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AMERICAN SOCIETY FOR TESTING AND MATERIALS
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Standard Test Methods for Measurement of Wet Film Thickness of Organic Coatings¹

This standard is issued under the fixed designation D 1212; 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.

^{ε1} NOTE—Unit of measurement statement added editorially in June 1996.

1. Scope

1.1 These test methods cover the determination of wet film thickness of organic coatings such as paint, varnish, and lacquer. Two methods are described as follows:

1.1.1 In *Test Method A*, the Wet Film Thickness Gage (English or Metric graduation (see 5.1)) is used to measure wet film thicknesses up to 60 mils on the English scale series, and up to 700 μm on the metric scale series (Sections 5-8).

1.1.2 In *Test Method B*, the Pfund Gage is used to measure wet film thicknesses up to 14.2 mils (360 μm) (Sections 9-13).

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

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 823 Practices for Producing Films of Uniform Thickness of Paint, Varnish, and Related Products on Test Panels²

3. Summary of Test Methods

3.1 The material is applied in the laboratory to plane, rigid test panels or in the field to the surface being coated. The wet film thickness is determined as quickly as possible to reduce shrinkage due to solvent loss.

3.2 In *Test Method A*, a gage with one eccentric and two concentric wheels is rolled over the surface and the point where the eccentric wheel first touches the wet film is determined.

3.3 In *Test Method B*, a gage with a convex lower surface is pushed into the wet film until the center touches the substrate. The diameter of the spot of wet coating left on the convex surface is measured and the film thickness calculated from the diameter of the spot and the radius of curvature.

4. Significance and Use

4.1 Wet film thickness measurements aid in the prediction of dry film thickness. In instances where dry film thickness cannot be measured nondestructively, wet film thickness is frequently specified. Also, the ability to determine wet film thickness during application can provide the opportunity to correct the application procedures.

TEST METHOD A

5. Apparatus

5.1 *Wet Film Thickness Gage*—Two versions of the gage are now in use:³ The original design as shown in Fig. 1 and a later design as shown in Fig. 2. Both designs consists of an eccentric center wheel supported by two concentric wheels so as to provide two scales that are bilaterally symmetrical. As the gage is rolled on the film, there is a change in clearance between the wet film and the eccentric wheel. The point at which the film first touches the center wheel measures the thickness of the film.

5.2 The later design shown in Fig. 2, moves the eccentric wheel from between the concentric wheels, as shown in Fig. 1, to the outside of the gage and closer to one of the concentric wheels. Gage reading errors of parallax across the gage are eliminated as the two scales are placed directly on the eccentric wheel and errors when measuring on uneven support surfaces are reduced by placing the eccentric wheel closer to one of the supporting concentric wheels.

5.3 Best precision is obtained when using the near linear central portion of each scale, constituting about 80 % of its total range as shown in the diagram in Fig. 1 and Fig. 2. Therefore, the range of the particular gage selected for use should be such that the measured film thickness falls within, and preferably toward the center of the middle 80 % of each scale. Gages are available covering the following ranges in mils and microns:

¹ These test methods are under the jurisdiction of ASTM Committee D-1 on Paint and Related Coatings, Materials, and Applications and are the direct responsibility of Subcommittee D01.23 on Physical Properties of Applied Paint Films.

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² *Annual Book of ASTM Standards*, Vol 06.01.

³ Both versions of this gage (Interchemical (INMONT) and Model "C"), available from BYK-Gardner, Inc., are covered by U.S. Patents 2 507 592 and 3 128 558, and are issued to Maynard R. Euvrard. Interested parties are invited to submit information regarding the identification of acceptable alternatives to this patented item to the Committee on Standards, ASTM Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend.

