



Designation: D 5146 – 98

Standard Guide to Testing Solvent-Borne Architectural Coatings¹

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1. Scope

1.1 This guide covers the selection and use of procedures for testing solvent-borne coatings to be used on exterior, interior or both types of surfaces (see Note 1). The properties that can be examined or, in some cases, the relevant test procedures are listed in Table 1 and Table 2.

NOTE 1—The term “architectural coating” as used here combines the definition in Terminology D 16 with that in the FSCT Paint/Coatings Dictionary, as follows: “Organic coatings intended for on-site application to interior or exterior surfaces of residential, commercial, institutional, or industrial buildings, in contrast to industrial coatings. They are protective and decorative finishes applied at ambient temperatures. Often called Trade Sales Coatings.” (See 2.3.)

NOTE 2—Architectural coatings that are designed to give better performance than most conventional coatings because they are tougher and more stain- and abrasion-resistant are covered by Guide D 3730.

1.2 The types of organic coatings covered by this guide are as follows:

- (1) Type 1 Interior Low-Gloss Wall Finish,
- (2) Type 2 Interior Gloss and Semigloss Wall and Trim Enamels,
- (3) Type 3 Exterior House and Trim Coatings, and
- (4) Type 4 Floor Enamel, Exterior and/or Interior.

1.2.1 Each is intended for application by brushing, rolling, spraying, or other means to the materials appropriate for its type, which may include wood, plaster, wallboard, masonry, steel, previously painted surfaces, and other architectural substrates.

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 16 Terminology for Paint and Related Coatings, Materials, and Applications²

D 93 Test Method for Flash Point by Pensky-Martens Closed Tester³

D 154 Guide for Testing Varnishes⁴

D 185 Test Methods for Coarse Particles in Pigments, Pastes, and Paints⁴

D 215 Practice for Chemical Analysis of White Linseed Oil Paints²

D 344 Test Method for Relative Hiding Power of Paints by the Visual Evaluation of Brushouts²

D 358 Specification for Wood to be Used as Panels in Weathering Tests of Coatings⁵

D 522 Test Method for Mandrel Bend Test of Attached Organic Coatings²

D 523 Test Method for Specular Gloss²

D 562 Test Method for Consistency of Paints Using the Stormer Viscometer²

D 658 Test Method for Abrasion Resistance of Organic Coatings by Air Blast Abrasive²

D 660 Test Method for Evaluating Degree of Checking of Exterior Paints²

D 661 Test Method for Evaluating Degree of Cracking of Exterior Paints²

D 662 Test Method for Evaluating Degree of Erosion of Exterior Paints²

D 772 Test Method for Evaluating Degree of Flaking (Scaling) of Exterior Paints²

D 869 Test Method for Evaluating Degree of Settling of Paint⁵

D 968 Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive²

D 1006 Practice for Conducting Exterior Exposure Tests of Paints on Wood²

D 1014 Test Method for Conducting Exterior Exposure Tests of Paints on Steel⁵

D 1038 Terminology Relating to Veneer and Plywood⁶

D 1208 Test Methods for Common Properties of Certain Pigments⁴

D 1210 Test Method for Fineness of Dispersion of Pigment-Vehicle Systems by Hegman-Type Gage²

¹ This guide is under the jurisdiction of ASTM Committee D-1 on Paint and Related Coating, Materials, and Applications and is the direct responsibility of Subcommittee D01.42 on Architectural Finishes.

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² Annual Book of ASTM Standards, Vol 06.01.

³ Annual Book of ASTM Standards, Vol 05.01.

⁴ Annual Book of ASTM Standards, Vol 06.03.

⁵ Annual Book of ASTM Standards, Vol 06.02.

⁶ Annual Book of ASTM Standards, Vol 04.10.

