IEC 60034-1

Edition 14.0 2022-02

INTERNATIONAL STANDARD

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Rotating electrical machines – Part 1: Rating and performance

Machines électriques tournantes – Partie 1: Caractéristiques assignées et caractéristiques de fonctionnement

IEC 60034-1:2022-02

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Rotating electrical machines – Part 1: Rating and performance

Machines électriques tournantes – Partie 1: Caractéristiques assignées et caractéristiques de fonctionnement

INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

ICS 29.160.01

ISBN 978-2-8322-1076-8

CONTENTS

FOREWORD 7
1 Scope 10
2 Normative references 10
3 Terms and definitions 12
4 Duty 17
4.1 Declaration of duty 17
4.2 Duty types 18
4.2.1 Duty type S1 – Continuous running duty 18
4.2.2 Duty type S2 – Short-time duty 19
4.2.3 Duty type S3 – Intermittent periodic duty 20
4.2.4 Duty type S4 – Intermittent periodic duty with starting 21
4.2.5 Duty type S5 – Intermittent periodic duty with electric braking 22
4.2.6 Duty type S6 – Continuous operation periodic duty 24
4.2.7 Duty type S7 – Continuous operation periodic duty with electric braking 25
4.2.8 Duty type S8 – Continuous operation periodic duty with related load/speed changes 26
4.2.9 Duty type S9 – Duty with non-periodic load and speed variations 27
4.2.10 Duty type S10 – Duty with discrete constant loads and speeds 28
5 Rating 31
5.1 Assignment of rating 31
5.2 Classes of rating 31
5.2.1 Rating for continuous running duty 31
5.2.2 Rating for short-time duty 31
5.2.3 Rating for periodic duty 31
5.2.4 Rating for non-periodic duty 31
5.2.5 Rating for duty with discrete constant loads and speeds 32
5.2.6 Rating for equivalent loading 32
5.3 Selection of a class of rating 32
5.4 Allocation of outputs to class of rating 32
5.5 Rated output 33
5.5.1 DC generators 33
5.5.2 AC generators 33
5.5.3 Motors 33
5.5.4 Synchronous compensators 33
5.6 Rated voltage 33
5.6.1 DC generators 33
5.6.2 AC generators 33
5.6.3 AC motors 33
5.7 Preferred combinations of voltages and outputs 33
5.8 Machines with more than one rating 34
6 Site conditions 34
6.1 General 34
6.2 Altitude 34
6.3 Maximum ambient air temperature 34
6.4 Minimum ambient air temperature 34
6.5 Water coolant temperature 35

6.6 Standstill, storage and transport 35
6.7 Purity of hydrogen coolant 35
7 Electrical operating conditions 35
7.1 Electrical supply 35
7.2 Form and symmetry of voltages and currents 36
7.2.1 AC motors 36
7.2.2 AC generators 37
7.2.3 Synchronous machines 37
7.2.4 DC motors supplied from static power converters 38
7.3 Voltage during starting of AC motors 39
7.4 Voltage and frequency variations during operation 39
7.5 Three-phase AC machines operating on unearthed systems 41
7.6 Voltage (peak and gradient) withstand levels 42
8 Thermal performance and tests 42
8.1 Thermal class 42
8.2 Reference coolant 42
8.3 Conditions for thermal tests 43
8.3.1 Electrical supply 43
8.3.2 Temperature of machine before test 43
8.3.3 Temperature of coolant 44
8.3.4 Measurement of coolant temperature during test 44
8.4 Temperature rise of a part of a machine 44
8.5 Methods of measurement of temperature 45
8.5.1 General 45
8.5.2 Resistance method 45
8.5.3 Embedded temperature detector (ETD) method 45
8.5.4 Thermometer method 45
8.6 Determination of winding temperature 45
8.6.1 Choice of method 45
8.6.2 Determination by resistance method 46
8.6.3 Determination by ETD method 48
8.6.4 Determination by thermometer method 48
8.7 Duration of thermal tests 48
8.7.1 Rating for continuous running duty 48
8.7.2 Rating for short-time duty 49
8.7.3 Rating for periodic duty 49
8.7.4 Ratings for non-periodic duty and for duty with discrete constant loads 49
8.8 Determination of the thermal equivalent time constant for machines of duty type S9 49
8.9 Measurement of bearing temperature 49
8.10 Limits of temperature and of temperature rise 50
8.10.1 General 50
8.10.2 Indirect cooled windings 50
8.10.3 Direct cooled windings 54
8.10.4 Adjustments to take account of hydrogen purity on test 55
8.10.5 Permanently short-circuited windings, magnetic cores and all structural components (other than bearings) whether or not in contact with insulation 55
8.10.6 Commutators and sliprings, open or enclosed and their brushes and brushgear 55

