



Designation: D5324 – 16 (Reapproved 2022)

Standard Guide for Testing Water-Borne Architectural Coatings¹

This standard is issued under the fixed designation D5324; 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.

1. Scope

1.1 This guide covers the selection and use of procedures for testing water-borne coatings to be used on exterior, interior or both types of surfaces (**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 **D16** with that in the *FSCT Paint/Coatings Dictionary*,² 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.”

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 **D3730**.

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

- (1) Type 1 Interior Latex Flat Wall Paints,
- (2) Type 2 Exterior Latex House Paints,
- (3) Type 3 Water-Borne Floor Paints, and
- (4) Type 4 Interior Latex Semigloss and Gloss Paints.

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

1.3 The values stated in SI 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 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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standard-*

ization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

2. Referenced Documents

2.1 ASTM Standards:³

- D16 Terminology for Paint, Related Coatings, Materials, and Applications**
- D185 Test Methods for Coarse Particles in Pigments**
- D215 Practice for the Chemical Analysis of White Linseed Oil Paints (Withdrawn 2005)⁴**
- D344 Test Method for Relative Hiding Power of Paints by the Visual Evaluation of Brushouts (Withdrawn 2018)⁴**
- D358 Specification for Wood to Be Used as Panels in Weathering Tests of Coatings (Withdrawn 2014)⁴**
- D522 Test Methods for Mandrel Bend Test of Attached Organic Coatings**
- D523 Test Method for Specular Gloss**
- D562 Test Method for Consistency of Paints Measuring Krebs Unit (KU) Viscosity Using a Stormer-Type Viscometer**
- D660 Test Method for Evaluating Degree of Checking of Exterior Paints**
- D661 Test Method for Evaluating Degree of Cracking of Exterior Paints**
- D662 Test Method for Evaluating Degree of Erosion of Exterior Paints**
- D772 Test Method for Evaluating Degree of Flaking (Scaling) of Exterior Paints**
- D869 Test Method for Evaluating Degree of Settling of Paint**
- D968 Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive**
- D1006 Practice for Conducting Exterior Exposure Tests of Hand and Factory Applied Paints on Wood and Wood Composite Materials**
- D1014 Practice for Conducting Exterior Exposure Tests of Paints and Coatings on Metal Substrates**

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

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² Available from Federation of Societies for Coatings Technology (FSCT), 492 Norristown Rd., Blue Bell, PA 19422-2350, <http://www.coatingstech.org>.

³ 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.

⁴ The last approved version of this historical standard is referenced on www.astm.org.

TABLE 1 List of Standards in Sectional Order

Property (or related test)	Section	ASTM Standard	Federal Test Method Standard 141D
Sampling	6.2	D3925	
Liquid Coating Properties			
Condition in container	7.1		3011
Coarse particles and foreign matter	7.2	D185	
Density or weight per gallon	7.3	D1475	
Fineness of dispersion	7.4	D1210	
Odor	7.5	D1296	
Colorant acceptance	7.6	D5326	
pH	7.7	E70	
Package stability	7.8		
Heat stability	7.8.1	D1849	
Freeze-thaw stability	7.8.2	D2243	
Settling	7.8.3	D869	
Microorganism resistance	7.8.4	D2574, D3273	
Coating Application and Film Formation			
Application properties	8.1		
Brush application	8.1.1	D5068	
Brush drag	8.1.1.1	D4958	
Roller application	8.1.2		2112
Roller spatter	8.1.2.1	D4707	
Spray application	8.1.3		2131
Touch-up uniformity	8.2	D3928, D7489	
Low-temperature coalescence	8.3	D3793, D7306	
Rheological properties	8.4		
Consistency (Low-shear viscosity)	8.4.1	D562	
Rheological properties of non-Newtonian materials	8.4.2	D2196, D4287	
Sag resistance	8.4.3	D4400	4494
Levelling properties	8.4.4	D4062	
Drying properties	8.5	D1640, D5895	
Wet-to-Dry Hiding Change	8.5.1	D5007	
Appearance of Dry Film			
Color difference	9.1	...	
Color appearance	9.1.1		
Color differences by visual comparison	9.1.2	D1729	
Color differences using instrumental measurements	9.1.3	D2244	
Directional reflectance	9.2	E1347	
Gloss	9.3		
Gloss, 60°	9.3.1	D523	
Sheen (85° gloss)	9.3.2	D523	
Hiding power	9.4	D344, D2805, D5150	
Burnish Resistance	9.5	D6736	
Enamel Holdout	9.6	D7786	
Properties of Dry Film			
Interior and Exterior Coatings	10.1		
Abrasion resistance	10.1.1	D968, D4060, D6037	6192
Adhesion	10.1.2	D2197, D3359, D5179	
Wet adhesion	10.1.3	D6900	6301
Flexibility	10.1.4	D522, D2370	6221 ^A
Resistance to household chemicals	10.1.5	D1308	
Efflorescence from the film	10.1.6		
Efflorescence from the substrate	10.1.7	D7072	
Surfactant Stain Resistance	10.1.8	D7190	
Interior Finishes	10.2		
Block resistance	10.2.1	D4946	
Print resistance	10.2.2	D2064	
Film porosity	10.2.3	D3258, D6583	
Washability and cleansability	10.2.4		
Washability	10.2.4.1	D2486, D4213	
Cleansability	10.2.4.2	D3450, D4828	6141 ^B
Ink Stainblocking	10.2.5	D7514	
Exterior Coatings	10.3		
Adhesion to chalky surfaces	10.3.1		6301
Dirt pick-up	10.3.2	D3719	
Fume resistance	10.3.3		
Fume resistance test	10.3.3.1		
Blister resistance	10.3.4	D4585	
Exposure resistance	10.3.5	D1006, D1014	
Chalking	10.3.5.2	D4214	
Checking	10.3.5.3	D660	
Cracking	10.3.5.4	D661	
Erosion	10.3.5.5	D662	
Flaking	10.3.5.6	D772	
Fade resistance	10.3.5.8	D2244	
Stain resistance	10.3.6		
Tannin Stain Resistance	10.3.6.1	D6686	
Coating Analysis			
Chemical analysis	11.1	D215	
Volatile content	11.2	D2369	
Volatile organic content	11.3	D3960	
Water content	11.4	D3792, D4017	

