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IEEE Standard for Preferred Power Supply (PPS) for Nuclear Power Generating Stations (NPGS)

IEEE Power and Energy Society

Sponsored by the
Nuclear Power Engineering Committee

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Abstract: The design criteria of the preferred power supply (PPS) and its interfaces with the Class 1E power system, switchyard, transmission system, and alternate ac (AAC) source are described. This standard provides PPS requirements for nuclear power plants and guidance in the areas of AAC power source interfaces with PPS, physical independence of the PPS power and control circuits, and expanded PPS criteria for multi-unit stations.

Keywords: AAC, alternate ac source, Class 1E, IEEE 765, NPGS, nuclear power generating station, PPS, preferred power supply, switchyard, transmission system

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3 Park Avenue, New York, NY 10016-5997, USA

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Farouk Baxter
Robert Beavers
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Introduction

This introduction is not part of IEEE Std 765-2012, IEEE Standard for Preferred Power Supply (PPS) for Nuclear Power Generating Stations (NPGS).

This standard was originally prepared to provide detailed design criteria for the preferred power supply (PPS) to ensure a design commensurate with its intended function and to provide sufficient detail to interpret, clarify, and expand on guidance given in Title 10, U.S. Code of Federal Regulations, Part 50 [B1], Appendix A, General Design Criteria 17 and General Design criteria 18, and IEEE Std 308™-1991.

Title 10, U.S. Code of Federal Regulations, Part 50 (10CFR50), Appendix A, General Design Criteria 17 (GDC-17) for nuclear power generating stations requires that an offsite electric power system be provided to permit functioning of structures, systems, and components important to safety. In addition, General Design Criteria 18 (GDC-18) provides requirements for inspection and testing of electric power systems.

In 1988, Title 10, Part 50.63 was added to the U.S. Code of Federal Regulations. Part 50.63 requires each light water-cooled nuclear power generating station to withstand a station blackout for a specific duration and to recover from it. In addition, Part 50.63 defines the requirements for coping with a station blackout by utilizing an alternate ac (AAC) power source.

The Nuclear Utility Management and Resource Council (NUMARC) provided additional guidance in NUMARC 87-00-1988, Guidelines and Technical Bases for NUMARC Initiatives Addressing Station Blackout at Light Water Reactors. Since NUMARC 87-00 (Revision 1 August 1991) is not available for general public distribution, the guidelines contained therein were considered by the Working Group. The design requirements of AAC are outside the scope of this standard.

This revision of the standard has removed Annex A and Annex B. Reference is made to IEEE Std 1792 ™-2011, which provides a more comprehensive discussion on topics related to PPS reliability.

Contents

IEEE Standard for Preferred Power Supply (PPS) for Nuclear Power Generating Stations (NPGS)

1. Overview

1.1 Document Organization

This standard has seven clauses. The first clause defines the scope of this standard, Clause 2 provides references, and Clause 3 provides definitions that are not found in other standards or are essential to the interpretation of the intent of this standard.

The general design criteria of the preferred power supply (PPS) are outlined in Clause 4, and the specific design criteria in Clause 5 describe the interfaces with the transmission system, switchyard, Class 1E power system, and alternate ac (AAC) source. Clause 6 describes the surveillance and test requirements, and Clause 7 describes multi-unit considerations.

1.2 Scope

This standard describes the design criteria of the PPS and its interfaces with the Class 1E power system, switchyard, transmission system, and AAC source. Figure 1 is a typical interface diagram of the PPS with related power systems.

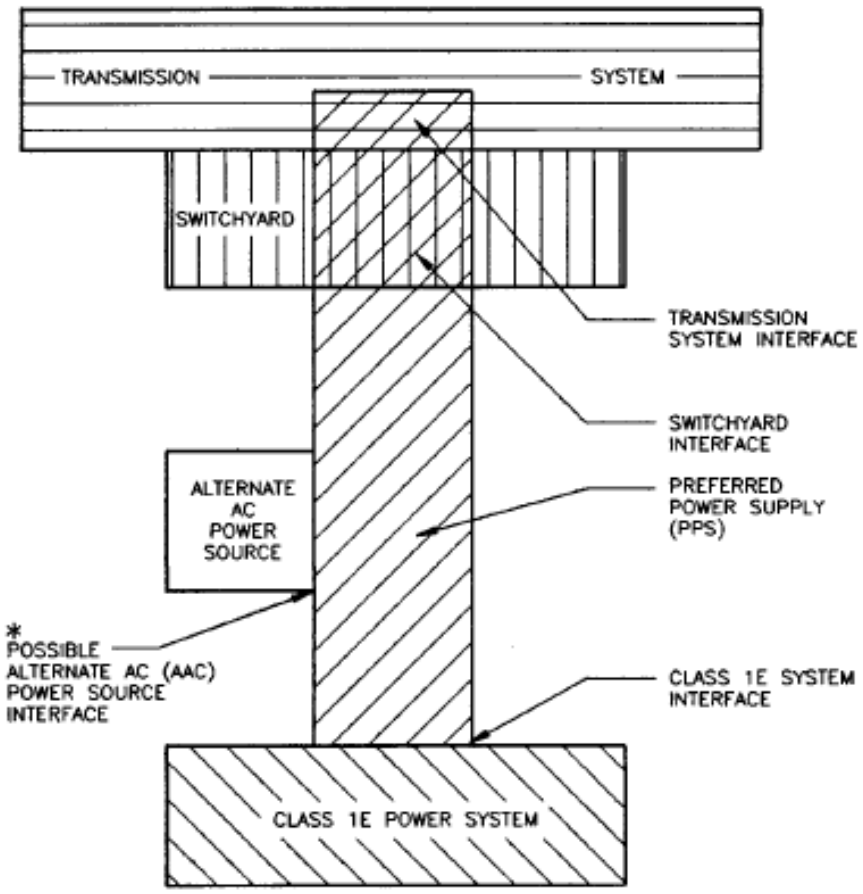

Figure 1—PPS interface diagram

1.3 Purpose

This standard provides PPS requirements for nuclear power generating stations (NPGSs) and guidance in the areas of AAC power source interfaces with the PPS, physical independence of the PPS power and control circuits, and expanded PPS criteria for multi-unit stations.

2. Normative references

The following referenced documents are indispensable for the application of this document (i.e., they must be understood and used, so each referenced document is cited in text and its relationship to this document is explained). For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments or corrigenda) applies.

IEEE Std 308™, IEEE Standard Criteria for Class 1E Power Systems for Nuclear Power Generating Stations.[1, 2]

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