IS 13703-2-1 (1993): Low-voltage fuses for voltages not exceeding 1 000 V AC or 1 500 V DC, Part 2: Fuses for use by authorized persons, Section 1: Supplementary requirements [ETD 39: Fuses]

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IEC Pub 269-2 (1986)
[Superseding IS 9224 (Part 2)]
(Reaffirmed 2004)

भारतीय मानक

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अनुभाग 1 अनुपूरक अपेक्षाएं

Indian Standard

SPECIFICATION FOR LOW-VOLTAGE FUSES FOR VOLTAGES NOT EXCEEDING 1 000 V AC OR 1 500 V DC

PART 2 FUSES FOR USE BY AUTHORIZED PERSONS

Section 1 Supplementary Requirements

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Indian Standard

SPECIFICATION FOR LOW-VOLTAGE FUSES FOR VOLTAGES NOT EXCEEDING 1 000 V AC OR 1 500 V DC

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NATIONAL FOREWORD

This Indian Standard (Part 2/Sec 1), which is identical with IEC Pub 269-2 (1986), issued by the International Electrotechnical Commission is being brought out to align the requirements of fuses for use in industrial application with the corresponding requirements at the IEC level.

This standard shall be read in conjunction with Part 1 and Part 2, Section 2. The other parts in the series cover requirements of semiconductor devices.

The text of the IEC Standard has been considered and approved by ET 39, Fuses Sectional Committee of BIS as suitable for publication as Indian Standard. This Section of Part 2 together with Section 2 supersedes IS 9224 (Part 2).

CROSS REFERENCES

In this Indian Standard, the following International Standards are referred to. Read in their respective place the following:

International Standard (IEC)	*Indian Standard*
269-1 (1986)	Part 1 of this standard
269-2-1 (1987)	Part 2/Sec 2 of this standard

These Indian Standards are identical to the IEC Publications referred to.

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EXPLANATORY NOTE

In view of the fact that this standard should be read together with IEC Publication 269-1: Low-voltage fuses, Part 1: General Requirements, the numbering of its clauses and sub-clauses corresponds to the latter. Regarding the tables, their numbering also corresponds to that of IEC Publication 269-1; 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* shall comply with all the requirements of IEC Publication 269-1, unless otherwise indicated hereinafter, and shall also comply with the supplementary requirements laid down below.

Note. - If fuses that are designed for use by authorized persons are intended to be used by unskilled persons they should also comply with the requirements of IEC Publication 269-3: Low-voltage Fuses. Supplementary Requirements for Fuses for Use by Unskilled Persons (in preparation).

1.1 *Scope*

These supplementary requirements apply to fuses for use by authorized persons.

Fuses for use by authorized persons are generally designed to be used in installations where the fuse-links are accessible to, and may be replaced by, authorized persons only.

1.2 *Object*

The following characteristics of fuses are specified in addition to IEC Publication 269-1:

- minimum rated breaking capacities;
- time-current characteristics;
- I^2t characteristics;
- standard conditions of construction;
- power dissipation and acceptance.

4. Classification

Fuses for use by authorized persons are classified by the fuse-system to which they belong.

Examples of standardized fuses for use by authorized persons are given in IEC Publication 269-2-1: Low-voltage Fuses, Part 2-1: Examples of Types of Standardized Fuses for Use by Authorized Persons (in preparation).

*See IEC Publication 269-1, Sub-clause 2.2.11.

5. Characteristics of fuses

5.3.2 *Rated currents of the fuse-holder*

The rated currents of the fuse-holder for standardized fuses are specified in IEC Publication 269-2-1.

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

The rated power dissipation and rated power acceptance respectively are particular to fuse-systems.

Values for fuse-systems given in IEC Publication 269-2-1 are specified in the data sheets of that publication.

