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شرکت ملی گاز ایران

مدیریت پژوهش و فنآوری

امورتدوین استانداردها

IGS

مشخصات فنی خرید

فیوز های الکتریکی فشار ضعیف،بخش اول–حفاظت مدار های برقی

Low Voltage Electrical Fuse, Part 1- For Protection the Power Electrical Circuit

دفترمدیرعامل

شرکت ملی گازایران

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ابلاغ مصوبه هیأت مدیره

مدیر محترم پژوهش و فناوری

باسلام،

به استحضار می‌رساند در جلسه ۲۰۴۴ مورخ ۱۴۰۲/۱۱/۰۱ هیات مدیره، نامه شماره ۱۹۲۸۰۱ مورخ ۱۴۰۲/۱۰/۲۵ آن مدیریت درمورد تصویب نهایی مقررات فنی شرکت ملی گاز ایران به شرح زیر مطرح و مورد تصویب قرار گرفت.

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Foreword

This standard specification is intended to be mainly used by N.I.G.C. and contractors, and has been prepared base on interpretation of recognized standards and technical documents, as well as knowledge, backgrounds and experiences in gas industries at national and international levels.

Iranian Gas Specification (IGS) are prepared, reviewed and amended by technical standard committees within NIGC standardization division of research and technology management and submitted to "the standards council of NIGC" for approval.

IGSs are subjected to revision, amendment or withdrawal, if required, and thus the latest edition of IGS shall be checked / inquired by NIGC'S users.

This standard must not be modified or altered by NIGC employees or its contractors. Any deviation or conflicts between this specification and other applicable standards, codes, procedure or well-known manufacturer's specifications must be resolved in writing by the user or its representative through Manager, Engineering Department or standardization division of NIGC.

The technical standard committee welcomes comments and feedbacks from concerned or interested corporate and individuals about this standard, and may revise this document accordingly based on the received feedbacks.

General Definitions

Throughout this standard the following definitions, where applicable, should be followed:

1- "STANDARDIZATION DIV." is organized to deal with all aspects of industry standards in NIGC. Therefore, all enquiries for clarification or amendments are requested to be directed to mentioned division.

2- "COMPANY": refers to National Iranian Gas Company (NIGC).

3- "SUPPLIER": refers to a firm who will supply the service, equipment or material to IGS specification whether as the prime producer or manufacturer or a trading firm.

4- "SHALL ": is used where a provision is mandatory.

5- "SHOULD": is used where a provision is advised only.

6- "MAY": is used where a provision is completely discretionary.

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Contents

Guidance for use of this specification

The amendments/ supplements IEC 60269-1 (2014) low electrical voltage fuse given in this specification are directly equivalent sections or clauses in IEC 60269-1 all other Paragraphs which are not amended by this supplementary shall remain valid as Written. The following annotations, as specified hereunder, have been used at the Beginning of each paragraph to indicate the type of change made to that paragraph of IEC 60269-1.

Sub. (Substitution) "The paragraph in IEC 60269-1 low voltage electrical fuse shall be deleted and replaced by the new paragraph in this supplementary"

Del. (Deletion) "The paragraph in IEC 60269-1 low voltage electrical fuse shall be deleted without any replacement"

Add. (Addition) "The new paragraph with the new number shall be added to the relevant section of IEC 60269-1 low voltage electrical fuse "

Mod. (Modification) "Part of the clause or paragraph in IEC 60269-1 low voltage electrical fuse shall be modified and/or the new description and/or statement shall be added to that clause or paragraph as given in this supplementary".

NOTE: This standard with draws and replaces IGS-M-EL-002

1 SCOPE (Sub.)

This document applies to all projects in NIGC and covers the minimum requirements of low voltage electrical fuses incorporating enclosed current-limiting fuse-links with rated breaking capacities of not less than 6 kA which are used for protecting power-frequency AC circuits of nominal voltages not exceeding 1 000 V or DC circuits of nominal voltages not exceeding 1500 V.

Subsequent parts of this standard, referred to herein, cover supplementary requirements for such fuses intended for specific conditions of use or applications.

Fuse-links intended to be included in fuse-switch combinations according to IEC 60947-3 should also comply with the following requirements.

NOTE 1 For "a" fuse-links, details of performance (see 2.2.4) on d.c. circuits should be subject to agreement between user and manufacturer.

NOTE 2 Modifications of, and supplements to, this standard required for certain types of fuses for particular applications – for example, certain fuses for rolling stock, or fuses for high-frequency circuits – will be covered, if necessary, by separate standards.

NOTE 3 This standard does not apply to miniature fuses, these being covered by IEC 60127.

The object of this standard is to establish the characteristics of fuses or parts of fuses (fuse base, fuse-carrier, fuse-link) in such a way that they can be replaced by other fuses or parts of fuses having the same characteristics provided that they are interchangeable as far as their dimensions are concerned. For this purpose, this standard refers in particular to the following characteristics of fuses:

- their rated values;
- their insulation;
- their temperature rise in normal service;
- their power dissipation and acceptable power dissipation;
- their time/current characteristics;
- their breaking capacity;
- their cut-off current characteristics and their *I2t*characteristics.
- type test for verification of the characteristics of fuses;
- the marking of fuses

2. Reference(s) (Sub.)

IEC 60269-1 (2014) Low voltage electrical fuse for protection the power electrical circuit

