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Standard Terminology Relating to Protective Coating and Lining Work for Power Generation Facilities[1]

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1. Scope

1.1 This terminology covers terms and their definitions relevant to the use of protective coatings in nuclear power plants.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D16 Terminology for Paint, Related Coatings, Materials, and Applications

D1193 Specification for Reagent Water

D3843 Practice for Quality Assurance for Protective Coatings Applied to Nuclear Facilities

D3911 Test Method for Evaluating Coatings Used in Light-Water Nuclear Power Plants at Simulated Design Basis Accident (DBA) Conditions

D4227 Practice for Qualification of Coating Applicators for Application of Coatings to Concrete Surfaces

D4228 Practice for Qualification of Coating Applicators for Application of Coatings to Steel Surfaces

D4537 Guide for Establishing Procedures to Qualify and Certify Personnel Performing Coating and Lining Work Inspection in Nuclear Facilities

D4787 Practice for Continuity Verification of Liquid or Sheet Linings Applied to Concrete Substrates

D5144 Guide for Use of Protective Coating Standards in Nuclear Power Plants

D5161 Guide for Specifying Inspection Requirements for Coating and Lining Work (Metal Substrates) (Withdrawn 2013)[3]

D5162 Practice for Discontinuity (Holiday) Testing of Nonconductive Protective Coating on Metallic Substrates

D5367 Practice for Evaluating Coatings Applied Over Surfaces Treated With Inhibitors Used to Prevent Flash Rusting of Steel When Water or Water/Abrasive Blasted

D5962 Guide for Maintaining Unqualified Coatings (Paints) Within Level I Areas of a Nuclear Power Facility (Withdrawn 2008)[3]

2.2 *Other Documents:*[4]

USNRC Regulatory Guide 8.8 Ensuring Occupational Radiation Exposure ALARA at Nuclear Power Stations

10CFR20.1 Standards for Protection Against Radiation

3. Terminology

acceptable coating or lining system, *n*—safety-related coating or lining system for which a suitability for application review that meets the plant licensing requirements has been completed and there is reasonable assurance that, when properly applied and maintained, the coating or lining will not detach under normal or accident conditions. **D5144**

ALARA, *n*—concept of reducing radiation exposure to personnel to levels "as low as reasonably achievable," as defined in the USNRC Regulatory Guide 8.8 and 10CFR20.1(C). **D5144**

blistering, *n*—formation of bubbles in a coating (paint) film. See D16 (take out "ability to resist"). **D3911**

boiling water reactor (BWR), *n*—reactor in which the water moderator-coolant is boiled directly within the reactor core and the pressure in the reactor vessel is only slightly greater than the steam turbine pressure. **D3911**

certification, *n*—written documentation of qualification.

checking, *n*—slight breaks in the film that do not penetrate to the previously applied coating or to the substrate.

chemical spray, *n*—solution of chemicals that could be used during a loss of coolant accident (LOCA) to suppress the incident, to scavenge fission products, and to return the facility to near-ambient conditions. **D3911**

[1] This terminology 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 D33.92 on Definitions.

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[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.

[3] The last approved version of this historical standard is referenced on www.astm.org.

[4] Available from U.S. Government Printing Office Superintendent of Documents, 732 N. Capitol St., NW, Mail Stop: SDE, Washington, DC 20401, http://www.access.gpo.gov.

coating applicator, *n*—organization or individual responsible for applying a protective or decorative coating. **D3843**

coating manufacturer, *n*—organization responsible for manufacturing coating materials. **D3843**

Coating Service Level I, *n*—term used to describe areas inside the reactor containment where coating failure could adversely affect the operation of post-accident fluid systems and, thereby, impair safe shutdown. **D5144**

Coating Service Level II, *n*—term used to describe areas outside the reactor containment where coating failure could impair, but not prevent, normal operating performance; the function of Coating Level II coatings is to provide corrosion protection and decontaminability in those areas outside the reactor containment subject to radiation exposure and radionuclide contamination and Service Level II coatings are not safety-related. **D5144**

Coating Service Level III, *n*—term used to describe areas outside the reactor containment where coating failure could adversely affect the safety function of a safety-related structure, system, or component (SSC). **D5144**

coating system, *n*—polymeric protective film consisting of one or more coats, applied in a predetermined order by prescribed methods. **D3843**

coating work, *n*—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. **D3843**

coating work inspection, *n*—phase of quality control that, by means of examination, observation, or measurement, determines the conformance of coating work to predetermined quality requirements. **D4537**

Code of Federal Regulations (CFR), *n*—rules and regulations of the U.S. Federal Government; the code is subdivided into titles, with Title 10 (10 CFR) applying to energy. **D3843**

cracking, *n*—formation of breaks in a coating film that extend through to the underlying surface.

crawling, *n*—defect in which the wet film recedes from localized areas of the substrate (usually caused by insufficient wetting) leaving those areas uncoated. **D16**

curing, *n*—transformation of a coating or other material into a solid phase or film. **D3911**

damp, *adj*—moist but not visibly wet.

DBA qualified coating system, *n*—coating system used inside reactor containment that can be attested to having passed the required laboratory testing, including irradiation and simulated design basis accident (DBA), and has adequate quality documentation to support its use as DBA qualified. **D5144**

DBA unqualified coating system, *n*—coating system used inside reactor containment that cannot be attested to having passed the required laboratory testing, including irradiation and simulated DBA or has inadequate quality documentation, or both, to support its use as DBA qualified. **D5144**

deionized water, *n*—water that has been purified of salts by passing through a cation-exchange resin to replace metal ions, such as calcium and iron, with the hydrogen ion and through an anion-exchange resin to remove both the hydrogen ions and the corresponding negative ions.

delamination, *n*—separation of one coat or layer from another coat or layer or from the substrate. **D3911**

design basis accident (DBA), *n*—generic term for any one of a family of accident conditions that can result from postulated events.

