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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

IEC 60156:2018-08(en-fr)

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

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, Publicly Available Specifications (PAS) 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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International Standard IEC 60156 has been prepared by IEC technical committee TC 10: Fluids for electrotechnical applications.

This third edition cancels and replaces the second edition published in 1995. 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 reason due to the very large number of instrumentation disseminated around the world, although the use of stirring is now recommended.

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

FDIS	Report on voting
10/1061/FDIS	10/1065/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.

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 a 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 oil-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 (informative) describes, for comparison, an alternative test method which could be introduced in the future. Annex B (informative) describes special test methods, using cells which may include low volume samples. Annex C (informative) 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 mm^2/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 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

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.