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IEEE Standard for Submersible Single-Phase Transformers: 250 kVA and Smaller; High Voltage 34 500 GrdY/19 920 V and Below; Low Voltage 600 V and Below

IEEE Power and Energy Society

Developed by the
Transformers Committee

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IEEE Std C57.12.23™-2018
(Revision of
IEEE Std C57.12.23-2009)

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Abstract: Electrical, dimensional, and mechanical characteristics and certain safety features of single-phase, 60 Hz, liquid-immersed, self-cooled, submersible distribution transformers are covered in this standard. This standard is intended for use as a basis for establishing the performance, electrical and mechanical interchangeability, and safety of the equipment covered, and to assist in the proper selection of such equipment.

Keywords: distribution transformer, IEEE C57.12.23™, liquid immersed, self-cooled, single-phase, submersible, subsurface, transformer, underground

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Introduction

This introduction is not part of IEEE Std C57.12.23-2018, IEEE Standard for Submersible Single-Phase Transformers: 250 kVA and Smaller; High Voltage 34 500 GrdY/19 920 V and Below; Low Voltage 600 V and Below.

This standard covers certain electrical, dimensional, and mechanical characteristics and takes into consideration certain safety features of single-phase, 60 Hz, mineral oil immersed, self-cooled, underground distribution transformers with separable insulated high voltage connectors. These transformers are generally used for step-down purposes from an underground primary cable supply and are suitable for occasional submerged operation. This standard is intended for use as a basis for determining performance, interchangeability, and safety of the equipment covered, and to assist in the proper selection of such equipment.

The 1986 revision to the standard expanded the scope to include 167 kVA. In addition, the dielectric test levels were updated and maximum test levels introduced to be consistent with other transformer standards.

The 1992 revision to the standard added the clause on storage and installation with particular emphasis on the position when stored and consideration of the angle of tilt when installed. This revision was re-affirmed in 1999.

The 2002 revision further expands the scope to include all high voltage ratings 25 000 V and below, including transformers designed for phase-to-phase connection. Previous revisions only included transformers designed for phase to ground connection. Also, the scope was expanded to include low voltage ratings 600 V and below. Previous revisions only covered a 240/120 V rating.

The 2002 revision is the first standard in the IEEE C57.12.2X series to use the SI units of measure exclusively. The intent of this revision is to simply convert the in-lb units of the 1992 revision to SI units. Users of this standard should use judgement when converting from SI units back to the in-lb equivalent.

The 2009 revision changes the title of the document from "Underground" to "Submersible" transformers to highlight that these transformers are suitable for continuous submerged operation. This revision also includes the English units of measure along with the SI units.

The 2019 revision expands the scope to include 250 kVA and 34 500 GrdY/19 920 V transformers. This revision also includes the addition of minimum impedance, tank material and minimum metal thickness and low voltage terminal threaded stud size.

Contents

IEEE Standard for Submersible Single-Phase Transformers: 250 kVA and Smaller; High Voltage 34 500 GrdY/19 920 V and Below; Low Voltage 600 V and Below

1. Overview

1.1 Scope

This standard covers certain electrical, dimensional, and mechanical characteristics and takes into consideration certain safety features of single-phase, 60 Hz, liquid-immersed, self-cooled, submersible distribution transformers with separable insulated high-voltage connectors. These transformers are rated 250 kVA and smaller, with high voltages of 34 500 GrdY/19 920 V and below and with low voltages of 600 V and below. These transformers are generally used for step-down purposes from an underground primary cable supply. These transformers are typically installed in an enclosure below ground level, operated from above and suitable for continuous submerged operation.

1.2 Purpose

This standard is intended for use as a basis for determining performance, interchangeability, and safety of the equipment covered, and to assist in the proper selection of such equipment.

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 explained). For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments or corrigenda) applies.

ANSI/NEMA WC 70/ICEA S-95-658, Power Cables Rated 2,000 V or Less for the Distribution of Electrical Energy.[1]

IEEE Std 386™, IEEE Standard for Separable Insulated Connector Systems for Power Distribution Systems Rated 2.5 kV through 35 kV.[2,3]

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