DISCUSSION—These conditions are generally associated with the rupture of high-energy piping. The more commonly recognized accident conditions used to evaluate coating systems for primary containment are the loss of coolant accident (LOCA) or main stream line break (MSLB). **D3911**

deviation, *n*—departure of a characteristic from established procedures or specified requirements. **D3843**

discontinuity, *n*—void, crack, thin spot, foreign inclusion, or contamination in the coating film that significantly lowers the dielectric strength of the coating film (may also be identified as a holiday). **D4787, D5162**

distilled water, *n*—water meeting the requirements of Specification D1193, Types II and III. **D3911, D5367**

documentation, *n*—any written or pictorial information describing, defining, specifying, reporting, or certifying activities, procedures, or results. **D3843**

engineered safety system, *n*—system designed to mitigate the effects of a design basis accident. **D3911**

governing documents, *n*—technical specifications, job-site procedures, and reference documents. **D4227, D4228**

high-voltage spark tester, *n*—electrical device (in excess of 800 V) used to locate discontinuities in a nonconductive protective coating applied to a conductive substrate. **D4787**

holiday, *n*—see **discontinuity**.

holiday detector, *n*—device that locates discontinuities in a nonconductive coating film applied to a conductive surface.

DISCUSSION—Two types of holiday detector are commonly used. A low-voltage holiday tester is a low-voltage wet sponge electrical detector. It is suitable to use for testing coating film less than 20 mils thick. A high-voltage spark tester is intended for linings in excess of 20 mils. It should be used with caution on surfaces that have been previously immersed, since such service can appreciably influence the dielectric properties of the lining and its ability to withstand the test voltage.

immersion service, *n*—exposure to continuous or intermittent submerged conditions. **D5161**

inspection, *n*—phase of quality control which by means of examination, observation, or measurement determines the conformance to predetermined quality requirements. **D3843**

inspection agency, *n*—person, persons, or organization authorized by the owner or owner's designee to verify and attest conformance of the coating work. **D3843**

irradiation, *n*—exposure to ionizing radiation. **D3911**

light-water nuclear reactor, *n*—apparatus, using light water as a moderator, in which fissionable material is arrayed so that controlled nuclear fission may be sustained in a self-supporting chain reaction. **D3911**

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

loss of coolant accident (LOCA) conditions, *n*—specific conditions anticipated following a loss of coolant accident that would expose the coated surface of the containments of a light-water nuclear power facility to the temperature-pressure environmental parameters described. **D3911**

low-voltage tester, *n*—low-voltage wet sponge electrical detector used to locate discontinuities in nonconductive linings applied to conductive substrates.

DISCUSSION—This test instrument is not suitable for testing linings in excess of 20 mils. **D4787**

mud-cracking, *n*—irregular broken network of cracks in the film that occurs as a result of volatile loss while drying or curing. **D16**

nonconformance, *n*—deficiency in characteristic, documentation, or procedure that renders the quality of an item unacceptable or indeterminate.

DISCUSSION—Examples of nonconformances include: physical defects, test failures, incorrect or inadequate documentation, or deviation from prescribed processing such as improper surface preparation, coating application and curing, inspection, or test procedures. **D3843**

owner, *n*—person, group, company, or corporation who has or will have the license for the facility or installation. **D3843**

owner's designee, *n*—person or persons authorized by the owner to act in his behalf. **D3843**

paintings/coatings, *n*—essentially synonymous terms for liquid or paste materials consisting of pigments and fillers bound in a resin matrix that dry or cure to form a thin, continuous protective or decorative film. **D3843**

pressurized-water reactor (PWR), *n*—nuclear power reactor design using water under high pressure as moderator-coolant. **D3911**

qualification, *n*—skills, training, and experience required for personnel to perform properly the duties and execute the responsibilities of the appropriate certification level. **D4537**

qualifying agents, *n*—designated representatives of the owner or the coating organization, or both, who have sufficient experience in the practical application and evaluation of coatings applied to steel surfaces or concrete surfaces of a nuclear facility. **D4227, D4228**

quality assurance, *n*—verifications of the conformance of materials and methods of application to the governing specifications to achieve the desired result. **D3911**

reactor containment, *n*—enclosure provided to protect the environment from the consequences of a nuclear incident. **D3911**

safety-related coating system, *n*—coating system used inside or outside of the reactor-containment, the detachment of which could adversely affect the safety function of a safety-related structure, system or component (SSC). **D5144**

sag or sagging, *v*—nonuniform downward flow of a wet paint film that occurs between the times of application and setting resulting in an uneven coating having a thick lower edge.

DISCUSSION—The sags usually occur at a local, thick area of a vertical film and may have the characteristic appearance of a draped curtain, hence the synonym "curtaining." **D16**

safety analysis report (SAR), *n*—document of a nuclear power plant that maintains licensability. **D5962**

severe service, *n*—corrosive/erosive environments including coastal salt-laden atmosphere, industrial atmosphere, and high-intensity sunlight. **D5161**

training, *n*—program developed to ensure that personnel receive the knowledge and skills necessary for qualification. **D4537**

unqualified coating or paint, *n*—coating or coating system that cannot be attested to having passed the required laboratory testing, including irradiation and simulated DBA or improper surface preparation, coating application and curing or lacks adequate quality documentation to support its use as qualified. **D5962**

vendor, *n*—any individual or organization who furnishes items or service to a procurement document. **D3843**

4. Keywords

4.1 coating; lining; nuclear power plant; paint; power generation facility