



موضوع: محاسبات حداقل ضخامت مورد نیاز برای استفاده از ورق به جای

Blind Flange برای پیگ لانچر پرتابل در تعمیرات خط لوله

Unstayed Flat Head Cover In Lieu of Blind Flange

محاسبات: ابراهیم خیر

پیشنهاد دهنده: مهندس محمد آتیار

صورت نامه:

استفاده از ورق به جای Blind Flange در پرتابل مربوط به تعمیرات خط ۲

نویسندگان: با توجه به فشار محسوس، محاسبات، آزمایشی MOP به وزن 7 bar خواهد بود.

ASME SA-283 Gr C

جنس ورق:

Ambient

حما:

استندardsی مورد استفاده:

1- ASME Sec VIII - Div 1 - Clause: UG-34

2- ASME Sec II - D - Table: 1A

توجه: مطابق استاندارد، ضخامت پیگ لانچر/اسپور مطابق استاندارد ظرف تحت فشار طراحی می شود.



ASME Sec VIII, Div 1 استاندارد UG-34

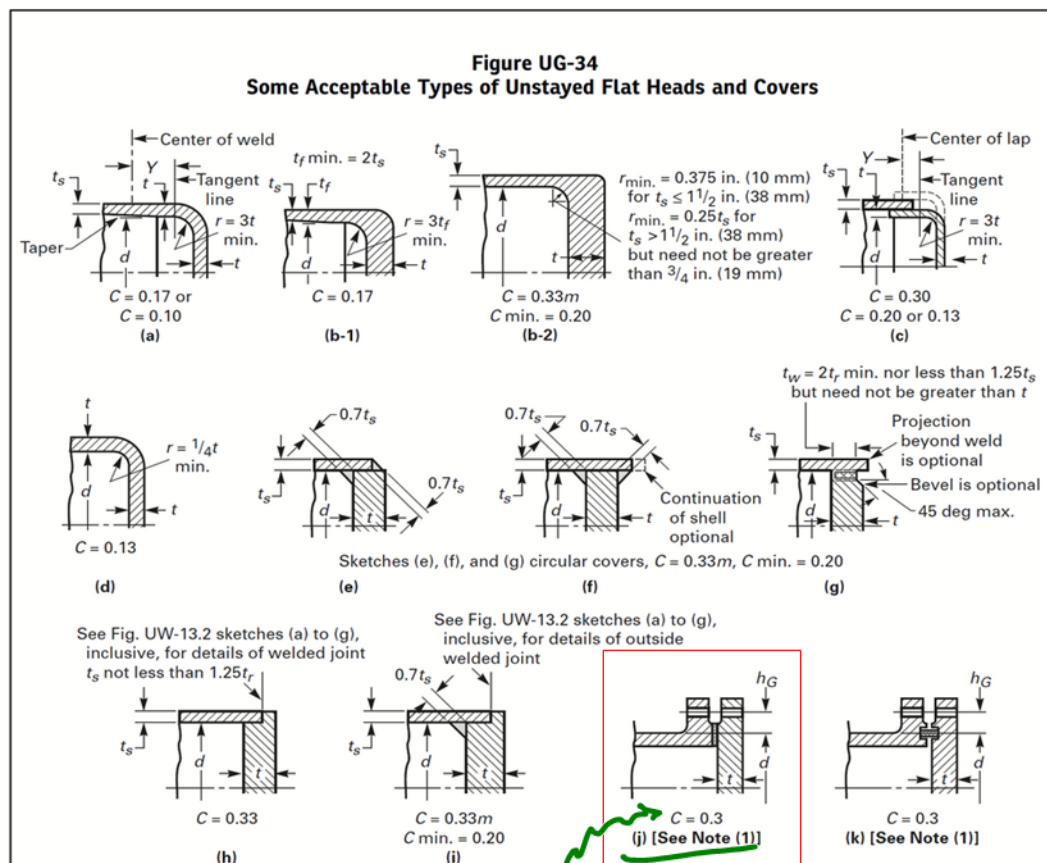
2019

موضوع: بررسی بند

UG-34 UNSTAYED FLAT HEADS AND COVERS (19)

(a) The minimum thickness of unstayed flat heads, cover plates and blind flanges shall conform to the requirements given in this paragraph. These requirements apply to both circular and noncircular²⁴ heads and covers. Some acceptable types of flat heads and covers are shown in Figure UG-34. In this figure, the dimensions of the component parts and the dimensions of the welds are exclusive of extra metal required for corrosion allowance.

