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شرکت ملی گاز ایران
مدیریت پژوهش و فناوری
امور تدوین استانداردها

IGS

مشخصات فنی خرید

فیوزهای الکتریکی فشار ضعیف،
بخش دوم - حفاظت تجهیزات نیمه هادی

Low Voltage Electrical Fuses,
PART2- For Protection the Semiconductor Devices



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شرکت ملی گاز ایران



دفتر مدیرعامل

ابلاغ مصوبه هیأت مدیره

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باسلام،

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سید محمد پیشوایی
دبیر هیأت مدیره

رونوشت: مدیرعامل محترم شرکت ملی گاز ایران و رئیس هیأت مدیره

اعضای محترم هیأت مدیره
مشاور و رئیس دفتر محترم مدیرعامل
سرپرست محترم امور حقوقی
سرپرست محترم حسابرسی داخلی
رئیس محترم امور مجامع

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.

Website: <http://igs.nigc.ir>
E-mail: igs@nigc.ir



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Guidance for use of this specification

The amendments/ supplements IEC 60269-4 (2012) low electrical voltage fuse given in this specification are directly equivalent sections or clauses in IEC 60269-4 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 60269-4.

Sub. (Substitution) "The paragraph in IEC 60269-4 low voltage electrical fuse shall be deleted and replaced by the new paragraph in this supplementary"

Del. (Deletion) "The paragraph in IEC 60269-4 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 60269-4 low voltage electrical fuse "

Mod. (Modification) "Part of the clause or paragraph in IEC 60269-4 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".

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 semiconductor devices for AC circuits of nominal voltages not exceeding 1000 V or DC circuits of nominal voltages not exceeding 1500 V.

NOTE 1 Such fuse-links are commonly referred to as “semiconductor fuse-links”.

NOTE 2 In most cases, a part of the associated equipment serves the purpose of a fuse-base. Owing to the great variety of equipment, no general rules can be given; the suitability of the associated equipment to serve as a fuse base should be subject to agreement between the manufacturer and the user. However, if separate fuse-bases or fuse-holders are used; they should comply with the appropriate requirements of IEC 60269-4.

The object of these supplementary requirements is to establish the characteristics of semiconductor fuse-links in such a way that they can be replaced by other fuse-links having the same characteristics, provided that their dimensions are identical. For this purpose, this standard refers in particular to

a) the following characteristics of fuses:

- 1) their rated values;
- 2) their temperature rises in normal service;
- 3) their power dissipation;
- 4) their time-current characteristics;
- 5) their breaking capacity;
- 6) their cut-off current characteristics and their I²t characteristics;
- 7) their arc voltage characteristics;

b) type tests for verification of the characteristics of fuses;

c) the markings on fuses;

2. Reference(s) (Sub.)

IEC 60269-4 (2012) Supplementary requirements for fuse-links for the protection of semiconductor devices

8. Test and inspection (Sub.)

- 1) Fully type tests and routine tests shall be carried out on the fuses according to the requirements of IEC 60269-4, 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 relieve 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.

9. Spare parts (Add.)

9.1 Together with the supply of all equipment under this specification, a complete set of spare parts for commissioning shall be supplied. 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.

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

10. Documentation (Add.)

10.1 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 fuses 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.

11. Shipment (Add.)

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

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

11.3 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.

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

11.5 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.

12. GUARANTEE (Add.)

12.1 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.

12.2 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(Add)
(informative)

DATA SHEET

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Fuse System A

Fuse for the protection of semiconductor devices

Item	Subject	Client		Vendor		
1	Reference Standards	IEC 60269-1, IEC 60269-4		IEC 60269-1, IEC 60269-4		
2	Fuse system	Single body fuse-links with bolted connections□		Single body fuse-links with bolted connections□		
		Double body fuse-links with bolted connections□		Double body fuse-links with bolted connections□		
		Twin body fuse-links with bolted connections□		Twin body fuse-links with bolted connections□		
3	Conventional time and current	“gR” fuse-links□ “gS” fuse-links □		“gR” fuse-links□ “gS” fuse-links □		
4	Fuse Holders	Rated Voltage (Vac)	690 or Higher □		690 or Higher □	
5		Rated Voltage (Vdc)	690 or Higher □		690 or Higher □....	
6		Size	Size 000□, Size 00□, Size 0□, Size 1□, Size 2□, Size 3□, Size 4□, Size 4a□		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□		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)		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) 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□.....	
10		Number of Poles	1□, 2□, 3□, 4□		....
11	Breaking range (Operation class)	First Letter	g□, a□		First Letter	g□, a□
		Second Letter	R□, S□		Second Letter	R□, S□
12	Degree Of protection	.... (At least IP2X)		....	
13	Peak Withstand Current	....		....
14	Fuse Links	Rated voltage (Vac)	230□, 690□		....
15		Rated voltage (Vdc)	For d.c. and VSI voltage ratings consult the manufacturer		....
16		Size	Size 000□, Size 00□, Size 0□, Size 1□, Size 2□, Size 3□, Size 4□		....
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□, 900□		....

