



# IEEE Standard for Submersible, Three-Phase Transformers, 3750 kVA and Smaller: High Voltage, 34 500 GrdY/19 920 Volts and Below, Low Voltage, 600 Volts and Below

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**IEEE Power & Energy Society**

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Transformers Committee

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**IEEE Standard for Submersible,  
Three-Phase Transformers, 3750 kVA  
and Smaller: High Voltage, 34 500  
GrdY/19 920 Volts and Below; Low  
Voltage, 600 Volts and Below**

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**Transformers Committee  
of the  
IEEE Power & Energy Society**

Approved 17 June 2009

**IEEE-SA Standards Board**

**Abstract:** This standard is intended for use as a basis for establishing the performance, electrical and mechanical interchangeability, and safety of the equipment covered, and to assist in the proper selection of such equipment.

**Keywords:** copper-bearing steel, impedance, submersible, tank, tap charger, temperature, three-phase, transformer

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This standard was originally a NEMA/ANSI standard last published as ANSI C57.12.24-2000. There were a number of technical omissions in that publication. This publication adds to those technical requirements and now publishes the standard as an IEEE document.

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### Giuseppe Termini *Chair*

Ignacio Ares  
Israel Barrientos-Torres  
Dave Blew  
Paul Buchanan  
Jerry Corkran  
Joseph Cultrera  
Don Duckett  
Rich Graham  
Robert Grunert

Mike Hardin  
Mohammed Hussain  
Alan Kasanow  
Gary King  
Brian Klappmeyer  
Dennis Lee  
Larry Lowdermilk  
Gene Miler  
John Moffat

Dan Mulkey  
Carl Niemann  
Alfonso Nelson  
Ken Romano  
Dinesh Sankarakurup  
Christopher Sullivan  
John Sullivan  
Steve Snyder  
Alan Traut

The following members of the individual balloting committee voted on this standard. Balloters may have voted for approval, disapproval, or abstention.

William J. Ackerman  
Samuel H. Aguirre  
William Bartley  
Steven Bezner  
Wallace Binder  
David Blew  
Chris Brooks  
Paul Buchanan  
Thomas Callsen  
Yunxiang Chen  
Bill Chiu  
Tommy Cooper  
Jerry Corkran  
Gary Engmann  
Marcel Fortin  
Jalal Gohari  
James Graham  
Randall Groves  
Bal K. Gupta  
Ajit Gwal

Kenneth Hanus  
Michael Hardin  
Jeffrey Hartenberger  
Gary Heuston  
James Huddleston, III  
Gary King  
Brian Klaponski  
Joseph L. Koepfinger  
Jim Kulchisky  
Chung-Yiu Lam  
Deni Lee  
G. Luri  
John W. Matthews  
Daniel Mulkey  
Michael S. Newman  
Carl Niemann  
Robert Olen  
Alvaro Portillo  
Iulian Profir  
Peter G. Risse  
Charles Rogers

Ken Ramano  
Dinesh Pranathy Sankarakurup  
Bartien Sayogo  
Hyeong Sim  
Charles Simmons  
James E. Smith  
Jerry Smith  
Steve Snyder  
John Sullivan  
David Tepen  
Giuseppe Termini  
Alan Traut  
Joseph Tumidajski  
Joe Uchiyama  
John Vergis  
Jane Verner  
Alan Wilks  
James Wilson  
William Wimmer  
Daniel Zipse

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Young Kyun Kim  
Joseph L. Koepfinger\*  
John Kulick

David J. Law  
Ted Olsen  
Glenn Parsons  
Ronald C. Petersen  
Narayanan Ramachandran  
Jon Walter Rosdahl  
Sam Sciacca

\*Member Emeritus

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Satish K. Aggarwal, *NRC Representative*

Michelle Turner  
*IEEE Standards Program Manager, Document Development*

Matthew Ceglia  
*IEEE Standards Program Manager, Technical Program Development*

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## 1. Overview

### 1.1 Scope

This standard covers certain electrical, dimensional, and mechanical characteristics and takes into consideration certain safety features of three-phase, 60 Hz, liquid-immersed, self-cooled, submersible transformers with separable insulated high-voltage connectors. These transformers are rated 3750 kVA and smaller with high voltages of 34 500 GrdY/19 920 V and below and with low voltages of 600 V and below. These transformers are generally used for step-down purposes from an underground primary cable supply. These transformers are typically installed in an enclosure below ground level, operated from above and suitable for continuous submerged operation.

### 1.2 Purpose

This standard is intended for use as a basis for establishing the performance, electrical and mechanical interchangeability, and safety of the equipment covered, and to assist in the proper selection of such equipment.

## 2. Normative references

The following referenced documents are indispensable for the application of this standard (i.e., they must be understood and used, so each referenced document is cited in text and its relationship to this standard 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.

IEEE Std 386™-2006, IEEE Standard for Separable Insulated Connector Systems for Power Distribution Systems Above 600 V.<sup>1, 2</sup>

IEEE Std C57.12.00™-2006, IEEE Standard for Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers.

IEEE Std C57.12.20™-2005, IEEE Standard For Overhead -Type Distribution Transformers, 500 kVA and Smaller: High Voltage, 34 500 V and Below; Low Voltage, 7970/13 800Y V and Below.

IEEE Std C57.12.32™-2002, IEEE Standard for Submersible Equipment–Enclosure Integrity.

IEEE Std C57.12.70™-2000, IEEE Standard Terminal Markings and Connections for Distribution and Power Transformers.

IEEE Std C57.12.80™-2002, IEEE Standard Terminology for Power and Distribution Transformers.

IEEE Std C57.12.90™-2006, IEEE Standard Test Code for Liquid-Immersed Distribution, Power, and Regulating Transformers.

IEEE Std C57.91™-1995, IEEE Standard Test Code for Dry-Type Distribution and Power Transformers.

## 3. Definitions

Except as modified in this standard, transformer terminology found in IEEE Std C57.12.80-2002 shall apply.

## 4. Service conditions

Transformers conforming to this standard shall be suitable for operation at rated kilovolt-amperes (kVA) and rated voltage under the usual service conditions specified in IEEE Std C57.12.00-2006 except as specified below.

### 4.1 Cooling air-temperature limit

The temperature of the cooling air (enclosure ambient temperature) shall not exceed 50 °C and the average temperature of the cooling air shall not exceed 40 °C for any 24-hour period.

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