



Designation: D8104 – 17 (Reapproved 2023)

Standard Guide for Determining Coating Qualification Test Data Applicability¹

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1. Scope

1.1 The purpose of this guide is to identify evaluation variables that can be used to determine whether existing coating qualification test data (for example, design basis accident or DBA, chemical resistance, fire resistance, thermal conductivity, etc.) meet the respective nuclear power plant qualification requirements or whether requalification is required. Guidance on developing a coating qualification test plan/procedure to qualify a new coating is beyond the scope of this standard.

1.2 This guide is intended for use in new construction and for refurbishing existing coating systems applied to concrete and metal substrates within containment.

1.3 This guide is intended for the use by, or under the supervision of, a person knowledgeable in coating technology and coatings used in CSL I applications, such as a person meeting the requirements of Guide [D7108](#) or equivalent.

1.4 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.6 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

¹ This guide is under the jurisdiction of ASTM Committee [D33](#) on Protective Coating and Lining Work for Power Generation Facilities and is the direct responsibility of Subcommittee [D33.02](#) on Service and Material Parameters.

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2. Referenced Documents

2.1 ASTM Standards:²

- [D3911](#) Test Method for Evaluating Coatings Used in Light-Water Nuclear Power Plants at Simulated Design Basis Accident (DBA) Conditions
- [D4060](#) Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser
- [D4082](#) Test Method for Effects of Gamma Radiation on Coatings for Use in Nuclear Power Plants
- [D4258](#) Practice for Surface Cleaning Concrete for Coating
- [D4259](#) Practice for Preparation of Concrete by Abrasion Prior to Coating Application
- [D4260](#) Practice for Liquid and Gelled Acid Etching of Concrete
- [D4538](#) Terminology Relating to Protective Coating and Lining Work for Power Generation Facilities
- [D4541](#) Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
- [D5139](#) Specification for Sample Preparation for Qualification Testing of Coatings to be Used in Nuclear Power Plants
- [D5144](#) Guide for Use of Protective Coating Standards in Nuclear Power Plants
- [D7108](#) Guide for Establishing Qualifications for a Nuclear Coatings Specialist
- [E84](#) Test Method for Surface Burning Characteristics of Building Materials
- [E1269](#) Test Method for Determining Specific Heat Capacity by Differential Scanning Calorimetry
- [E1530](#) Test Method for Evaluating the Resistance to Thermal Transmission by the Guarded Heat Flow Meter Technique
- [G14](#) Test Method for Impact Resistance of Pipeline Coatings (Falling Weight Test)

² 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.

2.2 Federal Standards:³

10CFR50 Ultimate design basis

Appendix A—Criterion 4 Environmental and Dynamic Effects

Appendix B—Part III Design Control

Appendix B—Part XI Test Control

2.3 U.S.NRC Standards:⁴

USNRC Regulatory Guide 1.54 Service Level I, II, and III Protective Coatings Applied to Nuclear Power Plants

USNRC APCS 9.5-1, Branch Technical Position APCS 9.5-1 Guidelines for Fire Protection for Nuclear Power Plants

2.4 ANSI Standards:⁵

ANSI N101.2 Protective Coatings (Paints) for Light Water Nuclear Reactor Containment Facilities

2.5 SSPC Standards:⁶

SSPC-SP 5 White Metal Blast Cleaning

SSPC-SP 6 Commercial Blast Cleaning

SSPC-SP 7 Brush-Off Blast Cleaning

SSPC-SP 8 Pickling

SSPC-SP 10 Near White Blast Cleaning

SSPC-SP 11 Power Tool Cleaning to Bare Metal

SSPC-SP WJ-1 Waterjet Cleaning of Metals—Clean

SSPC-SP WJ-2 Waterjet Cleaning of Metals—Very Thorough Cleaning

SSPC-SP WJ-3 Waterjet Cleaning of Metals—Thorough Cleaning

SSPC-SP WJ-4 Waterjet Cleaning of Metals—Light Cleaning

3. Terminology

3.1 Definitions for use with this standard are shown in Terminology D4538 or other applicable standards.

4. Significance and Use

4.1 For conformance with the intent of the criteria listed in 2.2 and 2.3, coating qualification tests are founded on plant-specific test parameters that realistically reflect or bound the material and process variables that can reasonably be expected to influence qualification testing performance.

4.2 This guide provides guidance for evaluating existing coating system qualification data for applicability to the nuclear plant desiring to use a coating system not previously used in the plant or to qualify an existing coating system.

4.3 It is recognized that new-build plants, as well as small modular reactors currently under development, may have design features that differ from those of the operating plants that formed the basis for the existing test data. Therefore, careful review is required to assure that coating performance

requirements critical to the new design are adequately addressed in the existing data or the need for additional coating testing is identified.

5. Variables and Their Use

5.1 Variables that can be used to evaluate existing test data are provided in Table 1. Also provided in Table 1 are criteria to assess the test values for each variable and a brief explanation of the significance of the variable relative to qualification of the coating system. Each variable should be used to compare the existing qualification test data to the respective nuclear plant's license basis and coating qualification requirements. If comparison of the existing test data for a given variable to the plant's qualification requirements shows that the test data does not satisfy the criteria described in Table 1, the existing test data is not applicable.

5.1.1 Example: The existing test data shows that the test was conducted at a peak temperature of 207 °F, but the plant's DBA peak temperature is 238 °F. The DBA test data are not applicable to the plant because the DBA test peak temperature is less than the postulated peak temperature for the plant's DBA.

5.2 An example approach to evaluating existing qualification test data for applicability: A plant wants to use a single product coating system to repair the existing coating system inside reactor containment. The coating has not previously been applied in the plant. The following describes one possible approach to evaluating the existing qualification test data for applicability to the plant using the variables in Table 1. Other approaches may be used. The specific variables to be used may vary with the particular scope of the search; not all variables may be applicable or necessary.

5.2.1 Step 1: Search the existing DBA test reports and select those applicable to the coating system.

5.2.2 Step 2: Review the reports selected in Step 1 and using the variable assessment criteria for DBA testing, select the reports that satisfy the criteria applicable to the plant.

5.2.3 Step 3: Review the reports selected in Step 2 and using the variable assessment criteria for Irradiation, select the reports that satisfy the criteria applicable to the plant.

5.2.4 Step 4: Review the reports selected in Step 3 and using the variable assessment criteria for Coupon Preparation, select the reports that satisfy the criteria applicable to the plant.

5.2.5 Step 5: Review the reports selected in Step 4 and using the variable assessment criteria for Coating Application, select the reports that satisfy the criteria applicable to the plant.

5.2.6 If, at the completion of Step 5, there are no acceptable DBA test reports, then satisfactory DBA testing of the coating to the plant's qualification requirements is required before the coating can be applied in the plant as a qualified coating.

5.2.7 If one or more DBA test reports are found to satisfy the criteria used in Steps 1 through 5, additional evaluation may be required prior to full approval of the coating for use as required by the plant's license basis and qualification requirements using the variable assessment criteria for Other Coating Properties.

5.2.8 Step 6: As required to satisfy the plant's qualification requirements, review the reports selected in Step 5 and using

³ Available from U.S. Government Printing Office, Superintendent of Documents, 732 N. Capitol St., NW, Washington, DC 20401-0001, <http://www.access.gpo.gov>.

⁴ Available from U. S. Nuclear Regulatory Commission (NRC), 11555 Rockville Pk., Rockville, MD 20852, <http://www.nrc.gov>.

⁵ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

⁶ Available from Society for Protective Coatings (SSPC), 800 Trumbull Dr., Pittsburgh, PA 15205, <http://www.sspc.org>.