SLOVENSKI STANDARD
SIST EN 60282-1:2001

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

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

Hochspannungssicherungen -- Teil 1: Strombegrenzende Sicherungen

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

Ta slovenski standard je istoveten z: EN 60282-1:1996

ICS:

29.120.50	Varovalke in druga medtokovna zaġ ita	Fuses and other overcurrent protection devices

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English version

High-voltage fuses
Part 1: Current-limiting fuses
(IEC 282-1:1994)

Fusibles à haute tension
Partie 1: Fusibles limiteurs de courant
(CEI 282-1:1994)

Hochspannungssicherungen
Teil 1: Strombegrenzende Sicherungen
(IEC 282-1:1994)

This European Standard was approved by CENELEC on 1995-11-28. 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, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and 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 the International Standard IEC 282-1:1994, prepared by SC 32A, High-voltage fuses, of IEC TC 32, Fuses, was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 60282-1 on 1995-11-28 without any modification.

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) 1996-11-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 1996-11-01

Anhänge, die als "normativ" bezeichnet sind, gehören zum Norminhalt.
Anhänge, die als "informativ" bezeichnet sind, enthalten nur Informationen.
In dieser Norm sind die Anhänge A, E und ZA normativ und sind die Anhänge B, C, D und F informativ.
Der Anhang ZA wurde von CENELEC hinzugefügt.

Endorsement notice

The text of the International Standard IEC 282-1:1994 was approved by CENELEC as a European Standard without any modification.

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

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

Publication	Year	Title	EN/HD	Year
IEC 50(151)	1978	International Electrotechnical Vocabulary (IEV) Chapter 151: Electrical and magnetic devices	-	-
IEC 50(441)	1984	Chapter 441: Switchgear, controlgear and fuses	-	-
IEC 56 (mod)	1987	High-voltage alternating-current circuit-breakers	HD 348 S6[1)]	1995
IEC 60-1	1989	High-voltage test techniques Part 1: General definitions and test requirements	HD 588.1 S1	1991
IEC 85	1984	Thermal evaluation and classification of electrical insulation	HD 566 S1	1990
IEC 265-1	1983	High-voltage switches Part 1: High-voltage switches for rated voltages above 1 kV and less than 52 kV	HD 355.1 S3[2)]	1995
IEC 420	1990	High-voltage alternating current switch-fuse combinations	EN 60420	1993
IEC 549	1976	High-voltage fuses for the external protection of shunt power capacitors	-	-
IEC 644	1979	Specification for high-voltage fuse-links for motor circuit applications	EN 60644	1993
IEC 787	1983	Application guide for the selection of fuse-links of high-voltage fuses for transformer circuit applications	-	-

1) HD 348 S6 includes A1:1992 + A2:1995 to IEC 56, mod.

2) HD 355.1 S3 includes A1:1984 + A2:1994 to IEC 265-1.

Publication	Year	Title	EN/HD	Year
ISO 179	1993	Plastics - Determination of Charpy impact strength	-	-
ISO R 442	1965	Verification of pendulum impact testing machines for testing steels	-	-

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Fusibles à haute tension –

Partie 1:
Fusibles limiteurs de courant

High-voltage fuses –

Part 1:
Current-limiting fuses

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CONTENTS

Clause Page

SECTION 7: APPLICATION GUIDE

Figures

Annexes

INTERNATIONAL ELECTROTECHNICAL COMMISSION

HIGH-VOLTAGE FUSES –

Part 1: Current-limiting fuses

FOREWORD

1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international cooperation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. 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. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.

2) The formal decisions or agreements of the IEC on technical matters, prepared by technical committees on which all the National Committees having a special interest therein are represented, express, as nearly as possible, an international consensus of opinion on the subjects dealt with.

3) They have the form of recommendations for international use published in the form of standards, technical reports or guides and they are accepted by the National Committees in that sense.

4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.

International Standard IEC 282-1 has been prepared by sub-committee 32A: High-voltage fuses, of IEC technical committee 32: Fuses.

This fourth edition cancels and replaces the third edition published in 1985 as well as amendments 1 (1988) and 2 (1992), and constitutes a technical and editorial revision.

The text of this standard is based on that of the third edition, of amendments 1 and 2 and on the following documents:

DIS	Reports on voting
32A(CO)114 32A(CO)115 32A(CO)118	32A(CO)116 32A(CO)117 32A(CO)123

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

Annexes A and E form an integral part of this standard.

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

This standard forms part 1 of IEC 282, *High-voltage fuses*, which includes the following parts:

Part 1: Current-limiting fuses

Part 2: Expulsion and similar fuses

Part 3: Determination of short-circuit power factor for testing current-limiting fuses and expulsion and similar fuses.

