



Standard Test Method for Dissipation Factor and Permittivity (Dielectric Constant) of Mica¹

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1. Scope

1.1 This test method covers the determination of the dissipation factor and the relative permittivity of natural block mica having thicknesses between 0.007 and 0.030 in. (0.18 and 0.77 mm) and mica films or capacitor splits between 0.0008 and 0.004 in. (0.02 and 0.10 mm) in thickness.

1.2 The values stated in inch-pound units are to be regarded as the standard. The values in parentheses are for information purposes only.

1.3 *This standard does not purport to address all of the safety problems, 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. A specific warning statement is given in Section 7 and Note 5.*

NOTE 1—Procedures for the measurement of dissipation factor and permittivity are given in IEC Publication 60371-2, but the details of the procedure are somewhat different from those specified in this test method.

2. Referenced Documents

2.1 ASTM Standards:

- D 150 Test Methods for A-C Loss Characteristics and Permittivity (Dielectric Constant) of Solid Electrical Insulating Materials²
- D 374 Test Methods for Thickness of Solid Electrical Insulation²
- D 748 Specification for Natural Block Mica and Mica Films Suitable for Use in Fixed Mica-Dielectric Capacitors²
- D 1711 Terminology Relating to Electrical Insulation²

2.2 IEC Publication:

- Publication 60371-2 Specification for insulating materials based on mica—Part 2: Methods of test³

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 D09.19 on Dielectric Sheet and Roll Products.

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

³ Available from American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.

3. Summary of Test Method

3.1 Any of the techniques and apparatus set forth in Test Method D 150 may be used for measuring dissipation factor and relative permittivity of block mica or film. Select an appropriate electrode system from those given in Section 5.

3.2 If a relative order of magnitude of dissipation factor is desired, the use of Method A in the Appendix of Specification D 748 is satisfactory.

4. Significance and Use

4.1 The dissipation factor of natural muscovite mica, as determined by this test method, is of practical importance as a measure of the electrical energy lost as heat in the mica serving as the dielectric substance of capacitors, or in other applications in which the electric field is applied perpendicular to the plane of cleavage. The dissipation factor is particularly important in applications using mica at radio frequencies and in some less extensive audio frequency applications. This test method is suitable for specification acceptance and dielectric-loss control tests (See the Significance and Use of Test Methods D 150).

4.2 *Relative Permittivity (Dielectric Constant)*—The permittivity of natural muscovite mica is a measure of its relative ability to store electrostatic energy. Since the relative permittivity perpendicular to the cleavage plane is fairly uniform, regardless of origin, its practical significance is mainly for identification purposes, special uses, research, and design. If a loss index is desired, the value of the permittivity must be known (see the Significance and Use of Test Methods D 150).

5. Apparatus

5.1 For a general description of apparatus suitable for measuring dissipation factor and relative permittivity, refer to Test Methods D 150.

5.2 Select a suitable electrode arrangement from the following:

5.2.1 *Steel Electrodes*—Three electrodes made of stainless steel or nickel-plated tool steel will be required. The electrodes shall be cylindrical in shape and of a diameter sufficient to provide the minimum specified capacitance (Note 2). The upper and lower electrodes shall have a minimum axial length of 1/2 in. (12.7 mm) and the center electrode shall have a