

## **Pöörlevad elektrimasinad. Osa 1: Tunnussuurused ja talitusviisid**

Rotating electrical machines - Part 1: Rating and performance

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN 60034-1:2006 sisaldab Euroopa standardi EN 60034-1:2004 ingliskeelset teksti.

Standard on kinnitatud Eesti Standardikeskuse 15.12.2006 käskkirjaga ja jõustub sellekohase teate avaldamisel EVS Teatajas.

Euroopa standardimisorganisatsioonide poolt rahvuslikele liikmetele Euroopa standardi teksti kättesaadavaks tegemise kuupäev on 16.06.2004.

Standard on kättesaadav Eesti standardiorganisatsioonist.

This Estonian standard EVS-EN 60034-1:2006 consists of the English text of the European standard EN 60034-1:2004.

This standard is ratified with the order of Estonian Centre for Standardisation dated 15.12.2006 and is endorsed with the notification published in the official bulletin of the Estonian national standardisation organisation.

Date of Availability of the European standard text 16.06.2004.

The standard is available from Estonian standardisation organisation.

ICS 29.160

**Võtmesõnad:** pöörlev masin, talitlus, tunnussuurused

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EUROPEAN STANDARD

**EN 60034-1**

NORME EUROPÉENNE

EUROPÄISCHE NORM

June 2004

ICS 29.160

Supersedes EN 60034-1:1998 + A1:1998 + A2:1999 + A11:2002

English version

**Rotating electrical machines**  
**Part 1: Rating and performance**  
(IEC 60034-1:2004)

Machines électriques tournantes  
Partie 1: Caractéristiques assignées  
et caractéristiques de fonctionnement  
(CEI 60034-1:2004)

Drehende elektrische Maschinen  
Teil 1: Bemessung und Betriebsverhalten  
(IEC 60034-1:2004)

This European Standard was approved by CENELEC on 2004-06-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

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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 document 2/1278/FDIS, future edition 11 of IEC 60034-1, prepared by IEC TC 2, Rotating machinery, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60034-1 on 2004-06-01.

This European Standard supersedes EN 60034-1:1998 + corrigendum February 2000 + A1:1998 + A2:1999 + A11:2002.

The major changes introduced in this edition are:

Clause or Subclause	Change
7.2.2	New requirements for a.c. generators to supply non-linear circuits
8	Major changes to Tables 4, 7 and 9
9.1	New requirements for routine tests
9.2	Table 16 Test voltages of auxiliaries
9.11	Total harmonic distortion for synchronous machines
11.1	Protective earthing for machines
12.1	Table 20 Tolerance on efficiency
13	Electromagnetic compatibility

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2005-03-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2007-06-01

Annex ZA has been added by CENELEC.

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## Endorsement notice

The text of the International Standard IEC 60034-1:2004 was approved by CENELEC as a European Standard without any modification.

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## 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 Where 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 60027-1	- <sup>1)</sup>	Letter symbols to be used in electrical technology Part 1: General	HD 60027-1	2004 <sup>2)</sup>
IEC 60027-4	- <sup>1)</sup>	Part 4: Symbols for quantities to be used for rotating electrical machines	HD 245.4 S1	1987 <sup>2)</sup>
IEC 60034-2	- <sup>1)</sup>	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	1996 <sup>2)</sup>
IEC 60034-3	- <sup>1)</sup>	Part 3: Specific requirements for turbine-type synchronous machines	EN 60034-3	1995 <sup>2)</sup>
IEC 60034-5	- <sup>1)</sup>	Part 5: Degrees of protection provided by the integral design of rotating electrical machines (IP code) - Classification	EN 60034-5	2001 <sup>2)</sup>
IEC 60034-6	- <sup>1)</sup>	Part 6: Methods of cooling (IC Code)	EN 60034-6	1993 <sup>2)</sup>
IEC 60034-8	- <sup>1)</sup>	Part 8: Terminal markings and direction of rotation	EN 60034-8	2002 <sup>2)</sup>
IEC 60034-12	- <sup>1)</sup>	Part 12: Starting performance of single-speed three-phase cage induction motors	EN 60034-12	2002 <sup>2)</sup>
IEC 60034-15	- <sup>1)</sup>	Part 15: Impulse voltage withstand levels of rotating a.c. machines with form-wound stator coils	EN 60034-15	1996 <sup>2)</sup>
IEC/TS 60034-17	- <sup>1)</sup>	Part 17: Cage induction motors when fed from converters - Application guide	CLC/TS 60034-17	
IEC 60034-18	Series	Part 18: Functional evaluation of insulation systems	EN 60034-18	Series

<sup>1)</sup> Undated reference.

