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# REGULATORY GUIDE

DIRECTORATE OF REGULATORY STANDARDS

## REGULATORY GUIDE 1.63

### ELECTRIC PENETRATION ASSEMBLIES IN CONTAINMENT STRUCTURES FOR WATER-COOLED NUCLEAR POWER PLANTS

#### A. INTRODUCTION

General Design Criterion 50, "Containment Design Basis," of Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50, "Licensing of Production and Utilization Facilities" requires, in part, that the reactor containment structure, including penetrations, be designed so that the containment structure can, without exceeding the design leakage rate, accommodate the calculated pressure, temperature, and other environmental conditions resulting from any loss-of-coolant accident. Appendix B to Part 50, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," establishes quality assurance requirements for the design, construction, and operation of nuclear power plant structures, systems, and components. This guide describes an acceptable method of complying with Appendix B and Criterion 50 of Appendix A with respect to the mechanical, electrical, and test requirements for the design, construction, and installation of electric penetration assemblies in containment structures for water-cooled nuclear power plants. The Advisory Committee on Reactor Safeguards has been consulted concerning this guide and has concurred in the regulatory position.

#### B. DISCUSSION

IEEE Std 317-1972,<sup>1</sup> "IEEE Standard for Electric Penetration Assemblies in Containment Structures for Nuclear Power Generating Stations," was prepared by the Joint Committee on Nuclear Power Standards (currently designated the Nuclear Power Engineering Committee) of the Institute of Electrical and Electronics Engineers, Inc. (IEEE), and subsequently approved by

<sup>1</sup>Copies may be obtained from the Institute of Electrical and Electronics Engineers, 345 East 47th Street, New York, New York 10017.

the IEEE Standards Committee on September 20, 1972. It is an IEEE standard which prescribes design, construction, installation, and testing requirements for electric penetration assemblies in containment structures for water-cooled nuclear power plants.

#### C. REGULATORY POSITION

IEEE Std 317-1972, "IEEE Standard for Electric Penetration Assemblies in Containment Structures for Nuclear Power Generating Stations," provides an acceptable method of complying with Appendix B and General Design Criterion 50 of Appendix A to 10 CFR Part 50 with respect to mechanical, electrical and test requirements for the design, construction, and installation of electric penetration assemblies in containment structures for water-cooled nuclear power plants, subject to the following:

1. Section 4 should be supplemented as follows: The electric penetration assembly should be designed to withstand, without loss of mechanical integrity, the maximum possible fault current vs. time conditions (which could occur because of single random failures of circuit overload protection devices) within the two leads of any one single-phase circuit or the three leads of any one three-phase circuit. Incorporating adequate self-fusing characteristics within the penetration conductors themselves constitutes an acceptable design approach. Where self-fusing characteristics are not incorporated, the circuit overload protection system should conform to the criteria of IEEE Std 279-1971,<sup>1</sup> "Criteria for Protection Systems for Nuclear Power Generating Stations" (also designated ANSI N42.7-1972).

2. The maximum containment pressure to be specified in accordance with Section 4.3 should be construed as being synonymous with maximum containment internal

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pressure as defined in footnote 1 to Article NE3000 of Section III of the ASME Boiler and Pressure Vessel Code (Summer 1972 Addenda).<sup>2</sup>

3. The specific applicability or acceptability of the codes, standards, and guides referenced in Section 3 will be covered separately in other regulatory guides, where appropriate.

<sup>2</sup>Copies may be obtained from the American Society of Mechanical Engineers, United Engineering Center, 345 East 47th Street, New York, New York 10017.

4. Section 8 should be supplemented as follows: The quality assurance requirements for the design, construction, installation, and testing of electric penetration assemblies shall be in accordance with the requirements set forth in ANSI N45.2-1971,<sup>2</sup> "Quality Assurance Program Requirements for Nuclear Power Plants," and ANSI N45.2.4-1972,<sup>1,2</sup> "Installation, Inspection, and Testing Requirements for Instrumentation and Electric Equipment During the Construction of Nuclear Power Generating Stations," (also designated IEEE Std 336-1971).