



Designation: D3382 – 24

Standard Test Methods for Measurement of Energy and Integrated Charge Transfer Due to Partial Discharges (Corona) Using Bridge Techniques¹

This standard is issued under the fixed designation D3382; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope*

1.1 These test methods cover two bridge techniques for measuring the energy and integrated charge of pulse and pseudoglow partial discharges:

1.2 Test Method A makes use of capacitance and loss characteristics such as measured by the transformer ratio-arm bridge or the high-voltage Schering bridge (Test Methods **D150**). Test Method A has been found useful to obtain the integrated charge transfer and energy loss due to partial discharges in a dielectric from the measured increase in capacitance and $\tan \delta$ with voltage. (See also IEEE 286 and IEEE 1434)

1.3 Test Method B makes use of a somewhat different bridge circuit, identified as a charge-voltage-trace (parallelogram) technique, which indicates directly on an oscilloscope the integrated charge transfer and the magnitude of the energy loss due to partial discharges.

1.4 Both test methods are intended to supplement the measurement and detection of pulse-type partial discharges as covered by Test Method **D1868**, by measuring the sum of both pulse and pseudoglow discharges per cycle in terms of their charge and energy.

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.* Specific precaution statements are given in Section 7.

1.6 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

¹ These test methods are under the jurisdiction of ASTM Committee **D09** on Electrical and Electronic Insulating Materials and are the direct responsibility of Subcommittee **D09.12** on Electrical Tests.

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2. Referenced Documents

2.1 ASTM Standards:²

D150 Test Methods for AC Loss Characteristics and Permittivity (Dielectric Constant) of Solid Electrical Insulation

D1711 Terminology Relating to Electrical Insulation

D1868 Test Method for Detection and Measurement of Partial Discharge (Corona) Pulses in Evaluation of Insulation Systems

2.2 IEEE Documents:³

IEEE 286 Recommended Practice for Measurement of Power Factor and Power Factor Tip-up for Rotating Machine Stator Coil Insulation

IEEE 1434 Guide to the Measurement of Partial Discharges in Rotating Machinery

IEEE C57.113 Guide for PD Measurements in Liquid-Filled Power Transformers

IEEE Standard C57.124 Recommended Practice for the Detection of PD and the Measurement of Apparent Charge in Dry-Type Transformers

2.3 AEIC Documents:⁴

AEIC T-24-380 Guide for Partial Discharge Procedure

AEIC CS5-87 Specifications for Thermoplastic and Cross-linked Polyethylene Insulated Shielded Power Cables Rated 5 through 35 kV, 9th Edition, 1987

3. Terminology

3.1 Definitions:

3.1.1 *pseudoglow discharge, n*—a type of partial discharge, which takes place within an expanded discharge channel and is characterized by pulses of relatively low magnitude and long rise time.

3.1.2 *pulse discharge, n*—a type of partial-discharge phenomenon characterized by a spark-type breakdown which occurs in a narrow constricted channel.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at www.astm.org/contact. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ Available from Institute of Electrical and Electronics Engineers, Inc. (IEEE), 445 Hoes Ln., P.O. Box 1331, Piscataway, NJ 08854-1331, <http://www.ieee.org>.

⁴ Available from The Association of Edison Illuminating Companies (AEIC), 600 N. 18th St, Birmingham, AL 35291, www.aeic.org.

*A Summary of Changes section appears at the end of this standard