



# Standard Test Method for Measurement of Dry-Film Thickness of Organic Coatings Using Micrometers<sup>1</sup>

This standard is issued under the fixed designation D 1005; 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.

*This standard has been approved for use by agencies of the Department of Defense.*

## 1. Scope

1.1 This test method covers the measurement of film thickness of dried films of paint, varnish, lacquer, and related products using micrometers. Procedures A and B utilize stationary micrometers and Procedures C and D, hand-held micrometers. Procedures A and C are not recommended for films less than 0.5 mils (12.5  $\mu\text{m}$ ) in thickness. The minimum thickness required for Procedures B and D is a function of that required to enable removal of the sample as a free film.

1.2 The procedures appear as follows:

1.2.1 *Procedure A*—Stationary micrometer for measuring coatings applied to plane rigid surfaces.

1.2.2 *Procedure B*—Stationary micrometer for measuring free films.

1.2.3 *Procedure C*—Hand-held micrometer for measuring coatings applied to plane rigid surfaces.

1.2.4 *Procedure D*—Hand-held micrometer for measuring free films.

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

1.4 *This standard does not purport to address 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 823 Practices for Producing Films of Uniform Thickness of Paint, Varnish, and Related Products on Test Panels<sup>2</sup>

D 2370 Test Method for Tensile Properties of Organic Coatings<sup>2</sup>

## 3. Significance and Use

3.1 This test method is particularly applicable to the measurement of free films and is also satisfactory for the measure-

ment of films on laboratory test panels.

3.2 The accuracy and precision of the thickness measurements may be influenced by the deformability of the coating. This test method is not applicable to coatings that are readily deformable under the load of the measuring instrument.

3.3 The accuracy and precision of the thickness measurements are also influenced by the uniformity of the substrate when the coatings are applied to laboratory test panels.

## 4. Apparatus

4.1 *Procedures A and B:*

4.1.1 The apparatus shall consist of a dial comparator, dial indicator, or micrometer. A rigid base is required for mounting the dial comparator or dial indicator gages. The presser foot of the micrometer or dial indicator shall be circular, from  $\frac{1}{16}$  to  $\frac{1}{8}$  in. (1.5 to 3.0 mm) in diameter, and shall be flat on the bottom. The presser foot shall be fixed to an indicator that reads to 0.1 mil (2.5  $\mu\text{m}$ ). The load on the presser foot shall be between 20 and 40 psi (140 and 275 kPa). For Procedure B, a smooth uncoated test plate is also required.

4.1.2 Verify the accuracy of instrument calibration by setting to zero with the anvils closed followed by measuring shims of known thicknesses or standards specifically designed for this purpose. Record the standard thickness gage measurement and the micrometer reading. Use these results to construct a calibration curve.

4.2 *Procedures C and D*—The apparatus shall consist of a hand-held micrometer. The anvils of the micrometer shall be circular, from  $\frac{1}{16}$  to  $\frac{1}{8}$  in. (1.5 to 3.0 mm) in diameter, with flat bottoms. Verify the accuracy of instrument calibration by setting to zero with the anvils closed followed by measuring shims of known thicknesses or standards specifically designed for this purpose. Record the standard thickness gage measurement and the micrometer reading. Use these results to construct a calibration curve.

## 5. Test Specimen

5.1 *Procedures A and C*—Apply test films to a suitable plane, rigid base material from which the dried film may be satisfactorily removed. The panels shall be of sufficient size to permit film thickness measurements to be made 1 in. (25 mm) from any edge.

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee D-1 on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee D01.23 on Physical Properties of Applied Paint Films.

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 06.01.