

# TECHNICAL SPECIFICATION

Characteristics of hollow pressurised and unpressurised ceramic and glass insulators for use in electrical equipment with rated voltages greater than 1000 V

This document is a preview generated by EVS



## THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2008 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester.

If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Central Office  
3, rue de Varembe  
CH-1211 Geneva 20  
Switzerland  
Email: [inmail@iec.ch](mailto:inmail@iec.ch)  
Web: [www.iec.ch](http://www.iec.ch)

### About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

### About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

- Catalogue of IEC publications: [www.iec.ch/searchpub](http://www.iec.ch/searchpub)

The IEC on-line Catalogue enables you to search by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, withdrawn and replaced publications.

- IEC Just Published: [www.iec.ch/online\\_news/justpub](http://www.iec.ch/online_news/justpub)

Stay up to date on all new IEC publications. Just Published details twice a month all new publications released. Available on-line and also by email.

- Electropedia: [www.electropedia.org](http://www.electropedia.org)

The world's leading online dictionary of electronic and electrical terms containing more than 20 000 terms and definitions in English and French, with equivalent terms in additional languages. Also known as the International Electrotechnical Vocabulary online.

- Customer Service Centre: [www.iec.ch/webstore/custserv](http://www.iec.ch/webstore/custserv)

If you wish to give us your feedback on this publication or need further assistance, please visit the Customer Service Centre FAQ or contact us:

Email: [csc@iec.ch](mailto:csc@iec.ch)  
Tel.: +41 22 919 02 11  
Fax: +41 22 919 03 00

Document for preview generated by EVS



# TECHNICAL SPECIFICATION

---

**Characteristics of hollow pressurised and unpressurised ceramic and glass insulators for use in electrical equipment with rated voltages greater than 1000 V**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

PRICE CODE

## CONTENTS

FOREWORD.....	3
INTRODUCTION.....	5
1 Scope.....	6
2 Normative references.....	7
3 Terms and definitions.....	7
4 Dimensional and mechanical characteristics.....	8
5 Marking.....	9
6 Fixing arrangement.....	9
7 Designation of hollow insulators.....	9
Bibliography.....	22
Figure 1 – Example of a straight type hollow insulator with metal fittings on both ends.....	18
Figure 2 – Example of a taper type hollow insulator with metal fittings on both ends.....	19
Figure 3 – Example of a straight type hollow insulator without metal fittings.....	20
Figure 4 – Example of a taper type hollow insulator without metal fittings.....	21
Table 1 – Straight type hollow insulators with metal fittings on both ends.....	11
Table 2 – Taper type hollow insulators with metal fittings on both ends.....	12
Table 3 – Straight type hollow insulators without metal fittings.....	14
Table 4 – Taper type hollow insulators without metal fittings.....	16

This document is a Preview generated by EVS

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**CHARACTERISTICS OF HOLLOW PRESSURISED  
AND UNPRESSURISED CERAMIC AND GLASS INSULATORS  
FOR USE IN ELECTRICAL EQUIPMENT WITH RATED VOLTAGES  
GREATER THAN 1000 V**

## FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

The main task of IEC technical committees is to prepare International Standards. In exceptional circumstances, a technical committee may propose the publication of a technical specification when

- the required support cannot be obtained for the publication of an International Standard, despite repeated efforts, or
- the subject is still under technical development or where, for any other reason, there is the future but no immediate possibility of an agreement on an International Standard.

Technical specifications are subject to review within three years of publication to decide whether they can be transformed into International Standards.

IEC 62371, which is a technical specification, has been prepared by subcommittee 36C: Insulators for substations, of IEC technical committee 36: Insulators.

The text of this technical specification is based on the following documents:

Enquiry draft	Report on voting
36C/172/DTS	36C/173/RVC

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

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

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- transformed into an International standard,
- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

This document is a preview generated by EVS

## INTRODUCTION

The IEC standards concerning insulators for overhead lines and substations are classified into two categories. One is the standard for test methods and acceptance criteria and the other is the product standard in which characteristics of the insulators are specified. Product standards of most insulators, for example cap and pin type, long rod type insulators for overhead lines and station post insulators for substations, are available.

In the case of hollow insulators, test methods and acceptance criteria are standardized in IEC 62155: *Hollow pressurized and unpressurized ceramic and glass insulators for use in electrical equipment with rated voltages greater than 1 000 V*, but there has been no product standard. This seems due to the difference in application among hollow insulators and other insulators. The hollow insulators are usually applied as a component of electrical equipment and other insulators such as cap and pin type or station post insulators are directly applied to the power system as equipment.

There are benefits for standardization of the hollow insulators, even if they are used as components, for insulator manufacturers, equipment manufacturers and final users for the equipment. That is, benefits of cost saving in respect of manufacturing and inventory control, short delivery, interchangeability, etc.

