

English version

**Rotating electrical machines -
Part 25: Guidance for the design and performance of a.c. motors
specifically designed for converter supply
(IEC/TS 60034-25:2007)**

This Technical Specification was approved by CENELEC on 2008-07-18.

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of the Technical Specification IEC/TS 60034-25:2007, prepared by IEC TC 2, Rotating machinery, was circulated for voting in accordance with the Internal Regulations, Part 2, Subclause 11.3.3.3 and was approved by CENELEC as CLC/TS 60034-25 on 2008-07-18.

This Technical Specification supersedes CLC/TS 60034-25:2005.

CLC/TS 60034-25:2008 contains the following significant technical changes with respect to CLC/TS 60034-25:2005:

- replacement of the original introduction by a shorter introduction;
- extension of the scope to include all converter-fed motors, not just LV-induction motors;
- minor changes throughout Clauses 4 to 9;
- addition of Subclauses 4.3.4, 4.3.5, 5.4, 6.2.1, 8.6.3, 8.7 and 8.8, and Figure 7;
- inclusion of Subclauses 4.4 and 4.5 in Annex A;
- expansion of original Annex A which becomes Annex B;
- re-drafting of Clause 5;
- upgrading of 6.1.4 to 6.3;
- removal of noise limits from normative text;
- addition of reference to EN 60034-9;
- addition of Annex C.

The following date was fixed:

- latest date by which the existence of the CLC/TS
has to be announced at national level (doa) 2009-01-18

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the Technical Specification IEC/TS 60034-25:2007 was approved by CENELEC as a Technical Specification without any modification.

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

The following referenced documents are indispensable for the application 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.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60034-1	- ¹⁾	Rotating electrical machines - Part 1: Rating and performance	EN 60034-1	2004 ²⁾
IEC 60034-2	- ¹⁾	Rotating electrical machines - Part 2: Methods for determining losses and efficiency of rotating electrical machinery from tests (excluding machines for traction vehicles)	EN 60034-2 ³⁾	1996 ²⁾
IEC 60034-6	- ¹⁾	Rotating electrical machines - Part 6: Methods of cooling (IC Code)	EN 60034-6	1993 ²⁾
IEC 60034-9 (mod)	- ¹⁾	Rotating electrical machines - Part 9: Noise limits	EN 60034-9	2005 ²⁾
IEC 60034-14	- ¹⁾	Rotating electrical machines - Part 14: Mechanical vibration of certain machines with shaft heights 56 mm and higher - Measurement, evaluation and limits of vibration severity	EN 60034-14	2004 ²⁾
IEC/TS 60034-17	2006	Rotating electrical machines - Part 17: Cage induction motors when fed from converters - Application guide	-	-
IEC/TR 61000-5-1	- ¹⁾	Electromagnetic compatibility (EMC) - Part 5: Installation and mitigation guidelines - Section 1: General considerations	-	-
IEC 61000-5-2	- ¹⁾	Electromagnetic compatibility (EMC) - Part 5: Installation and mitigation guidelines - Section 2: Earthing and cabling	-	-
IEC 61800-2	- ¹⁾	Adjustable speed electrical power drive systems - Part 2: General requirements - Rating specifications for low voltage adjustable frequency a.c. power drive systems	EN 61800-2	1998 ²⁾
IEC 61800-3	- ¹⁾	Adjustable speed electrical power drive systems - Part 3: EMC requirements and specific test methods	EN 61800-3	2004 ²⁾

¹⁾ Undated reference.

²⁾ Valid edition at date of issue.

³⁾ EN 60034-2 includes supplement A:1974 to IEC 60034-2:1972. It is partly superseded by EN 60034-2-1:2007, which is based on IEC 60034-2-1:2007

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61800-5-1	- ¹⁾	Adjustable speed electrical power drive systems - Part 5-1: Safety requirements - Electrical, thermal and energy	EN 61800-5-1	2007 ²⁾
IEC 61800-5-2	- ¹⁾	Adjustable speed electrical power drive systems - Part 5-2: Safety requirements - Functional	EN 61800-5-2	2007 ²⁾

TECHNICAL SPECIFICATION

IEC TS 60034-25

Second edition
2007-03

Rotating electrical machines –

**Part 25:
Guidance for the design and performance of a.c.
motors specifically designed for converter supply**



Reference number
IEC/TS 60034-25:2007(E)

Publication numbering

As from 1 January 1997 all IEC publications are issued with a designation in the 60000 series. For example, IEC 34-1 is now referred to as IEC 60034-1.

