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Standards

Irish Standard
I.S. EN 50598-2:2014&A1:2016

Ecodesign for power drive systems, motor starters, power electronics & their driven applications - Part 2: Energy efficiency indicators for power drive systems and motor starters

I.S. EN 50598-2:2014&A1:2016

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National Foreword

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EUROPEAN STANDARD

EN 50598-2:2014/A1

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Ecodesign for power drive systems, motor starters, power electronics & their driven applications - Part 2: Energy efficiency indicators for power drive systems and motor starters

Ecoconception des entraînements électriques de puissance, des démarreurs de moteur, de l'électronique de puissance et de leurs applications entraînées - Partie 2: Indicateurs d'efficacité énergétique pour les entraînements électriques de puissance (PDS) et les démarreurs de moteur

Ökodesign für Antriebssysteme, Motorstarter, Leistungselektronik und deren angetriebene Einrichtungen - Teil 2: Indikatoren für die Energieeffizienz von Antriebssystemen und Motorstartern

This amendment A1 modifies the European Standard EN 50598-2:2014; it was approved by CENELEC on 2016-06-28. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this amendment 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 amendment 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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, 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: Avenue Marnix 17, B-1000 Brussels

EN 50598-2:2014/A1:2016 (E)

European foreword

This document (EN 50598-2:2014/A1:2016) has been prepared by CLC/TC 22X "Power electronics".

The following dates are fixed:

- latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2017-06-28
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2019-06-28

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.

This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For the relationship with EU Directive(s) see informative Annex ZZ, which is an integral part of this document.

Add the following Annex ZZ:

Annex ZZ
(informative)

Relationship between this European Standard and the ecodesign requirements of Commission Regulation (EC) No 640/2009 aimed to be covered

This European standard has been prepared under a Commission's standardisation request, M/476 'Mandate to CEN, CENELEC and ETSI for Standardisation in the field of variable speed drives and/or Power Drive System products', to provide one voluntary means of conforming to ecodesign requirements of Commission Regulation (EC) No 640/2009 of 22 July 2009 implementing Directive 2005/32/EC of the European Parliament and of the Council with regard to ecodesign requirements for electric motors [OJ L 191/26].

Once this standard is cited in the Official Journal of the European Union under that Regulation, compliance with the normative clauses of this standard given in Table ZZ.1 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding ecodesign requirements of that Regulation, and associated EFTA Regulations.

Table ZZ.1 – Correspondence between this European Standard and Commission Regulation (EC) No 640/2009 of 22 July 2009 implementing Directive 2005/32/EC of the European Parliament and of the Council with regard to ecodesign requirements for electric motors [OJ L 191/26] and Commission's standardisation request M/476 'Mandate to CEN, CENELEC and ETSI for Standardisation in the field of variable speed drives and/or Power Drive System products'

Ecodesign requirements of Regulation (EC) No 640/2009 [OJ L 191/26]	Clause(s) / sub-clause(s) of this EN	Remarks / Notes
<p>Article 3.2.: from 1 January 2015: motors with a rated output of 7,5-375 kW shall not be less efficient than the IE3 efficiency level, as defined in Annex I, point 1, or meet the IE2 efficiency level, as defined in Annex I, point 1, and be equipped with a variable speed drive.</p> <p>Article 3.3.: from 1 January 2017: motors with a rated output of 0,75-375 kW shall not be less efficient than the IE3 efficiency level, as defined in Annex I, point 1, or meet the IE2 efficiency level, as defined in Annex I, point 1, and be equipped with a variable speed drive.</p>	<p>Clause 4.1 and 4.2 set the definitions for the concept of reference losses and for the optional relevant "torque versus speed operating points (including part load conditions)".</p> <p>Clause 4.3 set the workflow requirements to analyse the variable speed drive in combination with driven equipment.</p> <p>The clauses 4.4. - 4.8 set the IE and the IES classification system for converters and variable speed drives.</p> <p>Clause 9 sets the requirements for determination and type testing to verify the efficiency classes.</p>	<p>The option to use an IE2 motor in a variable speed application instead of an IE3 motor depends mainly on the torque versus speed characteristic of the driven equipment and how it is applied. In order to do the right optional decision for maximum energy savings, EN 50598-2 gives the fundamental requirements, the workflows and the classification system for variable speed drives to do the fundamental assessment in the power range of 0,12 kW up to 1000 kW.</p>

EUROPEAN STANDARD

EN 50598-2

NORME EUROPÉENNE

EUROPÄISCHE NORM

December 2014

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English Version

Ecodesign for power drive systems, motor starters, power electronics & their driven applications - Part 2: Energy efficiency indicators for power drive systems and motor starters

Ecoconception des entraînements électriques de puissance, des démarreurs de moteur, de l'électronique de puissance et de leurs applications entraînées - Partie 2: Indicateurs d'efficacité énergétique pour les entraînements électriques de puissance (PDS) et les démarreurs de moteur

Ökodesign für Antriebssysteme, Motorstarter, Leistungselektronik und deren angetriebene Einrichtungen - Teil 2: Indikatoren für die Energieeffizienz von Antriebssystemen und Motorstartern

This European Standard was approved by CENELEC on 2014-11-17. 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.

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

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Foreword

This document (EN 50598-2:2014) has been prepared by CLC/TC 22X "Power electronics".

The following dates are fixed:

- latest date by which this document has to (dop) 2015-11-17
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This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association.

