



Standard Guide for Testing Industrial Protective Coatings¹

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^{ε1} NOTE—References to withdrawn standards were removed editorially in September 2011.

1. Scope

1.1 This guide covers the selection and use of test methods and procedures for testing industrial protective coatings. Selection of the standards to be followed must be governed by experience and the requirements in each individual case, together with agreement between the supplier and the user.

1.2 This guide covers the testing of liquid coatings as applied on substrate by brushing, rolling, spraying, or other means appropriate to the coating and circumstance.

NOTE 1—The term “industrial protective coating” as used in this guide is described in the scope of Subcommittee D01.46¹ as “paints applied to substrates on-site of structures and buildings, especially where subject to corrosive environments, as industrial, urban, and marine environments.”

NOTE 2—Guides for testing other coating types, such as Guides D4712, D5146, D5324 or for surface preparation, coating application, such as Guide D3276, are available and should be used when it is applicable.

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

- B117 Practice for Operating Salt Spray (Fog) Apparatus
- C868 Test Method for Chemical Resistance of Protective Linings
- D16 Terminology for Paint, Related Coatings, Materials, and Applications
- D56 Test Method for Flash Point by Tag Closed Cup Tester

- D93 Test Methods for Flash Point by Pensky-Martens Closed Cup Tester
- D185 Test Methods for Coarse Particles in Pigments
- D344 Test Method for Relative Hiding Power of Paints by the Visual Evaluation of Brushouts
- 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
- D609 Practice for Preparation of Cold-Rolled Steel Panels for Testing Paint, Varnish, Conversion Coatings, and Related Coating Products
- D610 Practice for Evaluating Degree of Rusting on Painted Steel Surfaces
- 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
- D714 Test Method for Evaluating Degree of Blistering of Paints
- D772 Test Method for Evaluating Degree of Flaking (Scaling) of Exterior Paints
- D822 Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings
- D823 Practices for Producing Films of Uniform Thickness of Paint, Varnish, and Related Products on Test Panels
- D869 Test Method for Evaluating Degree of Settling of Paint
- D870 Practice for Testing Water Resistance of Coatings Using Water Immersion
- D968 Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive
- D1005 Test Method for Measurement of Dry-Film Thickness of Organic Coatings Using Micrometers
- 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 D01.46 on Industrial Protective Coatings.

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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.

