

Hollow pressurized and unpressurized ceramic and glass insulators for use in electrical equipment with rated voltages greater than 1000 V (IEC 62155:2003, modified)

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EUROPEAN STANDARD

EN 62155

NORME EUROPÉENNE

EUROPÄISCHE NORM

August 2003

ICS 29.080.10

Supersedes HD 329 S1:1977 & EN 61264:1998

English version

**Hollow pressurized and unpressurized
ceramic and glass insulators
for use in electrical equipment
with rated voltages greater than 1 000 V
(IEC 62155:2003, modified)**

Isolateurs creux avec ou sans pression interne, en matière céramique ou en verre, pour utilisation dans des appareillages prévus pour des tensions nominales supérieures à 1 000 V (CEI 62155:2003, modifiée)

Druckbeanspruchte und drucklose Hohlisolatoren aus keramischem Werkstoff und Glas für Anwendungen in elektrischen Betriebsmitteln mit Nennspannungen über 1 000 V (IEC 62155:2003, modifiziert)

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This European Standard was approved by CENELEC on 2003-05-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Lithuania, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of document 36C/143/FDIS, future edition 1 of IEC 62155, prepared by SC 36C, Insulators for substations, of IEC TC 36, Insulators, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 62155 on 2003-05-01.

A draft amendment, prepared by Reporting Secretariat SR 36C, was submitted to the formal vote and was approved by CENELEC for inclusion into EN 62155 on 2003-05-01.

This European Standard supersedes HD 329 S1:1977, EN 61264:1998 and its corrigendum July 2000.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2004-03-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2006-05-01

Annexes designated "normative" are part of the body of the standard.

Annexes designated "informative" are given for information only.

In this standard, annex ZA is normative and annexes A to D and ZB are informative.

Annexes ZA and ZB have been added by CENELEC.

iTeh STANDARD PREVIEW Endorsement notice (standards.iteh.ai)

The text of the International Standard IEC 62155:2003 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standard indicated:

ISO 9001	NOTE	Harmonized as EN ISO 9001:1994, which is superseded by EN ISO 9001:2000 (ISO 9001:2000) (not modified)
ISO 9002	NOTE	Harmonized as EN ISO 9002:1994 (not modified)
ISO 9003	NOTE	Harmonized as EN ISO 9003:1994 (not modified)
IEC 60672-1	NOTE	Harmonized as EN 60672-1:1995 (not modified)
ISO 9004	NOTE	Harmonized as EN ISO 9004:2000 (not modified)
IEC 60273	NOTE	Harmonized as HD 578 S1:1992 (not modified)
IEC 60437	NOTE	Harmonized as EN 60437:1997 (not modified)
IEC 60507	NOTE	Harmonized as EN 60507:1993 (not modified)

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60672-3	1997	Ceramic and glass-insulating materials Part 3: Specifications for individual materials	EN 60672-3	1997
IEC 60694	1996	Common specifications for high-voltage switchgear and controlgear standards	EN 60694 + corr. May	1996 1999
IEC 60865-1	1993	Short-circuit currents - Calculation of effects Part 1: Definitions and calculation methods	EN 60865-1	1993
IEC 61166	1993	High-voltage alternating current circuit- breakers - Guide for seismic qualification of high-voltage alternating current circuit-breakers	EN 61166	1993
IEC 61463	1996	Bushings - Seismic qualification	-	-
IEC 62271-100	2001	High-voltage switchgear and controlgear Part 100: High-voltage alternating- current circuit-breakers	EN 62271-100	2001
ISO 1460	1992	Metallic coatings - Hot dip galvanized coatings on ferrous metals - Gravimetric determination of the mass per unit area	EN ISO 1460	1994
ISO 1461	1999	Hot dip galvanized coatings on fabricated iron and steel articles - Specifications and test methods	EN ISO 1461	1999
ISO 1463	1982	Metallic and oxide coatings - Measurement of coating thickness - Microscopical method	EN ISO 1463	1994
ISO 2064	1996	Metallic and other inorganic coatings - Definitions and conventions concerning the measurement of thickness	EN ISO 2064	2000
ISO 2178	1982	Non-magnetic coatings on magnetic substrates - Measurement of coating thickness - Magnetic method	EN ISO 2178	1995

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
ISO 4287	1997	Geometrical Product Specifications (GPS) - Surface texture: Profile method - Terms, definitions and surface texture parameters	EN ISO 4287	1998

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Annex ZB
(informative)

A-deviations

A-deviation: national deviation due to regulations, the alteration of which is for the time being outside the competence of the CEN/CENELEC member.