3. Test and inspection (Sub.)

1) Fully type tests and routine tests shall be carried out on the fuses according to the requirements of IEC 60269-1, IEC 60269-2, and the relevant IEC publications referred to therein. Type test certificates shall be provided. Type tests shall be performed on the unique type with same design.
2) Components installed within the assembly shall be type and routine tested in accordance with the applicable IEC standards. Certificates obtained from the component manufacturers shall be made available at the request of principal.
3) Purchaser will require the presence of his nominated representative to witness the tests based on IEC requirements as per agreed Quality Control Plan (QCP) and Inspection Test Plan (ITP). The supplier shall inform the date of such tests at least four weeks in advance.
4) Factory Acceptance Test (FAT) shall be carried out in presence of client/purchaser representative(s). The tests shall be carried out either on 100% of the plans or on sample fuses selected by inspectors on random basis. FAT procedure and plan shall be decided upon and finalized by purchaser and manufacturer prior to tests.
   FAT does not relief the manufacturer from its quality and contractual obligations. Manufacturer is obliged to conduct all routine tests according to relevant IEC standards on 100% of the fuses. Routine test reports shall be presented to inspector during FAT as reference.
5) The purchaser's inspectors shall be granted the right for inspection at any stage of manufacture and testing.
6) Certificates shall be available at the quotation stage. Certificates issued/supported by independent testing laboratories are preferred
   The type test certificates and routine test reports for above items shall also be submitted to company by vendor.
   A test report shall be made of the routine tests.

4. Spare parts (Add.)

4.1 Together with the supply of all equipment under this specification, a complete set of spare parts for commissioning shall be supplied for each switchgear. The supplied spare parts shall comply with the same specifications as the original parts and shall be fully interchangeable with the original parts without any modification.

4.2 The vendor shall also supply a list of recommended spare parts for two years of operation

5.Documentation (Add.)

5.1 The vendor shall supply the necessary information with the quotation to enable evaluation of the submitted proposal. General documents/drawings are not acceptable unless they are revised to show the equipment proposed.

The documents to be supplied with the quotation shall at least include the following:

a) Completed enquiry data sheet/s.

b) Summary of exceptions/deviations to this standard specification.

c) Brochures and catalogues containing description of typical switchgear and technical data.

d) Type test certificates

e) List of accessories included in the bid.

f) Preliminary dimensional drawings.

g) Approximate shipping weights and sizes.

6.Shipment (Add.)

6.1 The supplier of the equipment under this specification is the sole responsible for packaging and preparation for shipment.

6.2 The packaging and preparation for shipment shall be adequate to avoid mechanical damage during transport and handling.

6.3 Each shipping section shall be provided with permanently attached identification tag containing necessary information together with the fuse identification number indicated in data sheet Annex F.

6.4 Shipping documents with exact description of equipment for custom release shall be supplied, with the equipment.

6.5 Special precautions may be essential for the protection of insulation during transport, storage and installation, and prior to energizing, to prevent moisture absorption due, for instance, to rain, snow or condensation. Vibrations during

transport should be considered. Appropriate instructions should be given by the manufacturer.

Special packaging should be proposed by the manufacturer for long term storage of parts for maintenance needs according to customer specifications.

7. GUARANTEE (Add.)

7.1 The supplier of the equipment under this specification shall guarantee the equipment and shall replace any damaged equipment/parts resulting from poor workmanship and / or faulty design.

7.2 The supplier shall replace any equipment failed under the following condition:

- Failure under startup and commissioning tests performed according to IEC recommendations.
- Failure under normal usage for a period of 12 months, not exceeding 18 months from the delivery date to company.

Annex F Datasheet (Add.)

Annex F
(informative)

DATA SHEET

F.1 SYSYTEM FUSE A

Type (FUSE Application)		A (NH Fuse System)			
Item	Subject	Requirements		Manufacturer/Supplier Offer	
1	Reference Standards	IEC 60269-1, IEC 60269-2, INSO 3109-1		……	
2	Fuse system	A - Fuse-links having blade contacts		A - Fuse-links having blade contacts	
3	Type	NH		NH	
4	Rated Voltage (Vac)	690 or Higher ☐		….	
5	Rated Voltage (Vdc)	As AC Value		….	
6	Size	Size 000☐, Size 00☐, Size 0☐, Size 1☐, Size 2☐, Size 3☐, Size 4☐, Size 4a☐		….	
7	Rated Current (A)	2☐, 4☐, 6☐, 8☐, 10☐, 12☐, 16☐, 20☐, 25☐, 32☐, 35☐, 40☐, 50☐, 63☐, 80☐, 100☐, 125☐, 160☐, 200☐, 250☐, 315☐, 400☐, 500☐, 630☐, 800☐, 1000☐, 1250☐		….	
8	Kind of Current & Rated Frequency (Hz)	50☐, 60☐ , …..(value between 45 to 62 Hz)		….	
9	Rated Acceptable Power Dissipation (w)	6☐, 6.5☐, 7☐, 7.5☐, 9☐, 10☐, 11☐, 12☐, 13☐, 16☐, 18☐, 22☐, 23☐, 25☐, 28☐, 32☐, 34☐, 35☐, 40☐, 48☐, 50☐, 53☐, 60☐, 80☐, 90☐, 110☐		Rated Power Dissipation (w)	……
10	Number of Poles	1☐, 2☐, 3☐, 4☐		….	
11	Breaking range	First Letter	g☐, a☐	First Letter	g☐, a☐

Fuse Holders

		(Operation class)	Second Letter	G☐, M☐	Second Letter	G☐, M☐
12		Degree Of protection	…. (At least IP2X)		….	
13		Peak Withstand Current	….		….	
14	Fuse Links	Rated voltage (Vac)	400☐, 500☐, 690☐		…..	
15		Rated voltage (Vdc)	250☐, 440☐		….	
16		Size	Size 000☐, Size 00☐, Size 0☐, Size 1☐, Size 2☐, Size 3☐, Size 4☐, Size 4a☐		….	
17		Rated Current (A)	2☐, 4☐, 6☐, 8☐, 10☐, 12☐, 16☐, 20☐, 25☐, 32☐, 35☐, 40☐, 50☐, 63☐, 80☐, 100☐, 125☐, 160☐, 200☐, 250☐, 315☐, 400☐, 500☐, 630☐, 800☐, 1000☐, 1250☐		….	
18		Minimum rated breaking Capacity (KA)	≤ 690 V ac	50 kA	….	
19			≤ 750 V dc	25 kA		
20		Kind of Current and Rated Frequency (Hz)	50☐, 60☐, …. (value between 45 to 62 Hz)		….	

