Designation: D1082 – 00 (Reapproved 2011)

Standard Test Method for Dissipation Factor and Permittivity (Dielectric Constant) of Mica[1]

This standard is issued under the fixed designation D1082; 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 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 6.1.1.

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:*[2]

D150 Test Methods for AC Loss Characteristics and Permittivity (Dielectric Constant) of Solid Electrical Insulation

D374 Test Methods for Thickness of Solid Electrical Insulation (Metric) D0374_D0374M

D748 Specification for Natural Block Mica and Mica Films Suitable for Use in Fixed Mica-Dielectric Capacitors

2.2 *IEC Publication:*

Publication 60371-2 Specification for insulating materials based on mica—Part 2: Methods of test[3]

3. Summary of Test Method

3.1 Any of the techniques and apparatus set forth in Test Methods D150 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 D748 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 D150).

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 D150).

5. Apparatus

5.1 For a general description of apparatus suitable for measuring dissipation factor and relative permittivity, refer to Test Methods D150.

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 ½ in. (12.7 mm) and the center electrode shall have a

[1] This test method is under the jurisdiction of ASTM Committee D09 on Electrical and Electronic Insulating Materialsand is the direct responsibility of Subcommittee D09.01 on Electrical Insulating Products.

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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.

[3] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036.