



Standard Test Method for Dielectric Breakdown Voltage of Insulating Oils of Petroleum Origin Using VDE Electrodes¹

This standard is issued under the fixed designation D 1816; 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 This test method covers the determination of the dielectric breakdown voltage of insulating oils of petroleum origin. This test method is applicable to liquid petroleum oils commonly used in cables, transformers, oil circuit breakers, and similar apparatus as an insulating and cooling medium. The suitability of this test method for testing oils having viscosity of more than 19 cSt, (100SUS) at 40°C (104°F) has not been determined. Refer to Terminology D 2864 for definitions used in this test method.

1.2 This test method is sensitive to the deleterious effects of moisture in solution especially when cellulosic fibers are present in the oil. It has been found to be especially useful in diagnostic and laboratory investigations of the dielectric breakdown strength of oil in insulating systems.²

1.3 This test method is used to judge if the VDE electrode breakdown voltage requirements are met for insulating liquids. This test method should be used as recommended by professional organization standards such as IEEE C57.106.

1.4 This test method may be used to obtain the dielectric breakdown of silicone fluid as specified in Test Method D 2225, provided that the discharge energy into the sample is less than 20 mJ (milli joule) per breakdown for five consecutive breakdowns.

1.5 Both the metric and the alternative inch-pound units are acceptable.

1.6 *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.*

¹ This test method is under the jurisdiction of ASTM Committee D27 on Electrical Insulating Liquids and Gases and is the direct responsibility of Subcommittee D27.05 on Electrical Tests.

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² Supporting data is available from ASTM Headquarters. Request RR:D27-1006.

2. Referenced Documents

2.1 ASTM Standards:³

D 235 Specification for Mineral Spirits (Petroleum Spirits) (Hydrocarbon Dry Cleaning Solvent)

D 923 Practice for Sampling Electrical Insulating Liquids

D 2225 Test Method for Silicone Fluids Used for Electrical Insulation

D 2864 Terminology Relating to Electrical Insulating Liquids and Gases

D 3487 Specification for Mineral Insulating Oil Used in Electrical Apparatus

2.2 IEEE Standard:

Standard 4 IEEE Standard Techniques for High Voltage Testing⁴

C57.106 Guide for Acceptance and Maintenance of Insulating Oil in Equipment⁴

3. Significance and Use

3.1 The dielectric breakdown voltage of an insulating liquid is of importance as a measure of the liquid's ability to withstand electric stress without failure. The dielectric breakdown voltage serves to indicate the presence of contaminating agents such as water, dirt, cellulosic fibers, or conducting particles in the liquid, one or more of which may be present in significant concentrations when low breakdown voltages are obtained. However, a high dielectric breakdown voltage does not necessarily indicate the absence of all contaminants; it may merely indicate that the concentrations of contaminants that are present in the liquid between the electrodes are not large enough to deleteriously affect the average breakdown voltage of the liquid when tested by this test method (see Appendix X1.)

³ 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.

⁴ Available from the Institute of Electrical and Electronic Engineers, Inc., PO Box 1331, Piscataway, NJ 08855.