

SSPC: The Society for Protective Coatings

Material and Preparation Requirements for Steel Test Panels Used to Evaluate the Performance of Industrial Coatings

1. Scope

This standard contains requirements for steel panels used to perform tests for evaluation of various performance characteristics of protective coatings applied to steel substrates. Panels meeting requirements of this standard may be used for tests including, but not limited to, natural and accelerated exposure in or out of the laboratory; tests to determine resistance to various chemicals, impact, and abrasion; and tests to characterize properties such as color, gloss, adhesion, and hardness. Requirements for steel composition, panel dimensions, surface preparation, ambient conditions for application and cure of coatings, and location and dimensions of scribes on coated panels are included.

2. Referenced Standards

2.1 The latest issue, revision, or amendment of the referenced standards in effect on the date of invitation to bid shall govern, unless otherwise specified.

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

2.3 SSPC STANDARDS AND JOINT STANDARDS:

PA 2	Procedure for Determining Compliance to Dry Coating Thickness Requirements
SP 5/NACE No. 1	White Metal Blast Cleaning

2.4 ASTM INTERNATIONAL STANDARDS:¹

D 512	Standard Test Methods for Chloride Ion In Water
D 823	Standard Practices for Producing Films of Uniform Thickness of Paint, Varnish, and Related Products on Test Panels
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 4285	Standard Test Method for Indicating Oil or Water in Compressed Air
D 4417	Standard Test Methods for Field Measurement of Surface Profile of Blast Cleaned Steel
D 4940	Standard Test Method for Conductimetric Analysis of Water Soluble Ionic Contamination of Blasting Abrasives
D 7055	Standard Practice for Preparation (by Abrasive Blast Cleaning) of Hot-Rolled Carbon Steel Panels for Testing of Coatings
D 7393	Standard Practice for Indicating Oil in Abrasives
G 101	Standard Guide for Estimating the Atmospheric Corrosion Resistance of Low-Alloy Steels

2.5 ANSI STANDARD²

B94.50	Single-Point Cutting Tools, Basic Nomenclature and Definitions for
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3. Material and Surface Preparation

3.1 Panel Requirements for Corrosion Resistance Testing: Hot-rolled carbon steel test panels shall be prepared in accordance with ASTM D 7055 except as otherwise specified herein. Test panels shall be fabricated from steel heats having certified mill test reports and an Atmospheric Corrosion Resistance Index of 5.5 ± 0.5 . Certified mill test reports shall, at a minimum, state the elemental composition for each of the following elements; copper, nickel, chromium, silicon, and phosphorus. The Atmospheric Corrosion Resistance Index shall be calculated in accordance with ASTM G 101, subsections 6.3.1.1 and 6.3.1.2. Test panels shall have minimum dimensions of 100 mm x 150 mm (4 inch x 6 inch), for adhesion testing, the minimum panel thickness shall be 6 mm (1/4 inch). If specified, each panel shall be stamped with an identifying code or number. Test panels shall be cleaned in accordance with SSPC-SP 5 using recyclable metallic abrasives. Compressed air used for blast cleaning shall be free of oil and water when tested in accordance with ASTM D 4285. The abrasives shall have a maximum chloride content of 15 ppm determined in

¹ ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959. 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.

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

accordance with ASTM D 512, a maximum conductivity of 150 microSiemens per centimeter as determined in accordance with ASTM D 4940, and shall be oil-free when tested in accordance with ASTM D 7393. Unless otherwise specified, the abrasive mixture shall be approximately 60 weight percent SAE shot number S230 and 40 weight percent SAE grit number G40 (see Note 8.1). Both the shot and grit shall have a Rockwell hardness of C 45 ± 3. Unless otherwise specified, the surface profile of the cleaned test panels shall be 65 to 90 micrometers (2.5 to 3.5 mils) when determined in accordance with ASTM D 4417, Method C. Surface profile measurements shall be performed and documented for a minimum of 10% of the number of prepared test panels. The surface profile shall be clean, and free of embedded friable material when examined with the unaided eye.

3.2 The use of other panels and dimensions required by a specified test method is permitted if the test results will be unaffected by the metallurgy of the substrate (e.g., for evaluating impact resistance, abrasion resistance, or color and gloss retention).

