

INTERNATIONAL STANDARD

IEC 60269-1

Edition 3.1
2005-04

Edition 3:1998 consolidated with amendment 1:2005

Low-voltage fuses –

Part 1: General requirements

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IEC 60269-1:1998

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*This **English-language** version is derived from the original **bilingual** publication by leaving out all French-language pages. Missing page numbers correspond to the French-language pages.*



Reference number
IEC 60269-1:1998+A1:2005(E)

Publication numbering

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

LOW-VOLTAGE FUSES –**Part 1: General requirements**

FOREWORD

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

This consolidated version of IEC 60269-1 is based on the third edition (1998) [documents 32B/308/FDIS and 32B/316/RVD], its amendment 1 (2005) [documents 32B/456/FDIS and 32B/460/RVD] and its corrigendum of December 2000.

It bears the edition number 3.1.

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

Annexes A, B, C and D are for information only.

The new edition of IEC 60269: Low-voltage fuses, is divided into the following parts:

- Part 1: General requirements (IEC 60269-1)
- Part 2: Supplementary requirements for fuses for use by authorized persons (fuses mainly for industrial application) (IEC 60269-2)
- Part 2-1: Supplementary requirements for fuses for use by authorized persons (fuses mainly for industrial application) – Sections I to V: Examples of types of standardized fuses (IEC 6029-2-1)
- Part 3: Supplementary requirements for fuses for use by unskilled persons (fuses mainly for household and similar applications) (IEC 60269-3)
- Part 3-1: Supplementary requirements for fuses for use by unskilled persons (fuses mainly for household and similar applications) – Sections I to IV (IEC 60629-3-1)
- Part 4: Supplementary requirements for fuse-links for the protection of semiconductor devices (IEC 60269-4)

The committee has decided that the contents of the base publication and its amendments will remain unchanged until the maintenance result date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

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- withdrawn,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

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LOW-VOLTAGE FUSES –

Part 1: General requirements

1 General

1.1 Scope and object

This standard is applicable to fuses incorporating enclosed current-limiting fuse-links with rated breaking capacities of not less than 6 kA, intended for protecting power-frequency a.c. circuits of nominal voltages not exceeding 1 000 V or d.c. circuits of nominal voltages not exceeding 1 500 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:
 - a) their rated values;
 - b) their insulation;
 - c) their temperature rise in normal service;
 - d) their power dissipation and acceptance;
 - e) their time/current characteristics;
 - f) their breaking capacity;
 - g) their cut-off current characteristics and their I^2t characteristics.
- type test for verification of the characteristics of fuses;
- the marking of fuses.

1.2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60038:1983, *IEC standard voltages*

IEC 60050(411):1984, *International Electrotechnical Vocabulary (IEV) – Chapter 441: Switchgear, controlgear and fuses*

IEC 60127, *Cartridge fuse-links for miniature fuses*

IEC 60269-2:1986, *Low-voltage fuses – Part 2: Supplementary requirements for fuses for use by authorized persons (fuses mainly for industrial application)*

IEC 60364-3:1993, *Electrical installations of buildings – Part 3: Assessment of general characteristics*

IEC 60364-5-52:2001, *Electrical installations of buildings – Part 5-52: Selection and erection of electrical equipment – Wiring systems*

IEC 60417:1973, *Graphical symbols for use on equipment – Index, survey and compilation of the single sheets*

IEC 60529:1989, *Degrees of protection provided by enclosures (Code IP)*

IEC 60584-1:1995, *Thermocouples – Part 1: Reference tables*

IEC 60617 (all parts) [DB]¹, *Graphical symbols for diagrams*

IEC 60664-1:2002, *Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests*

IEC 60695-2-1/0:1994, *Fire hazard testing – Part 2: Test methods – Section 1/sheet 0: Glow-wire test methods – General*

