

REGULATORY ANALYSIS

DRAFT REGULATORY GUIDE DG-1427 PROPOSED NEW REGULATORY GUIDE 1.257 REV 0

QUALIFICATION OF FIBER-OPTIC CABLES, CONNECTIONS, AND OPTICAL FIBER SPLICES FOR USE IN SAFETY SYSTEMS FOR PRODUCTION AND UTILIZATION FACILITIES

1. Statement of the Problem

The U.S. Nuclear Regulatory Commission (NRC) is considering issuing a new Regulatory Guide (RG) on the qualification of fiber-optic cables, connections, and optical fiber splices in safety systems in production and utilization facilities. This RG will endorse, subject to the conditions described in Section C of this RG, the Institute of Electrical and Electronics Engineers (IEEE) Standard (Std.) 1682-2023, "IEEE Standard for Qualifying Fiber Optic Cables, Connections, and Optical Fiber Splices for Use in Safety Systems in Nuclear Power Generating Stations." IEEE Std. 1682-2023 provides methods, directions, and documentation for the qualification of fiber-optic cables, connections, and optical fiber splices in safety systems of production and utilization facilities. This proposed RG is also intended to incorporate the NRC's implementation of a risk informed, performance-based approach to licensing and will apply to production and utilization facilities licensed under Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities," or 10 CFR Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants," which include operating reactors, new reactors, small modular reactors, and advanced reactors.

2. Objective

The objective of this regulatory action is compare alternatives and assess the need to update NRC guidance and provide applicants with a method to demonstrate compliance with the requirements given in Appendix A, "General Design Criteria for Nuclear Power Plants," and Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to 10 CFR Part 50 and in 10 CFR Part 52 for the qualification of fiber-optic cables, connections, and optical fiber splices.

3. Alternative Approaches

The NRC staff considered the following alternative approaches:

- (1) Do not issue RG 1.257.
- (2) Issue RG 1.257.

Alternative 1: Do Not Issue RG 1.257

Under this alternative, the NRC would not issue additional guidance and the current guidance would be retained. If the NRC does not take action, there will be no changes in costs or benefits to the public, licensees, or the agency. This alternative is considered the "no-action" alternative and provides a baseline condition from which any other alternatives will be assessed.

The “no-action” alternative would not address the absence of NRC guidance on this topic. The NRC would continue to review each application on a case-by-case basis.

Alternative 2: Issue RG 1.257

Under this alternative, the NRC would issue RG 1.257, “Qualification of Fiber-Optic Cables, Connections, and Optical Fiber Splices for Use in Safety Systems in Production and Utilization Facilities,” which would provide the latest information on the qualification methods for fiber-optic cables, connections, and optical fiber splices. By issuing this RG, the NRC would ensure that the guidance available in this area is current and accurately reflects the NRC staff’s position.

For the purposes of this RG, the primary objective of qualification is to demonstrate that equipment important to safety can perform its safety function(s) without experiencing common-cause failures during and after applicable design basis events (DBEs). The NRC defines DBEs in 10 CFR 50.49(b)(1)(ii) as conditions of normal operation, including anticipated operational occurrences, design-basis accidents, external events, and natural phenomena for which the plant must be designed to ensure the functions listed in 10 CFR 50.49(b)(1)(i)(A) through (C). 10 CFR 50.49 does not address extreme natural events and severe accident conditions and therefore, exceptions to certain sections of IEEE 1682-2023 are taken to clarify this point.

The impact to the NRC of issuing this RG would consist of the costs associated with preparing and issuing the RG. The impact to the public would consist of the voluntary costs associated with reviewing the draft guide and providing comments to the NRC during the public comment period. The value to the staff and license applicants would lie in the enhanced efficiency and effectiveness provided by the use of a common guidance document as the technical basis for license applications and for other interactions between the NRC and the entities it regulates.

4. Conclusion

Issuing this RG to endorse portions of a consensus standard is consistent with the NRC policy of evaluating the latest versions of national consensus standards to determine their suitability for endorsement by RGs. This approach will also comply with the NRC’s Management Directive (MD-6.5) – “NRC Participation in the Development and Use of Consensus Standards” (ML18073A164). This is in accordance with Public Law 104-113, “National Technology Transfer and Advancement Act of 1995.”

Based on this regulatory analysis, the NRC staff concludes that the issuance of RG 1.257 is warranted. The action will enhance safety and provide guidance on the qualification of fiber-optic cables, connections, and optical fiber splices.