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DRAFT REGULATORY GUIDE

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DRAFT REGULATORY GUIDE DG-1254

(Proposed Revision 1 to Regulatory Guide 1.156, dated November 1987)

QUALIFICATION OF CONNECTION ASSEMBLIES FOR NUCLEAR POWER PLANTS

A. INTRODUCTION

This regulatory guide describes a method that the U.S. Nuclear Regulatory Commission (NRC) considers acceptable for complying with the Commission's regulations on the environmental qualification of connection assemblies and environmental seals in combination with cables or wires as assemblies for service in nuclear power plants. The environmental qualification helps ensure that connection assemblies can perform their safety functions during and after a design-basis event.

Title 10, of the *Code of Federal Regulations*, Part 50, "Domestic Licensing of Production and Utilization Facilities" (10 CFR Part 50) (Ref. 1), Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," Criterion III, "Design Control," requires, in part, that test programs used to verify the adequacy of specific design features include suitable qualification testing of a prototype unit under the most adverse design conditions.

In 10 CFR 50.49, "Environmental Qualification of Electric Equipment Important to Safety for Nuclear Power Plants," the NRC requires that certain electric equipment important to safety be qualified for its application and specified performance. The regulation also identifies requirements for establishing environmental qualification methods and qualification parameters.

The NRC issues regulatory guides to describe to the public methods that the staff considers acceptable for use in implementing specific parts of the agency's regulations, to explain techniques that the staff uses in evaluating specific problems or postulated accidents, and to provide guidance to applicants. Regulatory guides are not substitutes for regulations and compliance with them is not required.

This regulatory guide contains information collection requirements covered by 10 CFR Part 50 that the Office of Management and Budget (OMB) approved under OMB control number 3150-0011. The NRC may neither conduct nor sponsor, and a person is not required to respond to, an information

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This regulatory guide is being issued in draft form to involve the public in the early stages of the development of a regulatory position in this area. It has not received final staff review or approval and does not represent an official NRC final staff position. Public comments are being solicited on this draft guide (including any implementation schedule) and its associated regulatory analysis or value/impact statement. Comments should be accompanied by appropriate supporting data. Written comments may be submitted to the Rules, Announcements, and Directives Branch, Office of Administration, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; submitted through the NRC's interactive rulemaking Web page at http://www.nrc.gov; or faxed to (301) 492-3446. Copies of comments received may be examined at the NRC's Public Document Room, 11555 Rockville Pike, Rockville, MD. Comments will be most helpful if received by April 27, 2011.

Electronic copies of this draft regulatory guide are available through the NRC's interactive rulemaking Web page (see above); the NRC's public Web site under Draft Regulatory Guides in the Regulatory Guides document collection of the NRC's Electronic Reading Room at http://www.nrc.gov/reading-rm/doc-collections/; and the NRC's Agencywide Documents Access and Management System (ADAMS) at http://www.nrc.gov/reading-rm/adams.html, under Accession No. ML102090535. The regulatory analysis may be found in ADAMS under Accession No. ML102090536.

collection request or requirement unless the requesting document displays a currently valid OMB control number. The NRC has determined that this regulatory guide is not a major rule as designated by the Congressional Review Act and has verified this determination with OMB.

B. DISCUSSION

Institute of Electrical and Electronics Engineers (IEEE) Standard (Std.) 572-2006, "Qualification of Class 1E Connection Assemblies for Nuclear Power Generating Stations," issued June 2007 (Ref. 2), was prepared by Subcommittee 2 (Qualification) of the IEEE Nuclear Power Engineering Committee and was approved by the IEEE Standards Board on December 6, 2006. This standard describes basic procedures for qualifying connection assemblies (e.g., connectors, terminations, and environmental seals in combination with related cables or wires as assemblies). The qualification requirements in this standard, when followed, demonstrate and document the ability of the equipment to perform safety functions under applicable service conditions, including design-basis events.

Regulatory Guide 1.100, "Seismic Qualification of Electric and Active Mechanical Equipment and Functional Qualification of Active Mechanical Equipment for Nuclear Power Plants" (Ref. 3), provides guidance on the seismic qualification of this equipment.

The regulations in10 CFR 50.49 defines three categories of electric equipment that must be environmentally qualified: (1) safety-related equipment, (2) nonsafety-related equipment whose failure could adversely affect safety-related equipment, and (3) certain post-accident monitoring equipment. This regulatory guide provides an acceptable method of qualifying connectors, terminations, and environmental seals in combination with cables or wires as assemblies for all three categories of equipment.

Other Codes and Standards

This regulatory guide endorses the use of one or more voluntary consensus codes or standards developed by external organizations. These codes or standards may contain references to other codes or standards. These references should be considered individually. If a referenced standard has been incorporated separately into NRC regulations, licensees and applicants must comply with that standard as set forth in the regulation. If the referenced standard has been endorsed in a regulatory guide, the standard constitutes a method acceptable to the NRC staff for meeting a regulatory requirement as described in the regulatory guide. If a referenced standard has been neither incorporated into NRC regulations nor endorsed in a regulatory guide, licensees and applicants may consider and use the information in the referenced standard, if appropriately justified, consistent with current regulatory practice.

