	...	...
100	9.5	9.4	0.34	9.8	9.7	0.35	9.6	9.4	0.34	8.3	8.2	0.30	...	...	...
150	9.6	9.5	0.91	10.1	9.9	0.95	9.9	9.6	0.92	8.6	8.4	0.81	...	...	...
200	9.7	9.6	1.5	10.2	10.0	1.6	10.1	9.8	1.5	8.8	8.5	1.3	...	...	...
250	9.9	9.6	2.1	10.3	10.1	2.2	10.3	9.9	2.1	9.0	8.6	1.9	...	...	...
300	10.0	9.7	2.7	10.4	10.1	2.8	10.5	10.0	2.8	9.2	8.7	2.4	...	...	...
350	10.1	9.8	3.3	10.4	10.2	3.4	10.8	10.1	3.4	9.4	8.8	3.0	...	...	...
400	10.2	9.8	3.9	10.5	10.2	4.0	11.1	10.2	4.1	9.5	8.9	3.5	...	...	...
450	10.3	9.9	4.5	10.6	10.3	4.7	11.3	10.4	4.7	9.7	9.0	4.1	...	...	...
500	10.3	9.9	5.1	10.8	10.3	5.3	11.5	10.5	5.4	9.7	9.1	4.7	...	...	...
550	10.3	10.0	5.7	10.9	10.4	6.0	11.6	10.6	6.1	9.6	9.1	5.3	9.5	9.5	5.5
600	10.4	10.0	6.4	11.0	10.4	6.6	11.7	10.7	6.8	9.5	9.2	5.8	...	...	...
650	...	...	...	11.1	10.5	7.3	11.9	10.8	7.5	9.3	9.2	6.4	...	...	...
700	...	...	...	11.1	10.5	8.0	12.2	10.9	8.2	9.2	9.2	7.0	...	...	...
750	...	...	...	11.1	10.6	8.6	13.0	11.0	9.0	...	...	...	...	...	...
800	...	...	...	11.0	10.6	9.3	14.5	11.2	9.8	...	...	...	...	...	...

GENERAL NOTE: Coefficient A is the instantaneous coefficient of thermal expansion $\times 10^{-6}$ (in./in./°F). Coefficient B is the mean coefficient of thermal expansion $\times 10^{-6}$ (in./in./°F) in going from 70°F to indicated temperature. Coefficient C is the linear thermal expansion (in./100 ft) in going from 70°F to indicated temperature.

NOTES:
(1) Includes C6XXXX, C8XXXX, C92XXX, C93XXX, and C95XXX alloys.
(2) Includes C2XXXX, C3XXXX, and C4XXXX alloys.
(3) Includes C71XXX, C72XXX, and C97600 alloys.
(4) Includes C70XXX and C96200 alloys.

Table TE-4
Thermal Expansion for Nickel Alloys

(21)

	Coefficients for N02200 and N02201			Coefficients for N04400 and N04405			Coefficients for N06002		
Temperature, °F	A	B	C	A	B	C	A	B	C
70	6.6	6.6	0	7.7	7.7	0	7.3	7.3	0
100	6.9	6.8	0.24	7.9	7.8	0.28	7.4	7.4	0.27
150	7.3	7.0	0.67	8.2	7.9	0.76	7.6	7.4	0.71
200	7.7	7.2	1.1	8.4	8.1	1.3	7.7	7.5	1.2
250	7.9	7.4	1.6	8.6	8.2	1.8	7.8	7.6	1.6
300	8.1	7.5	2.1	8.8	8.3	2.3	7.9	7.6	2.1
350	8.2	7.6	2.6	8.9	8.4	2.8	7.9	7.7	2.6
400	8.3	7.7	3.1	9.1	8.5	3.4	8.0	7.7	3.1
450	8.4	7.8	3.6	9.1	8.6	3.9	8.2	7.8	3.5
500	8.5	7.9	4.1	9.2	8.7	4.5	8.3	7.8	4.0
550	8.7	8.0	4.6	9.3	8.7	5.0	8.4	7.9	4.5
600	8.8	8.0	5.1	9.3	8.8	5.6	8.6	7.9	5.0
650	8.9	8.1	5.6	9.3	8.8	6.1	8.7	8.0	5.6
700	9.0	8.2	6.2	9.4	8.9	6.7	8.9	8.1	6.1
750	9.1	8.2	6.7	9.4	8.9	7.3	9.1	8.1	6.6
800	9.2	8.3	7.3	9.4	8.9	7.8	9.2	8.2	7.2
850	9.3	8.4	7.8	9.5	9.0	8.4	9.4	8.3	7.7
900	9.4	8.4	8.4	9.5	9.0	9.0	9.6	8.3	8.3
950	9.5	8.5	9.0	9.5	9.0	9.5	9.7	8.4	8.9
1,000	9.5	8.5	9.5	9.6	9.1	10.1	9.8	8.5	9.5
1,050	9.6	8.6	10.1	9.6	9.1	10.7	10.0	8.6	10.1
1,100	9.6	8.6	10.7	9.7	9.1	11.3	10.1	8.6	10.7
1,150	9.7	8.7	11.3	9.7	9.1	11.8	10.2	8.7	11.3
1,200	9.7	8.7	11.8	9.8	9.2	12.4	10.3	8.8	11.9
1,250	9.8	8.8	12.4	9.9	9.2	13.0	10.4	8.8	12.5
1,300	10.0	8.8	13.0	9.9	9.2	13.6	10.5	8.9	13.1
1,350	10.2	8.9	13.6	10.0	9.2	14.2	10.7	9.0	13.8
1,400	10.6	8.9	14.2	10.0	9.3	14.8	10.9	9.0	14.4
1,450	...	...	...	10.0	9.3	15.4	11.2	9.1	15.1
1,500	...	...	...	10.1	9.3	16.0	11.7	9.2	15.8
1,550	...	...	...	...	...	...	...	...	...
1,600	...	...	...	...	...	...	...	...	...
1,650	...	...	...	...	...	...	...	...	...

Table TE-4
Thermal Expansion for Nickel Alloys (Cont'd)

	Coefficients for N06007			Coefficients for N06022			Coefficients for N06030		
Temperature, °F	A	B	C	A	B	C	A	B	C
70	7.4	7.4	0	6.9	6.9	0	6.7	6.7	0
100	7.5	7.4	0.27	6.9	6.9	0.25	6.9	6.8	0.24
150	7.5	7.5	0.72	6.9	6.9	0.66	7.3	7.0	0.67
200	7.6	7.5	1.2	6.9	6.9	1.1	7.6	7.1	1.1
250	7.7	7.5	1.6	6.9	6.9	1.5	7.8	7.3	1.6
300	7.7	7.6	2.1	6.9	6.9	1.9	8.0	7.4	2.1
350	7.8	7.6	2.6	6.9	6.9	2.3	8.2	7.6	2.5
400	8.0	7.7	3.0	7.0	6.9	2.7	8.4	7.7	3.0
450	8.1	7.7	3.5	7.1	6.9	3.2	8.5	7.8	3.5
500	8.3	7.8	4.0	7.3	7.0	3.6	8.6	7.9	4.1
550	8.6	7.8	4.5	7.4	7.0	4.0	8.7	8.0	4.6
600	8.8	7.9	5.0	7.6	7.0	4.5	8.8	8.0	5.1
650	9.0	8.0	5.6	7.8	7.1	4.9	8.9	8.1	5.6
700	9.3	8.1	6.1	8.1	7.2	5.4	9.0	8.2	6.2
750	9.5	8.2	6.7	8.3	7.2	5.9	9.1	8.2	6.7
800	9.8	8.3	7.3	8.6	7.3	6.4	9.3	8.3	7.3
850	10.0	8.4	7.9	8.8	7.4	6.9	9.4	8.4	7.8
900	10.1	8.5	8.5	9.1	7.5	7.5	9.6	8.4	8.4
950	10.2	8.6	9.1	9.3	7.6	8.0	9.8	8.5	9.0
1,000	10.3	8.7	9.7	9.6	7.7	8.6	10.0	8.6	9.6
1,050	10.4	8.8	10.3	9.8	7.8	9.2	10.1	8.7	10.2
1,100	10.4	8.8	10.9	10.0	7.9	9.8	10.2	8.7	10.8
1,150	10.4	8.9	11.6	10.2	8.0	10.4	10.2	8.8	11.4
1,200	10.3	9.0	12.2	10.4	8.1	11.0	10.1	8.9	12.0
1,250	10.4	9.0	12.8	10.5	8.2	11.6	9.7	8.9	12.6
1,300	10.5	9.1	13.4	10.7	8.3	12.2	9.2	8.9	13.2
1,350	10.7	9.2	14.1	10.9	8.4	12.9	8.3	8.9	13.7
1,400	11.1	9.2	14.7	11.2	8.5	13.6	7.0	8.9	14.2
1,450	11.8	9.3	15.4	11.5	8.6	14.2	...	...	...
1,500	12.9	9.4	16.1	11.9	8.7	14.9	...	...	...
1,550	...	...	...	...	...	...	...	...	...
1,600	...	...	...	...	...	...	...	...	...
1,650	...	...	...	...	...	...	...	...	...

Table TE-4
Thermal Expansion for Nickel Alloys (Cont'd)

	Coefficients for N06045			Coefficients for N06059 and N06686			Coefficients for N06230		
Temperature, °F	A	B	C	A	B	C	A	B	C
70	6.1	6.1	0	6.5	6.5	0	6.9	6.9	0
100	6.6	6.4	0.23	6.5	6.5	0.23	6.9	6.9	0.25
150	7.4	6.8	0.65	6.6	6.5	0.62	7.0	6.9	0.66
200	8.0	7.1	1.1	6.7	6.6	1.0	7.1	7.0	1.1
250	8.3	7.4	1.6	6.8	6.6	1.4	7.2	7.0	1.5
300	8.6	7.7	2.1	6.9	6.7	1.8	7.3	7.1	2.0
350	8.8	7.8	2.6	7.0	6.7	2.3	7.4	7.1	2.4
400	8.8	8.0	3.2	7.1	6.8	2.7	7.5	7.2	2.8
450	8.9	8.1	3.7	7.2	6.8	3.1	7.6	7.2	3.3
500	8.9	8.2	4.2	7.2	6.9	3.6	7.7	7.3	3.7
550	8.9	8.3	4.8	7.3	6.9	4.0	7.9	7.3	4.2
600	8.9	8.3	5.3	7.3	7.0	4.4	8.0	7.4	4.7
650	9.0	8.4	5.8	7.3	7.0	4.9	8.1	7.4	5.2
700	9.1	8.4	6.4	7.4	7.0	5.3	8.3	7.5	5.7
750	9.2	8.5	6.9	7.4	7.0	5.7	8.4	7.6	6.2
800	9.3	8.5	7.5	7.5	7.1	6.2	8.5	7.6	6.7
850	9.5	8.6	8.0	7.6	7.1	6.6	8.7	7.7	7.2
900	9.7	8.7	8.6	7.7	7.1	7.1	8.8	7.7	7.7
950	9.9	8.7	9.2	7.7	7.2	7.6	8.9	7.8	8.2
1,000	10.1	8.8	9.8	7.6	7.2	8.0	8.9	7.9	8.8
1,050	10.3	8.9	10.4	7.3	7.2	8.5	9.0	7.9	9.3
1,100	10.5	8.9	11.0	...	7.2	8.9	9.1	8.0	9.9
1,150	10.7	9.0	11.7	...	...	...	9.1	8.0	10.4
1,200	10.8	9.1	12.3	...	...	...	9.2	8.1	11.0
1,250	10.9	9.2	13.0	...	...	...	9.3	8.1	11.5
1,300	11.0	9.2	13.6	...	...	...	9.3	8.2	12.1
1,350	11.0	9.3	14.3	...	...	...	9.5	8.2	12.6
1,400	11.0	9.4	15.0	...	...	...	9.6	8.3	13.2
1,450	11.0	9.4	15.6	...	...	...	9.9	8.3	13.8
1,500	11.1	9.5	16.3	...	...	...	10.2	8.4	14.4
1,550	...	...	...	...	...	...	...	...	...
1,600	...	...	...	...	...	...	...	...	...
1,650	...	...	...	...	...	...	...	...	...

Table TE-4
Thermal Expansion for Nickel Alloys (Cont'd)

	Coefficients for N06455			Coefficients for N06600			Coefficients for N06625		
Temperature, °F	A	B	C	A	B	C	A	B	C
70	5.8	5.8	0	6.8	6.8	0	6.7	6.7	0
100	6.0	5.9	0.21	7.0	6.9	0.25	6.9	6.8	0.24
150	6.2	6.0	0.58	7.2	7.0	0.67	7.2	7.0	0.67
200	6.5	6.2	0.97	7.4	7.1	1.1	7.4	7.1	1.1
250	6.8	6.3	1.4	7.6	7.2	1.6	7.4	7.2	1.6
300	7.0	6.4	1.8	7.7	7.3	2.0	7.5	7.2	2.0
350	7.2	6.5	2.2	7.9	7.4	2.5	7.5	7.3	2.4
400	7.4	6.7	2.6	8.0	7.5	3.0	7.5	7.3	2.9
450	7.5	6.8	3.1	8.2	7.6	3.5	7.5	7.3	3.3
500	7.7	6.9	3.5	8.3	7.6	3.9	7.5	7.4	3.8
550	7.7	7.0	4.0	8.4	7.7	4.4	7.6	7.4	4.2
600	7.8	7.0	4.5	8.5	7.8	5.0	7.7	7.4	4.7
650	7.9	7.1	4.9	8.6	7.9	5.5	7.8	7.4	5.2
700	7.9	7.2	5.4	8.7	7.9	6.0	8.0	7.5	5.6
750	7.9	7.2	5.9	8.8	8.0	6.5	8.2	7.5	6.1
800	7.9	7.3	6.4	8.9	8.0	7.0	8.4	7.6	6.6
850	7.9	7.3	6.8	9.1	8.1	7.6	8.7	7.6	7.1
900	7.9	7.3	7.3	9.2	8.2	8.1	8.9	7.7	7.7
950	7.9	7.4	7.8	9.3	8.2	8.7	9.1	7.8	8.2
1,000	8.0	7.4	8.3	9.5	8.3	9.3	9.4	7.9	8.8
1,050	8.0	7.4	8.7	9.7	8.4	9.8	9.6	7.9	9.3
1,100	8.0	7.5	9.2	9.9	8.4	10.4	9.8	8.0	9.9
1,150	8.1	7.5	9.7	10.1	8.5	11.0	9.9	8.1	10.5
1,200	8.1	7.5	10.2	10.3	8.6	11.6	10.1	8.2	11.1
1,250	8.1	7.5	10.7	10.5	8.6	12.2	10.2	8.3	11.7
1,300	8.1	7.6	11.2	10.6	8.7	12.9	10.4	8.4	12.3
1,350	8.0	7.6	11.7	10.8	8.8	13.5	10.5	8.4	13.0
1,400	7.9	7.6	12.1	11.0	8.9	14.2	10.7	8.5	13.6
1,450	7.6	7.6	12.6	11.1	9.0	14.8	10.9	8.6	14.2
1,500	7.2	7.6	13.0	11.1	9.0	15.5	11.3	8.7	14.9
1,550	...	...	...	...	...	...	...	...	...
1,600	...	...	...	...	...	...	...	...	...
1,650	...	...	...	...	...	...	...	...	...

Table TE-4
Thermal Expansion for Nickel Alloys (Cont'd)

	Coefficients for N06690			Coefficients for N07718			Coefficients for N07750		
Temperature, °F	A	B	C	A	B	C	A	B	C
70	7.7	7.7	0	7.1	7.1	0	6.7	6.7	0
100	7.8	7.8	0.28	7.1	7.1	0.26	6.8	6.8	0.24
150	7.9	7.8	0.75	7.2	7.2	0.69	7.1	6.9	0.66
200	8.0	7.9	1.2	7.4	7.2	1.1	7.3	7.0	1.1
250	8.0	7.9	1.7	7.5	7.3	1.6	7.5	7.1	1.5
300	8.1	7.9	2.2	7.6	7.3	2.0	7.7	7.2	2.0
350	8.2	8.0	2.7	7.7	7.4	2.5	7.8	7.3	2.5
400	8.3	8.0	3.2	7.9	7.5	3.0	7.8	7.4	2.9
450	8.5	8.1	3.7	8.0	7.5	3.4	7.8	7.4	3.4
500	8.6	8.1	4.2	8.0	7.6	3.9	7.7	7.5	3.9
550	8.7	8.2	4.7	8.1	7.6	4.4	7.7	7.5	4.3
600	8.7	8.2	5.2	8.2	7.7	4.9	7.7	7.5	4.8
650	8.7	8.3	5.8	8.3	7.7	5.4	7.8	7.6	5.3
700	8.5	8.3	6.3	8.4	7.8	5.9	8.1	7.6	5.7
750	8.3	8.3	6.8	8.5	7.8	6.4	8.6	7.6	6.2
800	8.1	8.3	7.3	8.6	7.9	6.9	9.4	7.7	6.8
850	...	...	...	8.7	7.9	7.4	...	...	...
900	...	...	...	8.8	8.0	7.9	...	...	...
950	...	...	...	8.9	8.0	8.5	...	...	...
1,000	...	...	...	9.1	8.1	9.0	...	...	...
1,050	...	...	...	9.2	8.1	9.6	...	...	...
1,100	...	...	...	9.4	8.2	10.1	...	...	...
1,150	...	...	...	...	...	...	...	...	...
1,200	...	...	...	...	...	...	...	...	...
1,250	...	...	...	...	...	...	...	...	...
1,300	...	...	...	...	...	...	...	...	...
1,350	...	...	...	...	...	...	...	...	...
1,400	...	...	...	...	...	...	...	...	...
1,450	...	...	...	...	...	...	...	...	...
1,500	...	...	...	...	...	...	...	...	...
1,550	...	...	...	...	...	...	...	...	...
1,600	...	...	...	...	...	...	...	...	...
1,650	...	...	...	...	...	...	...	...	...

Table TE-4
Thermal Expansion for Nickel Alloys (Cont'd)

	Coefficients for N08031 and N08367			Coefficients for N08330			Coefficients for N08354		
Temperature, °F	A	B	C	A	B	C	A	B	C
70	7.7	7.7	0	8.1	8.1	0	7.6	7.6	0
100	7.8	7.7	0.28	8.2	8.1	0.29	7.8	7.7	0.30
150	7.9	7.8	0.75	8.3	8.2	0.79	7.9	7.8	0.77
200	8.1	7.9	1.2	8.5	8.3	1.3	8.0	7.9	1.2
250	8.3	8.0	1.7	8.7	8.4	1.8	8.1	7.9	1.7
300	8.4	8.0	2.2	8.8	8.5	2.3	8.2	8.0	2.2
350	8.5	8.1	2.7	8.9	8.5	2.9	8.3	8.0	2.7
400	8.7	8.2	3.2	9.0	8.6	3.4	8.4	8.1	3.2
450	8.7	8.3	3.8	9.1	8.7	4.0	8.5	8.1	3.7
500	8.8	8.3	4.3	9.2	8.7	4.5	8.6	8.2	4.2
550	8.9	8.4	4.8	9.3	8.8	5.1	7.7	8.2	4.8
600	9.0	8.4	5.4	9.5	8.8	5.6	8.7	8.3	5.3
650	9.0	8.5	5.9	9.7	8.9	6.2	8.8	8.3	5.8
700	9.1	8.5	6.4	9.9	9.0	6.8	8.9	8.4	6.3
750	9.2	8.6	7.0	9.9	9.0	7.4	9.1	8.4	6.9
800	9.3	8.6	7.6	9.6	9.1	8.0	9.1	8.4	7.4
850	9.3	8.7	8.1	...	...	...	...	...	...
900	9.4	8.7	8.7	...	...	...	...	...	...
950	9.4	8.7	9.2	...	...	...	...	...	...
1,000	9.3	8.8	9.8	...	...	...	...	...	...
1,050	9.1	8.8	10.3	...	...	...	...	...	...
1,100	8.8	8.8	10.9	...	...	...	...	...	...
1,150	...	...	...	...	...	...	...	...	...
1,200	...	...	...	...	...	...	...	...	...
1,250	...	...	...	...	...	...	...	...	...
1,300	...	...	...	...	...	...	...	...	...
1,350	...	...	...	...	...	...	...	...	...
1,400	...	...	...	...	...	...	...	...	...
1,450	...	...	...	...	...	...	...	...	...
1,500	...	...	...	...	...	...	...	...	...
1,550	...	...	...	...	...	...	...	...	...
1,600	...	...	...	...	...	...	...	...	...
1,650	...	...	...	...	...	...	...	...	...

Table TE-4
Thermal Expansion for Nickel Alloys (Cont'd)

	Coefficients for N08800, N08801, N08810, and N08811			Coefficients for N08825			Coefficients for N10001		
Temperature, °F	A	B	C	A	B	C	A	B	C
70	7.9	7.9	0	7.5	7.5	0	6.0	6.0	0
100	8.1	8.0	0.29	7.6	7.5	0.27	6.2	6.1	0.22
150	8.5	8.2	0.79	7.8	7.6	0.73	6.3	6.2	0.60
200	8.7	8.4	1.3	8.0	7.7	1.2	6.4	6.3	0.98
250	8.9	8.5	1.8	8.1	7.8	1.7	6.5	6.3	1.4
300	9.1	8.6	2.4	8.2	7.9	2.2	6.5	6.3	1.8
350	9.2	8.7	2.9	8.2	7.9	2.7	6.5	6.4	2.1
400	9.3	8.8	3.5	8.3	8.0	3.2	6.5	6.4	2.5
450	9.4	8.9	4.0	8.3	8.0	3.7	6.6	6.4	2.9
500	9.5	8.9	4.6	8.5	8.1	4.2	6.6	6.4	3.3
550	9.5	9.0	5.2	8.7	8.1	4.7	6.7	6.5	3.7
600	9.6	9.0	5.7	8.9	8.2	5.2	6.9	6.5	4.1
650	9.7	9.1	6.3	9.2	8.3	5.8	7.0	6.5	4.5
700	9.7	9.1	6.9	9.2	8.3	6.3	7.2	6.6	5.0
750	9.8	9.2	7.5	8.9	8.4	6.9	7.4	6.6	5.4
800	9.9	9.2	8.1	7.8	8.4	7.4	7.6	6.7	5.9
850	10.0	9.3	8.7	...	...	...	7.7	6.7	6.3
900	10.1	9.3	9.3	...	...	...	7.9	6.8	6.8
950	10.2	9.4	9.9	...	...	...	8.1	6.9	7.3
1,000	10.3	9.4	10.5	...	...	...	8.2	6.9	7.7
1,050	10.4	9.5	11.1	...	...	...	8.4	7.0	8.2
1,100	10.5	9.5	11.8	...	...	...	8.5	7.1	8.8
1,150	10.6	9.6	12.4	...	...	...	8.6	7.1	9.3
1,200	10.8	9.6	13.0	...	...	...	8.7	7.2	9.8
1,250	10.9	9.7	13.7	...	...	...	8.8	7.3	10.3
1,300	11.1	9.7	14.4	...	...	...	9.0	7.3	10.8
1,350	11.3	9.8	15.0	...	...	...	9.3	7.4	11.4
1,400	11.6	9.8	15.7	...	...	...	9.8	7.5	12.0
1,450	11.9	9.9	16.4	...	...	...	10.4	7.6	12.6
1,500	12.4	10.0	17.1	...	...	...	11.3	7.7	13.2
1,550	13.0	10.1	17.9	...	...	...	...	...	...
1,600	13.7	10.2	18.7	...	...	...	...	...	...
1,650	14.7	10.3	19.6	...	...	...	...	...	...

Table TE-4
Thermal Expansion for Nickel Alloys (Cont'd)

	Coefficients for N10003			Coefficients for N10242			Coefficients for N10276		
Temperature, °F	A	B	C	A	B	C	A	B	C
70	6.2	6.2	0	5.8	5.8	0	6.0	6.0	0
100	6.3	6.2	0.22	5.9	5.8	0.21	6.1	6.1	0.22
150	6.5	6.3	0.60	6.0	5.9	0.57	6.4	6.2	0.60
200	6.6	6.4	1.0	6.2	6.0	0.94	6.6	6.3	0.98
250	6.8	6.5	1.4	6.4	6.1	1.3	6.8	6.4	1.4
300	6.9	6.6	1.8	6.5	6.1	1.7	7.0	6.5	1.8
350	7.0	6.6	2.2	6.7	6.2	2.1	7.2	6.6	2.2
400	7.0	6.7	2.6	6.8	6.3	2.5	7.3	6.7	2.7
450	7.1	6.7	3.1	6.9	6.4	2.9	7.5	6.8	3.1
500	7.1	6.8	3.5	7.0	6.5	3.3	7.7	6.9	3.6
550	7.2	6.8	3.9	7.0	6.5	3.8	7.8	7.0	4.0
600	7.4	6.9	4.4	7.0	6.6	4.2	7.9	7.1	4.5
650	7.6	6.9	4.8	7.0	6.6	4.6	8.0	7.1	5.0
700	7.7	7.0	5.3	7.0	6.6	5.0	8.1	7.2	5.5
750	7.8	7.0	5.7	7.0	6.7	5.4	8.2	7.3	5.9
800	7.7	7.1	6.2	7.0	6.7	5.8	8.3	7.4	6.4
850	...	...	...	7.0	6.7	6.3	8.4	7.4	6.9
900	...	...	...	7.0	6.7	6.7	8.5	7.5	7.5
950	...	...	...	7.2	6.7	7.1	8.6	7.5	8.0
1,000	...	...	...	7.3	6.8	7.5	8.7	7.6	8.5
1,050	...	...	...	7.6	6.8	8.0	8.8	7.7	9.0
1,100	...	...	...	8.0	6.8	8.5	8.9	7.7	9.5
1,150	...	...	...	8.4	6.9	9.0	8.9	7.8	10.1
1,200	...	...	...	9.0	7.0	9.5	9.0	7.8	10.6
1,250	...	...	...	9.8	7.1	10.0	9.1	7.9	11.2
1,300	...	...	...	10.6	7.2	10.6	9.2	7.9	11.7
1,350	...	...	...	11.7	7.4	11.3	9.2	8.0	12.3
1,400	...	...	...	12.9	7.6	12.1	9.3	8.0	12.8
1,450	...	...	...	14.2	7.8	12.9	9.2	8.1	13.4
1,500	...	...	...	15.8	8.0	13.8	9.2	8.1	13.9
1,550	...	...	...	...	...	...	...	...	...
1,600	...	...	...	...	...	...	...	...	...
1,650	...	...	...	...	...	...	...	...	...

Table TE-4
Thermal Expansion for Nickel Alloys (Cont'd)

	Coefficients for N10629			Coefficients for N10665			Coefficients for N10675		
Temperature, °F	A	B	C	A	B	C	A	B	C
70	5.5	5.5	0	5.3	5.3	0	...	5.7	0
100	5.6	5.5	0.20	5.5	5.4	0.19	...	5.7	0.21
150	5.8	5.6	0.54	5.8	5.6	0.54	...	5.8	0.56
200	5.9	5.7	0.89	6.0	5.7	0.89	...	5.8	0.90
250	6.0	5.8	1.2	6.1	5.8	1.3	...	5.9	1.3
300	6.2	5.9	1.6	6.2	5.9	1.6	...	5.9	1.6
350	6.3	5.9	2.0	6.3	6.0	2.0	...	6.0	2.0
400	6.3	6.0	2.4	6.4	6.0	2.4	...	6.1	2.4
450	6.4	6.0	2.7	6.5	6.1	2.8	...	6.1	2.8
500	6.5	6.1	3.1	6.5	6.1	3.2	...	6.2	3.2
550	6.6	6.1	3.5	6.6	6.2	3.6	...	6.3	3.6
600	6.7	6.2	3.9	6.7	6.2	4.0	...	6.3	4.0
650	6.8	6.2	4.3	6.9	6.3	4.4	...	6.4	4.4
700	6.8	6.3	4.7	7.0	6.3	4.8	...	6.4	4.9
750	6.9	6.3	5.2	7.1	6.4	5.2	...	6.5	5.3
800	6.9	6.4	5.6	7.2	6.4	5.6	...	6.5	5.7
850	6.9	6.4	6.0	7.3	6.5	6.1	...	6.5	6.1
900	7.0	6.4	6.4	7.3	6.5	6.5	...	6.5	6.5
950	7.0	6.5	6.8	7.3	6.6	6.9	...	6.5	6.9
1,000	7.0	6.5	7.2	7.3	6.6	7.4	...	6.5	7.3
1,050	7.0	6.5	7.7	7.2	6.6	7.8	...	6.6	7.7
1,100	7.1	6.5	8.1	7.1	6.7	8.2	...	6.6	8.1
1,150	7.2	6.6	8.5	7.0	6.7	8.7	...	6.6	8.5
1,200	...	...	...	6.9	6.7	9.1	...	6.6	9.0
1,250	...	...	...	6.8	6.7	9.5	...	6.7	9.4
1,300	...	...	...	6.8	6.7	9.9	...	6.7	9.9
1,350	...	...	...	7.0	6.7	10.3	...	6.8	10.5
1,400	...	...	...	7.3	6.7	10.7	...	7.0	11.1
1,450	...	...	...	7.9	6.8	11.2	...	7.2	11.9
1,500	...	...	...	8.8	6.8	11.7	...	7.4	12.7
1,550	...	...	...	...	...	...	...	...	...
1,600	...	...	...	...	...	...	...	...	...
1,650	...	...	...	...	...	...	...	...	...

Table TE-4
Thermal Expansion for Nickel Alloys (Cont'd)

	Coefficients for N12160			Coefficients for R20033		
Temperature, °F	A	B	C	A	B	C
70	6.9	6.9	0	7.8	7.8	0
100	7.0	7.0	0.25	7.9	7.9	0.28
150	7.3	7.1	0.68	8.2	8.0	0.77
200	7.5	7.2	1.1	8.4	8.1	1.3
250	7.7	7.3	1.6	8.6	8.2	1.8
300	7.9	7.4	2.0	8.7	8.3	2.3
350	8.1	7.5	2.5	8.8	8.4	2.8
400	8.2	7.6	3.0	8.7	8.5	3.3
450	8.3	7.7	3.5	8.7	8.5	3.9
500	8.4	7.8	4.0	8.6	8.5	4.4
550	8.5	7.9	4.5	8.7	8.5	4.9
600	8.6	7.9	5.0	8.8	8.5	5.4
650	8.6	8.0	5.6	9.0	8.6	6.0
700	8.7	8.0	6.1	9.4	8.6	6.5
750	8.7	8.1	6.6	9.7	8.7	7.1
800	8.8	8.1	7.1	9.9	8.8	7.7
850	8.9	8.2	7.7	9.9	8.8	8.3
900	9.0	8.2	8.2	9.3	8.9	8.9
950	9.2	8.3	8.7	...	...	...
1,000	9.3	8.3	9.3	...	...	...
1,050	9.5	8.4	9.9	...	...	...
1,100	9.8	8.4	10.4	...	...	...
1,150	10.1	8.5	11.0	...	...	...
1,200	10.4	8.6	11.6	...	...	...
1,250	10.6	8.7	12.3	...	...	...
1,300	10.9	8.8	12.9	...	...	...
1,350	11.1	8.8	13.6	...	...	...
1,400	11.2	8.9	14.2	...	...	...
1,450	11.2	9.0	14.9	...	...	...
1,500	10.9	9.1	15.6	...	...	...
1,550	...	...	...	...	...	...
1,600	...	...	...	...	...	...
1,650	...	...	...	...	...	...

GENERAL NOTE: Coefficient A is the instantaneous coefficient of thermal expansion $\times 10^{-6}$ (in./in./°F). Coefficient B is the mean coefficient of thermal expansion $\times 10^{-6}$ (in./in./°F) in going from 70°F to indicated temperature. Coefficient C is the linear thermal expansion (in./100 ft) in going from 70°F to indicated temperature.

Table TE-5
Thermal Expansion for Titanium Alloys

Temperature, °F	Coefficients for Titanium Alloy, Grades 1, 2, 2H, 3, 7, 7H, 11, 12, 16, 16H, 17, 26, 26H, and 27			Coefficients for Titanium Alloy, Grades 9 and 28			Coefficients for Titanium Alloy, Grade 38		
	A	B	C	A	B	C	A	B	C
70	4.6	4.6	0	4.7	4.7	0	4.8	4.8	0
100	4.7	4.7	0.17	4.8	4.7	0.17	4.9	4.9	0.18
150	4.8	4.7	0.45	4.8	4.8	0.46	4.9	4.9	0.47
200	4.8	4.7	0.73	4.9	4.8	0.75	5.0	5.0	0.78
250	4.8	4.8	1.0	5.1	4.9	1.1	5.0	5.0	1.1
300	4.9	4.8	1.3	5.2	4.9	1.4	5.1	5.0	1.4
350	4.9	4.8	1.6	5.3	5.0	1.7	5.1	5.0	1.7
400	5.0	4.8	1.9	5.3	5.0	2.0	5.2	5.0	2.0
450	5.0	4.8	2.2	5.3	5.1	2.3	5.2	5.0	2.3
500	5.1	4.9	2.5	5.3	5.1	2.6	5.3	5.1	2.6
550	5.1	4.9	2.8	5.5	5.1	2.9	5.3	5.1	2.9
600	5.2	4.9	3.1	6.4	5.2	3.3	5.4	5.1	3.2
650	5.3	4.9	3.4	...	...	...	5.4	5.1	3.5
700	5.5	5.0	3.8	...	...	...	5.4	5.2	3.9
750	5.9	5.0	4.1	...	...	...	5.5	5.2	4.2
800	6.6	5.1	4.5	...	...	...	5.5	5.2	4.6

GENERAL NOTE: Coefficient A is the instantaneous coefficient of thermal expansion $\times 10^{-6}$ (in./in./°F). Coefficient B is the mean coefficient of thermal expansion $\times 10^{-6}$ (in./in./°F) in going from 70°F to indicated temperature. Coefficient C is the linear thermal expansion (in./100 ft) in going from 70°F to indicated temperature.

(21)

Table TCD
Nominal Coefficients of Thermal Conductivity (TC) and Thermal Diffusivity (TD)

	Carbon and Low Alloy Steels		Carbon and Low Alloy Steels		Carbon and Low Alloy Steels		Carbon and Low Alloy Steels		Carbon and Low Alloy Steels	
	Material Group A [Note (1)] Plain Carbon		Material Group B [Note (2)]		Material Group C [Note (3)]		Material Group D [Note (4)]		Material Group E [Note (5)]	
Temp., °F	TC	TD	TC	TD	TC	TD	TC	TD	TC	TD
70	34.9	0.700	27.3	0.530	23.7	0.459	21.0	0.408	15.9	0.311
100	34.7	0.676	27.6	0.520	23.6	0.451	21.0	0.401	16.2	0.311
150	34.2	0.641	27.8	0.504	23.5	0.437	21.2	0.392	16.7	0.312
200	33.7	0.611	27.8	0.487	23.5	0.424	21.3	0.384	17.1	0.313
250	33.0	0.585	27.6	0.471	23.4	0.412	21.4	0.377	17.5	0.312
300	32.3	0.560	27.3	0.455	23.4	0.401	21.5	0.371	17.8	0.311
350	31.6	0.537	26.9	0.440	23.3	0.390	21.5	0.364	18.0	0.308
400	30.9	0.516	26.5	0.426	23.1	0.379	21.5	0.357	18.2	0.304
450	30.1	0.495	26.1	0.412	23.0	0.368	21.5	0.350	18.4	0.299
500	29.4	0.474	25.7	0.399	22.7	0.357	21.4	0.342	18.5	0.294
550	28.7	0.454	25.3	0.386	22.5	0.347	21.3	0.333	18.5	0.287
600	28.0	0.433	24.9	0.373	22.2	0.336	21.1	0.324	18.5	0.280
650	27.3	0.414	24.5	0.360	21.9	0.325	20.9	0.314	18.5	0.273
700	26.6	0.394	24.1	0.346	21.6	0.314	20.7	0.304	18.5	0.265
750	26.0	0.375	23.7	0.333	21.3	0.303	20.5	0.294	18.4	0.258
800	25.3	0.356	23.2	0.319	21.0	0.292	20.2	0.284	18.3	0.250
850	24.6	0.337	22.8	0.305	20.6	0.281	20.0	0.274	18.2	0.242
900	23.8	0.318	22.3	0.291	20.3	0.269	19.7	0.263	18.1	0.234
950	23.1	0.301	21.7	0.277	20.0	0.258	19.4	0.253	17.9	0.226
1,000	22.4	0.283	21.1	0.263	19.7	0.247	19.1	0.242	17.8	0.217
1,050	21.6	0.266	20.5	0.250	19.4	0.235	18.8	0.230	17.6	0.208
1,100	20.9	0.249	19.8	0.234	19.1	0.223	18.5	0.218	17.4	0.199
1,150	20.1	0.232	19.0	0.219	18.7	0.212	18.3	0.205	17.2	0.188
1,200	19.4	0.215	18.3	0.204	18.3	0.200	18.0	0.192	17.0	0.177
1,250	18.6	0.199	17.6	0.185	17.7	0.183	17.7	0.177	16.8	0.164
1,300	17.9	0.179	16.9	0.157	16.6	0.164	17.3	0.160	16.5	0.150
1,350	17.2	0.138	16.2	0.120	15.7	0.137	16.3	0.137	16.2	0.135
1,400	16.6	0.083	15.7	0.078	15.3	0.077	15.6	0.073	15.8	0.117
1,450	16.0	0.155	15.2	0.160	15.1	0.128	15.4	0.124	15.6	0.143
1,500	15.5	0.166	14.9	0.172	15.1	0.200	15.3	0.197	15.7	0.161
1,550	...	...	...	...	...	...	...	...	...	...

Table TCD
Nominal Coefficients of Thermal Conductivity (TC) and Thermal Diffusivity (TD) (Cont'd)

	Carbon and Low Alloy Steels (Cont'd)		Ductile Cast Iron		High Chrome Steels		High Chrome Steels		High Alloy Steels		High Alloy Steels	
	Material Group F [Note (6)]				Material Group G [Note (7)]		Material Group H [Note (8)]		Material Group I [Note (9)]		Material Group J [Note (10)]	
Temp., °F	TC	TD	TC	TD	TC	TD	TC	TD	TC	TD	TC	TD
70	12.8	0.256	21.7	0.439	14.2	0.276	11.6	0.221	10.0	0.188	8.6	0.151
100	13.1	0.257	22.0	0.445	14.2	0.271	11.6	0.220	10.1	0.189	8.7	0.152
150	13.6	0.258	22.5	0.455	14.3	0.265	11.7	0.217	10.3	0.189	9.0	0.154
200	14.0	0.260	22.9	0.463	14.3	0.260	11.7	0.214	10.6	0.190	9.3	0.156
250	14.4	0.261	23.2	0.430	14.4	0.256	11.8	0.211	10.9	0.190	9.6	0.158
300	14.7	0.262	23.4	0.434	14.4	0.251	11.8	0.208	11.2	0.190	9.8	0.160
350	15.0	0.262	23.5	0.436	14.4	0.246	11.9	0.205	11.5	0.190	10.1	0.162
400	15.2	0.260	23.5	0.436	14.5	0.242	11.9	0.203	11.7	0.190	10.4	0.165
450	15.4	0.258	23.5	0.436	14.5	0.237	12.0	0.200	12.0	0.190	10.6	0.167
500	15.6	0.254	23.4	0.434	14.5	0.231	12.0	0.198	12.3	0.190	10.9	0.169
550	15.8	0.250	23.3	0.399	14.6	0.226	12.1	0.195	12.5	0.190	11.1	0.172
600	15.9	0.245	23.1	0.396	14.6	0.221	12.2	0.193	12.8	0.189	11.3	0.174
650	16.0	0.239	23.0	0.394	14.6	0.216	12.2	0.190	13.0	0.188	11.6	0.177
700	16.0	0.233	...	...	14.6	0.210	12.3	0.187	13.1	0.187	11.8	0.179
750	16.1	0.227	...	...	14.6	0.205	12.3	0.183	13.3	0.184	12.0	0.182
800	16.1	0.220	...	...	14.7	0.200	12.4	0.179	13.4	0.181	12.3	0.184
850	16.1	0.214	...	...	14.7	0.196	12.5	0.174	13.6	0.177	12.5	0.186
900	16.1	0.207	...	...	14.7	0.191	12.6	0.169	13.7	0.171	12.7	0.189
950	16.1	0.200	...	...	14.7	0.186	12.6	0.163	13.8	0.166	12.9	0.191
1,000	16.1	0.193	...	...	14.7	0.180	12.7	0.158	13.9	0.159	13.1	0.194
1,050	16.0	0.185	...	...	14.7	0.174	12.8	0.153	14.0	0.152	13.4	0.196
1,100	16.0	0.176	...	...	14.7	0.167	12.9	0.148	14.0	0.144	13.6	0.198
1,150	15.9	0.166	...	...	14.8	0.159	13.0	0.152	14.1	0.136	13.8	0.201
1,200	15.8	0.155	...	...	14.8	0.149	13.1	0.159	14.3	0.130	14.0	0.203
1,250	15.7	0.142	...	...	14.8	0.137	13.2	0.168	14.4	0.138	14.3	0.205
1,300	15.6	0.127	...	...	14.8	0.123	13.4	0.176	14.5	0.153	14.5	0.208
1,350	15.4	0.111	...	...	14.8	0.107	13.5	0.183	14.7	0.171	14.7	0.210
1,400	15.3	0.147	...	...	14.8	0.158	13.7	0.189	14.9	0.185	14.9	0.212
1,450	15.1	0.165	...	...	14.8	0.172	13.8	0.194	15.2	0.194	15.1	0.214
1,500	14.9	0.177	...	...	14.9	0.173	14.0	0.199	15.5	0.200	15.3	0.216
1,550	...	...	...	...	...	...	...	...	...	...	...	...

Table TCD
Nominal Coefficients of Thermal Conductivity (TC) and Thermal Diffusivity (TD) (Cont'd)

	High Alloy Steels (Cont'd)		High Alloy Steels		High Nickel Alloys		High Nickel Alloys		High Nickel Alloys	
	Material Group K [Note (11)]		Material Group L [Note (12)]		Nickel N02200		Low C–Nickel N02201		Ni–Cu N04400	
Temp., °F	TC	TD	TC	TD	TC	TD	TC	TD	TC	TD
70	8.2	0.139	6.4	0.115	...	...	...	...	12.6	0.224
100	8.3	0.140	6.6	0.116	...	...	...	...	12.9	0.228
150	8.6	0.142	6.9	0.118	...	...	...	...	13.4	0.234
200	8.8	0.145	7.1	0.121	38.7	...	42.5	...	13.9	0.241
250	9.1	0.147	7.4	0.124	38.0	...	41.8	...	14.5	0.247
300	9.3	0.150	7.7	0.126	37.2	...	40.7	...	15.0	0.254
350	9.5	0.152	8.0	0.129	36.3	...	39.5	...	15.6	0.261
400	9.8	0.155	8.2	0.132	35.5	...	38.2	...	16.1	0.268
450	10.0	0.157	8.5	0.135	34.8	...	37.0	...	16.6	0.275
500	10.2	0.160	8.8	0.138	34.1	...	35.9	...	17.0	0.280
550	10.5	0.162	9.1	0.141	33.3	...	35.0	...	17.5	0.285
600	10.7	0.165	9.3	0.143	32.5	...	34.2	...	17.9	0.289
650	10.9	0.167	9.6	0.146	31.8	...	33.7	...	18.4	0.291
700	11.2	0.170	9.9	0.149	31.7	...	33.3	...	18.9	0.292
750	11.4	0.172	10.1	0.152	32.2	...	33.1	...	19.3	0.293
800	11.6	0.175	10.4	0.155	32.5	...	33.0	...	19.9	0.293
850	11.9	0.177	10.7	0.158	32.8	...	33.1	...	20.4	...
900	12.1	0.180	10.9	0.161	33.1	...	33.3	...	20.9	...
950	12.3	0.182	11.2	0.164	33.4	...	33.6	...	21.5	...
1,000	12.5	0.184	11.4	0.167	33.8	...	34.0	...	22.0	...
1,050	12.8	0.187	11.7	0.170	...	...	34.4	...	...	...
1,100	13.0	0.189	11.9	0.173	...	...	34.9	...	...	...
1,150	13.2	0.191	12.2	0.176	...	...	35.3	...	...	...
1,200	13.4	0.194	12.5	0.178	...	...	35.7	...	...	...
1,250	13.6	0.196	12.7	0.181	...	...	36.1	...	...	...
1,300	13.8	0.198	13.0	0.184	...	...	36.4	...	...	...
1,350	14.1	0.200	13.2	0.186	...	...	36.7	...	...	...
1,400	14.3	0.203	13.5	0.188	...	...	37.0	...	...	...
1,450	14.5	0.205	13.7	0.190	...	...	37.4	...	...	...
1,500	14.7	0.207	14.0	0.191	...	...	37.8	...	...	...
1,550	...	...	...	0.192	...	...	...	...	...	...

Table TCD
Nominal Coefficients of Thermal Conductivity (TC) and Thermal Diffusivity (TD) (Cont'd)

	High Nickel Alloys (Cont'd)		High Nickel Alloys		High Nickel Alloys		High Nickel Alloys		High Nickel Alloys	
	Ni–Cu N04405		Ni–Cr–Mo–Fe N06002		Ni–Cr–Fe–Mo–Cu N06007		N06022		N06030	
Temp., °F	TC	TD	TC	TD	TC	TD	TC	TD	TC	TD
70	12.6	...	5.2	0.088	5.8	0.117	5.6	...	5.9	...
100	12.9	...	5.5	0.092	6.0	0.116	5.8	...	6.1	...
150	13.4	...	5.9	0.098	6.2	0.116	6.0	...	6.5	...
200	13.9	...	6.3	0.105	6.4	0.116	6.4	...	6.9	...
250	14.5	...	6.6	0.111	6.7	0.118	6.7	...	7.3	...
300	15.0	...	7.0	0.116	6.9	0.120	7.0	...	7.6	...
350	15.6	...	7.3	0.122	7.2	0.122	7.4	...	8.0	...
400	16.1	...	7.6	0.127	7.4	0.125	7.8	...	8.4	...
450	16.6	...	7.9	0.132	7.7	0.128	8.1	...	8.7	...
500	17.0	...	8.2	0.136	7.9	0.131	8.5	...	9.1	...
550	17.5	...	8.5	0.141	8.2	0.133	8.8	...	9.5	...
600	17.9	...	8.8	0.145	8.4	0.136	9.1	...	9.8	...
650	18.4	...	9.1	0.149	8.6	0.139	9.4	...	10.2	...
700	18.9	...	9.4	0.153	8.9	0.142	9.7	...	10.5	...
750	19.3	...	9.7	0.156	9.2	0.145	10.1	...	10.8	...
800	19.9	...	10.1	0.160	9.4	0.148	10.4	...	11.1	...
850	20.4	...	10.4	0.163	9.7	0.151	10.7	...	11.4	...
900	20.9	...	10.7	0.166	9.9	0.154	11.0	...	11.6	...
950	21.5	...	11.0	0.169	10.2	0.157	11.4	...	11.9	...
1,000	22.0	...	11.4	0.172	10.5	0.160	11.7	...	12.1	...
1,050	...	...	11.7	0.174	10.7	0.163	12.0	...	12.2	...
1,100	...	...	12.0	0.176	10.9	0.166	12.3	...	12.4	...
1,150	...	...	12.3	0.178	11.1	0.168	...	...	...	...
1,200	...	...	12.6	0.180	11.2	0.171	...	...	...	...
1,250	...	...	12.9	0.182	...	...	...	...	...	...
1,300	...	...	13.2	0.183	...	...	...	...	...	...
1,350	...	...	13.5	0.183	...	...	...	...	...	...
1,400	...	...	13.8	0.184	...	...	...	...	...	...
1,450	...	...	14.2	0.183	...	...	...	...	...	...
1,500	...	...	14.6	0.182	...	...	...	...	...	...
1,550	...	...	...	0.181	...	...	...	...	...	...

Table TCD
Nominal Coefficients of Thermal Conductivity (TC) and Thermal Diffusivity (TD) (Cont'd)

	High Nickel Alloys (Cont'd)		High Nickel Alloys		High Nickel Alloys		High Nickel Alloys		High Nickel Alloys	
	N06045		N06059		N06230		Ni–Mo–Cr–Low C N06455 and N06686		Ni–Cr–Fe N06600	
Temp., °F	TC	TD	TC	TD	TC	TD	TC	TD	TC	TD
70	7.5	0.125	6.0	0.113	5.2	0.095	5.8	0.110	8.6	0.154
100	...	...	6.3	...	5.4	0.097	5.9	0.112	8.7	0.154
150	...	...	6.6	...	5.6	0.100	6.2	0.115	8.9	0.155
200	...	...	6.9	...	5.9	0.104	6.5	0.118	9.1	0.156
250	...	...	7.2	...	6.2	0.107	6.8	0.121	9.3	0.158
300	...	...	7.4	...	6.6	0.111	7.1	0.124	9.6	0.160
350	...	...	7.7	...	6.9	0.114	7.4	0.127	9.8	0.163
400	...	...	7.9	...	7.2	0.117	7.7	0.130	10.1	0.165
450	...	...	8.2	...	7.5	0.121	8.0	0.134	10.3	0.168
500	...	...	8.5	...	7.9	0.124	8.2	0.137	10.6	0.170
550	...	...	8.7	...	8.2	0.127	8.5	0.140	10.8	0.172
600	...	...	9.0	...	8.5	0.130	8.8	0.144	11.1	0.175
650	...	...	9.3	...	8.9	0.133	9.1	0.147	11.3	0.177
700	...	...	9.5	...	9.2	0.136	9.3	0.151	11.6	0.179
750	...	...	9.8	...	9.5	0.139	9.6	0.154	11.8	0.181
800	...	...	10.1	...	9.8	0.141	9.9	0.158	12.1	0.183
850	...	...	10.3	...	10.2	0.144	10.2	0.161	12.4	0.184
900	...	...	10.6	...	10.5	0.147	10.5	0.165	12.6	0.186
950	...	...	10.8	...	10.8	0.150	10.8	0.169	12.9	0.188
1,000	...	...	11.1	...	11.1	0.152	11.1	0.173	13.2	0.189
1,050	...	...	11.4	...	11.4	0.155	11.5	0.177	13.4	0.191
1,100	...	...	11.7	...	11.7	0.158	11.8	0.181	13.7	0.192
1,150	...	...	...	...	12.0	0.160	12.1	0.185	14.0	0.194
1,200	...	...	...	...	12.3	0.163	12.5	0.189	14.3	0.196
1,250	...	...	...	...	12.7	0.165	...	...	14.6	0.197
1,300	...	...	...	...	13.0	0.166	...	...	14.9	0.199
1,350	...	...	...	...	13.3	0.168	...	...	15.2	0.201
1,400	...	...	...	...	13.6	0.168	...	...	15.5	0.204
1,450	...	...	...	...	13.9	0.168	...	...	15.8	0.206
1,500	...	...	...	...	14.2	0.167	...	...	16.0	0.208
1,550	...	...	...	...	...	...	...	...	...	0.210

Table TCD
Nominal Coefficients of Thermal Conductivity (TC) and Thermal Diffusivity (TD) (Cont'd)

	High Nickel Alloys (Cont'd)		High Nickel Alloys		High Nickel Alloys		High Nickel Alloys		High Nickel Alloys	
	Ni–Cr–Mo–Cb N06625		Ni–Cr–Fe N06690		Ni–Cr–Fe–Mo–Cb N07718		70Ni–16Cr–7Fe–Ti–Al N07750		Cr–Ni–Fe–Mo–Cu–Cb N08020	
Temp., °F	TC	TD	TC	TD	TC	TD	TC	TD	TC	TD
70	5.7	0.110	6.8	0.125	6.4	0.119	6.9	0.132	...	0.121
100	5.8	0.113	7.0	0.127	6.6	0.122	7.0	0.132	6.9	0.123
150	6.0	0.116	7.3	0.131	6.8	0.127	7.2	0.132	7.2	0.126
200	6.3	0.119	7.6	0.134	7.1	0.130	7.4	0.133	7.5	0.130
250	6.5	0.121	7.9	0.137	7.4	0.133	7.6	0.134	7.8	0.133
300	6.7	0.124	8.2	0.141	7.7	0.135	7.8	0.135	8.0	0.137
350	7.0	0.126	8.5	0.144	7.9	0.138	8.0	0.136	8.3	0.140
400	7.2	0.128	8.8	0.147	8.2	0.140	8.2	0.138	8.6	0.144
450	7.5	0.130	9.1	0.150	8.5	0.143	8.4	0.141	8.8	0.147
500	7.7	0.132	9.4	0.154	8.8	0.147	8.6	0.143	9.1	0.151
550	7.9	0.134	9.7	0.157	9.0	0.151	8.8	0.146	9.4	0.154
600	8.2	0.136	10.0	0.160	9.3	0.155	9.1	0.148	9.7	0.158
650	8.4	0.138	10.3	0.164	9.6	0.160	9.3	0.151	10.0	0.161
700	8.7	0.140	10.6	0.167	9.9	0.165	9.5	0.153	10.2	0.165
750	8.9	0.142	10.9	0.171	10.1	0.169	9.8	0.156	10.5	0.168
800	9.1	0.144	11.2	0.174	10.4	0.174	10.0	0.158	10.8	0.172
850	9.4	0.146	11.5	0.177	10.7	0.178	10.2	0.160	11.0	...
900	9.6	0.148	11.8	0.181	11.0	0.181	10.5	0.162	11.3	...
950	9.8	0.150	12.2	0.184	11.2	0.183	10.7	0.165	11.6	...
1,000	10.1	0.152	12.5	0.187	11.5	0.184	10.9	0.169	11.9	...
1,050	10.3	0.154	12.8	0.190	11.8	0.183	...	...	...	...
1,100	10.5	0.156	13.1	0.192	12.0	0.182	...	...	...	...
1,150	10.8	0.158	13.4	0.195	12.3	0.179	...	...	...	...
1,200	11.0	0.159	13.7	0.197	12.6	0.175	...	...	...	...
1,250	11.3	0.161	14.0	0.199	12.8	0.171	...	...	...	...
1,300	11.5	0.163	14.3	0.201	13.1	0.167	...	...	...	...
1,350	11.8	0.165	14.6	0.203	13.3	0.163	...	...	...	...
1,400	12.0	0.167	14.9	0.204	13.6	0.160	...	...	...	...
1,450	12.3	0.169	15.2	0.206	13.8	0.160	...	...	...	...
1,500	12.6	0.172	15.5	0.208	14.1	0.162	...	...	...	...
1,550	...	0.175	...	0.211	...	0.169	...	...	...	...

Table TCD
Nominal Coefficients of Thermal Conductivity (TC) and Thermal Diffusivity (TD) (Cont'd)

	High Nickel Alloys (Cont'd)		High Nickel Alloys		High Nickel Alloys		High Nickel Alloys		High Nickel Alloys		High Nickel Alloys	
	N08031 and N08367		Ni–Fe–Cr–Si N08330		N08354		Ni–Fe–Cr N08800, N08801, N08810, N08811		Ni–Fe–Cr–Mo–Cu N08825		Ni–Mo N10001	
Temp., °F	TC	TD	TC	TD	TC	TD	TC	TD	TC	TD	TC	TD
70	6.7	0.122	7.1	0.131	6.4	0.115	6.7	0.122	...	0.132	...	...
100	6.9	...	7.3	0.131	6.7	0.118	6.8	0.125	...	0.129	6.1	0.115
150	7.2	...	7.5	0.135	7.1	0.122	7.1	0.129	...	0.127	6.2	0.115
200	7.5	...	7.7	0.141	7.5	0.127	7.4	0.133	7.1	0.126	6.4	0.115
250	7.8	...	7.9	...	7.9	0.131	7.7	0.137	7.3	0.127	6.5	0.116
300	8.1	...	8.2	...	8.2	0.136	8.0	0.140	7.6	0.128	6.7	0.117
350	8.4	...	8.5	...	8.6	0.140	8.3	0.144	7.9	0.129	6.8	0.118
400	8.7	...	8.8	...	8.9	0.144	8.5	0.147	8.1	0.130	7.0	0.119
450	9.0	...	9.1	...	9.3	0.148	8.8	0.150	8.4	0.131	7.2	0.120
500	9.3	...	9.4	...	9.6	0.152	9.1	0.153	8.6	0.132	7.4	0.121
550	9.6	...	9.7	...	9.9	0.156	9.3	0.156	8.9	0.133	7.5	0.122
600	9.8	...	10.0	...	10.2	0.159	9.6	0.159	9.1	0.133	7.7	0.124
650	10.1	...	10.3	...	10.5	0.162	9.8	0.161	9.3	0.133	8.0	0.125
700	10.4	...	10.6	...	10.8	0.164	10.1	0.164	9.6	0.133	8.2	0.127
750	10.6	...	10.9	...	11.0	0.167	10.3	0.167	9.8	0.133	8.4	0.129
800	10.9	...	11.2	...	11.3	0.168	10.6	0.169	10.0	0.133	8.7	0.132
850	11.2	...	11.5	...	...	...	10.8	0.171	10.2	0.133	9.0	0.135
900	11.5	...	11.8	...	...	...	11.1	0.174	10.4	0.132	9.3	0.138
950	11.8	...	12.1	...	...	...	11.3	0.176	10.7	0.131	9.7	0.142
1,000	12.0	...	12.4	...	...	...	11.6	0.178	10.9	0.128	10.0	0.146
1,050	12.3	...	12.7	...	...	...	11.8	0.181	11.1	...	10.4	0.149
1,100	12.6	...	13.0	...	...	...	12.1	0.183	11.4	...	10.7	0.153
1,150	...	...	13.3	...	...	...	12.4	0.185	11.6	...	11.1	0.156
1,200	...	...	13.5	...	...	...	12.7	0.187	11.8	...	...	...
1,250	...	...	13.8	...	...	...	13.0	0.189	12.1	...	...	...
1,300	...	...	...	...	...	...	13.3	0.191	12.4	...	...	...
1,350	...	...	...	...	...	...	13.6	0.193	12.7	...	...	...
1,400	...	...	...	...	...	...	13.9	0.194	13.0	...	...	...
1,450	...	...	...	...	...	...	14.2	0.196	13.3	...	...	...
1,500	...	...	...	...	...	...	14.5	0.198	13.6	...	...	...
1,550	...	...	...	...	...	...	...	0.200	...	...	...	...

Table TCD
Nominal Coefficients of Thermal Conductivity (TC) and Thermal Diffusivity (TD) (Cont'd)

	High Nickel Alloys (Cont'd)		High Nickel Alloys		High Nickel Alloys		High Nickel Alloys		High Nickel Alloys	
	Ni–Mo–Cr–Fe N10003		65Ni–25Mo–8Cr–2Fe N10242		Ni–Mo–Cr N10276		N10629		Ni–Mo N10665	
Temp., °F	TC	TD	TC	TD	TC	TD	TC	TD	TC	TD
70	...	...	6.3	0.117	...	...	6.4	0.124	...	...
100	...	...	6.4	0.120	5.9	...	6.5	...	6.8	0.128
150	6.2	0.114	6.7	0.124	6.2	...	6.8	...	6.9	0.129
200	6.5	0.120	7.0	0.128	6.4	...	7.0	...	7.0	0.130
250	6.8	0.124	7.2	0.131	6.7	...	7.2	...	7.2	0.132
300	7.0	0.126	7.5	0.134	7.0	...	7.4	...	7.3	0.133
350	7.2	0.128	7.7	0.137	7.2	...	7.6	...	7.5	0.135
400	7.4	0.129	8.0	0.140	7.5	...	7.8	...	7.6	0.137
450	7.6	0.130	8.2	0.142	7.8	...	8.0	...	7.8	0.139
500	7.9	0.133	8.5	0.145	8.1	...	8.2	...	8.0	0.141
550	8.1	0.135	8.8	0.148	8.4	...	8.4	...	8.2	0.144
600	8.3	0.139	9.0	0.152	8.7	...	8.7	...	8.4	0.146
650	8.5	0.143	9.3	0.155	8.9	...	8.9	...	8.6	0.149
700	8.7	0.147	9.5	0.159	9.2	...	9.1	...	8.9	0.151
750	9.0	0.151	9.8	0.163	9.5	...	9.3	...	9.1	0.154
800	9.2	0.155	10.1	0.167	9.8	...	9.5	...	9.4	0.157
850	9.5	0.158	10.3	0.171	10.1	...	9.7	...	9.7	0.160
900	9.8	0.160	10.6	0.175	10.4	...	9.9	...	10.0	0.164
950	10.1	0.161	10.8	0.179	10.7	...	10.1	...	10.3	0.167
1,000	10.4	0.160	11.1	0.182	11.0	...	10.3	...	10.7	0.171
1,050	10.7	0.159	11.3	0.185	11.3	...	10.5	...	11.0	0.175
1,100	11.1	0.158	11.6	0.188	11.5	...	10.8	...	11.4	0.179
1,150	11.4	0.157	11.9	0.190	11.8	...	11.3	...	11.8	0.184
1,200	11.7	0.157	12.1	0.191	12.1	...	12.0	...	12.2	0.188
1,250	12.1	0.161	12.4	0.191	...	...	...	...	...	...
1,300	12.5	0.171	12.7	0.189	...	...	...	...	...	...
1,350	12.9	...	12.9	0.187	...	...	...	...	...	...
1,400	13.3	...	13.2	0.183	...	...	...	...	...	...
1,450	13.7	...	13.4	0.178	...	...	...	...	...	...
1,500	14.2	...	13.7	0.172	...	...	...	...	...	...
1,550	...	...	...	...	...	...	...	...	...	...

Table TCD
Nominal Coefficients of Thermal Conductivity (TC) and Thermal Diffusivity (TD) (Cont'd)

	High Nickel Alloys (Cont'd)		High Nickel Alloys		High Nickel Alloys		Titanium Alloys		Titanium Alloys	
	N10675		N12160		R20033		Titanium Gr. 1, 2, 2H, 3, 7, 7H, 11, 12, 16, 16H, 17, 26, 26H, and 27		Titanium Grades 9 and 28	
Temp., °F	TC	TD	TC	TD	TC	TD	TC	TD	TC	TD
70	6.5	0.115	6.3	0.115	7.7	0.130	12.7	0.359	5.1	0.145
100	6.6	0.117	6.4	0.116	7.9	...	12.5	0.352	5.2	0.147
150	6.8	0.120	6.6	0.117	8.1	...	12.2	0.341	5.5	0.150
200	6.9	0.123	6.8	0.119	8.4	...	12.0	0.330	5.7	0.152
250	7.1	0.126	7.1	0.122	8.6	...	11.9	0.321	5.9	0.155
300	7.3	0.129	7.3	0.124	8.8	...	11.7	0.313	6.1	0.158
350	7.5	0.132	7.6	0.127	9.1	...	11.6	0.306	6.2	0.160
400	7.7	0.135	7.9	0.130	9.3	...	11.5	0.300	6.4	0.163
450	8.0	0.137	8.2	0.134	9.5	...	11.4	0.294	6.6	0.166
500	8.2	0.140	8.5	0.138	9.8	...	11.3	0.290	6.7	0.168
550	8.4	0.143	8.8	0.142	10.0	...	11.2	0.286	6.8	0.170
600	8.7	0.146	9.1	0.146	10.3	...	11.2	0.283	6.9	0.172
650	8.9	0.149	9.4	0.150	10.5	...	11.2	0.280	...	...
700	9.2	0.151	9.8	0.154	10.7	...	11.2	0.278	...	...
750	9.4	0.154	10.1	0.158	11.0	...	11.2	0.276	...	...
800	9.7	0.157	10.5	0.162	11.2	...	11.2	0.275	...	...
850	9.9	0.161	10.9	0.165	11.4	...	11.2	0.274	...	...
900	10.2	0.164	11.2	0.169	11.6	...	11.3	0.273	...	...
950	10.5	0.167	11.6	0.171	...	...	11.4	0.272	...	...
1,000	10.7	0.170	12.0	0.174	...	...	11.4	0.271	...	...
1,050	11.0	0.174	12.4	0.176	...	...	11.5	0.270	...	...
1,100	11.3	0.177	12.8	0.178	...	...	11.6	0.270	...	...
1,150	11.6	0.180	13.1	0.180	...	...	...	...	...	...
1,200	11.8	0.183	13.5	0.181	...	...	...	...	...	...
1,250	12.1	0.185	13.9	0.182	...	...	...	...	...	...
1,300	12.4	0.187	14.2	0.183	...	...	...	...	...	...
1,350	12.7	0.188	14.5	0.183	...	...	...	...	...	...
1,400	13.0	0.188	14.8	0.185	...	...	...	...	...	...
1,450	13.3	0.186	15.0	0.186	...	...	...	...	...	...
1,500	13.7	0.183	15.1	0.188	...	...	...	...	...	...
1,550	...	...	...	...	...	...	...	...	...	...

Table TCD
Nominal Coefficients of Thermal Conductivity (TC) and Thermal Diffusivity (TD) (Cont'd)

	Titanium Alloys (Cont'd)		Aluminum Alloys		Aluminum Alloys		Aluminum Alloys		Aluminum Alloys		Aluminum Alloys	
	Titanium Grade 38		A24430		A03560		A91060		A91100		A92014	
Temp., °F	TC	TD	TC	TD	TC	TD	TC	TD	TC	TD	TC	TD
70	4.3	0.122	94.0	2.641	92.0	2.611	135.2	3.721	133.1	3.671	89.9	2.470
100	4.4	0.124	94.5	2.638	92.9	2.608	133.7	3.647	131.8	3.606	90.9	2.480
150	4.6	0.127	96.0	2.632	94.2	2.603	131.7	3.544	130.0	3.505	92.3	2.480
200	4.8	0.130	97.3	2.629	95.4	2.597	130.1	3.457	128.5	3.418	93.6	2.480
250	5.0	0.133	98.2	2.628	96.4	2.592	128.7	3.380	127.3	3.347	94.7	2.481
300	5.2	0.137	98.9	2.622	97.4	2.590	127.5	3.311	126.2	3.285	95.7	2.479
350	5.4	0.141	99.8	2.609	98.2	2.590	126.5	3.249	125.3	3.227	96.6	2.470
400	5.6	0.144	100.4	2.600	98.9	2.580	125.6	3.190	124.5	3.170	97.4	2.470
450	5.8	0.148	...	...	...	...	...	...	...	...	...	...
500	6.0	0.152	...	...	...	...	...	...	...	...	...	...
550	6.2	0.157	...	...	...	...	...	...	...	...	...	...
600	6.4	0.161	...	...	...	...	...	...	...	...	...	...
650	6.6	0.165	...	...	...	...	...	...	...	...	...	...
700	6.9	0.171	...	...	...	...	...	...	...	...	...	...
750	7.2	0.177	...	...	...	...	...	...	...	...	...	...
800	7.5	0.184	...	...	...	...	...	...	...	...	...	...
850	...	...	...	...	...	...	...	...	...	...	...	...
900	...	...	...	...	...	...	...	...	...	...	...	...
950	...	...	...	...	...	...	...	...	...	...	...	...
1,000	...	...	...	...	...	...	...	...	...	...	...	...
1,050	...	...	...	...	...	...	...	...	...	...	...	...
1,100	...	...	...	...	...	...	...	...	...	...	...	...
1,150	...	...	...	...	...	...	...	...	...	...	...	...
1,200	...	...	...	...	...	...	...	...	...	...	...	...
1,250	...	...	...	...	...	...	...	...	...	...	...	...
1,300	...	...	...	...	...	...	...	...	...	...	...	...
1,350	...	...	...	...	...	...	...	...	...	...	...	...
1,400	...	...	...	...	...	...	...	...	...	...	...	...
1,450	...	...	...	...	...	...	...	...	...	...	...	...
1,500	...	...	...	...	...	...	...	...	...	...	...	...
1,550	...	...	...	...	...	...	...	...	...	...	...	...

Table TCD
Nominal Coefficients of Thermal Conductivity (TC) and Thermal Diffusivity (TD) (Cont'd)

	Aluminum Alloys (Cont'd)		Aluminum Alloys		Aluminum Alloys		Aluminum Alloys		Aluminum Alloys	
	A92024		A93003		A93004		A95052 and A95652		A95083	
Temp., °F	TC	TD	TC	TD	TC	TD	TC	TD	TC	TD
70	85.8	2.360	102.3	2.810	94.0	2.601	79.6	2.220	67.2	1.880
100	86.9	2.370	102.8	2.800	94.9	2.598	80.8	2.229	68.7	1.909
150	88.5	2.381	103.5	2.779	96.1	2.592	82.7	2.251	70.8	1.942
200	90.0	2.388	104.2	2.762	97.2	2.589	84.4	2.269	72.8	1.968
250	91.3	2.393	104.7	2.748	98.1	2.588	85.9	2.280	74.6	1.990
300	92.4	2.398	105.2	2.731	99.0	2.582	87.2	2.290	76.2	2.011
350	93.4	2.401	105.7	2.709	99.7	2.569	88.4	2.300	77.8	2.029
400	94.4	2.390	106.1	2.690	100.4	2.560	89.6	2.300	79.2	2.050
450	...	...	...	...	...	...	...	...	...	...
500	...	...	...	...	...	...	...	...	...	...
550	...	...	...	...	...	...	...	...	...	...
600	...	...	...	...	...	...	...	...	...	...
650	...	...	...	...	...	...	...	...	...	...
700	...	...	...	...	...	...	...	...	...	...
750	...	...	...	...	...	...	...	...	...	...
800	...	...	...	...	...	...	...	...	...	...
850	...	...	...	...	...	...	...	...	...	...
900	...	...	...	...	...	...	...	...	...	...
950	...	...	...	...	...	...	...	...	...	...
1,000	...	...	...	...	...	...	...	...	...	...
1,050	...	...	...	...	...	...	...	...	...	...
1,100	...	...	...	...	...	...	...	...	...	...
1,150	...	...	...	...	...	...	...	...	...	...
1,200	...	...	...	...	...	...	...	...	...	...
1,250	...	...	...	...	...	...	...	...	...	...
1,300	...	...	...	...	...	...	...	...	...	...
1,350	...	...	...	...	...	...	...	...	...	...
1,400	...	...	...	...	...	...	...	...	...	...
1,450	...	...	...	...	...	...	...	...	...	...
1,500	...	...	...	...	...	...	...	...	...	...
1,550	...	...	...	...	...	...	...	...	...	...

Table TCD
Nominal Coefficients of Thermal Conductivity (TC) and Thermal Diffusivity (TD) (Cont'd)

	Aluminum Alloys (Cont'd)		Aluminum Alloys		Aluminum Alloys		Aluminum Alloys		Aluminum Alloys		Aluminum Alloys	
	A95086		A95154 and A95254		A95454		A95456		A96061		A96063	
Temp., °F	TC	TD	TC	TD	TC	TD	TC	TD	TC	TD	TC	TD
70	73.4	2.05	73.4	2.050	77.5	2.150	67.2	1.890	96.1	2.661	120.8	3.340
100	74.8	2.08	74.8	2.079	78.6	2.169	68.7	1.909	96.9	2.660	120.3	3.299
150	76.8	2.10	76.8	2.101	80.7	2.191	70.8	1.940	98.0	2.650	119.7	3.232
200	78.7	2.12	78.7	2.119	82.6	2.210	72.8	1.971	99.0	2.649	119.0	3.177
250	80.3	2.14	80.3	2.141	84.1	2.228	74.6	1.998	99.8	2.641	118.5	3.133
300	81.9	2.16	81.9	2.160	85.4	2.242	76.3	2.022	100.6	2.629	118.1	3.088
350	83.2	2.17	83.2	2.170	86.7	2.249	77.8	2.039	101.3	2.620	118.0	3.040
400	84.5	2.18	84.5	2.180	87.9	2.250	79.2	2.050	101.9	2.620	117.6	3.000
450	...	...	...	...	...	...	...	...	...	...	...	...
500	...	...	...	...	...	...	...	...	...	...	...	...
550	...	...	...	...	...	...	...	...	...	...	...	...
600	...	...	...	...	...	...	...	...	...	...	...	...
650	...	...	...	...	...	...	...	...	...	...	...	...
700	...	...	...	...	...	...	...	...	...	...	...	...
750	...	...	...	...	...	...	...	...	...	...	...	...
800	...	...	...	...	...	...	...	...	...	...	...	...
850	...	...	...	...	...	...	...	...	...	...	...	...
900	...	...	...	...	...	...	...	...	...	...	...	...
950	...	...	...	...	...	...	...	...	...	...	...	...
1,000	...	...	...	...	...	...	...	...	...	...	...	...
1,050	...	...	...	...	...	...	...	...	...	...	...	...
1,100	...	...	...	...	...	...	...	...	...	...	...	...
1,150	...	...	...	...	...	...	...	...	...	...	...	...
1,200	...	...	...	...	...	...	...	...	...	...	...	...
1,250	...	...	...	...	...	...	...	...	...	...	...	...
1,300	...	...	...	...	...	...	...	...	...	...	...	...
1,350	...	...	...	...	...	...	...	...	...	...	...	...
1,400	...	...	...	...	...	...	...	...	...	...	...	...
1,450	...	...	...	...	...	...	...	...	...	...	...	...
1,500	...	...	...	...	...	...	...	...	...	...	...	...
1,550	...	...	...	...	...	...	...	...	...	...	...	...

GENERAL NOTES:

(a) TC is the thermal conductivity, Btu/hr-ft-°F, and TD is the thermal diffusivity, ft^2/hr:

$$TD = \frac{TC\left(Btu/hr–ft–°F\right)}{density\left(lb/ft^3\right) \times specific\ heat\left(Btu/lb–°F\right)}$$

(b) Values of thermal conductivity and thermal diffusivity should be used with the understanding that there is an associated ±10% uncertainty. This uncertainty results from compositional variations and variables associated with original data acquisition and analysis.

NOTES:

(1) Material Group A includes those materials listed as "Carbon steel" in the Nominal Composition column in Tables 1A, 2A, 3, 5A, U, or Y-1.

(2) Material Group B includes those materials listed as "C–Mn–Si–Cb," "C–Mn–Si–V," "C–Mn–Si–V–Cb," "C–Mn–Ti," or "C–Si–Ti" in the Nominal Composition column in Tables 1A, 2A, 3, 5A, U, or Y-1. Also includes:

$^3/_4$Cr–$^1/_2$Ni–Cu
$^3/_4$Ni–$^1/_2$Cu–Mo
1Cr–$^1/_2$Mo–Si
$2^1/_2$Ni

NOTES (CONT'D):

(3) Material Group C includes the following carbon–moly steels:

C–1/4Mo
C–1/2Mo

The following low chrome steels:

1/2Cr–1/5Mo–V
1/2Cr–1/4Mo–Si
1/2Cr–1/2Mo
1/2Cr–1/2Ni–1/5Mo
3/4Cr–3/4Ni–Cu–Al
1Cr–1Mn–1/4Mo
1Cr–1/5Mo
1Cr–1/2Mo
1 1/4Cr–1/2Mo
1 1/4Cr–1/2Mo–Si
1 3/4Cr–1/2Mo–Cu
1 3/4Cr–1/2Mo–Ti
2Cr–1/2Mo

The following manganese steels:

Mn–1/2Mo
Mn–1/2Mo–1/4Ni
Mn–1/2Mo–1/2Ni
Mn–1/2Mo–3/4Ni
Mn–1/2Ni–V
Mn–V

The following nickel steels:

1/2Ni–1/2Cr–1/4Mo–V
1/2Ni–1/2Mo–V
3/4Ni–1/2Cr–1/2Mo–V
3/4Ni–1/2Mo–1/3Cr–V
3/4Ni–1/2Mo–Cr–V
3/4Ni–1Mo–3/4Cr
1Ni–1/2Cr–1/2Mo
1 1/4Ni–1Cr–1/2Mo
3 1/2Ni–1 3/4Cr–1/2Mo–V
4Ni–1 1/2Cr–1/2Mo–V

(4) Material Group D includes the following low chrome steels:

2 1/4Cr–1Mo
3Cr–1Mo
3Cr–1Mo–1/4V–Cb–Ca
3Cr–1Mo–1/4V–Ti–B

The following manganese steel:

Mn–1/4Mo

The following nickel steels:

1 3/4Ni–3/4Cr–1/4Mo
2Ni–3/4Cr–1/4Mo
2Ni–3/4Cr–1/3Mo
2Ni–1 1/2Cr–1/4Mo–V
2Ni–1Cu
2 3/4Ni–1 1/2Cr–1/2Mo–V
5Ni–1/4Mo
7Ni
8Ni
9Ni

(5) Material Group E includes:

5Cr–1/2Mo
5Cr–1/2Mo–Si
5Cr–1/2Mo–Ti

(6) Material Group F includes:

9Cr–1Mo

(7) Material Group G includes:

12Cr
12Cr–1Al
13Cr
13Cr–4Ni
15Cr
17Cr

(8) Material Group H includes:

27Cr

(9) Material Group I includes:

17Cr–4Ni–4Cu
15Cr–5Ni–3Mo (only to 800°F)

(10) Material Group J includes:

15Cr–6Ni–Cu–Mo (only to 800°F)
17Cr–7Ni–1Al (only to 800°F)
18Cr–8Ni
18Cr–8Ni–S (or Se)
18Cr–11Ni
22Cr–2Ni–Mo–N
23Cr–4Ni–Mo–Cu

These thermal conductivity and diffusivity values are also appropriate for H, L, N, and LN grades of austenitic stainless steels.

NOTES (CONT'D):

(11) Material Group K includes:

13Cr–8Ni–2Mo (only to 800°F)
29Cr–7Ni–2Mo–N
25Ni–15Cr–2Ti
29Ni–20Cr–3Cu–2Mo
16Cr–12Ni–2Mo
18Cr–5Ni–3Mo
18Cr–10Ni–Cb
18Cr–10Ni–Ti
18Cr–13Ni–3Mo
18Cr–15Ni–4Si
19Cr–9Ni–Mo–W
21Cr–11Ni–N
22Cr–5Ni–3Mo–N
23Cr–12Ni
25Cr–6Ni–Mo–N
25Cr–7Ni–4Mo–N
25Cr–20Ni
25Cr–20Ni–2Mo
44Fe–25Ni–21Cr–Mo

These thermal conductivity and diffusivity values are also appropriate for H, L, N, and LN grades of austenitic stainless steels.

(12) Material Group L includes:

14Cr–16Ni–6Si–Cu–Mo
18Cr–18Ni–2Si
18Cr–20Ni–5.5Si
22Cr–13Ni–5Mn
24Cr–22Ni–6Mo–2W–Cu–N
24Cr–22Ni–7.5Mo
25Cr–12Ni
25Cr–35Ni–N–Ce
31Ni–31Fe–29Cr–Mo

These thermal conductivity and diffusivity values are also appropriate for H, L, N, and LN grades of austenitic stainless steels.

Table TM-1
Moduli of Elasticity *E* of Ferrous Materials for Given Temperatures

Materials	Modulus of Elasticity *E* = Value Given × 10^6 psi, for Temperature, °F, of																	
	−325	−200	−100	70	200	300	400	500	600	700	800	900	1,000	1,100	1,200	1,300	1,400	1,500
Carbon steels with C ≤ 0.30%	31.4	30.8	30.3	29.4	28.8	28.3	27.9	27.3	26.5	25.5	24.2	22.5	20.4	18.0	...	...	...	...
Carbon steels with C > 0.30%	31.2	30.6	30.1	29.2	28.6	28.1	27.7	27.1	26.4	25.3	24.0	22.3	20.2	17.9	15.4	...	...	...
Ductile cast iron	...	...	24.5	23.4	22.5	21.9	21.2	20.5	19.9	19.2	...	...	...	...	...	...	...	...
Material Group A [Note (1)]	31.1	30.5	30.0	29.0	28.5	28.0	27.6	27.0	26.3	25.3	23.9	22.2	20.1	17.8	15.3	...	...	...
Material Group B [Note (2)]	29.6	29.0	28.6	27.8	27.1	26.7	26.2	25.7	25.1	24.6	23.9	23.2	22.4	21.5	20.4	19.2	17.7	...
Material Group C [Note (3)]	31.6	30.9	30.5	29.6	29.0	28.5	28.0	27.4	26.9	26.2	25.6	24.8	23.9	23.0	21.8	20.5	18.9	...
Material Group D [Note (4)]	32.6	31.9	31.4	30.6	29.9	29.4	28.8	28.3	27.7	27.0	26.3	25.6	24.7	23.7	22.5	21.1	19.4	...
Material Group E [Note (5)]	33.0	32.4	31.9	31.0	30.3	29.7	29.2	28.6	28.1	27.5	26.9	26.2	25.4	24.4	23.3	22.0	20.5	...
Material Group F [Note (6)]	31.2	30.7	30.2	29.2	28.4	27.9	27.3	26.8	26.2	25.5	24.5	23.2	21.5	19.2	16.5	...	...	...
Material Group G [Note (7)]	30.3	29.7	29.2	28.3	27.5	27.0	26.4	25.9	25.3	24.8	24.1	23.5	22.8	22.0	21.2	20.3	19.2	18.1
Material Group H [Note (8)]	...	...	30.2	29.0	28.2	27.5	27.0	26.4	26.0	25.5	25.1	...	...	...	...	...	...	...
Material Group I [Note (9)]	27.8	27.1	26.6	25.8	25.1	24.6	24.1	23.6	23.1	22.6	22.1	21.6	21.1	20.6	20.1	19.6	19.1	18.6
Material Group J [Note (10)]	31.1	30.3	29.7	28.6	27.8	27.2	26.6	26.0	25.4	24.7	24.1	23.5	22.9	...	...	...	...	...
S13800 [Note (11)]	31.5	30.9	30.3	29.4	28.7	28.1	27.5	26.9	26.3	25.7	25.0	24.4	...	...	...	...	...	...
S15500 [Note (12)]	30.5	29.9	29.4	28.5	27.8	27.2	26.7	26.1	25.5	24.9	24.3	23.7	...	...	...	...	...	...
S45000 [Note (13)]	31.6	31.0	30.4	29.5	28.8	28.2	27.6	27.0	26.4	25.8	25.1	24.5	...	...	...	...	...	...
S17400 [Note (14)]	30.5	29.9	29.4	28.5	27.8	27.2	26.7	26.1	25.5	24.9	24.3	23.7	...	...	...	...	...	...
S17700 [Note (15)]	31.6	31.0	30.4	29.5	28.8	28.2	27.6	27.0	26.4	25.8	25.1	24.5	...	...	...	...	...	...
S66286 [Note (16)]	31.0	30.6	30.2	29.2	28.5	27.9	27.3	26.7	26.1	25.5	24.9	24.2	...	...	...	...	...	...

NOTES:

(1) Material Group A consists of the following carbon–molybdenum and manganese steels:

C–¼Mo
C–½Mo
Mn–¼Mo
Mn–½Mo
Mn–½Mo–¼Ni
Mn–½Mo–½Ni
Mn–½Ni–V
Mn–V

(2) Material Group B consists of the following Ni steels:

¾Cr–½Ni–Cu
¾Cr–¾Ni–Cu–Al
½Ni–½Cr–¼Mo–V
½Ni–½Mo–V
¾Ni–½Cr–½Mo–V
¾Ni–½Cu–Mo
¾Ni–½Mo–⅓Cr–V
¾Ni–½Mo–Cr–V
¾Ni–1Mo–¾Cr
1Ni–½Cr–½Mo
1¼Ni–1Cr–½Mo
1¾Ni–¾Cr–¼Mo
2Ni–1½Cr–¼Mo–V
2Ni–1Cu

Table TM-1
Moduli of Elasticity *E* of Ferrous Materials for Given Temperatures (Cont'd)

NOTES (CONT'D):

$2\frac{1}{2}$Ni
$2\frac{3}{4}$Ni–$1\frac{1}{2}$Cr–$\frac{1}{2}$Mo–V
$3\frac{1}{2}$Ni
$3\frac{1}{2}$Ni–$1\frac{3}{4}$Cr–$\frac{1}{2}$Mo–V
4Ni–$1\frac{1}{2}$Cr–$\frac{1}{2}$Mo–V
7Ni

(3) Material Group C consists of the following $\frac{1}{2}$–2Cr steels:

$\frac{1}{2}$Cr–$\frac{1}{5}$Mo–V
$\frac{1}{2}$Cr–$\frac{1}{4}$Mo–Si
$\frac{1}{2}$Cr–$\frac{1}{2}$Mo
1Cr–$\frac{1}{5}$Mo
1Cr–$\frac{1}{2}$Mo
1Cr–$\frac{1}{2}$Mo–V
$1\frac{1}{4}$Cr–$\frac{1}{2}$Mo
$1\frac{1}{4}$Cr–$\frac{1}{2}$Mo–Si
$1\frac{3}{4}$Cr–$\frac{1}{2}$Mo–Ti
2Cr–$\frac{1}{2}$Mo

(4) Material Group D consists of the following $2\frac{1}{4}$–3Cr steels:

$2\frac{1}{4}$Cr–1Mo
3Cr–1Mo
3Cr–1Mo–$\frac{1}{4}$V–Cb–Ca
3Cr–1Mo–$\frac{1}{4}$V–Ti–B

(5) Material Group E consists of the following 5–9Cr steels:

5Cr–$\frac{1}{2}$Mo
5Cr–$\frac{1}{2}$Mo–Si
5Cr–$\frac{1}{2}$Mo–Ti
7Cr–$\frac{1}{2}$Mo
9Cr–Mo, including variations thereof

(6) Material Group F consists of the following chromium steels:

12Cr–Al
13Cr
15Cr
17Cr

(7) Material Group G consists of the following austenitic steels:

16Cr–12Ni–2Mo
16Cr–12Ni–2Mo–N
18Cr–3Ni–13Mn
18Cr–8Ni
18Cr–8Ni–N
18Cr–8Ni–S
18Cr–8Ni–Se
18Cr–10Ni–Cb
18Cr–10Ni–Ti
18Cr–13Ni–3Mo
18Cr–18Ni–2Si
21Cr–6Ni–9Mn
22Cr–13Ni–5Mn
23Cr–12Ni
25Cr–20Ni

(8) Material Group H consists of the following duplex (austenitic–ferritic) stainless steels:

18Cr–5Ni–3Mo
22Cr–2Ni–Mo–N
22Cr–5Ni–3Mo–N
23Cr–4Ni–Mo–Cu–N
24Cr–10Ni–4Mo–N
25Cr–5Ni–3Mo–2Cu
25Cr–6Ni–Mo–N
25Cr–6.5Ni–3Mo–N
25Cr–7Ni–3Mo–W–Cu–N
25Cr–7Ni–4Mo–N
25Cr–7.5Ni–3.5Mo–N–Cu–W
29Cr–6.5Ni–2Mo–N

Table TM-1
Moduli of Elasticity *E* of Ferrous Materials for Given Temperatures (Cont'd)

NOTES (CONT'D):

(9) Material Group I consists of the following high-silicon austenitic steels:

14Cr–16Ni–6Si–Cu–Mo
17.5Cr–17.5Ni–5.3Si
18Cr–8Ni–4Si–N
18Cr–20Ni–5.5Si

(10) Material Group J consists of the following high-molybdenum austenitic stainless steels:

27Ni–22Cr–7Mo–Cu–N
20Cr–18Ni–6Mo
24Cr–22Ni–6Mo–2W–Cu–N
31Ni–31Fe–29Cr–Mo
46Fe–24Ni–21Cr–6Mo–N
25Ni–47Fe–21Cr–5Mo
25Ni–47Fe–23Cr–5.5Mo–N
44Fe–25Ni–21Cr–Mo
25Ni–20Cr–6Mo–Cu–N

(11) Also known as 13Cr–8Ni–2Mo, XM-13, or PH13-8Mo.
(12) Also known as 15Cr–5Ni–3Mo, XM-12, or 15-5PH.
(13) Also known as 15Cr–6Ni–Cu–Mo, Custom 450, or XM-25. Modulus values are for material aged at 900°F.
(14) Also known as 17Cr–4Ni–4Cu, Grade 630, or 17-4PH.
(15) Also known as 17Cr–7Ni–1Al, Grade 631, or 17-7PH.
(16) Also known as 25Ni–15Cr–2Ti, Grade 660, or A-286 stainless steel.

Table TM-2
Moduli of Elasticity *E* of Aluminum and Aluminum Alloys for Given Temperatures

	Modulus of Elasticity E = Value Given $\times 10^6$ psi, for Temperature, °F, of							
Material	**−325**	**−200**	**−100**	**70**	**200**	**300**	**400**	**500**
A03560	11.4	11.1	10.8	10.3	9.8	9.5	9.0	8.1
A95083	11.4	11.1	10.8	10.3	9.8	9.5	9.0	8.1
A95086	11.4	11.1	10.8	10.3	9.8	9.5	9.0	8.1
A95456	11.4	11.1	10.8	10.3	9.8	9.5	9.0	8.1
A24430	11.1	10.8	10.5	10.0	9.6	9.2	8.7	8.1
A91060	11.1	10.8	10.5	10.0	9.6	9.2	8.7	8.1
A91100	11.1	10.8	10.5	10.0	9.6	9.2	8.7	8.1
A93003	11.1	10.8	10.5	10.0	9.6	9.2	8.7	8.1
A93004	11.1	10.8	10.5	10.0	9.6	9.2	8.7	8.1
A96061	11.1	10.8	10.5	10.0	9.6	9.2	8.7	8.1
A96063	11.1	10.8	10.5	10.0	9.6	9.2	8.7	8.1
A92014	11.7	11.4	11.1	10.6	10.2	9.7	9.2	8.6
A92024	11.7	11.4	11.1	10.6	10.2	9.7	9.2	8.6
A95052	11.3	11.0	10.7	10.2	9.7	9.4	8.9	8.3
A95154	11.3	11.0	10.7	10.2	9.7	9.4	8.9	8.3
A95254	11.3	11.0	10.7	10.2	9.7	9.4	8.9	8.3
A95454	11.3	11.0	10.7	10.2	9.7	9.4	8.9	8.3
A95652	11.3	11.0	10.7	10.2	9.7	9.4	8.9	8.3

Table TM-3
Moduli of Elasticity *E* of Copper and Copper Alloys for Given Temperatures

	Modulus of Elasticity E = Value Given $\times 10^6$ psi, for Temperature, °F, of									
Material	**−325**	**−200**	**−100**	**70**	**200**	**300**	**400**	**500**	**600**	**700**
C93700	11.6	11.4	11.3	11.0	10.7	10.5	10.3	10.1	9.8	9.4
C83600	14.8	14.6	14.4	14.0	13.7	13.4	13.2	12.9	12.5	12.0
C92200	14.8	14.6	14.4	14.0	13.7	13.4	13.2	12.9	12.5	12.0
C28000	15.9	15.6	15.4	15.0	14.6	14.4	14.1	13.8	13.4	12.8
C36500	15.9	15.6	15.4	15.0	14.6	14.4	14.1	13.8	13.4	12.8
C46400	15.9	15.6	15.4	15.0	14.6	14.4	14.1	13.8	13.4	12.8
C65500	15.9	15.6	15.4	15.0	14.6	14.4	14.1	13.8	13.4	12.8
C66100	15.9	15.6	15.4	15.0	14.6	14.4	14.1	13.8	13.4	12.8
C95200	15.9	15.6	15.4	15.0	14.6	14.4	14.1	13.8	13.4	12.8
C95400	15.9	15.6	15.4	15.0	14.6	14.4	14.1	13.8	13.4	12.8
C95800	15.9	15.6	15.4	15.0	14.6	14.4	14.1	13.8	13.4	12.8
C95820	15.9	15.6	15.4	15.0	14.6	14.4	14.1	13.8	13.4	12.8
C44300	16.9	16.7	16.4	16.0	15.6	15.3	15.0	14.7	14.2	13.7
C44400	16.9	16.7	16.4	16.0	15.6	15.3	15.0	14.7	14.2	13.7
C44500	16.9	16.7	16.4	16.0	15.6	15.3	15.0	14.7	14.2	13.7
C64200	16.9	16.7	16.4	16.0	15.6	15.3	15.0	14.7	14.2	13.7
C68700	16.9	16.7	16.4	16.0	15.6	15.3	15.0	14.7	14.2	13.7
C10200	18.0	17.7	17.5	17.0	16.6	16.3	16.0	15.6	15.1	14.5
C10400	18.0	17.7	17.5	17.0	16.6	16.3	16.0	15.6	15.1	14.5
C10500	18.0	17.7	17.5	17.0	16.6	16.3	16.0	15.6	15.1	14.5
C10700	18.0	17.7	17.5	17.0	16.6	16.3	16.0	15.6	15.1	14.5
C11000	18.0	17.7	17.5	17.0	16.6	16.3	16.0	15.6	15.1	14.5
C12000	18.0	17.7	17.5	17.0	16.6	16.3	16.0	15.6	15.1	14.5
C12200	18.0	17.7	17.5	17.0	16.6	16.3	16.0	15.6	15.1	14.5
C12300	18.0	17.7	17.5	17.0	16.6	16.3	16.0	15.6	15.1	14.5
C12500	18.0	17.7	17.5	17.0	16.6	16.3	16.0	15.6	15.1	14.5
C14200	18.0	17.7	17.5	17.0	16.6	16.3	16.0	15.6	15.1	14.5
C23000	18.0	17.7	17.5	17.0	16.6	16.3	16.0	15.6	15.1	14.5
C61000	18.0	17.7	17.5	17.0	16.6	16.3	16.0	15.6	15.1	14.5
C61400	18.0	17.7	17.5	17.0	16.6	16.3	16.0	15.6	15.1	14.5
C65100	18.0	17.7	17.5	17.0	16.6	16.3	16.0	15.6	15.1	14.5
C70400	18.0	17.7	17.5	17.0	16.6	16.3	16.0	15.6	15.1	14.5
C19400	18.5	18.2	18.0	17.5	17.1	16.8	16.5	16.1	15.6	15.0
C60800	18.5	18.2	18.0	17.5	17.1	16.8	16.5	16.1	15.6	15.0
C63000	18.5	18.2	18.0	17.5	17.1	16.8	16.5	16.1	15.6	15.0
C70600	19.0	18.7	18.5	18.0	17.6	17.3	16.9	16.5	16.0	15.4
C70620	19.0	18.7	18.5	18.0	17.6	17.3	16.9	16.5	16.0	15.4
C97600	20.1	19.8	19.6	19.0	18.5	18.2	17.9	17.5	16.9	16.2
C71000	21.2	20.8	20.6	20.0	19.5	19.2	18.8	18.4	17.8	17.1
C71500	23.3	22.9	22.6	22.0	21.5	21.1	20.7	20.2	19.6	18.8
C71520	23.3	22.9	22.6	22.0	21.5	21.1	20.7	20.2	19.6	18.8

Table TM-4
Moduli of Elasticity *E* of High Nickel Alloys for Given Temperatures

	Modulus of Elasticity E = Value Given × 10^6 psi, for Temperature, °F, of																	
Material	**−325**	**−200**	**−100**	**70**	**200**	**300**	**400**	**500**	**600**	**700**	**800**	**900**	**1,000**	**1,100**	**1,200**	**1,300**	**1,400**	**1,500**
N02200	32.2	31.4	30.9	30.0	29.4	28.9	28.5	28.1	27.6	27.2	26.7	26.2	25.7	25.1	24.5	23.8	23.1	22.4
N02201	32.2	31.4	30.9	30.0	29.4	28.9	28.5	28.1	27.6	27.2	26.7	26.2	25.7	25.1	24.5	23.8	23.1	22.4
N04400	27.8	27.2	26.8	26.0	25.5	25.1	24.7	24.3	23.9	23.6	23.1	22.7	22.2	21.7	21.2	20.6	20.0	19.4
N04405	27.8	27.2	26.8	26.0	25.5	25.1	24.7	24.3	23.9	23.6	23.1	22.7	22.2	21.7	21.2	20.6	20.0	19.4
N06002	30.5	29.9	29.3	28.5	27.9	27.5	27.1	26.7	26.2	25.8	25.4	24.9	24.3	23.8	23.2	22.5	21.9	21.2
N06007	29.8	29.1	28.6	27.8	27.2	26.8	26.4	26.0	25.6	25.2	24.7	24.3	23.8	23.2	22.6	22.0	21.4	20.7
N06022	32.1	31.3	30.8	29.9	29.3	28.8	28.4	28.0	27.5	27.1	26.6	26.1	25.6	25.0	24.4	23.7	23.0	22.3
N06030	31.5	30.7	30.2	29.3	28.7	28.2	27.8	27.4	27.0	26.5	26.1	25.6	25.1	24.5	23.9	23.2	22.5	21.9
N06045	30.0	29.3	28.8	28.0	27.4	27.0	26.6	26.2	25.8	25.4	24.9	24.4	23.9	23.4	22.8	22.2	21.6	20.9
N06059	32.7	31.9	31.3	30.5	29.9	29.4	29.0	28.5	28.1	27.6	27.1	26.6	26.0	25.4	24.8	24.1	23.4	22.8
N06230	32.8	32.0	31.5	30.6	29.9	29.5	29.0	28.6	28.2	27.7	27.2	26.7	26.1	25.5	24.9	24.2	23.6	22.8
N06455	32.0	31.2	30.7	29.8	29.2	28.7	28.3	27.9	27.4	27.0	26.5	26.0	25.5	24.9	24.3	23.6	22.9	22.2
N06600	33.3	32.5	31.9	31.0	30.3	29.9	29.4	29.0	28.6	28.1	27.6	27.1	26.5	25.9	25.3	24.6	23.9	23.1
N06617	...	...	...	29.2	28.4	28.0	27.7	27.4	27.0	26.5	26.0	25.5	24.9	24.3	23.8	23.2	22.5	21.8
N06625	32.2	31.4	30.9	30.0	29.4	28.9	28.5	28.1	27.6	27.2	26.7	26.2	25.7	25.1	24.5	23.8	23.1	22.4
N06686	32.7	31.9	31.3	30.5	29.9	29.4	29.0	28.5	28.1	27.6	27.1	26.6	26.0	25.4	24.8	24.1	23.4	22.8
N06690	32.6	31.8	31.2	30.3	29.6	29.2	28.8	28.3	27.9	27.5	27.0	26.5	25.9	25.3	24.7	24.0	23.3	22.6
N07718	31.0	30.5	29.9	28.9	28.3	27.9	27.5	27.2	26.8	26.3	25.8	25.2	24.7	24.2	...	...	...	...
N07750	33.2	32.6	31.9	30.9	30.3	29.8	29.4	29.1	28.6	28.2	27.6	27.0	26.4	25.8	25.3	...	...	...
N08020	30.0	29.3	28.8	28.0	27.4	27.0	26.6	26.2	25.8	25.4	24.9	24.4	23.9	23.4	22.8	22.2	21.6	20.9
N08031	30.7	30.1	29.5	28.7	28.1	27.7	27.2	26.8	26.4	26.0	25.5	25.0	24.5	24.0	23.4	22.8	22.1	21.4
N08330	30.0	29.3	28.8	28.0	27.4	27.0	26.6	26.2	25.8	25.4	24.9	24.4	23.9	23.4	22.8	22.2	21.6	20.9
N08354	30.0	29.6	29.3	28.7	28.2	27.8	27.3	26.9	26.4	25.9	25.4	...	...	...	...	...	...	...
N08800	30.5	29.9	29.3	28.5	27.9	27.5	27.1	26.7	26.2	25.8	25.4	24.9	24.4	23.8	23.2	22.6	21.9	21.2
N08801	30.5	29.9	29.3	28.5	27.9	27.5	27.1	26.7	26.2	25.8	25.4	24.9	24.4	23.8	23.2	22.6	21.9	21.2
N08810	30.5	29.9	29.3	28.5	27.9	27.5	27.1	26.7	26.2	25.8	25.4	24.9	24.4	23.8	23.2	22.6	21.9	21.2
N08825	30.0	29.3	28.8	28.0	27.4	27.0	26.6	26.2	25.8	25.4	24.9	24.4	23.9	23.4	22.8	22.2	21.6	20.9
N10001	33.4	32.6	32.0	31.1	30.4	30.0	29.5	29.1	28.7	28.2	27.7	27.2	26.6	26.0	25.3	24.6	23.9	23.2
N10003	34.0	33.2	32.6	31.7	31.0	30.5	30.1	29.6	29.2	28.7	28.2	27.7	27.1	26.5	25.8	25.1	24.4	23.6
N10242	35.6	34.8	34.2	33.2	32.5	32.0	31.5	31.0	30.5	30.0	29.5	29.0	28.4	27.7	27.1	26.3	25.6	24.8
N10276	32.0	31.2	30.7	29.8	29.2	28.7	28.3	27.9	27.4	27.0	26.5	26.0	25.5	24.9	24.3	23.6	22.9	22.2
N10629	33.7	32.9	32.3	31.4	30.7	30.2	29.8	29.3	28.9	28.4	27.9	27.4	26.8	26.2	25.6	24.9	24.2	23.4
N10665	33.7	32.9	32.3	31.4	30.7	30.2	29.8	29.3	28.9	28.4	27.9	27.4	26.8	26.2	25.6	24.9	24.2	23.4
N10675	33.7	32.9	32.3	31.4	30.7	30.2	29.8	29.3	28.9	28.4	27.9	27.4	26.8	26.2	25.6	24.9	24.2	23.4
N12160	32.8	32.0	31.5	30.6	29.9	29.5	29.0	28.6	28.2	27.7	27.2	26.7	26.1	25.5	24.9	24.2	23.6	22.8
R20033	30.4	29.6	29.1	28.3	27.7	27.3	26.9	26.5	26.1	25.7	25.2	24.7	24.2	23.6	23.1	22.4	21.8	21.1

Table TM-5
Moduli of Elasticity *E* of Titanium and Zirconium for Given Temperatures

Material Grade/UNS No.	Modulus of Elasticity *E* = Value Given × 10^6 psi, for Temperature, °F, of							
	70	200	300	400	500	600	700	800
Titanium Alloys								
1 (R50250)	15.5	15.0	14.6	14.0	13.3	12.6	11.9	11.2
2, 2H (R50400)	15.5	15.0	14.6	14.0	13.3	12.6	11.9	11.2
3 (R50550)	15.5	15.0	14.6	14.0	13.3	12.6	11.9	11.2
7, 7H (R52400)	15.5	15.0	14.6	14.0	13.3	12.6	11.9	11.2
9 (R56320)	15.9	15.3	14.6	13.9	13.2	12.4	...	...
11 (R52250)	15.5	15.0	14.6	14.0	13.3	12.6	11.9	11.2
12 (R53400)	15.5	15.0	14.6	14.0	13.3	12.6	11.9	11.2
16, 16H (R52402)	15.5	15.0	14.6	14.0	13.3	12.6	11.9	11.2
17 (R52252)	15.5	15.0	14.6	14.0	13.3	12.6	11.9	11.2
26, 26H (R52404)	15.5	15.0	14.6	14.0	13.3	12.6	11.9	11.2
27 (R52254)	15.5	15.0	14.6	14.0	13.3	12.6	11.9	11.2
28 (R56323)	15.9	15.3	14.6	13.9	13.2	12.4	...	...
38 (R54250)	15.3	14.8	13.8	13.0	12.3	11.9	11.4	10.7
Zirconium Alloys								
702 (R60702)	14.4	13.5	12.6	11.7	10.9	10.1	9.3	8.2
705 (R60705)	13.7	13.1	12.7	12.2	11.7	11.3	10.8	10.4

GENERAL NOTE: These elastic modulus values are for the longitudinal direction of wrought plate. This represents a practical minimum for design. The modulus in other orientations will be higher. See Nonmandatory Appendix A, A-804.

(21)

Table PRD
Poisson's Ratio and Density of Materials

Material	Poisson's Ratio	Density, lb/in.^{3}	Material	Poisson's Ratio	Density, lb/in.^{3}
Ferrous Materials			**Nonferrous Materials**		
Carbon steels	0.30	0.280	**Aluminum Base**		
Cast irons	0.29	0.260	Alclad 3003	0.33	0.098
Low alloy steels			Alclad 3004	0.33	0.098
C–Mo steels	0.30	0.280	Alclad 6061	0.33	0.098
$\frac{1}{2}$Cr to 1$\frac{1}{4}$Cr steels	0.30	0.280	A02040	0.33	0.101
1$\frac{3}{4}$Cr to 3Cr steels	0.30	0.280	A03560	0.33	0.097
5Cr to 9Cr steels	0.30	0.280	A24430	0.33	0.097
Mn, Mn–Mo, and Si steels	0.30	0.280	A91060	0.33	0.098
Ni steels	0.30	0.280	A91100	0.33	0.098
PH stainless: S15500, S17400, S17700	0.31	0.280	A92014	0.33	0.101
High alloy steels (200 series)	0.31	0.282	A92024	0.33	0.100
High alloy steels (300 series)	0.31	0.290	A93003	0.33	0.099
High-Si stainless: S30600, S30601, S32615, and S38815	0.31	0.275	A93004	0.33	0.098
			A95052	0.33	0.097
5–7% Mo stainless: S32050, S31254, S31266, S31277, and S32654	0.31	0.293	A95083	0.33	0.096
			A95086	0.33	0.096
S32202	0.31	0.280	A95154	0.33	0.096
High alloy steels (400 series)	0.31	0.280	A95254	0.33	0.096
High alloy steels (duplex/ austenitic–ferritic)	0.31	0.282	A95454	0.33	0.097
			A95456	0.33	0.096
PH stainless: S66286	0.31	0.286	A95652	0.33	0.096
Cast high alloy steels	0.30	0.283	A96061	0.33	0.098

Table PRD
Poisson's Ratio and Density of Materials (Cont'd)

Material	Poisson's Ratio	Density, lb/in.^{3}
Nonferrous Materials (Cont'd)		
Aluminum Base (Cont'd)		
A96063	0.33	0.097
Chromium Base		
R20033	0.31	0.285
Cobalt Base		
R30556	0.31	0.297
R31233	0.31	0.306
Copper Base		
C10200, C10400, C10500, and C10700	0.33	0.323
C11000	0.33	0.321
C12000, C12200, C12300, and C14200	0.33	0.323
C19200	0.33	0.320
C19400	0.33	0.322
C23000	0.33	0.316
C28000	0.33	0.303
C36500	0.33	0.304
C37700	0.33	0.305
C44300, C44400, and C44500	0.33	0.308
C46400 and C46500	0.33	0.304
C60800	0.33	0.295
C61400	0.33	0.285
C63000	0.33	0.274
C64200	0.33	0.278
C65100	0.33	0.316
C65500 and C66100	0.33	0.308
C68700	0.33	0.301
C70400, C70600, C70620, C71000, C71500, C71520, and C72200	0.33	0.323
C83600	0.33	0.318
C99200	0.33	0.312
C93700	0.33	0.320
C95200	0.31	0.276
C95400	0.32	0.269
C95800	0.32	0.276
C95820	0.32	0.269
C97600	0.33	0.321
Nickel Base		
N02200 and N02201	0.31	0.321
N04400 and N04405	0.31	0.320
N05500	0.31	0.300
N06002	0.31	0.300
N06022	0.31	0.314
Nonferrous Materials (Cont'd)		
Nickel Base (Cont'd)		
N06030	0.31	0.297
N06045	0.31	0.289
N06059	0.31	0.311
N06200	0.31	0.307
N06230	0.31	0.324
N06455	0.31	0.312
N06600	0.31	0.300
N06601	0.31	0.291
N06617	0.31	0.302
N06625	0.31	0.305
N06686	0.31	0.315
N06690	0.31	0.293
N06975	0.31	0.295
N06985	0.31	0.300
N07718	0.31	0.297
N07750	0.31	0.298
N08020	0.31	0.291
N08024	0.31	0.293
N08026	0.31	0.294
N08028	0.31	0.289
N08031	0.31	0.293
N08330	0.31	0.290
N08354	0.31	0.295
N08367 and J94651	0.31	0.291
N08800, N08810, and N08811	0.31	0.290
N08825	0.31	0.294
N08904	0.31	0.291
N08925	0.31	0.294
N08926	0.31	0.291
N10001	0.31	0.331
N10003	0.31	0.320
N10242	0.31	0.327
N10276	0.31	0.320
N10629	0.31	0.332
N10665 and N10675	0.31	0.333
N12160	0.31	0.292
Titanium Base		
R50250, R50400, R50550, R52250, R52252, R52254, R52400, R52402, R52404, and R53400	0.32	0.163
R56320 and R56323	0.32	0.162
R54250	0.32	0.161
Zirconium Base		
R60702, R60704, and R60705	0.35	0.234

SUBPART 3
CHARTS AND TABLES FOR DETERMINING SHELL THICKNESS OF COMPONENTS UNDER EXTERNAL PRESSURE

Figure G
Geometric Chart for Components Under External or Compressive Loadings (for All Materials)

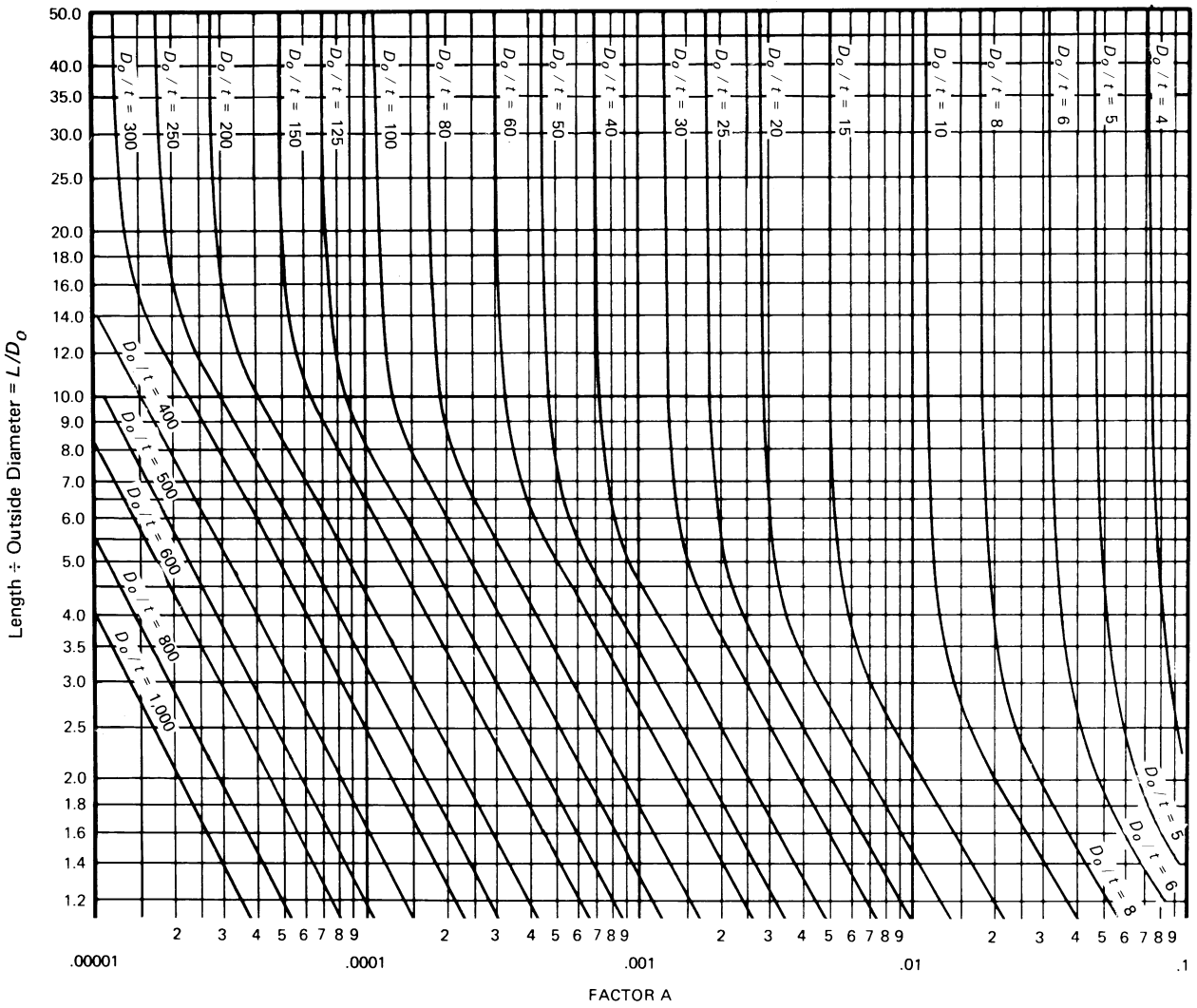
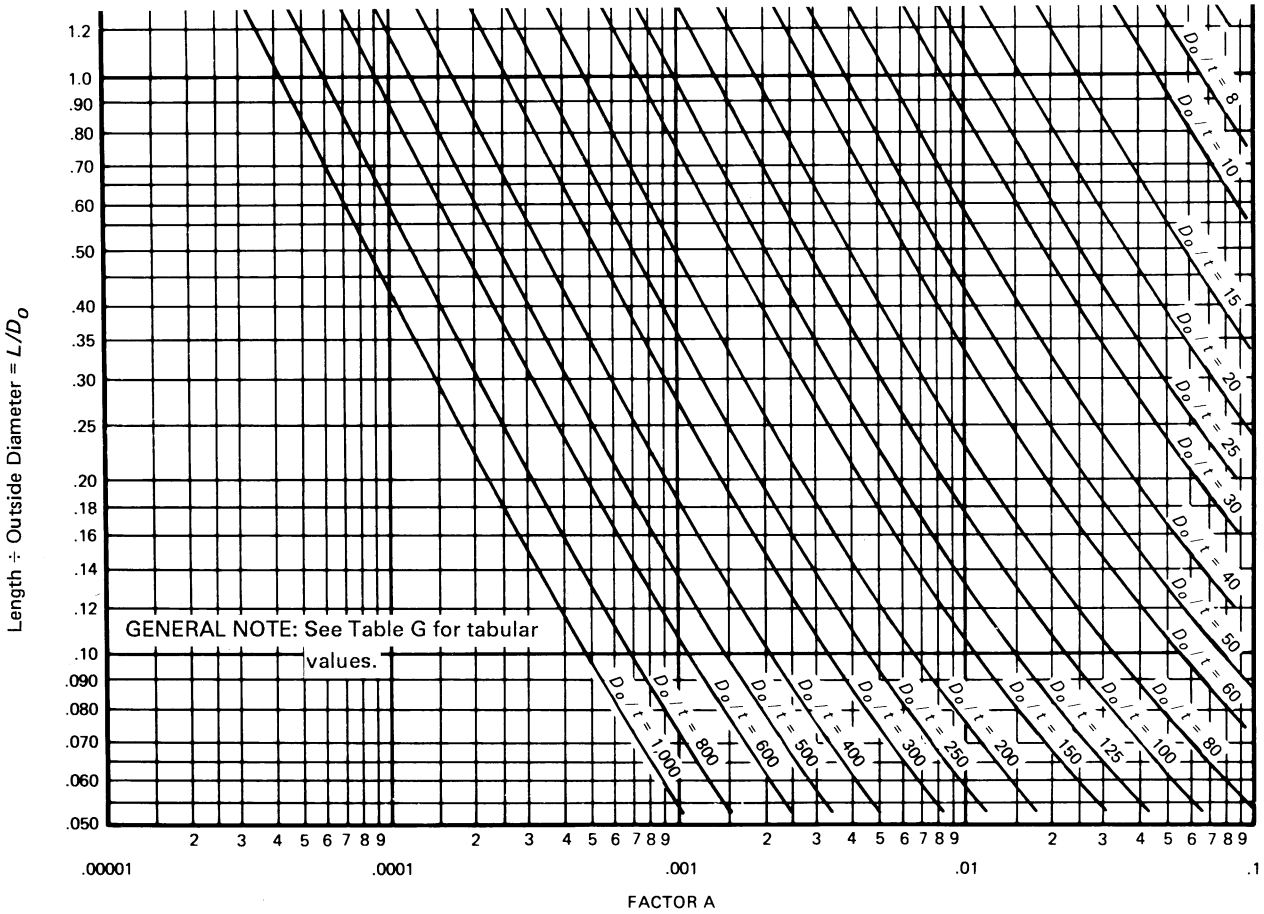
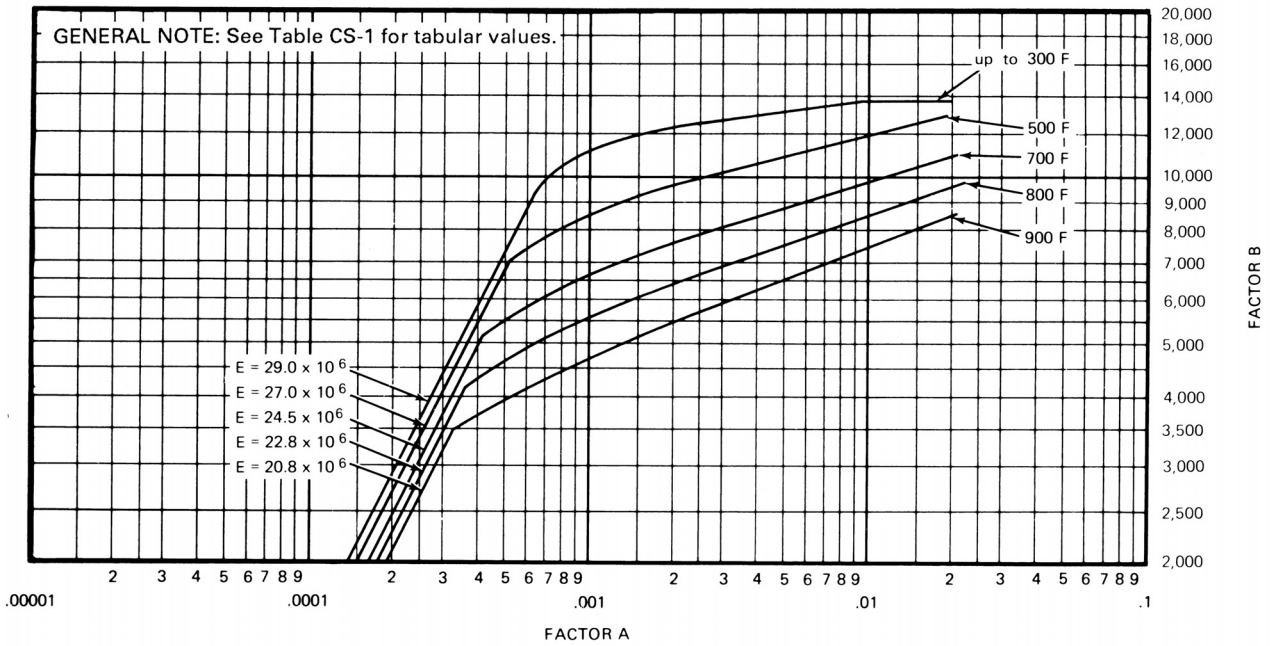


Figure G
Geometric Chart for Components Under External or Compressive Loadings (for All Materials) (Cont'd)



GENERAL NOTE: Extrapolation is not permitted except as explicitly allowed by the Construction Code.

Figure CS-1
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Carbon or Low Alloy Steels With Specified Minimum Yield Strength Less Than 30,000 psi

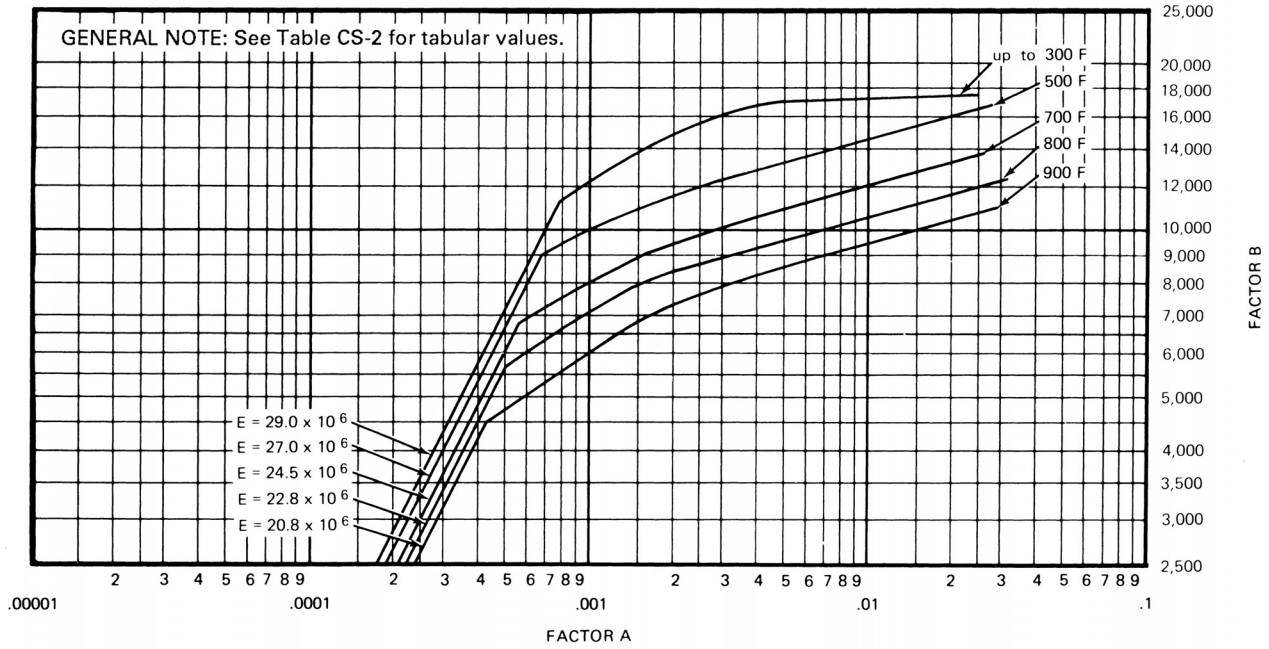


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure CS-2
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Carbon or Low Alloy Steels With Specified Minimum Yield Strength 30,000 psi and Higher

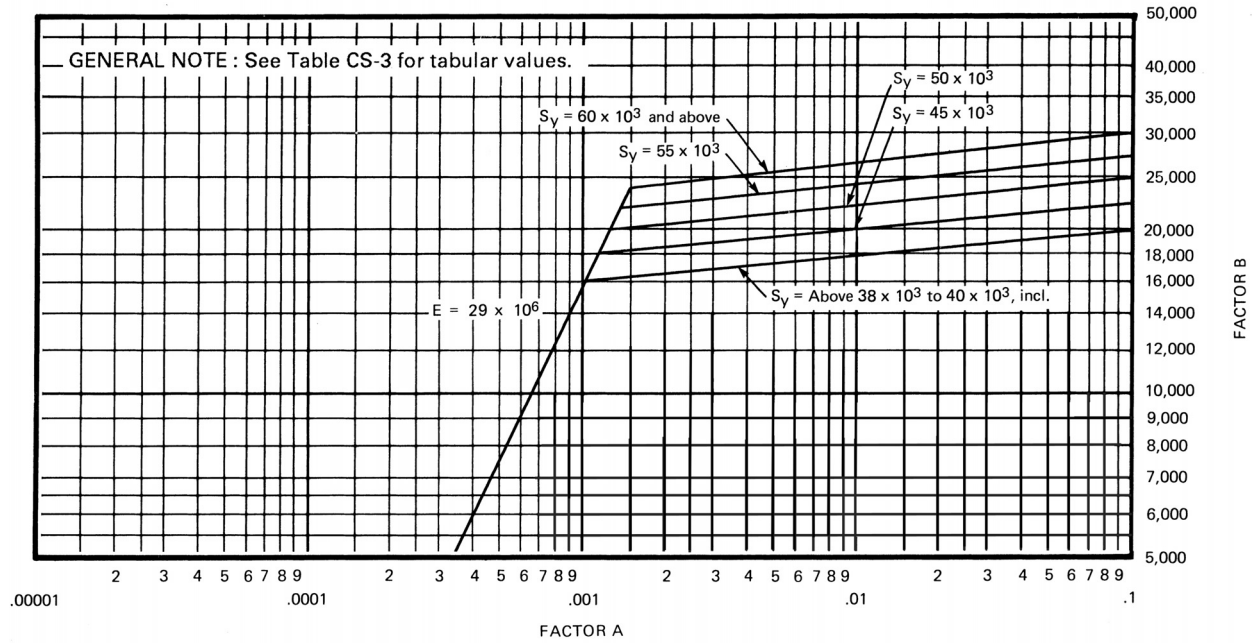


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure CS-3
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Carbon Steel and Low Alloy Steels With Specified Minimum Yield Strength 38,000 psi and Higher for Temperatures 300°F and Less



GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

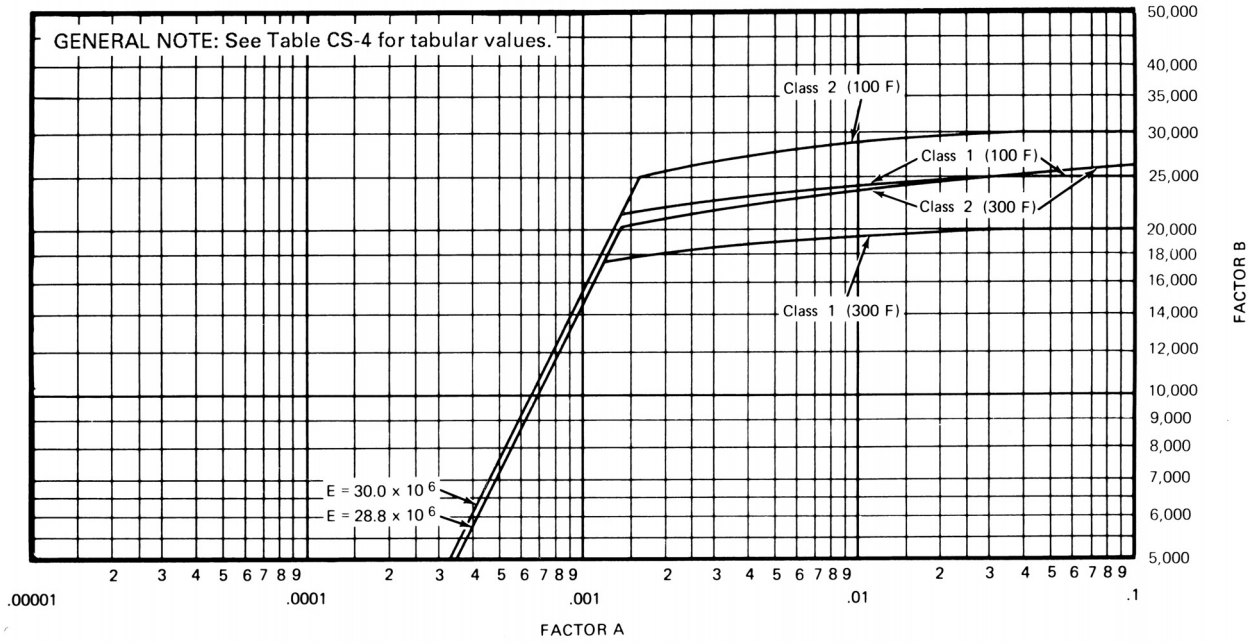
(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

(c) See Table Y-1 for values of yield strength at design temperature.

