

SSPC: The Society for Protective Coatings

PAINT SPECIFICATION NO. 36

Two-Component Weatherable Aliphatic Polyurethane Topcoat, Performance-Based

1. Scope

1.1 This specification covers the requirements for a high-performance two-component UV-stable polyurethane topcoat (ASTM D 16, Type V polyurethane). It is intended as a topcoat that provides excellent color and gloss retention, not as a thick-section elastomeric coating.

1.2 Coatings meeting the requirements of this specification are generally suitable for exposures in 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), 3B (chemical exposure, neutral), and 3C (chemical exposure, alkaline).

1.3 The specified coating is intended for application by brush, spray, or roller. It is generally applied over a primer or intermediate coating.

2. Description

2.1 This coating is typically based on a hydroxyl-functional polyol resin and an aliphatic polyisocyanate co-reactant.

2.2 WEATHERING LEVELS: This specification contains three levels of accelerated and South Florida weathering performance (see Section 6.2).

3. Referenced Standards

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

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

3.3 SSPC STANDARD:

Guide 13 Guide for the Identification and Use of Industrial Coating Materials in Computerized Product Databases

3.4 ASTM INTERNATIONAL STANDARDS:¹

D 16	Standard Terminology for Paint, Related Coatings, Materials, and Applications
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 968	Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive
D 1014	Standard Practice for Conducting Exterior Exposure Tests of Paints and Coatings on Metal Substrates
* D 1296	Standard Test Method for Odor of Volatile Solvents and Diluents
* D 1308	Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes
* D 1475	Standard Test Method for Density of Liquid Coatings, Inks, and Related Products
* D 1535	Standard Practice for Specifying Color by the Munsell System
* D 1640	Standard Test Methods for Drying, Curing, or Film Formation of Organic Coatings at Room Temperature
D 1849	Standard Test Method for Package Stability of Paint
D 2244	Standard Practice 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 3359	Standard Test Methods for Measuring Adhesion by Tape Test
* D 3719	Standard Test Method for Quantifying Dirt Collection on Coated Exterior Panels

¹ ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959. Standards available online from <http://www.astm.org>.

- D 3925 Standard Practice for Sampling Liquid Paints and Related Coatings
- * D 4214 Standard Test Methods for Evaluating Degree of Chalking of Exterior Paint Films
- D 4587 Standard Practice for Fluorescent UV-Condensation Exposures of Paint and Related Coatings
- * D 5402 Standard Practice for Assessing the Solvent Resistance of Organic Coatings Using Solvent Rubs
- * D 5590 Test Method for Determining the Resistance of Paint Films and Related Coatings to Fungal Defacement by Accelerated Four-Week Agar Plate Assay

3.5 AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI) STANDARD:²

- Z129.1 Hazardous Industrial Chemicals - Precautionary Labeling

3.6 AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO) STANDARD:³

- TP 67-03 Standard Method of Test for Analysis of Structural Steel Coatings for Isocyanate Content

4. Composition Requirements

4.1 RESIN REQUIREMENT: The curing agent shall be an aliphatic polyisocyanate. The total coating binder solids shall be made up of at least 17% polyisocyanate by weight. The method and formula for determining isocyanate content, developed by AASHTO as TP 67, is shown in the Annex.

4.2 VOC CONTENT: See Note 10.1.

5. Requirements of Liquid Coating

5.1 PACKAGE STABILITY: Package stability shall be tested in accordance with ASTM D 1849. Storage conditions shall be 30 days at 52 ± 1 °C (126 ± 2 °F). A change in consistency of greater than 10 Krebs units or noncompliance with the application requirements shall be cause for rejection.

5.2 APPLICATION PROPERTIES: All guidance provided by the manufacturer regarding mixing of multicomponent products, thinning requirements, induction times, and special

application requirements shall be followed. Following the manufacturer's recommendations, the coating shall be easily applied by brush, roller, or spray. The coating shall show no streaking, running, sagging, or other defects during application or while drying.

