



Designation: D 1640 – 03

Standard Test Methods for Drying, Curing, or Film Formation of Organic Coatings at Room Temperature¹

This standard is issued under the fixed designation D 1640; 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 Department of Defense.

1. Scope

1.1 These test methods cover the determination of the various stages and rates of film formation in the drying or curing of organic coatings normally used under conditions of ambient room temperature.

1.2 The values stated in SI 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:²

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

D 1005 Test Methods for Measurement of Dry-Film Thickness of Organic Coatings Using Micrometers

3. Significance and Use

3.1 These test methods are used to determine the various stages and rates of drying, curing, and film formation of organic coatings for the purpose of comparing types of coatings or ingredient changes, or both. This is significant in the development of organic coatings for various end uses and also for production quality control.

4. Coatings and Recommended Film Thicknesses

4.1 Whenever tests are to be performed on coatings not listed in Table 1, there should be a prior agreement between the

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

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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.

TABLE 1 Recommended Film Thickness of Materials to be Tested^A

Material	Dry Film Thickness
Drying oils	1.25 ± 0.25 mil (32 ± 6 μm) ^B
Varnishes	1 ± 0.1 mil (25 ± 2 μm)
Lacquers	0.5 ± 0.1 mil (12.5 ± 2 μm) (See 7.5.2)
Resin solutions	0.5 ± 0.1 mil (12.5 ± 2 μm)
Enamels	1.5 ± 0.25 mil (36.5 ± 6 μm)
Oil paints	1.8 ± 0.2 mil (45 ± 2.5 μm) (See 6.1.2)
Water paints	1 ± 0.1 mil (25 ± 2 μm)

^AThis table is a general guide to be used when nothing more specific is agreed upon between the purchaser and the seller.

^BSee 6.1.2 and 7.5.1. Add driers a minimum of 24 h before test.

purchaser and seller as to the substrate, film thickness, and application method for testing the specific coating involved.

5. Test Conditions

5.1 Conduct all drying tests in a well-ventilated room or chamber, free from direct drafts, dust, products of combustion, laboratory fumes and under diffused light (see 5.4). Make all measurements at a temperature of 23 ± 2°C and 50 ± 5 % relative humidity with the coated panels in a horizontal position while drying.

5.2 Tests should be carried out at practical viscosities at which films can be applied to the proper film thickness with resultant good flow and leveling properties. In the absence of any specific material specification, instructions for preparation of the film should be determined and agreed upon between the purchaser and the seller.

5.3 Films to be tested should have practical thicknesses commensurate with performance characteristics expected under actual usage for the type under test. All testing should be done within an area, any point of which is not less than 15 mm (½ in.) from the film edge.

5.4 *Light Conditions*—Illumination of the films during the entire drying test period from normal laboratory or sky sources, never from direct sunlight or other sources high in nonvisible radiant energy.

6. Preparation of Test Specimens

6.1 Carry out all tests as described in 6.1.1, 6.1.2 and 6.1.3, unless otherwise noted.