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FOREWORD

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

This third edition cancels and replaces the second edition published in 2012. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) The scope of the document is specified to comprise composite insulators with solid and hollow core and resin insulators used for both AC and DC 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 document;

of the electrodes;

c) Differences between hydrophobicity transfer material (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 on 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 AC. The control of electric fields of polymeric insulators for DC is still under consideration.

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

Draft	Report on voting
36/612/FDIS	36/631/RVD

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

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

- reconfirmed,
- withdrawn, or
- revised.

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 might differ significantly.

The tests given in this document 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 document specifies technical requirements for solid core, hollow core and resin insulators used in AC and DC systems, in indoor and outdoor, in applications of HV overhead lines and substations to ensure proper insulator performance under normal operating conditions. The technical requirements have been regrouped in this document 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, 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, the requirements on the modification of certain test procedures as well as the introduction of new tests were identified.

Pollution tests, according to IEC 60507 or IEC TS 61245 [1][1], are not included in this document. Specific pollution tests for polymeric insulators are under consideration of IEC, indications for design considering pollution are given in IEC TS 60815-1, IEC TS 60815-3 [2] and IEC TS 60815-4 [3].

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 1 000 h AC salt fog tracking and erosion test is considered as a design test in this document to reject materials in combination with the design which are inadequate. For the time being, the 1 000 h AC salt fog 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 has not been developed. Further tracking and erosion test methods such as the 5 000 hour and the tracking wheel test are described in IEC TR 62730 [4] 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. These aging tests do not form part of this present document.

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

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.

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[1] Numbers in square brackets refer to the Bibliography.

the 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 AC voltage.

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

This International Standard is applicable to polymeric insulators for AC systems with a nominal voltage greater than 1 000 V (frequency less than 100 Hz) and DC 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 document 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 document are done under AC voltage and are in general applicable to insulators to be used in DC systems too. Tests under DC voltage are intended to reflect up-to-date knowledge and experience.

NOTE Only polymeric housing materials of hybrid insulators are specified in this document. Tests for core materials and the interfaces between housing and core of hybrid insulators are not included.

The object of this document 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). This document includes design tests intended to reject materials or designs which are inadequate under normal operating and environmental conditions. This document defines test methods and acceptance criteria. The applicable tests are given in the relevant product standard.

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 60050-471:2007, *International Electrotechnical Vocabulary (IEV) - Part 471: Insulators*

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 TR 62039:2021, *Selection guidelines for polymeric materials for outdoor use under HV stress*

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

lamps

ISO 21920-2, *Geometrical product specifications (GPS) Surface texture: Profile - Part 2: Terms, definitions and surface texture parameters*