SLOVENSKI STANDARD
oSIST prEN IEC 62217:2024

01-februar-2024

Polimerni visokonapetostni izolatorji za notranjo in zunanjo uporabo - Splošne definicije, preskusne metode in prevzemna merila

Polymeric HV insulators for indoor and outdoor use - General definitions, test methods and acceptance criteria

Hochspannungs-Polymerisolatoren für Innenraum- und Freiluftanwendung - Allgemeine Begriffe, Prüfverfahren und Annahmekriterien

Isolateurs polymériques à haute tension pour utilisation à l'intérieur ou à l'extérieur - Définitions générales, méthodes d'essai et critères d'acceptation

Ta slovenski standard je istoveten z: **prEN IEC 62217:2023**

ICS:

29.080.10	Izolatorji	Insulators

oSIST prEN IEC 62217:2024 **en,fr,de**

36/589/CDV

COMMITTEE DRAFT FOR VOTE (CDV)

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IEC TC 36 : INSULATORS	
SECRETARIAT: Sweden	SECRETARY: Mr Dan Windmar
OF INTEREST TO THE FOLLOWING COMMITTEES:	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	
☒ SUBMITTED FOR CENELEC PARALLEL VOTING **Attention IEC-CENELEC parallel voting** The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) is submitted for parallel voting. The CENELEC members are invited to vote through the CENELEC online voting system.	☐ NOT SUBMITTED FOR CENELEC PARALLEL VOTING

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TITLE:

Polymeric HV insulators for indoor and outdoor use - General definitions, test methods and acceptance criteria

PROPOSED STABILITY DATE: 2027

NOTE FROM TC/SC OFFICERS:

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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POLYMERIC HV INSULATORS FOR INDOOR AND OUTDOOR USE - GENERAL DEFINITIONS, TEST METHODS AND ACCEPTANCE CRITERIA

FOREWORD

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International Standard IEC 62217 has been prepared by IEC technical committee 36: Insulators.

This third edition of the standard cancels and replaces the second edition, published in 2012. It constitutes its technical revision and introduces the following important changes:

a) The scope of the standard is specified to comprise composite insulators with solid and hollow core and resin insulators used for both a.c. and d.c. systems in indoor and outdoor applications of HV overhead lines and substations; hybrid insulators (defined in IEC TS 62896) with ceramic core and polymeric housing are also included, while coated insulators (e.g. with Room Temperature Vulcanized (RTV) silicone rubber coatings) are not considered in this standard;
b) Steep-front impulse voltage test is modified to avoid unwanted flashovers between the leads of the electrodes;
c) Differences between HTM and non-HTM housing materials are specified and relevant test methods and acceptance criteria for polymeric insulators with HTM housing are introduced;
d) The previous water diffusion test on core materials with or without housing is split into two tests. One is on core materials without housing, the other is core materials with housing. The acceptance criteria are modified;
e) Stress corrosion test for core materials is introduced;
f) Annex B summarizes the test application for evaluating the quality of interfaces and connections of end fittings, housing materials and core materials;

g) Annex E is introduced to emphasize the need for control of electric fields of polymeric insulators for a.c. The control of electric fields of polymeric insulators for d.c. is still under consideration.

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

CD	CC
36/537/CD	CC/36/537/CD 62217

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.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

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

The National Committees are requested to note that for this document the stability date is 20XX.

THIS TEXT IS INCLUDED FOR THE INFORMATION OF THE NATIONAL COMMITTEES AND WILL BE DELETED AT THE PUBLICATION STAGE.

INTRODUCTION

Polymeric insulators consist either of one insulating material (resin insulators) or two or several insulating materials (composite insulators). The insulating materials are generally cross-linked organic materials synthesised from carbon or silicon chemistry and form the insulating body. Insulating materials can be composed from organic materials containing various inorganic and organic ingredients, such as fillers and extenders. End fittings are often used at the ends of the insulating body to transmit mechanical loads. Despite these common features, the materials used and the construction details employed by manufacturers may differ significantly.

The tests given in this standard are those which are, in general, common to a majority of insulator designs and materials, whatever their final application. Considering the increasing applications of polymeric insulators, the scope of this standard specifies technical requirements for solid core, hollow core and resin insulators used in a.c. and d.c. systems in indoor and outdoor applications of HV overhead lines and substations to ensure proper insulator performance under normal operating conditions. The technical requirements have been regrouped in this standard to avoid repetition of the relevant product standards and drift between procedures as the various product standards are drafted or revised.

