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01-oktober-2024

Električni rotacijski stroji - 1. del: Nazivni podatki in preskus lastnosti

Rotating electrical machines - Part 1: Rating and performance

Drehende elektrische Maschinen - Teil 1: Bemessung und Betriebsverhalten

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

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Rotating machinery in
general

oSIST prEN IEC 60034-1:2024

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| <input checked="" type="checkbox"/> SUBMITTED FOR CENELEC PARALLEL VOTING Attention IEC-CENELEC parallel voting 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. The CENELEC members are invited to vote through the CENELEC online voting system. | <input type="checkbox"/> NOT SUBMITTED FOR CENELEC PARALLEL VOTING |

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TITLE:

Rotating electrical machines - Part 1: Rating and performance

PROPOSED STABILITY DATE: 2027

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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ROTATING ELECTRICAL MACHINES –

214

Part 1: Rating and performance

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FOREWORD

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219 all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international
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250 IEC 60034-1 has been prepared by IEC technical committee 2: Rotating machinery. It is an
251 International Standard.

252 This **fifteenth** edition cancels and replaces the **fourteenth** edition published in 2022. This edition
253 constitutes a technical revision.

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

| Clause or subclause | Change |
|---------------------|--|
| 1 | Clarification with respect to machines with integrated EMC-active components added |
| 2 | Normative references updated |
| 3 | Note on meaning of "agreement" deleted |
| 4.2.9, 4.2.10 | References to IEC TS 60034-25 deleted, as converter duty is now defined in 3.36 |
| 5.1 | Reference to IEC TS 60034-25 converted into note |
| 6.6 | Clarification of requirements |
| 7.2.1 | Reference to IEC TS 60034-25 converted into note |
| 7.5 | Clarification of requirements |
| 7.6 | Reference to IEC TS 60034-25 converted into note |
| 8.1 | Clarification of references |
| 8.6.1 | Clarification on choice of method for large machines |
| Table 11 | Updated values for thermal class 200 (N) |
| 8.10.3 | Clarification of requirements |
| 9.2 | Clarification on test voltage for old machines after rewinding |
| Table 17 | Items 9 and 10 merged and clarified |
| 9.7 | Clarification on overspeed test for machines held at stock added |
| Table 20 | Clarification on test speed for converter duty machines |
| 10.2 | Clarification of term 'digital form' |
| 10.3 | Note on QR code deleted |
| 11.1 | Reference to protective earth test added |
| 13.2.2 | Clarification on motors with integrated VSD added |
| 13.3 | Clarification of requirements after consultation with ACEC |
| 13.5 | Clarification of requirements after consultation with ACEC |
| 14 | Note on safety converted to normal text |

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

| Draft | Report on voting |
|------------|------------------|
| 2/xxx/FDIS | 2/xxx/RVD |

257 Full information on the voting for its approval can be found in the report on voting indicated in
258 the above table.
259

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

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

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

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

- 270 • reconfirmed,
- 271 • withdrawn,
- 272 • replaced by a revised edition, or
- 273 • amended.

274

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ROTATING ELECTRICAL MACHINES –

Part 1: Rating and performance

283 1 Scope

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

286 **Machines with integrated EMC-active components such as a variable frequency converter are**
287 **considered being a power drive system (see the IEC 61800 series of standards). In such cases, this**
288 **standard applies to the motor component of the power drive system only.**

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

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

293 2 Normative references

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

298 IEC 60027-1:1992, *Letters symbols to be used in electrical technology – Part 1: General*
299 IEC 60027-1:1992/AMD1:1997
300 IEC 60027-1:1992/AMD2:2005

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

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

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

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

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

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

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

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

318 IEC 60034-18-1:2022, *Rotating electrical machines - Part 18-1: Functional evaluation of*
319 *insulation systems - General guidelines*

320 IEC 60034-18-21:2012, *Functional evaluation of insulation systems - Test procedures for wire-*
321 *wound windings - Thermal evaluation and classification*

