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IEEE Standard for Standard Terminal Markings and Connections for Distribution and Power Transformers

STANDARDS

IEEE Power and Energy Society

Developed by the
Transformers Committee

IEEE Std C57.12.70™-2020
(Revision of IEEE Std C57.12.70-2011

IEEE

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IEEE Standard for Standard Terminal Markings and Connections for Distribution and Power Transformers

Sponsor

Transformers Committee
of the
IEEE Power and Energy Society

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Abstract: Standard terminal markings and connections are described for single-phase and three phase distribution, power, and regulating transformers. For terminal markings, it covers sequence designation, external terminal designation, neutral terminal designation, grounded terminal designation, and marking of full and tap winding terminals. Additive and subtractive polarity and parallel transformer operation are described. Connections of single-phase transformers in various configurations and angular displacement of three-phase transformers to connect to various system phase displacements are covered.

Keywords: IEEE C57.12.70™, transformer connection, transformer terminals, transformer polarity

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Introduction

This introduction is not part of IEEE Std C57.12.70-2020, IEEE Standard for Standard Terminal Markings and Connections for Distribution and Power Transformers.

In 1964, the first version of this standard was prepared. It replaced the material that originally appeared in a separate section of Part O of NEMA TR 1-1962, Transformers, Regulators, and Reactors. Moreover, it was intended that this standard would supersede the terminal markings and connections provided in ASA C6.1-1956, Standard Terminal Markings for Electric Apparatus.

After reaffirmation of this standard in 1971, it was revised and published as IEEE Std C57.12.70-1978. Significant revisions to this edition involved utilizing modern terminology, addition of zigzag phasor diagrams, inclusion of figures showing additional grounding connections, addition of figures showing "standard" and "reverse" arrangement commonly used in unit substations, and inclusion of a new "preferred" connection arrangement for three-phase delta-connected windings with a mid-tap in one winding.

In 2000, the standard was again revised as IEEE Std C57.12.70-2000 (Reaff 2006). The primary intent of that revision was to update the standard to comply with the approved style of currently published standards, to update reference standards, and to add terminal markings for pad-mounted compartmental transformers.

In 2011, the standard was again revised to update the references. Also an informative Annex A, Winding Connections Details and Explanations was added to introduce the clock face notation method for the transformer winding connection symbols. This is similar to the IEC method outlined in IEC 60076-1. A bibliography has been added in Informative Annex B. Further, the standard has again been updated to match current Style Guide requirements, text was generally revised, and many figures have been redrawn to improve clarity.

In this version of the standard, the references have again been updated. The informative Annex A was revised to address several errors that were introduced in the 2011 version of the standard. Most of the content from Clause 8 of the previous version of the standard was moved into new subclause 7.1.3 which introduces the concept of designations for angular displacement. Subclause 7.1.3 also introduces the requirement for adding the phasor group designation for three-phase transformers to the transformer nameplate.

Contents

IEEE Standard for Standard Terminal Markings and Connections for Distribution and Power Transformers

1. Overview

1.1 Scope

This standard defines the terminal markings and connections for distribution, power, and regulating transformers covered in the IEEE C57™ series of standards, guides, and recommended practices.

1.2 Purpose

The standard provides a consistent method for terminal markings and connections for single-phase and three-phase distribution, power, and regulating transformers. It designates terminal markings for interchangeability showing the sequence, external terminations, neutral terminations, grounded terminations, and marking of full and tap winding terminations. It also puts forth the connections of single-phase transformers in various configurations and describes the angular displacement of three-phase transformers when connected to various system phase displacements.

1.3 Word usage

The word *shall* indicates mandatory requirements strictly to be followed in order to conform to the standard and from which no deviation is permitted (*shall* equals is *required to*).[1,2]

The word *should* indicates that among several possibilities one is recommended as particularly suitable, without mentioning or excluding others; or that a certain course of action is preferred but not necessarily required (*should* equals is *recommended that*).

[1] The use of the word *must* is deprecated and cannot be used when stating mandatory requirements, *must* is used only to describe unavoidable situations.
[2] The use of *will* is deprecated and cannot be used when stating mandatory requirements, *will* is only used in statements of fact.