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IEEE Standard for Qualification of Class 1E Transformers for Nuclear Power Generating Stations

IEEE Power and Energy Society

Sponsored by the
Transformers Committee

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New York, NY 10016-5997
USA

IEEE Std 638™-2013
(Revision of
IEEE Std 638-1992)

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Abstract: Procedures for demonstrating the adequacy of new Class 1E transformers, located in a mild environment of a nuclear power generating station, to perform their required safety functions under postulated service conditions are presented. Single- and three-phase transformers rated 601 V to 15 000 V for the highest voltage winding and up to 2500 kVA (self-cooled rating) are covered. Because of the conservative approach used in the development of this new standard for new transformers, the end-point criteria cannot be used for in-service transformers.

Keywords: Class 1E transformers, design qualification, IEEE 638™, seismic qualification

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Introduction

This introduction is not part of IEEE Std 638™-2013, IEEE Standard for Qualification of Class 1E Transformers for Nuclear Power Generating Stations.

This latest revision to the IEEE Std 638 is a revision of IEEE Std 638-1992 and is the result of a review of IEEE Std 638-1992 and present practices in Class 1E transformer qualification. This revision incorporates current practices and lessons learned from the implementation of previous versions of this standard by the industry.

IEEE Std 638™ was developed to provide specific methods and test procedures for the qualification of Class 1E transformers in accordance with IEEE Std 323™, which provides guidance for demonstrating and documenting the qualification of electrical equipment used in all Class 1E and interface systems.

This latest revision has clarified or updated a number of items, including removing references to old IEEE standards that are no longer in use today, incorporating the information from the 7 April 1999 Correction to IEEE 638-1992 into the body of the document, and updating certain aspects of the document to be more in line with the latest versions of the related transformer standards referenced in this document.

Additionally, the modern technique of frequency response analysis (FRA) was incorporated into the qualification tests to be performed as part of this standard. Performing the FRA tests before and after the short-circuit test and seismic test will provide better insight into the actual condition of the transformer after completion of these two significant tests, further improving the understanding of the tested transformer design's capability to withstand such events in operation.

Adherence to this document alone may not suffice for assuring public health and safety because it is the integrated performance of the structures, fluid systems, instrumentation systems, and electrical systems of the nuclear power generating station that establish safe operating conditions.

This standard was prepared by Working Group P638 of the Power Transformers Subcommittee of the Transformers Committee of the IEEE Power and Energy Society.

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1. Overview

1.1 Scope

This standard provides requirements to demonstrate the adequacy of new Class IE transformers, located in a mild environment of a nuclear power generating station as defined in IEEE Std 323™[1], to perform their required safety functions under postulated service conditions. This standard applies to single- and three-phase transformers rated 601 V to 15 000 V for the highest voltage winding and up to 2500 kVA (base rating).

1.2 Purpose

The purpose of this standard is to provide specific qualification procedures for Class lE transformers to demonstrate their capability to meet the requirements of IEEE Std 323. The transformer shall perform its intended function under all specified service conditions.

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

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