Designation: D 4872 – 99

An American National Standard

Standard Test Method for Dielectric Testing of Wire and Cable Filling Compounds[1]

This standard is issued under the fixed designation D 4872; 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 dissipation factor, permittivity (dielectric constant) and ac volume resistivity of wire and cable filling compounds and related materials that are solid at room temperature, but capable of being melted at elevated temperature.

1.2 *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.

1.3 Whenever two sets of values are presented, in different units, the values in the first set are the standard, while those in parentheses are for information only.

2. Referenced Documents

2.1 *ASTM Standards:*

D 150 Test Methods for A-C Loss Characteristics and Permittivity (Dielectric Constant) of Solid Electrical Insulating Materials[2]

D 257 Test Methods for D-C Resistance or Conductance of Insulating Materials[2]

D 1321 Test Method for Needle Penetration of Petroleum Waxes[3]

D 1711 Terminology Relating to Electrical Insulation[2]

D 6054 Practice for Conditioning Electrical Insulating Materials for Testing[4]

3. Terminology

3.1 *Definitions*—For definitions of terms used in this test method, refer to Terminology D 1711.

4. Summary of Test Method

4.1 Place a measured volume of melted sample, free of entrapped air, into a level preheated specimen dish. Allow the specimen to cool and place primary and secondary electrodes in uniform contact with the specimen surface. Connect test leads to the specimen dish and the cover plate electrode; make measurements to obtain values from which dissipation factor, permittivity, and dc volume resistivity are calculated.

5. Significance and Use

5.1 Dissipation factor, permittivity and dc volume resistivity are properties of communication cable fillers and filler components that are controlled in order that the cable's electrical performance falls within its design limits. Relatively small amounts of contaminants, such as polar compounds, water or salts, degrade the cable's electrical properties. Limits on the dielectric properties of the cable filling compound are usually specified by the cable manufacturer, by industry standards or both.

6. Apparatus

6.1 *Specimen Dish and Cover Electrode* as shown in Fig. 1. Use a gold- or nickel-plated specimen dish and cover electrode plate to ensure a corrosion resistant, high conductivity surface.

6.1.1 Clean the specimen dish and electrode plate of oxidation by rinsing in a 5 % hydrochloric acid solution for a maximum of 5 s, followed by distilled water, isopropyl alcohol and, finally, by a low boiling petroleum distillate (naphtha) (see Section 7). Alternatively, use an ultrasonic cleansing bath. Store the dish and cover, wrapped in paper towels, in a desiccator or in an oven maintained at 50°C.

6.2 *Dial Comparator*[5] having a minimum travel of 0.4 in. (10.2 mm) or equivalent.

6.3 *Leveling Table*, adjustable to ±1 min of arc. The base from a Test Method D 1321 penetrometer is satisfactory.

6.4 *Glass Syringe*, 10.0-mL capacity.

6.5 *Oven* capable of maintaining the temperature used to determine viscosity for the particular compound under test.

6.6 *Q-Meter*,[6] or equivalent.

[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 D09.18 on Solid Insulations, Nonmetallic Shieldings, and Coverings for Electrical and Telecommunications Wires and Cables.

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

[3] *Annual Book of ASTM Standards*, Vol 05.01.

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

[5] Starrett Model 656-617 has been found satisfactory.

[6] Hewlett-Packard 4342A has been found satisfactory.