Taking account of every aspect on standardization of the hollow insulators, such as the fact that there are so many designs of electrical equipment, this Technical Specification covers only basic hollow insulators for normal application as a first step towards standardization work. Accordingly, special types of hollow insulators such as barrel type for some circuit-breakers, insulators for pollution and/or seismic areas, etc. are not within the scope of this specification.

Therefore, different hollow insulators not included in this specification can also be applied to the electrical equipment in the case where special characteristics are required, depending on environmental and/or system conditions. There may be the possibility to standardize those hollow insulators as a next step after gathering sufficient information on experiences.

In addition, it should be noted that the characteristics specified here are determined, considering the data collected through the survey on the presently available hollow insulators. There may be the possibility that the survey is not complete and then the hollow insulators not covered by this technical specification can also be applied. Such insulators as widely applied but not covered by this technical specification will be added in the next revision through ascertained experiences.

# CHARACTERISTICS OF HOLLOW PRESSURISED AND UNPRESSURISED CERAMIC AND GLASS INSULATORS FOR USE IN ELECTRICAL EQUIPMENT WITH RATED VOLTAGES GREATER THAN 1000 V

## 1 Scope

This Technical Specification applies to

- ceramic and glass hollow insulators intended for general use in electrical equipment;
- ceramic hollow insulators intended for use with a permanent gas pressure in switchgear and controlgear.

They are intended for indoor and outdoor use in electrical equipment, operating on alternating current with a rated voltage greater than 1 000 V and a frequency not greater than 100 Hz or for use in direct current equipment with a rated voltage greater than 1 500 V.

This specification specifies the dimensional and mechanical characteristics of the hollow insulator, which are essential for interchangeability of the hollow insulator of the same type. It is not the object of this specification to prescribe electrical characteristics because they are dependent on the apparatus of which the hollow insulator ultimately forms a part. However, standard lightning impulse withstand voltage which is provided in IEC 60071-1 is described only for reference for classification purpose.

This specification applies to hollow insulators for use in electrical equipment in clean areas or lightly polluted areas, where seismic qualification is not required. For use in areas characterised by heavy pollution levels and for other particular or extreme environmental conditions such as seismic force, it may be necessary for certain dimensions to be changed.

The hollow insulators covered by this specification are:

- a) straight type hollow insulators with metal fittings on both ends;
- b) taper type hollow insulators with metal fittings on both ends;
- c) straight type hollow insulators without metal fittings;
- d) taper type hollow insulators without metal fittings.

The hollow insulators are intended for use in electrical equipment, for example:

- circuit-breakers;
- instrument transformers;
- surge arresters;
- bushings;
- cable sealing ends;
- switch-disconnectors;
- disconnectors;
- earthing switches;
- capacitors.

There may be some cases that hollow insulators whose design can strongly be influenced by other components of specific equipment, for example, active parts of circuit-breakers. For such cases, the hollow insulators can be separately designed, depending on respective requirements of such equipment and not be covered by this specification.



NOTE 1 Hollow insulators not prescribed in this specification can also be applied to electrical equipment, depending on specific requirements of the equipment. However, if similar insulators are available in this specification, it is preferable to apply them.

NOTE 2 For general recommendations for design and tests of the hollow insulators, see IEC 62155.

NOTE 3 For characteristics of hollow insulators for use in polluted areas, reference can be made to IEC 60815-1 and IEC 60815-2.

## 2 Normative references

The following referenced documents are indispensable for the application 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 62155, *Hollow pressurized and unpressurized ceramic and glass insulators for use in electrical equipment with rated voltages greater than 1000 V*

## 3 Terms and definitions

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

### 3.1

#### **arcing distance**

shortest distance in air external to the insulator between the metallic parts which normally have the operating voltage between them

[IEV 471-01-01]

### 3.2

#### **creepage distance**

shortest distance along the external surface on an insulator between two conductive parts which normally have the operating voltage between them

[IEV 471-01-04, modified]

NOTE 1 The surface of cement or of other non-insulating jointing material is not considered as forming part of the creepage distance.

NOTE 2 If a high resistance coating is applied to parts of the insulating part of an insulator, such parts are considered to be effective insulating surfaces and the distance over them is included in the creepage distance.

NOTE 3 In case of hollow insulators without metal fitting, creepage distance is the shortest distance along the external surface on an insulator between the presumed position of two conductive parts as shown in Figures 3 and 4, unless otherwise agreed between the purchaser and the manufacturer.

### 3.3

#### **end fitting**

integral component or formed part of an insulator, intended to connect it to a supporting structure, or to a conductor, or to an item of equipment, or to another insulator

[IEV 471-01-06]

NOTE Where the end fitting is metallic, the term "metal fitting" is normally used.

### 3.4

#### **hollow insulator**

insulator which is open from end to end, with or without sheds, including end fittings

[IEV 471-01-08]

NOTE 1 A hollow insulator can be made from one or more permanently assembled insulating elements.