



**SLOVENSKI STANDARD**  
**SIST EN 60034-3:1999**

**01-april-1999**

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**Rotating electrical machines - Part 3: Specific requirements for turbine-type synchronous machines (IEC 60034-3:1988)**

Rotating electrical machines -- Part 3: Specific requirements for turbine-type synchronous machines

Drehende elektrische Maschinen -- Teil 3: Besondere Anforderungen an Dreiphasen-Turbogeneratoren

Machines électriques tournantes -- Partie 3: Règles spécifiques pour les turbomachines synchrones

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**Ta slovenski standard je istoveten z: EN 60034-3:1995**

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**ICS:**

29.160.20      Generatorji                              Generators

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EUROPEAN STANDARD

EN 60034-3

NORME EUROPÉENNE

EUROPÄISCHE NORM

October 1995

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Supersedes HD 53.3 S1:1991

Descriptors: Rotating electrical machines, turbine-type machines, synchronous motors, characteristics, specification

English version

**Rotating electrical machines**  
**Part 3: Specific requirements for turbine-type synchronous machines**  
**(IEC 34-3:1988)**

Machines électriques tournantes  
 Partie 3: Règles spécifiques pour les  
 turbomachines synchrones  
 (CEI 34-3:1988)

Drehende elektrische Maschinen  
 Teil 3: Besondere Anforderungen an  
 Dreiphasen-Turbogeneratoren  
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This European Standard was approved by CENELEC on 1995-09-20. 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.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

# 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 International Standard IEC 34-3:1988, prepared by SC 2A, Turbine-type generators, of IEC TC 2, Rotating machinery, was approved by CENELEC as HD 53.3 S1 on 1990-12-10.

This Harmonization Document was submitted to the formal vote for conversion into a European Standard and was approved by CENELEC as EN 60034-3 on 1995-09-20.

The following date was 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) 1996-10-01

Annexes designated "normative" are part of the body of the standard.  
In this standard, annex ZA is normative.  
Annex ZA has been added by CENELEC.

### Endorsement notice

The text of the International Standard IEC 34-3:1988 was approved by CENELEC as a European Standard without any modification.

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#### Editorial corrections to IEC 34-3

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#### 14 Overcurrent requirements

In the fourth paragraph, replace the formula by:

$$(\sqrt{2} - 1)t = 37,5 \text{ s}$$

#### 16.1 Short-circuit ratio

Replace "clauses 18 and 26" by "clauses 19 and 26".

#### 35.2.3 Peak capability

Amend the first line as follows:

The peak capability (see figure 3) is the range of continuous outputs ...

**Annex ZA (normative)****Normative references to international publications  
with their corresponding European publications**

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

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 45	1970	Specification for steam turbines	-	-

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1988

**Machines électriques tournantes**

**Troisième partie:**  
Règles spécifiques pour les turbomachines  
synchrones

**iTeh STANDARD PREVIEW**  
(**Rotating electrical machines**)

**Part 3:** EN 60034-3:1999

<https://standards.iteh.ai/catalog/standards/sist-en-60034-3-1999>  
**Specific requirements for turbine-type  
synchronous machines**

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Commission Electrotechnique Internationale  
International Electrotechnical Commission  
Международная Электротехническая Комиссия

CODE PRIX  
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Pour prix, voir catalogue en vigueur  
For price, see current catalogue

Clause

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LIQUID-COOLED MACHINES

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- Part 4: Methods for Determining Synchronous Machine Quantities from Tests, issued as IEC Publication 34-4.
- Part 5: Classification of Degrees of Protection provided by Enclosures for Rotating Machines, issued as IEC Publication 34-5.
- Part 6: Methods of Cooling Rotating Machinery, issued as IEC Publication 34-6.
- Part 7: Symbols for Types of Construction and Mounting Arrangements of Rotating Electrical Machinery, issued as IEC Publication 34-7.
- Part 8: Terminal Markings and Direction of Rotation of Rotating Machines, issued as IEC Publication 34-8.
- Part 9: Noise Limits, issued as IEC Publication 34-9.
- Part 10: Conventions for Description of Synchronous Machines, issued as IEC Publication 34-10.
- Part 11: Built-in Thermal Protection, Chapter 1: Rules for Protection of Rotating Electrical Machines, issued as IEC Publication 34-11.
- Part 12: Starting Performance of Single-speed Three-phase Cage Induction Motors for Voltages up to, and including 600 V, issued as IEC Publication 34-12.
- Part 13: Specification for Mill Auxiliary Motors, issued as IEC Publication 34-13.
- Part 14: Mechanical Vibration of Certain Machines with Shaft Heights 56 mm and Higher - Measurement, Evaluation and Limits of the Vibration Severity, issued as IEC Publication 34-14.

