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# IEEE Standard for Thermal Evaluation of Insulation Systems for Dry-Type Power and Distribution Transformers

IEEE Power and Energy Society

Developed by the
Transformers Committee

**IEEE Std C57.12.60™-2020**
(Revision of IEEE Std C57.12.60-2009)

IEEE

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# IEEE Standard for Thermal Evaluation of Insulation Systems for Dry-Type Power and Distribution Transformers

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

Approved 30 January 2020

**IEEE SA Standards Board**

**Abstract:** A uniform method is established for determining the temperature classification for the insulation systems for dry-type power and distribution transformers. These insulation systems are intended for use in transformers covered by IEEE Std C57.12.01™ and IEEE Std C57.12.91™ as they apply to dry-type transformers whose highest voltages exceed nominal 600 V.

**Keywords:** IEEE C57.12.60™, insulation systems, model transformer coils, resin-encapsulated transformers, solid-cast transformers, thermal evaluation

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## Introduction

This introduction is not part of IEEE Std C57.12.60-2020, IEEE Standard for Thermal Evaluation of Insulation Systems for Dry-Type Power and Distribution Transformers.

This standard is a revision of IEEE Std C57.12.60™-2009, and it represents the state of the art in methodology for evaluating insulation systems for dry-type power and distribution transformers with high-voltage ratings greater than 600 V. In the time since the last revision, there has been a significant amount of interest in such systems testing, and other standards bodies have developed or are developing testing standards with similar characteristics. This revision has tried to take into account the best parts of these other test methods to build on what has been developed over the years within IEEE, starting with IEEE Std 65™-1956 [B5][1] that first led to IEEE Std C57.12.56™-1986 [B10] and later to IEEE Std C57.12.60™-1998 [B11].

Areas of significant change from IEEE Std C57.12.60-2009 include the following:

— Modified table for suggested aging conditions

— Design screening test procedures

— Detailed dielectric testing procedures

— Detailed description for making changes to existing insulation systems

Informative annexes were also added to provide guidance on the selection of aging temperatures as well as a second annex that outlines a procedure for adding optional partial discharge testing to the testing protocol as a diagnostic tool.

NOTE—The dielectric test methods described in this standard are based on relevant IEEE standards. For customers considering use of this test methodology using different dielectric test methods, such as those outlined in IEC standards, those methods should be followed for the complete test program, and they should be agreed to in advance.[2]

[1]The numbers in brackets correspond to those of the bibliography in Annex A.

[2]Notes in text, tables, and figures are given for information only and do not contain requirements needed to implement the standard.

## Contents

# IEEE Standard for Thermal Evaluation of Insulation Systems for Dry-Type Power and Distribution Transformers

## 1. Overview

### 1.1 Scope

This test procedure for the thermal evaluation of insulation systems of dry-type power and distribution transformers is to be used for determining the temperature classification and modification of the insulation systems. This standard shall apply to all dry-type transformers with a voltage of 601 V or higher in the highest voltage winding except as follows:

a) Instrument transformers
b) Step- and induction-voltage regulators
c) Arc-furnace transformers
d) Rectifier transformers
e) Specialty and general-purpose transformers
f) Mine transformers
g) Testing transformers
h) Welding transformers

NOTE—Where IEEE standards do not exist for the transformers mentioned above or for other special transformers, this standard may be applicable as a whole or in parts subject to agreement between the parties responsible for the application and for the design of the transformer.

### 1.2 Purpose

The purpose of this test procedure is to establish a uniform method for the following:

a) Acquiring data used to determine the temperature classification of an insulation system
b) Acquiring data that may be used as a basis for a loading guide, such as IEEE Std C57.96™[3]
c) Modifying an established electrical insulation system

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