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IEEE Std 627-1980

IEEE Standard for Design Qualification of Safety Systems Equipment Used in Nuclear Power Generating Stations

Sponsor
**Nuclear Power Engineering Committee
of the
IEEE Power Engineering Society**

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Foreword

(This Foreword is not a part of IEEE Std 627-1980, IEEE Standard for Design Qualification of Safety Systems Equipment Used in Nuclear Power Generating Stations.)

The requirements for qualification of safety systems equipment are mandated by various standards and regulatory documents including the Code of Federal Regulations. Among them are the following:

- 1) 10 CFR Part 50, Appendix B, Quality Assurance Criteria, III *Design Control*. This requires that design control measures be established and that such measures provide for verifying or checking the adequacy of design. One of the methods of design verification is *by the performance of a suitable testing program*.
- 2) 10 CFR Part 50, Appendix B, Quality Assurance Criteria, XI *Test Control*. This requires that a test program be established and that testing be performed under suitable environmental conditions. These requirements, at least in part, can be met by suitable qualifications.
- 3) 10 CFR Part 50.55a Codes and Standards, Protection System. This requires that the protection system meet the requirements set forth in 4.4, Equipment Qualification, of ANSI/IEEE Std 279-1971, Criteria for Protection Systems for Nuclear Power Generating Stations.
- 4) ANSI/ASME BPV-III, ASME Boiler and Pressure Vessel Code, Section III.
- 5) 4.7, Equipment Qualification of IEEE Std 308-1980, IEEE Standard Criteria for Class 1E Power Systems for Nuclear Power Generating Stations.
- 6) IEEE Std 323-1974, IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations.
- 7) 4.6, Equipment Qualification, of IEEE Std 603-1980, IEEE Standard Criteria for Safety Systems for Nuclear Power Generating Stations.
- 8) 3.3, Equipment Qualification, of ANSI N276-1977, Boiler Water Reactor Containment Ventilation Systems.
- 9) 3.3, Component Performance Requirements of ANSI N277-1977, Pressurized Water Reactor Containment Ventilation Systems.
- 10) 4.6, Isolation Barrier Environmental Provisions of ANSI N271-1976, Containment Isolation Provisions for Fluid Systems.

Information pertinent to developing designs and their qualifications requirements may be found in the above mentioned documents and in General Design Criteria 1, 2, 4 and 23 of Appendix A to 10 CFR Part 50.

This standard is written to serve as a general standard for qualification of all types of safety systems equipment, mechanical and instrumentation as well as electrical. It also establishes principles and procedures to be followed in preparing specific safety systems equipment standards. Guidance for qualifying specific safety systems equipment may be found in various specific equipment qualification standards that are now available or are being prepared.

It is required that safety systems equipment in nuclear power generating stations meet or exceed its performance requirements throughout its installed life. This is accomplished by a disciplined program of design qualification and quality assurance of design, production, installation, maintenance and surveillance. This standard is for the design qualification section of the program only.

Design qualification is intended to demonstrate the capability of the equipment design to perform its safety function(s) over the expected range of normal, abnormal, design basis event, post design basis event, and in-service test conditions. Inherent to design qualification is the requirement for demonstration, within limitations afforded by established technical state-of-the-art, that in-service aging throughout the qualified life established for the equipment will not degrade safety systems equipment from its original design condition to the point where it cannot perform its required safety function(s), upon demand. The above requirement reflects the primary role of design qualification to provide reasonable assurance that design- and age-related common failure modes will not occur during performance of safety function(s) under postulated service conditions.

This standard was initiated in late 1975 at the request of the Nuclear Standards Management Board. In 1977 a joint ASME/IEEE agreement established responsibility for qualification and quality assurance standards preparation. In accordance with that agreement, IEEE is to prepare the generic qualification standard which is this standard. IEEE Std 323-1974 serves as the overall qualification standard for electrical equipment. It will be revised to be more consistent with IEEE Std 627. This standard was prepared by a working group of Subcommittee 2 (Qualification) of the Nuclear Power Engineering Committee of the IEEE Power Engineering Society. The working group consisted of the following members from the American Society of Mechanical Engineers, American Society of Civil Engineers, Institute of Electrical and Electronics Engineers and Instrument Society of America.

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