



SLOVENSKI STANDARD

SIST EN 60112:2004

01-april-2004

Nadomešča:
SIST HD 214 S2:1998

Metoda za ugotavljanje preskusnih in primerjalnih indeksov ustvarjanja prevodnih poti trdnih izolacijskih materialov (IEC 60112:2003)

Method for the determination of the proof and the comparative tracking indices of solid insulating materials

Verfahren zur Bestimmung der Prüfzahl und der Vergleichszahl der Kriechwegbildung von festen, isolierenden Werkstoffen

Méthode de détermination des indices de résistance et de tenue au cheminement des matériaux isolants solides

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Ta slovenski standard je istoveten z: EN 60112:2003

ICS:

29.035.01	Izolacijski materiali na splošno	Insulating materials in general
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en

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EUROPEAN STANDARD

EN 60112

NORME EUROPÉENNE

EUROPÄISCHE NORM

March 2003

ICS 19.080; 29.035.01

Supersedes HD 214 S2:1980

English version

**Method for the determination of the proof
and the comparative tracking indices
of solid insulating materials
(IEC 60112:2003)**

Méthode de détermination des indices
de résistance et de tenue
au cheminement des matériaux isolants
solides
(CEI 60112:2003)

Verfahren zur Bestimmung der Prüfzahl
und der Vergleichszahl
der Kriechwegbildung von festen,
isolierenden Werkstoffen
(IEC 60112:2003)

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This European Standard was approved by CENELEC on 2003-03-01. 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, 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 15E/209/FDIS, future edition 4 of IEC 60112, prepared by SC 15E, Methods of test, of IEC TC 15, Insulating materials, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60112 on 2003-03-01.

This European Standard supersedes HD 214 S2:1980.

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) 2003-12-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2006-03-01

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 and B are informative.
Annex ZA has been added by CENELEC.

iTeh STANDARD PREVIEW (**Endorsement notice**)

The text of the International Standard IEC 60112:2003 was approved by CENELEC as a European Standard without any modification.

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In the official version, for Bibliography, the following note has to be added for the standard indicated:

IEC 60587 NOTE Harmonized as HD 380 S2:1987 (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 60589	1977	Methods of test for the determination of ionic impurities in electrical insulating materials by extraction with liquids	HD 381 S1	1979
IEC Guide 104	1997	The preparation of safety publications and the use of basic safety publications and group safety publications	-	-
ISO 293	1986	Plastics - Compression moulding of test specimens of thermoplastic materials	-	-
ISO 294-1	1996	Plastics - Injection moulding of test specimens of thermoplastic materials Part 1: General principles, and moulding of multipurpose and bar test specimens	-	-
ISO 294-3	2002	Part 3: Small plates	-	-
ISO 295	1991	Plastics - Compression moulding of test specimens of thermosetting materials	-	-

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IEC 60112

Edition 4.0 2003-01

INTERNATIONAL STANDARD

NORME INTERNATIONALE

BASIC SAFETY PUBLICATION

PUBLICATION FONDAMENTALE DE SÉCURITÉ

Method for the determination of the proof and the comparative tracking indices
of solid insulating materials

Méthode de détermination des indices de résistance et de tenue au
cheminement des matériaux isolants solides

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

PRICE CODE
CODE PRIX

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CONTENTS

FOREWORD.....	5
1 Scope	9
2 Normative references.....	9
3 Terms and definitions.....	11
4 Principle	13
5 Test specimen	13
6 Test specimen conditioning.....	15
6.1 Environmental conditioning.....	15
6.2 Test specimen surface state.....	15
7 Test apparatus.....	15
7.1 Electrodes	15
7.2 Test circuit	17
7.3 Test solutions.....	17
7.4 Dropping device	19
7.5 Test specimen support platform.....	19
7.6 Electrode assembly installation	19
8 Basic test procedure.....	21
8.1 General.....	21
8.2 Preparation	21
8.3 Test procedure.....	23
9 Determination of erosion.....	23
10 Determination of proof tracking index (PTI).....	23
10.1 Procedure	23
10.2 Report	25
11 Determination of comparative tracking index (CTI).....	25
11.1 General.....	25
11.2 Determination of the 100 drop point.....	25
11.3 Determination of the maximum 50 drop withstand voltage	27
11.4 Report.....	29
Annex A (informative) List of factors that should be considered by product committees	37
Annex B (informative) Electrode material selection	39
Bibliography.....	41
Figure 1 – Electrode	33
Figure 2 – Electrode / specimen arrangement.....	33
Figure 3 – Example of typical electrode mounting and specimen support.....	35
Figure 4 – Example of test circuit.....	35

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**METHOD FOR THE DETERMINATION OF THE PROOF
AND THE COMPARATIVE TRACKING INDICES
OF SOLID INSULATING MATERIALS**

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 60112 has been prepared by subcommittee 15E: Methods of test, of IEC technical committee 15: Insulating materials.

