

SSPC: The Society for Protective Coatings

Coating Standard No. 33

Coal Tar Mastic Coating, Cold-Applied

1. Scope

1.1 This specification covers a cold-applied coal-tar coating for use on underground and underwater steel structures.

1.2 INTENDED USE: This coating, when applied over properly prepared carbon steel, is suitable for use on parts or structures exposed in Environmental Zones 2A (frequently wet by fresh water), 2B (frequently wet by salt water), 2C (fresh water immersion), 2D (salt water immersion), 3B (chemical exposure neutral), and 3C (chemical exposure alkaline). The coating is also suitable for use on hydraulic structures and pipe. It must be used with discretion for immersion in corrosive chemicals since the coating is dissolved by some organic solvents and attacked by oxidizing solutions.

1.3 This coating is intended for application by brush or spray for use by itself or as a primer in a multi-coat system.

2. Description

2.1 The coating described in this specification consists of a cold-applied, black, self-priming, heavy-duty protective coating. It is based on a blend of coal-tar pitch, selected solvents, and fillers.

2.2 The coating contains approximately 70 percent by volume of non-volatile film-forming solids. The theoretical spreading rate for a 380 μm (15 mil) dry film thickness is approximately 1.8 m^2/L (75 ft^2/gal). Actual spreading rates can be significantly lower.

2.3. To prevent checking and alligatoring when exposed to sunlight, the coating must be topcoated with a coal-tar emulsion coating meeting SSPC-Paint 32, or other suitable topcoat.

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:

Guide 13	Guide for the Identification and Use of Industrial Coating Materials in Computerized Product Databases
PA 2	Procedure for Determining Conformance to Dry Coating Thickness Requirements
Paint 32	Coal-Tar Emulsion Coating
SP 1	Solvent Cleaning
SP 2	Hand Tool Cleaning
SP 3	Power Tool Cleaning

3.4 ASTM INTERNATIONAL STANDARDS:¹

D5	Standard Test Method for Penetration of Bituminous Materials
D20	Standard Test Method for Distillation of Road Tars
D36	Standard Test Method for Softening Point of Bitumen (Ring-and-Ball Apparatus)
D92	Standard Test Method for Flash and Fire Points by Cleveland Open Cup Tester
D453	Standard Test Method for Tar Acids in Creosote-Coal Tar Solutions (withdrawn 2006)
* D562	Standard Test Method for Consistency of Paints Measuring Krebs Unit (KU) Viscosity Using a Stormer Type Viscometer
* D1475	Standard Test Method for Density of Liquid Coatings, Inks, and Related Products
D1640	Standard Test Methods for Drying, Curing, or Film Formation of Organic Coatings at Room Temperature
D2369	Standard Test Method for Volatile Content of Coatings
D2794	Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
* D3174	Standard Test Method for Ash in the Analysis Sample of Coal and Coke from Coal

¹ ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959. For referenced ASTM standards, visit the ASTM website, <http://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.

D3924	Standard Specification for Standard Environment for Conditioning and Testing Paint, Varnish, Lacquer, and Related Materials
D3925	Standard Practice for Sampling Liquid Paints and Related Pigmented Coatings
D6677	Standard Test Method for Evaluating Adhesion by Knife

3.5 UNITED NATIONS STANDARD²

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

4.1 The manufacturer is given wide latitude in the selection of raw materials and manufacturing processes (see Notes 9.1 and 9.2).

4.2 MATERIAL: The coating shall be a homogeneous mixture composed only of coal-tar pitch, solvents, and inert non-water-absorbent mineral filler. The 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 condensed ring aromatic hydrocarbons of three or more members. The coating shall not contain asphalt or asbestos.

5. Requirements of Liquid Coating

5.1 CONDITION IN CONTAINER: The coating shall be smooth and uniform with a minimum of settling. Any solvent that separates shall be readily incorporated upon stirring.

