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Low-voltage fuses –

Part 2-1:

**Supplementary requirements for fuses
for use by authorized persons
(fuses mainly for industrial application) –
Sections I to VI: Examples of types of
standardized fuses**

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International Electrotechnical Commission
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

LOW-VOLTAGE FUSES –

Part 2-1: Supplementary requirements for fuses for use by authorized persons (fuses mainly for industrial application) – Sections I to VI: Examples of types of standardized fuses

FOREWORD

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International Standard IEC 60269-2-1 has been prepared by subcommittee 32B: Low-voltage fuses, of IEC technical committee 32: Fuses.

This consolidated version of IEC 60269-2-1 is based on the third edition (1998) [documents 32B/299/FDIS and 32B/304/RVD], its amendment 1 (1999) [documents 32B/337/FDIS and 32B/340/RVD] and its amendment 2 (2002) [documents 32B/388/FDIS and 32B/394/RVD].

It bears the edition number 3.2

A vertical line in the margin shows where the base publication has been modified by amendments 1 and 2.

The committee has decided that the contents of the base publication and its amendments will remain unchanged until 2003-05. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

LOW-VOLTAGE FUSES –

Part 2-1: Supplementary requirements for fuses for use by authorized persons (fuses mainly for industrial application) – Sections I to VI: Examples of types of standardized fuses

EXPLANATORY NOTE

In view of the fact that this standard should be read together with IEC 60269-1 and 60269-2, the numbering of its clauses and subclauses are made to correspond to these publications. Regarding the tables, their numbering also corresponds to that of IEC 60269-1; however, when additional tables appear they are referred to by capital letters, for example, table A, table B, etc.

1 General

Fuses for use by authorized persons according to the following sections shall also comply with all subclauses of:

IEC 60269-1: *Low-voltage fuses – Part 1: General requirements*

IEC 60269-2: *Low-voltage fuses – Part 2: Supplementary requirements for fuses for use by authorized persons (fuses mainly for industrial applications)*

This standard is divided into sections, each dealing with a specific example of standardized fuses for use by authorized persons:

- Section I: Fuses with fuse-links with blade contacts
- Section IA: Fuses with striker fuse-links with blade contacts
- Section IB: Fuse-rails
- Section IC: Fuse-bases for busbar mounting
- Section II: Fuses with fuse-links for bolted connections
- Section III: Fuses with fuse-links having cylindrical contact caps
- Section IV: Fuses with fuse-links with offset blade contacts
- Section V: Fuses with fuse-links having "gD" and "gN" characteristic
- Section VI: gU fuse-links with wedge tightening contacts

Section I – Fuses with fuse-links with blade contacts

1.1 Scope

The following additional requirements apply to fuses with fuse-links having blade contacts intended to be replaced by means of a device, for example replacement handle, which complies with the dimensions specified in figures 1(I*) and 2(I*). Such fuses have rated currents up to and including 1 250 A and rated voltages up to and including AC 690 V or DC 440 V.

5.2 Rated voltage

For a.c., the standard values of rated voltage are 400 V, 500 V and 690 V. For d.c., the rated voltages are 250 V and 440 V. The standard values of d.c. rated voltage are not related to the standard values of a.c. rated voltage. For example the following standard combinations are possible: AC 500 V – DC 250 V, AC 500 V – DC 440 V, AC 500 V, etc.

5.3.1 Rated current of the fuse-link

For each size the maximum rated currents are given in figure 1(I). These values depend upon the utilization categories and rated voltages.

5.3.2 Rated current of the fuse-holder

The rated current for the different sizes of the fuse-bases is given in figure 2(I).

5.5 Rated power dissipation of a fuse-link and rated power acceptance of a fuse-holder

The maximum values of rated power dissipation for the different sizes of fuse-links are specified in figure 1(I). The values apply to the maximum rated currents of the fuse-links. The values of rated power acceptance of fuse-bases are given in figure 2(I).

5.6 Limits of time-current characteristics

5.6.1 Time-current characteristics, time-current zones and overload curves

The tolerance on time-current characteristics given by the manufacturer shall not deviate by more than $\pm 10\%$ in terms of current. The time-current zones given in figure 4(I), including manufacturing tolerances shall be met by all pre-arcing and total times measured at the test voltage according to 8.7.4.