C. REGULATORY POSITION

The NRC considers the use of the procedures in IEEE Std. 572-2006, when used in conjunction with Regulatory Guide 1.89, "Environmental Qualification of Certain Electric Equipment Important to Safety for Nuclear Power Plants" (Ref. 4), as an acceptable method of demonstrating compliance with the NRC regulations pertaining to the environmental qualification of connectors, terminations, and environmental seals in combination with cables or wires as assemblies for service in nuclear power plants to ensure that the connection assemblies can perform their safety functions.

D. IMPLEMENTATION

The purpose of this section is to provide information on how applicants and licensees may use this guide and information regarding the NRC's plans for using this regulatory guide. In addition, it describes how the NRC staff has complied with the Backfit Rule, 10 CFR 50.109, and any applicable finality provisions in 10 CFR Part 52.

Use by Applicants and Licensees

Applicants and licensees may voluntarily use the information in this regulatory guide to develop applications for initial licenses, amendments to licenses, requests for exemptions, or NRC regulatory approval. Licensees may use the information in this regulatory guide for actions which do not require prior NRC review and approval (e.g., changes to a facility design under 10 CFR 50.59 which do not require prior NRC review and approval). Licensees may voluntarily use the information in this Regulatory Guide or applicable parts to resolve regulatory or inspection issues (e.g., by committing to comply with provisions in the regulatory guide).

Current licensees may continue to use the guidance that was found acceptable for complying with specific portions of the regulations as part of their license approval process, which may be a previous version of this regulatory guide.

A licensee who believes that the NRC staff is inappropriately imposing this regulatory guide as part of a request for a license amendment or request for a change to a previously issued NRC regulatory approval may file a backfitting appeal with the NRC in accordance with applicable procedures.

NRC Staff Use

The NRC staff does not intend or approve any imposition or backfitting of the guidance in this regulatory guide. The staff does not expect any existing licensee to use or commit to using the guidance in this Regulatory Guide in the absence of a licensee-initiated change to its licensing basis. The NRC staff does not expect or plan to request licensees to voluntarily adopt this regulatory guide to resolve a generic regulatory issue. The NRC staff does not expect or plan to initiate NRC regulatory action which would require the use of this regulatory guide (e.g. issuance of an order requiring the use of the regulatory guide, requests for information under 10 CFR 50.54(f) as to whether a licensee intends to commit to use of this regulatory guide, generic communication, or promulgation of a rule requiring the use of this regulatory guide) without further back-fit consideration.

During inspections of specific facilities, the staff may suggest or recommend that licensees consider various actions consistent with staff positions in this regulatory guide as one acceptable means of meeting the underlying NRC regulatory requirement. Such suggestions and recommendations would not ordinarily be considered backfitting even if prior versions of this regulatory guide are part of the licensing basis of the facility with respect to the subject matter of the inspection. However, the staff may not represent to the licensee that: (1) the licensee's failure to comply with the positions in this regulatory guide constitutes a violation; (2) the licensee may avoid the violation only by agreeing to comply with

this regulatory guide; or (3) the only acceptable way for the licensee to address the NRC-identified non-compliance or violation is to commit to this regulatory guide (i.e., including this regulatory guide in the facility's licensing basis).

If an existing licensee seeks an amendment or change in an already approved area of NRC regulatory concern and: (1) the NRC staff's consideration of the request involves a regulatory issue directly relevant to this new or revised regulatory guide and (2) the specific subject matter of this regulatory guide is an essential consideration in the staff's determination of the acceptability of the licensee's request; then, as a prerequisite for NRC approval of the license amendment or change, the staff may require the licensee to either follow the guidance in this regulatory guide or to provide an equivalent alternative method that demonstrates compliance with the underlying NRC regulatory requirements. This is not considered backfitting as defined in 10 CFR 50.109(a)(1) or a violation of any of the issue finality provisions in 10 CFR Part 52.

Conclusion

This regulatory guide is not being imposed upon current licensees and may be voluntarily used by existing licensees. In addition, this regulatory guide is issued in conformance with all applicable internal NRC policies and procedures governing backfitting. Accordingly, the issuance of this regulatory guide by the NRC staff is not considered backfitting, as defined in 10 CFR 50.109(a)(1), nor is it deemed to be in conflict with any of the issue finality provisions in 10 CFR Part 52.

REFERENCES[1]

1. 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," U.S. Nuclear Regulatory Commission, Washington, DC.
2. IEEE Std. 572-2006, "Qualification of Class 1E Connection Assemblies for Nuclear Power Generating Stations," Institute of Electrical and Electronics Engineers, Piscataway, NJ, June 2007.[2]
3. Regulatory Guide 1.100, "Seismic Qualification of Electric and Active Mechanical Equipment and Functional Qualification of Active Mechanical Equipment for Nuclear Power Plants," U.S. Nuclear Regulatory Commission, Washington, DC.
4. Regulatory Guide 1.89, "Environmental Qualification of Certain Electric Equipment Important to Safety for Nuclear Power Plants," U.S. Nuclear Regulatory Commission, Washington, DC.

