Designation: D 149 – 97a (Reapproved 2004)

An American National Standard

Standard Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies[1]

This standard is issued under the fixed designation D 149; 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 procedures for the determination of dielectric strength of solid insulating materials at commercial power frequencies, under specified conditions.[2,3]

1.2 Unless otherwise specified, the tests shall be made at 60 Hz. However, this test method may be used at any frequency from 25 to 800 Hz. At frequencies above 800 Hz, dielectric heating may be a problem.

1.3 This test method is intended to be used in conjunction with any ASTM standard or other document that refers to this test method. References to this document should specify the particular options to be used (see 5.5).

1.4 It may be used at various temperatures, and in any suitable gaseous or liquid surrounding medium.

1.5 This test method is not intended for measuring the dielectric strength of materials that are fluid under the conditions of test.

1.6 This test method is not intended for use in determining intrinsic dielectric strength, direct-voltage dielectric strength, or thermal failure under electrical stress (see Test Method D 3151).

1.7 This test method is most commonly used to determine the dielectric breakdown voltage through the thickness of a test specimen (puncture). It may also be used to determine dielectric breakdown voltage along the interface between a solid specimen and a gaseous or liquid surrounding medium (flashover). With the addition of instructions modifying Section 12, this test method may be used for proof testing.

1.8 This test method is similar to IEC Publication 243-1. All procedures in this method are included in IEC 243-1. Differences between this method and IEC 243-1 are largely editorial.

1.9 *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 and health practices and determine the applicability of regulatory limitations prior to use.* Specific hazard statements are given in Section 7. Also see 6.4.1.

2. Referenced Documents

2.1 *ASTM Standards:* [4]

D 374 Test Methods for Thickness of Solid Electrical Insulation

D 618 Practice for Conditioning Plastics for Testing

D 877 Test Method for Dielectric Breakdown Voltage of Insulating Liquids Using Disk Electrodes

D 1711 Terminology Relating to Electrical Insulation

D 2413 Practice for Preparation of Insulating Paper and Board Impregnated with a Liquid Dielectric

D 3151 Test Method for Thermal Failure of Solid Electrical Insulating Materials Under Electric Stress

D 3487 Specification for Mineral Insulating Oil Used in Electrical Apparatus

D 5423 Specification for Forced-Convection Laboratory Ovens for Electrical Insulation

2.2 *IEC Standard:*

Pub. 243-1 Methods of Test for Electrical Strength of Solid Insulating Materials—Part 1: Tests at Power Frequencies[5]

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

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[2] Bartnikas, R., Chapter 3, "High Voltage Measurements," *Electrical Properties of Solid Insulating Materials, Measurement Techniques*, Vol. IIB, *Engineering Dielectrics*, R. Bartnikas, Editor, *ASTM STP 926*, ASTM, Philadelphia, 1987.

[3] Nelson, J. K., Chapter 5, "Dielectric Breakdown of Solids," *Electrical Properties of Solid Insulating Materials: Molecular Structure and Electrical Behavior*, Vol. IIA, *Engineering Dielectrics*, R. Bartnikas and R. M. Eichorn, Editors, *ASTM STP 783*, ASTM, Philadelphia, 1983.

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

[5] Available from the International Electrotechnical Commission, Geneva, Switzerland.

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