Designation: D 669 – 03

An American National Standard

Standard Test Method for Dissipation Factor and Permittivity Parallel with Laminations of Laminated Sheet and Plate Materials[1]

This standard is issued under the fixed designation D 669; 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 dissipation factor and permittivity of stiff laminated sheet and plate insulating materials in a direction parallel with the laminations. This test method primarily includes information covering the preparation of the specimen, and details concerning the procedure required to make measurements parallel with the laminations for this particular type of material. The apparatus and general test procedure shall be in accordance with Test Methods D 150.

1.2 The values stated in inch-pound units are to be regarded as the standard.

1.3 *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.* For a specific warning statement see 9.2.

2. Referenced Documents

2.1 *ASTM Standards:* [2]

D 150 Test Methods for AC Loss Characteristics and Permittivity (Dielectric Constant) of Solid Electrical Insulation

3. Significance and Use

3.1 It has long been recognized that dissipation factor and permittivity of laminated insulation as measured in a direction perpendicular to the laminations are not of the same magnitude as those measured parallel to the laminations. This test method provides a means of obtaining data parallel to the laminations where design parameters require this information.

4. Selection of Test Specimens

4.1 Select material for test that will not show obvious defects in the area where the electrodes are to be applied unless it is the purpose of this test to show the effects of such defects on the properties measured.

5. Specimen Holder

5.1 Construct a frame from ⅜-in. (9.5-mm) square metal bars as shown in Fig. 1. Mill slots 0.260 in. (6.60 mm) wide and 1⁄16 in. (1.6 mm) deep in two inner and opposite parallel sides of the frame to hold the test material in a parallel position. Insert threaded studs, equipped with nuts, in the open ends of the slotted bars to receive the (unmilled) clamping bars that are to be drawn tightly on the specimen pile-up.

6. Electrodes

6.1 Prepare two thin aluminum foil electrodes, 2 to 4 in. (50 to 100 mm) in diameter, depending on the frequency and the type of circuit used in the measurement (see the Appendix of Test Methods D 150). Preferably, use an electrode diameter so that the capacitance measured is greater than 50 pF. Use of smaller diameter electrodes increases the effects of stray capacitances and decreases the precision of the measurements.

7. Preparation of Test Specimens

7.1 Cut strips of material $0.250 + 0.005 - 0.001$ in. ($6.35 + 0.013 - 0.003$ mm) wide by 5.25 ± 0.015 in. (133.35 ± 0.38 mm) long in sufficient quantity to provide a pile-up of about 5.25 in. (134 mm) when stacked with the cut edges exposed.

7.2 Prepare two sets of test specimen pile-ups, one with the long dimension in the machine direction of the material and the other in the cross-machine direction. Where the machine direction of the paper-base or the warp direction of the fabric-base sheets is known, it shall constitute the length-wise direction. Otherwise, consider the longer direction of the sheet material the lengthwise direction. If the material sheet has the same length and width, then arbitrarily designate one dimension as the length.

7.3 Mount the strips in the specimen holder with the uncut surfaces adjacent to each other and the cut edges exposed. When testing thick sheets of material, it is permissible to

[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 D09.07 on Flexible and Rigid Insulating Materials.

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[2] 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.