Consolidated editions

The IEC is now publishing consolidated versions of its publications. For example, edition numbers 1.0, 1.1 and 1.2 refer, respectively, to the base publication, the base publication incorporating amendment 1 and the base publication incorporating amendments 1 and 2.

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The technical content of IEC publications is kept under constant review by the IEC, thus ensuring that the content reflects current technology. Information relating to this publication, including its validity, is available in the IEC Catalogue of publications (see below) in addition to new editions, amendments and corrigenda. Information on the subjects under consideration and work in progress undertaken by the technical committee which has prepared this publication, as well as the list of publications issued, is also available from the following:

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TECHNICAL SPECIFICATION IEC TS 60034-25

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Part 25:

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International Electrotechnical Commission, 3, rue de Varembé, PO Box 131, CH-1211 Geneva 20, Switzerland
Telephone: +41 22 919 02 11 Telefax: +41 22 919 03 00 E-mail: inmail@iec.ch Web: www.iec.ch



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ROTATING ELECTRICAL MACHINES –

Part 25: Guidance for the design and performance of a.c. motors specifically designed for converter supply

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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The main task of IEC technical committees is to prepare International Standards. In exceptional circumstances, a technical committee may propose the publication of a technical specification when

- the required support cannot be obtained for the publication of an International Standard, despite repeated efforts, or
- the subject is still under technical development or where, for any other reason, there is the future but no immediate possibility of an agreement on an International Standard.

Technical specifications are subject to review within three years of publication to decide whether they can be transformed into International Standards.

IEC 60034-25, which is a technical specification, has been prepared by IEC technical committee 2: Rotating machinery.

This second edition cancels and replaces the first edition published in 2004.

This second edition contains the following significant technical changes with respect to the previous edition:

- a) replacement of the original introduction by a shorter introduction;
- b) extension of the scope to include all converter-fed motors, not just LV-induction motors;
- c) minor changes throughout Clauses 4 to 9;
- d) addition of subclauses 4.3.4, 4.3.5, 5.4, 6.2.1, 8.6.3, 8.7 and 8.8, and Figure 7;
- e) inclusion of subclauses 4.4 and 4.5 in Annex A;
- f) expansion of original Annex A which becomes Annex B;
- g) re-drafting of Clause 5;
- h) upgrading of 6.1.4 to 6.3;
- i) removal of noise limits from normative text;
- j) addition of reference to IEC 60034-9;
- k) addition of Annex C.

The text of this technical specification is based on the following documents:

Enquiry draft	Report on voting
2/1406/DTS	2/1420A/RVC

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

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

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- transformed into an International standard,
- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this technical specification may be issued at a later date.

INTRODUCTION

The performance characteristics and operating data for *converter*-fed motors are influenced by the complete drive system, comprising supply system, *converter*, cabling, motor, mechanical shafting and control equipment. Each of these components exists in numerous technical variants. Any values quoted in this technical specification are thus indicative only.

In view of the complex technical interrelations within the system and the variety of operating conditions, it is beyond the scope and object of this technical specification to specify numerical or limiting values for all the quantities which are of importance for the design of the drive system.

To an increasing extent, it is practice that drive systems consist of components produced by different manufacturers. The object of this technical specification is to explain, as far as possible, the influence of these components on the design of the motor and its performance characteristics.

This technical specification deals with a.c. motors which are specifically designed for *converter* supply. *Converter*-fed motors within the scope of IEC 60034-12, which are designed originally for mains supply, are covered by IEC 60034-17.

Clauses 5 to 9 of this technical specification consider mainly the requirements for low voltage induction motors fed from voltage-source *converters* (U-*converters*). Clauses 10 to 16 provide additional information for other configurations.