<sup>2)</sup> Valid edition at date of issue.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60038 (mod)	- <sup>1)</sup>	IEC standard voltages <sup>3)</sup>	HD 472 S1	1989 <sup>2)</sup>
IEC 60050-411	1996	International Electrotechnical Vocabulary (IEV) Chapter 411: Rotating machines	-	-
IEC 60060-1	- <sup>1)</sup>	High-voltage test techniques Part 1: General definitions and test requirements	HD 588.1 S1	1991 <sup>2)</sup>
IEC 60072-3	- <sup>1)</sup>	Dimensions and output series for rotating electrical machines Part 3: Small built-in motors - Flange numbers BF10 to BF50	-	-
IEC 60204-1	- <sup>1)</sup>	Safety of machinery - Electrical equipment of machines Part 1: General requirements	EN 60204-1 + corr. September	1997 <sup>2)</sup> 1998
IEC 60204-11	- <sup>1)</sup>	Part 11: Requirements for HV equipment for voltages above 1 000 V a.c. or 1 500 V d.c. and not exceeding 36 kV	EN 60204-11	2000 <sup>2)</sup>
IEC 60279	- <sup>1)</sup>	Measurement of the winding resistance of an a.c. machine during operation at alternating voltage	-	-
IEC 60335-1 (mod)	- <sup>1)</sup>	Household and similar electrical appliances - Safety Part 1: General requirements	EN 60335-1 + A11	2002 <sup>2)</sup> 2004
IEC 60445	- <sup>1)</sup>	Basic and safety principles for man-machine interface, marking and identification - Identification of equipment terminals and of terminations of certain designated conductors, including general rules for an alphanumeric system	EN 60445	2000 <sup>2)</sup>
IEC 60971	- <sup>1)</sup>	Semiconductor convertors. Identification code for convertor connections	-	-
IEC 61293	- <sup>1)</sup>	Marking of electrical equipment with ratings related to electrical supply - Safety requirements	EN 61293	1994 <sup>2)</sup>
IEC 61986	- <sup>1)</sup>	Rotating electrical machines - Equivalent loading and super-position techniques - Indirect testing to determine temperature rise	EN 61986	2002 <sup>2)</sup>
IEC 62114	- <sup>1)</sup>	Electrical insulation systems (EIS) - Thermal classification	EN 62114	2001 <sup>2)</sup>

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<sup>3)</sup> The title of HD 472 S1 is : Nominal voltages for low-voltage public electricity supply systems.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
CISPR 11	- <sup>1)</sup>	Industrial scientific and medical (ISM) radio-frequency equipment - Electromagnetic disturbance characteristics - Limits and methods of measurement	-	-
CISPR 14	Series	Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus	EN 55014	Series
CISPR 16	Series	Specification for radio disturbance and immunity measuring apparatus and methods	EN 55016	Series

# INTERNATIONAL STANDARD

**IEC**  
**60034-1**

Eleventh edition  
2004-04

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## Rotating electrical machines –

### Part 1: Rating and performance

*This **English-language** version is derived from the original **bilingual** publication by leaving out all French-language pages. Missing page numbers correspond to the French-language pages.*



Reference number  
IEC 60034-1:2004(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.

## Further information on IEC publications

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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# INTERNATIONAL STANDARD

**IEC**  
**60034-1**

Eleventh edition  
2004-04

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## Rotating electrical machines –

### Part 1: Rating and performance

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International Electrotechnical Commission, 3, rue de Varembe, 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](mailto:inmail@iec.ch) Web: [www.iec.ch](http://www.iec.ch)



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International Electrotechnical Commission  
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## CONTENTS

