Designation: D 1868 – 93 (Reapproved 1998)

An American National Standard

Standard Test Method for Detection and Measurement of Partial Discharge (Corona) Pulses in Evaluation of Insulation Systems[1]

This standard is issued under the fixed designation D 1868; 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.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This test method covers the detection and measurement of partial discharge (corona) pulses at the terminals of an insulation system under an applied test voltage, including the determination of partial discharge (corona) inception and extinction voltages as the test voltage is raised and lowered. The test method is also useful in determining quantities such as apparent charge and pulse repetition rate together with such integrated quantities as average current, quadratic rate and power. The test method is useful for test voltages ranging in frequency from zero (direct voltage) to approximately 2000 Hz.

1.2 The test method is directly applicable to a simple insulation system that can be represented as a two-terminal capacitor **(1), (2)**.

1.3 The test method is also applicable to (distributed parameter) insulation systems such as high-voltage cable. Consideration must be given to attenuation and reflection phenomena in this type of system. Further information on distributed parameter systems will be found in Refs. **(1)**, **(2)**, **(3)**, and **(4)**.[2]

1.4 The test method can be applied to multi-terminal insulation systems, but at some loss in accuracy, especially where the insulation of inductive windings is involved.

1.5 *This standard does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.* Specific precaution statements are given in Sections 8 and 14.

2. Referenced Documents

2.1 *ASTM Standards:*

D 149 Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies[3]

D 618 Practice for Conditioning Plastics and Electrical Insulating Materials for Testing[4]

D 2275 Test Method for Voltage Endurance of Solid Electrical Insulating Materials Subjected to Partial Discharges (Corona) on the Surface[3]

D 3382 Test Methods for Measurement of Energy and Integrated Charge Transfer Due to Partial Discharges (Corona) Using Bridge Techniques[5]

2.2 *Other Documents:*

AEIC CS5-87 Specifications for Thermoplastic and Crosslinked Polyethylene Insulated Shielded Power Cables Rated 5 through 35 kV (9th Edition) October 1987[6]

ICEA T-24-380 Guide for Partial Discharge Procedure[7]

IEEE 48 Standard Test Procedures and Requirements for High Voltage Alternating Current Cable Terminations[8]

3. Terminology

3.1 *Definitions*—The following terms are presented in a developing sequence; it is best that they be read in their entirety:

3.1.1 *ionization*—the process by which electrons are lost from or transferred to neutral molecules or atoms to form positively or negatively charged particles.

3.1.2 *partial discharge (corona)*—an electrical discharge that only partially bridges the insulation between conductors. A transient gaseous ionization occurs in an insulation system if

[1] This test method is under the jurisdiction of ASTM Committee D-9 on Electrical and Electronic Insulating Materials and is the direct responsibility of Subcommittee D09.12 on Electrical Tests.

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[2] The boldface numbers in parentheses refer to the list of references at the end of this test method.

[3] *Annual Book of ASTM Standards*, Vol 10.01.

[4] *Annual Book of ASTM Standards*, Vols 08.01 and 10.01.

[5] *Annual Book of ASTM Standards*, Vol 10.02.

[6] Available from the publication department of the Association of Edison Illuminating Companies, 600 N. 18th St., PO Box 2641, Birmingham, AL 35291-0992.

[7] Available from the Insulated Cable Engineers Association, Inc., PO Box 440, South Yarmouth, MA 02664.

[8] Available from the Institute of Electrical and Electronics Engineers Service Center, 445 Hoes Lane, Piscataway, NJ 08854.

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