5.2 FLASH POINT: When tested according to ASTM D92 the flash point shall be a minimum of 35 °C (95 °F).

5.3 DISTILLATION: When tested according to ASTM D20 to a temperature of 235 °C (455 °F), the coating shall have a residue content of 15 to 30 percent by weight (wt %). The residue from the distillation when tested according to ASTM D5 shall have a penetration value of 5 to 25 mm (0.2 to 1 inch). The residue when tested according to ASTM D36 shall have a softening point of 96 to 116 °C (205 to 240 °F).

5.4 ASH CONTENT: When tested according to ASTM D3174, the coating shall have an ash content of 15 to 30 wt %

5.5 TAR ACIDS: When tested according to ASTM D453 (distillation to 300 °C [570°F]) the tar acids shall be less than 0.6 mL/100 g.

5.6 WORKING PROPERTIES: The coating shall be designed for application by brush or spray in accordance with the Directions for Use (see Section 7.3). When applied to vertical surfaces at specified thickness, the coating shall not sag (see Section 6.1).

6. Laboratory Physical Tests of Applied Films

Unless otherwise specified herein, or in referenced test methods, properties will be tested at standard atmospheric conditions as specified in ASTM D3924.

6.1 SAG: The coating shall not sag when tested as follows: Press a strip of 2.5 cm (1 inch) masking tape across the full width of two solvent-cleaned 75 x 150 mm (3 x 6 inch) cold-rolled steel panels. The tape shall be parallel to and centered on the shorter axis of the panel. Apply the material to the panel at a wet film thickness of $760 \pm 50 \mu\text{m}$ (30 ± 2 mils) on one panel and to a thickness of $380 \pm 25 \mu\text{m}$ (15 ± 1 mil) on the second panel. The application shall be made with a doctor blade according to ASTM D1640. Immediately after applying the material, carefully remove the masking tape and hang the first panel in a vertical position (with the bare strip horizontal) in a draft-free $23 \pm 3 \text{ }^{\circ}\text{C}$ ($73 \pm 5 \text{ }^{\circ}\text{F}$) location for 24 hours. Hang the second panel at $71 \pm 3 \text{ }^{\circ}\text{C}$ ($160 \pm 5 \text{ }^{\circ}\text{F}$) for 1 hour. At the end of the time periods, sagging or running of the coating into the bare area shall constitute failure of the material to pass the sag test.

6.2 THERMAL STABILITY: Expose the first coated sag panel (see Section 6.1) to $60 \pm 3 \text{ }^{\circ}\text{C}$ ($140 \pm 5 \text{ }^{\circ}\text{F}$) for 16 hours. Allow the panel to cool at room temperature for one hour, then expose to $-23 \pm 3 \text{ }^{\circ}\text{C}$ ($-9 \pm 5 \text{ }^{\circ}\text{F}$) for four hours. The coating shall not loosen, check, crack, peel, run, sag or otherwise lose protective value.

6.3 DRY TIME: When tested according to ASTM D1640, a $560 \pm 50 \mu\text{m}$ (22 ± 2 mils) wet film thickness shall meet the set-to-touch requirement in less than 6 hours and the dry-to-recoat requirement in less than 24 hours.

6.4 ADHESION: Apply 2 coats of the coating to a wire-brushed, solvent-cleaned (xylene) mild steel panel. Each coat shall have a dry film thickness of $380 \pm 25 \mu\text{m}$ (15 ± 1 mil) measured in accordance with SSPC-PA 2, using the protocol given in SSPC-PA 2 Appendix 5. The time between coats shall be 24 hours. Ninety-six hours after application of the second coat, the intercoat adhesion shall be tested according to ASTM D6677. The adhesion value for the coating, both to the bare steel and to itself, shall be 10.

6.5 IMPACT: Apply the coating to two wire-brushed, solvent-cleaned (xylene), mild steel plates, each 150 x 150 x

² 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 NBN Way, Ridge Summit PA 17124 <<https://unp.un.org>>