21		Maximum Allowable Power Dissipation (w)	6☐, 6.5☐, 7☐, 7.5☐, 9☐, 10☐, 11☐, 12☐, 13☐, 16☐, 18☐, 22☐, 23☐, 25☐, 28☐, 32☐, 34☐, 35☐, 40☐, 45☐, 48☐, 50☐, 53☐, 60☐, 80☐, 90☐, 110☐		Rated Power Dissipation (w)	…….
22		Maximum Pre-Arcing I^2t Values	I^2t_{min} (10^3*(A^2s))		I^2t_{min} (10^3*(A^2s))	
23			I^2t_{max} (10^3*(A^2s))		I^2t_{max} (10^3*(A^2s))	
24		Resistance to climate	- ….°C to +….°C at ….% relative humidity		- ….°C to +….°C at ….% relative humidity	
25		Accessory	STRICKER, OTHER……..			
26		Manufacture, brand, part no.				
27		Ambient Temperature (‘C)	Min= ……., Max= …….			
28		Degree Of protection	…….(At least IP2X)			
29		Packing and Packaging				
30		Documents (Figures & Diagrams)				
31		Approvals (Tests & Certificates)				
32		Time-Current Characteristics figure				
33		Altitude (m)				
34		Humidity (%)				

35	**Guaranty and Warranty**		

F.2 SYSTEM FUSE B

Type(FUSE Application)			B (NH Fuse System)			
Item		Subject	Requirements		Manufacturer/Supplier Offer	
1		Reference Standards	IEC 60269-1, IEC 60269-2, INSO 3109-1		……	
2		Fuse system	B – Fuse with striker fuse links with blade contacts		B – Fuse with striker fuse links with blade contacts	
3		Type	NH		NH	
4	Fuse Holders	Rated Voltage (Vac)	690 or Higher ☐		….	
5		Rated Voltage (Vdc)	Same As AC Value		….	
6		Size	Size 00☐, Size 0☐, Size 1☐, Size 2☐, Size 3☐, Size 4☐, Size 4a☐		….	
7		Rated Current (A)	2☐, 4☐, 6☐, 8☐, 10☐, 12☐, 16☐, 20☐, 25☐, 32☐, 35☐, 40☐, 50☐, 63☐, 80☐, 100☐, 125☐, 160☐, 200☐, 250☐, 315☐, 400☐, 500☐, 630☐, 800☐, 1000☐, 1250☐		….	
8		Kind of Current & Rated Frequency (Hz)	50☐, 60☐ , …. (value between 45 to 62 Hz)		….	
9		Rated Acceptable Power Dissipation (w)	12☐, 25☐, 32☐, 34☐, 45☐, 60☐, 90☐, 110☐		Rated Power Dissipation (w)	…….
10		Number of Poles	1☐, 2☐, 3☐, 4☐		1☐, 2☐, 3☐, 4☐	
11		Breaking range (Operation class)	First Letter	g☐, a☐	First Letter	g☐, a☐
12			Second Letter	G☐, M☐	Second Letter	G☐, M☐
13		Degree Of protection	…. (At least IP2X)		….	

14		Peak Withstand Current	……		….	
15	Fuse Links	Rated voltage (Vac)	400☐, 500☐, 690☐		….	
16		Rated voltage (Vdc)	250☐, 440☐		….	
17		Size	Size 000☐, Size 00☐, Size 0☐, Size 1☐, Size 2☐, Size 3☐, Size 4☐, Size 4a☐		….	
18		Rated Current (A)	2☐, 4☐, 6☐, 8☐, 10☐, 12☐, 16☐, 20☐, 25☐, 32☐, 35☐, 40☐, 50☐, 63☐, 80☐, 100☐, 125☐, 160☐, 200☐, 250☐, 315☐, 400☐, 500☐, 630☐, 800☐, 1000☐, 1250☐		….	
19		Minimum rated breaking Capacity (kA)	≤ 690 V ac	50 kA	….	
20			≤ 750 V dc	25 kA		
21		Kind of Current and Rated Frequency (Hz)	50☐, 60☐, …. (value between 45 to 62 Hz)		….	
22		Maximum Allowable Power Dissipation (w)	6☐, 6.5☐, 7☐, 7.5☐, 9☐, 10☐, 11☐, 12☐, 13☐, 16☐, 18☐, 22☐, 23☐, 25☐, 28☐, 32☐, 34☐, 35☐, 40☐, 45☐, 48☐, 50☐, 53☐, 60☐, 80☐, 90☐, 110☐		Rated Power Dissipation (w)	…….
23		Maximum Pre-Arcing I^2t Values	I^2t_{min} $(10^3*(A^2s))$		I^2t_{min} $(10^3*(A^2s))$	
			I^2t_{max} $(10^3*(A^2s))$		I^2t_{max} $(10^3*(A^2s))$	
24		Resistance to climate	- ….°C to +….°C at ….% relative humidity		- ….°C to +….°C at ….% relative humidity	
25		Accessory	Stricker ☐, Other……..			

26	Manufacture, brand, part no.		
27	Ambient Temperature	Min= ……., Max= …….	
28	Degree Of protection	…….(At least IP2X)	
29	Packing and Packaging		
30	Documents (Figures & Diagrams)		
31	Approvals (Tests & Certificates)		
32	Time-Current Characteristics		
33	Altitude (m)		
34	Humidity (%)		
35	Guaranty and Warranty		

F.3 System Fuse C

Type (Fuse Application)		C (NH Fuse System)	
Item	Subject	Requirements	Manufacturer/Supplier Offer
1	Reference Standards	IEC 60269-1, IEC 60269-2, INSO 3109-1	……
2	Fuse system	Fuse-rails	Fuse-rails
3	Type	NH	NH
4 (Fuse rail)	Fuse rail Size	00☐, 0☐, 1☐, 2☐, 3☐	….
5 (Fuse rail)	Design	Reference A☐, Reference B☐, Reference C☐	….

