

IEEE Std 946™-2004
(Revision of
IEEE Std 946-1992)

IEEE Standards

946™

**IEEE Recommended Practice for the
Design of DC Auxiliary Power
Systems for Generating Stations**

IEEE Power Engineering Society

Sponsored by the
Energy Development and Power Generation Committee



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

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IEEE Recommended Practice for the Design of DC Auxiliary Power Systems for Generating Stations

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Energy Development and Power Generation Committee
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IEEE Power Engineering Society

Approved 8 December 2004

IEEE-SA Standards Board

Abstract: Guidance for the design of the dc auxiliary power systems for nuclear and non-nuclear power generating stations is provided by this recommended practice. The components of the dc auxiliary power system addressed by this recommended practice include lead-acid storage batteries, static battery chargers, and distribution equipment. Guidance for selecting the quantity and types of equipment, the equipment ratings, interconnections, instrumentation, control and protection is also provided.

Keywords: battery, battery charger, cross-tie, dc, duty cycle, generating station, ground detection, instrumentation, nuclear, short circuit

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Introduction

This introduction is not part of IEEE Std 946-2004, IEEE Recommended Practice for the Design of DC Auxiliary Power Systems for Generating Stations.

DC auxiliary power systems continue to play a vital role in generating station control and in providing backup for emergencies. This recommended practice fulfills a need within the industry to provide common or standard practices for the design of dc systems. The design features are applicable to all installations and systems capacities.

The original issue of IEEE Std 946 was published in 1985 with the title IEEE Recommended Practice for the Design of Safety-Related DC Auxiliary Power Systems for Nuclear Power Generating Stations. The 1992 revision changed the title to apply to all generating stations, while including specific guidance and a detailed bibliography of nuclear design reference standards. This revision makes a general update to reflect the most recent industry practices as well as substantial additions to annexes. In addition, as the design of nuclear plant systems has become well documented by other IEEE standards, the direct emphasis on unique aspects of nuclear plant design has been further diminished, with a full listing of the nuclear design standards included in Annex A. Some nuclear discussion and illustrative figures have been retained as they offer a constructive comparison to non-nuclear designs without having to resort to additional standards.

This recommended practice was prepared by a Working Group that is part of the Station Design, Operation, and Control Subcommittee and was sponsored by the Energy Development and Power Generation Committee of the IEEE Power Engineering Society.

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IEEE Recommended Practice for the Design of DC Auxiliary Power Systems for Generating Stations

1. Overview

1.1 Scope

This recommended practice provides guidance for the design of the dc auxiliary power systems for nuclear and non-nuclear power generating stations. The components of the dc auxiliary power system addressed by this recommended practice include lead-acid storage batteries, static battery chargers, and distribution equipment. Guidance for selecting the quantity and types of equipment, the equipment ratings, interconnections, instrumentation, control, and protection is also provided.

The ac power supply to the battery chargers; the loads served by the dc systems, except as they influence the dc system design; and dedicated engine starting (cranking) battery systems are beyond the scope of this recommended practice.

2. Normative references

The following referenced documents are indispensable for the application of this document. 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 484TM, IEEE Recommended Practice for Installation Design and Installation of Vented Lead-Acid Storage Batteries for Stationary Applications.^{1,2}

IEEE Std 485TM, IEEE Recommended Practice for Sizing Large Lead Storage Batteries for Generating Stations and Substations.

IEEE Std 649TM, IEEE Standard for Qualifying Class 1E Motor Control Centers for Nuclear Power Generating Stations.

IEEE Std 666TM, IEEE Design Guide for Electric Power Service Systems for Generating Stations.

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