موضوع: تعیین طرح اتصال - مطابق تقویر UG-34 طرح اتصال (ز) اتصال بطنی است
دفعه دین



طرح اتصال بطنی - RF



(c) The thickness of flat unstayed heads, covers, and blind flanges shall conform to one of the following three requirements.²⁵

(1) Circular blind flanges conforming to any of the flange standards listed in Table U-3 and further limited in UG-44(a) shall be acceptable for the diameters and pressure-temperature ratings in the respective standard when the blind flange is of the types shown in Figure UG-34, sketches (j) and (k).

(2) The minimum required thickness of flat unstayed circular heads, covers and blind flanges shall be calculated by the following formula:

$$t = d \sqrt{CP/SE} \quad (1)$$

برای طرح اتصال جوشی

except when the head, cover, or blind flange is attached by bolts causing an edge moment [sketches (j) and (k)] in which case the thickness shall be calculated by

$$t = d \sqrt{CP/SE + 1.9Wh_G/SEd^3} \quad (2) \Rightarrow$$

When using eq. (2), the thickness t shall be calculated for both operating conditions and gasket seating, and the greater of the two values shall be used. For operating conditions, the value of P shall be the design pressure, and the values of S at the design temperature and W from eq. 2-5(e)(4) shall be used. For gasket seating, P equals zero, and the values of S at atmospheric temperature and W from eq. 2-5(e)(5) shall be used.

C = a factor depending upon the method of attachment of head, shell dimensions, and other items as listed in (d) below, dimensionless

$$= 0.3$$

C ضریب طرح اتصال

P = internal design pressure (see UG-21)

$$7 \text{ bar} = 100 \text{ psi}$$

P : فشار طراحی

figure UG-34

E = joint efficiency, from Table UW-12, of any Category A weld as defined in UW-3(a)

ن ضریب رانندگی اتصال جوشی $E = 1$
بدون جوش - یک تکه

طرح دوم فیدل محاسبیت همانند ضعیف:

فیدل سیم 2 بزرگ طرح اتصال بلی
استفادی شود:

- در این حالت هم برای رزای فیدل و هم
gasket Seating
ی لبه و مقدار بزرگتر مد نظر قرار گیرد

فیدل مربوطه

برای طرح اتصال بلی

خوب الان ما از این هم نیازی نداریم



perpendicular to short span
 d = diameter, or short span, measured as indicated in
Figure UG-34

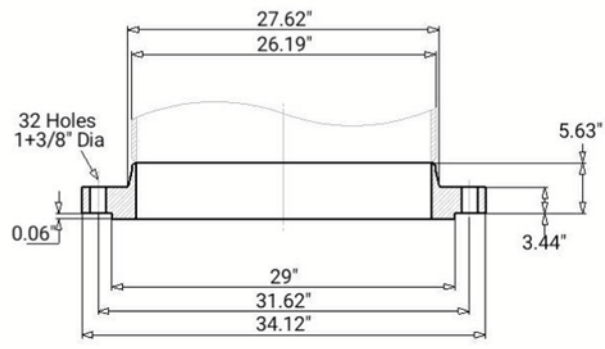
d : قطر کمرز تا کمرز بولت؟

1316.47

Weld neck - Class 300 استاندارد
Series B

با توجه به مبلغ بودجه ای آن

20 INCH SERIES B WELDNECK FLANGE 300# RT
Wt = 399.04 lb
S/Bolts & Nuts Wt = 56.00 lb



$d = 31.62$ inch

Stud Bolt Size : 1+1/4" UNC (or M33) x 10.50" LBSM B16.47-2006

Series 'B' Weldneck Flange	
Size	Class
26"	300#

W = total bolt load given for circular heads for eqs.
2-5(e)(4) and 2-5(e)(5)

(e) Flange Design Bolt Load W . The bolt loads used in the design of the flange shall be the values obtained from eqs. (4) and (5). For operating conditions,

$$W = W_{m1} \quad (4) \Rightarrow$$

شدنیوز آید

For gasket seating,

$$W = \frac{(A_m + A_b)S_a}{2} \quad (5) \Rightarrow$$

آب بندی گسست

S_a used in eq. (5) shall be not less than that tabulated in the stress tables (see UG-23). In addition to the minimum requirements for safety, eq. (5) provides a margin against abuse of the flange from overbolting. Since the margin against such abuse is needed primarily for the initial, bolting-up operation which is done at atmospheric temperature and before application of internal pressure, the flange design is required to satisfy this loading only under such conditions.