TABLE 2 Alphabetical List of Properties

Property (or related test)	Section	ASTM Standard	Federal Test Method Standard 141D
Abrasion Resistance	10.1.1	D968, D4060, D6037	6192
Adhesion	10.1.2	D2197, D3359	
Adhesion to chalky surfaces	10.3.1		6301
Analysis, chemical	11.1	D215	
Application properties	8.1		
Blister resistance	10.3.4	D4585	
Block resistance	10.2.1	D4946	
Brush application	8.1.1	D5068	
Brush drag	8.1.1.1	D4958	
Burnish Resistance	9.5	D6736	
Chalking	10.3.5.2	D4214	
Checking	10.3.5.3	D660	
Cleansability	10.2.4.2	D3450, D4828	6141 ^A
Coarse particles and foreign matter	7.2	D185	
Colorant acceptance	7.6	D5326	
Color appearance	9.1.1		
Color differences by visual comparison	9.1.2	D1729	
Color differences using instrumental measurements	9.1.3	D2244	
Condition in container	7.1		3011
Consistency (Low-shear viscosity)	8.4.1	D562	
Cracking	10.3.5.4	D661	
Density or weight per gal	7.3	D1475	
Dirt pick-up	10.3.2	D3719	
Drying properties	8.5	D1640, D5895	
Efflorescence from the film	10.1.6		
Efflorescence from the film substrate	10.1.7	D7072	
Enamel Holdout	9.6	D7786	
Erosion	10.3.5.5	D662	
Exposure resistance	10.3.5	D1006, D1014	
Fade resistance	10.3.5.8	D2244	
Film porosity	10.2.3	D3258, D6583	
Fineness of dispersion	7.4	D1210	
Flaking	10.3.5.6	D772	
Flexibility	10.1.4	D522, D2370	6221 ^B
Freeze-thaw stability	7.8.2	D2243	
Fume resistance	10.3.3		
Gloss	9.3		
Gloss, 60°	9.3.1	D523	
Heat stability	7.8.1	D1849	
Hiding power	9.4	D344, D2805, D5150	
Ink Stainblocking	10.2.5	D7514	
Levelling properties	8.4.4	D4062	
Low-temperature coalescence	8.3	D3793, D7306	
Microorganism resistance	7.8.4	D2574, D3273	
Nonvolatile vehicle identification	11.7	D3168	
Odor	7.5	D1296	4401
Package Stability	7.8		
pH	7.7	E70	
Pigment analysis	11.6	D215	7261
Pigment content	11.5	D3723	
Reflectance, directional	9.2	E1347	
Resistance to household chemicals	10.1.5	D1308	
Rheological properties of non-Newtonian materials	8.4.2	D2196, D4287	
Roller application	8.1.2	D5069	
Roller spatter	8.1.2.1	D4707	
Sag resistance	8.4.3	D4400	4494
Sampling	6.2	D3925	1022
Settling	7.8.3	D869	
Sheen (85° gloss)	9.3.2	D523	
Spray application	8.1.3		2131
Stain resistance	10.3.6		
Surfactant Staining	10.1.8	D7190	
Tannin Stain Resistance	10.3.6.1	D6686	
Touch-up uniformity	8.2	D3928, D7489	
Volatile content	11.2	D2369	
Volatile organic content (VOC)	11.3	D3960	
Washability	10.2.4.1	D2486, D4213	
Water content	11.4	D3792, D4017	
Wet adhesion	10.1.3		6301
Wet-to-Dry Hiding Change	8.5.1	D5007	

^A Except for scrub medium.

^B Equivalent only to Method B of Test Methods D522.