(d) When Table Y-1 yield strength values at design temperature are less than 38,000 psi for the material covered by this chart, Figure CS-2 shall be used.

(e) These curves shall not be used for design temperature above 300°F. Above 300°F, use the appropriate temperature curve shown in Figure CS-2.

Figure CS-4
Chart for Determining Shell Thickness of Components Under External Pressure Developed for SA-537 Thickness 2½ in. and Less

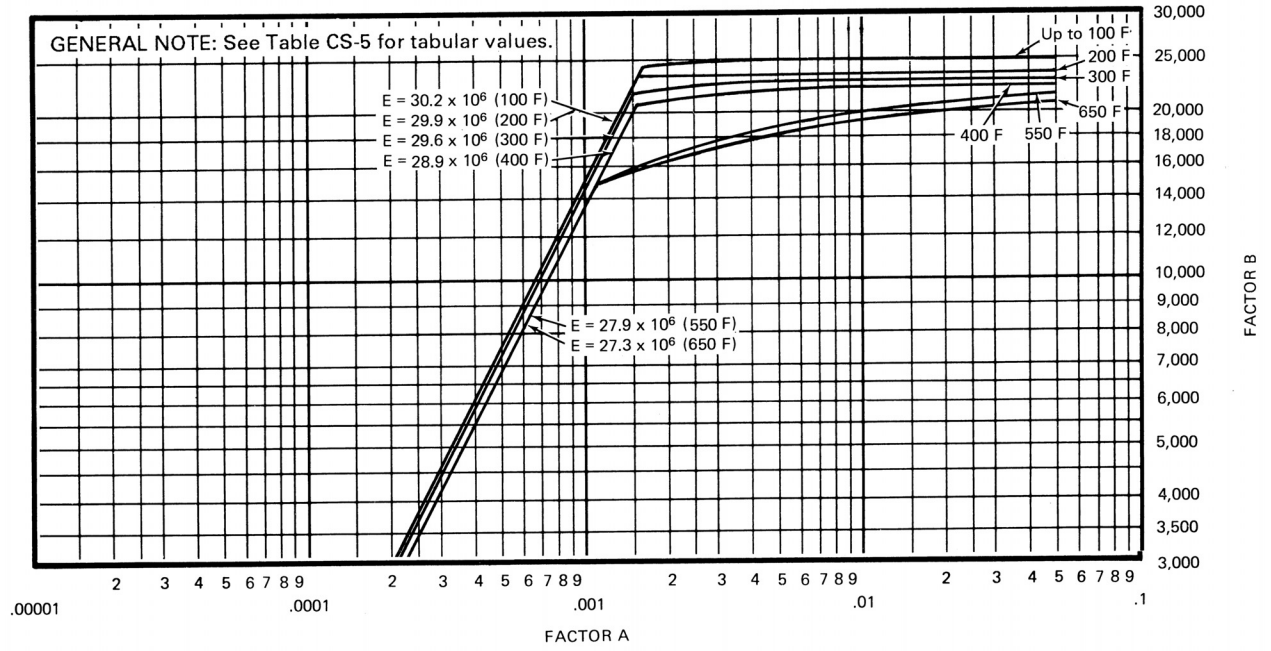


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure CS-5
Chart for Determining Shell Thickness of Components Under External Pressure Developed for SA-508 Class 1, Grades 2 and 3; SA-508 Class 2, Grade 2; SA-533 Class 1, Grades A, B, C, and D; SA-533 Class 2, Grades A, B, C, and D; or SA-541 Grades 2 and 3

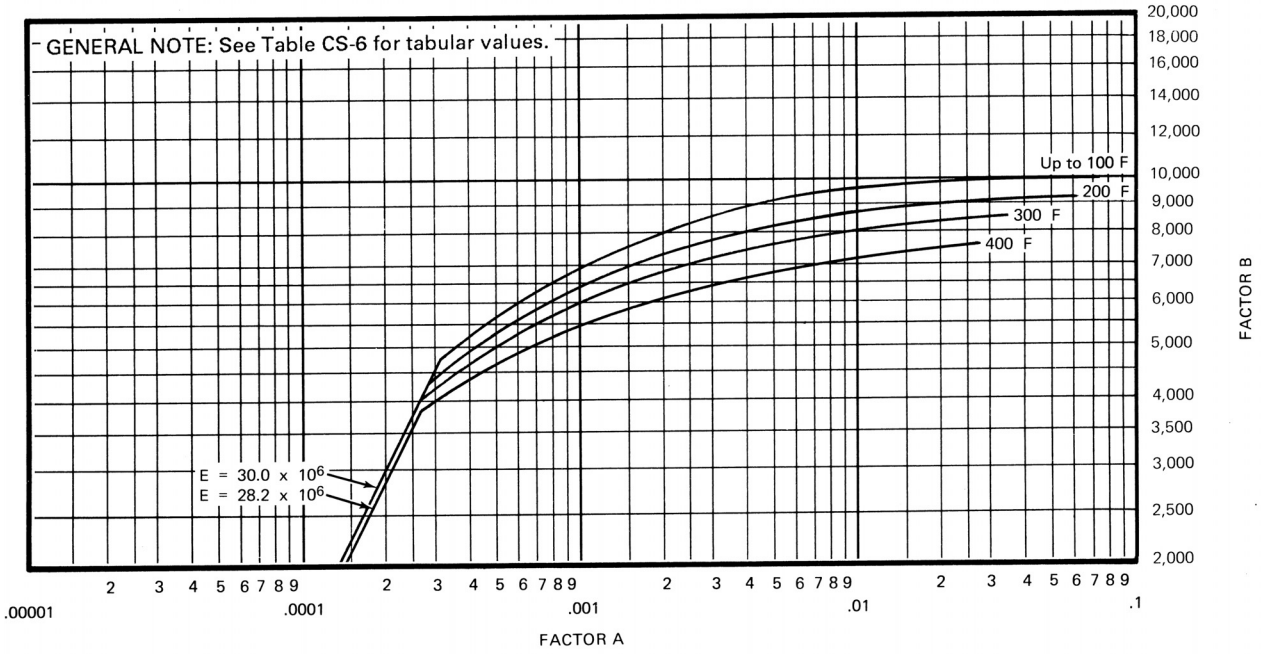


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure CS-6
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Carbon Steel With Specified Minimum Yield Strength of 20,000 psi

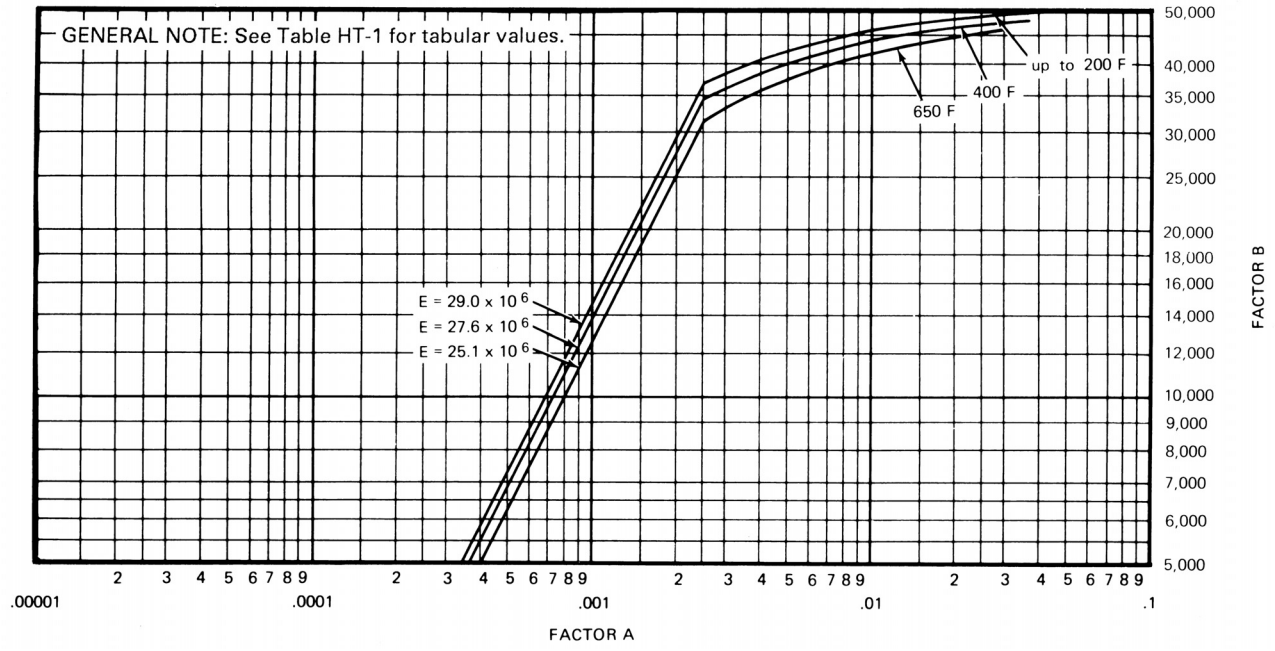


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure HT-1
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Quenched and Tempered Low Alloy Steel With Specified Minimum Yield Strength of 100,000 psi and Thickness $2\frac{1}{2}$ in. and Less

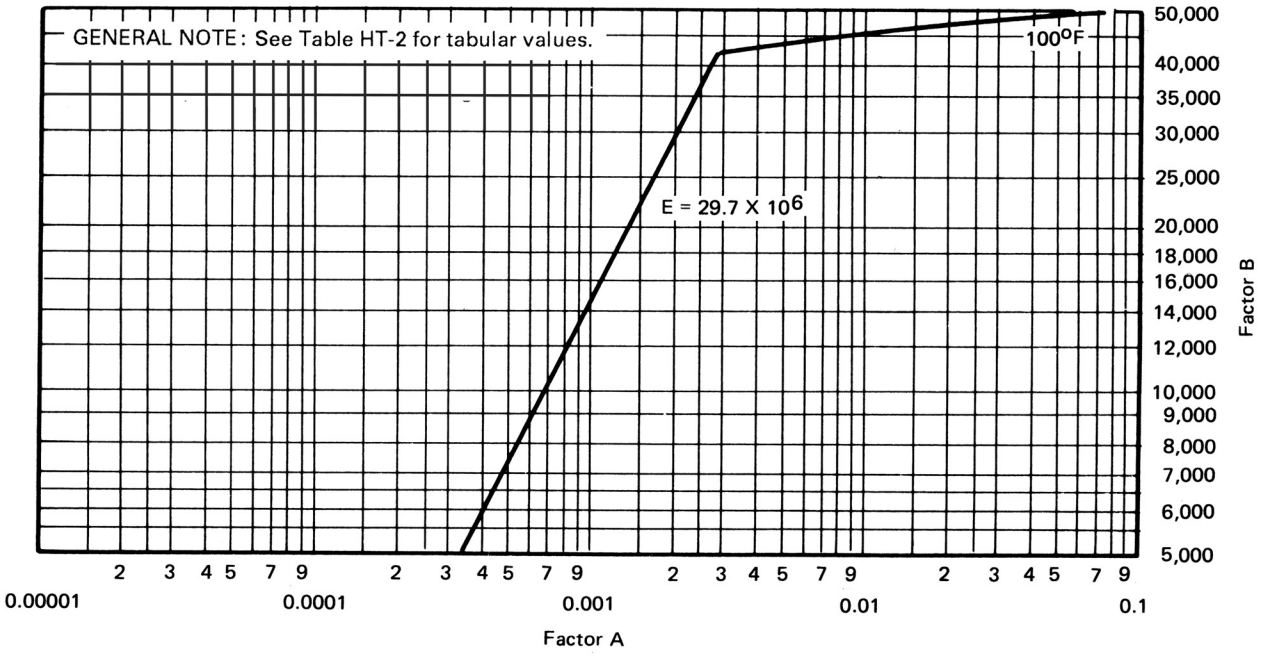


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure HT-2
Chart for Determining Shell Thickness of Components Under External Pressure Developed for SA-508 Grade 4N, Class 2 or SA-543 Types B and C, Class 2 With Specified Minimum Yield Strength of 100,000 psi



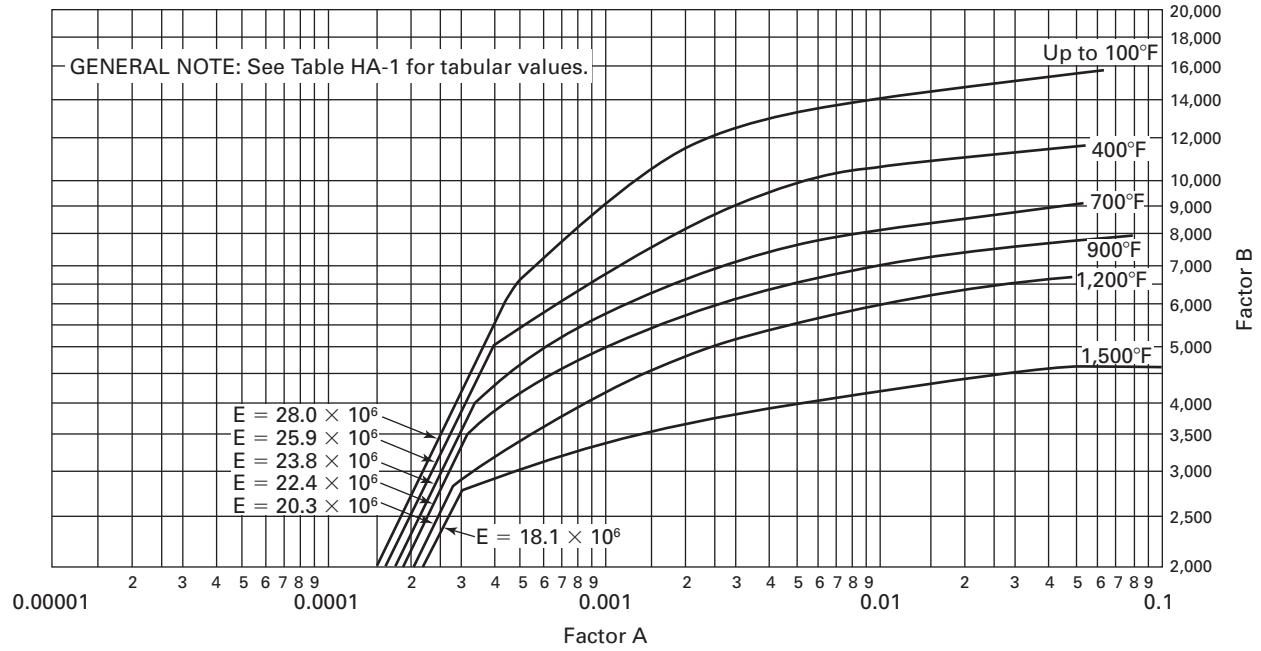
GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

(c) For temperatures over 100°F, use Figure CS-2.

Figure HA-1
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Austenitic Steel 18Cr–8Ni, Type 304

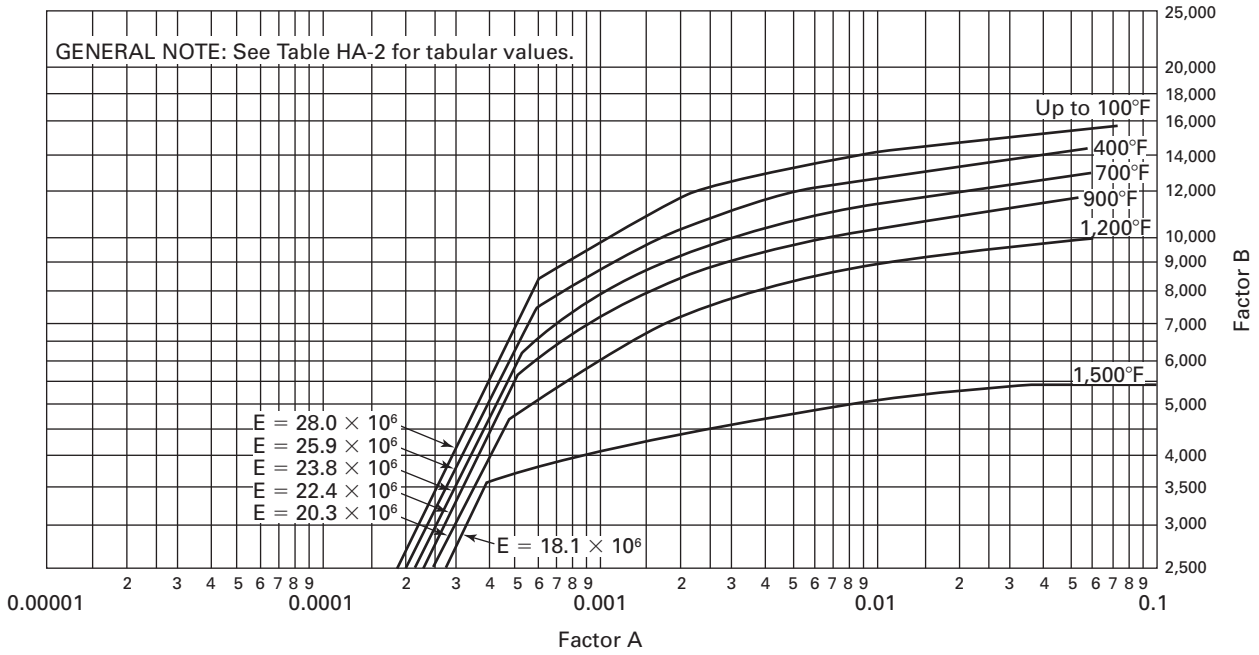


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure HA-2
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Austenitic Steel 16Cr–12Ni–2Mo, Type 316

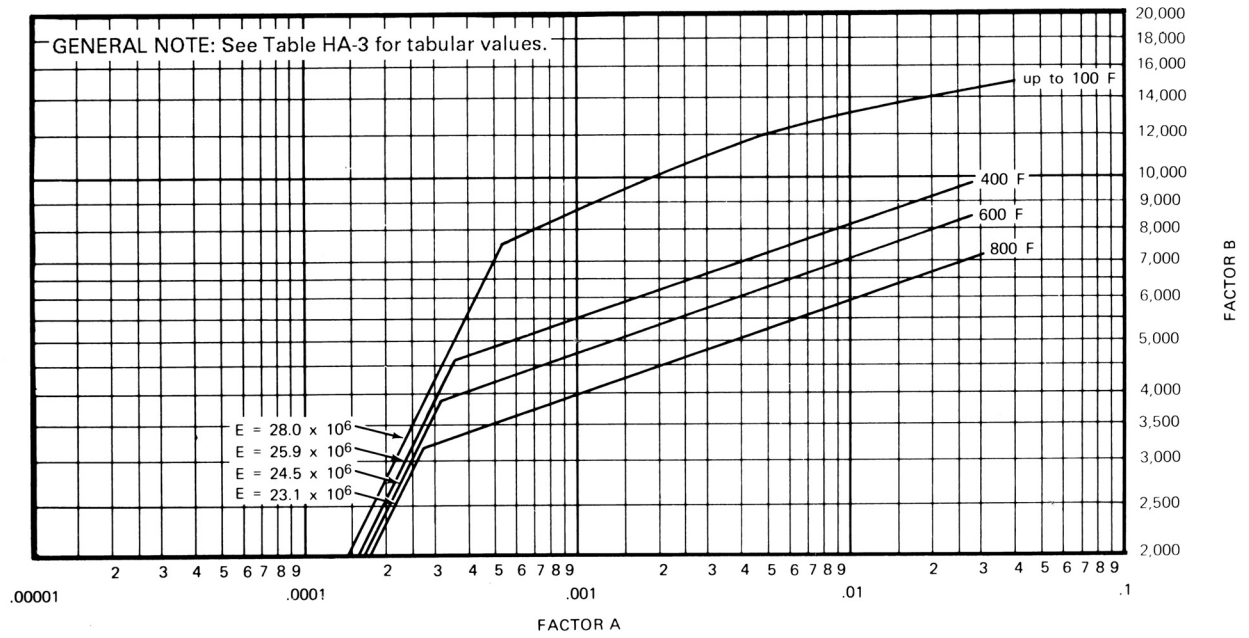


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure HA-3
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Austenitic Steel 18Cr–8Ni–0.035 Maximum Carbon, Type 304L

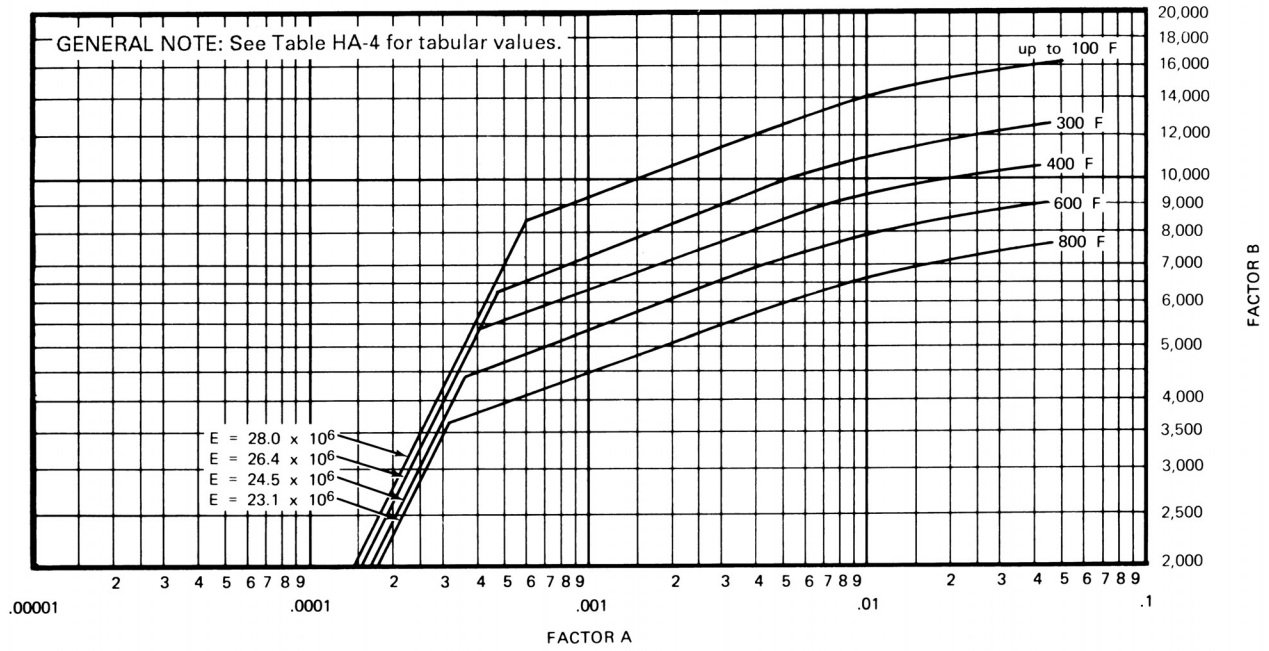


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure HA-4
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Austenitic Steel 18Cr–8Ni–Mo–0.035 Maximum Carbon, Type 316L



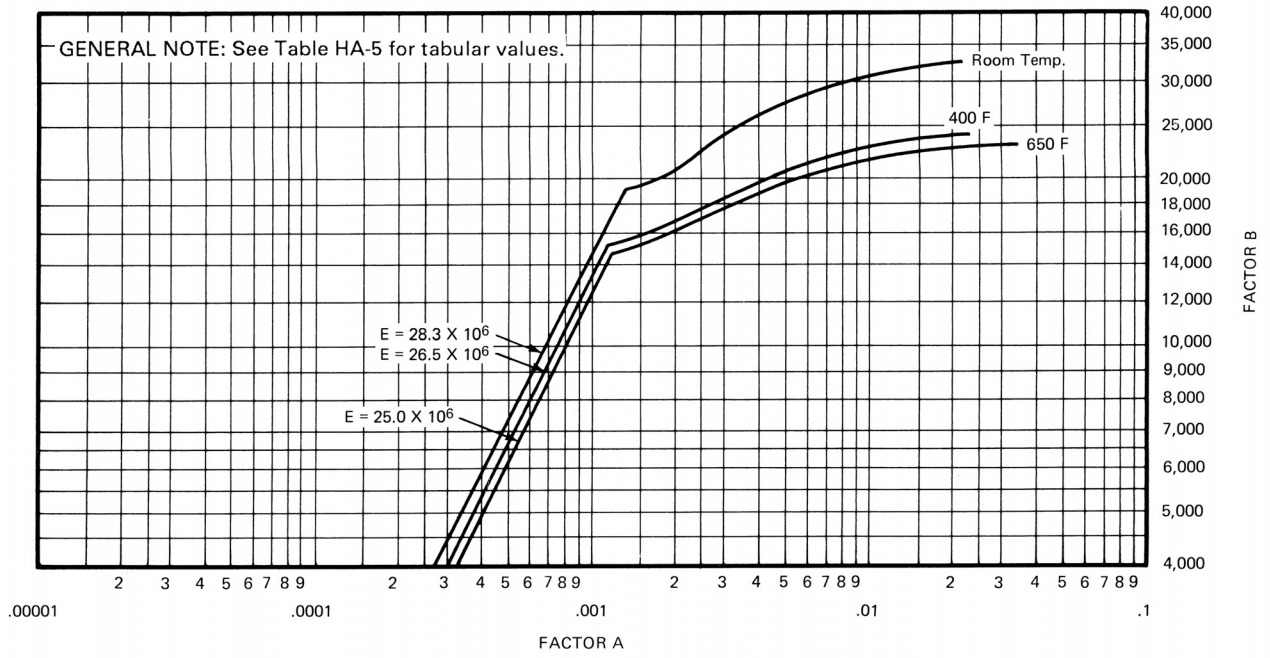
GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

(21)

Figure HA-5
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Austenitic–Ferritic Steel 18Cr–5Ni–3Mo S31500 and Austenitic–Ferritic Steel 25Cr–6Ni–Mo–N S32053

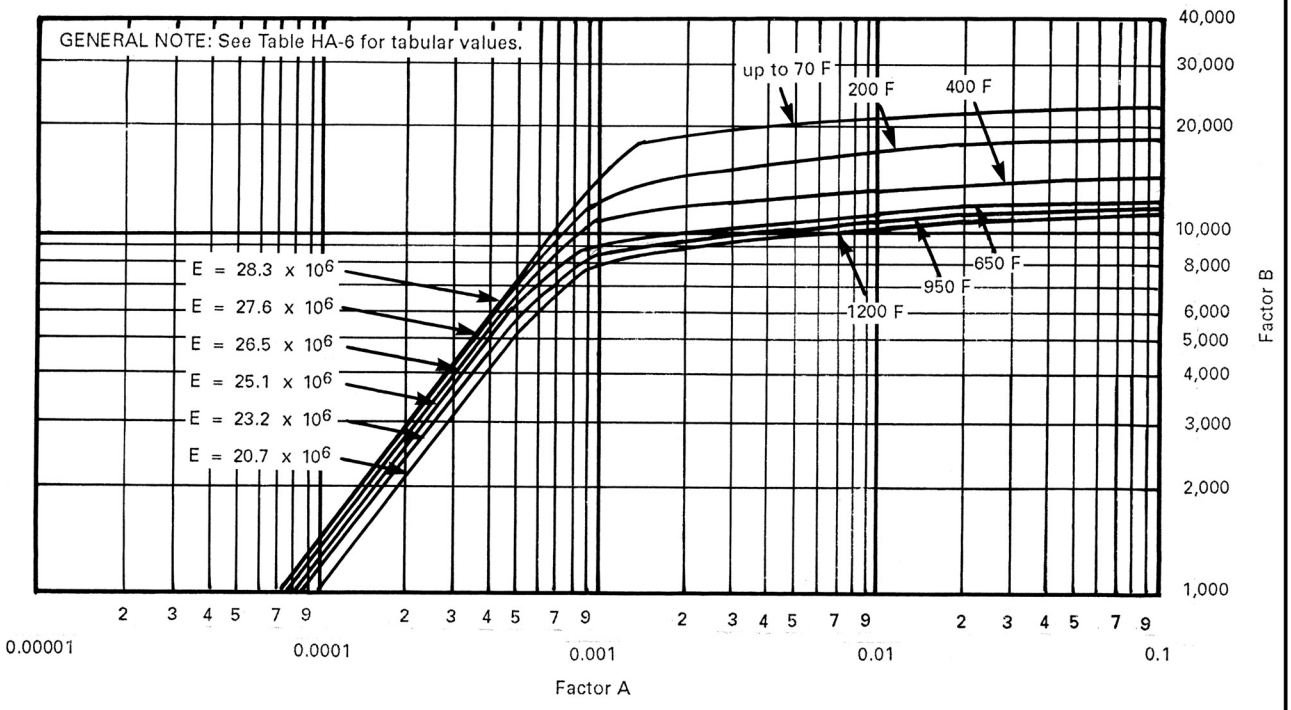


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure HA-6
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Austenitic Steel 21Cr–11Ni–N S30815



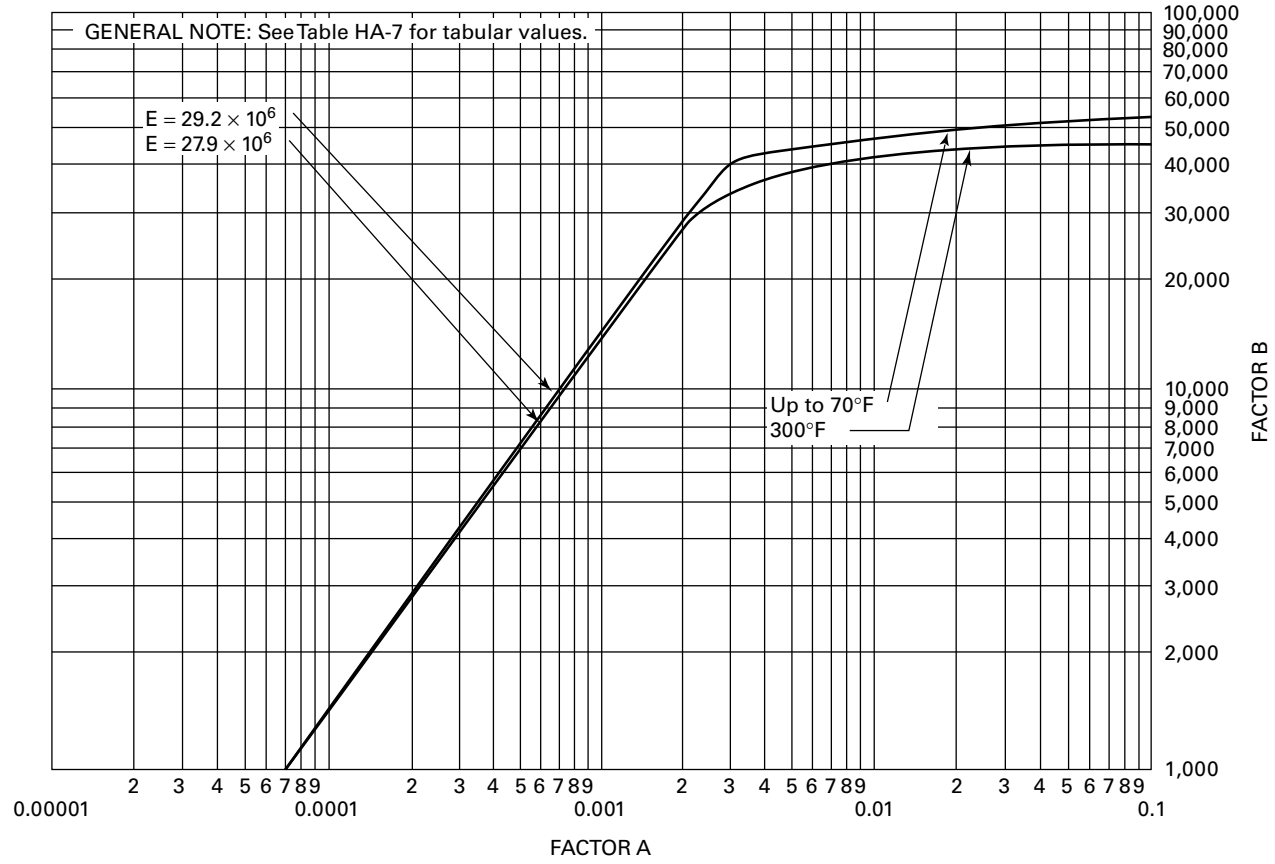
GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

(c) The external pressure chart does not account for reduction of buckling strength due to creep under long-term loads at temperatures above 1000°F.

Figure HA-7
Chart for Determining Shell Thickness of Components Under External Pressure Developed for SA-564 Type 630 H1150 (17Cr–4Ni–4Cu S17400)

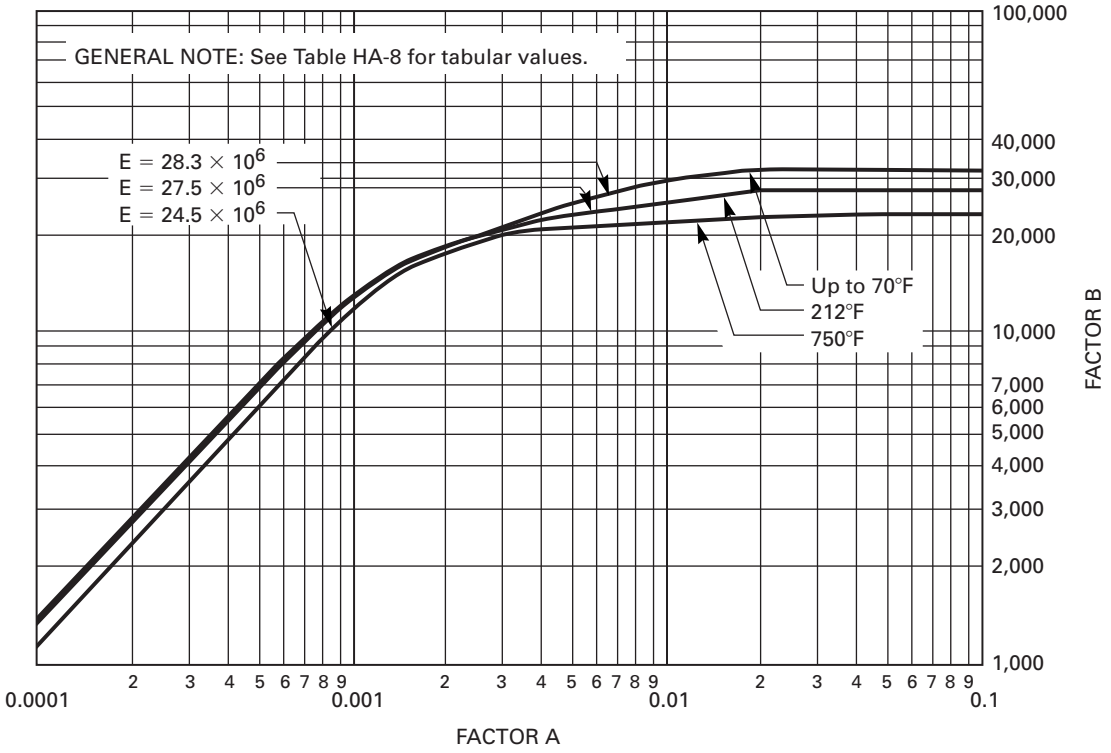


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure HA-8
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Austenitic–Ferritic Steel 25Cr–7Ni–3Mo–2W–0.28N S39274

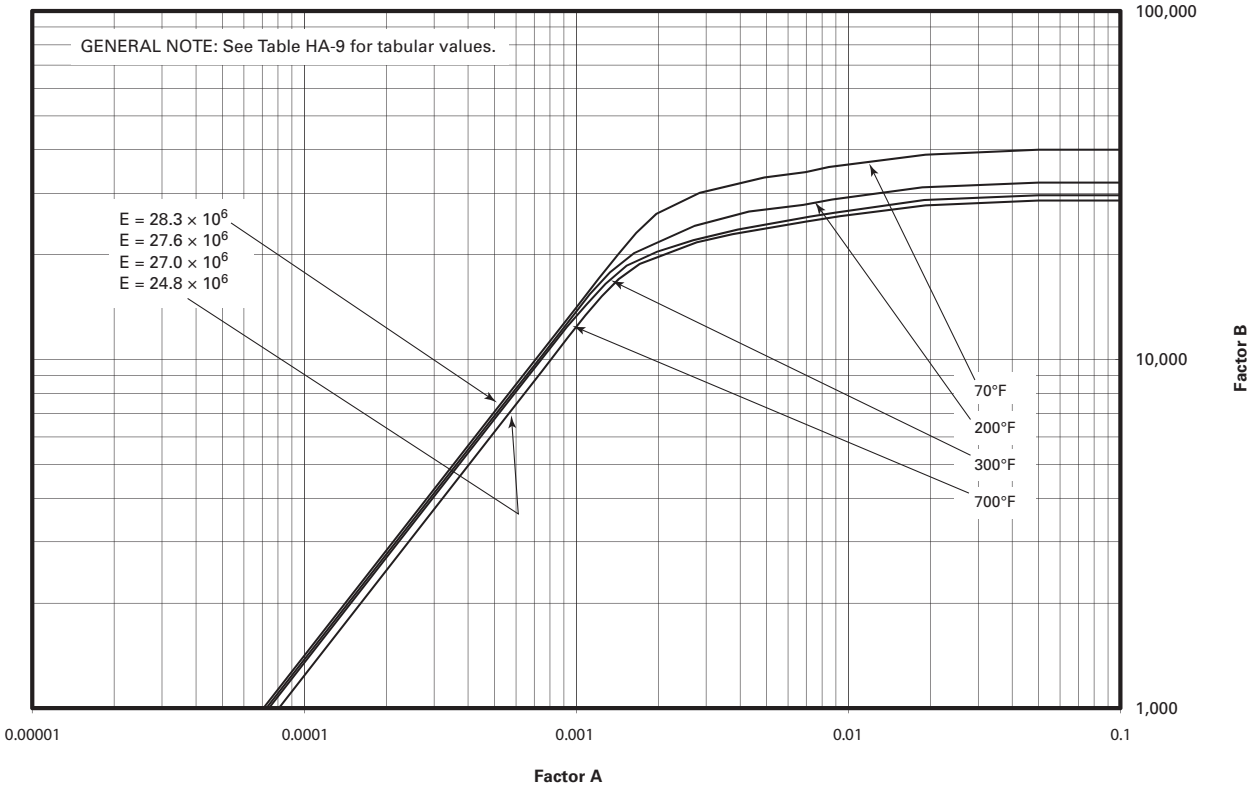


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure HA-9
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Austenitic Steel 25Cr–7.5Ni–3.5Mo–N–Cu–W S32760

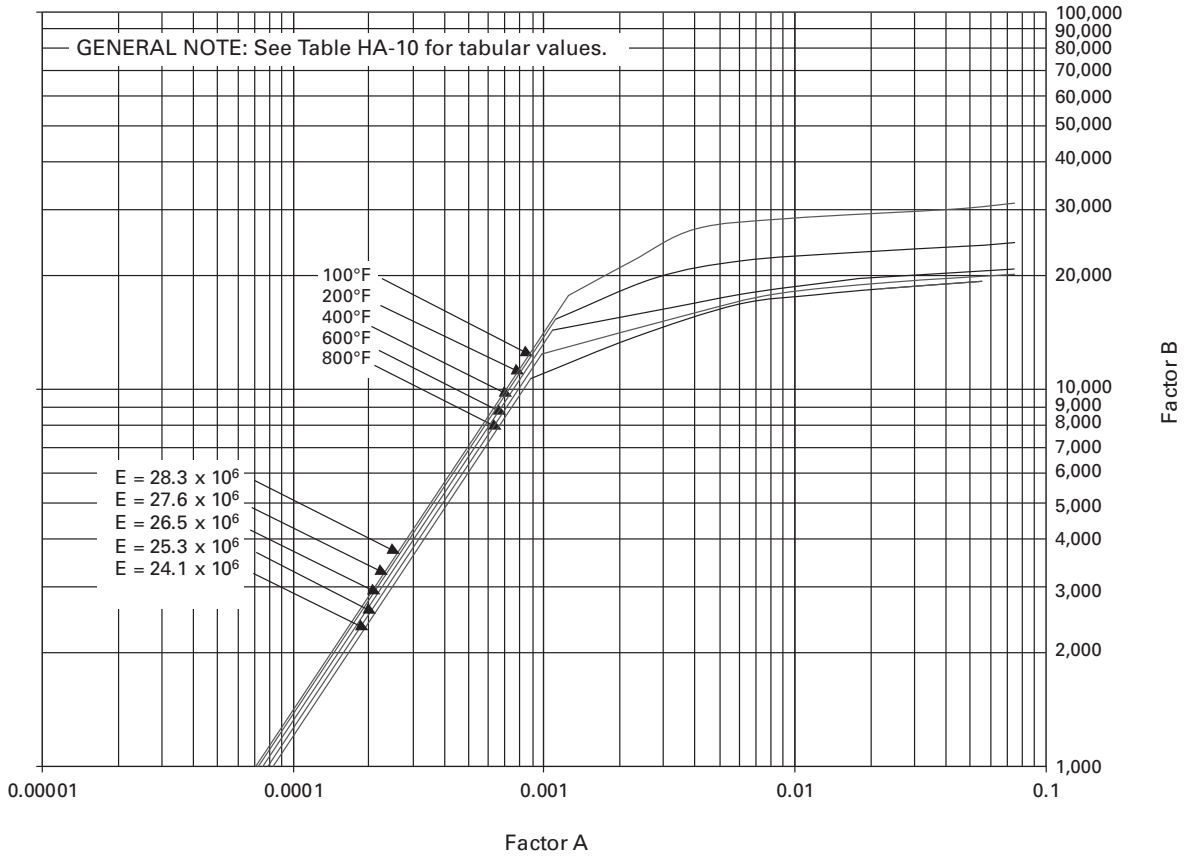


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure HA-10
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Austenitic Stainless Steel 24Cr–17Ni–6Mn–4.5Mo–N S34565

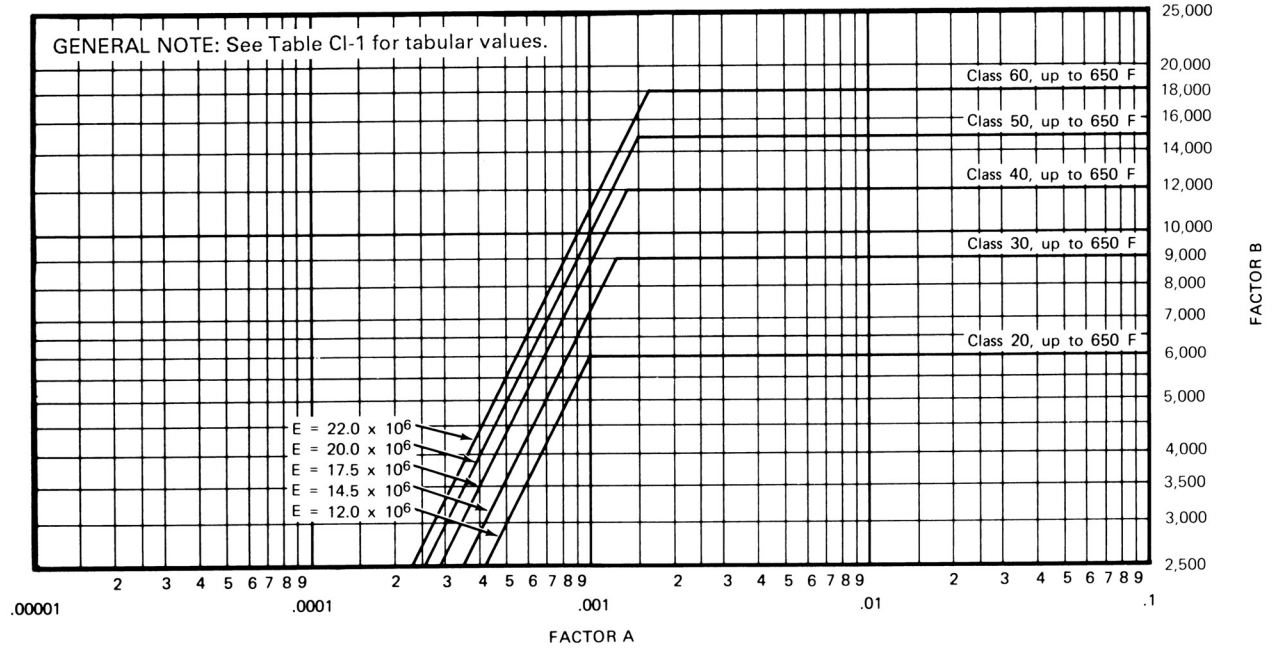


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure CI-1
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Cast Iron

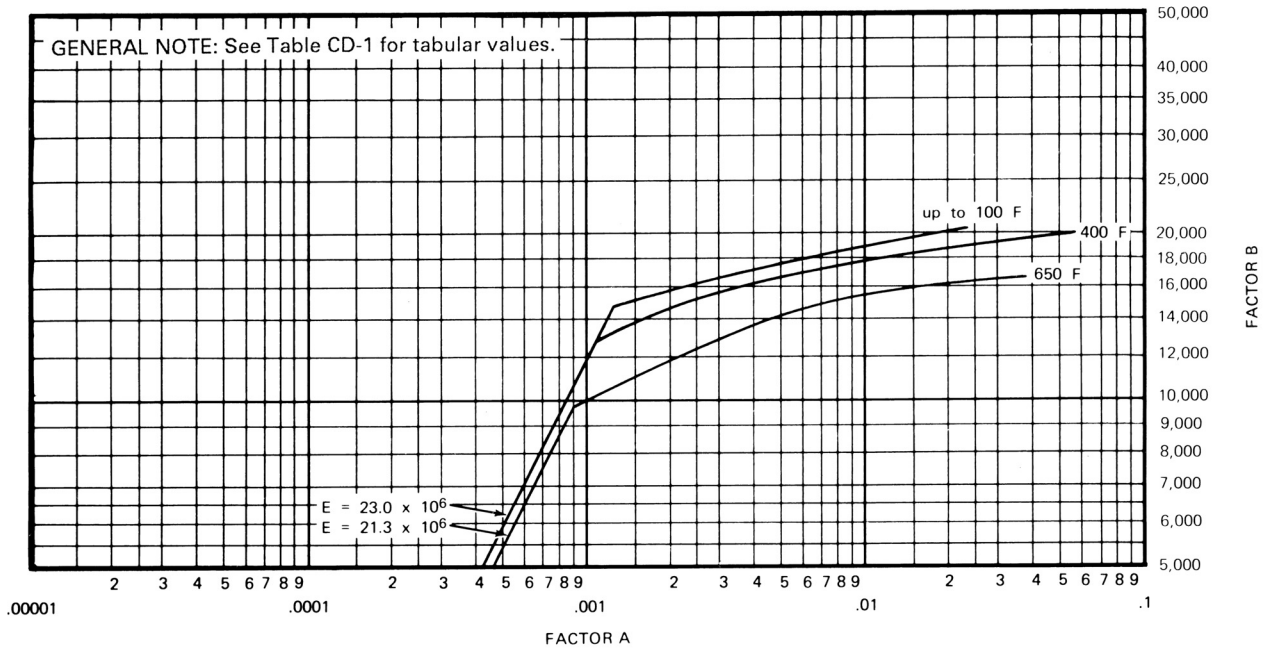


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure CD-1
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Cast Ductile Iron With a Specified Minimum Yield Strength of 40,000 psi

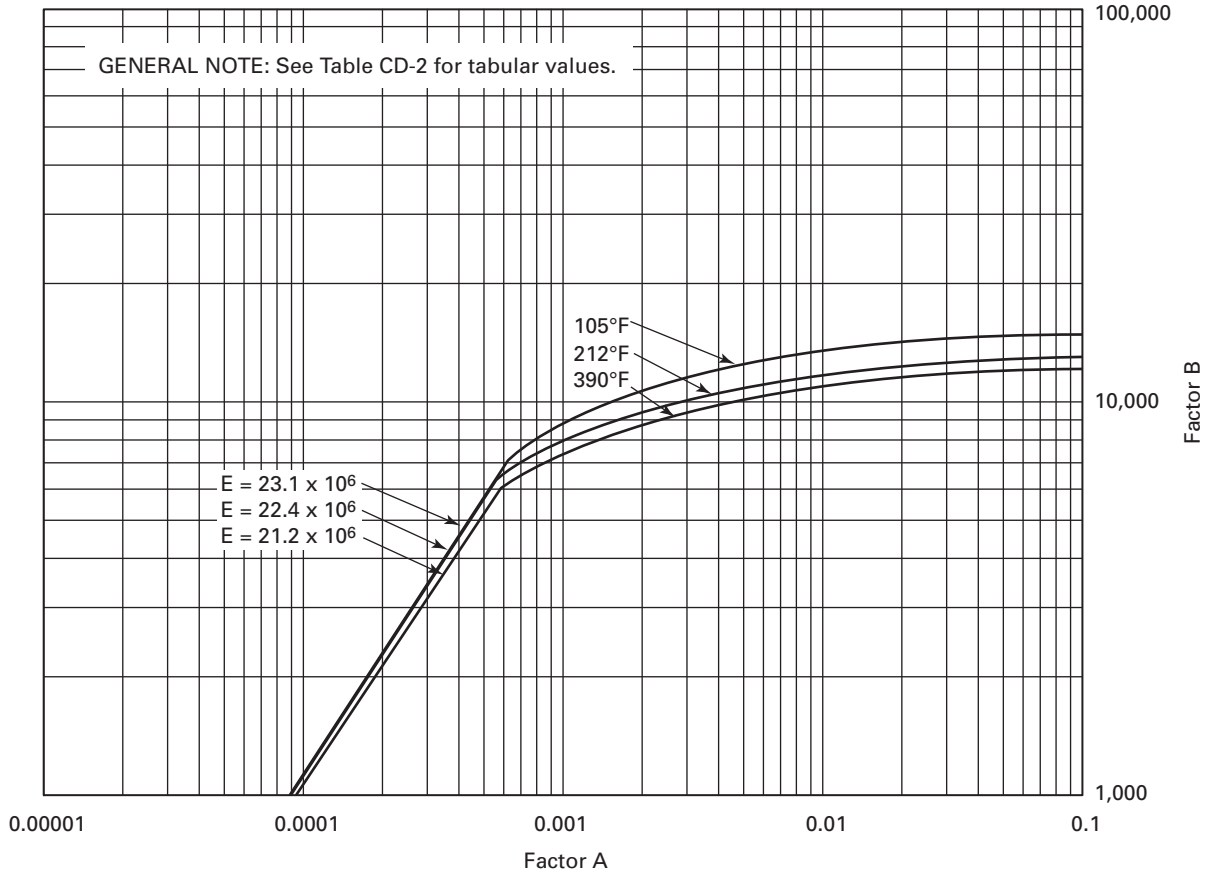


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure CD-2
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Cast Ductile Iron With a Specified Minimum Yield Strength of 29,000 psi

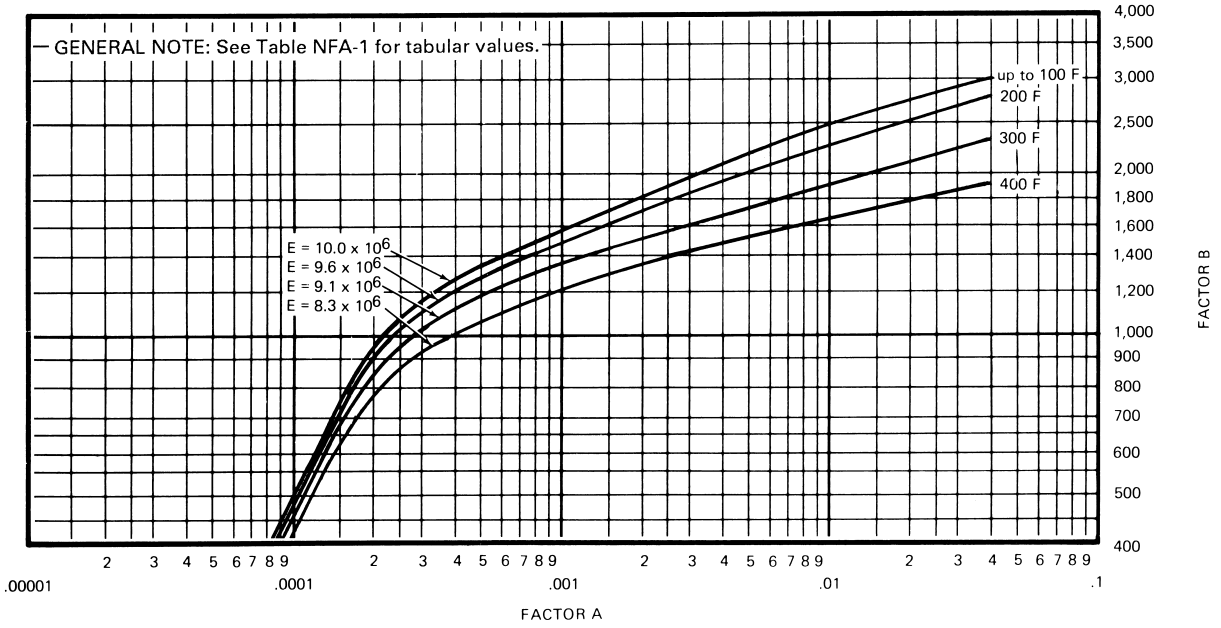


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure NFA-1
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Aluminum Alloy 3003 in O Temper



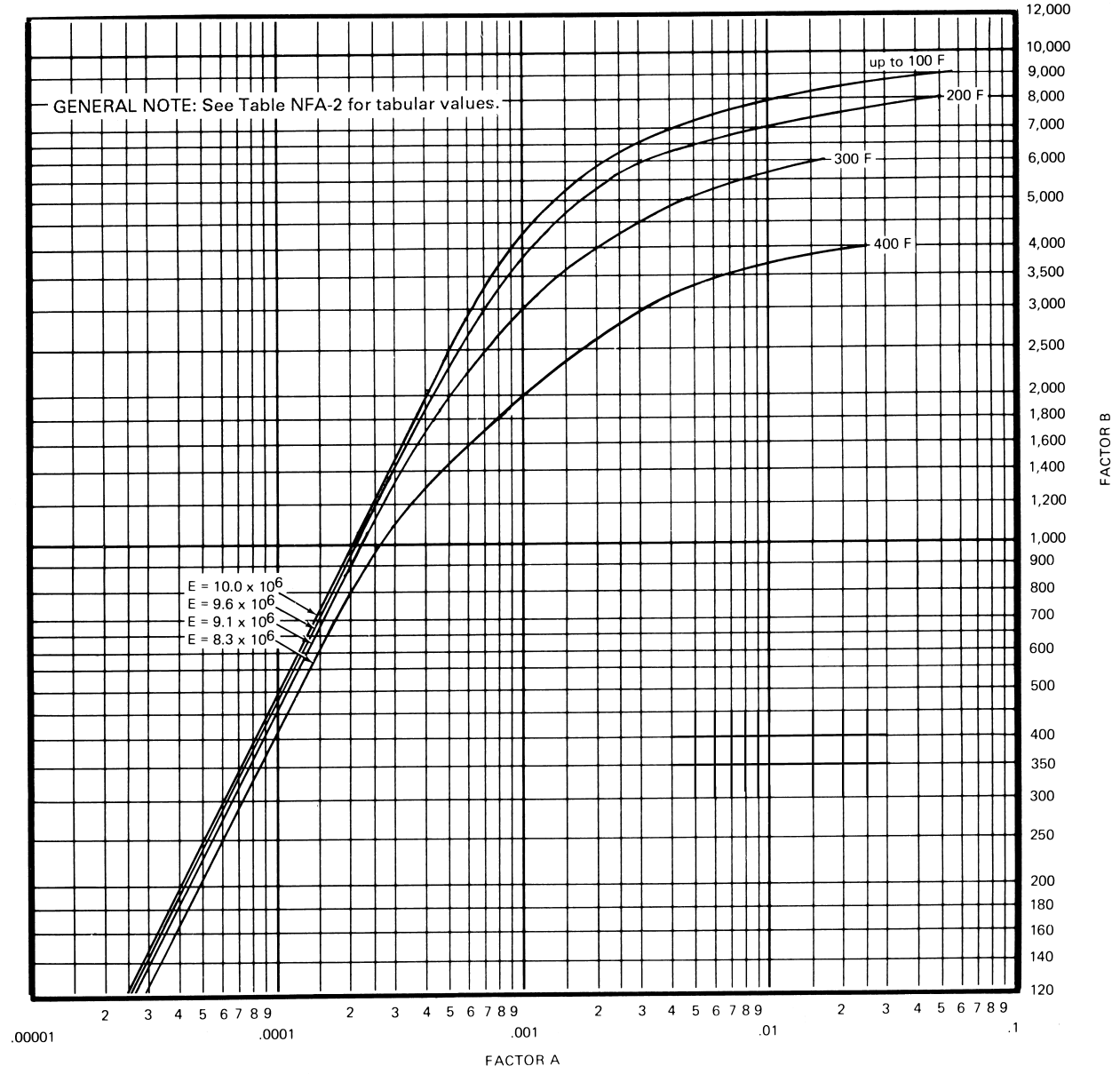
GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

(c) For Section III application, maximum use limit is 250°F, except for SB-209/3003/H112/0.250–0.499 and 0.500–3.0 in. use limits are 300°F and 200°F, respectively. Use 300°F curve for interpolation only.

Figure NFA-2
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Aluminum Alloy 3003 in H14 Temper



GENERAL NOTES:

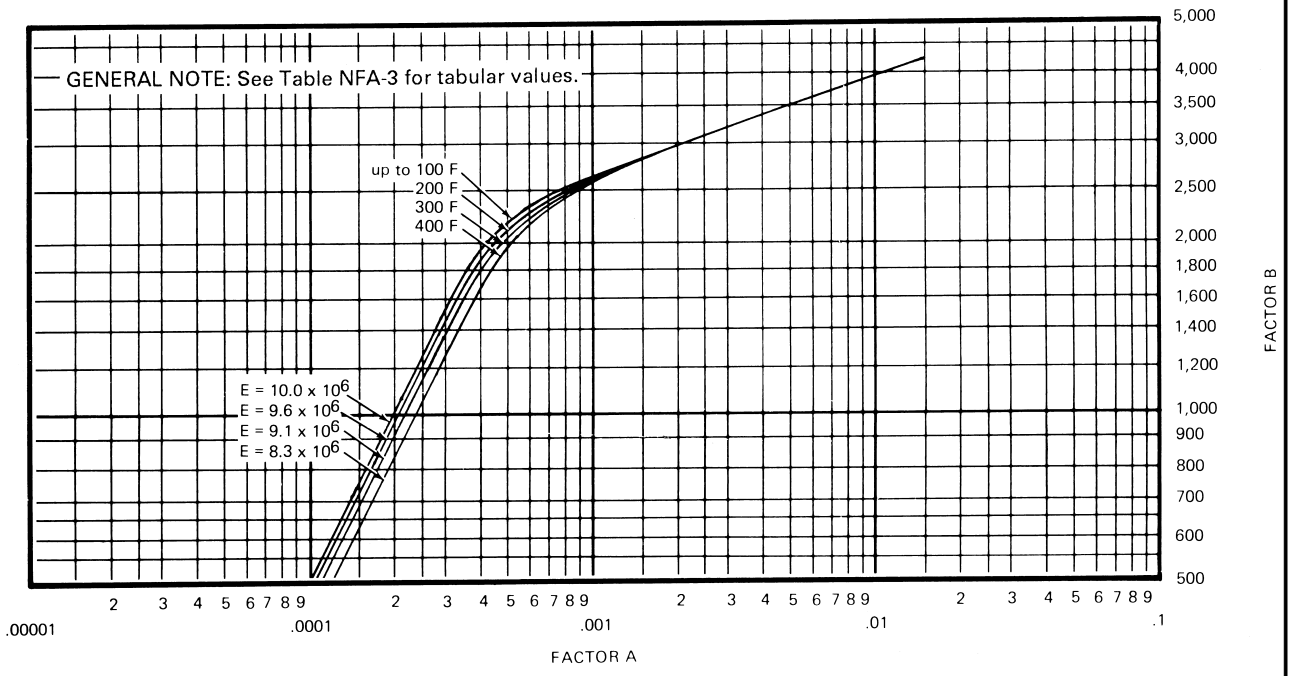
(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

(c) For Section III application, maximum use limit is 250°F, except for SB-209/3003/H112/0.250–0.499 and 0.500–3.0 in. use limits are 300°F and 200°F, respectively. Use 300°F curve for interpolation only.

(d) This chart is not to be used for welded construction.

Figure NFA-3
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Aluminum Alloy 3004 in O Temper

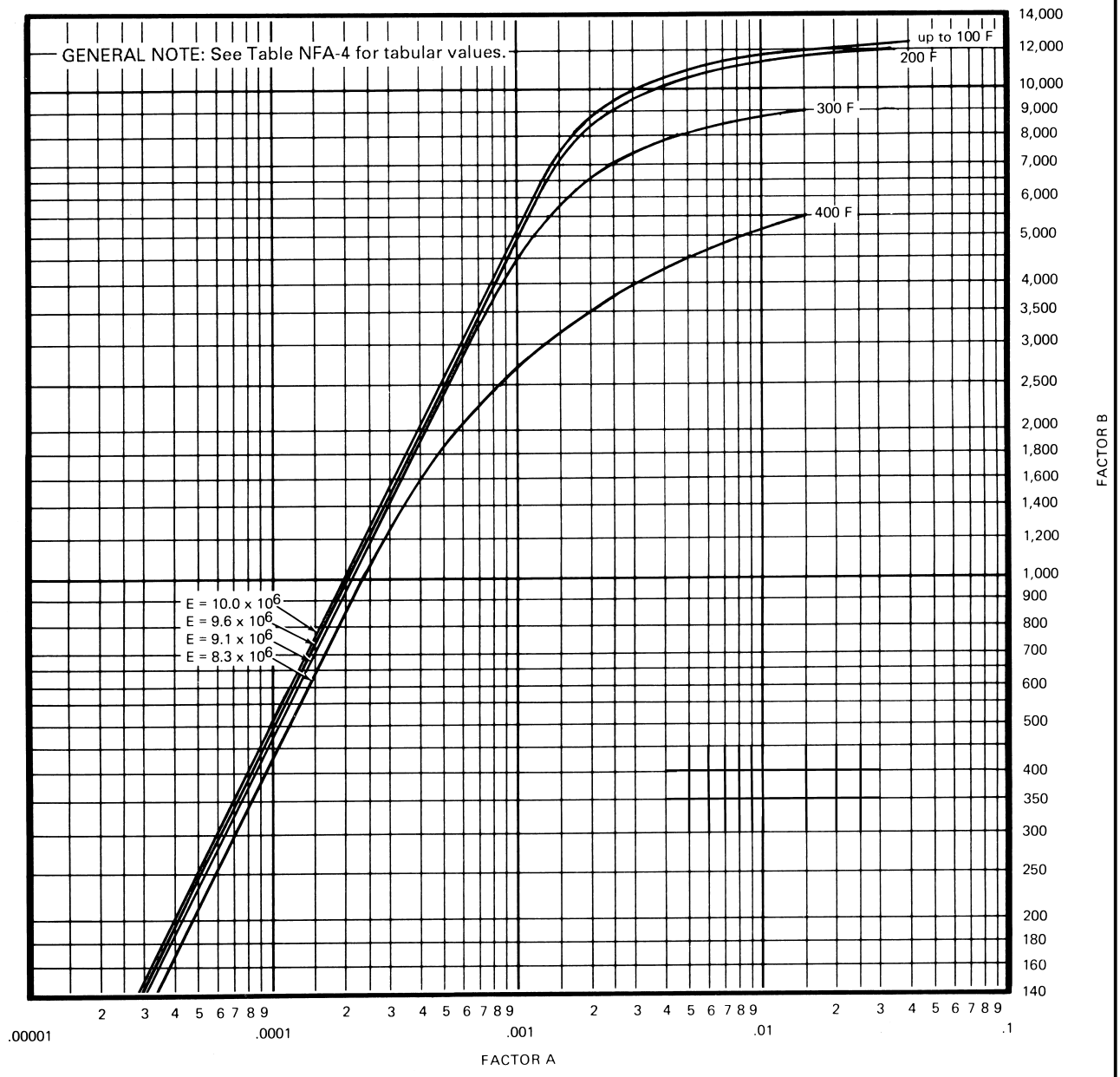


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure NFA-4
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Aluminum Alloy 3004 in H34 Temper



GENERAL NOTES:

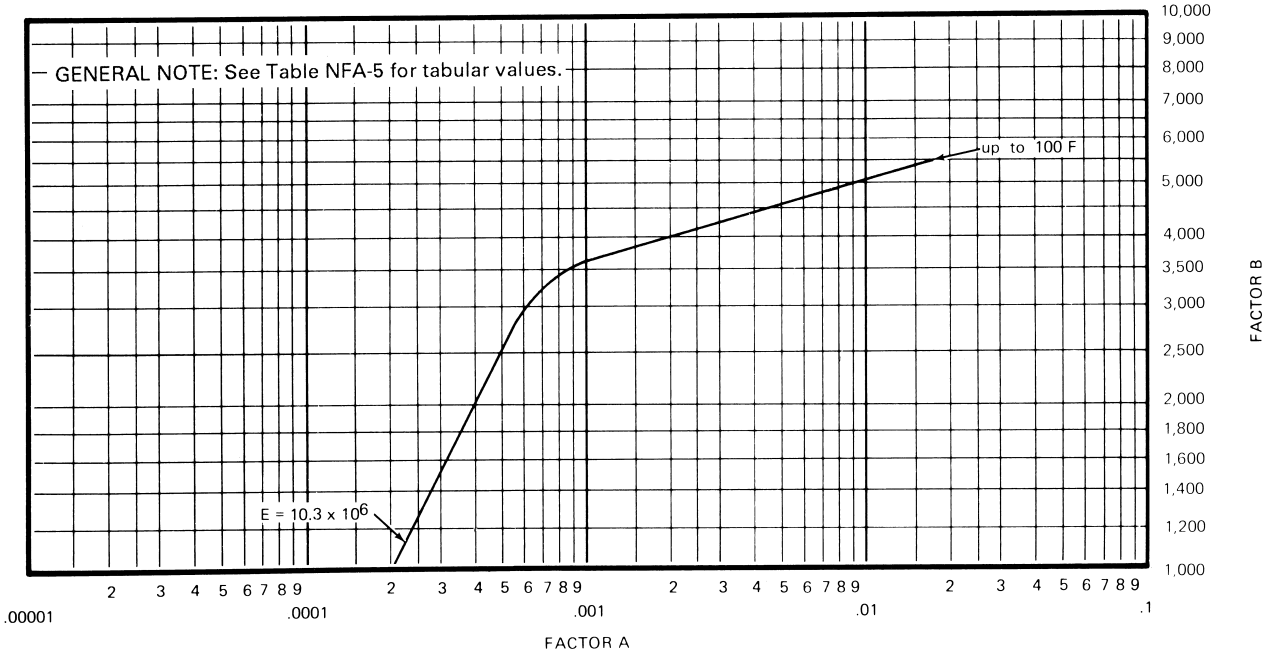
(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

(c) For Section III application, maximum use limit is 250°F, except for SB-209/3003/H112/0.250–0.499 and 0.500–3.0 in. use limits are 300°F and 200°F, respectively. Use 300°F curve for interpolation only.

(d) This chart is not to be used for welded construction.

Figure NFA-5
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Aluminum Alloy 5154 in O Temper

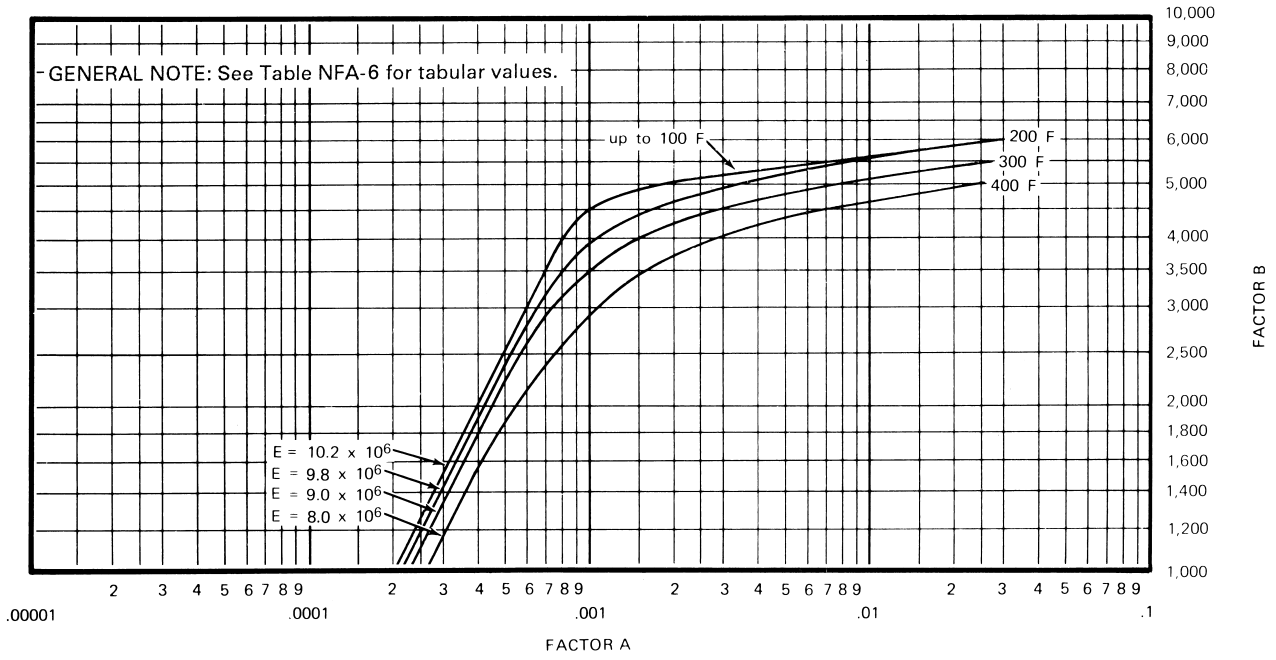


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure NFA-6
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Aluminum Alloy 5454 in O Temper

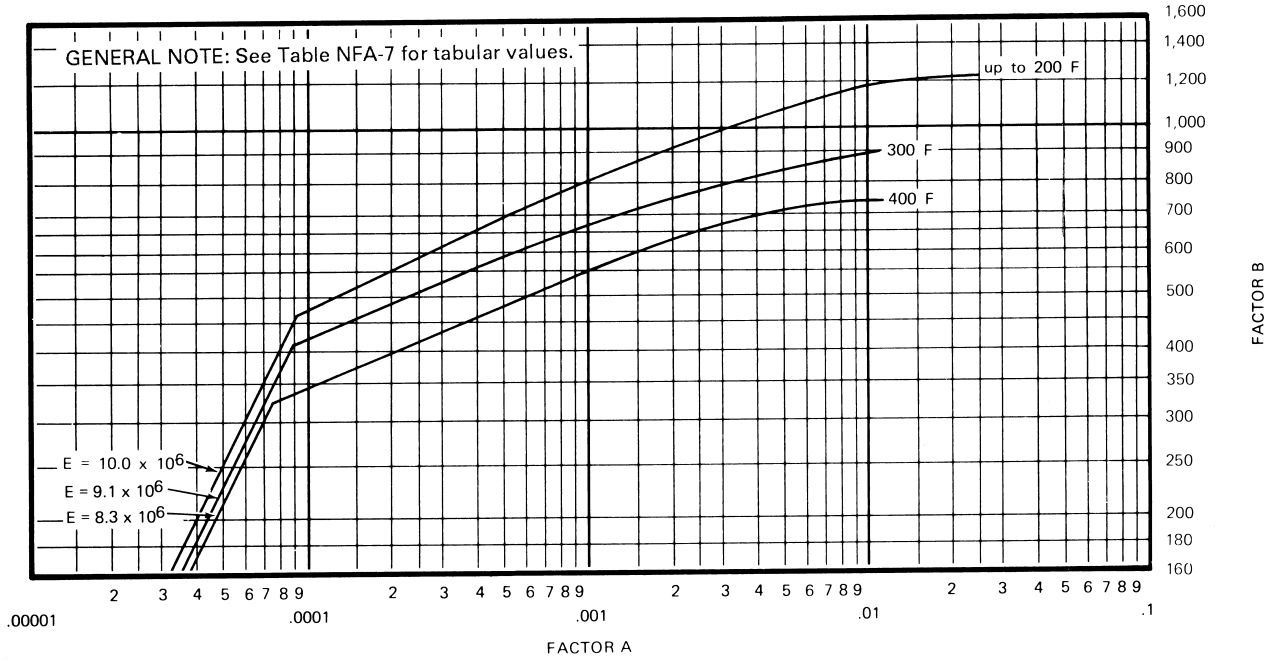


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure NFA-7
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Aluminum Alloy 1060 in O Temper

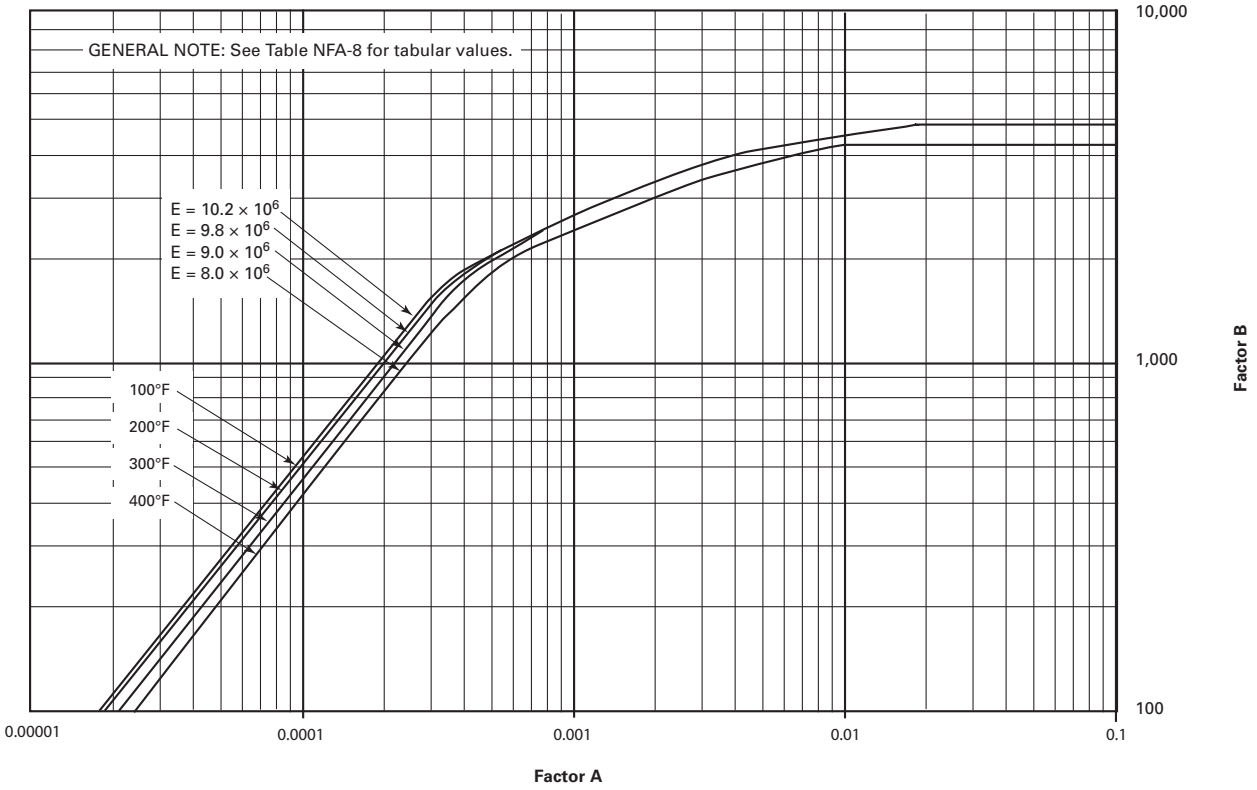


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure NFA-8
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Aluminum Alloy 5052 in O Temper



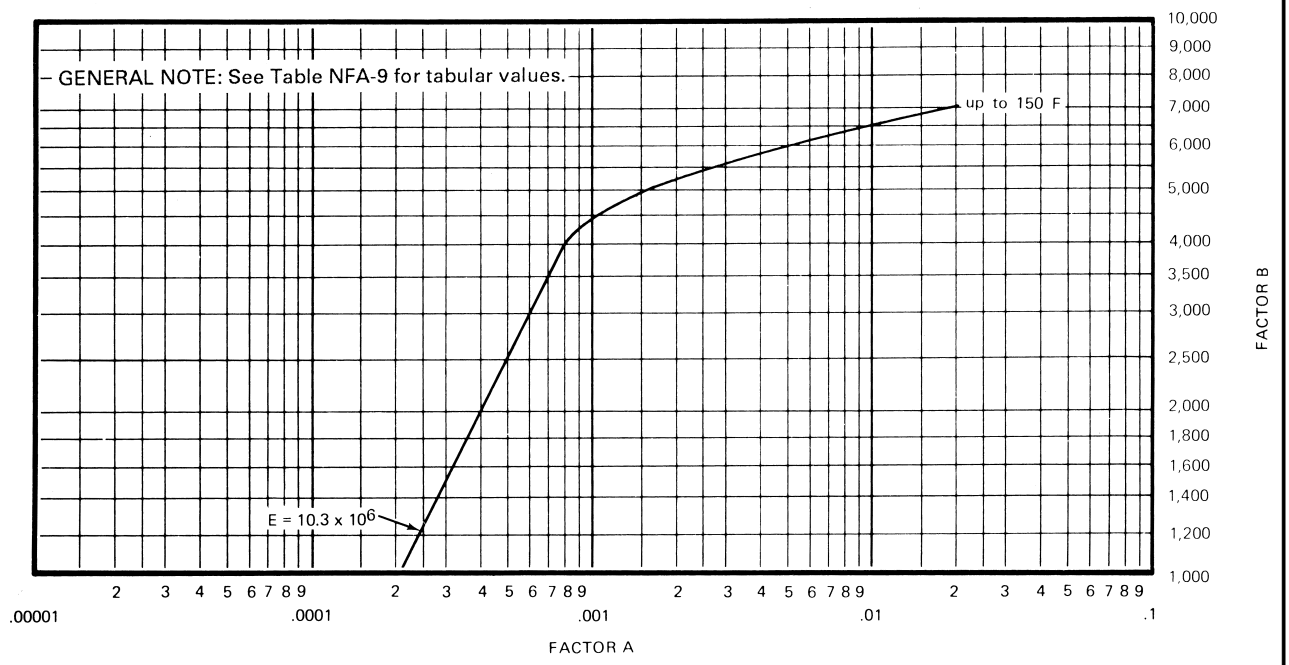
GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

(c) For Section III application, maximum use limit is 250°F, except for SB-210 use limit is 300°F. Use 300°F curve for interpolation only.

Figure NFA-9
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Aluminum Alloy 5086 in O Temper

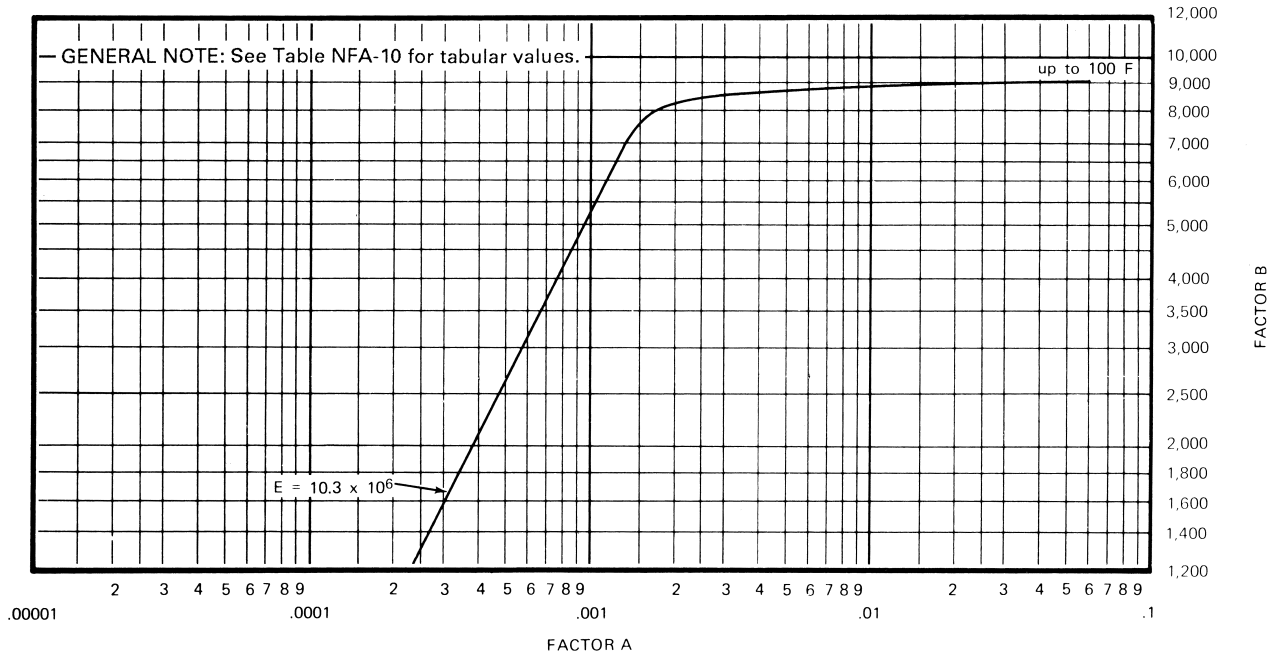


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure NFA-10
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Aluminum Alloy 5456 in O Temper

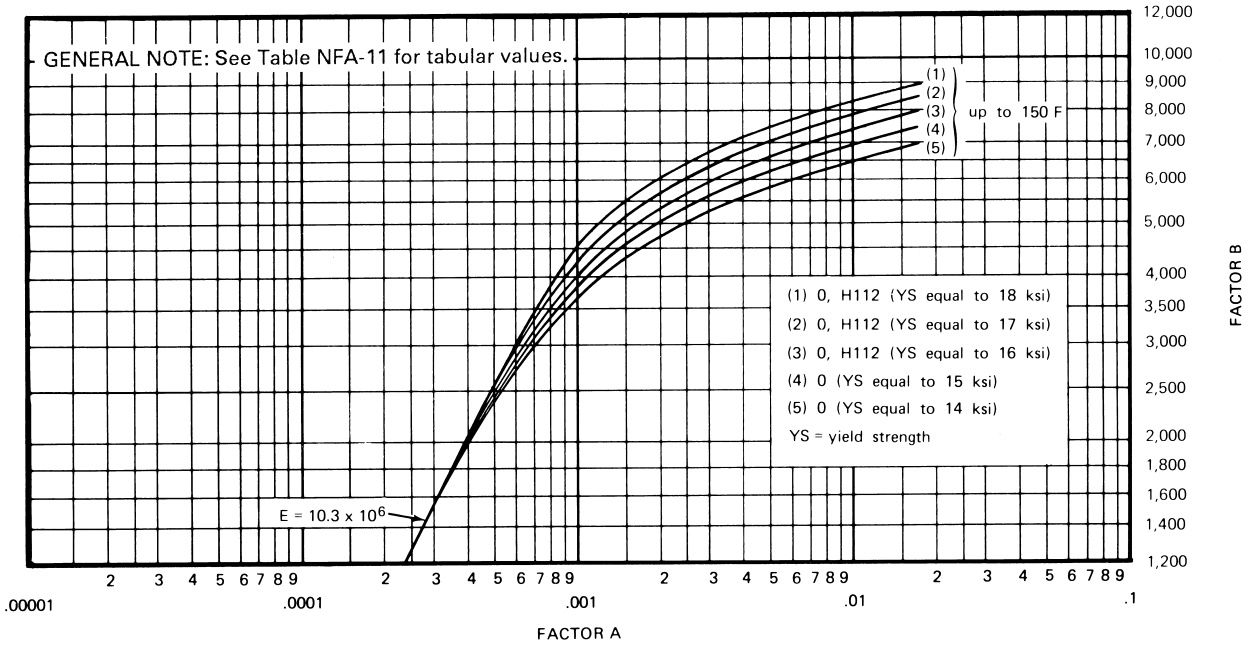


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure NFA-11
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Aluminum Alloy 5083 in O Temper

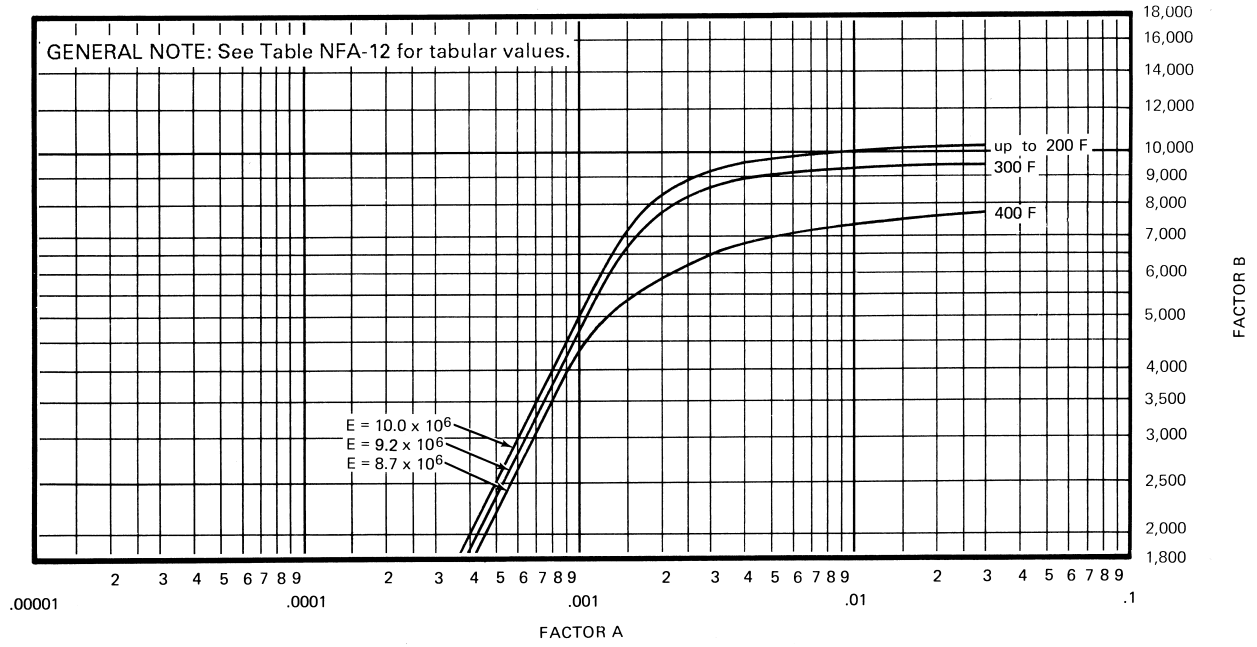


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure NFA-12
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Welded Aluminum Alloy 6061-T6

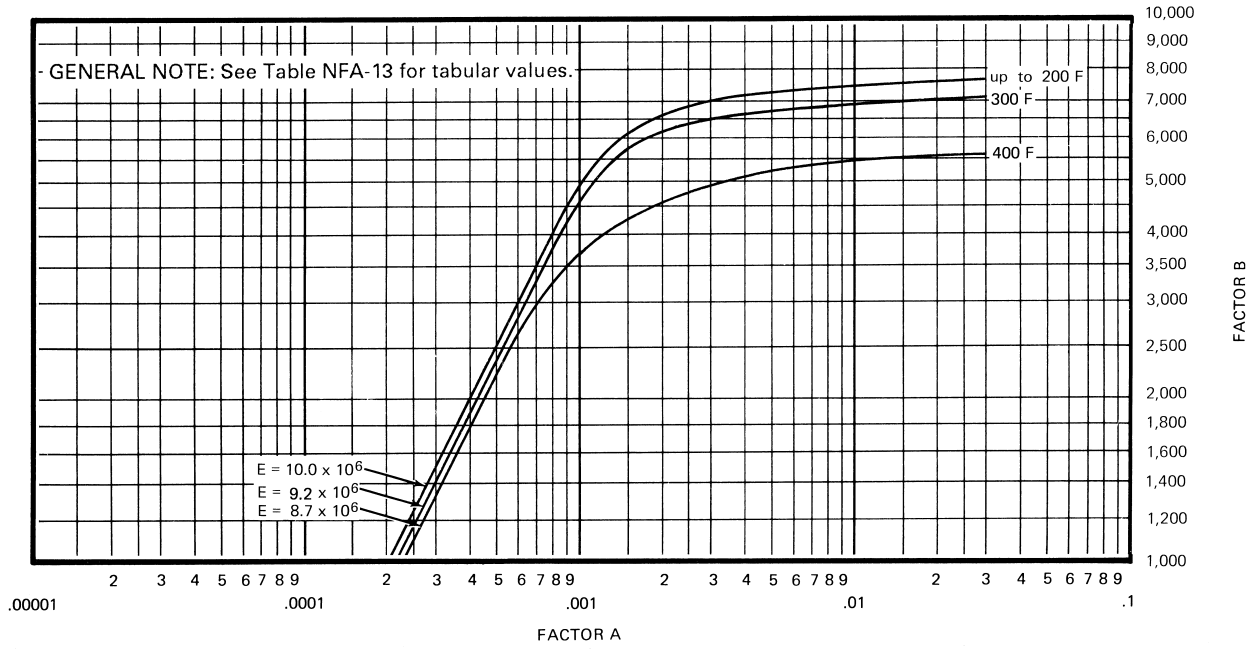


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure NFA-13
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Welded Aluminum Alloy 6061-T4

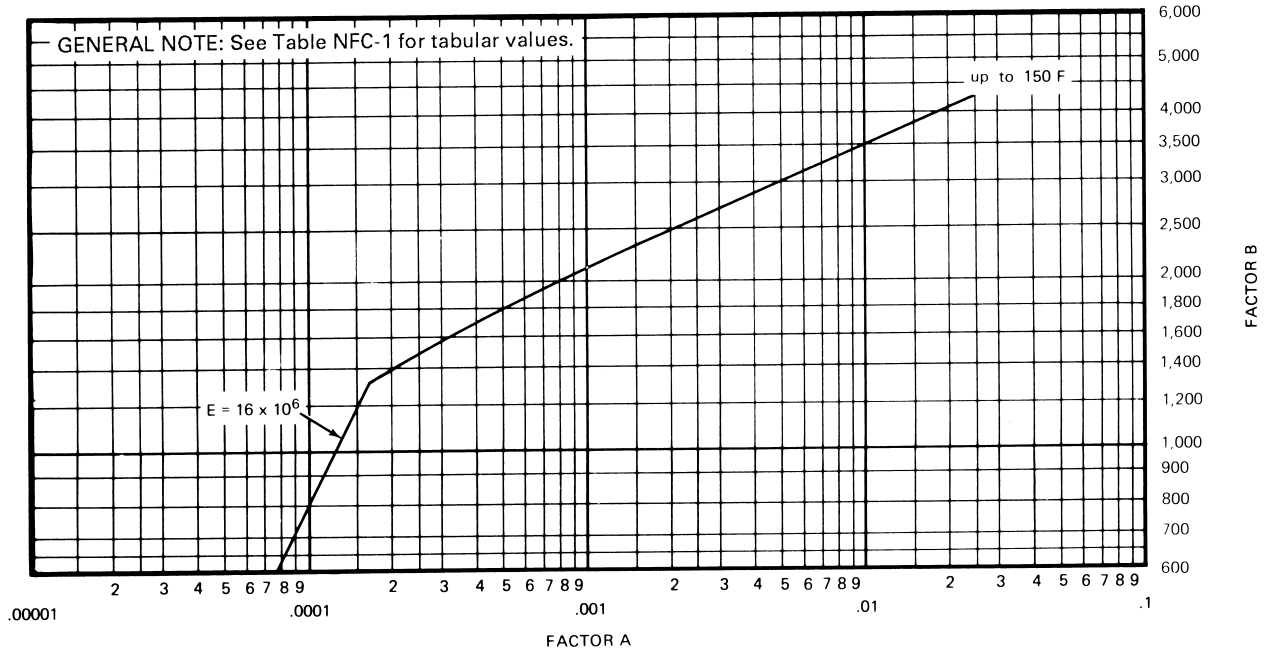


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure NFC-1
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Annealed Copper, Type DHP

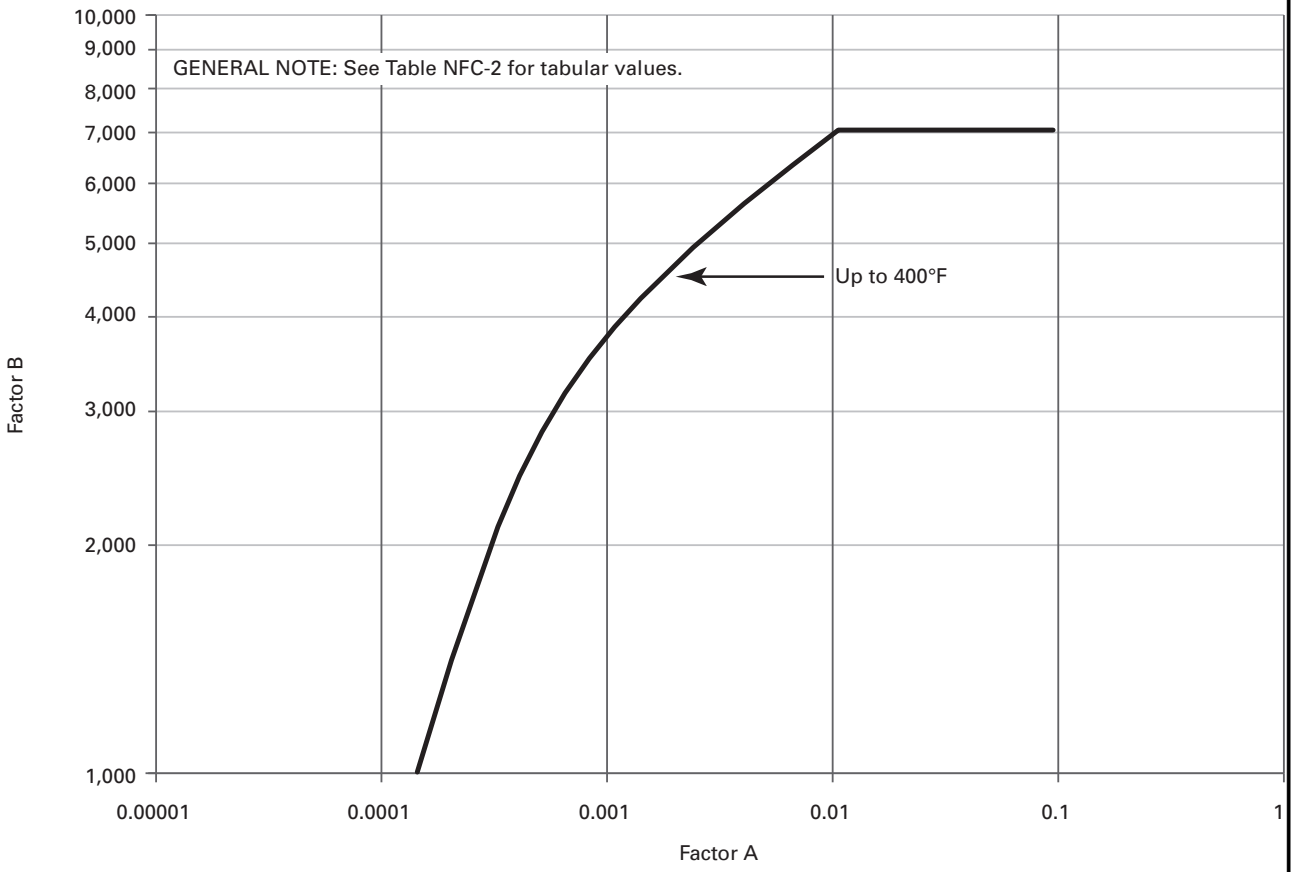


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure NFC-2
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Copper–Silicon Alloy C65500

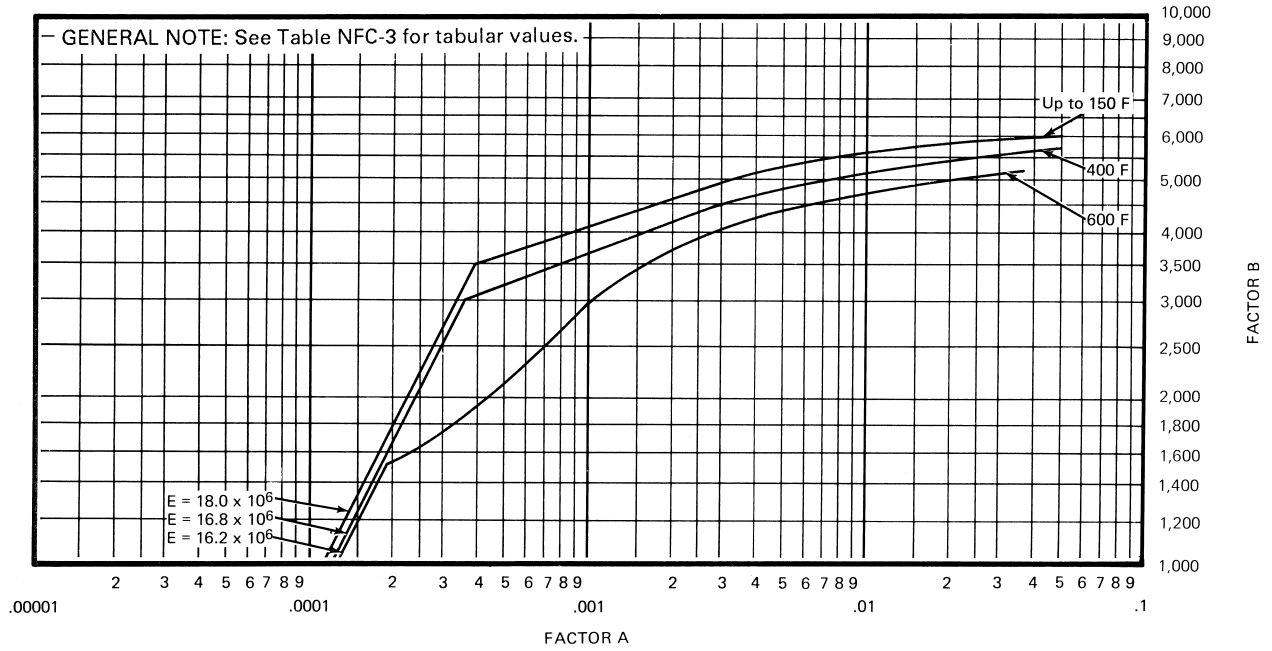


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure NFC-3
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Annealed 90–10 Copper–Nickel Alloy

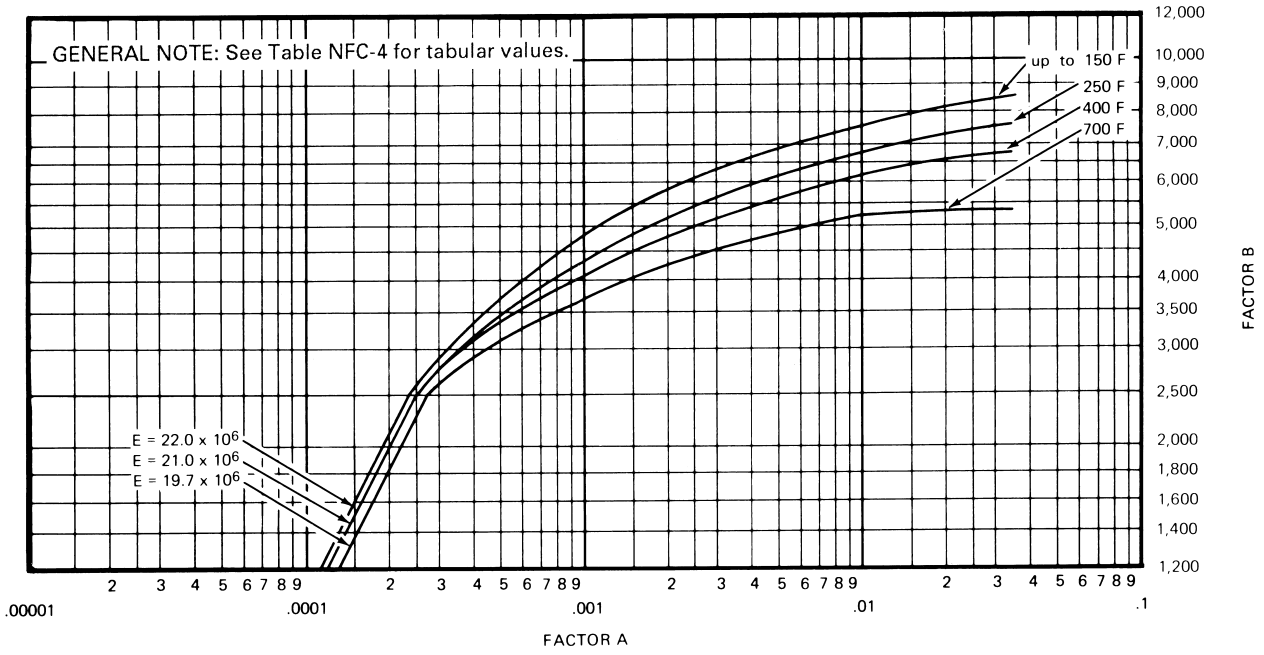


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure NFC-4
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Annealed 70–30 Copper–Nickel Alloy

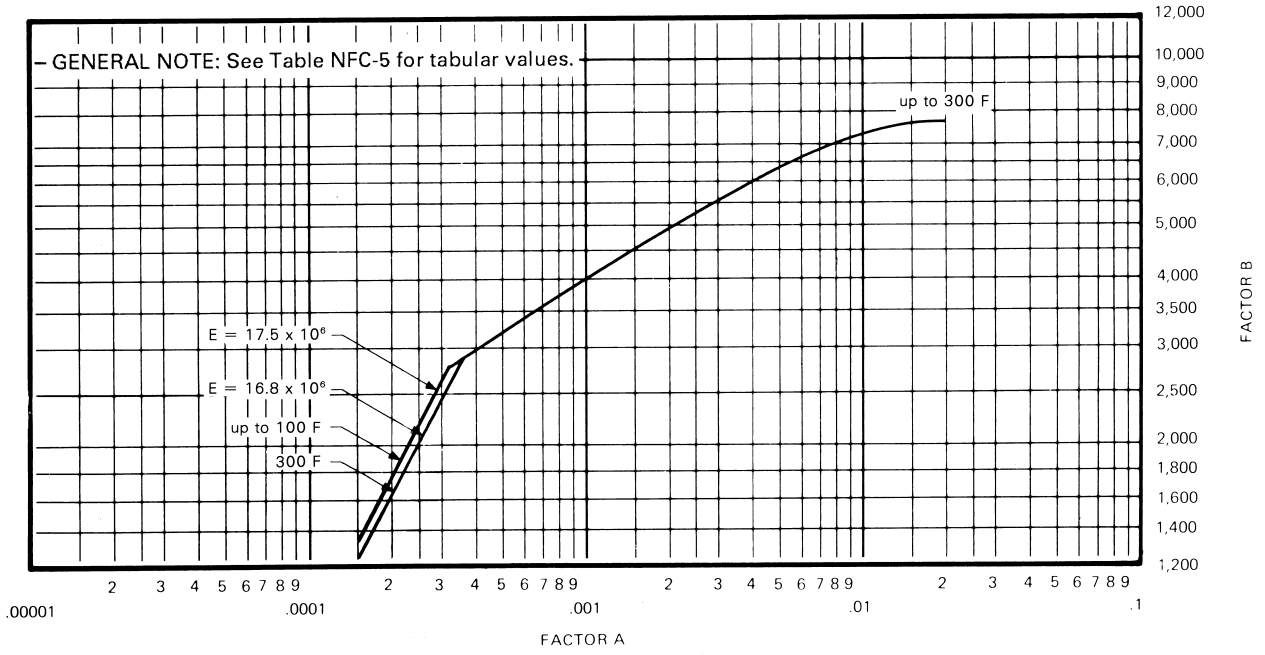


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure NFC-5
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Welded Copper–Iron Alloy Tube C19400 (SB-543 Welded)

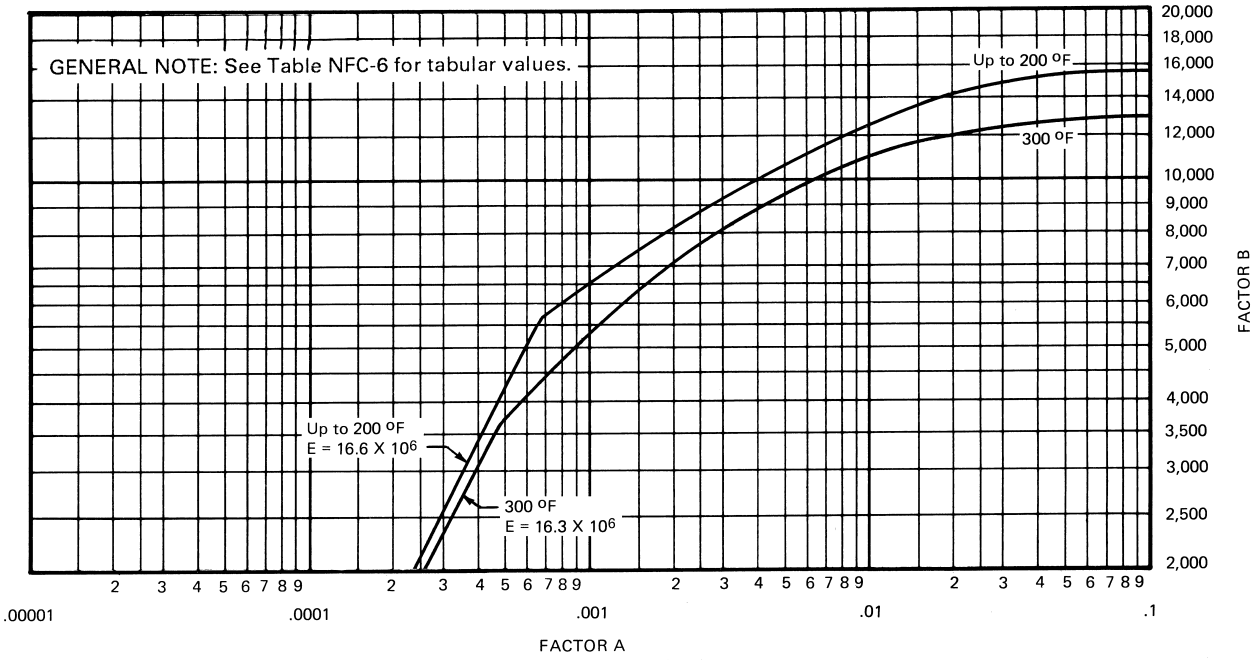


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure NFC-6
Chart for Determining Shell Thickness of Components Under External Pressure Developed for SB-75 and SB-111 Light Drawn Seamless Copper Tubes, Alloys C10200, C12000, C12200, and C14200

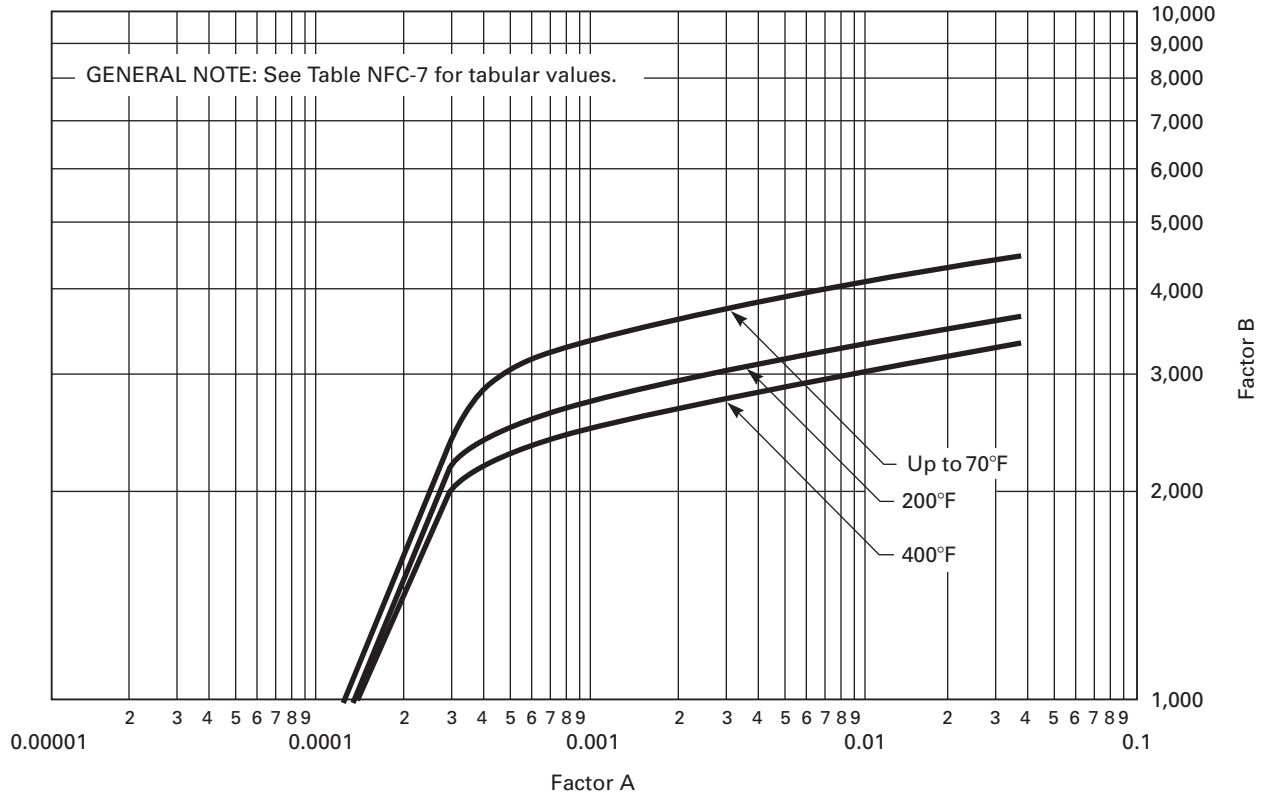


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure NFC-7
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Annealed Copper, SB-75, UNS C12200, Temper O50



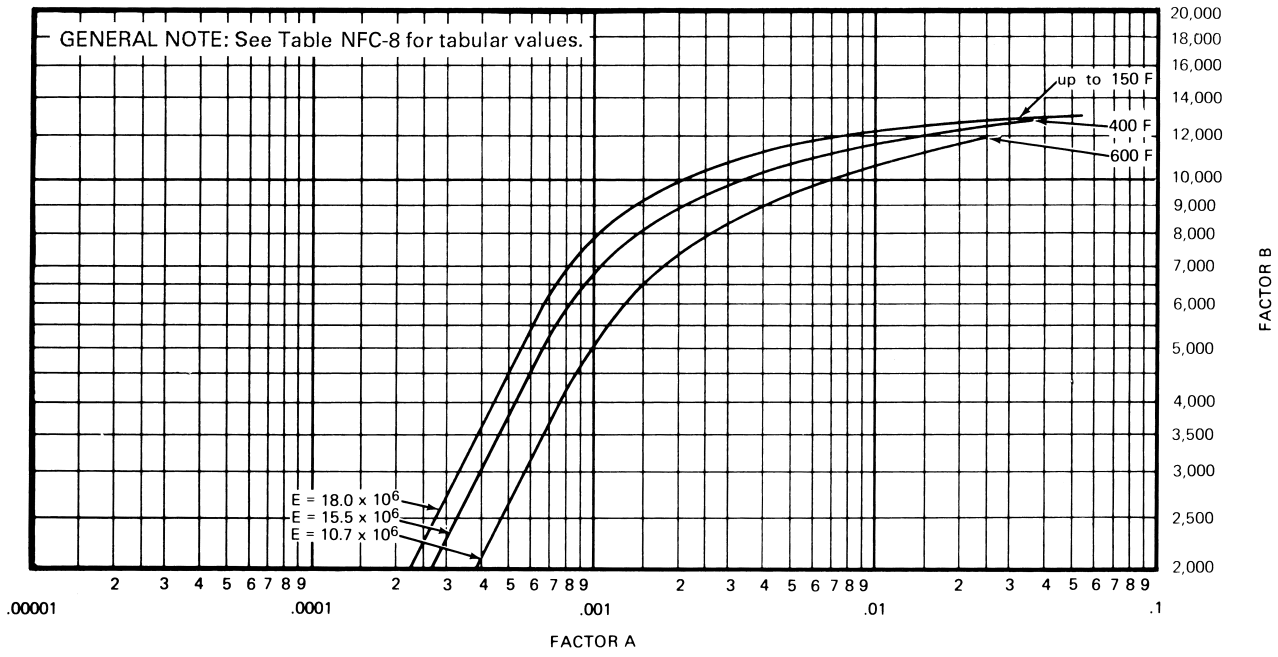
GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

(c) Use tabular data in Table NFC-7 for values of Factor A to the left of each curve.

