



# Standard Specification for Sample Preparation for Qualification Testing of Coatings to be Used in Nuclear Power Plants<sup>1</sup>

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## 1. Scope

1.1 This specification defines the size composition and surface preparation requirements for test samples used to evaluate coatings according to the following ASTM test procedures.

1.2 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

## 2. Referenced Documents

### 2.1 ASTM Standards:

- A 36 Specification for Carbon Structural Steel<sup>2</sup>
- C 33 Specification for Concrete Aggregates<sup>3</sup>
- C 150 Specification for Portland Cement<sup>4</sup>
- C 192 Practice for Making and Curing Concrete Test Specimens in the Laboratory<sup>5</sup>
- C 260 Specification for Air-Entraining Admixtures for Concrete<sup>3</sup>
- C 494 Specification for Chemical Admixtures for Concrete<sup>3</sup>
- C 618 Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete<sup>3</sup>
- D 3911 Test Method for Evaluating Coatings Used in Light-Water Nuclear Power Plants at Simulated Design Basis Accident (DBA) Conditions<sup>5</sup>
- D 3912 Test Method for Chemical Resistance of Coatings Used in Light-Water Nuclear Power Plants<sup>5</sup>
- D 4060 Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser<sup>6</sup>
- D 4082 Test Method for Effects of Radiation on Coatings Used in Light-Water Nuclear Power Plants<sup>5</sup>
- D 4256 Test Method for Determination of the Decontaminability of Coatings Used in Light-Water Nuclear Power Plants<sup>5</sup>
- D 4258 Practice for Surface Cleaning Concrete for Coating<sup>5</sup>

- D 4259 Practice for Abrading Concrete<sup>5</sup>
- D 4260 Practice for Acid Etching Concrete<sup>5</sup>
- D 4541 Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers<sup>5</sup>
- 2.2 *Other Standards:*  
American Concrete Institute, ACI 301 Specifications for Structural Concrete for Buildings<sup>7</sup>  
SSPC-SP-1, 2, 3, 5, 6, 7, 10, or 11<sup>8</sup>

## 3. Significance and Use

3.1 This specification provide uniform requirements for the preparation of test samples used for qualification testing of coatings used in nuclear power plant construction and maintenance.

## 4. Steel Samples

4.1 Sample size shall be a minimum of 2-in. wide by 4-in. long by 1/8-in. thick (50.8-mm wide by 101.6-mm long by 3.175-mm thick). Edges and corners may be rounded. A 1/4 in. diameter hole suitably located may be in the test panel as appropriate for the test samples in Test Methods D 3911, D 3912, D 4082 and D 4256.

4.1.1 For Test Method D 4541 the minimum size shall be 3-in. wide by 5 in.-long by 1/4 in.-thick (76.2-mm wide by 127-mm long by 6.35-mm thick).

4.2 All panels should be carbon steel, meeting the requirements of Specification A 36.

4.3 Surface preparation shall be in accordance with SSPC-SP 10 for qualification testing. Other surface preparation as required by the project or specific conditions may be used when testing for evaluation over surfaces other than SSPC-SP 10, such as SSPC-SP 1, 2, 3, 5, 6, 7, or 11.

## 5. Concrete Blocks

5.1 Applicable to Test Methods D 3911, D 3912, D 4082, D 4256 and D 4541. The minimum size shall be 2-in. by 2-in. deep by 4-in. long (50.8-mm by 50.8-mm deep by 101.6-mm long). The edges may be chamfered up to 1/4 in. (6.35 mm) maximum.

5.2 Composition shall be as follows:

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<sup>2</sup> Annual Book of ASTM Standards, Vol 01.04.

<sup>3</sup> Annual Book of ASTM Standards, Vol 04.02.

<sup>4</sup> Annual Book of ASTM Standards, Vol 04.01.

<sup>5</sup> Annual Book of ASTM Standards, Vol 06.02.

<sup>6</sup> Annual Book of ASTM Standards, Vol 06.01.

<sup>7</sup> Available from American Concrete Institute, P.O. Box 19150, Detroit, MI 48219.

