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2/2043/CDV

COMMITTEE DRAFT FOR VOTE (CDV)

PROJECT NUMBER: IEC 60034-1 ED14	
DATE OF CIRCULATION: 2021-03-12	CLOSING DATE FOR VOTING: 2021-06-04
SUPERSEDES DOCUMENTS: 2/2006/CD, 2/2020A/CC	

IEC TC 2 : ROTATING MACHINERY	
SECRETARIAT: United Kingdom	SECRETARY: Mr Charles Whitlock
OF INTEREST TO THE FOLLOWING COMMITTEES: TC 18	PROPOSED HORIZONTAL STANDARD: <input type="checkbox"/> Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.
FUNCTIONS CONCERNED: <input type="checkbox"/> EMC <input type="checkbox"/> ENVIRONMENT <input type="checkbox"/> QUALITY ASSURANCE <input type="checkbox"/> SAFETY	
<input checked="" type="checkbox"/> SUBMITTED FOR CENELEC PARALLEL VOTING	<input type="checkbox"/> NOT SUBMITTED FOR CENELEC PARALLEL VOTING
<p>Attention IEC-CENELEC parallel voting</p> <p>The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) is submitted for parallel voting.</p> <p>The CENELEC members are invited to vote through the CENELEC online voting system.</p>	

This document is still under study and subject to change. It should not be used for reference purposes.

Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

TITLE: Rotating electrical machines – Part 1: Rating and performance

PROPOSED STABILITY DATE: 2025

NOTE FROM TC/SC OFFICERS:

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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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- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

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

This thirteenth edition cancels and replaces the twelfth edition published in 2010. It constitutes a technical revision.

The main technical changes with regard to the previous edition are as follows:

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 clause 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 >1000 m
7.1	Clarification on bus transfer or fast reclosing Clarification on the capability to withstand impulse voltages
7.3	New clause 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 living 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 on minimum locked rotor torque
9.10	Note added on criteria for commutation test
9.11.3	Clarification added that synchronous motors don't need a THD test
9.12	New clause on protective earth test
9.13	New clause on measurement of insulation resistance and polarization index
9.14	New clause on shaft-voltage measurement
10.	Section 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 name of clause

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

FDIS	Report on voting
2/XXXX/FDIS	2/XXXX/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.

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.

NOTE A table of cross-references of all IEC TC 2 publications can be found in the IEC TC 2 dashboard on the IEC website.

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

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IEC 60027-1:1992+COR1:1993+AMD1:1997+AMD2:2005, *Letter symbols to be used in electrical technology – Part 1: General*

<https://standards.iteh.ai/catalog/standards/sist/2af2b5c1-b147-442e-adcb-5b49884891/sist-pr-en-60034-1-2021>

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

IEC 60034-2 (all parts, -2-1:2014, -2-2:2010, -2-3:2020), *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*

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+AMD1:2014, *Rotating electrical machines – Part 8: Terminal markings and direction of rotation*

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, -18-1:2010, -18-21:2012, -18-31:2012, -18-32:2010, -18-33:2010, -18-34:2012), *Rotating electrical machines – Part 18: Functional evaluation of insulation systems*

- 40 IEC 60034-18-41:2014+AMD1:2019, *Rotating electrical machines – Part 18-41: Partial*
 41 *discharge free electrical insulation systems (Type I) used in rotating electrical machines fed*
 42 *from voltage converters – Qualification and quality control tests*
- 43 IEC 60034-18-42:2017+AMD1:2019, *Rotating electrical machines - Part 18-42: Qualification*
 44 *and acceptance tests for Type II electrical insulation systems used in rotating electrical*
 45 *machines fed from voltage converters*
- 46 IEC 60034-19:2014, *Rotating electrical machines - Part 19: Specific test methods for d.c.*
 47 *machines on conventional and rectifier-fed supplies*
- 48 IEC TS 60034-24:2009, *Rotating electrical machines – Part 24: Online detection and*
 49 *diagnosis of potential failures at the active parts of rotating electrical machines and of bearing*
 50 *currents – Application guide*
- 51 IEC TS 60034-25:2014, *Rotating electrical machines – Part 25: AC electrical machines used*
 52 *in power drive systems – Application guide*
- 53 IEC 60034-29:2008, *Rotating electrical machines – Part 29: Equivalent loading and*
 54 *superposition techniques – Indirect testing to determine temperature rise*
- 55 IEC 60034-30-1:2014, *Rotating electrical machines – Part 30-1: Efficiency classes of line*
 56 *operated A.C. motors (IE-code)*
- 57 ~~IEC 60034-33:202x, Rotating electrical machines – Part 33: Specific technical requirements~~
 58 ~~for hydro-generators~~
- 59 IEC 60038:2009, *IEC standard voltages*
- 60 IEC 60050-411:1996+AMD1:2007, *International Electrotechnical Vocabulary (IEV) – Chapter*
 61 *411: Rotating machines*
- 62 IEC 60060-1:2010, *High-voltage test techniques – Part 1: General definitions and test*
 63 *requirements*
- 64 IEC 60072 (all parts, -1:1991, -2:1990, -3:1994), *Dimensions and output series for rotating*
 65 *electrical machines*
- 66 IEC 60085:2007, *Electrical insulation – Thermal evaluation and designation*
- 67 IEC 60204-1:2016, *Safety of machinery – Electrical equipment of machines – Part 1: General*
 68 *requirements*
- 69 IEC 60204-11:2018, *Safety of machinery – Electrical equipment of machines – Part 11:*
 70 *Requirements for HV equipment for voltages above 1 000 V a.c. or 1 500 V d.c. and not*
 71 *exceeding 36 kV*
- 72 IEC 60335-1:2010, *Household and similar electrical appliances – Safety – Part 1: General*
 73 *requirements*
- 74 IEC 60445:2017+COR1:2017, *Basic and safety principles for man-machine interface, marking*
 75 *and identification – Identification of equipment terminals, conductor terminations and*
 76 *conductors*
- 77 IEC 60664-1:2007, *Insulation coordination for equipment within low-voltage systems – Part 1:*
 78 *Principles, requirements and tests*