9 Other performance and tests 57
9.1 Routine tests 57
9.2 Withstand voltage test 58
9.3 Occasional excess current 62
9.3.1 General 62
9.3.2 Generators 62
9.3.3 Motors (except commutator motors and permanent magnet motors) 62
9.3.4 Commutator machines 62
9.4 Momentary excess torque for motors 62
9.4.1 Polyphase induction motors and DC motors 62
9.4.2 Polyphase synchronous motors 63
9.4.3 Other motors 63
9.5 Pull-up torque and locked-rotor torque for cage induction motors with direct online starting 63
9.6 Safe operating speed of cage induction motors 63
9.7 Overspeed 64
9.8 Short-circuit current for synchronous machines 65
9.9 Short-circuit withstand test for synchronous machines 65
9.10 Commutation test for commutator machines 66
9.11 Total harmonic distortion (THD) for synchronous machines 66
9.11.1 General 66
9.11.2 Limits 66
9.11.3 Tests 66
9.12 Protective earth test 66
9.13 Measurement of insulation resistance and polarization index of winding insulation 67
9.14 Shaft-voltage test 68
10 Information requirements 68
10.1 General 68
10.2 Product documentation 68
10.3 Rating plate 68
10.4 Information content 69
10.4.1 General 69
10.4.2 Minimum information requirements 69
10.4.3 All AC machines 70
10.4.4 All DC machines 70
10.4.5 Machines over 5 kW (or 5 kVA) rated output 70
10.4.6 Optional information 70
11 Miscellaneous requirements 71
11.1 Protective earthing of machines 71
11.2 Shaft-end key(s) 72
12 Tolerances 72
12.1 General 72
12.2 Tolerances on values of quantities 73
13 Electromagnetic compatibility (EMC) 74
13.1 General 74
13.2 Immunity 75
13.2.1 Machines not incorporating electronic circuits 75
13.2.2 Machines incorporating electronic circuits 75

13.3 Emission 75
13.4 Immunity tests 75
13.5 Emission measurements 75
14 Application requirements 75
Annex A (informative) Guidance for the application of duty type S10 and for establishing the value of relative thermal life expectancy TL 77
Annex B (informative) Electromagnetic compatibility (EMC) limits 78
Bibliography 79

Figure 1 – Continuous running duty – Duty type S1 19
Figure 2 – Short-time duty – Duty type S2 20
Figure 3 – Intermittent periodic duty – Duty type S3 21
Figure 4 – Intermittent periodic duty with starting – Duty type S4 22
Figure 5 – Intermittent periodic duty with electric braking – Duty type S5 23
Figure 6 – Continuous operation periodic duty – Duty type S6 24
Figure 7 – Continuous operation periodic duty with electric braking – Duty type S7 25
Figure 8 – Continuous operation periodic duty with related load/speed changes – Duty type S8 27
Figure 9 – Duty with non-periodic load and speed variations – Duty type S9 28
Figure 10 – Duty with discrete constant loads – Duty type S10 30
Figure 11 – Voltage and frequency limits for motors and for generators except generators or synchronous compensators within the scope of IEC 60034-3 and hydro generators within the scope of IEC 60034-33 41
Figure 12 – Worst case increase in temperature rise ($\Delta\theta$) and recommended reduction of output power (ΔP) of motors as a function of the combined change of voltage and frequency $|\Delta\varnothing|$ (indicative guideline to use for motors and generators only) 41
Figure 13 – Factor K for determining x_{REM} 67

Table 1 – Preferred voltage ratings 34
Table 2 – Unbalanced operating conditions for synchronous machines 38
Table 3 – CCC symbol designation 39
Table 4 – Primary functions of machines 40
Table 5 – Reference coolant (see also Table 11) 43
Table 6 – Time interval 47
Table 7 – Measuring points 49
Table 8 – Limits of temperature rise of windings indirectly cooled by air 51
Table 9 – Limits of temperature rise of windings indirectly cooled by hydrogen 52
Table 10 – Adjustments to limits of temperature rise at the operating site of indirect cooled windings to take account of non-reference operating conditions and ratings 53
Table 11 – Assumed maximum ambient temperature 54
Table 12 – 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 55
Table 13 – Limits of temperature of directly cooled windings and their coolants 56
Table 14 – 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 56

