

INTERNATIONAL STANDARD



BASIC SAFETY PUBLICATION

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



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67 000 electrotechnical terminology entries in English and French extracted from the Terms and definitions clause of IEC publications issued between 2002 and 2015. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.



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**Method for the determination of the proof and the comparative tracking indices
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

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This commented version (CMV) of the official standard IEC 60112:2020 edition 5.0 allows the user to identify the changes made to the previous edition IEC 60112:2003 +AMD1:2009 CSV edition 4.1. Furthermore, comments from IEC TC 112 experts are provided to explain the reasons of the most relevant changes.

A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text. Experts' comments are identified by a blue-background number. Mouse over a number to display a pop-up note with the comment.

This publication contains the CMV and the official standard. The full list of comments is available at the end of the CMV.

International Standard IEC 60112 has been prepared by IEC technical committee 112: Evaluation and qualification of electrical insulating materials and systems.

This fifth edition cancels and replaces the fourth edition published in 2003 and Amendment 1:2009. This edition constitutes a technical revision.

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

- Introduction of a new contaminant, solution C with a surfactant aligned with the test method of IEC 60587. The definition of the solution B was transferred to Annex B for backward reference.
- Introduction of a screening test, considering the fact that some materials can withstand high test voltages, but fail at lower test voltages.

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

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

FDIS	Report on voting
112/479/FDIS	112/484/RVD

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

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

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://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.

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

1 Scope

This document 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 voltage.

This document provides a procedure **1** 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.

This test method evaluates the composition of the material as well as the surface of the material being evaluated. Both the composition and surface condition directly influence the results of the evaluation and are considered when using the results in material selection process. **2**

Test results ~~cannot be used~~ are not directly suitable **3** for the evaluation of safe creepage distances when designing electrical apparatus.

NOTE 2 This is in compliance with IEC 60664-1, *Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests*. **4**

NOTE 3 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~~ available **5** 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~~ can rank materials in a different order from the drop test given in this document. **6**

This basic safety publication focusing on a safety test method is primarily intended for use by technical committees in the preparation of safety publications in accordance with the principles laid down in IEC Guide 104 and ISO/IEC Guide 51.

One of the responsibilities of a technical committee is, wherever applicable, to make use of basic safety publications in the preparation of its publications. **7**

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 Guide 104:1997, The preparation of safety publications and the use of basic safety publications and group safety publications~~ **8**

~~ISO 293:1986, Plastics – Compression moulding test specimens of thermoplastic materials~~ **9**

~~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~~ **10**

~~ISO 294-3:2002, Plastics – Injection moulding of test specimens of thermoplastic materials – Part 3: Small plates~~ **11**

~~ISO 295:1991, Plastics — Compression moulding of test specimens of thermosetting materials~~ 12

ISO 4287, Geometrical Product Specifications (GPS) – Surface texture: Profile method – Terms, definitions and surface texture parameters 13

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org>
- ISO Online browsing platform: available at <http://www.iso.org/obp> 14

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~~ conductive 15 parts

Note 1 to entry: 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~~ 16 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 (in V) 17 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 11.3)

Note 1 to entry: No tracking failure and no persistent flame are allowed at any lower test voltage. 18

Note 2 to entry: The criteria for CTI may also require a statement concerning the degree of erosion.

Note 3 to entry: 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.

Note 4 to entry: Some materials can withstand high test voltages, but fail at lower test voltages. See also 11.2. 19

3.6

persistent flame

~~in case of dispute — one~~ flame 20 which burns for more than 2 s