79 IEC 61148:2011, *Terminal markings for valve device stacks and assemblies and for power*
80 *conversion equipment*

81 IEC 61293:2019, *Marking of electrical equipment with ratings related to electrical supply –*
82 *Safety requirements*

83 CISPR 11:2015, *Industrial, scientific and medical equipment – Radiofrequency disturbance*
84 *characteristics – Limits and methods of measurement*

85 CISPR 14 (all parts, -1:2016, -2:2015), *Electromagnetic compatibility – Requirements for*
86 *household appliances, electric tools and similar apparatus*

87 CISPR 16 (all parts), *Specification for radio disturbance and immunity measuring apparatus*
88 *and methods*

89 3 Terms and definitions

90 For the purposes of this document, the terms and definitions in IEC 60050-411, some of which
91 are repeated here for convenience, and the following apply.

92 NOTE 1 For definitions concerning cooling and coolants, other than those in 3.17 to 3.22, see IEC 60034-6.

93 NOTE 2 For the purposes of this document, the term 'agreement' means 'agreement between the manufacturer
94 and purchaser'.

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

- 97 • IEC Electropedia: available at <http://www.electropedia.org/>
- 98 • ISO Online browsing platform: available at <http://www.iso.org/obp>

99 3.1

100 **rated value**

101 quantity value assigned, generally by a manufacturer, for a specified operating condition of a
102 machine

103 Note 1 to entry: The rated voltage or voltage range is the rated voltage or voltage range between lines at the
104 terminals.

105 [SOURCE: IEC 60050-411:1996, 411-51-23]

106 3.2

107 **rating**

108 set of rated values and operating conditions

109 [SOURCE: IEC 60050-411:1996, 411-51-24]

110 3.3

111 **rated output**

112 value of the output included in the rating

113 3.4

114 **load**

115 all the values of the, *in case of a generator*, electrical and, *in case of a motor*, mechanical
116 quantities that signify the demand made on a rotating machine by an electrical circuit or a
117 mechanism at a given instant

118 [SOURCE: IEC 60050-411:1996, 411-51-01, modified:modification indicated in italics]

- 119 3.5
120 **no-load <operation>**
121 state of a machine rotating with zero output power (*but under otherwise normal operating*
122 *conditions*)
- 123 [SOURCE: IEC 60050-411:1996, 411-51-02, modified: modification indicated in italics]
- 124 3.6
125 **full load**
126 load which causes a machine to operate at its rating
- 127 [SOURCE: IEC 60050-411:1996, 411-51-10]
- 128 3.7
129 **full load value**
130 quantity value for a machine operating at full load
- 131 Note 1 to entry: This concept applies to power, torque, current, speed, etc.
- 132 [SOURCE: IEC 60050-411:1996, 411-51-11]
- 133 3.8
134 **rest and de-energized**
135 complete absence of all movement and of all electrical supply or mechanical drive
- 136 [SOURCE: IEC 60050-411:1996, 411-51-03]
- 137 3.9
138 **duty**
139 statement of the load(s) to which the machine is subjected, including, if applicable, starting,
140 electric braking, no-load and rest and de-energized periods and including their durations and
141 sequence in time
- 142 [SOURCE: IEC 60050-411:1996, 411-51-06]
- 143 3.10
144 **duty type**
145 continuous, short-time or periodic duty, comprising one or more loads remaining constant for
146 the duration specified, or a non-periodic duty in which generally load and speed vary within
147 the permissible operating range
- 148 [SOURCE: IEC 60050-411:1996, 411-51-13]
- 149 3.11
150 **cyclic duration factor**
151 ratio between the period of loading, including starting and electric braking, and the duration of
152 the duty cycle, expressed as a percentage
- 153 [SOURCE: IEC 60050-411:1996, 411-51-09]
- 154 3.12
155 **locked-rotor torque**
156 minimum measured torque the motor develops at its shaft and with the rotor locked, over all
157 its angular positions, at rated voltage and frequency
- 158 [SOURCE: IEC 60050-411:1996, 411-48-06]