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AMERICAN SOCIETY FOR TESTING AND MATERIALS
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Standard Practice for Testing Primers and Primer Surfacers Over Preformed Metal[1]

This standard is issued under the fixed designation D 3322; 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.

ε[1] NOTE—ε[1] Note—Keywords were added editorially in July 1996.

1. Scope

1.1 This practice covers the selection and use of procedures for testing primers and primer surfacers. The test methods included are listed in Table 1.

1.2 *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:*

B 117 Practice for Operating Salt Spray (Fog) Apparatus[2]

C 540 Test Method for Image Gloss of Porcelain Enamel Surfaces[3]

D 16 Terminology Relating to Paint, Varnish, Lacquer, and Related Products[4]

D 522 Test Methods for Mandrel Bend Test of Attached Organic Coatings[4]

D 523 Test Method for Specular Gloss[4]

D 609 Practice for Preparation of Cold-Rolled Steel Panels for Testing Paint, Varnish, Lacquer, and Related Products[4]

D 610 Test Method for Evaluating Degree of Rusting on Painted Steel Surfaces[5]

D 658 Test Method for Abrasion Resistance of Organic Coatings by Air Blast Abrasive[4]

D 660 Test Method for Evaluating Degree of Checking of Exterior Paints[4]

D 661 Test Method for Evaluating Degree of Cracking of Exterior Paints[4]

D 714 Test Method for Evaluating Degree of Blistering of Paints[4]

D 823 Practices for Producing Films of Uniform Thickness of Paint, Varnish, and Related Products on Test Panels[4]

D 870 Practice for Testing Water Resistance of Coatings Using Water Immersion[4]

D 968 Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive[4]

D 1005 Test Methods for Measurement of Dry-Film Thickness of Organic Coatings Using Micrometers[4]

D 1186 Test Methods for Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to a Ferrous Base[4]

TABLE 1 Test Methods

Property	Section	ASTM Method	Federal Test Method Specification No. 141B
Abrasion resistance:			
Air blast abrasion tester	6.2	D 658	...
Falling sand method	6.2	D 968	6191
Adhesion:			
Scrape adhesion	6.3	D 2197	6303.1
Parallel-groove adhesion	6.3	D 2197	6302.1
Tape adhesion	6.3	D 3359	...
Chemical resistance:			
Household chemical resistance	6.4.2	D 1308	...
Detergent resistance	6.4.3	D 2248	
Hydrocarbon resistance	6.4.4	...	6011
Chip resistance	6.5	D 3170	...
Color difference:			
Visual evaluation	6.6	D 1729	4249.1
Instrumental evaluation	6.6	D 2244	6123
Cracking resistance	6.7	D 2246	...
Elongation:			
Conical mandrel	6.8	D 522	...
Cylindrical mandrel	6.8	D 1737	...
Filiform corrosion	6.9	D 2803	...
Gloss	6.10	D 523	6101
Hardness	6.11	D 1474	...
Holdout	6.12	C 540	...
Mildew resistance	6.13	...	6271.1
Outdoor exposure:			
Blistering	6.14.2	D 714	6461
Cracking	6.14.2	D 661	6471
Rusting	6.14.2	D 610	6451
Checking	6.14.2	D 660	6421
Print resistance	6.15	D 2091	...
Salt spray resistance	6.16	B 117	6061
Sanding properties	6.17	...	6321
Water resistance:			
High humidity	6.18.2	D 1735	...
Water immersion	6.18.3	D 870	...
Weldability	6.19	...	[A]

[A] U.S. Military Specification MIL-P-46105 (MR).

[1] This practice is under the jurisdiction of ASTM Committee D-1 on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee D01.55 on Factory-Applied Coatings on Preformed Products.

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[2] *Annual Book of ASTM Standards*, Vol 03.02.

[3] Discontinued; see *1990 Annual Book of ASTM Standards*, Vol 15.02.

[4] *Annual Book of ASTM Standards*, Vol 06.01.

[5] *Annual Book of ASTM Standards*, Vol 06.02.

