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IEEE Standard for Design and Installation of Cable Systems for Class 1E Circuits in Nuclear Power Generating Stations

IEEE Power and Energy Society

Sponsored by the
Nuclear Power Engineering Committee

IEEE
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New York, NY 10016-5997
USA

IEEE Std 690™-2018
(Revision of
IEEE Std 690-2004)

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Abstract: Direction for the design and installation of safety-related electrical cable systems, including associated circuits, in nuclear power generating stations is provided in this standard. Also provided is guidance for the design, installation and performance requirements of those non-safety related cable systems that may affect the function of safety related systems. This standard provides guidance on applications of cable-penetration, fire stops, cable fire breaks, and cable-system enclosures for cable systems for Class 1E circuits.

Keywords: cable, electrical design, generating facility, IEEE 690™

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Introduction

This introduction is not part of IEEE Std 690-2018, IEEE Standard for Design and Installation of Cable Systems for Class 1E Circuits in Nuclear Power Generating Stations.

This standard is the result of efforts by the working group to provide a document for use as a standard in the design and installation of cable systems for Class 1E circuits in nuclear power generating stations. This standard provides direction for the design and installation of safety-related electrical cable systems, including associated circuits, in nuclear power generating stations. Also provided is guidance for the design, installation and performance requirements of those non-safety related cable systems that may affect the function of safety related systems. This standard provides guidance on applications of cable-penetration, fire stops, cable fire breaks, and cable-system enclosures for cable systems for Class 1E circuits.

IEEE Std 422™ [B7], Guide for the Design of Cable and Raceway Systems for Electric Generating Facilities, was originally written to apply to both nuclear and non-nuclear electric power-generating stations except for the special requirements of wire and cable installations in Class 1E systems, for which the user was referred to IEEE Std 690™.[1,2] Most of the existing nuclear plants refer to IEEE Std 422-1986 in their governing documents and used the guidance of IEEE Std 422-1986 in their designs, especially for non-nuclear applications such as water treatment, cooling towers, administrative, and warehouse structures, etc. It is not the intent of this revision of IEEE Std 690 to change what was done in the past, require any new design changes to existing operating nuclear plants or to not use the guidance from IEEE Std 422-1986. The intent of this revision is to clarify the applicability of this document to future nuclear plant designs.

A revision to IEEE Std 422 [B7] has been issued, removing those design requirements (such as associated circuits) that are specific to only nuclear power generating stations. This revision to IEEE Std 690 is being issued to update the standard to current design requirements and capture any nuclear design requirements that are specific to nuclear generating stations but do not apply to non-nuclear generating stations such as fossil fueled, hydroelectric, solar, wind, etc. For additional guidance on standard criteria for the design, installation, and qualification of raceway systems for Class 1E circuits see IEEE Std 628™ [B11].

[1]IEEE publications are available from the Institute of Electrical and Electronics Engineers (http://standards.ieee.org/).
[2]The numbers in brackets correspond to those of the bibliography in Annex A.

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IEEE Standard for Design and Installation of Cable Systems for Class 1E Circuits in Nuclear Power Generating Stations

1. Overview

1.1 Scope

This standard provides requirements for the design and installation of safety related electrical cable systems, including associated circuits, in nuclear power generating stations. Also provided are requirements for the design and installation of those non-safety related cable systems that may affect the function of safety related systems.

NOTE—The term "associated" circuits is not repeated throughout the text; however, all requirements for the design and installation of cable systems for Class 1E circuits apply equally to associated circuits unless it can be shown by test or analysis that the associated circuits cannot affect the performance of the Class 1E circuits.[3]

1.2 Purpose

The purpose of this standard is to identify existing standards and to establish requirements pertaining to safety-related cable systems in nuclear power generating stations. Solutions are recommended for areas of concern such as fire protection, raceways, separation, cable performance requirements, and installation acceptance testing and documentation.[4]

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.

ASME NQA 1, Quality Assurance Program Requirements for Nuclear Power Plants.[5]

IEC/IEEE 60780-323, International Standard – Nuclear facilities – Electrical equipment important to safety – Qualification.

[3]Notes in text, tables, and figures of a standard are given for information only and do not contain requirements needed to implement this standard.
[4]Other solutions may also be acceptable based on an engineering review of the specifics involving the installation. Each situation should be reviewed and examined on its own merits.
[5]ASME publications are available from the American Society of Mechanical Engineers (http://www.asme.org/).