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INTERNATIONAL STANDARD

NORME INTERNATIONALE

Electric strength of insulating materials – Test methods – Part 1: Tests at power frequencies

Rigidité diélectrique des matériaux isolants – Méthodes d'essai – Partie 1: Essais aux fréquences industrielles

IEC 60243-1:2013

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ELECTRIC STRENGTH OF INSULATING MATERIALS – TEST METHODS –

Part 1: Tests at power frequencies

FOREWORD

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International Standard IEC 60243-1 has been prepared by technical committee 112: Evaluation and qualification of electrical insulating materials and systems.

This third edition cancels and replaces the second edition, published in 1998, and constitutes a technical revision.

The significant technical change with respect to the previous edition is that the current version now includes an option for testing elastomeric materials.

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

FDIS	Report on voting
112/237/FDIS	112/248/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.

A list of all the parts in the IEC 60243 series, published under the general title *Electric strength of insulating materials – Test methods,* can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability 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

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- withdrawn,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

ELECTRIC STRENGTH OF INSULATING MATERIALS – TEST METHODS –

Part 1: Tests at power frequencies

1 Scope

This part of IEC 60243 provides test methods for the determination of short-time electric strength of solid insulating materials at power frequencies between 48 Hz and 62 Hz.

This standard does not cover the testing of liquids and gases, although these are specified and used as impregnates or surrounding media for the solid insulating materials being tested.

NOTE Methods for the determination of breakdown voltages along the surfaces of solid insulating materials are included.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60212, *Standard conditions for use prior to and during the testing of solid electical insulating materials*

IEC 60296, *Fluids for electrotechnical applications – Unused mineral insulating oils for transformers and switchgear*

IEC 60455-2, *Specification for solventless polymerizable resinous compounds used for electrical insulation – Part 2: Methods of test*

IEC 60464-2, *Varnishes used for electrical insulation – Part 2: Methods of test*

IEC 60684-2, *Flexible insulating sleeving – Part 2: Methods of test*

IEC 60836, *Specifications for unused silicone insulating liquids for electrotechnical purposes*

IEC 61099, *Insulating liquids – Specifications for unused synthetic organic esters for electrical purposes*

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

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

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

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

ISO 10724 (all parts), *Plastics – Injection moulding of test specimens of thermosetting powder moulding compounds (PMCs)*

3 Terms and definitions

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

3.1
electric breakdown
severe loss of the insulating properties of test specimens while exposed to electric stress, which causes the current in the test circuit to operate an appropriate circuit-breaker

Note 1 to entry: Breakdown is often caused by partial discharges in the gas or liquid medium surrounding the test specimen and the electrodes which puncture the specimen beyond the periphery of the smaller electrode (or of both electrodes, if of equal diameter).

3.2
flashover
loss of the insulating properties of the gas or liquid medium surrounding a test specimen and electrodes while exposed to electric stress, which causes the current in the test circuit to operate an appropriate circuit-breaker

Note 1 to entry: The presence of carbonized channels or punctures through the specimen distinguishes tests where breakdown occurred, from others where flashover occurred.

3.3
breakdown voltage

3.3.1
< tests with continuously rising voltage > voltage at which a specimen suffers breakdown under the prescribed test conditions

3.3.2
< step-by-step tests > highest voltage which a specimen withstands without breakdown for the duration of the time at that voltage level

3.4
electric strength
quotient of the breakdown voltage and the distance between the electrodes between which the voltage is applied under the prescribed test conditions

Note 1 to entry: The distance between the test electrodes is determined as specified in 5.5, unless otherwise specified.

4 Significance of the test

Electric strength test results obtained in accordance with this standard are useful for detecting changes or deviations from normal characteristics resulting from processing variables, ageing conditions or other manufacturing or environmental situations. However, they are not intended for use in evaluating the behaviour of insulating materials in an actual application.

Measured values of the electric strength of a material may be affected by many factors, including:

a) Condition of test specimens
   1) the thickness and homogeneity of the specimen and the presence of mechanical strain;
   2) previous conditioning of the specimens, in particular drying and impregnation procedures;