



Standard Test Method for Dielectric Breakdown Voltage of Insulating Liquids Using Disk Electrodes¹

This standard is issued under the fixed designation D 877; 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 describes two procedures, A and B, for determining the electrical breakdown voltage of insulating liquid specimens. The breakdown test uses ac voltage in the power-frequency range from 45 to 65 Hz.

1.2 This test method is used to judge if the disk electrode breakdown voltage requirements are met for insulating liquids, as delivered from the manufacturer, that have never been filtered or dried. See Specification D 3487, Specification D 4652, and Guide D 5222 for the minimum specified electrical breakdown. This test method should be used as recommended by professional organization standards such as IEEE C57.106.

1.3 Limitations of the Procedures:

1.3.1 The sensitivity of this test method to the general population of contaminants present in a liquid sample decreases as applied test voltages used in this test method become greater than approximately 25 kV rms.

1.3.2 If the concentration of water in the sample at room temperature is less than 60 % of saturation, the sensitivity of this test method to the presence of water is decreased. For further information refer to RR: 327-1006.²

1.3.3 The suitability for this test method has not been determined for a liquid's viscosity higher than 900 cSt at 40°C.

1.4 *Procedure Applications*—Procedure A is used to determine the breakdown voltage of liquids in which any insoluble breakdown products easily settle during the interval between the required repeated breakdown tests. These liquids include petroleum oils, hydrocarbons, and askarels (PCB) used as insulating and cooling liquids in transformers, cables, and similar apparatus.

1.4.1 Procedure B

1.4.1.1 This procedure is used to determine the breakdown voltage of liquids in which any insoluble breakdown products do not completely settle from the space between the disks during the 1-min interval required in Procedure A. Procedure

B, modified in accordance with Section 17 of Test Methods D 2225, is acceptable for testing silicone dielectric liquids.

1.4.1.2 Procedure B should also be applied for the determination of the breakdown voltage of liquid samples containing insoluble materials that settle from the specimen during testing. These may include samples taken from circuit breakers, load tap changers, and other liquids heavily contaminated with insoluble particulate material. These examples represent samples that may have large differences between replicate tests. The use of Procedure B will result in a more accurate value of breakdown voltage when testing such liquids.

1.4.1.3 Use Procedure B to establish the breakdown voltage of an insulating liquid where an ASTM specification does not exist or when developing a value for an ASTM guide or standard. Procedure A may be used once the single operator precision of 13.1 has been demonstrated.

1.5 Both the SI and inch-pound units are equally 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.*

2. Referenced Documents

2.1 ASTM Standards:

D 923 Test Method for Sampling Electrical Insulating Liquids³

D 1816 Test Method for Dielectric Breakdown Voltage of Insulating Oils of Petroleum Origin Using VDE Electrodes³

D 2225 Test Methods for Silicone Fluids Used for Electrical Insulation³

D 2864 Terminology Relating to Electrical Insulating Liquids and Gases

D 3487 Specification for Mineral Insulating Oil Used in Electrical Apparatus³

D 4652 Specification for Silicone Fluid Used for Electrical Insulation³

D 5222 Guide for High Fire-Point Electrical Mineral Insulating Oils³

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 Test.

Current edition approved Dec. 10, 2000. Published February 2001. Originally published as D 877 – 46 T. Last previous edition D 877 – 87 (1995).

² RR: D27-1006, Round-Robin Data Using Modified VDE Electrode Cell for Dielectric Strength Tests on Oil, is available from ASTM Headquarters.

³ *Annual Book of ASTM Standards*, Vol 10.03.