



NSAI
Standards

Irish Standard
I.S. EN 60034-3:2008

Rotating electrical machines -- Part 3:
Specific requirements for synchronous
generators driven by steam turbines or
combustion gas turbines (IEC 60034
-3:2007 (EQV))

I.S. EN 60034-3:2008

Incorporating amendments/corrigenda issued since publication:

<i>This document replaces:</i> EN 60034-3:2005	<i>This document is based on:</i> EN 60034-3:2008 EN 60034-3:2005	<i>Published:</i> 11 July, 2008 29 July, 2005
This document was published under the authority of the NSAI and comes into effect on: 12 January, 2010		ICS number: 29.160
NSAI 1 Swift Square, Northwood, Santry Dublin 9	T +353 1 807 3800 F +353 1 807 3838 E standards@nsai.ie W NSAI.ie	Sales: T +353 1 857 6730 F +353 1 857 6729 W standards.ie
Údarás um Chaighdeáin Náisiúnta na hÉireann		

EUROPEAN STANDARD

EN 60034-3

NORME EUROPÉENNE

EUROPÄISCHE NORM

July 2008

ICS 29.160

Supersedes EN 60034-3:2005

English version

**Rotating electrical machines -
Part 3: Specific requirements for synchronous generators
driven by steam turbines or combustion gas turbines
(IEC 60034-3:2007)**

Machines électriques tournantes -
Partie 3: Règles spécifiques pour
les alternateurs synchrones entraînés
par turbines à vapeur ou par turbines
à gaz à combustion
(CEI 60034-3:2007)

Drehende elektrische Maschinen -
Teil 3: Besondere Anforderungen
an Synchrongeneratoren angetrieben
durch Dampfturbinen oder Gasturbinen
(IEC 60034-3:2007)

This European Standard was approved by CENELEC on 2008-06-01. 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, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the 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

I.S. EN 60034-3:2008

EN 60034-3:2008

- 2 -

Foreword

The text of document 2/1461/FDIS, future edition 6 of IEC 60034-3, prepared by IEC TC 2, Rotating machinery, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60034-3 on 2008-06-01.

This European Standard supersedes EN 60034-3:2005.

The significant technical changes with respect to EN 60034-3:2005 are as follows:

- the contents is now restricted to synchronous generators driven by steam turbines or combustion gas turbines, but covers as well cylindrical rotor and salient-pole generators;
- synchronous motors have been taken out of the scope of Part 3.

The following dates were 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) 2009-03-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2011-06-01

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60034-3:2007 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 60034-8 NOTE Harmonized as EN 60034-8:2007 (not modified).

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

The following referenced documents are indispensable for the application 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 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 60034-1	- ¹⁾	Rotating electrical machines - Part 1: Rating and performance	EN 60034-1	2004 ²⁾
IEC 60034-4	- ¹⁾	Rotating electrical machines - Part 4: Methods for determining synchronous machine quantities from tests	EN 60034-4	1995 ²⁾
IEC 60045-1	- ¹⁾	Steam turbines - Part 1: Specifications	EN 60045-1	1993 ²⁾
IEC 60079 (mod)	Series	Explosive atmospheres	EN 60079	Series

¹⁾ Undated reference.

²⁾ Valid edition at date of issue.

This page is intentionally left BLANK.

