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SUNI Review Complete
Template=ADM-013
E-RIDS=ADM-03

ADD: Michael Eudy, Bridget Curran, Solomon Sahle, Harriet Karagiannis, Amir Mobasheran, Mary Neely
Comment (2)
Publication Date: 2/1/2023
Citation:88 FR 6672

As of: 3/2/23, 2:37 PM
Received: March 02, 2023
Status: Pending_Post
Tracking No. ler-5u2q-x2h6
Comments Due: March 03, 2023
Submission Type: Web

Docket: NRC-2022-0151
Qualification of Class 1E Battery Chargers, Inverters, and Uninterruptible Power Supply Systems for Production and Utilization Facilities

Comment On: NRC-2022-0151-0001
Qualification of Class 1E Battery Chargers, Inverters, and Uninterruptible Power Supply Systems for Production and Utilization Facilities

Document: NRC-2022-0151-DRAFT-0002
Comment on FR Doc # 2023-02012

Submitter Information

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General Comment

See attached file(s)

Attachments

03-02-23 -- NUGEQ Comments on DG-1412

NUCLEAR UTILITY GROUP
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March 2, 2023

Mr. Edward F. O'Donnell, Acting Chief
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Washington, D.C. 20555-0001

Subj: Comments by the ***Nuclear Utility Group on Equipment Qualification*** Regarding Draft Regulatory Guide, DG-1412, "Qualification of Class 1E Battery Chargers, Inverters, and Uninterruptible Power Supply Systems for Production and Utilization Facilities" -- Docket ID: Docket ID NRC-2022-0151

Dear Mr. O'Donnell:

The Nuclear Utility Group on Equipment Qualification ("NUGEQ" or "Group")[1] hereby submits seven comments and one observation on the proposed Revision 1 of Regulatory Guide (RG) 1.210, "Qualification of Safety-Related Battery Chargers and Inverters for Nuclear Power Plants" in accordance with the *Federal Register* notice, dated April 22, 2022.[2] DG-1412 describes an approach that is acceptable to the NRC staff to meet regulatory requirements for the qualification of safety related or Class 1E battery chargers, inverters, and uninterruptible power supply systems for production and utilization facilities by endorsing Institute of Electrical and Electronic Engineers (IEEE) Standard (Std.) 650-2017, "IEEE Standard for Qualification of Class 1E Static Battery Chargers, Inverters, and Uninterruptible Power Supply Systems for Nuclear Power Generating Stations."

NUGEQ has provided 7 comments and 1 observation in the attached comment form. Four of the seven comments (Nos. 1–4) request that the guidance include additional clarification about

[1] The Group represents approximately 75% of the operating nuclear power plants in the United States. The Group was founded in 1981, as the NRC staff was evaluating and planning the ultimate promulgation of 10 CFR 50.49, "Environmental qualification of electric equipment important to safety for nuclear power plants." Since its inception, the Group has been actively involved in the development and implementation of licensee EQ programs, and in interaction with the NRC, regarding evolving NRC requirements and guidance. Most recently, the Group was also actively involved in the NRC DBA EQ program inspections and worked with licensees and the NRC in addressing implementation issues associated with those inspections.

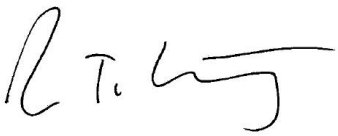
[2] Draft Regulatory Guide (DG), DG-1412, "Qualification of Class 1 E Battery Chargers, Inverters, and Uninterruptible Power Supply Systems for Production and Utilization Facilities." *See* 88 Fed. Reg. 6,672.

the normative references mentioned in IEEE Std. 650-2017. IEEE Std. 650-2017 explains that normative references are "indispensable for the application of this document (i.e., they must be understood and used, so each document is cited in text and its relationship to this document is explained)." NUGEQ requests additional guidance and clarification about how the staff intends to use these endorsed normative standards, and in particular, the required use of editions of industry standards that may be different from the plant's current design and/or licensing basis.

The remaining comments and sole observation (Nos. 5–8) address other issues with DG-1412 that would benefit from additional guidance. Comment No. 5 and Observation No. 7 identify potential conflicts with IEEE 650-2017 and other regulation guides or previous positions by the Commission, such as those taken in Generic Letter No. 82-09. Another comment (No. 6) identifies an apparent inconsistency in two statements in IEEE 650-2017 that requires further clarification about what criteria must be satisfied for an aging mechanism to be considered significant. Comment No. 8 recommends clarifying a single sentence in section B of DG-1412 to comport with the law.