مابین گسست مجزا برای همدیگر می کشیم
وضاحت بند آخر عدد ضرب کرد



ابتداءً مقدار W را می بینیم

$$W = W_{m1} \quad (4)$$

Table 2-5.2

W_{m1} = minimum required bolt load for the operating conditions [see 2-5(c)]. For flange pairs used to contain a tubesheet for a floating head or a U-tube type of heat exchangers, or for any other similar design, W_{m1} shall be the larger of the values as individually calculated for each flange, and that value shall be used for both flanges.

(c) *Required Bolt Loads.* The flange bolt loads used in calculating the required cross-sectional area of bolts shall be determined as follows.

(1) The required bolt load for the operating conditions W_{m1} shall be sufficient to resist the hydrostatic end force H exerted by the maximum allowable working pressure on the area bounded by the diameter of gasket reaction, and, in addition, to maintain on the gasket or joint-contact surface a compression load H_p , which experience has shown to be sufficient to ensure a tight joint. (This compression load is expressed as a multiple m of the internal pressure. Its value is a function of the gasket material and construction.)

NOTE: Tables 2-5.1 and 2-5.2 give a list of many commonly used gasket materials and contact facings, with suggested values of m , b , and y that have proved satisfactory in actual service. These values are suggested only and are not mandatory.

The required bolt load for the operating conditions W_{m1} is determined in accordance with eq. (1).

$$W_{m1} = H + H_p = 0.785G^2P + [2b \times 3.14GmP] \quad (1)$$

حال باید با دانستن H و H_p و G و m و b ، W را می بینیم.

2-5-2 معادله

W_{m1} : حداقل تنش وارده از پیچ بودن؟

ما این قابلیت تحمل فشار است هیدروستاتیک و فشار آب بندی مبلغ را داشته باشد.

که ضریب m از شدت داغی است و تا جایی از متریال گسکت در نوع آن می باشد.



ابتدا G را محاسبه کنیم:

G = diameter at location of gasket load reaction. Except as noted in sketch (1) of Figure 2-4, G is defined as follows (see Table 2-5.2):

(a) when $b_o \leq \frac{1}{4}$ in. (6 mm), G = mean diameter of gasket contact face

(b) when $b_o > \frac{1}{4}$ in. (6 mm), G = outside diameter of gasket contact face less $2b$

برای b_o ابتدا باید b_o را محاسبه کنیم:

is or greater than one

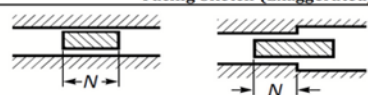
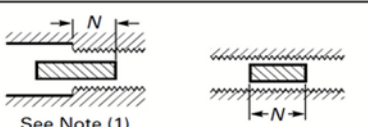
b_o = basic gasket seating width (from Table 2-5.2)

2-5.2 برای b_o

مخوب بودیم جدول

ASME BPVC.VIII.1-2019

2-6

Table 2-5.2 Effective Gasket Width		
Facing Sketch (Exaggerated)	Basic Gasket Seating Width, b_o	
	Column I	Column II
(1a) 	$\frac{N}{2}$	$\frac{N}{2}$
(1b) 		
GENERAL NOTE: The gasket factors listed only apply to flanged joints in which the gasket is contained entirely within the inner edges of the bolt holes. NOTE: (1) Where serrations do not exceed $\frac{1}{64}$ in. (0.4 mm) depth and $\frac{1}{32}$ in. (0.8 mm) width spacing, sketches (1b) and (1d) shall be used.		

با توجه به note این جدول باید از sketch 1b استفاده کنیم.

