SLOVENSKI STANDARD
oSIST prEN IEC 60282-4:2018

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Dodatne zahteve za preskušanje visokonapetostnih izklopnih varovalk s polimernimi izolatorji

Additional testing requirements for high-voltage expulsion fuses utilizing polymeric insulators

Ta slovenski standard je istoveten z: **prEN IEC 60282-4:2018**

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IEC SC 32A : HIGH-VOLTAGE FUSES	
SECRETARIAT: France	SECRETARY: Mr Raphaël Buisson
OF INTEREST TO THE FOLLOWING COMMITTEES: TC 36	PROPOSED HORIZONTAL STANDARD: ☐ Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.
FUNCTIONS CONCERNED: ☐ EMC ☐ ENVIRONMENT ☐ QUALITY ASSURANCE ☐ SAFETY	
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TITLE:

Additional testing requirements for high-voltage expulsion fuses utilizing polymeric insulators

PROPOSED STABILITY DATE: 2025

NOTE FROM TC/SC OFFICERS:

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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ADDITIONAL TESTING REQUIREMENTS FOR HIGH-VOLTAGE EXPULSION FUSES UTILIZING POLYMERIC INSULATORS

FOREWORD

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International Standard IEC 60282-4 has been prepared by subcommittee SC32A: High-voltage fuses, of IEC technical committee TC32: Fuses.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
32A/XX/FDIS	32A/XX/RVD

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

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

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- withdrawn,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

INTRODUCTION

High-voltage expulsion fuses are tested to IEC 60282-2 which recognizes that fuse-bases may use polymer (non-ceramic) insulators. However, very little additional testing is specified for fuses using such insulators. In the case of polymer post insulators and suspension insulators, only artificial pollution tests are required according to IEC 61592 and IEC 61109, respectively. However, for fuses that use insulators not covered by these standards, such as certain fuse-cutouts, the additional testing required is to be by agreement between manufacturer and user. Fuses that need such “additional testing” are expulsion fuses that utilize polymer insulators in which a single mounting bracket is used, either at the centre of an insulator or connected to two insulators (a “cutout fuse-base”). As the market for expulsion fuses using polymer insulators has grown, manufacturers have introduced many tests in addition to artificial pollution tests, covering other aspects of a fuse’s performance. This standard formalises such testing and provides standardisation and consistency. It should be noted that the document focusses on product testing as opposed to material testing. In addition to drawing on test procedures covered by IEC 62217:2012, “Polymeric HV insulators for indoor and outdoor use - General definitions, test methods and acceptance criteria”, material from IEEE Std C37.41:2016 (primarily 18.1.2 “Long-term deformation/creep testing”) is also used, by permission from IEEE.

ADDITIONAL TESTING REQUIREMENTS FOR HIGH-VOLTAGE EXPULSION FUSES UTILIZING POLYMERIC INSULATORS

1 Scope

This part of IEC 60282 applies to expulsion fuses complying with IEC 60282-2 and specifies additional testing requirements for fuses employing a cutout fuse-base that utilizes polymeric insulators.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 60060-1:2010, *High-voltage test techniques – Part 1: General definitions and test requirements*

IEC 60282-2:2008, *High-voltage fuses - Part 2: Expulsion fuses*

IEC 62217:2012, *Polymeric HV insulators for indoor and outdoor use - General definitions, test methods and acceptance criteria*

ISO 4287, *Geometrical Product Specifications (GPS) – Surface Texture: Profile method – Terms, definitions and surface texture parameters*

ISO 4892-2, *Plastics – Methods of exposure to laboratory light sources – Part 2: Xenon-arc sources*

ISO 868:2003, *Plastics and ebonite – Determination of indentation hardness by means of a durometer (Shore hardness)*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1
polymeric Insulator
insulator whose insulating body consists of at least one organic based material

Note 1 to entry: Polymeric insulators are also known as non-ceramic insulators.

Note 2 to entry: Coupling devices may be attached to the ends of the insulating body.

[SOURCE: IEC 60050-471:2007, 471-01-13]

3.2
composite polymeric insulator
polymeric insulator consisting of at least two separate polymeric insulating parts, namely a core and a housing, equipped with end fittings

[SOURCE: IEC 60050-471:2007, 471-01-02, modified to include the term “polymeric"]

3.3
core (of a composite polymeric insulator)
central insulating part of a composite polymeric insulator that provides the primary mechanical/strength characteristics of the insulator

[SOURCE: IEC 60050-471:2007, 471-01-03 modified: addition of “composite polymeric”; addition of “primary”, “strength” and “of the insulator”; note deleted]

3.4
housing (of a composite polymeric insulator)
external insulating part(s) of a composite insulator that provides the necessary leakage distance, other dielectric characteristics of the insulator, and protects the core from the environment

[SOURCE: IEC 60050-471:2007, 471-01-09, modified]

3.5
insulator body
insulating assembly that contains the insulator and permanent fittings

3.6
insulator trunk
central insulating part of an insulator from which the sheds project

Note 1 to entry: Also known as shank on smaller insulators.

[SOURCE: IEC 60050-471:2007, 471-01-11]

3.7
Shed (of an insulator)
insulating part, projecting from the insulator trunk, intended to increase the creepage distance

Note 1 to entry: The shed can be with or without ribs.