NUGEQ submits the above comments and observation to help future guidance provide necessary clarification to avoid potential issues with DG-1412.

Respectfully submitted,



Richard T. McCarty, Winston & Strawn LLP
Counsel to the Nuclear Utility Group on Equipment Qualification

Attachment

NUGEQ Comments on DG-1412 - Proposed Revision 1 to RG 1.210

Reviewed Document: U.S. NRC Draft Regulatory Guide DG-1412, "Qualification of Class 1E Battery Chargers, Inverters, and Uninterruptible Power Supply Systems for Production and Utilization Facilities," January 2023

NRC Docket # NRC-2022-0151

COMMENTS AND OBSERVATIONS					
No.	Comment Type[note 1]	Section / Page	Current Wording	Comment or Feedback	Basis for Comment or Proposed Changes (as applicable)
1	C	Section C (Staff Regulatory Guidance) of DG-1412/ Page 8 Section 2 (Normative references) of IEEE 650-2017 / Page 12	**DG-1412:** The NRC staff considers conformance with the requirements of IEEE Std. 650-2017 to be a method that is acceptable for use in satisfying the regulations with respect to the qualification of safety-related or Class 1E battery chargers, inverters, and UPS systems. **IEEE 650-2017:** IEC/IEEE 60780-323, International Standard – Nuclear facilities – Electrical equipment important to safety – Qualification.	Section C of DG-1412 refers to the requirements of IEEE Std. 650-2017. Section 2 of IEEE 650-2017 states that normative references are "indispensable for the application of this document (i.e., they must be understood and used, so each document is cited in text and its relationship to this document is explained)." Section C of DG-1412 should include additional guidance addressing issues with these normative references. For one normative reference, IEEE 650-2017 lists IEC/IEEE 60780-323-2016. But the IEC/IEEE 60780-323-2016 standard is not yet endorsed by the NRC, pending issuance of RG 1.89 R2. Section C of DG-1412 should provide additional explanation about whether the staff finds the use of normative references that are not endorsed, IEC/IEEE 60780-323-2016, as methods acceptable to the staff in satisfying the applicable regulations from 10CFR50 Appendix A and B. Section C of DG-1412 provides no such clarification related to the use of this normative standard pending issuance of DG-1361 as RG 1.89 R2. Additional comments addressing other issues with these normative standards are provided in Comments 2, 3, and 4.	Endorsement of an industry standard that requires the use of a normative reference that is not endorsed needs clarification. Specific guidance is needed regarding use of normative references whose edition level differs from a licensee's current design or licensing basis.
2	C	Section C (Staff Regulatory Guidance) of DG-1412/ Page 8 Section 2 (Normative references) of IEEE 650-2017 / Page 12	**DG-1412:** The NRC staff considers conformance with the requirements of IEEE Std. 650-2017 to be a method that is acceptable for use in satisfying the regulations with respect to the qualification of safety-related or Class 1E battery chargers, inverters, and UPS systems. **IEEE 650-2017:** IEEE Std 344™, IEEE Standard for Seismic Qualification of Equipment for Nuclear Power Generating Stations.	Section 2 of IEEE 650-2017 states that, "[f]or undated references, the latest edition of the referenced document (including any amendments or corrigenda) applies." One such undated, normative reference is IEEE Std IEEE Std. 344™, which addresses seismic qualification. This reference was current at the time IEEE 650-2017 was issued and is currently endorsed by RG 1.100 R4. However, this reference is out of date and the current version is the joint logo standard IEC/IEEE 60980-344-2020. Because the normative reference for IEEE Std. 344™ is undated, IEEE 650-2017 would require the use of the latest edition of the referenced document. This would imply the requirement to adopt IEC/IEEE 60980-344-2020, which is not currently endorsed by the NRC. Section C of DG-1412 should include a general position regarding the use of endorsed normative standards, and in particular, the required use of editions of industry standards that may be different from the plant's current design and/or licensing basis.	Endorsement of an industry standard that requires the use of a normative reference that is not endorsed needs clarification.