$\Rightarrow$ sketch 1b $\Rightarrow b_o = \frac{N}{2}$



ASME B16.20 گسکت درجه

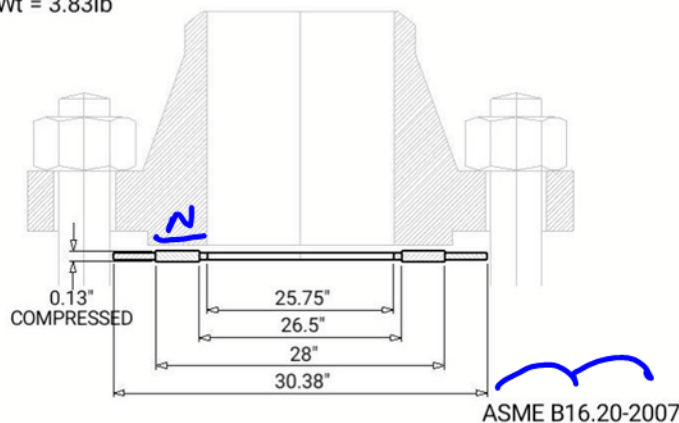
حال به مقدار N را بدست آوریم: به استناد

ی کنیم

26"NPS Spiral Wound ASME B16.47 Series B 30

300#

Wt = 3.83lb



$$N = \frac{28 - 26.5}{2} = 0.75$$

$$\Rightarrow b_o = \frac{N}{2} = 0.375$$

Spiral Wound ASME B16.47 Series B

Size	Class
26"	300#

حال مجدداً برای بدست آوردن G را می بینیم:

G = diameter at location of gasket load reaction. Except as noted in sketch (1) of Figure 2-4, G is defined as follows (see Table 2-5.2):

(a) when $b_o \leq \frac{1}{4}$ in. (6 mm), G = mean diameter of gasket contact face

(b) when $b_o > \frac{1}{4}$ in. (6 mm), G = outside diameter of gasket contact face less $2b$

با توجه به $b_o = 0.375$

$$= \frac{3}{8}$$

پس از آنکه G را استعلام می کنیم

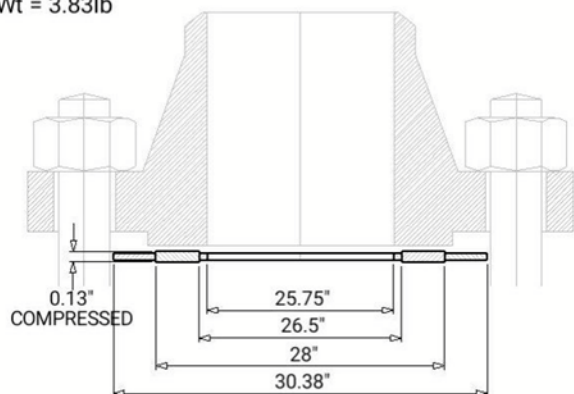
$$\Rightarrow G = O_{gasket} - 2b$$



26"NPS Spiral Wound ASME B16.47 Series B 30

300#

Wt = 3.83lb



ASME B16.20-2007

$$\Rightarrow OD_{gasket} = 30.38"$$

Spiral Wound ASME B16.47 Series B

Size	Class
26"	300#

حال با مقدار ط را در نظر بگیرم:

b = effective gasket or joint-contact-surface seating width [see Note in 2-5(c)(1)]

(c) *Required Bolt Loads.* The flange bolt loads used in calculating the required cross-sectional area of bolts shall be determined as follows.

(1) The required bolt load for the operating conditions W_{m1} shall be sufficient to resist the hydrostatic end force H exerted by the maximum allowable working pressure on the area bounded by the diameter of gasket reaction, and, in addition, to maintain on the gasket or joint-contact surface a compression load H_p , which experience has shown to be sufficient to ensure a tight joint. (This compression load is expressed as a multiple m of the internal pressure. Its value is a function of the gasket material and construction.)

NOTE: Tables 2-5.1 and 2-5.2 give a list of many commonly used gasket materials and contact facings, with suggested values of m , b , and y that have proved satisfactory in actual service. These values are suggested only and are not mandatory.

