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IEEE Standard Requirements for Liquid-Immersed Power Transformers

IEEE Power and Energy Society

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Transformers Committee

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IEEE Std C57.12.10™-2017
(Revision of IEEE Std C57.12.10-2010)

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IEEE-SA Standards Board

Abstract: This voluntary consensus standard sets forth the requirements for power transformer application. This standard is intended to be used as a basis for performance, interchangeability, and safety of the equipment covered, and to assist in the proper selection of such equipment. This document is a product standard that covers certain electrical, dimensional, and mechanical characteristics of 50 Hz and 60 Hz, liquid-immersed power transformers and autotransformers. Such power transformers may be remotely or integrally associated with either primary switchgear or substations, or both, for step-down or step-up purposes and base rated as follows: 833 kVA and above single-phase, 750 kVA and above three-phase.This standard applies to all liquid-immersed power transformers and autotransformers that do not belong to the following types of apparatus: instrument transformers, step voltage and induction voltage regulators, arc-furnace transformers, rectifier transformers, specialty transformers, grounding transformers, mobile transformers, and mine transformers.

Keywords: dimensional characteristics, electrical characteristics, IEEE C57.12.10, jacking, lifting, mechanical characteristics, on-load tap changer, power transformer, single-phase, three-phase

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Introduction

This introduction is not part of IEEE Std C57.12.10™-2017, IEEE Standard Requirements for Liquid-Immersed Power Transformers.

This document is a voluntary consensus standard. Its use may become mandatory only when required by a duly constituted legal authority or when specified in a contractual relationship. To meet specialized needs and to allow for innovation, specific changes are permissible when mutually determined by the user and the manufacturer, provided that such changes do not violate existing laws and are considered technically adequate for the function intended.

When this standard is used on a mandatory basis, the words shall and must indicate requirements which are mandatory; the words should and may refer to matters which are recommended or permissive, but are not considered mandatory.

This standard is a revision of IEEE Std C57.12.10™-2010, IEEE Standard Requirements for Liquid-Immersed Power Transformers. It has been prepared by the C57.12.10 Requirements for Liquid-Immersed Power Transformers Working Group of the Power Transformers Subcommittee of the Transformers Committee of the IEEE Power and Energy Society. The Purpose of this standard is to cover the dimensional, electrical, and mechanical characteristics for liquid-immersed power transformers and autotransformers.

The majority of the changes to this document are editorial in nature to improve clarity, to correct errors in previous revisions, and to update some of the references to other standards. The following is a summary of the more significant changes that were incorporated into this revision of the standard:

a) The acronym to be used for load tap changer has been changed from LTC to OLTC and added to the list of definitions to conform to other recently published IEEE Standards.

b) The following standards were added to the list of normative references:

   1) EN10226–1

   2) IEC 60225-26

   3) IEEE C37.90.2™

   4) IEEE C37.90.3™

   5) IEEE C57.143™

   6) IEEE C57.148™

   7) ISO 6708

c) Standard IEEE Std C57.12.70™ was removed from the list of normative references.

d) The publication date was removed from standard IEC 60038 in the normative reference list.

e) The terminology used to describe the transformer's load rating was changed to rated power because the term kilovoltampere (kVA) is actually a unit of measure.

f) Typical transformer kVA ratings listed in Table 2 were expanded to include 2nd stage cooling for single-phase and rated base kVA rated power to 33 333 kVA single-phase; 100 000 kVA three-phase.

g) The top-insulating liquid temperature-range limits clause was deleted.

h) Table 4 list of standard and optional accessories and construction features was revised and Table 5 listing standard and optional accessories for insulating liquid preservation systems was added.

i) The accessory requirements were revised, where applicable, to provide a standard when a metric installation is desired.

j) Further clarification of the requirements for the lifting, moving, and jacking facilities are provided on transformers.

k) Additional details are provided on the application of gas accumulation and Buchholtz relays.

l) A requirement was added that provisions for future bushing current transformers are to be provided when transformers are not equipped with bushing current transformers.

m) Informative section on transformer paralleling methods and control was removed from Annex A.

n) The following reference sources were added to the bibliography (Annex B):

   1) IEEE Std C57.12.70™

   2) IEEE Std C57.153™

   3) On-Load Tap Changers for Power Transformers by A. Krämer

   4) Platts and Hansen, TechCon North America 2017 in Houston, Texas, February 14 – 16, 2017

o) Throughout this standard the term “liquid-filled” is replaced with “liquid-immersed,” and “oil” and “fluid” are replaced with “insulating liquid.”

p) Combination drain and lower filter valve were changed to require a globe valve.

The technical revisions to the individual clauses were prepared by various Task Forces from within this Working Group and were presented to this Working Group for comments according to applicable rules and procedures of the Transformer Committee Policies and Procedures Manual.

Contents

IEEE Standard Requirements for Liquid-Immersed Power Transformers

1. Overview

1.1 Scope

This voluntary consensus standard sets forth the requirements for power transformer application. This standard is intended to be used as a basis for performance, interchangeability, and safety of the equipment covered, and to assist in the proper selection of such equipment.

This document is a product standard that covers certain electrical, dimensional, and mechanical characteristics of 50 Hz and 60 Hz, liquid-immersed power transformers and autotransformers. Such power transformers may be remotely or integrally associated with either primary switchgear or substations, or both, for step-down or step-up purposes and base rated as follows: 833 kVA and above single-phase, 750 kVA and above three-phase.

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a) Instrument transformers
b) Step voltage and induction voltage regulators
c) Arc-furnace transformers
d) Rectifier transformers
e) Specialty transformers
f) Grounding transformers
g) Mobile transformers
h) Mine transformers

1.2 Purpose

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

NOTE—The introduction of this standard describes the circumstances under which the document may be used on a mandatory basis.[1]

[1]Notes in text, tables, and figures of a standard are given for information only and do not contain requirements needed to implement the standard.