

# IEEE Standard Test Procedure for Thermal Evaluation of Systems of Insulating Materials for Random- Wound AC Electric Machinery

IEEE Power and Energy Society

Sponsored by the  
Rotating Machinery Committee

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USA

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# **IEEE Standard Test Procedure for Thermal Evaluation of Systems of Insulating Materials for Random- Wound AC Electric Machinery**

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**Rotating Machinery Committee  
of the  
IEEE Power and Energy Society**

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**Abstract:** The standard test procedure for the thermal evaluation and qualification of electrical insulation systems (EISs) for random-wound ac electric machinery, where thermal degradation is the dominating aging factor, is described. The relative thermal performance of a candidate EIS is compared to that of a reference EIS. Insulation systems for such machinery with input voltage of up to 600 V at 50/60 Hz are described in this standard. A statistical method for establishing a relative life-temperature relationship for an insulation system is also described. To have any significance, the reference insulation system must be supported with adequate field service data. Evaluation of insulation systems for use in air-cooled, random-wound ac electric machinery with “usual service conditions” is this procedure’s intent. This procedure, on its own, does not cover insulation systems such as exposure to conducting contaminants, radiation, inverter applications, or operation in oils, refrigerants, or other media that potentially degrades insulating materials.

**Keywords:** ac electric machinery, IEEE™, insulation system, random-wound, thermal evaluation

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## Introduction

This introduction is not part of IEEE Std 117™-2015, IEEE Standard Test Procedure for Thermal Evaluation of Systems of Insulating Materials for Random-Wound AC Electric Machinery.

This standard provides an evaluation of the thermal capability of an unsealed random-wound insulation system. Other aging factors—electrical, mechanical, and environmental—are also known to be important. Test procedures for evaluating those factors, both individually and in combination with each other, will be pursued by other working groups.

This standard was updated in 2015, with specific limitations noted here:

- Consideration of uprating for usage to 1000 V was discussed, but not implemented in the 2015 version. This was due to concerns about uprating without adequate test data. Publications and data collection of testing up to 1000 V should be completed prior to placing it into an IEEE standard.
- The use of a condensation chamber is listed herein. There is a round-robin study pending that will investigate the alternate use of a humidity chamber for testing. At present this standard remains with the wording of condensation chamber.

Comments on, and suggestions for the improvement of, this standard are welcome and should be sent to the IEEE Standards Board (see Participants).

## Acknowledgements

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# IEEE Standard Test Procedure for Thermal Evaluation of Systems of Insulating Materials for Random-Wound AC Electric Machinery

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## 1. Overview

### 1.1 Scope

This is a standard test procedure for the thermal evaluation and qualification of electrical insulation systems (EISs) for random-wound ac electric machinery, where thermal degradation is the dominating aging factor. This procedure compares the relative thermal performance of a candidate EIS to that of a reference EIS. This standard covers insulation systems for such machinery with operating voltage of up to 600 V at 50/60 Hz. This standard provides a statistical method for establishing a relative life-temperature relationship for an insulation system. To have any significance, the reference insulation system must be supported with adequate field-service data. This procedure is intended to evaluate insulation systems for use in air-cooled, random-wound ac electric machinery with “usual service conditions.” This procedure, on its own, does not cover insulation systems such as exposure to conducting contaminants, radiation, inverter applications, or operation in oils, refrigerants, or other media that potentially degrade insulating materials.

### 1.2 Purpose

The purpose of this standard procedure is to classify insulation systems in accordance with their temperature limits by test, rather than by chemical composition. This test procedure has been prepared to outline useful methods for the evaluation of systems of insulation for random-wound stators of rotating electric machines. The motorette procedure described is used for the evaluation of EISs.