- 322 IEC 60034-18-31:2012, *Functional evaluation of insulation systems - Test procedures for form-*
323 *wound windings - Thermal evaluation and classification of insulation systems used in machines*
324 *up to and including 50 MVA and 15 kV*
- 325 IEC 60034-18-32: 2022, *Functional evaluation of insulation systems - Test procedures for form-*
326 *wound windings - Electrical evaluation of insulation systems used in machines up to and*
327 *including 50 MVA and 15 kV*
- 328 IEC 60034-18-34:2012, *Functional evaluation of insulation systems - Test procedures for form-*
329 *wound windings - Evaluation of thermomechanical endurance of insulation systems*
- 330 IEC 60034-18-41:2014, *Rotating electrical machines – Part 18-41: Partial discharge free*
331 *electrical insulation systems (Type I) used in rotating electrical machines fed from voltage*
332 *converters – Qualification and quality control tests*
333 IEC 60034-18-41:2014/AMD1:2019
- 334 IEC 60034-18-42:2017, *Rotating electrical machines – Part 18-42: Partial discharge resistant*
335 *electrical insulation systems (Type II) used in rotating electrical machines fed from voltage*
336 *converters – Qualification tests*
337 IEC 60034-18-42:2017/AMD1:2020
- 338 IEC 60034-19:2014, *Rotating electrical machines – Part 19: Specific test methods for d.c.*
339 *machines on conventional and rectifier-fed supplies*
- 340 IEC 60034-27-4:2018, *Rotating electrical machines – Part 27-4: Measurement of insulation*
341 *resistance and polarization index of winding insulation of rotating electrical machines*
- 342 IEC 60034-29:2008, *Rotating electrical machines – Part 29: Equivalent loading and*
343 *superposition techniques – Indirect testing to determine temperature rise*
- 344 IEC 60034-30-1:2014, *Rotating electrical machines – Part 30-1: Efficiency classes of line*
345 *operated AC motors (IE-code)*
- 346 IEC 60034-30-3:2024, *Rotating electrical machines – Part 30-3: Efficiency classes of high*
347 *voltage AC motors (IE code)*
- 348 IEC 60034-33:2022 *Rotating electrical machines – Part 33: Specific technical requirements for*
349 *hydro generators*
- 350 IEC 60050-411:1996, *International Electrotechnical Vocabulary (IEV) – Part 411: Rotating*
351 *machinery*
352 IEC 60050-411:1996/AMD1:2007
353 IEC 60050-411:1996/AMD2:2021
- 354 IEC 60060-1:2010, *High-voltage test techniques – Part 1: General definitions and test*
355 *requirements*
- 356 IEC 60085:2007, *Electrical insulation – Thermal evaluation and designation*
- 357 IEC 60204-1:2016, *Safety of machinery – Electrical equipment of machines – Part 1: General*
358 *requirements*
- 359 IEC 60204-11:2018, *Safety of machinery – Electrical equipment of machines – Part 11:*
360 *Requirements for equipment for voltages above 1 000 V AC or 1 500 V DC and not exceeding*
361 *36 kV*
- 362 IEC 60335-1:2020, *Household and similar electrical appliances – Safety – Part 1: General*
363 *requirements*
- 364 IEC 60364 (all parts), *Low-voltage electrical installations*
- 365 IEC 60417:2002, *Graphical symbols for use on equipment – 12-month subscription to regularly*
366 *updated online database comprising all graphical symbols published in IEC 60417*
- 367 IEC 60445:2017, *Basic and safety principles for man-machine interface, marking and*
368 *identification – Identification of equipment terminals, conductor terminations and conductors*

369 IEC 60664-1:2020, *Insulation coordination for equipment within low-voltage systems – Part 1:*
370 *Principles, requirements and tests*

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

373 CISPR 11:2015, *Industrial, scientific and medical equipment – Radio-frequency disturbance*
374 *characteristics – Limits and methods of measurement*

375 CISPR 11:2015/AMD1:2016

376 CISPR 11:2015/AMD2:2019

377 CISPR 14 (all parts), *Electromagnetic compatibility – Requirements for household appliances,*
378 *electric tools and similar apparatus*

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

381 **3 Terms and definitions**

382 For the purposes of this document, the terms and definitions in IEC 60050-411, and the
383 following apply.

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

385 ~~NOTE 2 – For the purposes of this document, the term ‘agreement’ means ‘agreement between the manufacturer and~~
386 ~~purchaser’.~~

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

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

391 **3.1**

392 **rated value**

393 quantity value assigned, generally by a manufacturer, for a specified operating condition of a
394 machine

395 Note 1 to entry: The rated voltage or voltage range is the rated voltage or voltage range between lines at the
396 ~~machine~~ terminals.

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

398 **3.2**

399 **rating**

400 set of rated values and operating conditions

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

402 **3.3**

403 **rated output <of a machine>**

404 value of the output included in the rating

405 **3.4**

406 **load**

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

410 [SOURCE: IEC 60050-411:1996, 411-51-01, modified – “in case of a generator” and “in case of
411 a motor” have been added.]

412 **3.5**

413 **no-load <operation>**

414 state of a machine rotating with zero output power (*but under otherwise normal operating*
415 *conditions*)