این هم بنده

2-5. c.1

2-5-1

2-5-2

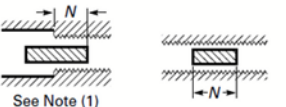
که به جدال

از جمع می کنه



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2-6

Table 2-5.2 Effective Gasket Width			
Facing Sketch (Exaggerated)		Basic Gasket Seating Width, b_o	
		Column I	Column II
(1a)		$\frac{N}{2}$	$\frac{N}{2}$
(1b)	 See Note (1)		

Effective Gasket Seating Width, b

$b = b_o$ when $b_o \leq \frac{1}{4}$ in. (6 mm); $b = C_b \sqrt{b_o}$, when $b_o > \frac{1}{4}$ in. (6 mm)

باتوجه به مقدار

$$b_o = 0.375 > \frac{1}{4}$$

پس

$$b = C_b \sqrt{b_o}$$

که نیاز است C_b ای ب غنیم:

where equal to C_n or C_p , whichever is less

C_b = conversion factor

= 0.5 for U.S. Customary calculations; 2.5 for SI calculations

C_b : فاکتور تبدیل

که باتوجه به سیستم

usc مقدار 0.5 دارد نظری بریم

$$C_b = 0.5$$

حال مقدار C_b ای ب غنیم:

$$b = C_b \sqrt{b_o} = 0.5 \sqrt{0.375} = 0.31$$



خوب حال بدست آمدن ط ، بدی داریم و عذر ها را می بینیم :

G = diameter at location of gasket load reaction. Except as noted in sketch (1) of Figure 2-4, G is defined as follows (see Table 2-5.2):

(a) when $b_o \leq \frac{1}{4}$ in. (6 mm), G = mean diameter of gasket contact face

(b) when $b_o > \frac{1}{4}$ in. (6 mm), G = outside diameter of gasket contact face less $2b$

$$G = OD_{gasket} - 2b$$

عذر OD_{gasket} را که قبلاً از $ASME B16.20$ بدست آورده بودیم

$$OD_{gasket} = 30.98"$$

$$\Rightarrow G = 30.98" - 2 \times 0.91 = 29.76$$

نکته: می توانیم به صورت محافظه کار G را هم قطر خدجی نسبت به نظر قرار دهیم.

اداره: محال باید عارضی را در نظر بگیریم W_{m1} را می بینیم :

The required bolt load for the operating conditions W_{m1} is determined in accordance with eq. (1).

$$W_{m1} = H + H_p = 0.785 \overline{G^2} P + [2b \times 3.14 \overline{Gm} P] \quad (1)$$

ابتدا به مدافع m می رویم



میزان m : فاکتور گasket

m = gasket factor, obtain from Table 2-5.1 [see Note in 2-5(c)(1)]

2-5.1

از جدول

بدست می آید

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2-5

Table 2-5.1
Gasket Materials and Contact Facings
Gasket Factors m for Operating Conditions and Minimum Design Seating Stress y

Gasket Material	Gasket Factor m	Min. Design Seating Stress y , psi (MPa)	Sketches	Facing Sketch and Column in Table 2-5.2
Spiral-wound metal, mineral fiber filled:				
Carbon	→ 2.50	10,000 (69)		(1a), (1b); Column II
Stainless, Monel, and nickel-base alloys	3.00	10,000 (69)		

2.5

مقدار m : برای گasket اسپیرال وند کربنی -

$$m = 2.5$$

$$y = 10000 \text{ psi}$$

مقدار W_{m1} بدست می آید

The required bolt load for the operating conditions W_{m1} is determined in accordance with eq. (1).

$$W_{m1} = H + H_p = 0.785G^2P + (2b \times 3.14GmP) \quad (1)$$

نیاز است H و H_p را محاسبه کنیم:

محاسبه H

$$H = \text{total hydrostatic end force} \\ = 0.785G^2P$$

H : نیروی حاصل از قسمت هیدرواستاتیک

$$G = 29.76 \text{ in} = \text{عرض لبه قبل}$$

$$\Rightarrow H = 0.785 \times (29.76^2) \times 100$$

$$P: \text{فشار طراحی} = 100 \text{ psi}$$

$$= 69524$$



حالت ۱: H_p رای لبه کنیم - آخرین بازمانده برکی می لبه W_{m1} 😊

$$H_p = \text{total joint-contact surface compression load} \\ = 2b \times 3.14 GmP$$

