

**SLOVENSKI STANDARD
SIST EN IEC 60034-3:2020****01-november-2020****Nadomešča:
SIST EN 60034-3:2008****Električni rotacijski stroji - 3. del: Posebne zahteve za sinhronske generatorje, ki jih poganjajo parne ali plinske turbine, in za sinhronske kompenzatorje (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 60034-3:2020)

iTeh STANDARD PREVIEW

(standards.iteh.ai)
Drehende elektrische Maschinen - Teil 3: Besondere Anforderungen an Synchrongeneratoren, angetrieben durch Dampfturbinen oder Gasturbinen, und an synchrone Phasenschieber (IEC 60034-3:2020)

<https://standards.iteh.ai/catalog/standards/sist/3655bbda-ca34-481a-8a30-ce21c615a231/sist-en-iec-60034-3-2020>

Machines électriques tournantes - Partie 3: Exigences spécifiques pour les alternateurs synchrones entraînés par des turbines à vapeur ou par des turbines à gaz et pour les compensateurs synchrones (IEC 60034-3:2020)

Ta slovenski standard je istoveten z: EN IEC 60034-3:2020**ICS:**

| | | |
|-----------|---|--|
| 27.040 | Plinske in parne turbine. Parni stroji | Gas and steam turbines. Steam engines |
| 29.160.20 | Generatorji | Generators |

SIST EN IEC 60034-3:2020**en,fr,de**

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN IEC 60034-3:2020

<https://standards.iteh.ai/catalog/standards/sist/3655bbda-ca34-481a-8a30-ce21c615a231/sist-en-iec-60034-3-2020>

EUROPEAN STANDARD

EN IEC 60034-3

NORME EUROPÉENNE

EUROPÄISCHE NORM

July 2020

ICS 29.160.01

Supersedes EN 60034-3:2008 and all of its amendments
and corrigenda (if any)

English Version

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

Machines électriques tournantes - Partie 3: Exigences
spécifiques pour les alternateurs synchrones entraînés par
des turbines à vapeur ou par des turbines à gaz et pour les
compensateurs synchrones
(IEC 60034-3:2020)

Drehende elektrische Maschinen - Teil 3: Besondere
Anforderungen an Synchrongeneratoren, angetrieben durch
Dampfturbinen oder Gasturbinen, und an synchrone
Phasenschieber
(IEC 60034-3:2020)

This European Standard was approved by CENELEC on 2020-06-30. 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 CEN-CENELEC Management Centre 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 CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.



European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

EN IEC 60034-3:2020 (E)**European foreword**

The text of document 2/1987/FDIS, future edition 7 of IEC 60034-3, prepared by IEC/TC 2 "Rotating machinery" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 60034-3:2020.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2021-03-30
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2023-06-30

This document supersedes EN 60034-3:2008 and all of its amendments and corrigenda (if any).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

iTeh STANDARD PREVIEW
Endorsement notice
(standards.iteh.ai)

The text of the International Standard IEC 60034-3:2020 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated:

IEC 60079-0 NOTE Harmonized as EN IEC 60079-0

Annex ZA

(normative)

Normative references to international publications with their corresponding European publications

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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

| <u>Publication</u> | <u>Year</u> | <u>Title</u> | <u>EN/HD</u> | <u>Year</u> |
|--------------------|-------------|---|------------------|-------------|
| IEC 60034-1 | 2017 | Rotating electrical machines - Part 1: Rating and performance | - | - |
| IEC 60034-4-1 | - | Rotating electrical machines - Part 4-1: Methods for determining electrically excited synchronous machine quantities from tests | EN IEC 60034-4-1 | - |
| IEC 60045-1 | - | Steam turbines - Part 1: Specifications | EN IEC 60045-1 | - |
| IEC 60079 | series | Explosive atmospheres | EN IEC 60079 | series |
| IEC 60085 | - | Electrical insulation - Thermal evaluation and designation | EN 60085 | - |

