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IEEE Standard Criteria for Combustion Turbine-Generator Units Applied as Standby Power Supplies for Nuclear Power Generating Stations

IEEE Power and Energy Society

Developed by the
Nuclear Power Engineering Committee

IEEE Std 2420™-2019
(Revision of IEEE Std 2420-2013)

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Abstract: The criteria for the application and testing of combustion turbine-generator units as Class 1E standby power supplies in nuclear power generating stations are described in this standard.

Keywords: aging classification, auxiliary equipment, capability, controls, design criteria, design features, combustion turbine-generator units, documentation requirements, engine, generator, IEEE 2420™, load profile, modifications, operation, periodic testing, pre-operational testing, production testing, protection, qualification requirements, rating, records, reliability program, scope, seismic qualification, site testing, standby power supply, testing requirements, test parameters, type testing

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Introduction

This introduction is not part of IEEE Std 2420-2019, IEEE Standard Criteria for Combustion Turbine-Generator Units Applied as Standby Power Supplies for Nuclear Power Generating Stations.

This standard supplements IEEE Std 308™-1991, IEEE Standard Criteria for Class 1E Power Systems for Nuclear Power Generating Stations,[1] in that it amplifies 6.2.4 of that standard (Standby power supplies) concerning requirements for combustion turbine-generator units.

The IEEE has developed this standard to provide the principal design criteria, design features, qualification considerations, and testing requirements for individual combustion turbine-generator units, including auxiliary equipment and controls within the scope of this standard used in the standby power supply of a nuclear facility, which comply with the Nuclear Regulatory Commission's Code of Federal Regulations (10 CFR 50).

This standard presents specific procedures and criteria applicable to qualifying the combustion turbine-generator unit and supplements the criteria described in IEC/IEEE 60780-323, Nuclear Facilities—Electrical Equipment Important to Safety—Qualification, and IEEE Std 627™, IEEE Standard for Qualification of Equipment Used in Nuclear Facilities [B7].

Other industry standards exist or are being developed to cover topics related to this standard, including the International Organization for Standardization series standards[2] describing design requirements for combustion turbine-generator unit auxiliary systems.

Adherence to these criteria may not suffice for ensuring public health and safety because it is the integrated performance of the structures, the fluid systems, the instrumentation systems, and the electrical systems of the station that establishes the consequences of accidents. Each applicant has the responsibility to ensure that this integrated performance is adequate.

[1]Information on references can be found in Clause 2.
[2]ISO publications are available from the International Organization for Standardization (http://www.iso.ch/) and the American National Standards Institute (http://www.ansi.org/).

Contents

IEEE Standard Criteria for Combustion Turbine-Generator Units Applied as Standby Power Supplies for Nuclear Power Generating Stations

1. Overview

1.1 Scope

This standard describes the criteria for the application and testing of combustion turbine-generator units as Class 1E standby power supplies in nuclear power generating stations.

Figure 1 shows the boundaries of systems and equipment included in the scope of this standard. Site testing is covered in Clause 7, and the boundaries for site testing are given in 1.1.2.

1.1.1 Inclusions

The following items are within the scope of this standard:

a) The combustion turbine engine (i.e., turbine, compressor and combustion section), including
   1) The gearbox and coupling (if applicable)
   2) The combustion air system, starting at the engine air intake connection, including the effects of any remote air intake filter or silencer, or both
   3) The starting system
   4) The starting energy system
   5) The fuel oil system (e.g., including the day tank, filters, piping, pumps, valves and strainers between the day tank and the combustion turbine)
   6) The lubricating oil system
   7) The cooling system, starting at the point where the cooling medium is introduced to the combustion turbine-generating unit
   8) The exhaust system
   9) The speed control system

b) The generator, which includes the following:
   1) The excitation and voltage regulation system