

**Rotating electrical machines -
Part 31: Selection of energy-efficient motors including variable speed
applications -
Application guide
(IEC/TS 60034-31:2010)**

Machines électriques tournantes -
Partie 31: Choix des moteurs
éconergétiques incluant les applications à
vitesse variable -
Guide d'application
(CEI/TS 60034-31:2010)

Drehende elektrische Maschinen -
Teil 31: Auswahl von Energiesparmotoren
einschließlich Drehzahlstellantrieben -
Anwendungsleitfaden
(IEC/TS 60034-31:2010)

This Technical Specification was approved by CENELEC on 2011-02-21.

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CENELEC

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

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Foreword

The text of the Technical Specification IEC/TS 60034-31:2010, prepared by IEC TC 2, Rotating machinery, was submitted to the formal vote and was approved by CENELEC as CLC/TS 60034-31 on 2011-02-21.

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

The following date was fixed:

- latest date by which the existence of the CLC/TS
has to be announced at national level (doa) 2011-08-21

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the Technical Specification IEC/TS 60034-31:2010 was approved by CENELEC as a Technical Specification without any modification.

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

IEC 60034-2-1:2007	NOTE	Harmonized as EN 60034-2-1:2007 (not modified).
IEC 60034-12	NOTE	Harmonized as EN 60034-12.
IEC/TS 60034-17	NOTE	Harmonized as CLC/TS 60034-17.
IEC/TS 60034-25	NOTE	Harmonized as CLC/TS 60034-25.
IEC 60034-26	NOTE	Harmonized as EN 60034-26.
IEC 60079-0	NOTE	Harmonized as EN 60079-0.
IEC 60300-3-3	NOTE	Harmonized as EN 60300-3-3.
IEC 61241-1	NOTE	Harmonized as EN 61241-1.
IEC 61800-2	NOTE	Harmonized as EN 61800-2.

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

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INTRODUCTION

The present technical specification gives technical guidelines for the application of energy-efficient motors in constant-speed and variable speed applications. It does not cover aspects of a purely commercial nature.

Standards developed by IEC technical committee 2 do not deal with methods of how to obtain a high efficiency but with tests to verify the guaranteed value. IEC 60034-2-1 is the most important standard for this purpose.

For approximately 15 years regional agreements were negotiated in many areas of the world regarding efficiency classes of three-phase, cage-induction motors with outputs up to about 200 kW maximum, as motors of this size are installed in high quantities and are for the most part produced in series production. The design of these motors is often driven by the market demand for low investment cost, hence energy efficiency was not a top priority.

In IEC 60034-30, IE efficiency classes for single-speed cage-induction motors have been defined and test procedures specified:

IE1	Standard efficiency
IE2	High efficiency
IE3	Premium efficiency
IE4	Super-premium efficiency

Determination of efficiency for motors powered by a frequency converter will be included in IEC standard 60034-2-3.

However, for motors rated 1 MW and above, which are usually custom made, a high efficiency has always been one of the most important design goals. The full-load efficiency of these machines typically ranges between 95 % and 98 %. Efficiency is usually part of the purchase contract and is penalized if the guaranteed values are not met. Therefore, these higher ratings are of secondary importance when assigning efficiency classes.

With permission from the National Electrical Manufacturers Association (NEMA), some parts of this TS are based on NEMA MG 10, *Energy Management Guide For Selection and Use of Fixed Frequency Medium AC Squirrel-Cage Polyphase Induction Motors*.

ROTATING ELECTRICAL MACHINES –

Part 31: Selection of energy-efficient motors including variable speed applications – Application guide

1 Scope

This part of IEC 60034 provides a guideline of technical aspects for the application of energy-efficient, three-phase, electric motors. It not only applies to motor manufacturers, OEMs (original equipment manufacturers), end users, regulators and legislators but to all other interested parties.

This technical specification is applicable to all electrical machines covered by IEC 60034-30. Most of the information however is also relevant for cage-induction machines with output powers exceeding 375 kW.

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

3 Terms, definitions and symbols

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60034-1 and in IEC 60034-30 apply.

3.2 Symbols

η_n is the nominal efficiency, %

η_N is the rated efficiency, %

f_N is the rated frequency, Hz

n_N is the rated speed, min^{-1}

P_N is the rated output power, kW

T_N is the rated output torque, Nm

U_N is the rated voltage, V