Figure NFC-8
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Aluminum Bronze Alloy C61400

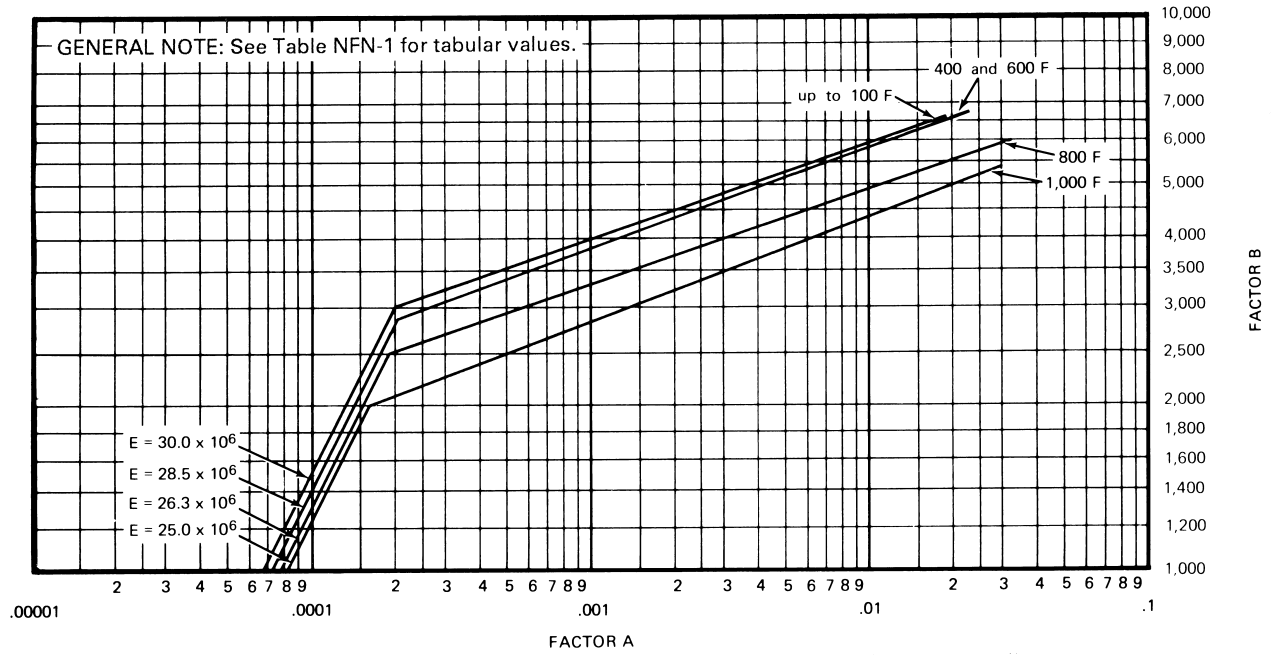


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure NFN-1
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Annealed Low Carbon Nickel N02201

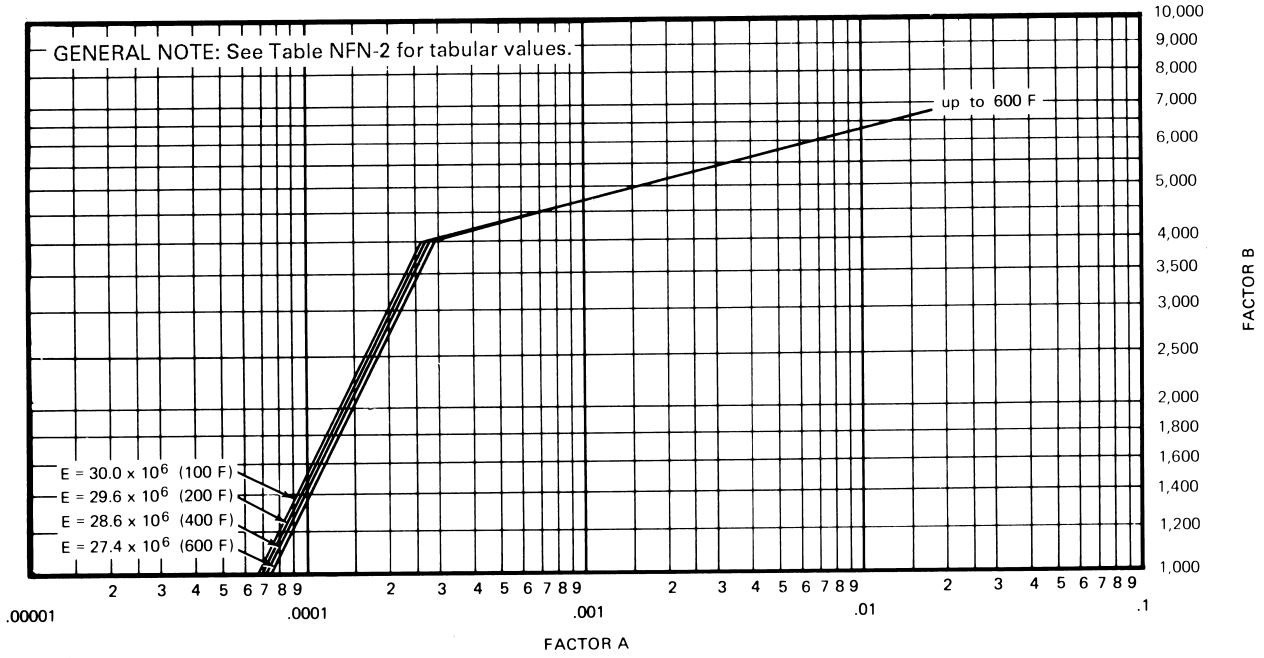


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure NFN-2
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Annealed Nickel N02200

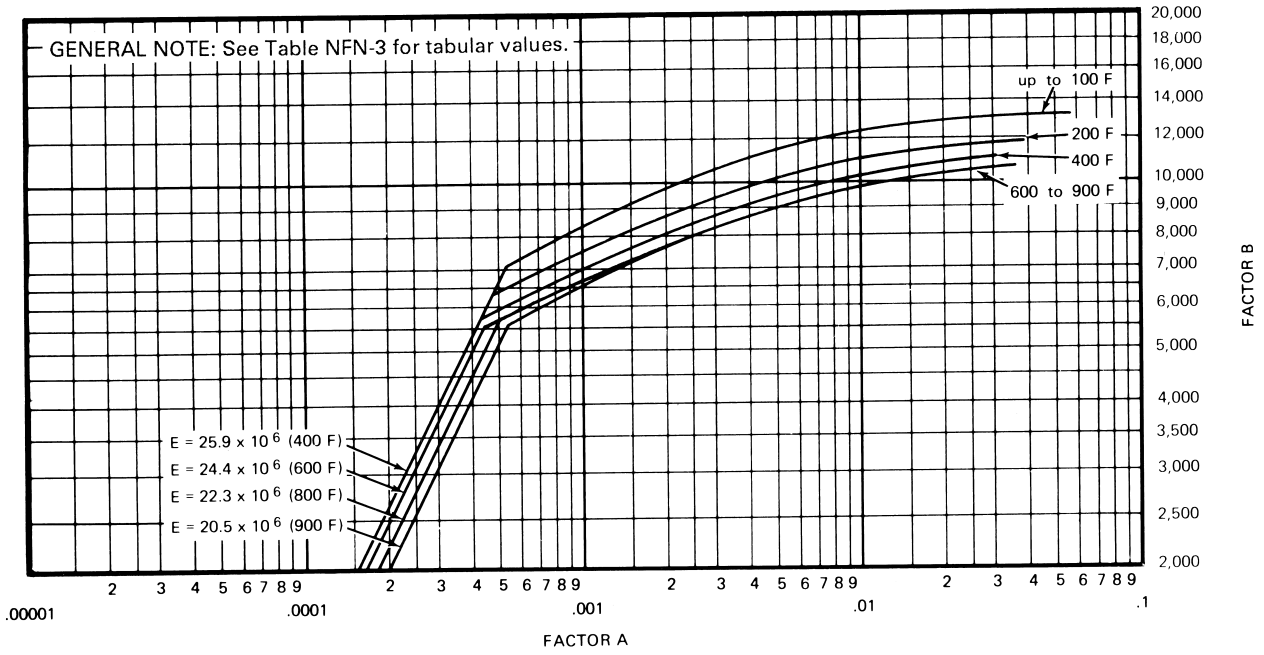


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure NFN-3
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Annealed Nickel–Copper Alloy N04400

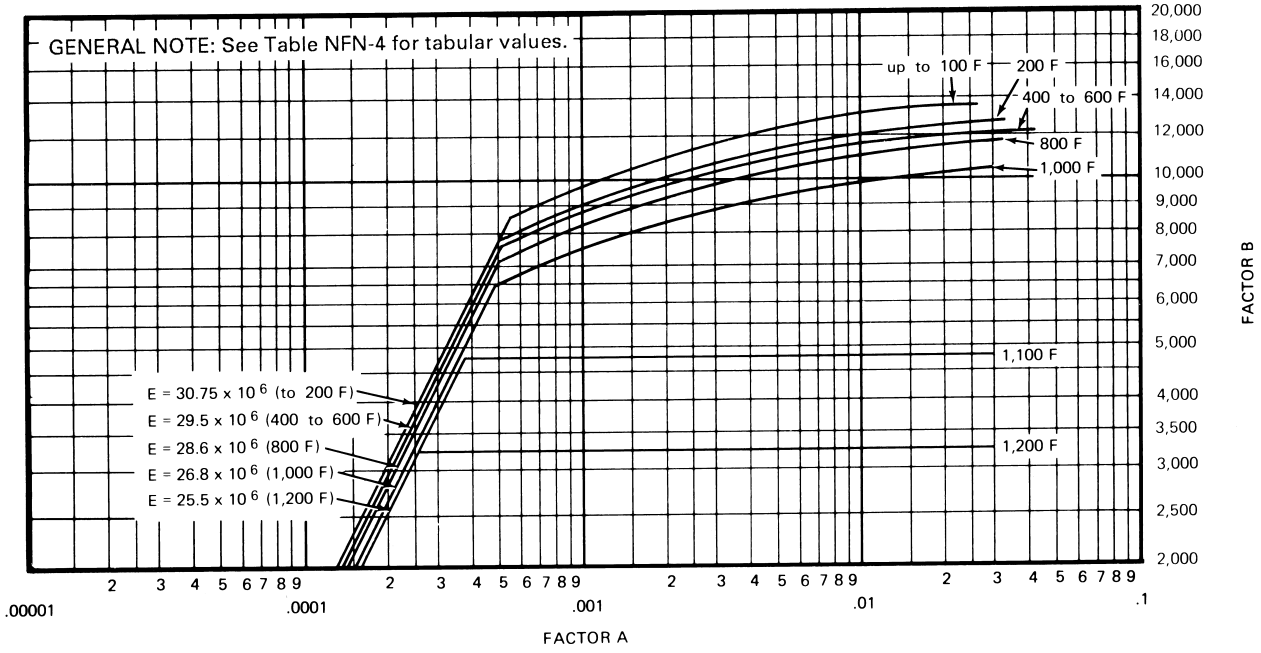


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure NFN-4
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Annealed Nickel–Chromium–Iron Alloy N06600

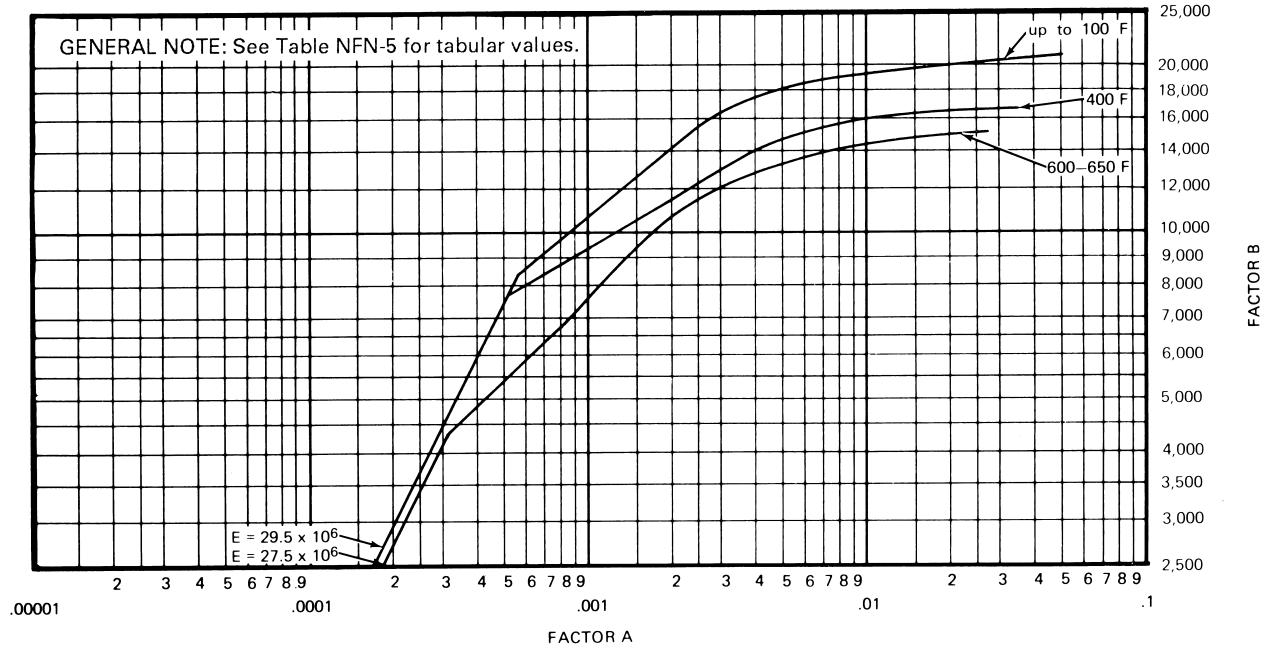


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure NFN-5
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Nickel–Molybdenum Alloy N10001

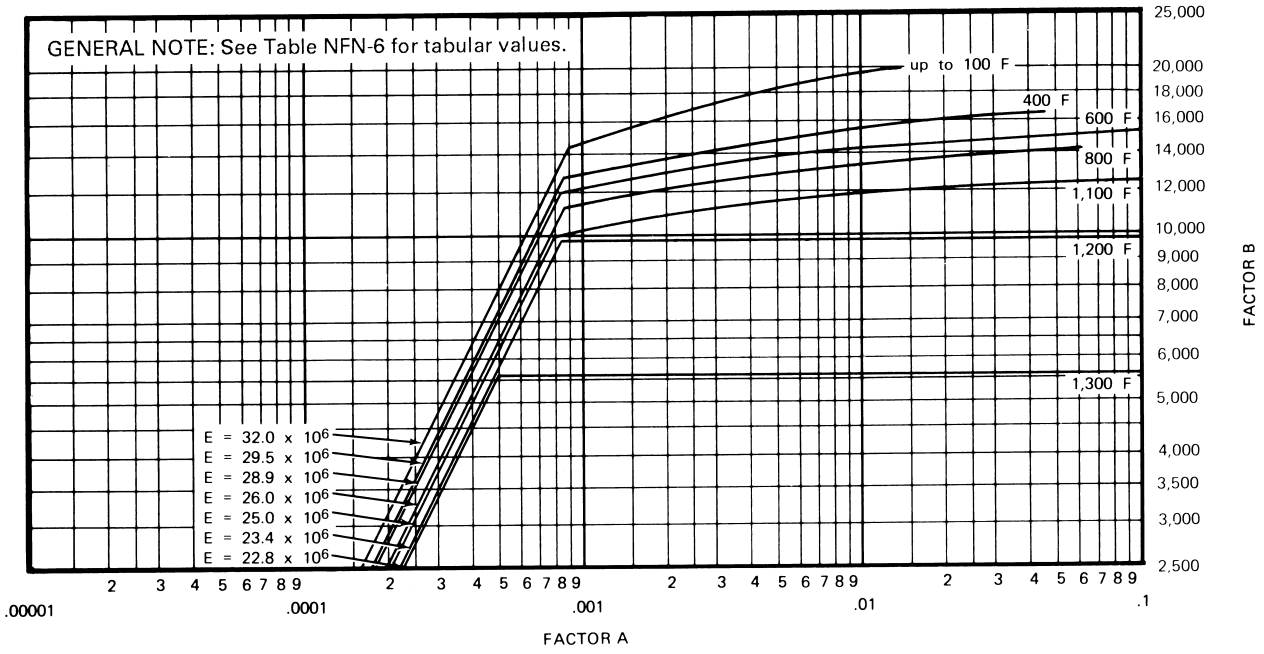


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure NFN-6
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Nickel–Molybdenum–Chromium–Iron Alloy N10003

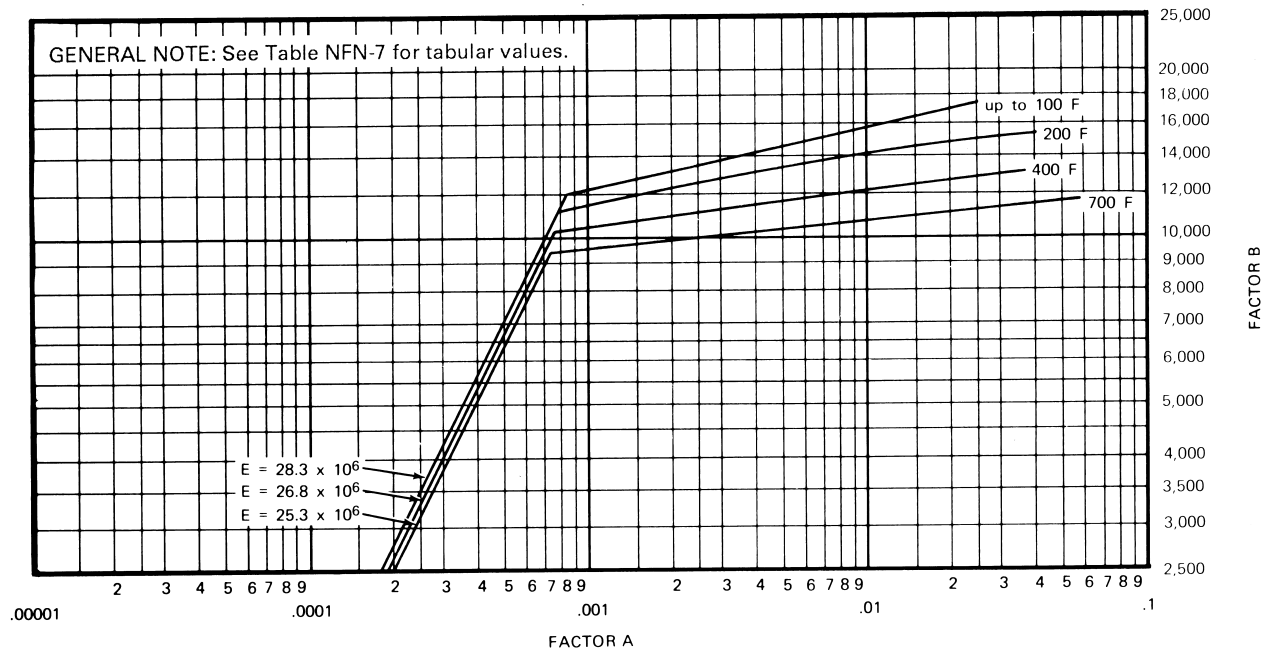


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure NFN-7
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Nickel–Iron–Chromium–Molybdenum–Copper Alloy N08825

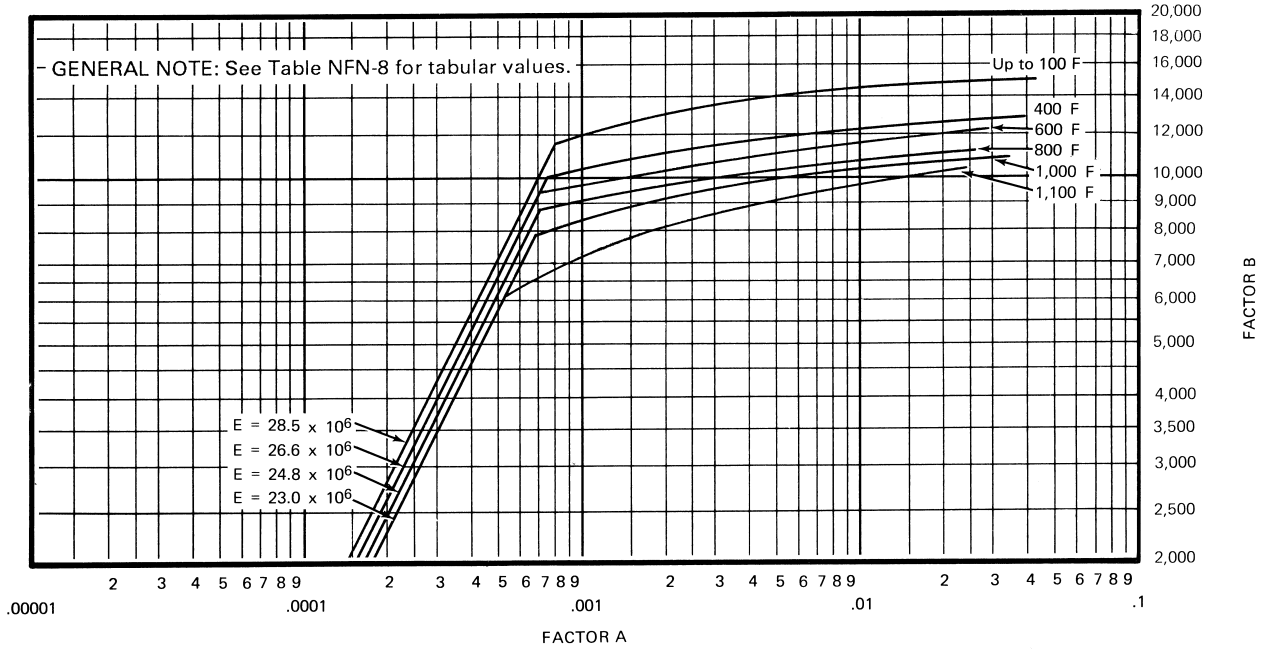


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure NFN-8
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Annealed Nickel–Iron–Chromium Alloy N08800

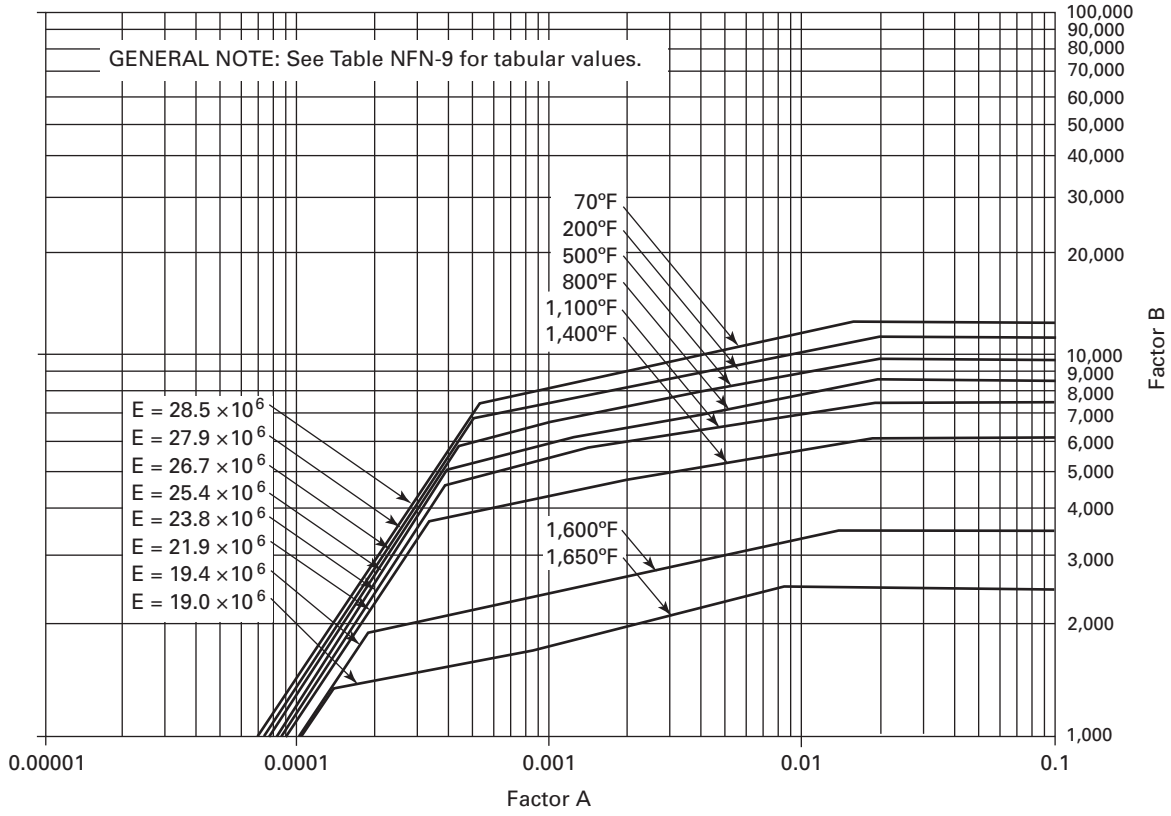


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure NFN-9
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Annealed Nickel–Iron–Chromium Alloy N08810

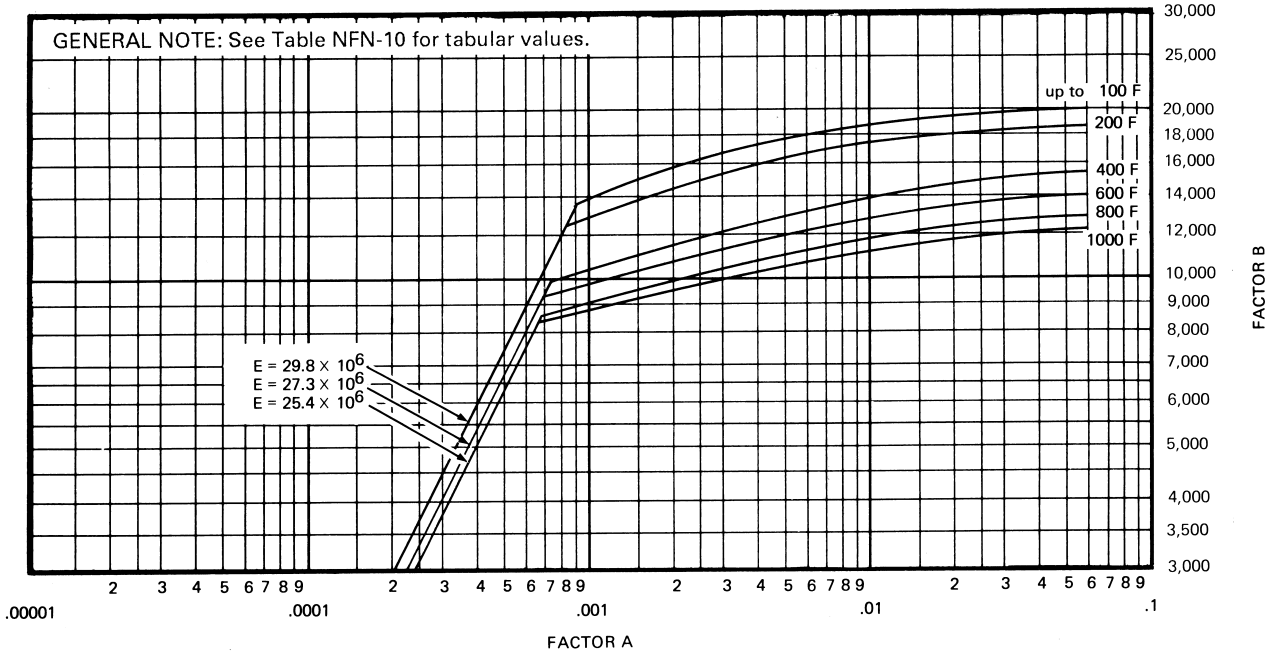


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure NFN-10
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Low Carbon Nickel–Molybdenum–Chromium Alloy N10276

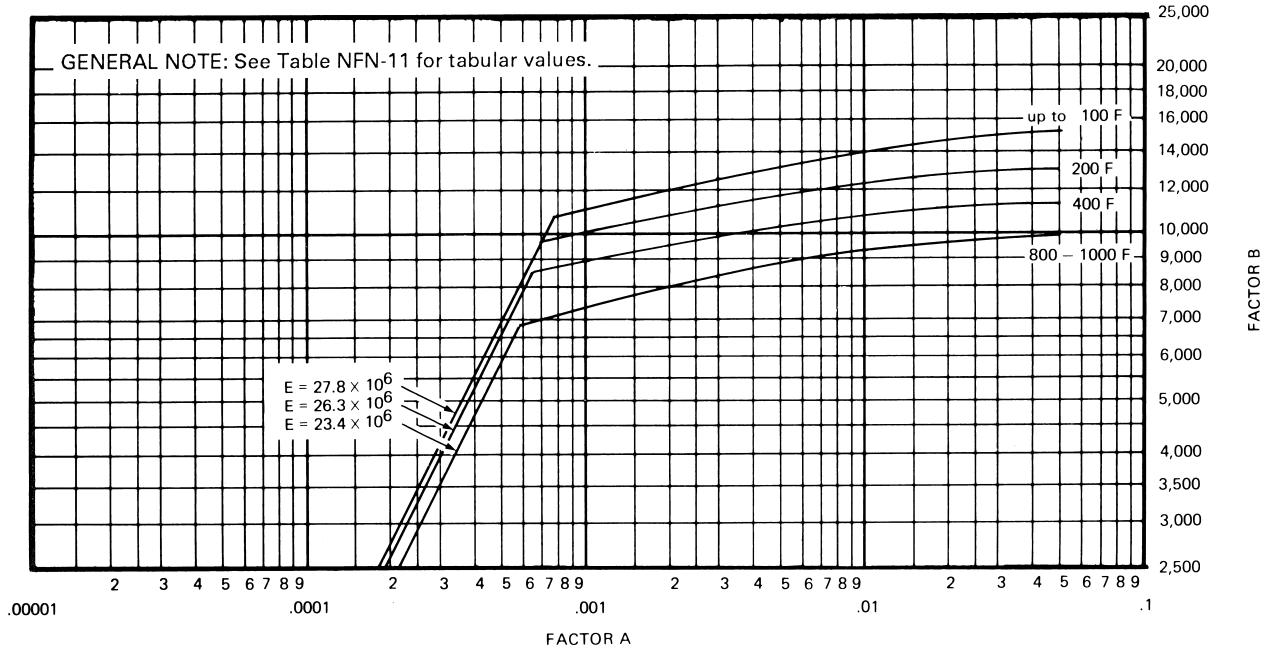


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure NFN-11
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Solution Treated Nickel–Chromium–Iron–Molybdenum–Copper Alloy N06007

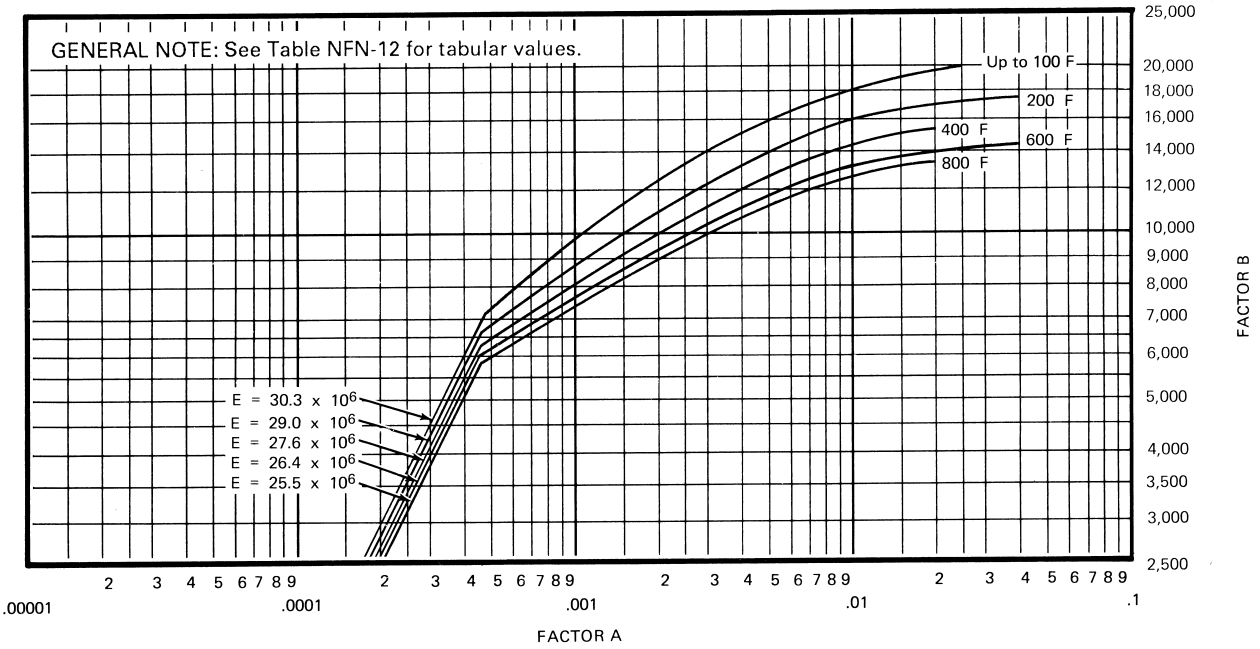


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure NFN-12
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Chromium–Nickel–Iron–Molybdenum–Copper–Columbium Alloy N08020

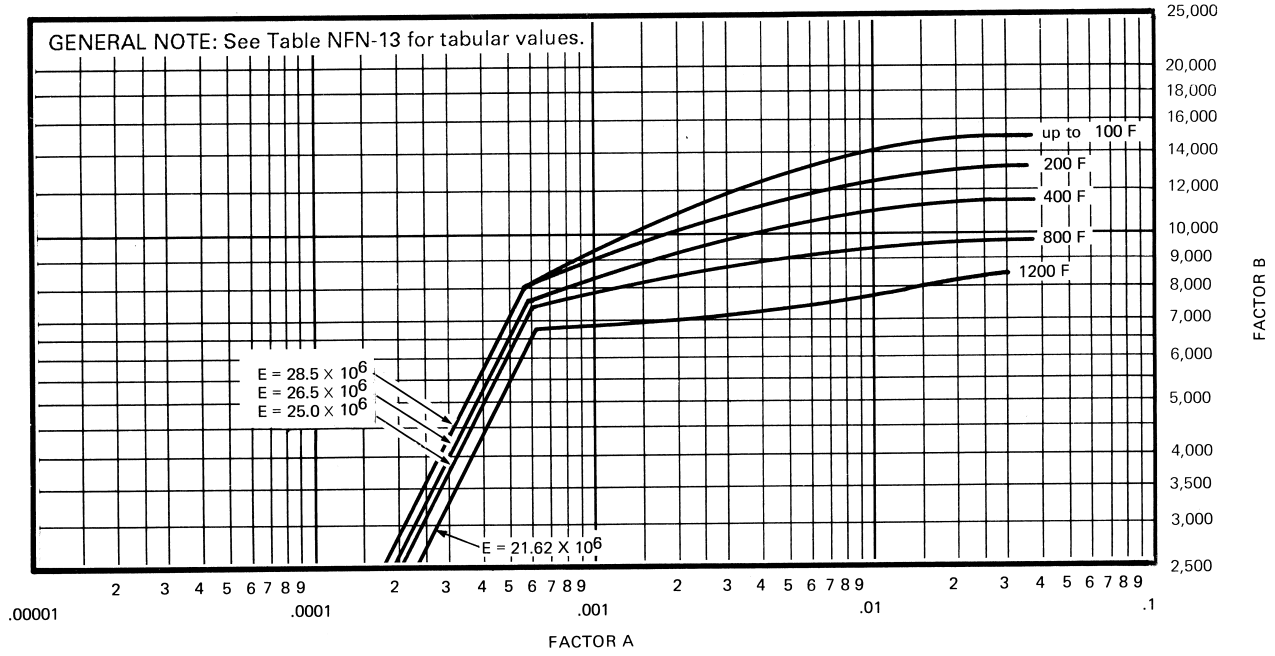


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure NFN-13
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Nickel–Iron–Chromium–Silicon Alloy N08330

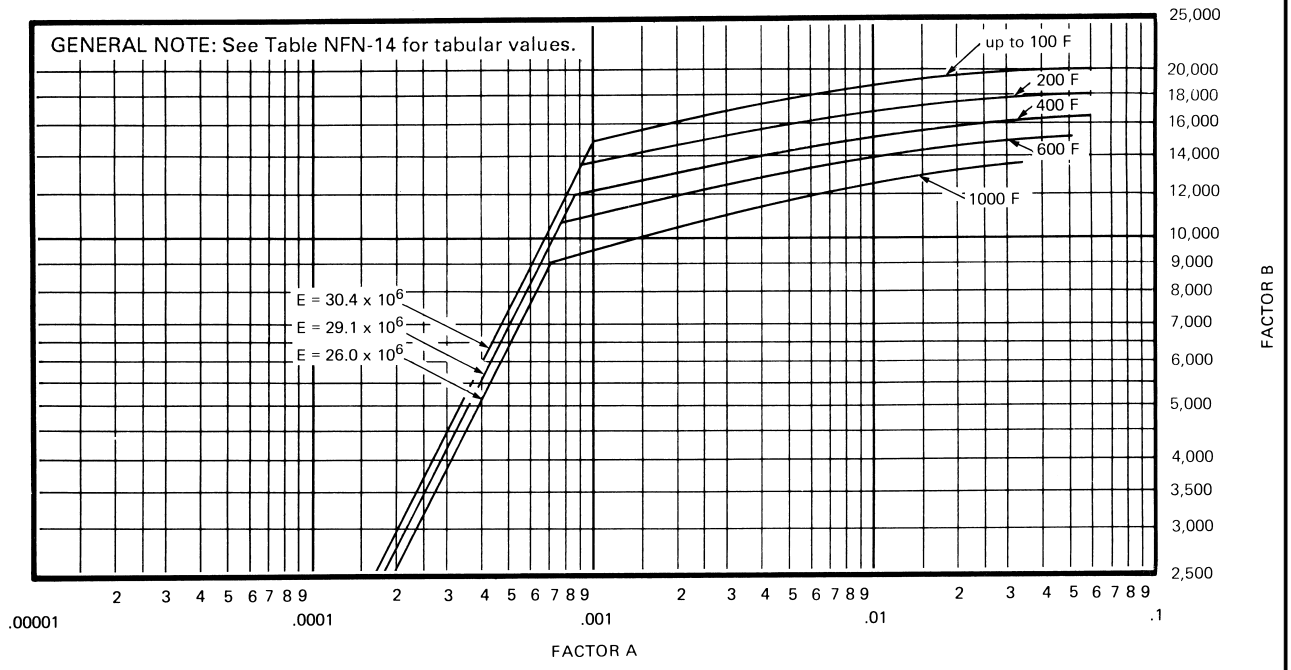


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure NFN-14
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Nickel–Chromium–Molybdenum Alloy N06455

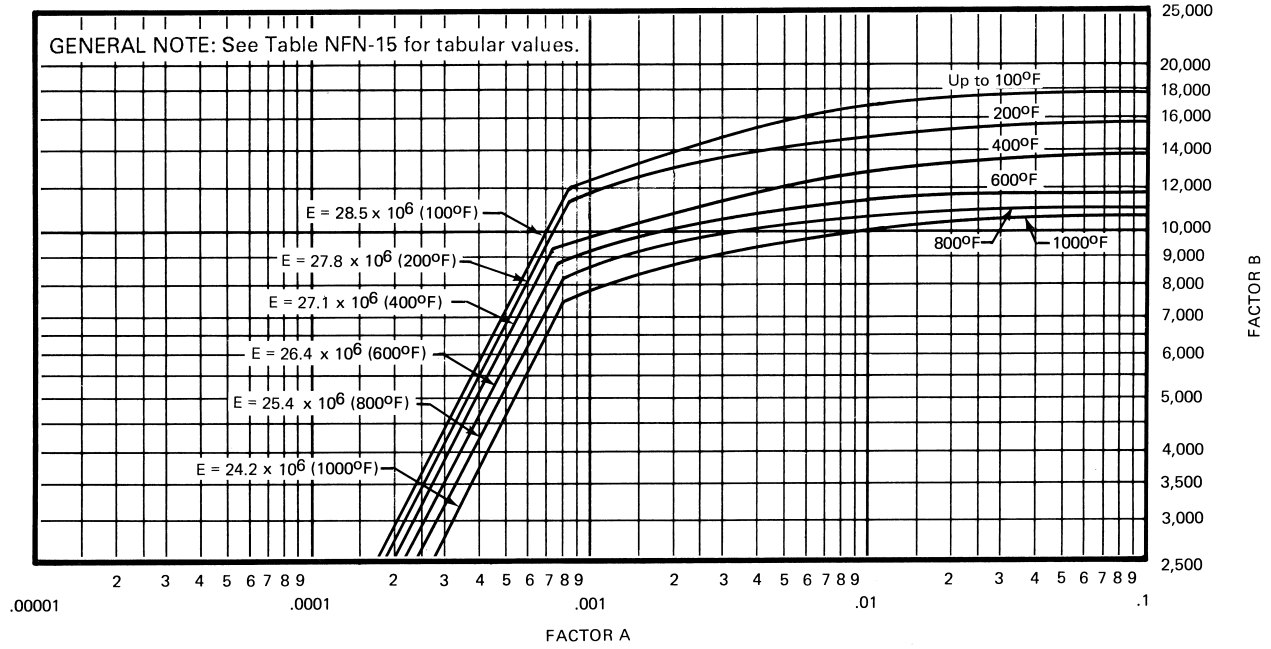


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure NFN-15
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Nickel–Molybdenum Alloy N06002

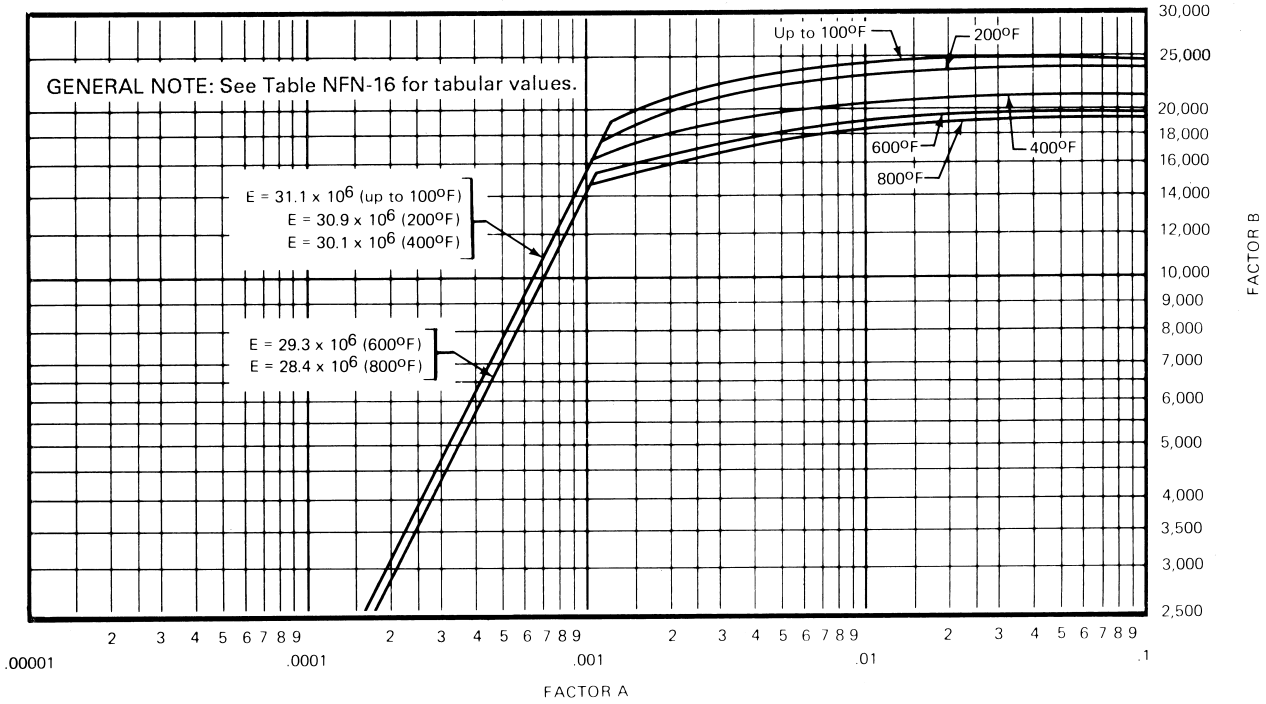


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure NFN-16
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Nickel–Molybdenum Alloy N10665

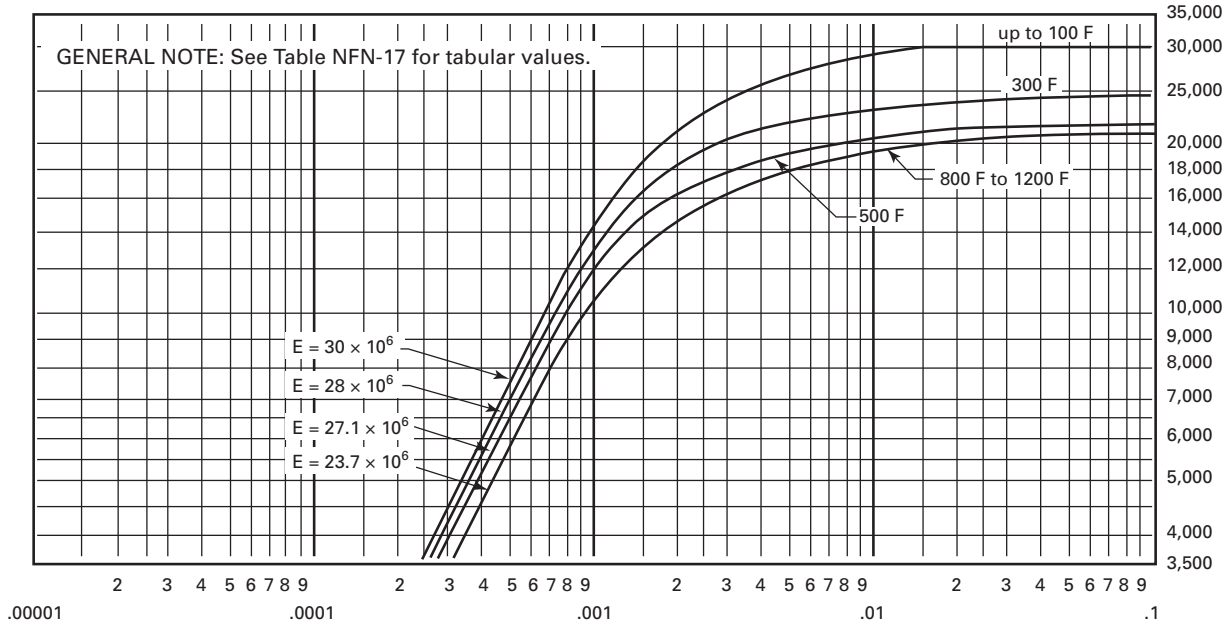


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure NFN-17
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Annealed Nickel–Chromium–Molybdenum–Columbium Alloy N06625 (SB-443, SB-444, and SB-446)

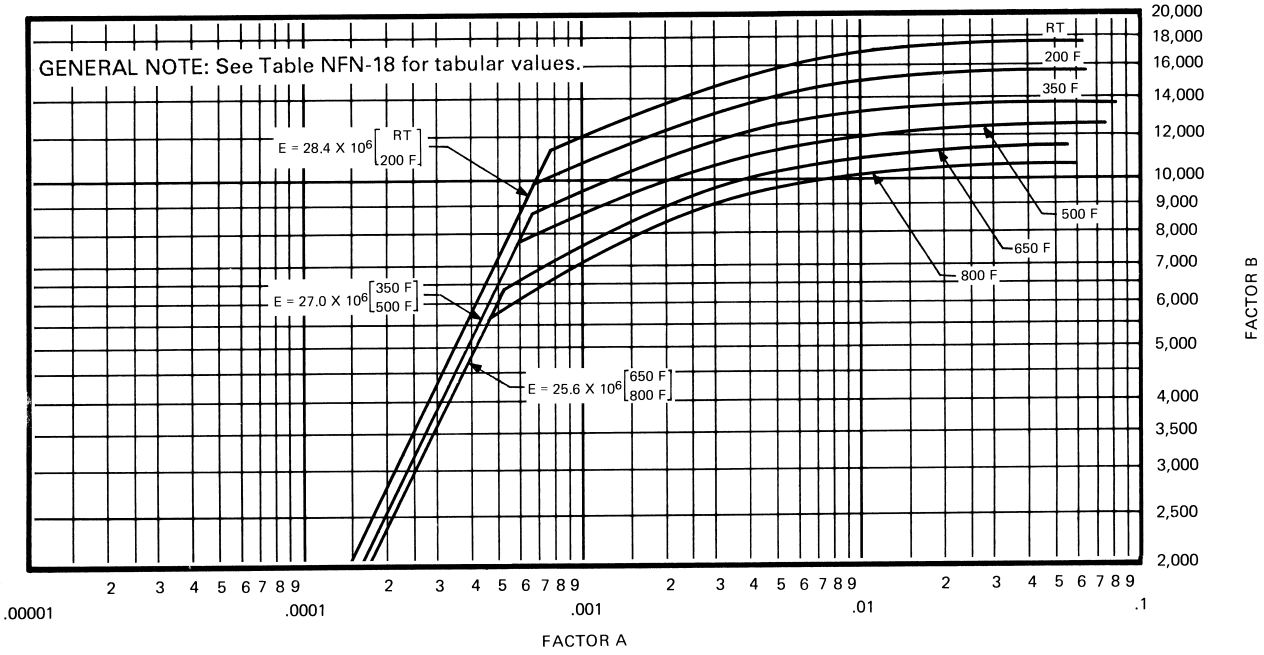


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure NFN-18
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Nickel–Molybdenum–Chromium–Iron–Copper Alloy N06985 Having a Minimum Yield Strength of 35 ksi

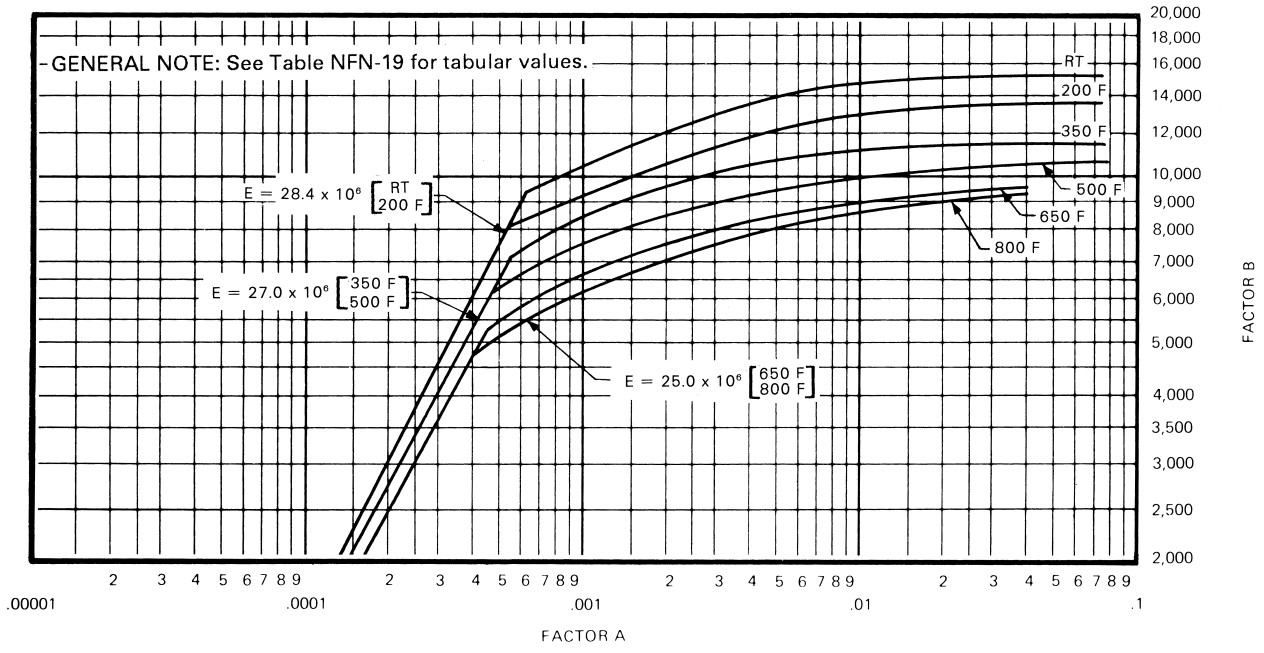


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure NFN-19
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Nickel–Molybdenum–Chromium–Iron–Copper Alloy N06985 Having a Minimum Yield Strength of 30 ksi

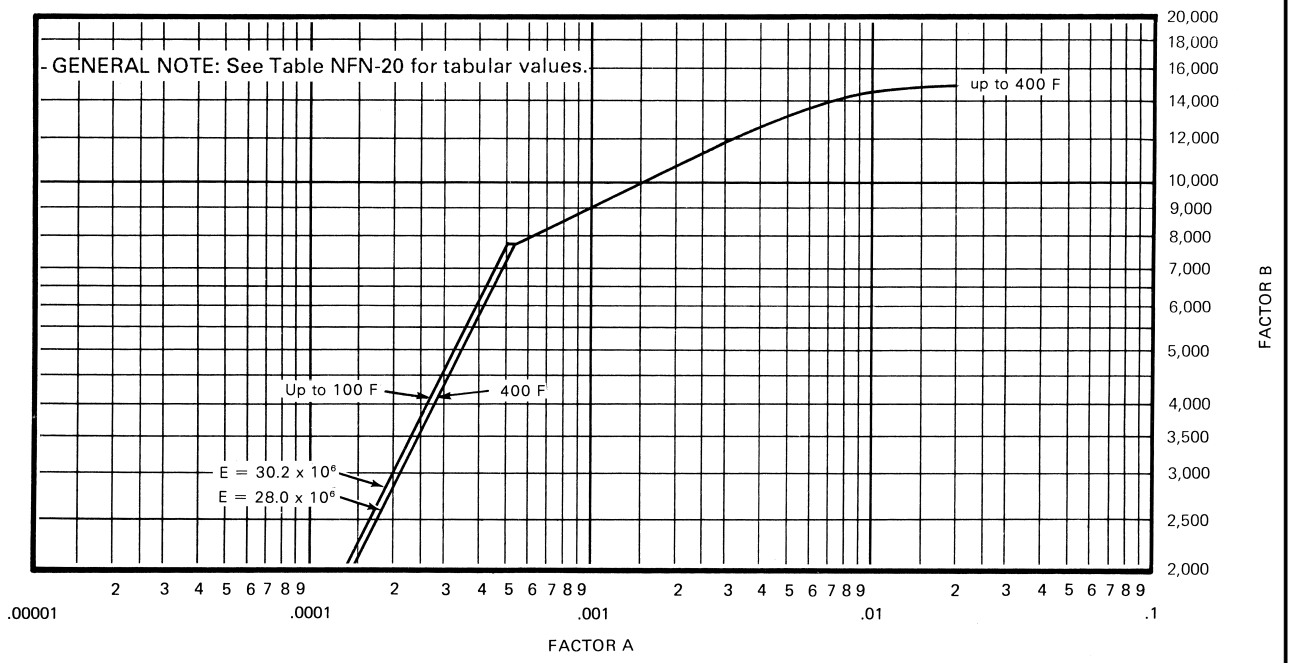


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure NFN-20
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Work-Hardened Nickel



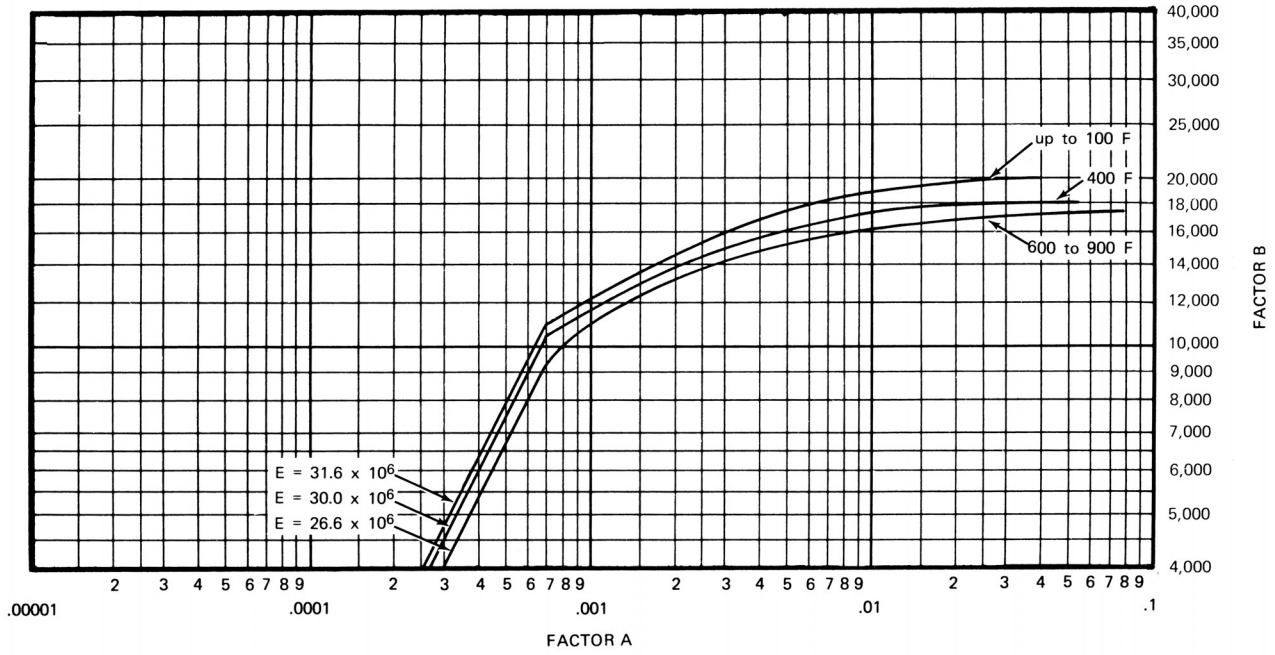
GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

(c) Vessels constructed of material covered by this chart must be subjected to an external hydrostatic test pressure of three times the maximum allowable working pressure. Thicknesses determined by this chart are minimum, and greater thickness may be required to withstand the test pressure if the planishing used does not provide an adequate degree of work-hardening.

Figure NFN-21
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Nickel–Chromium–Iron Alloy N06600 (Specified Minimum Yield Strength 40,000 psi)

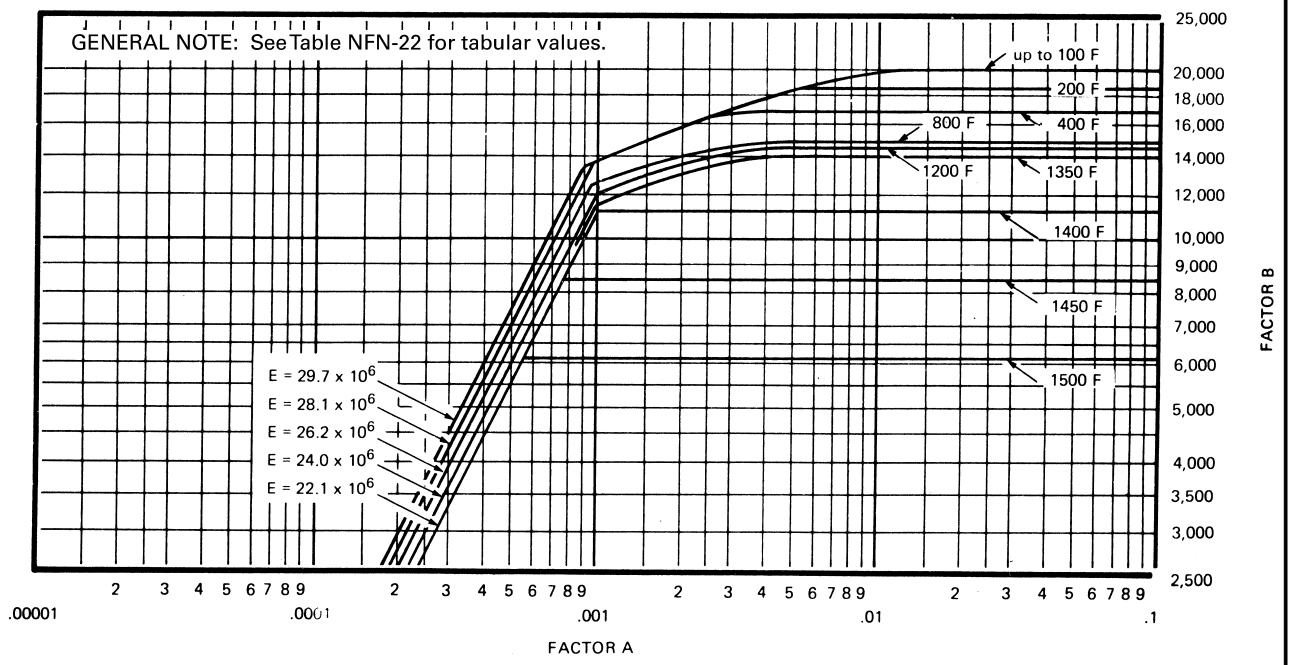


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure NFN-22
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Solution Annealed Ni–Cr–Mo–Cb Alloy, Grade 2 N06625



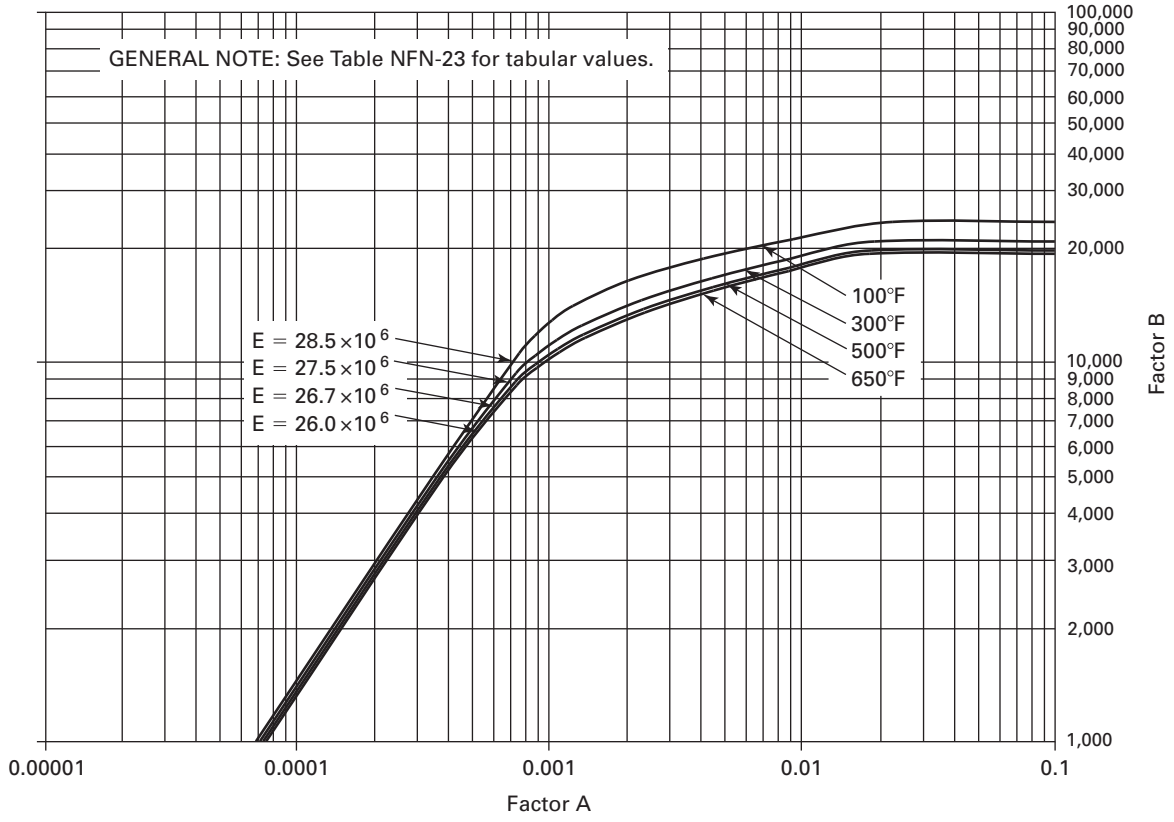
GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

(c) The external pressure chart does not account for reduction of buckling strength due to creep under long-term loads at temperatures above 1200°F.

Figure NFN-23
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Cold Worked Nickel–Iron–Chromium Alloy N08800

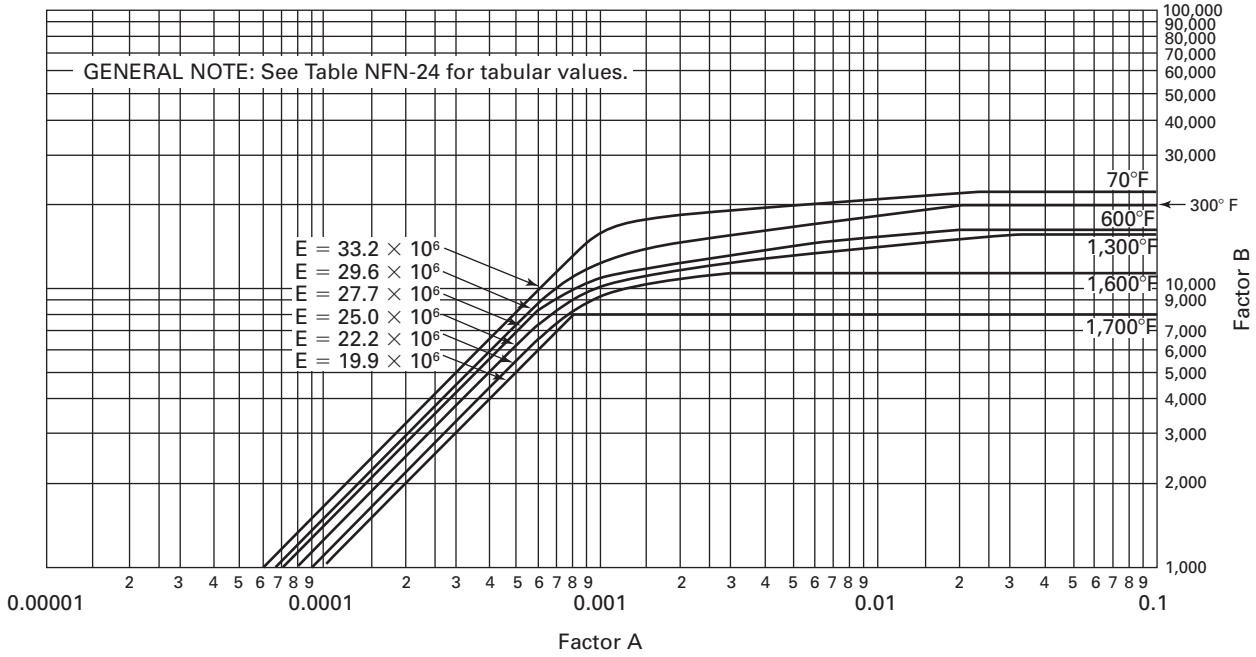


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure NFN-24
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Nickel Alloy N06230

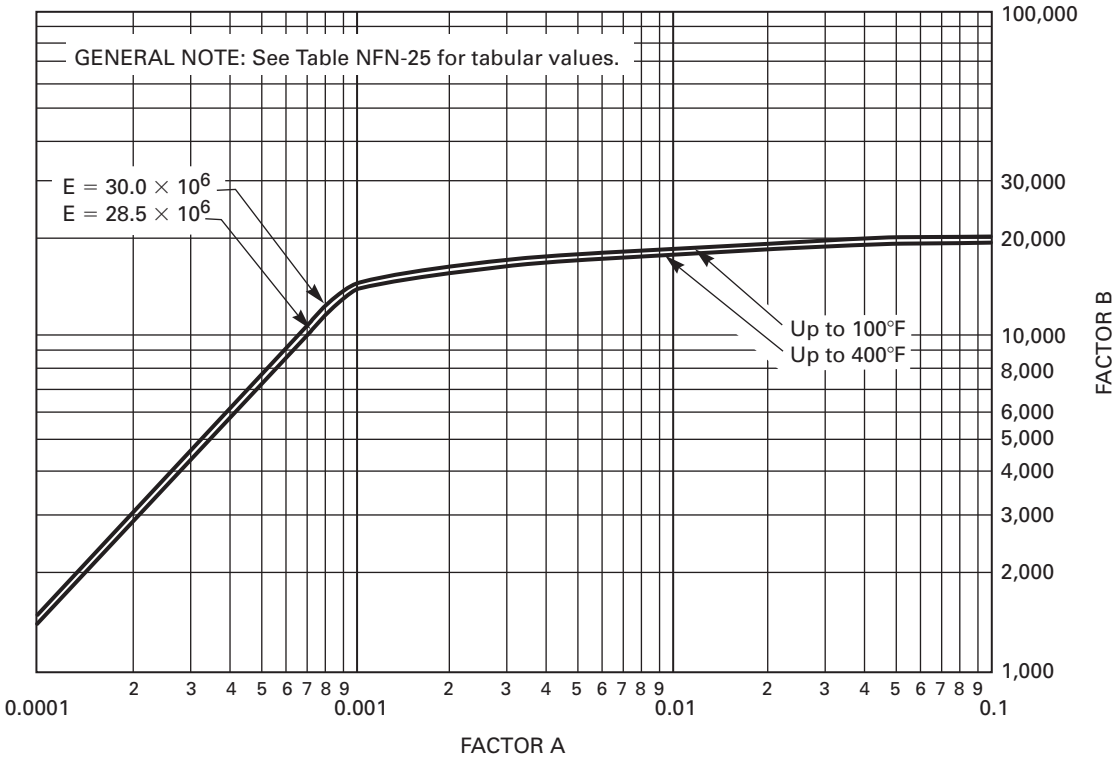


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure NFN-25
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Stress Relieved Nickel Alloy N02200

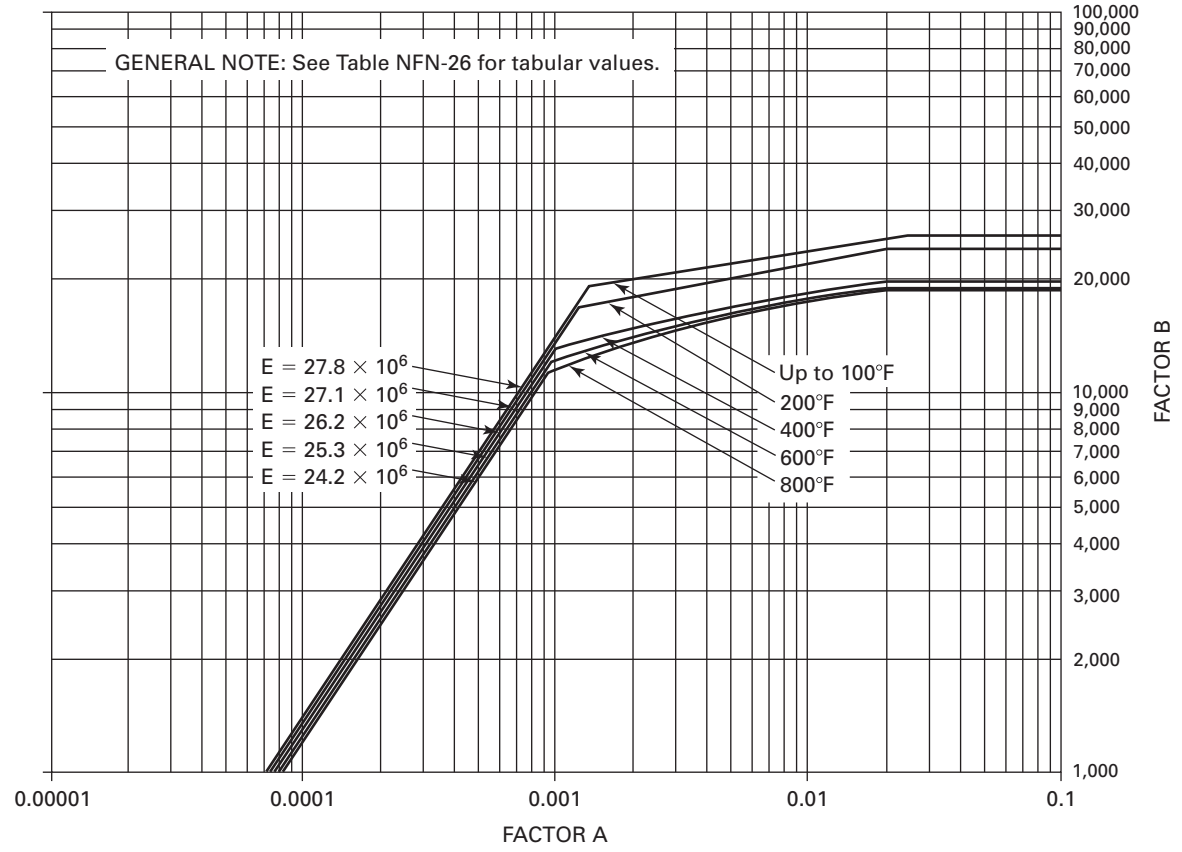


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure NFN-26
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Alloy S31277

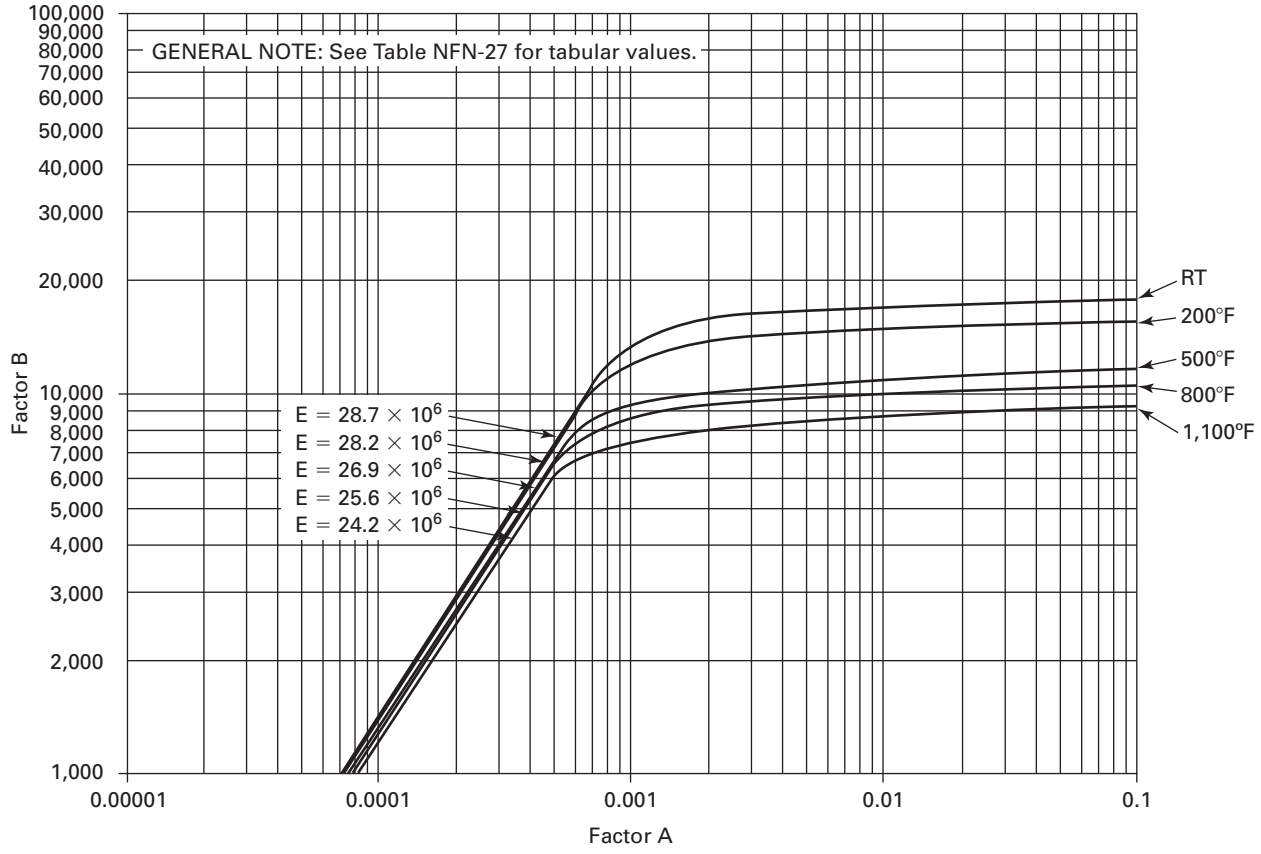


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure NFN-27
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Alloy N06035

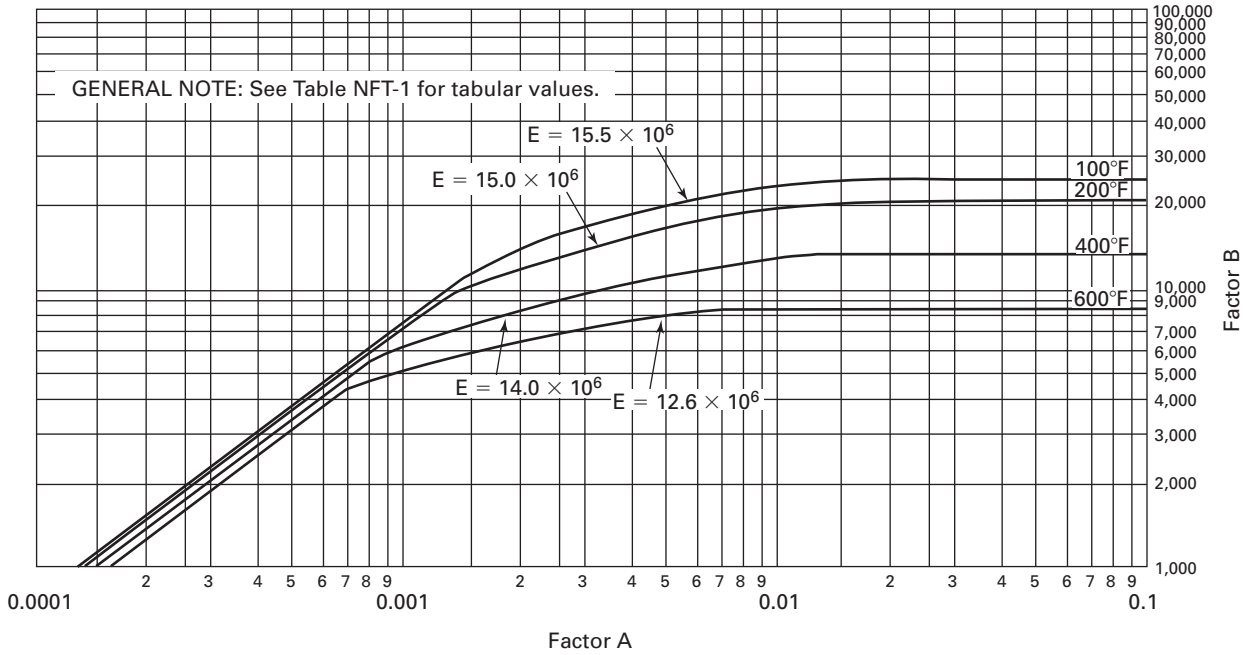


GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

Figure NFT-1
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Unalloyed Titanium Grade 3 (UNS R50550)



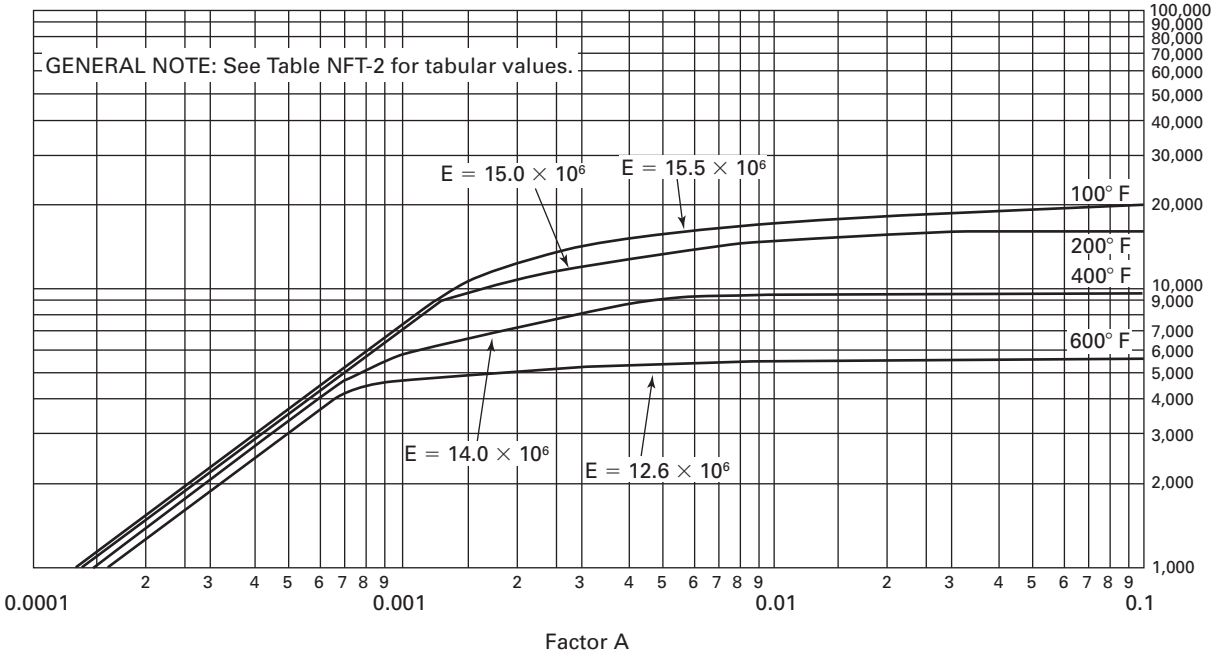
GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

(c) When unidirectionally produced bar product is utilized for stiffening rings, Factor A, elastic or inelastic, shall be multiplied by 1.1 to account for reduced stiffness.

Figure NFT-2
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Unalloyed Titanium Grade 2 (UNS R50400)



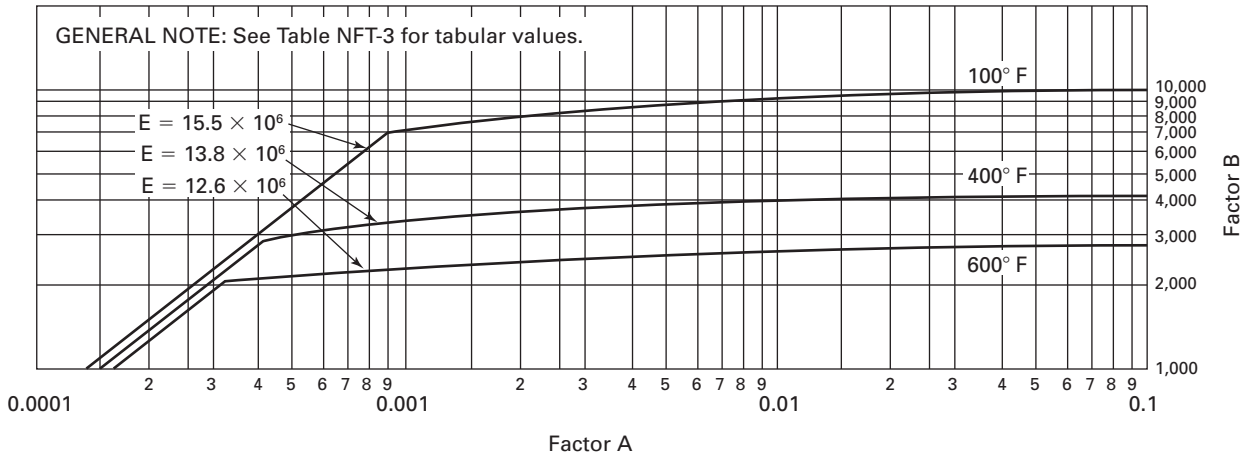
GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

(c) When unidirectionally produced bar product is utilized for stiffening rings, Factor A, elastic or inelastic, shall be multiplied by 1.1 to account for reduced stiffness.

Figure NFT-3
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Titanium Grade 1 (UNS R50250)



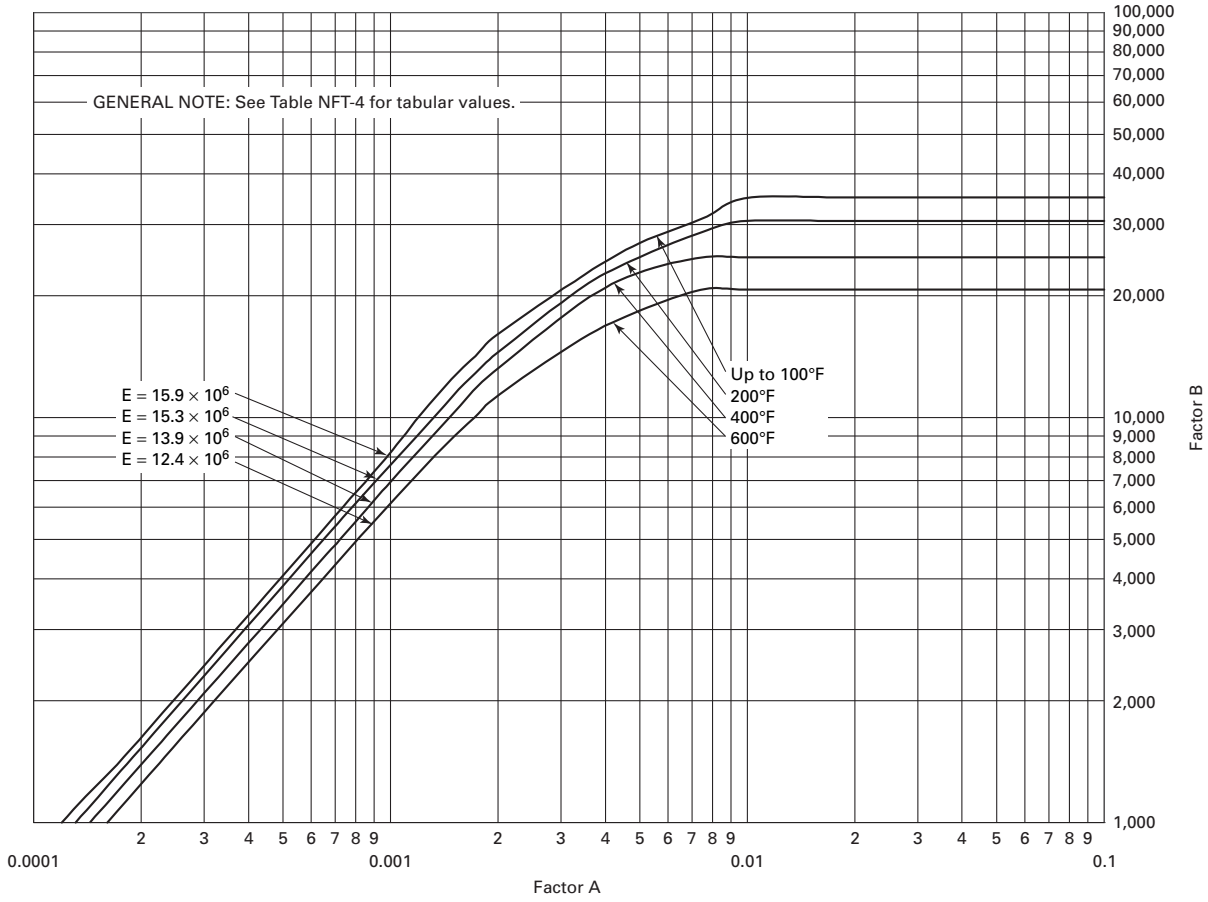
GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

(c) When unidirectionally produced bar product is utilized for stiffening rings, Factor A, elastic or inelastic, shall be multiplied by 1.1 to account for reduced stiffness.

Figure NFT-4
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Titanium Grade 9 Alloy (UNS R56320)



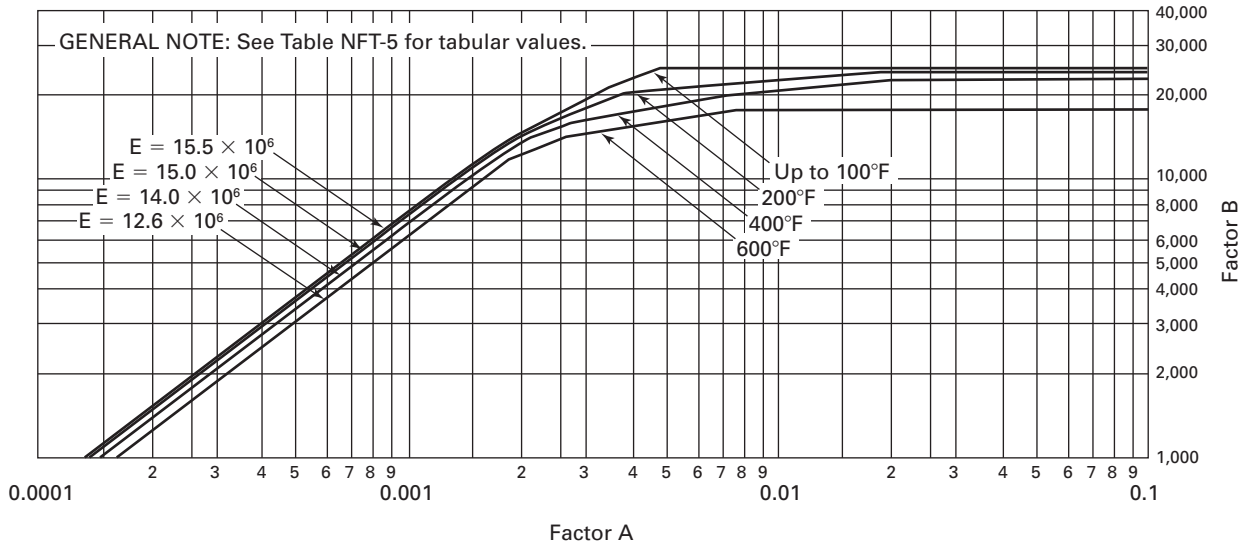
GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

(c) When unidirectionally produced bar product is utilized for stiffening rings, Factor A, elastic or inelastic, shall be multiplied by 1.1 to account for reduced stiffness.

Figure NFT-5
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Titanium Grade 12 Alloy (UNS R53400)



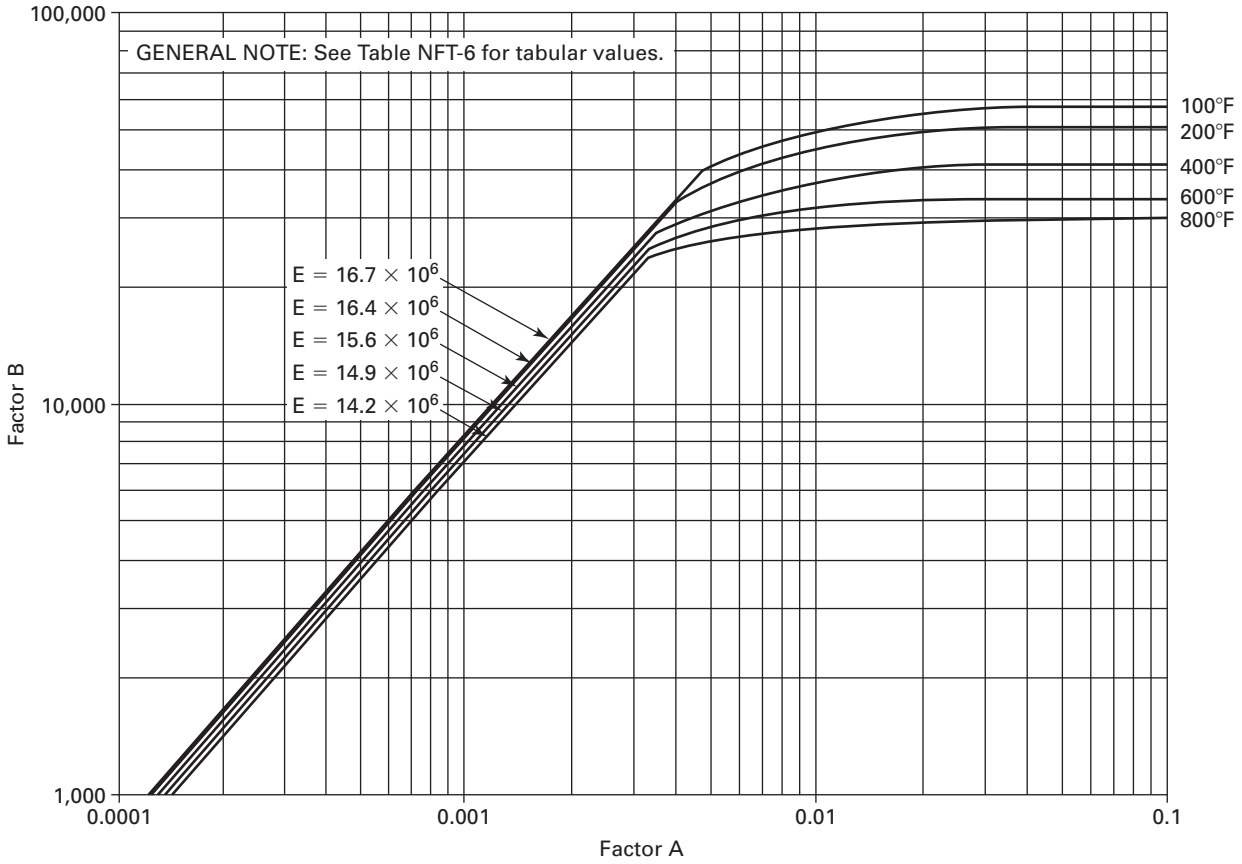
GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

(c) When unidirectionally produced bar product is utilized for stiffening rings, Factor A, elastic or inelastic, shall be multiplied by 1.1 to account for reduced stiffness.

Figure NFT-6
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Titanium Grade 38 (UNS R54250)



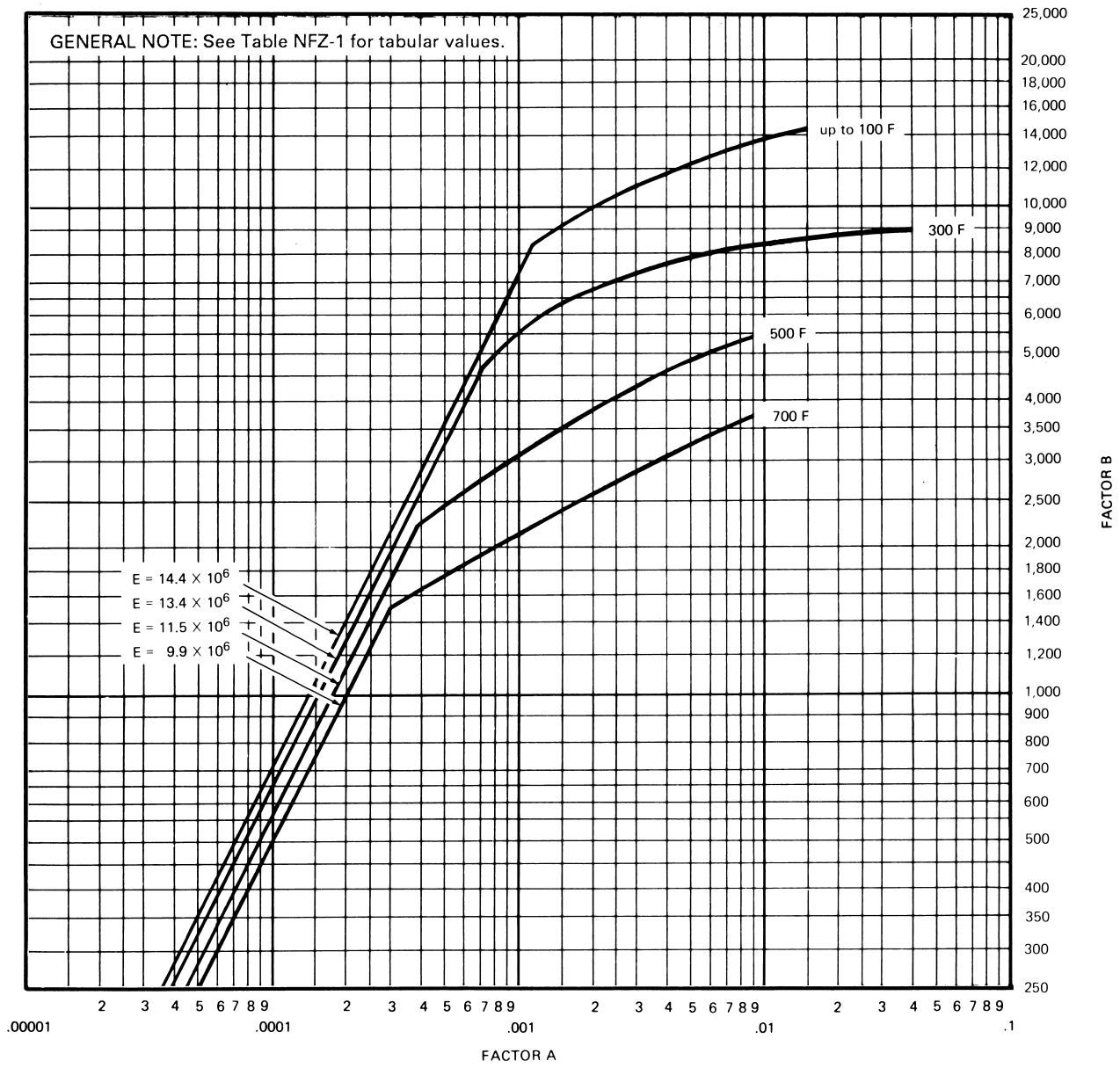
GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

(c) When unidirectionally produced bar product is utilized for stiffening rings, Factor A, elastic or inelastic, shall be multiplied by 1.1 to account for reduced stiffness.

Figure NFZ-1
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Zirconium Alloy (UNS R60702)



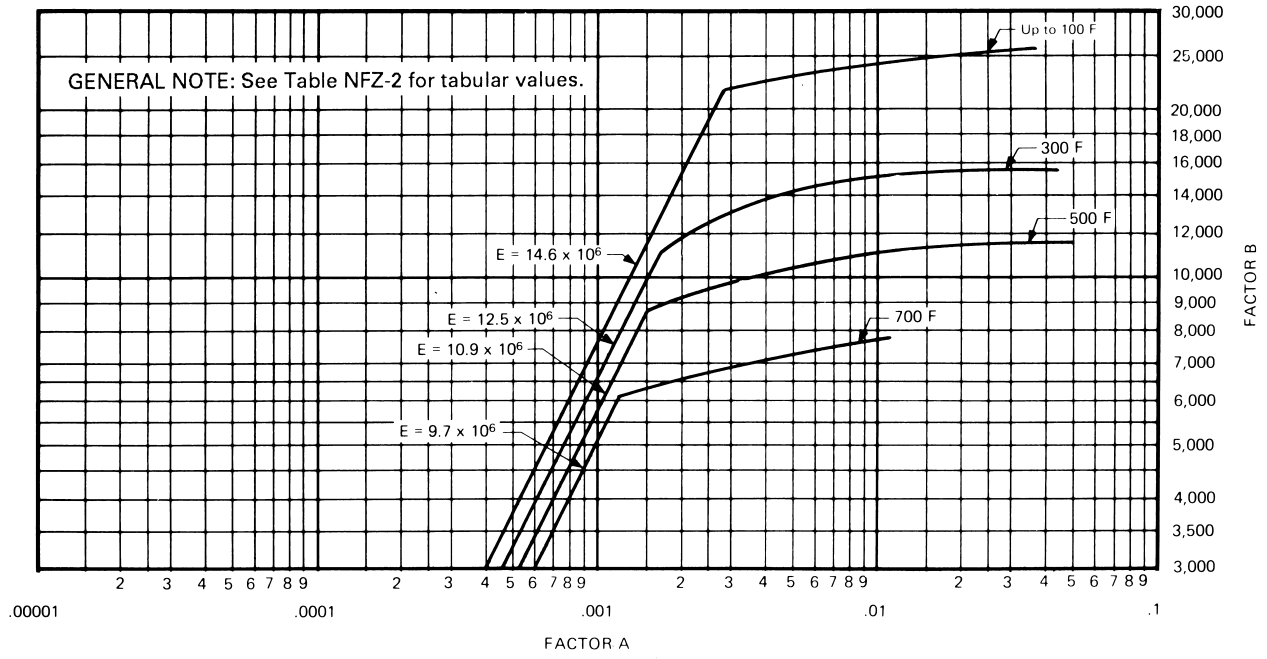
GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

(c) When unidirectionally produced bar product is utilized for stiffening rings, Factor A, elastic or inelastic, shall be multiplied by 1.1 to account for reduced stiffness.

Figure NFZ-2
Chart for Determining Shell Thickness of Components Under External Pressure Developed for Zirconium Alloy (UNS R60705)



GENERAL NOTES:

(a) The external pressure charts do not account for reduction of buckling strength due to creep under long-term loads. The effect of creep on buckling shall be considered at temperatures for which allowable stresses are shown italicized in Tables 1A, 1B, 5A, and 5B, and in boldface in Tables 2A and 2B.

(b) The external pressure chart assigned for a particular material is obtained from Tables 1A, 1B, 2A, 2B, 5A, and 5B under the column for External Pressure Chart No. for that material and is mandatory, with the exception of Tables 5A and 5B.

(c) When unidirectionally produced bar product is utilized for stiffening rings, Factor A, elastic or inelastic, shall be multiplied by 1.1 to account for reduced stiffness.

Table G
Tabular Values for Figure G

D_o/t	L/D_o	A	D_o/t	L/D_o	A	D_o/t	L/D_o	A	D_o/t	L/D_o	A	D_o/t	L/D_o	A	D_o/t	L/D_o	A
4	2.2	0.959 −01	8	5.0	0.184 −01	20	3.0	0.446 −02	30	30.0	0.122 −02	60	0.074	0.954 −01	100	0.20	0.831 −02
	2.6	0.884		7.0	0.179		3.4	0.388		50.0	0.122		0.10	0.556		0.40	0.364
	3.0	0.839		10.0	0.176		4.0	0.342					0.14	0.323		0.5	0.283
	4.0	0.783		20.0	0.174		5.0	0.308	40	0.12	0.864 −01		0.2	0.193		0.8	0.170
	5.0	0.759		50.0	0.174		7.0	0.287		0.2	0.385		0.4	0.812 −02		1.0	0.134
	7.0	0.739					10.0	0.280		0.3	0.222		0.6	0.510		2.0	0.641 −03
	10.0	0.729	10	0.56	0.964 −01		40.0	0.275		0.4	0.155		0.8	0.371		4.0	0.305
	30.0	0.720		0.7	0.720		50.0	0.275		0.6	0.958 −02		1.0	0.291		6.0	0.195
	50.0	0.720		1.0	0.463					0.8	0.691		2.0	0.138		8.0	0.142
				1.2	0.371	25	0.2	0.877 −01		1.0	0.539		3.0	0.886 −03		10.0	0.124
5	1.4	0.929 −01		2.0	0.201		0.3	0.484		1.2	0.441		4.0	0.645		14.0	0.114
	1.6	0.802		2.4	0.165		0.5	0.250		2.0	0.252		6.0	0.409		25.0	0.110
	2.0	0.658		3.0	0.139		0.8	0.143		4.0	0.117		7.0	0.364		50.0	0.110
	2.4	0.586		4.0	0.124		1.0	0.111		5.0	0.912 −03		8.0	0.341			
	3.0	0.532		5.0	0.118		1.2	0.902 −02		6.0	0.804		10.0	0.322	125	0.05	0.480 −01
	4.0	0.494		7.0	0.114		2.0	0.508		7.0	0.756		14.0	0.310		0.06	0.344
	5.0	0.478		10.0	0.112		3.0	0.323		8.0	0.731		40.0	0.306		0.08	0.210
	7.0	0.465		16.0	0.111		3.4	0.278		10.0	0.708		50.0	0.306		0.10	0.148
	10.0	0.459		50.0	0.111		4.0	0.235		16.0	0.692					0.14	0.917 −02
	30.0	0.454					4.4	0.219		40.0	0.688	80	0.054	0.990 −01		0.2	0.578
	50.0	0.453	15	0.34	0.968 −01		5.0	0.204		50.0	0.688		0.07	0.608		0.4	0.257
				0.4	0.770		6.0	0.191					0.09	0.391		0.6	0.165
6	1.2	0.837 −01		0.6	0.453		7.0	0.186	50	0.088	0.930 −01		0.10	0.328		0.8	0.121
	1.6	0.584		1.0	0.244		10.0	0.180		0.1	0.782		0.14	0.196		1.0	0.955 −03
	2.0	0.469		1.2	0.197		30.0	0.176		0.2	0.263		0.20	0.120		2.0	0.459
	2.4	0.411		2.0	0.109		50.0	0.176		0.3	0.154		0.24	0.950 −02		4.0	0.220
	3.0	0.369		2.4	0.890 −02					0.4	0.108		0.4	0.516		6.0	0.141
	4.0	0.341		3.0	0.691	30	0.16	0.904 −01		0.6	0.677 −02		0.6	0.328		9.0	0.904 −04
	5.0	0.329		4.0	0.573		0.2	0.635		0.8	0.490		0.8	0.239		10.0	0.837
	7.0	0.320		5.0	0.534		0.3	0.357		1.0	0.384		1.0	0.188		12.0	0.770
	10.0	0.316		6.0	0.516		0.4	0.246		2.0	0.181		2.0	0.895 −03		14.0	0.740
	30.0	0.312		10.0	0.497		0.6	0.150		4.0	0.842 −03		4.0	0.424		20.0	0.713
	50.0	0.312		40.0	0.490		0.8	0.108		5.0	0.652		6.6	0.241		40.0	0.704
				50.0	0.490		1.0	0.838 −02		6.0	0.548		8.0	0.205		50.0	0.704
8	0.74	0.968 −01					1.2	0.683		7.0	0.502		10.0	0.186			
	0.8	0.875	20	0.24	0.982 −01		2.0	0.388		8.0	0.478		14.0	0.176	150	0.05	0.338 −01
	1.0	0.660		0.4	0.477		3.0	0.246		10.0	0.458		30.0	0.172		0.06	0.244
	1.6	0.372		0.6	0.286		4.0	0.177		12.0	0.449		50.0	0.172		0.08	0.151
	2.0	0.285		0.8	0.203		4.4	0.161		16.0	0.444					0.10	0.108
	2.4	0.242		1.0	0.156		5.0	0.147		40.0	0.440	100	0.05	0.741 −01		0.12	0.833 −02
	3.0	0.212		1.2	0.127		6.0	0.136		50.0	0.440		0.07	0.398		0.16	0.569
	4.0	0.192		2.0	0.713 −02		7.0	0.130					0.10	0.220		0.2	0.431
							10.0	0.125					0.14	0.133		0.4	0.194

Table G
Tabular Values for Figure G (Cont'd)

D_o/t	L/D_o	A	D_o/t	L/D_o	A	D_o/t	L/D_o	A	D_o/t	L/D_o	A	D_o/t	L/D_o	A	D_o/t	L/D_o	A
150	0.6	0.125 −02	200	12.0	0.338 −04	300	0.05	0.923 −02	400	0.4	0.429 −03	500	12.0	0.880 −05	800	0.6	0.980 −04
	1.0	0.726 −03		14.0	0.309		0.06	0.690		0.6	0.280					0.8	0.728
	2.0	0.349		16.0	0.295		0.08	0.452		0.8	0.207	600	0.05	0.270 −02		1.0	0.580
	4.0	0.168		20.0	0.283		0.10	0.334		1.0	0.165		0.06	0.208		2.0	0.286
	6.0	0.108		40.0	0.275		0.12	0.264		2.0	0.808 −04		0.08	0.142		4.0	0.140
	8.0	0.787 −04		50.0	0.275		0.2	0.143		4.0	0.393		0.10	0.108		5.0	0.112
	10.0	0.619					0.4	0.666 −03		6.0	0.257		0.12	0.868 −03		5.6	0.992 −05
	12.0	0.553	250	0.05	0.129 −01		0.6	0.433		8.0	0.189		0.16	0.624			
	16.0	0.510		0.06	0.955 −02		0.8	0.321		10.0	0.148		0.2	0.486			
	20.0	0.498		0.08	0.617		1.0	0.254		14.0	0.102		0.4	0.231			
	40.0	0.489		0.10	0.452		2.0	0.124		16.0	0.882 −05		0.6	0.151	1,000	0.05	0.113 −02
	50.0	0.489		0.14	0.293		4.0	0.602 −04					0.8	0.112		0.06	0.891 −03
				0.2	0.191		6.0	0.393	500	0.05	0.370 −02		1.0	0.894 −04		0.07	0.733
200	0.05	0.196 −01		0.4	0.881 −03		8.0	0.287		0.06	0.284		2.0	0.439		0.09	0.541
	0.06	0.143		0.6	0.572		10.0	0.225		0.08	0.192		4.0	0.216		0.12	0.388
	0.08	0.909 −02		0.8	0.422		14.0	0.156		0.10	0.145		6.0	0.141		0.16	0.282
	0.10	0.659		1.0	0.335		16.0	0.142		0.12	0.116		8.0	0.104		0.2	0.221
	0.14	0.421		2.0	0.163		20.0	0.130		0.16	0.830 −03		8.4	0.988 −05		0.4	0.106
	0.2	0.272		4.0	0.789 −04		40.0	0.123		0.2	0.645					0.7	0.596 −04
	0.3	0.171		6.0	0.513		50.0	0.122		0.4	0.305	800	0.05	0.165 −02		1.0	0.414
	0.5	0.976 −03		8.0	0.377					0.6	0.199		0.06	0.129		2.0	0.204
	0.8	0.592		10.0	0.293	400	0.05	0.549 −02		0.8	0.148		0.08	0.892 −03		4.0	0.101
	1.0	0.469		12.0	0.238		0.06	0.417		1.0	0.118		0.10	0.682		4.2	0.957 −05
	2.0	0.227		14.0	0.210		0.08	0.278		2.0	0.579 −04		0.12	0.551			
	4.0	0.110		16.0	0.196		0.10	0.208		4.0	0.282		0.16	0.398			
	6.0	0.711 −04		20.0	0.184		0.12	0.166		6.0	0.185		0.2	0.312			
	8.0	0.520		40.0	0.176		0.16	0.118		8.0	0.137		0.4	0.149			
	10.0	0.403		50.0	0.176		0.2	0.914 −03		10.0	0.107						

GENERAL NOTE: Extrapolation is not permitted except as explicitly allowed by the Construction Code.

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Table CS-1
Tabular Values for Figure CS-1

Temp., °F	A	B, psi	Temp., °F	A	B, psi
300	0.100 −04	0.145 +03	700	0.900	0.650
	0.138 −03	0.200 +04		0.100 −02	0.665
	0.645 −03	0.940 +04		0.150	0.725
	0.700	0.990		0.200	0.760
	0.800	0.105 +05		0.212 −01	0.110 +05
	0.900	0.109		0.100 +00	0.110
	0.100 −02	0.112			
	0.150	0.119	800	0.100 −04	0.114 +03
	0.200	0.123		0.175 −03	0.200 +04
	0.950	0.138		0.367 −03	0.416 +04
	0.200 −01	0.138		0.400	0.435
	0.100 +00	0.138		0.500	0.465
				0.600	0.485
500	0.100 −04	0.135 +03		0.700	0.510
	0.148 −03	0.200 +04		0.100 −02	0.560
	0.513 −03	0.700 +04		0.150	0.605
	0.600	0.747		0.200	0.640
	0.800	0.810		0.225 −01	0.975
	0.100 −02	0.850		0.100 +00	0.975
	0.150	0.935			
	0.250	0.995	900	0.100 −04	0.104 +03
	0.195 −01	0.131 +05		0.192 −03	0.200 +04
	0.100 +00	0.131		0.331 −03	0.349 +04
				0.500	0.395
700	0.100 −04	0.123 +03		0.700	0.430
	0.163 −03	0.200 +04		0.100 −02	0.471
	0.413 −03	0.513 +04		0.150	0.516
	0.500	0.556		0.250	0.575
	0.600	0.580		0.213 −01	0.850
	0.700	0.610		0.100 +00	0.850
	0.800	0.630			

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Table CS-2
Tabular Values for Figure CS-2

Temp., °F	A	B, psi	Temp., °F	A	B, psi
300	0.100 −04	0.145 +03	700	0.204 −03	0.250 +04
	0.172 −03	0.250 +04		0.564 −03	0.680 +04
	0.783 −03	0.113 +05		0.100 −02	0.800
	0.800	0.114		0.300	0.101 +05
	0.900	0.118		0.100 −01	0.121
	0.100 −02	0.123		0.264	0.138
	0.200	0.150		0.100 +00	0.138
	0.300	0.162			
	0.400	0.168	800	0.100 −04	0.114 +03
	0.500	0.172		0.219 −03	0.250 +04
	0.250 −01	0.176		0.505 −03	0.571 +04
	0.100 +00	0.176		0.100 −02	0.710
				0.150	0.795
500	0.100 −04	0.135 +03		0.200	0.840
	0.185 −03	0.250 +04		0.300	0.890
	0.675 −03	0.900 +04		0.319 −01	0.124 +05
	0.900	0.965		0.100 +00	0.124
	0.100 −02	0.100 +05			
	0.250	0.120	900	0.100 −04	0.104 +03
	0.300	0.124		0.240 −03	0.250 +04
	0.800	0.142		0.428 −03	0.449 +04
	0.100 −01	0.146		0.100 −02	0.600
	0.150	0.155		0.150	0.680
	0.200	0.161		0.200	0.735
	0.280	0.169		0.300	0.790
	0.100 +00	0.169		0.800	0.920
				0.300 −01	0.111 +05
700	0.100 −04	0.123 +03		0.100 +00	0.111

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Table CS-3
Tabular Values for Figure CS-3

Yield Strength, psi	A	B, psi
60,000	0.100 −04	0.145 +03
	0.345 −03	0.500 +04
	0.100 −02	0.145 +05
	0.166	0.240
	0.100 +00	0.300
55,000	0.100 −04	0.145 +03
	0.345 −03	0.500 +04
	0.100 −02	0.145 +05
	0.152	0.220
	0.100 +00	0.270
50,000	0.100 −04	0.145 +03
	0.345 −03	0.500 +04
	0.100 −02	0.145 +05
	0.138	0.200
	0.100 +00	0.250
45,000	0.100 −04	0.145 +03
	0.345 −03	0.500 +04
	0.100 −02	0.145 +05
	0.124	0.180
	0.100 +00	0.225
38,000 to 40,000	0.100 −04	0.145 +03
	0.345 −03	0.500 +04
	0.100 −02	0.145 +05
	0.110	0.160
	0.100 +00	0.200

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Table CS-4
Tabular Values for Figure CS-4

Temp., °F	A	B, psi	Temp., °F	A	B, psi
100 (Cl. 2)	0.100 −04	0.150 +03	300 (Cl. 2)	0.100 −04	0.144 +03
	0.333 −03	0.500 +04		0.347 −03	0.500 +04
	0.156 −02	0.252 +05		0.135 −02	0.204 +05
	0.300	0.269		0.600	0.230
	0.700	0.287		0.100 −01	0.239
	0.900	0.290		0.400	0.256
	0.300 −01	0.304		0.100 +00	0.267
	0.400	0.307			
	0.100 +00	0.307	300 (Cl. 1)	0.100 −04	0.144 +03
				0.347 −03	0.500 +04
100 (Cl. 1)	0.100 −04	0.150 +03		0.118 −02	0.177 +05
	0.333 −03	0.500 +04		0.300	0.187
	0.136 −02	0.216 +05		0.400	0.190
	0.400	0.233		0.300 −01	0.202
	0.100 −01	0.244		0.700	0.204
	0.300	0.253		0.100 +00	0.204
	0.100 +00	0.253			

Table CS-5
Tabular Values for Figure CS-5

Temp., °F	A	B, psi	Temp., °F	A	B, psi
100	0.199 −03	0.300 +04	400	0.300 −02	0.212 +05
	0.160 −02	0.245 +05		0.700	0.220
	0.200	0.246		0.900	0.221
	0.300	0.248		0.100 −01	0.223
	0.500	0.249		0.500	0.223
	0.600	0.250			
	0.500 −01	0.250	550	0.215 −03	0.300 +04
				0.108 −02	0.150 +05
200	0.200 −03	0.300 +04		0.200	0.164
	0.157 −02	0.235 +05		0.400	0.184
	0.500 −01	0.235		0.100 −01	0.200
				0.200	0.207
300	0.203 −03	0.300 +04		0.500	0.213
	0.150 −02	0.220 +05			
	0.300	0.225	650	0.220 −03	0.300 +04
	0.600	0.225		0.121 −02	0.150 +05
	0.500 −01	0.225		0.200	0.164
				0.400	0.179
400	0.210 −03	0.300 +04		0.100 −01	0.194
	0.154 −02	0.207 +05		0.500	0.207

Table CS-6
Tabular Values for Figure CS-6

Temp., °F	A	B, psi	Temp., °F	A	B, psi
100	0.150 −03	0.220 +04	200	0.200 −01	0.900 +04
	0.200	0.300			
	0.300	0.450	300	0.150 −03	0.220 +04
	0.600	0.600		0.200	0.300
	0.800	0.650		0.500	0.500
	0.200 −02	0.800		0.100 −02	0.600
	0.420	0.900		0.250	0.700
	0.400 −01	0.100 +05		0.900	0.800
	0.700	0.100		0.250 −01	0.830
200	0.150 −03	0.220 +04	400	0.180 −03	0.250 +04
	0.200	0.300		0.300	0.400
	0.420	0.500		0.100 −02	0.550
	0.800	0.600		0.700	0.700
	0.150 −02	0.700		0.250 −01	0.750
	0.400	0.800			

Table HT-1
Tabular Values for Figure HT-1

Temp., °F	A	B, psi
Up to 200	0.100 −04	0.146 +03
	0.245 −02	0.368 +05
	0.400	0.406
	0.700	0.441
	0.100 −01	0.460
	0.200	0.482
	0.500	0.500
400	0.100 −04	0.137 +03
	0.245 −02	0.346 +05
	0.400	0.384
	0.700	0.420
	0.100 −01	0.441
	0.400	0.482
650	0.100 −04	0.124 +03
	0.243 −02	0.315 +05
	0.400	0.357
	0.700	0.399
	0.100 −01	0.417
	0.300	0.464

Table HT-2
Tabular Values for Figure HT-2

Temp., °F	A	B, psi
100	0.337 −03	0.500 +04
	0.283 −02	0.420 +05
	0.400	0.432
	0.600	0.440
	0.800	0.448
	0.100 −01	0.454
	0.150	0.468
	0.200	0.475
	0.250	0.482
	0.300	0.488
	0.400	0.494
	0.500	0.497
	0.600	0.498
	0.700	0.500
	0.100 +00	0.500

Table HA-1
Tabular Values for Figure HA-1

Temp., °F	A	B, psi	Temp., °F	A	B, psi
100	0.142 −04	0.200 +03	900	0.181 −04	0.200 +03
	0.463 −03	0.650 +04		0.315 −03	0.350 +04
	0.150 −02	0.106 +05		0.400	0.386
	0.200	0.115		0.500	0.416
	0.300	0.125		0.150 −02	0.548
	0.100 −01	0.140		0.300	0.612
	0.631	0.158		0.100 −01	0.707
	0.100 +00	0.158		0.200	0.742
				0.784	0.794
400	0.159 −04	0.200 +03		0.100 +00	0.794
	0.391 −03	0.500 +04			
	0.200 −02	0.820	1,200	0.200 −04	0.200 +03
	0.300	0.910		0.283 −03	0.284 +04
	0.400	0.969		0.100 −02	0.416
	0.500	0.100 +05		0.200	0.483
	0.100 −01	0.106		0.500	0.554
	0.538	0.116		0.100 −01	0.595
	0.100 +00	0.116		0.200	0.635
				0.488	0.670
700	0.170 −04	0.200 +03		0.100 +00	0.670
	0.338 −03	0.400 +04			
	0.400	0.433	1,500	1.00 −04	0.905 +03
	0.500	0.471		1.10	0.100 +04
	0.600	0.500		3.12	0.2825
	0.100 −02	0.576		4.00	0.300
	0.200	0.667		1.27 −03	0.350
	0.500	0.765		5.06	0.400
	0.600	0.780		4.00 −02	0.465
	0.100 −01	0.810		1.00 −01	0.465
	0.542	0.900			
	0.100 +00	0.900			

Table HA-2
Tabular Values for Figure HA-2

Temp., °F	A	B, psi	Temp., °F	A	B, psi
100	0.184 −04	0.250 +03	700	0.500 −01	0.127 +05
	0.605 −03	0.840 +04		0.592	0.129
	0.150 −02	0.111 +05		0.100 +00	0.129
	0.200	0.117			
	0.250	0.122	900	0.228 −04	0.250 +03
	0.300	0.126		0.510 −03	0.566 +04
	0.400	0.130		0.600	0.610
	0.500	0.133		0.100 −02	0.720
	0.700	0.136		0.300	0.905
	0.100 −01	0.140		0.400	0.940
	0.200	0.146		0.100 −01	0.103 +05
	0.726	0.156		0.522	0.117
	0.100 +00	0.156		0.100 +00	0.117
400	0.199 −04	0.250 +03	1,200	0.247 −04	0.250 +03
	0.585 −03	0.750 +04		0.460 −03	0.466 +04
	0.100 −02	0.870		0.100 −02	0.600
	0.150	0.970		0.200	0.720
	0.200	0.104 +05		0.300	0.780
	0.300	0.112		0.400	0.820
	0.400	0.117		0.500	0.840
	0.500	0.120		0.100 −01	0.895
	0.600	0.122		0.700	0.100 +05
	0.100 −01	0.127		0.100 +00	0.100
	0.574	0.143			
	0.100 +00	0.143	1,500	1.00 −04	0.905 +03
				1.10	0.100 +04
700	0.218 −04	0.250 +03		3.95	0.3575
	0.533 −03	0.625 +04		1.45 −03	0.425
	0.700	0.700		2.54	0.450
	0.100 −02	0.780		5.62	0.4819
	0.300	0.100 +05		3.50 −02	0.545
	0.400	0.105		1.00 −01	0.545
	0.100 −01	0.114			

Table HA-3
Tabular Values for Figure HA-3

Temp., °F	A	B, psi	Temp., °F	A	B, psi
100	0.139 −04	0.200 +03	600	0.165 −04	0.200 +03
	0.535 −03	0.755 +04		0.319 −03	0.389 +04
	0.200 −02	0.101 +05		0.100 −02	0.475
	0.600	0.124		0.100 −01	0.710
	0.400 −01	0.150		0.281	0.845
	0.100 +00	0.150		0.100 +00	0.845
400	0.158 −04	0.200 +03	800	0.174 −04	0.200 +03
	0.361 −03	0.463 +04		0.275 −03	0.317 +04
	0.100 −02	0.550		0.150 −02	0.427
	0.100 −01	0.815		0.100 −01	0.590
	0.283	0.975		0.300	0.720
	0.100 +00	0.975		0.100 +00	0.720

Table HA-4
Tabular Values for Figure HA-4

Temp., °F	A	B, psi	Temp., °F	A	B, psi
100	0.143 −04	0.200 +03	400	0.700 −02	0.895 +04
	0.600 −03	0.840 +04		0.100 −01	0.940
	0.700 −02	0.133 +05		0.429	0.106 +05
	0.100 −01	0.140		0.100 +00	0.106
	0.200	0.152			
	0.500	0.162	600	0.169 −04	0.200 +03
	0.100 +00	0.162		0.363 −03	0.438 +04
				0.500 −02	0.720
300	0.153 −04	0.200 +03		0.100 −01	0.790
	0.475 −03	0.625 +04		0.456	0.900
	0.500 −02	0.995		0.100 +00	0.900
	0.600	0.102 +05			
	0.100 −01	0.110	800	0.176 −04	0.200 +03
	0.458	0.126		0.317 −03	0.363 +04
	0.100 +00	0.126		0.500 −02	0.595
				0.100 −01	0.660
400	0.154 −04	0.200 +03		0.468	0.770
	0.410 −03	0.538 +04		0.100 +00	0.770

Table HA-5
Tabular Values for Figure HA-5

Temp., °F	A	B, psi	Temp., °F	A	B, psi
Room Temp.	0.000141	2,000	400	0.0040	19,500
	0.001340	19,000 P.L.		0.0060	21,000
	0.0015	19,250		0.010	22,500
	0.0020	20,600		0.015	23,250
	0.0025	22,500		0.023	24,000
	0.0030	23,800			
	0.0040	26,000	650	0.000160	2,000
	0.0060	28,300		0.00120	15,000 P.L.
	0.010	30,500		0.0015	15,500
	0.015	31,500		0.0020	16,200
	0.021	32,600		0.0025	17,000
				0.0030	17,800
400	0.0001509	2,000		0.0040	19,000
	0.001166	15,450 P.L.		0.0060	20,300
	0.0015	15,750		0.010	21,900
	0.0020	16,500		0.015	22,500
	0.0025	17,500		0.034	22,800
	0.0030	18,300			

Table HA-6
Tabular Values for Figure HA-6

Temp., °F	A	B, psi	Temp., °F	A	B, psi
70	7.07 −05	1.00 +03	650	7.98 −05	1.00 +03
	5.00 −04	7.08		4.99 −04	6.25
	1.00 −03	1.41 +04		8.85	8.92
	1.44	1.80		1.44 −03	9.65
	1.81	1.88		1.81	9.90
	4.48	2.02		4.66	1.07 +04
	9.42	2.09		9.80	1.12
	1.89 −02	2.16		2.00 −02	1.18
	5.00	2.25		5.00	1.20
	1.00 −01	2.25		1.00 −01	1.20
200	7.25 −05	1.00 +03	950	8.62 −05	1.00 +03
	5.00 −04	6.90		4.99 −04	5.79
	9.71	1.23 +04		9.64	8.84
	1.37 −03	1.37		1.09 −03	9.05
	1.95	1.45		1.27	9.25
	4.81	1.60		4.84	1.03 +04
	9.81	1.70		9.68	1.08
	1.96 −02	1.79		1.99 −02	1.12
	5.00	1.84		5.00	1.15
	1.00 −01	1.84		1.00 −01	1.15
400	7.55 −05	1.00 +03	1,200	9.64 −05	1.00 +03
	5.00 −04	6.62		4.98 −04	5.17
	9.76	1.08 +04		9.32	8.05
	1.31 −03	1.14		1.38 −03	8.70
	1.97	1.19		1.90	9.06
	4.44	1.27		4.88	9.84
	9.57	1.33		9.94	1.04 +04
	1.99 −02	1.38		1.94 −02	1.08
	5.00	1.44		5.00	1.13
	1.00 −01	1.44		1.00 −01	1.13

Table HA-7
Tabular Values for Figure HA-7

Temp., °F	A	B, psi	Temp., °F	A	B, psi
70	0.700 −04	0.100 +04	300	0.700 −04	0.100 +04
	0.500 −03	0.730		0.500 −03	0.698
	0.750	0.110 +05		0.750	0.105 +05
	0.100 −02	0.146		0.100 −02	0.139
	0.125	0.183		0.125	0.174
	0.150	0.219		0.150	0.209
	0.174	0.254		0.174	0.242
	0.198	0.288		0.198	0.274
	0.289	0.393		0.271	0.337
	0.407	0.429		0.462	0.380
	0.641	0.454		0.619	0.394
	0.749	0.460		0.763	0.403
	0.157 −01	0.486		0.199 −01	0.436
	0.500	0.520		0.500	0.462
	0.100 +00	0.525		0.100 +00	0.465

Table HA-8
Tabular Values for Figure HA-8

Temp., °F	A	B, psi	Temp., °F	A	B, psi
70	0.707 −04	0.100 +04	212	0.337 −02	0.220 +05
	0.403 −03	0.568		0.476	0.233
	0.606	0.841		0.742	0.247
	0.836	0.111 +05		0.985	0.256
	0.113 −02	0.139		0.199 −01	0.278
	0.148	0.162		0.500	0.282
	0.164	0.170		0.100 +00	0.282
	0.182	0.179			
	0.346	0.226	750	0.878 −04	0.100 +04
	0.487	0.250		0.500 −03	0.611
	0.730	0.278		0.750	0.917
	0.989	0.299		0.100 −02	0.120 +05
	0.200 −01	0.325		0.125	0.140
	0.500	0.325		0.147	0.155
	0.100 +00	0.325		0.170	0.167
				0.192	0.175
212	0.727 −04	0.100 +04		0.329	0.207
	0.473 −03	0.651		0.499	0.213
	0.707	0.973		0.736	0.218
	0.950	0.125 +05		0.937	0.221
	0.125 −02	0.151		0.197 −01	0.230
	0.146	0.165		0.500	0.238
	0.174	0.178		0.100 +00	0.239
	0.195	0.185			

Table HA-9
Tabular Values for Figure HA-9

Temp., °F	A	B, psi	Temp., °F	A	B, psi
70	0.100 −04	0.708 +03	300	0.100 −04	0.675 +03
	0.707	0.100 +04		0.741	0.100 +04
	0.500 −03	0.708		0.500 −03	0.675
	0.750	0.106 +05		0.750	0.101 +05
	0.992	0.140		0.923	0.124
	0.121 −02	0.171		0.109 −02	0.144
	0.143	0.201		0.128	0.165
	0.166	0.231		0.153	0.186
	0.197	0.262		0.198	0.204
	0.284	0.301		0.269	0.220
	0.491	0.333		0.392	0.236
	0.697	0.345		0.721	0.257
	0.849	0.357		0.893	0.264
	0.192 −01	0.387		0.190 −01	0.287
	0.500	0.400		0.500	0.296
	0.100 +00	0.400		0.100 +00	0.296
200	0.100 −04	0.690 +03	700	0.100 −04	0.620 +03
	0.725	0.100 +04		0.806	0.100 +04
	0.500 −03	0.690		0.500 −03	0.620
	0.750	0.103 +05		0.750	0.930
	0.939	0.129		0.933	0.116 +05
	0.112 −02	0.154		0.108 −02	0.134
	0.133	0.178		0.124	0.152
	0.163	0.202		0.143	0.170
	0.194	0.215		0.171	0.188
	0.272	0.242		0.277	0.217
	0.431	0.266		0.375	0.229
	0.683	0.278		0.701	0.249
	0.872	0.288		0.934	0.258
	0.187 −01	0.312		0.192 −01	0.277
	0.500	0.322		0.500	0.286
	0.100 +00	0.322		0.100 +00	0.286

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Table HA-10
Tabular Values for Figure HA-10

Temp., °F	A	B, psi	Temp., °F	A	B, psi
Up to 100	1.00 −05	1.42 +02	400	3.23	1.65
	7.07	1.00 +03		6.78	1.81
	1.00 −04	1.42		1.80 −02	1.97
	1.25 −03	1.77 +04		7.47	2.08
	2.24	2.18			
	4.01	2.66	600	1.00 −05	1.27 +02
	9.49	2.83		7.91	1.00 +03
	4.29 −02	3.00		1.00 −04	1.27
	7.50	3.11		9.79	1.24 +04
				3.77 −03	1.58
200	1.00 −05	1.38 +02		8.38	1.79
	7.25	1.00 +03		2.41 −02	1.92
	1.00 −04	1.38		7.50	2.02
	1.11 −03	1.53 +04			
	2.76	1.97	800	1.00 −05	1.21 +02
	6.14	2.19		8.30	1.00 +03
	1.64 −02	2.30		1.00 −04	1.21
	5.72	2.41		8.84	1.07 +04
	7.50	2.45		2.28 −03	1.37
				5.90	1.68
400	1.00 −05	1.33 +02		1.21 −02	1.78
	7.55	1.00 +03		2.19	1.85
	1.00 −04	1.33		5.55	1.93
	1.08 −03	1.43 +04		7.50	1.97

Table CI-1
Tabular Values for Figure CI-1

Class / Temp., °F	A	B, psi	Class / Temp., °F	A	B, psi
Class 60 up to 650	0.100 −04	0.110 +03	Class 40 up to 650	0.100 +00	0.120 +05
	0.160 −02	0.182 +05			
	0.100 +00	0.182	Class 30 up to 650	0.100 −04	0.716 +02
				0.122 −02	0.908 +04
Class 50 up to 650	0.100 −04	0.997 +02		0.100 +00	0.908
	0.147 −02	0.150 +05			
	0.100 +00	0.150	Class 20 up to 650	0.100 −04	0.595 +02
				0.991 −03	0.607 +04
Class 40 up to 650	0.100 −04	0.872 +02		0.100 +00	0.607
	0.135 −02	0.120 +05			

Table CD-1
Tabular Values for Figure CD-1

Temp., °F	A	B, psi	Temp., °F	A	B, psi
Up to 100	0.100 −04	0.122 +03	400	0.300 −01	0.195 +05
	0.124 −02	0.149 +05		0.600	0.203
	0.200	0.158			
	0.400	0.173	650	0.100 −04	0.112 +03
	0.100 −01	0.191		0.892 −03	0.982 +04
	0.250	0.207		0.200 −02	0.119 +05
				0.400	0.138
400	0.100 −04	0.122 +03		0.600	0.147
	0.107 −02	0.130 +05		0.800	0.152
	0.200	0.148		0.100 −01	0.155
	0.300	0.157		0.200	0.163
	0.400	0.164		0.400	0.169
	0.100 −01	0.180			

Table CD-2
Tabular Values for Figure CD-2

Temp., °F	A	B, psi	Temp., °F	A	B, psi
105	1.00 −05	1.16 +02	212	2.50 −03	9.74 +03
	8.66	1.00 +03		7.00	1.12 +04
	6.28 −04	7.25		3.00 −02	1.26
	1.00 −03	8.81		1.00 −01	1.26
	2.00	1.06 +04			
	7.00	1.30	390	1.00 −05	1.06 +02
	3.50 −02	1.45		9.43	1.00 +03
	1.00 −01	1.45		5.57 −04	5.90
				1.00 −03	7.40
212	1.00 −05	1.12 +02		2.50	9.10
	8.93	1.00 +03		7.00	1.04 +04
	5.62 −04	6.30		3.00 −02	1.18
	1.00 −03	8.00		1.00 −01	1.18

Table NFA-1
Tabular Values for Figure NFA-1

Temp., °F	A	B, psi	Temp., °F	A	B, psi
100	0.100 −04	0.502 +02	300	0.110 −04	0.500 +02
	0.148 −03	0.742 +03		0.148 −03	0.680 +03
	0.200	0.951		0.200	0.841
	0.250	0.107 +04		0.250	0.949
	0.300	0.116		0.300	0.102 +04
	0.100 −02	0.156		0.400	0.112
	0.150	0.171		0.700	0.127
	0.400	0.208		0.250 −02	0.156
	0.100 −01	0.246		0.400 −01	0.230
	0.150	0.262		0.100 +00	0.230
	0.400	0.301			
	0.100 +00	0.301	400	0.119 −04	0.500 +02
				0.998	0.428 +03
200	0.103 −04	0.500 +02		0.150 −03	0.623
	0.148 −03	0.709 +03		0.200	0.763
	0.200	0.910		0.250	0.861
	0.250	0.102 +04		0.300	0.927
	0.300	0.110		0.400	0.100 +04
	0.400	0.121		0.500	0.105
	0.100 −02	0.148		0.100 −02	0.121
	0.300	0.183		0.300	0.143
	0.600	0.208		0.100 −01	0.164
	0.200 −01	0.250		0.400	0.191
	0.400	0.279		0.100 +00	0.191
	0.100 +00	0.279			

Table NFA-2
Tabular Values for Figure NFA-2

Temp., °F	A	B, psi	Temp., °F	A	B, psi
100	0.100 −04	0.501 +02	300	0.199 −03	0.901 +03
	0.405 −03	0.200 +04		0.250	0.111 +04
	0.500	0.248		0.300	0.134
	0.600	0.291		0.400	0.168
	0.700	0.331		0.500	0.197
	0.800	0.365		0.600	0.224
	0.900	0.401		0.700	0.244
	0.100 −02	0.427		0.100 −02	0.299
	0.150	0.520		0.150	0.359
	0.200	0.584		0.250	0.425
	0.250	0.622		0.300	0.450
	0.300	0.653		0.400	0.484
	0.400	0.695		0.500	0.507
	0.500	0.726		0.100 −01	0.563
	0.600	0.740		0.150	0.592
	0.100 −01	0.793		0.100 +00	0.592
	0.200	0.844			
	0.400	0.884	400	0.118 −04	0.500 +02
	0.500	0.898		0.147 −03	0.603 +03
	0.100 +00	0.898		0.200	0.795
				0.250	0.953
200	0.102 −04	0.500 +02		0.300	0.108 +04
	0.301 −03	0.143 +04		0.400	0.128
	0.600	0.264		0.500	0.145
	0.700	0.299		0.100 −02	0.200
	0.100 −02	0.381		0.150	0.233
	0.150	0.468		0.200	0.259
	0.200	0.525		0.250	0.278
	0.250	0.566		0.300	0.295
	0.300	0.592		0.500	0.333
	0.400	0.623		0.600	0.342
	0.500	0.645		0.700	0.350
	0.600	0.659		0.100 −01	0.368
	0.100 −01	0.695		0.150	0.384
	0.500	0.800		0.200	0.392
	0.100 +00	0.800		0.250	0.399
				0.100 +00	0.399
300	0.110 −04	0.500 +02			

Table NFA-3
Tabular Values for Figure NFA-3

Temp., °F	A	B, psi	Temp., °F	A	B, psi
100	0.100 −04	0.506 +02	300	0.348 −03	0.159 +04
	0.353 −03	0.179 +04		0.400	0.180
	0.400	0.195		0.500	0.204
	0.500	0.217		0.600	0.221
	0.600	0.232		0.700	0.233
	0.700	0.243		0.800	0.244
	0.800	0.251		0.100 −02	0.256
	0.100 −02	0.264		0.150	0.282
	0.150	0.282		0.150 −01	0.423
	0.150 −01	0.423		0.100 +00	0.423
	0.100 +00	0.423			
			400	0.116 −04	0.500 +02
200	0.104 −04	0.501 +02		0.334 −03	0.141 +04
	0.375 −03	0.179 +04		0.400	0.168
	0.400	0.187		0.500	0.197
	0.500	0.209		0.600	0.216
	0.600	0.225		0.700	0.229
	0.700	0.238		0.800	0.239
	0.800	0.247		0.900	0.248
	0.100 −02	0.261		0.100 −02	0.255
	0.150	0.282		0.150	0.282
	0.150 −01	0.423		0.150 −01	0.423
	0.100 +00	0.423		0.100 +00	0.423
300	0.107 −04	0.500 +02			

Table NFA-4
Tabular Values for Figure NFA-4

Temp., °F	A	B, psi	Temp., °F	A	B, psi
100	0.100 −04	0.507 +02	300	0.698 −03	0.331 +04
	0.126 −02	0.652 +04		0.100 −02	0.450
	0.150	0.745		0.150	0.578
	0.200	0.874		0.200	0.656
	0.250	0.948		0.250	0.710
	0.300	0.998		0.300	0.742
	0.400	0.105 +05		0.400	0.782
	0.500	0.109		0.500	0.812
	0.600	0.112		0.600	0.831
	0.100 −01	0.117		0.100 −01	0.872
	0.150	0.119		0.150	0.901
	0.250	0.122		0.100 +00	0.901
	0.400	0.124			
	0.100 +00	0.124	400	0.117 −04	0.500 +02
				0.248 −03	0.106 +04
200	0.101 −04	0.500 +02		0.300	0.126
	0.131 −02	0.652 +04		0.400	0.159
	0.150	0.720		0.500	0.185
	0.200	0.837		0.600	0.206
	0.250	0.907		0.700	0.224
	0.300	0.957		0.900	0.254
	0.400	0.101 +05		0.100 −02	0.268
	0.500	0.105		0.150	0.315
	0.600	0.108		0.200	0.349
	0.700	0.110		0.250	0.377
	0.100 −01	0.113		0.300	0.395
	0.250	0.118		0.400	0.426
	0.300	0.119		0.100 −01	0.512
	0.400	0.120		0.150	0.549
	0.100 +00	0.120		0.100 +00	0.549
300	0.107 −04	0.500 +02			

