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IEEE Standard for Criteria for the Protection of Class 1E Power Systems and Equipment in Nuclear Power Generating Stations

IEEE Power and Energy Society

Sponsored by the
Nuclear Power Engineering Committee

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

IEEE Std 741™-2017
(Revision of IEEE Std 741-2007)

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Abstract: Criteria that establish protection requirements for Class 1E power systems and equipment are prescribed in this standard. The purpose of and the means for obtaining protection from electrical and mechanical damage, or failures that can occur within a time period that is shorter than that required for operator action, are described. Testing and surveillance requirements are included. Plant physical design requirements to protect against events such as pipe whip, fire, dropped load, etc., are not included.

Keywords: Class 1E, electrical equipment, IEEE 741™, nuclear power generating stations, power systems, protection

The Institute of Electrical and Electronics Engineers, Inc.
3 Park Avenue, New York, NY 10016-5997, USA

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Introduction

This introduction is not part of IEEE Std 741-2017, IEEE Standard for Criteria for the Protection of Class 1E Power Systems and Equipment in Nuclear Power Generating Stations.

The IEEE Power Engineering Society has developed this standard to provide the principal design criteria, design features, and testing requirements for the protection of Class 1E power systems and equipment supplied from those systems. It is of particular use in identifying the need for special protection features where the requirements of nuclear power generating stations necessitate supplementing accepted industry practices.

Wherever possible, this standard identifies other standards or documents that provide more explicit guidance for specific protection requirements. By definition, the protection shall be adequate to sense and to determine the presence of an unacceptable condition and to execute the operations required in order to limit degradation effects. In this role, this standard pays special attention to the requirements for design verification documentation to support the protection performance.

This standard also addresses the electrical penetration assemblies installed as part of the containment structure that may require special considerations for protection. Also included are the criteria used to establish the necessity for special considerations and the resulting protection requirements.

The revision of this standard includes the following principal changes:

— Updating normative references revisions, as necessary

— Moving definitions from Annexes to main body

— Updating Annex A to include one method found acceptable for the determination of the proper settings for loss of voltage and degraded voltage protection systems and their associated time delays.

Contents

IEEE Standard for Criteria for the Protection of Class 1E Power Systems and Equipment in Nuclear Power Generating Stations

1. Scope

This standard provides the principal design criteria, design features, and testing requirements for the protection of Class 1E power systems and equipment supplied from those systems. It identifies special protection features that are needed where the requirements of nuclear power generating stations necessitate supplementing accepted industry practices.

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 141™-1993, IEEE Recommended Practice for Electric Power Distribution for Industrial Plants (*IEEE Red Book*™).[1,2]

IEEE Std 142™, IEEE Recommended Practice for Grounding of Industrial and Commercial Power Systems *(IEEE Green Book*™).

IEEE Std 242™, IEEE Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems *(IEEE Buff Book*™).

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

IEEE Std 317™, IEEE Standard for Electric Penetration Assemblies in Containment Structures for Nuclear Power Generating Stations.

IEEE Std 336™, IEEE Standard Installation, Inspection, and Testing for Power, Instrumentation, and Control Equipment at Nuclear Facilities.

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