

SLOVENSKI STANDARD

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SIST EN 60137:1997

Insulated bushings for alternating voltages above 1000 V (IEC 60137:2003)

Insulated bushings for alternating voltages above 1 000 V

Isolierte Durchführungen für Wechselspannung über 1 000 V

Traversées isolées pour tensions alternatives supérieures à 1 000 V

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Ta slovenski standard je istoveten z: EN 60137:2003

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29.080.20 Skoznjiki Bushings

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EUROPEAN STANDARD

EN 60137

NORME EUROPÉENNE

EUROPÄISCHE NORM

November 2003

ICS 29.080.20

Supersedes EN 60137:1996

English version

**Insulated bushings for alternating voltages above 1 000 V
(IEC 60137:2003)**

Traversées isolées pour tensions
alternatives supérieures à 1 000 V
(CEI 60137:2003)

Isolierte Durchführungen für
Wechselspannung über 1 000 V
(IEC 60137:2003)

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This European Standard was approved by CENELEC on 2003-10-01. 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 36A/111/FDIS, future edition 5 of IEC 60137, prepared by SC 36A, Insulated bushings, of IEC TC 36, Insulators, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60137 on 2003-10-01.

This European Standard supersedes EN 60137:1996.

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) 2004-07-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2006-10-01

This edition includes the following significant technical changes with respect to EN 60137:1996:

- standard values of highest voltage for equipment of 550 kV and 800 kV to replace 525 kV and 765 kV;
- consideration of the development in the use of non-ceramic insulating envelopes and to special requirements for bushings used in air-insulated ducting;
- special requirements for bushings fitted to transformers.

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

In this standard, annex ZA is normative.

Annex ZA has been added by CENELEC.

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Endorsement notice

The text of the International Standard IEC 60137:2003 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 standards indicated:

IEC 60076-1	NOTE	Harmonized as EN 60076-1:1997 (modified).
IEC 60076-2	NOTE	Harmonized as EN 60076-2:1997 (modified).
IEC 60076-3	NOTE	Harmonized as EN 60076-3:2001 (not modified).
IEC 60517	NOTE	Harmonized as HD 358 S3:1992 (not modified).
IEC 60694	NOTE	Harmonized as EN 60694:1996 (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 60038 (mod)	1983	IEC standard voltages ¹⁾	HD 472 S1	1989
A2	1997		+ corr. February	1992
			-	-
IEC 60050-212	1990	International Electrotechnical Vocabulary (IEV) Chapter 212: Insulating solids, liquids and gases	-	-
IEC 60059	1999	IEC standard current ratings	EN 60059	1999
IEC 60060-1	1989	High-voltage test techniques		
+ corr. March	1990	Part 1: General definitions and test requirements	HD 588.1 S1	1991
IEC 60068-2-17	1994	Environmental testing Part 2: Tests - Test Q: Sealing	EN 60068-2-17	1994
IEC 60071-1	1993	Insulation co-ordination Part 1: Definitions, principles and rules	EN 60071-1	1995
IEC 60076-5	2000	Power transformers Part 5: Ability to withstand short circuit	EN 60076-5	2000
IEC 60216-2	1990	Guide for the determination of thermal endurance properties of electrical insulating materials Part 2: Choice of test criteria	HD 611.2 S1	1992
IEC 60270	2000	High-voltage test techniques - Partial discharge measurements	EN 60270	2001
IEC 60354	1991	Loading guide for oil-immersed power transformers	-	-
IEC 60505	1999	Evaluation and qualification of electrical insulation systems	EN 60505	2000

¹⁾ The title of HD 472 S1 is: Nominal voltages for low-voltage public electricity supply systems.

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<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60507	1991	Artificial pollution tests on high-voltage insulators to be used on a.c. systems	EN 60507	1993
IEC 60815	1986	Guide for the selection of insulators in respect of polluted conditions	-	-
IEC/TS 61462	1998	Composite insulators - Hollow insulators for use in outdoor and indoor electrical equipment - Definitions, test methods, acceptance criteria and design recommendations	-	-
IEC 61463	1996	Bushings - Seismic qualification	-	-
IEC 62155 (mod)	2003	Hollow pressurized and unpressurized ceramic and glass insulators for use in electrical equipment with rated voltages greater than 1 000 V	EN 62155	2003

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Traversées isolées pour tensions alternatives
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Insulated bushings for alternating voltages
above 1 000 V

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International Electrotechnical Commission
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

INSULATED BUSHINGS FOR ALTERNATING VOLTAGES
ABOVE 1 000 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, 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.
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- 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.

International Standard IEC 60137 has been prepared by sub-committee 36A: Insulated bushings, of IEC technical committee 36: Insulators.

This fifth edition cancels and replaces the fourth edition, published in 1995, and constitutes a technical revision.