- D 1296 Test Method for Odor of Volatile Solvents and Diluents⁷
- D 1308 Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes⁵
- D 1475 Test Method for Density of Liquid Coatings, Inks, and Related Products²
- D 1543 Test Method for Color Permanence of White Architectural Enamels⁸
- D 1554 Terminology Relating to Wood-Base Fiber and Particle Panel Materials⁶
- D 1640 Test Methods for Drying, Curing or Film Formation of Organic Coatings at Room Temperature²
- D 1729 Practice for Visual Evaluation of Color Differences of Opaque Materials²
- D 1849 Test Method for Package Stability of Paint⁵
- D 2196 Test Methods for Rheological Properties of Non-Newtonian Materials by Rotational (Brookfield) Viscometer²
- D 2197 Test Method for Adhesion of Organic Coatings by Scrape Adhesion²
- D 2244 Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates²
- D 2245 Test Method for Identification of Oils and Oil Acids in Solvent-Reducible Paints²
- D 2369 Test Method for Volatile Content of Coatings²
- D 2370 Test Method for Tensile Properties of Organic Coatings²
- D 2371 Test Method for Pigment Content of Solvent-Reducible Paints²
- D 2372 Practice for Separation of Vehicle from Solvent-Reducible Paints²
- D 2486 Test Method for Scrub Resistance of Interior Latex Flat Wall Paints⁵
- D 2621 Test Method for Infrared Identification of Vehicle Solids from Solvent-Reducible Paints²
- D 2697 Test Method for Volume Nonvolatile Matter in Clear or Pigmented Coatings²
- D 2698 Test Method for Determination of the Pigment Content of Solvent-Reducible Paints by High Speed Centrifuging²
- D 2805 Test Method for Hiding Power of Paints by Reflectometry²
- D 3278 Test Methods for Flash Point of Liquids by Small Scale Closed-Cup Apparatus²
- D 3359 Test Methods for Measuring Adhesion by Tape Test²
- D 3450 Test Method for Washability Properties of Interior Architectural Coatings⁵
- D 3456 Practice for Determining by Exterior Exposure Tests Susceptibility of Paint Films to Microbiological Attack²
- D 3730 Guide for Testing High-Performance Interior Architectural Wall Coatings⁵
- D 3925 Practice for Sampling Liquid Paints and Related Pigmented Coatings²
- D 3928 Test Method for Evaluation of Gloss or Sheen Uniformity⁵
- D 4017 Test Method for Water in Paints and Paint Materials by Karl Fischer Method²
- D 4060 Test Method for Abrasion Resistance of Organic Coating by the Taber Abraser²
- D 4062 Test Method for Leveling of Paints by Draw-Down Method⁵
- D 4213 Test Method for Scrub Resistance of Paints by Abrasion Weight Loss⁵
- D 4214 Test Methods for Evaluating Degree of Chalking of Exterior Paint Films²
- D 4287 Test Method for High Shear Viscosity Using the ICI Cone/Plate Viscometer²
- D 4400 Test Methods for Sag Resistance of Paints Using a Multinotch Applicator⁵
- D 4585 Practice for Testing Water Resistance of Coatings Using Controlled Condensation²
- D 4707 Test Method for Measuring Paint Spatter Resistance During Roller Application⁵
- D 4828 Test Method for Practical Washability of Organic Coatings⁵
- D 4958 Test Method for Comparison of the Brush Drag of Latex Paints⁵
- E 105 Practice for Probability Sampling of Materials⁹
- E 313 Practice for Calculating Yellowness and Whiteness Indices from Instrumentally Measured Color Coordinates²
- E 1347 Test Method for Color and Color-Difference Measurement by Tristimulus (Filter) colorimetry²
- 2.2 U.S. Federal Standard:**
Federal Test Method Standard No. 141¹⁰
- 2112 Application by Roller
- 2131 Application of Sprayed Films
- 2141 Application of Brushed Films
- 3011 Condition in Container
- 4203 Reducibility and Dilution Stability
- 4401 Odor Test
- 4421 Absorption Test
- 4541 Working Properties and Appearance of Dried Film
- 6132 Accelerated Yellowness
- 2.3 Other Document:**
Paint/Coatings Dictionary of the Federation of Societies for Coatings Technology¹¹

3. Terminology

3.1 For definitions of terms in this guide refer to Terminology D 16, D 1554 and D 1038 and to the FSCT Paint/Coatings Dictionary.

