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IEEE Standard for General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers

IEEE Power and Energy Society

Sponsored by the
Transformers Committee

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USA

IEEE Std C57.12.00™-2015
(Revision of
IEEE Std C57.12.00-2010)

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IEEE Standard for General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers

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IEEE-SA Standards Board

Abstract: Electrical and mechanical requirements for liquid-immersed distribution and power transformers, and autotransformers and regulating transformers; single-phase and polyphase, with voltages of 601 V or higher in the highest voltage winding, are set forth. This standard is a basis for the establishment of performance, and limited electrical and mechanical interchangeability requirements of equipment are described; it is also a basis for assistance in the proper selection of such equipment. The requirements in this standard apply to all liquid-immersed distribution, power, and regulating transformers except the following: instrument transformers, step voltage and induction voltage regulators, arc furnace transformers, rectifier transformers, specialty transformers, grounding transformers, mobile transformers, and mine transformers.

Keywords: autotransformers, distribution transformers, electrical requirements, IEEE C57.12.00™, mechanical requirements, power transformers, regulating transformers

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Introduction

This introduction is not part of IEEE Std C57.12.00™-2015, IEEE Standard for General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers.

This standard 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 agreement. To meet specialized needs and to allow for innovation, specific changes are permissible when mutually determined by the user and the manufacturer, provided these changes do not violate existing laws and are considered technically adequate for the function intended.

Where applicable, editorial changes have been incorporated into this revision. Sentence structure and punctuation have been edited to improve clarity and conciseness. Also, editorial changes have been made to conform to the *2014 IEEE-SA Standards Style Manual.*[1] Some changes have also been made to correct errors in previous revisions. When applicable, references to other standards have been updated.

A summary of the major changes is listed in sequential order, as follows:

a) A note was added to 4.1.6.1, further clarifying the overvoltage requirements for generator step-up and system tie transformers.

b) What was formerly Table 2 for cooling class designations has been moved to Annex A in this revision to be retained for historical purposes. Accordingly, all the remaining tables in the standard have been renumbered, and all annexes relabeled.

c) Subclauses 5.8, 5.9, 7.4, 8.4, and 8.7 have been revised to adopt a standard definition for reference temperature.

d) The definitions for Class I and Class II power transformers have been revised in 5.10.

e) Changes to the neutral BIL level for Class I power transformers have been implemented in Table 3, columns 10 and 11.

f) Numerous changes have been made to the insulation levels specified in Table 4, and a new Note 7 was added.

g) Subclause 5.10.5.5 was revised to remove the statement “except 69 kV and below do not follow this formula.” This statement was also removed from Note 2 in Table 4.

h) Subclause 5.10.7.2, 3rd paragraph, has been revised to read “…high-voltage terminals result in a voltage on another winding *lower* than the BSL requirements….”

i) New 5.11.1.2 has been added.

j) A statement has been added in 5.11.1.4 to specify a core hot spot temperature and to explain the rationale for this limit. Also, a statement has been inserted defining excessive temperature rise.

k) References to ANSI standards have been replaced with IEEE references where applicable. This affected footnote a, in Table 10, Table 11, and Table 12.

l) Table 14 on short-circuit apparent power of the system to be used unless otherwise specified has been completely revised.

m) Constants specified for Equation (10) in 7.4 were found to contain a metric conversion error since the 2006 publication, and have been revised accordingly.

[1] Available at https://development.standards.ieee.org/myproject/Public/mytools/draft/styleman.pdf.

n) Table 17 has been revised to expound upon the audible sound level test and to reference the new Annex C. Also, the following tests were changed from “Other” to “Routine” for Class I power transformers: winding insulation resistance, core insulation resistance, insulation power factor and capacitance, and low-frequency test on auxiliary devices and control and current transformer circuits.

o) A new requirement to record on the certified test report the winding resistance of tertiary windings when two external terminals are available was added in 8.7 c2).

p) A new statement was added to 9.1 to clarify ratio tolerances on reactance type tap changers when in the bridging position.

q) Annex A on cooling class designations has been added.

r) What was formerly Annex A is now Annex B. This informative annex on front-of-wave test levels has been revised and expanded.

s) A new Annex C on reference sound power levels has been added.

t) Annex D (Bibliography), formerly Annex B, has been updated.

Revisions of individual clauses (now modified) were prepared by separate groups within the Transformers Committee. Those clauses were balloted independently in the Working Groups, according to applicable rules and procedures of the Transformers Committee P&P Manual.

Suggestions for improvement resulting from use of this standard will be welcomed.

Contents

IEEE Standard for General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers

1. Overview

1.1 Scope

This standard describes electrical and mechanical requirements of liquid-immersed distribution and power transformers, and autotransformers and regulating transformers, single-phase and polyphase, with voltages of 601 V or higher in the highest voltage winding.

This standard applies to all liquid-immersed distribution, power, and regulating transformers 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