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High-voltage fuses – Part 1: Current-limiting fuses

Fusibles à haute tension – Partie 1: Fusibles limiteurs de courant

IEC 60282-1:2009-10+AMD1:2014-07 CSV(en-fr)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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HIGH-VOLTAGE FUSES –

Part 1: Current-limiting fuses

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This Consolidated version of IEC 60282-1 bears the edition number 7.1. It consists of the seventh edition (2009-10) [documents 32A/274/FDIS and 32A/277/RVD] and its amendment 1 (2014-07) [documents 32A/311/FDIS and 32A/312/RVD]. The technical content is identical to the base edition and its amendment.

In this Redline version, a vertical line in the margin shows where the technical content is modified by amendment 1. Additions and deletions are displayed in red, with deletions being struck through. A separate Final version with all changes accepted is available in this publication.

This publication has been prepared for user convenience.

International Standard IEC 60282-1 has been prepared by subcommittee 32A: High-voltage fuses, of IEC technical committee 32: Fuses.

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

A list of all parts of IEC 60282 series, under the general title *High-voltage fuses,* can be found on the IEC website.

The committee has decided that the contents of the base publication and its amendment will remain unchanged until the stability 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

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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*

IEC 60071-1:2006, *Insulation co-ordination – Part 1: Definitions, principles and rules*

IEC 60085:2007, *Electrical insulation – Thermal evaluation and designation*

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/TR 60787:2007, *Application guide for the selection of high-voltage current-limiting fuse-links for transformer circuits*

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

IEC TR 62655:2013, *Tutorial and application guide for high-voltage fuses*

ISO 148-2, *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.

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. When fuses incorporating external insulation are required for use at altitudes above 1 000 m, 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 and 1 500 m and between 1 500 m and 3 000 m, 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 m (1)	Correction factor for test voltages referred to sea-level (2)	Correction factor for rated voltages (3)
1 000	1,0	1,0
1 500	1,05	0,95
3 000	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 1 000 m 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 and 1 500 m and between 1 500 m and 3 000 m, 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 m (1)	Correction factor for rated current (2)	Correction factor for temperature rise (3)
1 000	1,0	1,0
1 500	0,99	0,98
3 000	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 guidance:

– 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/m^2.

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 terms and 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

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

[IEV 441-18-35 modified]

3.1.2
rating
set of rated values and operating conditions

[IEV 441-18-36]

3.1.3
prospective current (of a circuit and with respect to a fuse)
current that would flow in the circuit if the fuse were replaced by a conductor of negligible impedance

NOTE For the method to evaluate and to express the prospective current, see 6.6.2.1 and 6.6.2.2.

[IEV 441-17-01, modified]

3.1.4
prospective peak current
peak value of a prospective current during the transient period following initiation

NOTE The definition assumes that the current is made by an ideal switching device, i.e. with instantaneous transition from infinite to zero impedance. For circuits where the current can follow several different paths, for example polyphase circuits, it further assumes that the current is made simultaneously in all poles, even if only the current in one pole is considered.

[IEV 441-17-02]