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IEEE Standard for Qualification of Class 1E Connection Assemblies for Nuclear Power Generating Stations and Other Nuclear Facilities

IEEE Power and Energy Society

Sponsored by the
Nuclear Power Engineering Committee

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USA

IEEE Std 572™-2019
(Revision of
IEEE Std 572-2006)

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Abstract: Basic requirements, direction, and methods for qualifying Class IE connection assemblies for service in nuclear power generating stations and other nuclear facilities are provided in this standard. These requirements include connectors, terminations, and environmental seals in combination with related cables or wires as assemblies. Qualification of cable with connectors to this standard does not replace qualification to IEEE Std 383™-2015. This standard does not apply to containment electric penetrations, fire stops, in-line splices, components for service within the reactor vessel, or fiber optic connectors. (Refer to IEEE Std 1682™-2011.) The qualification requirements in this standard, when met, demonstrate and document the ability of the equipment to perform safety function(s) under applicable service conditions (including design basis events) reducing the risks of common cause equipment failures. This standard does not provide environmental stress levels and performance requirements.

Keywords: age, age conditioning, aging, baseline parameter, cable, cable assembly, condition monitoring, connection assemblies, connector, equipment qualification, generic qualification, harsh environment, IEEE 572™, interface, margin, mild environment, nuclear, qualification methods, qualified life, radiation, safety-related function, significant aging mechanism, termination, test plan, test sequence, type testing

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Introduction

This introduction is not part of IEEE Std 572-2019, IEEE Standard for Qualification of Class 1E Connection Assemblies for Nuclear Power Generating Stations and Other Nuclear Facilities.

This standard is the result of a review of IEEE Std 572-2006 and present practices in connection assembly qualification. This revision incorporates current practices and lessons learned from the implementation of previous versions of this standard by the nuclear industry. The goal of this revision is to make the standard more useful to the industry, especially for new generation plants.

The following issues are clarified or changed in this revision:

- "Other Nuclear Facilities" was added to the title because there are facilities other than nuclear power plants which may benefit from this standard.
- The wording, definitions, references, and word usage of this standard were updated to be consistent with IEC/IEEE 60780-323-2016.[1]
- Definitions of connection assemblies, cable assemblies and their interfaces were updated.
- The flowchart provided as Figure 1 was updated and clarified for consistency with the text.
- Guidance was included for tests at possible environmental conditions that are beyond the design basis of the plant such as extreme natural events and severe accidents.
- Guidance was included for accelerated vibration testing pertinent to connection assemblies which may be exposed to long-term vibrational aging.
- Submergence qualification was addressed.
- Fiber optic connector qualification was not included in this standard and was instead referenced to IEEE Std 1682™-2011.
- Unsupported cable length and monitoring of circuit continuity were added to seismic test considerations.
- Clarifications were added for various issues, including, but not limited to: functional tests, condition monitoring, abnormal environments, circuit resistance tests, and thermal cycles.

[1]Additional information on references can be found in Clause 2.

Contents

IEEE Standard for Qualification of Class 1E Connection Assemblies for Nuclear Power Generating Stations and Other Nuclear Facilities

1. Overview

1.1 Scope

This standard provides basic requirements, direction, and methods for qualifying Class lE connection assemblies for service in nuclear power generating stations and other nuclear facilities. These include connectors, terminations, and environmental seals in combination with related cables or wires as assemblies. Qualification of cable with connectors to this standard does not replace qualification to IEEE Std 383™-2015.[2] This standard does not apply to containment electric penetrations, fire stops, in-line splices, components for service within the reactor vessel, or fiber optic connectors (refer to IEEE Std 1682™-2011 [B9]).[3] The qualification requirements in this standard, when met, demonstrate and document the ability of the equipment to perform safety function(s) under applicable service conditions (including design basis events) reducing the risks of common cause equipment failures. This standard does not provide environmental stress levels and performance requirements.

NOTE—Other IEEE standards that present qualification methods for specific equipment, specific environments, or specific parts of qualification program may be used to supplement this standard, as applicable. The bibliography of IEC/IEEE 60780-323-2016 lists other standards related to equipment qualification.[4]

1.2 Purpose

The purpose of this standard is to provide specific direction for the implementation of IEC/IEEE 60780-323-2016 for qualification as it pertains to qualification of connectors, terminations, and environmental seals (related to cables as assemblies).

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

[2]Information on references can be found in Clause 2.
[3]The numbers in brackets correspond to those of the bibliography in Annex C.
[4]Notes in text, tables, and figures are given for information only and do not contain requirements needed to implement the standard.