Table NFA-5
Tabular Values for Figure NFA-5

Temp., °F	A	B, psi
100	0.100 −04	0.514 +02
	0.492 −03	0.255 +04
	0.600	0.300
	0.700	0.327
	0.800	0.347
	0.900	0.359
	0.100 −02	0.367
	0.171 −01	0.550
	0.100 +00	0.550

Table NFA-6
Tabular Values for Figure NFA-6

Temp., °F	A	B, psi	Temp., °F	A	B, psi
Up to 100	0.100 −04	0.523 +02	300	0.499 −03	0.227 +04
	0.687 −03	0.356 +04		0.600	0.264
	0.800	0.406		0.700	0.294
	0.900	0.439		0.800	0.321
	0.100 −02	0.456		0.100 −02	0.356
	0.150	0.498		0.150	0.407
	0.200	0.512		0.200	0.432
	0.300	0.525		0.300	0.460
	0.100 −01	0.570		0.100 −01	0.520
	0.300	0.611		0.300	0.562
200	0.101 −04	0.500 +02	400	0.126 −04	0.500 +02
	0.499 −03	0.243 +04		0.398 −03	0.159 +04
	0.700	0.322		0.500	0.189
	0.800	0.354		0.700	0.240
	0.900	0.382		0.100 −02	0.294
	0.100 −02	0.397		0.150	0.351
	0.150	0.447		0.200	0.380
	0.200	0.472		0.300	0.410
	0.300	0.500		0.500	0.443
	0.100 −01	0.566		0.100 −01	0.473
	0.300	0.611		0.250	0.511
300	0.110 −04	0.500 +02			

Table NFA-7
Tabular Values for Figure NFA-7

Temp., °F	A	B, psi	Temp., °F	A	B, psi
200	0.101 −04	0.500 +02	300	0.700 −03	0.634 +03
	0.901	0.466 +03		0.150 −02	0.724
	0.500 −03	0.701		0.300	0.798
	0.700	0.751		0.600	0.861
	0.150 −02	0.880		0.100 −01	0.906
	0.400	0.105 +04		0.100 +00	0.906
	0.700	0.115			
	0.100 −01	0.120	400	0.119 −04	0.500 +02
	0.150	0.123		0.746	0.327 +03
	0.200	0.125		0.150 −02	0.604
	0.100 +00	0.125		0.300	0.680
				0.500	0.719
300	0.112 −04	0.500 +02		0.700	0.736
	0.885	0.415 +03		0.900	0.746
	0.500 −03	0.594		0.100 +00	0.746

Table NFA-8
Tabular Values for Figure NFA-8

Temp., °F	A	B, psi	Temp., °F	A	B, psi
100	0.100 −04	0.510 +02	300	0.100 −04	0.450 +02
	0.196	0.100 +03		0.222	0.100 +03
	0.278 −03	0.142 +04		0.338 −03	0.153 +04
	0.300	0.152		0.400	0.175
	0.400	0.184		0.100 −02	0.265
	0.100 −02	0.265		0.250	0.354
	0.250	0.354		0.500	0.415
	0.500	0.415		0.600	0.428
	0.600	0.428		0.700	0.438
	0.700	0.438		0.800	0.444
	0.800	0.444		0.900	0.452
	0.900	0.452		0.100 −01	0.456
	0.100 −01	0.456		0.150	0.476
	0.150	0.476		0.200	0.486
	0.200	0.486		0.100 +00	0.486
	0.100 +00	0.486			
			400	0.100 −04	0.400 +02
200	0.100 −04	0.490 +02		0.250	0.100 +03
	0.204	0.100 +03		0.288 −03	0.116 +04
	0.283 −03	0.141 +04		0.300	0.121
	0.300	0.148		0.400	0.153
	0.400	0.182		0.600	0.197
	0.100 −02	0.265		0.100 −02	0.240
	0.250	0.354		0.250	0.320
	0.500	0.415		0.300	0.336
	0.600	0.428		0.400	0.360
	0.700	0.438		0.500	0.378
	0.800	0.444		0.600	0.389
	0.900	0.452		0.700	0.401
	0.100 −01	0.456		0.800	0.410
	0.150	0.476		0.900	0.418
	0.200	0.486		0.100 −01	0.423
	0.100 +00	0.486		0.100 +00	0.423

Table NFA-9
Tabular Values for Figure NFA-9

Temp., °F	A	B, psi
150	0.100 −04	0.500 +02
	0.792 −03	0.407 +04
	0.900	0.434
	0.100 −02	0.454
	0.150	0.505
	0.200	0.531
	0.400	0.589
	0.600	0.625
	0.200 −01	0.715
	0.100 +00	0.715

Table NFA-10
Tabular Values for Figure NFA-10

Temp., °F	A	B, psi
100	0.100 −04	0.518 +02
	0.134 −02	0.724 +04
	0.150	0.776
	0.200	0.840
	0.250	0.859
	0.300	0.871
	0.500	0.888
	0.100 −01	0.900
	0.150	0.911
	0.250	0.915
	0.300	0.919
	0.400	0.921
	0.500	0.925
	0.100 +00	0.925

Table NFA-11
Tabular Values for Figure NFA-11

Temp., °F	A	B, psi	Temp., °F	A	B, psi	Temp., °F	A	B, psi
150 (Curve 1)	0.100 −04	0.509 +02	150 (Curve 2)	0.900 −02	0.790 +04	150 (Curve 4)	0.200 −02	0.510 +04
	0.301 −03	0.157 +04		0.100 −01	0.802		0.250	0.544
	0.500	0.258		0.174	0.861		0.300	0.568
	0.600	0.307		0.100 +00	0.861		0.400	0.606
	0.700	0.352					0.900	0.693
	0.100 −02	0.462	150 (Curve 3)	0.100 −04	0.509 +02		0.100 −01	0.706
	0.150	0.557		0.301 −03	0.157 +04		0.150	0.748
	0.200	0.614		0.500	0.251		0.174	0.753
	0.250	0.652		0.600	0.290		0.100 +00	0.753
	0.300	0.686		0.700	0.326			
	0.400	0.729		0.100 −02	0.406	150 (Curve 5)	0.100 −04	0.509 +02
	0.500	0.758		0.150	0.492		0.301 −03	0.157 +04
	0.900	0.836		0.200	0.538		0.500	0.241
	0.150 −01	0.894		0.250	0.573		0.600	0.275
	0.174	0.906		0.300	0.603		0.700	0.304
	0.100 +00	0.906		0.900	0.739		0.100 −02	0.372
				0.100 −01	0.753		0.150	0.440
150 (Curve 2)	0.100 −04	0.509 +02		0.174	0.811		0.200	0.480
	0.301 −03	0.157 +04		0.100 +00	0.811		0.250	0.508
	0.500	0.258					0.300	0.534
	0.800	0.374	150 (Curve 4)	0.100 −04	0.509 +02		0.400	0.566
	0.100 −02	0.430		0.301 −03	0.157 +04		0.900	0.646
	0.150	0.525		0.500	0.245		0.100 −01	0.658
	0.200	0.574		0.600	0.283		0.150	0.698
	0.250	0.614		0.700	0.316		0.174	0.706
	0.300	0.643		0.100 −02	0.391		0.100 +00	0.706
	0.400	0.686		0.150	0.466			
	0.500	0.717						

Table NFA-12
Tabular Values for Figure NFA-12

Temp., °F	A	B, psi	Temp., °F	A	B, psi
Up to 200	0.100 −04	0.505 +02	300	0.300 −02	0.872 +04
	0.119 −02	0.613 +04		0.400	0.905
	0.150	0.730		0.500	0.920
	0.200	0.844		0.100 −01	0.946
	0.250	0.899		0.250	0.964
	0.300	0.933			
	0.400	0.968	400	0.114 −04	0.500 +02
	0.700	0.100 +05		0.891 −03	0.404 +04
	0.100 −01	0.102		0.100 −02	0.442
	0.200	0.104		0.150	0.545
				0.200	0.595
300	0.107 −04	0.500 +02		0.300	0.659
	0.122 −02	0.587 +04		0.500	0.710
	0.150	0.681		0.100 −01	0.750
	0.200	0.786		0.300	0.788
	0.250	0.839			

Table NFA-13
Tabular Values for Figure NFA-13

Temp., °F	A	B, psi	Temp., °F	A	B, psi
Up to 200	0.100 −04	0.500 +02	300	0.500 −02	0.683 +04
	0.787 −03	0.407 +04		0.100 −01	0.706
	0.900	0.455		0.300	0.726
	0.100 −02	0.500			
	0.150	0.623	400	0.113 −04	0.500 +02
	0.200	0.671		0.495 −03	0.225 +04
	0.250	0.696		0.600	0.268
	0.300	0.712		0.700	0.303
	0.400	0.731		0.800	0.332
	0.100 −01	0.759		0.100 −02	0.373
	0.250	0.782		0.150	0.431
				0.200	0.463
300	0.107 −04	0.500 +02		0.250	0.483
	0.787 −03	0.385 +04		0.300	0.497
	0.100 −02	0.465		0.400	0.517
	0.150	0.585		0.500	0.529
	0.200	0.629		0.100 −01	0.555
	0.250	0.649		0.250	0.570
	0.300	0.657			

Table NFC-1
Tabular Values for Figure NFC-1

Temp., °F	A	B, psi
150	0.100 −04	0.797 +02
	0.163 −03	0.134 +04
	0.250	0.151
	0.500	0.181
	0.100 −02	0.214
	0.400	0.291
	0.250 −01	0.435
	0.100 +00	0.435

Table NFC-2
Tabular Values for Figure NFC-2

Temp., °F	A	B, psi
400	0.100 −04	0.705 +02
	0.145 −03	0.100 +04
	0.204	0.141
	0.409	0.247
	0.513	0.282
	0.651	0.317
	0.834	0.353
	0.141 −02	0.423
	0.240	0.494
	0.405	0.564
	0.665	0.634
	0.106 −01	0.705
	0.300	0.705
	0.600	0.705
	0.100 +00	0.705

Table NFC-3
Tabular Values for Figure NFC-3

Temp., °F	A	B, psi	Temp., °F	A	B, psi
150	0.100 −04	0.899 +02	600	0.100 −04	0.804 +02
	0.386 −03	0.353 +04		0.189 −03	0.154 +04
	0.300 −02	0.499		0.200	0.155
	0.400	0.521		0.250	0.165
	0.500	0.535		0.300	0.176
	0.100 −01	0.567		0.400	0.195
	0.200	0.592		0.500	0.214
	0.250	0.596		0.600	0.233
	0.500	0.612		0.100 −02	0.300
	0.100 +00	0.612		0.150	0.347
				0.200	0.374
400	0.100 −04	0.837 +02		0.250	0.392
	0.358 −03	0.307 +04		0.300	0.408
	0.300 −02	0.453		0.400	0.429
	0.400	0.472		0.100 −01	0.476
	0.100 −01	0.519		0.300	0.521
	0.150	0.537		0.400	0.530
	0.200	0.550		0.100 +00	0.530
	0.500	0.583			
	0.100 +00	0.583			

Table NFC-4
Tabular Values for Figure NFC-4

Temp., °F	A	B, psi	Temp., °F	A	B, psi
150	0.100 −04	0.115 +03	400	0.100 −04	0.108 +03
	0.230 −03	0.251 +04		0.248 −03	0.251 +04
	0.400	0.339		0.300	0.281
	0.500	0.375		0.400	0.316
	0.600	0.404		0.500	0.340
	0.100 −02	0.486		0.700	0.375
	0.150	0.551		0.100 −02	0.411
	0.300	0.639		0.150	0.454
	0.400	0.674		0.200	0.486
	0.700	0.731		0.250	0.503
	0.100 −01	0.764		0.300	0.521
	0.200	0.830		0.600	0.584
	0.400	0.874		0.100 −01	0.623
	0.100 +00	0.874		0.200	0.666
				0.400	0.683
250	0.100 −04	0.108 +03		0.100 +00	0.688
	0.248 −03	0.251 +04			
	0.300	0.280	700	0.100 −04	0.987 +02
	0.400	0.322		0.269 −03	0.251 +04
	0.500	0.351		0.300	0.263
	0.700	0.393		0.400	0.293
	0.100 −02	0.436		0.500	0.316
	0.150	0.488		0.700	0.344
	0.200	0.523		0.100 −02	0.374
	0.300	0.569		0.150	0.409
	0.400	0.601		0.200	0.432
	0.700	0.655		0.250	0.446
	0.100 −01	0.683		0.300	0.460
	0.150	0.719		0.600	0.481
	0.300	0.767		0.100 −01	0.526
	0.400	0.775		0.200	0.537
	0.100 +00	0.775		0.100 +00	0.539

Table NFC-5
Tabular Values for Figure NFC-5

Temp., °F	A	B, psi	Temp., °F	A	B, psi
100	0.150 −03	0.131 +04	100	0.100 −01	0.725 +04
	0.200	0.175		0.150	0.765
	0.250	0.219		0.190	0.770
	0.300	0.263			
	0.325	0.285	300	0.150 −03	0.126 +04
	0.400	0.300		0.200	0.168
	0.100 −02	0.395		0.250	0.210
	0.400	0.600		0.300	0.252
	0.500	0.640		0.345	0.290
	0.600	0.660			
	0.800	0.700			

Table NFC-6
Tabular Values for Figure NFC-6

Temp., °F	A	B, psi	Temp., °F	A	B, psi
200	0.301 −03	2,500	300	0.442 −03	3,600
	0.669	5,550		0.70	4,550
	0.10 −02	6,500		0.10 −02	5,400
	0.20	8,200		0.20	7,200
	0.40	10,000		0.40	9,000
	0.60	11,000		0.60	10,000
	0.80	11,850		0.80	10,600
	0.10 −01	12,400		0.10 −01	11,100
	0.20	13,900		0.20	12,200
	0.40	14,900		0.40	12,800
	0.60	15,000		0.60	13,000
300	0.307 −03	2,500			

Table NFC-7
Tabular Values for Figure NFC-7

Temp., °F	A	B, psi	Temp., °F	A	B, psi
70	0.118 −04	0.100 +03	200	0.150 −02	0.284 +04
	0.100 −03	0.813		0.175	0.288
	0.123	0.100 +04		0.200	0.291
	0.200	0.162		0.350	0.305
	0.300	0.243		0.500	0.314
	0.400	0.288		0.750	0.324
	0.600	0.315		0.100 −01	0.331
	0.800	0.328		0.200	0.349
	0.100 −02	0.337		0.371	0.365
	0.125	0.345			
	0.150	0.351	400	0.123 −04	0.100 +03
	0.175	0.357		0.100 −03	0.753
	0.200	0.360		0.133	0.100 +04
	0.350	0.378		0.200	0.150
	0.500	0.388		0.300	0.204
	0.750	0.400		0.400	0.218
	0.100 −01	0.409		0.600	0.233
	0.200	0.430		0.800	0.241
	0.371	0.449		0.100 −02	0.247
				0.125	0.253
200	0.120 −04	0.100 +03		0.150	0.256
	0.100 −03	0.775		0.175	0.260
	0.129	0.100 +04		0.200	0.263
	0.200	0.154		0.350	0.276
	0.300	0.221		0.500	0.284
	0.400	0.240		0.750	0.293
	0.600	0.257		0.100 −01	0.299
	0.800	0.266		0.200	0.315
	0.100 −02	0.273		0.367	0.330
	0.125	0.280			

Table NFC-8
Tabular Values for Figure NFC-8

Temp., °F	A	B, psi	Temp., °F	A	B, psi
150	0.100 −04	0.915 +02	400	0.200 −02	0.906 +04
	0.585 −03	0.550 +04		0.300	0.992
	0.700	0.635		0.400	0.105 +05
	0.800	0.704		0.700	0.114
	0.100 −02	0.801		0.100 −01	0.118
	0.150	0.936		0.150	0.122
	0.200	0.101 +05		0.300	0.129
	0.300	0.109		0.400	0.131
	0.400	0.114		0.100 +00	0.131
	0.700	0.121			
	0.100 −01	0.125	600	0.100 −04	0.530 +02
	0.150	0.128		0.788 −03	0.422 +04
	0.300	0.131		0.900	0.475
	0.500	0.133		0.100 −02	0.513
	0.100 +00	0.133		0.150	0.664
				0.200	0.749
400	0.100 −04	0.767 +02		0.250	0.803
	0.585 −03	0.461 +04		0.400	0.913
	0.700	0.534		0.600	0.992
	0.800	0.598		0.100 −01	0.108 +05
	0.100 −02	0.691		0.250	0.121
	0.151	0.828		0.100 +00	0.121

Table NFN-1
Tabular Values for Figure NFN-1

Temp., °F	A	B, psi	Temp., °F	A	B, psi
100	0.100 −04	0.153 +03	600	0.100 −01	0.592 +04
	0.197 −03	0.305 +04		0.184	0.655
	0.100 −02	0.404		0.100 +00	0.655
	0.100 −01	0.601			
	0.165	0.655	800	0.100 −04	0.132 +03
	0.100 +00	0.655		0.187 −03	0.252 +04
				0.100 −02	0.336
400	0.100 −04	0.142 +03		0.100 −01	0.498
	0.201 −03	0.291 +04		0.300	0.603
	0.100 −02	0.388		0.100 +00	0.603
	0.100 −01	0.592			
	0.184	0.655	1,000	0.100 −04	0.125 +03
	0.100 +00	0.655		0.162 −03	0.205 +04
				0.100 −02	0.287
600	0.100 −04	0.142 +03		0.100 −01	0.444
	0.201 −03	0.291 +04		0.300	0.547
	0.100 −02	0.388		0.100 +00	0.547

Table NFN-2
Tabular Values for Figure NFN-2

Temp., °F	A	B, psi	Temp., °F	A	B, psi
100	0.100 −04	0.153 +03	400	0.100 −04	0.143 +03
	0.257 −03	0.406 +04		0.276 −03	0.405 +04
	0.500	0.439		0.500	0.439
	0.178 −01	0.686		0.178 −01	0.686
	0.100 +00	0.686		0.100 +00	0.686
200	0.100 −04	0.148 +03	600	0.101 −04	0.138 +03
	0.265 −03	0.404 +04		0.291 −03	0.405 +04
	0.500	0.439		0.500	0.439
	0.178 −01	0.686		0.178 −01	0.686
	0.100 +00	0.686		0.100 +00	0.686

Table NFN-3
Tabular Values for Figure NFN-3

Temp., °F	A	B, psi	Temp., °F	A	B, psi	Temp., °F	A	B, psi
100	0.100 −04	0.132 +03	200	0.100 +00	0.120 +05	600	0.300 −01	0.107 +05
	0.523 −03	0.721 +04					0.100 +00	0.107
	0.700	0.771	400	0.100 −04	0.132 +03			
	0.100 −02	0.850		0.423 −03	0.582 +04	800	0.100 −04	0.110 +03
	0.200	0.988		0.700	0.652		0.500 −03	0.574 +04
	0.250	0.103 +05		0.100 −02	0.712		0.100 −02	0.675
	0.300	0.107		0.150	0.776		0.200	0.776
	0.500	0.116		0.250	0.854		0.300	0.842
	0.600	0.119		0.300	0.882		0.400	0.878
	0.700	0.121		0.400	0.928		0.600	0.937
	0.800	0.122		0.600	0.984		0.800	0.968
	0.100 −01	0.125		0.700	0.100 +05		0.100 −01	0.993
	0.200	0.130		0.900	0.103		0.150	0.103 +05
	0.250	0.132		0.100 −01	0.104		0.200	0.105
	0.400	0.133		0.150	0.107		0.300	0.107
	0.100 +00	0.133		0.200	0.110		0.100 +00	0.107
				0.300	0.112			
200	0.100 −04	0.132 +03		0.100 +00	0.112	900	0.100 −04	0.998 +02
	0.468 −03	0.643 +04					0.528 −03	0.565 +04
	0.600	0.677	600	0.100 −04	0.122 +03		0.100 −02	0.661
	0.900	0.746		0.437 −03	0.562 +04		0.200	0.773
	0.100 −02	0.767		0.500	0.574		0.300	0.842
	0.150	0.834		0.100 −02	0.675		0.400	0.878
	0.200	0.880		0.200	0.776		0.600	0.937
	0.300	0.950		0.300	0.842		0.800	0.963
	0.400	0.995		0.400	0.878		0.100 −01	0.993
	0.500	0.103 +05		0.600	0.937		0.150	0.103 +05
	0.700	0.107		0.800	0.968		0.200	0.105
	0.100 −01	0.111		0.100 −01	0.993		0.300	0.107
	0.150	0.115		0.150	0.103 +05		0.100 +00	0.107
	0.250	0.118		0.200	0.105			
	0.400	0.120						

Table NFN-4
Tabular Values for Figure NFN-4

Temp., °F	A	B, psi	Temp., °F	A	B, psi
100	0.100 −04	0.159 +03	600	0.400 −02	0.108 +05
	0.531 −03	0.865 +04		0.500	0.111
	0.100 −02	0.983		0.100 −01	0.117
	0.300	0.117 +05		0.300	0.123
	0.400	0.122		0.100 +00	0.123
	0.100 −01	0.133			
	0.200	0.138	800	0.100 −04	0.144 +03
	0.100 +00	0.138		0.487 −03	0.722 +04
				0.100 −02	0.834
200	0.100 −04	0.159 +03		0.400	0.102 +05
	0.494 −03	0.792 +04		0.150 −01	0.114
	0.100 −02	0.906		0.300	0.118
	0.200	0.102 +05		0.100 +00	0.118
	0.300	0.108			
	0.900	0.121	1,000	0.100 −04	0.135 +03
	0.200 −01	0.126		0.471 −03	0.652 +04
	0.100 +00	0.128		0.100 −02	0.760
				0.200	0.845
400	0.100 −04	0.150 +03		0.500	0.941
	0.500 −03	0.769 +04		0.100 −01	0.994
	0.100 −02	0.883		0.300	0.106 +05
	0.200	0.985		0.100 +00	0.106
	0.400	0.108 +05			
	0.500	0.111	1,100	0.100 −04	0.128 +03
	0.100 −01	0.117		0.372 −03	0.486 +04
	0.300	0.123		0.400	0.486
	0.100 +00	0.123		0.100 +00	0.486
600	0.100 −04	0.150 +03	1,200	0.100 −04	0.128 +03
	0.500 −03	0.769 +04		0.250 −03	0.328 +04
	0.100 −02	0.883		0.100 +00	0.328
	0.200	0.985			

Table NFN-5
Tabular Values for Figure NFN-5

Temp., °F	A	B, psi	Temp., °F	A	B, psi
100	0.100 −04	0.148 +03	400	0.250 −01	0.169 +05
	0.551 −03	0.850 +04		0.100 +00	0.169
	0.250 −02	0.157 +05			
	0.300	0.167	600–650	0.100 −04	0.137 +03
	0.400	0.178		0.312 −03	0.437 +04
	0.500	0.185		0.900	0.734
	0.700	0.191		0.150 −02	0.959
	0.100 −01	0.196		0.200	0.108 +05
	0.500	0.213		0.250	0.117
	0.100 +00	0.213		0.300	0.122
				0.400	0.130
400	0.100 −04	0.148 +03		0.500	0.135
	0.509 −03	0.783 +04		0.700	0.141
	0.400 −02	0.142 +05		0.100 −01	0.147
	0.500	0.149		0.150	0.151
	0.900	0.161		0.250	0.155
	0.150 −01	0.166		0.100 +00	0.155

Table NFN-6
Tabular Values for Figure NFN-6

Temp., °F	A	B, psi	Temp., °F	A	B, psi
100	0.100 −04	0.161 +03	800	0.100 −02	0.116
	0.879 −03	0.146 +05		0.200	0.123
	0.100 −02	0.149		0.400	0.129
	0.100 −01	0.199		0.100 −01	0.135
	0.150	0.203		0.500	0.144
400	0.100 −04	0.146 +03	1,100	0.100 −04	0.124 +03
	0.847 −03	0.129 +05		0.786 −03	0.101 +05
	0.100 −02	0.131		0.100 −02	0.104
	0.300	0.144		0.200	0.110
	0.100 −01	0.158		0.400	0.116
	0.400	0.168		0.100 −01	0.120
				0.200	0.123
600	0.100 −04	0.142 +03		0.600	0.126
	0.820 −03	0.121 +05			
	0.100 −02	0.124	1,200	0.100 −04	0.116 +03
	0.500	0.140		0.839 −03	0.994 +04
	0.100 −01	0.145		0.100 +00	0.994
	0.300	0.150			
	0.100 +00	0.155	1,300	0.100 −04	0.112 +03
				0.493 −03	0.567 +04
800	0.100 −04	0.129 +03		0.100 +00	0.567
	0.851 −03	0.114 +05			

Table NFN-7
Tabular Values for Figure NFN-7

Temp., °F	A	B, psi	Temp., °F	A	B, psi
100	0.100 −04	0.140 +03	400	0.100 −04	0.132 +03
	0.825 −03	0.121 +05		0.745 −03	0.104 +05
	0.100 −02	0.124		0.100 −02	0.106
	0.200	0.133		0.400	0.116
	0.600	0.151		0.100 −01	0.123
	0.100 −01	0.160		0.400	0.134
	0.200	0.173			
	0.250	0.178	700	0.100 −04	0.125 +03
				0.722 −03	0.953 +04
200	0.100 −04	0.143 +03		0.100 −02	0.967
	0.777 −03	0.113 +05		0.200	0.100 +05
	0.100 −02	0.116		0.800	0.108
	0.400	0.133		0.200 −01	0.113
	0.100 −01	0.144		0.600	0.120
	0.400	0.157			

Table NFN-8
Tabular Values for Figure NFN-8

Temp., °F	A	B, psi	Temp., °F	A	B, psi
100	0.100 −04	0.143 +03	800	0.687 −03	0.885 +04
	0.779 −03	0.117 +05		0.100 −02	0.926
	0.100 −02	0.121		0.200	0.980
	0.200	0.133		0.400	0.103 +05
	0.400	0.141		0.100 −01	0.109
	0.100 −01	0.148		0.250	0.114
	0.400	0.154		0.100 +00	0.114
	0.100 +00	0.154			
			1,000	0.100 −04	0.114 +03
400	0.100 −04	0.132 +03		0.672 −03	0.801 +04
	0.737 −03	0.102 +05		0.100 −02	0.852
	0.100 −02	0.105		0.200	0.933
	0.400	0.118		0.400	0.996
	0.100 −01	0.125		0.100 −01	0.105 +05
	0.300	0.131		0.300	0.111
	0.100 +00	0.131		0.100 +00	0.111
600	0.100 −04	0.132 +03	1,100	0.100 −04	0.114 +03
	0.697 −03	0.957 +04		0.526 −03	0.625 +04
	0.100 −02	0.986		0.100 −02	0.733
	0.300	0.109 +05		0.200	0.833
	0.100 −01	0.118		0.400	0.903
	0.300	0.125		0.100 −01	0.986
	0.100 +00	0.125		0.250	0.106 +05
				0.100 +00	0.106
800	0.100 −04	0.122 +03			

Table NFN-9
Tabular Values for Figure NFN-9

Temp., °F	A	B, psi	Temp., °F	A	B, psi
70	1.00 −05	1.43 +02	1,100	1.00 −05	1.19 +02
	7.02	1.00 +03		8.40	1.00 +03
	5.26 −04	7.50		3.78 −04	4.50
	8.80	8.10		7.84	5.05
	1.53 −03	8.85		1.64 −03	5.625
	3.54	1.00 +04		2.83	6.025
	6.96	1.10		5.02	6.50
	1.22 −02	1.20		9.91	7.075
	1.63	1.25		1.63 −02	7.50
	1.00 −01	1.25		1.00 −01	7.50
200	1.00 −05	1.40 +02	1,400	1.00 −05	1.10 +02
	7.17	1.00 +03		9.13	1.00 +03
	4.95 −04	6.90		3.38 −04	3.70
	1.43 −03	7.97		5.63	4.00
	1.98	8.32		1.24 −03	4.475
	3.57	9.10		3.17	5.025
	5.28	9.575		6.99	5.50
	1.15 −02	1.06 +04		1.92 −02	6.15
	2.02	1.15		1.00 −01	6.15
	1.00 −01	1.15			
			1,600	1.00 −05	9.7 +01
500	1.00 −05	1.34 +02		1.03 −04	1.00 +03
	7.49	1.00 +03		1.93	1.875
	4.34 −04	5.80		7.71	2.30
	7.30	6.35		1.28 −03	2.475
	1.18 −03	6.90		1.97	2.625
	3.46	8.00		4.52	2.975
	1.04 −02	9.025		8.12	3.25
	2.08	9.65		1.49 −02	3.55
	1.00 −01	9.65		1.00 −01	3.55
800	1.00 −05	1.27 +02	1,650	1.00 −05	9.5 +01
	7.87	1.00 +03		1.05 −04	1.00 +03
	3.94 −04	5.00		1.39	1.325
	1.33 −03	6.15		6.00	1.60
	2.10	6.55		1.17 −03	1.775
	3.29	6.95		2.46	2.00
	6.43	7.50		6.62	2.40
	1.35 −02	8.05		8.33	2.50
	2.06	8.35		1.00 −01	2.50
	1.00 −01	8.35			

Table NFN-10
Tabular Values for Figure NFN-10

Temp., °F	A	B, psi	Temp., °F	A	B, psi
100	0.100 −04	0.150 +03	600	0.692 −03	0.938 +04
	0.897 −03	0.137 +05		0.100 −02	0.981
	0.200 −02	0.159		0.200	0.108 +05
	0.400	0.175		0.400	0.117
	0.600	0.181		0.600	0.122
	0.100 −01	0.189		0.100 −01	0.128
	0.200	0.196		0.200	0.135
	0.400	0.201		0.500	0.141
200	0.100 −04	0.150 +03	800	0.100 −04	0.125 +03
	0.822 −03	0.125 +05		0.667 −03	0.863 +04
	0.200 −02	0.145		0.100 −02	0.908
	0.400	0.161		0.200	0.997
	0.600	0.168		0.400	0.108 +05
	0.100 −01	0.176		0.600	0.112
	0.200	0.182		0.100 −01	0.118
	0.500	0.188		0.200	0.124
				0.600	0.130
400	0.100 −04	0.134 +03			
	0.732 −03	0.100 +05	1,000	0.100 −04	0.125 +03
	0.100 −02	0.104		0.655 −03	0.843 +04
	0.200	0.115		0.100 −02	0.883
	0.400	0.126		0.200	0.960
	0.600	0.132		0.400	0.103 +05
	0.100 −01	0.140		0.600	0.108
	0.200	0.148		0.100 −01	0.112
	0.600	0.156		0.200	0.117
				0.600	0.123
600	0.100 −04	0.134 +03			

Table NFN-11
Tabular Values for Figure NFN-11

Temp., °F	A	B, psi	Temp., °F	A	B, psi
100	0.100 −04	0.139 +03	400	0.635 −03	0.846 +04
	0.761 −03	0.108 +05		0.200 −02	0.948
	0.200 −02	0.120		0.600	0.104 +05
	0.600	0.134		0.100 −01	0.107
	0.100 −01	0.140		0.200	0.111
	0.200	0.148		0.300	0.113
	0.400	0.153			
			800 to 1,000	0.100 −04	0.116 +03
200	0.100 −04	0.139 +03		0.576 −03	0.680 +04
	0.687 −03	0.970 +04		0.200 −02	0.798
	0.200 −02	0.108 +05		0.600	0.896
	0.600	0.119		0.100 −01	0.930
	0.100 −01	0.123		0.200	0.961
	0.200	0.129		0.300	0.979
	0.500	0.132		0.500	0.993
400	0.100 −04	0.131 +03			

Table NFN-12
Tabular Values for Figure NFN-12

Temp., °F	A	B, psi	Temp., °F	A	B, psi
100	0.200 −03	0.300 +04	400	0.200 −02	0.100 +05
	0.400	0.600		0.400	0.120
	0.800	0.900		0.850	0.140
	0.300 −02	0.140 +05			
	0.500	0.160	600	0.300 −03	0.400 +04
	0.100 −01	0.180		0.450	0.600
				0.600	0.650
200	0.250 −03	0.360 +04		0.250 −02	0.990
	0.800	0.800		0.200 −01	0.140 +05
	0.100 −02	0.100 +05			
	0.500	0.140	800	0.400 −03	0.500 +04
	0.100 −01	0.160		0.500	0.600
	0.250	0.170		0.200 −02	0.900
				0.300	0.100 +05
400	0.400 −03	0.550 +04		0.700	0.120
	0.500	0.650		0.150 −01	0.130

Table NFN-13
Tabular Values for Figure NFN-13

Temp., °F	A	B, psi	Temp., °F	A	B, psi
100	0.200 −03	0.280 +04	400	0.400 −02	0.100 +05
	0.500	0.700		0.250 −01	0.113
	0.100 −02	0.930			
	0.300	0.120 +05	800	0.250 −03	0.300 +04
	0.100 −01	0.140		0.500	0.600
	0.250	0.148		0.600	0.730
				0.120 −02	0.800
200	0.200 −03	0.280 +04		0.500	0.900
	0.500	0.700		0.260 −01	0.960
	0.100 −02	0.900			
	0.180	0.100 +05	1,200	0.600 −03	0.650 +04
	0.700	0.120		0.200 −02	0.700
	0.250 −01	0.130		0.400	0.715
				0.590	0.737
400	0.230 −03	0.300 +04		0.850	0.755
	0.500	0.650		0.115 −01	0.778
	0.800	0.800		0.170	0.810
	0.150 −02	0.900		0.300	0.835

Table NFN-14
Tabular Values for Figure NFN-14

Temp., °F	A	B, psi	Temp., °F	A	B, psi
100	0.200 −03	0.280 +04	400	0.850 −03	0.120 +05
	0.800	0.118 +05		0.400 −02	0.140
	0.100 −02	0.149		0.250 −01	0.160
	0.200	0.160			
	0.600	0.180	600	0.250 −03	0.343 +04
	0.400 −01	0.200		0.500	0.700
				0.765	0.108 +05
200	0.200 −03	0.280 +04		0.200 −02	0.120
	0.800	0.118 +05		0.100 −01	0.140
	0.920	0.137		0.500	0.150
	0.500 −02	0.160			
	0.150 −01	0.170	1,000	0.270 −03	0.350 +04
	0.400	0.180		0.700	0.900
				0.150 −02	0.100 +05
400	0.250 −03	0.343 +04		0.650	0.120
	0.500	0.700		0.300 −01	0.130

Table NFN-15
Tabular Values for Figure NFN-15

Temp. up to 100°F, E = 28.5 × 10^6 psi		Temp. 200°F, E = 27.8 × 10^6 psi		Temp. 400°F, E = 27.1 × 10^6 psi		Temp. 600°F, E = 26.4 × 10^6 psi		Temp. 800°F, E = 25.4 × 10^6 psi		Temp. 1,000°F, E = 24.2 × 10^6 psi	
A	B, psi	A	B, psi	A	B, psi	A	B, psi	A	B, psi	A	B, psi
0.00021	3,000	0.00022	3,000	0.00022	3,000	0.00023	3,000	0.00024	3,000	0.00025	3,000
0.00042	6,000	0.00043	6,000	0.00044	6,000	0.00045	6,000	0.00047	6,000	0.00050	6,000
0.00084	12,000 P.L.	0.00081	11,300 P.L.	0.00068	9,200 P.L.	0.00061	8,000 P.L.	0.00067	8,500 P.L.	0.00062	7,500 P.L.
0.001	12,200	0.001	11,600	0.0009	9,500	0.0008	8,900	0.0009	8,600	0.0009	7,700
0.0015	13,200	0.0015	12,300	0.0010	9,800	0.0010	9,200	0.001	8,800	0.001	7,800
0.002	13,990	0.002	12,800	0.0015	10,400	0.0015	9,400	0.0015	9,200	0.0015	8,300
0.003	14,700	0.003	13,400	0.002	10,800	0.002	10,000	0.002	9,500	0.002	8,600
0.004	15,300	0.004	14,000	0.003	11,500	0.003	10,400	0.0025	9,700	0.0025	8,900
0.006	16,000	0.006	14,200	0.004	11,990	0.004	10,600	0.003	9,900	0.003	9,100
0.008	16,300	0.008	14,500	0.006	12,200	0.006	10,900	0.004	10,100	0.004	9,400
0.010	16,700	0.010	14,700	0.008	12,500	0.008	11,300	0.006	10,300	0.006	9,700
0.020	17,500	0.015	15,000	0.010	12,800	0.010	11,400	0.008	10,600	0.008	9,900
0.030	17,700	0.020	15,100	0.015	13,100	0.015	11,600	0.010	10,700	0.010	10,100
0.040	17,800	0.040	15,500	0.020	13,300	0.020	11,700	0.015	10,800	0.015	10,300
0.060	17,800	0.060	15,600	0.030	13,500	0.030	11,700	0.020	10,900	0.020	10,600
0.080	17,800	0.080	15,600	0.040	13,700	0.040	11,700	0.030	11,000	0.040	10,800
0.100	17,800	0.100	15,600	0.060	13,700	0.060	11,700	0.040	11,000	0.060	10,800
...	...	...	...	0.080	13,700	0.080	11,700	0.060	11,000	0.080	10,800
...	...	...	...	0.100	13,700	0.080	11,700	0.060	11,000	0.100	10,800
...	...	...	...	...	...	...	...	0.080	11,000	...	...

Table NFN-16
Tabular Values for Figure NFN-16

Temp. up to 100°F, $E = 31.1 \times 10^6$ psi		Temp. 200°F, $E = 30.9 \times 10^6$ psi		Temp. 400°F, $E = 30.1 \times 10^6$ psi		Temp. 600°F, $E = 29.3 \times 10^6$ psi		Temp. 800°F, $E = 28.4 \times 10^6$ psi	
A	B, psi	A	B, psi	A	B, psi	A	B, psi	A	B, psi
0.00019	3,000	0.000195	3,000	0.0002	3,000	0.00020	3,000	0.00021	3,000
0.00038	6,000	0.00039	6,000	0.00040	6,000	0.00041	6,000	0.00042	6,000
0.00058	9,000	0.00058	9,000	0.00060	9,000	0.00061	9,000	0.00063	9,000
0.00077	12,000	0.00078	12,000	0.00080	12,000	0.00082	12,000	0.00085	12,000
0.00115	18,000	0.00114	17,600	0.00108	16,300	0.0010	15,100	0.0010	14,200
0.0012	19,000	0.0015	18,600	0.0015	16,800	0.0015	15,900	0.0015	15,600
0.0015	19,500	0.002	19,600	0.002	17,400	0.002	16,500	0.002	16,200
0.002	20,500	0.003	20,800	0.003	18,100	0.003	17,000	0.003	17,400
0.003	21,600	0.004	21,400	0.004	18,900	0.004	17,500	0.004	17,800
0.004	22,800	0.006	22,000	0.006	19,600	0.006	18,400	0.006	18,200
0.005	23,000	0.008	22,600	0.008	20,000	0.008	18,600	0.008	18,400
0.007	23,600	0.010	22,800	0.010	20,200	0.010	19,100	0.010	18,500
0.010	24,500	0.020	23,400	0.020	20,900	0.020	19,900	0.020	18,800
0.012	24,700	0.040	23,800	0.040	21,100	0.040	19,900	0.040	19,000
0.030	25,000	0.060	24,000	0.060	21,200	0.060	19,900	0.060	19,100
0.050	25,500	0.080	24,000	0.080	21,300	0.080	19,900	0.080	19,100
0.100	25,500	0.100	24,000	0.100	21,400	0.100	19,900	0.100	19,100

Table NFN-17
Tabular Values for Figure NFN-17

Temp., °F	A	B, psi	Temp., °F	A	B, psi
100	0.200 −03	0.300 +04	500	0.660 −03	0.900 +04
	0.930	0.140 +05		0.800	0.110 +05
	0.108 −02	0.160		0.900	0.120
	0.116	0.170		0.950	0.125
	0.125	0.180		0.100 −02	0.130
	0.140	0.190		0.112	0.135
	0.160	0.200		0.125	0.140
	0.182	0.210		0.139	0.145
	0.205	0.220		0.155	0.150
	0.240	0.230		0.190	0.160
	0.280	0.240		0.250	0.170
	0.350	0.250		0.340	0.180
	0.700	0.275		0.500	0.190
	0.200 −01	0.300		0.800	0.200
	0.100 +00	0.300		0.150 −01	0.210
				0.100 +00	0.210
300	0.210 −03	0.300 +04			
	0.850	0.120 +05	800 to 1,200	0.250 −03	0.300 +04
	0.950	0.130		0.800	0.900
	0.105 −02	0.140		0.105 −02	0.110 +05
	0.125	0.150		0.125	0.120
	0.142	0.160		0.135	0.125
	0.165	0.170		0.148	0.130
	0.190	0.180		0.163	0.135
	0.230	0.190		0.180	0.140
	0.300	0.200		0.200	0.145
	0.400	0.210		0.225	0.150
	0.520	0.220		0.280	0.160
	0.100 −01	0.230		0.370	0.170
	0.400	0.240		0.540	0.180
	0.800	0.243		0.830	0.190
	0.100 +00	0.243		0.165 −01	0.200
				0.300	0.205
500	0.220 −03	0.300 +04		0.100 +00	0.205

Table NFN-18
Tabular Values for Figure NFN-18

Room Temp., $E = 28.4 \times 10^6$ psi		Temp. 200°F, $E = 28.4 \times 10^6$ psi		Temp. 350°F, $E = 27.0 \times 10^6$ psi		Temp. 500°F, $E = 27.0 \times 10^6$ psi		Temp. 650°F, $E = 25.6 \times 10^6$ psi		Temp. 800°F, $E = 25.6 \times 10^6$ psi	
A	B, psi	A	B, psi	A	B, psi	A	B, psi	A	B, psi	A	B, psi
0.0002	2,340	0.0002	2,840	0.0002	2,700	0.0002	2,700	0.0002	2,560	0.0002	2,560
0.00079	11,300	0.00068	9,700	0.00064	8,600	0.00057	7,700	0.00049	6,300	0.00045	5,800
0.0008	11,400	0.0007	9,800	0.0007	8,900	0.0006	7,800	0.0005	6,450	0.0005	6,000
0.0009	11,600	0.0008	10,200	0.0008	9,200	0.0007	8,100	0.0006	6,700	0.0006	6,400
0.001	12,000	0.0009	10,400	0.0009	9,400	0.0008	8,400	0.0007	7,000	0.0007	6,700
0.0015	12,800	0.001	10,600	0.001	9,700	0.0009	8,600	0.0008	7,300	0.0008	6,900
0.002	13,800	0.0015	11,600	0.0015	10,400	0.001	8,800	0.0009	7,500	0.0009	7,200
0.0025	14,100	0.002	12,300	0.002	11,000	0.0015	9,000	0.001	7,800	0.001	7,400
0.003	14,500	0.0025	12,900	0.0025	11,500	0.002	10,100	0.0015	8,500	0.0015	8,000
0.004	15,100	0.003	13,300	0.003	11,800	0.0025	10,300	0.002	9,000	0.002	8,400
0.005	15,600	0.004	13,900	0.004	12,300	0.003	10,600	0.0025	9,300	0.0025	8,800
0.006	16,000	0.005	14,300	0.005	12,600	0.004	11,000	0.003	9,500	0.003	9,000
0.007	16,400	0.006	14,600	0.006	12,800	0.005	11,300	0.004	10,000	0.004	9,200
0.008	16,500	0.007	14,900	0.007	13,000	0.006	11,400	0.005	10,300	0.005	9,500
0.009	16,600	0.008	15,000	0.008	13,100	0.007	11,500	0.006	10,400	0.006	9,600
0.01	16,800	0.009	15,100	0.009	13,200	0.008	11,600	0.007	10,500	0.007	9,700
0.015	17,100	0.01	15,200	0.01	13,300	0.009	11,700	0.008	10,600	0.008	9,800
0.02	17,400	0.015	15,400	0.015	13,500	0.01	11,800	0.009	10,700	0.009	9,900
0.025	17,500	0.02	15,500	0.02	13,700	0.015	12,000	0.01	10,700	0.01	10,000
0.03	17,500	0.025	15,600	0.025	13,700	0.02	12,100	0.015	11,000	0.015	10,100
0.04	17,500	0.03	15,600	0.03	13,700	0.025	12,200	0.02	11,000	0.02	10,200
0.05	17,500	0.04	15,600	0.04	13,800	0.03	12,300	0.025	11,200	0.025	10,300
0.06	17,500	0.05	15,600	0.05	13,800	0.04	12,500	0.03	11,200	0.03	10,400
0.07	17,500	0.06	15,600	0.06	13,800	0.05	12,600	0.04	11,400	0.04	10,500
...	...	0.07	15,600	0.07	13,800	0.06	12,600	0.05	11,400	0.05	10,500
...	...	...	...	0.08	13,800	0.07	12,600	0.06	11,400	0.06	10,500
...	...	...	...	0.09	13,800	0.08	12,600	...	...	...	...

Table NFN-19
Tabular Values for Figure NFN-19

Room Temp., $E = 28.4 \times 10^6$ psi		Temp. 200°F, $E = 28.4 \times 10^6$ psi		Temp. 350°F, $E = 27.0 \times 10^6$ psi		Temp. 500°F, $E = 27.0 \times 10^6$ psi		Temp. 650°F, $E = 25.0 \times 10^6$ psi		Temp. 800°F, $E = 25.0 \times 10^6$ psi	
A	B, psi	A	B, psi	A	B, psi	A	B, psi	A	B, psi	A	B, psi
0.0002	2,840	0.0002	2,840	0.0002	2,700	0.0002	2,700	0.0002	2,500	0.0002	2,500
0.00061	9,200	0.00056	8,000	0.00051	7,000	0.00045	6,100	0.0004	5,000	0.00037	4,650
0.0007	9,400	0.0006	8,100	0.0006	7,300	0.0005	6,200	0.0005	5,500	0.0004	4,750
0.0008	9,700	0.0007	8,500	0.0007	7,650	0.0006	6,600	0.0006	5,800	0.0005	5,100
0.0009	10,000	0.0008	8,750	0.0008	7,900	0.0007	6,900	0.0007	6,000	0.0006	5,150
0.0010	10,300	0.0009	9,000	0.0009	8,150	0.0008	7,200	0.0008	6,200	0.0007	5,600
0.0015	11,300	0.001	9,200	0.001	8,300	0.0009	7,400	0.0009	6,400	0.0008	5,850
0.002	12,000	0.0015	10,000	0.0015	9,000	0.001	7,500	0.001	6,500	0.0009	6,000
0.0025	12,500	0.002	10,500	0.002	9,300	0.0015	8,000	0.0015	7,100	0.001	6,150
0.003	12,900	0.0025	11,000	0.0025	9,700	0.002	8,400	0.002	7,600	0.0015	6,700
0.004	13,400	0.003	11,300	0.003	10,000	0.0025	8,600	0.0025	7,800	0.002	7,100
0.005	13,800	0.004	11,700	0.004	10,300	0.003	8,800	0.003	8,000	0.0025	7,300
0.006	13,950	0.005	12,000	0.005	10,500	0.004	9,100	0.004	8,300	0.003	7,500
0.007	14,050	0.006	12,300	0.006	10,700	0.005	9,400	0.005	8,500	0.004	7,800
0.008	14,300	0.007	12,400	0.007	10,800	0.006	9,500	0.006	8,650	0.005	8,000
0.009	14,400	0.008	12,500	0.008	10,850	0.007	9,600	0.007	8,800	0.006	8,150
0.010	14,500	0.009	12,600	0.009	10,900	0.008	9,700	0.008	8,900	0.007	8,300
0.015	14,900	0.010	12,700	0.01	10,950	0.009	9,800	0.009	9,000	0.008	8,400
0.020	15,000	0.015	12,900	0.015	11,200	0.01	9,900	0.01	9,050	0.009	8,500
0.025	15,000	0.020	13,200	0.02	11,400	0.015	10,000	0.015	9,200	0.010	8,600
0.03	15,025	0.025	13,300	0.025	11,400	0.02	10,100	0.02	9,500	0.015	8,700
0.04	15,075	0.03	13,300	0.03	11,400	0.025	10,100	0.025	9,500	0.02	8,800
0.05	15,100	0.04	13,300	0.04	11,400	0.03	10,200	0.03	9,500	0.025	9,000
0.06	15,125	0.05	13,300	0.05	11,400	0.04	10,300	0.04	9,500	0.03	9,300
0.07	15,175	0.06	13,300	0.06	11,400	0.05	10,300	...	...	0.04	9,300
0.08	15,200	0.07	13,300	0.07	11,400	0.06	10,400	...	...	...	...
...	...	0.08	13,300	0.08	11,400	0.07	10,400	...	...	...	...
...	...	0.09	13,300	...	...	0.08	10,400	...	...	...	...

Table NFN-20
Tabular Values for Figure NFN-20

Temp., °F	A	B, psi	Temp., °F	A	B, psi
100	0.132 −03	0.200 +04	400	0.143 −03	0.200 +04
	0.513	0.775		0.554	0.775
	0.600	0.790		0.600	0.790
	0.100 −02	0.900		0.100 −02	0.900
	0.300	0.119 +05		0.300	0.119 +05
	0.400	0.126		0.400	0.126
	0.500	0.132		0.500	0.132
	0.600	0.136		0.600	0.136
	0.700	0.140		0.700	0.140
	0.800	0.142		0.800	0.142
	0.900	0.144		0.900	0.144
	0.100 −01	0.145		0.100 −01	0.145
	0.150	0.149		0.150	0.149
	0.200	0.150		0.200	0.150

Table NFN-22
Tabular Values for Figure NFN-22

Temp., °F	A	B, psi	Temp., °F	A	B, psi
100	0.0002	3,000	800	0.004	14,800
	0.0009	13,400		0.005	14,900
	0.002	15,700		0.1	14,900
	0.003	17,000			
	0.004	17,700	1,200	0.00025	3,000
	0.005	18,400		0.001	12,000
	0.007	19,200		0.002	13,600
	0.009	19,600		0.003	14,300
	0.012	20,000		0.004	14,500
	0.1	20,000		0.005	14,600
				0.1	14,600
200	0.0002	3,000			
	0.0009	13,400	1,350	0.00025	2,800
	0.002	15,700		0.001	11,500
	0.003	17,000		0.002	13,000
	0.004	17,700		0.003	13,600
	0.005	18,400		0.004	14,000
	0.1	18,400		0.1	14,000
400	0.0002	2,750	1,400	0.00025	2,700
	0.00095	13,600		0.001	11,300
	0.002	15,700		0.1	11,300
	0.0025	16,300			
	0.003	16,600	1,450	0.00025	2,700
	0.004	16,900		0.001	8,500
	0.1	16,900		0.1	8,500
800	0.0002	2,500	1,500	0.00025	2,700
	0.00095	12,500		0.001	6,100
	0.002	14,000		0.1	6,100
	0.003	14,600			

Table NFN-23
Tabular Values for Figure NFN-23

Temp., °F	A	B, psi	Temp., °F	A	B, psi
100	1.006 −05	143	500	1.006 −05	134
	7.017	1,000		7.501	1,001
	3.509 −04	5,000		3.764 −04	5,000
	7.675	10,575		7.415	8,888
	8.842	11,750		8.892	9,875
	1.036 −03	12,925		1.091 −03	10,863
	1.251	14,100		1.375	11,850
	2.073	16,450		2.374	13,825
	4.108	18,800		4.470	15,800
	9.257	21,150		8.922	17,775
	6.037 −02	23,500		1.881 −02	19,750
	1.000 −01	23,500		1.000 −01	19,750
300	1.001 −05	138	650	1.005 −05	131
	7.279	1,001		7.695	1,000
	3.649 −04	5,004		3.870 −04	5,000
	7.470	9,383		7.502	8,708
	8.891	10,425		9.014	9,675
	1.082 −03	11,468		1.107 −03	10,643
	1.356	12,510		1.397	11,610
	2.332	14,595		2.407	13,545
	4.432	16,680		4.503	15,480
	9.009	19,360		8.906	17,415
	1.944 −02	20,850		1.860 −02	19,350
	1.000 −01	20,850		1.000 −01	19,350

Table NFN-24
Tabular Values for Figure NFN-24

Temp., °F	A	B, psi	Temp., °F	A	B, psi
70	1.00 −05	166	600	2.00 −02	16,400
	6.02	1,000		1.00 −01	16,400
	7.48 −04	12,400	1,300	1.00 −05	125
	9.68	15,500		8.00	1,000
	1.20 −03	17,000		6.00 −04	7,500
	1.65	18,000		8.48	9,400
	5.00	20,000		1.20 −03	10,600
	2.30 −02	22,500		2.88	12,400
	1.00 −01	22,500		1.00 −02	14,300
300	1.00 −05	148		3.00	15,600
	6.76	1,000		1.00 −01	15,600
	6.00 −04	8,900	1,600	1.00 −05	111
	7.28	10,400		9.00	1,000
	9.24	12,000		5.00 −04	5,600
	1.28 −03	13,500		7.50	8,000
	3.22	15,800		1.20 −03	10,000
	2.00 −02	19,800		1.90	10,900
	1.00 −01	19,800		3.00	11,500
600	1.00 −05	138		1.00 −01	11,500
	7.22	1,000	1,700	1.00 −05	100
	6.00 −04	8,300		1.01 −04	1,000
	7.05	9,200		5.00	5,000
	9.50	10,600		8.14	8,100
	1.30 −03	11,600		1.00 −01	8,100
	4.60	14,200			

Table NFN-25
Tabular Values for Figure NFN-25

Temp., °F	A	B, psi	Temp., °F	A	B, psi
100	0.100 −04	0.150 +03	400	0.100 −04	0.143 +03
	0.100 −03	0.150 +04		0.100 −03	0.143 +04
	0.500	0.750		0.500	0.713
	0.750	0.112 +05		0.750	0.107 +05
	0.100 −02	0.143		0.990	0.135
	0.124	0.154		0.125 −02	0.146
	0.145	0.158		0.145	0.151
	0.174	0.163		0.173	0.155
	0.192	0.164		0.192	0.157
	0.295	0.170		0.288	0.163
	0.465	0.176		0.493	0.169
	0.677	0.180		0.663	0.172
	0.927	0.183		0.972	0.176
	0.188 −01	0.190		0.194 −01	0.183
	0.500	0.199		0.500	0.191
	0.100 +00	0.200		0.100 +00	0.191

Table NFN-26
Tabular Values for Figure NFN-26

Temp., °F	A	B, ksi	Temp., °F	A	B, ksi
Up to 100	1.00 −05	0.139	400	8.90 −03	18.0
	7.21	1.0		2.10 −02	19.8
	1.37 −03	19.0		1.00 −01	19.8
	2.00	20.0			
	5.00	22.0	600	1.00 −05	0.126
	1.10 −02	24.0		7.92	1.0
	2.40	26.0		9.50 −04	12.0
	1.00 −01	26.0		2.00 −03	14.0
				4.50	16.0
200	1.00 −05	0.136		1.20 −02	18.0
	7.38	1.0		2.10	19.0
	1.22 −03	16.6		1.00 −01	19.0
	2.10	18.0			
	4.70	20.0	800	1.00 −05	0.121
	2.10 −02	24.1		8.27	1.0
	1.00 −01	24.1		9.27 −04	11.3
				1.70 −03	13.0
400	1.00 −05	0.131		3.50	15.0
	7.63	1.0		8.50	17.0
	9.92 −04	13.0		2.00 −02	18.7
	2.20 −03	15.0		1.00 −01	18.7
	5.50	17.0			

Table NFN-27
Tabular Values for Figure NFN-27

Temp., °F	A	B, ksi	Temp., °F	A	B, ksi
Room temp.	1.00 −05	0.143	500	1.10 −03	9.5
	6.97	1.0		1.90	10.0
	8.01 −04	11.5		4.61	10.5
	1.00 −03	13.0		1.83 −02	11.0
	1.55	15.0		1.00 −01	11.5
	3.00	16.0			
	1.65 −02	17.0	800	1.00 −05	0.128
	1.00 −01	17.5		7.81	1.0
				5.47 −04	7.0
200	1.00 −05	0.141		7.60	8.0
	7.09	1.0		1.50 −03	9.0
	7.20 −04	10.0		3.11	9.5
	9.50	11.5		1.26 −02	10.0
	1.30 −0.3	12.5		1.00 −01	10.4
	2.20	13.5			
	3.50	14.0	1,100	1.00 −05	0.121
	7.60	14.5		8.26	1.0
	2.68 −02	15.0		4.96 −04	6.0
	1.00 −01	15.3		5.60	6.5
				7.37	7.0
500	1.00 −05	0.114		2.20 −03	8.0
	7.43	1.0		2.57 −02	9.0
	6.15 −04	8.0		1.00 −01	9.2
	8.50 −04	9.0			

Table NFT-1
Tabular Values for Figure NFT-1

Temp., °F	A	B, psi	Temp., °F	A	B, psi
100	0.100 −04	0.775 +02	400	0.100 −04	0.700 +02
	0.116 −02	0.899 +04		0.788 −03	0.552 +04
	0.150	0.116 +05		0.900	0.590
	0.200	0.141		0.100 −02	0.622
	0.250	0.159		0.150	0.756
	0.300	0.171		0.200	0.845
	0.400	0.190		0.250	0.912
	0.500	0.203		0.300	0.971
	0.600	0.211		0.400	0.107 +05
	0.700	0.219		0.500	0.113
	0.800	0.225		0.600	0.119
	0.900	0.229		0.700	0.122
	0.100 −01	0.232		0.800	0.126
	0.150	0.245		0.900	0.130
	0.200	0.248		0.100 −01	0.132
	0.250	0.252		0.126	0.137
	0.100 +00	0.252		0.100 +00	0.137
200	0.100 −04	0.750 +02	600	0.100 −04	0.630 +02
	0.122 −02	0.915 +04		0.692 −03	0.436 +04
	0.150	0.106 +05		0.800	0.468
	0.200	0.120		0.100 −02	0.512
	0.250	0.132		0.150	0.587
	0.300	0.141		0.200	0.647
	0.400	0.158		0.250	0.692
	0.500	0.172		0.300	0.728
	0.600	0.181		0.400	0.774
	0.700	0.187		0.500	0.812
	0.800	0.192		0.700	0.855
	0.900	0.195		0.900	0.855
	0.100 −01	0.198		0.100 −01	0.855
	0.150	0.203		0.150	0.855
	0.200	0.206		0.100 +00	0.855
	0.250	0.208			
	0.300	0.209			
	0.100 +00	0.209			

Table NFT-2
Tabular Values for Figure NFT-2

Temp., °F	A	B, psi	Temp., °F	A	B, psi
100	0.100 −04	0.775 +02	400	0.685 −03	0.480 +04
	0.128 −02	0.992 +04		0.100 −02	0.595
	0.150	0.110 +05		0.200	0.720
	0.200	0.130		0.400	0.866
	0.300	0.149		0.600	0.937
	0.500	0.167		0.900	0.963
	0.800	0.178		0.100 −01	0.974
	0.100 −01	0.181		0.130	0.980
	0.200	0.188		0.100 +00	0.980
	0.600	0.200			
	0.100 +00	0.200	600	0.100 −04	0.630 +02
				0.641 −03	0.404 +04
200	0.100 −04	0.750 +02		0.685	0.428
	0.123 −02	0.923 +04		0.800	0.460
	0.150	0.102 +05		0.100 −02	0.480
	0.200	0.113		0.200	0.499
	0.400	0.134		0.300	0.515
	0.700	0.148		0.500	0.530
	0.100 −01	0.155		0.800	0.540
	0.200	0.163		0.100 −01	0.550
	0.400	0.168		0.150	0.560
	0.100 +00	0.168		0.180	0.565
				0.100 +00	0.570
400	0.100 −04	0.700 +02			

Table NFT-3
Tabular Values for Figure NFT-3

Temp., °F	A	B, psi	Temp., °F	A	B, psi
100	0.100 −04	0.775 +02	400	0.900	0.400
	0.129 −03	0.100 +04		0.200 −01	0.405
	0.187	0.145		0.300	0.410
	0.900	0.698		0.400	0.410
	0.250 −02	0.800		0.500	0.410
	0.550	0.880		0.100 +00	0.410
	0.110 −01	0.931			
	0.200	0.974	600	0.100 −04	0.630 +02
	0.300	0.998		0.159 −03	0.100 +04
	0.400	0.100 +05		0.230	0.145
	0.500	0.100		0.330	0.208
	0.600	0.100		0.100 −02	0.230
	0.100 +00	0.100		0.150	0.240
				0.250	0.251
400	0.100 −04	0.700 +02		0.400	0.260
	0.143 −03	0.100 +04		0.700	0.265
	0.207	0.145		0.100 −01	0.265
	0.420	0.294		0.200	0.265
	0.200 −02	0.360		0.300	0.265
	0.400	0.380		0.400	0.265
	0.700	0.397		0.100 +00	0.265

Table NFT-4
Tabular Values for Figure NFT-4

Temp., °F	A	B, psi	Temp., °F	A	B, psi
100	0.100 −04	0.833 +02	400	0.100 −04	0.694 +02
	0.120 −03	0.100 +04		0.144 −03	0.100 +04
	0.179	0.145		0.209	0.145
	0.735	0.600		0.745	0.517
	0.977	0.800		0.994	0.689
	0.124 −02	0.104 +05		0.125 −02	0.861
	0.149	0.125		0.146	0.100 +05
	0.173	0.142		0.167	0.114
	0.198	0.160		0.189	0.127
	0.350	0.225		0.342	0.192
	0.499	0.270		0.497	0.228
	0.749	0.310		0.749	0.249
	0.100 −01	0.349		0.993	0.249
	0.200	0.350		0.200 −01	0.249
	0.100 +00	0.350		0.100 +00	0.249
200	0.100 −04	0.763 +02	600	0.100 −04	0.621 +02
	0.131 −03	0.100 +04		0.161 −03	0.100 +04
	0.190	0.145		0.233	0.145
	0.781	0.600		0.748	0.462
	0.100 −02	0.762		0.992	0.610
	0.125	0.945		0.122 −02	0.743
	0.149	0.113 +05		0.146	0.875
	0.173	0.129		0.172	0.100 +05
	0.198	0.144		0.199	0.113
	0.346	0.210		0.342	0.156
	0.494	0.248		0.500	0.184
	0.746	0.287		0.748	0.207
	0.991	0.306		0.997	0.207
	0.200 −01	0.306		0.200 −01	0.207
	0.100 +00	0.306		0.100 +00	0.207

Table NFT-5
Tabular Values for Figure NFT-5

Temp., °F	A	B, psi	Temp., °F	A	B, psi
100	0.100 −03	0.774 +03	400	0.100 −03	0.700 +03
	0.129	0.100 +04		0.143	0.100 +04
	0.188	0.145		0.207	0.145
	0.998	0.769		0.244	0.171
	0.125 −02	0.955		0.295	0.207
	0.150	0.113 +05		0.347	0.243
	0.174	0.129		0.398	0.278
	0.200	0.145		0.449	0.314
	0.348	0.212		0.757	0.529
	0.470	0.245		0.213 −02	0.140 +05
	0.750	0.250		0.265	0.155
	0.100 −01	0.250		0.750	0.200
	0.200	0.250		0.200 −01	0.223
	0.500	0.250		0.500	0.223
	0.100 +00	0.250		0.100 +00	0.223
200	0.100 −03	0.749 +03	600	0.100 −03	0.629 +03
	0.133	0.100 +04		0.159	0.100 +04
	0.193	0.145		0.230	0.145
	0.298	0.224		0.549	0.346
	0.364	0.273		0.680	0.428
	0.430	0.323		0.810	0.511
	0.497	0.372		0.941	0.593
	0.563	0.422		0.107 −02	0.675
	0.961	0.719		0.186	0.117 +05
	0.136 −02	0.100 +05		0.265	0.140
	0.206	0.145		0.750	0.174
	0.380	0.201		0.100 −01	0.174
	0.200 −01	0.241		0.200	0.174
	0.500	0.241		0.500	0.174
	0.100 +00	0.241		0.100 +00	0.174

Table NFT-6
Tabular Values for Figure NFT-6

Temp., °F	A	B, psi	Temp., °F	A	B, psi
100	1.00 −05	8.35 +01	400	6.57	3.35
	1.20 −04	1.00 +03		1.17 −02	3.75
	4.67 −03	3.90 +04		2.00	4.00
	7.26	4.60		3.00	4.11
	1.05 −02	5.00		1.00 −01	4.11
	1.83	5.48			
	3.83	5.75	600	1.00 −05	7.45 +01
	1.00 −01	5.75		1.34 −04	1.00 +03
				3.36 −03	2.50 +04
200	1.00 −05	8.20 +01		4.78	2.79
	1.22 −04	1.00 +03		1.23 −02	3.25
	4.09 −03	3.35 +04		4.50	3.41
	5.97	3.90		1.00 −01	3.41
	1.01 −02	4.50			
	2.44	5.00	800	1.00 −05	7.10 +01
	4.11	5.14		1.41 −04	1.00 +03
	1.00 −01	5.14		3.38 −03	2.40 +04
				3.88	2.50
400	1.00 −05	7.80 +01		8.82	2.80
	1.28 −04	1.00 +03		5.45 −02	3.00
	3.53 −03	2.75 +04		1.00 −01	3.00

Table NFZ-1
Tabular Values for Figure NFZ-1

Temp., °F	A	B, psi	Temp., °F	A	B, psi
100	0.100 −04	0.711 +02	300	0.200 −01	0.886 +04
	0.108 −02	0.841 +04		0.400	0.911
	0.200	0.101 +05			
	0.400	0.118	500	0.100 −04	0.575 +02
	0.600	0.128		0.383 −03	0.223 +04
	0.100 −01	0.139		0.100 −02	0.311
	0.150	0.145		0.300	0.431
				0.900	0.548
300	0.100 −04	0.659 +02			
	0.672 −03	0.467 +04	700	0.100 −04	0.505 +02
	0.100 −02	0.559		0.293 −03	0.152 +04
	0.150	0.641		0.100 −02	0.214
	0.200	0.686		0.300	0.289
	0.400	0.772		0.900	0.375
	0.600	0.811			
	0.100 −01	0.845			

Table NFZ-2
Tabular Values for Figure NFZ-2

Temp. up to 100°F, $E = 14.6 \times 10^6$ psi		Temp. 300°F, $E = 12.5 \times 10^6$ psi		Temp. 500°F, $E = 10.9 \times 10^6$ psi		Temp. 700°F, $E = 9.7 \times 10^6$ psi	
A	B, psi	A	B, psi	A	B, psi	A	B, psi
0.00002	146	0.00002	125	0.00002	109	0.00002	97
0.00289	21,097	0.00196	12,250	0.00151	8,230	0.00126	6,111
0.003	21,500	0.0025	12,400	0.002	9,500	0.0015	6,300
0.004	22,200	0.003	13,000	0.0025	9,800	0.0020	6,600
0.005	22,800	0.004	13,600	0.003	10,100	0.0025	6,800
0.006	23,000	0.005	14,000	0.004	10,400	0.003	6,900
0.007	23,700	0.006	14,400	0.005	10,700	0.004	7,100
0.008	24,000	0.007	14,600	0.006	10,800	0.005	7,200
0.009	24,100	0.008	14,900	0.007	10,900	0.006	7,400
0.01	24,200	0.009	15,100	0.008	11,000	0.007	7,500
0.015	24,500	0.01	15,200	0.009	11,050	0.008	7,600
0.02	25,000	0.015	15,400	0.01	11,100	0.009	7,700
0.03	25,100	0.02	15,500	0.015	11,150	0.01	7,800
0.035	25,300	0.03	15,600	0.020	11,200	0.012	7,820
...	...	0.04	15,700	0.030	11,250	...	...
...	...	0.045	15,800	0.040	11,300	...	...
...	...	...	...	0.050	11,300	...	...

MANDATORY APPENDIX 1
BASIS FOR ESTABLISHING STRESS VALUES IN TABLES 1A AND 1B

1-100 DERIVATION OF ALLOWABLE STRESS VALUES

The values in Tables 1A and 1B are established by the Committee only. In the determination of allowable stress values for materials, the Committee is guided by successful experience in service, insofar as evidence of satisfactory performance is available. Such evidence is considered equivalent to test data where operating conditions are known with reasonable certainty. In the evaluation of new materials, the Committee is guided to a certain extent by the comparison of test information with available data on successful applications of similar materials.

Nomenclature:

F_{avg} = multiplier applied to average stress for rupture in 100,000 hr. At 1,500°F and below, F_{avg} = 0.67. Above 1,500°F, it is determined from the slope of the log time-to-rupture versus log stress plot at 100,000 hr such that log $F_{avg} = 1/n$, but it may not exceed 0.67.

R_T = ratio of the average temperature dependent trend curve value of tensile strength to the room temperature tensile strength

R_Y = ratio of the average temperature dependent trend curve value of yield strength to the room temperature yield strength

S_C = average stress to produce a creep rate of 0.01%/1,000 hr

S_{Ravg} = average stress to cause rupture at the end of 100,000 hr

S_{Rmin} = minimum stress to cause rupture at the end of 100,000 hr

S_T = specified minimum tensile strength at room temperature, ksi

S_Y = specified minimum yield strength at room temperature, ksi

n = a negative number equal to Δ log time-to-rupture divided by Δ log stress at 100,000 hr

NA = not applicable

The maximum allowable stress shall be the lowest value obtained from the criteria in Table 1-100. The mechanical properties considered, and the factors applied to establish the maximum allowable stresses, are as given below.

(a) At temperatures below the range where creep and stress rupture strength govern the selection of stresses, the maximum allowable stress value is the lowest of the following:

(1) the specified minimum tensile strength at room temperature divided by 3.5

(2) the tensile strength at temperature divided by 3.5

(3) two-thirds of the specified minimum yield strength at room temperature

(4) two-thirds of the yield strength at temperature

In the application of these criteria, the Committee considers the yield strength at temperature to be $S_Y R_Y$, and the tensile strength at temperature to be $1.1 S_T R_T$

Two sets of allowable stress values are provided in Tables 1A and 1B for austenitic stainless steels, nickel alloys, copper alloys, and cobalt alloys having an S_Y/S_T ratio less than 0.625. The higher alternative allowable stresses are identified by a footnote to the tables. These stresses exceed two-thirds but do not exceed 90% of the minimum yield strength at temperature. The higher stress values should be used only where slightly higher deformation is not in itself objectionable. These higher stresses are not recommended for the design of flanges or other strain-sensitive applications.

(b) At temperatures in the range where creep and stress rupture strength govern the selection of stresses, the maximum allowable stress value for all materials is established by the Committee not to exceed the lowest of the following:

(1) 100% of the average stress to produce a creep rate of 0.01%/1,000 hr

(2) $100F_{avg}$% of the average stress to cause rupture at the end of 100,000 hr

(3) 80% of the minimum stress to cause rupture at the end of 100,000 hr

Stress values for high temperatures are based, whenever possible, on representative uniaxial properties of the materials obtained under standard ASTM testing conditions or equivalent. The stress values are based on basic properties of the materials and no consideration is given for corrosive environment, for abnormal temperature and stress conditions, or for other design considerations.

Table 1-100
Criteria for Establishing Allowable Stress Values for Tables 1A and 1B

Product/Material	Room Temperature and Below		Above Room Temperature						
	Tensile Strength	Yield Strength	Tensile Strength		Yield Strength		Stress Rupture		Creep Rate
Wrought or cast ferrous and nonferrous	$\frac{S_T}{3.5}$	$^2/_3\ S_Y$	$\frac{S_T}{3.5}$	$\frac{1.1}{3.5} S_T R_T$	$^2/_3\ S_Y$	$^2/_3\ S_Y R_Y$ or $0.9\ S_Y R_Y$ [Note (1)]	$F_{avg} S_{Ravg}$	$0.8\ S_{Rmin}$	$1.0\ S_c$
Welded pipe or tube, ferrous and nonferrous	$\frac{0.85}{3.5} S_T$	$^2/_3 \times 0.85\ S_Y$	$\frac{0.85}{3.5} S_T$	$\frac{(1.1 \times 0.85)}{3.5} S_T R_T$	$^2/_3 \times 0.85\ S_Y$	$^2/_3 \times 0.85\ S_Y R_Y$ or $0.9 \times 0.85\ S_Y R_Y$ [Note (1)]	$(F_{avg} \times 0.85)\ S_{Ravg}$	$(0.8 \times 0.85)\ S_{Rmin}$	$0.85\ S_c$

NOTE:

(1) Two sets of allowable stress values may be provided for austenitic stainless steels in Table 1A; and nickel alloys, copper alloys, and cobalt alloys in Table 1B; having an S_Y/S_T ratio less than 0.625. The lower values are not specifically identified by a footnote. These lower values do not exceed two-thirds of the yield strength at temperature. The higher alternative allowable stresses are identified by a footnote. These higher stresses may exceed two-thirds but do not exceed 90% of the yield strength at temperature. The higher values should be used only where slightly higher deformation is not in itself objectionable. These higher stresses are not recommended for the design of flanges or for other strain-sensitive applications.

MANDATORY APPENDIX 2
BASIS FOR ESTABLISHING DESIGN STRESS INTENSITY VALUES FOR TABLES 2A, 2B, AND 4, AND ALLOWABLE STRESS VALUES FOR TABLE 3

2-100 DERIVATION OF STRESS INTENSITY VALUES

The values in Tables 2A, 2B, 3, and 4 are established by the Committee only. In the determination of allowable stress values for nonnuclear materials in Table 3, the Committee is guided by successful experience in service, insofar as evidence of satisfactory experience is available. Such evidence is considered equivalent to test data where operating conditions are known with reasonable certainty. In the evaluation of new materials for both nuclear and nonnuclear applications, it is sometimes necessary to be guided to a certain extent by the comparison of test information with available data on successful applications of similar materials.

The factors employed to determine design stress intensity values are provided in Tables 2-100(a), 2-100(b), and 2-100(c). Nomenclature for these Tables is as follows:

F_{avg} = multiplier applied to average stress for rupture in 100,000 hr. At 1,500°F and below, F_{avg} = 0.67. Above 1,500°F, it is determined from the slope of the log time-to-rupture versus log stress plot at 100,000 hr such that log $F_{avg} = 1/n$, but it may not exceed 0.67.

R_T = ratio of the average temperature dependent trend curve value of tensile strength to the room temperature tensile strength

R_Y = ratio of the average temperature dependent trend curve value of yield strength to the room temperature yield strength

S_T = specified minimum tensile strength at room temperature, ksi

S_Y = specified minimum yield strength at room temperature, ksi

n = a negative number equal to Δ log time-to-rupture divided by Δ log stress at 100,000 hr

NA = not applicable

The maximum design stress intensity shall be the lowest value obtained from the criteria in Tables 2-100(a), 2-100(b), and 2-100(c). The mechanical properties considered, and the factors applied to establish the maximum allowable stresses, are given in 2-110 through 2-130.

2-110 CRITERIA FOR MATERIALS OTHER THAN BOLTING: TABLES 2A AND 2B

The design stress intensity values at any temperature are no larger than the least of the following:

(a) one-third of the specified minimum tensile strength at room temperature;

(b) one-third of the tensile strength at temperature;

(c) two-thirds of the specified minimum yield strength at room temperature;

(d) two-thirds of the yield strength at temperature, except that for austenitic stainless steels, nickel alloys, copper alloys, and cobalt alloys having an S_Y/S_T ratio less than 0.625, as indicated in Tables 2A and 2B, this value may be as large as 90% of the yield strength at temperature (but never more than two-thirds of the specified minimum yield strength).

In the application of these criteria, the Committee considers the yield strength at temperature to be $S_Y R_Y$, and the tensile strength at temperature to be $1.1 S_T R_T$.

When, in the judgment of the Committee, values have been in use for a sufficient period of time to have demonstrated successful experience in service, even at temperatures at which the behavior of the material is time dependent, such values shall be retained, but shall be identified by a different typeface (normally italics) and a note in the tables that indicates at what temperature the use of such values begins.

2-120 CRITERIA FOR BOLTING MATERIALS IN TABLE 3 FOR USE WITH SECTION III (CLASS 2 AND 3 RULES); SECTION VIII, DIVISION 1; SECTION VIII, DIVISION 2 (PART 4.16 RULES); AND SECTION XII

(a) For materials whose strength has not been enhanced by heat treatment or by strain hardening, the allowable stress value shown at any temperature in Table 3 is the least of the following:

(1) one-fourth of the specified minimum tensile strength at room temperature;

(2) one-fourth of the tensile strength at temperature;

(3) two-thirds of the specified minimum yield strength at room temperature;

(4) two-thirds of the yield strength at temperature.

(b) For materials whose strength has been enhanced by heat treatment or by strain hardening, the allowable stress value shown at any temperature in Table 3 is the least of the following, unless these values are lower than the annealed values, in which case the annealed values shall be used:

(1) one-fifth of the specified minimum tensile strength at room temperature;

(2) one-fourth of the tensile strength at temperature;

(3) one-fourth of the specified minimum yield strength at room temperature;

(4) two-thirds of the yield strength at temperature.

(c) In the application of these criteria, the Committee considers the yield strength at temperature to be $S_Y R_Y$, and the tensile strength at temperature to be $1.1 S_T R_T$.

(d) At temperatures in the range where creep and stress rupture strength govern the selection of stresses, the maximum allowable stress value for all materials is established by the Committee not to exceed the lowest of the following:

(1) 100% of the average stress to produce a creep rate of 0.01%/1,000 hr;

(2) $100F_{avg}$% of the average stress to cause rupture at the end of 100,000 hr;

(3) 80% of the minimum stress to cause rupture at the end of 100,000 hr.

Stress values for high temperatures are based, whenever possible, on representative uniaxial properties of the materials obtained under standard ASTM testing conditions or equivalent. The stress values are based on basic properties of the materials and no consideration is given for corrosive environment, for abnormal temperature and stress conditions, or for other design considerations.

2-130 CRITERIA FOR BOLTING MATERIALS IN TABLE 4 FOR USE WITH SECTION VIII, DIVISION 2, PART 5 AND ANNEX 5.F; AND WITH SECTION III, SUBSECTIONS NB AND WB

The allowable stress or design stress intensity value shown at any temperature in Table 4 is the least of the following:

(a) For materials whose strength has not been enhanced by heat treatment or strain hardening,

(1) one-fourth of the specified minimum tensile strength at room temperature;

(2) one fourth of the tensile strength at temperature;

(3) two-thirds of the specified minimum yield strength at room temperature;

(4) two-thirds of the yield strength at temperature.

(b) For materials whose strength has been enhanced by heat treatment or strain hardening,

(1) one-third of the specified minimum yield strength at room temperature;

(2) one-third of the yield strength at temperature.

In the application of these criteria, the Committee considers the yield strength at temperature to be $S_Y R_Y$, and the tensile strength at temperature to be $1.1 S_T R_T$.

Table 2-100(a)
Criteria for Establishing Design Stress Intensity Values for Tables 2A and 2B

	Room Temperature and Below		Above Room Temperature			
			Tensile Strength		Yield Strength	
Product/Material	Tensile Strength	Yield Strength				
Wrought or cast, ferrous and nonferrous	$\frac{S_T}{3}$	$\frac{2}{3} S_Y$	$\frac{S_T}{3}$	$\frac{1.1}{3} S_T R_T$	$\frac{2}{3} S_Y$	$\frac{2}{3} S_Y R_Y$ or $0.9 S_Y R_Y$ [Note (1)]
Welded pipe or tube, ferrous and nonferrous	$\frac{0.85}{3} S_T$	$\frac{2}{3} \times 0.85 S_Y$	$\frac{0.85}{3} S_T$	$\frac{1.1 \times 0.85}{3} S_T R_T$	$\frac{2}{3} \times 0.85 S_Y$	$\frac{2}{3} \times 0.85 S_Y R_Y$ or $0.9 \times 0.85 S_Y R_Y$ [Note (1)]

NOTE:
(1) For austenitic stainless steels, nickel alloys, copper alloys, and cobalt alloys having an S_Y/S_T ratio less than 0.625, the design stress intensity values in Tables 2A and 2B may exceed two-thirds and may be as high as 90% of the yield strength at temperature.

Table 2-100(b)
Criteria for Establishing Allowable Stress Values for Table 3

Product/Material	Room Temperature and Below		Above Room Temperature						
	Tensile Strength	Yield Strength	Tensile Strength		Yield Strength		Stress Rupture		Creep Rate
Bolting, annealed ferrous and nonferrous	$\frac{S_T}{4}$	$\frac{2}{3}S_Y$	$\frac{S_T}{4}$	$\frac{1.1}{4}S_TR_T$	$\frac{2}{3}S_Y$	$\frac{2}{3}S_YR_Y$	$F_{avg}S_{Ravg}$	$0.8S_{Rmin}$	$1.0S_C$
Bolting, with strength enhanced by heat treatment or strain hardening, ferrous and nonferrous [Note (1)]	$\frac{S_T}{5}$	$\frac{S_Y}{4}$	$\frac{1}{5}S_T$	$\frac{1.1}{4}S_TR_T$	$\frac{1}{4}S_Y$	$\frac{2}{3}S_YR_Y$	$F_{avg}S_{Ravg}$	$0.8S_{Rmin}$	$1.0S_C$

NOTE:
(1) For materials whose strength has been enhanced by heat treatment or by strain hardening, the criteria shown shall govern unless the values are lower than for the annealed material, in which case the annealed values shall be used.

Table 2-100(c)
Criteria for Establishing Allowable Stress or Design Stress Intensity Values for Table 4

Product/Material	Room Temperature and Below		Above Room Temperature	
	Tensile Strength	Yield Strength	Tensile Strength	Yield Strength
Bolting, with strength not enhanced by heat treatment or strain hardening, ferrous and nonferrous	$\frac{1}{4}S_T$	$\frac{2}{3}S_Y$	$\frac{1.1}{4}S_TR_T$	$\frac{2}{3}S_YR_Y$
Bolting, with strength enhanced by heat treatment or strain hardening, ferrous and nonferrous [Note (1)]	NA	$\frac{1}{3}S_Y$	NA	$\frac{1}{3}S_YR_Y$

NOTE:
(1) For materials whose strength has been enhanced by heat treatment or by strain hardening, the criteria shown shall govern unless the values are lower than for material whose strength is not enhanced by heat treatment or strain hardening, in which case the values for the material whose strength has not been enhanced by heat treatment or strain hardening shall be used.

MANDATORY APPENDIX 3
BASIS FOR ESTABLISHING EXTERNAL PRESSURE CHARTS

3-100 GENERAL

The charts in Subpart 3 were established in order to facilitate a conservative approach in determining external pressure ratings for components covering a wide range of geometries, materials, and conditions. The methods provide for a uniform basis of calculation for the referencing Section; the use of the charts eliminates the need for complex calculations by equations and incorporates realistic factors of safety for components of widely varying length-to-diameter and diameter-to-thickness ratios.

3-200 BASIS OF CHARTS IN SUBPART 3

Rules for allowable longitudinal compressive stress, rules for shells and tubes under external pressure, rules for stiffening rings, and rules for formed heads under external pressure make reference to and use material in Subpart 3, Charts and Tables for Determining Shell Thickness of Components Under External Pressure. Entrance into the charts is via the Factor A, abscissa, which is a nondimensional term related to certain geometrical considerations of the part in question, such as thickness, diameter, and length. These geometrical considerations are independent of material properties; thus a single geometry chart, Figure G, applies to all materials and is used in conjunction with the materials charts in Subpart 3.

3-300 USE OF CHARTS IN SUBPART 3

External pressure capability of cylinders, spheres, and formed heads, as well as allowable compressive stress for cylinders subject to axial compression, is obtained by reference to the charts in Subpart 3 along with instructions and equations given in the appropriate paragraphs in the body of the referencing Section.

3-400 BACKGROUND AND DEVELOPMENT OF THEORY

The development of the present rules for external pressure has a long history. Among the principal references used in developing these rules are Timoshenko's *Theory of Elasticity* (3-900[1]), *Theory of Plates and Shells* (3-900[2]), and *Theory of Elastic Stability* (3-900[3]); a group of papers reprinted as Section 9 in ASME's publication *Pressure Vessel and Piping Design — Collected Papers 1927–1959* (3-900[4]); and Sturm's 1941 University of Illinois Bulletin 329, *A Study of the Collapsing Pressure of Thin Walled Cylinders* (3-900[5]). The format for the charts in Subpart 3 is detailed in Sturm's University of Illinois Bulletin 329 (3-900[5]), with additional comments in Bergman's 1952 paper, The New Type Code Chart for the Design of Vessels Under External Pressure (included in 3-900[4]). The Sturm and Bergman papers detail the mechanics involved in combining the materials and geometrical factors into a nomograph format; an important companion paper to those of Sturm and Bergman is Sturm and O'Brien's 1946 ASME paper, Computing Strength of Vessels Subjected to External Pressure (3-900[6]).

Alternative rules for determining allowable compressive stress are given in BPVC Section VIII, Division 2. An equation is given (3.D.5) for the tangent modulus of the stress–strain curve that could be used to develop external pressure charts as in Subpart 3 The tangent modulus is derived from generic stress–strain relations, represented in equation form, to represent broad classes of materials.

3-500 DESIGN BASIS

As noted previously, stress and strain values for components are analytically and geometrically distilled into the two chart parameters A and B. The design is based on the following considerations.

(a) External Pressure on Cylinders. The geometric chart, Figure G,[2] for components is used in conjunction with the appropriate material chart and an equation for B to obtain a design external pressure. This is based on the following considerations.

(1) The assumed critical buckling stress without any reduction for tolerance, etc., is based upon the reference in 3-900[5], assuming pressure on the ends of the vessel as well as radial to the cylinder, and assuming the ends of the cylinder are simply supported.

(2) The parameters and stresses are those at the design temperature.

(3) The tangent modulus is used for buckling stresses above the proportional limit. The point at which yield or creep governs (beyond the transition) is chosen at a relatively high value of A (i.e., t/R).

(4) The allowable tolerances are based on empirical relationships intended to limit the buckling pressure to not less than 80% of that for a perfectly uniform vessel.

(b) External Pressure on Spheres. The material charts are used together with equations to determine A from the geometry and to determine the pressure using B

determined from the chart to determine a design external pressure. This procedure is based upon the following considerations.

(1) The assumed critical elastic buckling stress including a reduction for tolerance, theory versus tests, etc., is based on

$$0.125\frac{Et}{R_0}$$

(2) The parameters and stresses are those at the design temperature.

(3) The tangent modulus is used for buckling stresses above the proportional limit [see (a)(3) above].

(4) The allowable tolerances are based upon empirical relationships intended to limit (along with reduction factors based on tests) the buckling pressure to not less than 60% of that obtained using the equation in (1) above.

NOTE: This gives results similar to those for the cylinder in the elastic range. However, the present material charts give more restrictive results for spheres than for cylinders in the plastic range.

(c) Axial Compression on Cylinders.[3] An equation is used to determine A from the geometry. Then A is used with the material chart to determine B, the allowable compressive stress for that geometry. This is based upon the following considerations.

(1) The assumed critical elastic buckling stress including a reduction for tolerance, theory versus tests, etc., is based upon

$$0.125\frac{Et}{R_0}$$

(2) The parameters and stresses are those at the design temperature

(3) The tangent modulus is used for buckling stresses above the proportional limit [see (a)(3) above].

(4) The allowable tolerances are based upon empirical relationships intended to limit (along with reduction factors based upon tests) the critical buckling stress to not less than that obtained using the equation in (1) above for R/t values.

(d) Elevated Temperature Effects

(1) The design basis described here does not include the effects of creep on buckling. The Subpart 3 external pressure charts and tables are based on stress–strain properties that do not include time-dependent effects. At elevated temperatures, the effect of creep is to reduce buckling stress depending on the magnitude of load and time at load. At some temperatures for which limits are provided in the Subpart 3 charts, the material is in the creep range and buckling stresses are reduced, with the reduction increasing with time at load. The result is that for temperatures in the creep range, the actual design margins will be less than those intended by this design basis and the associated criteria for allowable stresses (see 3-600). However, the design margins may still be adequate due to conservatism of the design limits and the specific nature of creep buckling.

(2) Design limits for elevated temperature buckling and instability are given in Section III, Division 5, Subsection HB, Subpart B. Design guidance is given that may be used to address creep buckling for components designed to the limits of the Subpart 3 external pressure charts. However, if the design temperature of a component is less than the temperature limits provided in Figure 3-500.1 for a cylinder under external pressure, Figure 3-500.2 for a cylinder under axial compression, or Figure 3-500.3 for a sphere under external pressure, the design margin of the Subpart 3 charts is not reduced by creep.

(3) The temperature limits of Figures 3-500.1, 3-500.2, and 3-500.3 were obtained using the analysis method of WRC Bulletin 443, *External Pressure: Effect of Initial Imperfections and Temperature Limits* (see 3-900 [7]); the design limits of Section III, Division 5, Subsection HB, Subpart B; and 100,000 hr materials property data except as noted for SA-533. Limits were developed only for materials where the necessary creep properties were available.

3-600 CRITERIA FOR ALLOWABLE STRESSES

In establishing allowable stresses for preparing the material charts, consideration is given not only to the available mechanical property data but also to service experience. The external pressure charts are based on short-term tensile properties and may not adequately account for creep effects. Creep reduces the critical buckling stress. In evaluating new or modified materials, reliance is also placed on comparison with test data and service experience for similar materials. Except for the overriding consideration of experience, the allowable stresses are based on the factors and properties given below.

(a) For cylindrical shells, under external pressures, the allowable stress is the least of

(1) 33% of the assumed critical buckling stress as defined in 3-500(a)(1) but limited by allowable tolerances defined in 3-500(a)(4)

(2) 33% of the specified minimum yield strength and yield strength at temperature

(3) 66% of the average stress to produce a creep rate of 0.01% per 1,000 hr

(4) 100% of the allowable stress in tension

(b) For spheres and spherical portions of heads under external pressure, the allowable stress is the least of

(1) 25% of the assumed critical buckling stress as defined in 3-500(b)(1) but limited by allowable tolerances defined in 3-500(b)(4)

(2) 25% of the specified minimum yield strength and yield strength at temperature

(3) 50% of the average stress to produce a creep rate of 0.01% per 1,000 hr

Figure 3-500.1
Temperature Limits for Application of Section II External Pressure Charts for Cylinder Under External Pressure

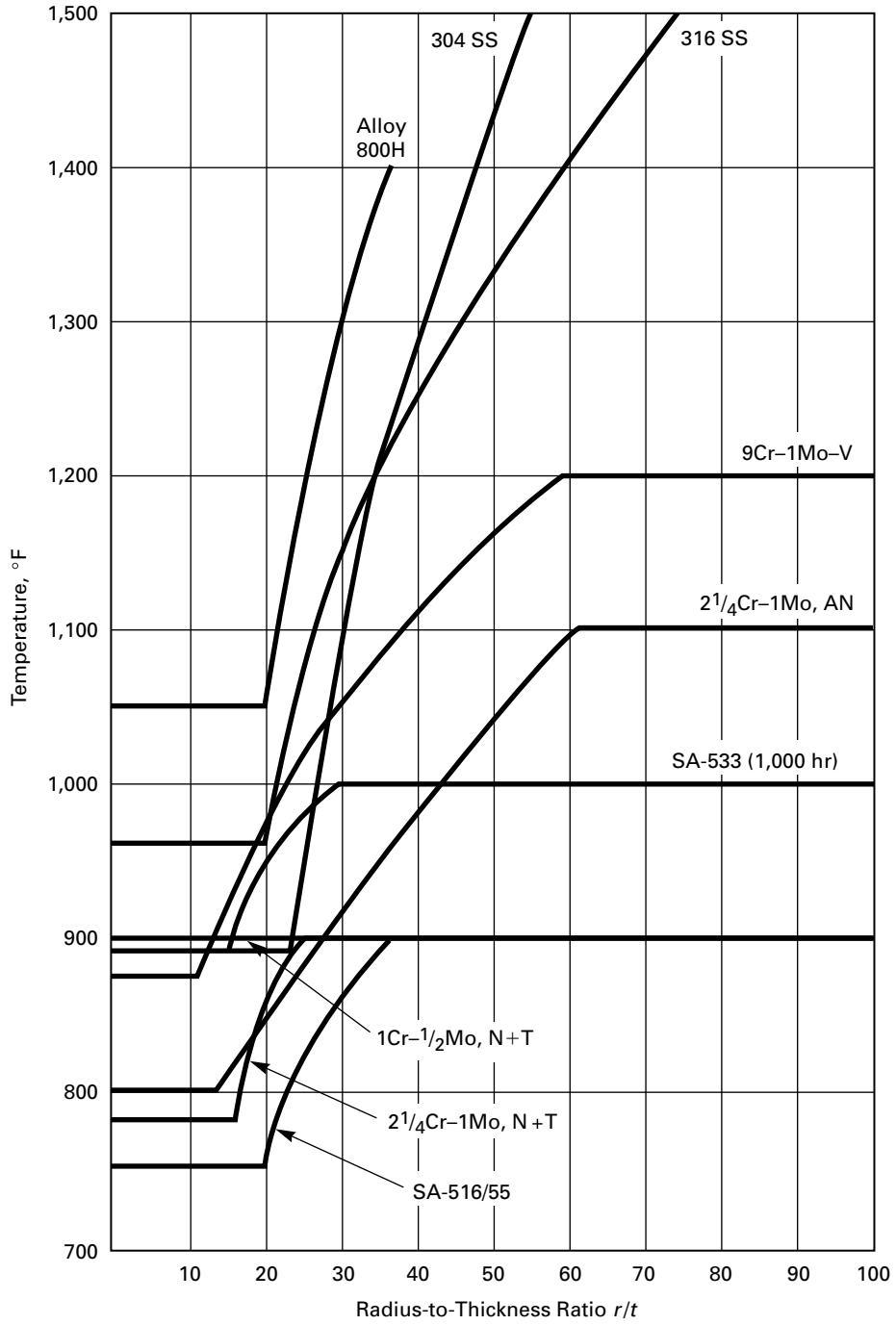
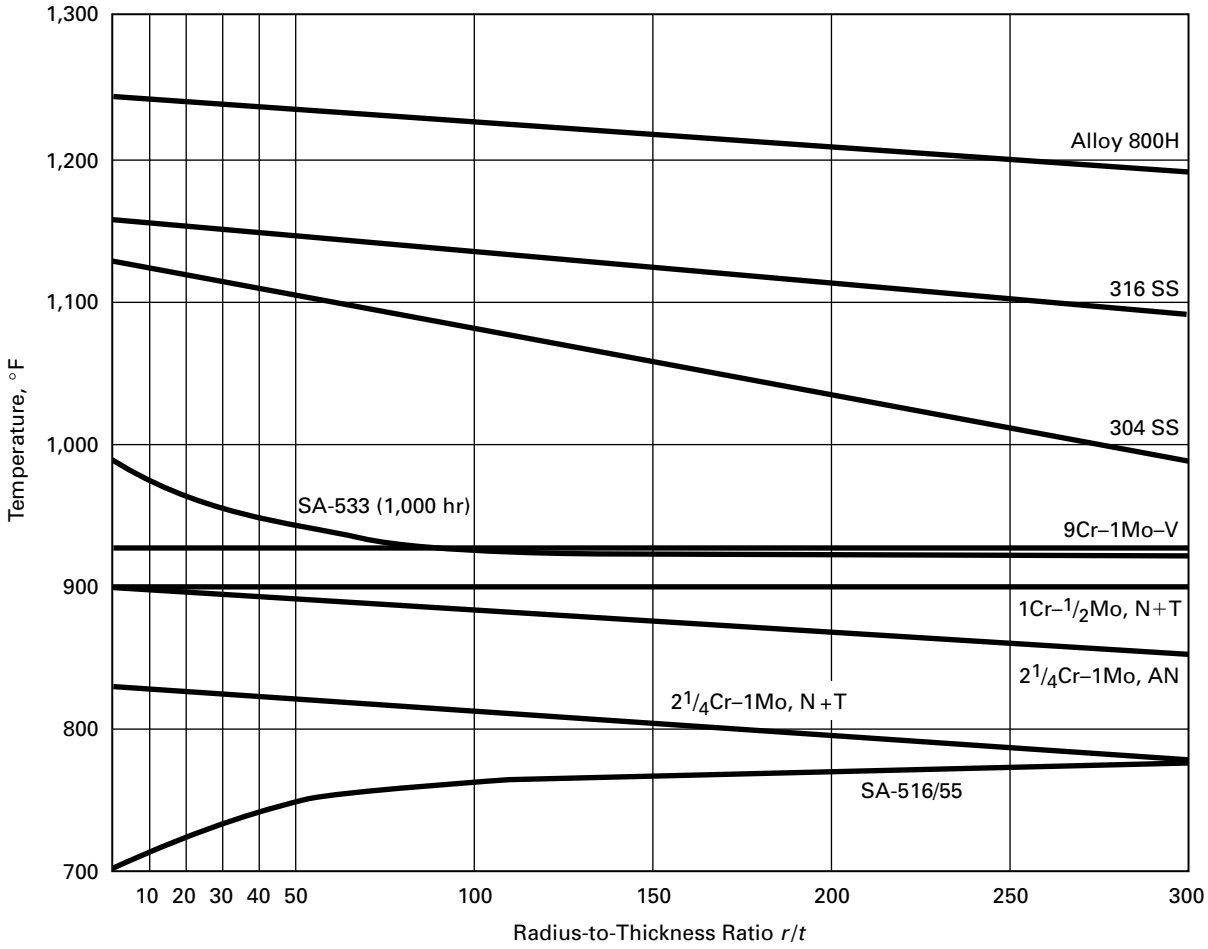


Figure 3-500.2
Temperature Limits for Application of Section II External Pressure Charts for Cylinder Under Axial Compression



(4) 100% of the allowable stress in tension

(c) For cylindrical shells under axial compression, the allowable stress is the least of

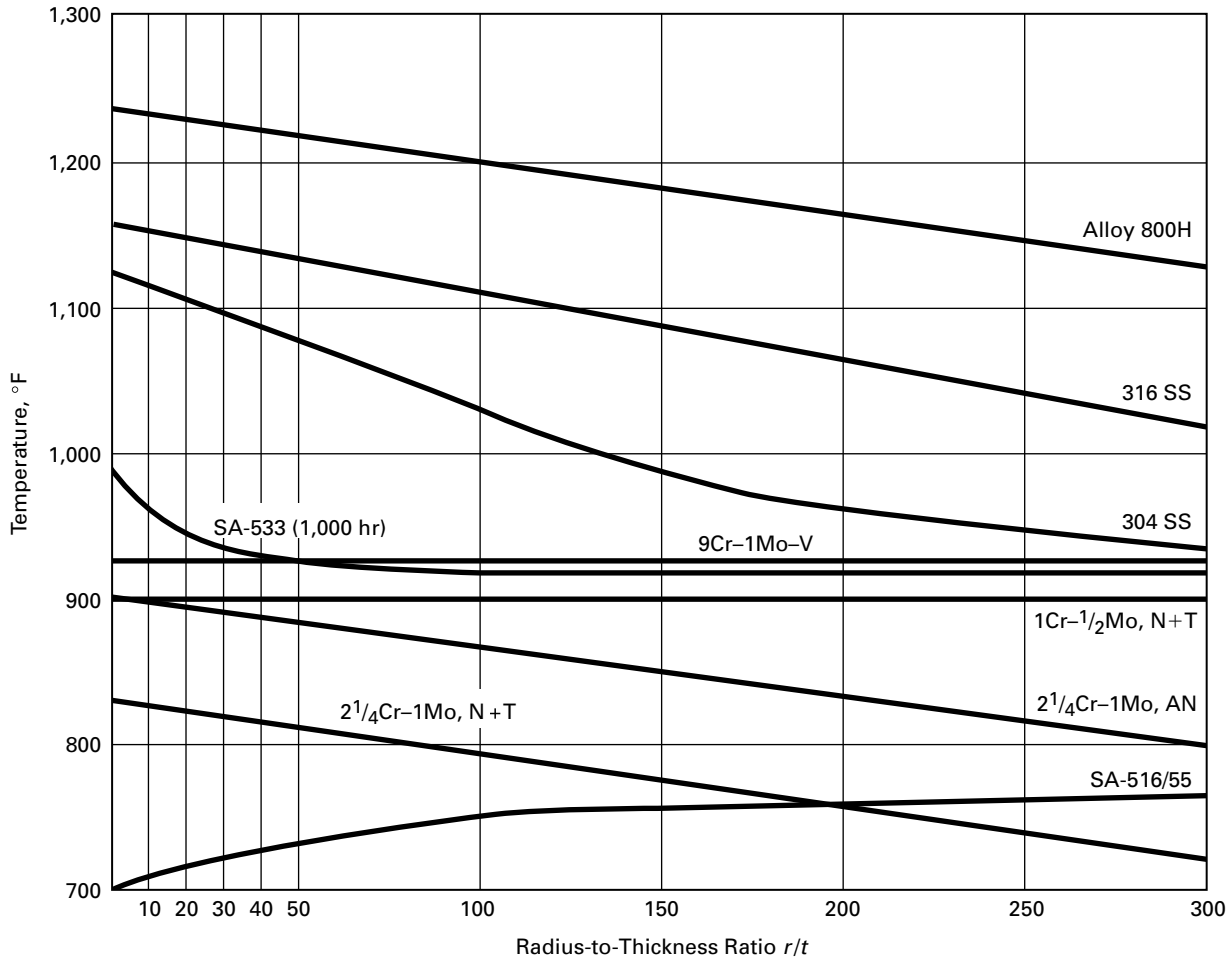
(1) 50% of the assumed critical buckling stress as defined in 3-500(c)(1) but limited by allowable tolerances defined in 3-500(c)(4)

(2) 50% of the specified minimum yield strength and yield strength at temperature

(3) 100% of the average stress to produce a creep rate of 0.01% per 1,000 hr

(4) 100% of the allowable stress in tension

Figure 3-500.3
Temperature Limits for Application of Section II External Pressure Charts for Sphere Under External Pressure



3-700 PROCEDURE AND RESPONSIBILITY FOR CHART DEVELOPMENT

Development of an external pressure chart for a new material requires materials data as specified in Mandatory Appendix 5, Guideline on the Approval of New Materials Under the ASME Boiler and Pressure Vessel Code. The requestor is responsible for providing these data in the specified form.

The following data are required for each temperature of interest:

(a) Elastic modulus, E, usually obtained by a dynamic test, and included in, or approved to be included in, Table TM-1, TM-2, TM-3, TM-4, or TM-5 of Section II, Part D.

(b) Minimum yield strength, $\sigma_{y\min}$, from the Section II, Part D yield strength table, Table Y-1, or approved for inclusion in Table Y-1.

(c) A representative stress–strain, σ–ε, curve that covers the range of strain from 0 to 1.0%.

(1) Procedure. The procedure for developing the chart parameters, A and B, from the σ–ε plots is described in the following:

Step 1. Select a representative σ–ε curve. For a new material, σ–ε curves are provided in accordance with the requirements of Mandatory Appendix 5. For multiple σ–ε curves from multiple heats all at a specific temperature, select the curve that shows the largest plastic deformation at lower stresses, usually the one with the lowest ratio of proportional limit to yield stress. The shape of the curve is more important than the absolute value of stress, because the curve is going to be normalized to $\sigma_{y\min}$. A σ–ε curve is required for each temperature for which an external pressure chart is desired, not to exceed the requirements of Mandatory Appendix 5.

Step 2. Normalize the σ–ε curve for each temperature to the specified E and $\sigma_{y\min}$ at that temperature. First, determine the yield stress, σ_y, on the representative σ–ε curve in the usual manner, i.e., the stress at 0.2%

plastic strain [see Figure 3-700.1, illustration (a)]. If the σ–ε curve has no clearly defined elastic portion, then it is necessary to obtain E by constructing a line tangent to the σ–ε curve at its origin. The total strain at a point is composed of an elastic component and a plastic component. The elastic strain is defined by E, i.e., elastic strain = σ/E. The rest of the strain at the point is plastic. The elastic strain measured by a tensile test is unreliable, so it is necessary to subtract it out from the total strain [see Figure 3-700.1, illustration (b)]. The σ–ε curve is then normalized to $\sigma_{y\min}$ by multiplying the stress at each value of plastic strain by the ratio $\sigma_{y\min}/\sigma_y$ [see Figure 3-700.1, illustration (c)]. The normalized σ–ε curve is then constructed by plotting the normalized stress against total strain, where the elastic strain is obtained using the Code approved value of E, i.e., elastic strain = (normalized stress)/E_{code}, for each temperature [see Figure 3-700.1, illustration (d)].

Step 3. Obtain the tangent modulus of the normalized σ–ε plot as a function of stress. This can be done graphically by calculating the tangent (i.e., the slope of a straight line tangent to the curve) at a number of points along the σ–ε curve and plotting the tangent against the stress at the associated points. Alternatively, if the σ–ε curve is approximated in algebraic terms and represented in equation form, the tangent modulus is the first derivative of the equation, $d\sigma/d\varepsilon$, and can be represented in equation form.

Step 4. The values of A and B used to construct the external pressure charts can now be calculated from the following:

$$\text{A} = \text{stress} / \text{tangent modulus}$$

$$\text{B} = \text{stress}/2$$

where a different curve is plotted for each temperature.

(2) Chart Construction. The external pressure charts are plotted in log–log coordinates, with A as the abscissa and B as the ordinate. Section II, Part D, Subpart 3 limits B to one-half of $\sigma_{y\min}$. Thus, the curves can generally be plotted in two or three segments, which may be more convenient for curve fitting. The first segment is linear, representing the linear portion of the σ–ε curve up to the proportional limit, if there is a proportional limit. It may be argued that there is no true proportional limit, and there may not be for a few metals, but definition of a proportional limit is required in Mandatory Appendix 5 and a practical limit can generally be constructed. The second segment is nonlinear and represents the σ–ε curve beyond the proportional limit. It is not necessary that the tangent to the curve be continuous between the first and second segments. The allowable stress, B, increases with increasing A until it reaches $\frac{1}{2}\,\sigma_{y\min}$ or the maximum value of A on the chart. If B is restricted by the limit, then there is a third segment of the curve that is linear and parallel to the abscissa at B = $\frac{1}{2}\,\sigma_{y\min}$. In summary,

(a) Segment 1: B = $\frac{1}{2}$ AE up to the proportional limit (PL)

(b) Segment 2: B = $\frac{1}{2}$ AE_t from PL to $\frac{1}{2}\,\sigma_{y\min}$, where $E_t = d\sigma/d\varepsilon$

(c) Segment 3: B = $\frac{1}{2}\,\sigma_{y\min}$

Chart construction and the development of tabular values are the responsibility of the Subgroup on External Pressure of the BPV-II Committee on Materials.

3-800 ALTERNATE PROCEDURE FOR DETERMINING ALLOWABLE COMPRESSIVE STRESSES

Alternative rules for the design of shells under external pressure and allowable compressive stresses are given in Section VIII, Division 2, Part 4, para. 4.4. These rules are based on linear structural stability theory, modified by reduction factors to account for the effects of imperfections, boundary conditions, nonlinearity of material properties, and residual stresses. A step-by-step procedure is given to calculate the allowable compressive stress for components made of carbon and low alloy steel plate material at temperatures limited depending on the specific material. For materials other than carbon and low alloy steel, the procedure is modified by calculating the allowable compressive stress based on carbon and low alloy plate material, and then applying an adjustment that essentially replaces the elastic modulus with the tangent modulus of the material. The tangent modulus is determined based on a stress equal to the elastic compressive membrane failure stress of the component. This alternative procedure is applicable to a broader range of geometry and loading conditions than covered in the external pressure charts of Section II, Part D. Where comparisons have been made between the two methods, agreement is generally good.

3-900 REFERENCES

[1] Timoshenko, S. and Goodier, J. N., *Theory of Elasticity*, McGraw-Hill Book Co., New York, 1951

[2] Timoshenko, S. and Woinowsky-Krieger, S., *Theory of Plates and Shells*, McGraw-Hill Book Co., New York, 1959

[3] Timoshenko, S. and Gere, J. M., *Theory of Elastic Stability*, McGraw-Hill Book Co., New York, 1961

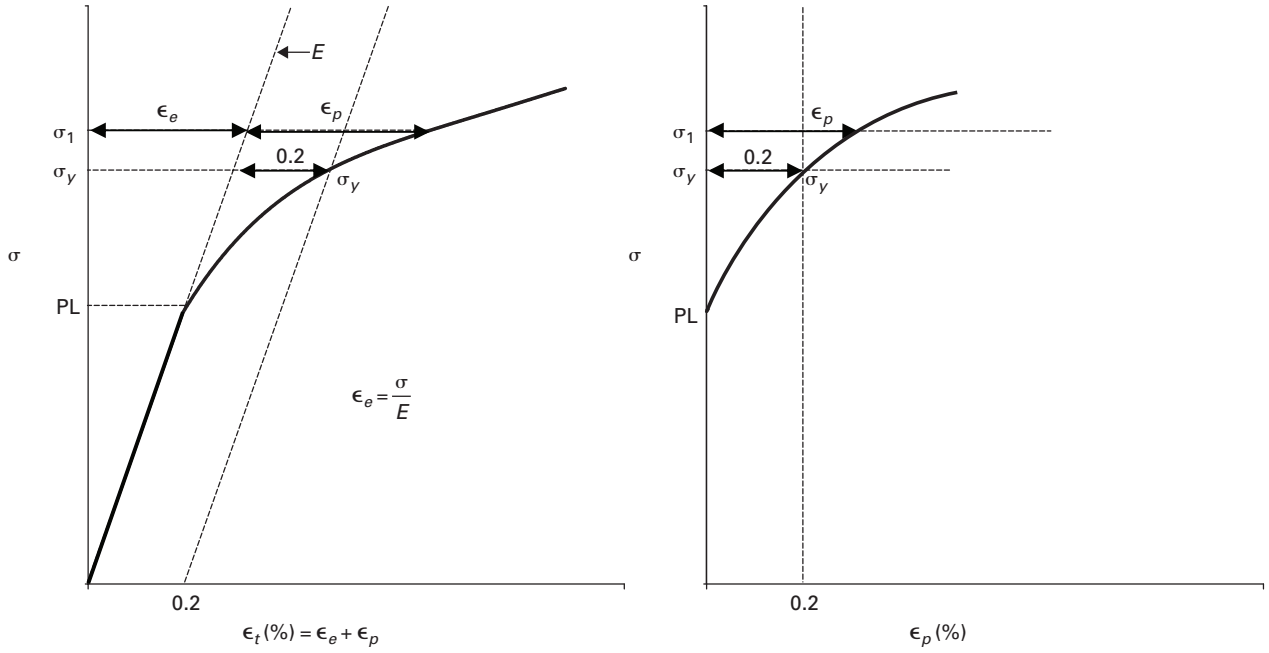
[4] *Pressure Vessel and Piping Design — Collected Papers 1927–1959*, ASME, New York, 1960

[5] Sturm, R. G., *A Study of the Collapsing Pressure of Thin Walled Cylinders*, University of Illinois Bulletin 329, 1941

[6] Sturm, R. G. and O'Brien, H. L., *Computing Strength of Vessels Subjected to External Pressure*, Transactions of the ASME, May 1947

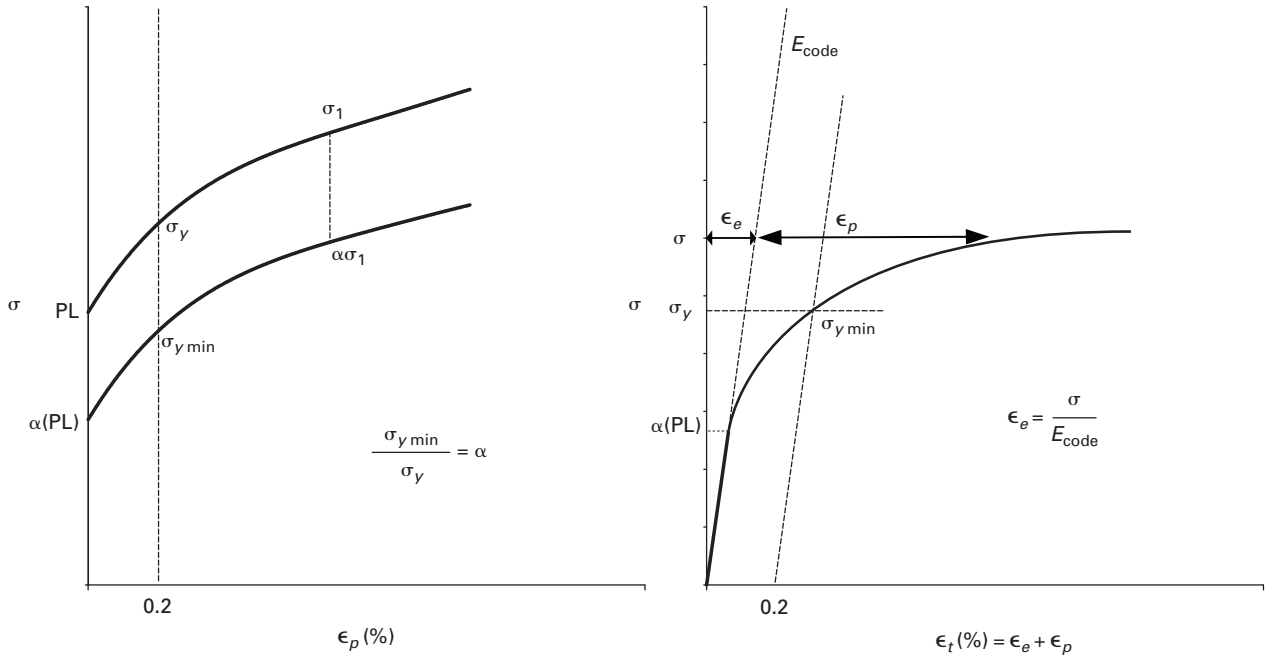
[7] Griffin, D. S., *External Pressure: Effect of Initial Imperfections and Temperature Limits*, WRC Bulletin 443

Figure 3-700.1
Normalization of Test σ–ε to $\sigma_{y\,min}$ and E_{code}



(a) From Test

(b) Subtract Out Elastic



(c) Normalize to $\sigma_{y\,min}$

(d) Add in Code E

MANDATORY APPENDIX 5
GUIDELINES ON THE APPROVAL OF NEW MATERIALS UNDER THE ASME BOILER AND PRESSURE VESSEL CODE

5-100 CODE POLICY

It is expected that requests for Code approval will normally be for materials for which there is a recognized national or international specification. It is the policy of the ASME Boiler and Pressure Vessel (BPV) Committee on Materials to approve, for inclusion in the Code Sections, only materials covered by specifications that have been issued by standards-developing organizations such as, but not limited to, American Petroleum Institute (API), American Society for Testing and Materials (ASTM), American Welding Society (AWS), Canadian Standards Association (CSA), European Committee for Standardization (CEN), Japan Industrial Standards (JIS), Standards Association of Australia (SAA), and China Standardization Committee (CSC).

Material specifications of other than national or international organizations, such as those of material producers/suppliers or equipment manufacturers, will not be considered for approval. The Committee will consider only official requests for specifications authorized by the originating standardization body and available in the English language and in U.S. Customary and/or SI/Metric units.

For materials made to a recognized national or international specification other than that of ASTM or AWS, the inquirer shall give notice to the standards-developing organization that a request has been made to ASME for approval of the specification under the ASME Code and should request that the issuing organization grant ASME permission to at least reproduce copies of the specification for Code Committee internal use and, if possible, reprint the specification. For other materials, a request shall be made to ASTM, AWS, or a recognized national or international standardization body to include the material in a specification that can be presented to the BPV Committee on Materials.

It is the policy of the ASME BPV Committee on Materials to consider requests to approve new materials only from boiler, pressure vessel, transport tank, nuclear facility component manufacturers, architect–engineers, or end users. Such requests should be for wrought, cast, or hot isostatically pressed powder materials for which there is a reasonable expectation of use in a boiler, pressure vessel, transport tank, or nuclear facility component constructed to the rules of one of the Sections of this Code. When a grade does exist in a defined wrought product form, a material producer/supplier may request the inclusion of additional wrought product forms or, provided all of the requirements of Table 5-100 of this Appendix are met, the inclusion of hot isostatically pressed (HIP) powder metallurgy components of this grade. When a grade does exist in a defined cast product form, a material producer/supplier may request the inclusion of additional cast product forms.

Any qualified organization requesting that an ASME BPV Committee approve a “new” material for use in their Code book should be aware that only the BPV Committee on Materials provides the appropriate design values for the Construction Codes (Sections I, III, IV, VIII, and XII of the BPV Code and B31 Codes).

The design values are calculated in accordance with the appropriate mandatory Code rules. If the inquirer considers the material to be essentially identical to one that has been approved by the BPV Committee on Materials, the inquirer shall so state in its request, and the BPV Committee on Materials shall evaluate that judgment. If the material is not essentially identical to one that has been approved by the BPV Committee on Materials, the inquirer shall provide all of the data cited in this Mandatory Appendix. Based on those data, the BPV Committee on Materials will provide the appropriate design values.

Before approval of a new material for inclusion in one of the Sections of the Code, use of this material may be permitted in the form of a Code Case. This Case shall fix at least the conditions of use and the necessary requirements linked to these conditions. It is the policy of the ASME BPV Committee to admit, in this way, material for which full experience on all working parameters has not yet been acquired.

5-200 APPLICATION

The inquirer shall identify to the BPV Committee the following:

(a) the Section or Sections and Divisions of the Code in which the new material is to be approved

(b) the temperature range of intended application

(c) whether cyclic service is to be considered

(d) whether external pressure is to be considered

The inquirer shall identify all product forms, size ranges, and specifications or specification requirements for the material for which approval is desired. When

Table 5-100
Hot Isostatically Pressed Component Requirements for Austenitic Stainless Steels, Austenitic–Ferritic (Duplex) Stainless Steels, Martensitic Stainless Steels, Ferritic Steels, and Nickel Alloys

Category	Requirement
Chemistry	The chemistry requirements of the hot isostatically pressed components shall be identical to those of the corresponding wrought product form.
Mechanical properties	The room-temperature mechanical properties of hot isostatically pressed components shall be identical to those that apply to the corresponding wrought product form.
Heat treatment	The heat-treatment requirements that apply to the hot isostatically pressed components shall be identical to those that apply to the corresponding wrought product form.
Grain size	The grain size requirements that apply to the hot isostatically pressed components shall be identical to those that apply to the corresponding wrought product form.
Control of powder prior to hot isostatic pressing	The maximum allowable powder size shall be 0.020 in. and the powder shall be produced by the gas atomization process. Immediately following atomization, the powder shall remain shielded by an inert gas until the powder is below a temperature of 105°F, to ensure that the detrimental absorption of oxygen and other deleterious contaminants is no longer possible. For austenitic stainless steels, duplex stainless steels, martensitic stainless steels, and nickel alloys, powder should be protected during storage to prevent the detrimental pickup of oxygen and other contaminants. For ferritic steels, following atomization, powders shall be stored under a positive nitrogen or argon atmosphere or vacuum to minimize potential oxidation or contamination.
Mandatory testing of hot isostatically pressed components	The chemical composition of a sample from one part from each lot of parts shall be determined by the manufacturer. The composition of the sample shall conform to the chemistry requirements of the defined wrought product form. The microstructure shall be examined at 20–50X, 100–200X, and 1,000–2,000X. The microstructure shall be reasonably uniform and shall be free of voids, laps, cracks, and porosity. One sample from each production lot shall be examined. The sample shall be taken from the component, stem, protrusion, or test part made from a single powder blend consolidated in the same hot isostatic press, using the same pressure, temperature, and time parameters, and heat treated in the same final heat-treatment charge at the option of the producer, after hot isostatic pressing or after final heat treatment. Samples for mechanical testing shall be from the component, stem, protrusion, or test part made from a single powder blend consolidated in the same hot isostatic press, using the same pressure, temperature, and time parameters, and heat-treated in the same final heat-treatment charge.
Material certification requirements	A manufacturer's certification shall be furnished to the purchaser stating that material has been manufactured, tested, and inspected in accordance with the applicable specification, and that the test results on representative samples meet specification requirements. A report of the test results shall be furnished.

GENERAL NOTES:

(a) When a grade does exist in a defined wrought product form for alloys other than those cited, an inquirer may request the inclusion of hot isostatically pressed (HIP) components of this grade. However, the Committee may have additional requirements placed on the grade to accept this request.

(b) If the material is to be used at temperatures where the time-dependent performance will determine the allowable stress values, the requirements of Mandatory Appendix 5 relative to the provision of data for new materials shall apply.

available, the inquirer shall furnish information describing service experience in the temperature range requested.

5-300 CHEMICAL COMPOSITION

The inquirer shall recommend to the BPV Committee on Materials whether the chemical composition specified in the reference specification applies or whether restrictions to this composition shall be imposed for the intended application. When coverage by a recognized national or international standardization body has been requested but not yet obtained, the inquirer shall indicate the detailed chemical composition in the inquiry. The inquirer shall explain the reasons for the chemistry and chemistry limits, and their relationship to the metallurgical structure (e.g., influence on precipitates and their morphology, grain size, and phases), heat treatment effect (e.g., strengthening mechanisms and their stability), and mechanical properties. Elements that significantly influence strength, ductility, toughness, weldability, and behavior under service conditions should be identified.

After review of the submitted data, the Committee reserves the right to modify the permitted compositional ranges for key elements so that they more accurately reflect the range of the elements of the submitted test heats.

5-400 METALLURGICAL STRUCTURE AND HEAT TREATMENT

When applicable for the proposed material, the inquirer shall indicate the intended metallurgical structure(s) to be achieved in order to comply with the mechanical properties requirements and, where applicable, fully describe the heat treatment (including cooling rates) to be applied to achieve this (or these) structure (s), the mechanical properties, and the expected behavior under service conditions.

An explanation for the proposed heat treatment temperature ranges shall be furnished. When such concepts apply, metallurgical transformation curves and information on the transformation points and conditions for appearance of the major phases in the microstructure (e.g., continuous cooling transformation diagram or time–temperature precipitation plots) would be beneficial for the Committee's consideration.

5-500 MECHANICAL PROPERTIES

Test methods employed for the properties tested shall be those referenced in or by the material specifications, or shall be the appropriate ASTM test methods, recommended practices, or test methods described in accepted international standards. The test methods used shall be indicated in the data package.

It is desired that the data be obtained using material representative of the range of effects of the key variables of composition, thickness, mechanical working, and heat treatment. It is desirable that, when applicable, test data also be provided for the range of heat treatment exposures that may influence properties such as tensile strength, toughness, and stress rupture behavior. After consideration of the submitted data, the Committee reserves the right to modify the specification requirements.

5-600 DEFINITIONS FOR DATA COLLECTION PURPOSES

casting lot: single production pour from a master heat.

heat: quantity of metal with one chemical composition, produced by a recognized production process from a single primary melt of the metal. Remelted ingot material is not recognized as a separate heat unless it is produced from a melt having a different chemical composition than the other heats.

hot isostatically pressed component lot: a number of parts made from a single powder blend consolidated in the same hot isostatic press using the same pressure, temperature, and time parameters, and heat treated in the same final heat-treatment charge.

powder blend: a homogeneous mixture of powder from one or more heats of the same grade. The term "powder blend" shall be substituted for the term "heat" for hot isostatically pressed powder material in 5-300, 5-700, 5-900, 5-1200, 5-1400, and 5-1800.

wrought lot: quantity of metal made by melting followed by working or by working and heat treatment as a unique batch. Different lots may come from the same heat and may be made into different product forms. Lot definitions are expected to be found in the applicable material specifications.

5-700 REQUIRED SAMPLING

For all mechanical properties, data shall be provided over the required range of test temperatures from at least three heats of material meeting all of the requirements of the applicable specifications. Data submitted on three heats of one wrought product form for which coverage is requested may be considered to be applicable for all other wrought product forms having the same chemistry.

For wrought materials and especially for those materials whose mechanical properties are enhanced by heat treatment, forming practices, or a combination thereof, and for other materials for which the mechanical properties may be reasonably expected to be thickness dependent, data from one additional lot from material of at least 75% of the maximum thickness for which coverage

is requested shall be submitted. If no maximum thickness is given, information shall be provided to support the suitability of the thickness used for the tested samples.

When adoption of cast product forms is requested, data from at least three heats for one of the cast product forms shall be submitted. The cast material shall be considered as a separate material even if its nominal composition is the same or very similar to that of an approved wrought material.

If the hot isostatically pressed powder material meets all of the requirements of Table 5-100, it shall be considered the same material as that of the approved wrought material for temperatures approximately 50°F below the temperature where time-dependent properties, as defined by the Time-Dependent Properties Notes (T-Notes) in the applicable allowable stress table for the approved wrought material, govern.

If the hot isostatically pressed material is to be used at temperatures where the time-dependent properties, as defined by the Time-Dependent Properties Notes (T-Notes) in the applicable allowable stress table for the approved wrought material, govern, the requirements of this Appendix relative to the provision of data for new materials shall apply.

If the hot isostatically pressed powder material does not meet all of the requirements of Table 5-100, it shall be considered as a separate material to that of the approved wrought material. In this case, the requirements of this Appendix relative to the provision of data for new materials shall apply.

Additional data for other heats tested to a lesser degree than described herein would be beneficial to the Committee's consideration.

5-800 TIME-INDEPENDENT PROPERTIES

For time-independent properties at and above room temperature, the required data include values of ultimate tensile strength, 0.2% offset yield strength, reduction of area (when specified in the material specification), and elongation. For steels, nickel alloys, cobalt alloys, and aluminum alloys, data shall be provided at room temperature and 100°F intervals, beginning at 200°F to 100°F above the maximum intended use temperature, unless the maximum intended use temperature does not exceed 100°F. For copper alloys, titanium alloys, and zirconium alloys, data shall be provided at room temperature, 150°F, and 200°F, and then at 100°F intervals, to 100°F above the maximum intended use temperature, unless the maximum intended use temperature does not exceed 100°F. The test methods shall be as given in ASTM A370, ASTM A1058, ASTM E8, ASTM E21, or other equivalent national or international test standards. In addition, when specified in the material specification, hardness values shall be provided at room temperature and shall be determined as specified in the material specification. Data provided shall be expressed in the units and to the number of significant figures shown in Table 5-800. When either the material specification or the applicable construction code (e.g., Section XII) permits or requires that yield strength be determined by other than the 0.2% offset method, those other yield strength values shall also be reported.

