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REGULATORY GUIDE DISTRIBUTION LIST (DIVISION 1)

Regulatory Guide 1.63, Revision 2, "Electric Penetration Assemblies in Containment Structures for Light-Water-Cooled Nuclear Power Plants," transmitted herewith, describes a method acceptable to the NRC staff for complying with the Commission's regulations regarding mechanical, electrical, and test requirements for the design, qualification, construction, installation, and testing of electric penetration assemblies.

With reference to the provisions of Section D, "Implementation," of the guide, any purchase orders for electric penetration assemblies executed prior to the effective date of the guide that specify the provisions of either Revision 0 or Revision 1 of Regulatory Guide 1.63 need not be changed.

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# REGULATORY GUIDE

OFFICE OF STANDARDS DEVELOPMENT

## REGULATORY GUIDE 1.63

### ELECTRIC PENETRATION ASSEMBLIES IN CONTAINMENT STRUCTURES FOR LIGHT-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, "Domestic 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, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to 10 CFR Part 50 establishes quality assurance requirements for the design, construction, and operation of nuclear power plant structures, systems, and components. This guide describes a method acceptable to the NRC staff for complying with General Design Criterion 50 of Appendix A and with Appendix B with respect to the mechanical, electrical, and test requirements for the design, qualification, construction, installation, and testing of electric penetration assemblies in containment structures of light-water-cooled nuclear power plants. The Advisory Committee on Reactor Safeguards was consulted regarding this guide and concurred in the regulatory positions.

#### B. DISCUSSION

IEEE Std 317-1976,<sup>1</sup> "IEEE Standard for Electric Penetration Assemblies in Containment Structures for Nuclear Power Generating Stations," was prepared

\* Lines indicate substantive changes from previous issue.

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

by a working group of Subcommittee 1 (General Plant Criteria) of the Nuclear Power Engineering Committee of the Institute of Electrical and Electronics Engineers (IEEE) and was subsequently approved by the IEEE Standards Board on September 4, 1975. This IEEE standard prescribes design, qualification, construction, installation, and testing requirements for electric penetration assemblies in containment structures for light-water-cooled nuclear power plants.

#### C. REGULATORY POSITION

Conformance with the requirements of IEEE Std 317-1976, "IEEE Standard for Electric Penetration Assemblies in Containment Structures for Nuclear Power Generating Stations," provides an acceptable method of complying with General Design Criterion 50 of Appendix A and with Appendix B to 10 CFR Part 50 with respect to mechanical, electrical, and test requirements for the design, qualification, construction, installation, and testing of electric penetration assemblies in containment structures for light-water-cooled nuclear power plants, subject to the following:

1. Section 4.2.4 should be supplemented by the following: The electric penetration assembly should be designed to withstand, without loss of mechanical integrity, the maximum short-circuit current vs. time conditions that could occur given single random failures of circuit overload protection devices. 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 short-circuit current assessed at the penetration assembly should be consistent with the criteria used in establishing the interrupting

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Comments and suggestions for improvements in these guides are encouraged at all times, and guides will be revised, as appropriate, to accommodate comments and to reflect new information or experience. This guide was revised as a result of substantive comments received from the public and additional staff review.

Comments should be sent to the Secretary of the Commission, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, Attention: Docketing and Service Branch.

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capability of the protective device associated with the penetration assembly conductors. Accordingly, the provisions of Section 4.2.4 pertaining to the rated short-circuit current for alternating-current circuits should be modified as follows:

<i>Rated Voltage (V)</i>	<i>x/r Ratio<sup>2</sup></i>
300 } 600 } 1000 }	>8
5000 } 8000 } 15000 }	>15

3. The provisions of Section 4.2.4 pertaining to the duration of the maximum short-circuit current are representative of circuits protected by molded-case circuit breakers but are not representative of circuits using other air circuit breakers. The provisions pertaining to the duration of the maximum short-circuit current should be modified as follows:

<i>Service Classification</i>	<i>Duration(s)</i>
Low-voltage power and control	0.033 (for molded-case circuit breakers) 0.066 (for other air circuit breakers)

4.<sup>3</sup> Section 6.4.4, "Dielectric-Strength Test," should be supplemented, for qualification testing only, by the following:

(3) Each medium-voltage power conductor shall be given an impulse withstand test by applying a  $1.2 \times 50 \mu\text{s}$  impulse voltage test series consisting of three positive and three negative impulse voltages. If flashover occurs on only one test during any group of three consecutive tests, three more shall be made. If no flashover occurs in the second group of tests, the flashover in the first group shall be considered as a random flashover and the equipment shall be considered as having passed the test.

<sup>2</sup> Values based on data of ANSI C37.010-1972, "Application Guide for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis."

<sup>3</sup> This additional staff position, not contained in Revision 1, was included in a letter to the Division 1 distribution, dated February 1978.

The test voltages for the above shall be based on the voltage rating of the conductor in accordance with the following table:

<i>Conductor Rated Voltage (V)</i>	<i>Impulse<sup>4</sup> Voltage (V)</i>
300 and 600	.....
1000	.....
5000	60,000
8000	95,000
15,000	95,000

5. The 500-hour aging time at minimum aging temperature of Section 6.3.3 is a printing error<sup>5</sup> and should be changed to 5000 hours.

6. The definition of "Double Aperture Seal" in Section 2 is a printing error<sup>5</sup> and should be changed as follows: "Two single aperture seals in series."

7. 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.

#### D. IMPLEMENTATION

The purpose of this section is to provide information to applicants regarding the NRC staff's plans for using this regulatory guide. Except in those cases in which the applicant proposes an acceptable alternative method for complying with specified portions of the Commission's regulations, the method described herein will be used in the evaluation of submittals for construction permit applications docketed after August 31, 1978.

If an applicant wishes to use this regulatory guide in developing submittals for applications docketed on or before August 31, 1978, the pertinent portions of the application will be evaluated on the basis of this guide.

<sup>4</sup> Values based on data of ANSI C37.20-1969, "Switchgear Assemblies Including Metal-Enclosed Bus" (1974 Consolidated Edition dated September 3, 1974).

<sup>5</sup> This printing error was corrected in printings of the standard after August 25, 1976.

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