6		Rated Voltage (Vac)	400☐, 500☐, 690☐	....
7		Rated Voltage (Vdc)	250☐, 440☐	....
8		Kind of Current and Rated Frequency (Hz)	50☐, 60☐ , ..(value between 45 to 62 Hz)	....
9		Rated current per phase of fuse rail (A)	160☐, 250☐, 400☐, 630☐	....
10		Cross-sectional area ranges (mm^2) Cu☐, Al☐	6 to 70☐, 25 to120☐, 50 to 240☐, 25 to 95☐, 35 to 150☐, 70 to 300☐	....
11		Rated power dissipation, Pn (w)	12☐, 32☐, 45☐, 60☐	....
12		Rated impulse withstand voltage	Overvoltage category III with pollution degree 3	....
13		Minimum rated breaking capacity (KA)	50☐	....
14		Resistance to climate	- ....°C to +....°C at ....% relative humidity	- ....°C to +....°C at ....% relative humidity
15		Accessory	STRICKER, OTHER….....	
16		Manufacture, brand, part no.		
17		Ambient Temperature	Min= ……., Max= …….	
18		Degree Of protection	…….(At least IP2X)	
19		Packing and Packaging		

20	**Documents (Figures & Diagrams)**		
21	**Approvals (Tests & Certificates)**		
22	**Time-Current Charactristic**		
23	**Altitude (m)**		
24	**Humidity (%)**		
25	**Guaranty and Warranty**		

F.4 System fuse D

Type (FUSE Application)			D (NH Fuse System)	
Item	Subject		Requirements	Manufacturer/Supplier Offer
1	Reference Standards		IEC 60269-1, IEC 60269-2, INSO 3109-1	……
2	Fuse system		D - Fuse-bases for busbar mounting (40 mm System)	Fuse-bases for busbar mounting (40 mm System)
3	Type		NH	NH
4	Fuse Base for bus bar mounting	Number of Poles	1☐, 3☐, 2*3☐	….
5		Fuse Base Size	00☐	….
6		Rated Voltage (Vac)	400☐, 500☐, 690☐	….
7		Rated Voltage (Vdc)	250☐, 440☐	….
8		Kind of Current and Rated Frequency (Hz)	50☐, 60☐, ….(value between 45 to 62 Hz)	….
9		Rated current of tandem fuse-base for each outlet(A)	63☐, 80☐, 100☐, 125☐, 160☐ 2x63☐, 2x80☐, 2x100☐, 2x125☐, 2x160☐	….
10		Cross-sectional area ranges (mm^2) Cu☐, Al☐	2.5 to 25☐, Other: …	….
11		Rated power dissipation per outlet, Pn (w)	7.5☐	….
12		Minimum rated breaking capacity (KA)	50☐, 25☐	….
13		Resistance to climate	- ….°C to +….°C at ….% relative humidity	- ….°C to +….°C at ….% relative humidity

14	Accessory	……	
15	Manufacture, brand, part no.		
16	Ambient Temperature	Min= ……., Max= ……	
17	Degree Of protection	…….(At least IP2X)	
18	Packing and Packaging		
19	Documents (Figures & Diagrams)		
20	Approvals (Tests & Certificates)		
21	Time-Current Characteristics		
22	Altitude (m)		
23	Humidity (%)		
24	Guaranty and Warranty		

F.5 System fuse E

Type (Fuse application)			E (BS Bolted Fuse System)			
Item	Subject		Requirements		Manufacturer/Supplier Offer	
1	Reference Standards		IEC 60269-1, IEC 60269-2, INSO 3109-1		....	
2	Fuse system		E – Fuses with Fuse Links for Bolted Connections			
3	Type		BS			
4	Fuse Base	Rated Voltage (Vac)	500☐, 690☐ 400☐,		....	
5		Rated Voltage (Vdc)	500☐, 250☐,400☐,		....	
6		Size	Size A1 ☐, Size A2 ☐, Size A3 ☐, Size A4 ☐ Size B1 + B2 ☐		....	
7		Rated Current	2☐, 4☐, 6☐, 8☐, 10☐, 12☐, 16☐, 20☐, 25☐, 32☐, 35☐, 40☐, 50☐, 63☐, 80☐, 100☐, 125☐, 160☐, 200☐		....	
8		Kind of Current & Rated Frequency	50☐, 60☐ , ...(value between 45 to 62 Hz)		....	
9		Maximum Allowable Power Dissipation (w)	2.7☐, 4.4☐, 6.9☐, 9.1☐, 17☐		Rated Power Dissipation (w)	.....
10		Number of Poles	1☐, 2☐, 3☐, 4☐			
11		Breaking rang (Operation class)	First Letter	g☐, a☐	.....	
12			Second Letter	G☐, M☐		

13	Fuse Links	Rated Voltage (Vac)	400☐, 500☐, 690☐			
14		Rated Voltage (Vdc)	00☐5250☐, 400☐			
15		Size	Size A1 ☐, Size A2 ☐, Size A3 ☐, Size A4 ☐ Size B1 ☐, Size B2 ☐, Size B3 ☐, Size B4 ☐ Size C1 ☐, Size C2 ☐, Size C3 ☐ Size D1 ☐			
16		Rated Current (A)	2☐, 4☐, 6☐, 8☐, 10☐, 12☐, 16☐, 20☐, 25☐, 32☐, 35☐, 40☐, 50☐, 63☐, 80☐, 100☐, 125☐, 160☐, 200☐			
17		Minimum rated breaking Capacity (KA)	≤ 690 V ac	At least 80 kA	…….	
18			≤ 750 V dc	At least 40 kA		
19		Kind of Current and Rated Frequency (Hz)	50☐, 60☐ , …..(value between 45 to 62 Hz)			
20		Maximum Allowable Power Dissipation (w)	2.7☐, 4.4☐, 6.9☐, 9.1☐, 17☐, 32☐, 40☐, 55☐, 70☐, 100☐		Rated Power Dissipation (w)	…….
21	Breaking Test Report					
22	Accessory					
23	Manufacture, brand, part no.					
24	Packing and Packaging					
25	Test Approvals and Reports					

