SLOVENSKI STANDARD

SIST EN 60034-30-1:2014

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Električni rotacijski stroji - 30-1. del: Razredi izkoristka enohitrostnih trifaznih motorjev s kratkostično kletko (koda IE) (IEC 60034-30-1:2014)

Rotating electrical machines - Part 30-1: Efficiency classes of single-speed, three-phase, cage-induction motors (IE code) (IEC 60034-30-1:2014)

Drehende elektrische Maschinen - Teil 30-1: Wirkungrad-Klassifizierung von netzgespeisten Drehstrommotoren (IE-Code) (IEC 60034-30-1:2014)

Machines électriques tournantes - Partie 30-1: Classes de rendement pour les moteurs à courant alternatif alimentés par le réseau (Code IE) (IEC 60034-30-1:2014)

Ta slovenski standard je istoveten z: **EN 60034-30-1:2014**

ICS:

29.160.30	Motorji	Motors

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NORME EUROPÉENNE

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EN 60034-30-1

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Supersedes EN 60034-30:2009, CLC/TS 60034-31:2011 (partially)

English Version

Rotating electrical machines - Part 30-1: Efficiency classes of line operated AC motors (IE code) (IEC 60034-30-1:2014)

Machines électriques tournantes - Partie 30-1: Classes de rendement pour les moteurs à courant alternatif alimentés par le réseau (code IE)
(CEI 60034-30-1:2014)

Drehende elektrische Maschinen - Teil 30-1: Wirkungrad-Klassifizierung von netzgespeisten Drehstrommotoren (IE-Code)
(IEC 60034-30-1:2014)

This European Standard was approved by CENELEC on 2014-04-10. 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.

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Ref. No. EN 60034-30-1:2014 E

Foreword

The text of document 2/1729/FDIS, future edition 1 of IEC 60034-30-1, prepared by IEC/TC 2 "Rotating machinery" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60034-30-1:2014.

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)	2015-01-10
–	latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2017-04-10

This document supersedes EN 60034-30:2009 and partially supersedes CLC/TS 60034-31:2011 (Annex A).

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

Endorsement notice

The text of the International Standard IEC 60034-30-1:2014 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60034-5	NOTE	Harmonized as EN 60034-5.
IEC 60034-12	NOTE	Harmonized as EN 60034-12.
IEC/TS 60034-31:2010	NOTE	Harmonized as CLC/TS 60034-31:2011 (not modified).

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE 1 When 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.

Publication	Year	Title	EN/HD	Year
IEC 60034-1	-	Rotating electrical machines Part 1: Rating and performance	EN 60034-1	-
IEC 60034-2-1	-	Rotating electrical machines Part 2-1: Standard methods for determining losses and efficiency from tests (excluding machines for traction vehicles)	EN 60034-2-1	-
IEC 60034-6	-	Rotating electrical machines Part 6: Methods of cooling (IC Code)	EN 60034-6	-
IEC 60038	-	IEC standard voltages	EN 60038	-
IEC 60079-0	-	Explosive atmospheres Part 0: Equipment - General requirements	EN 60079-0	-
IEC/TS 60034-2-3	-	Rotating electrical machines Part 2-3: Specific test methods for determining losses and efficiency of converter-fed AC induction motors	-	-
IEC/TS 60034-25	-	Rotating electrical machines Part 25: Guidance for the design and performance of a.c. motors specifically designed for converter supply	CLC/TS 60034-25	-

IEC 60034-30-1

Edition 1.0 2014-03

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Rotating electrical machines –
Part 30-1: Efficiency classes of line operated AC motors (IE code)

Machines électriques tournantes –
Partie 30-1: Classes de rendement pour les moteurs à courant alternatif alimentés par le réseau (code IE)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ROTATING ELECTRICAL MACHINES –

Part 30-1: Efficiency classes of line operated AC motors (IE code)

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.
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International Standard IEC 60034-30-1 has been prepared by IEC technical committee 2: Rotating machinery.

This first edition of IEC 60034-30-1 cancels and replaces IEC 60034-30 (2008). It also cancels and replaces Annex A of IEC 60034-31 (2010). In the next revision of IEC 60034-31:2010 this annex will be removed from its contents.

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

FDIS	Report on voting
2/1729/FDIS	2/1739/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.

NOTE A table of cross-references of all IEC TC 2 publications can be found on the IEC TC 2 dashboard on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability 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.

