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IEEE Standard Test Code for Liquid-Immersed Distribution, Power, and Regulating Transformers

IEEE Power and Energy Society

Developed by the
Transformers Committee

IEEE Std C57.12.90™-2021
(Revision of IEEE Std C57.12.90-2015)

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Approved 9 November 2021

IEEE SA Standards Board

Abstract: Methods for performing tests specified in IEEE Std C57.12.00™ and other standards applicable to liquid-immersed distribution, power, and regulating transformers are described. Instrument transformers, step-voltage and induction voltage regulators, arc furnace transformers, rectifier transformers, specialty transformers, grounding transformers, and mine transformers are excluded. Resistance measurements, polarity and phase-relation tests, ratio tests, no-load loss and excitation current measurements, impedance and load loss measurements, dielectric tests, temperature tests, short-circuit tests, audible sound level measurements, and calculated data are covered in this standard.

Keywords: IEEE C57.12.90™, tests, transformer tests, transformers

The Institute of Electrical and Electronics Engineers, Inc.
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PDF: ISBN 978-1-5044-8151-9 STD25077
Print: ISBN 978-1-5044-8152-6 STDPD25077

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Introduction

This introduction is not part of IEEE Std C57.12.90-2021, IEEE Standard Test Code for Liquid-Immersed Distribution, Power, and Regulating Transformers.

This standard is one document within the IEEE C57 series of documents, applicable to transformers and associated equipment. It covers "Test Code," which specifies the test procedure to be followed. The requirements and applicability of the tests are covered in other documents, such as IEEE Std C57.12.00™.[1]

This standard is on a continuous revision cycle and is constantly being reviewed and updated. It has been revised and republished in years 2015, 2010, 2006, 1999, 1993, 1987, and earlier. For information on select activities and to participate in upcoming projects, go to http://www.transformerscommittee.org. The following is a brief summary of the technical changes in this revision, from 2015 to 2020:

— Implemented corrigendum IEEE C57.12.90™-2015/Cor 1-2017, to correct an editorial mistake of the constant k in the definitions for Equation (2) in 8.3, and in 10.8.2, the terminal voltage was changed from 115 kV to 69 kV to reflect the new definition (in 2015) of Class II transformers.

— Subclause 5.4.1. Added requirement for line-to-ground resistance measurement on wye windings.

— Subclause 9.3.1. Added text for an alternative method for measuring load loss and impedance, and a new Figure 19. All figures after this in the document are renumbered accordingly.

— Subclause 10.2.4. Added text regarding tap connection during switching impulse test.

— Subclause 10.3.1 and 10.3.1.1. Added text regarding impulse waveshape and front-time of full wave.

— Subclause 10.3.1.3. Added text regarding steepness of voltage collapse for chopped-wave test.

— Subclause 10.3.2.1. Added text regarding connection of tertiary terminals during impulse test.

— Subclause 10.7.7. Inserted a new procedure for a special induced test to detect improper core grounding of wound cores, for distribution transformers and Class I power transformers. This is to coincide with a new requirement in IEEE Std C57.12.00-2021, Subclause 6.7.2.1 and Table 17.

— Subclause 10.8.1. Added text regarding tap connection during induced voltage test. Also, added Annex D with more information on this subject. The plan is to transfer the annex and possibly parts of the subclause text into a future guide on low-frequency testing, currently in development.

— Subclause 10.8.2. Added requirement that overpressure is not allowed during induced test.

— Subclause 10.8.5. Decreased partial discharge failure detection limits: 500 pC to 250 pC; 150 pC to 50 pC.

— Subclause 11.1.2.2e). Added text to allow subsequent gradient runs of 30 min, instead of 60 min.

— Subclause 11.4.3. Change (editorial) from 3280 ft to 3300 ft as 1000 m equivalent. This is to coordinate with altitude corrections used here and in other IEEE documents such as IEEE Std C57.12.00 and IEEE Std C57.91™.

Technical revisions were prepared by various groups (TF, WG, SC) within the IEEE PES Transformers Committee and have been surveyed and approved by these groups up through the subcommittee level, in accordance with the procedure manual.

[1] Information on references can be found in Clause 2.

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