5-900 TIME-DEPENDENT PROPERTIES

If approval is desired for temperatures where time-dependent properties may be expected to control design, time-dependent data, as itemized below, shall be provided, starting at temperatures approximately 50°F below the temperature where time-dependent properties may govern and extending at least 100°F above the maximum intended use temperature. Exceptions to this rule are permitted, provided the inquirer provides suitable justification for the deviation. The creep–rupture test method shall be in accordance with ASTM E139 or other equivalent national or international test standard.

For time-dependent tests, the interval between successive temperatures shall be chosen such that it permits, in all cases, an accurate estimation of the slope of the stress-rupture curves. For normally stable materials (e.g., solid solution-strengthened materials), test temperatures shall be at intervals of 100°F or less. Where there is a possibility of degradation of strength related to metallurgical instability (e.g., for precipitation-strengthened materials), test temperatures shall be at intervals of 50°F or less. Data provided shall be expressed in the units and to the number of significant figures shown in Table 5-800.

In addition, for certain types of steels or alloys, it may be necessary to choose different temperature intervals in order to adequately reflect the evolution of the properties. In such cases, the interval between successive test temperatures shall be chosen such that rupture lives do not differ by more than a factor of 10 at any given stress for two adjacent temperatures. Data to be reported include stress, temperature, time to rupture, and, when available, either or both elongation and reduction of area. Additional comments regarding post-test specimen appearance (e.g., oxidation, necking, intergranular fracture, etc.), as well as photographs and photomicrographs, may be beneficial for the analysis.

Except as provided further below, the longest rupture time at each test temperature shall be in excess of 10,000 hr for each required heat. At least three additional tests shall be conducted for each required heat at each test temperature, at stresses selected to provide shorter rupture times but at least 500 hr (e.g., 500 hr, 1,400 hr, and 4,000 hr).

Tests of shorter duration than about 500 hr are not desired for long-term stress rupture prediction. Obviously, longer times and additional test data are beneficial. At successive temperatures, two or more test stresses should be selected to be preferably identical or in a close range.

(21)

Table 5-800
ASTM Test Methods and Units for Reporting

ASTM Designation	Title	Property	U.S. Customary Units	U.S. Customary Significant Figures
A370	Standard Test Methods and Definitions for Mechanical Testing of Steel Products	Tensile strength and yield strength	ksi	3
A1058	Standard Test Methods for Mechanical Testing of Steel Products—Metric	Tensile strength and yield strength	...	...
D2766	Standard Test Method for Specific Heat of Liquids and Solids	Specific heat [Note (1)]	Btu/lb-°F	3
E8	Standard Test Methods for Tension Testing of Metallic Materials	Tensile strength and yield strength	ksi	3
		Density	$lb/in.^3$	3
E21	Standard Test Methods for Elevated Temperature Tension Tests of Metallic Materials	Tensile strength and yield strength	ksi	3
E132	Standard Test Method for Poisson's Ratio at Room Temperature	Poisson's ratio	...	2
E139	Standard Test Methods for Conducting Creep, Creep–Rupture, and Stress–Rupture Tests of Metallic Materials	Rupture time	hr	5
E228	Standard Test Method for Linear Thermal Expansion of Solid Materials With a Push-Rod Dilatometer	Instantaneous coefficient	$(in./in./°F) \times 10^{-6}$	3, except 2 for $x < 10$
		Mean linear coefficient	$(in./in./°F) \times 10^{-6}$	
		Linear coefficient	in./100 ft	
E289	Standard Test Method for Linear Thermal Expansion of Rigid Solids With Interferometry	Instantaneous coefficient	$in./in./°F \times 10^{-6}$	3
		Mean coefficient	$in./in./°F \times 10^{-6}$	
		Linear coefficient	in./100 ft	
E831	Standard Test Method for Linear Thermal Expansion of Solid Materials by Thermomechanical Analysis	Instantaneous coefficient	$(in./in./°F) \times 10^{-6}$	3, except 2 for $x < 10$
		Mean linear coefficient	$(in./in./°F) \times 10^{-6}$	
		Linear coefficient	in./100 ft	
E1225	Standard Test Method for Thermal Conductivity of Solids Using the Guarded-Comparative-Longitudinal Heat Flow Technique	Thermal conductivity	Btu/hr-ft-°F	3, except 2 for $x < 10$
E1461	Standard Test Method for Thermal Diffusivity by the Flash Method	Thermal diffusivity	ft^2/hr	3
		Thermal conductivity	Btu/hr-ft-°F	3, except 2 for $x < 10$
E1875	Standard Test Method for Dynamic Young's Modulus, Shear Modulus, and Poisson's Ratio by Sonic Resonance	Modulus of elasticity	$psi \times 10^6$	3

NOTE:
(1) Specific heat is not published but may be used to calculate thermal diffusivity from thermal conductivity.

Alternative test plans that deviate from the prior description but achieve the overall objective may be considered. This may, in particular, apply to solid solution alloys for which the stability of strength-controlling microstructures is certain.

For new materials for which the expectation of reasonable stability of strength-controlling microstructures is uncertain or suspect, and for extension of allowable stresses of more familiar classes of alloys into much higher temperature applications where such stability might come into question, either creep–rupture data with duration of more than 30,000 hr or equivalent experience in service is required. A Code Case may be approved based on shorter duration test data, but inclusion of the material into one of the sections of the BPV Code may be deferred until longer-term creep–rupture data are available or until sufficient service experience is obtained to provide confidence that extrapolations from the existing database reasonably describe the long-term behavior of the material.

For at least two heats, strain–time plots or minimum creep rate (MCR) data shall be provided for at least two test stresses at each test temperature, including at least one stress for each material resulting in MCR values below 3×10^{-4} %/hr. If it can be conclusively demonstrated that creep rate does not control the design stresses, the creep rate data may be sparse in relation to the above requirement. Creep rate data may be obtained in the course of stress–rupture testing or may be obtained on additional specimens.

5-1000 LOW-TEMPERATURE PROPERTIES

If use of the material below room temperature is contemplated, data should be provided at appropriate temperatures down to the lowest contemplated use temperature.

5-1100 TOUGHNESS DATA

Toughness data shall be provided for materials for which Construction Code toughness rules would be expected to apply. The test requirements shall be as required by the requested Construction Code(s). The data shall include test results for the intended lowest service metal temperature and for the range of material thicknesses desired.

(21) 5-1200 STRESS–STRAIN CURVES

Stress–strain data (tension or compression) shall be furnished for each of the three heats of material at 100°F intervals from room temperature up to 100°F above the maximum temperature desired. Engineering stress–strain data (stress versus strain) shall be provided in the form of stress–strain plots and digitized data, from which the plots were derived, in tabular form up to 1.2% strain. Digitized data shall be provided at intervals no greater than 0.01% strain. In addition, the minimum yield strength, modulus of elasticity, and proportional limit, for materials where a proportional limit can be identified, shall be reported for each temperature. The stress–strain plots (not load versus extension) shall be determined using a Class B-2 or better-accuracy extensometer as defined in ASTM E83. The plots shall include gridlines with the units marked on the gridlines: for strain, minor gridlines at intervals of 0.01% and major gridlines at 0.1%, up to 1.2% strain; and for stress, minor gridlines at 0.2 ksi and major gridlines at 2.0 ksi.

5-1300 FATIGUE DATA

If the material is to be used in cyclic service and the Construction Code in which adoption is desired requires explicit consideration of cyclic behavior, fatigue data for characterized samples shall also be furnished over the range of design temperatures desired, from 10^3 to at least 10^6 cycles.

5-1400 PHYSICAL PROPERTIES (21)

For at least one heat meeting the requirements of the material specification, the inquirer shall furnish to the Boiler and Pressure Vessel Committee on Materials adequate data necessary to establish values for coefficient of thermal expansion, coefficients of thermal conductivity and diffusivity, modulus of elasticity, Poisson's ratio, and density. Test methods shall be as follows:

(a) ASTM E228, ASTM E289, or ASTM E831 for thermal expansion coefficients

(b) ASTM E1225 or ASTM E1461 and ASTM D2766 for thermal conductivity and thermal diffusivity

(c) ASTM E1875 for modulus of elasticity

(d) ASTM E1875 or ASTM E132 for Poisson's ratio

Data from other equivalent national or international test standards shall be acceptable in lieu of those listed above. Instantaneous, mean, and linear coefficients of thermal expansion shall be reported. Data for all physical properties shall be provided at least over the range of temperatures for which the material is to be used. It is recommended that data be collected at temperature intervals not greater than 100°F. If the material is intended to be used below room temperature, data should be provided for temperatures down to the minimum use temperature. Data provided shall be expressed in the units and to the number of significant figures shown in Table 5-800.

5-1500 DATA REQUIREMENTS FOR WELDS, WELDMENTS, AND WELDABILITY

The following three types of welding information are required for a new base metal for use in welded construction in an ASME BPV Construction Code: data on weldability, data on strength and toughness in the time-independent regime, and data on strength in the time-dependent regime.

The data requirements for weldability and for strength in the time-independent regime are the responsibility of the BPV IX Standards Committee and are to be found in Section II, Part C, Guideline on the Approval of New Welding and Brazing Material Classifications Under the ASME Boiler and Pressure Vessel Code; and in Section IX, Mandatory Appendix J, Guideline for Requesting P-Number Assignments for Base Metals Not Listed in Table QW/QB-422. The requirements for weld metal and weldment toughness data vary with the class of materials and their application, and are to be found in the Construction Codes that have toughness rules — Sections III, VIII, and XII.

Data for welds and weldments for a new base material for use in the time-dependent regime are the responsibility of the BPV II and BPV IX Standards Committees, and particularly of their joint Subgroup on Strength of Weldments. The following welding information shall be provided by the Inquirer, to support the request for a Code Case for, or incorporation of, a new base material for use in elevated temperature service:

(a) When there is one or more AWS, ASME, or equivalent consumable specification and classification suitable for use with the new base material, and when such consumable/process combinations can produce welds and weldments that have both good weldability and as high or higher strengths as the base metal over the range of expected service temperatures, no time-dependent test data is required. Rather, the inquirer shall submit a tabular or graphical comparison of time-dependent allowable stresses for base metals nominally matching the compositions of such welding consumables against the allowable stresses proposed for the new base metal. (Note that since neither ASME nor any other organization publishes allowable stresses for all-weld metal or for weldments, it is necessary to use, in this comparison, the allowable stresses for the base metals equivalent to the welding consumables as a reasonable first approximation.) An example of such a comparison appears in Table 5-1500.

(b) When there is no such suitable consumable having an AWS, ASME, or equivalent specification and classification, or when it is necessary or desirable to use a new, perhaps nominally matching, welding consumable, the following information shall be provided to the Committee:

(1) the chemistry ranges for each element specified for the consumable to be used. If the chemistry ranges vary for the consumables to be used for different processes, then the chemistry ranges of the consumables appropriate for each process shall be provided.

(2) creep–rupture data for weldments made with one lot of consumables for each process intended to be used with the new base material

(-a) at temperature intervals not greater than 200°F

(-b) over a temperature range spanning the range from the first rational temperature above the temperature at which time-dependent properties control the allowable stresses of the new base material to about 100°F above the maximum temperature for which allowable stresses for the base material are requested

(-c) at a minimum of four stresses calculated to produce rupture times of about 1000, 2500, and 4500 hr, and beyond 6000 hr

(-d) the test temperature; stress; rupture time; specimen size and configuration, including weld location; and failure location (base metal, weld metal, or heat affected zone), for each test condition

(-e) the creep–rupture data shall be compared to the scatter bands of data for the base metal

5-1600 LONG-TERM PROPERTIES STABILITY

For new materials, and particularly for those whose creep-rupture properties are affected by heat treatment or deformation processes or a combination of these, it is important to know the structural stability characteristics and the degree of retention of properties with long-term exposure at temperature. Where particular temperature ranges of service exposure or fabrication heat treatment, cooling rates, and combination of mechanical working and thermal treatments cause significant changes in the microstructure on which the creep-rupture properties depend, these shall be brought to the attention of the BPV Committee.

5-1700 REQUESTS FOR ADDITIONAL DATA

The Committee may request additional data, including data on properties or material behavior not explicitly treated in the Construction Code for which approval is desired.

5-1800 NEW MATERIALS CHECKLIST

To assist inquirers desiring Code coverage for new materials, or extending coverage of existing materials, the Committee has developed the following checklist of items that ought to be addressed in each inquiry. While taking into account the intended application of the product, the

Table 5-1500
Example of a Comparison of Allowable Stresses of Base Metals With Compositions Similar to Those of Selected Welding Consumables and the Proposed New Base Metal

Comparison of Nominal Chemical Compositions, %, and Specified Mechanical Properties of Ni-Base Alloys in Section II, Part B

Grade	Ni	Cr	Fe	Mn	Mo	Co	Al	C	Cu	B	Si	Ti	W	Cb + Ta	Ultimate Tensile Strength, ksi	Yield Strength, ksi
N06230	Bal. ≈ 53	22	3	0.65	2	5	0.5	0.1	...	...	0.5	...	14	...	110	45
N06600	72 min.	15.5	8	0.5	...	...	...	0.1	0.25	...	0.25	...	...	...	80	35
N06617	44	22	1.5	0.5	9	12	1.2	0.1	0.25	0.005	0.5	0.4	...	...	95	35
N06625	58 min.	21.5	5	0.5	9	1	0.4	0.1	0.4	...	0.5	0.4	...	3.65	120	60
N06696	Bal. ≈ 60	30	4	0.2	2	...	...	0.07	2	...	1.5	0.2	...	...	85	35

Comparison of Allowable Stresses of Ni-Base Alloys in Section II, Part B (ksi at Temperature, °F, Estimated for N06696)

Grade	P-No.	950	1,000	1,050	1,100	1,150	1,200	1,250	1,300	1,350	1,400	1,450	1,500	1,550	1,600	1,650	1,700	1,750	1,800
N06230	43	20.9	20.9	20.9	20.9	19.0	15.6	12.9	10.6	9.5	6.7	5.3	4.1	2.9	2.1	1.5	1.1	0.70	0.45
N06600	43	10.6	7.0	4.5	3.0	2.2	2.0	...	...	...	...	...	...	...	...	...	...	...	...
N06617	43	21.0	20.9	20.9	20.8	20.7	18.1	14.5	11.2	8.7	6.6	5.1	3.9	3.0	2.3	1.8	1.4	1.1	0.73
N06625	43	26.6	26.4	26.3	26.2	26.1	20.0	15.0	11.6	8.5	6.7	4.9	3.8	2.6	1.9	...	...	...	...
N06696	TBD	17.9	14.1	11.0	8.6	6.7	5.2	4.1	3.2	2.4	1.8	1.4	1.1	0.76	0.59	0.47	0.37	0.29	0.23

GENERAL NOTE: In this example, the proposed new base metal is N06696.

Committee may require specific information from the inquirer, as shown above for certain material characteristics.

(a) Has a qualified inquirer request been provided?

(b) Has a request either for revision to existing Code requirements or for a Code Case been defined?

(c) Has a letter to ASTM or AWS been submitted requesting coverage of the new material in a specification? Alternatively, is this material already covered by a specification issued by a recognized national or international organization and has an English language version been provided?

(d) Has the Construction Code and, if applicable, a Division, Subsection, or Part been identified?

(e) Have product forms, size range, and the applicable specification(s) been defined?

(f) Has the range (maximum/minimum) of temperature application been defined?

(g) Has the chemistry been submitted and the related requirements been addressed?

(h) Have the metallurgical structure and heat treatment requirements been submitted?

(i) Have mechanical property data been submitted (ultimate tensile strength, yield strength, reduction of area, and elongation at 100°F intervals, from room temperature to 100°F above the maximum intended use temperature, for three heats of appropriate product forms and sizes?

(j) If requested temperatures of coverage are above those at which time-dependent properties begin to govern design values, have appropriate time-dependent property data for base metal and weldments been submitted?

(k) If higher allowable stresses for material to be used below room temperature are requested, have appropriate mechanical property data below room temperature been submitted?

(l) Have toughness considerations required by the Construction Code been defined and have appropriate data been submitted?

(m) Have stress–strain curves been submitted for the establishment of External Pressure Charts?

(n) If cyclic service considerations are required by the requested Construction Code application, have appropriate fatigue data been submitted?

(o) Have physical properties data (coefficient of thermal expansion, thermal conductivity and diffusivity, modulus of elasticity, Poisson's ratio, and density) been submitted?

(p) Have welding requirements been defined, and weld metal and weldment data been submitted?

(q) Has the influence of fabrication practices on material properties been defined?

5-1900 REQUIREMENTS FOR RECOGNIZED NATIONAL OR INTERNATIONAL SPECIFICATIONS

Acceptable material specifications will be identified by date or edition. The latest approved edition(s) will be stated in the subtitle of the ASME specification. Eventually, acceptable previous editions will be listed in Section II, Parts A and B. Minimum requirements that shall be contained in a material specification for which acceptance is being requested include such items as the name of the national or international organization, scope, reference documents, process, manufacture, conditions for delivery, heat treatment, chemical and tensile requirements, forming properties, testing specifications and requirements, workmanship, finish, marking, inspection, and rejection.

5-2000 PUBLICATION OF RECOGNIZED NATIONAL OR INTERNATIONAL SPECIFICATIONS

Specifications for which ASME has been given publishing permission by the originating organization will be published in Section II, Parts A and B. Specifications for which ASME has not been given publishing permission by the originating organization will be referenced on a cover sheet in Section II, Parts A and B. Information on obtaining a copy of those referenced documents will be maintained in those Parts. Additions and exceptions to the material specification will be noted in the subtitle of the specification and in Table II-200-1 or II-200-2 in Section II, Parts A and B.

5-2100 CEN SPECIFICATIONS

European Standards are adopted by CEN in three official languages (English, French, and German) as an EN standard. After the CEN adoption, to become applicable in a member country of CEN, an EN standard shall be given the status of a national standard. During this process

(a) the text of the EN standard shall remain unaltered and shall be included as adopted by CEN

(b) national forewords and/or annexes may be added to cover specific national practices, but shall not be in contradiction with the EN standard

(c) a prefix XX (e.g., XX = BS for the United Kingdom, NF for France, and DIN for Germany) is added to the designation of the EN standard (e.g., BS EN 10028-1 or NF EN 10028-1)

(d) the date of adoption as a national standard will differ from the date of adoption as an EN standard, and may differ from one country to another

Written or electronic copies can only be obtained from European National Standardization Bodies as XX EN (CEN does not sell standards). Consequently, in order to maintain coherence and homogeneity in the reference system, the mentions in the subtitle of the corresponding ASME specification will only refer to the EN standard number without any prefix and to the year of approval by CEN. It will also be mentioned in the cover sheet that the national parts do not apply for the ASME specification.

MANDATORY APPENDIX 6
BASIS FOR ESTABLISHING STRESS VALUES IN TABLES 6A, 6B, 6C, AND 6D

6-100 DERIVATION OF ALLOWABLE STRESS VALUES

The values in Tables 6A, 6B, 6C, and 6D are established by the Committee only. In the determination of allowable stress values for materials, the Committee is guided by successful experience in service, insofar as evidence of satisfactory performance is available. Such evidence is considered equivalent to test data where operating conditions are known with reasonable certainty. In the evaluation of new materials, the Committee is guided to a certain extent by the comparison of test information with available data on successful applications of similar materials.

The factors employed to determine the allowable stress values are provided in Tables 6-100(a), 6-100(b), and 6-100(c). Nomenclature for these tables is as follows:

R_T = ratio of the average temperature-dependent trend curve value of tensile strength to the room temperature tensile strength

R_Y = ratio of the average temperature-dependent yield curve value of yield strength to the room temperature yield strength

S_T = specified minimum tensile strength at room temperature, ksi

S_Y = specified minimum yield strength at room temperature, ksi

The maximum allowable stress shall be the lowest value obtained from the criteria in Tables 6-100(a), 6-100(b), and 6-100(c). The maximum use temperature for materials is limited to below the time-dependent regime. Allowable stresses are listed for temperatures up to 500°F. If a material reaches the time-dependent regime below 500°F, no allowable stress values are listed for that material above the cross-over temperature. The mechanical properties considered and the factors applied to establish the maximum allowable stresses are given below.

6-110 RULES FOR ESTABLISHING STRESS VALUES IN TABLES 6A AND 6B

(a) At any temperature below the creep range, the allowable stresses are established at no higher than the lowest of the following:

(1) one-fifth of the specified minimum tensile strength at room temperature

(2) one-fifth of the tensile strength at temperature

(3) two-thirds of the specified minimum yield strength at room temperature

(4) two-thirds of the yield strength at temperature

(b) For bolting materials, the basis for setting stresses is the same as for all other materials with the exception that (a)(1) and (a)(2) above are replaced by

(1) one-fourth of the specified minimum tensile strength at room temperature

(2) one-fourth of the tensile strength at temperature

The following limitation also applies to bolting materials: At temperatures below the creep range, the stresses for materials whose strength has been enhanced by heat treatment or by strain hardening shall not exceed the lesser of 20% of the specified minimum tensile strength at room temperature or 25% of the specified minimum yield strength at room temperature unless these values are lower than the annealed values, in which case the annealed values shall be used.

In the application of these criteria, the Committee considers the yield strength at temperature to be $S_Y R_Y$, and the tensile strength at temperature to be $1.1 S_T R_T$.

6-120 RULES FOR ESTABLISHING STRESS VALUES IN TABLES 6C AND 6D

At any temperature below the creep range, the allowable stresses are established at no higher than the lowest of the following:

(a) one-fourth of the specified minimum tensile strength at room temperature

(b) one-fourth of the tensile strength at temperature

(c) two-thirds of the specified minimum yield strength at room temperature

(d) two-thirds of the yield strength at temperature

Two sets of allowable stress values are provided in Table 6D for austenitic stainless steels. The higher values should be used only where slightly greater deformation is not in itself objectionable. The higher alternative allowable stresses are identified by a Note. These stresses exceed two-thirds for austenitic stainless steel materials

but do not exceed 90% of the minimum yield strength at temperature. These higher stresses are not recommended for the design of flanges and other strain-sensitive applications.

In the application of these criteria, the Committee considers the yield strength at temperature to be $S_Y R_Y$ and the tensile strength at temperature to be $1.1 S_T R_T$.

Table 6-100(a)
Criteria for Establishing Allowable Stress Values for Tables 6A and 6B

Product/Material	Room Temperature and Below		Above Room Temperature			
	Tensile Strength	Yield Strength	Tensile Strength		Yield Strength	
Wrought or cast, ferrous and nonferrous	$\frac{S_T}{5}$	$\frac{2}{3} S_Y$	$\frac{S_T}{5}$	$\frac{1.1}{5} S_T R_T$	$\frac{2}{3} S_Y$	$\frac{2}{3} S_Y R_Y$
Welded pipe or tube, ferrous and nonferrous	$\frac{0.85}{5} S_T$	$\frac{2}{3} \times 0.85 S_Y$	$\frac{0.85}{5} S_T$	$\frac{1.1 \times 0.85}{5} S_T R_T$	$\frac{2}{3} \times 0.85 S_Y$	$\frac{2}{3} \times 0.85 S_Y R_Y$
Bolting, wrought ferrous	$\frac{S_T}{4}$	$\frac{2}{3} S_Y$	$\frac{S_T}{4}$	$\frac{1.1}{4} S_T R_T$	$\frac{2}{3} S_Y$	$\frac{2}{3} S_Y R_Y$

Table 6-100(b)
Criteria for Establishing Allowable Stress Values for Table 6C

Product/Material	Room Temperature and Below		Above Room Temperature			
	Tensile Strength	Yield Strength	Tensile Strength		Yield Strength	
Wrought or cast, ferrous and nonferrous	$\frac{S_T}{4}$	$\frac{2}{3} S_Y$	$\frac{S_T}{4}$	$\frac{1.1}{4} S_T R_T$	$\frac{2}{3} S_Y$	$\frac{2}{3} S_Y R_Y$
Welded pipe or tube, ferrous and nonferrous	$\frac{0.85}{4} S_T$	$\frac{2}{3} \times 0.85 S_Y$	$\frac{0.85}{4} S_T$	$\frac{1.1 \times 0.85}{4} S_T R_T$	$\frac{2}{3} \times 0.85 S_Y$	$\frac{2}{3} \times 0.85 S_Y R_Y$

Table 6-100(c)
Criteria for Establishing Allowable Stress Values for Table 6D

Product/Material	Room Temperature and Below		Above Room Temperature			
	Tensile Strength	Yield Strength	Tensile Strength		Yield Strength	
Wrought or cast, ferrous and nonferrous	$\frac{S_T}{4}$	$\frac{2}{3} S_Y$	$\frac{S_T}{4}$	$\frac{1.1}{4} S_T R_T$	$\frac{2}{3} S_Y$	$0.9 S_Y R_Y$ [Note (1)]
Welded pipe or tube, ferrous and nonferrous	$\frac{0.85}{4} S_T$	$\frac{2}{3} \times 0.85 S_Y$	$\frac{0.85}{4} S_T$	$\frac{1.1 \times 0.85}{4} S_T R_T$	$\frac{2}{3} \times 0.85 S_Y$	$0.9 \times 0.85 S_Y R_Y$ [Note (1)]

NOTE:
(1) Two sets of allowable stress values may be provided in Table 6D for austenitic materials. The lower values are not specifically identified by a Note; these lower values do not exceed two-thirds of the yield strength at temperature. The higher alternate allowable stresses are identified by a Note; these higher stresses may exceed two-thirds but do not exceed 90% of the yield strength at temperature. The higher stress values should only be used where slightly higher deformation is not in itself objectionable. These higher stresses are not recommended for the design of flanges or for other strain-sensitive applications.

MANDATORY APPENDIX 7
GUIDELINES ON MULTIPLE MARKING OF MATERIALS

7-100 BACKGROUND

A common inquiry topic is the permissibility of using material that is identified with two or more specifications (or grades, classes, or types), even if they have different strengths, or even if one of them is not permitted for use in the construction code of application. The Committee has addressed variants of these questions in several interpretations: I-89-11, IIA-92-08, VIII-1-89-269, and VIII-1-89-197.

7-200 GUIDELINES

The construction codes individually define what materials may be used in boilers, vessels, and components constructed in compliance to their rules. If a material meets all of the requirements for a specification for which it is marked, including documentation, if any, and if it meets all requirements for use imposed by the construction code, it may be used. The construction codes, in general, do not address the case of materials marked with more than one specification, grade, class, or type, so these guidelines are offered for clarification.

7-210 ACCEPTABILITY OF MULTIPLE MARKING

Dual or multiple marking is acceptable, as long as the material so marked meets all of the requirements of all the specifications, grades, classes, and types with which it is marked.

All of the measured and controlled attributes of the multiply marked grades or specifications must overlap (e.g., chemistry, mechanical properties, dimensions, and tolerances) and the material so marked must exhibit values that fall within the overlaps. Further, the controlled but unmeasured attributes of the specifications or grades must overlap (e.g., melting practices, heat treatments, and inspection).

Many specifications or grades have significant overlap of chemistry ranges or properties. It is common for material manufacturers to produce materials that satisfy more than one specification, grade, class, or type. Examples are SA-53 and SA-106 (some grades and classes), SA-213 TP304L and TP304, SA-213 TP304 and TP304H, and SA-106 B and C.

7-220 PROHIBITION ON MULTIPLE MARKING

Dual or multiple marking is not acceptable if two or more specifications to which the material is marked have mutually exclusive requirements.

This prohibition includes more than just chemistry and property requirements. One example is SA-515 and SA-516; the former requires melting to coarse grain practice while the latter requires melting to fine grain practice. Another example is SA-213 TP304L and TP304H; the carbon content ranges of these grades have no overlap.

7-230 GRADE SUBSTITUTION

Grade substitution is not permitted. Grade substitution occurs when:

(a) the material contains an element (other than nitrogen) that is unspecified for one of the grades marked; and

(b) the amount of that element present in the material meets the minimum and maximum composition limits for that element in another grade of a specification contained in Section II, Part A or Part B, whether or not it is also so marked.

For example, a material meets all of the composition limits for SA-240 304, contains 0.06C and 0.02N, but also contains 0.45% Ti. This material cannot be marked or provided as meeting SA-240 304 because the Ti content meets the requirements of SA-240 321 [which is Ti greater than 5 × (C + N) but less than 0.70].

Another material, with identical composition, except 0.35% Ti, may be marked SA-240 304 because the Ti content does not meet the minimum requirement for 321. The Ti content is just a residual.

7-240 MARKING SELECTION

If a material is marked with specifications, grades, classes, or types, it may be used with the allowable stresses, design stress intensities, or ratings appropriate for any of the markings on the material, as long as the material specification, grade, class, and type is permitted by the code of construction governing the boiler, vessel, or component in which the material is to be used. However, once the designer has selected which marking applies (specification, grade, class, type, etc.), the designer must use all the design values appropriate for that selection and may not mix and match values from any other specifications, grades, classes, types, etc., with which the material may be marked.

7-250 OTHER MARKINGS

Any other markings, such as marking of non-ASME or non-ASTM material specifications, have no relevance, even if those markings are for materials explicitly prohibited by the construction code being used. That is, as long as the *one* marking, and the documentation required by the material and by the construction code, shows that it meets all the requirements for use of that material in that construction code, any additional markings are irrelevant.

MANDATORY APPENDIX 9
STANDARD UNITS FOR USE IN EQUATIONS

Table 9-100
Standard Units for Use in Equations

Quantity	U.S. Customary Units	SI Units
Linear dimensions (e.g., length, height, thickness, radius, diameter)	inches (in.)	millimeters (mm)
Area	square inches ($in.^2$)	square millimeters (mm^2)
Volume	cubic inches ($in.^3$)	cubic millimeters (mm^3)
Section modulus	cubic inches ($in.^3$)	cubic millimeters (mm^3)
Moment of inertia of section	$inches^4$ ($in.^4$)	$millimeters^4$ (mm^4)
Mass (weight)	pounds mass (lbm)	kilograms (kg)
Force (load)	pounds force (lbf)	newtons (N)
Bending moment	inch-pounds (in.-lb)	newton-millimeters (N·mm)
Pressure, stress, stress intensity, and modulus of elasticity	pounds per square inch (psi)	megapascals (MPa)
Energy (e.g., Charpy impact values)	foot-pounds (ft-lb)	joules (J)
Temperature	degrees Fahrenheit (°F)	degrees Celsius (°C)
Absolute temperature	Rankine (R)	kelvin (K)
Fracture toughness	ksi square root inches ($ksi\sqrt{in.}$)	MPa square root meters ($MPa\sqrt{m}$)
Angle	degrees or radians	degrees or radians
Boiler capacity	Btu/hr	watts (W)

MANDATORY APPENDIX 10
BASIS FOR ESTABLISHING MAXIMUM ALLOWABLE STRESS VALUES FOR TABLES 5A AND 5B

10-100 DERIVATION OF ALLOWABLE STRESS VALUES

The values in Tables 5A and 5B are established by the Committee only. In the determination of allowable stress values, the Committee is guided by successful experience in service, insofar as evidence of satisfactory performance is available. Such evidence is considered equivalent to test data where operating conditions are known with reasonable certainty. In the evaluation of new materials, it is sometimes necessary to be guided by the comparison of test information with available data on successful applications of similar materials.

The factors employed to determine the maximum allowable stress values are provided in Table 10-100. Nomenclature for this Table is as follows:

F_{avg} = multiplier applied to average stress for rupture in 100,000 hr. At 1,500°F and below, F_{avg} = 0.67. Above 1,500°F, it is determined from the slope of the log time-to-rupture versus log stress plot at 100,000 hr such that log [F_{avg}] = $1/n$, but F_{avg} may not exceed 0.67.

NA = not applicable

n = a negative number equal to Δ log time-to-rupture divided by Δ log stress at 100,000 hr

R_y = ratio of the average temperature dependent trend curve value of yield strength to the room temperature yield strength

S_{Cavg} = average stress to produce a creep rate of 0.01%/1,000 hr

S_{Ravg} = average stress to cause rupture at the end of 100,000 hr

S_{Rmin} = minimum stress to cause rupture at the end of 100,000 hr

S_T = specified minimum tensile strength at room temperature

S_y = specified minimum yield strength at room temperature

10-110 CRITERIA FOR MATERIALS OTHER THAN BOLTING

The maximum allowable stress values at any temperature shall be the lowest value obtained from the criteria in Table 10-100. The mechanical properties considered and the factors applied to establish the maximum allowable stresses are as given below.

(a) At temperatures below the range where creep and stress rupture strength govern the selection of stresses, the maximum allowable stress value is the lowest of the following:

(1) the specified minimum tensile strength at room temperature divided by 2.4

(2) the specified minimum yield strength divided by 1.5

(3) the yield strength at temperature divided by 1.5, except for austenitic stainless steels, nickel alloys, copper alloys, and cobalt alloys

(4) for austenitic stainless steels, nickel alloys, copper alloys, and cobalt alloys having an S_y/S_T ratio less than 0.625, higher stress values are established at temperatures where the short-time tensile properties govern, to permit use of these alloys where slightly greater deformation is acceptable. The stress values in this range exceed $66^2/_3$%, but do not exceed 90%, of the yield strength at temperature, but never exceed two-thirds of the specified room-temperature minimum yield strength. These higher stress values are not recommended for the flanges of gasketed joints or other applications where slight amounts of distortion can cause leakage or malfunction. Table Y-2 lists multiplying factors that, when applied to the yield strength values shown in Table Y-1, will give allowable stresses that will result in lower levels of permanent strain.

In the application of these criteria, the Committee considers the yield strength at temperature to be $R_y S_y$.

(b) At temperatures in the range where creep and stress rupture govern the selection of stresses, the maximum allowable stress value for all materials is established by the Committee not to exceed the lowest of the following:

(1) 100% of the average stress to produce a creep rate of 0.01%/1,000 hr

(2) $100F_{avg}$% of the average stress to cause rupture at the end of 100,000 hr

(3) 80% of the minimum stress to cause rupture at the end of 100,000 hr

Stress values for high temperature are based, whenever possible, on representative uniaxial properties of the materials obtained under standard testing conditions. The stress values are based on basic properties of the material

and no consideration is given for corrosive environment, for abnormal temperature and stress conditions, or for other design considerations.

10-120 CRITERIA FOR BOLTING MATERIALS

The criteria for bolting materials listed in Tables 3 and 4 are to be found in Mandatory Appendix 2.

Table 10-100
Criteria for Establishing Allowable Stress Values for Tables 5A and 5B

Product/Material	Below Room Temperature		Room Temperature and Above			
	Tensile Strength	Yield Strength	Tensile Strength	Yield Strength	Stress Rupture	Creep Rate
All wrought or cast ferrous and nonferrous product forms except bolting, and except for austenitic stainless steel, nickel alloy, copper alloy, and cobalt alloy product forms having an S_y/S_T ratio less than 0.625	$\frac{S_T}{2.4}$	$\frac{S_y}{1.5}$	$\frac{S_T}{2.4}$	$\frac{R_y S_y}{1.5}$	$\text{Min.}\left(F_{\text{avg}} S_{R\text{avg}}, 0.8\, S_{R\text{min}}\right)$	$1.0\, S_{C\text{avg}}$
All wrought or cast austenitic stainless steel, nickel alloy, copper alloy, and cobalt alloy product forms except bolting, having an S_y/S_T ratio less than 0.625 [Note (1)]	$\frac{S_T}{2.4}$	$\frac{S_y}{1.5}$	$\frac{S_T}{2.4}$	$\text{Min.}\left(\frac{S_y}{1.5}, \frac{0.9 S_y R_y}{1.0}\right)$	$\text{Min.}\left(F_{\text{avg}} S_{R\text{avg}}, 0.8\, S_{R\text{min}}\right)$	$1.0\, S_{C\text{avg}}$

GENERAL NOTE: When using this stress basis criterion to determine the allowable stresses for a specific material as a function of temperature, the derived allowable stress at a higher temperature can never be greater than the derived allowable stress at a lower temperature.

NOTE:
(1) These higher stress values were established at temperatures where the short-time tensile properties govern, to permit the use of these materials where slightly greater deformation is acceptable. The stress values in this range exceed $66\frac{2}{3}$% but do not exceed 90% of the yield strength at temperature. These stress values are not recommended for the flanges of gasketed joints or other applications where slight amounts of distortion can cause leakage or malfunction. Table Y-2 lists multiplying factors that, when applied to the yield strength values shown in Table Y-1, will give allowable stresses that will result in lower values of permanent strain.

NONMANDATORY APPENDIX A
ISSUES ASSOCIATED WITH MATERIALS USED IN ASME CODE CONSTRUCTION

A-100 GENERAL

The performance over time of the various ferrous and nonferrous alloys permitted for use in Code construction may be influenced by many factors, ranging from the processes involved in their fabrication into components and their installation to changes in the material structure or direct damage to the material related to operation in the intended service. If Code-constructed equipment is to provide the reasonably long period of safe operation expected by the users of that equipment, then the equipment designers must be aware of any potential change in the material's properties related to fabrication, installation, or service as they go about selecting materials for Code usage. Although the Code does not mandate that all of the various metallurgical phenomena and environmental effects that can influence material performance be considered in the design of a Code component, such consideration is a part of the good engineering judgment that is expected to be exercised in all Code-related matters and, as such, this Nonmandatory Appendix is provided to designers and other Code users to assist in the material selection process.

Historically, some of the information contained in this Nonmandatory Appendix has been available in other Sections of the Boiler and Pressure Vessel Code, as well as in the Piping Code. In addition to information provided previously in Nonmandatory Appendix A, Metallurgical Phenomena, in Section II, Part D, there was information available in Section VIII and more recently in Section III Appendices, Nonmandatory Appendix W, Environmental Effects. A review of these various information sources revealed that there were many important issues not covered, and that there were other issues that required revision to incorporate new information. Thus, what follows is an expanded coverage of metallurgical phenomena and environmental effects. It is emphasized, however, that this is not a comprehensive coverage of all possible mechanisms, nor is it an exhaustive treatment of the individual topics. Rather, this revised Appendix is intended to serve as a more convenient resource for designers and users of Code equipment as they consider the many issues that could adversely affect materials in Code service.

A-110 ISSUES COVERED

Issues covered in this Nonmandatory Appendix include those listed below (it is recognized, of course, that some of these issues could be placed in more than one of the general categories). In the first section, on metallurgical changes (A-200), an attempt is made to identify the materials most commonly affected by the changes in question. In the remaining sections (A-300 through A-800), the various types of damage to which materials may be subject are described, with a strong emphasis on the environmental effects that, in the absence of appropriate preventive measures, can render the materials inoperable. Items covered in each section and paragraph are as follows:

Section/ Paragraph Number	Section/Paragraph Description
A-200	Metallurgical changes
A-201	Graphitization (occurs almost exclusively in carbon and C–Mo steels)
A-202	Softening (occurs in most ferritic alloys used for elevated temperature service)
A-203	Temper embrittlement (occurs in low alloy steels)
A-204	Strain aging (occurs in carbon and low alloy steels)
A-205	Cold working (effects occur in most steels, but are particularly important for the 300 series stainless steels)
A-206	Relaxation cracking
A-207	885°F embrittlement (occurs mostly in high chromium stainless steels and in the ferritic phase of duplex stainless steels)
A-208	Sigma phase embrittlement (occurs in 300 series stainless steels and in some 400 series stainless steels with Cr >17%)
A-209	Laves phase precipitation (occurs in some 300 series stainless steels, Fe–Ni base alloys, Co-base superalloys, and in the tungsten-bearing CSEF steels)
A-210	Sensitization (carbide formation) (occurs in both the 300 series stainless steels as well as in 400 series stainless grades)
A-211	Thermal aging embrittlement (occurs to varying degrees in most ferrous alloys)
A-212	Radiation embrittlement (affects all materials, both ferrous and nonferrous)
A-213	Solidification cracking in nickel alloys
A-300	Uniform corrosion
A-301	General corrosion and wastage
A-302	Atmospheric corrosion
A-303	Galvanic corrosion
A-304	Stray current corrosion

Table continued

Section/ Paragraph Number	Section/Paragraph Description
A-305	High-temperature corrosion
A-306	Soil corrosion
A-307	Caustic corrosion
A-308	Carbon dioxide corrosion
A-309	Concentration cell corrosion
A-310	Differential-temperature cell corrosion
A-311	Molten salt corrosion
A-312	Liquid metal corrosion
A-400	Localized corrosion
A-401	Pitting corrosion
A-402	Filiform corrosion
A-403	Crevice corrosion
A-404	Microbiologically induced corrosion
A-500	Metallurgically influenced corrosion
A-501	Intergranular corrosion
A-502	Dealloying corrosion (dezincification and graphite corrosion) (occurs mainly in brasses and gray cast iron)
A-503	Grooving (occurs mostly in ERW carbon steel pipe)
A-600	Mechanically assisted corrosion
A-601	Velocity-affected corrosion
A-602	Erosion-corrosion
A-603	Impingement corrosion
A-604	Cavitation erosion
A-605	Corrosion fatigue
A-700	Environmentally induced embrittlement and cracking
A-701	Stress corrosion cracking – Transgranular stress corrosion cracking – Intergranular stress corrosion cracking – Irradiation-assisted stress corrosion cracking
A-702	Hydrogen damage – Hydrogen embrittlement – Hydrogen stress cracking – Hydrogen attack (high-temperature damage)
A-703	Liquid metal embrittlement
A-704	Caustic embrittlement
A-705	Flow-assisted corrosion
A-706	Sulfur embrittlement
A-800	Mechanical damage mechanisms
A-801	Fretting and wear
A-802	Thermal fatigue
A-803	Dynamic loading
A-804	Anisotropy

Discussion of the above various issues in this Nonmandatory Appendix is limited to a definition of the phenomenon or environmental effect in question, which includes a brief description of the conditions under which the metallurgical change or the damage may occur. This is followed by a references section that is provided to guide the Code user to more-comprehensive sources of information. Some "authoritative sources" used in covering materials issues are listed below. These are not all of the possible references, but they are considered to be adequate for providing a general characterization of the various phenomena and environmental effects discussed.

A-120 GENERAL REFERENCES

ASM Handbooks

Volume 1, *Properties and Selection: Iron, Steels, and High-Performance Alloys*, 1993

Volume 2, *Properties and Selection: Nonferrous Alloys and Special-Purpose Materials*, 1993

Volume 9, *Metallography and Microstructures*, 2004

Volume 11, *Failure Analysis and Prevention*, 2002

Volume 13A, *Corrosion: Fundamentals, Testing, and Protection*, 2003

Volume 13B, *Corrosion: Materials*, 2005

Volume 13C, *Corrosion: Environments and Industries*, 2006

Garverick, L., *Corrosion in the Petrochemical Industry*, ASM, 1994

Collins, J. A., *Failure of Materials in Mechanical Design*, John Wiley and Sons, New York, 1981

Wulpi, D. J., *Understanding How Components Fail*, ASM, 1985

Smith, G. V., *Properties of Metals at Elevated Temperatures*, McGraw-Hill Book Co., New York, 1950

Revie, R. W. and Uhlig, H. H., *Corrosion and Corrosion Control*, John Wiley and Sons, New York, 2008

Dobis, J. D. and Bennett, D. C., *Damage Mechanisms Affecting Fixed Equipment in the Pulp and Paper Industry*, WRC Bulletin 488, January 2004

Dobis, J. D. et al., *Damage Mechanisms Affecting Fixed Equipment in the Refining Industry*, WRC Bulletin 489, February 2004

Dobis, J. D. and French, D. N., *Damage Mechanisms Affecting Fixed Equipment in the Fossil Electric Power Industry*, WRC Bulletin 490, April 2004

McGuire, M. F., *Stainless Steels for Design Engineers*, ASM International, 2008

References cited in

- Section II, Part D (2007 Edition), Materials Properties, Appendix A, Metallurgical Phenomena
- Section III, Division 1 (2007 Edition), Nuclear Construction, Appendix W, Environmental Effects
- ASME B31.1-2007, Power Piping
- ASME B31.3-2008, Process Piping

A-200 METALLURGICAL CHANGES THAT CAN OCCUR IN SERVICE

Materials purchased to ASTM or ASME specifications are, by intent, well-defined substances, each having a well-characterized database from which allowable stresses can be developed. However, there are certain manufacturing and installation processes, as well as many service conditions, that can affect the macrostructure and

microstructure of these materials and, in so doing, modify the behavior of these materials in service. These are the "bulk" effects where large parts of an entire structure have been altered – and these effects are sometimes called metallurgical phenomena. The various phenomena of potential interest to Code users are discussed below, in no particular order of importance.

A-201 GRAPHITIZATION

A-201.1 Definition. Graphitization is a process in which some portion of the carbon, present in the iron carbide that forms in the microstructure of carbon or carbon–0.5Mo steels during virtually all standard heat treatments for these steels, dissociates from the carbides and forms separate particles of free carbon, or graphite. This change will occur only over a relatively long period of time when the steel is operating in the temperature range of 800°F to 1,100°F and, depending on the nature of the distribution of the graphite particles in the microstructure, can result in a substantial loss of the material's strength and ductility. The graphite particles may be randomly distributed throughout the structure, in which case the effects on material performance will be minimal (although a modest loss of creep strength may be observed), or they may be aligned along certain preferred planes in the structure (e.g., at the edge of weld heat-affected zones or along cold-worked bands of material), in which case the loss of ductility can be severe, leading to unexpected failure of the component. Graphitization competes with another metallurgical phenomenon known as spheroidization (discussed in A-202), with graphitization more likely to occur at temperatures below approximately 1,025°F.

The relative susceptibility to graphitization of the carbon or carbon–moly steels can vary substantially, depending on the specific heat chemistry, and there is not at this time a good quantitative understanding of the influence of individual elements on susceptibility. For example, it has long been suspected that aluminum enhances the graphitization process, so that aluminum-killed steels are more susceptible to graphitization than are steels killed with silicon or titanium, but some investigators have disputed this, suggesting that the aluminum may hasten the process of the initial particle formation but does not influence the overall extent of the graphitization over time. Nor is there at this time a complete understanding of why in some cases the aligned-type particle formation is favored over the random-type formation. As noted above, graphitization will occur over a range of temperatures, with the rate of particle formation varying with temperature. Experience has shown that for the carbon–moly steels the temperatures of greatest susceptibility are approximately 50°F higher than for the plain carbon steels. The addition of approximately 0.5 weight % chromium to the steel will stabilize the carbides in the microstructure and prevent the occurrence of graphitization, which is an inducement to use other grades of steel containing chromium for service at elevated temperatures.

A-201.2 References. In addition to the general references cited in A-120, see also the following references for additional details:

[1] *Embrittlement of Components in Fossil Fueled Power Plants*, EPRI 1004515, 2003.
[2] *Boiler Tubes: Theory and Practice, Volume 3: Steam Touched Tubes*, EPRI TR-105261 – V3.
[3] French, D. N., "Microstructural Degradation," The National Board of Boiler and Pressure Vessel Inspectors, June 2001.
[4] Foulds, J. R. and R. Viswanathan, "Graphitization of Steels in Elevated Temperature Service," *Proceedings of the First International Symposium on Microstructures and Mechanical Properties of Aging Materials*, The Minerals, Metals and Materials Society, November 1992.
[5] Port, R. D., "Non-Weld-Related Graphitization Failures," *Corrosion/89*, Paper No. 248, NACE.
[6] Wilson, J. G., *Graphitization of Steel in Petroleum Refining Equipment and the Effect of Graphitization of Steel on Stress Rupture Properties*, WRC Bulletin 32, January 1957.
[7] Thielsch, H., *Defects and Failures in Pressure Vessels and Piping*, Reinhold Publishing Corp., 1965.
[8] Hemingway, W. L., "The Study of Graphitization," The Edwards Valve Co., 1952.

A-202 SPHEROIDIZATION (SOFTENING)

A-202.1 Definition. As noted in A-201.1, graphitization and spheroidization are competing processes in which the carbide phases of certain steels are altered as the result of prolonged exposure to temperatures in the range of 800°F to 1,400°F. In the case of spheroidization, the carbide does not break down to release the carbon, but it changes from an approximately planar shape developed during the original heat treatment (e.g., the platelike lamellae of pearlite in normalized carbon steel) to a lower-energy spheroidal shape, resulting in some loss of both room temperature and elevated temperature strength (by as much as 30%), but an increase in ductility.

Spheroidization may occur in any carbon or alloy steel, including the 9% Cr and 12% Cr creep strength-enhanced ferritic steels. Experience over the years has shown the following:

(a) Annealed steels are more resistant to spheroidization than normalized steels, since they are intentionally heat treated to exist in a more stable condition.

(b) Coarse-grained steels are more resistant to spheroidization than fine-grained steels.

(c) Fine-grained silicon-killed steels are more resistant than aluminum-killed steels.

For components operating in the time-dependent regime, spheroidization often is an inevitable part of the aging process, and qualitative correlations between the degree of spheroidization and the amount of remaining life have been used with a moderate degree of success.

A-202.2 References. In addition to the general references cited in A-120, see the references cited in A-201.2, particularly references [3] and [5].

A-203 TEMPER EMBRITTLEMENT

A-203.1 Definition. Temper embrittlement is a metallurgical phenomenon that can occur in several different classes of steel, including plain carbon steels, low alloy steels, and martensitic steels, in which the toughness of the material drops significantly when subjected to prolonged exposure to temperatures within what would be considered a normal range for either heat treatment or service. When testing for embrittlement is carried out by use of the Charpy V-notch test, the embrittlement manifests itself as an upward shift in the ductile-to-brittle transition temperature. The mechanisms of embrittlement vary somewhat with the type of steel involved, but in the application of materials for Code construction, the more significant embrittlement is that which occurs in some low alloy steels during long-time exposure in the temperature range of 650°F to 1,100°F. Temper embrittlement can occur either during fabrication or during prolonged exposure in the embrittling temperature range during service.

For the low alloy steels, the embrittling mechanism has been shown to involve the preferential segregation of certain residual and surface-active elements to the grain boundaries. Elements that are believed to be particularly harmful include phosphorous, arsenic, antimony, and tin, with other elements, such as manganese, silicon, chromium, nickel, and vanadium, playing a lesser role in the embrittlement process by facilitating the action of the more-harmful elements. The embrittled material is most vulnerable during equipment startups and shutdowns, during which times it is most likely to fracture in a brittle manner when rapidly loaded at temperatures within or below the transition temperature range.

One of the most commonly used low alloy steels, $2^{1}/_{4}$Cr–1Mo, is also one of the most susceptible steels, with 3Cr–1Mo being slightly less susceptible. High-strength low alloy (HSLA) chromium–molybdenum–vanadium steels are also susceptible to temper embrittlement. Steels of an older vintage (prior to approximately 1972) and those steels produced without the advantage of modern clean steel technologies also tend to be more susceptible to the embrittlement, due to the higher levels of impurities.

Various methods have been devised for controlling the susceptibility to temper embrittlement through control of chemical composition, with the use of the J and X factors having achieved a fairly broad range of acceptance. Through use of these factors, the amounts of the most deleterious elements are limited to levels known to confer a high degree of resistance to temper embrittlement. These factors are defined as follows:

$$\text{J factor (base metal)} = (\text{Si} + \text{Mn}) \times (\text{P} + \text{Sn}) \times 10{,}000 \leq 150 \text{ (elements calculated in wt. \%)}$$

$$\text{X factor (weld metal)} = (10\text{P} + 5\text{Sb} + 4\text{Sn} + \text{As})/100 \leq 15 \text{ (elements calculated in ppm)}$$

In addition to material composition, postweld heat treatment procedures should be carefully selected and/or qualified to avoid temper embrittlement before exposing the material to service conditions.

The effects of temper embrittlement can be reversed by heating the affected material to a minimum temperature of 1,150°F and holding for 2 hr per inch of thickness, followed by rapid cooling to room temperature. However, the material will quickly re-embrittle if it is reexposed to the conditions that caused the embrittlement in the first place.

A-203.2 References. In addition to the general references cited in A-120, see the following references for additional details:

[1] API RP 934, *Materials and Fabrication Requirements for $2^{1}/_{4}$Cr-1Mo and 3Cr-1Mo Steel Heavy Wall Pressure Vessels for High Temperature, High Pressure Hydrogen Service*, American Petroleum Institute.

[2] White, R. A. and E. F. Ehmke, *Materials Selection for Refineries and Associated Facilities*. NACE, 1991, pp. 53-54.

[3] Viswanathan, R., *Damage Mechanisms and Life Assessment of High Temperature Components*, ASM International, 1989.

[4] Swift, R. A., "Temper Embrittlement in Low Alloy Ferritic Steels," *Corrosion/76*, Paper No. 125, NACE.

A-204 STRAIN AGING

A-204.1 Definition. An early (1948 edition/1960 reprinting) edition of the ASM Metals Handbook defines strain aging as "aging induced by cold working." With improved understanding of the strain aging mechanism, strain aging now can be defined as an age-hardening phenomena in which the tensile strength and hardness of a cold-worked material are increased and the ductility reduced when that material is exposed to moderately elevated temperatures, normally as a result of service, although it can also occur during fabrication. The most common mechanism for the aging is the precipitation of nitrides at dislocations and other crystalline defects created during the cold working of the material, and it is for this reason that strain age damage is far more prevalent in older versions (pre-1980) of carbon and carbon–0.5 molybdenum steels, where control of the nitrogen content was less effective. Newer steels made in basic oxygen furnaces and fully killed with aluminum

have not shown as great a susceptibility to strain age damage. The effects of strain aging can be minimized or eliminated by a stress-relieving heat treatment following the cold working, where the temperature of the stress relief is sufficiently high to substantially reduce the number of available initiation sites for the nitride precipitation.

A-204.2 References. Most of what is needed to understand and deal with strain aging can be found in the general references cited in A-120.

A-205 COLD WORKING (COLD STRAIN)

A-205.1 Definition. Cold working is any process of plastic deformation of a metal that occurs at temperatures below the material's transformation or recrystallization temperature and in which the material is hardened by the strain. As the hardness of a cold-worked material is increased, the ductility of the material decreases. The amount of hardening that occurs with a given amount of cold work varies with the alloy system, and cold work effects are particularly pronounced in alloys like the austenitic (3XX series) stainless steels. When austenitic stainless steels that have been moderately to heavily cold worked are operated in the creep range (generally above about 1,000°F), recrystallization may occur and the grain size can be substantially reduced, particularly if the temperature is limited to a level only slightly above the recrystallization temperature. This can result in an increase in the creep rate, with a corresponding decrease in creep rupture strength. As discussed earlier (see A-201 and A-204), cold work contributes to certain types of microstructural instability. In addition, the residual stresses induced by cold work can substantially increase the risk of cracking in austenitic stainless steels and other austenitic alloys when these materials are exposed to certain types of aggressive environment (see A-701 on stress corrosion cracking).

Cold work can accelerate other forms of embrittlement; see reference [1]. Concern over the effects of cold work has led to the implementation of various requirements in the construction codes for heat treatment of certain cold-worked materials once a critical level of strain is exceeded. It is understood that because of the complexity of the relationship between cold work and material degradation, implementation of the heat treatment rules is not a guarantee that premature failures will be avoided in all situations. Likewise, violation of the limits defined in the rules will not inevitably result in premature failures. Factors such as melting practice, consolidation (forming) and heat treatment practices of the material producer, and the initial grain size all can play a role in determining whether a cold-worked material operates reliably in service. However, the rules represent a consensus of what can be considered good practice by parties representing disparate interests and, in general, serve to benefit the end user.

A-205.2 References. The general references cited in A-120 contain extensive information on the effects of cold work in materials used for Code construction. See the following reference for additional detail:

[1] Groebner, P. J. and R. F. Steigerwald, "Effect of Cold Work on the 885°F (475°C) Embrittlement of 18Cr-2Mo Ferritic Stainless Steels," Journal of Metals, July 1977, pp. 17–23.

A-206 RELAXATION CRACKING (STRAIN-INDUCED PRECIPITATION HARDENING)

A-206.1 Definition. Relaxation cracking is a condition that may develop in cold-worked or warm-worked austenitic materials when temper-resistant particles precipitate at excess defect sites generated by the cold or warm working operations; these precipitates act to "pin" the defects, which results in a substantial increase in the material's creep strength and hardness. The bulk of the strengthening occurs within the individual grains, while the grain boundaries remain comparatively weak, so that when the material is heated to intermediate temperatures in the range of 950°F to 1,400°F any strains that develop either in response to heat treatments or service temperatures concentrate in the grain boundaries. This can lead to rapid creep crack growth and ultimately failure of the component in a nonductile fashion. In the austenitic stainless steel alloys, the precipitates commonly are carbides and carbonitrides involving columbium or titanium, while in the nickel-base alloys titanium and aluminum contribute to the formation of gamma prime or gamma double-prime precipitates. There is substantial heat-to-heat variability in the relative susceptibility of an alloy to relaxation cracking, but in susceptible heats the rate of crack growth can be quite rapid if the amount of working and the temperature of exposure are unfavorable. In fact, pressure parts fabricated from susceptible heats of 347H material and 310HCbN have cracked through-wall during heat-up for solution annealing. The rules contained in PG-19 (BPVC Section I) and UHA-44 (Section VIII, Division 1) were developed, in part, to minimize the risk of relaxation cracking.

A-206.2 References.

[1] Truman, R. J. and H. W. Kirkby, "Some Ductility Aspects of 18-12-1Nb Steel," *Journal of the Iron and Steel Institute*, October 1960.

[2] Moore, N. E. and J. A. Griffiths, "Microstructural Causes of Heat-Affected Zone Cracking in Heavy Section 18-12-Nb Austenitic Stainless Steel Welded Joints," *Journal of the Iron and Steel Institute*, January 1961.

[3] Shingledecker, J. P. "Creep-Rupture Behavior and Recrystallization in Cold-Bent Boiler Tubing for USC Applications," *Proceedings of the 5th International Conference on Advances in Materials Technology for Fossil Power Plants*, Marco Island, Florida, 2007.

[4] Van Wortel, H. "Control of Relaxation Cracking in Austenitic High Temperature Components," *Corrosion/2007*, Paper No. 07423, NACE.

A-207 885°F EMBRITTLEMENT

A-207.1 Definition. Upon exposure to elevated temperatures, high chromium stainless steels and the ferrite phase of austenitic and austenitic–ferritic (duplex) stainless steels are subject to a type of embrittlement in which the material hardness increases and the tensile ductility and toughness decrease at and below the service temperature. This metallurgical phenomenon is observed at chromium levels in excess of 10% to 12% and the embrittlement may be due to carbide, nitride, or silicide precipitation, especially at the lower chromium levels, rather than precipitation of alpha prime chromium-rich particles. The severity of embrittlement increases with increasing chromium content, and the effect is enhanced by certain alloying elements, notably aluminum, molybdenum, and tungsten, which tend to increase and stabilize the ferrite content. While the maximum rate of embrittlement occurs at 885°F, a typical "C" curve time–temperature behavior is observed and some alloys with as little as 15% to 18% chromium have shown significant embrittlement with just a few thousand hours exposure at temperatures as low as 500°F. At very high chromium levels, alpha prime embrittlement proceeds via spinodal decomposition, rather than by nucleation and growth of discrete alpha prime particles. This may be the primary cause of embrittlement for alloys S44735 and S44660.

The 885°F embrittlement generally becomes apparent first as a reduction in Charpy impact ductile–brittle transition temperature (DBTT), and only in its last stages are changes in strength, hardness, and ductility observed. The embrittlement normally is not a problem at elevated temperatures, but it can become a problem when components are cooled to ambient temperatures.

A-207.2 References. In addition to the general references cited in A-120, see also the following references for additional information:

[1] Miller, G. E. "Experiences with 885°F Embrittlement in Ferritic Stainless Steels," *Materials Protection*, NACE International, May 1966.
[2] Groebner, P. J., "The 885°F (475°C) Embrittlement of Ferritic Steels," *Metallurgical Transactions*, Volume 4, January 1973, pp. 251–260.
[3] Nichol, T. J., A. Datta, and G. Aggen, "Embrittlement of Ferritic Stainless Steels," *Metallurgical Transactions*, Volume 11A, April 1980, pp. 573–585.

A-208 SIGMA PHASE EMBRITTLEMENT

A-208.1 Definition. Sigma phase embrittlement is a metallurgical phenomenon in which an iron–chromium intermetallic compound that is hard and brittle forms in certain high alloy steels after prolonged exposure at temperatures ranging from 1,050°F to 1,700°F. The embrittling effect is observed most immediately at lower temperatures, where there is a reduction in tensile ductility and a loss in toughness. The presence of sigma phase normally is less injurious at the higher temperatures where it forms. However, under certain conditions the presence of large amounts of the sigma phase has been linked to significant reductions in creep ductility, with a corresponding reduction in the creep life of a component.

Materials typically susceptible to sigma phase formation include the following:

(a) 300 series stainless steels, including both wrought and cast forms, as well as weld metal

(b) 400 series stainless steels, both ferritic and martensitic types, generally with chromium levels of 17% and more

(c) duplex stainless steels

Factors that influence the rate of sigma phase formation include the amount of delta ferrite present, time within the temperature range of formation, prior cold working, variations in composition due to progressive solidification, increased chromium content, and the presence of ferrite-stabilizing elements, particularly molybdenum, niobium, and titanium, which act to increase the chromium equivalent, while austenite-stabilizing elements, particularly carbon, nitrogen, nickel, and manganese, reduce the rate of sigma phase formation.

Sigma phase can nucleate preferentially at carbides and especially at ferrite–austenite interfaces in predominantly austenitic alloys, or in duplex alloys it can result from the transformation of the delta ferrite phase at temperatures following exposure to temperatures above approximately 1,200°F. It is possible to "de-sigmatize" affected materials by re-solution annealing at a minimum of 1,950°F for about 4 hr, followed by a water quench, but the rate of reformation when reexposed to temperatures within the susceptible range is rapid.

A-208.2 References. In addition to the general references cited in A-120, see also the following references for additional details:

[1] Viswanathan, R., "Damage Mechanisms and Life Assessment of High Temperature Components," ASM International, 1989.
[2] API Publication 581, "Risk-Based Resource Document," American Petroleum Institute.
[3] Kiesheyer, H. and H. Brandis, "Precipitation and Embrittlement Behavior of Nickel-Containing Superferrites," Zeit. Werkst. 8, March 1977, pp. 69–77.

A-209 LAVES AND LAVES PHASE PRECIPITATION

A-209.1 Definition. Most austenitic (300 series) stainless steels are metastable materials, which means that during elevated temperature service a range of complex carbides and other noncarbide phases may form, depending on the time and temperature of exposure, the specific alloy composition, and prior cold working or

other fabrication process variables. One of those phases is the Laves phase, the formation of which may occur during alloy production or during service, and is another of the metallurgical phenomena that may occur during exposure of austenitic stainless steels containing molybdenum, titanium, and niobium, in the temperature range from just above 1,100°F to approximately 1,600°F. Laves phase may also develop in other iron-base, iron–nickel-base, or cobalt-base superalloys, including the tungsten-enriched grades of the creep strength-enhanced ferritic steels (e.g., Grades 92 and 122). Silicon and niobium promote formation of Laves phase in Alloy 718 (N07718). Laves phase precipitates within the grains (intragranularly) or intergranularly, forming into globular particles or into platelets.

Laves phase forms during solidification of high niobium alloys, most notably N07718, and its presence can result in the embrittlement of welded materials unless a very high temperature solution-annealing operation is performed as the postweld heat treatment. There is also an Ni_2Mg Laves phase that can form as a result of excessive desulfurization of N07718 and similar alloys.

A-209.2 References. In addition to the general references cited in A-120, see also the following references for additional details:

[1] Kriege, O. H., "Phase Separation as a Technique for the Characterization of Superalloys," STP 557, ASTM, 1974.
[2] Kuy, E., "On the Methodology of Phase Extraction in Nickel-Base Superalloys," *Practical Metallography*, Volume 13, November 1976.

A-210 SENSITIZATION (CARBIDE FORMATION)

A-210.1 Definition. Sensitization involves the precipitation of chromium carbides along the grain boundaries of austenitic (300 series) and ferritic/martensitic (400 series) stainless steels when they are exposed for significant periods of time in the temperature range of about 1,000°F to 1,550°F. Most high-temperature alloys are sensitized either as-produced or as the result of service. The grain boundary precipitation of the chromium carbides typically results in a strengthening of the alloy; however, because the formation of the carbides depletes the material immediately adjacent to the precipitates of chromium, the material can be highly susceptible to intergranular corrosion when exposed to corrosive aqueous environments at lower temperatures. The rate at which sensitization occurs and the degree of sensitization will depend on the specific material composition and the time and temperature of exposure. For example, the ferritic stainless grades will sensitize much more rapidly than the austenitic grades, due to the difference in diffusion rates in the two different crystal structures. Portions of a weld heat-affected zone in a susceptible material inevitably will be subjected to sensitizing temperatures and this should be considered if the welded component is to be subjected to a corrosive environment. For high-temperature applications, the material will desensitize over time as the chromium from the surrounding material diffuses back into the depleted region, but this process occurs much more slowly than the sensitization itself. Modifications have been made to the composition of some austenitic and ferritic grades to minimize the risk of sensitization, including the reduction of carbon (i.e., the so-called L grades) and the introduction of elements such as titanium and niobium that form carbides in preference to the chromium carbide (e.g., Type 321 and Type 347). It should be noted, however, that in high-temperature applications, the presence of "stabilizing" elements such as titanium or niobium will typically retard, but not prevent, the occurrence of sensitization, although the presence of these elements will alter the rate of its development.

It should be understood that the sensitized condition does not relate directly to the presence of the carbides in the grain boundaries; rather, the condition occurs because at a certain stage in the evolution of the carbides, chromium-depleted zones are created that render the material subject to intergranular attack. Different tests for sensitization (e.g., ASTM A262 Practices A, B, C, E, and F) will detect different levels of chromium depletion and may yield different results. Since the extent of chromium depletion can vary, the degree of sensitization (DOS) varies too. Standard electrochemical techniques (see ASTM G108) exist for quantifying the DOS and allow determination of whether the DOS is compatible with the intended service. Note that some of the intergranular corrosion tests (most commonly the ASTM A262, Practice C Nitric Acid Test) may detect susceptibility to intergranular corrosion caused by mechanisms other than carbide precipitation. Thus, test method selection and the proper interpretation of results are important.

A-210.2 References. In addition to the general references cited in A-120, see also the following reference for additional details:

[1] J. J. Demo and A. P. Bond, "Intergranular Corrosion and Embrittlement of Ferritic Stainless Steels," *Corrosion*, Volume 31, January 1975, pp. 21-22.

A-211 THERMAL AGING EMBRITTLEMENT

A-211.1 Definition. Several forms of thermally induced embrittlement have previously been covered in A-201 (graphitization), A-203 (temper embrittlement), A-204 (strain-aging embrittlement), A-207 (885°F embrittlement), and A-208 (sigma phase embrittlement). Issues not yet covered within the general subject of thermal aging embrittlement include blue brittleness, quench age embrittlement, stress-relief embrittlement, and tempered-martensite embrittlement. These last four issues all arise during fabrication-related heating activities.

Blue brittleness is an embrittling phenomenon that occurs when plain carbon steels and some alloy steels are heated into the temperature range of 450°F to 700°F. Blue

brittleness is an accelerated form of strain-age embrittlement and is characterized by an increase in strength and a marked decrease in ductility and toughness.

Quench-age embrittlement occurs in low carbon steels when the material undergoes hardening in response to the precipitation of carbides at existing dislocations due to differences in the solid solubility of carbon in ferrite at different temperatures. The hardening reaction is made possible by rapid cooling from temperatures slightly below the lower critical transformation temperature, at which temperature the solubility of carbon is substantially greater than at room temperature. As the hardness of the steel increases with increased aging at room temperature, the ductility decreases proportionally. An aging period of several weeks at room temperature is required for maximum embrittlement.

Stress-relief embrittlement is also known as *postweld heat treat cracking* or *reheat cracking*; where this mechanism is active, it will lead to intergranular cracking within the higher-strength portions of the weld zone (e.g., the coarse-grained heat-affected zone and the weld deposit itself) during stress relieving or during subsequent elevated temperature service. The metallurgical phenomenon occurs only in low alloy structural and pressure vessel steels, ferritic creep-resisting steels, austenitic stainless steels, and some nickel-base alloys. In all of these alloys, the rapid precipitation of temper-resistant phases during the early stages of heat treatment or service leads to a significant strengthening of the interior of grains within the material. The creep strain that is the mechanism of stress relief then concentrates within the grain boundary regions, which often are depleted of precipitates, leading to rapid intergranular cracking.

Tempered-martensite embrittlement is a metallurgical phenomenon affecting quenched and tempered high-strength low alloy steels over the temperature range of 400°F to 700°F. Tempered-martensite embrittlement is generally thought to be caused by ferrite networks that develop due to the precipitation of cementite platelets along prior-austenite grain boundaries. Steels containing significant percentages of chromium or manganese have the highest potential for this form of embrittlement.

A-211.2 References. Everything covered in this paragraph was derived from the general references cited in A-120, with particular emphasis on ASM Handbook Volumes 1 and 11.

A-212 RADIATION EMBRITTLEMENT

A-212.1 Definition. Radiation embrittlement is a metallurgical phenomenon affecting most structural materials exposed to high levels of high-energy neutrons, usually within or near the cores of nuclear reactors. The embrittlement is evident as a substantial loss in toughness and ductility, with accompanying gains in strength (hardening). For pressure-boundary materials, the most significant concern is the increase in the ductile-to-brittle transition temperature and a decrease in the upper-shelf energy observed during impact tests.

Extensive research over the years has revealed the following:

(a) High-strength steels that have lower initial nil-ductility transition temperatures than low-strength steels are generally less susceptible to radiation embrittlement.

(b) Steels with low initial nil-ductility transition temperatures, fine-grain microstructures, and structures with high dislocation densities generally show greater resistance to radiation embrittlement.

(c) Steels with tempered-martensite in the microstructures are less susceptible than those with tempered upper bainite or ferritic microstructures.

(d) Vacuum degassing and control of alloying elements such as copper, phosphorus, and possibly nickel help to reduce the susceptibility to radiation embrittlement.

A-212.2 References. In addition to the general references cited in A-120, additional useful information can be derived from the following references:

[1] Billington, D. S. and J. H. Crawford, *Radiation Damage in Solids*, Princeton University Press, 1961.

[2] Bement, A. L., STP 484, *Irradiation Effects on Structural Alloys for Nuclear Reactor Applications*, ASTM, 1970.

[3] Wechsler, M. S. and W. H. Smith, CONF-730801, *Symposium on Materials Performance in Operating Nuclear Systems*, National Technical Information Center, August 1973.

A-213 SOLIDIFICATION CRACKING

Solidification cracking is a form of hot cracking that can occur in weldments of nickel-base alloys. Solidification cracking occurs when alloying elements or impurities are present that segregate during solidification and form low-melting-point liquid films on grain boundaries. Tensile stresses, which build up during solidification and cooling of the weld metal, can cause cracking along the liquid films. Elements that can promote solidification cracking in nickel-base alloys include sulfur, phosphorus, silicon, boron, and zirconium. The problem may appear as macroscopic solidification cracks, typically along the weld centerline, or as microfissures within the weld metal. Solidification cracks may or may not be open to the surface. For a given material, the occurrence of solidification cracking is influenced by weld joint design and weld bead geometry. Solidification cracking is promoted by high heat input, a concave weld bead profile, and a teardrop-shaped weld pool. Heavy restraint, due to thick material or a rigid joint design, will also promote solidification cracking.

A-300 UNIFORM CORROSION

This is the simplest form of environmental damage – one that generally results in a uniform amount of wall loss over a defined period of time. It can usually be expressed as some amount of wall thickness lost per unit of time (e.g., mils per year). Most Sections of the Code have requirements for corrosion allowance, and uniform corrosion is usually what is addressed. The following are several possible uniform corrosion mechanisms, which are presented in no particular order of importance.

A-301 GENERAL CORROSION AND WASTAGE

A-301.1 Definition. General corrosion and wastage are terms frequently used to describe the phenomenon of uniform corrosion in a material. General corrosion refers to corrosion dominated by uniform wall thinning that typically proceeds without any obvious signs of localized attack. Weathering steels and copper alloys are classic examples of materials that undergo general attack or corrosion in the process of developing a semiprotective oxide layer that then resists subsequent attack. The term *wastage* is defined in Webster's Dictionary as that which is lost by "deterioration, wear, destruction, or the like." In general corrosion and wastage, electrochemical reactions develop between adjacent closely spaced micro-anode and micro-cathode areas, resulting in what appears to be (on a macro scale) a uniform loss of material. Consequently, general corrosion and wastage can be considered to be a specialized form of pitting attack, in which the number of individual electrochemical cells active on the material surface is so great that to the unaided eye it appears that the material is being removed uniformly over the entire surface of the component affected.

A-301.2 References. Most of what is needed to understand and effectively deal with general corrosion and wastage can be found in the general references cited in A-120.

A-302 ATMOSPHERIC CORROSION

A-302.1 Definition. Atmospheric corrosion is the process in which material cross-section is reduced as the result of the corrosive nature of the atmosphere. The relative corrosivity of the atmosphere depends heavily on the location of the metal parts under consideration. For example, metal parts exposed to dry desert air typically will suffer very little, if any, corrosion due to the absence of moisture – an essential component in any electrochemical reaction. On the other hand, metals exposed to warm and moist tropical conditions, particularly near a seacoast, may undergo rapid wall loss. A variety of factors can influence the rate of atmospheric corrosion, including temperature, humidity, the strength of prevailing winds, and the presence of pollutants in the air. If airborne particulate matter happens to deposit on the metal, then that substance, along with any moisture present, might lead to nonuniform attack (which is discussed in A-400, Localized Corrosion).

A-302.2 References. Most of what is needed to understand and effectively deal with atmospheric corrosion can be found in the general references cited in A-120.

A-303 GALVANIC CORROSION

A-303.1 Definition. A useful definition of galvanic corrosion comes from ASM Handbook Volume 11, which reads as follows: When dissimilar metals are in electrical contact in an electrolyte, the less noble metal (anode) is attacked to a greater degree than if it were exposed alone, and the more noble metal (cathode) is attacked to a lesser degree than if it were exposed alone. This behavior, which is known as galvanic corrosion, can often be recognized by the fact that the corrosion is more severe near the junction of the two metals than elsewhere on the metal surfaces. Galvanic corrosion is usually the result of poor design and selection of materials, or the plating out of a more noble metal from solution on a less noble metal. The greater the difference in potential between the two metals, the more rapid will be the galvanic attack. The textbook electromotive-force series ranks the metals according to their chemical reactivity, but applies only to the laboratory conditions under which the reactivity was determined. In practice, the solution potential of metals is affected by such factors as the presence of passive or other protective films on some metals, polarization effects, the degree of aeration, complexing agents, and temperature.

A-303.2 References. Information that can be of use in dealing with galvanic corrosion can be found in the general references cited in A-120.

A-304 STRAY CURRENT CORROSION

A-304.1 Definition. Stray current corrosion is damage to materials that occurs due to the influence of electric currents from a source (or sources) external to the component affected (typically extraneous current in the earth). This type of attack is most frequently seen in buried cast iron, carbon steel, and low alloy steel components – mostly because high alloy steels and most nonferrous materials are not typically buried. Sources of stray currents may include cathodic protection systems, electric welding machines, and grounded direct-current electric sources. However, temporary use of welding equipment during fabrication or repair on-site is unlikely to cause a long-term problem. Nearby aluminum pot line facilities, electroplating, electrolytic refining, or electrowinning facilities are more likely sources of stray currents. Other environmental factors, e.g., oxygen concentration, pH, and soil makeup, may play a role in the overall corrosion process.

At points where the current enters the metal, the site will become cathodic – and the site where the current leaves will become anodic. These coupled cells may be located hundreds of yards apart, or they may be located in close proximity to each other, e.g., on either side of a gasketed pipe joint. Bolted flange connections do not provide reliable electrical continuity in pipe systems unless electrical bonds are used that are carefully installed and maintained.

A-304.2 References. What is described above with regard to stray current corrosion was generally derived from the general references cited in A-120. Additional references that may prove useful include the following:

[1] Parker, M. E. and E. G. Peattie, *Pipeline Corrosion and Cathodic Protection*, Third Edition, Gulf Publishing, 1984.

[2] NACE Paper No. 98559, "Stray Currents Generation, Interference Effects and Control."

A-305 HIGH-TEMPERATURE CORROSION

A-305.1 Definition. High-temperature corrosion is the attack of a metal surface that occurs when the material is exposed to an oxidizing gas at elevated temperature. Corrosion or metal loss occurs by direct reaction with the gas, without the presence of a liquid electrolyte. This type of corrosion may also be called high-temperature oxidation, tarnishing, or scaling. As should be expected, the rate of attack typically increases with increasing temperature, although in some material/environment combinations the rate of attack may diminish with increasing temperature.

When exposed to a high-temperature environment, most engineering materials will spontaneously form an oxide film on their surface, and depending on the character of the film, it may substantially impede the corrosion process or have very little effect on the rate of attack. Initial film formation occurs rapidly, but subsequent increases in film thickness depend upon transport of reactive species through the film. Although these films are generally considered to be oxides, the films may also be sulfides, carbides, or mixtures of these species – or other species depending on the balance of oxidation and reduction, and the dissociation pressure.

A-305.2 References. The general references cited in A-120 provide information that is useful in understanding and dealing with this type of corrosion.

A-306 SOIL CORROSION

A-306.1 Definition. Soil corrosion is the deterioration of metals and alloys that occurs when they are exposed to soils. Since "soils" can consist of an endless variety of naturally occurring substances, as well as an equally large number of man-made contaminants, predicting under what conditions soil corrosion will occur and how rapidly it will proceed can be an extraordinarily difficult task. The materials that most often are found to have experienced soil corrosion are those materials, such as cast irons, carbon steels, and low alloy steels, from which buried piping is produced.

Naturally occurring factors that will influence susceptibility to soil corrosion include moisture content, oxygen availability, soil homogeneity, soil drainage, the presence of seashells (in coastal areas), and the overall soil chemistry. Chloride and sulfate content, together with soil pH, also strongly affect the susceptibility of a material to soil corrosion. Other factors that may affect soil corrosion include, but are not limited to, dissimilar soils, galvanic corrosion, stray currents, differential aeration cells, and microbiologically induced corrosion. These issues are all discussed in more detail elsewhere in this Nonmandatory Appendix.

Soil corrosion is characterized by external wall thinning (general corrosion), accompanied by areas of localized attack due to pitting. Corrosion rates tend to increase with higher metal temperatures.

A-306.2 References. In addition to the general references cited in A-120, the following references should be of use:

[1] Jones, D. A., *Principles and Prevention of Corrosion*, Macmillan Publishing Co., New York, 1992.

[2] NACE RP-0169, *Standard Recommended Practice: Control of External Corrosion on Underground or Submerged Metallic Piping Systems*, NACE International.

A-307 CAUSTIC CORROSION

A-307.1 Definition. Caustic corrosion is a form of localized attack of metals and alloys that occurs when caustic (or alkaline) salts, primarily NaOH and KOH, concentrate on a surface. However, more general corrosion can also occur, depending on the level of concentration. Caustic corrosion is an all-too-common problem in steam- or water-side boilers, where the caustic salts can concentrate under deposits formed on the internal surface of evaporative tubing. The caustics in these units often are intentionally added to control pH and to protect tube surfaces in the event of the introduction of acidic species, such as chlorides. Materials mostly affected by this type of corrosion include the carbon steels, low alloy steels, and some aluminum alloys.

A-307.2 References. Information useful in understanding the basics of caustic corrosion, including means of prevention, can be found in the general references cited in A-120.

A-308 CARBON DIOXIDE CORROSION

A-308.1 Definition. Carbon dioxide corrosion is a form of metal attack that occurs when carbon dioxide dissolves in water and forms carbonic acid, which is the actual corrodent. As with any acid, the pH of the solution is lowered and, with sufficient quantities, general corrosion and/or pitting will occur.

Materials most commonly affected by carbon dioxide corrosion are the carbon steels and, to a lesser extent, the low alloy steels Alloy steels containing at least 12% chromium tend to be immune to carbon dioxide corrosion.

A-308.2 References. The information needed to understand the basics of carbon dioxide corrosion can be found in the general references cited in A-120.

A-309 CONCENTRATION CELL CORROSION

A-309.1 Definition. Concentration cell corrosion is damage to a metal or alloy that occurs when an electrolytic cell develops, the electromotive driving force of which is caused by a local difference in the concentration of some component of the electrolyte. This concentration difference leads to the formation of discrete anodic and cathodic regions. If the difference in electromotive force or potential is great enough, the more anodic area corrodes preferentially.

There are many situations in which concentration cells may form, e.g.:

(a) The rate of diffusion of air produces differential aeration in the layers of water or aqueous solutions just below the liquid level and causes concentration cell corrosion in this region on partly immersed metal parts.

(b) In a metal part that is partly immersed in a liquid electrolyte, a concentration cell can develop if the gaseous phase above the electrolyte consists of a gas (or gases) other than air.

(c) Concentration cell corrosion can initiate on buried metals as a result of their being in contact with soils that have different chemical compositions, water contents, or degrees of aeration (oxygen supply).

See the paragraphs below for pitting, crevice, and microbiologically influenced corrosion, which are all special forms of concentration cell corrosion.

A-309.2 References. Information useful for understanding the basic causes of concentration cell corrosion can be found in the general references cited in A-120.

A-310 DIFFERENTIAL-TEMPERATURE CELL CORROSION

A-310.1 Definition. Differential-temperature cell corrosion is one of the more obscure corrosion processes that cause metal loss when different parts of the same metal or alloy are immersed in an electrolyte that varies in temperature from one location to another. If the anode and cathode are areas located on a single piece of metal (or on two electrically connected pieces of the same metal) immersed in the same electrolyte, corrosion will proceed as in any short-circuit galvanic cell.

For steels immersed in dilute aerated chloride solutions, the warmer area is anodic to the cooler area. But, as the reaction progresses, the polarity may reverse, depending on aeration, the solution velocity where it contacts the metal surface, and other factors.

For copper in aqueous salt solutions, the area of the metal at the higher temperature is the cathode and the area at the lower temperature is the anode. So, there is preferential attack at the anodic area, with copper dissolving from the cold area and depositing on the warmer cathodic area.

A-310.2 References. Information useful for understanding the basics of differential-temperature cell corrosion can be found in the general references cited in A-120.

A-311 MOLTEN SALT CORROSION

A-311.1 Definition. Molten salt corrosion is the attack that metals experience when a molten salt in contact with the surface completely or partially dissolves the protective oxide film that in more benign environments limits the rate of attack. In the absence of the protective oxide film, the reaction of the metal with dissolved or combined oxygen in the salt can occur very rapidly to form molten flux in the salt or nodular oxide on the metal surface, which then promotes galvanic corrosion. The molten salts may be fluorides, chlorides, nitrates, or sulfates, or they may be molten hydroxides or carbonates. Uniform metal loss is the most common form of molten salt corrosion. However, selective leaching of one or more elements from the metal may occur at the higher temperatures, whereas pitting and/or crevice corrosion may take place at the lower temperatures. All forms of corrosion observed in aqueous systems, such as stress-assisted corrosion, galvanic corrosion, erosion-corrosion, and fretting, have been experienced in molten salts. Molten salt exposure will exist where molten salts are used for heat transfer or storage, but may also occur in waste incineration, fossil-fuel combustion, and other high-temperature environments. In the latter environments, this phenomenon is often called hot corrosion.

A-311.2 References. Much of the information needed to understand the basics of molten salt corrosion can be found in the general references cited in A-120. Reputable material suppliers should also be contacted to determine if one or more of their materials has shown good performance under conditions similar to those where the problem exists.

A-312 LIQUID METAL CORROSION

A-312.1 Definition. Liquid metal corrosion is the attack experienced by susceptible materials in plants and/or systems that use liquid metals as coolants. These systems are generally associated with nuclear reactors, other than the conventional water-cooled or gas-cooled types. System coolants may be molten forms of sodium, sodium–potassium (NaK) eutectic, lead, lithium, mercury, cesium, lead–bismuth alloys, and lead–lithium alloys. An experience base exists showing which structural/pressure boundary materials are suitable at given time/temperature combinations for service with particular liquid metals.

Liquid metal corrosion may involve dissolution from a surface by direct dissolution; surface reaction, involving solid-metal atoms, the liquid metal, and an impurity element present in the liquid metal: or intergranular attack. It may also involve impurity and interstitial reactions, alloying (or dealloying), and compound reduction.

In evaluating instances of liquid metal corrosion, there are three important factors:

- surface attrition (loss in thickness)
- depth of depleted zone (altered base metal)
- presence of intergranular attack

A factor often overlooked is the probability that any material lost in a given region of a liquid metal system may turn up elsewhere in the system as a deposit, most likely in a cooler portion of the system.

A-312.2 References. Liquid metal corrosion is a fairly rare occurrence, since there are limited applications for the use of liquid metals. A general understanding of the corrosion mechanism can be derived from the general references cited in A-120. One additional source of information is

[1] Draley, J. E. and J. R. Weeks, *Corrosion by Liquid Metals*, Plenum Press, 1970.

A-400 LOCALIZED CORROSION

As the name implies, localized corrosion is a broad term describing any one of a number of corrosion processes in which damage takes place at small and well-defined locations on the surface of a material rather than uniformly over the entire surface. A concern with this type of corrosion is that often it is difficult to determine how serious is the degree of attack until leakage at one or more sites on the surface actually occurs. This type of corrosion usually does not lead to the catastrophic ruptures typically associated with gross wall loss over a period of time. The following are several mechanisms considered to be forms of localized corrosion, in no particular order of significance.

A-401 PITTING CORROSION

A-401.1 Definition. Pitting corrosion is defined as localized attack of a metal surface, with the attack confined to a point or small area in which the ratio of the depth of the attack to the amount of surface area affected is large. Pitting is one of the most difficult types of corrosion to manage, because of the lack of predictability regarding where the attack will occur and the speed with which the attack may proceed.

The mechanism driving pitting corrosion is thought to begin with a local breakdown of the passive film on the metal surface. The breakdown is followed by the formation of an electrolytic cell. The anode of this cell is the small area of active attack and the cathode is the remaining large area of passivated metal. Once pits begin, they tend to continue to grow in depth by a self-sustaining or autocatalytic process. Propagation of pits is thought to involve the dissolution of metal and the maintenance of a high degree of acidity at the bottom of the pit by hydrolysis of the dissolved metal ions.

A-401.2 References. Information that may be useful in effectively dealing with pitting corrosion can be found in the general references cited in A-120.

A-402 FILIFORM CORROSION

A-402.1 Definition. Filiform corrosion is that material deterioration that occurs under some coatings which assumes the form of randomly distributed threadlike filaments. Filiform corrosion usually occurs on metal surfaces that are coated with a thin layer (approximately 4 mils) of an organic coating. The corrosion usually initiates at a defect of some sort (i.e., a hole, a scratch, etc.) in the coating.

Filiform corrosion generally occurs when the coated material is exposed to temperatures in the range of 70°F to 95°F at relative humidity levels between 60% and 95%. The surrounding atmosphere must contain air or oxygen.

Filiform corrosion is characterized by its unique appearance, in which fine filaments emanate from one or more sources in somewhat random directions across the surface of the material. The filaments are fine tunnels composed of corrosion products underneath the bulged or cracked coating.

A-402.2 References. Most of what is needed to understand and deal with filiform corrosion can be found in the general references cited in A-120.

A-403 CREVICE CORROSION (AND DENTING)

A-403.1 Definition. Crevice corrosion is the localized attack of a metal surface that occurs when the surface is located immediately adjacent to an area that is shielded from full exposure to the environment by the surface of another material (not necessarily a metal). The environment, itself, may be relatively benign with respect to the metal experiencing the crevice corrosion. The term denting has a more specialized meaning, originating primarily from special crevice corrosion problems experienced in pressurized water nuclear reactor steam generators. Denting involves corrosion of the tube support plates, with the resulting denting of the tubes due to the impingement of the increased volume of the corrosion products on the surface of the tubing.

Crevices frequently occur as narrow openings or spaces (gaps) between metal-to-metal or nonmetal-to-metal components. These may occur as a normal part of any construction (e.g., the area around a washer on a bolted assembly). Unintentional crevices also occur as cracks, laps, seams, and other similar discontinuities. Underdeposit corrosion is another form of crevice corrosion.

Note also that the presence of weld spatter and unremoved heat tint has been identified as a potential source of pitting of welds in stainless steels.

In crevice corrosion, regardless of the materials involved, a common factor is the development of localized environments that differ from the bulk coolant environment. This condition is referred to as an oxygen differential cell and it develops as oxygen within the crevice is consumed while the bulk coolant remains constant in oxygen content. The bulk surfaces then become the larger cathode, while the crevice area becomes the anode, resulting in potentially rapid attack of the anodic area.

A-403.2 References. The information needed to understand and deal with crevice corrosion can be found in the general references cited in A-120.

A-404 MICROBIOLOGICALLY INFLUENCED CORROSION

A-404.1 Definition. Microbiologically influenced corrosion (MIC) is the deterioration that can occur in a broad range of alloys as the result of the metabolic activity of microorganisms. Attack from MIC typically is characterized by localized pitting under deposits or tubercles that are utilized by the organisms to sustain their metabolic activity. In cast irons and carbon steels, subsurface damage usually appears to be cup-shaped, while in stainless steels, subsurface cavities or "wormholes" tend to develop. MIC usually occurs in situations where water is present (either continuously or intermittently), particularly when stagnant or low-flow conditions exist, which fosters the growth of microorganisms. There are a large variety of microorganisms that potentially can be involved in the degradation of materials and they thrive on a variety of nutrients including inorganic substances (sulfur, ammonia, hydrogen sulfide, etc.) and organics, such as hydrocarbons and organic acids. All of these organisms require carbon, nitrogen, and phosphorus for their growth.

In most cases the conditions favoring the development of MIC will not exist over the entire surface of the component under attack, whether it is a pipe, a pump, or a boiler tube, but rather will be associated with the local formation of dispersed deposits or slime coatings. Welds often are preferentially affected by MIC. This corrosion mechanism has been encountered in numerous industries, including the chemical processing industry, the fossil and nuclear power industries, the petrochemical industry (both offshore and oil field), and generally in any application in which buried pipelines are involved.

A-404.2 References. In addition to the general references cited in A-120, the following sources of information may be helpful in dealing with MIC:

[1] Kobrin, G., ed., *A Practical Manual on Microbiologically Influenced Corrosion*, NACE International, 1993.

[2] Lucina, G. J., *Sourcebook for Microbiologically Influenced Corrosion in Nuclear Power Plants*, EPRI NP-5580, Electric Power Research Institute, 1988.

A-500 METALLURGICALLY INFLUENCED CORROSION

This group of corrosion mechanisms involves those cases where the structure of a material has been altered either during fabrication into a component or during relatively longtime exposure to service conditions. Examples of these mechanisms follow.

A-501 INTERGRANULAR CORROSION

A-501.1 Definition. Intergranular corrosion is the attack of a material that occurs preferentially at its grain boundaries, usually with slight or negligible attack on the adjacent grain surfaces. This is also known as intercrystalline corrosion, or intergranular attack (IGA).

One prerequisite for intergranular corrosion is the development of a condition in which the grain boundary or the material immediately adjacent to the grain boundary is rendered substantially less resistant to certain contaminants, due to a local concentration or loss of particular elements. This may involve the diffusion of certain types of impurities to the grain boundaries, or it may involve the depletion of critical alloying constituents from the material immediately adjacent to the grain boundary due to the precipitation of carbide or carbonitride phases in the grain boundaries. A second obvious prerequisite for intergranular corrosion is exposure of the susceptible material to an electrolyte, which may be either the system coolant or an external contaminant activated by the presence of moisture in some form.

The classic example of intergranular corrosion is the standard carbon grade of Type 304 stainless steel that has been joined by welding to another piece of metal (Type 304 SS or otherwise). With typical welding heat input and a slower rate of cooling from the temperatures of welding, and in the absence of a postweld solution-annealing heat treatment, chromium-rich carbides form in the grain boundaries located in the heat-affected zone. The formation of these carbides robs chromium from the adjoining material, setting up a significant difference in corrosion potential between the chromium-depleted material at the grain boundaries and the chromium-enriched material within the grains. In this condition, rapid dissolution of the chromium-depleted material can occur if the material is exposed to a contaminant, because the anodic area (i.e., the chromium-depleted material at the grain boundaries) is small compared to the cathodic area (i.e., the much larger intragranular area where the chromium is at "normal" levels). See also A-210, dealing with sensitization (carbide formation).

Several common aluminum alloys also suffer from intergranular corrosion (often called exfoliation corrosion) due to segregation of alloying elements such as copper and magnesium.

A-501.2 References. Information useful in understanding the basics of intergranular corrosion can be found in the general references cited in A-120.

A-502 DEALLOYING CORROSION (DEZINCIFICATION AND GRAPHITE CORROSION)

A-502.1 Definition. Dealloying involves the selective attack of one or more components of a metal solid solution. Also known as parting or selective leaching, it is the mechanism involved in such phenomena as decarburization, decobaltification, denickelification, dezincification, and graphite corrosion. One highly detrimental result of this type of selective attack is that with the loss of one or more of the alloy constituents, the density of the material may be reduced and the structure may become porous. In turn, this can lead to an undermining of the material's mechanical integrity, so that the material becomes subject to sudden unanticipated overload failure. The process by which dealloying occurs is not fully understood and, as a consequence, the variables controlling the process are difficult to quantify; however, it is known that damage may occur progressively over many years under conditions of operation that are otherwise regarded as innocuous.

Dezincification, which is one of the most common forms of dealloying corrosion, occurs in some brasses and involves the selective removal of zinc from the alloy. Inhibited alpha phase brasses containing certain minor alloying additions are less prone to dezincification, while the duplex alpha–beta phase brasses are more prone to this degradation mechanism. Graphitic corrosion is another very common form of dealloying that affects primarily gray cast iron. Ductile and malleable cast irons tend to be immune to dealloying corrosion.

A-502.2 References. Information needed to understand and effectively deal with dealloying corrosion can be found in the general references cited in A-120.

A-503 GROOVING

A-503.1 Definition. Grooving is a form of localized corrosion that is most typically encountered in electric resistance welded (ERW) carbon steel pipe exposed to aggressive aqueous coolants. The preferential corrosion, or grooving, is related to the redistribution of manganese sulfides along the weld line during the welding process. The higher temperatures that develop in the weld area during welding tend to break down the manganese sulfides, leading to local enrichment of the matrix in sulfur. The resulting heterogeneous structure can behave like a dissimilar metal couple, leading to selective attack of the sulfur-enriched anodic zone (the groove) in the presence of an electrolyte.

A-503.2 References. Information useful in effectively dealing with grooving can be found in the general references cited in A-120.

A-600 MECHANICALLY ASSISTED CORROSION

These are corrosion-related damage mechanisms in which the process of metal loss is substantially enhanced by the impinging action of a solid, liquid, or gas present in the operating environment on the surface of the component containing that environment. The impinging substance may be any impurity, corrosion product, or entrained gas contained within the operating system. The damage caused by any one of these mechanisms tends to be localized, reflecting the influence of variations in the flow pattern of the water or other process fluids. Examples of these mechanisms follow.

A-601 VELOCITY-AFFECTED CORROSION

A-601.1 Definition. Velocity-affected corrosion is a general term used to define the attack that occurs on metals immersed in flowing water. The extent of attack varies as a function of the water velocity and is most pronounced in metals that show passivity behavior or form protective films in water.

Velocity-affected corrosion is generally subdivided into the following categories:

- Effects of slow-moving and stagnant waters
- Swift-moving water
- Erosion-corrosion
- Impingement corrosion
- Cavitation corrosion

The latter three types of velocity-affected corrosion are handled in separate discussions; see A-602, A-603, and A-604.

In slow-moving and stagnant waters, loosely adherent solid corrosion products can deposit on component surfaces and aggravate corrosion. In closed systems, corrosion inhibitors can lose their effectiveness under very low flow conditions or within stagnant legs of the system.

Swift-moving water may carry away dissolved metal ions from a corroding area before protective films can reform, resulting in a continuous high rate of attack of the component surface. [Flow-accelerated corrosion (FAC) is a special form of velocity-affected corrosion in which the protective oxide film on a component surface is dissolved in the feedwater or boiler water under specific conditions of pH and electrochemical potential; see A-705.] Suspended solids in water can scour metal surfaces and continually expose fresh metal to corrosive attack. In fresh water, as velocities increase, the corrosion rate in a particular area of a component may first

increase, then decrease, and then increase again as the passivity of the metal breaks down under the effects of the erosive action.

Metals that perform well in swift-moving water may still be prone to pitting in stagnant waters or areas of low flow.

A-601.2 References. Information useful to an understanding of velocity-affected corrosion can be found in the general references cited in A-120.

A-602 EROSION-CORROSION

A-602.1 Definition. Erosion-corrosion is the damage to metals that occurs when particles transported in a liquid impinge on a component surface and remove the protective surface film. This exposes fresh metal surfaces that are anodic to neighboring protected surfaces, which results in rapid localized corrosion of the exposed areas. The areas attacked will often exhibit grooves, channels, or other asymmetric surface penetrations that reflect a directional pattern. Nearly all flowing or turbulent corrosive fluids can cause erosion-corrosion.

Metal loss rates vary greatly with coolant velocity, corrosion resistance of the materials, hardness of the materials, and corrosivity of the flowing media.

A-602.2 References. Useful information that will assist in understanding the issues surrounding erosion-corrosion can be found in the general references cited in A-120.

A-603 IMPINGEMENT CORROSION

A-603.1 Definition. Impingement corrosion is the attack of a metal surface caused by the impingement on that surface of turbulent flowing liquids. Attack may be accelerated by solids or gas bubbles entrained in the impinging liquid. This corrosion mechanism can be considered a severe form of erosion-corrosion.

Impingement corrosion most frequently occurs where there is a sharp change in fluid direction, at impellers (or turbine blades), or even in straight runs of tubing where there is a partial blockage disrupting the flow.

A-603.2 References. Most of what is needed to understand the issues surrounding impingement corrosion can be found in the general references cited in A-120.

A-604 CAVITATION EROSION

A-604.1 Definition. Cavitation erosion is the most severe form of erosion-corrosion, and occurs through the formation and collapse of gas bubbles under conditions of changing pressure in the liquid in direct contact with the affected surface. The gas bubbles form when the pressure in the liquid drops in response to some change in the operating environment and they collapse when the pressure increases. If the shock waves generated by the collapse of the gas bubbles impinge on a metal surface, the local pressures at the surface can be of sufficient magnitude to cause local plastic deformation of the metal and breakdown of the protective film at the metal surface. This permits a brief cycle of accelerated corrosion to occur until the protective film re-forms, and the cycle is repeated when another gas bubble collapses in the same area.

Damage is characterized by the appearance of sharp-edged pits, but it may also appear as gouges in rotating components. The damage tends to be limited to localized low-pressure zones.

A-604.2 References. Most of what is needed to understand issues associated with cavitation erosion can be found in the general references cited in A-120.

A-605 CORROSION FATIGUE

A-605.1 Definition. Corrosion fatigue is a form of damage that occurs through the interaction of repeated or fluctuating stresses and a corrosive environment, with the damage occurring at lower stress levels or fewer cycles than would be required in the absence of the corrosive environment. For a given operating environment in which corrosion-fatigue cracking occurs, the relative contribution of stress and corrosion can vary substantially, and the complexity of the interaction between the loading condition, the metallurgical variables, and the environmental parameters can complicate the identification of the root cause of the damage.

Corrosion-fatigue cracks invariably begin at the material surface; even in cases where there are near-surface defects that act as stress concentration sites and facilitate subsurface crack initiation, the damage cannot be defined as corrosion fatigue until the environmental influence is activated. Surface features that can be observed at the origin of a corrosion-fatigue crack can vary from alloy to alloy and will be strongly influenced by the environmental parameters. If a component suffering from corrosion fatigue eventually fails, corrosion products will generally be found on most of the fracture surfaces.

A-605.2 References. Most of what is needed to understand issues associated with corrosion fatigue can be found in the general references cited in A-120.

A-700 ENVIRONMMENTALLY INDUCED EMBRITTLEMENT AND CRACKING

This general category of damage could be included in the discussion of some of the other types of damage in which metallurgical changes and corrosion interact. However, because some of the specific types of damage have special significance in Code construction, they warrant individual coverage to draw attention to their importance.

A-701 STRESS CORROSION CRACKING

A-701.1 Definition. Stress corrosion cracking (SCC) is a type of damage that requires the simultaneous action of a corrodent at a critical concentration and a sustained

tensile stress of sufficient magnitude on a susceptible material in order for the cracking to occur. The elimination of any one of these three factors, or a change in the concentration of the corrodent or a reduction in the level of stress, can completely remove or significantly reduce the susceptibility to SCC.

Stress corrosion cracking frequently occurs in seemingly mild chemical environments, at tensile stresses well below the yield strength of the metal. Failures, when they occur, often take the form of fine cracks that penetrate deeply into the metal, with little or no evidence of corrosion on the adjoining surface. A casual visual inspection, or in some cases even a detailed inspection using one of the volumetric NDE methods, may fail to detect any signs of the cracking.

Stresses that contribute to SCC can arise during manufacturing/fabrication or in service. During manufacturing/fabrication/construction, residual tensile stresses can develop during thermal processing, surface finishing, various forming processes (particularly cold bending), and assembly operations such as fit-up and welding. The influence of these stresses can be substantially increased wherever stress risers may exist. During service, sources of stress include temperature differences that may occur during plant startup or during shutdowns. Stress raisers also can develop in the form of pitting corrosion. The design pressure loads in pressure vessels and piping systems also can be sufficiently high to cause SCC in certain environments.

Metal susceptibility to SCC has been the subject of extensive research. One of the better summaries of "specific ions and substances that have been known to cause SCC in various alloys when present at low concentrations and as impurities" is found in ASM Handbook Volume 11.

Chloride SCC is common, especially in the austenitic stainless steels. The 18–8 type alloys, such as TP304 and TP316, are the most susceptible to chloride SCC. They can suffer SCC whenever temperatures exceed 140°F when in contact with high chloride concentrations. Alloy substitution can reduce susceptibility; higher nickel austenitic alloys, ferritic stainless steels, and duplex (austenitic–ferritic) stainless steels are less susceptible. Nickel-free ferritic stainless steels, austenitic alloys with greater than 50% nickel content, and carbon steels are effectively immune to chloride SCC.

There are three basic forms of SCC, which are distinguished as follows:

- Transgranular stress corrosion cracking (TGSCC)
- Intergranular stress corrosion cracking (IGSCC)
- Irradiation-assisted stress corrosion cracking (IASCC)

Transgranular stress corrosion cracking is generally thought to be associated with higher stress levels, with cracks (cross-sections) beginning at the surface of a component in a single location — possibly a pit — and growing into the component in a continually branching mode.

Intergranular stress corrosion cracking typically occurs near welds, in heat-affected zones, or in base metal where the material has been subjected to a level of heating that has altered the material structure near the grain boundaries in such a way that the grain boundary region is less corrosion resistant than the material away from the grain boundaries. In response to residual stresses from welding or to applied service loads, cracking will develop in the material if the fluids in contact with the surface are corrosive. Cracking proceeds inward along the grain boundaries in a direction that is approximately normal to the dominant source of stress.

It is important to note, however, that under some conditions, stress corrosion cracking in certain steels may propagate by a mixed transgranular/intergranular mode of fracture.

Irradiation-assisted stress corrosion cracking is a special form of SCC in which the source or the driving force for the cracking is the high level of neutron bombardment to which the materials are subjected; the austenitic stainless steels used in the core region of nuclear reactors have shown particular susceptibility to this type of damage. It is believed that the passage of the neutrons through the material creates (through transmutation) both impurity species that concentrate in the grain boundaries and "residual" stresses. In the presence of a corrosive media, the grain boundaries are anodic to the grains themselves and if the level of tensile stress is sufficiently high, SCC will occur.

A-701.2 References. Stress corrosion cracking is covered in nearly every one of the sources identified in A-120. The extent of coverage above and in cited references should be enough to provide the necessary guidance for avoiding this form of environmental damage.

A-702 HYDROGEN DAMAGE

A-702.1 Definition. Hydrogen damage is a general term used to cover several types of possible material degradation for which hydrogen is the principal degrading agent, including the following:

- Hydrogen embrittlement
- Hydrogen-induced blistering
- Cracking from precipitation of internal hydrogen
- Hydrogen attack
- Cracking from hydride formation

Many metals and alloys are susceptible to hydrogen damage, but it occurs most frequently in carbon and low alloy steels. Hydrogen is one of the more abundant gases in the earth's atmosphere and it often is present during various phases of alloy production, during certain phases of the processing of the alloy, and once the alloy is placed in service. Corrosion reactions frequently are the source of damaging amounts of hydrogen. Thus, hydrogen damage can develop in a wide variety of environments

and under a broad range of circumstances. The following are brief discussions of each of the five most-common hydrogen-dominated damage mechanisms.

A-702.1.1 Hydrogen Embrittlement. This is a condition of induced low ductility or hydrogen-induced cracking in metals resulting from the absorption of hydrogen. A related term, *hydrogen-induced delayed cracking*, is sometimes used to identify a form of hydrogen embrittlement in which the metal or alloy appears to fracture spontaneously under a steady stress *less* than the yield stress. There is usually a delay between the application of stress (or exposure of the stressed metal to hydrogen) and the onset of cracking. This damage is sometimes referred to as static fatigue.

Steels can be embrittled by a very small amount of hydrogen (i.e., a few parts per million) from a wide variety of sources. Failure by hydrogen embrittlement occurs with very little plastic deformation, with the fracture surface characterized by brittle cleavage or quasi-cleavage.

The susceptibility of carbon and low alloy steels to hydrogen embrittlement tends to increase with increased strength of the steels. For a given hydrogen content, embrittlement tendency increases with decreased strain rate. Embrittlement is most prevalent at room temperature, with cracking tendency decreasing as temperatures rise. Above 390°F, susceptibility to hydrogen embrittlement disappears entirely in steels, due to the rapid diffusion of the small hydrogen atom through the crystal lattice at those temperatures.

A-702.1.2 Hydrogen-Induced Blistering. This is a condition that involves the formation of blisters on or below a metal surface due to excessive internal hydrogen pressure. The hydrogen may be generated during cleaning, pickling, plating, corrosion, etc. Hydrogen-induced blistering is most prevalent in low strength alloys that are exposed to hydrogen-charging conditions. When hydrogen is absorbed into the metal and diffuses inward, it can precipitate as molecular hydrogen at internal voids, laminations, or at inclusion/matrix interfaces. As the larger hydrogen molecules concentrate within a particular location in the material, pressure can increase to levels where internal cracks form. If these cracks are just below the surface, the gas pressure in the cracked area can cause the metal at the surface to become raised and bulge out, creating a blister-like protuberance on the surface. Although this type of damage is encountered in a variety of situations, it is worth noting that hydrogen blistering in line pipe steels is always associated with certain metallurgical features, such as inclusions, large precipitate particles, or martensite bands.

A-702.1.3 Cracking From the Precipitation of Internal Hydrogen. This can appear as flakes, fish eyes, or underbead cracking (also known as hydrogen-delayed cracking). Flakes frequently are encountered on the surfaces of heavy steel forgings, where they appear as small elliptically shaped cracks. These are formed during cooling after the first forging or rolling operation. The flakes are caused by localized hydrogen embrittlement resulting from the concentration of internal hydrogen. The source for the hydrogen frequently is the steelmaking process itself, with the hydrogen coming from moisture in the atmosphere or from moisture entrained in additives used in the steelmaking process. When the metal is cooled, any hydrogen present can precipitate as molecular hydrogen at inclusions, where flakes are subsequently formed due to the increased pressure of the gaseous hydrogen.

Fish eyes (small rounded shiny areas of fracture) also are associated with absorbed hydrogen, but they more typically appear on the fracture surface of tensile specimens from steel forgings or plates having high hydrogen contents. When fish eyes are found on the fracture surfaces of tensile specimens, there will be an associated loss in ductility. Baking or prolonged room-temperature aging allows a portion of the hydrogen to diffuse out of the material, and typically eliminates fish eyes and restores tensile ductility.

When this type of hydrogen damage occurs in welding, it is called underbead cracking. The cracking typically develops in the coarse-grained region of the heat-affected zone, running generally parallel to the fusion line. Since this cracking may not occur until several hours after welding, it is commonly referred to as hydrogen-delayed cracking. As the weld metal cools, it becomes supersaturated with hydrogen, and further cooling, coupled with residual stresses in the weld area, eventually leads to cracking.

A-702.1.4 Hydrogen Attack. This is damage that occurs when a material is exposed at high temperatures and high pressures to a hydrogen-rich environment, whereby the material appears to be unaffected for many days or months, and then suddenly loses its strength and ductility. The effects of high-temperature attack are irreversible. Failure by hydrogen attack is characterized by decarburization and fissuring at grain boundaries, or by bubbles in the metal matrix. Damage of this type is most commonly encountered in the petroleum industry where equipment experiences hydrogen and hydrogen–hydrocarbon substances at pressures as high as 3 psi and temperatures up to 1,000°F. However, hydrogen attack also is a common mode of damage in the furnace wall tubing of high-pressure steam generators, where acid-forming constituents that concentrate at internal deposits instigate corrosion that liberates hydrogen. This hydrogen then diffuses through the metal lattice, where it combines with carbon from carbides to form methane. The methane diffuses to grain boundaries, where it causes fissuring, and ultimately the tube fails due to loss of effective thickness.

A-702.1.5 Cracking From Hydride Formation. This is the fifth in the list of hydrogen damage mechanisms unique to a variety of transition, rare-earth, and

alkaline-earth metals. For ASME Code applications, the only hydride-forming metals whose use is permitted are the alloys of titanium and zirconium. The presence of hydrides in these metals can cause significant increases in strength, accompanied by substantial losses in toughness and ductility. Hydrogen in these materials is picked up during melting or welding, with hydride formation taking place during the cooling process. Applied stresses can cause preferential alignment of hydrides, which typically are much less ductile than the matrix.

Hydride pickup from corrosion reactions in service also occurs and has been shown to cause fracture. Typically, elevated temperature exposure is required, as the mobility of hydrogen in these alloys at room temperature is insufficient to affect the bulk material.

A-702.2 References. Most of what is needed to understand and deal with hydrogen damage can be found in the general references cited in A-120. An additional useful specific reference is:

[1] "Steels for Hydrogen Service at Elevated Temperatures and Pressures in Petroleum Refineries and Petrochemical Practices", API 941, American Petroleum Institute, Dallas, TX 1970.

A-703 LIQUID METAL EMBRITTLEMENT

A-703.1 Definition. Liquid metal embrittlement (LME) is the decrease in ductility of a metal caused by contact with a liquid metal, sometimes leading to catastrophic brittle fracture of a normally ductile metal. Liquid metals can include those purposely being contained by the system – or their source can be low-melting-point substances that inadvertently have come in contact with the pressure boundary material.

The following are considered critical factors in the development of LME:

(a) LME can occur in very specific combinations of structural/pressure boundary materials and low-melting-point metals, such as zinc, mercury, cadmium, lead, bismuth, copper, and tin.

(b) Very small quantities of the low-melting-point metals are sufficient to cause LME problems.

(c) High tensile stress promotes cracking, but cracking can occur simply through contact with the molten metal. Cracking under load can be very rapid.

(d) Cracking due to LME can also take a very long time to occur with some metal/liquid metal combinations.

(e) A susceptible metal in contact with a low-melting-point metal may not crack until the temperature of the materials rises above the melting point of the contaminating low-melting-point metal.

Copper checking is an example of LME that has been encountered with some frequency in the manufacture of thick-walled pressure parts with relatively high levels of residual copper. During high-temperature forming operations, the iron at the surface of the part will oxidize, leading to an enrichment of the surface in elemental copper. With further high-temperature processing, the material at the surface can develop shallow cracks due to the penetration of the copper into the grain boundaries of the host material.

A-703.2 References. Most of what is needed to understand the basics of liquid metal embrittlement can be found in the general references cited in A-120.

A-704 CAUSTIC EMBRITTLEMENT

A-704.1 Definition. Caustic embrittlement or caustic cracking is an obsolete historical term denoting a form of stress corrosion cracking (SCC) most frequently encountered in carbon steels or iron–chromium–nickel alloys that are exposed to concentrated hydroxide solutions at temperatures of 400°F to 480°F. In austenitic stainless steels (300 series), caustic cracking has been observed at temperatures as low as 195°F, is mostly transgranular, and is not easily distinguished from chloride stress-corrosion cracking. Alloys such as N06600 and N08800 generally exhibit intergranular SCC in high-temperature caustic environments.

A-704.2 References. Information related to the basics of caustic embrittlement and caustic stress corrosion cracking can be found in the general references cited in A-120.

A-705 FLOW-ACCELERATED CORROSION

A-705.1 Definition. Flow-accelerated corrosion (FAC) has emerged as a serious problem in both nuclear and fossil-fired power plants, where its occurrence has resulted in fatalities at several plants. It is a term used to describe a form of attack on metals that occurs as the result of the local dissolution of the protective oxide film and the simultaneous sweeping away of metal ions from the exposed surfaces by the flowing liquid. This type of attack is sometimes erroneously considered to be a form of erosion-corrosion, involving mechanical removal of the protective oxide film by the fluid and whatever suspended solids it might be carrying, whereas in FAC the damage to the oxide film that instigates the attack is chemical in nature. Also, as was the case in liquid metal corrosion (discussed in A-312), if material is being dissolved away at one location, then it must be assumed that whatever was dissolved will eventually be deposited elsewhere in the system; if these deposits accumulate on heat transfer surfaces, they may lead to problems related to the under-deposit corrosion mechanisms, such as hydrogen attack, caustic gouging, or acid phosphate corrosion.

Flow-accelerated corrosion can occur under either single- or two-phase conditions and is influenced by a complex interaction between a number of variables, including base material composition, water/steam temperature and steam quality (dry versus wet), pH, oxygen content, fluid velocity, and geometry. Because FAC takes place as a gradual thinning in localized areas, piping has a tendency to rupture when it becomes

sufficiently thinned. Relatively small amounts of chromium in the base metal — some studies have suggested as little as 0.10% (by weight) — can render the material immune to FAC.

A-705.2 References. In addition to the general references cited in A-120, the following additional references may be helpful in dealing with FAC:

[1] Wu, P. C., "Erosion/Corrosion-Induced Pipe Wall Thinning in U.S. Nuclear Power Plants," Final Report, U.S. NRC NUREG-1344, April 1989.
[2] Partlo, J. G., "Erosion/Corrosion-Induced Pipe Wall Thinning," U.S. NRC Generic Letter 89-08, May 2, 1989.
[3] Jonas, O., "Erosion-Corrosion of PWR Feedwater Piping Survey of Experience, Design, Water Chemistry, and Materials," Final Report, U.S. NRC NUREG/CR-5149, March 1988.

A-706 SULFUR EMBRITTLEMENT

Nickel combines with sulfur at elevated temperatures to form a brittle sulfide. This phenomenon takes place preferentially at the grain boundaries, and results in embrittlement that exhibits itself as a network of cracks when the material is stressed or bent. Nickel is affected most, nickel–copper somewhat less, and nickel–chromium–iron still less. The more sulfur present or the higher the temperature, the more rapid and deep will be the attack.

Material that has been sulfur embrittled cannot be salvaged. It must be scrapped.

Prior to any operation that involves heating to a higher temperature, such as welding, brazing, annealing, hot forming, and forging, it is imperative to remove all sulfur-containing substances, such as oil, grease, marking pencil marks, paint, and drawing or threading lubricants. In addition, the atmosphere of the furnace in which heating is done should be essentially sulfur-free. A city gas or natural gas containing less than 25 grains of sulfur per 100 ft^3 or a fuel oil containing less than 0.5% sulfur will be satisfactory for heating. Coal and coke are not satisfactory.

A-800 MECHANICAL DAMAGE MECHANISMS

Mechanical damage mechanisms are those mechanisms in which the damage is not controlled by direct electrochemical reactions between the pressure-containing material and the substance contained. Instead, damage occurs to system materials as a result of simple mechanical contact with other materials — or from sudden changes in coolant temperature and/or velocity. The more important damage mechanisms are described as follows.

A-801 FRETTING AND WEAR

A-801.1 Definition. Fretting is defined as wear that occurs between tight-fitting surfaces subjected to oscillation at very small amplitudes. This type of wear can be a combination of oxidative wear and abrasive wear. If corrosion is a factor in the damage, then the deterioration at the interface is termed fretting corrosion. Wear is defined as the damage to a solid surface, generally involving progressive loss of material due to relative motion between one surface and a contacting surface or substance.

The term fretting covers numerous forms of deterioration, including fretting corrosion, false brinelling, friction oxidation, chafing fatigue, molecular attrition, and wear oxidation.

Wear may range in severity from mild polishing over a long period of time, to the rapid and aggressive removal of material with accompanying surface roughening. There are numerous wear modes and they may change in service as a component deteriorates.

Adhesive wear occurs generally under nonlubricated conditions when both contacting surfaces are metallic. It is also known as scoring, galling, seizing, or scuffing. Microscopic projections from the mating surfaces bond at the sliding interface under very high local pressure. As the bonds are broken, material may be torn from one surface and adhere to the other surface, or loose particles may be formed that then contribute to abrasive wear.

Abrasive wear occurs when hard particles of some origin slide or roll under pressure across a surface, cutting grooves in the surface. Both of the mating sliding surfaces may wear, or the particles may become embedded in one of the surfaces, causing abrasive wear to the mating surface. Abrasive wear may be grinding abrasion or low-stress scratching abrasion.

Corrosive wear is a form of abrasive wear in which chemical or electrochemical reactions accelerate the metal loss between mating surfaces where sliding occurs. In this mode of wear, it may be unclear whether the damage due to mechanical wear precedes the chemical reactions, or vice versa.

Surface fatigue is another mode of wear, in which particles of metal are detached from a surface under high cyclic contact stresses, causing pitting and spalling.

A-801.2 References. Most of what is needed to understand the various aspects of fretting and wear can be found in the general references cited in A-120. References specific to coating options include the following:

[1] Davis, J. R., *Handbook of Thermal Spray Technology*, ASM International, 2004.
[2] Davis, J. R., *Surface Engineering for Corrosion and Wear Resistance*, ASM International, 2001.

A-802 THERMAL FATIGUE

A-802.1 Definition. Thermal fatigue damage is defined as fracture resulting from the presence of temperature gradients that vary with time to produce cyclic stresses in a structure. Two conditions essential for thermal fatigue are some form of mechanical restraint and a temperature change. Thermal stresses are caused by the thermal expansions and contractions against restrained

endpoints. In thick sections, temperature gradients may develop through the thickness, as well as longitudinally, causing triaxial stresses. Most thermal fatigue fractures are of the low-cycle, high-strain type. The resulting fracture surfaces are rough and faceted at or near the initiation sites, and are more fibrous with shear lips at the final fracture area.

A-802.2 References. Information that may be of assistance in understanding and dealing with thermal fatigue can be found in the general references cited in A-120.

A-803 DYNAMIC LOADING

A-803.1 Definition. Dynamic loading involves the application of moving, sometimes high-velocity stresses, that can produce high strain rates in the affected component. This type of loading is contrasted with static loadings of the type imposed by deadweights or the slow application (or variation) of pressure stresses within a system.

Dynamic loads may range from the mild application of cyclic loads during normal plant operations to severe impact loads experienced during abnormal plant excursions (transients) or during some type of component/plant failure. Impacts with tools, suspended loads, or mobile equipment are other sources of dynamic loading. Mobile equipment (i.e., BPVC Section XII) may demand additional considerations of dynamic loadings.

Toughness — the ability to absorb energy without fracturing — is one of the most important material properties for structures/components subjected to dynamic loads. A relatively simple gauge of a material's toughness can be made using the Charpy V-notch test, in which a notched material specimen at a controlled temperature is struck with a heavy pendulum, and the amount of energy absorbed in breaking the specimen is considered to be a relative measure of the material's toughness. As temperatures are reduced, materials will generally break at lower values of absorbed energy, with fractures displaying progressively more brittle rather than ductile characteristics.

A-803.2 References. Most of what is needed to understand and deal with a wide variety of dynamic loading events can be found in the general references cited in A-120.

A-804 ANISOTROPY

All materials possess some degree of directional dependence of properties, or *anisotropy.* For polycrystalline cubic metals, this anisotropy is not significant. For wrought hexagonal metals, such as titanium and zirconium, the anisotropy can be significant. Anisotropy is usually described with reference to the principal direction of mechanical working; for bar this is the axial direction and for plate it is the longitudinal direction. For titanium and zirconium, the axial/longitudinal direction has lower elastic modulus and lower yield strength than the circumferential long-transverse direction, which has lower elastic modulus and lower yield strength than the radial/short-transverse direction. Through-thickness modulus can be up to 45% greater than the axial/longitudinal modulus. Thermal expansion is also anisotropic, with expansion in the through-thickness direction being up to 15% greater than in the working direction.

NONMANDATORY APPENDIX B
DEVELOPING NOMINAL COMPOSITION DESIGNATIONS FOR ASME CODE MATERIALS

B-100 BACKGROUND

Nominal composition designations play an essential role in the ordering of materials in stress tables for ferrous materials in Section II, Part D of the ASME Boiler and Pressure Vessel Code and in other Sections of the Code containing such tables. In Code stress tables for nonferrous materials, alloys are ordered by increasing Unified Numbering System (UNS) numbers, except that nonferrous alloys without UNS numbers (alloys not listed in an ASTM specification) are listed following similar nonferrous alloys that do have UNS numbers. Nonferrous alloys include aluminum, copper, nickel, and the reactive and refractory alloys (cobalt, titanium, and zirconium). For nonferrous materials, Code stress tables provide nominal composition designations for information only, but only for nickel-base and the reactive and refractory alloys. A voted action within the Subcommittee on Materials (now BPV II on Materials) several years ago precluded the listing of nominal compositions for both aluminum and copper-base alloys. However, nominal compositions for all aluminum and copper alloys, along with all ferrous alloys and nickel-base alloys, can be found in other sources.[4, 5]

Nominal composition designations have existed in the Code stress tables for many years, but it was the publication of Section II, Part D that placed new significance on nominal composition designations, as they were used in the ordering of ferrous materials in the stress tables. At the same time, the Section II-D tables of thermophysical properties were also updated, with values for ferrous materials tied to their nominal compositions. It became necessary to resolve some conflicts where nominal compositions differed within a given alloy. No guidelines had ever been developed by those who established the earlier designations. This guideline now serves that need.

In the interest of helping those who have to define nominal composition designations for new alloys introduced to the Code through Construction Code Code Cases and incorporation into Section II, and to resolve discrepancies within established nominal composition descriptions, this guideline describes how these nominal compositions are developed for each class of Code materials – first for ferrous alloys, and then for the various nonferrous alloys.

B-200 GENERAL GUIDELINE FOR ALL MATERIALS

Any nominal composition designation is nothing more than a naming device, helping to describe the primary or most significant elements in a given alloy. The nominal composition is *not* meant to be construed as a specified composition, particularly since amounts of each element are shown as single values, rather than as maximums, minimums, or ranges.

To simplify the process of designating nominal compositions, a list consisting of between two and five elements should be used to distinguish one alloy from another. However, additional elements may be used, if necessary, to adequately describe the alloy or alloys.

It has been customary to list the elements comprising the nominal composition designations in order of decreasing amounts present. However, some existing nominal composition designations violate this guideline and there is no intent to revise those designations.

When small amounts of selected elements are added to the alloys to impart particular characteristics, they may be shown without a specified amount (percentage). Otherwise, the values shown for each element are considered weight percentages (corresponding to specified amounts in ASME, ASTM, or other approved materials specifications). Weight percentages are generally shown as whole percentage numbers, although sometimes it is necessary to show such percentages to one decimal place. Further, some designations have been in common usage for so long that they are still used, even though the designations may not reflect the midpoint of a composition range and even though the specified composition ranges may have been changed. Examples of such situations are austenitic stainless steel designations, such as 18Cr–8Ni and 18Cr–10Ni–Cb. Finally, some classes of such alloys that differ by small variations (examples are grades 347, 348, 347H, 347LN, etc.) may all be grouped into one nominal compositional designation (e.g., 18Cr–10Ni–Cb), differentiated by grade, and listed in the tables in order of increasing UNS number.

B-300 GUIDELINES FOR DEVELOPING NOMINAL COMPOSITION DESIGNATIONS FOR FERROUS MATERIALS

The first source for determining the nominal composition designations for a given ferrous material is the title of its specification. Those specification titles often identify the category to which the material belongs — carbon steel, alloy steel (low and intermediate), or high alloy steel (chromium, chromium–nickel, heat-resisting austenitics, etc.). If the title of the specification does not identify the class of materials covered, the scope paragraph of the specification may do so.

For all categories of ferrous materials, iron is always presumed to be present and is *never* shown in the nominal composition designation. Further, most steels contain customary amounts of sulfur, phosphorus, silicon, and manganese, and these elements, too, are *not* listed in the nominal compositions, unless they are intentionally added in higher amounts to impart special characteristics.

Primary alloying constituents, found in the specified chemical requirements as a minimum amount, are usually listed in the nominal composition at that numerical percentage value. If the specified chemical requirements show a range, then a value at the midpoint of the range is selected. Carbon steels, carbon–manganese steels, carbon–silicon steels, and carbon–manganese–silicon steels are simply listed as "Carbon steel." When a specification for an alloy otherwise similar to an alloy in the C steel group identifies or covers the alloy as "microalloyed" material, the principal alloying ingredients are listed without numerical values (since amounts are generally small fractions of 1%).

For all other classes of ferrous materials, simply two to five of the principal alloying constituents, in order of decreasing percentage amounts, are shown.

B-400 GUIDELINES FOR DEVELOPING NOMINAL COMPOSITION DESIGNATIONS FOR NONFERROUS MATERIALS

B-410 NICKEL ALLOYS

Many of the specifications for nickel alloys have complex titles that provide information about the primary elements comprising each alloy covered by a given specification, e.g., SB-574, SB-688, and SB-710. Most specifications for nickel alloys will generally list the nickel content as "balance" or "remainder." Since nominal composition designations for nickel alloys always begin with the percentage amount of nickel, it is necessary to add up the nominal or average percentage amounts of all other specified elements and then subtract their total from 100 to develop a value for the nickel content (i.e., determine by difference). After the amount of nickel is listed, then other alloying elements are listed in decreasing order of alloy content. For some complex alloys, it might seem necessary to list more than five elements to adequately differentiate one alloy from another, but since these alloys are sufficiently defined and ordered in the table by their UNS numbers, it is not necessary to be overly precise in developing such lists of alloying elements and the listing of more than five alloying elements is to be discouraged.

