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## REDLINE VERSION

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### **Roterande elektriska maskiner – Del 11: Termiskt skydd**

*Rotating electrical machines –  
Part 11: Thermal protection*

En så kallad ”Redline version” (RLV) innehåller både standarden som fastställts som SEK-publication och en ändringsmarkerad IEC-standard. Alla tillägg och borttagningar sedan den tidigare utgåvan av IEC-standarderna är markerade med färg. Med en RLV sparar du mycket tid när du ska identifiera och bedöma aktuella ändringar i standarderna. SEK Svensk Elstandard kan bara ge ut RLV i de fall den finns tillgänglig från IEC.



IEC 60034-11

Edition 3.0 2020-10  
REDLINE VERSION

# INTERNATIONAL STANDARD



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**Rotating electrical machines –  
Part 11: Thermal protection**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

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ICS 29.160.01

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

## ROTATING ELECTRICAL MACHINES –

## Part 11: Thermal protection

## 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.

**This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.**

International Standard IEC 60034-11 has been prepared by IEC technical committee 2: Rotating machinery.

This third edition cancels and replaces the second edition, published in 2004. This edition constitutes a technical revision.

The main changes with respect to the previous edition are

- the additional specification of winding temperature limits for temperature class 200 (N),
- the increased limits of maximum winding temperatures for overloads with rapid variation,
- the clarification that the motor winding may be permanently damaged after it has been exposed to temperatures according to Table 2,
- a clarification of scope,
- a clarification of the definition of indirect thermal protection,
- a clarifying note in Clause 6,
- the conversion of note 3 in Clause 6 into normal text including changes in wording,
- the incorporation of note 3 in Clause 5 into Clause 2,
- a clarification on the test methods for larger motors in 8.3.

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

FDIS	Report on voting
2/2011/FDIS	2/2019/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 in the 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.

**IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.**

## INTRODUCTION

Thermal protection systems are based on the principle of protecting or monitoring the vulnerable machine parts against excessive temperatures. This requires the selection of the appropriate thermal protection device to suit both the type of protection required and the machine component to be protected. This document does not detail the protection methods available or specify the protection method to be used for particular applications, but instead it specifies the temperature of the protected parts that should not be exceeded if a fault or machine abuse occurs.

The requirements are not intended to guarantee a "normal" machine life for all conditions of use, but rather to avoid both failure and accelerated premature thermal ageing of the winding insulation. The requirements result from a compromise, since the level of protection should neither be set so low that it causes nuisance tripping nor so high that it allows continuous working at temperatures that will seriously affect the life of the winding insulation.

Normal insulation life can only be ensured by correct motor application and maintenance. Frequent operation at above the normal temperature limits, see IEC 60034-1, which cannot be prevented by built-in thermal protection without risking nuisance tripping may lead to a noticeable reduction in machine life. ~~It should be noted that~~ The life of the winding insulation is approximately halved for every 8 K to 10 K increase in the continuous operating temperature.

The requirement to incorporate thermal protection in a machine is a matter for agreement. The application of this document ~~should be~~ is a matter of agreement between the user and the machine manufacturer.

# ROTATING ELECTRICAL MACHINES –

## Part 11: Thermal protection

### 1 Scope

This part of IEC 60034 specifies requirements relating to the use of thermal protectors and thermal detectors incorporated into the stator windings or placed in other suitable positions in induction machines in order to protect them against serious damage due to thermal overloads. ~~It applies to machines manufactured in accordance with IEC 60034-12 with the voltage limits specified in IEC 60034-12. The protection of bearings and other mechanical parts is not included.~~ It applies to single-speed three-phase 50 Hz or 60 Hz cage induction motors in accordance with IEC 60034-1 and IEC 60034-12 that:

- have a rated voltage up to 1 000 V;
- are intended for direct-on-line or star-delta starting.

Not included are:

- direct protection of the rotor winding; the methods of protection only protect rotor windings indirectly; for large motors (particularly 2 pole motors) and for motors starting large inertia loads, special attention is given to rotor heating both when starting and especially after a "trip" has occurred;
- the protection of bearings and other mechanical parts;
- the protection methods to be used for particular applications.

NOTE 1 Although temperature values given in this document are higher than those specified in IEC 60034-1, they are not in conflict.

NOTE 2 Additional requirements may apply to particular motor types, such as those used in household appliances, or for motors used in explosive atmospheres.

### 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.

IEC 60034-1:~~2004~~2017, *Rotating electrical machines – Part 1: Rating and performance*

IEC 60034-12:~~2002~~2016, *Rotating electrical machines – Part 12: Starting performance of single-speed three-phase cage induction motors*

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## Roterande elektriska maskiner – Del 11: Termiskt skydd

*Rotating electrical machines –  
Part 11: Thermal protection*

Som svensk standard gäller europastandarden EN IEC 60034-11:2024. Den svenska standarden innehåller den officiella engelska språkversionen av EN IEC 60034-11:2024.

### Nationellt förord

Europastandarden EN IEC 60034-11:2024

består av:

- **europastandardens ikraftsättningsdokument**, utarbetat inom CENELEC
- **IEC 60034-11, Third edition, 2020 - Rotating electrical machines - Part 11: Thermal protection**

utarbetad inom International Electrotechnical Commission, IEC.