5.6 *Limits of time-current characteristics*

- Time-current characteristics for "gG" and "gM" fuse-links. The standard limits for time-current characteristics based on reference ambient air temperature of 20 °C are given in Tables II and III of IEC Publication 269-1.
- Time-current characteristics for "aM" fuse-links. The standard limits for time-current characteristics based on reference ambient air temperature of 20 °C are given in Table A and Figure 1, page 14. The standardized k-factors are: $k_0 = 1.5$, $k_1 = 4$ and $k_2 = 6.3$.

TABLE A

Gates for "aM" fuse-links (all rated currents)

	4 I_n	6.3 I_n	8 I_n	10 I_n	12.5 I_n	19 I_n
$t_{operating}$	-	60 s	-	-	0.5 s	0.10 s
$t_{pre\text{-}arcing}$	60 s	-	0.5 s	0.2 s	-	-

5.7.2 *Rated breaking capacity*

The minimum rated breaking capacities are specified in Table B.

TABLE B

Minimum rated breaking capacities

Rated voltages U_n	Minimum rated breaking capacities
≤ 660 V a.c.*	50 kA
≤ 750 V d.c.*	25 kA

*Other values above 660 V a.c. and 750 V d.c. are under consideration

6. Marking

In addition to IEC Publication 269-1, the following applies:

6.1 *Markings of the fuse-holders*

- Size.

6.2 *Markings of the fuse-links*

- Size or reference.
- Rated breaking capacities (see IEC Publication 269-1, Sub-clause 5.7.2).

7.2 *Insulating properties*

This requirement is covered by Sub-clause 7.2 of IEC Publication 269-1. The values are at present under consideration.

7.6 *Cut-off current characteristic*

Note. - For the cut-off current characteristic as a function of the actual pre-arcing time, see Appendix C of IEC Publication 269-1.

7.7 *I^2t characteristics*

For "gG" and "gM" fuse-links the limits of the pre-arcing I^2t values are given in IEC Publication 269-1.

Note. - Examples for operating I^2t values may be given in IEC Publication 269-2-1.

The maximum operating I^2t values for "aM" fuse-links are specified in Table C on the test-voltage of $1.1 \times U_n$ and the test No. 2 at the largest rated current of each homogeneous series. (Table XIIA of IEC Publication 269-1.)

TABLE C

Maximum operating I^2t values for "aM" fuse-links

Rated voltage U_n V	I^2t max A^2s
$U_n < 400$	$18\ I_n^2$
$400 \leqslant U_n \leqslant 500$	$24\ I_n^2$
$500 \leqslant U_n \leqslant 660$	$35\ I_n^2$

These values apply for prospective currents corresponding to pre-arcing times less than 0.01 s.

8. **Tests**

8.4.3.3 *Verification of time-current characteristics and gates*

8.4.3.3.2 *Verification of gates*

The following tests may be made at a reduced voltage.

For "aM" fuse-links, additional to the tests in IEC Publication 269-1, the following shall be verified.

a) A fuse-link is subjected to the current of Table A, column 2, for 60 s. It shall not operate.

b) A fuse-link is subjected to the current of Table A, column 3. It shall operate within 5 s.

c) A fuse-link is subjected to the current of Table A, column 5, for 0.2 s. It shall not operate.

d) A fuse-link is subjected to the current of Table A, column 7. It shall operate within 0.10 s.

Note. – Tests *b)* and *c)* may be verified with the breaking capacity tests Nos. 4 and 5, respectively.

8.9.1 *Verification of resistance to heat of the fuse-holder*

Fuse-holders fitted with fuse-links having the maximum power dissipation corresponding to the power acceptance of the fuse-holder shall be cyclically loaded as pre-treatment. The pre-treatment is specified in Sub-clause 8.4.3.2 of IEC Publication 269-1. After cooling to normal temperature the breaking capacity shall be tested at I_1 in accordance with Sub-clause 8.5 of that publication.

Fuse-links containing organic material in the body or filler shall be subjected to the same test as described above. These fuse-links shall interrupt the test currents I_1 and I_5.