CONTENTS

FOREWORD.....	4
1 Scope.....	6
2 Normative references	6
3 Terms and definitions	6
4 General	7
4.1 General rules	7
4.2 Rated conditions	7
4.3 Rated voltage	7
4.4 Power factor	7
4.5 Rated speed	7
4.6 Ranges of voltage and frequency	8
4.7 Direction of rotation.....	8
4.8 Stator winding	9
4.9 Generator rated field current and voltage	9
4.10 Winding insulation	9
4.10.1 Thermal class	9
4.10.2 Withstand voltage tests	9
4.11 Insulation against shaft current.....	9
4.12 Over-speed test.....	9
4.13 Critical speeds	9
4.14 P-Q capability diagram	9
4.15 Overcurrent requirements.....	11
4.16 Sudden short circuit	11
4.17 Short-circuit ratio.....	12
4.18 Direct axis transient and subtransient reactances for generators	12
4.19 Tolerances on short-circuit ratio and direct axis transient and subtransient reactances	12
4.20 Mechanical conditions for rotors.....	12
4.20.1 Number of starts	12
4.20.2 Turning gear operation	12
4.21 Coolers	13
5 Air-cooled generators	13
5.1 General.....	13
5.2 Generator cooling.....	13
5.3 Temperature of primary coolant.....	13
5.3.1 Temperature detectors	14
6 Hydrogen-cooled or liquid-cooled generators.....	14
6.1 General	14
6.2 Hydrogen pressure and purity in the casing.....	14
6.3 Generator housing and cover plates	14
6.4 Stator winding terminals	14
6.5 Temperature of primary coolants, temperatures and temperature rises of the generator	14
6.6 Temperature detectors	15
6.7 Auxiliary system	15

7	Generators for combustion gas turbines or combined cycle applications	16
7.1	General	16
7.2	Service conditions	16
7.2.1	General	16
7.2.2	Primary coolant temperature	16
7.2.3	Number of starts	16
7.2.4	Application of load	16
7.3	Rated output	16
7.4	Capabilities	17
7.4.1	General	17
7.4.2	Base capability	17
7.4.3	Temperature rise and temperature at base capability	18
7.4.4	Peak capability	19
7.5	Rating plate	19
7.6	Temperature tests	19
	Annex A (normative) Precautions to be taken when using hydrogen cooled turbine-driven synchronous generators	20
	Bibliography	27
	Figure 1 – Operation over ranges of voltage and frequency	8
	Figure 2 – Typical P-Q capability diagram	10
	Figure 3 – Typical generator capability curves	18
	Figure A.1 – Example of a large hydrogen supply unit feeding one or more generators (simplified diagram)	26

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ROTATING ELECTRICAL MACHINES –

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

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 provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
- 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 sixth edition cancels and replaces the fifth edition published in 2005. This edition constitutes a technical revision. The significant technical changes with respect to the previous edition are as follows:

- the contents is now restricted to synchronous generators driven by steam turbines or combustion gas turbines, but covers as well cylindrical rotor and salient-pole generators;
- synchronous motors have been taken out of the scope of part 3.

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

FDIS	Report on voting
2/1461/FDIS	2/1474/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 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 publication will remain unchanged until the maintenance result date indicated on the IEC web site 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.

ROTATING ELECTRICAL MACHINES –

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

1 Scope

This part of IEC 60034 applies to three-phase synchronous generators, having rated outputs of 10 MVA and above driven by steam turbines or combustion gas turbines. It supplements the basic requirements for rotating machines given in IEC 60034-1.

Common requirements are prescribed together with specific requirements for air, for hydrogen or for liquid cooled synchronous generators.

This part of IEC 60034 also gives the precautions to be taken when using hydrogen cooled generators including:

- rotating exciters driven by synchronous generators;
- auxiliary equipment needed for operating the generators;
- parts of the building where hydrogen might accumulate.

NOTE 1 These requirements also apply to a synchronous generator driven by both a steam turbine and a combustion gas turbine as part of a single shaft combined cycle unit.

NOTE 2 These requirements do not apply to synchronous generators driven by water (hydraulic) turbine or wind turbine.

NOTE 3 The precautions to be taken when using hydrogen are valid for all cases where hydrogen is used as a coolant.

2 Normative references

The following referenced documents are indispensable for the application 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 60034-1, *Rotating electrical machines – Part 1: Rating and performance*

IEC 60034-4, *Rotating electrical machines – Part 4: Methods for determining synchronous machine quantities from tests*

IEC 60045-1, *Steam turbines – Part 1: Specifications*

IEC 60079 (all parts), *Electrical apparatus for explosive gas atmospheres*

3 Terms and definitions

For the purposes of this document, the terms and definitions in IEC 60034-1 together with the following additions apply.

This is a free preview. Purchase the entire publication at the link below:

[Product Page](#)

-
- [Looking for additional Standards? Visit Intertek Inform Infostore](#)
 - [Learn about LexConnect, All Jurisdictions, Standards referenced in Australian legislation](#)
-