

SSPC: The Society for Protective Coatings

Coating Standard No. 16

Coal Tar Epoxy Polyamide, Black (or Dark Red) Coating

1. Scope

This standard covers a two-component coal tar epoxy polyamide black (or dark red) coating for structural steel.

2. Description

2.1 The coal tar epoxy-polyamide black (or dark red) coating consists of two parts. Component A contains a refined coal tar pitch, a liquid-type polyamide resin, and a polyamine promoter to accelerate curing rate. Component B is a liquid-type epoxy resin that is mixed into Component A just prior to application. Details of the composition are given in Table 1.

2.2 This coating contains approximately 71 percent by volume (vol. %) of nonvolatile film-forming solids (pigment and binder). The theoretical spreading rate for a 200-micrometer [μm] (8 mil) dry film thickness is 3.5 square meters/liter (142 square feet/U.S. gallon). Actual spreading rates can be significantly lower.

2.3 This coating is suitable for exposures in SSPC Environmental Zones 2A (frequently wet by fresh water), 2B (frequently wet by salt water), 2C (fresh water immersion), 2D (salt water immersion), 3A (chemical, acidic), 3B (chemical, neutral), and 3C (chemical, alkaline); and is intended for spray application over steel surfaces prepared in accordance with SSPC-SP 6, "Commercial Blast Cleaning" (for non-immersion service), SSPC-SP 10, "Near White Blast Cleaning" (for immersion service), or SSPC-SP 8, "Pickling." The coating is self-priming and exhibits good adhesion to clean structural steel and concrete surfaces. Adhesion of the coating to smooth surfaces such as cold-rolled steel or intact mill scale has been found to be substantially inferior to that attained on blast roughened surfaces (see Note 8.1).

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, 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 STANDARDS AND JOINT STANDARDS:

Guide 13	Guide for the Identification and Use of Industrial Coating Material in Computerized Product Databases
PA 1	Shop, Field, and Maintenance Painting of Steel
PA 2	Procedure for Determining Conformance to Dry Coating Thickness Requirements
SP 6/NACE No. 3	Commercial Blast Cleaning
SP 8	Pickling
SP 10/NACE No. 2	Near-White Blast Cleaning

3.4 ASTM INTERNATIONAL STANDARDS:¹

D4	Standard Test Method for Bitumen Content
D5/D5M	Standard Test Method for Penetration of Bituminous Materials
D36/D36M	Standard Test Method for Softening Point of Bitumen (Ring-and-Ball Apparatus)
D139	Standard Test Method for Float Test for Bituminous Materials
D605	Standard Specification for Magnesium Silicate Pigment (Talc)
D609	Standard Practice for Preparation of Cold-Rolled Steel Panels for Testing Paint, Varnish, Conversion Coatings, and Related Coating Products
D1296	Standard Test Method for Odor of Volatile Solvents and Diluents
D1475	Standard Test Method for Density of Liquid Coatings, Inks, and Related Products
D1544	Standard Test Method for Color of Transparent Liquids (Gardner Color Scale)
D1652	Standard Test Methods for Epoxy Content of Epoxy Resins
D2415	Standard Test Method for Ash in Coal Tar and Pitch
D3721	Standard Specification for Synthetic Red Iron Oxide Pigment

¹ ASTM International, 100 Barr Harbor Road, West Conshohocken, PA 19380. Standards are available online from <http://www.astm.org>

3.5 FEDERAL STANDARDS:

- * **MIL-PRF-23236** Coating Systems for Ship Structures²

3.6 UNITED NATIONS STANDARD³

GHS Globally Harmonized System of Classification and Labelling of Chemicals (GHS), 4th Revised Edition.

4. Composition

4.1 Ingredients and proportions shall be as specified in Table 1 and in Sections 4.3 through 4.7 (see Notes 8.2 and 8.3).

4.2 Each component of this coating based on the specified ingredients shall be uniform, stable in storage, and free from grit and coarse particles.

4.3 Coal tar pitch used in this coating is defined as a product obtained from the distillation of high temperature crude coke oven tar, which in itself is a product obtained during the destructive distillation of coal in slot ovens operated at a temperature above 700 °C (1300 °F). The coal tar pitch shall be composed primarily of a complex combination of three or more membered condensed ring aromatic hydrocarbons.

4.4 The epoxy resin shall be a di-epoxide condensation product of bisphenol-A and epichlorohydrin with terminal epoxide groups.

4.5 The polyamide resin shall be a condensation product of a dimerized fatty acid in polyamines.

4.6 Acceptable gelling agents are organic derivatives of magnesium montmorillonite and hydrogenated castor oil. Acceptable activators, if used, are methanol, ethanol, or propylene carbonate (see Note 8.4).

