



Standard Practice for Quality Assurance for Protective Coatings Applied to Nuclear Facilities¹

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1. Scope

1.1 This practice provides a common basis for, and specifically comprises quality assurance requirements applicable to, safety-related protective coating work in Coating Service Level I areas of nuclear facilities as defined in Guide D 5144.

1.2 *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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:

D 4227 Practice for Qualification of Coating Applicators for Application of Coatings to Concrete Surfaces²

D 4228 Practice for Qualification of Coating Applicators for Application of Coatings to Steel Surfaces²

D 4537 Guide for Establishing Procedures to Qualify and Certify Inspection Personnel for Coating Work in Nuclear Facilities²

D 5144 Guide for Use of Protective Coating Standards in Nuclear Power Plants²

2.2 ANSI Standards:

N45.2 Quality Assurance Program Requirements for Nuclear Power Plants³

NQA-1 (86) Quality Assurance Program Requirements for Nuclear Facilities³

2.3 ASME Standard:

NQA-1 (89) Quality Assurance Program Requirements for Nuclear Facilities⁴

2.4 Code of Federal Regulations:⁵

10 CFR 50, Appendix B: Title 10, Chapter 1, Energy, Part 50, Domestic Licensing of Production and Utilization

Facilities, Appendix B, Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants
10 CFR 21 Reporting of Defects and Noncompliances

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *certification*—the written documentation of the qualification of personnel or material.

3.1.2 *coating applicator*—an organization or individual responsible for applying a protective or decorative coating system.

3.1.3 *coating manufacturer*—an organization responsible for manufacturing coating materials.

3.1.4 *coating system*—a polymeric protective film consisting of one or more coats, applied in a predetermined order by prescribed methods.

3.1.5 *coating work*—an all-inclusive term to define all operations required to accomplish a complete coating job. The term shall be construed to include materials, equipment, labor, preparation of surfaces, control of ambient conditions, application and repair of coating systems, and inspection.

3.1.6 *Code of Federal Regulations (CFR)*—the rules and regulations of the United States Federal Government. The code is subdivided into titles, with Title 10 (10 CFR) applying to energy.

3.1.7 *paintings/coatings/linings*—essentially synonymous terms for liquid-applied materials consisting of pigments and fillers bound in a resin matrix, which dry or cure to form a thin, continuous protective or decorative film. “Linings” indicate an immersion environment.

3.1.8 *deviation*—a departure of a characteristic from established procedures or from specified requirements.

3.1.9 *documentation*—any written or pictorial information describing, defining, specifying, reporting, or certifying activities, requirements, procedures, or results.

3.1.10 *inspection*—a phase of quality control which by means of examination, observation, or measurement determines the conformance of materials, supplies, components, parts, appurtenances, systems, processes, or structures to predetermined quality requirements.

3.1.11 *inspection agency*—a person or persons authorized by the owner or owner’s designee to verify and attest conformance of the coating work.

3.1.12 *nonconformance*—a deficiency in characteristic,

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² *Annual Book of ASTM Standards*, Vol 06.02.

³ Available from American National Standards Institute, 13th Floor, 11 W. 42nd St., New York, NY 10036.

⁴ Available from the American Society of Mechanical Engineers, 345 E. 47th St., NY 10017.

⁵ Available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

documentation, or procedure that renders the quality of an item unacceptable or indeterminate. Examples of nonconformances include: physical defects, test failures, incorrect or inadequate documentation, or deviation from prescribed processing, inspection, or test procedures.

3.1.13 *owner*—the person, group, company, or corporation who has or will have the license for the facility or installation.

3.1.14 *owner's designee*—a person or persons authorized by the owner to act in his behalf.

3.1.15 *vendor*—any individual or organization who furnishes items or service to a procurement document.

4. Significance and Use

4.1 Quality assurance, as covered by this practice, comprises all those planned and systematic actions necessary to provide adequate confidence that safety-related coating work in nuclear facilities as defined in Guide D 5144, will perform satisfactorily in service.

4.2 It is not practical to impose all the requirements of this practice on certain specific items that require only a small quantity of coating material. The owner, consistent with his formal Quality Assurance Program, may accept affidavits of compliance or certification attesting to the quality of a shop or field coating for such items. If required by licensing commitment; safety-related coatings that are not qualified or for which the quantification basis is indeterminate as defined in Guide D 5144, shall be identified, quantified, and documented.

4.3 This practice may be incorporated in a project specification by direct reference or may be used to provide guidelines for the quality assurance program for coatings, on the basis of the owner's requirements. Effective use of this practice may also require the incorporation of applicable sections in project specifications for coatings on concrete, steel, equipment, and other related items.

5. General Quality Assurance Requirements

5.1 This section defines the general quality assurance requirements necessary for compliance with this practice. These requirements shall apply to all other sections of this practice.

5.2 The owner or the owner's designee shall be responsible for determining whether source inspection or a certificate of compliance attesting to the quality of coating work activity is required.

5.3 The general quality assurance requirements necessary to meet the purpose of this practice provide an acceptable basis for establishing a protective coating quality assurance program. All deviations from or exceptions to these requirements shall be reviewed by and shall be subject to approval by the owner or his designee before implementation. If unapproved deviations are discovered during any phase of the coating work activity, a nonconformance report shall be completed either by the owner, vendor, or owner's designee. The owner or the owner's designee shall approve the disposition of the nonconformance report in accordance with the owner's quality assurance program.