This fourth edition cancels and replaces the third edition, published in 1979, of which it constitutes a technical revision.

Major changes since the previous edition are the following:

The selection of a material for a specific application frequently involves compromises in the levels of the individual properties and test criteria. In the previous edition of IEC 60112 the test criteria required "no burning of the specimen", but this gave rise to two issues:

- difficulties in the identification of burning which includes all types of combustion, e.g. flaming, and smouldering in the situation where scintillations had occurred giving rise in many cases to carbon on the surface of the specimen, and
- a situation in which some product committees had found it necessary to dispense with the "no burning" criterion in the tracking tests which they replaced by flame tests on the final product, thereby giving rise to two types of CTI/PTI with different criteria.

This standard attempts to regularize this situation.

It has the status of a basic safety publication in accordance with IEC Guide 104.

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

FDIS	Report on voting
15E/209/FDIS	15E/213/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 2015. At this date, the publication will be

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

The contents of the corrigenda of June 2003 and October 2003 have been included in this copy.

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METHOD FOR THE DETERMINATION OF THE PROOF AND THE COMPARATIVE TRACKING INDICES OF SOLID INSULATING MATERIALS

1 Scope

This International standard specifies the method of test for the determination of the proof and comparative tracking indices of solid insulating materials on pieces taken from parts of equipment and on plaques of material using alternating voltages.

The standard provides for the determination of erosion when required.

NOTE 1 The proof tracking index is used as an acceptance criterion as well as a means for the quality control of materials and fabricated parts. The comparative tracking index is mainly used for the basic characterization and comparison of the properties of materials.

Test results cannot be used directly for the evaluation of safe creepage distances when designing electrical apparatus.

NOTE 2 This test discriminates between materials with relatively poor resistance to tracking, and those with moderate or good resistance, for use in equipment which can be used under moist conditions. More severe tests, of longer duration are required for the assessment of performance of materials for outdoor use, utilizing higher voltages and larger test specimens (see the inclined plane test of IEC 60587). Other test methods such as the inclined method may rank materials in a different order from the drop test given in this 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 60589:1977, *Methods of test for the determination of ionic impurities in electrical insulating materials by extraction with liquids*

IEC Guide 104:1997, *The preparation of safety publications and the use of basic safety publications and group safety publications*

ISO 293:1986, *Plastics – Compression moulding test specimens of thermoplastic materials*

ISO 294-1:1996, *Plastics – Injection moulding of test specimens of thermoplastic materials – Part 1: General principles, and moulding of multi-purpose and bar test specimens*

ISO 294-3:2002, *Plastics – Injection moulding of test specimens of thermoplastic materials – Part 3: Small plates*

ISO 295:1991, *Plastics – Compression moulding of test specimens of thermosetting materials*

3 Terms and definitions

For the purposes of this International Standard, the following definitions apply:

3.1

tracking

progressive formation of conducting paths, which are produced on the surface and/or within a solid insulating material, due to the combined effects of electric stress and electrolytic contamination

3.2

tracking failure

failure of insulation due to tracking between conducting parts

NOTE In the present test, tracking is indicated by operation of an over-current device due to the passage of a current of at least 0,5 A for at least 2 s across the test surface and/or within the specimen.

3.3

electrical erosion

wearing away of insulating material by the action of electrical discharges

3.4

air arc

arc between the electrodes above the surface of the specimen

3.5

comparative tracking index

CTI

numerical value of the maximum voltage at which five test specimens withstand the test period for 50 drops without tracking failure and without a persistent flame occurring and including also a statement relating to the behaviour of the material when tested using 100 drops (see 11.4)

NOTE 1 The criteria for CTI may also require a statement concerning the degree of erosion.

NOTE 2 Although a non-persistent flame is allowed in the test without constituting failure, materials which generate no flame at all are preferred unless other factors are considered to be more important. See also Annex A.

3.6

persistent flame

in case of dispute – one which burns for more than 2 s

3.7

proof tracking index

PTI

numerical value of the proof voltage in volts at which five test specimens withstand the test period for 50 drops without tracking failure and without a persistent flame occurring

NOTE Although a non-persistent flame is allowed in the test without constituting failure, materials which generate no flame at all are preferred unless other factors are considered to be more important. See also Annex A.