D 1308 Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes[5]
D 1400 Test Method for Nondestructive Measurement of Dry Film Thickness of Nonconductive Coatings Applied to a Nonferrous Metal Base[4]
D 1474 Test Methods for Indentation Hardness of Organic Coatings[4]
D 1640 Test Methods for Drying, Curing, or Film Formation of Organic Coatings at Room Temperature[4]
D 1729 Practice for Visual Evaluation of Color Differences of Opaque Materials[4]
D 1730 Practices for Preparation of Aluminum and Aluminum-Alloy Surfaces for Painting[6]
D 1731 Practices for Preparation of Hot-Dip Aluminum Surfaces for Painting[6]
D 1732 Practices for Preparation of Magnesium Alloy Surfaces for Painting[6]
D 1733 Method of Preparation of Aluminum Alloy Panels for Testing Paint, Varnish, Lacquer, and Related Products[7]
D 1735 Practice for Testing Water Resistance of Coatings Using Water Fog Apparatus[4]
D 1737 Test Method for Elongation of Attached Organic Coatings with Cylindrical Mandrel Apparatus[8]
D 2091 Test Method for Print Resistance of Lacquers[5]
D 2092 Guide for Treatment of Zinc-Coated (Galvanized) Steel Surfaces for Painting[5]
D 2197 Test Methods for Adhesion of Organic Coatings by Scrape Adhesion[4]
D 2201 Practice for Preparation of Zinc–Coated and Zinc–Alloy–Coated Steel Panels for Testing Paint and Related Coating Products[4]
D 2244 Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates[4]
D 2246 Test Method for Finishes on Primed Metallic Substrates for Humidity-Thermal Cycle Cracking[4]
D 2248 Practice for Detergent Resistance of Organic Finishes[4]
D 2454 Practice for Determining the Effect of Overbaking on Organic Coatings[4]
D 2803 Guide for Filiform Corrosion Resistance of Organic Coatings on Metal[4]
D 3170 Test Method for Chipping Resistance of Coatings[5]
D 3359 Test Methods for Measuring Adhesion by Tape Test[4]
D 3456 Practice for Determining by Exterior Exposure Tests the Susceptibility of Paint Films to Microbiological Attack[4]

2.2 *Federal Test Methods:*[9]
141B/6011 Immersion Resistance
141B/6271.1 Mildew Resistance
141B/6321 Sanding Characteristics

2.3 *U.S. Military Specification:*
MIL-P-46105[9]

3. Terminology

3.1 *Definitions:*

3.1.1 *primer*—the first of two or more coats of paint, varnish, or lacquer system (same as in Terminology D 16).

3.1.2 *primer surfacer*—a pigmented coating for filling minor irregularities which is sanded to obtain a smooth uniform surface preparatory to applying finish coats. A primer surfacer is not usually applied over a primer.

4. Significance and Use

4.1 Primers and primer surfacers may be used over many different surfaces top coated with one or more of a variety of coatings and subjected to many kinds of wear and exposure.

4.2 The selection of the tests to be used for any given product or system must be governed by experience and by the requirement agreed upon between the producer and the user.

5. Panel Preparation

5.1 *Treatment of Substrate*—Preparation of test panels should include any cleaning treatment agreed upon between the purchaser and the seller or one of the following ASTM Practices: D609, D1730, D1731, D1732, D2201; Guide D 2092; and Method D 1733.

5.2 *Substrate, Film Thickness, and Application Means*—Conduct performance tests on the specified substrate on coatings having a film thickness agreed upon between the purchaser and the seller. Primers are generally applied to a dry film thickness of 0.3 to 1.5 mil (8 to 38 µm) and primer surfacers to film thickness of 0.7 to 2.0 mil (17 to 50 µm). Unless otherwise agreed upon, apply primers and primer surfacers in accordance with Practices D 823.

5.3 *Measurement of Film Thickness*—Since the properties of the primer or primer surfacer can vary considerably with the thickness of the coating, it is important to know the film thickness. Measure the film thickness in accordance with Test Methods D 1400, D 1005, or D 1186.

5.4 *Drying of Primer or Primer Surfacer*:

5.4.1 Before tests are run, air dry or bake the primer or primer surfacer according to the schedule and temperature and age as agreed upon between the purchaser and the seller.

5.4.2 Overbake the primer or primer surfacer to determine the time/temperature effect on the physical and chemical properties. Do this in accordance with Practice D 2454.

5.4.3 It may be desirable for some reason (handling, stacking, etc.) to determine the various stages and rates of film formation in the drying or curing of primers and primer surfacers at room temperatures. Do this as described in Test Method D 1640.

6. Physical Properties of The Dry Film

6.1 Primers and primer surfacers are usually (but not always) topcoated. Therefore, many of the following tests should be run on the complete system (substrate/primer or primer surfacer/topcoat). Some of the tests however are for the untopcoated primer or primer surfacer. The properties required of a primer or primer surfacer depend on the intended end use and the tests to be used should be selected on the basis of experience and agreed upon between the purchaser and the seller.

[6] *Annual Book of ASTM Standards*, Vol 02.05.
[7] Discontinued; see *1980 Annual Book of ASTM Standards*, Part 27.
[8] Discontinued; see *1988 Annual Book of ASTM Standards*, Vol 06.01.
[9] Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094.