*The following IEC publications are quoted in this standard:*

Publication No. 45 (1970): Specification for Steam Turbines.

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### 3. Rated voltage

The rated voltage shall be fixed by agreement.

### 4. Rated speed

The rated speed shall be 1 500 rev/min or 3 000 rev/min for 50 Hz machines, and 1 800 rev/min or 3 600 rev/min for 60 Hz machines.

### 5. Ranges of voltage and frequency

Machines shall be capable of continuous rated output at the rated power factor over the ranges of  $\pm 5\%$  in voltage and  $\pm 2\%$  in frequency, as defined by the shaded area of Figure 1.

The temperature rise limits in Tables I and II, or the total temperature limits in Table III of IEC Publication 34-1 shall apply at the rated voltage and frequency only.

*Notes* 1.- As the operating point moves away from the rated values of voltage and frequency, the temperature rise or total temperatures may progressively increase. Continuous operation at rated output at certain parts of the boundary of the shaded area causes temperature rises to increase by up to 10 K approximately. Machines will also carry output at rated power factor within the ranges of  $\pm 5\%$  in voltage and  $+3\%/-5\%$  in frequency, as defined by the outer boundary of Figure 1, but temperature rises will be further increased.

2.- Therefore, to minimise the reduction of the machine's lifetime due to the effects of temperature or temperature differences, operation outside the shaded area should be limited in extent, duration and frequency of occurrence. The output should be reduced or other corrective measures taken as soon as practicable.

If operation over a still wider range of voltage or frequency is required, this should be the subject of an agreement.

3.- It is considered that overvoltage together with low frequency, or low voltage with overfrequency, are unlikely operating conditions. The former is the condition most likely to increase the temperature rise of the field winding.

Figure 1 shows operation in these quadrants restricted to conditions that will cause the machine and its transformer to be over- or under-fluxed by no more than 5%.

10 times the rated field voltage, with a minimum of 1 500 V;

- for rated field voltages above 500 V:  
4 000 V + twice the rated field voltage.

#### 10. Insulation against shaft current

Suitable precautions shall be taken to prevent harmful flow of shaft current and to earth the rotor shaft adequately. Any insulation needed shall preferably be arranged so that it can be measured while the machine is operating.

#### 11. Overspeed test

Rotors of turbine-type machines shall be tested at 1.2 times rated speed for 2 min.

#### 12. Critical speeds

Critical speeds of the rotor assembly of the complete set shall not cause unsatisfactory operation within the speed range corresponding to the frequency range agreed in accordance with Clause 5 (see IEC Publication 45). (standards.iteh.ai)

#### 13. Capability diagram

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The manufacturer shall supply a capability diagram indicating the limits of operation set by temperatures or temperature rises and, if appropriate, by steady-state stability. The diagram will be drawn for operation at rated voltage and frequency, and, for a hydrogen-cooled machine, at rated hydrogen pressure.

A typical diagram is shown in Figure 2. Its boundaries are set by the following limitations:

- Curve A represents operation with constant rated field current and therefore with approximately constant temperature rise of the field winding;
- Curve B represents constant rated stator current and consequently approximately constant temperature rise of the stator winding;
- Curve C indicates the limit set by localized end region heating, or by steady-state stability, or by a combination of both effects.

By agreement between the manufacturer and the purchaser, other diagrams may be provided for operation at agreed conditions within the voltage and frequency ranges agreed in accordance with Clause 5, and for hydrogen pressures other than rated pressure.