26	Time-Current Characteristics Figure	Shall be presented by vendor	
27	Resistance to climate	- ….°C to +….°C at ….% relative humidity	- ….°C to +….°C at ….% relative humidity
28	Ambient Temperature (ʻC)	Min= ……., Max= …….	
29	Altitude (m)		
30	Humidity (%)		
31	Guaranty and Warranty		

F.6 Fuse System F

FUSE Application(Type			F (NF Cylindrical Fuse System)	
item	Subject		Requirements	Manufacturer/Supplier Offer
1	Reference Standards		IEC 60269-1, IEC 60269-2, INSO 3109-1	
2	Fuse System		F - Fuse with Fuse Links Having Cylindrical Contact Caps	
3	Type		NF	
4	Fuse Base	Rated Voltage (Vac)	500☐, 690☐, 1000☐ 400☐,	….
5		Rated Voltage (Vdc)	500☐, 1500☐ 400☐, 250☐,	….
6		Size(mm)	8*32☐, 10*38 ☐, 14*51 ☐, 22*58 ☐ , Other….	….

7		Rated Current(A)	2☐, 4☐, 6☐, 8☐, 10☐, 12☐, 16☐, 20☐, 25☐, 32☐, 35☐, 40☐, 50☐, 63☐, 80☐, 100☐		....	
8		Kind of Current & Rated Frequency(Hz)	50☐, 60☐ , ...(value between 45 to 62 Hz)		....	
9		Rated Acceptable Power Dissipation (w)	2.5☐, 3☐, 5☐, 9.5☐		Rated Power Dissipation (w)	.....
10		Number of Poles	1☐, 2☐, 3☐, 4☐		.....	
11		Breaking range	First Letter	g☐, a☐	.....	
12		(Operation class)	Second Letter	G☐, M☐		
13	Fuse Links	Rated Voltage (Vac)	400☐, 500☐, 690☐, 1000☐		....	
14		Rated Voltage (Vdc)	250☐, 400☐, 500☐, 1500☐		....	
15		Size	8*32 ☐, 10*38 ☐, 14*51 ☐, 22*58 ☐, Other		....	
16		Rated Current (A)	2☐, 4☐, 6☐, 8☐, 10☐, 12☐, 16☐, 20☐, 25☐, 32☐, 35☐, 40☐, 50☐, 63☐, 80☐, 100☐		....	
17		Minimum rated breaking Capacity (KA)	≤ 500 Vac	100 kA	.....	
18			500 Vac ≤ Un ≤ 690 Vac	50 kA		
19			≤ 750 V dc	25KA		

20		Kind of Current and Rated Frequency (Hz)	50☐, 60☐ , ...(value between 45 to 62 Hz)		.....	
21		Maximum Allowable Power Dissipation (w)	0.6☐, 0.8☐, 1☐, 1.2☐, 1.3☐, 2☐, 2.3☐, 2.5☐, 2.8☐, 2.9☐ 3☐, 4.6☐, 5☐, 5.3☐, 6.8☐, 7.3☐, 8.5☐, 9.5☐		Rated Power Dissipation(w)	.....
22		Maximum Pre-Arcing I^2t Values	I^2t_{min} $(10^3*(A^2s))$		I^2t_{min} $(10^3*(A^2s))$	
23			I^2t_{max} $(10^3*(A^2s))$		I^2t_{max} $(10^3*(A^2s))$	
24	Accessory		Striker☐			
25	Manufacture, brand, part no.					
26	Ambient Temperature (°C)		Min= ....., Max=			
27	Degree Of protection		.....(At least IP2X)			
28	Packing and Packaging					
29	Documents (Figures & Diagrams)					
30	Approvals (Tests & Certificates)					
31	Time Current Characteristics Diagram					
32	Altitude (m)					
33	Humidity (%)					
34	Resistance to climate		....°C to +....°C at ....% relative humidity		....°C to +....°C at ....% relative humidity	
35	Guaranty and Warranty					

F.7 System Fuse G

FUSE Application(Type			G (BS Clip in Fuse System)		
Item	Subject		Requirements		Manufacturer/Supplier Offer
1	Reference Standards		IEC 60269-1, IEC 60269-2		
2	Fuse System		G - Fuse with Fuse Links with Offset Blade Contacts		
3	Type		BS		
4	Fuse Holders	Rated Voltage (Vac)	Size E1	230□	....
5			Size F1, F2, F3	400□	
6		Rated Current	Size E1	2□, 4□, 6□, 8□, 10□, 12□, 16□, 20□	....
7			Size F1	2□, 4□, 6□, 8□, 10□, 12□, 16□, 20□, 25□, 32□	
8			Size F2	2□, 4□, 6□, 8□, 10□, 12□, 16□, 20□, 25□, 32□, 35□, 40□, 50□, 63□	
9			Size F3	2□, 4□, 6□, 8□, 10□, 12□, 16□, 20□, 25□, 32□, 35□, 40□, 50□, 63□, 80□, 100□, 125□, 160□, 200□, 250□, 315□, 400□, 500□, 630□, 800□, 1000□, 1250□	
10		Kind of Current & Rated Frequency			
11		Rated Acceptable Power Dissipation			
12		Dimension or Size			

