
Visokonapetostne varovalke – 1. del: Tokovno omejlne varovalke (IEC 60282-1:2005)

High-voltage fuses – Part 1: Current-limiting fuses (IEC 60282-1:2005)

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English version

High-voltage fuses
Part 1: Current-limiting fuses
(IEC 60282-1:2005)

Fusibles à haute tension
Partie 1: Fusibles limiteurs de courant
(CEI 60282-1:2005)

Hochspannungssicherungen
Teil 1: Strombegrenzende Sicherungen
(IEC 60282-1:2005)

This European Standard was approved by CENELEC on 2006-03-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of document 32A/235/FDIS, future edition 6 of IEC 60282-1, prepared by SC 32A, High-voltage fuses, of IEC TC 32, Fuses, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60282-1 on 2006-03-01.

This European Standard supersedes EN 60282-1:2002.

The main changes introduced by this EN 60282-1:2006 are as follows:

- definition and dedicated test requirements for so-called "organic fuses";
- definition and requirements for maximum application temperature in order to cover applications in which the fuses are used in surrounding temperatures above 40 °C;
- clarification and improvements for testing fuses that exhibit a cross-over current;
- information about fuses operated in parallel.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2006-12-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2009-03-01

Annex ZA has been added by CENELEC.

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Endorsement notice

The text of the International Standard IEC 60282-1:2005 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60694	NOTE	Harmonized as EN 60694:1996 (not modified).
IEC 60890	NOTE	Harmonized as CLC/TR 60890:1987 (not modified).
IEC 62271-100	NOTE	Harmonized as EN 62271-100:2001 + A1:2002 (not modified).

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

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.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60060-1 + corr. March	1989 1990	High-voltage test techniques Part 1: General definitions and test requirements	HD 588.1 S1	1991
IEC 60071-1	1993	Insulation co-ordination Part 1: Definitions, principles and rules	EN 60071-1 ¹⁾	1995
IEC 60085	2004	Electrical insulation - Thermal classification	EN 60085	2004
IEC 60265-1	1998	High-voltage switches Part 1: Switches for rated voltages above 1 kV and less than 52 kV	EN 60265-1	1998
IEC 60549	1976	High-voltage fuses for the external protection of shunt power capacitors	-	-
IEC 60644	1979	Specification for high-voltage fuse-links for motor circuit applications	EN 60644	1993
IEC 60787	1983	Application guide for the selection of fuse-links of high-voltage fuses for transformer circuit applications	-	-
IEC 62271-105	2002	High-voltage switchgear and controlgear Part 105: Alternating current switch-fuse combinations	EN 62271-105	2003
ISO 148-2	1998	Metallic materials Charpy pendulum impact test Part 2: Verification of test machines	-	-
ISO 179	Series	Plastics - Determination of Charpy impact properties	EN ISO 179	Series

¹⁾ EN 60071-1 is superseded by EN 60071-1:2006, which is based on IEC 60071-1:2006.

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Sixième édition
Sixth edition
2005-11

Fusibles à haute tension –

**Partie 1:
Fusibles limiteurs de courant**

iTeh STANDARD PREVIEW
High-voltage fuses –
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**Part 1:
Current-limiting fuses**

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For price, see current catalogue*

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

HIGH-VOLTAGE FUSES –

Part 1: Current-limiting fuses

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 60282-1 has been prepared by subcommittee 32A: High-voltage fuses, of IEC technical committee 32: Fuses.

This sixth edition cancels and replace the fifth edition published in 2002, and constitutes a technical revision. The content of the corrigendum (August 2002) has been considered for this revision.

The main changes introduced by this new edition are as follows:

- definition and dedicated test requirements for so-called "organic fuses";
- definition and requirements for maximum application temperature in order to cover applications in which the fuses are used in surrounding temperatures above 40 °C;
- clarification and improvements for testing fuses that exhibit a cross-over current;
- information about fuses operated in parallel.

The text of this standard is based on the following documents:

FDIS	Report on voting
32A/235/FDIS	32A/238/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The IEC 60282 series consists of the following parts, under the general title *High-voltage fuses*:

Part 1: Current-limiting fuses

Part 2: Expulsion fuses

The committee has decided that the contents of this publication 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 either be:

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

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HIGH-VOLTAGE FUSES –

Part 1: Current-limiting fuses

1 General

1.1 Scope

This part of IEC 60282 applies to all types of high-voltage current-limiting fuses designed for use outdoors or indoors on alternating current systems of 50 Hz and 60 Hz and of rated voltages exceeding 1 000 V.

Some fuses are provided with fuse-links equipped with an indicating device or a striker. These fuses come within the scope of this standard, but the correct operation of the striker in combination with the tripping mechanism of the switching device is outside the scope of this standard; see IEC 62271-105.