Other components are tested in accordance with the subsequent parts.

8.11.1 *Mechanical strength*

8.11.1.1 *Mechanical strength of fuse-holders*

The fuse-holder, fitted with a dummy fuse-link, where specified in IEC Publication 269-2-1 or fitted with a fuse-link of the largest rated current and power dissipation that can be accommodated by the fuse-holder, shall be subjected to a temperature-rise test at rated current.

At the conclusion of the temperature-rise test, the fuse-link or the fuse-carrier as appropriate, shall be withdrawn and inserted into the fuse-base 100 times.

At the conclusion of these tests, all parts shall be intact and shall function normally.

Compliance shall be verified by a further temperature-rise test at rated current at the conclusion of which the values obtained shall be not more than 5 K or 15% (whichever is the greater) above the values obtained from the temperature-rise test prior to the commencement of the mechanical test.

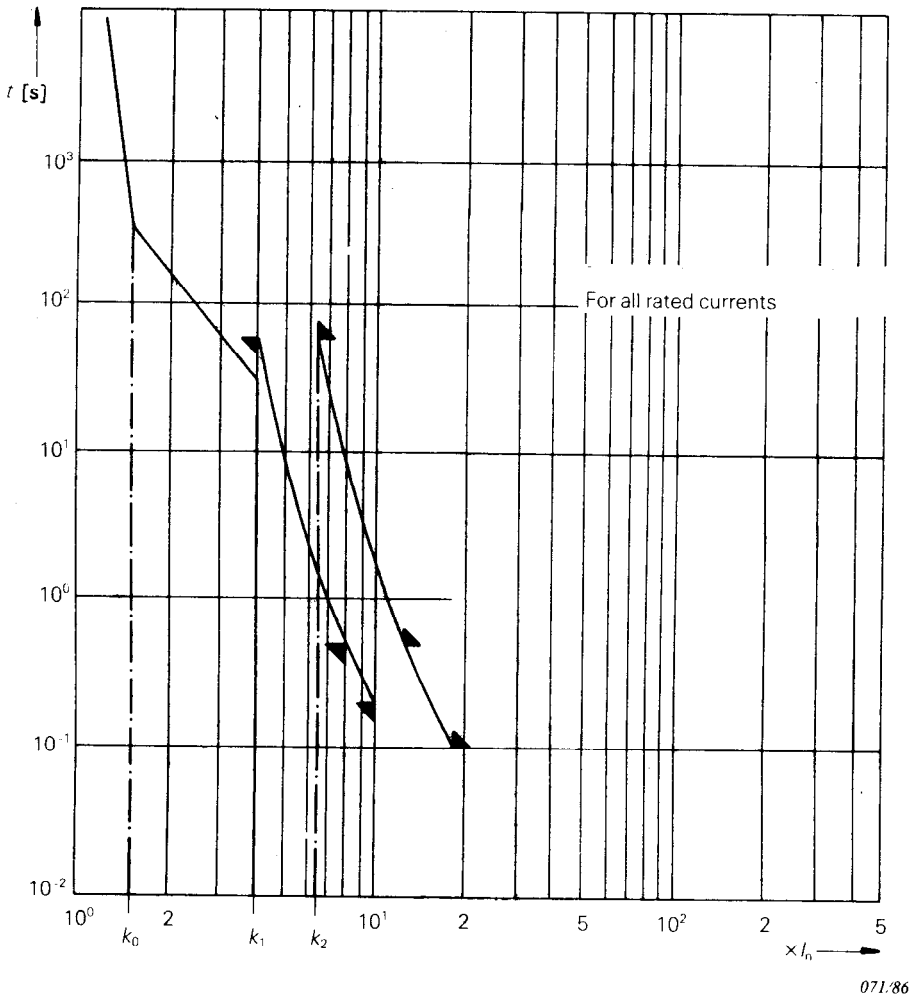

FIG. 1. – Time-current zone "aM"

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