There are some alloys that were considered to be nickel alloys by the former definition of a nonferrous material (an alloy containing 50% or less of iron), but that are now considered to be ferrous materials (alloys whose principal element is iron). Those alloys have nominal compositions beginning with the amount of iron, unlike the other ferrous alloys described previously. However, an action plan was initiated in 2010 to move those alloys out of the nonferrous material tables and specifications.

B-420 ALUMINUM ALLOYS

Nominal composition designations for aluminum alloys always begin with "Al", with no designation of the amount of aluminum in the alloy. Other alloying elements should be listed in order of decreasing nominal content in the alloy as listed in the composition requirements of the specification.

B-430 COPPER ALLOYS

Nominal composition designations for copper alloys are developed in a manner similar to the process used for nickel alloys. First listed is the amount of copper present and again this is usually determined by difference. Then, using the nominal or average amounts of alloying elements, their amounts are selected and listed in decreasing order of concentration.

B-440 TITANIUM ALLOYS

Similarly to the guidelines for aluminum alloys, nominal composition designations for titanium alloys simply begin with "Ti," with no numerical designation of the amount of titanium. Then, using the specified chemical requirements, nominal or midrange values of principal alloy ingredients are identified and listed in order of decreasing amounts.

B-450 ZIRCONIUM ALLOYS

As with the guidelines for nickel and copper alloys, nominal composition designations for zirconium alloys always show the amount of zirconium. Also, the amount of zirconium is generally obtained by difference. After listing the amount of zirconium, then the percentage amounts of the other alloying ingredients are listed in order of decreasing content. However, for zirconium alloys used in Code construction, the *actual amounts* of alloying additions are *not* shown for the single alloying element.

B-460 COBALT ALLOYS

Cobalt alloys are identified as R3XXXX alloys in the Unified Numbering System designations. The cobalt alloys have their own unique nominal composition designation system. New cobalt alloys should follow the precedent used for those now listed.

B-500 SUMMARY

This guideline follows the existing historical conventions to the extent possible. Thus, it is based in large part on precedent and does not create a new convention that could be applied to all alloys. If it did not, a very large part of the Code would have to be revised and that would not be a fruitful use of resources.

In developing *new* nominal composition designations, refer first to these new guidelines, but remember to also do the following:

(a) Try to conform new nominal compositions to existing designations found in specifications or other sources.

(b) Follow precedent to the extent possible.

(c) Add up the percentage amounts of all elements shown in the nominal composition designation and ensure that the total does not exceed 100. Totals less than 100 are acceptable, particularly for those alloy systems (e.g., ferrous, aluminum, and titanium alloys) that do not list the amounts of the principal alloying elements in the nominal composition.

(d) Avoid, to the extent possible, the listing of more than five alloying elements.

Since most of the use of nominal composition designations is in the stress and property tables of Section II, Part D, the BPV II Committee on Materials retains the final approval authority over any revisions to, or development of, any new nominal composition designations.

NONMANDATORY APPENDIX C
GUIDANCE FOR THE USE OF U.S. CUSTOMARY AND SI UNITS IN THE ASME BOILER AND PRESSURE VESSEL CODE

C-100 USE OF UNITS IN EQUATIONS

The equations in this Section are suitable for use with either the U.S. Customary or the SI units provided in Mandatory Appendix 9, or with the units provided in the nomenclatures associated with the equations. It is the responsibility of the individual and organization performing the calculations to ensure that appropriate units are used. Either U.S. Customary or SI units may be used as a consistent set. When necessary to convert from one system of units to another, the units shall be converted to at least three significant figures for use in calculations and other aspects of construction.

C-200 GUIDELINES USED TO DEVELOP SI EQUIVALENTS

The following guidelines were used to develop SI equivalents:

(a) SI units are placed in parentheses after the U.S. Customary units in the text.

(b) In general, separate SI tables are provided if interpolation is expected. The table designation (e.g., table number) is the same for both the U.S. Customary and SI tables, with the addition of suffix "M" to the designator for the SI table, if a separate table is provided. In the text, references to a table use only the primary table number (i.e., without the "M"). For some small tables, where interpolation is not required, SI units are placed in parentheses after the U.S. Customary unit.

(c) Separate SI versions of graphical information (charts) are provided, except that if both axes are dimensionless, a single figure (chart) is used.

(d) In most cases, conversions of units in the text were done using hard SI conversion practices, with some soft conversions on a case-by-case basis, as appropriate. This was implemented by rounding the SI values to the number of significant figures of implied precision in the existing U.S. Customary units. For example, 3,000 psi has an implied precision of one significant figure. Therefore, the conversion to SI units would typically be to 20 000 kPa. This is a difference of about 3% from the "exact" or soft conversion of 20 684.27 kPa. However, the precision of the conversion was determined by the Committee on a case-by-case basis. More significant digits were included in the SI equivalent if there was any question. The values of allowable stress in Section II, Part D generally include three significant figures.

(e) Minimum thickness and radius values that are expressed in fractions of an inch were generally converted according to the following table:

Fraction, in.	Proposed SI Conversion, mm	Difference, %
1/32	0.8	−0.8
3/64	1.2	−0.8
1/16	1.5	5.5
3/32	2.5	−5.0
1/8	3	5.5
5/32	4	−0.8
3/16	5	−5.0
7/32	5.5	1.0
1/4	6	5.5
5/16	8	−0.8
3/8	10	−5.0
7/16	11	1.0
1/2	13	−2.4
9/16	14	2.0
5/8	16	−0.8
11/16	17	2.6
3/4	19	0.3
7/8	22	1.0
1	25	1.6

(f) For nominal sizes that are in even increments of inches, even multiples of 25 mm were generally used. Intermediate values were interpolated rather than converting and rounding to the nearest mm. See examples in the following table. [Note that this table does not apply to nominal pipe sizes (NPS), which are covered below.]

Size, in.	Size, mm
1	25
1 1/8	29
1 1/4	32
1 1/2	38
2	50
2 1/4	57
2 1/2	64
3	75
3 1/2	89
4	100
4 1/2	114
5	125
6	150

Table continued

Size, in.	Size, mm
8	200
12	300
18	450
20	500
24	600
36	900
40	1 000
54	1 350
60	1 500
72	1 800

Size or Length, ft	Size or Length, m
3	1
5	1.5
200	60

(g) For nominal pipe sizes, the following relationships were used:

U.S. Customary Practice	SI Practice	U.S. Customary Practice	SI Practice
NPS 1/8	DN 6	NPS 20	DN 500
NPS 1/4	DN 8	NPS 22	DN 550
NPS 3/8	DN 10	NPS 24	DN 600
NPS 1/2	DN 15	NPS 26	DN 650
NPS 3/4	DN 20	NPS 28	DN 700
NPS 1	DN 25	NPS 30	DN 750
NPS 1 1/4	DN 32	NPS 32	DN 800
NPS 1 1/2	DN 40	NPS 34	DN 850
NPS 2	DN 50	NPS 36	DN 900
NPS 2 1/2	DN 65	NPS 38	DN 950
NPS 3	DN 80	NPS 40	DN 1000
NPS 3 1/2	DN 90	NPS 42	DN 1050
NPS 4	DN 100	NPS 44	DN 1100
NPS 5	DN 125	NPS 46	DN 1150
NPS 6	DN 150	NPS 48	DN 1200
NPS 8	DN 200	NPS 50	DN 1250
NPS 10	DN 250	NPS 52	DN 1300
NPS 12	DN 300	NPS 54	DN 1350
NPS 14	DN 350	NPS 56	DN 1400
NPS 16	DN 400	NPS 58	DN 1450
NPS 18	DN 450	NPS 60	DN 1500

(h) Areas in square inches ($in.^2$) were converted to square millimeters (mm^2), and areas in square feet (ft^2) were converted to square meters (m^2). See examples in the following table:

Area (U.S. Customary)	Area (SI)
1 $in.^2$	650 mm^2
6 $in.^2$	4 000 mm^2
10 $in.^2$	6 500 mm^2
5 ft^2	0.5 m^2

(i) Volumes in cubic inches ($in.^3$) were converted to cubic millimeters (mm^3), and volumes in cubic feet (ft^3) were converted to cubic meters (m^3). See examples in the following table:

Volume (U.S. Customary)	Volume (SI)
1 $in.^3$	16 000 mm^3
6 $in.^3$	100 000 mm^3
10 $in.^3$	160 000 mm^3
5 ft^3	0.14 m^3

(j) Although the pressure should always be in MPa for calculations, there are cases where other units are used in the text. For example, kPa is used for small pressures. Also, rounding was to one significant figure (two at the most) in most cases. See examples in the following table. (Note that 14.7 psi converts to 101 kPa, while 15 psi converts to 100 kPa. While this may seem at first glance to be an anomaly, it is consistent with the rounding philosophy.)

Pressure (U.S. Customary)	Pressure (SI)
0.5 psi	3 kPa
2 psi	15 kPa
3 psi	20 kPa
10 psi	70 kPa
14.7 psi	101 kPa
15 psi	100 kPa
30 psi	200 kPa
50 psi	350 kPa
100 psi	700 kPa
150 psi	1 MPa
200 psi	1.5 MPa
250 psi	1.7 MPa
300 psi	2 MPa
350 psi	2.5 MPa
400 psi	3 MPa
500 psi	3.5 MPa
600 psi	4 MPa
1,200 psi	8 MPa
1,500 psi	10 MPa

(k) Material properties that are expressed in psi or ksi (e.g., allowable stress, yield and tensile strength, elastic modulus) were generally converted to MPa to three significant figures. See example in the following table:

Strength (U.S. Customary)	Strength (SI)
95,000 psi	655 MPa

(l) In most cases, temperatures (e.g., for PWHT) were rounded to the nearest 5°C. Depending on the implied precision of the temperature, some were rounded to the nearest 1°C or 10°C or even 25°C. Temperatures colder than 0°F (negative values) were generally rounded to the nearest 1°C. The examples in the table below were created by rounding to the nearest 5°C, with one exception:

Temperature, °F	Temperature, °C
70	20
100	38
120	50
150	65
200	95
250	120
300	150
350	175
400	205
450	230
500	260
550	290
600	315
650	345
700	370
750	400
800	425
850	455
900	480
925	495
950	510
1,000	540
1,050	565
1,100	595
1,150	620
1,200	650
1,250	675
1,800	980
1,900	1 040
2,000	1 095
2,050	1 120

C-300 SOFT CONVERSION FACTORS

The following table of "soft" conversion factors is provided for convenience. Multiply the U.S. Customary value by the factor given to obtain the SI value. Similarly, divide the SI value by the factor given to obtain the U.S. Customary value. In most cases it is appropriate to round the answer to three significant figures.

U.S. Customary	SI	Factor	Notes
in.	mm	25.4	...
ft	m	0.3048	...
$in.^2$	mm^2	645.16	...
ft^2	m^2	0.09290304	...
$in.^3$	mm^3	16,387.064	...
ft^3	m^3	0.02831685	...
U.S. gal	m^3	0.003785412	...
U.S. gal	liters	3.785412	...
psi	MPa (N/mm^2)	0.0068948	Use exclusively in equations
psi	kPa	6.894757	Use only in text and for nameplate
psi	bar	0.06894757	...
ft-lb	J	1.355818	...
°F	°C	$\frac{5}{9} \times (°F - 32)$	Not for temperature difference
°F	°C	$\frac{5}{9}$	For temperature differences only
R	K	$\frac{5}{9}$	Absolute temperature
lbm	kg	0.4535924	...
lbf	N	4.448222	...
in.-lb	N·mm	112.98484	Use exclusively in equations
ft-lb	N·m	1.3558181	Use only in text
$ksi\sqrt{in.}$	$MPa\sqrt{m}$	1.0988434	...
Btu/hr	W	0.2930711	Use for boiler rating and heat transfer
lb/ft^3	kg/m^3	16.018463	...

NONMANDATORY APPENDIX D
GUIDELINES FOR ROUNDING MINIMUM SPECIFIED TENSILE AND YIELD STRENGTH VALUES AND FOR ESTABLISHING ANCHOR POINTS FOR TENSILE AND YIELD STRENGTH TREND CURVES IN TABLES 1A, 1B, 2A, 2B, 3, 4, 5A, 5B, U, AND Y-1

(21)

D-100 MINIMUM TENSILE STRENGTH AND MINIMUM YIELD STRENGTH COLUMNS

D-110 DUAL UNIT SPECIFICATIONS

For specifications that contain both U.S. Customary and Metric minimum specified tensile and yield strength values, do the following:

(a) List the U.S. Customary values from the material specification in the columns for Minimum Tensile Strength, ksi and Minimum Yield Strength, ksi in the U.S. Customary edition tables of Section II, Part D.

(b) List the Metric values from the material specification in the columns for Minimum Tensile Strength, MPa and Minimum Yield Strength, MPa in the Metric edition tables of Section II, Part D.

D-120 TWO SEPARATE SPECIFICATIONS FOR THE SAME PRODUCT FORM

When two separate specifications exist for the same product form, one in U.S. Customary units and one in Metric units (a common situation for some fastener specifications), do the following:

(a) List the values from the U.S. Customary edition of the material specification in the columns for Minimum Tensile Strength, ksi and Minimum Yield Strength, ksi in the U.S. Customary edition tables of Section II, Part D.

(b) List the values from the Metric edition of the material specification in the columns for Minimum Tensile Strength, MPa and Minimum Yield Strength, MPa in the Metric edition tables of Section II, Part D.

D-130 SPECIFICATION EXISTS IN ONLY ONE SET OF UNITS

When a specification exists for only one set of units (common for EN and other non-U.S. specifications for which only Metric editions exist), do the following:

(a) Specification Exists Only in U.S. Customary Units

(1) List the U.S. Customary values in the columns for Minimum Tensile Strength, ksi and Minimum Yield Strength, ksi in the U.S. Customary edition tables of Section II, Part D.

(2) Multiply the U.S. Customary specification values by 6.894757, round to the nearest MPa (i.e., do a soft conversion), and list these rounded values in the columns for Minimum Tensile Strength, MPa and Minimum Yield Strength, MPa in the Metric edition tables of Section II, Part D.

(b) Specification Exists Only in Metric Units

(1) List the Metric values in the columns for Minimum Tensile Strength, MPa and Minimum Yield Strength, MPa in the Metric edition tables of Section II, Part D.

(2) Divide the Metric specification values by 6.894757, round to the nearest 0.5 ksi (i.e., do a soft conversion), and list these rounded values in the columns for Minimum Tensile Strength, ksi and Minimum Yield Strength, ksi in the U.S. Customary edition tables of Section II, Part D.

D-200 SELECTING ANCHOR POINT FOR TENSILE AND YIELD STRENGTH TREND CURVES FOR ALL SITUATIONS IN WHICH THE MINIMUM RT SPECIFIED VALUES IN ONE UNIT SYSTEM ARE NOT PRECISE CONVERSIONS OF THE UNITS IN THE OTHER SYSTEM

D-210 ONE MATERIAL HAS ONE TREND CURVE RULE

This rule requires that the trend curves in either system of units are precisely congruent with one another. That is, if the Metric and U.S. Customary curves are placed on top of one another, they appear to be only one curve. Thus, a material does not have two trend curves of the same shape, but has one curve.

It should be recognized that following the “one material: one trend curve” rule will result in certain inconsistencies with the criteria established by Section II, Part D, Mandatory Appendices 1, 2, and 10. The rule was first established when the Section II-D tables were metricated. An example of the inconsistency with Appendix 1 can be seen in the Metric values for Type 347H stainless steel, on pp. 102–105 of the 2010 Edition, 2011 Addenda of

Section II, Part D Metric. Inspection of Line No. 1 on these pages, for SA-312 seamless pipe, shows that the values in the Min. Tensile Strength and Min. Yield Strength columns on p. 103 are, respectively, 515 MPa and 205 MPa, as they appear in the SA-312 specification in Section II, Part A. However, the value in the −30 to 40°C and the 65°C columns, 138 MPa, is not equal to either 515/3.5 = 147.14 = 147 MPa or (205 × 2)/3 = 136.67 = 137 MPa. Instead, 138 MPa is obtained from (30 ksi × 6.894757 × 2)/3 = 137.89514 = 138 MPa. In this example, the "one material: one trend curve" rule results in a value at two temperatures that is slightly higher than would have been obtained from applying the Appendix 1 criteria to the Metric minimum specified yield strength. For other materials, slightly lower values might result. However, in either example, the values will be identical (within rounding variances) to those of the U.S. Customary values at the same temperatures.

D-220 ANCHORING THE TREND CURVE

When anchoring the yield and tensile strength trend curve, the U.S. Customary tensile and yield strengths are used when the specification is either a dual unit specification or exists only in U.S. Customary units. The Metric trend curve is then anchored to the conversion of the U.S. Customary values — the U.S. Customary values multiplied by 6.894757. Rounding is delayed until the last step (see D-300). However, when the specification exists only in a Metric version, the U.S. Customary trend curves are anchored to the soft conversion from the Metric-specified minimum tensile and yield strengths, in all cases, i.e., the U.S. Customary trend curves are anchored to the Metric-specified minimum tensile and yield strengths divided by 6.894757. Again, rounding is delayed until the last step.

D-230 EQUIVALENT MATERIALS

When a non-ASTM specification that, in the judgment of the Committee, has chemistry and heat treatment requirements so similar to an ASTM specification and grade that is already listed in Section II, Part D, that it is indistinguishable from the ASTM material, the Committee may choose to use the same trend curves for the non-ASTM specification as were used to develop the values for the ASTM material, regardless of any differences between the U.S. Customary minimum specified values and the Metric minimum specified values.

D-300 SIGNIFICANT FIGURES IN THE ALLOWABLE STRESS, TENSILE STRENGTH, AND YIELD STRENGTH TABLES IN SECTION II, PART D AND IN CODE CASES

D-310 U.S. CUSTOMARY TABLES

When listing allowable stress values in ksi, the last step in the analysis is to round the calculated values to three significant figures for values of 10.0 ksi and greater, and to two significant figures for values less than 10.0 ksi. When listing tensile strength and yield strength values in ksi, the last step in the analysis is to round the calculated values to four significant figures for values of 100.0 ksi and greater, to three significant figures for values less than 100.0 ksi down to and including 10.0 ksi, and to two significant figures for values less than 10.0 ksi.

D-320 METRIC TABLES

When listing allowable stress, tensile strength, and yield strength values in MPa, the last step in the analysis is to round the calculated values to three significant figures, except that, for values greater than 999 MPa, round the value of the fourth figure to 0 or 5. For example, 1 022 rounds to 1 020, while 1 023 rounds to 1 025 MPa.

NONMANDATORY APPENDIX E
MATERIAL DATA FOR STRESS ANALYSIS IN THE TIME-DEPENDENT REGIME

E-100 INTRODUCTION

Tables E-100.1-1 through E-100.23-1 and Figures E-100.2-1 through E-100.22-11 were drawn from the 2015 Edition of Section III, Subsection NH. They are intended to be used in the time-dependent stress analysis for nonnuclear applications using the strain method. A cross-reference between the table and figure numbers in this Appendix and those in the 2015 Edition of Section III, Subsection NH is provided in Table E-100.24-1.

Table E-100.1-1
Tensile Strength Values, S_u

For Metal Temperature Not Exceeding, °F	See Table U for Values up to 1,000°F				
	304 SS	316 SS	Ni–Fe–Cr UNS N08810	2¼Cr–1Mo	9Cr–1Mo–V
1,050	55.0	61.5	57.4	49.2	51.4
1,100	52.3	58.3	55.3	43.7	45.5
1,150	49.1	54.7	52.9	37.1	39.4
1,200	45.6	50.6	50.2	29.6	33.2
1,250	41.8	46.0	47.0	...	...
1,300	37.7	41.0	43.6	...	...
1,350	33.4	35.7	39.9	...	...
1,400	29.1	30.0	36.0	...	...
1,450	24.8	24.2	32.0	...	...
1,500	20.6	18.2	27.8	...	...
1,550	...	...	23.7	...	...
1,600	...	...	19.7	...	...
1,650	...	...	16.0	...	...

GENERAL NOTES:

(a) At temperatures above room temperature, the values of tensile strength tend toward an average or expected value which may be as much as 10% above the tensile strength trend curve adjusted to the minimum specified room temperature tensile strength. At temperatures above room temperature, the yield strength values correspond to the yield strength trend curve adjusted to the minimum specified room temperature yield strength. Neither the tensile strength nor the yield strength values correspond exactly to either *average* or *minimum* as these terms are applied to a statistical treatment of a homogeneous set of data.

(b) Neither the ASME Material Specifications nor the rules of Sections I, IV, VIII, or XII require elevated temperature testing for tensile or yield strengths of production material for use in Code components. It is not intended that results of such tests, if performed, be compared with these tabulated tensile and yield strength values for ASME Code acceptance/rejection purposes for materials. If some elevated temperature test results on production material appear lower than the tabulated values by a large amount (more than the typical variability of material and suggesting the possibility of some error), further investigation by retest or other means should be considered.

Table E-100.1-2
Tensile and Yield Strength Reduction Factor Due to Long Time Prior Elevated Temperature Service

Material	Service Temp., °F	YS Reduction Factor	TS Reduction Factor
304 SS	≥900	1.00	0.80
316 SS	≥900	1.00	0.80
800H	≥1,350	0.90	0.90
2¼Cr–1Mo	≥800	[Note (1)]	[Note (1)]
9Cr–1Mo–V	≥900	1.0	[Note (2)]

GENERAL NOTE: No reduction factor required for service below the indicated temperature.

NOTES:
(1) Tables E-100.1-3 and E-100.1-4 are selected to correspond to the maximum wall-averaged temperature achieved during any Level A, B, or C Service Loading.
(2) See Table E-100.1-5.

Table E-100.1-3
Yield Strength Reduction Factors for 2¼Cr–1Mo

	Time, hr										
Temp., °F	1	10	30	10^2	3×10^2	10^3	3×10^3	10^4	3×10^4	10^5	3×10^5
700	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
750	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
800	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
850	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.92
900	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.93	0.86
950	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.91	0.85	0.80
1,000	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.91	0.85	0.79	0.74
1,050	1.00	1.00	1.00	1.00	1.00	0.96	0.90	0.84	0.78	0.72	0.67
1,100	1.00	1.00	1.00	1.00	1.00	0.91	0.85	0.79	0.73	0.68	0.63
1,150	1.00	1.00	1.00	1.00	0.94	0.86	...	...	...	...	...
1,200	1.00	1.00	1.00	0.96	0.89	0.82	...	...	...	...	...

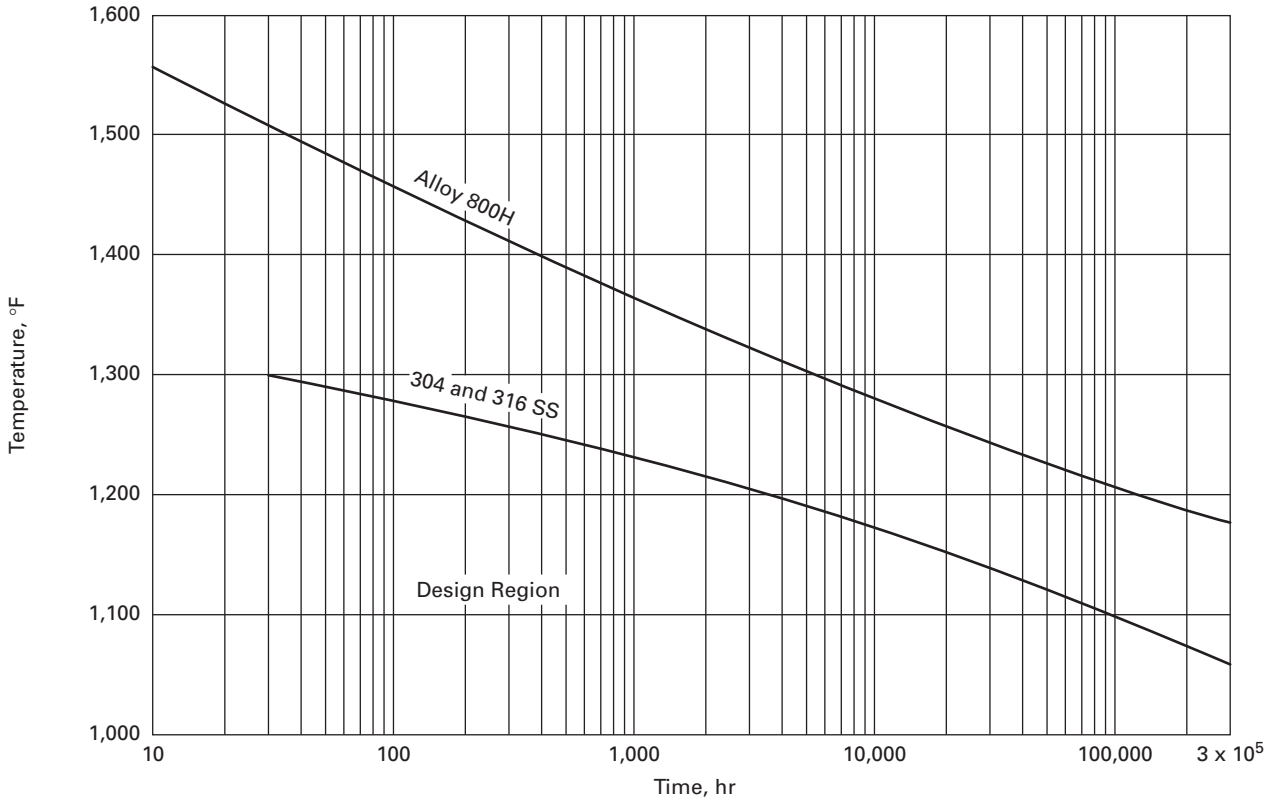
Table E-100.1-4
Tensile Strength Reduction Factors for 2¼Cr–1Mo

	Time, hr										
Temp.,°F	1	10	30	10^2	3×10^2	10^3	3×10^3	10^4	3×10^4	10^5	3×10^5
700	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
750	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
800	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	0.94
850	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	0.92	0.88
900	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.92	0.86	0.82
950	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.91	0.86	0.82	0.77
1,000	1.00	1.00	1.00	1.00	1.00	0.97	0.92	0.86	0.82	0.76	0.72
1,050	1.00	1.00	1.00	1.00	1.00	0.92	0.88	0.82	0.77	0.71	0.67
1,100	1.00	1.00	1.00	1.00	0.94	0.88	0.83	0.77	0.72	0.67	0.62
1,150	1.00	1.00	1.00	0.95	0.89	0.83	...	...	...	...	...
1,200	1.00	1.00	1.00	0.90	0.84	0.78	...	...	...	...	...

Table E-100.1-5
Tensile Strength Reduction Factors for 9Cr–1Mo–V

	Time, hr										
Temp.,°F	1	10	30	10^2	3×10^2	10^3	3×10^3	10^4	3×10^4	10^5	3×10^5
700	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
750	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
800	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
850	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
900	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97
950	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.96	0.93
1,000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.96	0.93	0.90
1,050	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.96	0.93	0.89	0.84
1,100	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.93	0.90	0.86	0.84
1,150	1.00	1.00	1.00	1.00	1.00	0.97	0.94	0.90	0.87	0.84	0.81
1,200	1.00	1.00	1.00	1.00	0.98	0.94	0.91	0.87	0.84	0.81	0.78

Figure E-100.2-1
Permissible Time/Temperature Conditions for Material That Has Been Cold Worked >5% and <20% and Subjected to Short-Time High Temperature Transients



GENERAL NOTE: The sum of time at every temperature shall determine a point within the design region of the figure for the specific material. For multiple temperature/time combinations, the linear summation of life fraction shall not exceed 1.0, the material limit.

Table E-100.3-1
Permissible Base Materials for Structures Other Than Bolting

Base Material	Spec. No.	Product Form	Types, Grades, or Classes
Types 304 SS and 316 SS [Note (1)], [Note (2)]	SA-182	Fittings & forgings	F304, F304H, F316, F316H
	SA-213	Smls. tube	TP304, TP304H, TP316, TP316H
	SA-240	Plate	304, 316, 304H, 316H
	SA-249	Welded tube	TP304, TP304H, TP316, TP316H
	SA-312	Welded & smls. pipe	TP304, TP304H, TP316, TP316H
	SA-358	Welded pipe	304, 316, 304H, 316H
	SA-376	Smls. pipe	TP304, TP304H, TP316, TP316H
	SA-403	Fittings	WP304, WP304H, WP316, WP316H, WP304W, WP304HW, WP316W, WP316HW
	SA-479	Bar	304, 304H, 316, 316H
	SA-965	Forgings	F304, F304H, F316, F316H
	SA-430	Forged & bored pipe	FP304, FP304H, FP316, FP316H
Ni–Fe–Cr (Alloy 800H) [Note (3)]	SB-163	Smls. tube	UNS N08810
	SB-407	Smls. pipe & tube	UNS N08810
	SB-408	Rod & bar	UNS N08810
	SB-409	Plate, sheet & strip	UNS N08810
	SB-564	Forgings	UNS N08810
$2\frac{1}{4}$Cr–1Mo [Note (4)]	SA-182	Forgings	F22, Class 1
	SA-213	Smls. tube	T22
	SA-234	Piping fittings	WP22, WP22W [Note (5)]
	SA-335	Forged pipe	P22
	SA-336	Fittings, forgings	F22a
	SA-369	Forged pipe	FP22
	SA-387	Plate	Grade 22, Class 1
	SA-691	Welded pipe	Pipe $2\frac{1}{4}$CR (SA-387, Grade 22, Class 1)
9Cr–1Mo–V	SA-182	Forgings	F91
	SA-213	Smls. tube	T91
	SA-335	Smls. pipe	P91
	SA-387	Plate	91

NOTES:
(1) These materials shall have a minimum specified room temperature yield strength of 30,000 psi and a minimum specified carbon content of 0.04%.
(2) For use at temperatures above 1,000°F, these materials may be used only if the material is heat treated by heating to a minimum temperature of 1,900°F and quenching in water or rapidly cooling by other means.
(3) These materials shall have a total aluminum-plus-titanium content of at least 0.50% and shall have been heat treated at a temperature of 2,050°F or higher.
(4) This material shall have a minimum specified room temperature yield strength of 30,000 psi, a minimum specified room temperature ultimate strength of 60,000 psi, a maximum specified room temperature ultimate strength of 85,000 psi, and a minimum specified carbon content of 0.07%.
(5) The material allowed under SA-234 shall correspond to one of the following:
(a) SA-335, Grade P22
(b) SA-387, Grade 22, Class 1
(c) SA-182, Grade F22, Class 1 in compliance with Note (3).

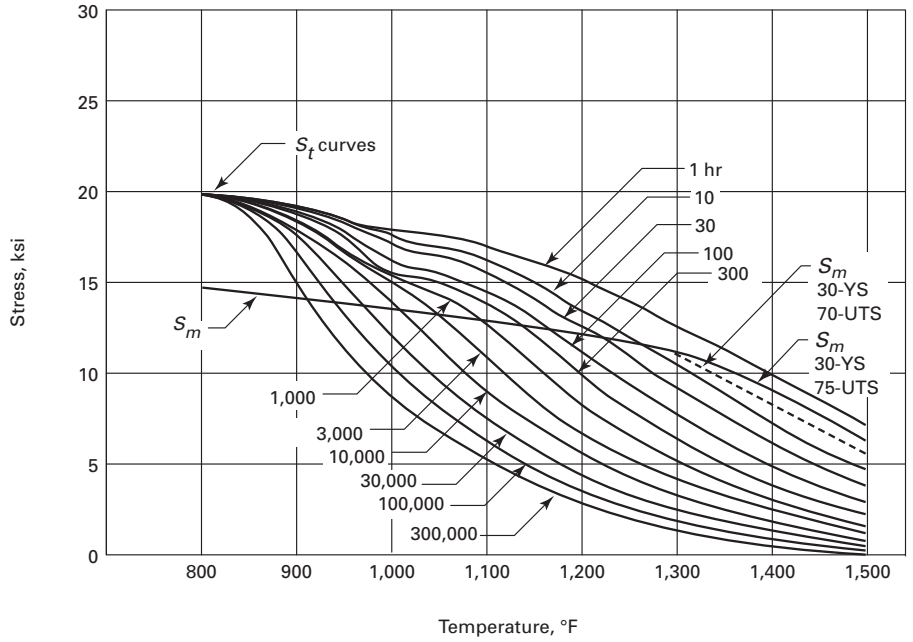
Table E-100.3-2
Permissible Weld Materials

Base Material	Spec. No.	Class
Types 304 SS and 316 SS	SFA-5.4	E308, E308L, E316, E316L, E16-8-2
	SFA-5.9	ER308, ER308L, ER316, ER316L, ER16-8-2
	SFA-5.22	E308, E308T, E308LT, E316T, E316LT-1, EXXXT-G (16-8-2 chemistry)
Ni–Fe–Cr (Alloy 800H)	SFA-5.11	ENiCrFe-2
	SFA-5.14	ERNiCr-3
$2\frac{1}{4}$Cr–1Mo	SFA-5.5	E90XX-B3 (>0.05% carbon)
	SFA-5.23	EB3, ECB3
	SFA-5.28	E90C-B3 (>0.05% carbon), ER90S-B3
	SFA-5.29	E90T-B3 (>0.05% carbon)
9Cr–1Mo–V	SFA-5.5	E90XX-B9
	SFA-5.23	EB9
	SFA-5.28	ER90S-B9

Table E-100.3-3
S_o — Maximum Allowable Stress Intensity, ksi, for Design Condition Calculations

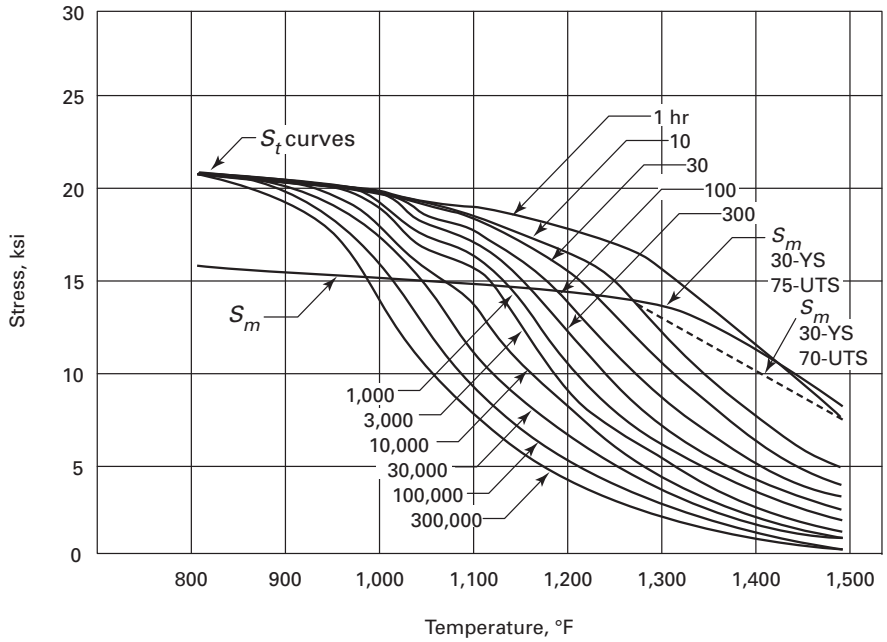
For Metal Temperature Not Exceeding, °F	304 SS	316 SS	Ni–Fe–Cr (Solution Annealed) UNS N08810	$2\frac{1}{4}$Cr–1Mo	9Cr–1Mo–V
700	...	...	...	17.9	26.7
750	...	...	...	17.9	25.9
800	15.2	15.9	15.3	16.6	24.9
850	14.8	15.7	15.1	16.6	23.7
900	14.6	15.6	14.8	13.6	21.9
950	14.2	15.5	14.6	10.8	17.8
1,000	11.1	14.0	14.1	8.0	16.3
1,050	10.1	11.2	11.2	5.7	12.9
1,100	9.8	11.1	10.0	3.8	9.6
1,150	7.7	9.8	9.3	...	7.0
1,200	6.1	7.4	7.4	...	4.3
1,250	4.7	5.5	5.9	...	...
1,300	3.7	4.1	4.7	...	...
1,350	2.9	3.1	3.8	...	...
1,400	2.3	2.3	3.0	...	...
1,450	1.8	1.7	...	...	...
1,500	1.4	1.3	...	...	...

Figure E-100.4-1
S_{mt} — Allowable Stress Intensity Values, ksi, Type 304 SS — 30-YS, 75-UTS (30-YS, 70-UTS)



Temp., °F	1 hr	10 hr	30 hr	10^2 hr	3×10^2 hr	10^3 hr	3×10^3 hr	10^4 hr	3×10^4 hr	10^5 hr	3×10^5 hr
800	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2
850	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8
900	14.6	14.6	14.6	14.6	14.6	14.6	14.6	14.6	14.6	14.6	14.6
950	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.2	12.2
1,000	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	13.1	11.1	9.3
1,050	13.6	13.6	13.6	13.6	13.6	13.6	13.6	12.2	10.3	8.7	7.3
1,100	13.2	13.2	13.2	13.2	13.2	13.2	11.5	9.7	8.2	6.8	5.7
1,150	12.9	12.9	12.9	12.9	12.9	11.0	9.3	7.7	6.4	5.3	4.4
1,200	12.7	12.7	12.7	12.2	10.6	8.9	7.4	6.1	5.1	4.1	3.4
1,250	12.3	12.3	11.9	10.3	8.7	7.2	5.9	4.9	4.0	3.2	2.7
1,300	11.9 (11.8)	11.4	10.0	8.5	7.0	5.9	4.8	3.9	3.2	2.5	2.1
1,350	10.9 (10.5)	9.7	8.4	7.1	5.9	4.8	3.9	3.1	2.5	2.0	1.6
1,400	9.5 (9.0)	8.1	6.9	5.9	4.8	3.9	3.1	2.5	2.0	1.6	1.2
1,450	8.2 (7.5)	6.8	5.8	4.6	3.8	3.0	2.4	1.9	1.5	1.2	0.9
1,500	7.0 (6.4)	5.3	4.4	3.5	2.8	2.2	1.7	1.3	1.0	0.8	0.6

Figure E-100.4-2
S_{mt} — Allowable Stress Intensity Values, ksi, Type 316 SS — 30-YS, 75-UTS (30-YS, 70-UTS)



Temp., °F	1 hr	10 hr	30 hr	10^2 hr	3×10^2 hr	10^3 hr	3×10^3 hr	10^4 hr	3×10^4 hr	10^5 hr	3×10^5 hr
800	15.9	15.9	15.9	15.9	15.9	15.9	15.9	15.9	15.9	15.9	15.9
850	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7
900	15.6	15.6	15.6	15.6	15.6	15.6	15.6	15.6	15.6	15.6	15.6
950	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5
1,000	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	14.0
1,050	15.1	15.1	15.1	15.1	15.1	15.1	15.1	15.1	14.9	12.5	10.7
1,100	14.8	14.8	14.8	14.8	14.8	14.8	14.8	13.9	11.5	9.5	7.8
1,150	14.7	14.7	14.7	14.7	14.7	14.2	13.0	10.9	8.9	7.2	5.9
1,200	14.6	14.6	14.6	14.2	12.4	10.6	9.4	8.3	6.9	5.5	4.5
1,250	14.2	14.2	14.2	11.5	9.8	8.3	7.3	6.3	5.4	4.2	3.3
1,300	13.8 (13.4)	12.8	10.9	9.1	7.5	6.4	5.6	4.7	3.9	3.1	2.5
1,350	12.8 (11.9)	10.3	8.6	7.0	5.9	5.0	4.2	3.4	2.8	2.1	1.8
1,400	11.3 (10.5)	8.2	6.7	5.4	4.5	3.8	3.1	2.5	2.0	1.5	1.2
1,450	9.7 (9.0)	6.4	5.1	4.1	3.4	2.9	2.2	1.7	1.4	1.0	0.9
1,500	7.8 (7.7)	4.9	3.9	3.2	2.6	2.1	1.6	1.2	0.9	0.65	0.5

Figure E-100.4-3
S_{mt} — Allowable Stress Intensity Values, ksi, Ni–Fe–Cr (Alloy 800H)

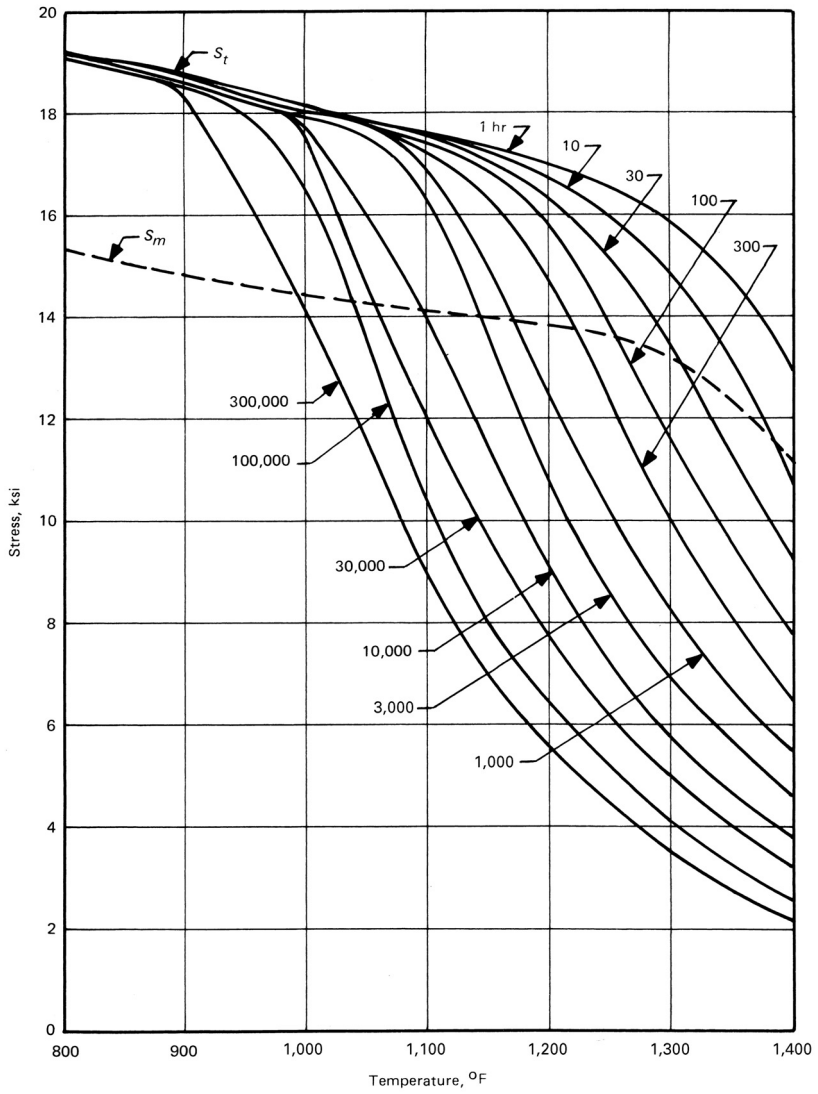
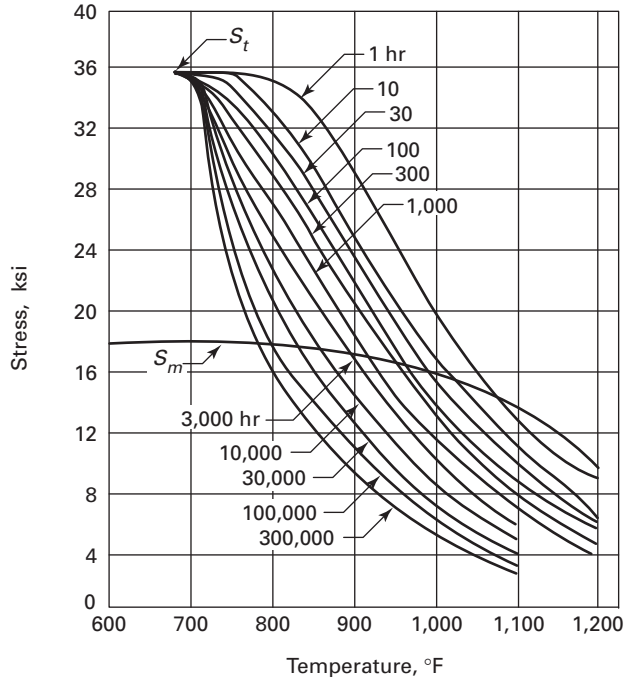


Figure E-100.4-3
S_{mt} — Allowable Stress Intensity Values, ksi, Ni–Fe–Cr (Alloy 800H) (Cont'd)

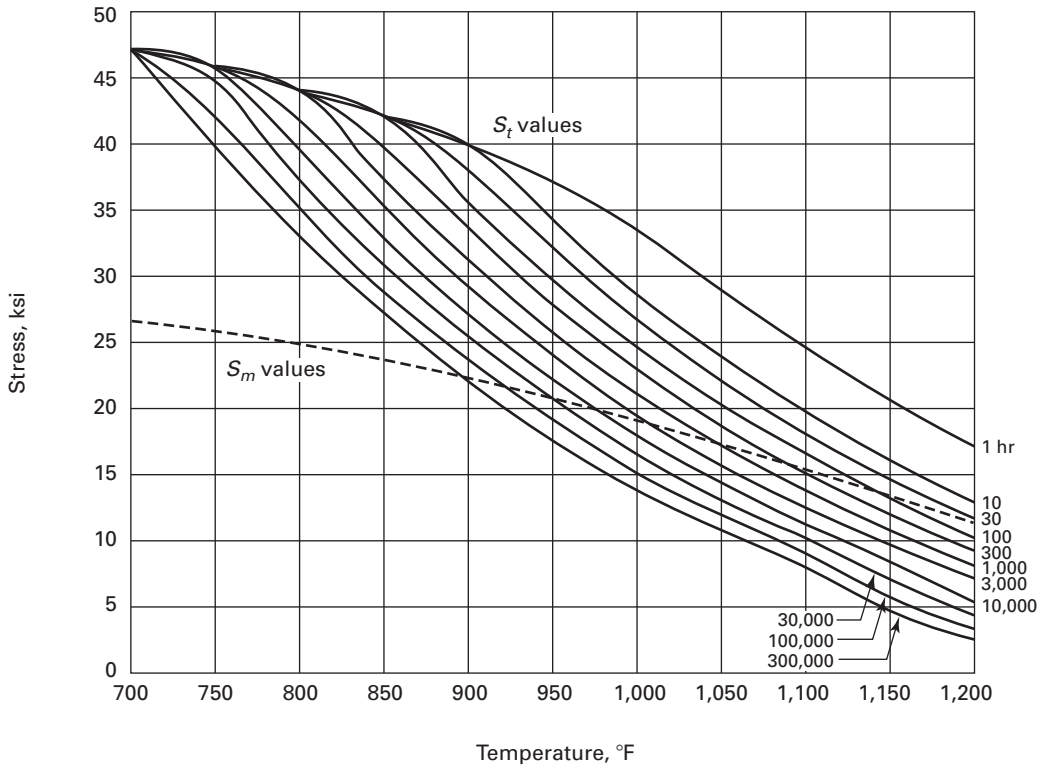
Temp., °F	1 hr	10 hr	30 hr	10^2 hr	3×10^2 hr	10^3 hr	3×10^3 hr	10^4 hr	3×10^4 hr	10^5 hr	3×10^5 hr
800	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3
850	15.1	15.1	15.1	15.1	15.1	15.1	15.1	15.1	15.1	15.1	15.1
900	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8
950	14.6	14.6	14.6	14.6	14.6	14.6	14.6	14.6	14.6	14.6	14.6
1,000	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.1
1,050	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	12.8	11.2
1,100	14.1	14.1	14.1	14.1	14.1	14.1	14.1	13.9	12.0	10.2	8.9
1,150	13.9	13.9	13.9	13.9	13.9	13.9	13.2	11.2	9.6	8.2	7.0
1,200	13.8	13.8	13.8	13.8	13.8	12.4	10.7	9.0	7.7	6.5	5.6
1,250	13.5	13.5	13.5	13.5	12.0	10.1	8.6	7.2	6.2	5.2	4.4
1,300	13.2	13.2	13.2	11.6	9.8	8.2	7.0	5.8	5.0	4.1	3.5
1,350	12.0	12.0	11.3	9.5	8.0	6.7	5.7	4.7	4.0	3.3	2.8
1,400	11.0	10.8	9.3	7.8	6.5	5.4	4.6	3.8	3.2	2.6	2.2

Figure E-100.4-4
S_{mt} — Allowable Stress Intensity Values, ksi, 2¼Cr–1Mo



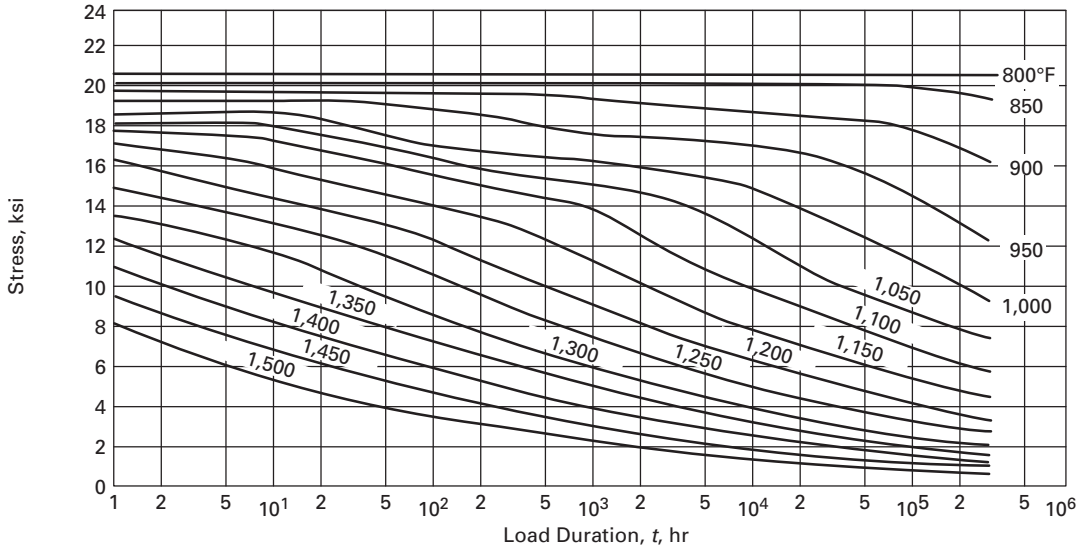
Temp., °F	1 hr	10 hr	30 hr	10^2 hr	3×10^2 hr	10^3 hr	3×10^3 hr	10^4 hr	3×10^4 hr	10^5 hr	3×10^5 hr
700	...	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9
750	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9
800	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	16.1
850	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	16.3	14.0	12.3
900	17.2	17.2	17.2	17.2	17.2	17.2	16.5	14.4	12.5	10.9	9.6
950	16.7	16.7	16.7	16.7	16.3	14.8	13.2	11.3	9.7	8.4	7.3
1,000	15.9	15.9	15.5	14.2	13.1	11.9	10.4	8.7	7.5	6.3	5.2
1,050	14.9	13.8	12.5	11.2	10.2	9.3	7.9	6.7	5.7	4.7	4.0
1,100	13.6	11.0	10.0	9.0	8.2	7.2	6.2	5.0	4.1	3.3	2.7
1,150	10.8	8.8	8.0	7.2	6.3	5.4	...	...	...	...	...
1,200	9.0	6.2	6.1	5.9	5.1	4.1	...	...	...	...	...

Figure E-100.4-5
S_{mt} — Allowable Stress Intensity Values, ksi, 9Cr–1Mo–V



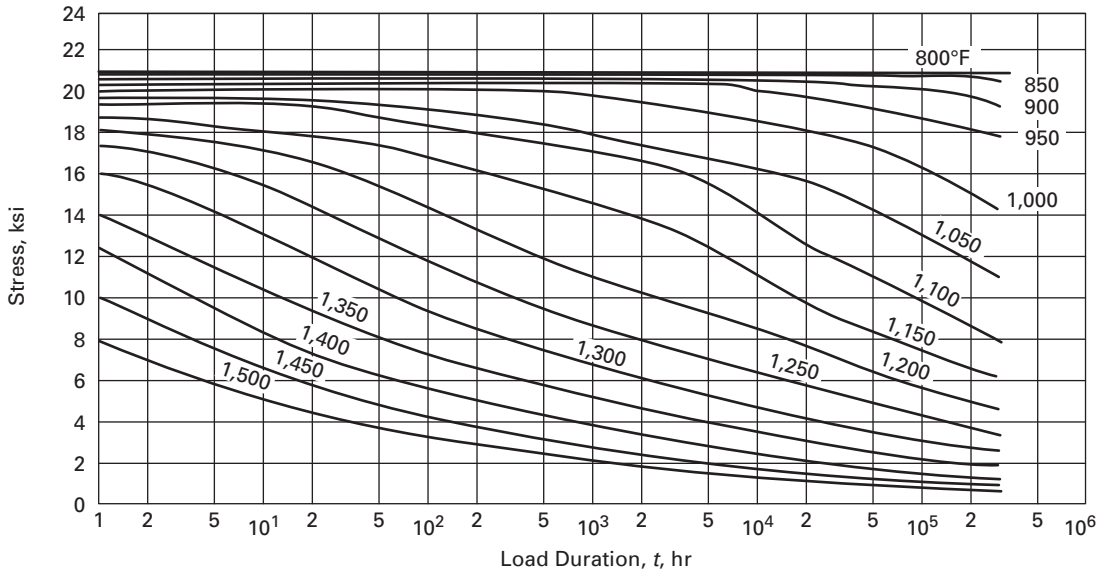
Temp., °F	1 hr	10 hr	30 hr	10^2 hr	3×10^2 hr	10^3 hr	3×10^3 hr	10^4 hr	3×10^4 hr	10^5 hr	3×10^5 hr
700	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7
750	25.9	25.9	25.9	25.9	25.9	25.9	25.9	25.9	25.9	25.9	25.9
800	24.9	24.9	24.9	24.9	24.9	24.9	24.9	24.9	24.9	24.9	24.9
850	23.7	23.7	23.7	23.7	23.7	23.7	23.7	23.7	23.7	23.7	23.7
900	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	21.9
950	20.7	20.7	20.7	20.7	20.7	20.7	20.7	20.7	20.5	18.8	17.4
1,000	19.0	19.0	19.0	19.0	19.0	19.0	19.0	17.7	16.3	14.9	13.7
1,050	17.1	17.1	17.1	17.1	17.1	16.9	15.5	14.1	12.8	11.5	10.5
1,100	15.2	15.2	15.2	15.2	14.9	13.4	12.3	10.9	9.9	8.7	7.8
1,150	13.1	13.1	13.1	12.9	11.7	10.5	9.5	8.3	6.8	5.5	4.5
1,200	11.1	11.1	11.1	10.1	9.1	7.9	6.5	5.3	4.3	3.3	2.5

Figure E-100.5-1
S_t — Allowable Stress Intensity Values, ksi, Type 304 SS



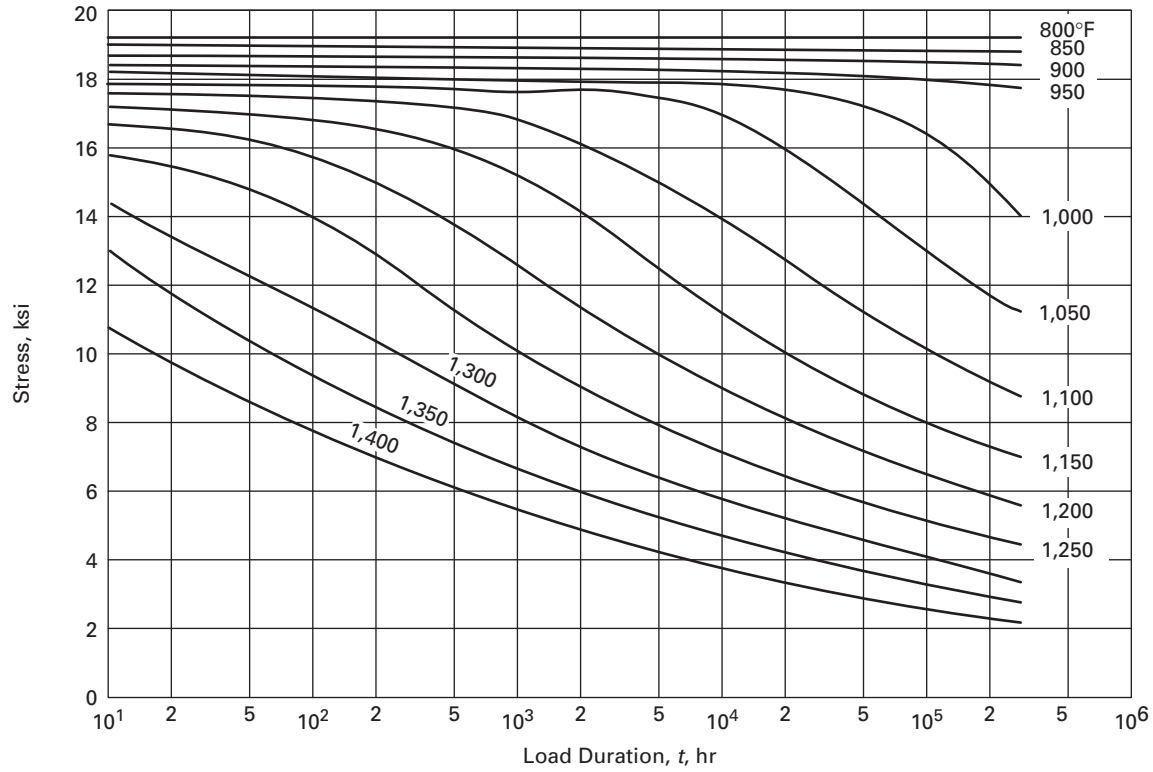
Temp., °F	1 hr	10 hr	30 hr	10^2 hr	3×10^2 hr	10^3 hr	3×10^3 hr	10^4 hr	3×10^4 hr	10^5 hr	3×10^5 hr
800	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4
850	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	19.9	19.8	19.3
900	19.6	19.6	19.5	19.5	19.4	19.2	18.8	18.5	18.3	17.7	16.0
950	19.1	19.1	19.0	18.7	18.2	17.5	17.2	16.9	16.2	14.2	12.2
1,000	18.5	18.4	17.8	16.9	16.2	15.9	15.5	14.7	13.1	11.1	9.3
1,050	18.0	17.7	17.1	16.2	15.5	14.9	14.1	12.2	10.3	8.7	7.3
1,100	17.6	17.1	16.3	15.3	14.5	13.5	11.5	9.7	8.2	6.8	5.7
1,150	17.0	15.7	14.8	13.8	12.9	11.0	9.3	7.7	6.4	5.3	4.4
1,200	16.0	14.2	13.3	12.2	10.6	8.9	7.4	6.1	5.1	4.1	3.4
1,250	14.7	12.9	11.9	10.3	8.7	7.2	5.9	4.9	4.0	3.2	2.7
1,300	13.4	11.4	10.0	8.5	7.0	5.9	4.8	3.9	3.2	2.5	2.1
1,350	12.2	9.7	8.4	7.1	5.9	4.8	3.9	3.1	2.5	2.0	1.6
1,400	10.8	8.1	6.9	5.9	4.8	3.9	3.1	2.5	2.0	1.6	1.2
1,450	9.3	6.8	5.9	4.6	3.8	3.0	2.4	1.9	1.5	1.2	0.9
1,500	7.9	5.3	4.4	3.5	2.8	2.2	1.7	1.3	1.0	0.8	0.6

Figure E-100.5-2
S_t — Allowable Stress Intensity Values, ksi, Type 316 SS



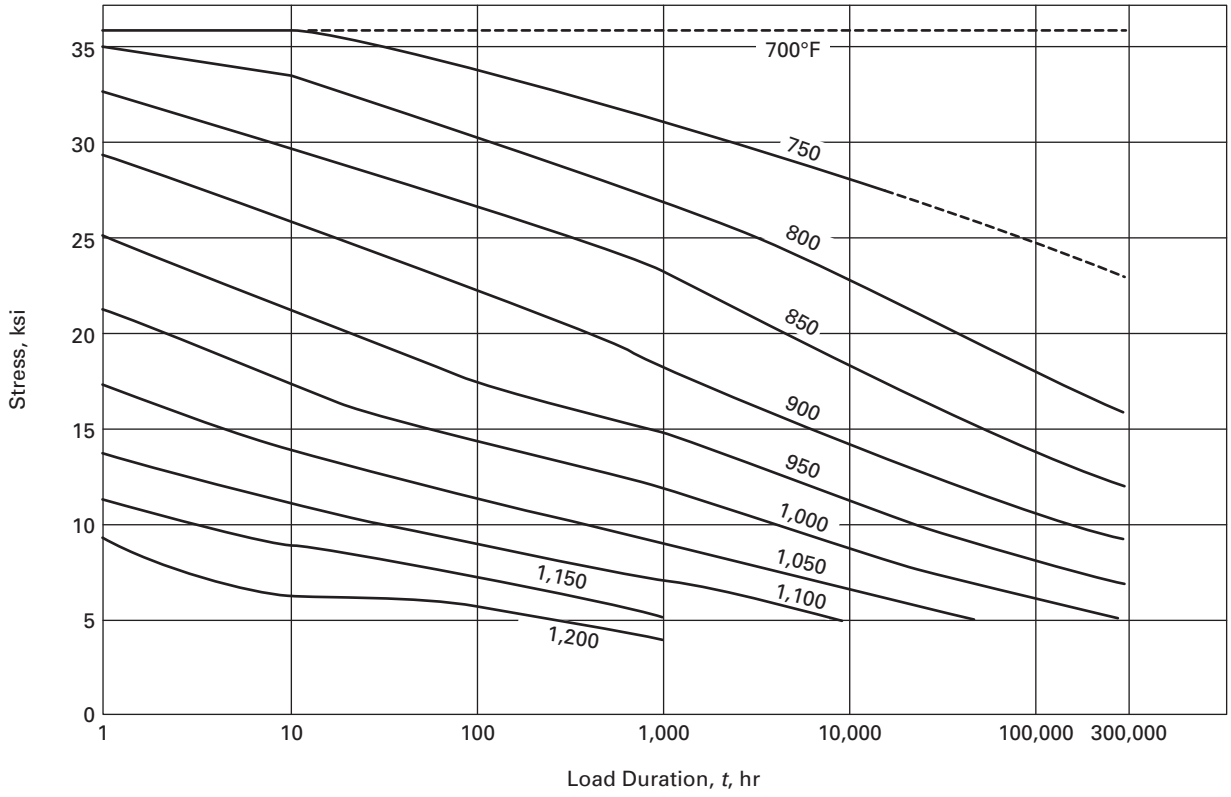
Temp., °F	1 hr	10 hr	30 hr	10^2 hr	3×10^2 hr	10^3 hr	3×10^3 hr	10^4 hr	3×10^4 hr	10^5 hr	3×10^5 hr
800	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8
850	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.3
900	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.2	19.9	19.3
950	20.1	20.1	20.1	20.1	20.1	20.0	20.0	19.7	19.2	18.4	17.6
1,000	19.8	19.8	19.8	19.8	19.8	19.5	19.0	18.2	17.5	16.2	14.0
1,050	19.4	19.4	19.2	18.7	18.3	17.6	16.8	15.9	14.9	12.5	10.7
1,100	19.1	19.0	18.5	17.8	17.3	16.6	15.9	13.9	11.5	9.5	7.8
1,150	18.5	17.7	17.3	16.4	15.4	14.2	13.0	10.9	8.9	7.2	5.9
1,200	17.8	16.8	15.8	14.2	12.4	10.6	9.4	8.3	6.9	5.5	4.5
1,250	17.1	15.2	13.5	11.5	9.8	8.3	7.3	6.3	5.4	4.2	3.3
1,300	16.1	12.8	10.9	9.1	7.5	6.4	5.6	4.7	3.9	3.1	2.5
1,350	14.2	10.3	8.6	7.0	5.9	5.0	4.2	3.4	2.8	2.1	1.8
1,400	12.0	8.2	6.7	5.4	4.5	3.8	3.1	2.5	2.0	1.5	1.2
1,450	9.7	6.4	5.1	4.1	3.4	2.9	2.2	1.7	1.4	1.0	0.8
1,500	7.8	4.9	3.9	3.2	2.6	2.1	1.6	1.2	0.9	0.65	0.5

Figure E-100.5-3
S_t — Allowable Stress Intensity Values, ksi, Ni–Fe–Cr (Alloy 800H)



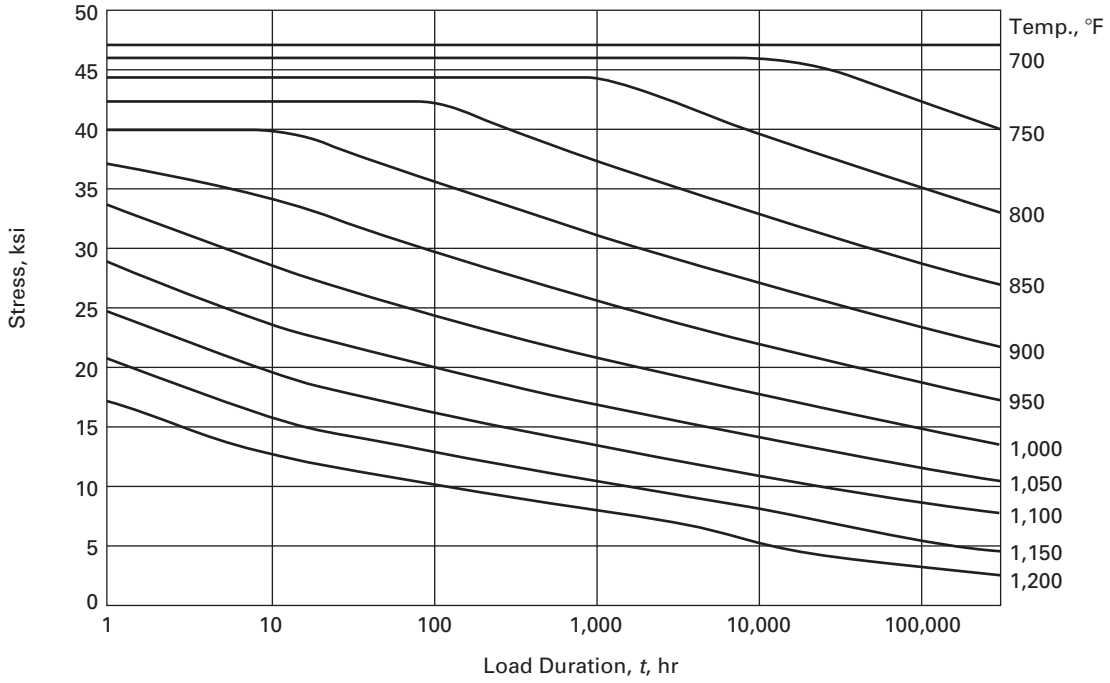
Temp., °F	1 hr	10 hr	30 hr	10^2 hr	3×10^2 hr	10^3 hr	3×10^3 hr	10^4 hr	3×10^4 hr	10^5 hr	3×10^5 hr
800	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.1	19.1
850	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.8	18.8
900	18.7	18.7	18.7	18.7	18.7	18.7	18.6	18.6	18.6	18.5	18.4
950	18.4	18.4	18.4	18.4	18.4	18.4	18.3	18.2	18.2	18.0	17.8
1,000	18.2	18.1	18.1	18.1	18.1	18.0	17.9	17.8	17.6	16.5	14.1
1,050	17.9	17.9	17.8	17.8	17.7	17.6	17.4	17.1	15.0	12.9	11.1
1,100	17.6	17.6	17.5	17.4	17.2	16.9	16.3	13.9	12.0	10.3	8.9
1,150	17.3	17.2	17.0	16.8	16.4	15.3	13.2	11.2	9.6	8.1	7.0
1,200	17.0	16.7	16.3	15.8	14.7	12.4	10.7	9.0	7.7	6.5	5.6
1,250	16.5	15.8	15.2	14.1	12.0	10.1	8.6	7.2	6.2	5.2	4.4
1,300	15.8	14.4	13.4	11.5	9.8	8.2	7.0	5.8	5.0	4.1	3.5
1,350	14.7	13.1	11.3	9.5	8.0	6.7	5.7	4.7	4.0	3.3	2.8
1,400	13.0	10.8	9.3	7.8	6.5	5.4	4.6	3.8	3.2	2.6	2.2

Figure E-100.5-4
S_t — Allowable Stress Intensity Values, ksi, 2¼Cr–1Mo



Temp., °F	1 hr	10 hr	30 hr	10^2 hr	3 × 10^2 hr	10^3 hr	3 × 10^3 hr	10^4 hr	3 × 10^4 hr	10^5 hr	3 × 10^5 hr
700	...	35.5	35.5	35.5	35.5	35.5	35.5	35.5	35.5	35.5	35.5
750	35.3	35.2	34.6	33.5	32.5	31.3	29.7	28.4	26.6	25.0	23.3
800	35.0	33.2	31.8	30.4	28.8	26.8	25.0	23.0	20.5	18.0	16.1
850	32.3	29.4	28.0	26.4	25.0	23.2	21.0	18.3	16.3	14.0	12.3
900	29.0	25.5	23.7	22.0	20.2	18.5	16.5	14.4	12.5	10.9	9.6
950	25.0	21.0	19.3	17.5	16.3	14.8	13.2	11.3	9.7	8.4	7.3
1,000	20.7	17.1	15.5	14.2	13.1	11.9	10.4	8.7	7.5	6.3	5.2
1,050	16.8	13.8	12.5	11.2	10.2	9.3	7.9	6.7	5.7	4.7	4.0
1,100	13.6	11.0	10.0	9.0	8.2	7.2	6.2	5.0	4.1	3.3	2.7
1,150	10.8	8.8	8.0	7.2	6.3	5.4	...	...	...	...	...
1,200	9.0	6.2	6.1	5.9	5.1	4.1	...	...	...	...	...

Figure E-100.5-5
S_t — Allowable Stress Intensity Values, ksi, 9Cr–1Mo–V



Temp., °F	1 hr	10 hr	30 hr	10^2 hr	3×10^2 hr	10^3 hr	3×10^3 hr	10^4 hr	3×10^4 hr	10^5 hr	3×10^5 hr
700	47.3	47.3	47.3	47.3	47.3	47.3	47.3	47.3	47.3	47.3	47.3
750	46.0	46.0	46.0	46.0	46.0	46.0	46.0	46.0	44.9	42.3	40.1
800	44.3	44.3	44.3	44.3	44.3	44.3	42.1	39.6	37.4	35.1	33.1
850	42.3	42.3	42.3	42.3	39.8	37.3	35.1	32.9	30.9	28.9	27.1
900	39.8	39.9	38.0	35.5	33.3	31.1	29.1	27.1	25.3	23.5	21.9
950	37.0	34.1	31.9	29.7	27.7	25.7	23.9	22.1	20.5	18.8	17.4
1,000	33.5	28.5	26.6	24.5	22.7	20.9	19.3	17.7	16.3	14.9	13.7
1,050	28.8	23.7	21.9	20.1	18.5	16.9	15.5	14.1	12.8	11.5	10.5
1,100	24.6	19.5	17.9	16.3	14.9	13.4	12.2	10.9	9.9	8.7	7.8
1,150	20.7	15.8	14.4	12.9	11.7	10.5	9.4	8.3	6.8	5.5	4.5
1,200	17.1	12.7	11.4	10.1	9.1	7.9	7.0	5.3	4.3	3.3	2.5

Table E-100.6-1
Yield Strength Values, S_y, Versus Temperature

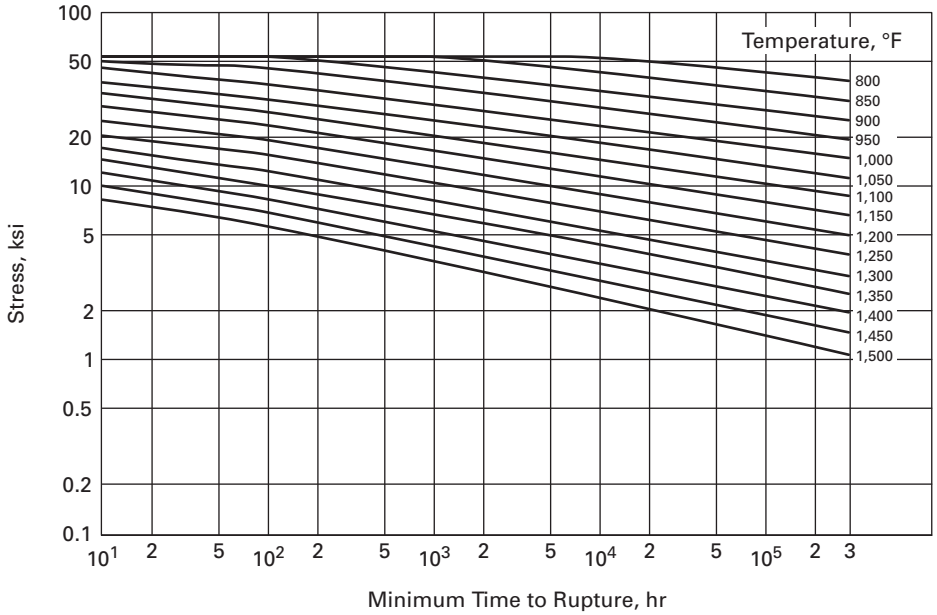
	Stresses, ksi					
Temp., °F	304 SS	316 SS	Ni–Fe–Cr UNS N08810	$2\frac{1}{4}$Cr–1Mo	9Cr–1Mo–V	Ni–Cr–Fe–Mo–Cb UNS N07718
RT						150.0
100						148.4
200						143.9
300						140.7
400						138.3
500						136.7
600						135.4
			See Table Y-1 for values up to 1,000°F			
700						134.3
750						133.7
800						133.1
850						132.4
900						131.5
950						130.5
1,000						129.4
1,050	15.2	16.8	15.5	22.4	36.6	128.0
1,100	14.9	16.6	15.5	20.7	32.7	...
1,150	14.5	16.3	15.5	18.6	28.6	...
1,200	14.1	16.0	15.5	16.1	24.2	...
1,250	13.6	15.5	15.2	...	...	...
1,300	13.1	14.9	14.8	...	...	...
1,350	12.4	14.2	14.2	...	...	...
1,400	11.6	13.3	13.6	...	...	...
1,450	10.6	12.3	12.9	...	...	...
1,500	9.3	10.9	12.2	...	...	...
1,550	...	...	11.3	...	...	...
1,600	...	...	10.3	...	...	...
1,650	...	...	9.3	...	...	...

GENERAL NOTES:

(a) At temperatures above room temperature, the yield strength values correspond to the yield strength trend curve adjusted to the minimum specified room temperature yield strength. The yield strength values do not correspond exactly to either *average* or *minimum* as these terms are applied to a statistical treatment of a homogeneous set of data.

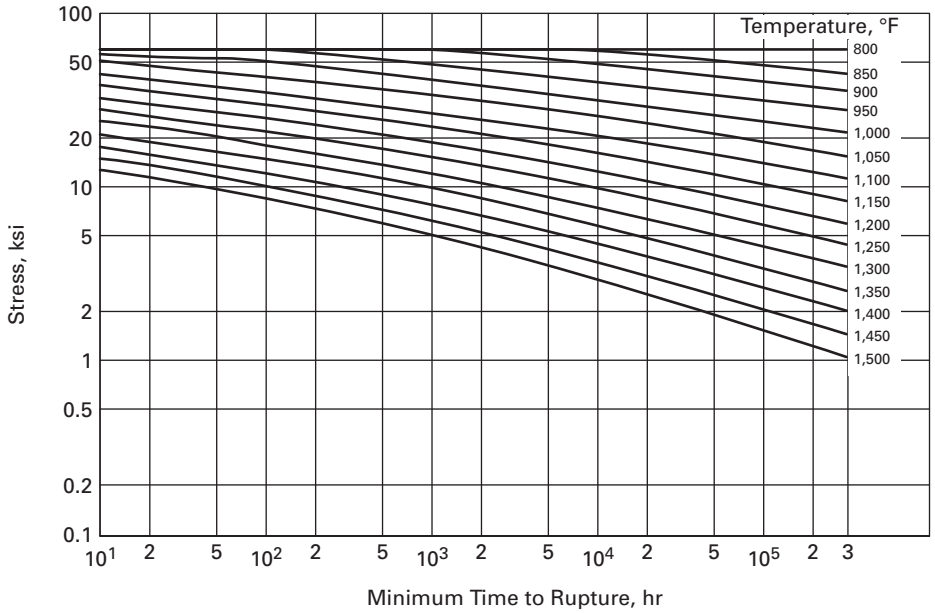
(b) Neither the ASME Materials Specifications nor the rules of Sections I, IV, VIII, or XII require elevated temperature testing for yield strengths of production material for use in Code components. It is not intended that results of such tests, if performed, be compared with these tabulated yield strength values for ASME Code acceptance/rejection purposes for materials. If some elevated temperature test results on production material appear lower than the tabulated values by a large amount (more than the typical variability of material and suggesting the possibility of some error), further investigation by retests or other means should be considered.

Figure E-100.7-1
Expected Minimum Stress-to-Rupture Values, ksi, Type 304 SS



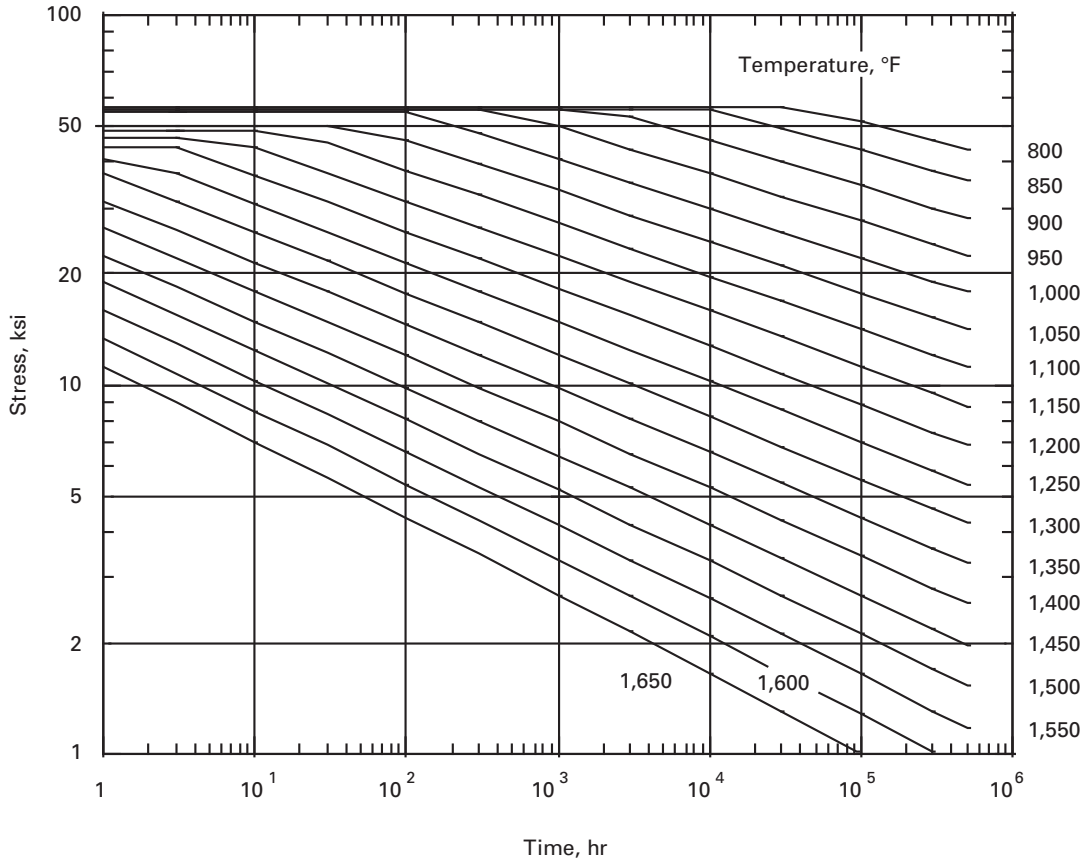
Temp., °F	1 hr	10 hr	30 hr	10^2 hr	3×10^2 hr	10^3 hr	3×10^3 hr	10^4 hr	3×10^4 hr	10^5 hr	3×10^5 hr
800	57	57	57	57	57	57	57	57	51	44.3	39
850	56.5	56.5	56.5	56.5	56.5	56.5	50.2	45.4	40	34.7	30.5
900	55.5	55.5	55.5	55.5	51.5	46.9	41.2	36.1	31.5	27.2	24
950	54.2	54.2	51	48.1	43	38.0	33.5	28.8	24.9	21.2	18.3
1,000	52.5	50	44.5	39.8	35	30.9	26.5	22.9	19.7	16.6	14.9
1,050	50	41.9	37	32.9	28.9	25.0	21.6	18.2	15.5	13.0	11.0
1,100	45	35.2	31	27.2	23.9	20.3	17.3	14.5	12.3	10.2	8.6
1,150	38	29.5	26	22.5	19.3	16.5	13.9	11.6	9.6	8.0	6.6
1,200	32	24.7	21.5	18.6	15.9	13.4	11.1	9.2	7.6	6.2	5.0
1,250	27	20.7	17.9	15.4	13	10.8	8.9	7.3	6.0	4.9	4.0
1,300	23	17.4	15	12.7	10.5	8.8	7.2	5.8	4.8	3.8	3.1
1,350	19.5	14.6	12.6	10.6	8.8	7.2	5.8	4.6	3.8	3.0	2.4
1,400	16.5	12.1	10.3	8.8	7.2	5.8	4.7	3.7	3.0	2.3	1.9
1,450	14.0	10.2	8.8	7.3	5.8	4.6	3.8	2.9	2.3	1.8	1.4
1,500	12.0	8.6	7.2	6.0	4.9	3.8	3.0	2.4	1.8	1.4	1.1

Figure E-100.7-2
Expected Minimum Stress-to-Rupture Values, ksi, Type 316 SS



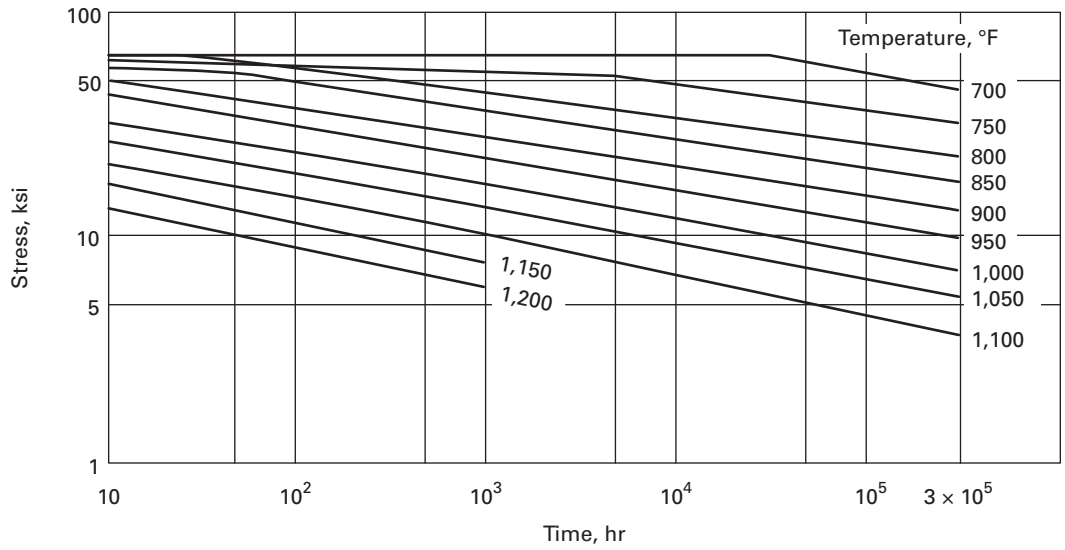
Temp., °F	1 hr	10 hr	30 hr	10^2 hr	3×10^2 hr	10^3 hr	3×10^3 hr	10^4 hr	3×10^4 hr	10^5 hr	3×10^5 hr
800	64.5	64.5	64.5	64.5	64.5	64.5	64.5	64.5	64.5	64.5	64.5
850	63.3	63.3	63.3	63.3	63.3	63.3	63.3	63.3	60	56	52
900	62.2	62.2	62.2	62.2	62.1	62	58	54.1	48	42.6	38
950	60	60	60	60	56	51.6	46.5	42.6	37.5	32.4	28.3
1,000	58.5	58.5	55	51.7	47	42.1	37.5	33.6	28.8	24.6	21
1,050	56	52.9	47.5	43.4	38.2	34.4	30.2	26.4	22.3	18.8	16
1,100	53.5	45.1	40	36.4	32.2	28.1	24.2	20.8	17.3	14.3	11.7
1,150	46.5	38.4	34	30.5	26.6	23.0	19.5	16.4	13.4	10.9	8.8
1,200	40	32.7	29	25.6	22	18.8	15.6	12.9	10.3	8.3	6.7
1,250	35	27.8	24.3	21.4	18.1	15.4	12.7	10.2	8.1	6.3	4.9
1,300	30	23.7	20.8	18.0	15	12.5	10.0	8.0	6.2	4.8	3.7
1,350	26	20.0	17.5	15.0	12.7	10.4	8.2	6.4	4.9	3.6	2.7
1,400	22.5	17.1	14.8	12.4	10.2	8.4	6.6	5.0	3.8	2.8	2.1
1,450	19.5	14.6	12.6	10.5	8.6	6.8	5.2	3.9	2.9	2.1	1.5
1,500	17	12.5	10.6	8.8	7.2	5.6	4.2	3.1	2.3	1.6	1.2

Figure E-100.7-3
Expected Minimum Stress-to-Rupture Values, ksi, Ni–Fe–Cr (Alloy 800H)



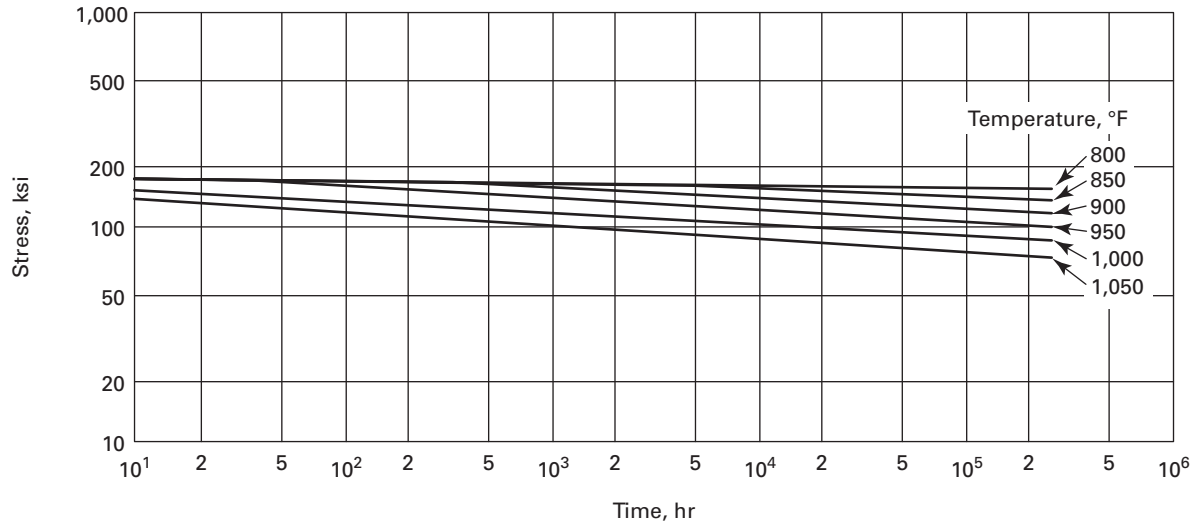
Temp., °F	1 hr	3 hr	10 hr	30 hr	10^2 hr	3×10^2 hr	10^3 hr	3×10^3 hr	10^4 hr	3×10^4 hr	10^5 hr	3×10^5 hr	5×10^5 hr
800	56.2	56.2	56.2	56.2	56.2	56.2	56.2	56.2	56.2	56.2	51.9	45.9	43.3
850	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	49.6	43.0	37.8	35.6
900	55.6	55.6	55.6	55.6	55.6	55.6	55.6	53.0	45.8	40.1	34.5	30.2	28.3
950	55.3	55.3	55.3	55.3	55.3	55.3	49.8	43.4	37.2	32.3	27.7	24.0	22.5
1,000	54.7	54.7	54.7	54.7	54.7	47.9	40.9	35.4	30.1	26.0	22.1	19.1	17.8
1,050	50.2	50.2	50.2	50.2	45.9	39.5	33.5	28.8	24.4	20.9	17.7	15.1	14.1
1,100	48.4	48.4	48.4	45.0	38.0	32.5	27.4	23.4	19.7	16.8	14.1	12.0	11.1
1,150	46.3	46.3	44.0	37.5	31.5	26.8	22.4	19.0	15.9	13.4	11.2	9.5	8.7
1,200	43.9	43.9	36.8	31.2	26.0	22.0	18.3	15.4	12.8	10.7	8.9	7.5	6.9
1,250	41.1	37.1	30.8	25.9	21.5	18.0	14.9	12.5	10.3	8.6	7.0	5.9	5.4
1,300	37.2	31.2	25.7	21.5	17.7	14.8	12.1	10.1	8.2	6.8	5.6	4.6	4.2
1,350	31.4	26.2	21.5	17.8	14.6	12.1	9.8	8.1	6.6	5.4	4.4	3.6	3.3
1,400	26.5	22.0	17.9	14.8	12.0	9.9	8.0	6.5	5.3	4.3	3.4	2.8	2.6
1,450	22.4	18.4	14.9	12.2	9.8	8.0	6.4	5.2	4.2	3.4	2.7	2.2	2.0
1,500	18.9	15.4	12.4	10.1	8.0	6.5	5.2	4.2	3.3	2.7	2.1	1.7	1.5
1,550	15.9	12.9	10.3	8.3	6.6	5.3	4.2	3.4	2.6	2.1	1.6	1.3	1.2
1,600	13.3	10.8	8.5	6.8	5.4	4.3	3.4	2.7	2.1	1.7	1.3	1.0	0.91
1,650	11.2	9.0	7.0	5.6	4.4	3.5	2.7	2.1	1.6	1.3	1.0	0.78	0.70

Figure E-100.7-4
Expected Minimum Stress-to-Rupture Values, ksi, 2¼Cr–1Mo



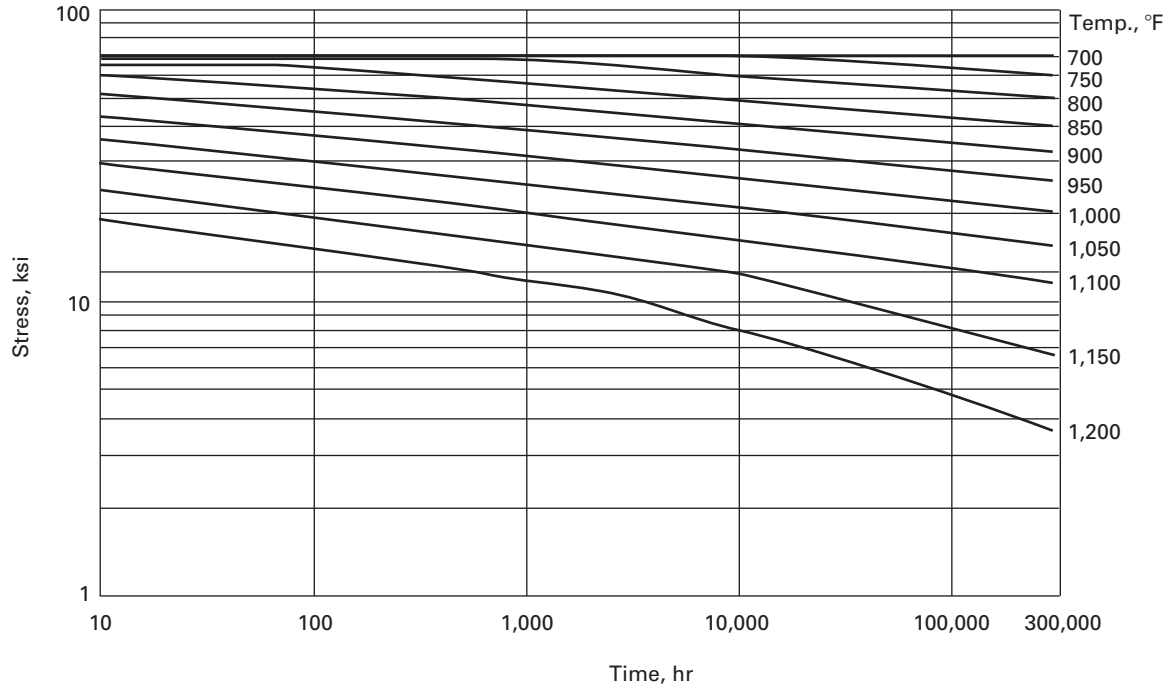
Temp., °F	10 hr	30 hr	10^2 hr	3×10^2 hr	10^3 hr	3×10^3 hr	10^4 hr	3×10^4 hr	10^5 hr	3×10^5 hr
700	59.0	59.0	59.0	59.0	59.0	59.0	59.0	59.0	54.0	49.0
750	58.0	57.0	56.0	54.6	53.0	51.2	48.0	43.3	37.5	34.1
800	56.0	55.5	54.0	48.5	43.0	37.5	34.5	30.5	27.0	24.0
850	52.0	50.5	46.0	40.5	35.0	31.0	27.5	24.0	21.0	18.5
900	46.0	41.0	36.0	32.0	28.0	25.0	21.6	19.0	16.4	14.1
950	40.0	35.0	30.0	26.0	22.2	19.5	17.0	14.6	12.6	11.0
1,000	31.5	27.5	24.0	21.0	17.9	15.2	13.1	11.0	9.4	7.9
1,050	26.0	22.5	19.0	16.5	14.0	12.0	10.0	8.3	7.0	5.8
1,100	21.0	18.0	15.1	13.0	10.8	9.1	7.5	6.2	5.0	4.1
1,150	17.0	14.1	11.8	9.8	8.0	...	...	...	...	...
1,200	13.5	11.1	9.2	7.6	6.2	...	...	...	...	...

Figure E-100.7-5
Expected Minimum Stress-to-Rupture Values, ksi, Ni–Cr–Fe–Mo–Cb (Alloy 718)



Temp., °F	10 hr	30 hr	10^2 hr	3×10^2 hr	10^3 hr	3×10^3 hr	10^4 hr	3×10^4 hr	10^5 hr	3×10^5 hr
800	168	168	168	168	168	168	168	168	160	154
850	172	172	172	172	172	166	159	151	146	140
900	170	170	170	166	158	151	144	138	130	124
950	170	166	158	150	144	136	129	122	114	106
1,000	160	150	144	136	130	122	114	106	98	90
1,050	146	138	130	124	114	106	98	91	81	74

Figure E-100.7-6
Expected Minimum Stress-to-Rupture Values, ksi, 9Cr–1Mo–V



Temp., °F	10 hr	30 hr	10^2 hr	3×10^2 hr	10^3 hr	3×10^3 hr	10^4 hr	3×10^4 hr	10^5 hr	3×10^5 hr
700	71.0	71.0	71.0	71.0	71.0	71.0	71.0	71.0	71.0	71.0
750	69.0	69.0	69.0	69.0	69.0	69.0	69.0	67.3	63.5	60.2
800	66.5	66.5	66.5	66.5	66.5	63.1	59.4	56.1	52.7	49.6
850	63.4	63.4	63.4	59.7	56.0	52.7	49.3	46.3	43.3	40.6
900	59.8	57.0	53.3	50.0	46.6	43.7	40.6	37.9	35.2	32.8
950	51.2	47.9	44.5	41.5	38.5	35.8	33.1	30.7	28.2	26.1
1,000	42.8	39.9	36.8	34.1	31.4	29.0	26.6	24.5	22.3	20.5
1,050	35.6	32.9	30.1	27.7	25.3	23.2	21.1	19.2	17.3	15.7
1,100	29.2	26.8	24.4	22.3	20.1	18.3	16.4	14.8	13.1	11.7
1,150	23.7	21.6	19.4	17.6	15.7	14.1	12.4	10.2	8.2	6.7
1,200	19.0	17.1	15.2	13.6	11.9	10.5	8.0	6.5	4.9	3.7

Table E-100.8-1
Stress Rupture Factors for Type 304 Stainless Steel Welded With SFA-5.22 E308T and E308LT, SFA-5.4 E308 and E308L, and SFA-5.9 ER308 and ER308L

Temp., °F	10 hr	30 hr	10^2 hr	3×10^2 hr	10^3 hr	3×10^3 hr	10^4 hr	3×10^4 hr	10^5 hr	3×10^5 hr
850	1.00	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.97	0.97
900	1.00	0.99	0.98	0.97	0.97	0.97	0.97	0.97	0.95	0.94
950	1.00	0.98	0.97	0.96	0.95	0.95	0.95	0.95	0.93	0.91
1,000	1.00	0.98	0.96	0.94	0.93	0.93	0.93	0.93	0.91	0.88
1,050	1.00	0.99	0.98	0.97	0.97	0.97	0.97	0.95	0.91	0.85
1,100	1.00	0.99	0.98	1.00	1.00	1.00	0.99	0.95	0.89	0.82
1,150	1.00	1.00	1.00	1.00	1.00	0.99	0.95	0.90	0.81	0.72
1,200	1.00	1.00	1.00	1.00	0.98	0.95	0.88	0.81	0.71	0.60
1,250	1.00	1.00	0.97	0.97	0.92	0.87	0.78	0.69	0.57	0.46

Table E-100.8-2
Stress Rupture Factors for Type 304 Stainless Steel Welded With SFA-5.22 EXXXT-G (16-8-2 Chemistry), SFA-5.4 E16-8-2, and SFA-5.9 ER16-8-2

Temp., °F	10 hr	30 hr	10^2 hr	3×10^2 hr	10^3 hr	3×10^3 hr	10^4 hr	3×10^4 hr	10^5 hr	3×10^5 hr
850	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
900	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
950	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1,000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1,050	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1,100	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1,150	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1,200	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table E-100.8-3
Stress Rupture Factors for Type 304 Stainless Steel Welded With SFA-5.22 E316T and E316LT-1, -2, and -3; SFA-5.4 E316 and E316L; and SFA-5.9 ER316 and ER316L

Temp., °F	10 hr	30 hr	10^2 hr	3×10^2 hr	10^3 hr	3×10^3 hr	10^4 hr	3×10^4 hr	10^5 hr	3×10^5 hr
850	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	0.98	0.94
900	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.95	0.90
950	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.96	0.92	0.86
1,000	1.00	1.00	1.00	1.00	1.00	1.00	0.98	0.95	0.89	0.82
1,050	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.89	0.80
1,100	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	0.89	0.79
1,150	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.96	0.83	0.74
1,200	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.92	0.79	0.68
1,250	1.00	1.00	1.00	1.00	1.00	1.00	0.96	0.85	0.72	0.61
1,300	1.00	1.00	1.00	1.00	1.00	1.00	0.89	0.78	0.65	0.54
1,350	1.00	1.00	1.00	1.00	1.00	0.92	0.81	0.70	0.59	0.49
1,400	1.00	1.00	1.00	1.00	0.93	0.85	0.73	0.63	0.51	0.45

Table E-100.9-1
Stress Rupture Factors for Type 316 Stainless Steel Welded With SFA-5.22 E308T and E308LT, SFA-5.4 E308 and E308L, and SFA-5.9 ER308 and ER308L

Temp., °F	10 hr	30 hr	10^2 hr	3×10^2 hr	10^3 hr	3×10^3 hr	10^4 hr	3×10^4 hr	10^5 hr	3×10^5 hr
850	1.00	0.98	0.95	0.95	0.95	0.94	0.92	0.92	0.92	0.92
900	1.00	0.94	0.88	0.88	0.88	0.87	0.84	0.84	0.82	0.82
950	1.00	0.90	0.81	0.81	0.81	0.80	0.77	0.76	0.73	0.72
1,000	1.00	0.87	0.75	0.75	0.74	0.73	0.70	0.68	0.64	0.62
1,050	1.00	0.89	0.78	0.78	0.77	0.76	0.74	0.72	0.67	0.60
1,100	1.00	0.90	0.81	0.81	0.79	0.79	0.76	0.73	0.69	0.63
1,150	0.90	0.88	0.86	0.82	0.79	0.77	0.74	0.70	0.64	0.57
1,200	0.81	0.80	0.79	0.79	0.76	0.75	0.70	0.64	0.57	0.49
1,250	0.79	0.78	0.76	0.74	0.72	0.68	0.63	0.56	0.48	0.39
1,300	0.75	0.73	0.70	0.68	0.63	0.59	0.53	0.46	0.38	0.30

Table E-100.9-2
Stress Rupture Factors for Type 316 Stainless Steel Welded With SFA-5.22 EXXXT-G (16-8-2 Chemistry), SFA-5.4 E16-8-2, and SFA-5.9 ER16-8-2

Temp., °F	10 hr	30 hr	10^2 hr	3×10^2 hr	10^3 hr	3×10^3 hr	10^4 hr	3×10^4 hr	10^5 hr	3×10^5 hr
850	1.00	0.96	0.91	0.91	0.91	0.90	0.89	0.88	0.87	0.86
900	1.00	0.94	0.88	0.82	0.81	0.80	0.77	0.76	0.74	0.72
950	1.00	0.93	0.86	0.86	0.85	0.83	0.83	0.81	0.79	0.78
1,000	1.00	0.93	0.90	0.90	0.90	0.89	0.87	0.87	0.85	0.85
1,050	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.93	0.90	0.86
1,100	0.91	0.91	0.93	0.94	0.94	0.96	0.96	0.96	0.97	0.96
1,150	0.91	0.91	0.93	0.95	0.95	0.96	0.98	0.99	0.99	1.00
1,200	0.89	0.89	0.90	0.92	0.93	0.97	0.99	1.00	1.00	1.00

Table E-100.9-3
Stress Rupture Factors for Type 316 Stainless Steel Welded With SFA-5.22 E316T and E316LT-1 and -2, SFA-5.4 E316 and E316L, and SFA-5.9 ER316 and ER316L

Temp., °F	10 hr	30 hr	10^2 hr	3×10^2 hr	10^3 hr	3×10^3 hr	10^4 hr	3×10^4 hr	10^5 hr	3×10^5 hr
850	1.00	1.00	0.99	0.98	0.97	0.96	0.95	0.94	0.92	0.88
900	1.00	1.00	0.97	0.94	0.91	0.89	0.88	0.86	0.82	0.78
950	1.00	1.00	0.95	0.90	0.87	0.84	0.81	0.78	0.72	0.68
1,000	1.00	1.00	0.88	0.86	0.83	0.79	0.74	0.70	0.62	0.58
1,050	1.00	1.00	0.92	0.89	0.87	0.83	0.78	0.74	0.66	0.56
1,100	1.00	1.00	0.96	0.94	0.90	0.87	0.81	0.75	0.68	0.61
1,150	1.00	1.00	1.00	0.96	0.91	0.87	0.81	0.75	0.66	0.59
1,200	1.00	1.00	0.96	0.95	0.90	0.87	0.81	0.72	0.64	0.55
1,250	1.00	1.00	0.96	0.93	0.89	0.84	0.77	0.69	0.60	0.51
1,300	1.00	0.98	0.93	0.89	0.83	0.79	0.72	0.65	0.56	0.48
1,350	0.99	0.96	0.89	0.84	0.77	0.72	0.65	0.59	0.52	0.45
1,400	0.95	0.90	0.82	0.77	0.71	0.66	0.60	0.55	0.47	0.42

Table E-100.10-1
Stress Rupture Factors for Alloy 800H Welded With SFA-5.11 ENiCrFe-2 (INCO A)

Temp., °F	10 hr	30 hr	10^2 hr	3×10^2 hr	10^3 hr	3×10^3 hr	10^4 hr	3×10^4 hr	10^5 hr	3×10^5 hr
850–900	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
950	1.00	1.00	1.00	1.00	0.98	0.95	0.92	0.90	0.86	0.83
1,000	1.00	1.00	1.00	1.00	0.98	0.94	0.90	0.86	0.82	0.78
1,050	1.00	1.00	1.00	1.00	0.98	0.94	0.89	0.85	0.81	0.76
1,100	1.00	1.00	1.00	1.00	0.98	0.94	0.89	0.84	0.79	0.75
1,150	1.00	1.00	1.00	1.00	0.98	0.93	0.88	0.83	0.77	0.72
1,200	1.00	1.00	1.00	1.00	0.98	0.93	0.87	0.81	0.75	0.70
1,250	1.00	1.00	1.00	1.00	0.98	0.92	0.85	0.80	0.73	0.68
1,300	1.00	1.00	1.00	1.00	0.97	0.91	0.84	0.77	0.71	0.65
1,350	1.00	1.00	1.00	1.00	0.96	0.89	0.82	0.75	0.68	0.62
1,400	1.00	1.00	1.00	1.00	0.95	0.87	0.80	0.73	0.65	0.59

Table E-100.10-2
Stress Rupture Factors for Alloy 800H Welded With SFA-5.14 ERNiCr-3 (INCO 82)

Temp., °F	10 hr	30 hr	10^2 hr	3×10^2 hr	10^3 hr	3×10^3 hr	10^4 hr	3×10^4 hr	10^5 hr	3×10^5 hr
850–900	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
950	0.89	0.90	0.90	0.90	0.89	0.89	0.88	0.87	0.86	0.86
1,000	0.85	0.86	0.86	0.86	0.85	0.85	0.84	0.84	0.82	0.81
1,050	0.88	0.88	0.88	0.88	0.87	0.86	0.85	0.84	0.83	0.81
1,100	0.91	0.91	0.91	0.90	0.89	0.88	0.87	0.85	0.83	0.81
1,150	0.94	0.93	0.93	0.92	0.90	0.89	0.87	0.85	0.83	0.81
1,200	0.96	0.96	0.95	0.93	0.92	0.90	0.88	0.86	0.83	0.81
1,250	0.99	0.98	0.96	0.95	0.93	0.91	0.88	0.85	0.82	0.80
1,300	1.00	1.00	0.98	0.96	0.93	0.91	0.88	0.85	0.82	0.78
1,350	1.00	1.00	0.99	0.96	0.94	0.91	0.87	0.84	0.77	0.68
1,400	1.00	1.00	1.00	0.97	0.94	0.89	0.79	0.71	0.62	0.54

Table E-100.11-1
Stress Rupture Factors for 2¼Cr–1Mo (60/30) Welded With SFA-5.28 E90C-B3, SFA-5.28 ER90S-B3, SFA-5.5 E90XX-B3 (>0.05C), SFA-5.23 EB3, SFA-5.23 ECB3 (>0.05C), and SFA-5.29 E90T1-B3 (>0.05C)

Temp., °F	10 hr	30 hr	10^2 hr	3×10^2 hr	10^3 hr	3×10^3 hr	10^4 hr	3×10^4 hr	10^5 hr	3×10^5 hr
750–850	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
900	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99
950	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	0.96
1,000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	0.96	0.93
1,050	1.00	1.00	1.00	1.00	1.00	1.00	0.98	0.95	0.91	0.87
1,100	1.00	1.00	1.00	1.00	1.00	0.98	0.94	0.90	0.86	0.81
1,150	1.00	1.00	1.00	1.00	0.98	0.94	0.89	0.85	0.79	0.74
1,200	1.00	1.00	1.00	0.98	0.93	0.89	0.83	0.78	0.71	0.66

Table E-100.12-1
Stress Rupture Factors for 9Cr–1Mo–V Welded With SFA-5.28 ER90S-B9, SFA-5.5 E90XX-B9, and SFA-5.23 EB9

Temp., °F	Ratio
800	1.0
850	0.94
900	0.93
950	0.92
1,000	0.90
1,050	0.88
1,100	0.85
1,150	0.81
1,200	0.76

Table E-100.13-1
Permissible Materials for Bolting

Material	Spec. No.	Grades
Type 304 SS	SA-193	B8, Class 1 and B8A, Class 1A [Note (1)]
Type 316 SS	SA-193	B8M, Class 1 and B8MA, Class 1A [Note (1)]
Ni–Cr–Fe–Mo–Cb Alloy 718 [Note (2)], [Note (3)], [Note (4)]	SB-637	N07718

GENERAL NOTE: If bolting temperatures do not exceed those given in Table 4 for the bolting material, the S_m values in Table 4 shall apply. For elevated temperatures, the list of materials shown above can be used in bolting applications.

NOTES:
(1) For use at temperatures above 1,000°F, these materials may be used only if the material is heat treated by heating to a minimum temperature of 1,900°F and quenching in water or rapidly cooling by other means.
(2) Maximum forging diameter shall be limited to 6 in.
(3) Welding is not permitted.
(4) Precautionary Note: In use of Alloy 718, consideration shall be given to a reduction in toughness caused by long-term exposure at a temperature of 1,000°F or greater.

Table E-100.14-1
S_o — Maximum Allowable Stress Intensity, ksi, for Design Condition Calculations of Bolting Materials

For Metal Temperature Not Exceeding, °F	304 SS	316 SS	Alloy 718
800	5.5	5.8	33.3
850	5.5	5.8	33.1
900	5.4	5.7	32.9
950	5.3	5.7	32.6
1,000	5.2	5.6	32.3
1,050	5.1	5.6	32.0
1,100	4.9	5.5	...
1,150	4.8	5.4	...
1,200	4.7	5.4	...
1,250	4.7	5.3	...
1,300	3.7	4.1	...

Figure E-100.15-1
S_{mt} — Allowable Stress Intensity, Type 304 SS, Bolting

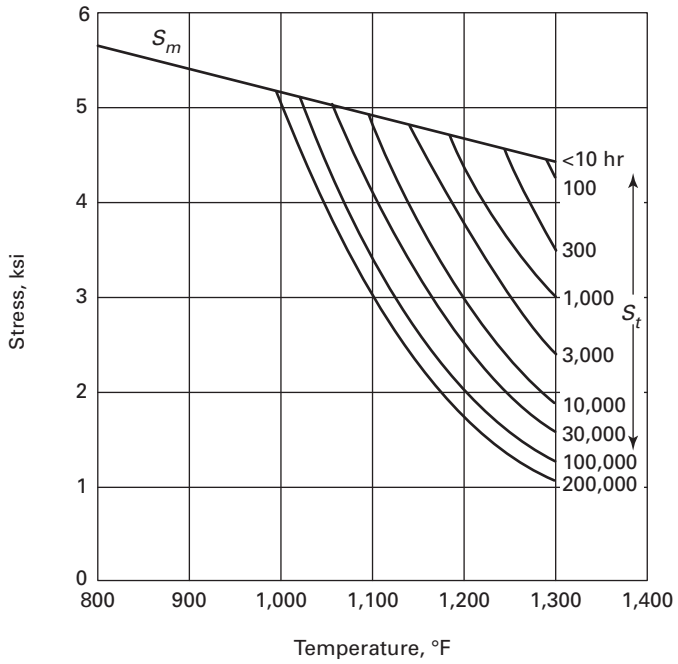


Figure E-100.15-2
S_{mt} — Allowable Stress Intensity, Type 316 SS, Bolting

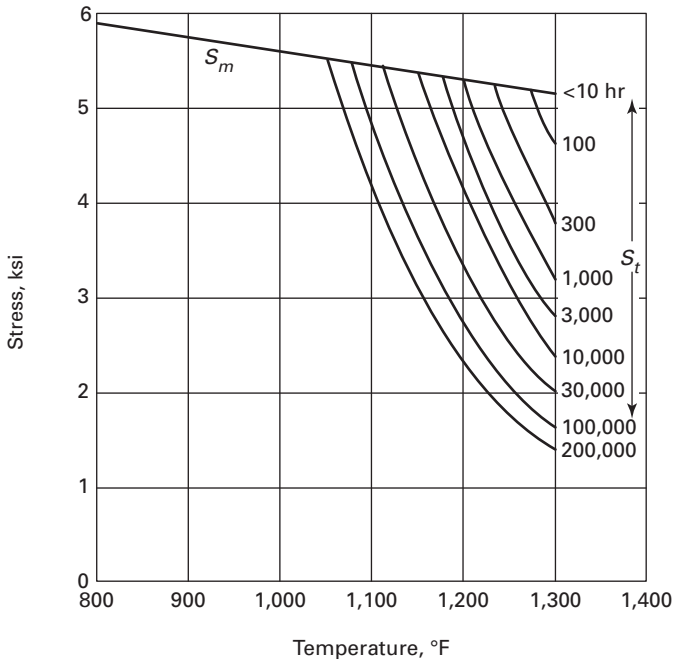
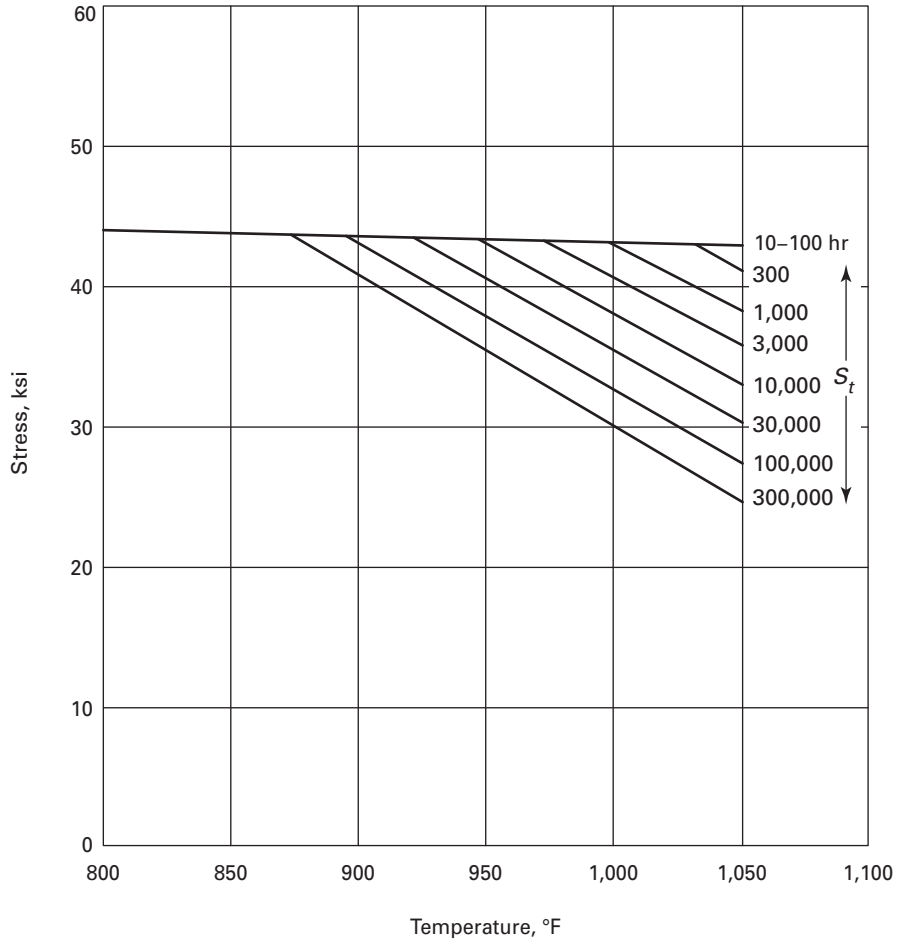
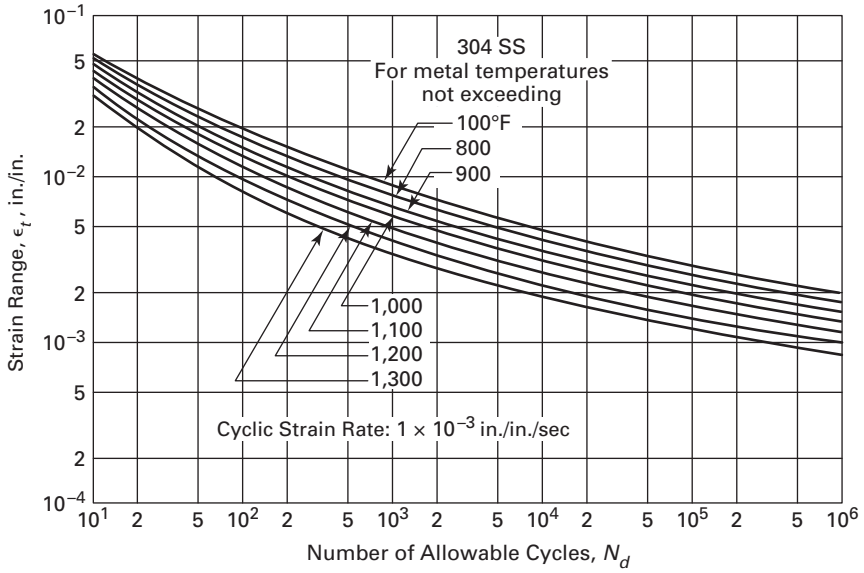


Figure E-100.15-3
S_{mt} — Allowable Stress Values, ksi, Alloy 718, Bolting



Temp., °F	10 hr	30 hr	10^2 hr	3×10^2 hr	10^3 hr	3×10^3 hr	10^4 hr	3×10^4 hr	10^5 hr	3×10^5 hr
800	44.4	44.4	44.4	44.4	44.4	44.4	44.4	44.4	44.4	44.4
850	44.1	44.1	44.1	44.1	44.1	44.1	44.1	44.1	44.1	44.1
900	43.8	43.8	43.8	43.8	43.8	43.8	43.8	43.8	43.3	43.3
950	43.5	43.5	43.5	43.5	43.5	43.5	43.0	40.7	38.0	35.3
1,000	43.1	43.1	43.1	43.1	43.1	40.7	38.0	35.3	32.7	30.0
1,050	42.7	42.7	42.7	41.3	38.0	35.3	32.7	30.3	27.0	24.7

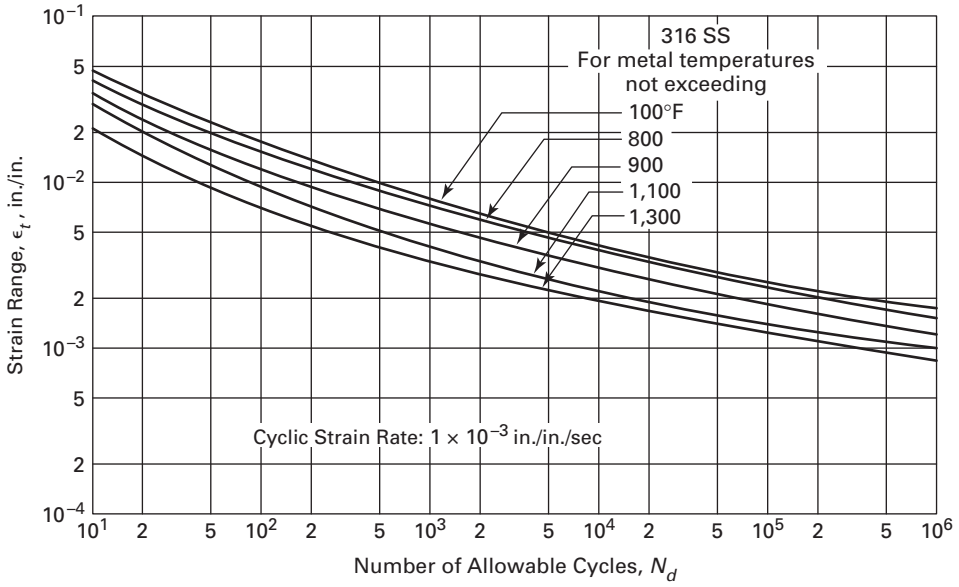
Figure E-100.16-1
Design Fatigue Strain Range, ϵ_t, for 304 SS



Number of Cycles, N_d [Note (1)]	Strain Range, ϵ_t (in./in.), at Temperature						
	100°F	800°F	900°F	1,000°F	1,100°F	1,200°F	1,300°F
10	0.051	0.050	0.0465	0.0425	0.0382	0.0335	0.0297
20	0.036	0.0345	0.0315	0.0284	0.025	0.0217	0.0186
40	0.0263	0.0246	0.0222	0.0197	0.017	0.0146	0.0123
10^2	0.018	0.0164	0.0146	0.0128	0.011	0.0093	0.0077
2×10^2	0.0142	0.0125	0.011	0.0096	0.0082	0.0069	0.0057
4×10^2	0.0113	0.00965	0.00845	0.00735	0.0063	0.00525	0.00443
10^3	0.00845	0.00725	0.0063	0.0055	0.0047	0.00385	0.00333
2×10^3	0.0067	0.0059	0.0051	0.0045	0.0038	0.00315	0.00276
4×10^3	0.00545	0.00485	0.0042	0.00373	0.0032	0.00263	0.0023
10^4	0.0043	0.00385	0.00335	0.00298	0.0026	0.00215	0.00185
2×10^4	0.0037	0.0033	0.0029	0.00256	0.00226	0.00187	0.00158
4×10^4	0.0032	0.00287	0.00254	0.00224	0.00197	0.00162	0.00138
10^5	0.00272	0.00242	0.00213	0.00188	0.00164	0.00140	0.00117
2×10^5	0.0024	0.00215	0.0019	0.00167	0.00145	0.00123	0.00105
4×10^5	0.00215	0.00192	0.0017	0.0015	0.0013	0.0011	0.00094
10^6	0.0019	0.00169	0.00149	0.0013	0.00112	0.00098	0.00084

NOTE:
(1) Cyclic strain rate: 1×10^{-3} in./in./sec.

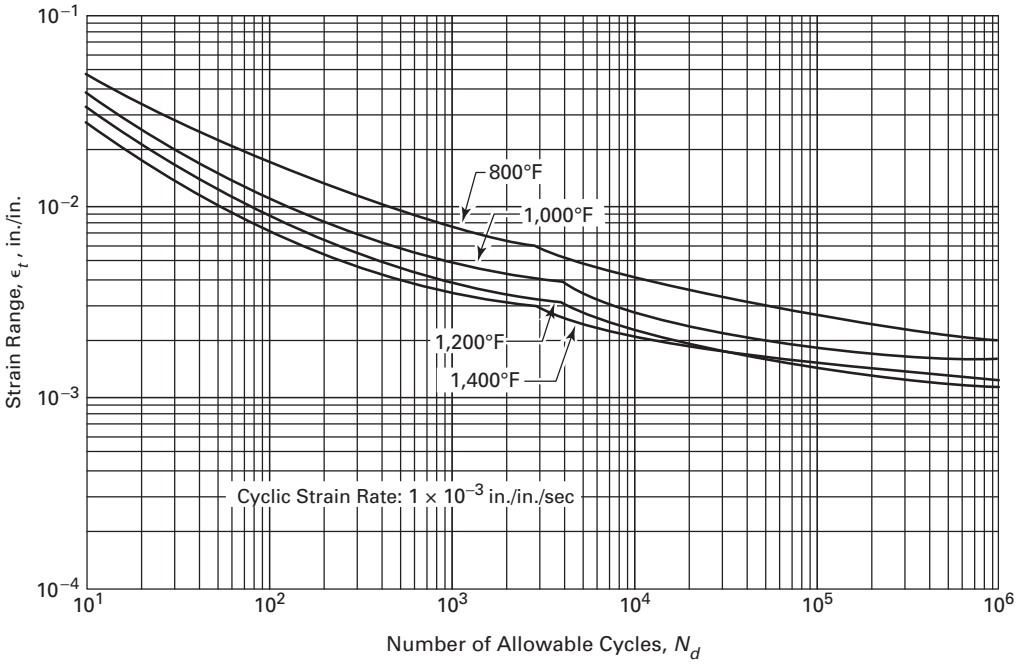
Figure E-100.16-2
Design Fatigue Strain Range, ϵ_t, for 316 SS



Number of Cycles, N_d [Note (1)]	Strain Range, ϵ_t (in./in.), at Temperature				
	100°F	800°F	900°F	1,000°F to 1,200°F	1,300°F
10^1	0.0507	0.0438	0.0378	0.0318	0.0214
2×10^1	0.0357	0.0318	0.0251	0.0208	0.0149
4×10^1	0.026	0.0233	0.0181	0.0148	0.0105
10^2	0.0177	0.0159	0.0123	0.00974	0.00711
2×10^2	0.0139	0.0125	0.00961	0.00744	0.00551
4×10^2	0.0110	0.00956	0.00761	0.00574	0.00431
10^3	0.00818	0.00716	0.00571	0.00424	0.00328
2×10^3	0.00643	0.00581	0.00466	0.00339	0.00268
4×10^3	0.00518	0.00476	0.00381	0.00279	0.00226
10^4	0.00403	0.00376	0.00301	0.00221	0.00186
2×10^4	0.00343	0.00316	0.00256	0.00186	0.00162
4×10^4	0.00293	0.00273	0.00221	0.00161	0.00144
10^5	0.00245	0.00226	0.00182	0.00136	0.00121
2×10^5	0.00213	0.00196	0.00159	0.00121	0.00108
4×10^5	0.00188	0.00173	0.00139	0.00109	0.000954
10^6	0.00163	0.00151	0.00118	0.000963	0.000834

NOTE:
(1) Cyclic strain rate: 1×10^{-3} in./in./sec.