NUGEQ Comments on DG-1412 - Proposed Revision 1 to RG 1.210

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No.	Comment Type[note 1]	Section / Page	Current Wording	Comment or Feedback	Basis for Comment or Proposed Changes (as applicable)
3	C	Section C (Staff Regulatory Guidance) of DG-1412/ Page 8 Section 2 (Normative references) of IEEE 650-2017 / Page 13	**DG-1412:** The NRC staff considers conformance with the requirements of IEEE Std. 650-2017 to be a method that is acceptable for use in satisfying the regulations with respect to the qualification of safety-related or Class 1E battery chargers, inverters, and UPS systems. **IEEE 650-2017:** IEEE Std 383™, IEEE Std 384™, and IEEE Std 7-4.3.2™	Section 2 of IEEE 650-2017 lists IEEE Std. 383™ as another undated, normative reference as explained in comment 2 above. The current NRC endorsement of IEEE Std 383 in RG 1.211 is specific to the 2003 edition of the IEEE standard for qualifying Class 1E electric cable and field splices for nuclear power generating stations. This edition has been superseded by IEEE 383-2015. Because IEEE Std. 383™ is undated, this would require the use of an edition of IEEE 383 that is not currently endorsed. Section C of DG-1412 should include a general position regarding the use of endorsed normative standards, and in particular, the required use of editions of industry standards that may be different from the plant's current design and/or licensing basis. Other normative references listed in IEEE 650-2017 have similar problems. The current edition of IEEE 384 is not currently endorsed. RG 1.75 R3 endorses IEEE 384-1992 and not the current 2018 edition. Also, RG 1.152 R3 currently endorses IEEE 7-4.3.2-2003 and not the current 2016 edition. These are additional examples for why there should be some general position regarding the use of normative standards when the current regulatory endorsement does not cover the currently issued edition.	Endorsement of an industry standard that requires the use of a normative reference that is not endorsed needs clarification.
4	C	Section C (Staff Regulatory Guidance) of DG-1412/ Page 8 Section 2 (Normative references) of IEEE 650-2017 / Pages 12-13	**DG-1412:** The NRC staff considers conformance with the requirements of IEEE Std. 650-2017 to be a method that is acceptable for use in satisfying the regulations with respect to the qualification of safety-related or Class 1E battery chargers, inverters, and UPS systems.	Section 2 of IEEE 650-2017 makes no reference to IEEE 572-2019, which is currently endorsed by RG 1.156 R2. There is overlap in the qualification of connectors between IEEE 650-2017 and IEEE 572-2019. As a result, DG-1412 should include a statement explaining that one should also look to additional guidance in IEEE 572-2019, as endorsed by RG 1.156 R2, on qualification of electrical connection assemblies.	Consistency between RGs that endorse qualification standards.

NUGEQ Comments on DG-1412 - Proposed Revision 1 to RG 1.210

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No.	Comment Type[note 1]	Section / Page	Current Wording	Comment or Feedback	Basis for Comment or Proposed Changes (as applicable)
5	C	Section C (Staff Regulatory Guidance) of DG-1412/ Page 8 Section 3 / Pages 13-14 of IEEE 650-2017	**DG-1412:** The NRC staff considers conformance with the requirements of IEEE Std. 650-2017 to be a method that is acceptable for use in satisfying the regulations with respect to the qualification of safety-related or Class 1E battery chargers, inverters, and UPS systems. **IEEE 650-2017: qualified life:** The period for which an equipment has been demonstrated, through testing, analysis, and/or experience, to be capable of functioning within acceptance criteria during specific operating conditions while retaining the ability to perform its safety functions during design basis events. NOTE—At the end of the qualified life, the equipment shall be capable of performing the safety function(s) required for the postulated design-basis event and design extension (post-design-basis events) conditions (IEC/IEEE 60780-323).	The definition of qualified life in IEEE 650-2017 appears to conflict with itself regarding the applicability of qualified life to design extension (e.g., severe accident or beyond design basis events) since the note below the definition states that, at the end of the qualified life, the equipment shall be capable of performing the safety function(s) required for the postulated design-basis event and design extension (post-design-basis events) conditions. Keeping in mind that IEEE 650-2017 is specific to mild environment applications, it should be recognized that the term qualified life has historically been associated with the qualification of equipment for harsh environment applications. Service life or design life is typically used for mild environment equipment. The concept of a qualified life being applicable to mild environment equipment is also inconsistent with the Introduction in RG 1.209 R0 that *"…, because of ready accessibility for monitoring and maintenance in mild environments, the need to establish a qualified life does not apply."* DG-1412 should specifically clarify that the term "qualified life" is specific to harsh environment equipment and is not applicable to mild environment equipment. A service life should be established for mild environment equipment that has significant aging mechanisms. DG-1412 should also clarify that the term "qualified life" does not apply to design-extension conditions, which per IEC/IEEE 60780-323-2016 is related to severe accident (e.g., beyond design basis) conditions.	Consistency between RGs for mild environment equipment. IEEE 650-2017 uses the term "qualified life" throughout the document even though it clearly indicates that this standard is only applicable for equipment located in a mild environment where the only design basis event (DBE) of consequence is a seismic event. See Sections 4.2.2, 4.2.3, 5.1.1, 5.1.2.3.1, 5.2, 5.2.1, 5.2.2.1, 5.2.2.2, 5.2.2.4, 5.2.2.7, 5.2.2.8, 5.2.2.11, 5.3.1.1, 5.5, 6.1, 6.2, 6.3, Annex B-Section B.2, and Annex D. The NOTE after the definition of "qualified life" in IEEE 650-2017 expands the definition beyond what is currently cited in Definition 3.20 in IEC/IEEE 60780-323-2016