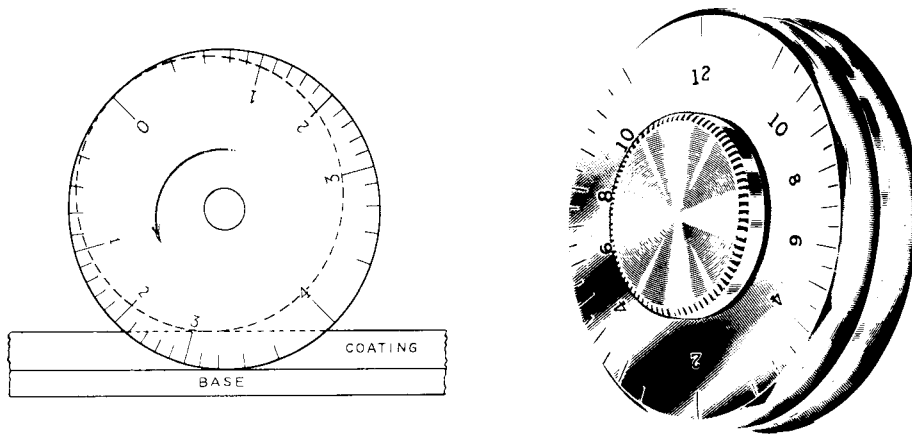


FIG. 1 Interchemical Wet Film Thickness Gages

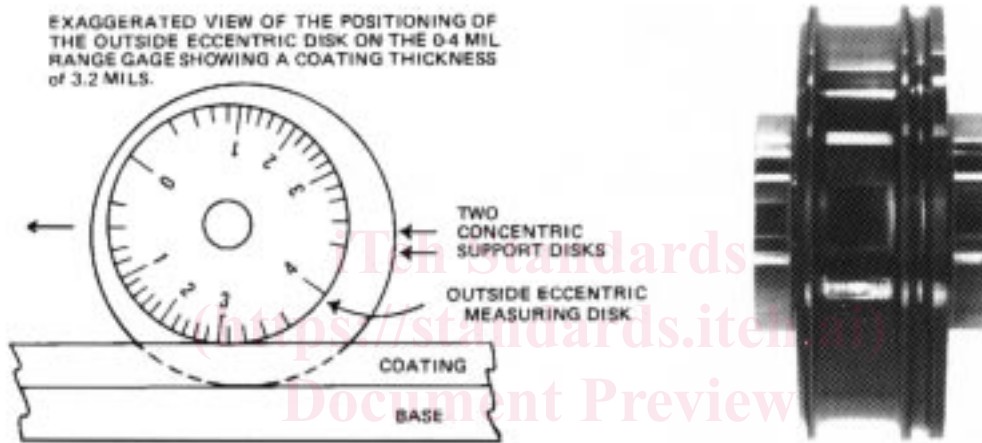


FIG. 2 Model "C" Wet Film Thickness Gages

Range, mils	Smallest Graduation, mils
0 to 2	0.1
0 to 4	0.2
2 to 12	0.5
10 to 30	1.0
20 to 60	2.0
Range, μ m	Smallest Graduation, μ m
0 to 40	2.0
0 to 100	5.00
50 to 250	10.00
200 to 700	25.00

6. Procedure

6.1 Apply the material in accordance with Practices D 823 to suitable plane rigid panels of area sufficiently large to permit film thickness measurements at least 1 in. (25 mm) from any edge. Determine the film thickness immediately after application.

6.2 Support the test panels on a suitable level base in such a way that there will be no movement or spring of the panels during the film thickness measurements. Place the gage on the wet film so that the minimum marking is at the top and the greatest clearance between the eccentric wheel and the film is directly over the wet film. Roll the gage over the film one-half revolution in one direction toward the minimum marking on

the gage and repeat in the opposite direction. Read the points at which the coating first makes contact with the eccentric wheel and determine the mean which is considered as one reading.

6.3 If the coating contains a solvent that evaporates rapidly or if the solids content is low, make at least a second separate reading on a freshly applied film and calculate the mean of the separate readings.

7. Report

7.1 Report the mean of the separate readings and the range and smallest graduation of the gage used.

8. Precision⁴

8.1 In an interlaboratory study of this test method, in which two operators in at least six laboratories made measurements with the 0- to 2- and 0- to 4-mil gages on three materials, applied at two film thicknesses, the pooled within-laboratory standard deviation was found to be 0.12 mils with 34 df and the between-laboratories standard deviation 0.18 for two determinations and 0.17 for four determinations with 25 df. Based on

⁴ Supporting data are available from ASTM Headquarters. Request RR: D01-1023.