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# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

colour inside

## Rotating electrical machines –
## Part 4-1: Methods for determining electrically excited synchronous machine quantities from tests

## Machines électriques tournantes –
## Partie 4-1: Méthodes pour la détermination, à partir d'essais, des grandeurs des machines synchrones à excitation électrique

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## Machines électriques tournantes – Partie 4-1: Méthodes pour la détermination, à partir d'essais, des grandeurs des machines synchrones à excitation électrique

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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# ROTATING ELECTRICAL MACHINES –

# Part 4-1: Methods for determining electrically excited synchronous machine quantities from tests

## FOREWORD

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International Standard IEC 60034-4-1 has been prepared by IEC technical committee 2: Rotating machinery.

IEC 60034-4-1 first edition cancels and replaces the third edition of IEC 60034-4 published in 2008. This edition constitutes a technical revision.

This publication includes the following significant technical changes with respect to IEC 60034-4 edition 3:

a) improvement of several procedures with respect to evaluation of quantities;
b) deletion of uncommon procedures;
c) applicability of procedures for permanent magnet machines.

The text of this International Standard is based on the following documents:

| CDV | Report on voting |
|---|---|
| 2/1829/CDV | 2/1869/RVC |

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

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# ROTATING ELECTRICAL MACHINES –

# Part 4-1: Methods for determining electrically excited synchronous machine quantities from tests

## 1 Scope

This part of IEC 60034 applies to three-phase synchronous machines of 1 kVA rating and larger.

Most of the methods are intended to be used for machines having an excitation winding with slip-rings and brushes for their supply. Synchronous machines with brushless excitation require special effort for some of the tests. For machines with permanent magnet excitation, there is a limited applicability of the described tests, and special precautions should be taken against irreversible demagnetization.

Excluded are axial-field machines and special synchronous machines such as inductor type machines, transversal flux machines and reluctance machines.

It is not intended that this document be interpreted as requiring any or all of the tests described therein on any given machine. The particular tests to be carried out are subject to agreement between manufacturer and customer.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60034-1:2017, *Rotating electrical machines – Part 1: Rating and performance*

IEC 60034-2-1, *Rotating electrical machines – Part 2-1: Standard methods for determining losses and efficiency from tests (excluding machines for traction vehicles)*

IEC 60051 (all parts), *Direct acting indicating analogue electrical measuring instruments and their accessories*

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

**3.1**
**<synchronous motors> initial starting impedance**
quotient of the applied armature voltage and the sustained average armature current, the machine being at standstill