The majority of these tests have been grouped together as "Design tests", to be performed only once for insulators of the same design. The design tests are intended to eliminate insulator designs, materials or manufacturing technologies which are not suitable for high- voltage (HV) applications. The influence of time on the electrical properties of the complete polymeric insulator and its components (core material, housing, interfaces etc.) has been considered in specifying the design tests in order to ensure a satisfactory lifetime under normal operating and environmental conditions. To ensure quality and reliable long-term performance of insulators, a need to modify some test procedures as well as to introduce new tests were identified.

Pollution tests, according to IEC 60507 or IEC TS 61245, are not included in this document. Specific pollution tests for polymeric insulators are under consideration of IEC, indications for pollution design are given in IEC TS 60815-1, IEC TS 60815-3, IEC TS 60815-4.

Before the appropriate standard for DC applications will be issued, the majority of tests listed in this document can also be applied to DC insulators. The AC 1000 h salt fog tracking and erosion test is considered as a design test in this standard to reject materials in combination with the design which are inadequate. For the time being, the 1 000 h AC tracking and erosion test is used to establish a minimum requirement for the tracking and erosion resistance, for both AC and DC. For DC applications, a specific DC tracking and erosion test procedure as a design test shall be developed.Further tracking and erosion test methods such as the 5 000 hour and the tracking wheel test are described in IEC TR 62730 and can be used for research or other purposes. Tracking and erosion tests are not intended to evaluate long term performance of insulators in harsh environments by the simulation of multiple environmental factors. It is therefore necessary to carry out ageing tests for insulator designs under cumulative service stresses.

For polymeric insulators with hydrophobicity transfer property, relevant test procedures are introduced. In the standard the hydrophobicity transfer test is intended to distinguish the hydrophobicity transfer material (HTM) from non-HTM rather than differentiate between different HTMs.

The water diffusion test is divided into two tests. The first one is for the core (as earlier), the second one is for the core with housing. The water diffusion test on core with housing addresses the interface between the core and the housing. The acceptance criteria are modified and harmonized for both tests.

Stress corrosion test for insulators mainly subjected to tensile load is introduced to minimize risks of brittle fractures.

Annex B summarizes the test application for evaluating the quality of interfaces and connections of end fittings, housing materials and core materials.

Annex E is introduced to emphasize the need for the control of electric field of polymeric insulators under a.c. voltage.

IEC Guide 111 has been followed wherever possible during the preparation of this standard.

POLYMERIC HV INSULATORS FOR INDOOR AND OUTDOOR USE - GENERAL DEFINITIONS, TEST METHODS AND ACCEPTANCE CRITERIA

1 Scope

This International Standard is applicable to polymeric insulators for a.c. systems with a nominal voltage greater than 1 000 V (frequency less than 100 Hz) and d.c. systems with a nominal voltage greater than 1 500 V whose insulating body consists of one or various organic materials. Polymeric insulators covered by this standard are intended for use both on HV overhead lines and in substations, in both indoor and outdoor applications. They include composite insulators with solid and hollow core and resin insulators. Hybrid insulators with ceramic core and polymeric housing are also included, while coated insulators (e.g. with RTV silicone rubber coatings) are not included in this standard. Electrical tests described in this standard are done under a.c. voltage and are in general applicable to insulators to be used in d.c. systems too. Tests under d.c. voltage should reflect up-to-date knowledge and experience..

The object of this standard is

- to define the common terms used for polymeric insulators;
- to prescribe common test methods for design tests on polymeric insulators;
- to prescribe acceptance or failure criteria, if applicable;

These tests, criteria and recommendations are intended to ensure a satisfactory lifetime under normal operating and environmental conditions (see Clause 5). The standard includes design tests intended to reject materials or designs which are inadequate under normal operating and environmental conditions. This standard shall only be applied in conjunction with the relevant product standard.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60050-471, International Electrotechnical Vocabulary - Part 471: Insulators

IEC 60050-151, International Electrotechnical Vocabulary - Part 151: Electrical and magnetic devices

IEC 60060-1, High-voltage test techniques - Part 1: General definitions and test requirements

IEC 60507:2013/COR1:2018, Artificial pollution tests on high-voltage ceramic and glass insulators to be used on a.c. systems

IEC 60695-11-10, Fire hazard testing - Part 11-10: Test flames - 50 W horizontal and vertical flame test methods

IEC 60721-1, Classification of environmental conditions - Part 1: Environmental parameters and their severities

IEC TS 60815-1, Selection and dimensioning of high-voltage insulators intended for use in polluted conditions - Part 1: Definitions, information and general principles

IEC TS 60815-3, Selection and dimensioning of high-voltage insulators intended for use in polluted conditions - Part 3: Polymer insulators for a.c. system

IEC TS 60815-4, Selection and dimensioning of high voltage insulators intended for use in polluted conditions – Part 4: Insulators for d.c. systems