- D1200** Test Method for Viscosity by Ford Viscosity Cup
- D1210** Test Method for Fineness of Dispersion of Pigment-Vehicle Systems by Hegman-Type Gage
- D1212** Test Methods for Measurement of Wet Film Thickness of Organic Coatings
- D1296** Test Method for Odor of Volatile Solvents and Diluents
- D1308** Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes
- D1474** Test Methods for Indentation Hardness of Organic Coatings
- D1475** Test Method For Density of Liquid Coatings, Inks, and Related Products
- D1535** Practice for Specifying Color by the Munsell System
- D1640** Test Methods for Drying, Curing, or Film Formation of Organic Coatings at Room Temperature
- D1653** Test Methods for Water Vapor Transmission of Organic Coating Films
- D1654** Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments
- D1729** Practice for Visual Appraisal of Colors and Color Differences of Diffusely-Illuminated Opaque Materials
- D1730** Practices for Preparation of Aluminum and Aluminum-Alloy Surfaces for Painting
- D1731** Practices for Preparation of Hot-Dip Aluminum Surfaces for Painting
- D1732** Practices for Preparation of Magnesium Alloy Surfaces for Painting
- D1735** Practice for Testing Water Resistance of Coatings Using Water Fog Apparatus
- D1849** Test Method for Package Stability of Paint
- D2196** Test Methods for Rheological Properties of Non-Newtonian Materials by Rotational (Brookfield type) Viscometer
- D2197** Test Method for Adhesion of Organic Coatings by Scrape Adhesion
- D2201** Practice for Preparation of Zinc-Coated and Zinc-Alloy-Coated Steel Panels for Testing Paint and Related Coating Products
- D2243** Test Method for Freeze-Thaw Resistance of Water-Borne Coatings
- D2244** Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates
- D2247** Practice for Testing Water Resistance of Coatings in 100 % Relative Humidity
- D2354** Test Method for Minimum Film Formation Temperature (MFFT) of Emulsion Vehicles
- D2369** Test Method for Volatile Content of Coatings
- D2371** Test Method for Pigment Content of Solvent-Reducible Paints
- D2574** Test Method for Resistance of Emulsion Paints in the Container to Attack by Microorganisms
- D2616** Test Method for Evaluation of Visual Color Difference With a Gray Scale
- D2621** Test Method for Infrared Identification of Vehicle Solids From Solvent-Reducible Paints
- D2697** Test Method for Volume Nonvolatile Matter in Clear or Pigmented Coatings
- D2794** Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
- D2803** Guide for Testing Filiform Corrosion Resistance of Organic Coatings on Metal
- D2805** Test Method for Hiding Power of Paints by Reflectometry
- D2832** Guide for Determining Volatile and Nonvolatile Content of Paint and Related Coatings
- D3134** Practice for Establishing Color and Gloss Tolerances
- D3168** Practice for Qualitative Identification of Polymers in Emulsion Paints
- D3170** Test Method for Chipping Resistance of Coatings
- D3276** Guide for Painting Inspectors (Metal Substrates)
- D3278** Test Methods for Flash Point of Liquids by Small Scale Closed-Cup Apparatus
- D3359** Test Methods for Measuring Adhesion by Tape Test
- D3363** Test Method for Film Hardness by Pencil Test
- D3792** Test Method for Water Content of Coatings by Direct Injection Into a Gas Chromatograph
- D3793** Test Method for Low-Temperature Coalescence of Latex Paint Films by Porosity Measurement
- D3912** Test Method for Chemical Resistance of Coatings and Linings for Use in Nuclear Power Plants
- D3924** Specification for Environment for Conditioning and Testing Paint, Varnish, Lacquer, and Related Materials
- D3925** Practice for Sampling Liquid Paints and Related Pigmented Coatings
- D3928** Test Method for Evaluation of Gloss or Sheen Uniformity
- D3960** Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings
- D4017** Test Method for Water in Paints and Paint Materials by Karl Fischer Method
- D4060** Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser
- D4062** Test Method for Leveling of Paints by Draw-Down Method
- D4138** Practices for Measurement of Dry Film Thickness of Protective Coating Systems by Destructive, Cross-Sectioning Means
- D4141** Practice for Conducting Black Box and Solar Concentrating Exposures of Coatings
- D4212** Test Method for Viscosity by Dip-Type Viscosity Cups
- D4214** Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films
- D4287** Test Method for High-Shear Viscosity Using a Cone/Plate Viscometer
- D4400** Test Method for Sag Resistance of Paints Using a Multinotch Applicator
- D4457** Test Method for Determination of Dichloromethane and 1,1,1-Trichloroethane in Paints and Coatings by Direct Injection into a Gas Chromatograph
- D4541** Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers

