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INTERNATIONAL STANDARD

NORME INTERNATIONALE

Composite hollow insulators – Pressurized and unpressurized insulators for use in electrical equipment with AC rated voltage greater than 1 000 V AC and D.C. voltage greater than 1500V – Definitions, test methods, acceptance criteria and design recommendations

Isolateurs composites creux – Isolateurs avec ou sans pression interne pour utilisation dans des appareillages électriques de tensions alternatives assignées supérieures à 1 000 V et de tensions continues supérieures à 1 500 V – Définitions, méthodes d'essai, critères d'acceptation et recommandations de conception

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COMPOSITE HOLLOW INSULATORS – PRESSURIZED AND UNPRESSURIZED INSULATORS FOR USE IN ELECTRICAL EQUIPMENT WITH AC RATED VOLTAGE GREATER THAN 1 000 V AND DC VOLTAGE GREATER THAN 1 500 V – DEFINITIONS, TEST METHODS, ACCEPTANCE CRITERIA AND DESIGN RECOMMENDATIONS

FOREWORD

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IEC 61462 has been prepared by IEC technical committee 36: Insulators. It is an International Standard.

This new edition cancels and replaces the previous edition published in 2007. This edition constitutes a technical revision.

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

a) modifications of terms and definitions;
b) modifications of tests procedures included in IEC TR 62039 and IEC 62217 (Hydrophobicity transfer test; Water diffusion test on the core with housing);
c) modification of Clause 8 (type tests) to reflect common practice and to also consider tapered (conical) insulators;

d) modification of order of the stages of mechanical sample test (9.4) by setting the tightness test as last stage;

e) harmonization of Table 3 (Tests to be carried out after design changes) with other product standards;

f) addition of a new informative Annex D: Principle sketch of hollow insulators design assembly;

g) addition of a new informative Annex E: Type tests on tapered (conical) insulators.

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

Draft	Report on voting
36/567/FDIS	36/586/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,
- replaced by a revised edition, or
- amended.

INTRODUCTION

Composite hollow insulators consist of an insulating tube bearing the mechanical load protected by an elastomeric housing, the loads being transmitted to the tube by metal fittings. Despite these common features, the materials used and the construction details employed by different manufacturers may vary.

Some tests have been grouped together as "Design tests" to be performed only once for insulators of the same design and material. The design tests are performed in order to eliminate designs and materials not suitable for high-voltage applications.

The relevant design tests defined in IEC 62217 are applied for composite hollow insulators; additional specific mechanical tests are given in this document. The influence of time on the electrical and mechanical properties of the complete composite hollow insulator and its components (tube material, housing material, interfaces, etc.) has been considered in specifying the design tests in order to ensure a satisfactory lifetime under normal service conditions. These conditions may also depend on the equipment inside or outside the composite hollow insulators; however, this matter has not been covered in this document. It is possible for test methods not specified in this document to be considered for specific combinations of materials and specific applications, and are a matter of agreement between manufacturers and users. In this document, the term "user" in general means the equipment manufacturer using composite hollow insulators.

Composite hollow insulators are used in both AC and DC applications. 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. In spite of this, a specific tracking and erosion test procedure for DC applications as a design test is still being considered to be developed. Some information about the difference of AC and DC material erosion test can be found in the CIGRE Technical Brochure 611. For the time being, the 1 000 h AC tracking and erosion test of IEC 62217 is used to establish a minimum requirement for the tracking and erosion resistance, for both AC and DC

This document distinguishes between design tests and type tests because several general characteristics of a specific design and specific combinations of materials do not vary for different insulator types. In these cases results from design tests can be adopted for different insulator types.

Pollution tests according to IEC 60507 or IEC 61245 are not included in this document since they are designed for non-polymeric items. Specific pollution tests for polymeric insulators are still under consideration.

The mechanical characteristics of composite hollow insulators are quite different compared to those of hollow insulators made of ceramics. In order to determine the onset of mechanical deterioration of composite hollow insulators under the influence of mechanical stress, strain gauge measurements are used.

This document refers to different characteristic pressures which are used for design and testing of composite hollow insulators. The term "maximum service pressure" (MSP) is equivalent to the term "design pressure" which is used in other standards for ceramic hollow insulators; however, this latter term is not used in this standard in order to avoid confusion with "design" as used in "design tests".

General recommendations for the design and construction of composite hollow insulators are presented in Annex B.

COMPOSITE HOLLOW INSULATORS – PRESSURIZED AND UNPRESSURIZED INSULATORS FOR USE IN ELECTRICAL EQUIPMENT WITH AC RATED VOLTAGE GREATER THAN 1 000 V AND DC VOLTAGE GREATER THAN 1 500 V – DEFINITIONS, TEST METHODS, ACCEPTANCE CRITERIA AND DESIGN RECOMMENDATIONS

1 Scope

This document, which is an International Standard, applies to composite hollow insulators consisting of a load-bearing insulating tube made of resin impregnated fibres, a housing (outside the insulating tube) made of elastomeric material (for example silicone or ethylene-propylene) and metal fixing devices at the ends of the insulating tube (see Figure D.1 and Figure D.2 for examples). Composite hollow insulators as defined in this document are intended for general use (unpressurized) or for use with a permanent gas pressure (pressurized). They are intended for use in both outdoor and indoor electrical equipment operating on alternating current with a rated voltage greater than 1 000 V AC and a frequency not greater than 100 Hz or for use in direct current equipment with a rated voltage greater than 1 500 V DC.

The object of this document is:

– to define the terms used;

– to specify test methods;

– to specify acceptance criteria.

Hollow insulators are integrated into electrical equipment which is electrically type tested as required by the applicable equipment standard. So, it is not the object of this document to specify dielectric type tests because the withstand voltages and flashover behaviour are not characteristics of the hollow insulator itself but of the apparatus of which it ultimately forms a part.

All the tests in this document, apart from the thermal-mechanical test, are performed at normal ambient temperature. This document does not specify tests that might be characteristic of the equipment of which the hollow insulator ultimately forms a part.

Composite hollow insulators are intended for use in electrical equipment, such as, but not limited to:

- HV circuit-breakers,
- switch-disconnectors,
- disconnectors,
- station posts,
- disconnecting circuit breakers,
- earthing switches,
- instrument- and power transformers,
- bushings,
- housing for surge arresters,
- cable terminations.

Additional testing defined by the relevant IEC equipment standard may be required.