ROTATING ELECTRICAL MACHINES –

Part 25: Guidance for the design and performance of a.c. motors specifically designed for converter supply

1 Scope

This part of IEC 60034 describes the design features and performance characteristics of a.c. motors specifically designed for use on *converter* supplies. It also specifies the interface parameters and interactions between the motor and the *converter* including installation guidance as part of a *power drive system*.

The general requirements of relevant parts of the IEC 60034 series of standards also apply to motors within the scope of this technical specification.

NOTE 1 For motors operating in potentially explosive atmospheres, additional requirements as described in the IEC 60079 series apply.

NOTE 2 This technical specification is not primarily concerned with safety. However, some of its recommendations may have implications for safety, which should be considered as necessary.

NOTE 3 Where a *converter* manufacturer provides specific installation recommendations, they should take precedence over the recommendations of this technical specification.

2 Normative references

The following referenced documents are indispensable for the application 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, *Rotating electrical machines – Part 1: Rating and performance*

IEC 60034-2, *Rotating electrical machines – Part 2: Methods for determining losses and efficiency of rotating electrical machinery from tests (excluding machines for traction vehicles)*

IEC 60034-6, *Rotating electrical machines – Part 6: Methods of cooling (IC Code)*

IEC 60034-9, *Rotating electrical machines – Part 9: Noise limits*

IEC 60034-14, *Rotating electrical machines – Part 14: Mechanical vibration of certain machines with shaft heights 56 mm and higher – Measurement, evaluation and limits of vibration severity*

IEC 60034-17:2006, *Rotating electrical machines – Part 17: Cage induction motors when fed from converters – Application guide*

IEC 61000-5-1, *Electromagnetic compatibility (EMC) – Part 5: Installation and mitigation guidelines – Section 1: General considerations – Basic EMC publication*

IEC 61000-5-2, *Electromagnetic compatibility (EMC) – Part 5: Installation and mitigation guidelines – Section 2: Earthing and cabling*

IEC 61800-2, *Adjustable speed electrical power drive systems – Part 2: General requirements – Rating specifications for low voltage adjustable frequency a.c. power drive systems*

IEC 61800-3, *Adjustable speed electrical power drive systems – Part 3: EMC product standard including specific test methods*

IEC 61800-5-1, *Adjustable speed electrical power drive systems – Part 5-1: Safety requirements – Electrical, thermal and energy*

IEC 61800-5-2, *Adjustable speed electrical power drive systems – Part 5-2: Safety requirements – Functional*¹

3 Terms and definitions

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

Table 1 provides an alphabetical cross-reference of terms.

Table 1 – Alphabetical list of terms

Term	Term number	Term	Term number	Term	Term number
bearing voltage ratio (BVR)	3.1	electromagnetic compatibility (EMC)	3.5	protective earthing	3.9
bonding	3.2	field weakening	3.6	skip band	3.10
common mode voltage (current)	3.3	peak rise time	3.7	surface transfer impedance	3.11
converter	3.4	power drive system (PDS)	3.8		

NOTE Throughout this technical specification, references to the following definitions are identified by italic script.

3.1

bearing voltage ratio

BVR

ratio of the capacitively coupled bearing voltage to the *common mode voltage*

3.2

bonding

electrical connection of metallic parts of an installation together and to ground (earth)

NOTE For the purposes of this part of IEC 60034, this definition combines elements of IEC 195-01-10 (equipotential bonding) and IEC 195-01-16 (functional equipotential bonding).

3.3

common mode voltage (current)

arithmetic mean of the phase voltages (currents) to earth

3.4

converter

unit for electronic power conversion, changing one or more electrical characteristics and comprising one or more electronic switching devices and associated components, such as transformers, filters, commutation aids, controls, protections and auxiliaries, if any [IEC 61800-2, 2.2.1, modified]

NOTE This definition is taken from IEC 61800-2 and, for the purposes of this technical specification, embraces the terms complete drive module (CDM) and basic drive module (BDM) as used in the IEC 61800 series.

¹ To be published.