

INTERNATIONAL STANDARD

NORME INTERNATIONALE

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

**Fusibles basse tension –
Partie 1: Exigences générales**

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

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

The general re-organization of the IEC 60269 series has led to the creation of this new edition.

This consolidated version of IEC 60269-1 consists of the fourth edition (2006) [documents 32B/483/FDIS and 32B/490/RVD] and its amendment 1 (2009) [documents 32B/534/FDIS and 32B/540/RVD].

The technical content is therefore identical to the base edition and its amendment and has been prepared for user convenience.

It bears the edition number 4.1.

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

IEC 60269 consists of the following parts, under the general title *Low-voltage fuses*:

Part 1: General requirements

NOTE This part includes IEC 60269-1 (third edition, 1998) and parts of IEC 60269-2 (second edition, 1986) and IEC 60269-3 (second edition, 1987).

Part 2: Supplementary requirements for fuses for use by authorized persons (fuses mainly for industrial application) – Examples of standardized systems of fuses A to I

NOTE This part includes parts of IEC 60269-2 (second edition, 1986) and all of IEC 60269-2-1 (fourth edition, 2004).

Part 3: Supplementary requirements for fuses for use by unskilled persons (fuses mainly for household or similar application) – Examples of standardized systems of fuses A to F

NOTE This part includes parts of IEC 60269-3 (second edition, 1987) and all of IEC 60269-3-1 (second edition, 2004).

Part 4: Supplementary requirements for fuse-links for the protection of semiconductor devices

NOTE This part includes IEC 60269-4 (third edition, 1986) and IEC 60269-4-1 (first edition, 2002).

Part 5: Guidance for the application of low-voltage fuses

NOTE Currently IEC/TR 61818 (2003).

For reasons of convenience, when a part of this publication has come from other publications, a remark to this effect has been inserted in the text.

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
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INTRODUCTION

A reorganization of the different parts of the IEC 60269 series has been carried out, in order to simplify its use, especially by the laboratories which test the fuses.

IEC 60269-1, IEC 60269-2, IEC 60269-3 and IEC 60269-3-1 have been integrated into either the new part 1 or the new parts 2 or 3, according to the subjects considered, so that the clauses which deal exclusively with “fuses for authorized persons” are separated from the clauses dealing with “fuses for unauthorized persons”.

As far as IEC 60269-4 and IEC 60269-4-1 are concerned, they have been integrated into the new part 4 which deals with the fuse-links used for semiconductor protection.

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LOW-VOLTAGE FUSES –

Part 1: General requirements

1 General

1.1 Scope and object

This part of IEC 60269 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:

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

IEC 60269-2, *Low-voltage fuses – Part 2: Supplementary requirements for fuses for use by authorized persons (fuses mainly for industrial application) – Examples of standardized systems of fuses A to I)*

IEC 60269-3, *Low-voltage fuses – Part 3: Supplementary requirements for fuses for use by unskilled persons (fuses mainly for household or similar application) – Examples of standardized systems of fuses A to F*

IEC 60269-4, *Low-voltage fuses – Part 4: Supplementary requirements for fuse-links for the protection of semiconductor devices*

IEC 60269-5, *Low-voltage fuses – Part 5: Guidance for the application of low-voltage fuses*

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 system*

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

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

IEC 60617, *Graphical symbols for diagrams*

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

IEC 60695-2-10:2000, *Fire hazard testing – Part 2: Test methods – Section 1/sheet 0: Glow-wire test methods – General*

IEC 60695-2-11:2000, *Fire hazard testing – Part 2: Test methods – Section 1/sheet 1: Glow-wire end-product test and guidance*

IEC 60695-2-12:2000, *Fire hazard testing – Part 2: Test methods – Section 1/sheet 2: Glow-wire flammability test on materials*

IEC 60695-2-13:2000, *Fire hazard testing – Part 2: Test methods – Section 1/sheet 3: Glow-wire ignitability test on materials*

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*

2 Terms and definitions

NOTE For general definitions concerning fuses, see also IEC 60050-441.

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]

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

2.1.5

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 (for example, main terminal, earth terminal, etc.) and also according to their design (for example, 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

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2.1.12**linked fuse-carrier**

a fuse-carrier which is mechanically linked to the fuse-base and gives a defined insertion and withdrawal movement to the fuse-link

[This definition was definition 2.1.12 in IEC 60269-2-1, Section I, which has been withdrawn.]

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, for example, 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 overcurrents.

2.2.5**temperatures****2.2.5.1****ambient air temperature**

T_a

the 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

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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**

coordination 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.