



# REGULATORY GUIDE

OFFICE OF NUCLEAR REGULATORY RESEARCH

## REGULATORY GUIDE 1.32

(Draft was issued as DG-1079)

### CRITERIA FOR POWER SYSTEMS FOR NUCLEAR POWER PLANTS

#### A. INTRODUCTION

General Design Criterion 17, "Electric Power Systems," of Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," requires an onsite electric power system and an offsite electric power system to be provided to permit functioning of certain structures, systems, and components. In addition, General Design Criterion 18, "Inspection and Testing of Electric Power Systems," of Appendix A to 10 CFR Part 50 specifies requirements for periodic inspection, testing, and testability of electric power systems.

This regulatory guide describes a method acceptable to the NRC staff for complying with the NRC's regulations for the design, operation, and testing of electric power systems in nuclear power plants. Specifically, it provides guidance for meeting the General Design Criteria for the safety-related portions of systems and equipment in the alternating current power systems, direct current power systems, and instrumentation and control power systems.

The information collections contained in this regulatory guide are covered by the requirements of 10 CFR Part 50, which were approved by the Office of Management and Budget (OMB), approval number 3150-0011. The NRC may not conduct or sponsor, and a person is not required to respond to, a request for information or an information collection requirement unless the requesting document displays a currently valid OMB control number.

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Regulatory guides are issued to describe and make available to the public such information as methods acceptable to the NRC staff for implementing specific parts of the NRC's regulations, techniques used by the staff in evaluating specific problems or postulated accidents, and data needed by the NRC staff in its review of applications for permits and licenses. Regulatory guides are not substitutes for regulations, and compliance with them is not required. Methods and solutions different from those set out in the guides will be acceptable if they provide a basis for the findings requisite to the issuance or continuance of a permit or license by the Commission.

This guide was issued after consideration of comments received from the public. 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. Written comments may be submitted to the Rules and Directives Branch, ADM, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001.

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## B. DISCUSSION

IEEE Std. 308-2001, “Criteria for Class 1E Power Systems for Nuclear Power Generating Stations,”\* was prepared by Working Group 4.1 of Subcommittee 4, “Auxiliary Power,” of IEEE Nuclear Power Engineering Committee and was approved by the IEEE Standards Board on December 6, 2001. This standard provides guidance on the design of nuclear power plant electrical power systems that are specifically related to protection of the health and safety of the public. The major role of the safety-related power system is to provide electric power to the reactor trip system, engineered safety features, and auxiliary supporting features; therefore, the safety-related power system is an auxiliary supporting feature. The safety-related power system is more complex than other auxiliary supporting features; it can provide power to both safety-related and non-safety-related loads.

IEEE Std. 308-2001 provides (1) the principal design criteria and the design features for the safety-related power systems that enable the systems to meet their functional requirements under the conditions produced by the postulated design basis events, (2) methods for tests and surveillance of the safety-related power systems, (3) criteria for sharing safety-related power systems in multi-unit nuclear power plants, and (4) provisions for documentation of the safety-related power systems.

Section 7.1 of IEEE Std. 308-2001 states that shared Class 1E (safety-related) power systems are permissible in multi-unit stations provided certain rigorous conditions for sharing are met. However, Regulatory Guide 1.81, “Shared Emergency and Shutdown Electric Systems for Multi-Unit Nuclear Power Plants,” states that dc power systems in multi-unit nuclear power plants should not be shared. Sharing of dc power systems and their interactions between units could compromise safe shutdown. Rather, independent dc power systems for each unit of multi-unit stations have the following advantages: (1) they are simple; (2) they provide overall excellence; (3) they are less prone to error and thus provide overall reliability; and (4) they involve simplified maintenance and operation. In advanced reactors, such as AP600/AP1000 or SWR 1000 designs, dc power systems are heavily relied upon for a safe shutdown in case of an accident or abnormal operational occurrence. Therefore, the NRC does not endorse the IEEE Std. 308-2001 criteria for sharing safety-related dc power systems in multi-unit nuclear power plants.

IEEE Std. 308-2001 references several industry standards. Unless these referenced standards are specifically incorporated by reference in the NRC regulations, they are not mandatory requirements. If a referenced standard has been endorsed in a regulatory guide, the standard constitutes a method acceptable to the NRC of meeting a regulatory requirement as described in the regulatory guide. If a referenced standard has not been endorsed in a regulatory guide, licensees and applicants may consider and use the information in a referenced standard consistent with current regulatory practice.

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\* IEEE standards may be purchased from the IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08855.

### **C. REGULATORY POSITION**

Conformance with the requirements of IEEE Std. 308-2001, “Criteria for Class 1E Power Systems for Nuclear Power Generating Stations,” is acceptable to the NRC staff for satisfying the NRC’s regulations with respect to the design, operation, and testing of safety-related power systems for nuclear power plants, except for sharing of dc power systems at multi-unit nuclear power plants, as described in Revision 1 of Regulatory Guide 1.81, “Shared Emergency and Shutdown Electric Systems for Multi-Unit Nuclear Power Plants.”

### **D. IMPLEMENTATION**

The purpose of this section is to provide information to applicants and licensees regarding the NRC staff’s plans for using this regulatory guide. No backfitting is intended or approved in connection with the issuance of this guide.

Except in cases in which an applicant or licensee proposes or has previously established an acceptable alternative method for complying with specified portions of the NRC’s regulations, the methods described in this guide will be used in evaluations of (1) submittals in connection with applications for construction permits, design certifications, operating licenses, and combined licenses and (2) submittals from operating reactor licensees who voluntarily propose to initiate system modifications if there is a clear nexus between the proposed modifications and this subject for which guidance is provided herein.

## **REGULATORY ANALYSIS**

A separate regulatory analysis was not prepared for this regulatory guide. The regulatory analysis prepared for Draft Regulatory Guide DG-1079, “Criteria for Power Systems for Nuclear Power Plants” (April 2003), provides the regulatory basis for this regulatory guide as well. DG-1079 was issued for public comment as the draft of this Revision 3 of Regulatory Guide 1.32. A copy of the regulatory analysis is available for inspection and copying for a fee at the U.S. Nuclear Regulatory Commission Public Document Room, 11555 Rockville Pike, Rockville, MD; the PDR’s mailing address is USNRC PDR, Washington, DC 20555; telephone (301)415-4737 or 1-(800)397-4209; fax (301)415-3548; e-mail <[PDR@NRC.GOV](mailto:PDR@NRC.GOV)>. The regulatory analysis is also available electronically as a part of Draft Regulatory Guide DG-1079 through NRC’s Electronic Reading Room, accession number ML031280598.