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

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FOREWORD

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This commented version (CMV) of the official standard IEC 62217:2025 edition 3.0 allows the user to identify the changes made to the previous IEC 62217:2012 edition 2.0. Furthermore, comments from IEC TC 36 experts are provided to explain the reasons of the most relevant changes, or to clarify any part of the content.

A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text. Experts' comments are identified by a blue-background number. Mouse over a number to display a pop-up note with the comment.

This publication contains the CMV and the official standard. The full list of comments is available at the end of the CMV.

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;

b) Steep-front impulse voltage test is modified to avoid unwanted flashovers between the leads 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.

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 ~~different~~ manufacturers ~~may be widely different~~ might differ significantly.

The tests given in this document are those which are, in general, common to a ~~great~~ 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 ~~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, 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~~, the applicability of their methodology to composite insulators not having been proven and still requiring study by CIGRE~~. ~~The results of such pollution tests performed on insulators made of polymeric materials do not correlate with experience obtained from service.~~ Specific pollution tests for polymeric insulators are ~~still~~ 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].

~~The 1 000 hour salt-fog tracking and erosion test given in this second edition of IEC 62217 is considered as a screening test intended to reject materials or designs which are inadequate. This test is not intended to predict long term performance for insulator designs under cumulative service stresses. For more information, see Annex C. The first edition of IEC 62217 (2005) included two other alternative tracking and erosion tests (a 5 000 hour multi-stress test and a tracking wheel test) which were based on tests developed by CIGRE and utilities. These tests are no longer given as normative alternatives following the results of a study/questionnaire by TC 36 on the relative merits of all three tracking and erosion tests. The 5 000 hour multi-stress test and a tracking wheel test are described in IEC/TR 62730 (2012).~~

~~Composite insulators are used in both a.c. and d.c. applications. In spite of this fact a specific tracking and erosion test procedure for d.c. applications as a design test has not yet been defined and accepted. The 1 000 hour a.c. tracking and erosion test described in this standard is used to establish a minimum requirement for the tracking resistance of the housing material.~~

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

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1 Numbers in square brackets refer to the Bibliography.