FOREWORD.....	9
1 Scope.....	13
2 Normative references .....	13
3 Terms and definitions .....	17
4 Duty .....	25
4.1 Declaration of duty .....	25
4.2 Duty types .....	27
5 Rating .....	51
5.1 Assignment of rating.....	51
5.2 Classes of rating .....	51
5.3 Selection of a class of rating .....	53
5.4 Allocation of outputs to class of rating .....	55
5.5 Rated output .....	55
5.6 Rated voltage.....	55
5.7 Co-ordination of voltages and outputs .....	55
5.8 Machines with more than one rating .....	57
6 Site operating conditions .....	57
6.1 General.....	57
6.2 Altitude.....	57
6.3 Maximum ambient air temperature.....	57
6.4 Minimum ambient air temperature .....	57
6.5 Water coolant temperature .....	59
6.6 Storage and transport.....	59
6.7 Purity of hydrogen coolant.....	59
7 Electrical operating conditions .....	59
7.1 Electrical supply .....	59
7.2 Form and symmetry of voltages and currents .....	59
7.3 Voltage and frequency variations during operation .....	65
7.4 Three-phase a.c. machines operating on unearthed systems.....	69
7.5 Voltage (peak and gradient) withstand levels.....	71
8 Thermal performance and tests .....	71
8.1 Thermal class.....	71
8.2 Reference coolant .....	71
8.3 Conditions for thermal tests.....	73
8.4 Temperature rise of a part of a machine .....	75
8.5 Methods of measurement of temperature.....	75
8.6 Determination of winding temperature .....	77
8.7 Duration of thermal tests .....	83
8.8 Determination of the thermal equivalent time constant for machines of duty type S9.....	85
8.9 Measurement of bearing temperature .....	85
8.10 Limits of temperature and of temperature rise .....	85

9	Other performance and tests .....	103
9.1	Routine tests .....	103
9.2	Withstand voltage test .....	105
9.3	Occasional excess current .....	109
9.4	Momentary excess torque for motors .....	111
9.5	Pull-up torque .....	113
9.6	Safe operating speed of cage induction motors .....	113
9.7	Overspeed .....	115
9.8	Short-circuit current for synchronous machines .....	117
9.9	Short-circuit withstand test for synchronous machines .....	117
9.10	Commutation test for commutator machines .....	117
9.11	Total Harmonic Distortion (THD) for synchronous machines .....	117
10	Rating plates .....	119
10.1	General .....	119
10.2	Marking .....	119
11	Miscellaneous requirements .....	123
11.1	Protective earthing of machines .....	123
11.2	Shaft-end key(s) .....	125
12	Tolerances .....	127
12.1	General .....	127
13	Electromagnetic compatibility (EMC) .....	131
13.1	General .....	131
13.2	Immunity .....	131
13.3	Emission .....	131
13.4	Immunity tests .....	131
13.5	Emission tests .....	133
14	Safety .....	133

Annex A (informative)	Guidance for the application of duty type S10 and for establishing the value of relative thermal life expectancy $TL$ .....	135
-----------------------	---	-----

Annex B (informative)	Electromagnetic compatibility (EMC) limits .....	137
-----------------------	--	-----

Figure 1	– Continuous running duty – Duty type S1 .....	27
Figure 2	– Short-time duty – Duty type S2 .....	29
Figure 3	– Intermittent periodic duty – Duty type S3 .....	31
Figure 4	– Intermittent periodic duty with starting – Duty type S4 .....	33
Figure 5	– Intermittent periodic duty with electric braking – Duty type S5 .....	35
Figure 6	– Continuous operation periodic duty – Duty type S6 .....	37
Figure 7	– Continuous operation periodic duty with electric braking – Duty type S7 .....	39
Figure 8	– Continuous operation periodic duty with related load/speed changes – Duty type S8 .....	43
Figure 9	– Duty with non-periodic load and speed variations – Duty type S9 .....	45
Figure 10	– Duty with discrete constant loads – Duty type S10 .....	49
Figure 11	– Voltage and frequency limits for generators .....	69
Figure 12	– Voltage and frequency limits for motors .....	69

Table 1 – Preferred voltage ratings .....	57
Table 2 – Unbalanced operating conditions for synchronous machines .....	63
Table 3 – Primary functions of machines .....	67
Table 4 – Reference coolant (see also Table 10) .....	71
Table 5 – Time interval .....	81
Table 6 – Measuring points .....	85
Table 7 – Limits of temperature rise of windings indirectly cooled by air .....	89
Table 8 – Limits of temperature rise of windings indirectly cooled by hydrogen .....	91
Table 9 – Adjustments to limits of temperature rise at the operating site of indirect cooled windings to take account of non-reference operating conditions and ratings .....	91
Table 10 – Assumed maximum ambient temperature .....	95
Table 11 – Adjusted limits of temperature rise at the test site ( $\Delta\theta_T$ ) for windings indirectly cooled by air to take account of test site operating conditions .....	97
Table 12 – Limits of temperature of directly cooled windings and their coolants .....	99
Table 13 – Adjustments to limits of temperature at the operating site for windings directly cooled by air or hydrogen to take account of non-reference operating conditions and ratings .....	101
Table 14 – Adjusted limits of temperature at the test site $\theta_T$ for windings directly cooled by air to take account of test site operating conditions .....	101
Table 15 – Minimum schedule of routine tests .....	103
Table 16 – Withstand voltage tests .....	107
Table 17 – Maximum safe operating speed ( $\text{min}^{-1}$ ) of three-phase single-speed cage induction motors for voltages up to and including 1 000 V .....	113
Table 18 – Overspeeds .....	115
Table 19 – Cross-sectional areas of earthing conductors .....	125
Table 20 – Schedule of tolerances on values of quantities .....	127
Table B.1 – Electromagnetic emission limits for machines without brushes .....	137
Table B.2 – Electromagnetic emission limits for machines with brushes .....	137