IEC 61109 Insulators for overhead lines – Composite suspension and tension insulators for a.c. systems with nominal voltage greater than 1 000 V – Definitions, test methods and acceptance criteria

IEC TS 61245 Artifical pollution tests on high-voltage insulators to be used on d.c. systems

IEC 61462, Composite hollow insulators – Pressurized and unpressurized insulators for use in electrical equipment with rated voltage greater than 1 000 V – Definitions, test methods, acceptance criteria and design recommendations

IEC 61952 Insulators for overhead lines – Composite line post insulators for A.C. systems with a nominal voltage greater than 1 000 V – Definitions, test methods and acceptance criteria

IEC TR 62039, Selection guide for polymeric materials for outdoor use under HV stress

IEC TS 62073, Guidance on the measurement of wettability of insulator surfaces

IEC TR 62730, HV polymeric insulators for indoor and outdoor use tracking and erosion testing by wheel test and 5000 h test

IEC 62772 Composite hollow core station post insulators for substations with a.c. voltage greater than 1 000 V and d.c. voltage greater than 1 500 V – Definitions, test methods and acceptance criteria

IEC TS 62896, Hybrid insulators for a.c. and d.c. high-voltage applications – Definitions, test methods and acceptance criteria

ISO 868, Plastics and ebonite - Determination of indentation hardness by means of a durometer (Shore hardness)

ISO 3274 Geometrical Product Specifications (GPS) — Surface texture: Profile method — Nominal characteristics of contact (stylus) instruments

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

3 Terms and definitions

For the purposes of this document the terms and definitions given in IEC 60050-471:2007 and the following 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
high voltage (HV)
voltage over 1 000 V a.c. or over 1 500 V d.c. or over 1 500 V peak value

3.2
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]

3.3
resin insulator
polymeric insulator whose insulating body consists of a solid insulator trunk and sheds protruding from the insulator trunk made from only one organic based housing material (e.g. cycloaliphatic epoxy)

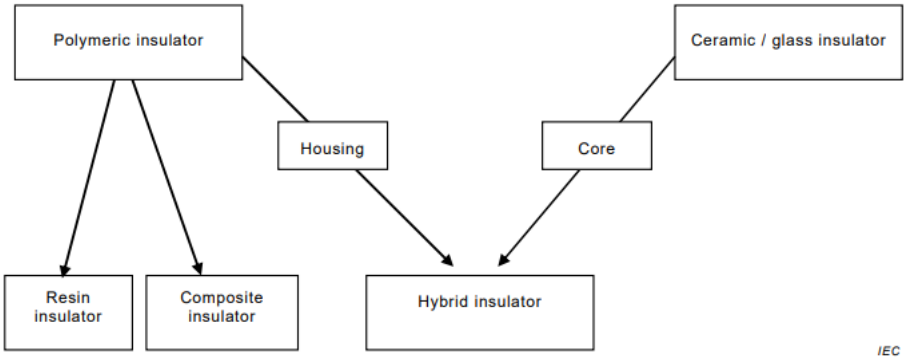
3.4
composite insulator
insulator made of at least two insulating parts, namely a core and a housing, equipped with metal fittings

Note 1 to entry: Composite insulators, for example, can consist either of individual sheds mounted on the core, with or without an intermediate sheath, or alternatively, of a housing directly moulded or cast in one or several pieces on to the core.

[SOURCE: IEC 60050-471:2007, 471-01-02]

3.5
hybrid insulator

insulator that consists of a ceramic core and a polymeric housing, equipped with one or more metal fittings



Note 1 to entry: According to IEC TS 62896.

Note 2 to entry: The mechanical functions are mainly characterised by the core, the external electrical functions are mainly characterised by the polymeric housing. The housing may cover the core completely or partly. In the latter case the exposed portions of the ceramic core are usually covered by glaze.

3.6
composite insulator with fibre reinforced plastic solid core
composite insulator with FRP solid core

Composite insulators of which the core is made of solid insulating polymeric material reinforced by fibres such as glass fibres. The core is covered by polymeric housing.

3.7
composite hollow insulator

insulator consisting of at least two insulating parts, namely a tube-shaped core, and a housing

Note 1 to entry: The housing may consist either of individual sheds mounted on the tube, with or without an intermediate sheath, or directly applied in one or several pieces onto the tube. A composite hollow insulator unit is permanently equipped with fixing devices or end fittings.

3.8
core
central insulating part of an insulator which provides the mechanical characteristics

Note 1 to entry: The housing and sheds are not part of the core.

[SOURCE: IEC 60050-471:2007, 471-01-03]

3.9
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]

3.10
housing
external insulating part of a composite insulator providing the necessary creepage distance and protecting core from environment