HIGH-VOLTAGE FUSES –

Part 1: Current-limiting fuses

Section 1: General

1 Scope

This standard 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 420.

1.1 *Normative references*

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 282. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this part of IEC 282 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 50(151): 1978, *International Electrotechnical Vocabulary (IEV) – Chapter 151: Electrical and magnetic devices*

IEC 50(441): 1984, *International Electrotechnical Vocabulary (IEV) – Chapter 441: Switchgear, controlgear and fuses*

IEC 56: 1987, *High-voltage alternating-current circuit-breakers*

IEC 60-1: 1989, *High-voltage test techniques – Part 1: General definitions and test requirements*

IEC 85: 1984, *Thermal evaluation and classification of electrical insulation*

IEC 265-1: 1983, *High-voltage switches – Part 1: High-voltage switches for rated voltages above 1 kV and less than 52 kV*

IEC 420: 1990, *High-voltage alternating current switch-fuse combinations*

IEC 549: 1976, *High-voltage fuses for the external protection of shunt power capacitors*

IEC 644: 1979, *Specification for high-voltage fuse-links for motor circuit applications*

IEC 787: 1983, *Application guide for the selection of fuse-links of high-voltage fuses for transformer circuit applications*

ISO 179: 1993, *Plastics – Determination of Charpy impact strength*

ISO R/442: 1965, *Verification of pendulum impact testing machines for testing steels*

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 – This does not apply to time/current characteristics of fuses which will be modified appreciably at the minimum temperatures.

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

NOTES

1 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:

1) The test voltages for insulating parts in air should be determined by multiplying the standard test voltages given in tables 6 and 7 by the appropriate correction factor given in column (2) of table 1.

2) 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

Maximum altitude m	(ft) (1)	Correction factor for test voltages referred to sea level (2)	Correction factor for rated voltages (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.

2 The rated current or the temperature-rise specified in this standard can be corrected for altitudes exceeding 1 000 m (3 300 ft) by using 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

Maximum altitude m (ft) (1)	Correction factor for rated current (2)	Correction factor for temperature-rise (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 mbar;

– the average value of the relative humidity, for a period of one month, does not exceed 90 %;

– the average value of the vapour pressure, for a period of one month, does not exceed 18 mbar.

For these conditions, condensation may occasionally occur.

NOTES

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

2 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.

3 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 temperature due to sunlight does not exceed an equivalent black-body temperature of 80 °C.

2.2 *Special service conditions*

By agreement between manufacturer and 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.

Section 2: Definitions

The reference numbers in brackets are those of IEC 50(151)* and 50(441)**.

For the purposes of this International Standard, the following definitions apply.

3 Electrical characteristics

3.1 **rated value:** A quantity value assigned, generally by a manufacturer, for a specified operating condition of a component, device or equipment. [151-04-03]

NOTE – Example of rated values usually stated for fuses: voltage, current, breaking current.

3.2 **rating:** The set of rated values and operating conditions. [151-04-04]

3.3 **prospective current (of a circuit and with respect to a fuse):** The current that would flow in the circuit if the fuse were replaced by a conductor of negligible impedance. [441-17-01]

NOTE – For the method to evaluate and to express the prospective current, see 13.2.1 and 13.2.2.

3.4 **prospective peak current:** The peak value of a prospective current during the transient period following initiation. [441-17-02]

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.

3.5 **prospective breaking current:** The prospective current evaluated at a time corresponding to the instant of the initiation of the breaking process. [441-17-06]

NOTE – For the fuses, this instant is usually defined as the moment of the initiation of the arc during the breaking process. Conventions relating to the instant of the initiation of the arc are given in 13.2.3.

3.6 **cut-off current; let-through current:** The maximum instantaneous value of current attained during the breaking operation of a fuse. [441-17-12]

NOTE – This concept is of particular importance when the fuse operates in such a manner that the prospective peak current of the circuit is not reached.

3.7 **breaking capacity:** A value of prospective current that a fuse is capable of breaking at a stated voltage under prescribed conditions of use and behaviour.

3.8 **pre-arcing time; melting time:** The interval of time between the beginning of a current large enough to cause a break in the fuse-element(s) and the instant when an arc is initiated. [441-18-21]

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* IEC 50(151): *International Electrotechnical Vocabulary (IEV) – Chapter 151: Electrical and magnetic devices.*

** IEC 50(441): *International Electrotechnical Vocabulary (IEV) – Chapter 441: Switchgear and controlgear.*