

Regulatory Guide Periodic Review (Criteria for Independence of Electrical Safety System)

Regulatory Guide Number: 1.75, Revision 3

Title: Criteria for Independence of Electrical Safety Systems

Office/Division/Branch: NRR/DE/EEB

Technical Lead: Kayleh James

Staff Action Decided: Revise

1. What are the known technical or regulatory issues with the current version of Regulatory Guide (RG)?

Revision 3 (Rev. 3) of RG 1.75, "Criteria for Independence of Electrical Safety Systems," issued in February 2005, provides a method acceptable to NRC staff for complying with the agency's regulations with respect to the physical independence requirements of the circuit and electric equipment that comprise or are associated with safety systems. The current version of RG 1.75 endorses, with some exceptions and clarifications, the Institute of Electrical and Electronics Engineers (IEEE) Standard 384-1992, "IEEE Standard Criteria for Independence of Class 1E Equipment and Circuits" with a clarification. IEEE Std 384 has been revised in 2008 and 2018, and the current version, IEEE Std. 384-2018, has been published. The staff reviewed both the 2008 and 2018 versions and noted some major changes, additions, and clarifications.

Specifically, IEEE Std 384-2008 includes updates processes and programs to current methodologies and contains guidance on the use of fiber optic circuits and methods to protect electrical and electronic circuits from the adverse impact of electromagnetic and radio-frequency interference (EMI/RFI). IEEE Std 384-2008 also includes a reference to IEEE Std 603, "IEEE Standard Criteria for Safety Systems for Nuclear Power Generating Stations," for further specific guidance, which includes a normative reference to the latest standard on environmental qualification, the joint logo standard International Electrotechnical Commission (IEC)/IEEE Std. 60780-323:2016, Edition 1, "Nuclear facilities -- Electrical equipment important to safety -- Qualification."

RG 1.75 complements RG 1.89, "Environmental Qualification of Certain Electric Equipment Important to Safety for Nuclear Power Plants," which addresses compliance with Title 10 of the Code of Federal Regulations Section 50.49 (10 CFR 50.49), "Environmental Qualification of Electric Equipment Important to Safety for Nuclear Power Plants." NRC issued RG 1.89, Rev. 2 in 2023 (ML22272A602). RG 1.89, Rev. 2, endorses the joint logo standard, IEC/IEEE Std. 60780-323:2016, Edition 1. Due to the technical nexus between RG 1.89 and RG 1.75, RG 1.75 should be updated for technical and regulatory consistency between the RGs that discuss environmental qualification.

In addition, IEEE Std. 384-2018 addressed the installation of mitigating equipment connections in regard to physical separation criteria and electrical isolation for a beyond-design-basis external event (BDBEE), i.e., Fukushima event. IEEE Std. 384-2018 provides methods that could support compliance with 10 CFR 50.155, "Mitigation of beyond-design-basis events," with respect to independence of electrical systems, and therefore, RG 1.75 should be updated to address BDBEE.

2. What is the impact on internal and external stakeholders of not updating the RG for the known issues, in terms of anticipated numbers of licensing and inspection activities over the next several years?

The current version of RG 1.75 remains valid and will have no known negative impact on internal or external stakeholders at this time. The updated guidance in IEEE 384-2018, as well as referenced standards, will be integral to NRC staff reviews of license applications for advanced reactors, license renewals, and facility modifications. However, the impact of not updating RG 1.75 increases the potential for technical or regulatory challenges because 1) different versions of IEEE standards on environmental qualification are referenced in NRC guidance and 2) lack of guidance on independence of electrical systems under BDBEE.

3. What is an estimate of the level of effort needed to address identified issues in terms of full-time equivalent (FTE) and contractor resources?

The level of effort needed for the next revision of RG 1.75 is estimated at approximately 0.5 full-time equivalent (FTE). No contractor resources are expected to be required.

4. Based on the answers to the questions above, what is the staff action for this guide (Reviewed with no issues identified, Reviewed with issues identified for future consideration, Revise, or Withdraw)?

Revise.

5. Provide a conceptual plan and timeframe to address the issues identified during the review.

The staff plans to update RG 1.75, Revision 3 and anticipates that the draft guide will be issued in 2026.

References

IEEE Std. 384-2018, "IEEE Standard Criteria for Independence of Class 1E Equipment and Circuits"

NOTE: This review was conducted in June 2026 and reflects the staff's plans as of that date. These plans are tentative and subject to change.