Table 15 – Adjusted limits of temperature at the test site θ_T for windings directly cooled by air to take account of test site operating conditions 57
Table 16 – Minimum routine tests for machines assembled and tested in the factory of the manufacturer 58
Table 17 – Withstand voltage tests 60
Table 18 – Test voltage factors for machines with an assigned Impulse Voltage Insulation Class (IVIC) according to IEC 60034-18-41 and IEC 60034-18-42 61
Table 19 – Maximum safe operating speed (min^{-1}) of three-phase single-speed cage induction motors for voltages up to and including 1 000 V 64
Table 20 – Overspeeds 65
Table 21 – Cross-sectional areas of earthing conductors 72
Table 22 – Schedule of tolerances on values of quantities 73
Table B.1 – Electromagnetic emission limits per CISPR 11 Class B Group 1 78
Table B.2 – Electromagnetic emission limits per CISPR 11 Class A Group 1 78

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

This fourteenth edition cancels and replaces the thirteenth edition published in 2017. This edition constitutes a technical revision.

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

Clause or subclause	Change
1	Clarification of the scope
2	General use of dated references
3.29	Clarification on identification of maximum and minimum current
3.34	Definition of main insulation
3.35	Definition of converter capable machine
3.36	Definition of converter duty machine
3.37	Definition of shaft voltage
4.2	Explanation for using duty types S9 and S10 for converter duty machines
5.6.3	New subclause for clarification of the terms range of rated voltages and voltage variations
6.2	Requirement to consider reduced arcing distance in machine design for altitudes >1 000 m
7.1	Clarification on bus transfer or fast reclosing Clarification on the capability to withstand impulse voltages
7.3	New subclause on voltage deviation during starting
7.4	Extended variation of supply frequency Note added on design for operation with extended voltage and frequency Recommended derating added for high variations of voltage and frequency
7.6	Clarification that enamelled wires are no bare insulating material
8.3.1	Clarification on electrical supply during thermal tests added
9.1	Changes in Table 16, especially inclusion of PM and reluctance synchronous machines
9.2	Requirement on test equipment for withstand voltage test added Test voltage for variable speed AC machines added Clarification to withstand voltage test for machines after stock holding
9.5	Extended to requirements for minimum locked rotor torque
9.10	Note added on criteria for commutation test
9.11.3	Clarification added that synchronous motors do not need a THD test
9.12	New subclause on protective earth test
9.13	New subclause on measurement of insulation resistance and polarization index
9.14	New subclause on shaft-voltage measurement
10.	Clause has been rearranged completely Clarification on unit symbol for speed added
11.1	Clarification on protective earth test after installation added
12.1	Clarification on the tolerances due to the accuracy of the test equipment Note on measurement uncertainty added
12.2	Change in the tolerance on efficiency Clarification on the tolerance on locked-rotor current New tolerance on sound pressure level
14	Improved title of clause

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

Draft	Report on voting
2/2084/FDIS	2/2090/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

A list of all parts of the IEC 60034 series, published under the general title *Rotating electrical machines*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

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

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ROTATING ELECTRICAL MACHINES –

Part 1: Rating and performance

1 Scope

This part of IEC 60034 is applicable to all rotating electrical machines, except rotating electrical machines for rail and road vehicles, which are covered by the IEC 60349 series of standards.

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

NOTE If particular clauses of this document 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 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 60027-1:1992, *Letters symbols to be used in electrical technology – Part 1: General*
IEC 60027-1:1992/AMD1:1997
IEC 60027-1:1992/AMD2:2005

IEC 60027-4:2006, *Letter symbols to be used in electrical technology – Part 4: Rotating electric machines*

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

IEC 60034-3:2020, *Rotating electrical machines – Part 3: Specific requirements for synchronous generators driven by steam turbines or combustion gas turbines and for synchronous compensators*

IEC 60034-5:2020, *Rotating electrical machines – Part 5: Degrees of protection provided by the integral design of rotating electrical machines (IP code) – Classification*

IEC 60034-6:1991, *Rotating electrical machines – Part 6: Methods of cooling (IC code)*

IEC 60034-8:2007, *Rotating electrical machines – Part 8: Terminal markings and direction of* rotation
IEC 60034-8:2007/AMD1:2014

IEC 60034-12:2016, *Rotating electrical machines – Part 12: Starting performance of single-speed three-phase cage induction motors*

IEC 60034-15:2009, *Rotating electrical machines – Part 15: Impulse voltage withstand levels of form-wound stator coils for rotating a.c. machines*

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