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN IEC 60034-3:2020](#)

<https://standards.iteh.ai/catalog/standards/sist/3655bbda-ca34-481a-8a30-ce21c615a231/sist-en-iec-60034-3-2020>



IEC 60034-3

Edition 7.0 2020-05

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Rotating electrical machines –
Part 3: Specific requirements for synchronous generators driven by steam
turbines or combustion gas turbines and for synchronous compensators

Machines électriques tournantes –
Partie 3: Exigences spécifiques pour les alternateurs synchrones entraînés
par des turbines à vapeur ou par des turbines à gaz et pour les compensateurs
synchrones

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 29.160.01

ISBN 978-2-8322-8084-3

Warning! Make sure that you obtained this publication from an authorized distributor.
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.

CONTENTS

| | |
|--|----|
| FOREWORD | 5 |
| 1 Scope | 7 |
| 2 Normative references | 7 |
| 3 Terms and definitions | 8 |
| 4 General | 8 |
| 4.1 General rules | 8 |
| 4.2 Rated conditions | 9 |
| 4.2.1 Generators | 9 |
| 4.2.2 Compensators | 9 |
| 4.3 Rated voltage | 9 |
| 4.4 Power factor | 9 |
| 4.5 Rated speed | 10 |
| 4.6 Ranges of voltage and frequency | 10 |
| 4.7 Direction of rotation | 11 |
| 4.8 Stator winding, output voltage | 11 |
| 4.9 Winding insulation | 11 |
| 4.9.1 Insulation systems, thermal class | 11 |
| 4.9.2 Withstand voltage tests | 11 |
| 4.10 Insulation against shaft current | 12 |
| 4.11 Overspeed test | 12 |
| 4.12 Critical speeds | 12 |
| 4.13 <i>P-Q</i> capability diagram | 12 |
| 4.14 Overcurrent requirements | 14 |
| 4.14.1 General | 14 |
| 4.14.2 Stator current | 14 |
| 4.14.3 Rotor field current | 14 |
| 4.15 Unbalanced currents and current harmonics capability | 15 |
| 4.15.1 Negative sequence current | 15 |
| 4.15.2 Current harmonics | 15 |
| 4.16 Sudden short circuit | 16 |
| 4.17 Synchronisation | 16 |
| 4.18 Short circuit ratio (SCR) | 17 |
| 4.19 Direct axis transient and subtransient reactances | 17 |
| 4.20 Tolerances on short circuit ratio and direct axis transient and subtransient reactances | 17 |
| 4.21 Mechanical conditions for rotors | 17 |
| 4.21.1 Number of starts | 17 |
| 4.21.2 Turning gear operation | 18 |
| 4.22 Coolers | 18 |
| 5 Air-cooled generators or compensators | 18 |
| 5.1 General | 18 |
| 5.2 Cooling system | 18 |
| 5.3 Temperature of primary coolant | 19 |
| 5.3.1 General | 19 |
| 5.3.2 Temperature detectors | 19 |
| 6 Hydrogen-cooled or liquid-cooled generators or compensators | 19 |

