

IEEE Standard for Control Cabinets for Power Transformers

IEEE Power & Energy Society

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Transformers Committee

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IEEE Standard for Control Cabinets for Power Transformers

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Abstract: Requirements for the design and construction of control cabinets on power transformers.

Keywords: cabinet, circuit, component, construction, control cabinet, controls, current transformer, design, IEEE C57.148, layout, manufacture

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Introduction

This introduction is not part of IEEE Std C57.148-2011, IEEE Standard for Control Cabinets for Power Transformers.

This standard is intended to provide requirements for the design and manufacture of control cabinets for Class I and Class II power transformers. The standard also contains options to cover the various types of components that could be provided, the various types of cooling classes that may be employed, and the various site-specific or user-specified requirements that may exist for the transformer.

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1. Overview

1.1 Scope

This standard will provide minimum and optional function, layout, and construction requirements for standard control cabinet designs. It will also include a coding system for specifying standard control cabinets with the required options. This standard will apply to Class 1 and Class 2 power transformers and will not apply to distribution or padmount design transformers.

1.2 Purpose

This document will provide users and manufacturers with a set of standard designs that can be easily specified. The document should greatly reduce the engineering time required by manufacturers to create and by users to review control cabinet designs.

2. Normative references

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

ANSI/ASME B1.1, Unified Inch Screw Threads (UN and UNR Thread Form).¹

ANSI Z55.1, Gray Finishes for Industrial Apparatus and Equipment (R1973).²

DIN EN 50022, Specification for low voltage switchgear and control-gear for industrial use. Mounting rails. Top hat rails 35 mm wide for snap-on mounting of equipment.

IEC Publication 60529, Classification of Degrees of Protection Provided by Enclosures.³

IEEE Std C37.2™, IEEE Standard for Electrical Power System Device Function Numbers, Acronyms, and Contact Designations.^{4,5}

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

IEEE Std C57.12.10™, IEEE Standard Requirements for Liquid-Immersed Power Transformers.

ISO 262, ISO General purpose metric screw threads — Selected sizes for screws, bolts, and nuts.⁶

NEMA 250, Enclosures for Electrical Equipment (1000 Volts Maximum).⁷

NFPA 70, National Electrical Code® (NEC®).⁸

3. Definitions, acronyms, and abbreviations

3.1 Definitions

For the purposes of this document, the following terms and definitions apply. The *IEEE Standards Dictionary: Glossary of Terms & Definitions* should be consulted for terms not defined in this clause.⁹

control cabinet: The primary cabinet(s) on a Class I or Class II transformer that contains the control panels for relay, metering, alarms, cooling controls, auxiliary power, and related circuits for user connection to the related systems in the substation.

control cabinet designer: The engineer or designer responsible for designing the layout and circuitry in the control cabinet.

DIN rail: A standard 35-mm-wide metal rail used to mount terminals, circuit breakers, and other types of devices (as specified in DIN EN 50022).

¹ASME publications are available from the American Society of Mechanical Engineers, <http://www.asme.org/>.

²ANSI Z55.1 (R1973) has been withdrawn; however, copies can be obtained from the Sales Department, American National Standards Institute, <http://www.ansi.org/>.

³This IEC publication is available from <http://standards.ieee.org/store>.

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⁹The *IEEE Standards Dictionary: Glossary of Terms & Definitions* is available at <http://shop.ieee.org/>.

fluorinated ethylene propylene (FEP): A compound used for wire and cable insulation and jackets.

ground fault interrupter (GFI): A device commonly used for protection of personnel or some circuits by fast tripping for differential current in the neutral and phase wires of a circuit.

machine tool wire: A flexible, stranded wire with a polyvinylchloride (PVC) insulation and jacket compound.

manufacturer: The organization that constructs or supplies the device or equipment.

piano hinge: A long hinge with one continuous pin, attached along the full available lengths of a door and frame. Also referred to as a continuous hinge.

positive temperature coefficient (PTC) heater: A type of heater that provides self-regulating temperature control resulting from the thermal-resistive properties of the ceramic materials used for the heating elements.

supplier: Refers to the transformer manufacturer when the control cabinet has been ordered by the transformer manufacturer, or refers to the control cabinet manufacturer when the control cabinet has been ordered directly from the control cabinet manufacturer by the user.

switchboard wire: A flexible, stranded, tin-coated wire, with a cross-linked polyethylene insulation and jacket compound.

user: The organization, or representative of the organization, who specifies and orders the purchase of the transformer and/or control cabinet and will own and operate the transformer and/or control cabinet when it is received and placed in service. As used in the introductory sections before the Contents, the term refers to the user of this standard.

wire raceway: A channel, with or without a cover, designed to contain and route wires and cables adjacent to terminal blocks and other devices.

3.2 Acronyms and abbreviations

AWG	American Wire Gauge
CT	current transformer
DIN	Deutsches Institut für Normung e.V. (German Institute for Standardization)
ETFE	ethylene-tetrafluoroethylene
FEP	fluorinated ethylene propylene
GFI	ground fault interrupter
MTW	machine tool wire
OEM	original equipment manufacturer
ODAF	oil directed air forced
OFAF	oil forced air forced
ONAF	oil natural air forced
ONAN	oil natural air natural
SIS	switchboard wire
XLP	cross-linked polyethylene