

# IEEE Recommended Practice for the Preparation of Test Procedures for the Thermal Evaluation of Insulation Systems for Electrical Equipment

IEEE Standards Coordinating Committee 4

Developed by the  
IEEE Standards Coordinating Committee 4 on  
Electrical Insulation

**IEEE Std 99™-2019**  
(Revision of IEEE Std 99-2007)

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# **IEEE Recommended Practice for the Preparation of Test Procedures for the Thermal Evaluation of Insulation Systems for Electrical Equipment**

Developed by the

**IEEE Standards Coordinating Committee 4 on Electrical Insulation**

Approved 7 November 2019

**IEEE SA Standards Board**

**Abstract:** A general form for the preparation of test procedures is provided in this standard. Points to be considered by technical committees in the preparation of specific instructions for the thermal evaluation of insulation systems for electric equipment are suggested. The test procedures involve accelerated thermal aging of insulation systems and specify tests that the committees deem pertinent based on conditions of use. The objective of the procedures is to provide for the functional evaluation, by test, of insulation systems for electric equipment.

**Keywords:** diagnostic factor, EIS, electrical insulation system, IEEE 99™, insulation system, test procedures, test specimen, thermal aging, thermal endurance, thermal evaluation

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## Introduction

This introduction is not part of IEEE Std 99-2019, IEEE Recommended Practice for the Preparation of Test Procedures for the Thermal Evaluation of Insulation Systems for Electrical Equipment.

The previous version, IEEE Std 99-2007, had been revised substantially to coordinate with both relevant IEC standards and the recently revised IEEE Std 98™.<sup>1</sup> These revisions include:

- Definitions and references
- Detail on examples of thermal endurance testing, including how to plot temperature index and relative temperature index
- Updated table for exposure temperatures and times
- Methodology for life requirements different than the 20 000 h life on which [Table 2](#) is based
- Detail on how to interpret aging data
- Addition of [Annex B](#), which provides a historical basis for discussions on the repeatability of systems testing.

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<sup>1</sup>Information on references can be found in [Clause 2](#).

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# IEEE Recommended Practice for the Preparation of Test Procedures for the Thermal Evaluation of Insulation Systems for Electrical Equipment

## 1. Overview

### 1.1 Scope

This recommended practice provides criteria for the preparation of test procedures for accelerated thermal aging of insulation systems for electrical equipment and for the specification of tests based on conditions of use. The objective of these test procedures is to provide for the functional evaluation, by test, of insulation systems for electrical equipment.

### 1.2 Purpose

This recommended practice provides a general format for the preparation of test procedures and suggest the points to be considered by technical committees in the preparation of specific instructions for the thermal evaluation of insulation systems for electrical equipment. The thermal evaluation of an insulation system involves the following thermal factors of influence:

- Exposure temperature
- Ambient temperature
- Temperature gradient
- Rate of temperature change

## 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.

IEC 60505, Evaluation and Qualification of Electrical Insulation Systems.<sup>2</sup>

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<sup>2</sup>IEC publications are available from the International Electrotechnical Commission (<http://www.iec.ch/>) and the American National Standards Institute (<http://www.ansi.org>).