نیروی فکری سطح تماس گسست

$$b = 0.31 \text{ مقدار طار قبل}$$

$$G = 29.76$$

$$P = 100$$

$$m = 2.5$$

$$H_p = 2 \times 0.31 \times 3.14 \times 2.5 \times 100 \\ = 486.7$$

حالت دوم: W_{m1} رای لبه کنیم :

$$W_{m1} = H + H_p = 0.785G^2P + [2b \times 3.14GmP] \quad (1)$$

$$H = 69524$$

$$H_p = 486.7$$

$$G = 29.76$$

$$P = 100$$

$$b = 0.31$$

$$m = 2.5$$

$$\Rightarrow W_{m1} = 69524 + 486.7 + 0.785 \times (29.76)^2 \times 100 \\ + (2 \times 0.31 \times 3.14 \times 29.76 \times 2.5 \times 100) \\ = 154019$$

$$\Rightarrow W_{m1} = 154019$$



خوب تائیدی مقدار W_{m1} برای سنجش نیاز بندی بدست آمد

نیاز است W_{m2} برای آب بندی مبلغ را نیز ببینیم

For gasket seating,

$$W = \frac{(A_m + A_b)S_a}{2} \quad (5)$$

برای A_m :

مقدار بند است

A_{m1}

A_{m2}

A_m = total required cross-sectional area of bolts, taken as the greater of A_{m1} and A_{m2}

A_{m1} = total cross-sectional area of bolts at root of thread or section of least diameter under stress, required for the operating conditions

$$= \frac{W_{m1}}{S_b}$$

A_{m2} = total cross-sectional area of bolts at root of thread or section of least diameter under stress, required for gasket seating

$$= \frac{W_{m2}}{S_a}$$

S_a = allowable bolt stress at atmospheric temperature (see UG-23) $\Rightarrow$

S_b = allowable bolt stress at design temperature (see UG-23)

$S_a =$ See Table 3

Table 3
Section III, 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.
29	1Cr-1/2Mo	Bolting	SA-193	B7M	G41400	...	$\leq 2\frac{1}{2}$
30	1Cr-1/2Mo	Bolting	SA-320	L7M	G41400	...	$\leq 2\frac{1}{2}$



Table 3
Section III, 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.	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900
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

$$\Rightarrow S_a = 20000$$

$$S_b = 20000$$

S_a = allowable bolt stress at atmospheric temperature (see UG-23)

S_b = allowable bolt stress at design temperature (see UG-23)

unthreaded portion, in stress

A_m = total required cross-sectional area of bolts, taken as the greater of A_{m1} and A_{m2}

A_{m1} = total cross-sectional area of bolts at root of thread or section of least diameter under stress, required for the operating conditions

$$= W_{m1} / S_b$$

A_{m2} = total cross-sectional area of bolts at root of thread or section of least diameter under stress, required for gasket seating

$$= W_{m2} / S_a$$

حالت می توان A_{m1} را می بیند

$$A_{m1} = \frac{W_{m1}}{S_b} = \frac{154019}{20000} = 7.7$$

این نیاز است A_{m2} را می بیند

$$A_{m2} = \frac{W_{m2}}{S_b}$$



W_{m2} داریم

که نیاز به S_b



می ب. W_{m2}

حداقل نیروی بولت مورد نیاز برای آب بندی کردن

که به بند $c-2-5$ ارجاعی دهد

and that value shall be used for both flanges.

W_{m2} = minimum required bolt load for gasket seating [see 2-5(c)]. For flange pairs used to contain a tubesheet for a floating head or U-tube type of heat exchanger, or for any other similar design where the flanges or gaskets are not the same, W_{m2} shall be the larger of the values calculated for each flange and that value shall be used for both flanges.

the effective gasket area to be seated. The minimum initial bolt load required for this purpose W_{m2} shall be determined in accordance with eq. (2).