IEC 60695-2-1/1:1994, *Fire hazard testing – Part 2: Test methods – Section 1/sheet 1: Glow-wire end-product test and guidance*

IEC 60695-2-1/2:1994, *Fire hazard testing – Part 2: Test methods – Section 1/sheet 2: Glow-wire flammability test on materials*

IEC 60695-2-1/3:1994, *Fire hazard testing – Part 2: Test methods – Section 1/sheet 3: Glow-wire ignitability test on materials*

IEC 60947-3:1998, *Low-voltage switchgear and controlgear – Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units*

ISO 3:1973, *Preferred numbers – Series of preferred numbers*

ISO 478:1974, *Paper – Untrimmed stock sizes for the ISO-A series – ISO primary range*

ISO 593:1974, *Paper – Untrimmed stock size for the ISO-A series – ISO supplementary range*

ISO 4046:1978, *Paper, board, pulp and related terms – Vocabulary – Bilingual edition*

¹ "DB" refers to the IEC on-line database.

2 Terms and definitions

NOTE For general definitions concerning fuses, see also IEC 60050-441².

For the purposes of this document, the following terms and definitions apply.

2.1 Fuses and their component parts

2.1.1

fuse

device that by the fusing of one or more of its specially designed and proportioned components opens the circuit in which it is inserted by breaking the current when this exceeds a given value for a sufficient time. The fuse comprises all the parts that form the complete device

[IEV 441-18-01]

2.1.2

fuse-holder

combination of the fuse-base with its fuse-carrier

NOTE Where, in this standard the term "fuse-holder" is used, it covers fuse-bases and/or fuse-carriers, if no clearer distinction is necessary.

[IEV 441-18-14]

2.1.2.1

fuse-base (fuse-mount)

fixed part of a fuse provided with contacts and terminals

[IEV 441-18-02]

NOTE Where applicable, covers are considered as part of the fuse-base.

2.1.2.2

fuse-carrier

movable part of a fuse designed to carry a fuse-link

[IEV 441-18-13]

2.1.3

fuse-link

part of a fuse including the fuse-element(s), intended to be replaced after the fuse has operated

[IEV 441-18-09]

2.1.4

fuse-contact

two or more conductive parts designed to ensure circuit continuity between a fuse-link and the corresponding fuse-holder

² IEC 60050-441:1984, *International Electrotechnical Vocabulary – Chapter 441: Switchgear, controlgear and fuses* Amendment 1 (2000)

2.1.5**fuse-element**

part of the fuse-link designed to melt under the action of current exceeding some definite value for a definite period of time

[IEV 441-18-08]

NOTE The fuse-link may comprise several fuse-elements in parallel.

2.1.6**indicating device
(indicator)**

part of a fuse provided to indicate whether the fuse has operated

[IEV 441-18-17]

2.1.7**striker**

mechanical device forming part of a fuse-link which, when the fuse operates, releases the energy required to cause operation of other apparatus or indicators or to provide interlocking

[IEV 441-18-18]

2.1.8**terminal**

conductive part of a fuse provided for electric connection to external circuits

NOTE Terminals may be distinguished according to the kind of circuits for which they are intended (e.g. main terminal, earth terminal, etc.) and also according to their design (e.g. screw terminal, plug terminal, etc.).

2.1.9**dummy fuse-link**

test fuse-link with defined power dissipation and dimensions

2.1.10**test rig**

defined test fuse-base

2.1.11**gauge-piece**

additional part of a fuse-base intended to achieve a degree of non-interchangeability

2.2 General terms**2.2.1****enclosed fuse-link**

fuse-link in which the fuse-element(s) is (are) totally enclosed, so that during operation within its rating it cannot produce any harmful external effects, e.g. due to development of an arc, the release of gas or the ejection of flame or metallic particles

[IEV 441-18-12]

2.2.2**current-limiting fuse-link**

fuse-link that during and by its operation in a specified current range, limits the current to a substantially lower value than the peak value of the prospective current

