

SSPC: The Society for Protective Coatings

COATING SYSTEM STANDARD PS 28.02

Three-Coat Moisture-Cured Polyurethane Coating System, Performance-Based

1. Scope

This standard contains performance requirements for a coating system for steel substrates comprised of (1) a zinc-rich moisture-cured polyurethane primer (complying with SSPC-Paint 40), (2) a moisture-cured polyurethane intermediate coat (complying with SSPC-Paint 41), and (3) a single-component moisture-cured aliphatic polyurethane topcoat (complying with SSPC-Paint 38).

The coating system is generally suitable for exposures in SSPC Environmental Zones 1A (interior, normally dry), 1B (exterior, normally dry), 2A (frequently wet by fresh water, excluding immersion), 2B (frequently wet by salt water, excluding immersion), and 3B (chemical exposure, neutral). The primer/intermediate coat/topcoat system shall meet the performance requirements of Sections 7 and 8 described in this standard.

2. Description

2.1 This coating system consists of three moisture-cured polyurethane coatings that are each supplied as single-package products.

Note: The zinc-rich primer may be supplied as either a single or two-component product in accordance with SSPC-Paint 40, Section 2.1.

2.2 The three coatings described herein are characterized by the presence of free polyisocyanate groups capable of reacting with atmospheric moisture in order to form a solid film. Individual products meeting minimum performance requirements of this standard may vary in formulation, raw materials, and application characteristics.

2.3 The primer, intermediate coat and topcoat are intended for spray application with allowance for small area touch-up by brush (see Note 11.1). The topcoat is tolerant of larger-scale application by brush or roller. All applications shall be in accordance with manufacturer's instructions.

3. Referenced Standards

3.1 The latest issue, revision, or amendment of the referenced standards in effect on the date of publication of the project specification shall govern, unless otherwise specified. A standard marked with an asterisk (*) is referenced only in the Notes or the Appendix, which are not requirements of this standard.

3.2 If there is a conflict between the requirements of any of the cited reference standards and this standard, the requirements of this standard shall prevail.

3.3 SSPC STANDARDS AND JOINT STANDARDS:

Guide 13	Guide for the Identification and Use of Industrial Coating Materials in Computerized Product Databases
PA 2	Measurement of Dry Coating Thickness with Magnetic Gages
Paint 38	Single-Component Moisture-Cure Weatherable Aliphatic Polyurethane Topcoat, Performance-Based
Paint 40	Zinc-Rich Moisture Cured Polyurethane Primer, Performance Based
Paint 41	Moisture-Cured Polyurethane Primer or Intermediate Coat, Micaceous Iron Oxide Reinforced, Performance-Based
SP 1	Solvent Cleaning
SP 5/NACE No. 1	White Metal Blast Cleaning
VIS 2/ASTM D 610	Standard Method of Evaluating Degree of Rusting on Painted Steel Surfaces

3.4 ASTM INTERNATIONAL STANDARDS:¹

A 572	Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel
* D 512	Standard Test Methods for Chloride Ion in Water
* D 520	Standard Specification for Zinc Dust Pigment
D 523	Standard Test Method for Specular Gloss
* D 562	Standard Test Method for Consistency of Paints Measuring Krebs Unit (KU) Viscosity Using a Stormer-Type Viscometer
D 714	Standard Test Method for Evaluating Degree of Blistering of Paints
D 1014	Standard Practice for Conducting Exterior Exposure Tests of Paints and Coatings on Metal Substrates
* D 1475	Standard Test Method for Density of Liquid Coatings, Inks, and Related Products
D 1640	Standard Test Methods for Drying, Curing, or Film Formation of Organic Coatings at Room Temperature
D 1654	Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments

- D 2244** Standard Test Method for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates
- * D 2369** Standard Test Method for Volatile Content of Coatings
- * D 2371** Standard Test Method for Pigment Content of Solvent-Reducible Paints
- * D 2621** Standard Test Method for Infrared Identification of Vehicle Solids from Solvent-Reducible Paints
- D 2794** Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
- D 4417** Standard Test Methods for Field Measurement of Surface Profile of Blast Cleaned Steel
- D 4541** Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
- * D 4940** Standard Test Method for Conductimetric Analysis of Water Soluble Ionic Contamination of Blasting Abrasives
- D 5894** Standard Practice for Cyclic Salt Fog/UV Exposure of Painted Metal, (Alternating Exposures in a Fog/Dry Cabinet and a UV/Condensation Cabinet)
- * G 101** Standard Guide for Estimating the Atmospheric Corrosion Resistance of Low-Alloy Steels

