



## Standard Test Methods for Thickness of Solid Electrical Insulation (Metric)<sup>1</sup>

This standard is issued under the fixed designation D 374M; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 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 SI units are 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:*

D 1711 Terminology Relating to Electrical Insulation<sup>2</sup>

D 6054 Practice for Conditioning Electrical Insulating Materials for Testing<sup>3</sup>

E 252 Test Method for Thickness of Thin Foil and Film by Weighing<sup>4</sup>

### 3. Terminology

3.1 Refer to Terminology D 1711 for definitions pertinent to this standard.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *absolute uncertainty (of a measurement), n*—the smallest division that may be read directly on the instrument used for measurement.

3.2.2 *micrometer, n*—an instrument for measuring any dimension with absolute uncertainty of 25  $\mu\text{m}$  or smaller.

3.2.3 *1 micron,  $\mu\text{m}$ , n*—a dimension equivalent to 0.0000010 m.

<sup>1</sup> These test methods are under the jurisdiction of ASTM Committee D-9 on Electrical and Electronic Insulating Materials and are the direct responsibility of Subcommittee D09.12 on Electrical Tests.

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 10.01

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 10.02.

<sup>4</sup> *Annual Book of ASTM Standards*, Vol 02.02.

### 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 Methods A through H) employ different micrometers that exert various pressures for varying times upon specimens of different geometries. Table 1 and Table 2 display basic differences of each test method and identify 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*<sup>5</sup> 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 2  $\mu\text{m}$ .

6.1.3 Use an instrument with the diameter of the anvil and spindle surfaces (which contact the specimen) of  $6.25 \pm 0.05$  mm.

6.1.4 Use an instrument conforming to the requirements of 7.1, 7.2, 7.5, 7.6.1, and 7.6.2.

6.1.5 Periodically, test the micrometer for conformance to the requirements of 6.1.4.

6.2 *Apparatus B—Machinist's Micrometer without a Ratchet:*

<sup>5</sup> Hereinafter referred to as a machinist's micrometer.