| | | |
|--------------|---|----|
| 6.1 | General..... | 19 |
| 6.2 | Hydrogen pressure and purity in the casing | 19 |
| 6.3 | Machine housing and cover plates | 20 |
| 6.4 | Stator winding terminals..... | 20 |
| 6.5 | Temperature of primary coolants, temperatures and temperature rises | 20 |
| 6.6 | Temperature detectors..... | 20 |
| 6.7 | Auxiliary systems | 21 |
| 7 | Generators for combustion gas turbines or combined cycle applications | 21 |
| 7.1 | General..... | 21 |
| 7.2 | Service conditions..... | 21 |
| 7.2.1 | General | 21 |
| 7.2.2 | Primary coolant temperature..... | 22 |
| 7.2.3 | Number of starts..... | 22 |
| 7.2.4 | Application of load | 22 |
| 7.3 | Rated output | 22 |
| 7.4 | Capabilities | 22 |
| 7.4.1 | General | 22 |
| 7.4.2 | Base capability | 22 |
| 7.4.3 | Temperature rise and temperatures at base capability | 24 |
| 7.4.4 | Peak capability | 24 |
| 7.5 | Rating plate | 25 |
| 7.6 | Temperature tests..... | 25 |
| Annex A | (normative) Precautions to be taken when using hydrogen- cooled synchronous generators or compensators..... | 26 |
| A.1 | General..... | 26 |
| A.2 | Hydrogen purity | 26 |
| A.3 | Normal operating conditions..... | 26 |
| A.4 | Protective measures for sliprings and coupled exciters | 26 |
| A.5 | Auxiliary equipment | 27 |
| A.5.1 | General | 27 |
| A.5.2 | Degassing tanks | 27 |
| A.5.3 | Gas dryer | 27 |
| A.5.4 | Instrumentation, control devices | 27 |
| A.5.5 | Electrical connections..... | 27 |
| A.5.6 | Containment of hydrogen..... | 28 |
| A.5.7 | Accumulation of hydrogen-air mixture | 29 |
| A.5.8 | Vent pipes | 29 |
| A.5.9 | Adjacent area | 29 |
| A.6 | Operation of the generator and its auxiliary equipment..... | 29 |
| A.6.1 | Sources of ignition..... | 29 |
| A.6.2 | Hydrogen-air mixture | 29 |
| A.6.3 | Air or hydrogen displacement | 29 |
| A.6.4 | Seal oil supply and hydrogen pressure | 30 |
| A.6.5 | Gas tightness | 30 |
| A.6.6 | Water system | 31 |
| A.7 | Guidance for adequate ventilation..... | 31 |
| Bibliography | | 33 |
| Figure 1 | – Operation over ranges of voltage and frequency | 10 |

| | |
|---|----|
| Figure 2 – Typical P - Q capability diagram of a generator | 13 |
| Figure 3 – Typical generator capability curves | 23 |
| Figure A.1 – Example of a large hydrogen supply unit feeding one or more generators (simplified diagram) | 32 |

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN IEC 60034-3:2020](https://standards.iteh.ai/catalog/standards/sist/3655bbda-ca34-481a-8a30-ce21c615a231/sist-en-iec-60034-3-2020)

[https://standards.iteh.ai/catalog/standards/sist/3655bbda-ca34-481a-8a30-
ce21c615a231/sist-en-iec-60034-3-2020](https://standards.iteh.ai/catalog/standards/sist/3655bbda-ca34-481a-8a30-ce21c615a231/sist-en-iec-60034-3-2020)

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ROTATING ELECTRICAL MACHINES –

**Part 3: Specific requirements for synchronous generators
driven by steam turbines or combustion gas turbines
and for synchronous compensators**

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.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 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 60034-3 has been prepared by IEC technical committee 2: Rotating machinery.

This seventh edition cancels and replaces the sixth edition published in 2007. This edition constitutes a technical revision.

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

- a) title modified;
- b) scope extended to synchronous compensators;
- c) rotor overcurrent requirements added;
- d) impact of stator harmonics on rotor unbalanced load capability introduced;
- e) synchronisation requirements added;

- f) adjustments of temperatures or temperature rise revised for gas turbine applications;
- g) requirements for auxiliaries updated.

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

| FDIS | Report on voting |
|-------------|------------------|
| 2/1987/FDIS | 2/1993/RVD |

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts of 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 "<http://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.

ITeH STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN IEC 60034-3:2020](https://standards.iteh.ai/catalog/standards/sist/3655bbda-ca34-481a-8a30-ce21c615a231/sist-en-iec-60034-3-2020)

<https://standards.iteh.ai/catalog/standards/sist/3655bbda-ca34-481a-8a30-ce21c615a231/sist-en-iec-60034-3-2020>