Tidigare fastställd svensk standard SS-EN 60034-11, utg 1:2005 med eventuella tillägg, ändringar och rättelser gäller ej fr o m 2027-11-30.

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Denna standard är fastställd av SEK Svensk Elstandard, som också kan lämna upplysningar om **sakinnehållet** i standarden.  
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## Standarder underlättar utvecklingen och höjer elsäkerheten

Det finns många fördelar med att ha gemensamma tekniska regler för bl a mätning, säkerhet och provning och för utförande, skötsel och dokumentation av elprodukter och elanläggningar.

Genom att utforma sådana standarder blir säkerhetsfordringar tydliga och utvecklingskostnaderna rimliga samtidigt som marknadens acceptans för produkten eller tjänsten ökar.

Många standarder inom elområdet beskriver tekniska lösningar och metoder som åstadkommer den elsäkerhet som föreskrivs av svenska myndigheter och av EU.

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SEK Svensk Elstandard svarar för standardiseringen inom elområdet i Sverige och samordnar svensk medverkan i internationell och europeisk standardisering. SEK är en ideell organisation med frivilligt deltagande från svenska myndigheter, företag och organisationer som vill medverka till och påverka utformningen av tekniska regler inom elektrotekniken.

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## Stora delar av arbetet sker internationellt

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Standardiseringsarbetet inom SEK är organiserat i referensgrupper bestående av ett antal tekniska kommittéer som speglar hur arbetet inom IEC och CENELEC är organiserat.

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Den som deltar i SEKs tekniska kommittéarbete har möjlighet att påverka framtida standarder och får tidig tillgång till information och dokumentation om utvecklingen inom sitt teknikområde. Arbetet och kontakterna med kollegor, kunder och konkurrenter kan gynnsamt påverka enskilda företags affärsutveckling och bidrar till deltagarnas egen kompetensutveckling.

Du som vill dra nytta av dessa möjligheter är välkommen att kontakta SEKs kansli för mer information.

## SEK Svensk Elstandard

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English Version

Rotating electrical machines - Part 11: Thermal protection  
(IEC 60034-11:2020)

Machines électriques tournantes - Partie 11: Protection  
thermique  
(IEC 60034-11:2020)

Drehende elektrische Maschinen - Teil 11: Thermischer  
Schutz  
(IEC 60034-11:2020)

This European Standard was approved by CENELEC on 2024-09-25. 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, Türkiye 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

## **European foreword**

The text of document 2/2011/FDIS, future edition 3 of IEC 60034-11, prepared by TC 2 "Rotating machinery" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 60034-11:2024.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical standard or by endorsement (dop) 2025-11-30
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2027-11-30

This document supersedes EN 60034-11:2004 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.

Any feedback and questions on this document should be directed to the users' national committee. A complete listing of these bodies can be found on the CENELEC website.

### **Endorsement notice**

The text of the International Standard IEC 60034-11:2020 was approved by CENELEC as a European Standard without any modification.

## 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.cencenelec.eu](http://www.cencenelec.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 60034-12	2016	Rotating electrical machines - Part 12: Starting performance of single-speed three-phase cage induction motors	EN 60034-12	2017



# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

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**Rotating electrical machines –  
Part 11: Thermal protection**

**Machines électriques tournantes –  
Partie 11: Protection thermique**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

COMMISSION  
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INTERNATIONALE

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

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- the increased limits of maximum winding temperatures for overloads with rapid variation,
- the clarification that the motor winding may be permanently damaged after it has been exposed to temperatures according to Table 2,
- a clarification of scope,
- a clarification of the definition of indirect thermal protection,
- a clarifying note in Clause 6,
- the conversion of note 3 in Clause 6 into normal text including changes in wording,

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## INTRODUCTION

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The requirement to incorporate thermal protection in a machine is a matter for agreement. The application of this document is a matter of agreement between the user and the machine manufacturer.

# ROTATING ELECTRICAL MACHINES –

## Part 11: Thermal protection

### 1 Scope

This part of IEC 60034 specifies requirements relating to the use of thermal protectors and thermal detectors incorporated into the stator windings or placed in other suitable positions in induction machines in order to protect them against serious damage due to thermal overloads. It applies to single-speed three-phase 50 Hz or 60 Hz cage induction motors in accordance with IEC 60034-1 and IEC 60034-12 that:

- have a rated voltage up to 1 000 V;
- are intended for direct-on-line or star-delta starting.

Not included are:

- direct protection of the rotor winding; the methods of protection only protect rotor windings indirectly; for large motors (particularly 2 pole motors) and for motors starting large inertia loads, special attention is given to rotor heating both when starting and especially after a "trip" has occurred;
- the protection of bearings and other mechanical parts;
- the protection methods to be used for particular applications.

NOTE 1 Although temperature values given in this document are higher than those specified in IEC 60034-1, they are not in conflict.

NOTE 2 Additional requirements may apply to particular motor types, such as those used in household appliances, or for motors used in explosive atmospheres.

### 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.

IEC 60034-1:2017, *Rotating electrical machines – Part 1: Rating and performance*

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