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

- standard values of highest voltage for equipment of 550 kV and 800 kV to replace 525 kV and 765 kV;
- consideration of the development in the use of non-ceramic insulating envelopes and to special requirements for bushings used in air-insulated ducting;
- special requirements for bushings fitted to transformers.

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

FDIS	Report on voting
36A/111/FDIS	36A/114/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 2003. At this date, the publication will be

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

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INTRODUCTION

To reflect the current usage of the term “composite bushing”, the definition has been changed to mean a bushing with an insulating envelope consisting of a resin impregnated fibre tube with rubber compound covering. The previous definition of a multi-dielectric bushing is given the term “combined insulation bushing”.

For bushings operating in air-insulated ducting, locally high ambient air temperatures have a significant effect on their current rating. This edition defines a limit to this temperature and specifies corresponding test conditions.

The term “highest voltage for equipment” is introduced into this standard in preference to “rated voltage”. This change is in line with other equipment standards.

Gas-insulated and gas-impregnated bushings have become a mature technology, for use in gas insulated switchgear. Limiting values for temperature rise and dielectric dissipation factor have therefore been introduced.

The special requirements addressed for bushings fitted to transformer have not been considered necessary for bushings fitted to switchgear or used for other applications. A high level of integrity is needed to ensure that the bushing will not fail, or be the initiator of internal flashover in the transformer under test. Dry power-frequency withstand test voltage levels for transformers bushings should be increased according to 9.3. Extension of the range of application of lightning impulse and switching impulse tests included in IEC 60076-3, is not considered technically or commercially justified for bushing routine or type tests.

The dynamic current withstand test is not mentioned in the text, because insufficient experience has so far been collected to design a realistic test.

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INSULATED BUSHINGS FOR ALTERNATING VOLTAGES ABOVE 1 000 V

1 Scope

This International Standard specifies the characteristics and tests for insulated bushings.

This standard is applicable to bushings, as defined in Clause 3, intended for use in electrical apparatus, machinery, transformers, switchgear and installations for three-phase alternating current systems, having highest voltage for equipment above 1 000 V and power frequencies of 15 Hz up to and including 60 Hz.

Subject to special agreement between purchaser and supplier, this standard may be applied, in part or as a whole, to the following:

- bushings used in other than three-phase systems;
- bushings for high-voltage, direct current systems;
- bushings for testing transformers;
- terminals for power cables (potheads);
- bushings for capacitors.

Special requirements and tests for transformer bushings in this standard apply also to reactor bushings.

[SIST EN 60137:2004](https://standards.iteh.ai/catalog/standards/sist/en-60137-2004)

This standard is applicable to bushings made and sold separately. Bushings which are a part of an apparatus and which cannot be tested according to this standard, should be tested with the apparatus of which they form part.

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 60038:1983, *IEC standard voltages*
Amendment 2 (1997)

IEC 60050(212):1990, *International Electrotechnical Vocabulary (IEV) – Chapter 212: Insulating solids, liquids and gases*

IEC 60059:1999, *IEC standard current ratings*

IEC 60060-1:1989, *High-voltage test techniques – Part 1: General definitions and test requirements*

IEC 60068-2-17:1994, *Basic environmental testing procedures – Part 2: Tests – Test Q: Sealing*

IEC 60071-1:1993, *Insulation co-ordination – Part 1: Definitions, principles and rules*

IEC 60076-5:2000, *Power transformers – Part 5: Ability to withstand short circuit*

IEC 60216-2:1990, *Guide for the determination of thermal endurance properties of electrical insulating materials – Part 2: Choice of test criteria*

IEC 60270:2000, *High-voltage test techniques – Partial discharge measurements*

IEC 60354:1991, *Loading guide for oil-immersed power transformers*

IEC 60505:1999, *Evaluation and qualification of electrical insulation systems*

IEC 60507:1991, *Artificial pollution tests on high-voltage insulators to be used on a.c. systems*

IEC 60815:1986, *Guide for the selection of insulators in respect of polluted conditions*

IEC 61462:1998, *Composite insulators – Hollow insulators for use in outdoor and indoor electrical equipment – Definitions, test methods, acceptance criteria and design recommendations*

IEC 61463:1996, *Bushings – Seismic qualification*

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

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3 Terms and definitions

SIST EN 60137:2004

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

3.1

bushing

device that enables one or several conductors to pass through a partition such as a wall or a tank, and insulates the conductors from it. The means of attachment (flange or fixing device) to the partition forms part of the bushing

[IEV 471-02-01, modified]

NOTE 1 The conductor may form an integral part of the bushing or be drawn into the central tube of the bushing.

NOTE 2 The bushing may be of the types as prescribed in 3.2 to 3.21.

3.2

liquid-filled bushing

bushing in which the space between the inside surface of the insulating envelope and the solid major insulation is filled with oil

3.3

compound-filled bushing

bushing in which the space between the inside surface of the insulating envelope and the solid major insulation is filled with an insulating compound