5.6.2 Conventional times and currents

The conventional times and currents, in addition to the values of IEC 60269-1, are given in table II.

* Refers to section I.

Table II – Conventional time and current for "gG" fuse-links with rated current lower than 16 A

Rated current I_n A	Conventional time h	Conventional current	
		I_{nf}	I_f
$I_n \leq 4$	1	$1,5 I_n$	$2,1 I_n$
$4 < I_n < 16$	1	$1,5 I_n$	$1,9 I_n$

5.6.3 Gates

For "gG" fuse-links the gates given in table III apply, in addition to the gates of IEC 60269-1.

Table III – Gates for specified pre-arcing and operating times of "gG" fuse-links with rated current lower than 16 A

I_n A	I_{min} (10 s) A	I_{max} (5 s) A	I_{min} (0,1 s) A	I_{max} (0,1 s) A
2	3,7	9,2	6,0	23,0
4	7,8	18,5	14,0	47,0
6	11,0	28,0	26,0	72,0
8	16,0	35,2	41,6	92,0
10	22,0	46,5	58,0	110,0
12	24,0	55,2	69,6	140,4

6 Marking

Fuse-links and fuse-holders which meet the requirements and tests of section I of this standard may be marked with 60269-2-1.

6.1 Markings of fuse-holders

The marking of the rated current and the rated voltage shall be discernible from the front when a fuse-link has not been fitted.

6.2 Markings of fuse-links

The marking of the rated current and the rated voltage shall be discernible from the front. Furthermore, fuse-links shall be marked as described in the following table:

Characteristic	gG		aM	
Colour of marking	Black		Green	
Kind of print	Strip with inverse print	Normal print	Strip with inverse print	Normal print
Voltage				
400 V ¹⁾	X		X	
500 V		X		X
690 V	X		X	

¹⁾ For 400 V gG, a blue colour is also permitted.

7.1 Mechanical design

The dimensions of fuse-links and fuse-bases are given in figures 1(l) and 2(l).

7.1.2 Connections, including terminals

There are different kinds of terminals. As far as lug terminals are concerned, the range of cross-sections which the terminals shall be capable of accepting results from the following ranges of rated currents of fuse-links of each size.

Terminals designed for unprepared conductors shall be capable of accepting as a minimum three consecutive sizes of conductors within the cross-sectional ranges given in table D. In case the terminal is a lug terminal (see IEC 60999*), the torques which shall be applied are given in table F. Torque values for other terminals should be given in the manufacturers' instructions.

Table D – Minimum cross-sectional ranges of unprepared conductors

Size	Range of the rated currents of the fuse-links A	Cross-sectional area ranges mm ²	
		Copper	Aluminium
00	6 to 160	10 to 70	25 to 95
0*	6 to 160	10 to 70	25 to 95
1	80 to 250	70 to 120	95 to 150
2	125 to 400	95 to 240	120 to 300
3	315 to 630	} No values available	
4	500 to 1 000		
4a	500 to 1 250		

* Not allowed for new installations except for fuse-links with strikers.

Connections of larger and/or smaller cross-sectional area may be necessary. This can be achieved either by the construction of the terminal, or by additional means of connection as recommended by the manufacturer.

Whether the terminals for unprepared conductors are suitable for copper, aluminium or copper and aluminium shall be marked accordingly. Furthermore, the range of cross-sections shall be marked on or near to the clamping saddle, or given in the manufacturer's literature.

7.1.3 Fuse-contacts

The contact surfaces of fuse-links and fuse bases should be silver-plated, otherwise it shall be verified that contacting is not impaired in normal operation. The requirements for fuse contacts will be verified by the tests given in 8.10 of IEC 60269-1.

7.1.7 Construction of a fuse-link

The preferred construction is as follows; the blade contacts shall be made of solid material. If any other construction of blade contacts is used the manufacturer has to demonstrate that this construction is adequate for the purpose.

* IEC 60999 (all parts): *Connecting devices – Safety requirements for screw-type and screwless-type clamping units for electrical copper conductors*