[SOURCE: IEC 60050-471:2007, 471-01-15]

3.8
cutout fuse-base
fuse-base that uses an insulator or insulators having a single point mounting bracket, generally located centrally between the terminals that are mounted at the outer ends of the insulator(s)

3.9
Resin insulator
polymeric insulator whose insulating body is made from only one insulating part and which is equipped with end fittings

polymeric insulator whose insulating body consists of a solid shank and sheds protruding from the shank made from only one organic based housing material (e.g. cycloaliphatic epoxy)

4 Type tests

4.1 General requirements

Fuses according to this standard shall comply with the requirements of IEC 60282-2, except for those that are specifically replaced with requirements specified in this standard for the following type tests.

4.2 Mechanical tests

4.2.1 Mechanical stressing at temperature extremes

4.2.1.1 General

When conducting this test with a fuse using a polymeric insulator(s), it is not necessary to also perform the mechanical tests outlined in 8.8.1 of IEC 60282-2:2008. The testing covered in 4.2.1 only applies to disconnecting devices that can be opened and closed manually.

4.2.1.2 Test procedure

Three new fuses shall be used for this test. The test samples shall consist of the fuse-base, fuse-carrier, and end fittings. The fuse carriers should contain fuse-links of sufficiently high current rating, or dummy links, so that the fuse-links are not subjected to the same endurance test as the fuse-bases and fuse-carriers.

All samples shall be cycled between -30 °C (+0 ºC, −5 ºC) and +40 °C (+5 ºC, −0 ºC). The samples shall remain at each temperature extreme for a minimum of 8 h per cycle. The cycle time from one temperature extreme to the other shall be any convenient value, however the sample rate of temperature change should be no more than 0.5 ºC/min and steps should be taken to avoid thermal shock. All samples shall complete 4 cycles (a cycle includes both temperature extremes) resulting in a minimum total test time of approximately 83 h. See Figure 1 for a representation of the preferred test sequence. If the specified minimum ambient air temperature for the fuse is other than -30 °C (see IEC 60282-2:2008, 4.1 a)) then this value (+0 ºC, −5 ºC) shall be used for the minimum temperature of the cycle.

Once per cycle, manual open/close operations shall be performed, using a device approved by the manufacturer. At the end of an eight-hour soak period, each sample is subjected to 50 open/close cycles. All operations shall be performed at a minimum 30° angle from centreline with 25 on the right and 25 on the left. The closing force should be approximately 1 kN. Tests shall alternate with each cycle such that over the four cycles, a total of 100 cycles are performed hot and 100 cycles cold. The four-cycle sequence can start with a hot period or cold period, but a cold period is the preferred sequence.

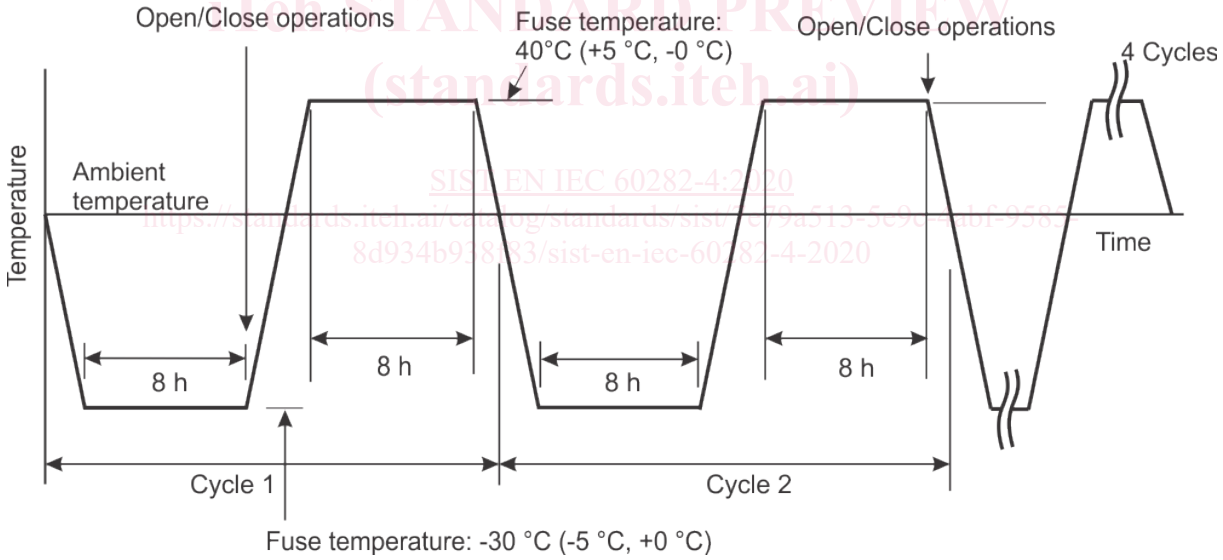

Figure 1 – Test sequence

4.2.1.3 Acceptance criteria

4.2.1.3.1 Initial acceptance criteria

The following are the initial criteria for successful completion of this test:

a) Overall length of fuse-base shall comply with manufacturer's specification.

b) No loose or deformed parts, cracks or other obvious visual deformation in any of the assemblies shall occur.

c) Each sample shall perform its intended function as demonstrated by 4.2.1.3.2