



Standard Test Methods for Thickness of Solid Electrical Insulation¹

This standard is issued under the fixed designation D374/D374M; 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 U.S. Department of Defense.

1. Scope

1.1 These test methods cover the determination of the thickness of several types of solid electrical insulating materials employing recommended techniques. Use these test methods except as otherwise required by a material specification.

1.2 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with 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.*

2. Referenced Documents

2.1 *ASTM Standards:*²

D1711 Terminology Relating to Electrical Insulation

D6054 Practice for Conditioning Electrical Insulating Materials for Testing (Withdrawn 2012)³

E252 Test Method for Thickness of Foil, Thin Sheet, and Film by Mass Measurement

3. Terminology

3.1 Refer to Terminology **D1711** for definitions pertinent to this standard.

3.2 *Definitions of Terms Specific to This Standard:*

¹ These test methods are under the jurisdiction of ASTM Committee **D09** on Electrical and Electronic Insulating Materials and are the direct responsibility of Subcommittee **D09.12** on Electrical Tests.

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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 The last approved version of this historical standard is referenced on www.astm.org.

3.2.1 *1 micron, μm , n* —a dimension equivalent to 0.03937 mils.

3.2.2 *1 mil, n* —a dimension equivalent to 0.0010 in.

3.2.3 *absolute uncertainty (of a measurement), n* —the smallest division able to be read directly on the instrument used for measurement.

3.2.4 *micrometer, n* —an instrument for measuring any dimension with absolute uncertainty of 1 mil [25 μm] or smaller.

4. Summary of Test Methods

4.1 This standard provides eight different test methods for the measurement of thickness of solid electrical insulation materials. The test methods (identified as Test Methods A through H) employ different micrometers that exert various pressures for varying times upon specimens of different geometries. **Tables 1 and 2** display basic differences of each test method and identify test methods applicable for use on various categories of materials.

5. Significance and Use

5.1 Some electrical properties, such as dielectric strength, vary with the thickness of the material. Determination of certain properties, such as relative permittivity (dielectric constant) and volume resistivity, usually require a knowledge of the thickness. Design and construction of electrical machinery require that the thickness of insulation be known.

6. Apparatus

6.1 *Apparatus A—Machinist's Micrometer Caliper*⁴ with Calibrated Ratchet or Friction Thimble:

6.1.1 Apparatus A is a micrometer caliper without a locking device but is equipped with either a calibrated ratchet or a friction thimble. By use of a proper manipulative procedure and a calibrated spring (see **Annex A1**), the pressure exerted on the specimen is controllable.

6.1.2 Use an instrument constructed with a vernier capable of measurement to the nearest 0.1 mil [2 μm].

6.1.3 Use an instrument with the diameter of the anvil and spindle surfaces (which contact the specimen) of 250 ± 1 mil [6.35 ± 0.05 mm].

⁴ Hereinafter referred to as a machinist's micrometer.