13		Number of Poles				
14		Peak Withstand Current				
15	Fuse Links	Rated Voltage (V ac)	Size E1	230☐		....
16			Size F1, F2, F3	400☐		
17		Rated Current (A)	Size E1	2☐, 4☐, 6☐, 8☐, 10☐, 12☐, 16☐, 20☐		....
18			Size F1	2☐, 4☐, 6☐, 8☐, 10☐, 12☐, 16☐, 20☐, 25☐, 32☐		
19			Size F2	2☐, 4☐, 6☐, 8☐, 10☐, 12☐, 16☐, 20☐, 25☐, 32☐, 35☐, 40☐, 50☐, 63☐		
20			Size F3	2☐, 4☐, 6☐, 8☐, 10☐, 12☐, 16☐, 20☐, 25☐, 32☐, 35☐, 40☐, 50☐, 63☐, 80☐, 100☐, 125☐, 160☐, 200☐, 250☐, 315☐, 400☐, 500☐, 630☐, 800☐, 1000☐, 1250☐		
21		Kind of Current and Rated Frequency (Hz)	50☐, 60☐ , ...(value between 45 to 62 Hz)			....
22		Rated Power Dissipation (w)	Maximum Allowable Power Dissipation (w)	Size E1	1.8☐	Rated Power Dissipation (w) .....
				Size F1	3.2☐	
				Size F2	4.8☐	
				Size F3	7.5☐	
23		Breaking Range	First Letter		g☐, a☐	.....
			Second Letter		G☐, D☐, M☐, N☐	
24		Rated Breaking Capacity (kA)	Size E1 ☐		50	.....
			Size F1 ☐		80	.....
			Size F2 ☐		80	.....

			Size F3 ☐	80	……
25		Cut-off Current Characteristics			
26		I^2t Characteristics			
27		Dimension or Size			
28	Dimensions (mm)		….		
29	Accessory		….		
30	Manufacture, brand, part no.				….
31	Ambient Temperature (‘C)		Min= ……., Max= …….		
32	Degree Of protection		…….(At least IP2X)		
33	Packing and Packaging				
34	Documents (Figures & Diagrams)				
35	Approvals (Tests & Certificates)				
36	Time-Current Characteristics Figure				
37	Altitude (m)				
38	Humidity (%)				
39	Guaranty and Warranty				

F.8 System Fuse H

Type(FUSE Application)			H (Class J, Class T, and class L Time Delay and Non Time Delay Fuse Types)			
item	Subject		Requirements			Manufacturer/Supplier Offer
1	Reference Standards		IEC 60269-1, IEC 60269-2, INSO 3109-1			
2	Fuse System		H - Fuse with Fuse Links having “gD” and “gN” characteristics			
3	Type		Class J, Class T, and class L Time Delay and Non Time Delay Fuse Types			
4	Fuse Holder	Rated Voltage (Vac)	600			....
5		Size(mm)	J		a=……, b=……, c=……, d=……,e=…… f=……,g=……, h=……, i= ….	....
6			L		a=……, b=……, c=…….	
7			T		a=……, b=……, c=……, d=……,e=…… f=……,g=……, h=……, i= ….	
8		Rated Current (A)	Class J	A	2☐, 4☐, 6☐, 8☐, 10☐, 12☐, 16☐, 20☐, 25☐, 32☐, 35☐, 40☐, 50☐, 60☐ 5☐, 17.5☐, 35☐	
9				B, C	70☐, 80☐, 100☐, 125☐, 160☐, 200☐, 250☐, 315☐, 400☐, 500☐, 600☐	

					175□, 350□		
10			Class L	C	700□, 800□		
11				D	1000□, 1250□, 2000□ 1200□, 1400□, 1600□		
12				E	2500□, 3000□		
13				F	3500□, 4000□		
14				G	5000□, 6000□		
15			Class T	A	1□, 2□, 4□, 6□, 8□, 10□, 12□, 16□, 20□, 25□, 30□, 32□, 35□, 40□, 50□, 60□, 5□, 17.5□, 35□		
16				B	100□, 125□, 160□, 200□, 250□, 315□, 400□, 500□, 630□, 800□, 1000□ 175□, 350□, 700□, 1200□	....	
17		Rated Frequency(Hz)	50□, 60□ , ...(value between 45 to 62 Hz)			....	
18		Maximum Allowable Power Dissipation (w)	Class J	A	6□, 8□	Rated Power Dissipation (w)	…….
19				B	18□, 25□, 50□, 70□		
20				C	18□, 25□, 50□, 70□		
21			Class L	D	63□, 72□		

22				E	90☐, 108☐, 126☐, 144☐, 180☐		
23				F	213☐, 255☐, 300☐, 340☐		
24				G	425☐, 510☐		
25			Class T	A	8☐, 12☐		
26				B	18☐, 34☐, 64☐, 92☐, 120☐, 180☐		
27		Number of Poles	1☐, 2☐, 3☐, 4☐				
28		Rated breaking capacity (kA)	200 kA☐			…….	
29	Fuse Links	Rated Voltage (Vac)	600☐				
30		Size (mm)[1]	J	a = …, b = …, c = …., d = …., e = …., f = …., g = …., h = ….			
30			L	a = …, b = …, c = …., d = ….			
31			T	a = …, b = …, c = …., d = …., e = …., f = …., g = …., h = …., i = ….			
32		Rated Current (A)	J	A	2☐, 4☐, 6☐, 8☐, 10☐, 12☐, 16☐, 20☐, 25☐, 32☐, 35☐, 40☐, 50☐, 60☐ 5☐, 17.5☐, 35☐	……	