<sup>8</sup> Surface Preparation Standards are available from Steel Structures Painting Council, 4400 5th Ave., Pittsburg, PA 15213-2683.

Cement	Specification C 150, Type II	7 sacks/yd <sup>3</sup>
Gravel	Specification C 33, size ¾ in.	45 % by volume
Sand	Specification C 33	55 % by volume
Air-entraining admixture	Specification C 260	As recommended 4 to 7 %
Water-reducing admixture	Specification C 494	As recommended
Pozzolan	Specification C 618	As recommended to 15 % amount 3 in. slump
Water, demineralized or distilled		Nominal 1 Cubic Foot Batch 22.2 lb (10.07 kg)
Cement	Specification C 150, Type II low alkali	
Gravel	Specification C 33, Size ¾ in.	45.3 lb (20.55 kg)
Sand	Specification C 33	55.5 lb (25.17 kg)
Air-entraining admixture	Specification C 260	1.05 fl oz (31 mL)
Pozzolan	Specification C 618	2.2 lb (1.0 kg)
Water-reducing admixture (Type A)	Specification C 494	As recommended by the manufacturer
Water, demineralized or distilled		As required to produce 3-in. (76.2-mm) slump (approximately)

5.3 Blocks shall be cast horizontally in forms using release agents that are compatible with the coatings to be used. The top surface, as cast, shall be given a broom finish, unless otherwise specified. The block surface is to be covered with plastic during the first 24 h to simulate water curing unless a curing compound is included in the testing.

5.4 The block shall be removed from the form after 24 h and wet cured in accordance with ACI 301 or Practice C 192.

5.5 If a curing compound is to be used, apply the compound to the broom finished surface immediately after finishing and to all other surfaces of the block within 2 h after its removal from the form.

5.6 Allow the block to cure for 28 days in accordance with ACI 301 before application of the coating system unless otherwise specified.

5.7 After curing, remove loose material on the broom finish surface by light wirebrushing. Remove loose material on the cast surfaces by blowing with air (80 to 100 psi) unless otherwise specified, such as Practices D 4258, D 4259, or D 4260.

5.8 All surfaces of the blocks shall be coated in accordance with Test Method D 3912. The upper and/or lower ends of the blocks shall be left uncoated for all other testing.

5.9 A suitable hanger compatible with the testing apparatus shall be affixed at the mid-point of the upper end of the block where applicable.

5.10 Large bug-holes, rock pockets and other coating defects may be simulated by drilling holes to test coating systems for patching surface defects.

## 6. Miscellaneous Materials

6.1 Follow 4.1 and 4.3 for metallic materials such as aluminum, galvanized steel, and other metals.

6.2 Follow 5.1 and 5.3 for castable materials such as grout, fireproofing, and other castables.

## 7. Abrasion Test Samples

7.1 Substrate material for abrasion testing shall be of a size in accordance with Test Method D 4060 and shall be aluminum or steel and of a thickness to maintain a flat surface after surface preparation.

7.2 Surface preparation shall be compatible with coating to be tested.

## 8. Application

8.1 All test samples shall be coated with the full coating system including any applicable fillers. The manufacturer's latest published application instructions shall be followed for mixing and coating application unless otherwise specified. Any special procedures or conditions shall be noted in the documentation including thinning, mixing, drying/curing times, force curing, aging between coats/systems, intermediate surface preparations or other special procedures or conditions.

8.2 The film thickness range shall be representative of the specified work for which the testing is being conducted.

8.3 Test samples for maintenance painting test programs may include simulated aging of the existing coating, intermediate surface preparation and wide ranges of coating film thicknesses. Field conditions should be duplicated as close as is possible including coating application methods that may differ from the manufacturer's published data.

## 9. Documentation

9.1 The procedures and conditions used for the test sample preparation shall be documented. As a minimum the documentation shall include preparation times and dates, surface preparation details, coating sequence and individual dry film thickness ranges of each coat, total thickness range, environmental conditions, and product batch identification.

9.2 Record all deviations from the procedures called for in this specification, that is, all items allowing "unless otherwise specified" that are different than those described.

## 10. Keywords

10.1 concrete blocks; nuclear power plants; qualification testing; sample preparation; steel samples; test samples

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