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IEEE Recommended Practice for Installation, Inspection, and Testing for Class 1E Power, Instrumentation, and Control Equipment at Nuclear Facilities

IEEE STANDARDS

IEEE Power and Energy Society

Developed by the
Nuclear Power Engineering Committee

IEEE Std 336™-2020
(Revision of IEEE Std 336-2010)

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IEEE SA Standards Board

Abstract: Considerations for the pre-installation, installation, inspection, and testing of Class 1E power, instrumentation, and control equipment and systems of a nuclear facility while in the process of installing, inspecting, and testing during new construction, modification, or maintenance are provided in this recommended practice. This recommended practice does not apply to periodic surveillance testing. For purposes of this recommended practice, in addition to a nuclear power plant, a nuclear facility is defined as a facility related to the nuclear fuel cycle from fuel processing to reprocessing and waste management.

Keywords: Class 1E, configuration management, constructability reviews, functional testing, IEEE 336™, inspection procedures, multi-unit, nuclear facilities, plant design bases, pre-installation, post-installation inspection, post-maintenance test, post-modification test, test plans, test procedures

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Introduction

This introduction is not part of IEEE Std 336-2020, IEEE Recommended Practice for Installation, Inspection, and Testing for Class 1E Power, Instrumentation, and Control Equipment at Nuclear Facilities.

This recommended practice was originally published as a standard, and it set forth requirements for installation, inspection, and testing of important instrumentation and electric equipment in a nuclear power generating station during its construction phase. This recommended practice was prepared by the IEEE in response to a request by American National Standards Committee N45 on Reactor Plants and their maintenance. The N45 committee was chartered to promote development of standards for location, design, construction, and maintenance of nuclear reactors and plants embodying nuclear reactors, including equipment, methods, and components specifically for this purpose.

In May 1969, the IEEE Joint Committee on Nuclear Power Standards (JCNPS) established an ad hoc committee on Installation, Inspection, and Testing of Electric and Instrumentation Equipment. The purpose of this committee was to prepare a standard for general industry use that would define requirements for installation, inspection, and testing of instrumentation and electric equipment necessary to ensure attainment of a safe and reliable nuclear power generating station. The ad hoc committee was composed of representatives of key segments of the nuclear industry, including utilities, reactor suppliers, construction contractors, component manufacturers, and consultants.

In 1977, the standard was revised to provide clarity and simplification. In 1979, the standard was again revised to expand the scope to include operating plant modifications that are comparable in nature and extent with those related activities occurring during initial construction of the station. Subcommittee 8 of the Nuclear Power Engineering Committee (NPEC) developed these revisions.

In 1985, this standard was then revised to allow application of the requirements to include nuclear facilities other than nuclear power generation stations. Nuclear facilities include facilities for power generation, spent fuel storage, waste storage, fuel processing, plutonium processing, and fuel fabrication.

In 2003, the NPEC directed its Working Group 3.1 to convert IEEE Std 336™-1985 from a standard to a guide (to allow more flexibility for selective guidance than mandatory requirements), to incorporate “lessons learned” from industry (in particular, for post-modification and post-maintenance testing), and to change the format to be more user-friendly. The guide was issued in 2005.

IEEE Std 336-2010 converted IEEE Std 336-2005 to a recommended practice. The purpose for recategorizing IEEE Std 336 to a recommended practice was to elevate the importance of the subject matter for an industry that anticipates significant new construction. A recommended practice emphasis will allow reasonable flexibility with respect to the interpretation of the information provided but will use language that is more significant than a guide without the strict prescriptive language of a standard.

This revision is including reference to IEEE Std 1819™ for facilities implementing risk-informed methodologies, providing additional clarifications, updating to the revised template, and expanding the bibliography.

Contents

IEEE Recommended Practice for Installation, Inspection, and Testing for Class 1E Power, Instrumentation, and Control Equipment at Nuclear Facilities

1. Overview

1.1 Scope

This recommended practice provides considerations for the pre-installation, installation, inspection, and testing of Class 1E power, instrumentation, and control equipment and systems of a nuclear facility while in the process of installing, inspecting, and testing during new construction, modification, and maintenance. This recommended practice does not apply to periodic surveillance testing.

1.2 Purpose

The purpose of this recommended practice is to identify the activities, instructions, and attributes that should be considered in the process of installing, inspecting, and testing during new construction, modification, and maintenance for Class 1E power, instrumentation, and control equipment at nuclear facilities.

1.3 Applicability

The recommendations set forth in this recommended practice apply to the work of organizations that participate in the installation (including new equipment and modifications to equipment), inspections, and testing, or modification of power, instrumentation, and control equipment and systems in a nuclear facility from the time the equipment is turned over for installation until it is declared operable for service. This recommended practice is intended for nuclear generating stations and other facilities related to the nuclear fuel cycle from fuel processing, to reprocessing and waste management, all referred to as *facilities* in this guide.

Nuclear facilities implementing risk-informed methodologies should implement this recommended practice in conjunction with IEEE Std 1819™ [B4].[1]

[1]The numbers in brackets correspond to those of the bibliography in Annex A.