NUGEQ Comments on DG-1412 - Proposed Revision 1 to RG 1.210

COMMENTS AND OBSERVATIONS					
No.	Comment Type[note 1]	Section / Page	Current Wording	Comment or Feedback	Basis for Comment or Proposed Changes (as applicable)
6	C	Section C (Staff Regulatory Guidance) of DG-1412/ Page 8 Section 5.2 / Pages 21 and 22 of IEEE 650-2017	**DG-1412:** The NRC staff considers conformance with the requirements of IEEE Std. 650-2017 to be a method that is acceptable for use in satisfying the regulations with respect to the qualification of safety-related or Class 1E battery chargers, inverters, and UPS systems. **IEEE 650-2017: "**Components with significant aging mechanisms need not be aged prior to the type test if they can be addressed by periodic in-service surveillance/maintenance" and "[c]omponents with significant aging mechanisms shall be aged in accordance with one or more of the following techniques, as applicable."	One statement from Section 5.2 of IEEE 650-2017—that is, "[*c*]*omponents with significant aging mechanisms need not be aged prior to the type test if they can be addressed by periodic in-service surveillance/maintenance*"—is inconsistent with another statement on the top of the next page: [*c*]*omponents with significant aging mechanisms shall be aged in accordance with one or more of the following techniques, as applicable*." Given the apparent inconsistency in these statements, there should be some clarification or guidance in DG-1412 regarding the need for environmental type testing for mild environment equipment. DG-1412 should clarify what criteria must be satisfied for an aging mechanism to be considered significant. The guidance in IEEE 650-2017 centers around whether a component has significant aging mechanisms (SAM) or not. The guidance, however, does not include a definition for significant aging mechanisms or list criteria to make this determination. For example, a pending update to IEEE 1205 incorporates four criteria from IEEE 627-2010 that need to be satisfied for an aging mechanism to be considered significant. The criteria for a SAM from IEEE 627-2010 states: "***Aging is significant for the purpose of an aging program if it satisfies all of the following criteria:*** *a) In the normal service environments, an aging mechanism promotes the same failure mode as that resulting from exposure to abnormal or DBE service conditions.* *b) The aging mechanism adversely affects the ability of the equipment to perform its required function in accordance with its specification requirements.* *c) The deterioration caused by the aging mechanism is not amenable to assessment by in-service inspection or surveillance activities that provide confidence in the equipment's ability to function in accordance with its specification requirements during the intervals between surveillance.* *d) In the normal service environment, the aging mechanism causes degradation during the design life of the equipment that is appreciable compared to degradation caused by the DBE."* The NRC has previously used very similar criteria presented in Section 3.4.5 of Technical Evaluation Report TER-C5257-532, "Implementation Guidance for New and Corrective Equipment Environmental Qualification" dated 04/22/1983 [ML20244C266]. Like the above examples, DG-1412 should clarify what criteria must be satisfied for an aging mechanism to be considered significant.	Note that type testing to establish environmental qualification has not been required for mild environment equipment whose service conditions were specified at the time of procurement and are being used within the manufacturer's ratings (*see* SRP 3.11 Acceptance Criteria #15 in NUREG-0800 as well as in GL 82-09). GDC-4 simply requires that the equipment be **designed** to be compatible with and accommodate the effects of the specified environmental service conditions. IEEE and ASME use the same four criteria for a SAM but differ in whether a SAM needs to meet all four criteria (e.g., IEEE position) or any one of the four criteria (e.g., ASME position). Satisfying all four criteria is consistent with the definition of a significant aging mechanism provided in IEEE 1205-2014. Section 3 of IEEE 1205-2014 defines a SAM as: "*An aging mechanism that, under normal and abnormal service conditions, causes degradation of equipment that progressively and appreciably renders the equipment vulnerable to failure to perform its specified function(s).*" However, the criteria from Section QR-5310 of ASME QME-1-2017 (endorsed by RG 1.100 R4) is inconsistent with the definition of a SAM since it can identify an aging mechanism as being significant even if the degradation has no effect on the equipment's ability to perform its required function.