حال این هم بند $c-2-5$ سر

$$W_{m2} = 3.14 b G y \quad (2)$$

قبلاً

$$b = 0.31$$

$$G = 29.76$$

$$y = 10000 \leftarrow \text{برگذاشتن نوع گasket و همین ان سر}$$

ASME BPVC.VIII.1-2019

2-5

Table 2-5.1
Gasket Materials and Contact Facings
Gasket Factors m for Operating Conditions and Minimum Design Seating Stress y

Gasket Material	Gasket Factor m	Min. Design Seating Stress y , psi (MPa)	Facing Sketch and Column in Table 2-5.2
Spiral-wound metal, mineral fiber filled:			
Carbon	2.50	10,000 (69)	 (1a), (1b); Column II
Stainless, Monel, and nickel-base alloys	3.00	10,000 (69)	

$$\Rightarrow W_{m2} = 3.14 b G y = 3.14 \times 0.31 \times 29.76 \times 10000 = 289683$$



حال A_{m2} را بدست آوریم:

threaded position, if less

A_m = total required cross-sectional area of bolts, taken as the greater of A_{m1} and A_{m2}

A_{m1} = total cross-sectional area of bolts at root of thread or section of least diameter under stress, required for the operating conditions

$$= W_{m1} / S_b$$

A_{m2} = total cross-sectional area of bolts at root of thread or section of least diameter under stress, required for gasket seating

$$= W_{m2} / S_a$$

$$\Rightarrow A_{m2} = \frac{W_{m2}}{S_a}$$

$$\Rightarrow A_{m2} = \frac{289683}{20000} = 14.5$$

مخوب مقدار A_m برابر است با مقدار بزرگتر A_{m1} و A_{m2}

$$A_{m1} = 7.7 \Rightarrow A_m = 14.5$$

$$A_{m2} = 14.5$$

با بدست آمدن A_m می توانیم W - نیز لازم بود برای آب بندی را بدست آوریم: برای سطح تخت

(e) Flange Design Bolt Load W . The bolt loads used in the design of the flange shall be the values obtained from eqs. (4) and (5). For operating conditions,

$$W = W_{m1}$$

$$(4) \Rightarrow N = W_{m1} = 154019 \text{ شدنی و فاکتور}$$

For gasket seating,

$$W = \frac{(A_m + A_b) S_a}{2}$$

$$(5) \Rightarrow W = \frac{(A_m + A_b) S_a}{2} \text{ شدنی و فاکتور}$$



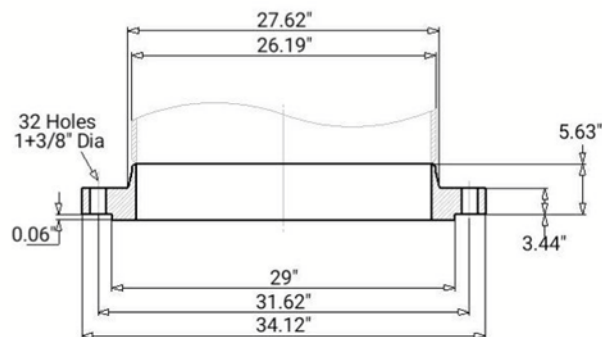
نیاز است A_b را بیابیم

A_b = سطح مقطع بولت

A_b = cross-sectional area of the bolts using the root diameter of the thread or least diameter of un-threaded position, if less

تقریباً ۶ براساس ASME B16.47

20 INCH SERIES 'B' WELDNECK FLANGE 300# RT
Wt = 399.04 lb
S/Bolts & Nuts Wt = 56.00 lb



Bolt Diameter = 1.25"

$$\Rightarrow A_b = \frac{\pi d^2}{4}$$

$$= 1.22 \text{ in}^2$$

StudBolt Size : 1+1/4" UNC (or M33) x 10.50" ASME B16.47-2006

Series 'B' Weldneck Flange

Size	Class
26"	300#

حال می توانیم نیروی لازم برای آب بندی در سوراخ گasket را بدست آوریم:

For gasket seating,

$$W = \frac{(A_m + A_b) S_a}{2} \quad (5) \Rightarrow$$

قبل

$$A_m = 14.5$$

$$A_b = 1.22$$

$$S_a = 20000$$

$$\Rightarrow W_{\text{gasket}} = \frac{(14.5 + 1.22) \times 20000}{2}$$

$$= 157200$$



مخوب از قبل می دانستیم که باید W را برای ردیف خزانها و ردیف گسست سلب کنیم و خطا
بزرگتر املاک قرار دهیم.

