



Designation: D7167 – 05

Standard Guide for Establishing Procedures to Monitor the Performance of Safety-Related Coating Service Level III Lining Systems in an Operating Nuclear Power Plant¹

This standard is issued under the fixed designation D7167; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This guide covers procedures for establishing a program to monitor the performance of Coating Service Level III lining (and coating) systems in operating nuclear power plants. Monitoring is an ongoing process of evaluating the condition of the in-service lining systems.

1.2 Coating Service Level III lining systems subject to this guide are generally those applied to metal substrates comprising raw water or condensate-quality water wetted (that is, full or intermittent immersion) surfaces² in systems that include:

1.2.1 Service water piping upstream of safety-related components,

1.2.2 Service water pump internals (draft tube, volutes, and diffusers),

1.2.3 Service water heat exchangers including the channels, pass partitions, tubesheets, end bells, and covers

1.2.4 Service water strainers, and

1.2.5 Reactor water storage tanks (RWSTs) and refuel cavity water storage tanks.

1.3 It is the intent of this guide to provide a recommended basis for establishing a coatings monitoring program, not to mandate a singular basis for all programs. Variations or simplifications of the program described in this guide may be appropriate for any given operating nuclear power plant depending on its licensing commitments. Similar guidelines may be applicable for certain Coating Service Level II applications such as fluid immersion systems.

1.4 *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*

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 D33.04 on Quality Systems and Inspection.

Current edition approved June 1, 2005. Published July 2005. DOI: 10.1520/D7167-05.

² This category could include combustion air intakes and fuel storage vessel linings for emergency diesel generators

appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

2. Referenced Documents

2.1 *ASTM Standards:*³

D610 Practice for Evaluating Degree of Rusting on Painted Steel Surfaces

D714 Test Method for Evaluating Degree of Blistering of Paints

D1186 Test Methods for Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to a Ferrous Base (Withdrawn 2006)⁴

D1400 Test Method for Nondestructive Measurement of Dry Film Thickness of Nonconductive Coatings Applied to a Nonferrous Metal Base (Withdrawn 2006)⁴

D3359 Test Methods for Measuring Adhesion by Tape Test
D4537 Guide for Establishing Procedures to Qualify and Certify Personnel Performing Coating and Lining Work Inspection in Nuclear Facilities

D4541 Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers

D6677 Test Method for Evaluating Adhesion by Knife

F1130 Practice for Inspecting the Coating System of a Ship

2.2 *ANSI Standard:*⁵

N 45.2.6 Qualification of Inspection, Examination, and Testing Personnel for Nuclear Power Plants

2.3 *SSPC Standard:*⁶

SSPC-PA2 Measurement of Dry Paint Thickness With Magnetic Gages

³ 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.

⁴ The last approved version of this historical standard is referenced on www.astm.org.

⁵ Available from American National Standards Institute, 25 W. 43rd St., New York, NY 10036.

⁶ Available from Society for Protective Coatings (SSPC), 40 24th St., 6th Floor, Pittsburgh, PA 15222-4656.

SSPC-VIS 2 Standard Method of Evaluating Degree of Rusting on Painted Steel Surfaces

2.4 *U.S. Nuclear Regulatory Commission Documents:*⁷
Generic Letter 89-13 Service Water System Problems Affecting Safety-Related Equipment

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *Coating Service Level III, n*—areas outside the reactor containment where lining (or coating) failure could adversely affect the safety function of a safety-related structure, system, or component (SSC).

3.1.2 *lining, n*—particular type of coating intended for protection of substrates from corrosion as a result of continuous or intermittent fluid immersion.

3.1.2.1 *Discussion*—The normal operating service environments to which linings are subject are aggressive. As such, material and application process parameters are specialized and require exacting quality control measures. Linings are sometimes applied to heat exchangers to prevent tubesheet-to-tubesheet leakage.

4. Significance and Use

4.1 Establishment of an in-service linings monitoring program permits planning and prioritization of lining maintenance work as needed to maintain lining integrity and performance in nuclear Coating Service Level III lining systems. For additional information on nuclear maintenance coating work, refer to *Manual on Maintenance Coatings for Nuclear Power Plants*.⁸

4.2 A linings monitoring program enables early identification and detection of potential problems in lining systems. Some Coating Service Level III lining systems may be known in advance to be suspect, deficient, or degraded. Monitoring lining performance will assist in developing follow-up procedures to resolve any significant deficiency relative to lining work.

4.3 Degraded linings may generate debris under normal operation and testing or during upset conditions that could adversely affect the performance of the safety-related systems. In most cases, the consequence of the debris generation is flow blockage, essential heat transfer reduction, or both; ultimately leading to degradation of equipment or system performance. A linings monitoring program may be required to fulfill licensing commitments for Coating Service Level III lining work.

5. Responsibility

5.1 The owner/operator shall identify the department or group within the organization responsible for establishing the applicable requirements for activities or procedures covered by this guide and shall document the scope of their responsibility.

Owner/operator delegation of this responsibility to other outside qualified organizations is permitted and shall be documented.

5.2 It is the responsibility of the owner/operator or his designee performing these activities to specify the detailed methods and procedures for meeting the applicable requirements of this guide.

5.3 The owner/operator or his designee shall assign a coordinator to be responsible for supervising lining inspection activities, data collection and documentation, and for ensuring that personnel performing inspection are adequately trained and qualified.

5.4 The owner/operator shall assign responsibility for evaluating the results of inspection activities carried out under the linings performance monitoring program.

6. Frequency

6.1 Frequency of in-service lining inspection monitoring shall be determined by the owner/operator.

6.2 Inspection frequency should be based on the impact of lining failures on plant safety, potential problems identified during prior inspections, known service life history, availability and accessibility of the linings, considerations with respect to satisfying “as low as reasonably achievable” (ALARA) objectives, and outage schedules. In many cases, lining condition assessments can be performed in conjunction with other routine maintenance performed on the lined equipment (for example, tank inspections and Generic Letter 89-13 heat exchanger inspections).

6.3 Inspection frequencies may change based on the assessment findings. Should two or more consecutive inspections indicate satisfactory conditions, then frequencies of future inspections can be adjusted accordingly.

7. Records and Past History

7.1 Surface preparation, lining materials that are acceptable for the service conditions, and quality of the application are important factors that determine the longevity of a Coating Service Level III lining system. Operating conditions also can influence the service life of the linings. Flow conditions (cavitation, erosion, and so forth), water chemistry, system upsets, and temperature gradients (“cold wall” configurations) can result in premature failure.

7.2 Initial assessments shall include a review of the past lining history. Past lining history data to be reviewed may include:

7.2.1 Copies of lining specifications, manufacturer’s product data sheets, and application procedures for in-place linings.

7.2.2 Quality control documentation for the existing in-place lining systems and their application.

7.2.3 Copies of previous inspection or monitoring reports.

7.2.4 Documentation pertaining to any maintenance work performed on in-place lining systems.

7.2.5 Review of industry operating experience for the lining material.

⁷ Available from U.S. Government Printing Office Superintendent of Documents, 732 N. Capitol St., NW, Mail Stop: SDE, Washington, DC 20401.

⁸ Available from ASTM International Headquarters, 100 Barr Harbor Dr., Box C700, West Conshohocken, PA 19428-2959.