18	Minimum rated breaking Capacity (KA)	AC	50 kA	....
19		DC	8 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	Pre-arcing I ² t characteristic	Shall be provided by manufacturer		
23	**Operating I ² t characteristics	Shall be provided by manufacturer		
24	Arc voltage characteristics	Shall be provided by manufacturer		
25	Resistance to climate	-°C to +....°C at% relative humidity		-°C to +....°C at% relative humidity
26	Accessory	STRICKER, OTHER.....		
27	Manufacture, brand, part no.			
28	Ambient Temperature (°C)	Min=, Max=		
29	Degree Of protection	.....(At least IP2X)		
30	Packing and Packaging			
31	Documents (Figures & Diagrams)			
32	Approvals (Tests & Certificates)			
33	Time-Current Characteristics figure(s)			
34	Altitude (m)			
35	Humidity (%)			
36	Guaranty and Warranty			

Fuse System B

Fuse for the protection of semiconductor devices

Item	Subject	Requirements	Manufacturer/Supplier Offer			
1	Reference Standards	IEC 60269-1, IEC 60269-4	.....		
2	Fuse system	Fuse-links with bolted connections type B - DIN□	.....		
3	Conventional time and current	“gS” fuse-links □ “gR” fuse-links□	.....		
4	Fuse Holders	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 (Operation class)	First Letter	g□, a□	First Letter	g□, a□
			Second Letter	R□, S□	Second Letter	R□, S□
12		Degree Of protection	.... (At least IP2X)		
13	Peak Withstand Current	.... ....			
14	Fuse Links	Rated voltage (Vac)	230□, 690□			
15		Rated voltage (Vdc)	For d.c. and VSI voltage ratings consult the manufacturer			
16		Size	Size 000□, Size 00□,			
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□			
18		Minimum rated breaking Capacity (KA)	AC	50 kA		
19			DC	8 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	Pre-arcing I ² t characteristic	Shall be provided by manufacturer		
	**Operating I ² t characteristics	Shall be provided by manufacturer		
	Arc voltage characteristics	Shall be provided by manufacturer		
23	Resistance to climate	-°C to +....°C at% relative humidity	-°C to +....°C at% relative humidity	
24	Accessory	STRICKER, OTHER.....		
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 figure(s)			
32	Altitude (m)			
33	Humidity (%)			
34	Guaranty and Warranty			

* In addition to the requirements of IEC 60269-1, the manufacturer shall indicate the power dissipation as a function of current for the range 50 % to 100 % of the rated current or for 50 %, 63 %, 80 % and 100 % of the rated current.

** For AC system, the voltage parameters shall include at least 100 %, 50 % and 25 % of rated voltage. For DC system, the voltage parameters shall include at least 100 % and 50 % of rated voltage

Fuse System C

Fuse for the protection of semiconductor devices						
Item	Subject	Requirements		Manufacturer/Supplier Offer		
1	Reference Standards	IEC 60269-1, IEC 60269-4		.....	
2	Fuse system	Fuse-links with bolted connections type C		Fuse-links with bolted connections		
3	Conventional time and current	"gR" fuse-links		"gR" fuse-links		
		"gS" fuse-links		"gS" fuse-links		
4	Fuse Holders	Rated Voltage (Vac)		690 or Higher □		
5		Rated Voltage (Vdc)		As AC Value		
6		Size		.....	
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□		
10		Number of Poles		1□, 2□, 3□, 4□		
11		Breaking range (Operation class)		First Letter	g□, a□	
				Second Letter	G□, M□	
12		Degree Of protection		.... (At least IP2X)	
13	Peak Withstand Current		....		
14	Fuse Links	Rated voltage (Vac)		130/150□, 230/300□, 500□, 700□, 1000□		
15		Rated voltage (Vdc)		For d.c. and VSI voltage ratings consult the manufacturer		
16		Size		According to figure CC.7 of IEC 60269-4		
17		Rated Current (A)		35□, 50□, 65□, 110□, 225□, 400□, 600□, 800□, 1200□,		
18		Minimum rated breaking Capacity (KA)		AC	50 kA	
19				DC	8 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 ² t Values	I ² t _{min} (10 ³ *(A ² s))		I ² t _{min} (10 ³ *(A ² s))	
23		I ² t _{max} (10 ³ *(A ² s))		I ² t _{max} (10 ³ *(A ² s))	
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				