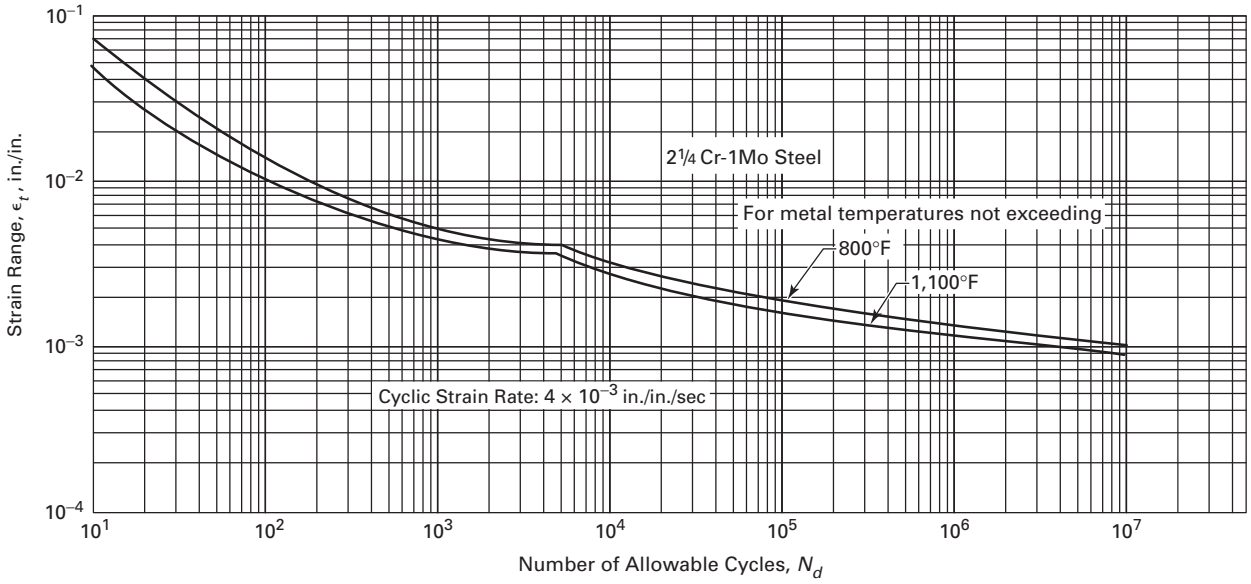
Figure E-100.16-3
Design Fatigue Strain Range, ϵ_t, for Ni–Fe–Cr Alloy 800H



Number of Cycles, N_d [Note (1)]	Strain Range, ϵ_t (in./in.), at Temperature			
	800°F	1,000°F	1,200°F	1,400°F
10^1	0.0500	0.0424	0.03414	0.02841
2×10^1	0.0362	0.02735	0.02199	0.01829
4×10^1	0.0027	0.01849	0.01483	0.01233
10^2	0.0184	0.01164	0.00932	0.00774
2×10^2	0.0142	0.00849	0.00678	0.00562
4×10^2	0.0113	0.00660	0.00533	0.00469
10^3	0.00841	0.00515	0.00417	0.00388
2×10^3	0.00685	0.00454	0.00366	0.00349
3×10^3	0.00644	0.00433	0.00347	0.00309
4×10^3	0.00572	0.00409	0.00327	0.00270
10^4	0.00452	0.00293	0.00234	0.00212
2×10^4	0.00392	0.00243	0.00197	0.00183
4×10^4	0.00343	0.00212	0.00175	0.00164
10^5	0.00288	0.00194	0.00155	0.00149
2×10^5	0.00254	0.00186	0.00147	0.00140
4×10^5	0.00229	0.00178	0.00140	0.00132
10^6	0.00200	0.00169	0.00131	0.00122

NOTE:
(1) Cyclic strain rate: 1×10^{-3} in./in./sec.

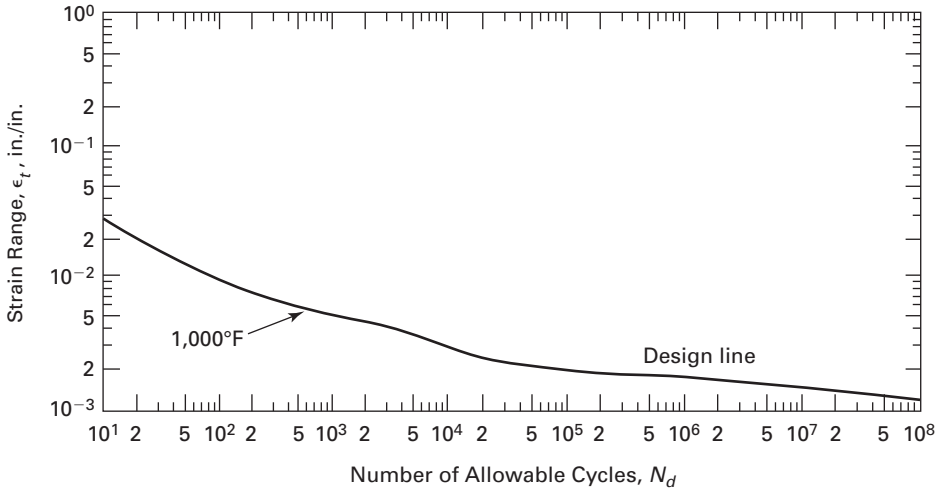
Figure E-100.16-4
Design Fatigue Strain Range, ϵ_t, for 2¼Cr–1Mo Steel



Number of Cycles, N_d [Note (1)]	Strain Range, ϵ_t (in./in.), at Temperature	
	800°F	900°F to 1,000°F
10^1	0.056	0.040
4×10^1	0.023	0.0163
10^2	0.013	0.0097
2×10^2	0.0094	0.0070
4×10^2	0.0070	0.0056
10^3	0.0052	0.0042
2×10^3	0.0044	0.0039
4×10^3	0.0040	0.0035
10^4	0.0032	0.00265
2×10^4	0.0026	0.00215
4×10^4	0.0023	0.00182
10^5	0.00195	0.00158
2×10^5	0.00173	0.00142
4×10^5	0.00155	0.00130
10^6	0.00137	0.00118

NOTE:
(1) Cyclic strain rate: 4×10^{-3} in./in./sec.

Figure E-100.16-5
Design Fatigue Strain Range, ϵ_t, for 9Cr–1Mo–V Steel



Number of Cycles, N_d [Note (1)]	Strain Range, ϵ_t (in./in.), at 1,000°F Temperature
10	0.028
20	0.019
40	0.0138
10^2	0.0095
2×10^2	0.0075
4×10^2	0.0062
10^3	0.0050
2×10^3	0.0044
4×10^3	0.0039
10^4	0.0029
2×10^4	0.0024
4×10^4	0.0021
10^5	0.0019
2×10^5	0.00176
4×10^5	0.0017
10^6	0.00163
2×10^6	0.00155
4×10^6	0.00148
10^7	0.00140
2×10^7	0.00132
4×10^7	0.00125
10^8	0.00120

NOTE:
(1) Cyclic strain rate: 4×10^{-3} in./in./sec.

Figure E-100.17-1
Time–Temperature Limits for Application of Section II External Pressure Charts for Cylinder Under Axial Compression

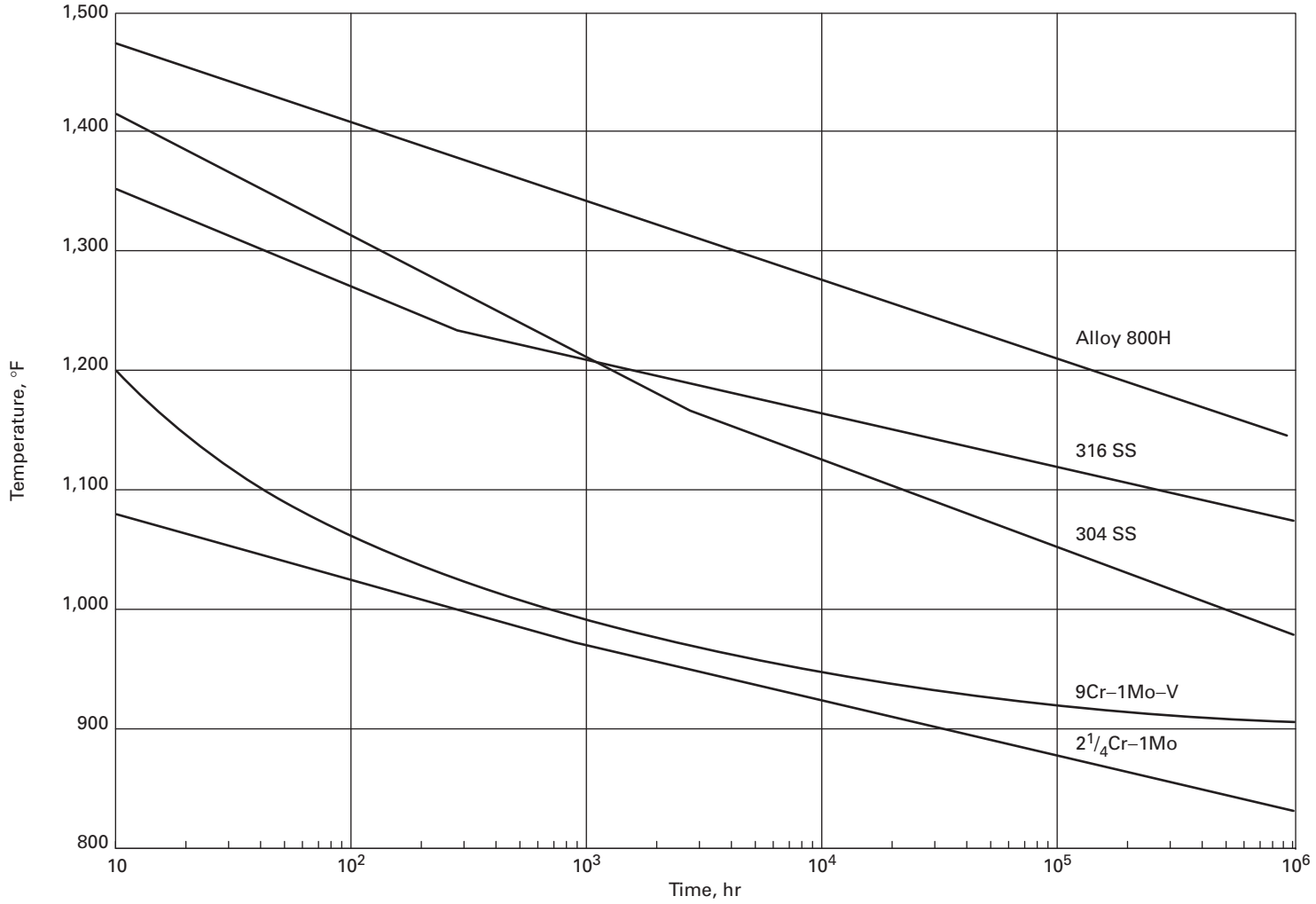


Figure E-100.17-2
Time–Temperature Limits for Application of Section II External Pressure Charts for Sphere Under External Pressure

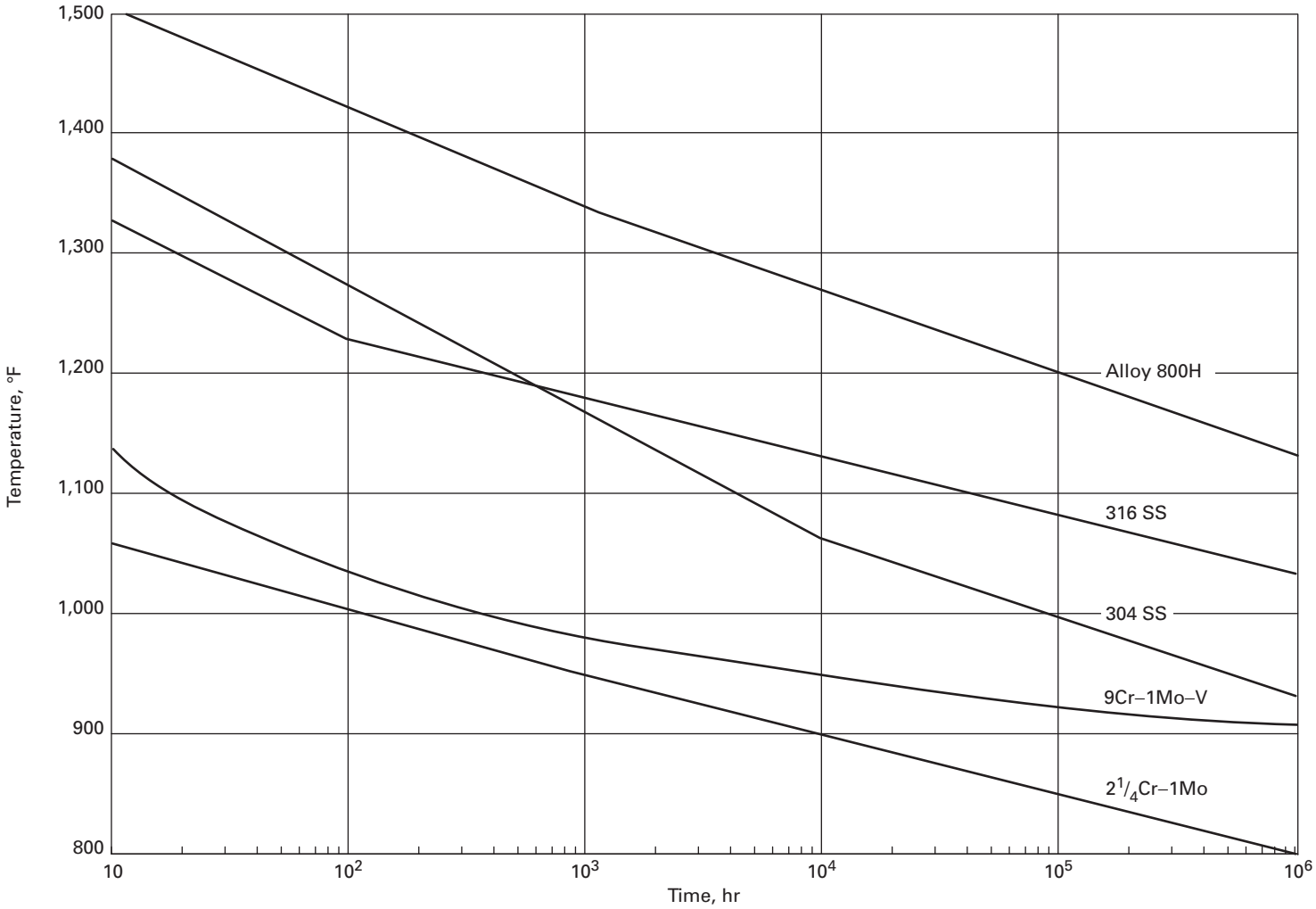


Figure E-100.17-3
Temperature Limits for Application of Section II External Pressure Charts for Cylinder Under External Pressure

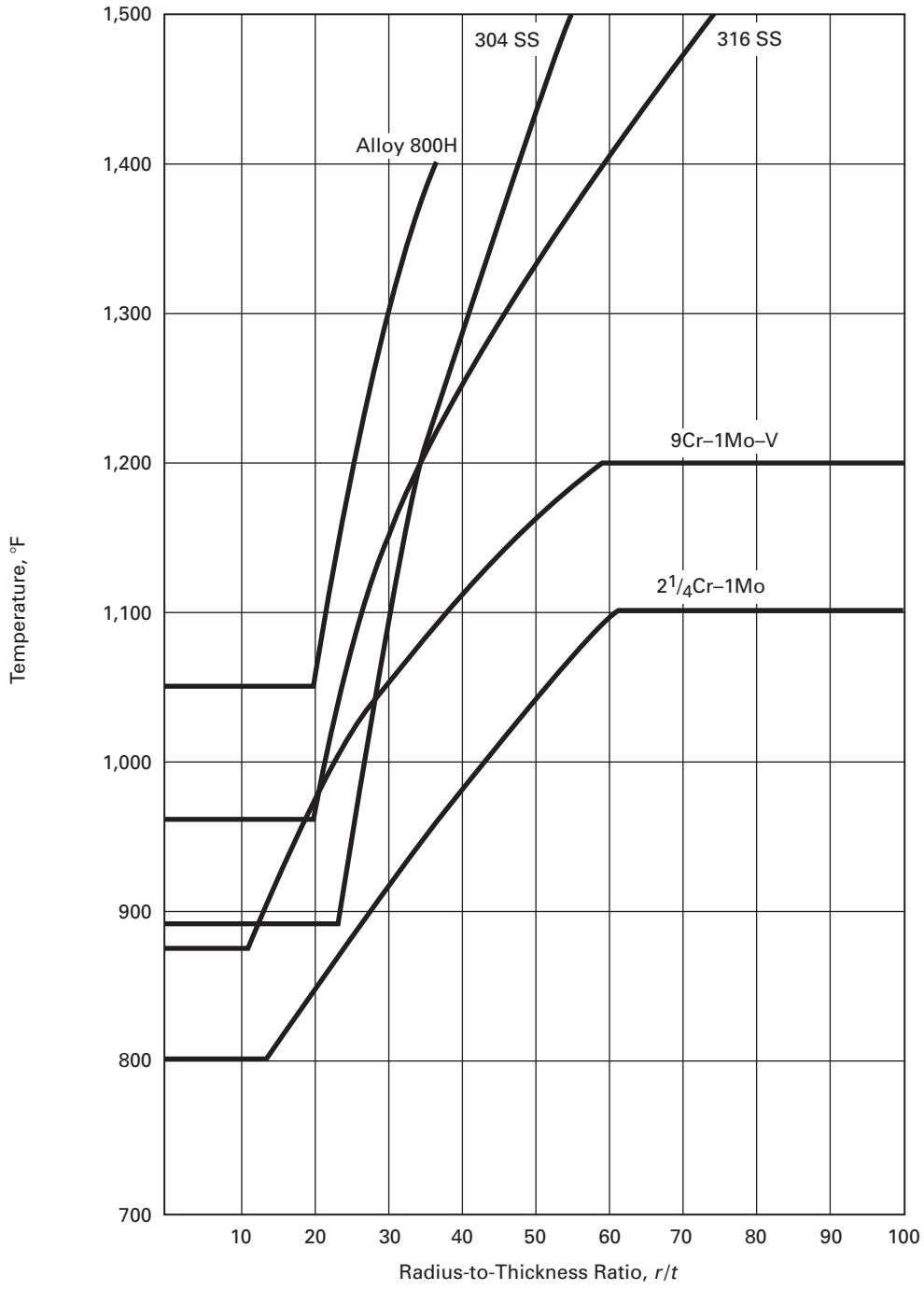


Figure E-100.18-1
Average Isochronous Stress–Strain Curves for Type 304 SS at 800°F

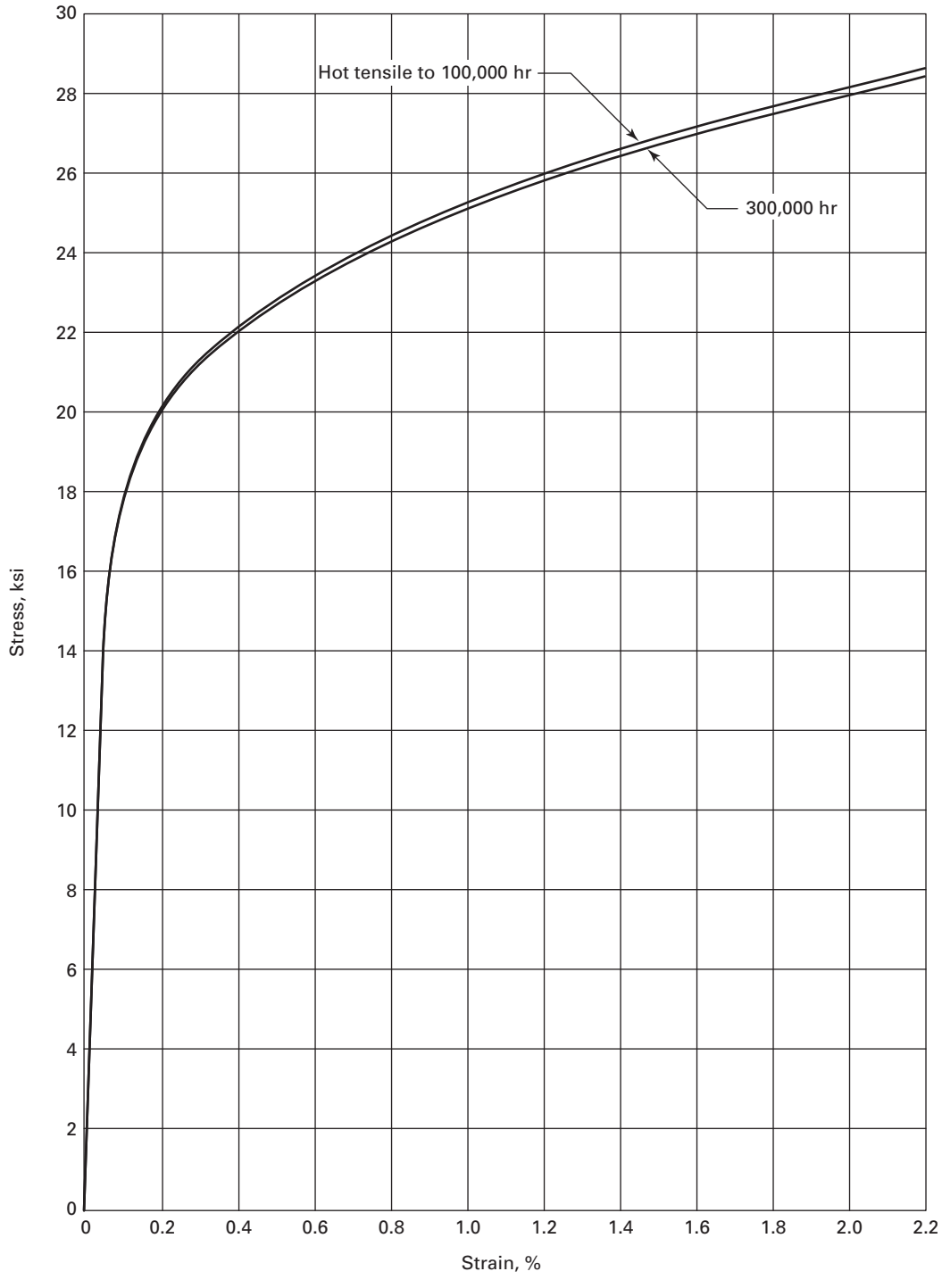


Figure E-100.18-2
Average Isochronous Stress–Strain Curves for Type 304 SS at 850°F

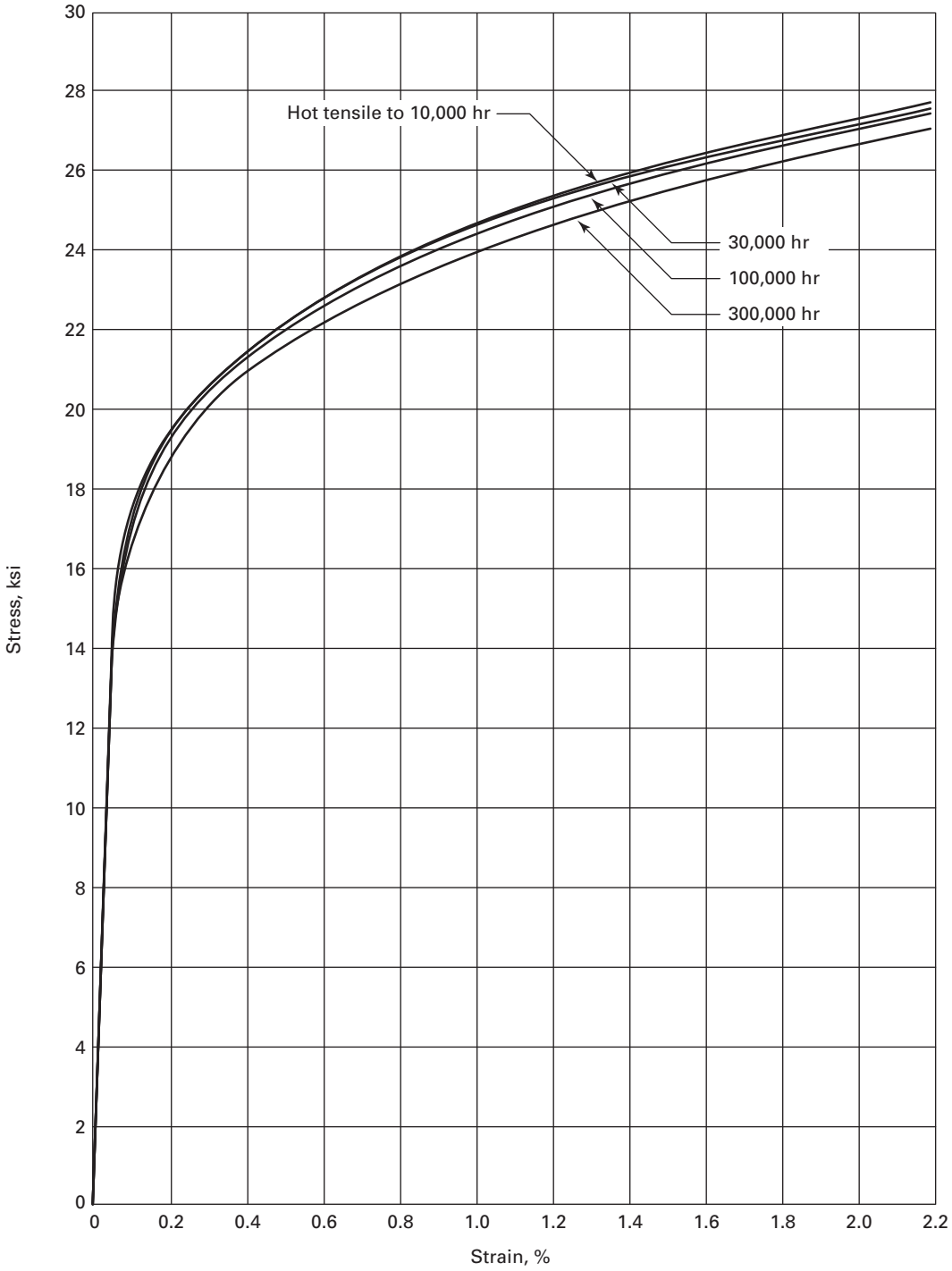


Figure E-100.18-3
Average Isochronous Stress–Strain Curves for Type 304 SS at 900°F

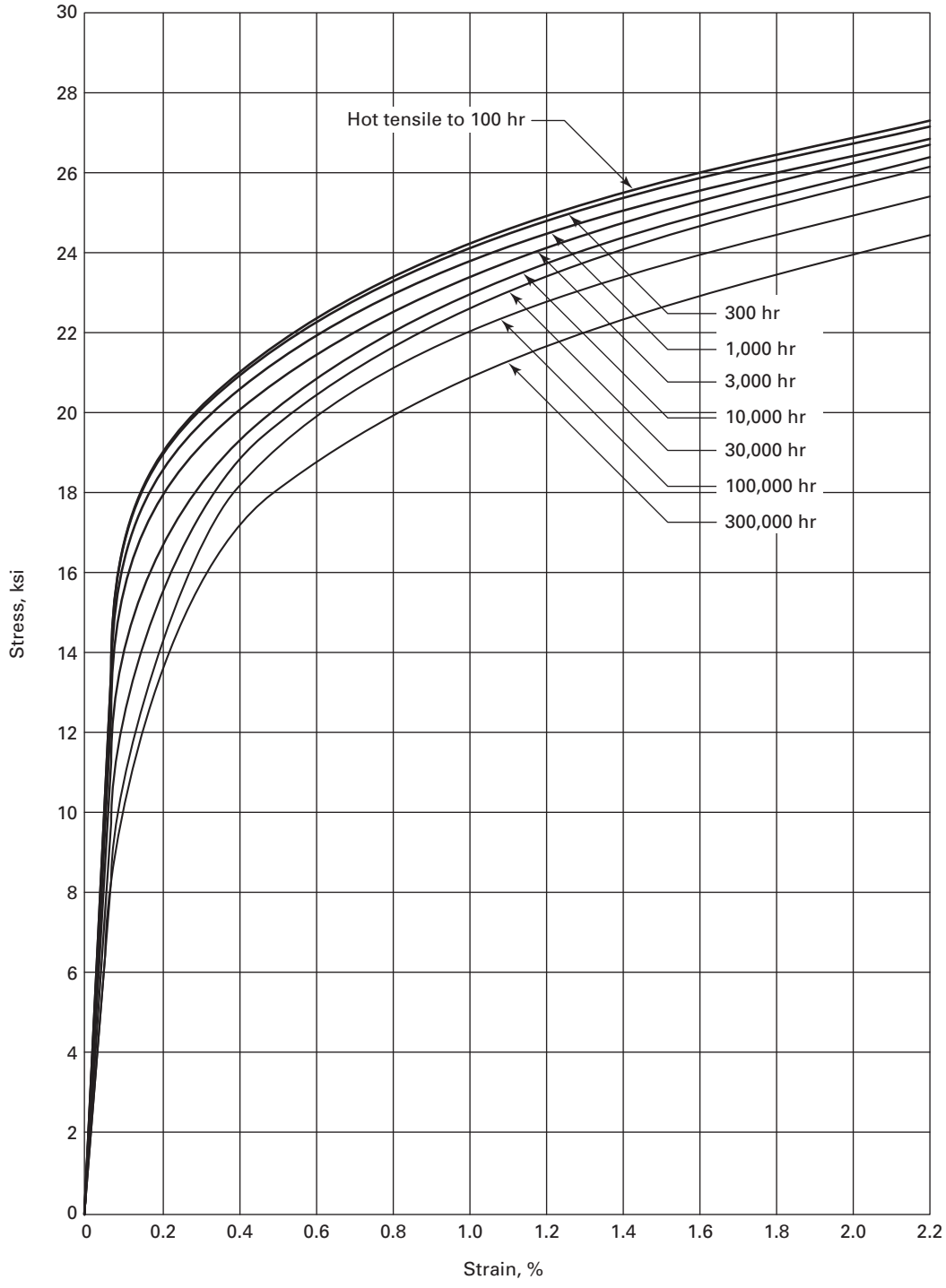


Figure E-100.18-4
Average Isochronous Stress–Strain Curves for Type 304 SS at 950°F

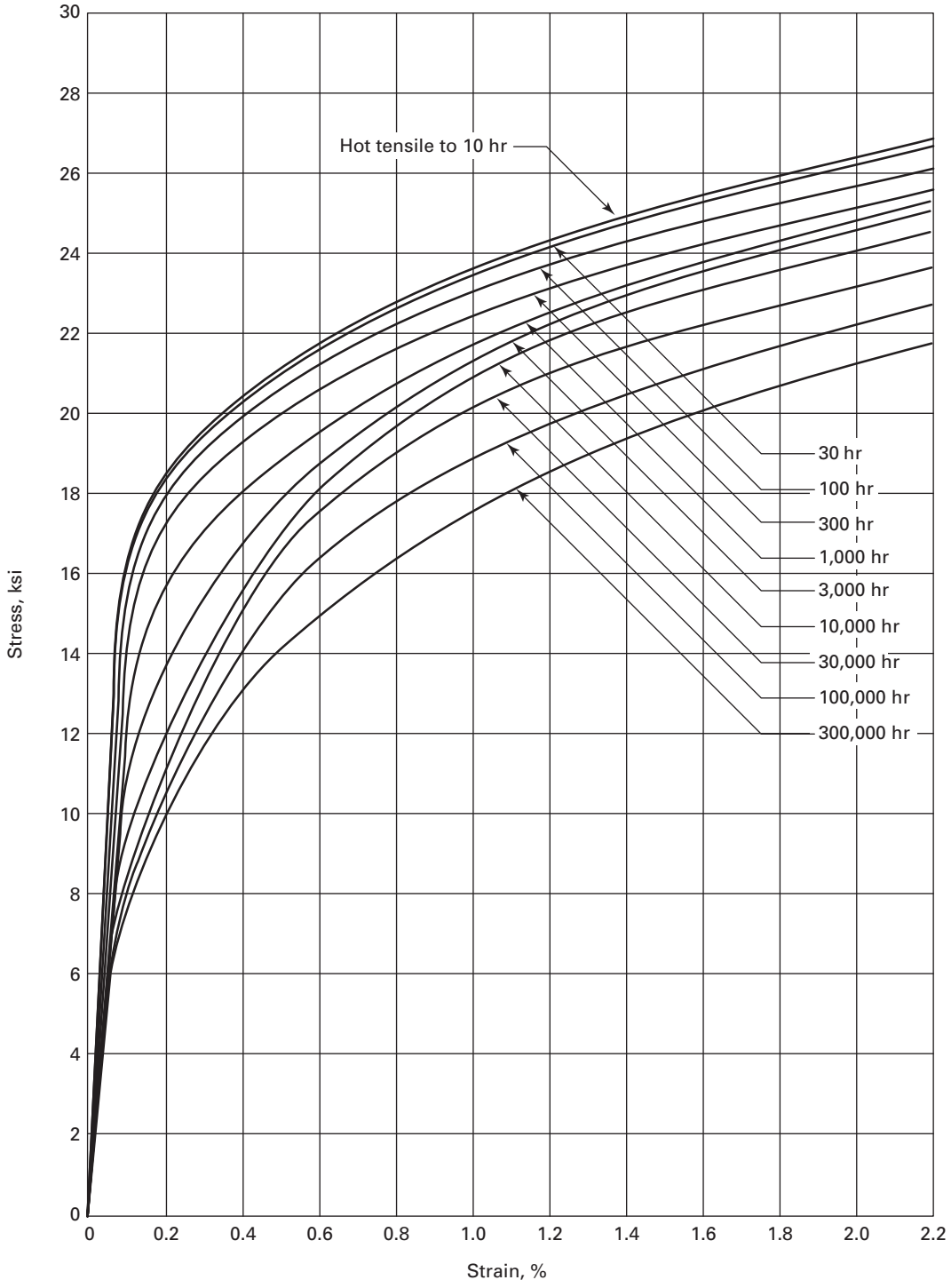


Figure E-100.18-5
Average Isochronous Stress–Strain Curves for Type 304 SS at 1,000°F

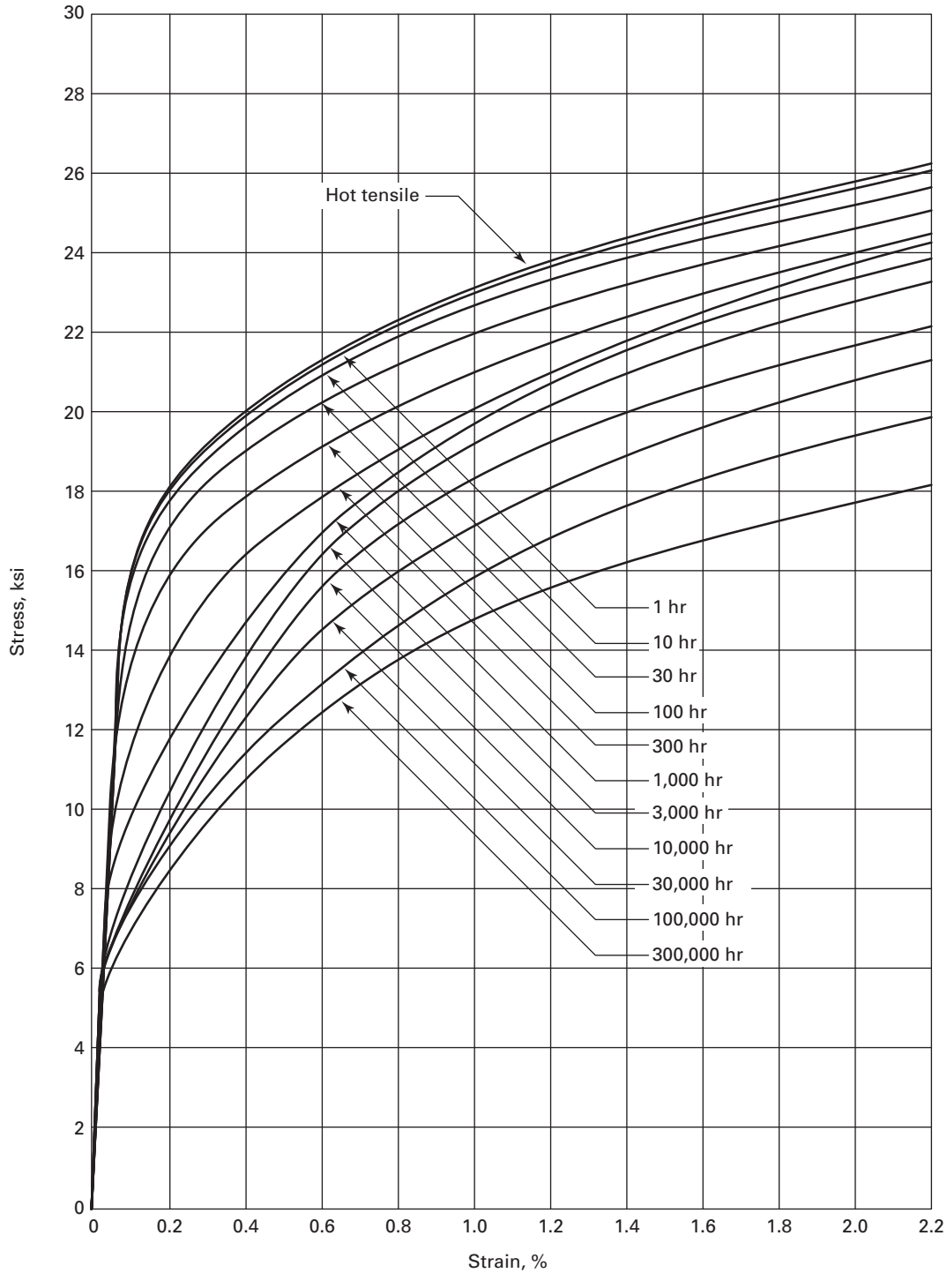


Figure E-100.18-6
Average Isochronous Stress–Strain Curves for Type 304 SS at 1,050°F

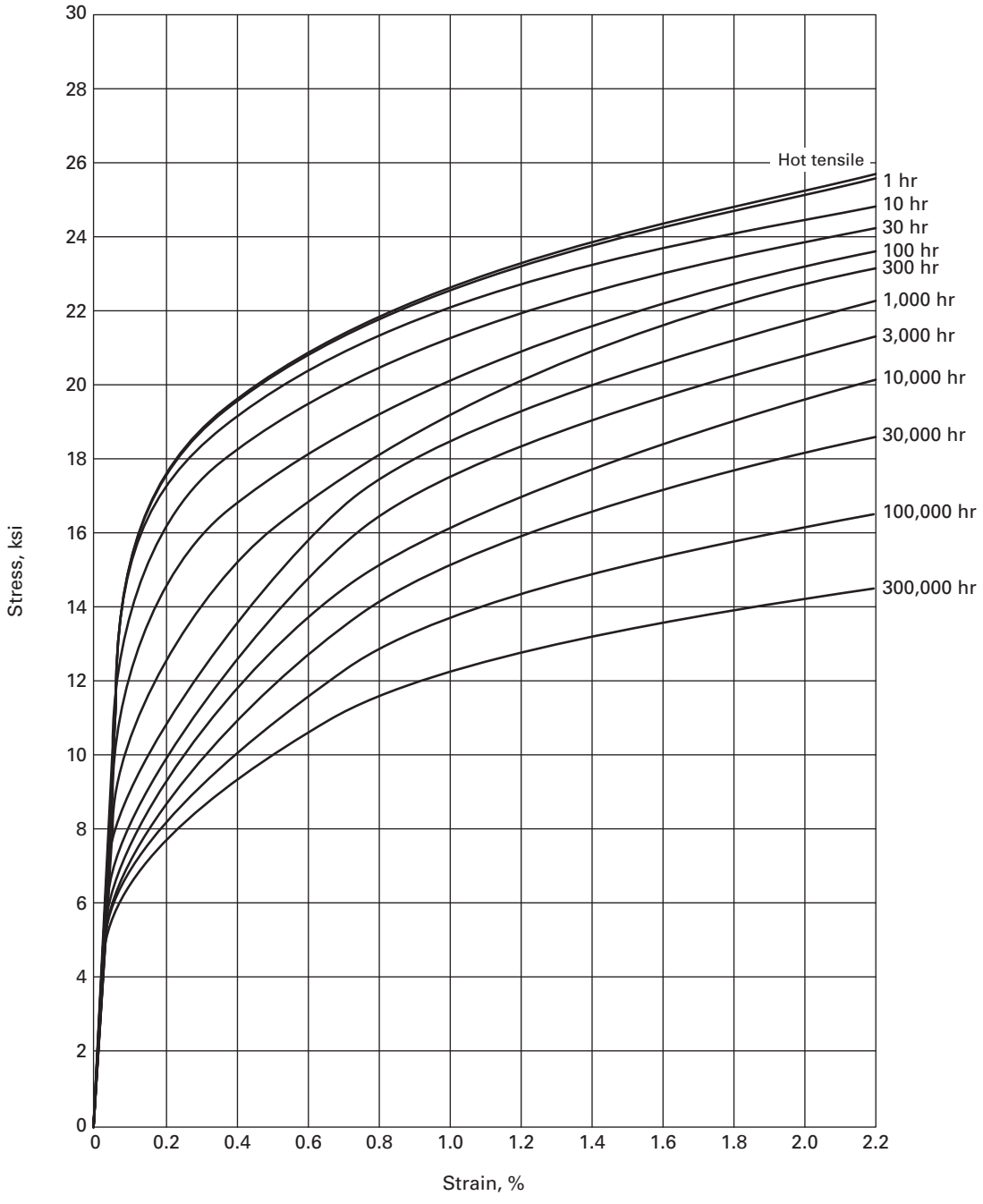


Figure E-100.18-7
Average Isochronous Stress–Strain Curves for Type 304 SS at 1,100°F

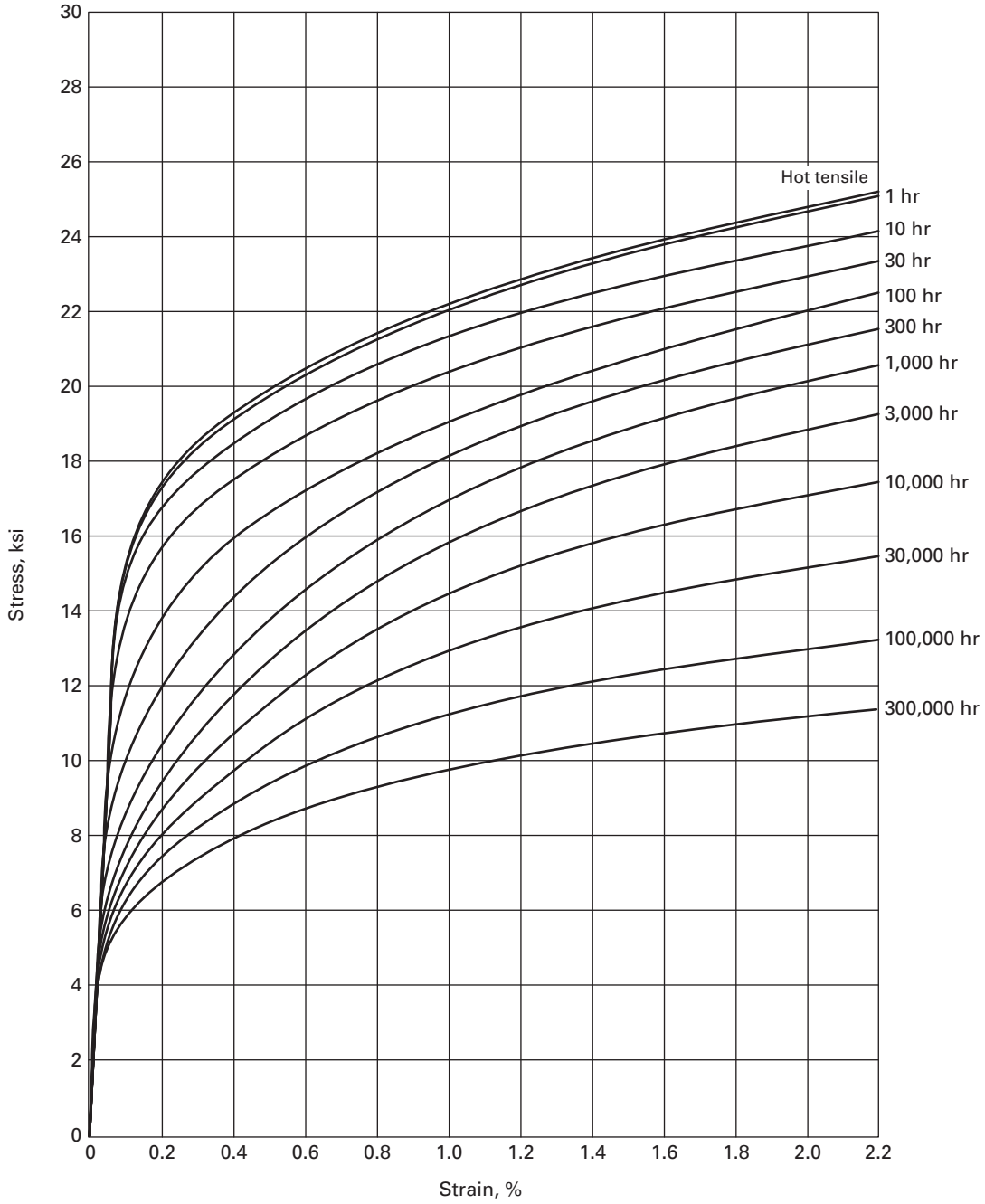


Figure E-100.18-8
Average Isochronous Stress–Strain Curves for Type 304 SS at 1,150°F

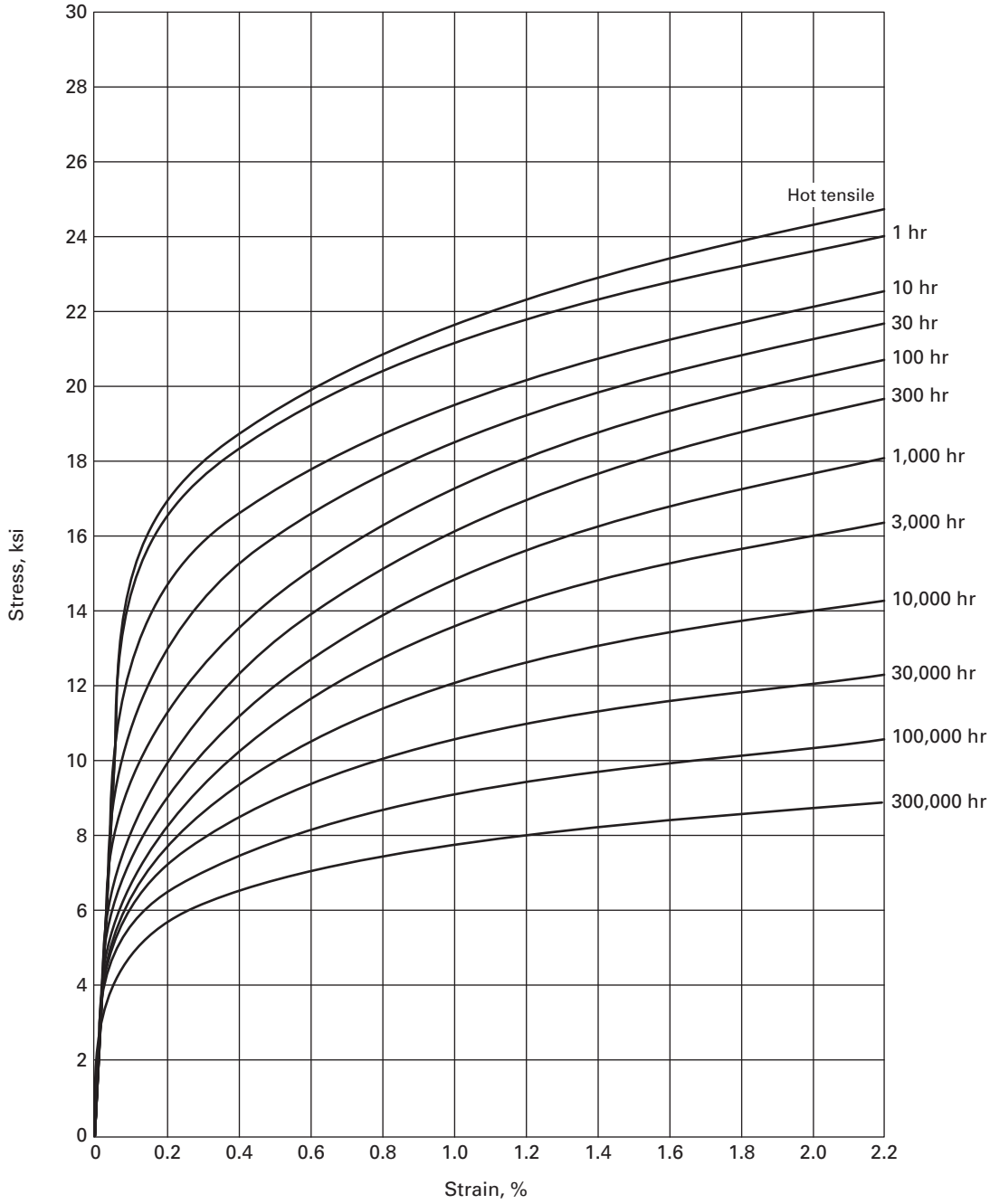


Figure E-100.18-9
Average Isochronous Stress–Strain Curves for Type 304 SS at 1,200°F

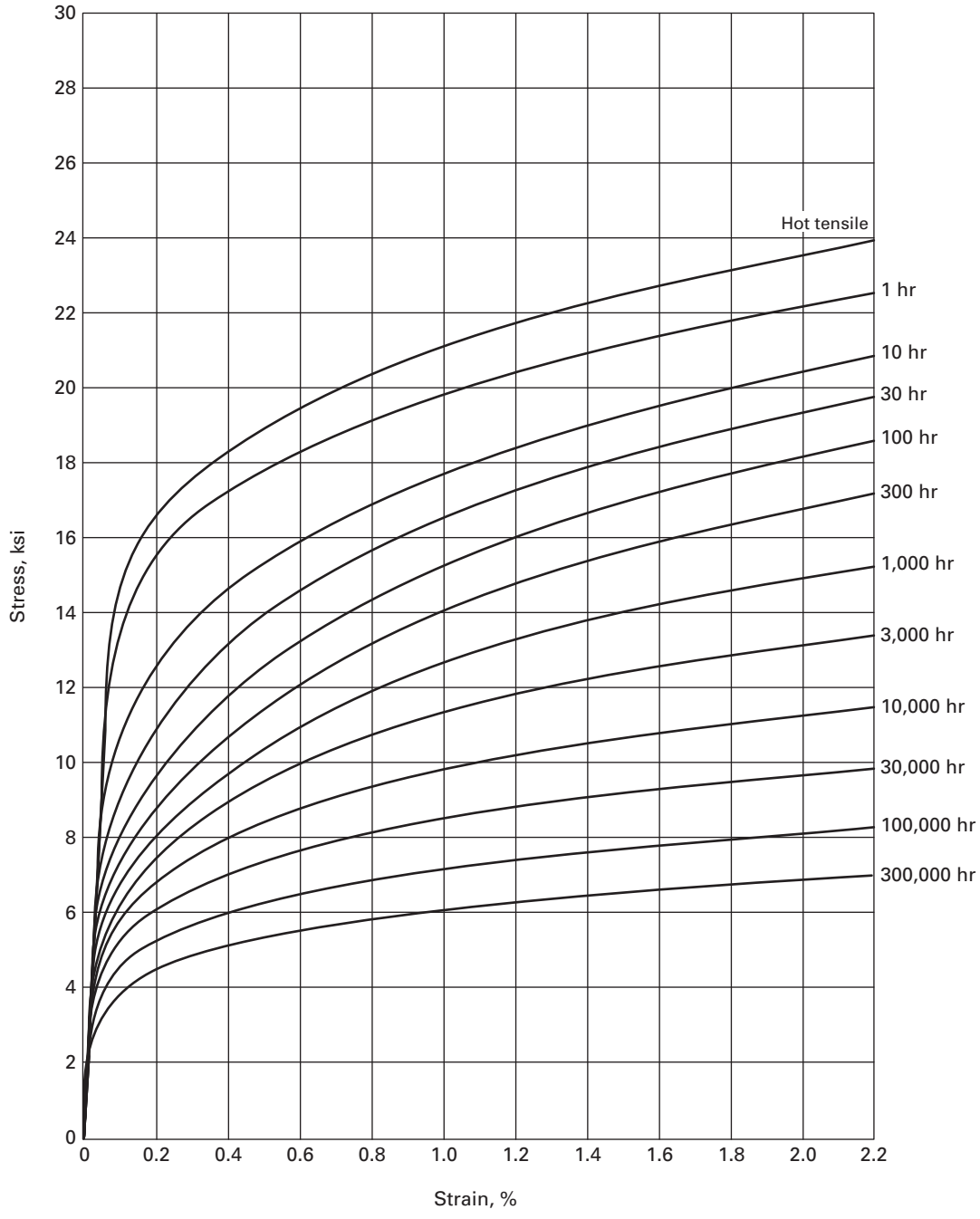


Figure E-100.18-10
Average Isochronous Stress–Strain Curves for Type 304 SS at 1,250°F

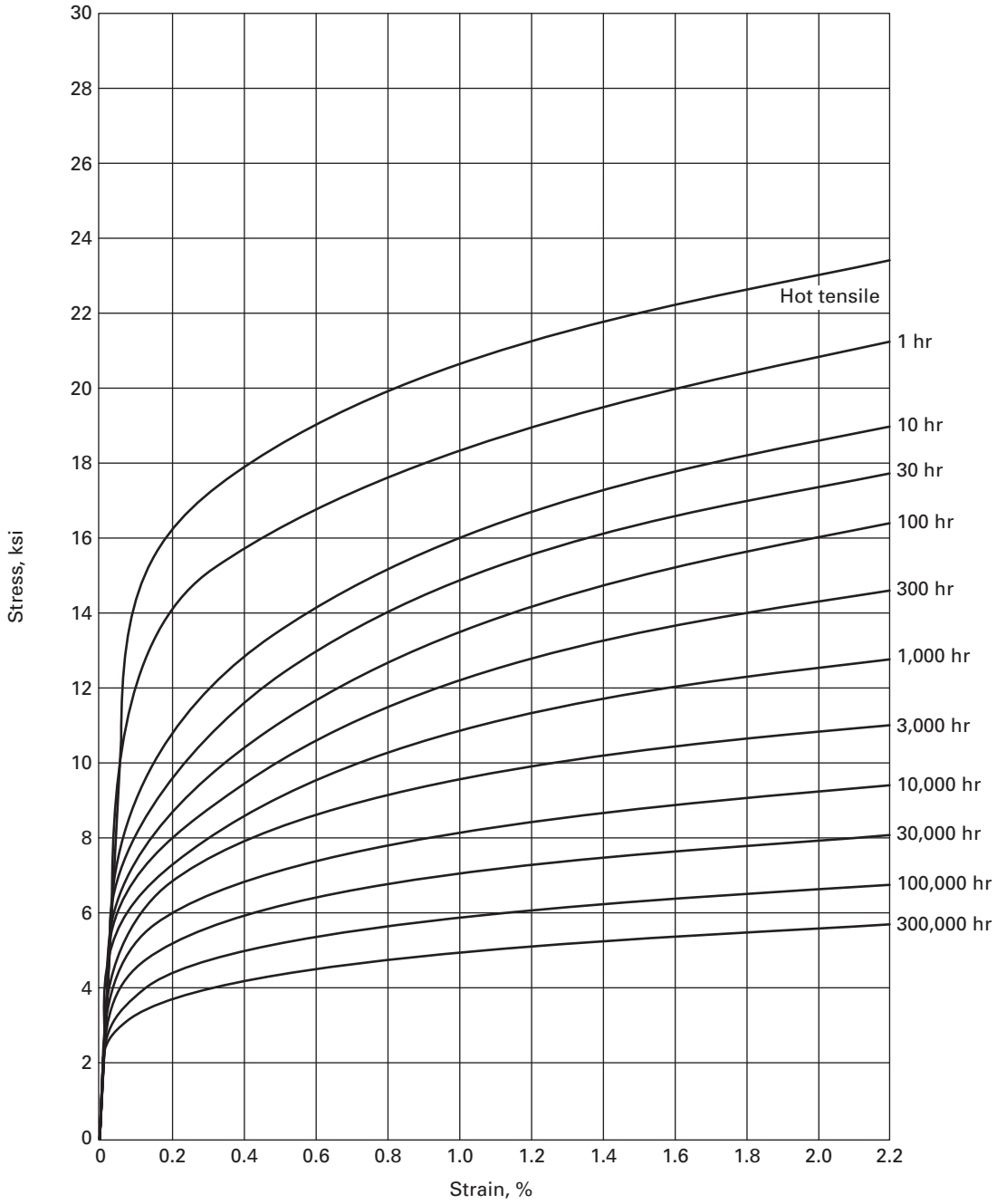


Figure E-100.18-11
Average Isochronous Stress–Strain Curves for Type 304 SS at 1,300°F

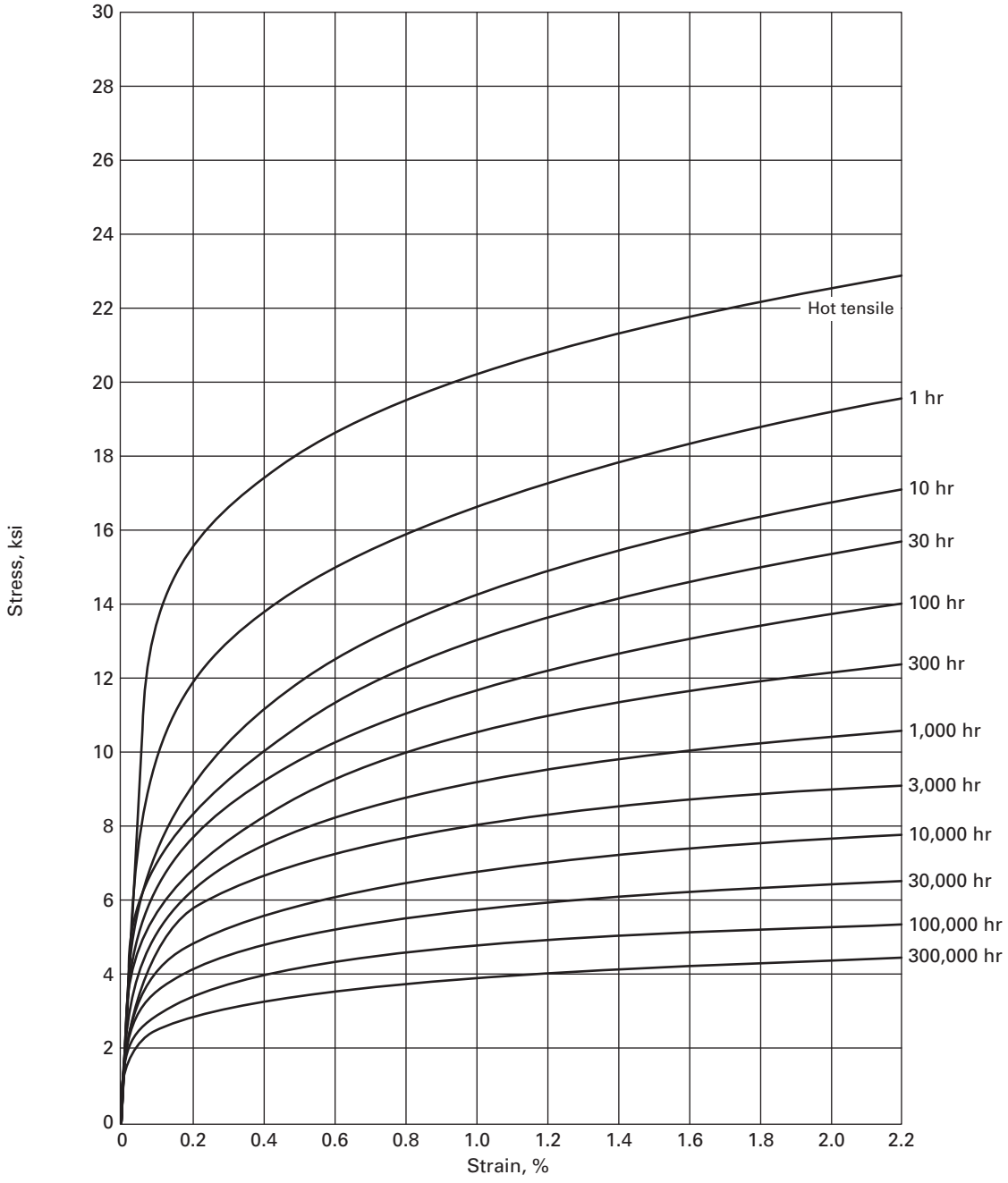


Figure E-100.18-12
Average Isochronous Stress–Strain Curves for Type 304 SS at 1,350°F

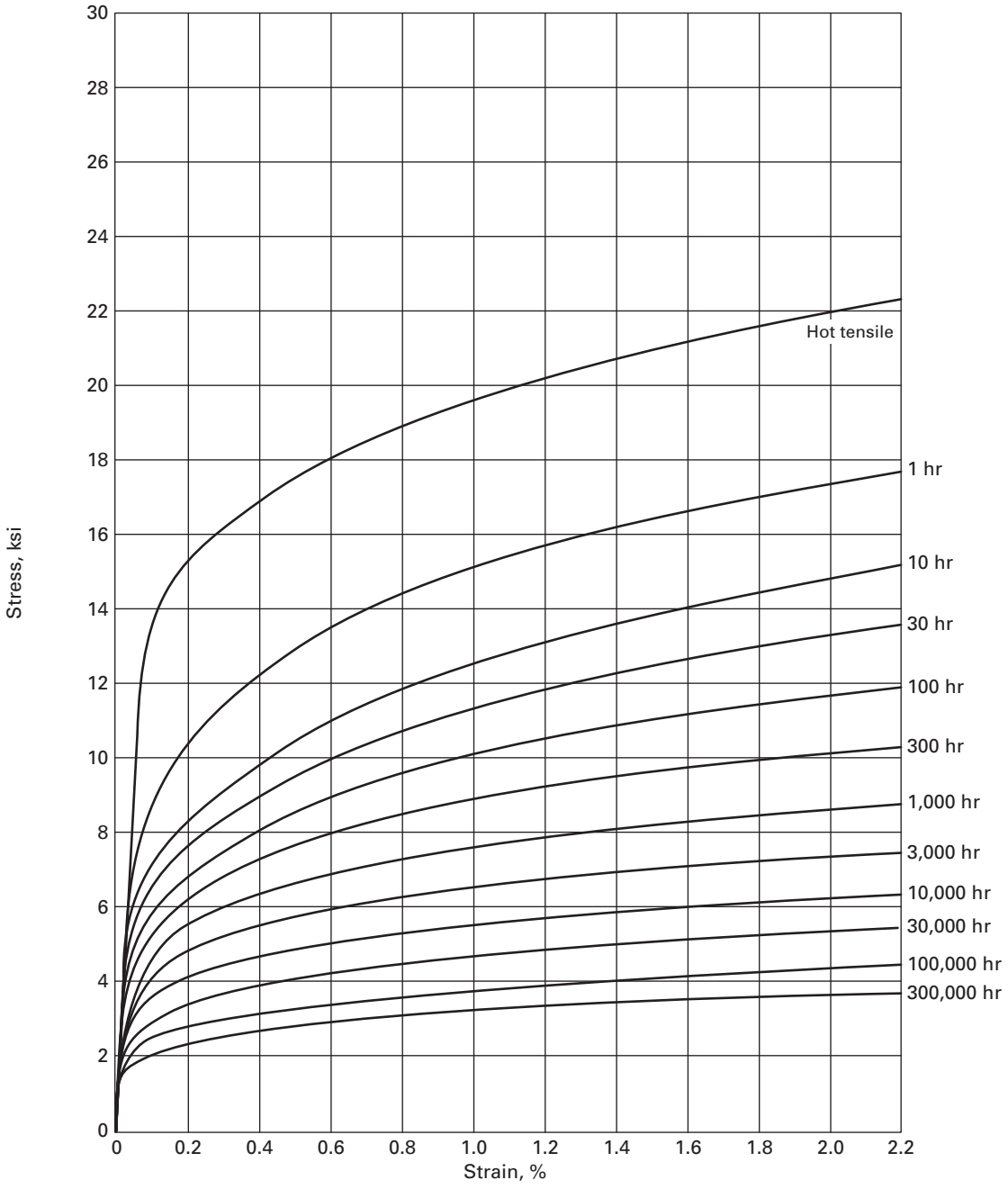


Figure E-100.18-13
Average Isochronous Stress–Strain Curves for Type 304 SS at 1,400°F

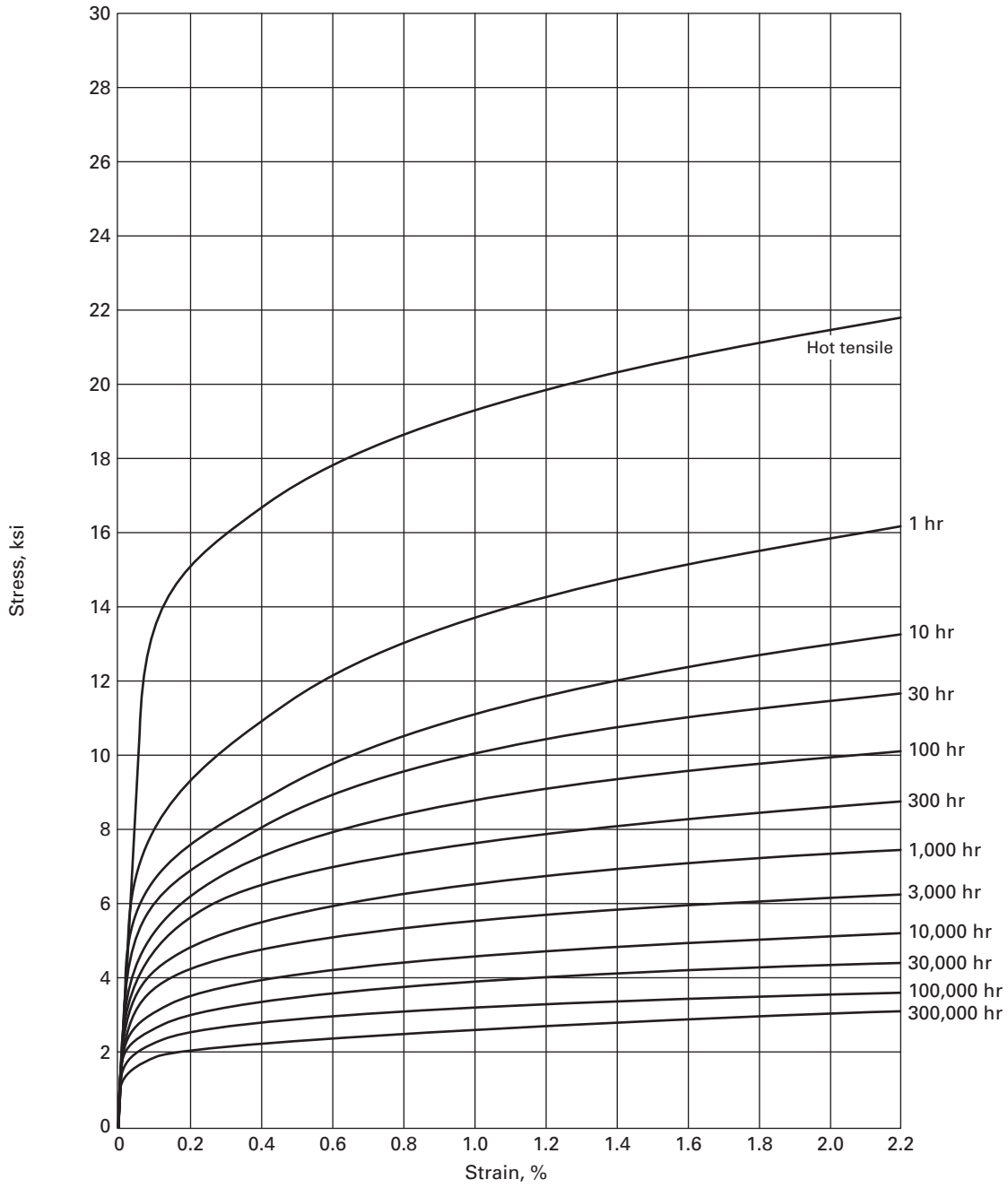


Figure E-100.18-14
Average Isochronous Stress–Strain Curves for Type 304 SS at 1,450°F

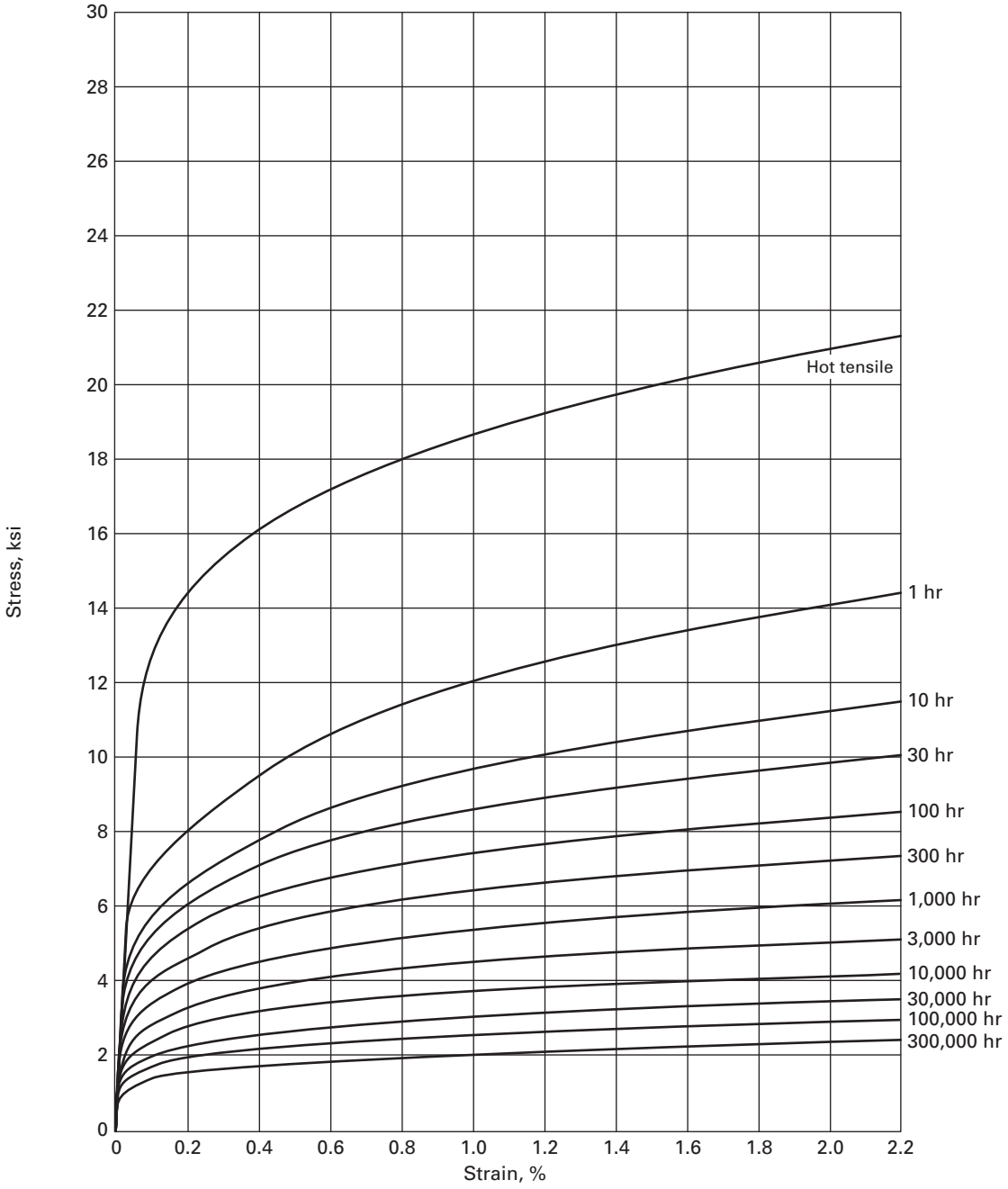


Figure E-100.18-15
Average Isochronous Stress–Strain Curves for Type 304 SS at 1,500°F

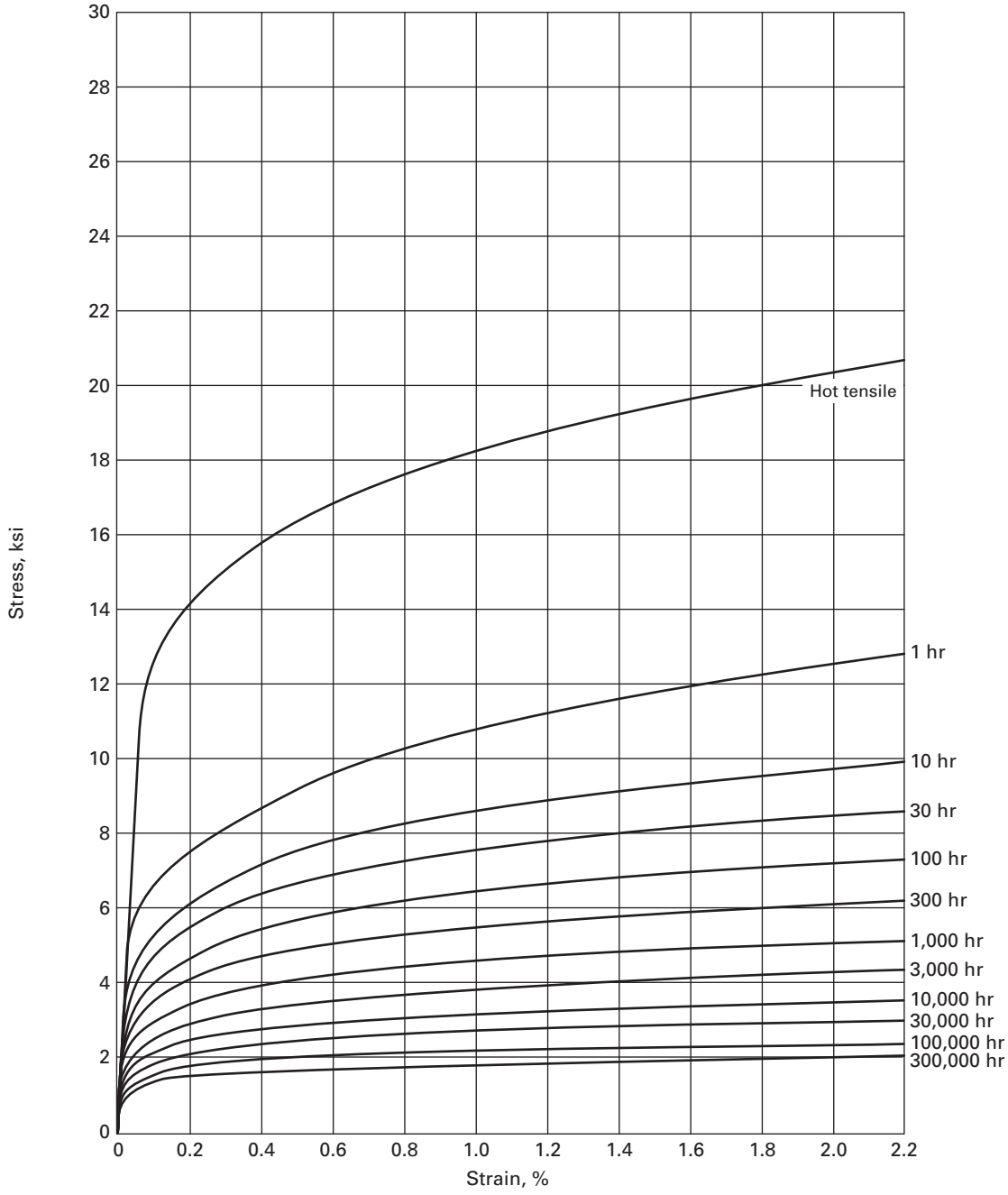


Figure E-100.19-1
Average Isochronous Stress–Strain Curves for Type 316 SS at 800°F

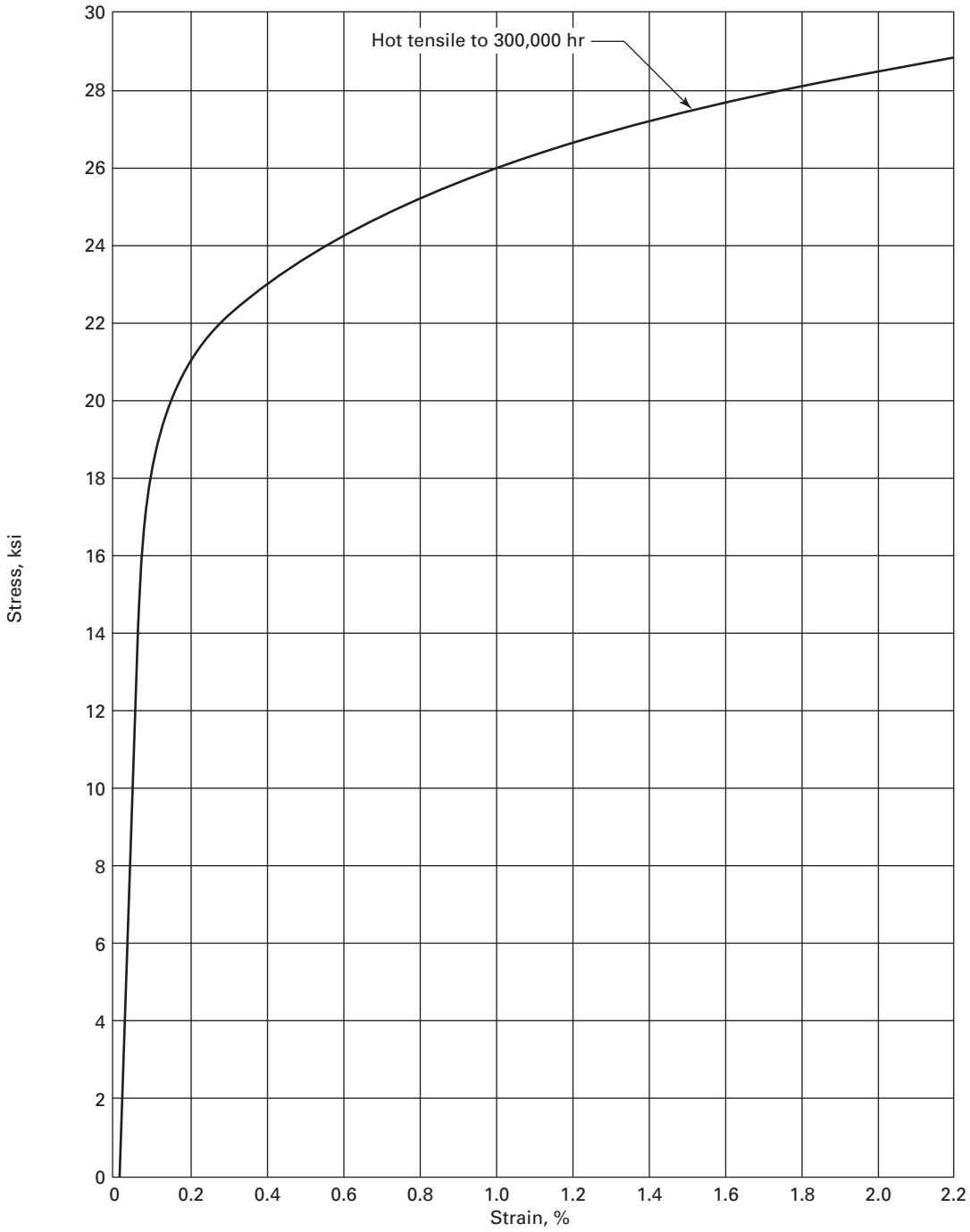


Figure E-100.19-2
Average Isochronous Stress–Strain Curves for Type 316 SS at 850°F

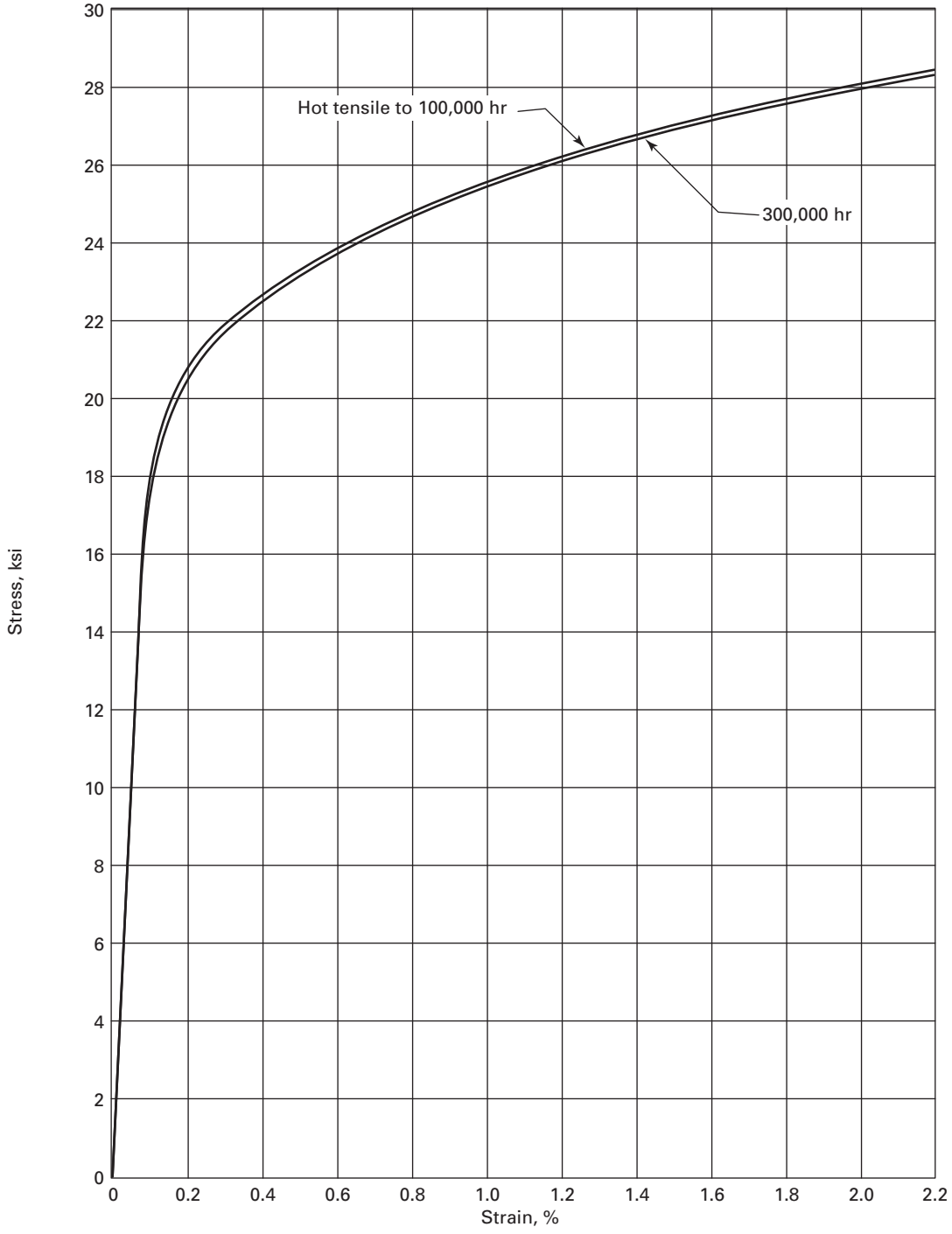


Figure E-100.19-3
Average Isochronous Stress–Strain Curves for Type 316 SS at 900°F

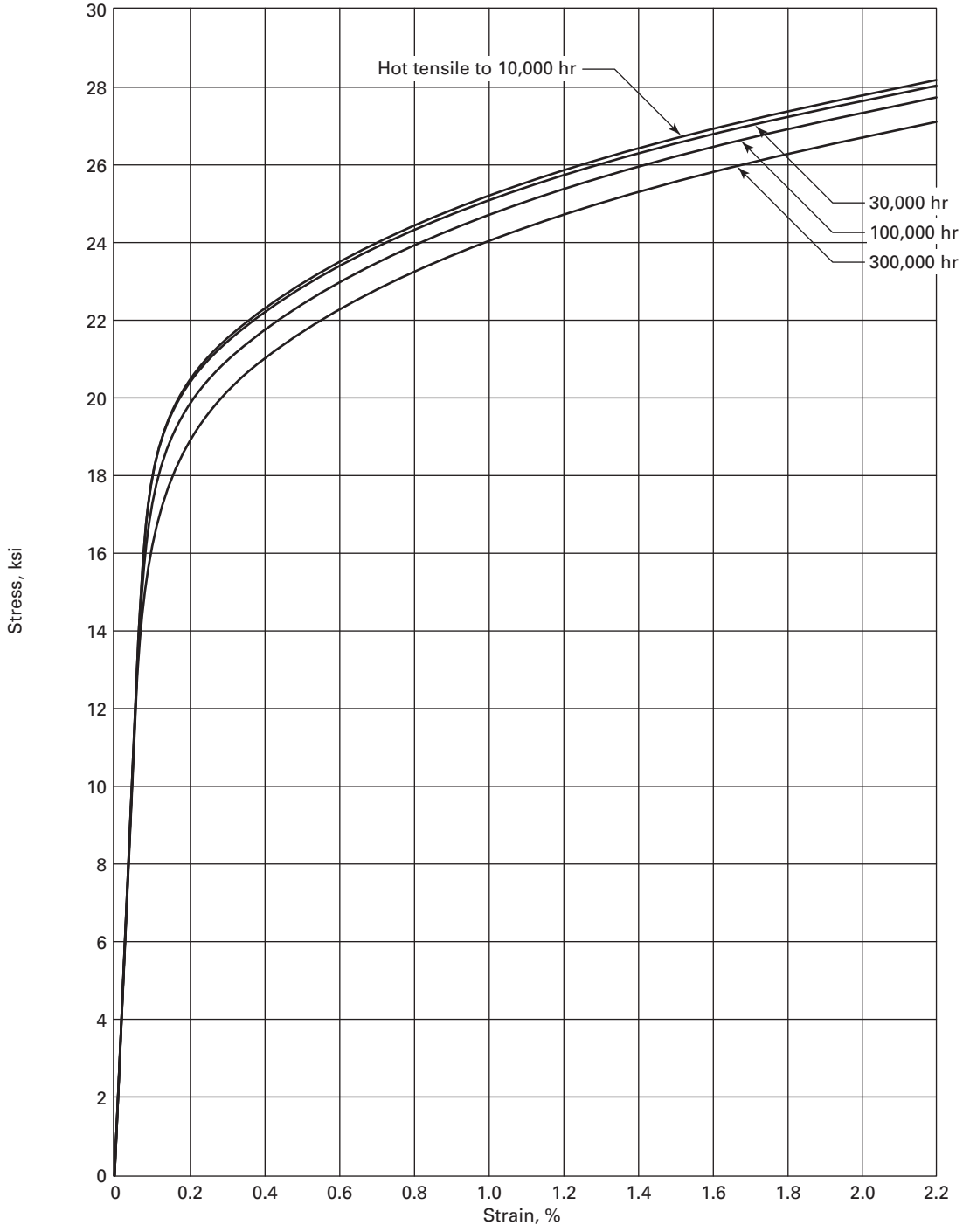


Figure E-100.19-4
Average Isochronous Stress–Strain Curves for Type 316 SS at 950°F

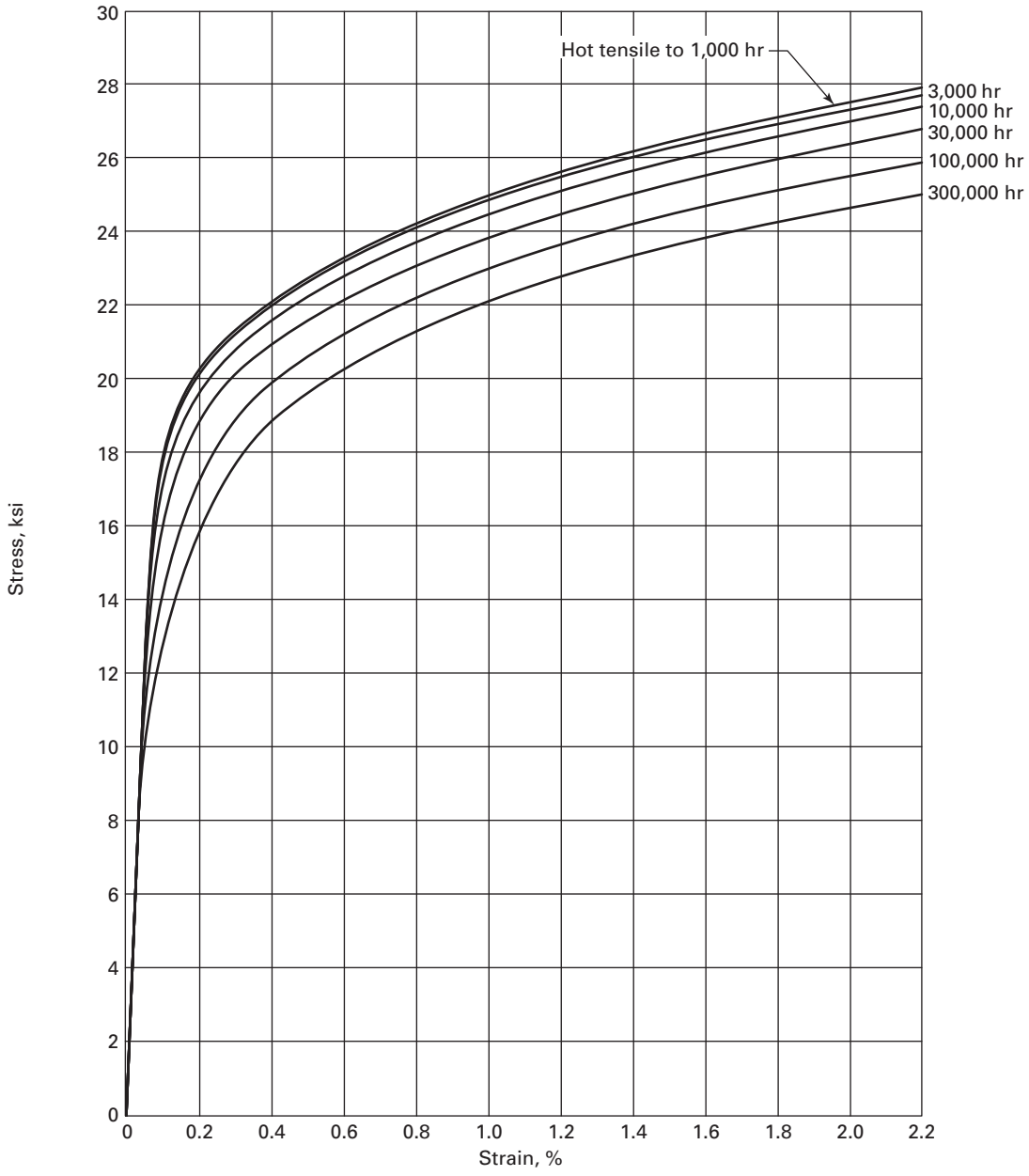


Figure E-100.19-5
Average Isochronous Stress–Strain Curves for Type 316 SS at 1,000°F

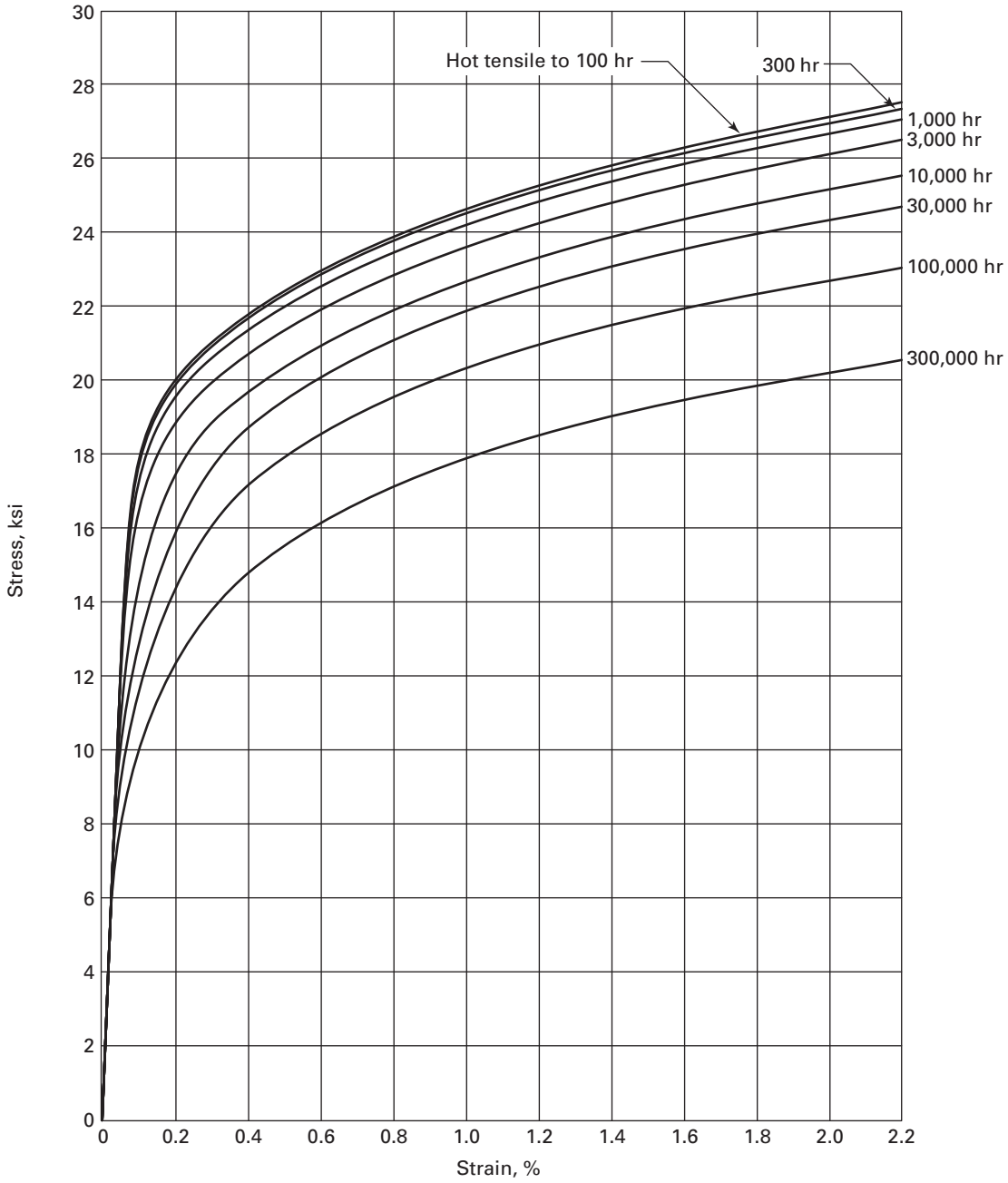


Figure E-100.19-6
Average Isochronous Stress–Strain Curves for Type 316 SS at 1,050°F

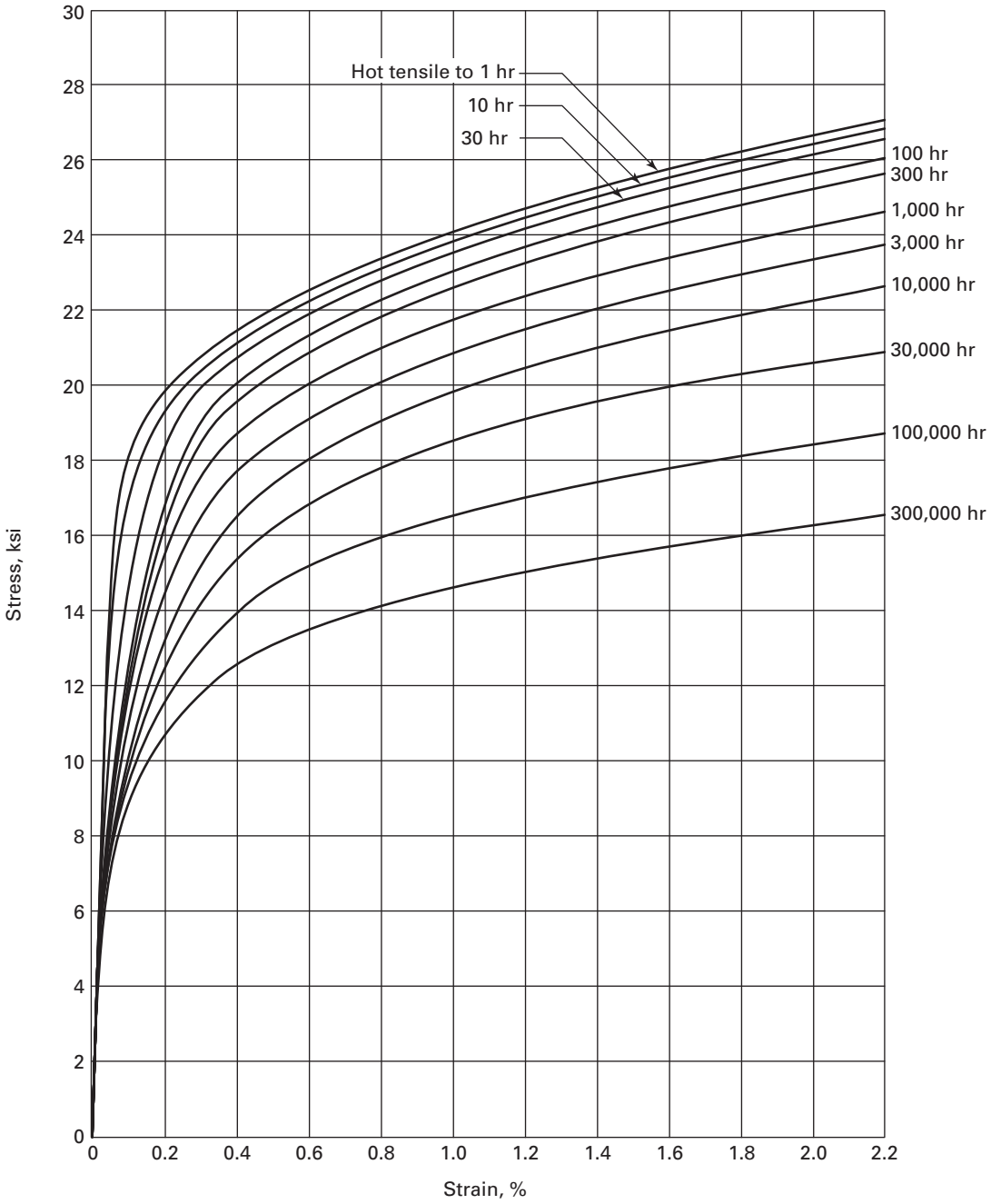


Figure E-100.19-7
Average Isochronous Stress–Strain Curves for Type 316 SS at 1,100°F

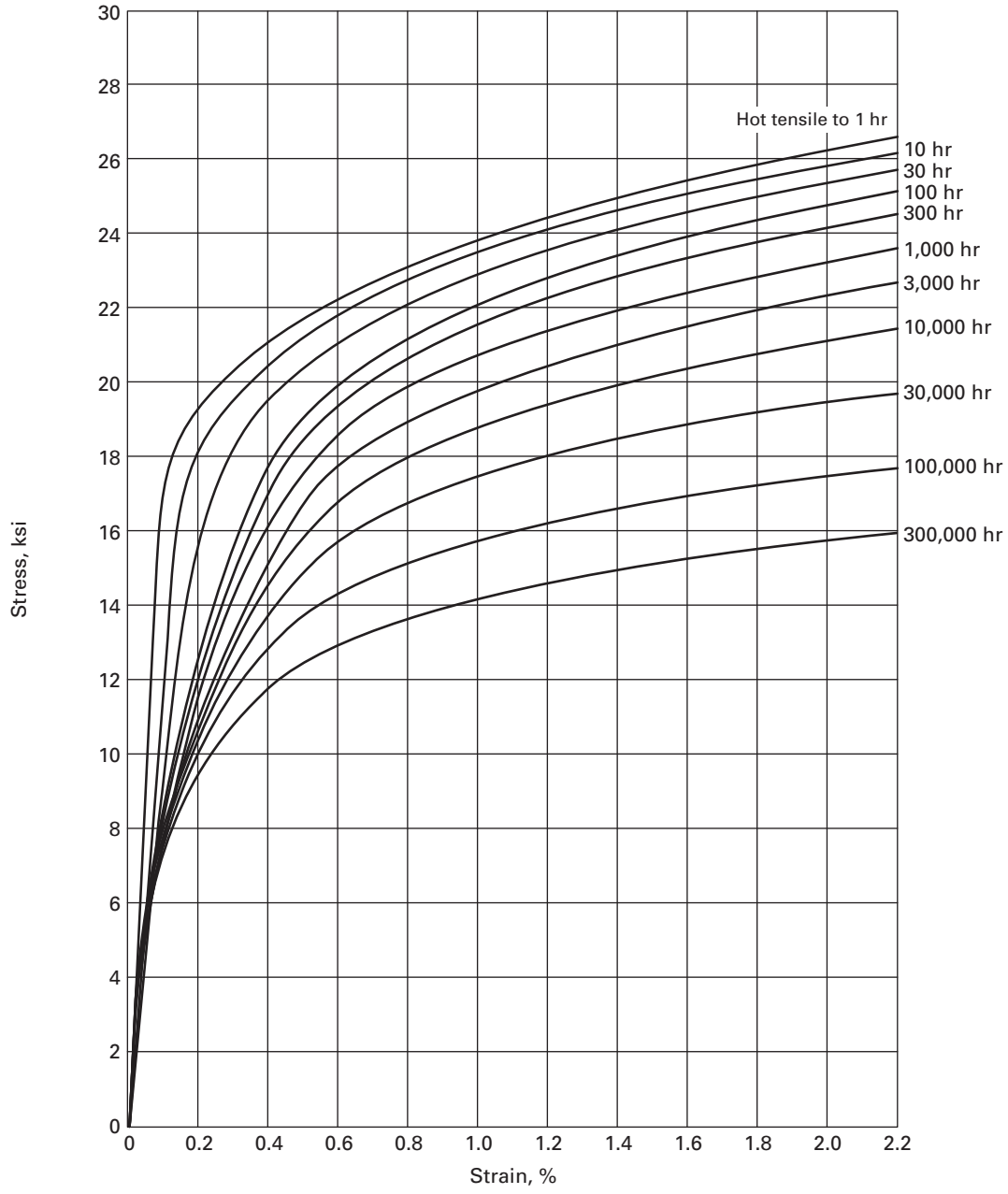


Figure E-100.19-8
Average Isochronous Stress–Strain Curves for Type 316 SS at 1,150°F

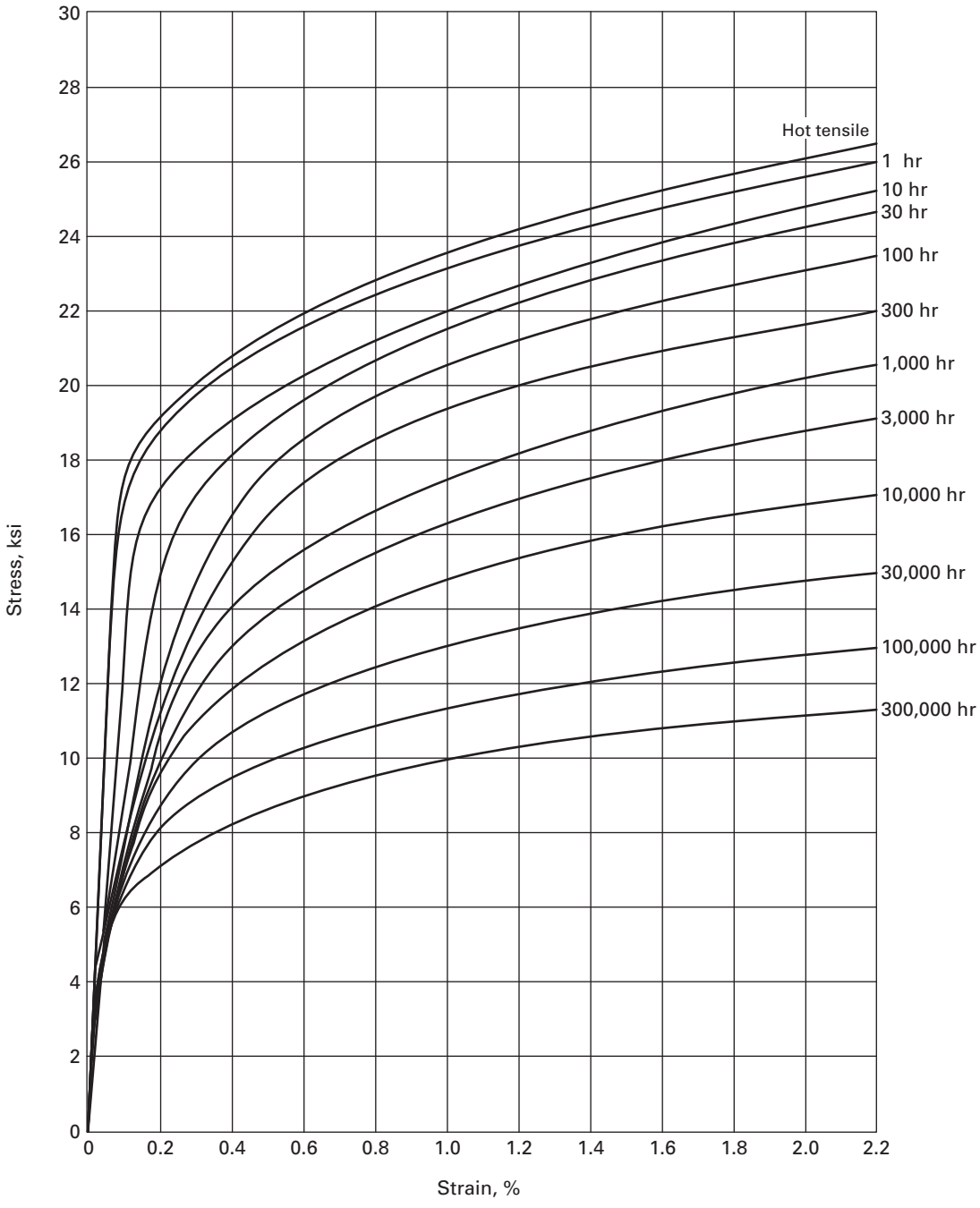


Figure E-100.19-9
Average Isochronous Stress–Strain Curves for Type 316 SS at 1,200°F

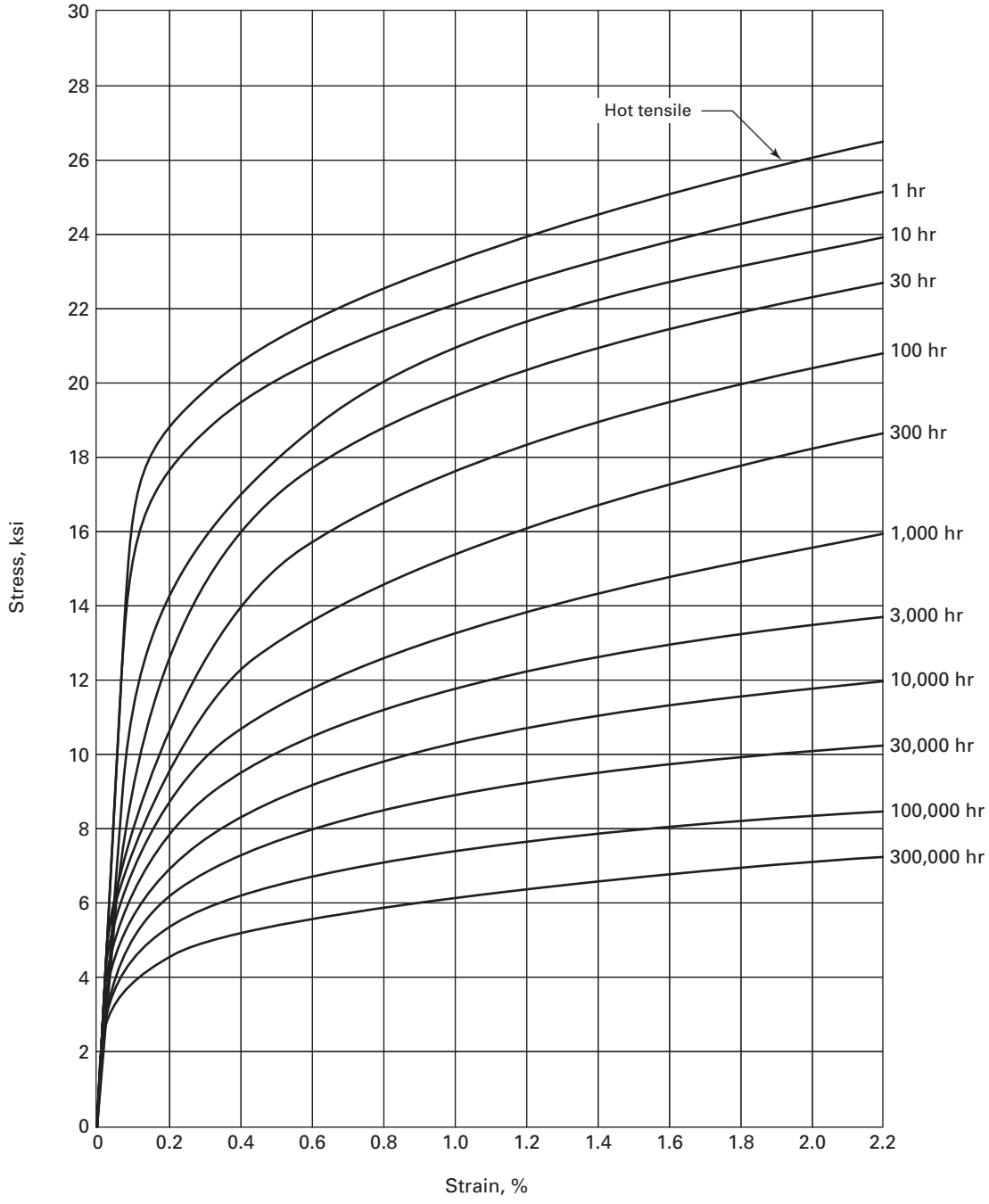


Figure E-100.19-10
Average Isochronous Stress–Strain Curves for Type 316 SS at 1,250°F

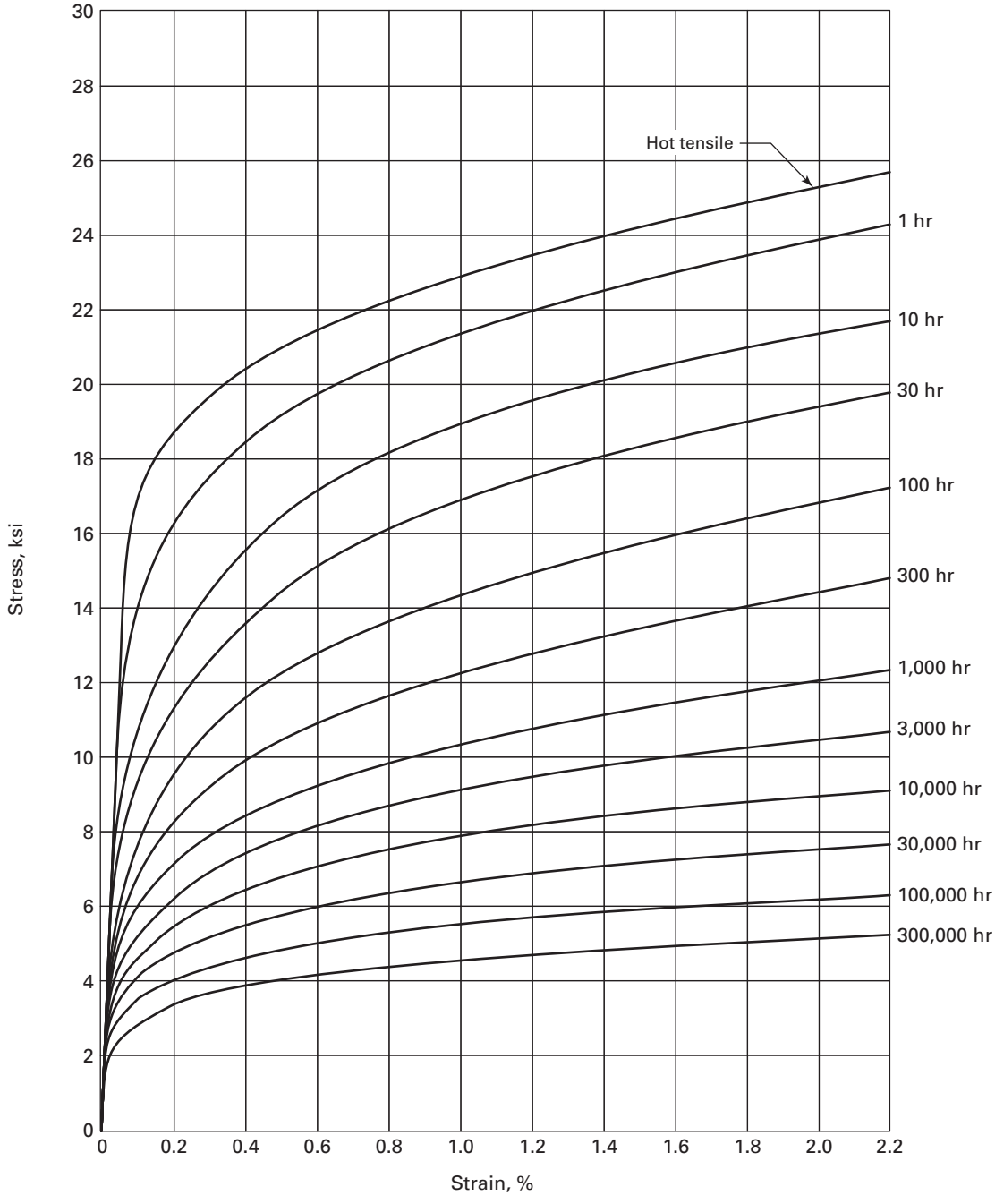


Figure E-100.19-11
Average Isochronous Stress–Strain Curves for Type 316 SS at 1,300°F

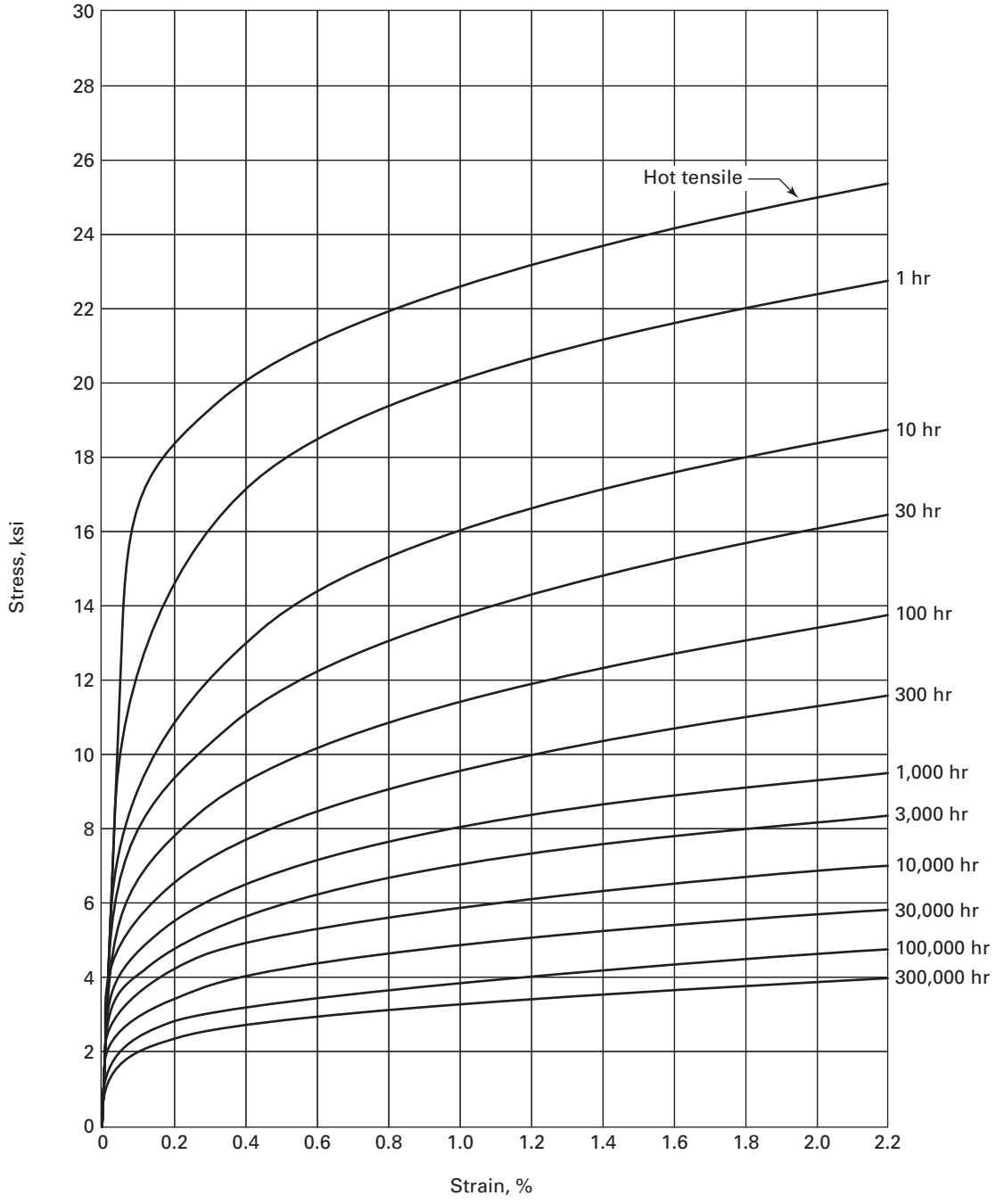


Figure E-100.19-12
Average Isochronous Stress–Strain Curves for Type 316 SS at 1,350°F

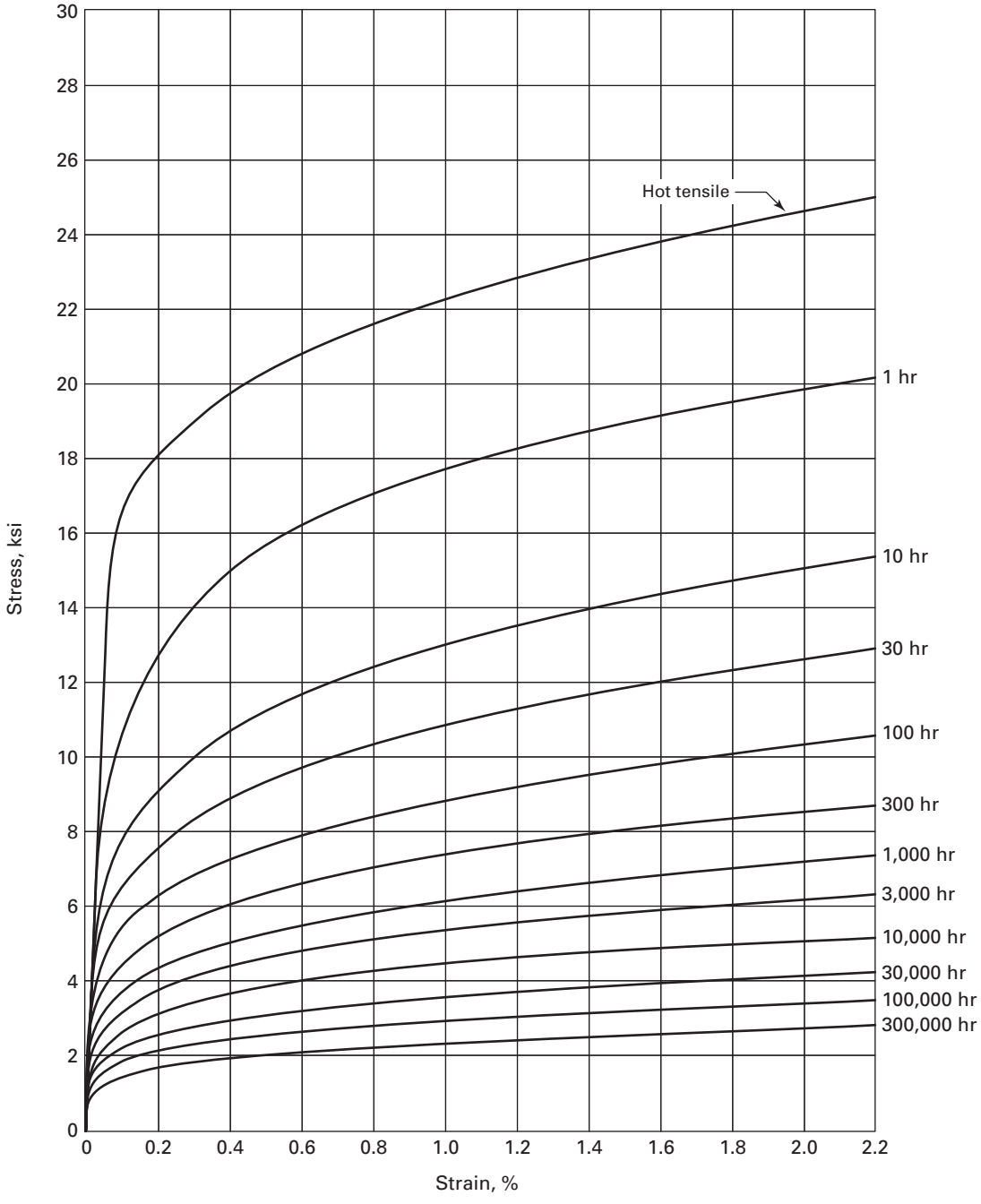


Figure E-100.19-13
Average Isochronous Stress–Strain Curves for Type 316 SS at 1,400°F

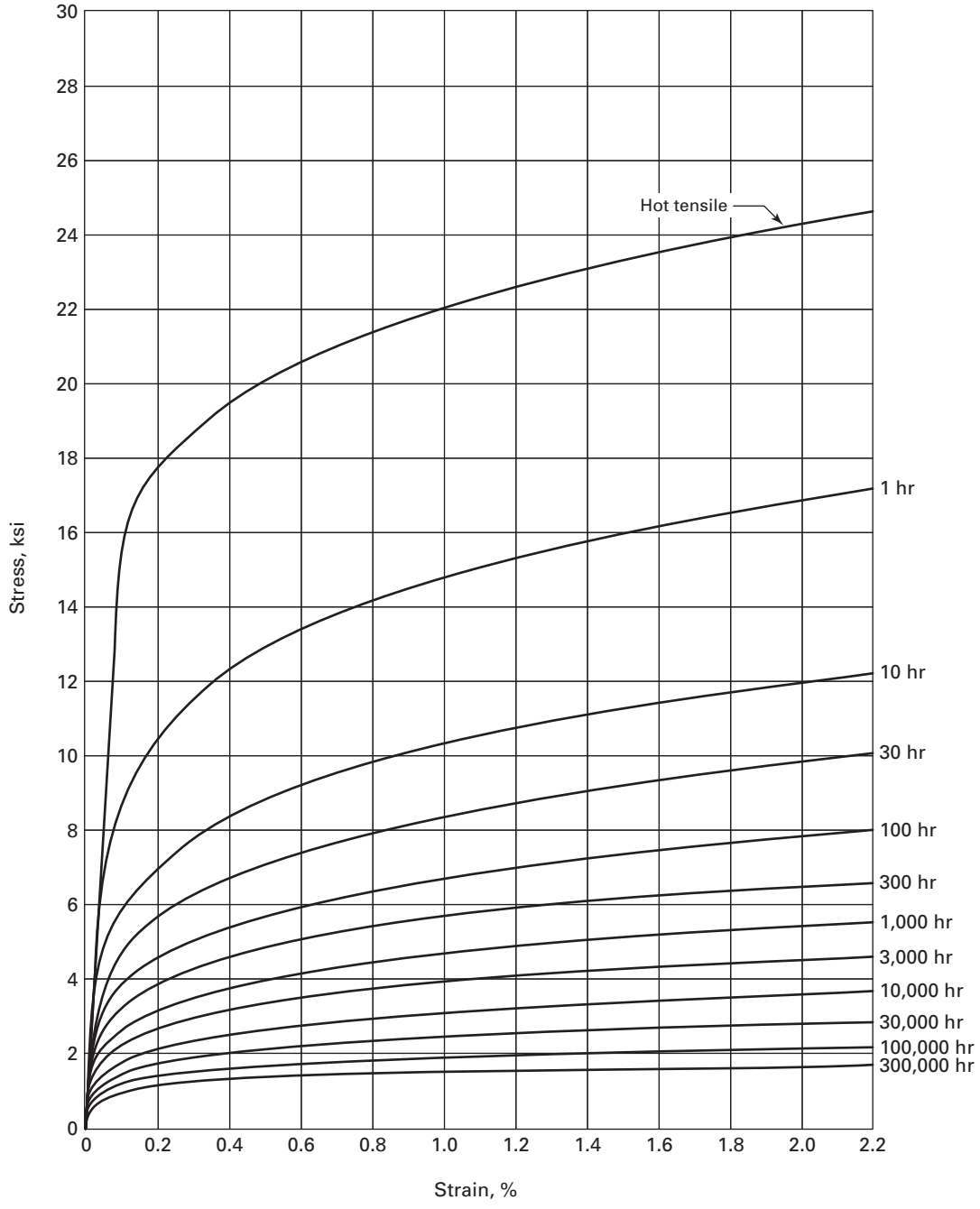


Figure E-100.19-14
Average Isochronous Stress–Strain Curves for Type 316 SS at 1,450°F

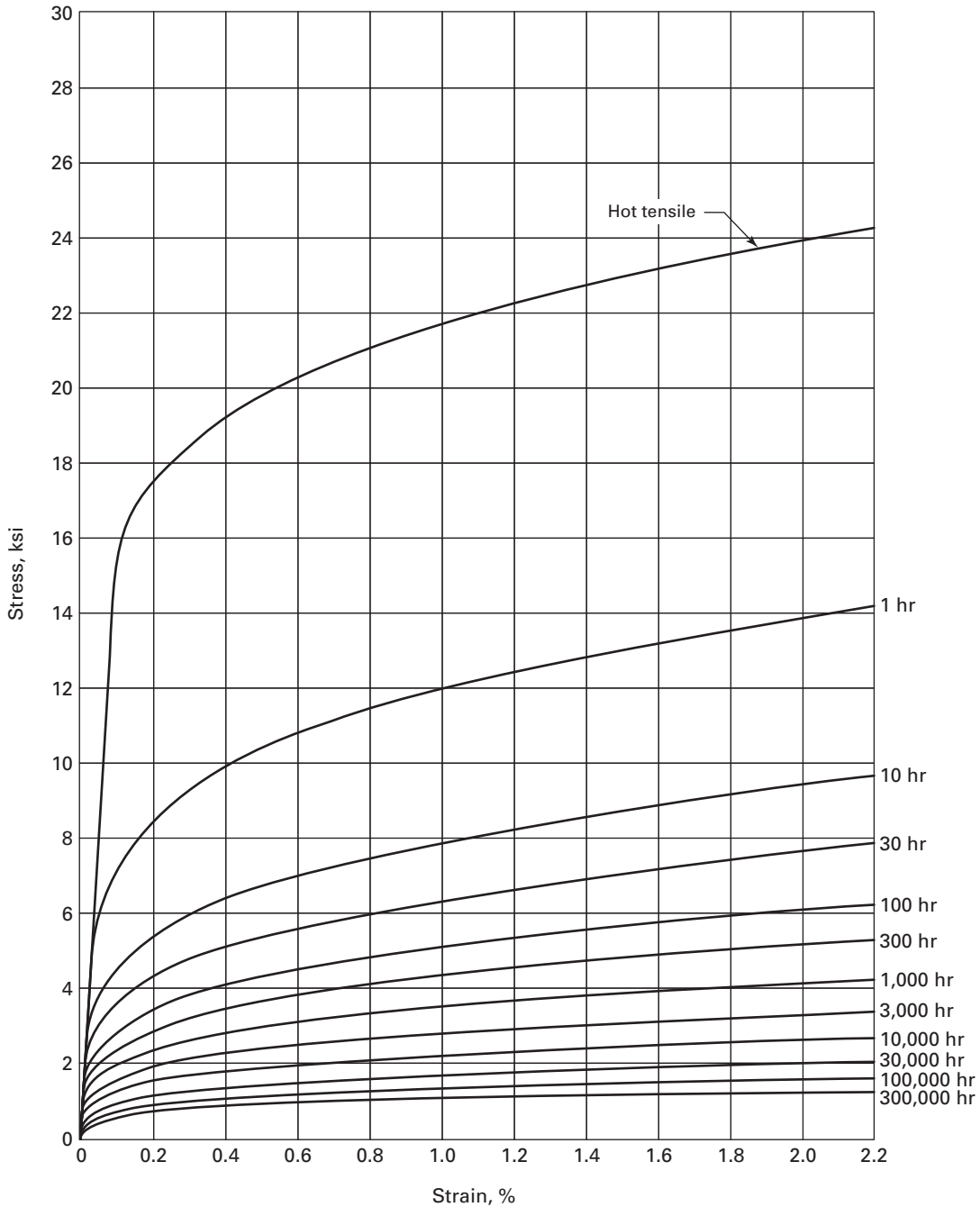


Figure E-100.19-15
Average Isochronous Stress–Strain Curves for Type 316 SS at 1,500°F