3.5 AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI) STANDARDS:²

ANSI Z129.1 Hazardous Industrial Chemicals—Precautionary Labeling

ANSI B94.50 Basic Nomenclature and Definitions for Single-Point Cutting Tools

4. Composition Requirements

4.1 RESINS AND PIGMENTS

4.1.1 Primer: The resin used in the primer is characterized by the presence of free polyisocyanate groups capable of reacting with atmospheric moisture in order to form a film. The major pigment component is zinc dust. Composition requirements of the primer are described in SSPC-Paint 40 (see Notes 11.2, 11.3, 11.4, and 11.5).

4.1.2 Intermediate Coat: The resin used in the intermediate coat is characterized by the presence of free polyisocyanate groups capable of reacting with atmospheric moisture in order to form a film. Other resin composition requirements are described in SSPC-Paint 41; as per SSPC-Paint 41, micaceous iron oxide is a required pigment component in this coating.

4.1.3 Topcoat: The resin used in the topcoat is characterized by the presence of free polyisocyanate groups capable of reacting with atmospheric moisture in order to form a film in accordance with compositional requirements of SSPC-Paint 38, Section 4.1.

² American National Standards Institute, 1819 L Street, NW, Suite 600, Washington, DC 20036. Standards available online from www.ansi.org.

5. Standard Testing Conditions

5.1 TEST PANELS: Triplicate panels shall be used for each test. Unless otherwise specified, the hot rolled steel test panels shall conform to ASTM A 572 (see Appendix A). Panel size shall be 100 mm x 150 mm x 6 mm (4 inch x 6 inch x ¼ inch). Test panels shall be solvent cleaned in accordance with SSPC-SP 1 prior to blast cleaning. The test panels shall be blast cleaned in accordance with SSPC-SP 5. The blast profile shall be 44 to 57 micrometers (1.75 to 2.25 mils) as measured in accordance with ASTM D 4417, Method C.

5.2 APPLICATION: The primer, intermediate coat and topcoat shall be applied in accordance with the manufacturer's recommendations, observing the defined recoat windows. The coatings shall show no streaking, running, sagging or other defects during application or while drying.

5.3 DRY FILM THICKNESS: The dry film thickness (DFT) for each coat of the system (primer, intermediate coat and topcoat) on the test panels shall meet the manufacturer's written recommended range (see Note 11.6). The DFT shall be measured in accordance with SSPC-PA 2, Appendix 5.

5.4 CURE: The primer, intermediate coat and the topcoat shall be dried and cured in accordance with manufacturer's written recommendations unless otherwise specified (for example, for preparing panels for testing according to AASHTO R-31).³ After application of the three coats in accordance with product data sheets, the coating system shall be aged for a minimum of 14 days in an environment with a minimum relative humidity of 50%, and at a temperature of 23 ± 2 °C (73.5 ± 3.5 °F), as described in paragraph 5.1 of ASTM D 1640.

5.5 SCRIBING: Two vertical parallel lines shall be scribed on the face of the coated panels to expose the underlying metal before testing. The lines shall be at least 2.5 cm (1 inch) from the edge, the top, and the bottom of each panel and at least 5 cm (2 inches) from each other. Each scribe shall be 6 cm (2.4 inches) long. The scribes shall run parallel to the long axis of the panel so that they are positioned vertically when subjected to the specified exposure. Scribes shall be made using a straight-shank tungsten carbide tip lathe cutting tool (ANSI B94.50, Style E) following the procedure in Section 4.1 of ASTM D 1654.

5.6 BACKS AND EDGES: The edges and the back of each panel shall be sealed with coating or tape.

6. Requirements of Liquid Coatings

The liquid primer shall meet the requirements of Paint 40; the liquid intermediate coat shall meet the requirements of Paint 41, and the liquid topcoat shall meet the requirements of Paint 38 (see Note 11.7).

7. Laboratory Physical Tests of Applied Films

7.1 PRIMER ADHESION TO SUBSTRATE: Primer shall be applied to three panels in accordance with Sections 5.1

³ AASHTO R-31, "Evaluation of Protective Coatings for Structural Steel", American Association of State Highway and Transportation Officials (AASHTO), 444 North Capital Street, NW, Suite 249, Washington DC 20001.