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**ROTATING ELECTRICAL MACHINES –****Part 1: Rating and performance**

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

This eleventh edition cancels and replaces the tenth edition published in 1996, its amendments 1 (1997) and 2 (1999). It constitutes a technical revision.

The major changes introduced in this edition are:

Clause or subclause	Change
7.2.2	New requirements for a.c. generators to supply non-linear circuits
8	Major changes to Tables 4, 7 and 9
9.1	New requirements for routine tests
9.2	Table 16 Test voltage of auxiliaries
9.11	Total harmonic distortion for synchronous machines
11.1	Protective earthing of machines
12.1	Table 20 Tolerance on efficiency
13	Electromagnetic compatibility

The text of this standard is based on the following documents:

FDIS	Report on voting
2/1278/FDIS	2/1294/RVD

Full information on the voting for the approval of this standard 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 2005. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

## ROTATING ELECTRICAL MACHINES –

### Part 1: Rating and performance

#### 1 Scope

This part of IEC 60034 is applicable to all rotating electrical machines except those covered by other IEC standards, for example, IEC 60349.

Machines within the scope of this standard may also be subject to superseding, modifying or additional requirements in other publications, for example, IEC 60079, and IEC 60092.

NOTE If particular clauses of this standard are modified to meet special applications, for example machines subject to radioactivity or machines for aerospace, all other clauses apply insofar as they are compatible.

#### 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 60027-1, *Letter symbols to be used in electrical technology – Part 1: General*

IEC 60027-4, *Letter symbols to be used in electrical technology – Part 4: Symbols for quantities to be used for rotating electrical machines*

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 60034-3, *Rotating electrical machines – Part 3: Specific requirements for turbine-type synchronous machines*

IEC 60034-5, *Rotating electrical machines – Part 5: Degrees of protection provided by the integral design of rotating electrical machines (IP code)- Classification*

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

IEC 60034-8, *Rotating electrical machines – Part 8: Terminal markings and direction of rotation*

IEC 60034-12, *Rotating electrical machines – Part 12: Starting performance of single-speed three-phase cage induction motors*

IEC 60034-15, *Rotating electrical machines – Part 15: Impulse voltage withstand levels of rotating a.c. machines with form-wound stator coils*

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



IEC 60034-18 (all parts), *Rotating electrical machines – Functional evaluation of insulating systems*

IEC 60038, *IEC standard voltages*

IEC 60050(411):1996, *International Electrotechnical Vocabulary (IEV) – Chapter 411: Rotating machines*

IEC 60060-1, *High-voltage test techniques – Part 1: General definitions and test requirements*

IEC 60072 (all parts), *Dimensions and output series for rotating electrical machines*

IEC 60204-1, *Safety of machinery – Electrical equipment of machines – Part 1: General requirements*

IEC 60204-11, *Safety of machinery – Electrical equipment of machines – Part 11: Requirements for HV equipment for voltages above 1 000 V a.c. or 1 500 V d.c. and not exceeding 36 kV*

IEC 60279, *Measurement of the winding resistance of an a.c. machine during operation at alternating voltage*

IEC 60335-1, *Household and similar electrical appliances – Safety – Part 1: General requirements*

IEC 60445, *Basic and safety principles for man-machine interface, marking and identification – Identification of equipment terminals and of terminations of certain designated conductors, including general rules for an alphanumeric system*

IEC 60971, *Semiconductor convertors. Identification code for convertor connections*

IEC 61293, *Marking of electrical equipment with ratings related to electrical supply – Safety requirements*

IEC 61986, *Rotating electrical machines – Equivalent loading and super-position techniques – Indirect testing to determine temperature rise*

IEC 62114, *Electrical insulation systems – Thermal classification*

CISPR 11, *Industrial, scientific and medical (ISM) radio-frequency equipment – Electromagnetic disturbance characteristics – Limits and methods of measurement*

CISPR 14, *Electromagnetic compatibility – Requirements for household appliances, electric tools and similar apparatus*

CISPR 16, *Specification for radio disturbance and immunity measuring apparatus and methods*