INTRODUCTION

This IEC standard provides for the global harmonization of energy-efficiency classes of electric motors. It deals with all kinds of electric motors that are rated for line operation (including starting at reduced voltage). This includes all single- and three-phase low voltage induction motors, regardless of their rated voltage and frequency, as well as line-start permanent-magnet motors.

A second part of this standard series (IEC 60034-30-2) will be prepared for motors rated for variable voltage and frequency supply, such as synchronous motors. The second part will also provide for harmonic voltage losses in motors capable of line operation when fed by frequency converters.

IEC 60034-30-1 widens the product range covered in the first edition of IEC 60034-30 significantly. The power range has been expanded (starting at 0,12 kW and ending at 1 000 kW). All technical constructions of electric motors are covered as long as they are rated for on-line operation and not just three-phase, cage-induction motors as in the first edition.

The IE4 class is newly included in this standard. The informative definition of IE4, which was previously included in IEC/TS 60034-31:2010, is therefore outdated.

The new class IE5 is not yet defined in detail but is envisaged for potential products in a future edition of the standard.

For a given power and frame size it is generally easier to achieve a higher motor efficiency when the motor is designed for and operated directly on-line with a 60 Hz supply frequency rather than on 50 Hz as explained in Note 1.

NOTE 1 As the utilization and size of motors are related to torque rather than power the theoretical power of single-speed motors increases linearly with supply frequency (and hence with speed), i.e. by 20 % from 50 Hz to 60 Hz.

I^2R winding-losses are dominant especially in small and medium sized induction motors. They basically remain constant at 50 Hz and 60 Hz as long as the torque is kept constant. Although windage, friction and iron losses increase with frequency, they play a minor role especially in motors with a number of poles of four and higher. Therefore, at 60 Hz, the losses increase less than the 20 % power increase when compared to 50 Hz and consequently, the efficiency is improved.

In practice, both 60 Hz and 50 Hz power designations of single-speed motors have to conform to standard power levels in accordance with IEC 60072-1 and local standards such as EN 50347. Therefore, an increased rating of motor power by 20 % is not always possible. However the general advantage of 60 Hz still applies when the motor design is optimized for the respective supply frequency rather than just re-rated.

The difference in efficiency between 50 Hz and 60 Hz varies with the number of poles and the size of the motor. In general, the 60 Hz efficiency of three-phase, cage-induction motors in the power range from 0,75 kW up to 375 kW is between 2,5 percentage points to less than 0,5 percentage points greater when compared to the 50 Hz efficiency. Only large 2-pole motors may experience a reduced efficiency at 60 Hz due to their high share of iron, windage and friction losses.

It is not expected that all manufacturers will produce motors for all efficiency classes nor all ratings of a given class.

Users should select the efficiency class in accordance with a given application depending on the actual operating hours. It may not be energy efficient to select motors of a high efficiency class for intermittent or short time duty due to increased inertia and start-up losses.

NOTE 2 The application guide IEC/TS 60034-31:2010 gives further information on useful applications of high-efficient electric motors.

In order to achieve a significant market share it is essential for high-efficiency motors to meet national/regional standards for assigned powers in relation to mechanical dimensions (such as frame-size, flanges). There are a number of national/regional frame assignment standards (EN 50347, JIS C 4212, NBR 17094, NEMA MG13, SANS 1804 and others) but there is no

IEC standard. As this standard (IEC 60034-30-1) defines energy-efficiency classes independent of dimensional constraints it may not be possible in all markets to produce motors with higher efficiency classes and maintain the mechanical dimensions of the national/regional standards.

IE codes are not limited to motors but may be used to classify other components such as frequency converters and gearboxes.

However, it is anticipated that other components are rated with a comparable system: IE1 meaning low efficiency up to IE5 meaning the highest efficiency.

Combinations of components (such as power drive systems) will need a combined efficiency rating. That rating should not be an IE code in order to avoid confusion. It will be defined in other IEC standards.

The efficiency levels in this standard for 50 Hz and 60 Hz are not always entirely consistent across all numbers of poles and over the whole power range.

NOTE 3 The efficiency levels for 60 Hz motors were assigned for compatibility with U.S. legal requirements.

NOTE 4 The efficiency levels for 50 Hz motors between 0,75 kW and 375 kW remain unchanged for compatibility with European legal requirements.