[IEV 441-18-10]

2.2.3

"g" fuse-link (full-range breaking-capacity fuse-link, formerly general purpose fuse-link) current-limiting fuse-link capable of breaking under specified conditions all currents, which cause melting of the fuse-element up to its rated breaking capacity

2.2.4

"a" fuse-link (partial-range breaking-capacity fuse-link, formerly back-up fuse-link) current-limiting fuse-link capable of breaking under specified conditions all currents between the lowest current indicated on its operating time-current characteristic ($k_2 I_n$ in Figure 2) and its rated breaking capacity

NOTE "a" fuse-links are generally used to provide short-circuit protection. Where protection is required against over-currents less than $k_2 I_n$ in Figure 2, they are used in conjunction with another suitable switching device designed to interrupt such small over-currents.

2.2.5

temperatures

2.2.5.1

ambient air temperature

T_a

temperature of the air surrounding the fuse (at a distance of about 1 m from the fuse or its enclosure, if any)

2.2.5.2

fluid environment temperature

T_e

temperature of the fluid cooling the fuse-components (contact, terminal, etc.). It is the sum of the ambient air temperature T_a and the temperature rise ΔT_e with respect to the ambient temperature of the internal fluid in contact with the fuse-components (contact, terminal, etc.) if the latter is in an enclosure. If it is not in an enclosure, it is assumed that T_e is equal to T_a

2.2.5.3

fuse-component temperature

T

fuse-component (contact, terminal, etc.) temperature T is that of the relevant part

2.2.6

overcurrent discrimination

co-ordination of the relevant characteristics of two or more overcurrent protective devices such that, on the occurrence of overcurrents within stated limits, the device intended to operate within these limits does so, while the other(s) do(es) not

2.2.7

fuse-system

family of fuses following the same physical design principles with respect to the shape of the fuse-links, type of contact, etc.

2.2.8

size

specified set of dimensions of fuses within a fuse-system. Each individual size covers a given range of rated currents for which the specified dimensions of the fuses remain unchanged

2.2.9

homogeneous series of fuse-links

series of fuse-links, within a given size, deviating from each other only in such characteristics that for a given test, the testing of one or a reduced number of particular fuse-links of that series may be taken as representative for all the fuse-links of the homogeneous series

NOTE The characteristics by which the fuse-links of a homogeneous series may deviate and details on which of the fuse-links should be tested are specified in association with the tests concerned (see Tables 7B and 7C).

[IEV 441-18-34, modified]

2.2.10

utilization category (of a fuse link)

combination of specified requirements related to the conditions in which the fuse-link fulfils its purpose, selected to represent a characteristic group of practical applications (see 5.7.1)

2.2.11

fuses for use by authorized persons (formerly called fuses for industrial application)

fuses intended to be used in installations where the fuse-links are accessible to and intended to be replaced by authorized persons only

NOTE 1 Non-interchangeability and protection against accidental contact with live parts need not necessarily be ensured by constructional means.

NOTE 2 Authorized person is understood to have the meaning defined for categories BA 4 "Instructed*" and BA 5 "Skilled**" in IEC 60364-3.

2.2.12

fuses for use by unskilled persons (formerly called fuses for domestic and similar applications)

fuses intended to be used in installations where the fuse-links are accessible to and can be replaced by unskilled persons

NOTE For these fuses protection against direct contact with live parts is recommended and non-interchangeability may be required, if necessary.

2.2.13

non-interchangeability

limitations on shape and/or dimensions with the object of avoiding in a specific fuse-base the inadvertent use of fuse-links having electrical properties other than those ensuring the desired degree of protection

[IEV 441-18-33]

* Instructed: persons adequately advised or supervised by skilled persons to enable them to avoid dangers which electricity may create (operating and maintenance staff).

** Skilled: persons with technical knowledge or sufficient experience to enable them to avoid dangers which electricity may create (engineers and technicians).