[1] All publicly available NRC documents are available electronically through the Electronic Reading Room on the NRC's public Web site at http://www.nrc.gov/reading rm/doc collections/cfr/. The documents can also be viewed on-line for free or printed for a fee in the NRC's Public Document Room (PDR) at 11555 Rockville Pike, Rockville, MD; the mailing address is USNRC PDR, Washington, DC 20555; telephone (301) 415-4737 or (800) 397-4209; fax (301) 415 3548; and e mail pdr.resource@nrc.gov.

[2] Copies of Institute of Electrical and Electronics Engineers (IEEE) documents may be purchased from the Institute of Electrical and Electronics Engineers Service Center, 445 Hoes Lane, PO Box 1331, Piscataway, NJ 08855 or through the IEEE's public Web site at http://www.ieee.org/publications_standards/index.html.

APPENDIX A

MODIFICATIONS MADE TO IEEE STD 572-2006 VS. IEEE STD 572-1985

Page ii	Added abstract
Page iii	Added photocopy restrictions
Page iv	Added introduction and deleted forward
Page v	Added restrictions on patents
Page 1, Section 1.1	Revised scope statement to address added scope for other types of connectors
Page 1, Section 1.2	Updated to reference the latest version of Institute of Electrical and Electronics Engineers (IEEE) Standard (Std.) 323-2003
Page 2, Section 2.0	Changed from "latest issued Rev" for listed Reference to the specific dated references
Page 2, Section 2.0	Deleted the references American National Standards Institute/IEEE Std. 99-80 and IEEE Std. 1-1969 and added IEEE Std. 98-1984 and IEEE Std. 101-72
Page 2, Section 3.0	Deleted all definitions from previous revisions
Page 3, Section 3.0	Added new definition No. 3.7 for terminations
Page 3, Section 4.0	Added fourth paragraph and a statement on "qualified life"
Page 4, Section 5.2	Changed test sample wording from "generically equivalent" to "similar design"
Page 4, Section 5.2	Deleted Section 5.2.2, which provided guidance if the environmental requirements were greater than the installed conditions
Page 5, Section 5.3	Expanded explanation of limitations in using analysis as a qualification process
Page 5, Section 5.3(f)	Added section to address modifications
Page 5, Section 5.4	Expanded first paragraph explanation of ongoing qualification
Page 6, Section 5.4(c)	Expanded directions on pacing methodology
Page 7, Section 6.1.2.2	Expanded required detail
Page 7, Section 6.1.2.3	Expanded required detail
Page 7, Section 6.1.2.3	Changed "termination" to "terminal" and expanded required detail
Page 8, Section 6.1.2.5	Expanded required detail
Page 8, Section 6.1.2.6	Added requirements section on mounting
Page 8, Section 6.1.4	Expanded required detail
Page 9, Section 6.1.7	Expanded explanation of margin
Page 9, Section 6.2	Expanded the scope beyond multiple-pin quick disconnect connectors to a more generic and broader application
Page 9, Section 6.2.1	Provided more guidance on sample size and sample selection
Page 10, Section 6.2.2(c)	Added section on locking devices

Page 10, Section 6.2.2(f)	Added a requirement to provide detailed mounting and assembly requirements
Page 12, Section 6.2.3(c)	Expanded detail but did not add any new requirements
Page 12, Section 6.2.4.2	Expanded detailed information provided
Page 12, Section 6.2.4.3	Expanded detailed information provided
Page 13, Section 6.2.4.7	Redefined nonseismic vibration
Page 13, Section 6.2.4.8	Added electromagnetic interference/radio frequency interference testing guidance to the standard
Page 14, Section 6.2.5.2	Deleted guidance on age-conditioning individual component parts of the connector to the limiting component
Page 15, Section 6.2.5.3	Deleted this section on pacing
Page 15, Section 6.2.7.1	Revised to reference the latest version of IEEE Std. 344
Page 15, Section 6.2.7.2	Revised the requirement to be more specific
Page 16, Section 6.2.7.3	Revised the requirement to be more specific
Page 16, Section 6.3	Deleted the paragraph that gave guidance on how to qualify other connectors
Page 17, Section 8.2	Revised introductory paragraph to the latest revision of IEEE Std. 323
Page 17, Section 8.2(f)	Added requirements to include assembly procedures and workmanship standards
Page 18, Section 8.5(i)	Added section requiring approval signature and date
Page 18, Section 8.6	Added second paragraph specifying requirements to support the mathematical model
Page 18, Section 8.6	Added significant additional documentation requirements after the new second paragraph
Page 19, Table A-1	Added 10-percent margin to the period of time in which the connector is expected to operate following a design-basis event
Page 20, Annex B	Added Section e, “Contact Resistance Test”
Page 21, Annex C	Added glossary
Page 22, Annex D	Bibliography: Deleted original [B2] Mil Std. 1344 and added [B1] to [B9]