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IEEE Standard Requirements for Liquid-Immersed Distribution Substation Transformers

IEEE Power and Energy Society

Sponsored by the
Transformers Committee

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USA

IEEE Std C57.12.36™-2017
(Revision of
IEEE Std C57.12.36-2007)

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Approved 15 June 2017

IEEE-SA Standards Board

Abstract: Small power transformers have become a significant element in distribution systems supplying large commercial customers like major resort hotels and site-specific industrial customers that desire the local utility to own, operate, and maintain the serving transformer. These transformers can range in sizes from 112.5 kVA to 10 000 kVA with primary voltages at 69 000 V and below and secondary voltages from 34 500 V to 120 V. Transformers in this standard are generally for larger distribution customers often with special voltages or installation requirements like convention centers with large chiller plants and extensive exhibit space. There is often a desire to serve these transformers from underground systems using side-mounted bushings on the primary. This standard seeks to define the small power transformer that is applied as more than just a limited-scope version of the power transformers covered by IEEE Std C57.12.10™ and as more than a large distribution-class transformer covered by IEEE Std C57.12.34™.

Keywords: class I, distribution substation transformer, IEEE C57.12.36™, liquid-immersed, station type, transformer, unit substation

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PDF: ISBN 978-1-5044-4147-6 STD22660
Print: ISBN 978-1-5044-4148-3 STDPD22660

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Introduction

This introduction is not part of IEEE Std C57.12.36–2017, IEEE Standard Requirements for Liquid-Immersed Distribution Substation Transformers.

The conception of this standard was derived from the need to clarify the requirements for a unique class of transformer that was not adequately covered by existing standards for either pad-mounted distribution transformers or power transformers. The existing power transformers standard, IEEE Std C57.12.10™[1], covered ratings up to 100 000 kVA and 230 kV, which were far beyond the scope of this standard. This standard is a revision of IEEE Std C57.12.36–2007, and was generally revised to meet current style requirements.

The basis for the development of this standard started from IEEE Std C57.12.13™, NEMA standards 201 and 210[2] along with using sections from both the power transformer standard, IEEE Std C57.12.10, and the newly-developed three-phase pad-mount distribution transformer standard, IEEE Std C57.12.34™. In conjunction with the development of this distribution standard, it was agreed to with NESCOM that the scope of IEEE Std C57.12.10 would continue to cover a broad product range such that power transformers with these same ratings would still be covered. This approach was taken to avoid creating a hole in the standards where small power transformers (e.g., rated 5 MVA with a 25 kV high voltage) would no longer be covered.

During the development of this standard, there was a desire to include equipment coordination information for bushings and interface enclosures that would be useful when the transformer is directly connected to switchgear. Due to the variety of standards currently in place with existing switchgear manufactures, it was not possible to come to a consensus on what should or could be a transformer standard at this point in time. Instead, an informative annex was created to provide the users of this standard some options for equipment coordination.

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[2]NEMA publications are available from the National Electrical Manufacturers Association (http://www.nema.org/).

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1. Overview

1.1 Introduction

This standard sets forth the requirements for indoor/outdoor distribution substation transformer application that is not covered by ANSI/IEEE distribution and power transformer standards. This standard is intended for use as a basis for performance and interchangeability as well as to assist in the proper selection of such equipment.

1.2 Scope

This standard covers certain electrical, dimensional, and mechanical characteristics of 50 Hz and 60 Hz, two winding, liquid-immersed distribution substation transformers. Such transformers may be remotely or integrally associated with either primary and secondary switchgear or substations, or both, for step-down or step-up purposes rated as follows:

a) 112.5 kVA through 10 000 kVA three-phase

b) 250 kVA through 6667 kVA single-phase

c) High voltage 69 000 V and below, and low voltage 34 500 V and below

It is not intended that this standard shall apply to dry-type, regulating, pad-mounted, secondary-network, furnace, rectifier, mobile, railway, or mine transformers.

1.3 Mandatory requirements

When this standard is used on a mandatory basis, the words *shall* and *must* indicate mandatory requirements, and the words *should* and *may* refer to matters that are recommended and permitted, respectively, but not mandatory.