In the relevant CENELEC countries these A-deviations are valid instead of the provision of the European Standard until they have been removed.

<u>Clause</u>	<u>Legal reference + deviation</u>
Italy	
1	(I.S.P.E.S.L. Rules, 95 revision: VSR. 8.B.1; VSR. 8.B.2; M.15.D.2) Italian laws apply to gas pressurized enclosures made of both insulating and metallic materials with a capacity of 25 litres or above, a design pressure higher than 0,05 kg/cm ² and a temperature range: -25 °C/+100 °C (only for insulating materials). Moreover the manufacturer of any electrical equipment which comprehends gas pressurized enclosures must submit the design of the pressurized enclosures itself to a proper legal Authority indicating the stresses and the loads which have any influence on the design itself. For each of the stresses the manufacturer must indicate the design values and the relevant computations.
4 and 5.2.2	(I.S.P.E.S.L. Rules, 95 revision: VSR. 8.B.1 and M.15.D.3. Tab I for porcelain) Only the use of porcelain type "A or S" (Aluminous or Siliceous) is permitted.
6.1.1	(I.S.P.E.S.L. Rules, 95 revision: VSR. 8.B.1 Clause 2) The type test shall be performed in the presence of the Authority Supervisor.
7.2.1 and 8.2	(I.S.P.E.S.L. Rules, 95 revision: VSR. 8.B.2 Clause 2; M.15.D.4) An additional pressure test shall be performed on a complete pressurized enclosure. This has withstand 1,5 times the design pressure without failure for five minutes. Temperature cycles test and electrical test shall be made; after these tests it shall be carried out consecutively the pressure test at pressure $p \geq 4,25$ times the design pressure.
9.2	(I.S.P.E.S.L. Rules, 95 revision: VSR. 8.B.1 subclause 4.1.2) For a homogeneous batch of 100 pieces maximim, one hollow insulator shall be subjected to the failure test with a pressure 4,25 times the pressure design.
10.2	(I.S.P.E.S.L. Rules, 95 revision: M.15.D.4; VSR. 8.B.1 subclause 4.1.2) Routine tests comprise <ul style="list-style-type: none"> • routine temperature cycle test (M.15.D.4), • pressure test on a complete pressurized enclosure, $p = 1,1$ times the design pressure (VSR.8.B.1 subclause 4.1.2).
11.1	(I.S.P.E.S.L. Rules, 95 revision: M.15.D.5) Add the following text: Moreover each hollow insulator body shall be marked with a distinctive letter "A" or "S" for porcelain and with the design pressure.

11.2 (I.S.P.E.S.L. Rules, 95 revision: M.15.D.6; VSR. 8.B.1)

The insulator manufacturer shall be provided with certificates containing the information reported in I.S.P.E.S.L. Rules, 95 revision: M.15.D.6, and the equipment manufacturer with certificates containing the information reported in I.S.P.E.S.L. Rules, 95 revision: VSR. 8.B.1.

I.S.P.E.S.L.: Istituto Superiore per la Prevenzione e la Sicurezza del Lavoro.

NOTE A.N.C.C. (Associazione Nazionale per il Controllo della Combustione) was replaced by I.S.P.E.S.L.

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NORME
INTERNATIONALE
INTERNATIONAL
STANDARD

CEI
IEC

62155

Première édition
First edition
2003-05

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Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

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For price, see current catalogue*

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**HOLLOW PRESSURIZED AND UNPRESSURIZED CERAMIC
AND GLASS INSULATORS FOR USE IN ELECTRICAL EQUIPMENT
WITH RATED VOLTAGES GREATER THAN 1000 V**

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The 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 the 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 National Committees.
- 3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
- 4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.
- 5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.
- 6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 62155 has been prepared by subcommittee 36C: Insulators for substations, of IEC technical committee 36: Insulators.

This International Standard cancels and replaces the second edition of IEC 60233, published in 1974, and the second edition of IEC 61264, published in 1998, and constitutes a technical revision of IEC 60233.

The text of this standard is based on the following documents:

FDIS	Report on voting
36C/143/FDIS	36C/145/RVD

Full information on the voting for the approval of this standard 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 2007. At this date, the publication will be

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

HOLLOW PRESSURIZED AND UNPRESSURIZED CERAMIC AND GLASS INSULATORS FOR USE IN ELECTRICAL EQUIPMENT WITH RATED VOLTAGES GREATER THAN 1000 V

1 Scope and object

1.1 General

This standard is applicable 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.