بریم به ابتدا و جدول ۴-۵۵

except when the head, cover, or blind flange is attached by bolts causing an edge moment [sketches (j) and (k)] in which case the thickness shall be calculated by

قطر یا دایره h_G باقی می ماند:

$$t = d \sqrt{CP/SE + 1.9Wh_G/SEd^3} \quad (2)$$

$$d = 31.62$$

$$C = 0.9$$

$$S = 20000$$

$$E = 1$$

$$P = 100$$

h_G = gasket moment arm, equal to the radial distance from the centerline of the bolts to the line of the gasket reaction, as shown in Table 2-5.2

دایره h_G : طول بین گسست

$$W = \begin{cases} \text{operation} = 154019 \\ \text{gasket} = 157200 \quad \checkmark \end{cases}$$

برای بدست آوردن طول بین گسست به جدول ۲-۵.۲ مراجعه می کنیم

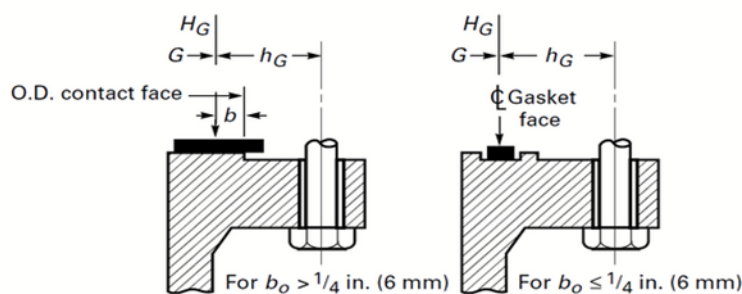
2-6

ASME BPVC.VIII.1-2019

$$b_o = 0.975$$

Table 2-5.2
Effective Gasket Width (Cont'd)

Location of Gasket Load Reaction



نکته ✓

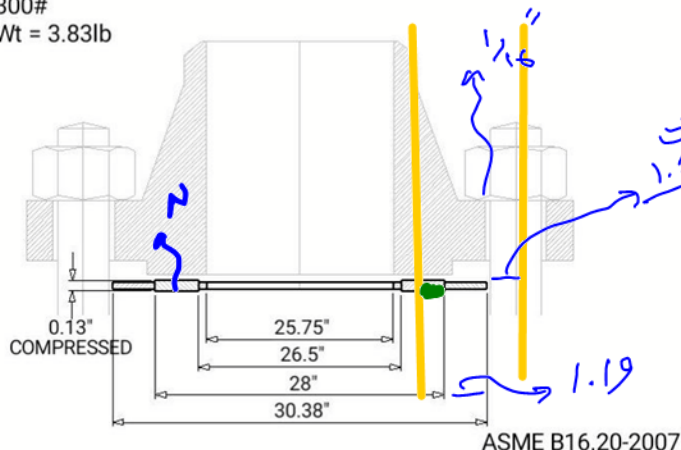


برای سلب h_g نیاز داریم مجدداً به ASME B16.20 برویم:

26"NPS Spiral Wound ASME B16.47 Series B 30

300#

Wt = 3.83lb



ASME B16.20-2007

Spiral Wound ASME B16.47 Series B

Size	Class
26"	300#

h_g : ارتفاع بولت تا مرکز N

$$N = 0.75$$

در ضمن "۱/۸" هم فضای بین بولت و سرخ فلنج هست که البته باید نصف آن را در نظر بگیریم.

$$h_g = \frac{0.75}{2} + 1.19 + \frac{1}{16} + \frac{1.25}{2} = 2.315$$

مقدار t را داریم به دست آمد حال نقطه فزبول $u_6 - 94$ باقی می ماند که باید کنیم

$$t = d \sqrt{CP/SE + 1.9Wh_G/SEd^3} \quad (2)$$

$$d = 31.62$$

$$C = 0.3$$

$$p = 100$$

$$E = 1$$

$$w = 157200$$

$$S = 20000$$

$$h_g = 2.315$$



$$t = d \sqrt{CP/SE + 1.9Wh_G/SEd^3} \quad (2)$$

$$\Rightarrow t = 31.62 \sqrt{\left(\frac{0.3 \times 100}{20000}\right) + \frac{1.9 \times 157200 \times 2.315}{20000 \times 1 \times (31.62)^3}}$$

$$\Rightarrow t = 31.62 \sqrt{10.0015) + .0011}$$

$$\Rightarrow t = 31.62 \sqrt{0.0026} = 1.58''$$

⇒ حداقل ضخامت مورد نیاز ورق ۱.۵۸ می باشد.