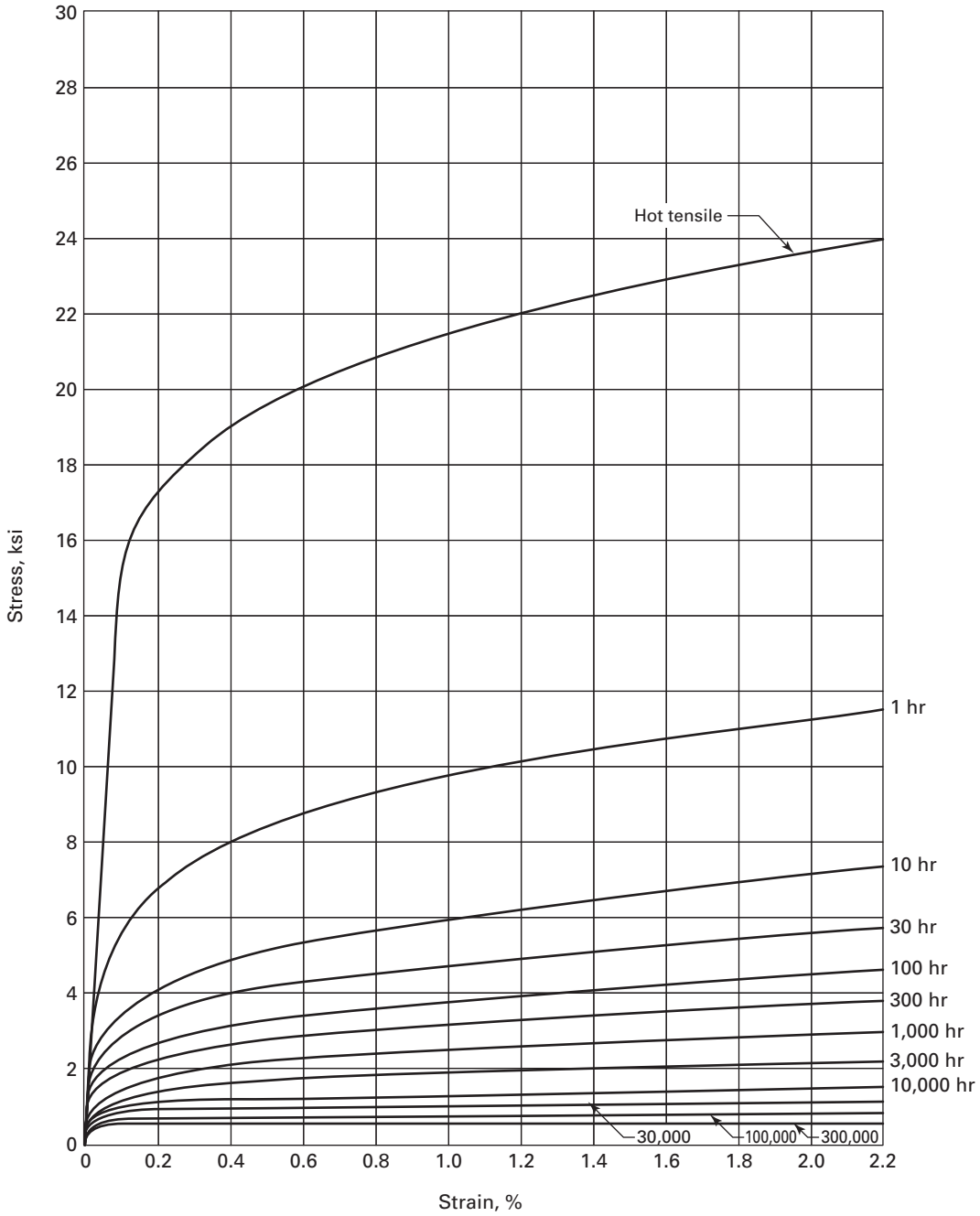


Figure E-100.20-1
Average Isochronous Stress–Strain Curves for Alloy 800H at 800°F and 850°F

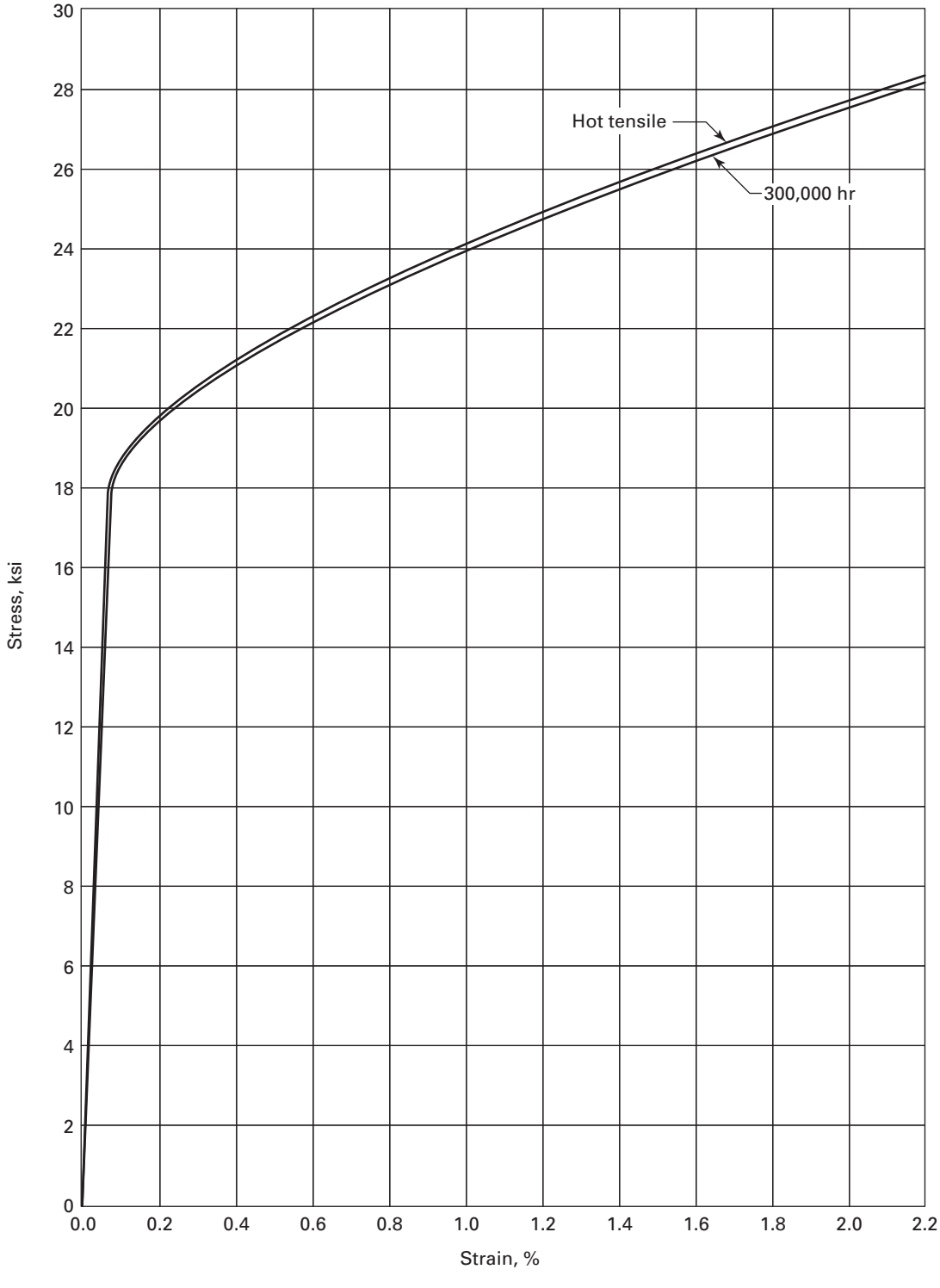


Figure E-100.20-2
Average Isochronous Stress–Strain Curves for Alloy 800H at 900°F

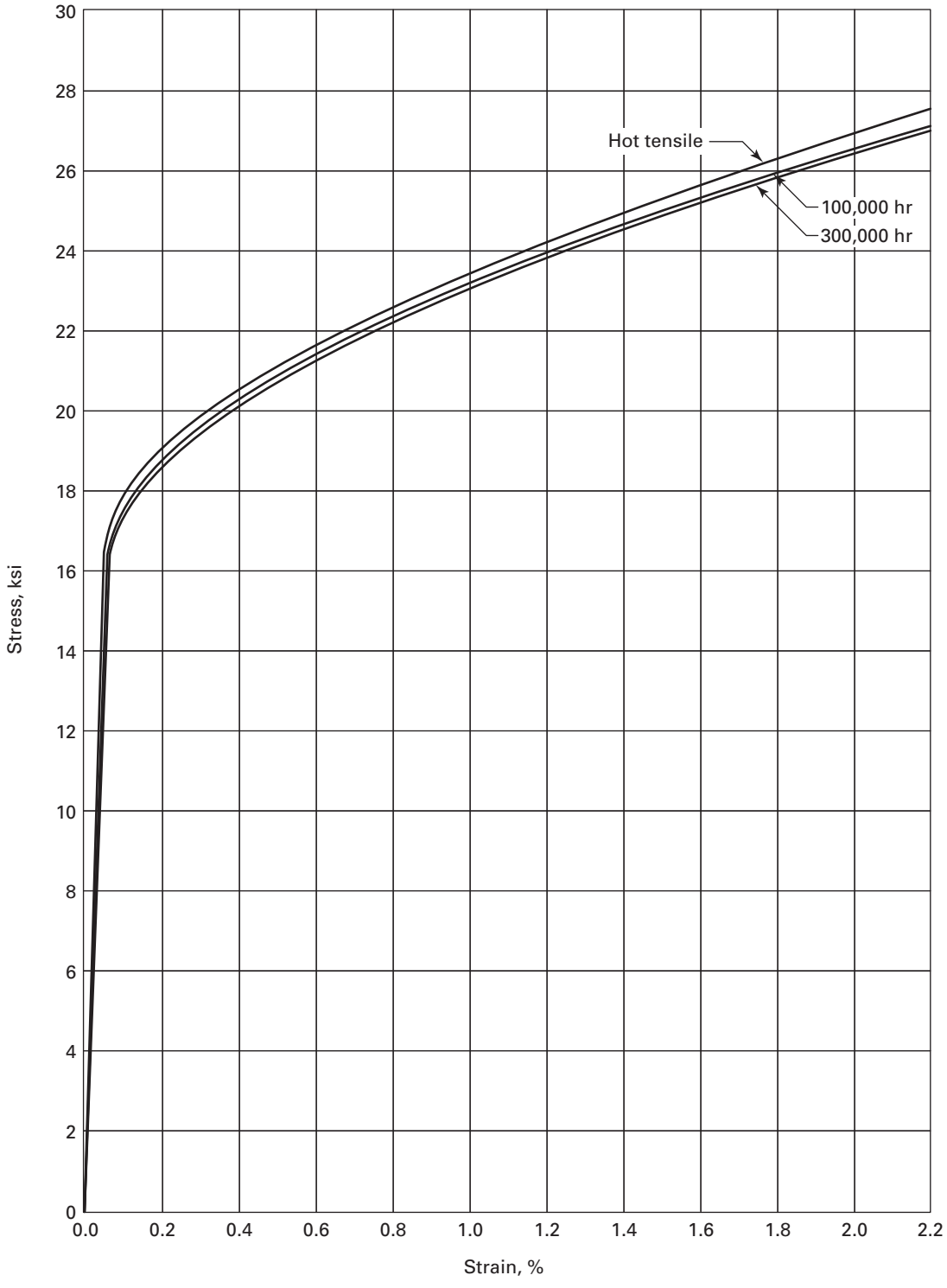


Figure E-100.20-3
Average Isochronous Stress–Strain Curves for Alloy 800H at 950°F

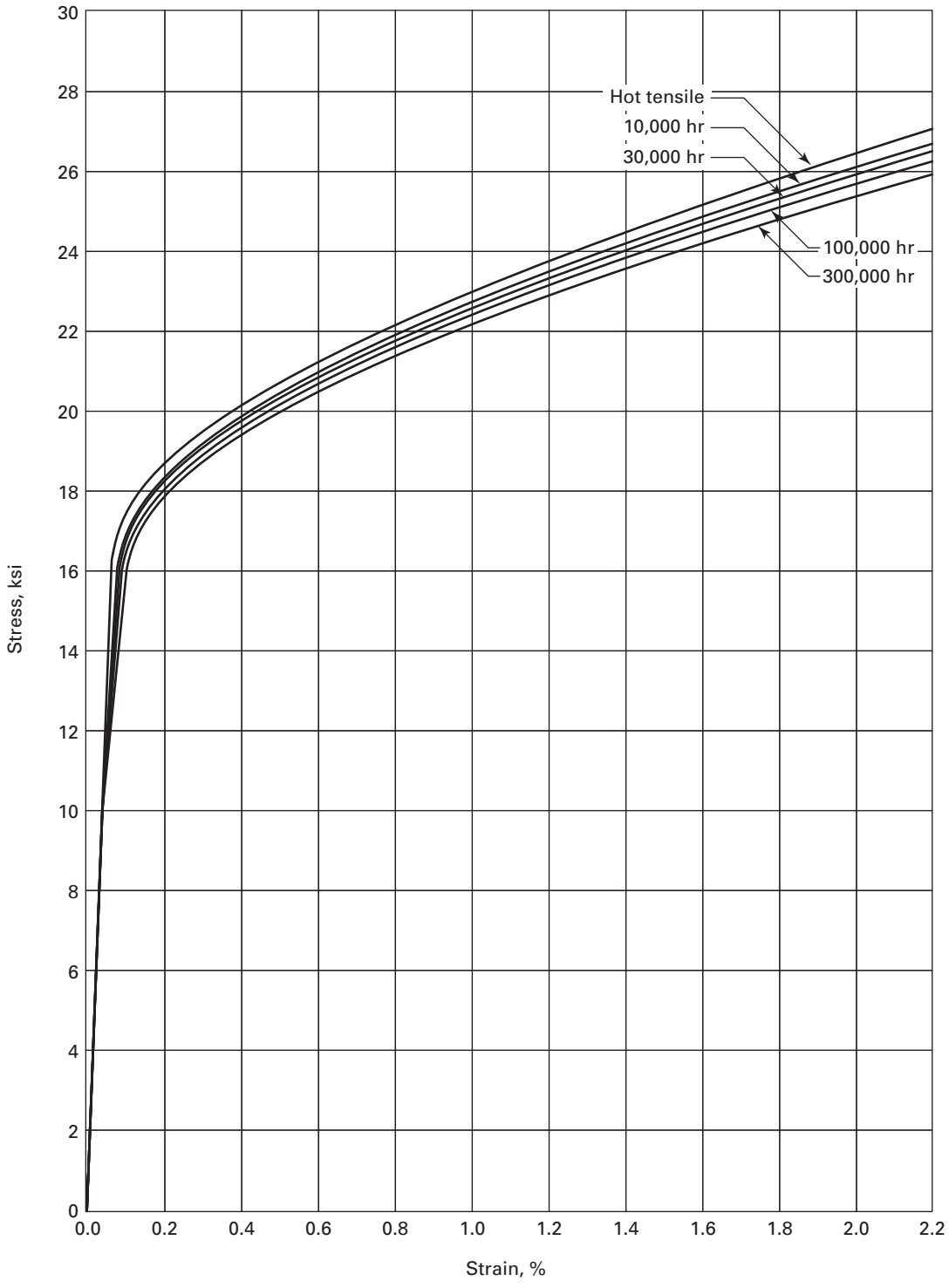


Figure E-100.20-4
Average Isochronous Stress–Strain Curves for Alloy 800H at 1,000°F

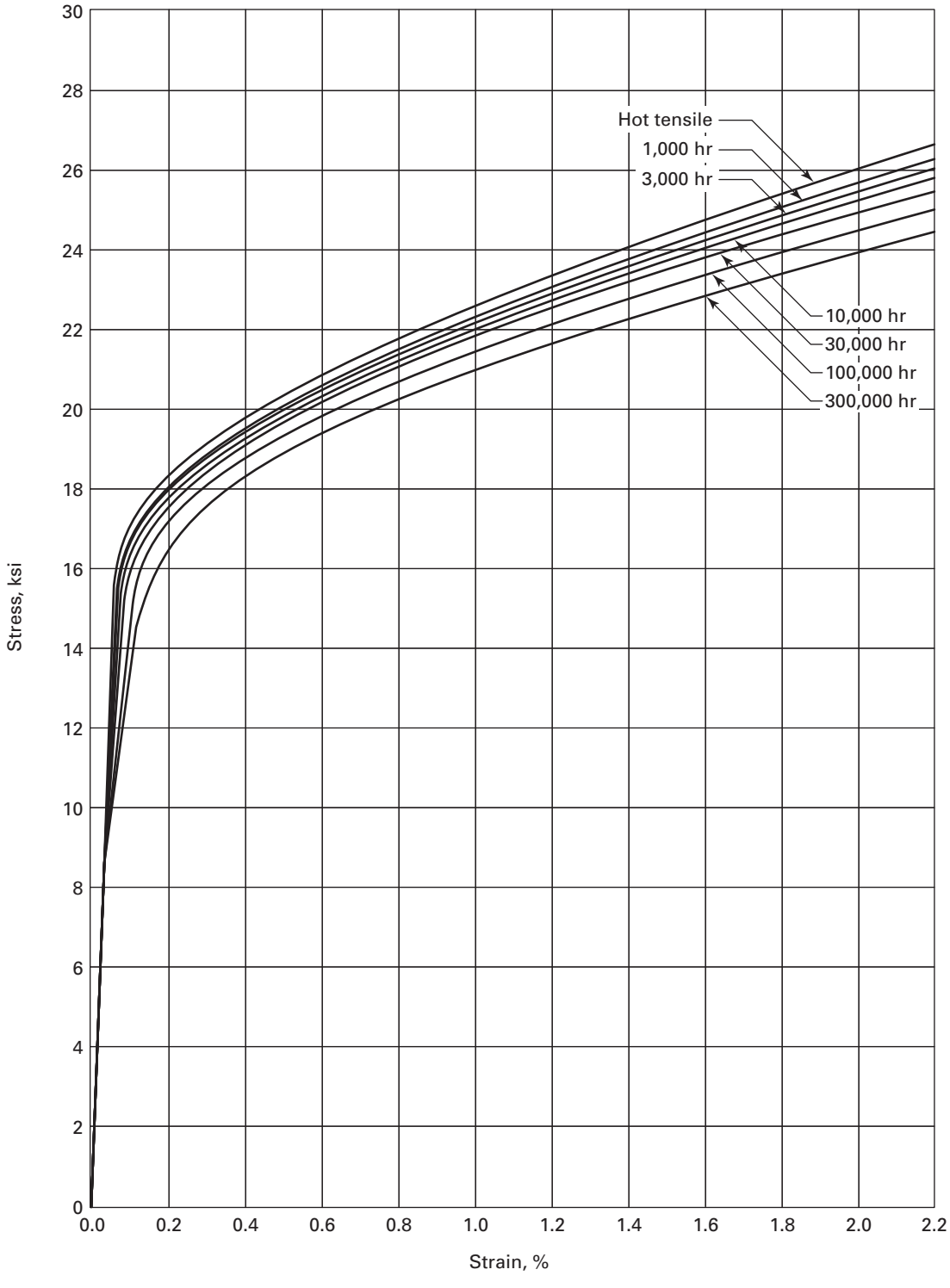


Figure E-100.20-5
Average Isochronous Stress–Strain Curves for Alloy 800H at 1,050°F

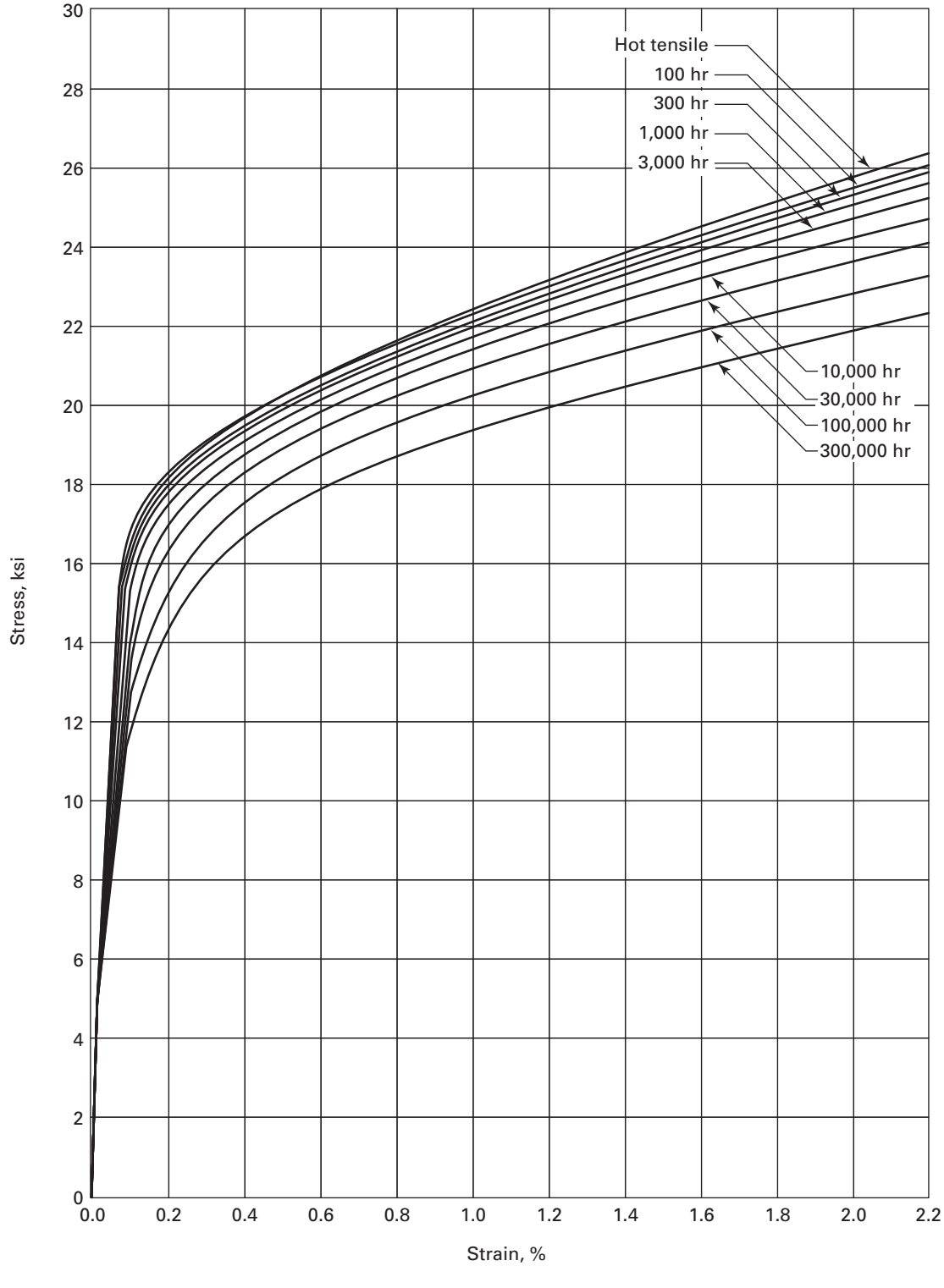


Figure E-100.20-6
Average Isochronous Stress–Strain Curves for Alloy 800H at 1,100°F

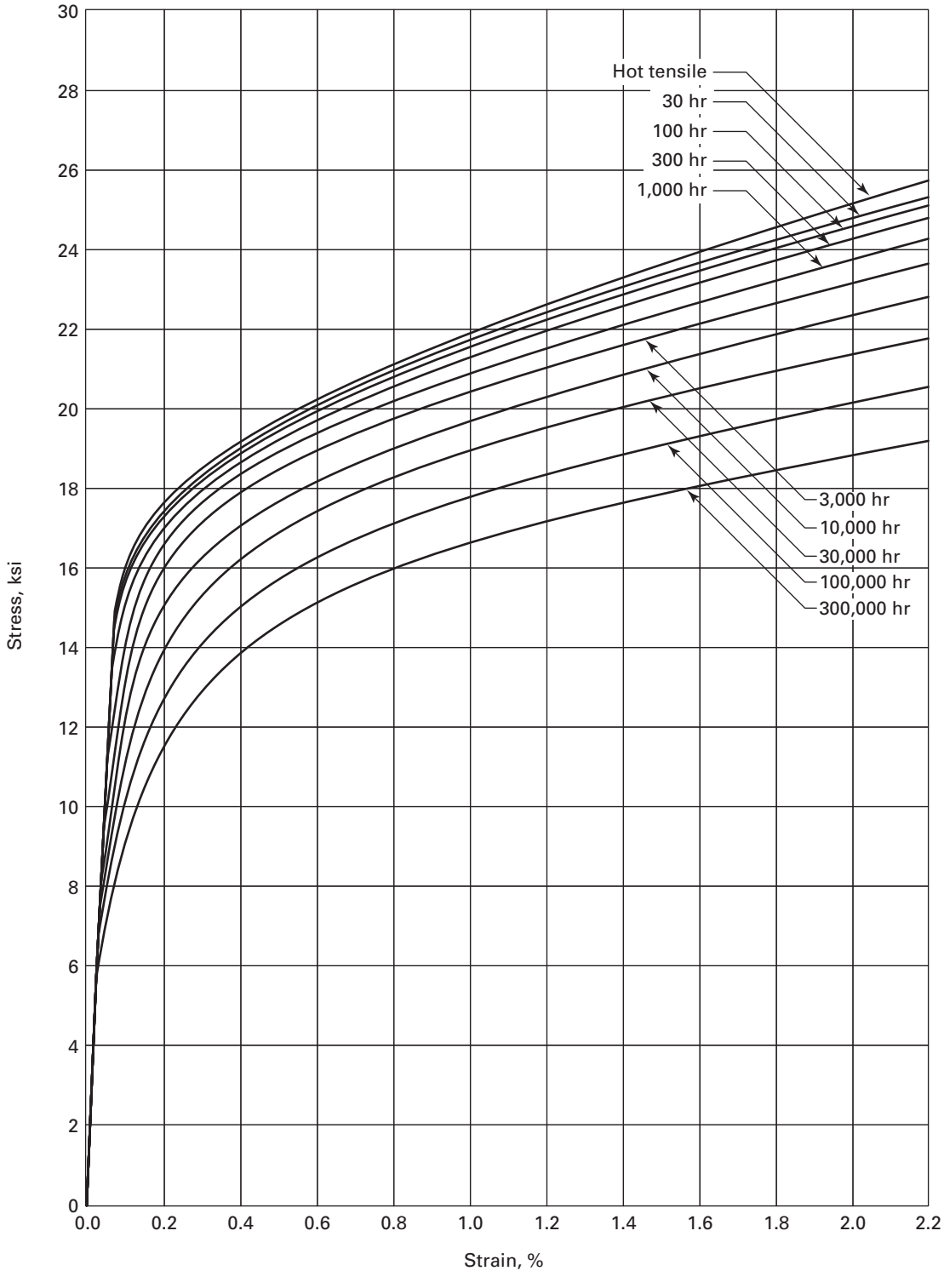


Figure E-100.20-7
Average Isochronous Stress–Strain Curves for Alloy 800H at 1,150°F

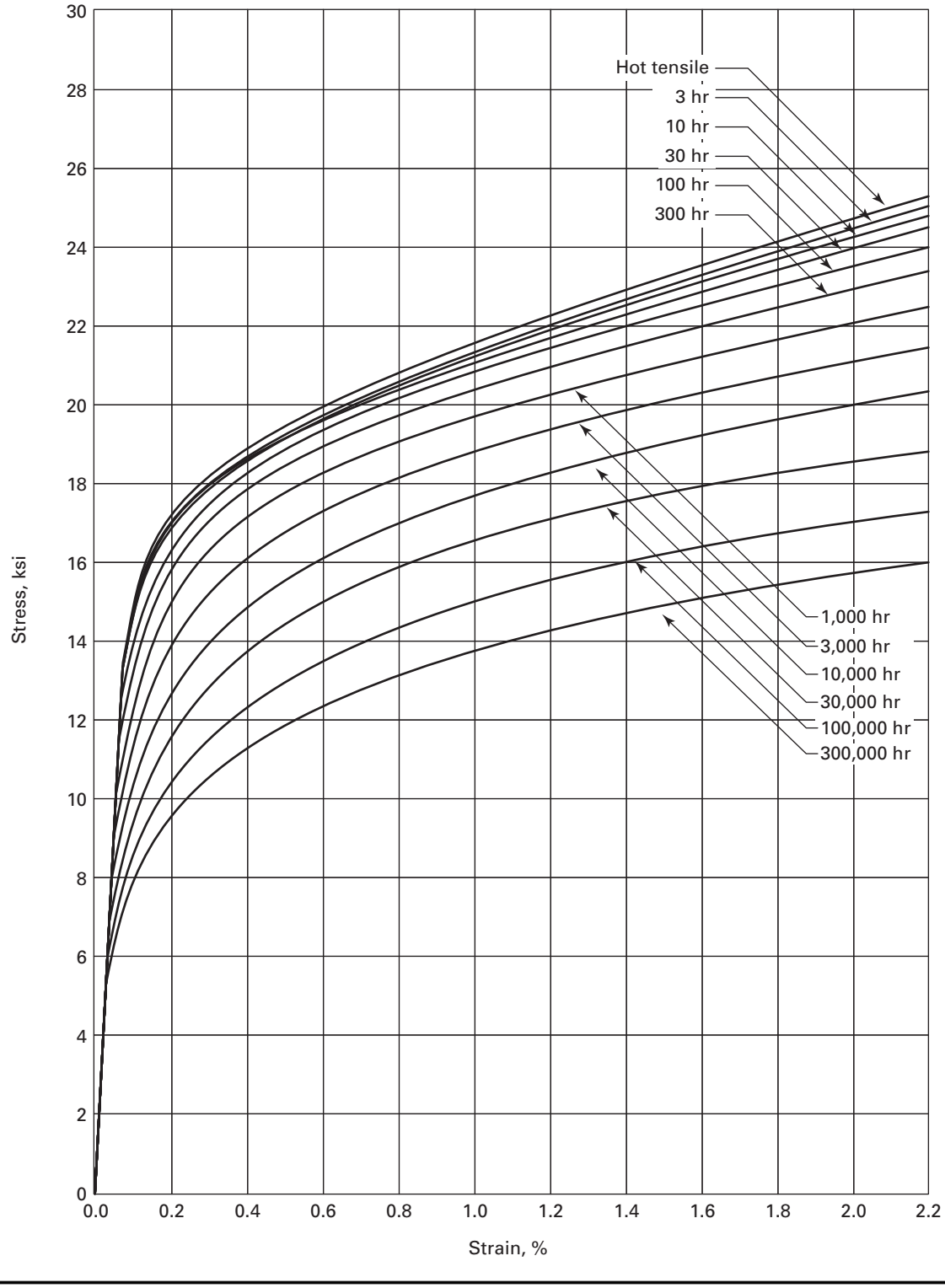


Figure E-100.20-8
Average Isochronous Stress–Strain Curves for Alloy 800H at 1,200°F

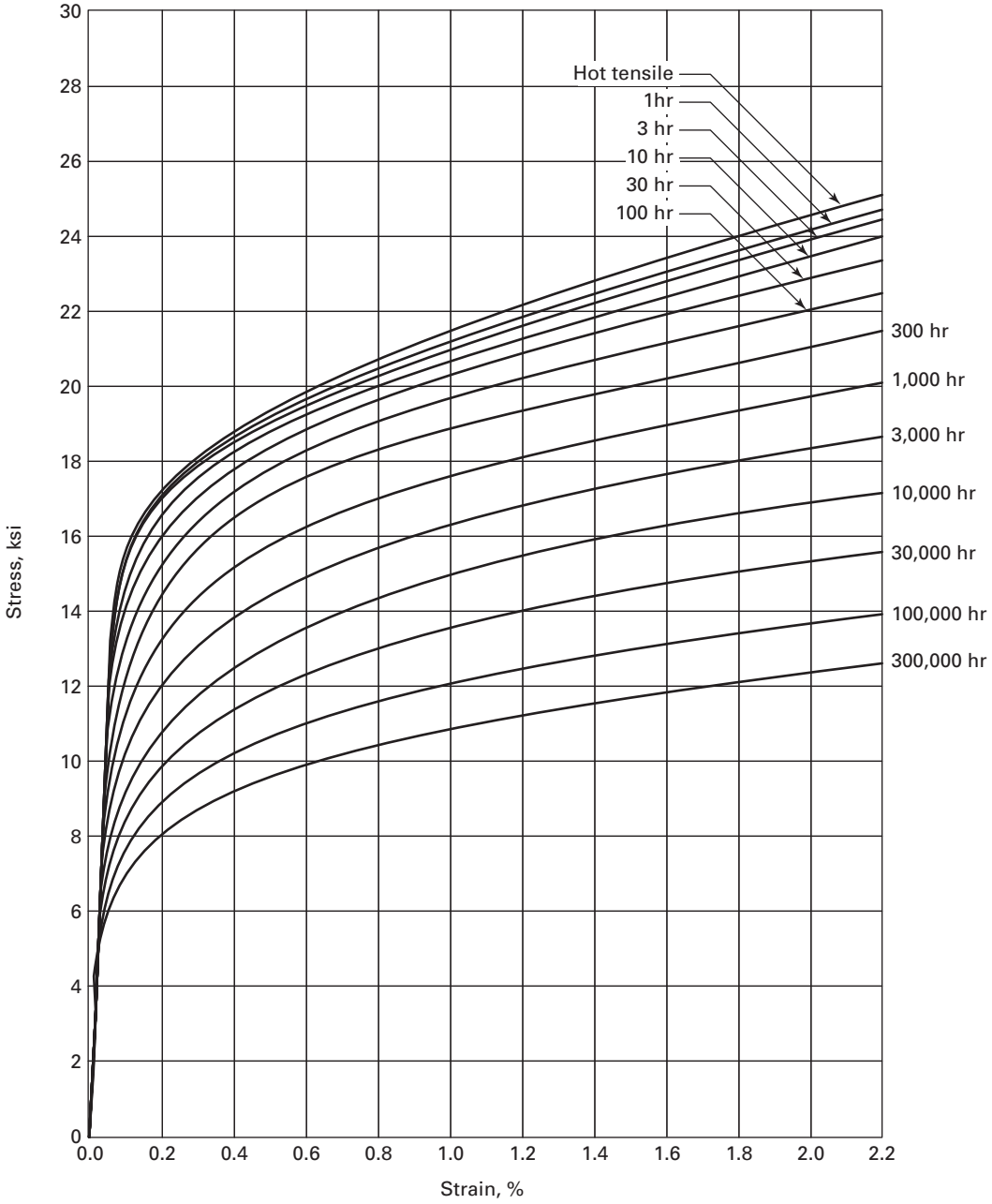


Figure E-100.20-9
Average Isochronous Stress–Strain Curves for Alloy 800H at 1,250°F

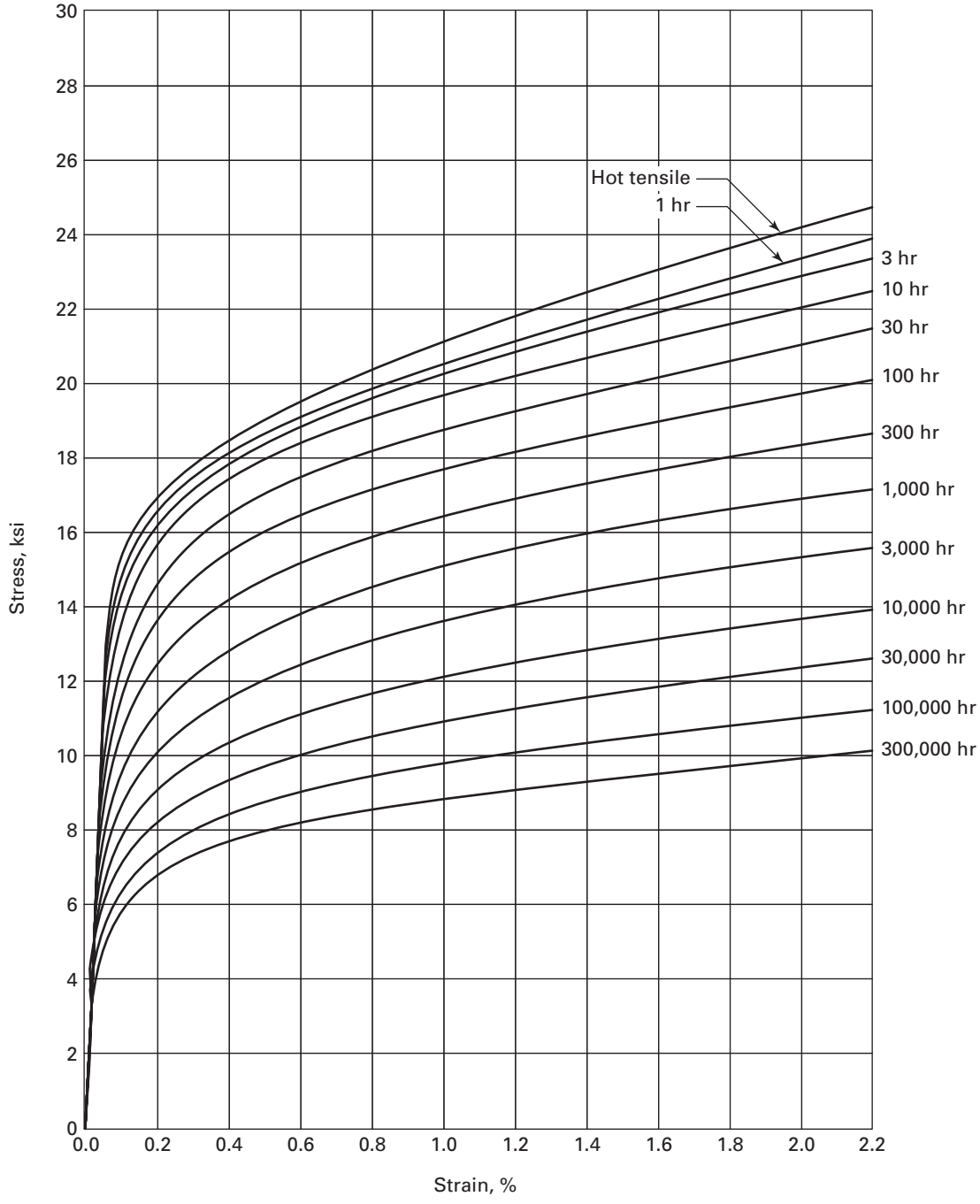


Figure E-100.20-10
Average Isochronous Stress–Strain Curves for Alloy 800H at 1,300°F

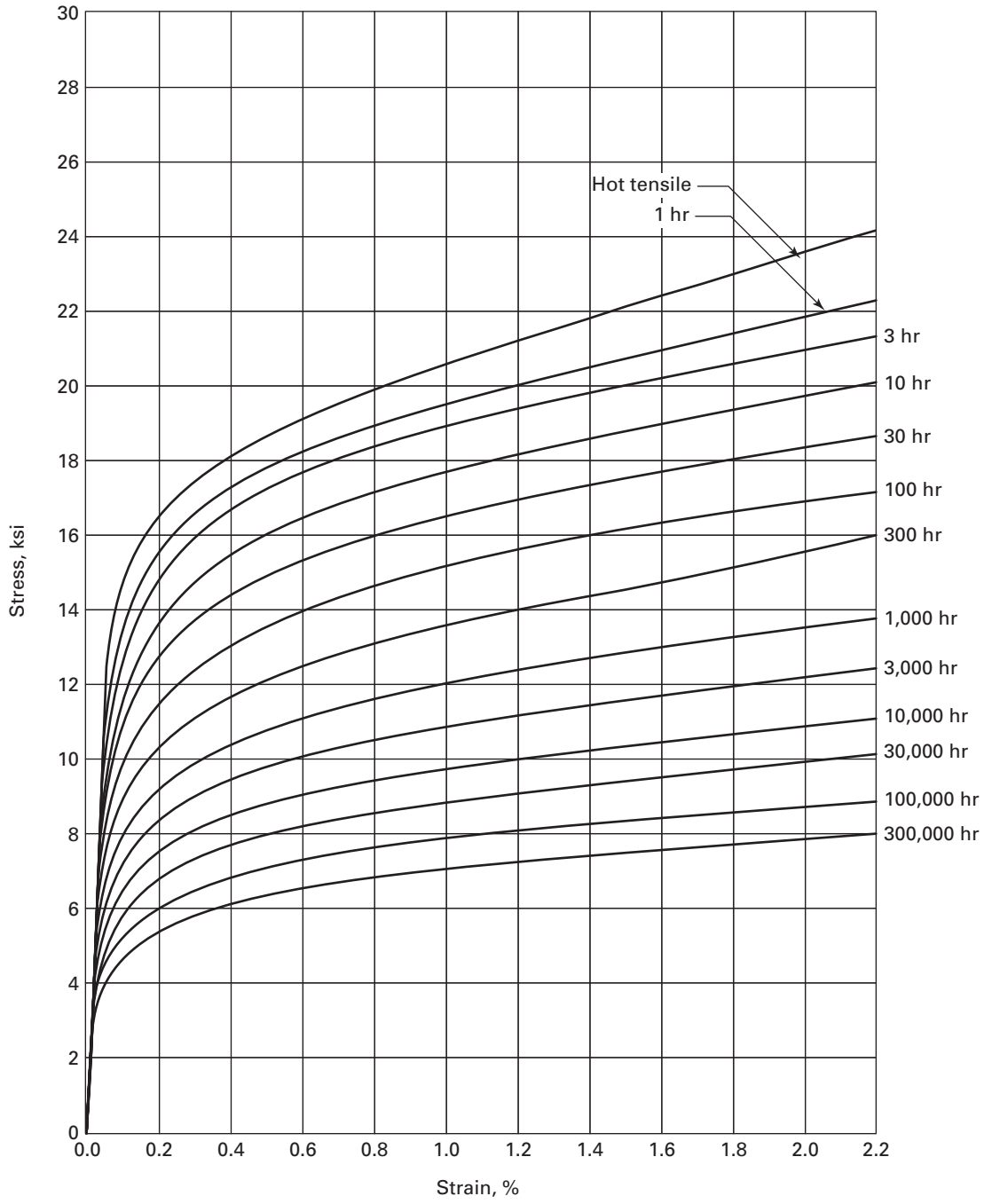


Figure E-100.20-11
Average Isochronous Stress–Strain Curves for Alloy 800H at 1,350°F

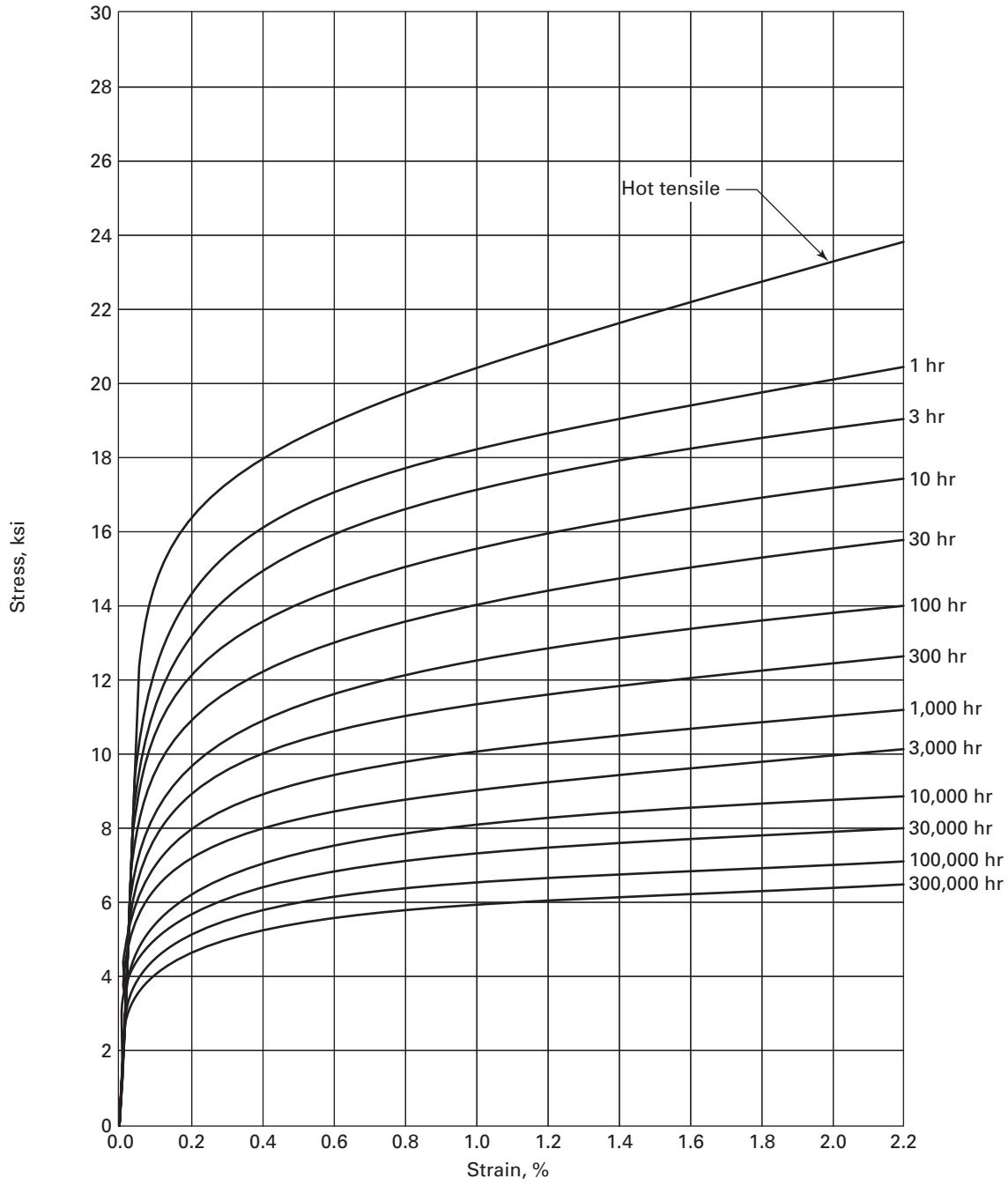


Figure E-100.20-12
Average Isochronous Stress–Strain Curves for Alloy 800H at 1,400°F

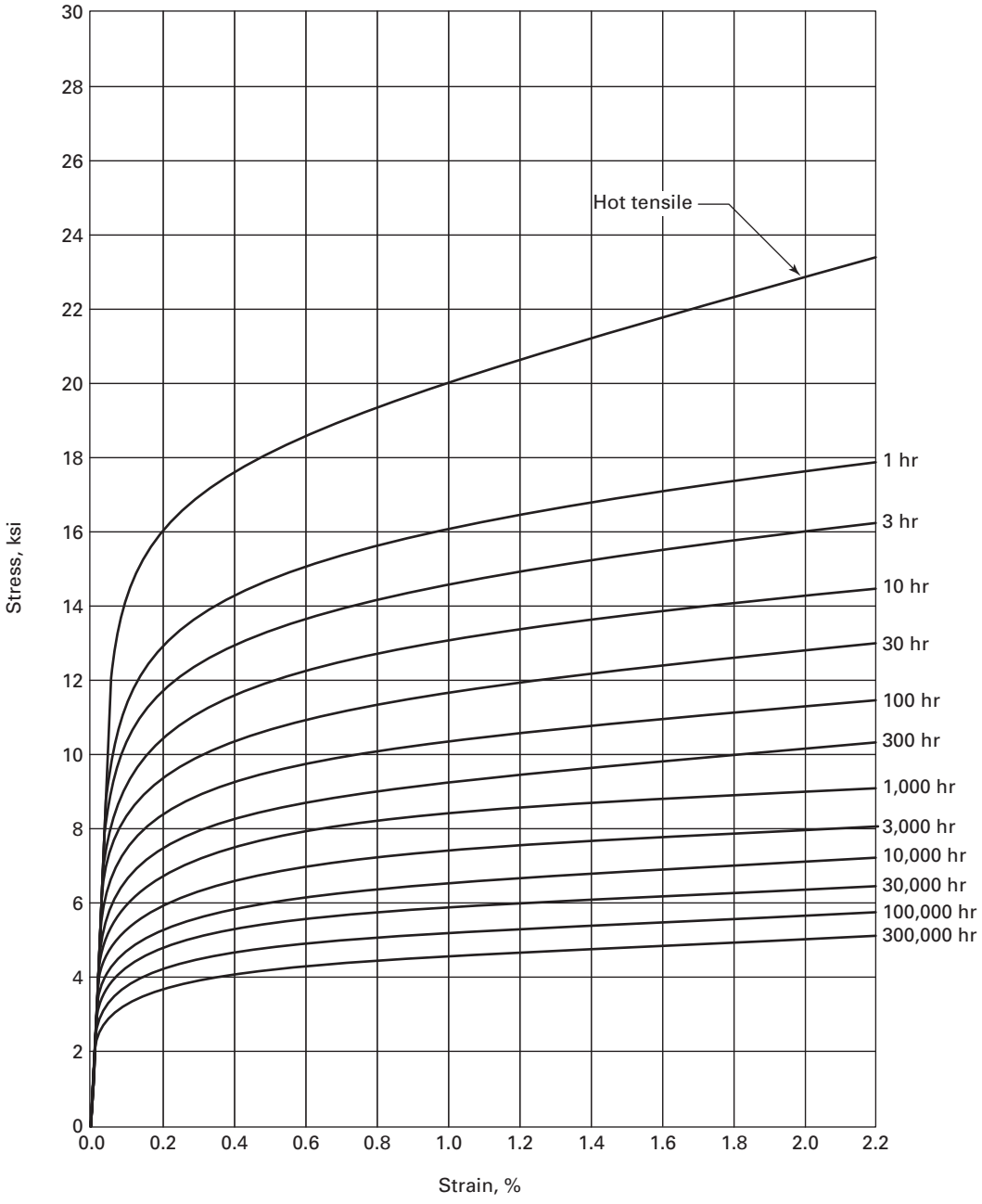


Figure E-100.21-1
Average Isochronous Stress–Strain Curves for Annealed 2¼Cr–1Mo at 700°F

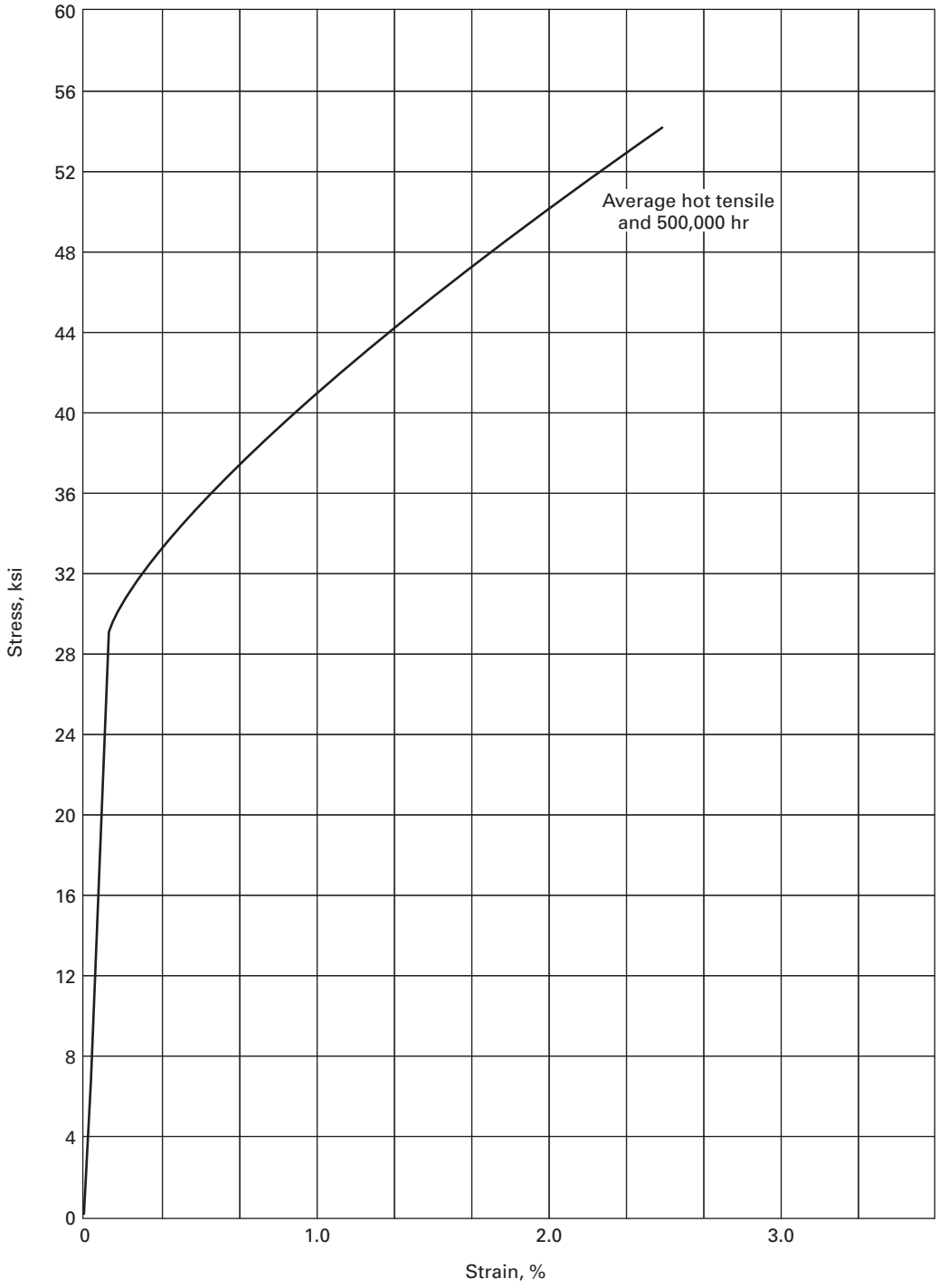


Figure E-100.21-2
Average Isochronous Stress–Strain Curves for Annealed $2\frac{1}{4}$Cr–1Mo at 750°F

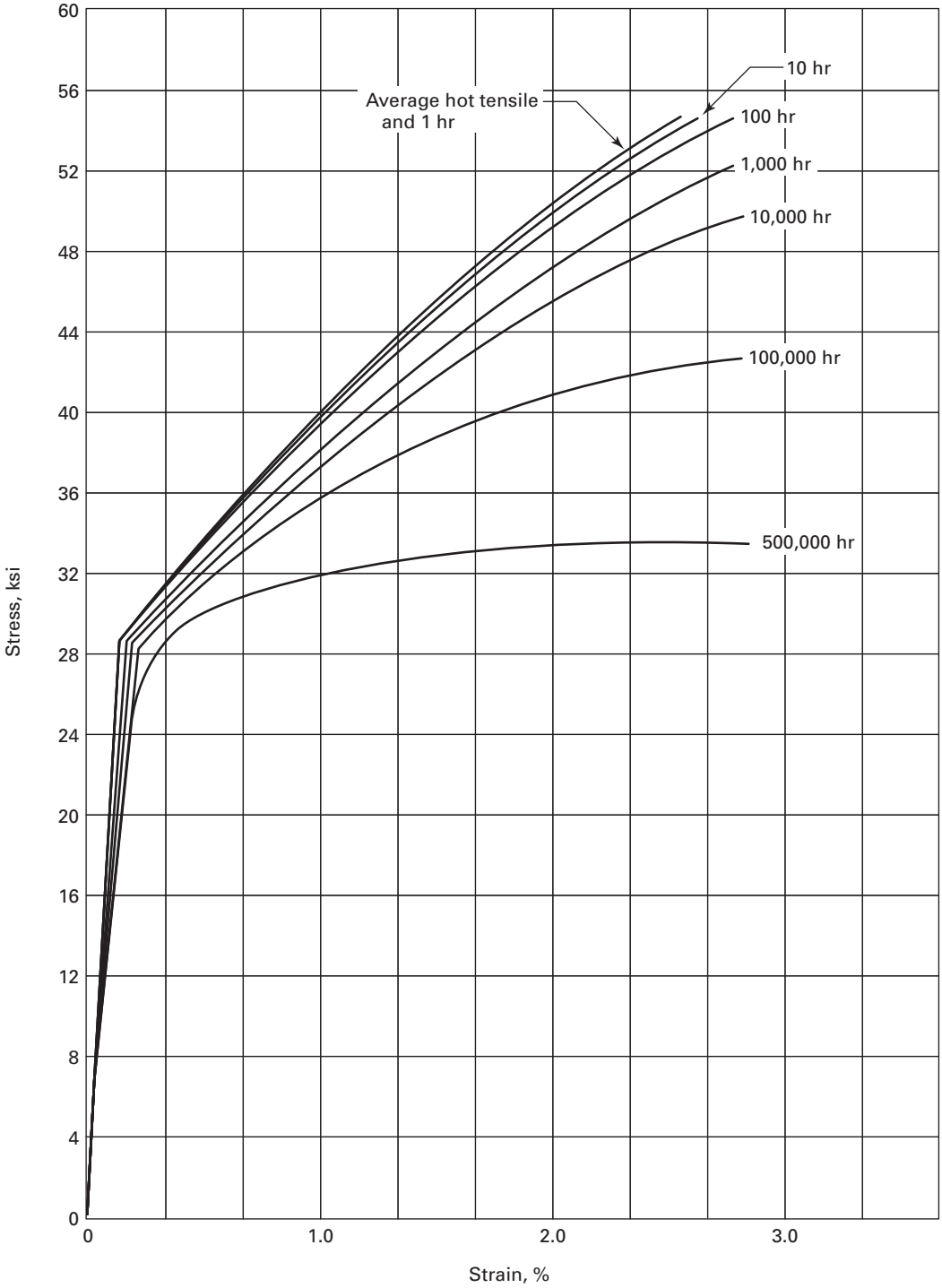


Figure E-100.21-3
Average Isochronous Stress–Strain Curves for Annealed 2¼Cr–1Mo at 800°F

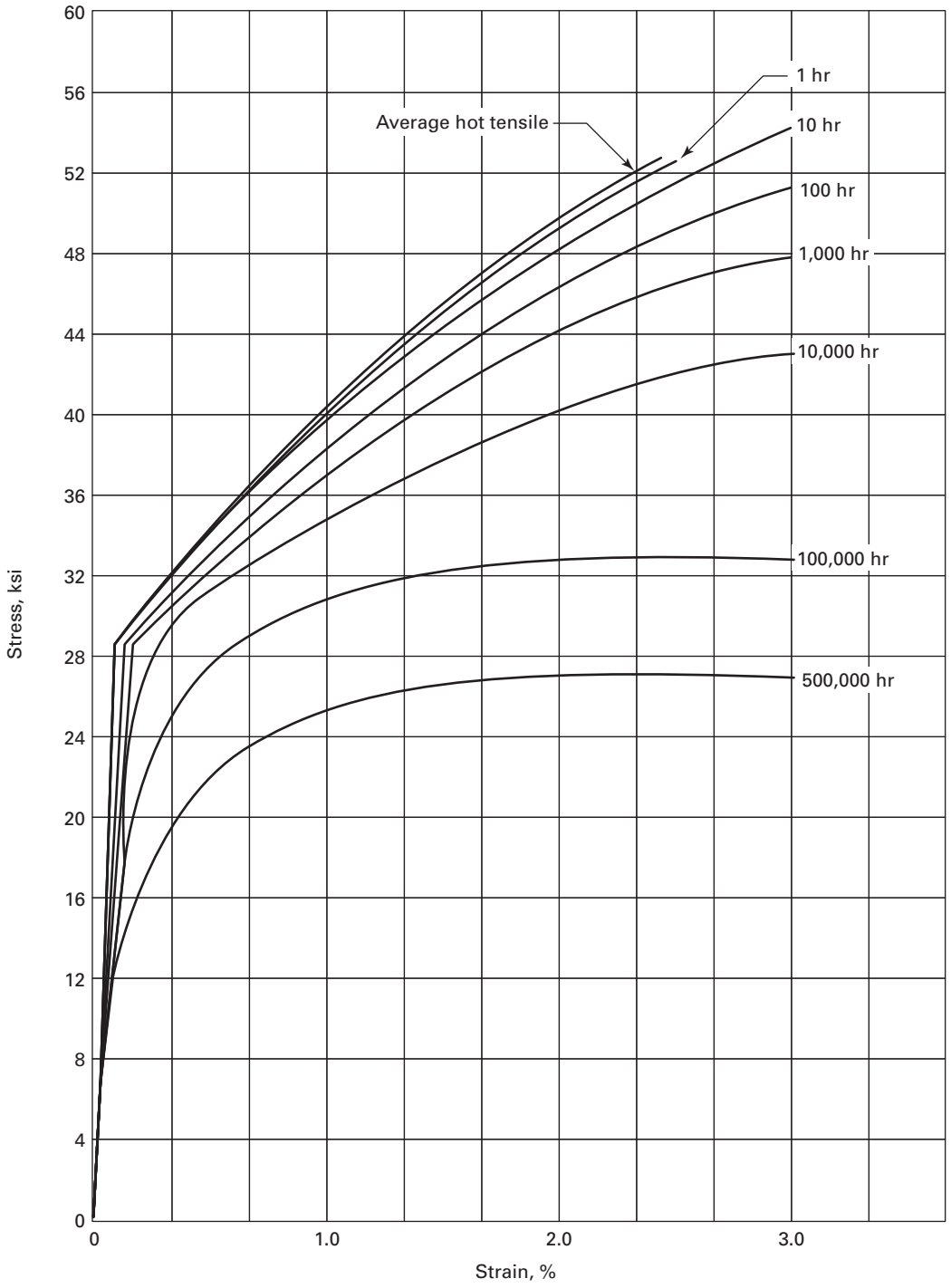


Figure E-100.21-4
Average Isochronous Stress–Strain Curves for Annealed 2¼Cr–1Mo at 850°F

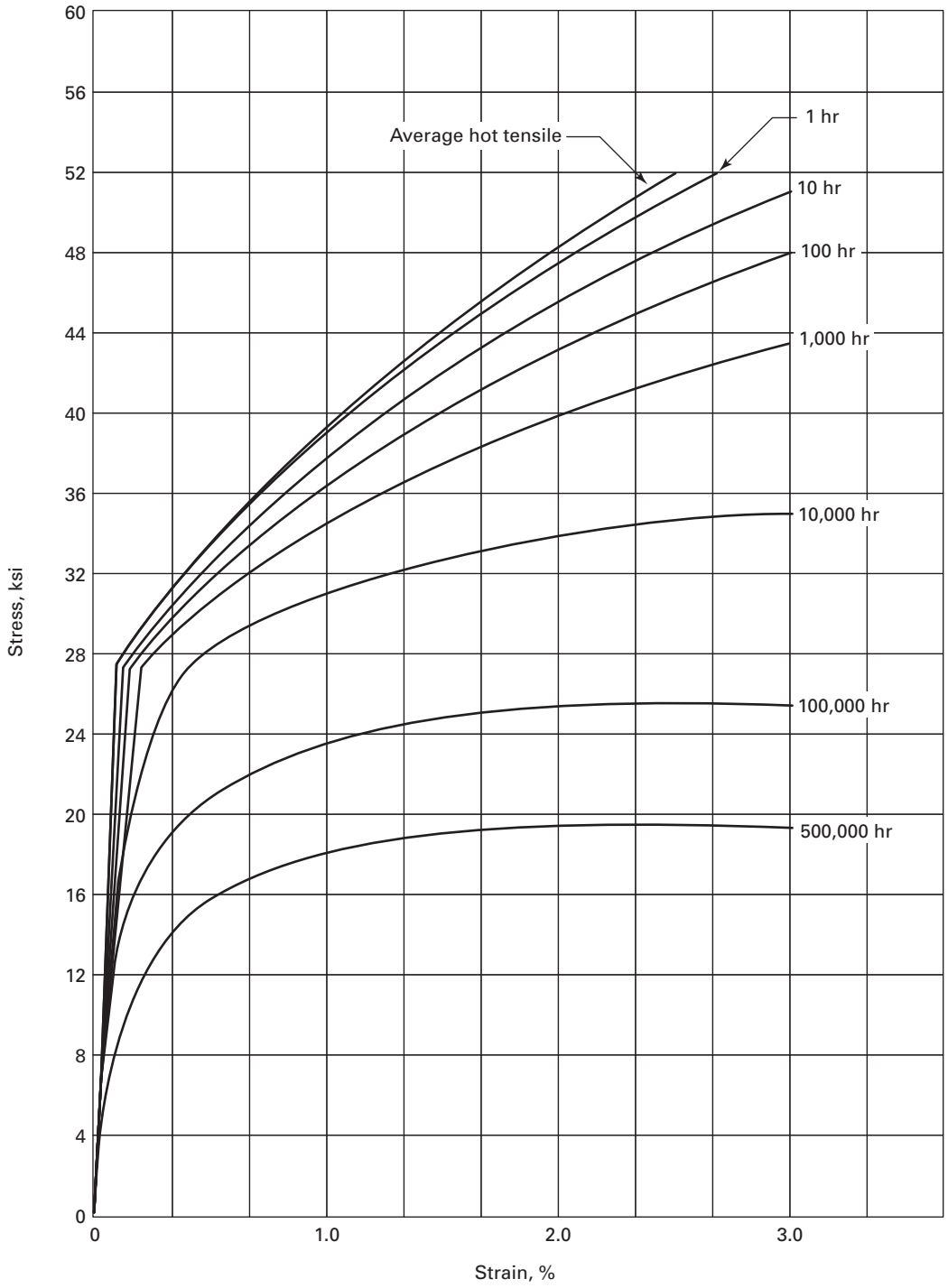


Figure E-100.21-5
Average Isochronous Stress–Strain Curves for Annealed 2¼Cr–1Mo at 900°F

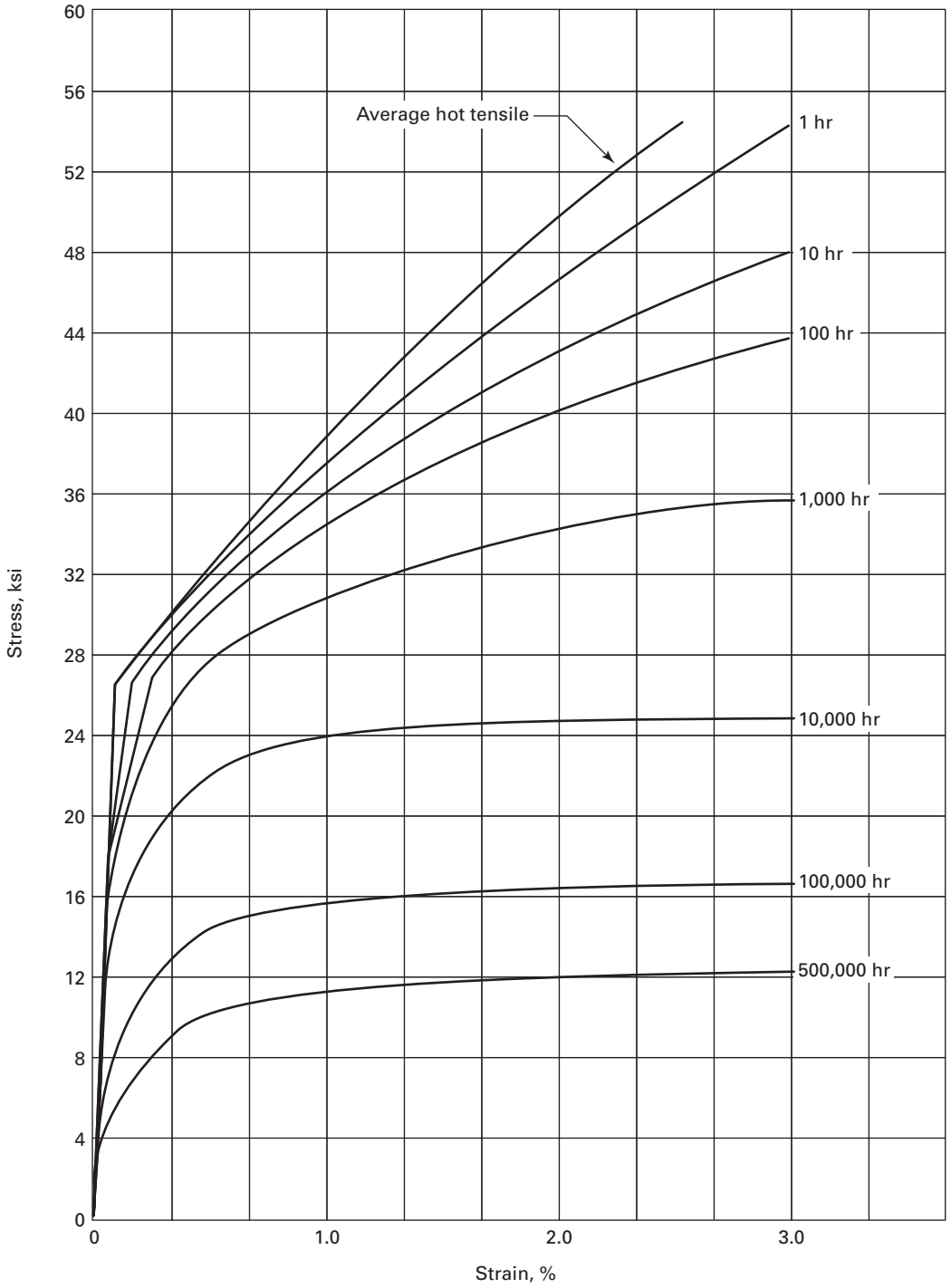


Figure E-100.21-6
Average Isochronous Stress–Strain Curves for Annealed 2¼Cr–1Mo at 950°F

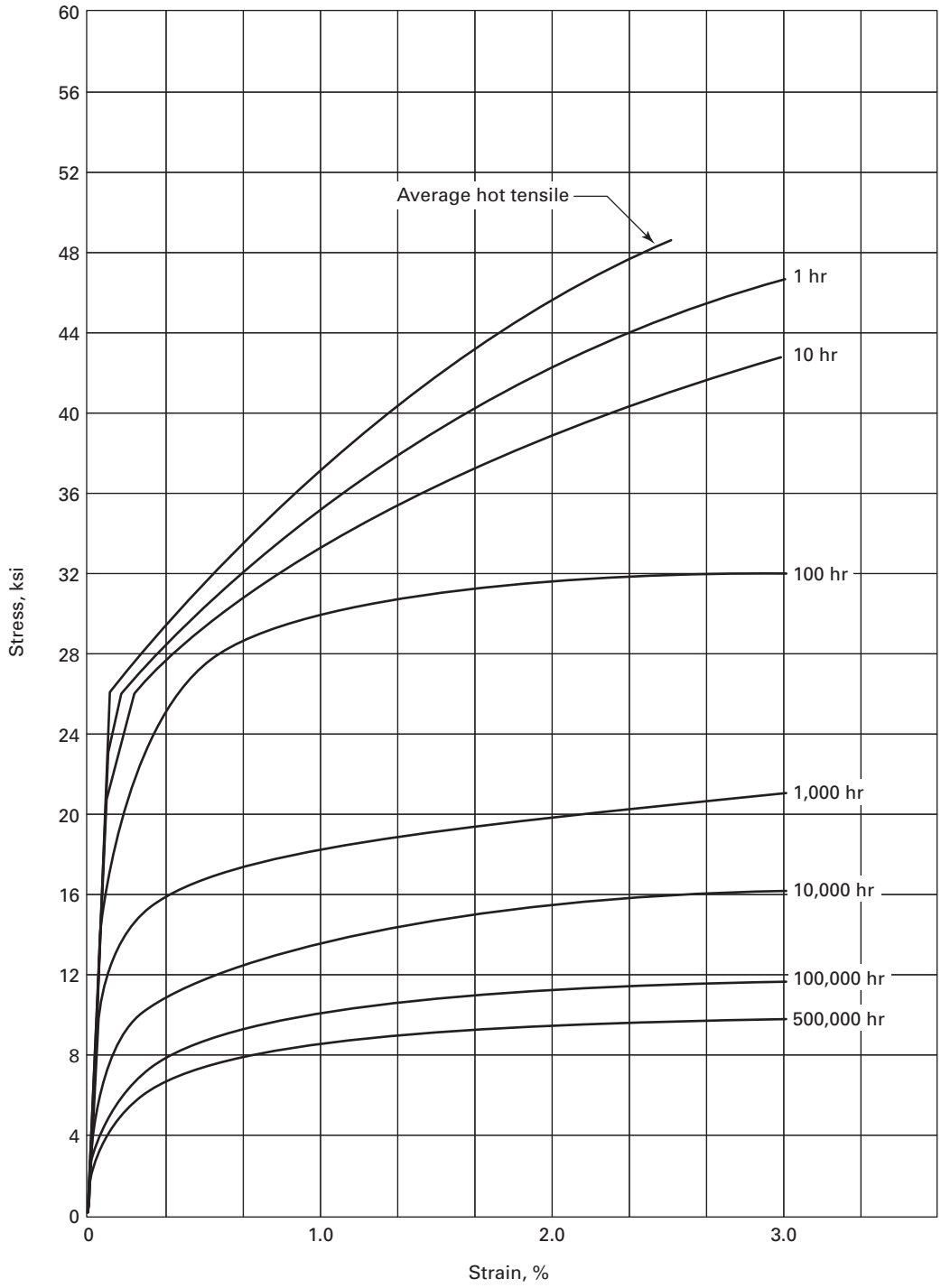


Figure E-100.21-7
Average Isochronous Stress–Strain Curves for Annealed 2¼Cr–1Mo at 1,000°F

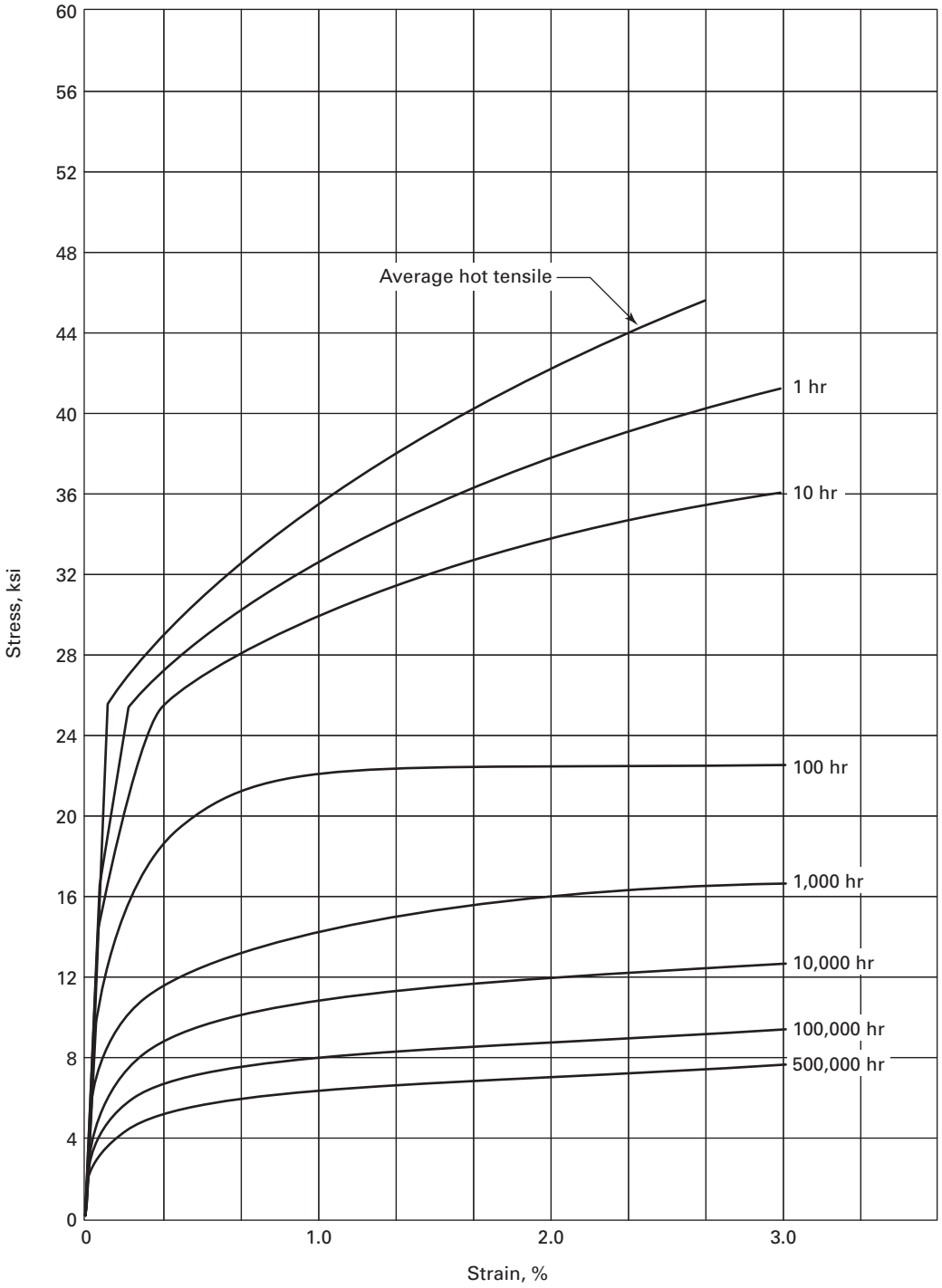


Figure E-100.21-8
Average Isochronous Stress–Strain Curves for Annealed 2¼Cr–1Mo at 1,050°F

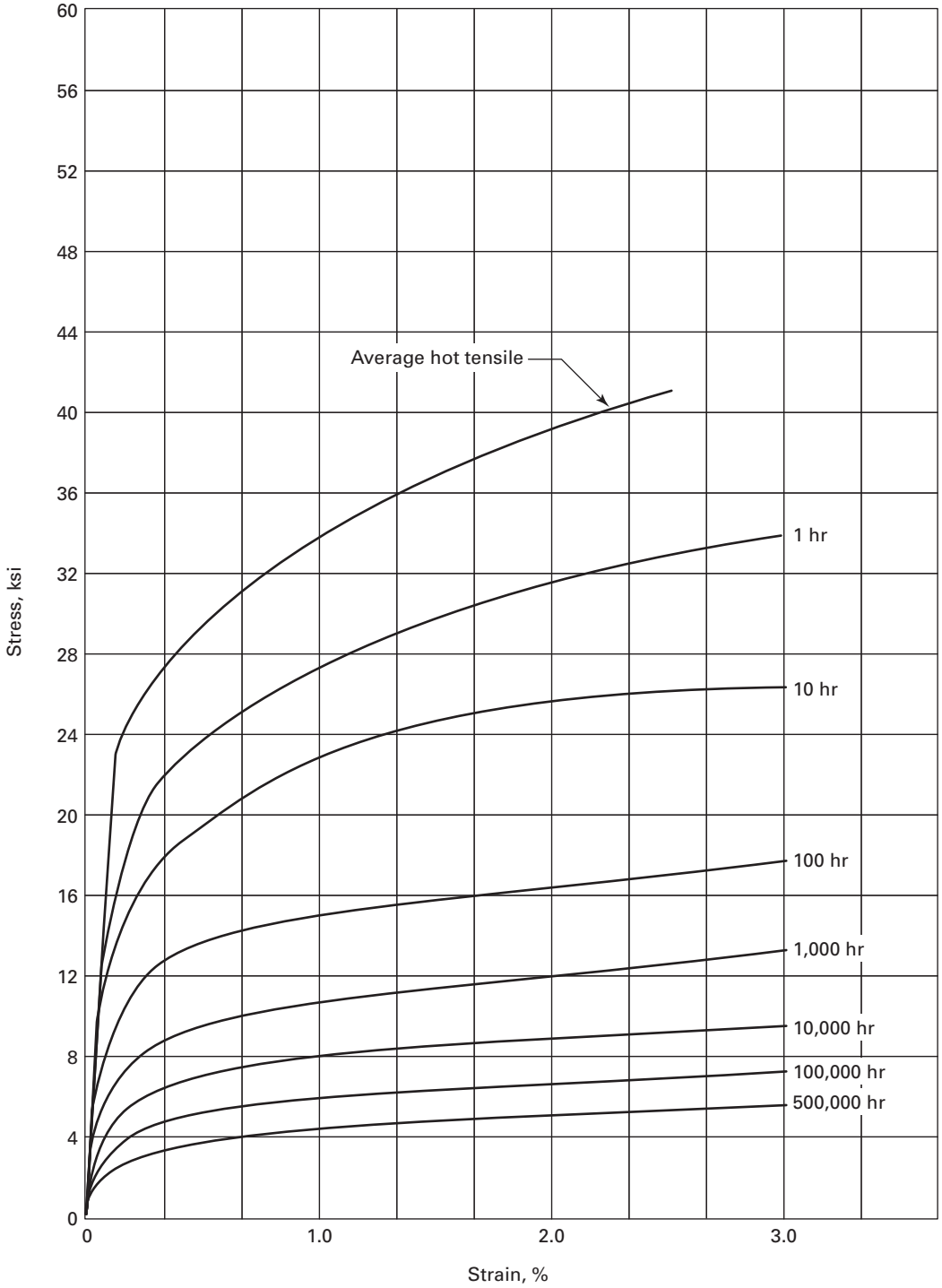


Figure E-100.21-9
Average Isochronous Stress–Strain Curves for Annealed 2¼Cr–1Mo at 1,100°F

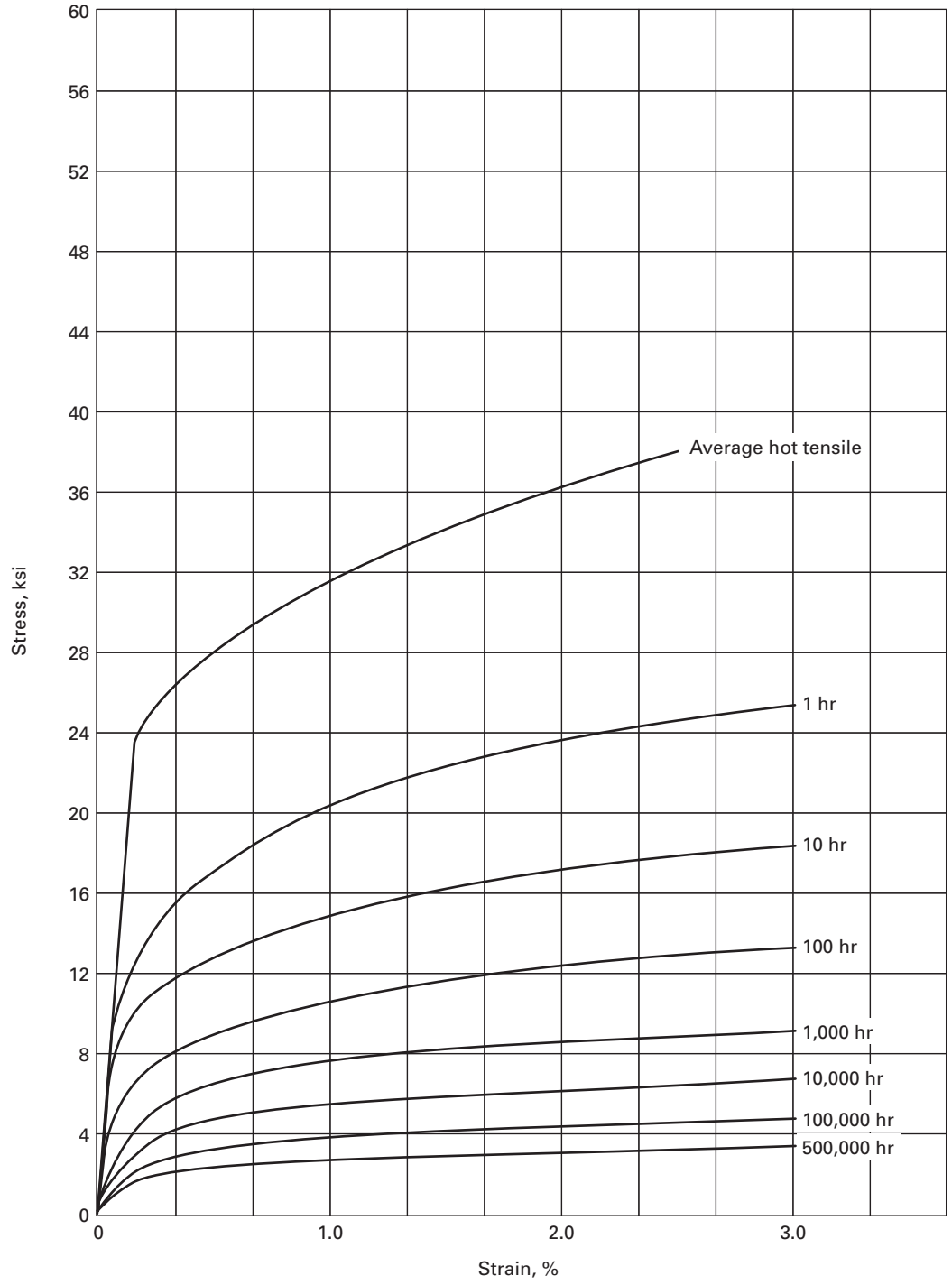


Figure E-100.21-10
Average Isochronous Stress–Strain Curves for Annealed 2¼Cr–1Mo at 1,150°F

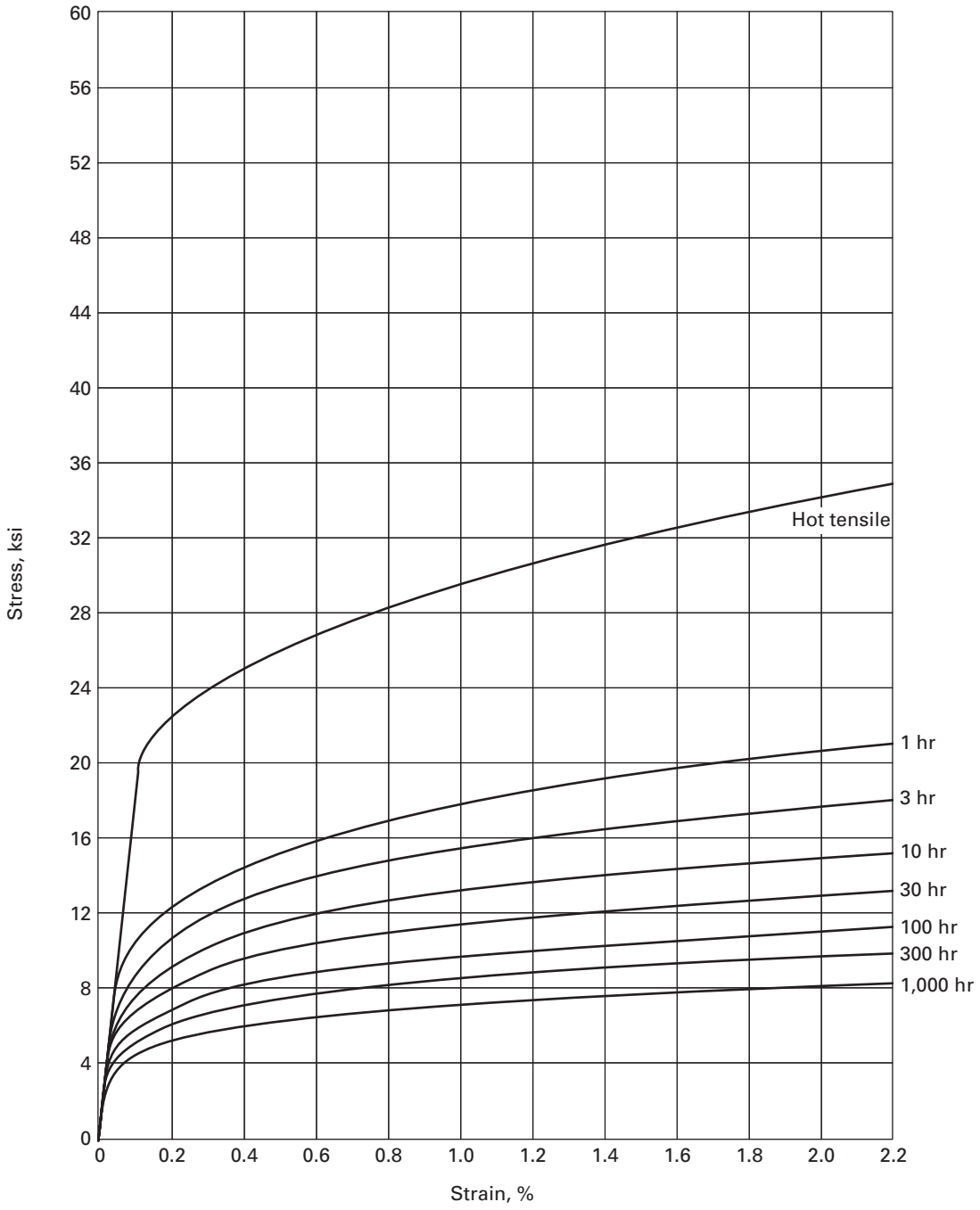


Figure E-100.21-11
Average Isochronous Stress–Strain Curves for Annealed 2¼Cr–1Mo at 1,200°F

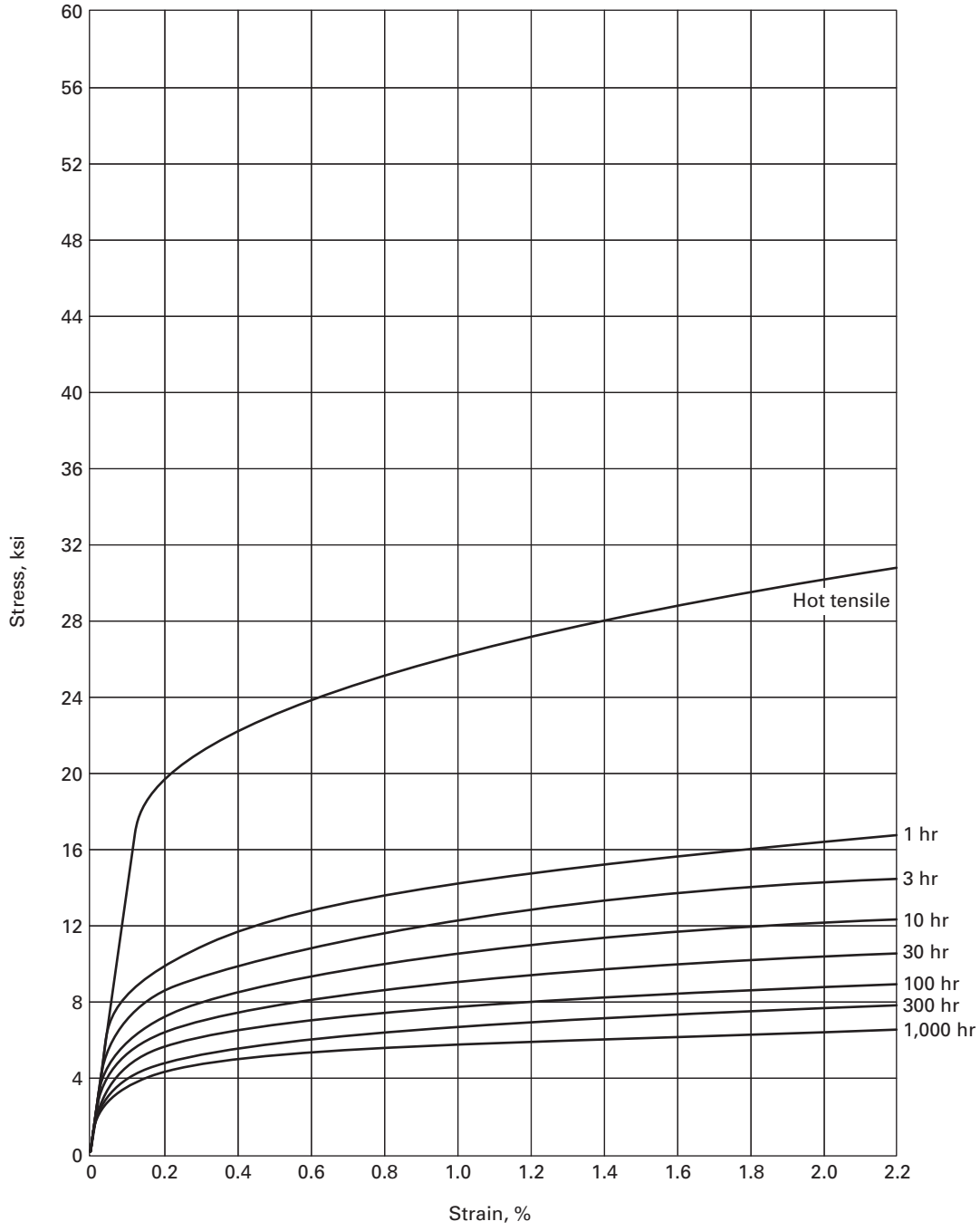


Figure E-100.22-1
Average Isochronous Stress–Strain Curves for 9Cr–1Mo–V at 700°F

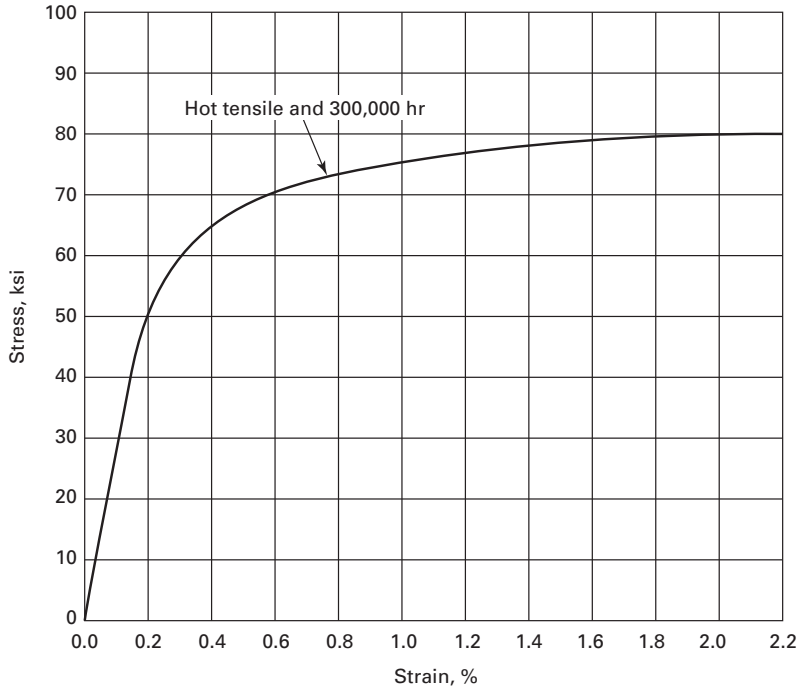


Figure E-100.22-2
Average Isochronous Stress–Strain Curves for 9Cr–1Mo–V at 750°F

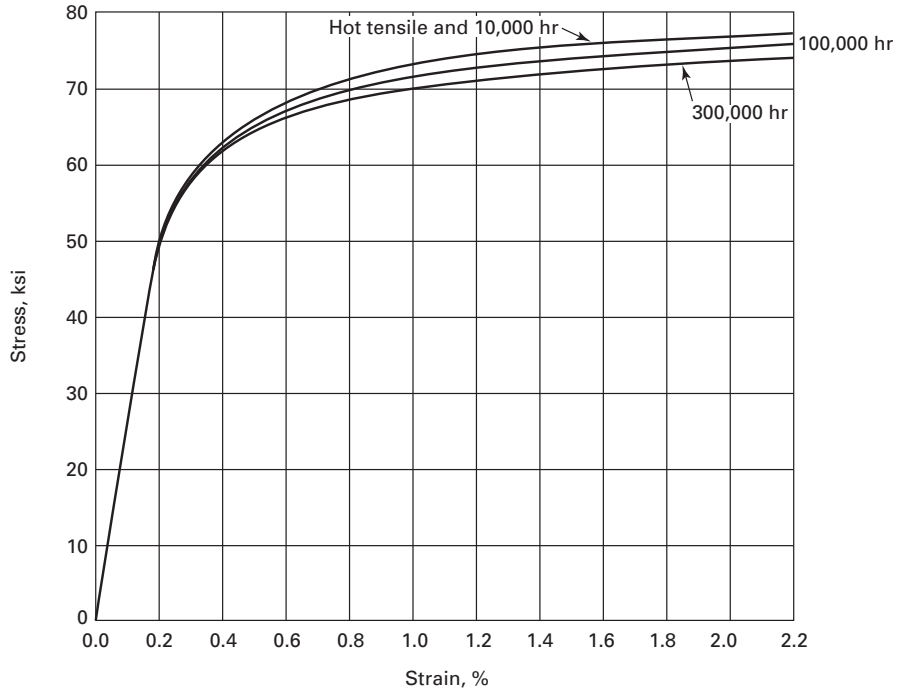


Figure E-100.22-3
Average Isochronous Stress–Strain Curves for 9Cr–1Mo–V at 800°F

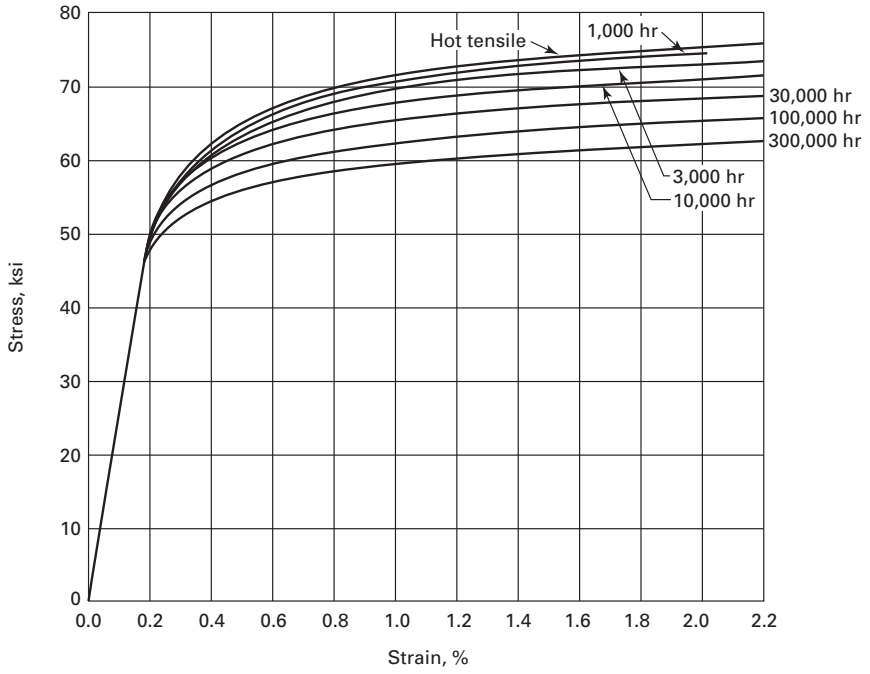


Figure E-100.22-4
Average Isochronous Stress–Strain Curves for 9Cr–1Mo–V at 850°F

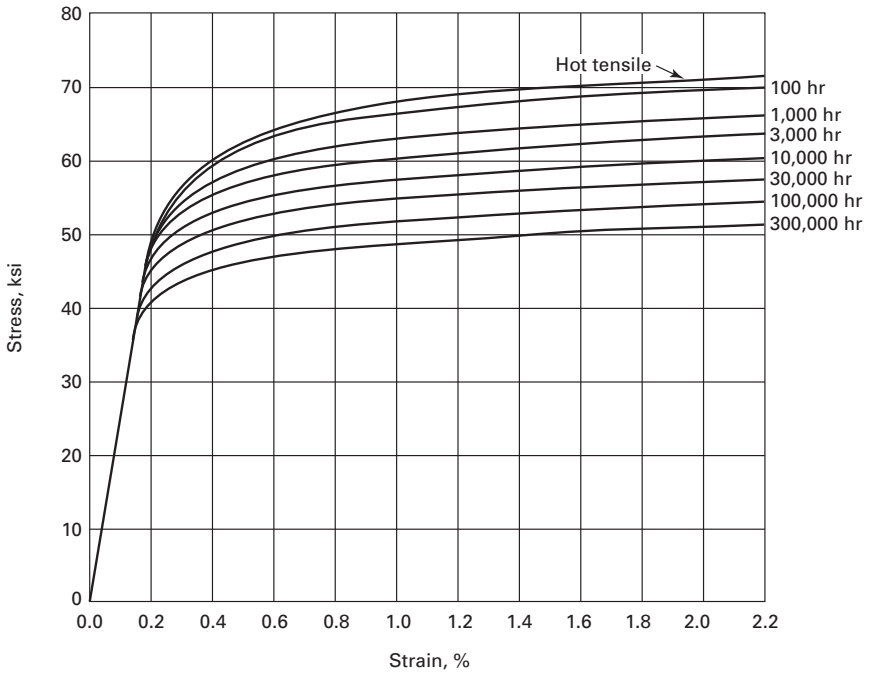


Figure E-100.22-5
Average Isochronous Stress–Strain Curves for 9Cr–1Mo–V at 900°F

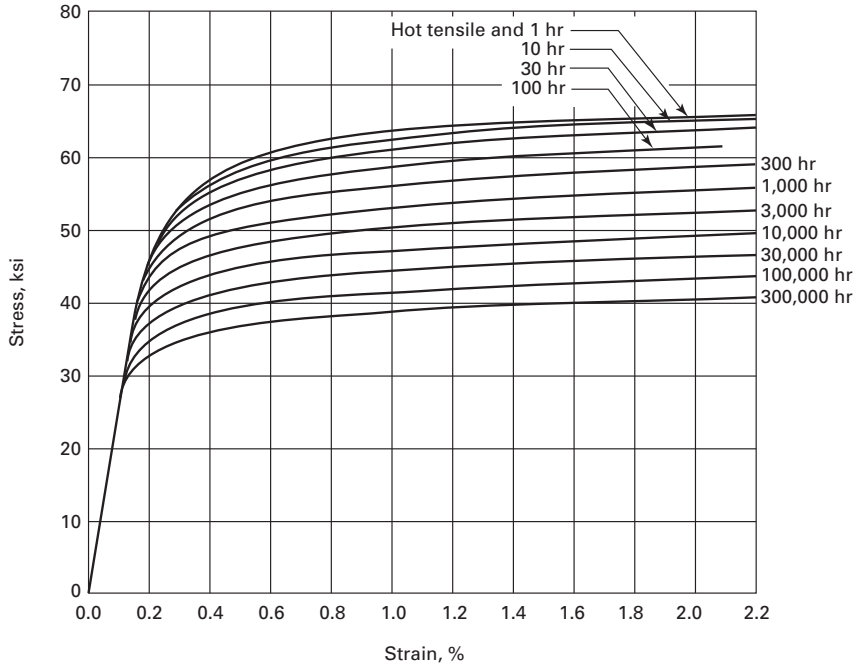


Figure E-100.22-6
Average Isochronous Stress–Strain Curves for 9Cr–1Mo–V at 950°F

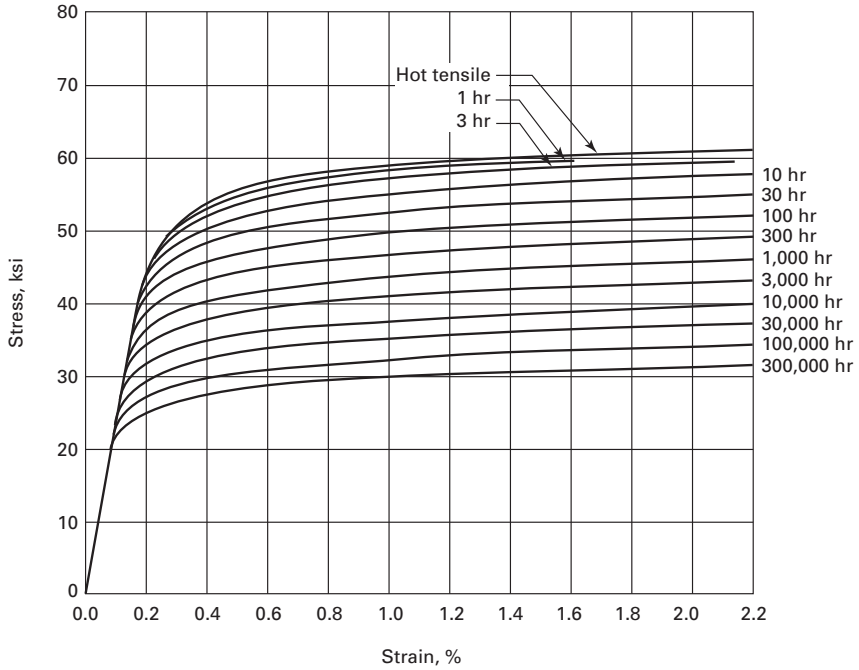


Figure E-100.22-7
Average Isochronous Stress–Strain Curves for 9Cr–1Mo–V at 1,000°F

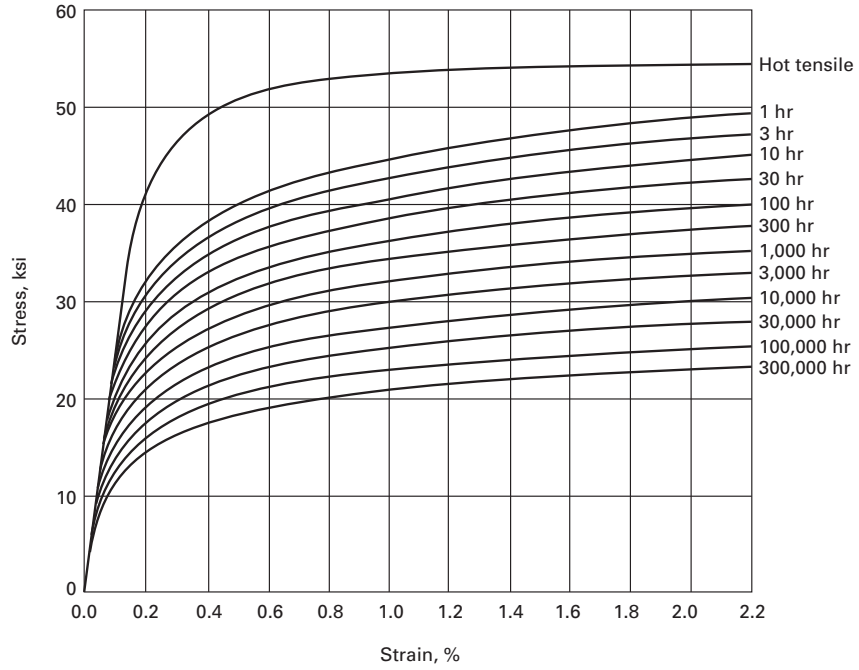


Figure E-100.22-8
Average Isochronous Stress–Strain Curves for 9Cr–1Mo–V at 1,050°F

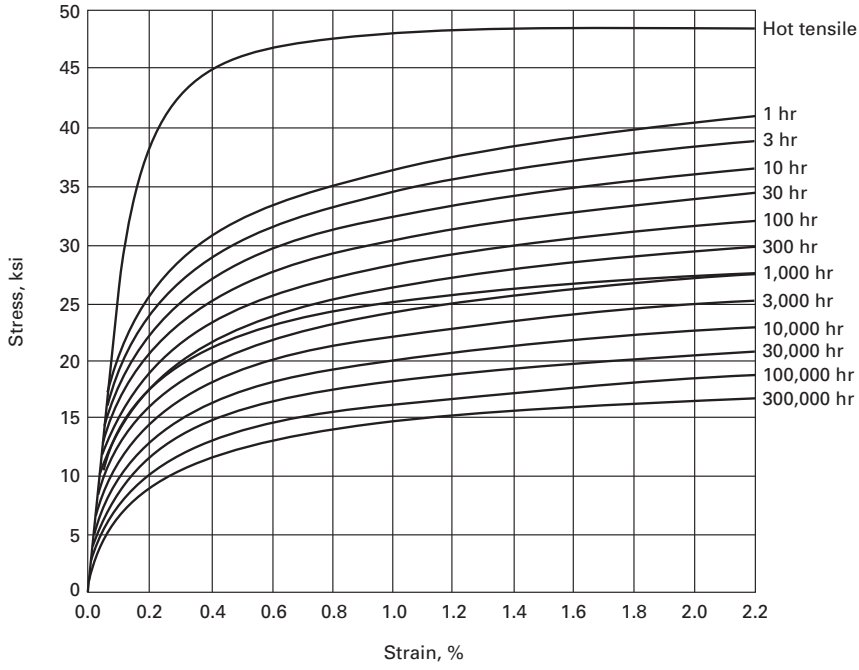


Figure E-100.22-9
Average Isochronous Stress–Strain Curves for 9Cr–1Mo–V at 1,100°F

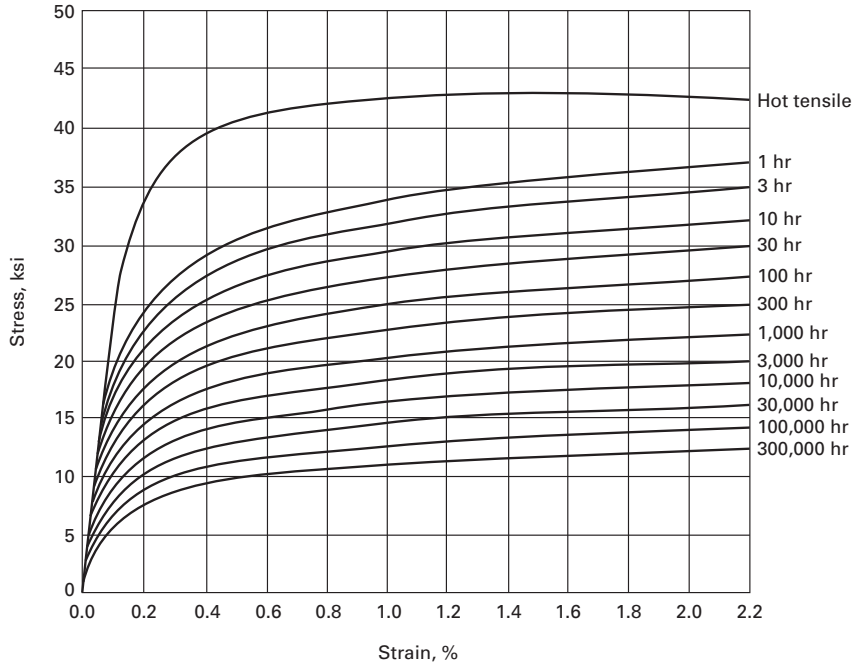


Figure E-100.22-10
Average Isochronous Stress–Strain Curves for 9Cr–1Mo–V at 1,150°F

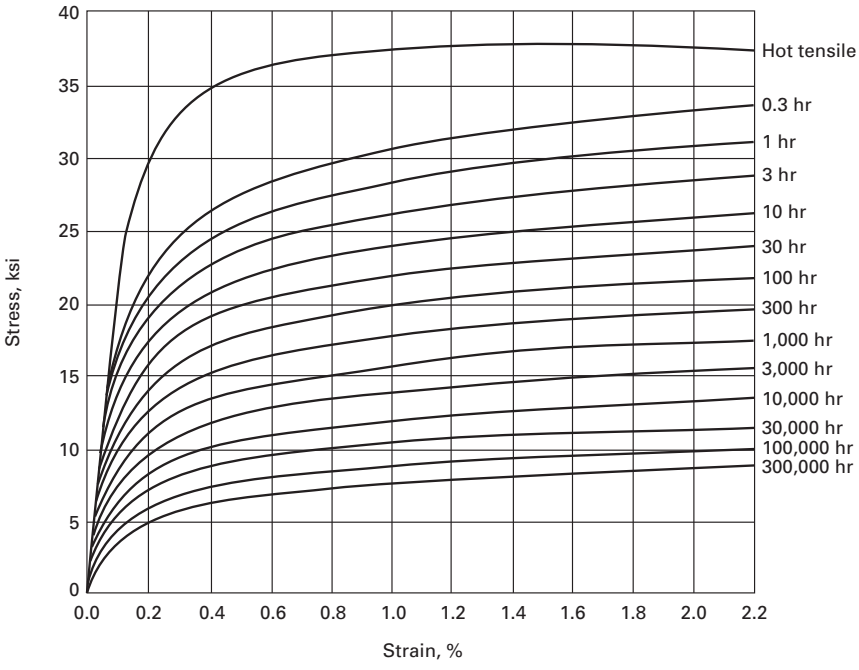


Figure E-100.22-11
Average Isochronous Stress–Strain Curves for 9Cr–1Mo–V at 1,200°F

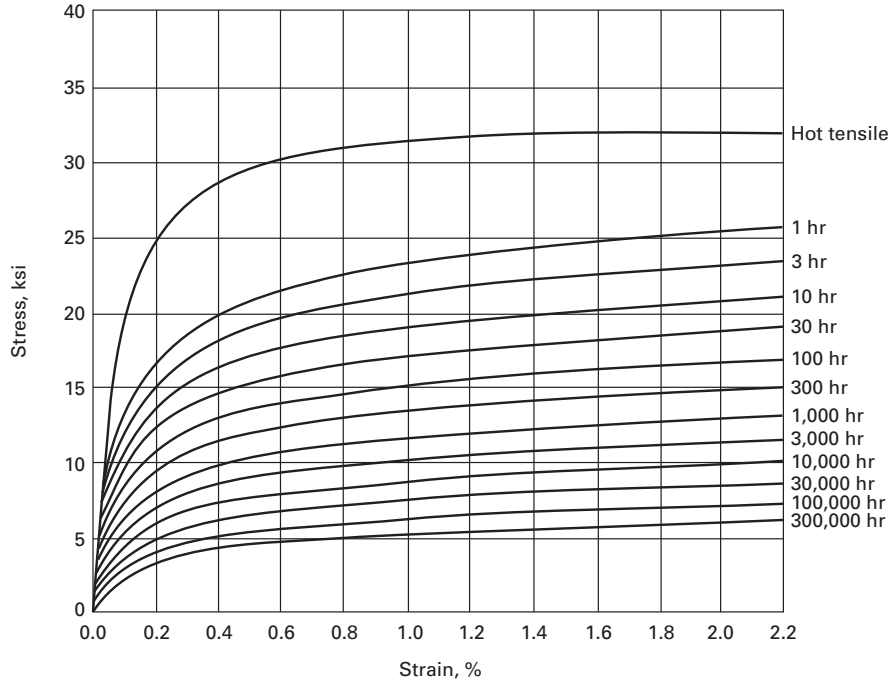


Table E-100.23-1
Recommended Restrictions

Element	Type 304	Type 316
(a) Chemical composition [Note (1)]		
Carbon	0.04–0.06	0.04–0.06
Nitrogen	0.04–0.07	0.04–0.07
Silicon	0.6	0.6
Manganese	1.0–2.0	1.0–2.0
Nickel	8.00–10.00	11.00–12.5
Chromium	18.5–20.00	17.00–18.00
Molybdenum	0.2	2.5–3.0
Sulfur	0.02	<0.02
Phosphorus	0.045	<0.03
Niobium	0.02 [Note (2)]	...
Aluminum	0.05	0.05
Antimony	0.02	0.02
Boron	...	0.003 [Note (3)]
Lead	0.003	0.003
Selenium	0.015	0.015
Tin	0.015	0.015
Vanadium	0.05	0.05
Zinc	0.01	0.01
(b) Grain size (ASTM)	3–6	3–6
(c) Melt practice	AOD or AOD/ESR	AOD or AOD/ESR
(d) Suggested upper long-term use limit for improved performance:		
Temperature, °F	1,100	1,100

NOTES:
(1) All values are maximum percentages unless indicated as ranges.
(2) To further reduce data scatter, a minimum value of 0.005% should be specified.
(3) To further reduce data scatter, a minimum value of 0.0015% should be specified.

Table E-100.24-1
Cross-Reference Table of Section II, Part D and Section III, Subsection NH 2015 Edition

Subsection NH Designation	Subsection NH Title	Nonmandatory Appendix E Designation
Figure NH-4212-1	Permissible Time/Temperature Conditions for Material Which Has Been Cold Worked > 5% and < 20% and Subjected to Short-Time High Temperature Transients	Figure E-100.2-1
Figure NH-I-14.3A	S_{mt} — Type 304 SS	Figure E-100.4-1
Figure NH-I-14.3B	S_{mt} — Type 316 SS	Figure E-100.4-2
Figure NH-I-14.3C	S_{mt} — Ni–Fe–Cr (Alloy 800H)	Figure E-100.4-3
Figure NH-I-14.3D	S_{mt} — 2¼Cr–1Mo	Figure E-100.4-4
Figure NH-I-14.3E	S_{mt} — 9Cr–1Mo–V	Figure E-100.4-5
Figure NH-I-14.4A	S_t — Type 304 SS	Figure E-100.5-1
Figure NH-I-14.4B	S_t — Type 316 SS	Figure E-100.5-2
Figure NH-I-14.4C	S_t — Ni–Fe–Cr (Alloy 800H)	Figure E-100.5-3
Figure NH-I-14.4D	S_t — 2¼Cr–1Mo	Figure E-100.5-4
Figure NH-I-14.4E	S_t — 9Cr–1Mo–V	Figure E-100.5-5
Figure NH-I-14.6A	Minimum Stress-to-Rupture	Figure E-100.7-1
Figure NH-I-14.6B	Minimum Stress-to-Rupture	Figure E-100.7-2
Figure NH-I-14.6C	Minimum Stress-to-Rupture — Ni–Fe–Cr (Alloy 800H)	Figure E-100.7-3
Figure NH-I-14.6D	2¼Cr–1Mo — 100% of the Minimum Stress-to-Rupture	Figure E-100.7-4
Figure NH-I-14.6E	Minimum Stress-to-Rupture, Alloy 718	Figure E-100.7-5
Figure NH-I-14.6F	9Cr–1Mo–V — Expected Minimum Stress-to-Rupture, ksi	Figure E-100.7-6
Figure NH-I-14.13A	S_{mt} — Allowable Stress Intensity, Type 304 SS, Bolting	Figure E-100.15-1

Table E-100.24-1
Cross-Reference Table of Section II, Part D and Section III, Subsection NH 2015 Edition (Cont'd)

Subsection NH Designation	Subsection NH Title	Nonmandatory Appendix E Designation
Figure NH-I-14.13B	S_{mt} — Allowable Stress Intensity, Type 316 SS, Bolting	Figure E-100.15-2
Figure NH-I-14.13C	S_{mt} — Allowable Stress, Alloy 718, Bolting	Figure E-100.15-3
Figure NH-T-1420-1A	Design Fatigue Strain Range, ε_t, for 304 SS	Figure E-100.16-1
Figure NH-T-1420-1B	Design Fatigue Strain Range, ε_t, for 316 SS	Figure E-100.16-2
Figure NH-T-1420-1C	Design Fatigue Strain Range, ε_t, for Ni–Fe–Cr Alloy 800H	Figure E-100.16-3
Figure NH-T-1420-1D	Design Fatigue Strain Range, ε_t, for $2\frac{1}{4}$Cr–1Mo Steel	Figure E-100.16-4
Figure NH-T-1420-1E	Design Fatigue Strain Range, ε_t, for 9Cr–1Mo–V Steel	Figure E-100.16-5
Figure NH-T-1522-1	Time–Temperature Limits for Application of Section II External Pressure Charts	Figure E-100.17-1
Figure NH-T-1522-2	Time–Temperature Limits for Application of Section II External Pressure Charts	Figure E-100.17-2
Figure NH-T-1522-3	Temperature Limits for Application of Section II External Pressure Charts	Figure E-100.17-3
Figure NH-T-1800-A-1	Average Isochronous Stress–Strain Curves (304 SS 800°F)	Figure E-100.18-1
Figure NH-T-1800-A-2	Average Isochronous Stress–Strain Curves (304 SS 850°F)	Figure E-100.18-2
Figure NH-T-1800-A-3	Average Isochronous Stress–Strain Curves (304 SS 900°F)	Figure E-100.18-3
Figure NH-T-1800-A-4	Average Isochronous Stress–Strain Curves (304 SS 950°F)	Figure E-100.18-4
Figure NH-T-1800-A-5	Average Isochronous Stress–Strain Curves (304 SS 1,000°F)	Figure E-100.18-5
Figure NH-T-1800-A-6	Average Isochronous Stress–Strain Curves (304 SS 1,050°F)	Figure E-100.18-6
Figure NH-T-1800-A-7	Average Isochronous Stress–Strain Curves (304 SS 1,100°F)	Figure E-100.18-7
Figure NH-T-1800-A-8	Average Isochronous Stress–Strain Curves (304 SS 1,150°F)	Figure E-100.18-8
Figure NH-T-1800-A-9	Average Isochronous Stress–Strain Curves (304 SS 1,200°F)	Figure E-100.18-9
Figure NH-T-1800-A-10	Average Isochronous Stress–Strain Curves (304 SS 1,250°F)	Figure E-100.18-10
Figure NH-T-1800-A-11	Average Isochronous Stress–Strain Curves (304 SS 1,300°F)	Figure E-100.18-11
Figure NH-T-1800-A-12	Average Isochronous Stress–Strain Curves (304 SS 1,350°F)	Figure E-100.18-12
Figure NH-T-1800-A-13	Average Isochronous Stress–Strain Curves (304 SS 1,400°F)	Figure E-100.18-13
Figure NH-T-1800-A-14	Average Isochronous Stress–Strain Curves (304 SS 1,450°F)	Figure E-100.18-14
Figure NH-T-1800-A-15	Average Isochronous Stress–Strain Curves (304 SS 1,500°F)	Figure E-100.18-15
Figure NH-T-1800-B-1	Average Isochronous Stress–Strain Curves (316 SS 800°F)	Figure E-100.19-1
Figure NH-T-1800-B-2	Average Isochronous Stress–Strain Curves (316 SS 850°F)	Figure E-100.19-2
Figure NH-T-1800-B-3	Average Isochronous Stress–Strain Curves (316 SS 900°F)	Figure E-100.19-3
Figure NH-T-1800-B-4	Average Isochronous Stress–Strain Curves (316 SS 950°F)	Figure E-100.19-4
Figure NH-T-1800-B-5	Average Isochronous Stress–Strain Curves (316 SS 1,000°F)	Figure E-100.19-5
Figure NH-T-1800-B-6	Average Isochronous Stress–Strain Curves (316 SS 1,050°F)	Figure E-100.19-6
Figure NH-T-1800-B-7	Average Isochronous Stress–Strain Curves (316 SS 1,100°F)	Figure E-100.19-7
Figure NH-T-1800-B-8	Average Isochronous Stress–Strain Curves (316 SS 1,150°F)	Figure E-100.19-8
Figure NH-T-1800-B-9	Average Isochronous Stress–Strain Curves (316 SS 1,200°F)	Figure E-100.19-9
Figure NH-T-1800-B-10	Average Isochronous Stress–Strain Curves (316 SS 1,250°F)	Figure E-100.19-10
Figure NH-T-1800-B-11	Average Isochronous Stress–Strain Curves (316 SS 1,300°F)	Figure E-100.19-11
Figure NH-T-1800-B-12	Average Isochronous Stress–Strain Curves (316 SS 1,350°F)	Figure E-100.19-12
Figure NH-T-1800-B-13	Average Isochronous Stress–Strain Curves (316 SS 1,400°F)	Figure E-100.19-13
Figure NH-T-1800-B-14	Average Isochronous Stress–Strain Curves (316 SS 1,450°F)	Figure E-100.19-14
Figure NH-T-1800-B-15	Average Isochronous Stress–Strain Curves (316 SS 1,500°F)	Figure E-100.19-15
Figure NH-T-1800-C-1	Average Isochronous Stress–Strain Curves (800H 800°F and 850°F)	Figure E-100.20-1
Figure NH-T-1800-C-2	Average Isochronous Stress–Strain Curves (800H 900°F)	Figure E-100.20-2
Figure NH-T-1800-C-3	Average Isochronous Stress–Strain Curves (800H 950°F)	Figure E-100.20-3
Figure NH-T-1800-C-4	Average Isochronous Stress–Strain Curves (800H 1,000°F)	Figure E-100.20-4
Figure NH-T-1800-C-5	Average Isochronous Stress–Strain Curves (800H 1,050°F)	Figure E-100.20-5
Figure NH-T-1800-C-6	Average Isochronous Stress–Strain Curves (800H 1,100°F)	Figure E-100.20-6
Figure NH-T-1800-C-7	Average Isochronous Stress–Strain Curves (800H 1,150°F)	Figure E-100.20-7
Figure NH-T-1800-C-8	Average Isochronous Stress–Strain Curves (800H 1,200°F)	Figure E-100.20-8
Figure NH-T-1800-C-9	Average Isochronous Stress–Strain Curves (800H 1,250°F)	Figure E-100.20-9
Figure NH-T-1800-C-10	Average Isochronous Stress–Strain Curves (800H 1,300°F)	Figure E-100.20-10

Table E-100.24-1
Cross-Reference Table of Section II, Part D and Section III, Subsection NH 2015 Edition (Cont'd)

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ENDNOTES

1 ASME uses the current ASTM definition of *ferrous alloy*: an alloy whose major constituent is iron, even if the iron content is less than 50% of the total composition. However, this is a recently adopted definition and the change to specifications is occurring over time. Therefore, some alloys that were formerly defined as nonferrous are still listed in the nonferrous tables or both.

2 This chart is used only for this condition and is only applicable to uniform external pressure.

3 This applies to unstiffened cylinders.

4 *CASTI Guidebook to ASME Section II, B31.1 & B31.3 – Materials Index*, latest edition.

5 *Metals & Alloys in the Unified Numbering System*, SAE HS-1086 and ASTM DS-56, latest edition.

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