4. Coating Application

4.1 APPLICATION: The coating system shall be applied to the test panels using the manufacturer's written recommended equipment and application conditions. Application conditions shall be recorded. If the manufacturer's written recommendations allow spray application, then apply the coating(s) in accordance with Practice A or D of ASTM D 823 (see Note 8.2).

4.2 RECOAT TIME AND CONDITIONS: For multi-coat systems, recoat shall be performed within the manufacturer's written recommended recoat window or when the dry-hard condition (per ASTM D 1640) is reached. During the recoat time, panels shall be cured at 16 to 27 °C (60 to 80 °F) and 35 to 65% relative humidity (see Note 8.2). Recoat time and conditions shall be recorded and reported.

4.3 CURE: Prior to any exposure testing, all panels shall be cured for a minimum of 14 days at 16 to 27 °C (60 to 80 °F) and 35 to 65% relative humidity after application of the final coat, unless otherwise specified (see Note 8.2).

4.4 BACK AND EDGE PROTECTION: Unless otherwise specified, the back, sides and edges of coated test panels subjected to accelerated or natural exposure testing for corrosion resistance shall be protected with tape or coating. The edge protection shall not overlap the face of the test panel by more than 6 mm (1/4 inch).

5. Coating Dry Film Thickness

5.1 PROCEDURE: The dry film thickness of each painted test panel shall be measured in accordance with SSPC-PA 2 Appendix 5 – Method for Measuring Dry Film Thickness on Coated Steel Test Panels.

5.2 ACCEPTANCE CRITERIA: Unless otherwise specified, the dry film thickness of each coat as measured in Section 5.1 shall comply with dry film thickness required by the coating manufacturer.

6. Scribing

Unless otherwise specified, scribe two parallel lines on the face of each coated panel in accordance with the scribe-cutting procedure described in ASTM D 1654 using a lathe tool meeting requirements of ANSI/ASME B94.50. The lines shall be at least 1.25 cm (0.5 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 6.0 cm (2-3/8 inches) long. The scribes shall run vertically down the face of the panel. Scribed test panels shall be protected from contamination prior to use.

7. Disclaimer

7.1 While every precaution is taken to ensure that all information furnished in SSPC standards and specifications is as accurate, complete, and useful as possible, SSPC cannot assume responsibility nor incur any obligation resulting from the use of any materials, coatings, or methods specified herein, or of the specification or standard itself.

7.2 This specification does not attempt to address problems concerning safety associated with its use. The user of this specification, as well as the user of all products or practices described herein, is responsible for instituting appropriate health and safety practices and for ensuring compliance with all applicable governmental regulations.

8. Notes

Notes are not requirements of this standard.

8.1 The specifier may want to consider requiring 100% steel grit, for example, when preparing panels for testing of thermal-spray coatings, as a shot/grit mix may not provide a sufficiently angular profile required for these coatings.

8.2 In some cases, it may be advisable to specify application and cure conditions at the extremes of the manufacturer's recommended ranges in order to simulate potential service environments. Application and cure conditions shall be recorded and reported.

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TABLE 1
SUMMARY OF TEST PANEL REQUIREMENTS

SUBSTRATE	REQUIREMENT
Steel	Panels shall meet requirements of Section 3 for tests that are affected by metallurgy (e.g., corrosion testing, adhesion testing). Panels shall meet requirements specified by test method for abrasion and impact resistance
Size	100 x 150 mm (4 x 6 in) unless otherwise specified. For adhesion testing, minimum panel thickness shall be 6 mm (¼ inch)
Shape	Flat
SURFACE PREPARATION	REQUIREMENT
Degree of cleaning	SSPC-SP 5, white metal
Blast medium – type	Grit/shot mixture as described in Section 3.1 unless otherwise specified
Profile	65 - 90 μ m (2.5 - 3.5 mils) per ASTM D 4417, Method C, unless otherwise specified
COATING APPLICATION	REQUIREMENT
Temperature	Within manufacturer's recommended range, actual temperature documented at time of application
Relative humidity	Within manufacturer's recommended range, actual temperature documented at time of application
Method	ASTM D 823 Method A or D unless otherwise specified
DFT measurement	PA 2 Appendix 5
Cure	Minimum 14 days unless otherwise specified
SCRIBING	REQUIREMENT
Number of scribes per panel	2 parallel vertical scribes, 5 cm (2 in) apart
Scribe method	ASTM D 1654, using lathe tool as described by ANSI B94.50 Style E
Scribe length	6 cm (2-3/8 in)