These insulators are intended for indoor and outdoor use in electrical equipment, operating on alternating current with a rated voltage greater than 1000 V and a frequency not greater than 100 Hz or for use in direct-current equipment with a rated voltage of greater than 1500 V.

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

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

It is not the object of this standard to prescribe dielectric type tests because the withstand voltages are not characteristics of the hollow insulator itself but of the apparatus of which it ultimately forms a part.

1.2 Hollow insulators or hollow insulator bodies intended for general use

Hollow insulators or insulator bodies of ceramic material or glass, intended for use

- without pressure;
- with permanent pressure ≤ 50 kPa gauge;
- with permanent gas pressure > 50 kPa gauge in combination with an internal volume < 1 l (1000 cm³);
- with permanent hydraulic pressure.

The object of this standard is to define

- the terms used;
- the mechanical and dimensional characteristics of hollow insulators and hollow insulator bodies;
- the electrical soundness of the wall;
- the conditions under which the specified values of these characteristics are verified;
- the methods of test;
- the acceptance criteria.

1.3 Ceramic hollow insulators intended for use with permanent gas pressure

Hollow insulators or hollow insulator bodies with their fixing devices, intended for use with permanent gas pressure: permanent gas pressure >50 kPa gauge in combination with an internal volume ≥ 1 l (1 000 cm³).

NOTE 1 The gas can be dry air, inert gases, for example, SF₆ or nitrogen or a mixture of such gases.

The object of this standard is to define

- the terms used;
- the mechanical and dimensional characteristics of hollow insulators and hollow insulator bodies;
- the electrical soundness of the wall;
- the conditions under which the specified values of these characteristics are verified;
- the methods of test;
- the acceptance criteria;
- design rules;
- test procedures and test values.

NOTE 2 Hollow insulators or hollow insulator bodies are usually integrated into electrical equipment which is electrically type tested as required by the equipment standard.

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 60672-3:1997, *Ceramic and glass insulating materials – Part 3: Specifications for individual materials*

IEC 60694:1996, *Common specifications for high-voltage switchgear and controlgear standards*

IEC 60865-1:1993, *Short-circuit currents – Calculation of effects – Part 1: Definitions and calculation methods*

IEC 61166:1993, *High-voltage alternating current circuit-breakers – Guide for seismic qualification of high-voltage alternating current circuit-breakers*

IEC 61463:1996, *Bushings – Seismic qualification*

IEC 62271-100:2001, *High-voltage switchgear and controlgear – Part 100: High-voltage alternating-current circuit-breakers*

ISO 1460:1992, *Metallic coatings – Hot dip galvanized coatings on ferrous metals – Gravimetric determination of the mass per unit area*

ISO 1461:1999, *Hot dip galvanized coatings on fabricated iron and steel articles – Specifications and test methods*

ISO 1463:1982, *Metal and oxide coatings – Measurement of coating thickness – Microscopical method*

ISO 2064:1996, *Metallic and other inorganic coatings – Definitions and conventions concerning the measurement of thickness*

ISO 2178:1982, *Non-magnetic coatings on magnetic substrates – Measurement of coating thickness – Magnetic method*

ISO 4287:1997, *Geometrical Product Specifications (GPS) – Surface texture: Profile method – Terms, definitions and surface texture parameters*

3 Terms and definitions

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

NOTE Some of the definitions cited below are taken from IEC 60050(471), modified or unmodified.

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3.1

hollow insulator body

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hollow insulating body, which is open from end to end, with or without sheds, not including the fixing devices or end fittings

3.2

hollow insulator

hollow insulating part, which is open from end to end, with or without sheds, including the fixing devices or end fittings

[IEV 471-01-17, modified]

NOTE This is a general term which also covers the definitions 3.4, 3.5 and 3.6.

3.3

fixing device end fitting

device forming part of a hollow insulator, intended to connect it to a supporting structure or to an item of equipment, or to another insulator

NOTE Where the fixing device is metallic, the term “metal fitting” is also used.

[IEV 471-01-02, modified]

3.4

hollow post insulator

hollow post insulator, which consists of one hollow post insulator unit or an assembly of more units and is intended to give support to a live part, which is to be insulated from earth or from another live part