4.7 The accelerator shall be 2,4,6-tri (dimethylamino-methyl) phenol.

² US Department of Defense Single Stock Point (DODSSP) military standards are available online via <<https://assist.daps.dla.mil>>

³ United Nations Economic Commission for Europe, Transport Division, Palais des Nations, CH - 1211 Geneva 10, Switzerland. Copies of this standard may be obtained from the United Nations Publications Customer Service, National Book Network, 15200, 15200 NBN Way, Ridge Summit PA 17124 <<https://unp.un.org>>

**TABLE 1
COMPOSITION**

INGREDIENTS	REQUIRED		TYPICAL COMPOSITION		INGREDIENT STDS.
	Min.	Max.	Component A and B		
	wt. %	vol. %			
COMPONENT A (82±0.5 wt. %) (80 vol. %)					
Coal Tar Pitch	33.0	36.0	28.2	29.0	Par 4.3 and 5.1
Polyamide Resin	11.0	12.0	9.5	12.4	Par 4.5 and 5.3
Magnesium Silicate ¹	30.0	33.0	25.8	11.9	ASTM D605
Xylene ²	18.0	21.0	15.4	22.9	----
Gelling Agent and Activator	2.5	2.6	2.0	2.4	Par 4.6
Accelerator	1.2	1.3	1.1	1.4	Par 4.7
Component A TOTALS	100		82.0	80.0	
COMPONENT B(18.±0.5 wt. %) (20 vol. %)					
Liquid Epoxy Resin	----	----	18.0	20.0	Par 4.4 and 5.2
TOTALS					
(Component A and B)	100	100	100.0	100.0	

¹ When specified in the procurement documents, a dark red colored coating shall be furnished in which 50% or more (by volume) of the magnesium silicate is replaced by synthetic red iron oxide conforming to ASTM D3721. The red coating shall meet all of the test requirements prescribed for the black coating, except that the nonvolatile content of Component A shall reflect the greater specific gravity of the iron oxide pigment.

² In most cases where the specified volatiles are not permitted, the volatile portion of the coal tar epoxy coating may be replaced with exempt materials to the extent necessary to assure compliance with the applicable regulations. The modified coating shall meet all of the test requirements specified herein except that determination of compliance with the nonvolatile weight content shall reflect any difference in specific gravity between xylene and the substituted solvents.

TABLE 2
ANALYSIS OF COAL TAR PITCH

CHARACTERISTICS	TYPE 1		TYPE 2		TYPE 3		ASTM Method
	Min.	Max.	Min.	Max.	Min.	Max.	
Float Test at 50 °C, seconds	----	----	----	---	150	220	D139
Softening Point, in water, °C	70	75	54	62	----	----	D36
Insolubles in Carbon Disulfide, wt. %	----	20	----	20	----	20	D4
Ash, wt. %.	----	0.5	----	0.5	----	0.5	D2415
Distillation, Dry Basis, wt. %							
0-170 °C	----	----	----	----	----	0	----
0-250 °C	----	0	----	0	----	----	----
0-270 °C	----	----	----	----	----	6	----
0-300 °C	----	5	----	5	----	15	----
Softening point of residue at 300 °C, in water, °C	----	----	----	----	45	60	D36

TABLE 3
ANALYSIS OF EPOXY RESIN

CHARACTERISTICS	REQUIREMENTS		
	Min.	Max.	ASTM Method
Epoxide Equivalent	180	200	D1652
Nonvolatile content (1-2 grams after 1 h @ 105 ± 2 °C), wt. %	99	----	----
Color, Gardner	----	5	D1544
Specific Gravity	1.15	1.18	D1475
Viscosity, Brookfield, at 15 °C, poises	100	160	----

5. Properties

5.1 The coal tar pitch used shall meet the requirements for one of the types listed in Table 2.

5.2 The epoxy resin shall be clear, shall be free of turbidity, crystals, and particulate matter; and shall meet the requirements of Table 3.

5.3 The polyamide resin shall be clear, shall be free of turbidity and particulate matter, and shall meet the requirements of Table 4.

5.4 Component A of this coating shall meet the requirements of Sections 5.5 through 5.8.

5.5 ODOR: Shall be normal for the materials permitted (ASTM D1296).

5.6 COLOR: The color shall be black or dark red (see Note 8.5).

5.7 The viscosity of Component A shall not exceed 160 poises when tested as follows:

Fill a container having a diameter and a height of not less than 7.6 centimeters [cm] (3 inches [in.]) and 9.5 cm (3.75 in.), respectively, to a depth of not less than 7.6 cm (3 in.) with a representative sample of Component A. Set up an RVT series Brookfield viscometer with a No. 7 spindle and with guard removed. Bring the sample to (and thereafter maintain) a temperature of 77 °F (25 °C) and stir vigorously for two minutes with a stiff spatula. Immediately after stirring, lower the viscometer until 1/2 of the "neck" mark on the spindle is covered. Run the viscometer at 100 rpm for one minute and take a reading of the position of the pointer on the dial. If the dial reading is 40 or less, the viscosity shall be considered to be 160 poises or less. If the reading is over 40, immediately start the motor and take additional readings at one-minute intervals. If one or more readings of 40 or less are obtained out of ten readings, taken at one-minute intervals, the viscosity of the material shall be considered to meet the viscosity requirement.

5.8 The nonvolatile content of Component A shall not be less than 77 percent by weight (wt. %) when tested as follows:

Place a stirrer made of stiff wire into a small disposable aluminum dish of about 5 cm (2 in.) in diameter and weigh to the nearest 0.1 mg. As rapidly as possible, place between