- D4585 Practice for Testing Water Resistance of Coatings Using Controlled Condensation
- D4587 Practice for Fluorescent UV-Condensation Exposures of Paint and Related Coatings
- D4712 Guide for Testing Industrial Water-Reducible Coatings
- D4752 Practice for Measuring MEK Resistance of Ethyl Silicate (Inorganic) Zinc-Rich Primers by Solvent Rub
- D4958 Test Method for Comparison of the Brush Drag of Latex Paints
- D5009 Test Method for Evaluating and Comparing Transfer Efficiency of Spray Applied Coatings Under Laboratory Conditions
- D5031 Practice for Enclosed Carbon-Arc Exposure Tests of Paint and Related Coatings
- D5064 Practice for Conducting a Patch Test to Assess Coating Compatibility
- D5065 Guide for Assessing the Condition of Aged Coatings on Steel Surfaces
- D5146 Guide to Testing Solvent-Borne Architectural Coatings
- D5162 Practice for Discontinuity (Holiday) Testing of Non-conductive Protective Coating on Metallic Substrates
- D5201 Practice for Calculating Formulation Physical Constants of Paints and Coatings
- D5286 Test Methods for Determination of Transfer Efficiency Under General Production Conditions for Spray Application of Paints
- D5324 Guide for Testing Water-Borne Architectural Coatings
- D5327 Practice for Evaluating and Comparing Transfer Efficiency of Spray Applied Coatings Under General Laboratory Conditions
- D5402 Practice for Assessing the Solvent Resistance of Organic Coatings Using Solvent Rubs
- D5894 Practice for Cyclic Salt Fog/UV Exposure of Painted Metal, (Alternating Exposures in a Fog/Dry Cabinet and a UV/Condensation Cabinet)
- D6093 Test Method for Percent Volume Nonvolatile Matter in Clear or Pigmented Coatings Using a Helium Gas Pycnometer
- D6132 Test Method for Nondestructive Measurement of Dry Film Thickness of Applied Organic Coatings Using an Ultrasonic Gage
- D6578 Practice for Determination of Graffiti Resistance
- D6677 Test Method for Evaluating Adhesion by Knife
- D6695 Practice for Xenon-Arc Exposures of Paint and Related Coatings
- D6943 Practice for Immersion Testing of Industrial Protective Coatings
- D6944 Practice for Resistance of Cured Coatings to Thermal Cycling
- D7055 Practice for Preparation (by Abrasive Blast Cleaning) of Hot-Rolled Carbon Steel Panels for Testing of Coatings
- D7091 Practice for Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to Ferrous Metals and Nonmagnetic, Nonconductive Coatings Applied to Non-Ferrous Metals
- E84 Test Method for Surface Burning Characteristics of Building Materials
- F1249 Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor
- G7 Practice for Atmospheric Environmental Exposure Testing of Nonmetallic Materials
- G8 Test Methods for Cathodic Disbonding of Pipeline Coatings
- G14 Test Method for Impact Resistance of Pipeline Coatings (Falling Weight Test)
- G20 Test Method for Chemical Resistance of Pipeline Coatings
- G42 Test Method for Cathodic Disbonding of Pipeline Coatings Subjected to Elevated Temperatures
- G50 Practice for Conducting Atmospheric Corrosion Tests on Metals
- G80 Test Method for Specific Cathodic Disbonding of Pipeline Coatings
- G85 Practice for Modified Salt Spray (Fog) Testing
- G90 Practice for Performing Accelerated Outdoor Weathering of Nonmetallic Materials Using Concentrated Natural Sunlight
- G95 Test Method for Cathodic Disbondment Test of Pipeline Coatings (Attached Cell Method)
- G113 Terminology Relating to Natural and Artificial Weathering Tests of Nonmetallic Materials
- G141 Guide for Addressing Variability in Exposure Testing of Nonmetallic Materials
- G147 Practice for Conditioning and Handling of Nonmetallic Materials for Natural and Artificial Weathering Tests
- G151 Practice for Exposing Nonmetallic Materials in Accelerated Test Devices that Use Laboratory Light Sources
- G152 Practice for Operating Open Flame Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials
- G153 Practice for Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials
- G154 Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials
- G155 Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials
- 2.2 *Federal Standards:*³
- U.S. Federal Test Method Standard No. 141C:**
- 1022 Sampling for Inspection and Testing
- 2112 Application by Roller
- 2131 Application of Sprayed Films
- 2141 Application of Brushed Films
- 2161 Application of Film with Film Applicator (Magnetic Chuck)
- 2162 Application of Film with Film Applicator Using Suction Panel Holder
- 3011 Condition in Container

³ Available from Standardization Documents Order Desk, DODSSP, Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5098, <http://dodssp.daps.dla.mil>.