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 60060-1:1989, *High-voltage test techniques – Part 1: General definitions and test requirements*

[SIST EN 60282-1:2006](https://standards.iteh.ai/catalog/standards/sist/62ad2015-e8e1-40ed-bb7d-11d1-4060-802933394121/iec-60060-1-1989)

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IEC 60071-1:1993, *Insulation coordination – Part 1: Definitions, principles and rules*

IEC 60085:2004, *Electrical insulation – Thermal classification*

IEC 60265-1:1998, *High-voltage switches – Part 1: Switches for rated voltages above 1 kV and less than 52 kV*

IEC 60549:1976, *High-voltage fuses for the external protection of shunt power capacitors*

IEC 60644:1979, *Specification for high-voltage fuse-links for motor circuit applications*

IEC 60787:1983, *Application guide for the selection of fuse-links of high-voltage fuses for transformer circuit applications*

IEC 62271-105:2002, *High-voltage switchgear and controlgear – Part 105: Alternating current switch-fuse combinations*

ISO 148-2:1998, *Metallic materials – Charpy pendulum impact test – Part 2: Verification of test machines*

ISO 179 (all parts), *Plastics – Determination of Charpy impact properties*

2 Normal and special service conditions

2.1 Normal service conditions

Fuses complying with this standard are designed to be used under the following conditions.

- a) The maximum ambient air temperature is 40 °C and its mean measured over a period of 24 h does not exceed 35 °C.

The minimum ambient air temperature is –25 °C.

NOTE 1 The time-current characteristics of fuses will be modified at the minimum and maximum temperatures.

- b) The altitude does not exceed 1 000 m (3 300 ft).

NOTE 2 The rated voltages and insulation levels specified in this standard apply to fuses intended for use at altitudes not exceeding 1 000 m (3 300 ft). When fuses incorporating external insulation are required for use at altitudes above 1 000 m (3 300 ft), one or other of the following procedures should be adopted.

- a) The test voltages for insulating parts in air should be determined by multiplying the standard test voltages given in Tables 4 and 5 by the appropriate correction factor given in column (2) of Table 1.
- b) The fuses may be selected with a rated voltage which, when multiplied by the appropriate correction factor given in column (3) of Table 1 is not lower than the highest voltage of the system.

For altitudes between 1 000 m (3 300 ft) and 1 500 m (5 000 ft) and between 1 500 m (5 000 ft) and 3 000 m (10 000 ft), the correction factors can be obtained by linear interpolation between the values in Table 1.

Table 1 – Altitude correction factors – Test voltage and rated voltage

Maximum altitude		Correction factor for test voltages referred to sea-level	Correction factor for rated voltages
m	ft		
(1)		(2)	(3)
1 000	(3 300)	1,0	1,0
1 500	(5 000)	1,05	0,95
3 000	(10 000)	1,25	0,80

Where the dielectric characteristics are identical at any altitude, no special precautions need to be taken.

NOTE 3 The rated current or the temperature rise specified in this standard can be corrected for altitudes exceeding 1000 m (3300 ft) by using the appropriate factors given in Table 2, columns (2) and (3) respectively. Use one correction factor from columns (2) or (3), but not both, for any one application.

For altitudes between 1 000 m (3 300 ft) and 1 500 m (5 000 ft) and between 1 500 m (5 000 ft) and 3 000 m (10 000 ft), the correction factors can be obtained by linear interpolation between the values in Table 2.

Table 2 – Altitude correction factors – Rated current and temperature rise

Maximum altitude		Correction factor for rated current	Correction factor for temperature rise
m	ft		
(1)		(2)	(3)
1 000	(3 300)	1,0	1,0
1 500	(5 000)	0,99	0,98
3 000	(10 000)	0,96	0,92

- c) The ambient air is not excessively (or abnormally) polluted by dust, smoke, corrosive or flammable gases, vapour or salt.

- d) For indoor installations, the conditions of humidity are under consideration but, in the meantime, the following figures can be used as a guide:
- the average value of the relative humidity, measured during a period of 24 h, does not exceed 95 %;
 - the average value of the vapour pressure, for a period of 24 h, does not exceed 22 hPa;
 - the average value of the relative humidity, for a period of one month, does not exceed 90 %;
 - the average value of the water vapour pressure, for a period of one month, does not exceed 18 hPa.

For these conditions, condensation may occasionally occur.

NOTE 4 Condensation can be expected where sudden temperature changes occur in periods of high humidity.

NOTE 5 To withstand the effects of high humidity and occasional condensation, such as breakdown of insulation or corrosion of metallic parts, indoor fuses designed for such conditions and tested accordingly or outdoor fuses may be used.

NOTE 6 Condensation may be prevented by special design of the building or housing, by suitable ventilation and heating of the station or by the use of dehumidifying equipment.

- e) Vibrations due to causes external to fuses or earth tremors are negligible.

In addition, for outdoor installations,

- f) account should be taken of the presence of condensation or rain and rapid temperature changes;
- g) the wind pressure does not exceed 700 Pa (corresponding to 34 m/s wind speed);
- h) the solar radiation does not exceed 1,1 kW/m².

2.2 Other service conditions

Fuse-links intended for use at surrounding temperatures (see 3.3.11) above 40 °C are covered in this standard in Annex E.

2.3 Special service conditions

By agreement between the manufacturer and the user, high-voltage fuses may be used under conditions different from the normal service conditions given in 2.1. For any special service condition, the manufacturer shall be consulted.

2.4 Environmental behaviour

Fuses complying with this standard are inert devices during normal service. It is also a requirement of 5.1.3 that no significant external emission takes place. Therefore, they are regarded as environmentally safe devices in service and operation.

3 Terms and definitions

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

3.1 Electrical characteristics

3.1.1

rated value

value of a quantity used for specification purposes, established for a specified set of operating conditions of a component, device, equipment, or system

[IEV 441-18-35 modified]

NOTE Examples of rated values usually stated for fuses, voltage, current and breaking current.