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IEEE Standard Requirements for Liquid-Immersed Power Transformers

IEEE Power & Energy Society

Sponsored by the
Transformers Committee

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Abstract: This 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: autotransformer, dimensional characteristics, electrical characteristics, load tap changer, mechanical characteristics, power transformer, single-phase, three-phase

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Introduction

This introduction is not part of IEEE Std C57.12.10-2010, IEEE Standard Requirements for Liquid-Immersed Power Transformers.

This standard was prepared by the Revision of C57.12.10 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.

This standard is a revision of ANSI C57.12.10-1997, American National Standard for Transformers—230 kV and Below 833/958 through 8333/10 417 kVA, Single-Phase, and 750/862 through 60 000/80 000/100 000 kVA, Three-Phase Without Load Tap Changing; and 3750/4687 through 60 000/80 000/100 000 kVA with Load Tap Changing—Safety Requirements.

The focus of this revision was to expand the scope of the standard and to include the requirements for power transformers and autotransformers with high voltage up to 765 kV and with no limit on the megavoltampere rating.

This revised standard includes the following significant changes:

- The title was changed.
- The scope was expanded to include autotransformers, increase the upper voltage limit to 765 kV, and remove the maximum megavoltampere limit.
- Distribution substation transformers, as defined in IEEE Std C57.12.36™ [B1],[a] were excluded from this standard.
- Most of the clauses were revised, rewritten, or rearranged.
- Significant changes were made in the load tap changer (LTC) section. Additional requirements for transformer paralleling operation were added.
- An informative annex on LTC considerations was added.

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

[a] The numbers in brackets correspond to the numbers in the bibliography in Annex B.

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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.

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This standard applies to all liquid-immersed power transformers and autotransformers that do *not* belong to the following types of apparatus:

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 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.

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

2. Normative references

The following referenced documents are indispensable for the application of this document (i.e., they must be understood and used; therefore, 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 referenced, the latest edition of the referenced document (including any amendments or corrigenda) applies.

ANSI C84.1, American National Standard for Electric Power Systems and Equipment—Voltage Ratings (60 Hertz).[2]

ASME B1.1, American National Standard for Unified Inch Screw Threads (UN and UNR Thread Form).[3]

ASME B1.20.1, American National Standard for Pipe Threads, General Purpose, Inch.

IEC 60038:2009, IEC standard voltages, ed7.0.[4]

IEEE Std C37.90.1™, IEEE Standard for Surge Withstand Capability (SWC) Tests for Relays and Relay Systems Associated with Electric Power Apparatus.[5, 6]

IEEE Std C57.12.00™, IEEE Standard General Requirements for Liquid-Immersed Distribution, Power and Regulating Transformers.

IEEE Std C57.12.70™, IEEE Standard Terminal Markings and Connections for Distribution and Power Transformers.

IEEE Std C57.12.80™, IEEE Standard Terminology for Power and Distribution Transformers.

IEEE Std C57.13™, IEEE Standard Requirements for Instrument Transformers.

[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.
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