6. Weathering Requirements

6.1 WEATHERING RESISTANCE: Two weathering test procedures are specified below. Test data may not be available for the desired color and gloss specified. Performance levels are established using whites and light colors. It is left to the discretion of the specifier whether to accept Florida data from a similar color or to use UV-A data in lieu of Florida weathering data.

6.1.1 Accelerated Weathering: Accelerated weathering shall be performed in accordance with ASTM D 4587, Cycle 2. Test panels shall have a primer/intermediate coat as recommended by the manufacturer.

6.1.2 South Florida Weathering: South Florida weathering shall be performed in accordance with ASTM D 1014 (45 degrees south exposure, washed with mild detergent). Test panels shall have a primer/intermediate coat as recommended by the manufacturer.

6.1.3 Application shall be according to manufacturer's written recommendations. A minimum of three panels shall be exposed. Clear coatings must be tested over the intended basecoat. Initially, and at the end of each level period, 60 degree gloss shall be measured according to ASTM D 523 and tristimulus color shall be measured according to ASTM D 2244. Table 3 summarizes the tests of Section 6 as well as the minimum acceptance criteria.

6.2 Performance Levels: Tables 1 and 2 specify the amount of time the coating must perform before noticeable change in order to achieve the defined performance level. Polyurethane topcoats are available in a wide range of color and gloss. Procurement documents shall state the desired level of performance, exposure method (in accordance with Tables 1 and 2), color, and gloss. For example, a specifier may require Level 2 Florida exposure, initial gloss greater than 80, matched to a specific color. A certain level of accelerated weathering does not necessarily correspond to a particular level of atmospheric weathering and they need to be specified independently. These are two independent complementary

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

³ American Association of State Highway and Transportation Officials, 444 North Capitol Street, NW, Suite 249, Washington DC 20001, 202-624-5800. (<http://www.transportation.org/aashto/home.nsf>)

TABLE 1
TIME CORRESPONDING TO EACH PERFORMANCE LEVEL

<u>Accelerated UV-A/Condensation</u>	<u>Hours to Noticeable Change†</u>	<u>Cycles to Noticeable Change†</u>
Level 1	500 to 999	63 to 125
Level 2	1000 to 1999	126 to 250
Level 3	2000 or more	251 or more

† Noticeable change following Accelerated UV-A/Condensation testing is defined as a gloss reduction of 25% or more of the initial gloss value measured at a 60° angle or a color change greater than 2.0 ΔE^* C.I.E. 1976 L*A*B* (see Section 6.1.1 and Note 11.2).

TABLE 2
FLORIDA EXPOSURE

	<u>Months to Noticeable Change†</u>
Level 1	12 to 23
Level 2	24 to 47
Level 3	48 or more

† Noticeable change following Florida Exposure testing is defined as a gloss reduction of 35% or more of the initial gloss value measured at a 60° angle or a color change greater than 2.0 ΔE^* C.I.E. 1976 L*A*B* (see Section 6.1.2 and Note 11.2).

TABLE 3
PERFORMANCE TESTING RESULTS TO BE REPORTED

Exposure Test	Performance Level	Exposure Time	Measurement Test/Minimum Criteria	
			Color Change ASTM D 2244	Maximum Gloss Reduction ASTM D 523
Accelerated Weathering ASTM D 4587	Level 1	500 h	Color Change less than 2.0 ΔE^* C.I.E. 1976 L*A*B*†	25% from original reading
	Level 2	1000 h		
	Level 3	2000 h		
South Florida Weathering ASTM D 1014	Level 1	12 mo	Color Change less than 2.0 ΔE^* C.I.E. 1976 L*A*B*†	35% from original reading
	Level 2	24 mo		
	Level 3	48 mo		

† Smaller values of color change (less than 2.0 ΔE^*) may be visible to the eye, but the noticeable change maximum of 2.0 ΔE^* C.I.E. 1976 L*A*B* specified herein is deemed acceptable for most industrial and marine applications. More stringent gloss and color retention requirements may be specified as needed (see Note 11.2).