NUGEQ Comments on DG-1412 - Proposed Revision 1 to RG 1.210

COMMENTS AND OBSERVATIONS					
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7	O	Various	General Observation	DG-1412 endorses IEEE 650-2017 without any clarification or exception as it relates to the use of environmental type testing as a special treatment that verifies the designed capability of equipment. The NRC Commission explained its logic regarding equipment located in a mild environment in the paragraphs of the Statement of Considerations (SOC) for 10 C.F.R 50.49 [48FR2731-2732]. Review of Generic Letter No. 82-09 as well as Section 3.11 of NUREG-0800 also provides guidance on the method of qualification for safety-related electrical equipment located in mild environment areas and the associated documentation requirements. DG-1412 endorses a different method than that previously identified by both the Commission (48FR2731) and Generic Letter No. 82-09 as well as the SRP acceptance criteria 15 in Section 3.11 of NUREG-0800 without any clarification or exception. As the Commission has previously found these methods acceptable, they should all be included within DG-1412.	1. The NRC endorsement of "Qualification requirements" for equipment specifically excluded (Mild Environment) from 10 C.F.R. 50.49 appears to be in direct conflict with the Statement of Considerations for publication of the Final Rule on Environmental Qualification at 48FR2731-2732 which states in part: *(3) Scope-Equipment in a Mild Environment-Paragraph 50.49(b)* *Issue: The rule makes no distinction between equipment located in a harsh or mild environment. The stresses for equipment located in a mild environment are less severe than for those in a harsh environment.* *Response: The final rule does not cover the electric equipment located in a mild environment. The Commission has concluded that the general quality and surveillance requirements applicable to electric equipment as a result of other commission regulations, including 10CFR50, Appendix B (See for example Regulatory Guide 1.33, Quality Assurance Program Requirements (Operation)," Revision 3) are sufficient to ensure adequate performance of electric important to safety located in mild environments. Since it has been concluded that no further environmental qualification requirements are needed for such equipment, they fully satisfy all other applicable regulations, the Commission has determined that no additional requirements are necessary with respect to electric equipment important to safety located in mild environments in order for licensees to satisfy, with respect to such equipment, existing license conditions or technical specifications calling for qualification of safety-related electric equipment in accordance with DOR Guidelines or NUREG-0588.*

NUGEQ Comments on DG-1412 - Proposed Revision 1 to RG 1.210

COMMENTS AND OBSERVATIONS					
No.	Comment Type[note 1]	Section / Page	Current Wording	Comment or Feedback	Basis for Comment or Proposed Changes (as applicable)
8	C	Section B (Discussion) under Reason for Revision on Page 5	Section B of DG-1412 indicates that "[*t*]*he information in this revised guide is specific to the qualification of safety-related equipment important to safety located in mild environments at production and utilization facilities licensed under 10 CFR Part 50 or 10 CFR Part 52."*	NRC should add to the Staff Regulatory Guidance section of the DG that this equipment is generally maintained in a mild environment and the requirements of 10 C.F.R. 50.49 and RG 1.89 Rev 1 are not legal requirements for this equipment, if so located.	

Note 1: Codes for Types of Comments - (C) = Comment, (Q) = Question, (O) = Observation, (E) = Editorial