[1] Refer to figure 801, 802, 805 of IEC 60269-2 2016

33				**B**	**70□, 80□, 100□, 125□, 160□, 200□, 250□, 315□, 400□, 500□, 600□** **175□, 350□**	
34			**L**	**C**	**700□, 800□**	
35				**D**	**1000□, 1250□, 2000□** **1200□, 1400□, 1600□**	
36				**E**	**2500□, 3000□**	
37				**F**	**3500□, 4000□**	
38				**G**	**5000□, 6000□**	
39			**T**	**A**	**1□, 2□, 4□, 6□, 8□, 10□, 12□, 16□, 20□, 25□, 30□** **5□, 17.5□**	
40				**B, C**	**35□, 40□, 50□, 60□**	

41				D	70☐, 80☐, 100☐, 125☐, 160☐, 200☐, 250☐, 315☐, 400☐, 500☐, 600☐, 1000☐, 1200☐ 175☐, 350☐	
42		Withstand Current (KA)	200KA☐			…….
43		Maximum Cut of Current (kA)				
44		Kind of Current and Rated Frequency (Hz)	50☐, 60☐ , …..			50☐, 60☐ , …..
45		Maximum Pre-Arcing I^2t Values	I^2t_{min} $(10^3*(A^2s))$			I^2t_{min} $(10^3*(A^2s))$
46			I^2t_{max} $(10^3*(A^2s))$			I^2t_{max} $(10^3*(A^2s))$
		Maximum Allowable Power Dissipation (w)	J	A	6☐, 8☐	….
				B	18☐, 25☐, 50☐, 70☐	
			L	C	63☐, 72☐	
				D	90☐, 108☐, 126☐, 144☐, 180☐	
				E	213☐, 255☐	
47				F	300☐, 340☐	
				G	425☐, 510☐	
			T	A	8☐	

				B	12☐	
				C	12☐	
				D	18☐, 34☐, 64☐, 92☐, 120☐, 180☐	
48	Accessory		Striker☐			
49	Manufacture, brand, part no.					
50	Altitude (m)		……			……
51	Humidity (%)		……			……
52	Ambient Temperature (°C)		Min= ……., Max= …….			Min= ……., Max= …….
53	Degree Of protection		…….(At least IP2X)			
54	Packing and Packaging					
55	Documents (Figures & Diagrams)					
56	Approvals (Tests & Certificates)					
57	Time-Current Characteristic Figure					
58	Resistance to climate		….°C to +….°C at ….% relative humidity			….°C to +….°C at ….% relative humidity
59	Guaranty & Warranty					

F.9 System Fuse I

FUSE Application(Type			I (gU Fuse Links with Wedge Tightening Contacts)	
Item	**Subject**		**Requirements**	**Manufacturer/Supplier Offer**
1	Reference Standards		IEC 60269-1, IEC 60269-2	
2	Fuse System		gU Fuse Links with Wedge Tightening Contacts	
3	Type		gU	
4	Fuse Holders	Rated Voltage (Vac)	400□	....
5		Rated Current (A)	2□, 4□, 6□, 8□, 10□, 12□, 16□, 20□, 25□, 32□, 35□, 40□, 50□, 63□, 80□, 100□, 125□, 160□, 200□, 250□, 315□, 355□, 400□, 500□, 630□,	....
6		Kind of Current & Rated Frequency (Hz)	50□, 60□ , ...(value between 45 to 62 Hz)	
7		Acceptable Power Dissipation (W)		
8		Dimension or Size (mm)		
9		Number of Poles		
10		Peak Withstand Current (A)		
11	Fuse Links	Rated Voltage (V ac)	400□	....

12		Rated Current (A)	2☐, 4☐, 6☐, 8☐, 10☐, 12☐, 16☐, 20☐, 25☐, 32☐, 35☐, 40☐, 50☐, 63☐, 80☐, 100☐, 125☐, 160☐, 200☐, 250☐, 315☐, 355☐, 400☐, 500☐, 630☐,		....	
13		Kind of Current and Rated Frequency (Hz)	50☐, 60☐ , ...(value between 45 to 62 Hz)		....	
14		Power Dissipation (w)	Maximum Allowable Power	10☐, 14☐, 18☐, 22☐, 29☐, 33☐, 38☐, 46☐	Rated Power Dissipation (w)	.....
15		Rated Breaking Capacity (kA)	At least 50 kA	....	.....	
16						
17		Cut-off Current (A)				
18		Maximum Pre-Arcing I^2t Values	I^2t_{min} = ... (10^3*(A^2s))		I^2t_{min} = ... (10^3*(A^2s))	
19			I^2t_{max} = ... (10^3*(A^2s))		I^2t_{max} = ... (10^3*(A^2s))	
10	Dimensions (mm)		....			
12	Accessory		....			
13	Manufacture, brand, part no.				....	
14	Ambient Temperature		Min= ....., Max=			
15	Degree Of protection		.....(At least IP2X)			
16	Packing and Packaging					

17	**Documents (Figures & Diagrams)**		
18	**Approvals (Tests & Certificates)**		
19	**Time-Current Characteristics Figure**		
20	**Altitude (m)**		
21	**Humidity (%)**		
22	**Resistance to Climate**	**….°C to +….°C at ….% relative humidity**	**….°C to +….°C at ….% relative humidity**
23	**Guaranty and Warranty**		

F.10 System fuse J

Type(FUSE Application)			Fuse System J (Fuse with Fuse Links Having "gD Class CC" and "gN Class CC" Characteristics		
item	Subject		Requirements	Manufacturer/Supplier Offer	
1	Reference Standards		IEC 60269-1, IEC 60269-2, INSO 3109-1		
2	Fuse System		J - "gD Class CC", "gN Class CC"		
3	Fuse Type		Class CC Time Delay and Non-Time Delay Fuse Types		
4	Fuse Holder	Rated Voltage (Vac)	600☐	600☐, ...	
5		Size(mm)	a(min)=9.4 ,b(min)=25.65, c(min)=34.26, d(min)=10.29, e(min)=6.35, f(min)=9.4, g(min)=3.05	a=……, b=……., c=……., d=……,e=……. f=……,g=…….	
6		Rated Current (A)	0.5☐,1☐,2☐, 4☐, 5☐, 6☐, 8☐, 10☐, 12☐, 16☐, 17.5☐, 20☐, 25☐, 30☐	….	
7		Rated Frequency(Hz)	50☐, 60☐ , ….(value between 45 to 62 Hz)	50☐, 60☐ , …..	
8		Minimum Tolerable Power Dissipation (w)	8☐, …	Allowable Power Dissipation (W)	………
9		Number of Poles	1☐, 2☐, 3☐, 4☐		
10		Maximum Withstand Current (kA)	200☐	………	
11	Fuse Links	Rated Voltage (Vac)	600☐		

