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Insulating liquids - Determination of the breakdown voltage at power frequency - Test method

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

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English Version

Insulating liquids - Determination of the breakdown voltage at power frequency - Test method (IEC 60156:2025)

Isolants liquides - Détermination de la tension de claquage à fréquence industrielle - Méthode d'essai
(IEC 60156:2025)

Isolierflüssigkeiten - Bestimmung der Durchschlagsspannung bei Netzfrequenz - Prüfverfahren
(IEC 60156:2025)

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European foreword

The text of document 10/1241/FDIS, future edition 4 of IEC 60156, prepared by TC 10 "Fluids for electrotechnical applications" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 60156:2025.

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IEC 60060-3	NOTE	Approved as EN 60060-3
IEC 60052:2002	NOTE	Approved as EN 60052:2002 (not modified)
IEC 60060-2:2010	NOTE	Approved as EN 60060-2:2011 (not modified)
ISO 21920-2:2021	NOTE	Approved as EN ISO 21920-2:2022 (not modified)
IEC 60296	NOTE	Approved as EN IEC 60296
IEC 60422	NOTE	Approved as EN IEC 60422

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Insulating liquids – Determination of the breakdown voltage at power frequency – Test method

Isolants liquides – Détermination de la tension de claquage à fréquence industrielle – Méthode d'essai



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IEC Secretariat
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

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INTERNATIONAL STANDARD

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**INSULATING LIQUIDS – DETERMINATION OF THE BREAKDOWN
VOLTAGE AT POWER FREQUENCY – TEST METHOD**

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IEC 60156 has been prepared by IEC technical committee 10: Fluids for electrotechnical applications. It is an International Standard.

This fourth edition cancels and replaces the third edition published in 2018. This edition constitutes a technical revision.

This edition constitutes a technical revision and, mainly, confirms the content of the previous edition even if some advances are included. The test method has not been changed for practical reasons, due to the very large number of instrumentations disseminated around the world.

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

Draft	Report on voting
10/1241/FDIS	10/1256/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

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- reconfirmed,
- withdrawn, or
- revised.

INTRODUCTION

As normally applied, breakdown voltage of insulating liquids is not a basic material property but an empirical test procedure intended to indicate the presence of contaminants such as water and solid suspended matter and the advisability of carrying out drying and filtration treatment.

The AC breakdown voltage value of insulating liquids strongly depends on the particular set of conditions used in its measurement. Therefore, standardized testing procedures and equipment are essential for the unambiguous interpretation of test results.

The method described in this document applies to either acceptance tests on new deliveries of insulating liquids or testing of treated liquids prior to or during filling into electrical equipment, or to the monitoring and maintenance of insulating liquid-filled apparatus in service. It specifies rigorous sample-handling procedures and temperature control that should be adhered to when certified results are required. For routine tests, especially in the field, less stringent procedures may be practicable, and it is the responsibility of the user to determine their effect on the results.

Annex A describes, for comparison, an alternative test method which could be introduced in the future. Annex B describes special test methods, using cells which may include low volume samples. Annex C describes a reference material for a performance test and check according to IEC 60060-3 [1]¹.

¹ Numbers in square brackets refer to the Bibliography.

INSULATING LIQUIDS – DETERMINATION OF THE BREAKDOWN VOLTAGE AT POWER FREQUENCY – TEST METHOD

1 Scope

This document specifies the method for determining the dielectric breakdown voltage of insulating liquids at power frequency. The test procedure is performed in a specified apparatus, where the oil sample is subjected to an increasing AC electrical field until breakdown occurs. The method applies to all types of insulating liquids of nominal viscosity up to 350 mm²/s at 40 °C. It is appropriate both for acceptance testing on unused liquids at the time of their delivery and for establishing the condition of samples taken in monitoring and maintenance of equipment.

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 60475, *Method of sampling insulating liquids*

3 Terms and definitions

No terms and definitions are listed in this document.

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

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

4 Electrical apparatus

4.1 General

The electrical apparatus consists of the following units:

- 1) voltage regulator,
- 2) step-up transformer,
- 3) switching system,
- 4) current-limiting resistors,
- 5) measuring device.

Two or more of these units may be integrated in any equipment system.

4.2 Voltage regulator

The test voltage shall be increased with an automatic control of the required uniform voltage rate of rise. The device should not introduce harmonics disturbances (< 3 %) and the AC source should be free from harmonics.