4. Conditions Affecting Solvent-Reducible Coatings

4.1 Interior and Exterior Coatings:

4.1.1 *Substrate Type*—The substrate to be painted can affect not only the application properties of a coating, such as gloss

⁷ Annual Book of ASTM Standards, Vol 06.04.

⁸ Discontinued; see 1990 Annual Book of ASTM Standards, Vol 06.01.

⁹ Annual Book of ASTM Standards, Vol 14.02.

¹⁰ Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094.

¹¹ Available from the Federation of Societies for Coatings Technology, 492 Norristown Rd., Blue Bell, PA 19422.





TABLE 1 List of Standards in Sectional Order

Property (or related test)	Section	ASTM Standard	Federal Test Method Standard 141
Sampling	6.2	D 3925	1022
Liquid Paint Properties			
Skinning	7.1	D 154	3021
Condition in container	7.2		3011
Coarse particles and foreign matter	7.3	D 185	
Density or Weight per gallon	7.4	D 1475	
Fineness of dispersion	7.5	D 1210	
Flash point	7.6	D 93, D 3278	
Odor	7.7	D 1296	4401
Absorption	7.8		4421
Colorant acceptance	7.9		
Dilution stability	7.10		4203
Package stability	7.11		
Heat stability	7.11.1	D 1849	
Settling	7.11.2	D 869	
Coating Application and Film Formation			
Application properties	8.1		4541
Brush application	8.1.1		2141
Brush drag	8.1.1.1	D 4958	
Roller application	8.1.2		2112
Roller spatter	8.1.2.1	D 4707	
Spray application	8.1.3		2131
Touch-up uniformity	8.2	D 3928	
Rheological properties	8.3		
Consistency (Low-shear viscosity)	8.3.1	D 562	
Rheological properties of non-Newtonian liquids	8.3.2	D 2196, D 4287	
Sag resistance	8.3.3	D 4400	4494
Levelling properties	8.3.4	D 4062	
Drying properties	8.4	D 1640	4061
Appearance of Dry Film			
Color difference	9.1		
Color appearance	9.1.1		
Color differences by visual comparison	9.1.2	D 1729	
Color differences using instrumental measurements	9.1.3	D 2244	
Directional reflectance	9.2	E 1347	
Gloss	9.3		
Gloss, 60°	9.3.1	D 523	
Sheen (85° gloss)	9.3.2	D 523	
Hiding power	9.4	D 344, D 2805	
Yellowness index	9.5	E 313	6131
Properties of Dry Film			
Interior and Exterior Coatings	10.1		
Abrasion resistance	10.1.1	D 658, D 968, D 4060	6192
Adhesion	10.1.2	D 2197, D 3359	
Flexibility	10.1.3	D 522, D 2370	6221 ^A
Resistance to household chemicals	10.1.4	D 1308	
Interior Coatings	10.2		
Color change of white enamels	10.2.1		6132
Washability and cleansability	10.2.2		
Washability	10.2.2.1	D 2486, D 4213	
Cleansability	10.2.2.2	D 3450, D 4828	6141 ^B
Exterior Coatings	10.3		
Blister resistance	10.3.1	D 4585	
Exposure resistance	10.3.2	D 1006, D 1014	
Chalking	10.3.2.2	D 4214	
Checking	10.3.2.3	D 660	
Cracking	10.3.2.4	D 661	
Erosion	10.3.2.5	D 662	
Flaking	10.3.2.6	D 772	
Mildew resistance	10.3.3	D 3456	^C
Fume resistance	10.3.4		
Coating Analysis			
Chemical analysis	11.1	D 215	
Volatile content	11.2	D 2369	
Nonvolatile volume content	11.3	D 2697	
Water content	11.4	D 1208, D 4017	4081
Pigment content	11.5	D 2371	4021
Pigment analysis	11.6	D 215	7261
Nonvolatile vehicle content	11.7	D 215	4053
Vehicle separation	11.8	D 2372	
Nonvolatile vehicle identification	11.9	D 2621, D 2245	

^A Equivalent only to Method B of Test Method D 522.^B Except for scrub medium.^C 6271 is not equivalent.