12		Size (mm)	a= 38.10±0.79, b= 10.29±0.13, c= 6.35±0.13, d(min)= 3.05, e(min)= 9.4		a=……, b=……., c=……., d=…….,e=…….	
13		Rated Current (A)	0.5☐,1☐,2☐, 4☐, 6☐, 8☐, 10☐, 12☐, 16☐, 20☐, 25☐, 30☐		0.5☐,1☐,2☐, 4☐, 6☐, 8☐, 10☐, 12☐, 16☐, 20☐, 25☐, 30☐, ……	
14		Minimum rated breaking Capacity (KA)	The rated AC. breaking capacity shall be 200 kA	200KA☐	…….	
15		Kind of Current and Rated Frequency (Hz)	50☐, 60☐ , …..		50☐, 60☐ , …..	
16		Maximum Allowable Power Dissipation (w)	8☐		Rated Power Dissipation(w)	…….
17		Maximum Cut-off Current (kA)	…….		…….	
18		Maximum Pre-Arcing I^2t Values	I^2t_{min} (10^3*(A^2s))	….	I^2t_{min} (10^3*(A^2s))	….
19			I^2t_{max} (10^3*(A^2s))	….	I^2t_{max} (10^3*(A^2s))	….
20	Accessory		Striker☐			
21	Manufacture, brand, part no.					
22	Altitude (m)		……		……	
23	Humidity (%)		……		……	
24	Ambient Temperature (℃)		Min= ……., Max= …….		Min= ……., Max= …….	
25	Degree Of protection		…….(At least IP2X)			
26	Packing and Packaging					

27	**Documents (Figures & Diagrams)**		
28	**Approvals (Tests & Certificates)**		
29	**Time-Current Characteristic Figure**		
30	**Resistance to Climate**	**….°C to +….°C at ….% relative humidity**	**….°C to +….°C at ….% relative humidity**
31	**Guaranty & Warranty**		

F.11 System Fuse K

Type(FUSE Application)			Fuse System K (High Current Fuse Link rating from 1250 A Up to 4800 A)		
item	Subject		Requirements	Manufacturer/Supplier Offer	
1	Reference Standards		IEC 60269-1, IEC 60269-2, INSO 3109-1		
2	Fuse System		K - gK Fuse Links with Blade Contacts for Bolted Connections (High Current Fuse Link rating from 1250 A Up to 4800 A)		
3	Fuse Type		Master Fuse Links		
4	Fuse Holder	Rated Voltage (Vac)	400☐, 500☐, 690☐		
5		Rated Voltage (Vdc)	250☐, 440☐, 500☐		
6		Size(mm)	....	…….	
7		Rated Current (A)	1250☐, 1600☐, 2000☐, 2500☐, 3200☐, 4000☐, 4800☐	....	
8		Rated Frequency(Hz)	50☐, 60☐ , ...(value between 45 to 62 Hz)	50☐, 60☐ , ...	
9		Minimum Tolerable Power Dissipation (w)	100☐, 125☐, 150☐, 190☐, 230☐, 280☐, 330☐	Allowable Power Dissipation (W)	…….
10		Number of Poles	1☐, 2☐, 3☐, 4☐		
11		Maximum Withstand Current (kA)	100kA☐, 160kA☐, 200kA☐	…….	

12	Fuse Links	Rated Voltage (Vac)	400☐, 500☐, 690☐			
13		Rated Voltage (Vdc)	250☐, 440☐, 500☐			
14		Size (mm)	D☐, E☐, F☐, G☐			.....
15		Rated Current (A)	Size D	1250☐, 1600☐		.....
16			Size E	2000☐, 2500☐		
17			Size F	3200☐		
18			Size G	4000☐, 4800☐		
19		Minimum rated breaking Capacity (KA)	The rated AC. breaking capacity shall be 200 kA	100kA☐, 160kA☐, 200kA☐		.....
20		Kind of Current and Rated Frequency (Hz)	50☐, 60☐ , ...			50☐, 60☐ , ...
21		Maximum Allowable Power Dissipation (w)	Size D	100☐, 125☐	Rated Power Dissipation(w)	.....
22			Size E	150☐, 190☐		
23			Size F	230☐		
24			Size G	280☐, 330☐		
25		Maximum Cut-off Current (kA)	.....			.....
26		Maximum Pre-Arcing I^2t Values	I^2t_{min} (10^3*(A^2s))	....	I^2t_{min} (10^3*(A^2s))	....
27			I^2t_{max} (10^3*(A^2s))	....	I^2t_{max} (10^3*(A^2s))	....
28	Accessory		Striker☐			
29	Manufacture, brand, part no.					
30	Altitude (m)		.....			.....

31	**Humidity (%)**	**……..**	**……..**
32	**Ambient Temperature (°C)**	**Min= ……., Max= ……..**	**Min= ……., Max= ……..**
33	**Degree Of protection**	**…….(At least IP2X)**	
34	**Packing and Packaging**		
35	**Documents (Figures & Diagrams)**		
36	**Approvals (Tests & Certificates)**		
37	**Time-Current Characteristic Figure**		
38	**Resistance to Climate**	**….°C to +….°C at ….% relative humidity**	**….°C to +….°C at ….% relative humidity**
39	**Guaranty & Warranty**		