NOTE 1—Notification of the Nuclear Regulatory Commission (NRC) is required by 10 CFR 21 for certain types of defects and noncompliances.

5.4 Safety-related coating work shall be governed by programmatic and procedural quality provisions that ensure that

the requirements of 10 CFR 50, Appendix. B as defined are satisfied. Guidance in this regard is available in ANSI N45.2 and ASME NQA-1. Refer, also, to EPRI TR-109937.

6. Control of Selection and Qualification of Coating Materials

6.1 All qualifications of coating materials shall meet the applicable standards referenced in Guide D 5144 to the extent defined by the owner or the owner's designee in design criteria, safety analysis reports, quality assurance program, or other controlling documents.

6.2 The coating manufacturer shall furnish recommended surface preparation and application procedures for each coating system on each substrate as covered by the project specification including previously coated surfaces as applicable. The coating manufacturer shall also furnish recommended storage conditions for each coating material specified.

7. Control of Coating Manufacturing

7.1 The coating manufacturer shall maintain a Quality Assurance Program and shall provide adequate documentation to show that the quality of a given coating system as supplied is the same composition as (within owner approved manufacturing tolerances) the coating system previously tested for qualification. The coating system shall be requalified if there are significant changes in formulation or end-product properties. The manufacturer shall provide the owner or the owner's designee documentation based on the criteria stated in 7.1.1-7.1.5.

7.1.1 The coating manufacturer shall provide the purchaser with a product identity certification record for each batch of coating material shipped. As a minimum, the product identity certification record shall contain the following information:

7.1.1.1 Established acceptance criteria ranges and batch characteristics for weight per gallon and viscosity,

7.1.1.2 Batch number,

7.1.1.3 Date manufactured,

7.1.1.4 Shelf life expiration date,

7.1.1.5 Certification (signed by a responsible technical manager) that the product shipped is the same composition (within owner-approved manufacturing tolerances) as the product tested for qualification.

7.1.2 Separate acceptance criteria may be established for evaluation at time of manufacture and for evaluation during the shelf life period, but these shall be separately identified.

7.1.3 Data which is generic to the product and not batch specific (for example, nonvolatile, cure time, pot life, etc.) shall be furnished to the owner as requested, but need not be duplicated on each product identity certification record.

7.1.4 Material which has exceeded shelf life may be re-evaluated by testing and the shelf life extended in writing by the manufacturer's technical department. Testing for extension of shelf life shall be performed on an unopened container removed from the job site storage area, and not from a retained laboratory sample.

7.1.5 The owner may elect to perform verification testing of products received to ensure compliance with this practice.

7.2 Each container shall be labeled with the product designation. The label or container shall bear a batch number or

other factory marking, permanently affixed, showing the individual lot or batch designation. The date of manufacture, and the shelf life expiration date shall appear separately on the label or container.

7.3 Retained batch samples from products furnished for the project shall be kept by the manufacturer for the stated shelf life.

8. Control of Surface Preparation of Substrates

8.1 This section defines the quality assurance requirements for the surface preparation of bare substrates or of previously coated surfaces.

8.2 The surface preparation of substrates or of previously coated surfaces shall conform to the requirements of the project specification. Treatment of nonqualified or noncompatible concrete primers/sealers and concrete form-release agents shall be addressed.

8.3 The project specification shall include inspection methods to ensure the requirements of the specification are met.

8.4 The coating applicator shall follow written surface preparation procedures addressing each substrate to be coated including previously coated surfaces.

8.5 The responsible organization shall report on surface preparation for each area of work, in accordance with approved procedures.

9. Control of Application of Coating Systems

9.1 This section defines the quality-assurance requirements necessary to comply with this practice to ensure that the applied coating system is basically the same as that which was tested for qualification.

9.2 The coating applicator shall follow written owner accepted application procedures for applying each coating system on each substrate and on each previously coated surface.

9.3 All application personnel shall be qualified and their qualification documented in accordance with the applicable quality assurance program. Practices D 4227 or D 4228 provide guidelines.

9.4 Receiving, storing, and dispensing of coating materials shall be appropriately documented as per established requirements.

9.5 The responsible organization shall report on the application work for each area of work, in accordance with approved procedures.

10. Control of Coating Inspection

10.1 It is the responsibility of the owner as identified in 5.3 to specify and verify control measures to assure that the inspection of the coating work is adequate to achieve the required quality. Inspection hold points shall be established to ensure in-process inspection results are adequate. The owner or the owner's designee shall be responsible for the inspection activity. In all cases the inspection function shall be properly documented as required for record purposes by Appendix B of 10 CFR 50 and ANSI N45.2 and shall, when required, meet the intent of NQA-1.

10.2 All inspection personnel shall be qualified and certified in accordance with applicable quality assurance programs. Guide D 4537 provides guidelines.

10.3 Inspection shall conform to all the applicable requirements of the project specification and all other applicable requirements of this document.

10.4 Coating inspection record shall be maintained by the owner.

10.5 In the case of any deviation or defective work, the corrective action shall be documented in accordance with 5.3.

10.6 Final acceptance of completed work shall be documented.

11. Documentation

11.1 Sufficient quality-assurance records and documents shall be maintained to furnish objective evidence of compliance with the specifications and the specified quality assurance procedures.

11.2 Documentation shall be maintained by the owner or the owner's designee as defined in the owner's quality assurance program.

11.3 Distribution of documentation shall be as defined in the quality assurance procedures.

12. Keywords

12.1 inspection; nuclear; protective coatings; quality assurance

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