EN 50598, *Ecodesign for power drive systems, motor starters, power electronics & their driven applications*, will consist of the following parts:

- *Part 1: General requirements for setting energy efficiency standards for power driven equipment using the extended product approach (EPA), and semi analytical model (SAM);*
- *Part 2: Energy efficiency indicators for power drive systems and motor starters;*
- *Part 3: Quantitative ecodesign approach through life cycle assessment including product category rules and the content of environmental declarations.*

The CLC/TC 22X/WG 06 is the enabled task force for dealing with the mandate M/476 from European Commission for the standardization in the field of variable speed drives and/or power drive system products.

It has been set a close collaboration with several other technical committees (i.e. CLC/TC 2; CLC/TC 17B) in order to provide a comprehensive standard for energy efficiency and ecodesign requirements together with a pilot stakeholder committee CEN/TC 197 from the customers side.

Key points:

- Clear requirements how to achieve an energy efficient driven equipment using a motor system;
- Requirements and limits for IE-classes for power electronic converters;
- Requirements and limits for IES-classes for power drive systems (PDS);
- Loss determination of the PDS and requirements for the link to the driven equipment in order to determine the energy efficiency classification/evaluation of the extended product;

- Requirements how to achieve the environmentally conscious design and environmental declaration of a motor system.

It is the intention of the working group that this document, once finalized as a European Standard series, will be further processed to an international consensus in IEC according to the UAP procedure agreement between CENELEC and IEC.

EN 50598-2:2014 (E)

Introduction

The Technical Committee CLC/TC 22X has circulated on 2010-03-31 the document CLC/TC22X/Sec0100/DC including the mandate M/476 from the European Commission for standardization in the field of variable speed drives and/or power drive system products.

As the PDS contains converter driven motors, the requirements for measuring of the energy efficiency of motors with non-sinusoidal supply is under the responsibility of CLC/TC 2 covering the requirement from mandate M/470.

The document is based on the CENELEC technical board document referenced BT137/DG8058/INF also reproducing this EC-mandate.

The CLC/TC22X working group 6 as being the standardization task force for dealing with this Mandate has close collaboration with several other technical committees (i.e. CLC/TC2; CLC/TC17B).

Therefore CLC/TC 22X committee has been enabled responsible to clarify all relevant aspects in the field of energy efficiency and ecodesign requirements for power electronics, switchgear, control gear, and power drive systems and their industrial applications.

The sometimes controversial requirements are illustrated in Figure 1. The work has been agreed to provide the reasonable target as a best compromise.

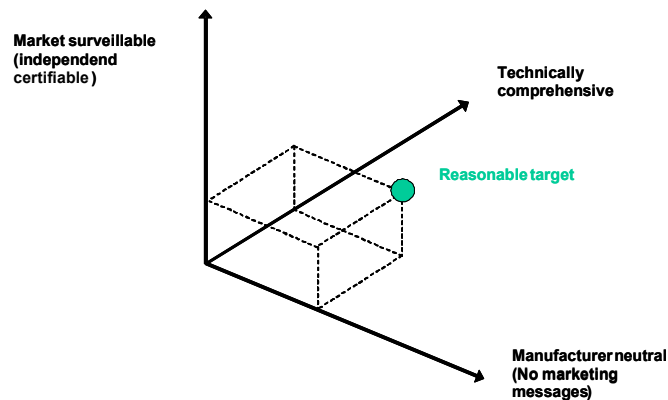


Figure 1 — Illustration of controversial requirements for the energy related product (ErP) standardization

EN 50598 is developed under the CENELEC projects number 24602 to 24604 for compliance with requirements from the horizontal mandate M/495.

Its three parts are together directly related to the mandates M/470 and M/476.

For the other mandates listed in Table 1, this standard could be applied if the future product standards developed will make reference to it.

Table 1 — Mandates of the European Commission given to CEN, CENELEC and ETSI and how they are contributed by these standard series parts

Mandates	Part 1	Part 2	Part 3
M/470 Motors		✓	✓
M/476 PDS		✓	✓
M/495 Horizontal all future Applications	✓	✓	✓
M/488 HVAC comfort fans	✓	✓	(✓)
M/498 Pumps	✓	✓	(✓)
M/500 Compressors	✓	✓	(✓)

In according with its Scope, this standard series does not deal with mechanical engineering components.

NOTE Geared motors (motor plus gearbox) needs to be treated for efficiency classes like a power drive system (converter plus motor). See EN 60034-30-1 for classification of the losses of a geared motor. The efficiency classes of gearboxes as individual components are under consideration.

EN 50598-2:2014 (E)

1 Scope

This European Standard specifies the energy efficiency indicators for power electronics (e.g. complete drive modules, CDM), power drive systems and motor starters, all used for motor driven equipment in the power range of 0,12 kW up to 1 000 kW.

It specifies the methodology for determination of losses of the complete drive module (CDM), the power drive system (PDS) and the complete motor system.

It defines IE and IES-classes, their limit values and provides test procedures for the classification of the overall losses of the motor system.

Furthermore, this part of EN 50598 proposes a methodology for characterization of the best energy efficiency solution to be implemented. This depends on the motor driven system architecture, the speed/load profile and the operating points over time of the driven equipment.

The methodology of the extended product approach and the semianalytical models are defined in Part 1 of the series.

The structure of this EN 50598 contains the following:

- the losses of a standardized reference PDS (RPDS) and the mathematical model for their calculation are given and classified;
- the reference load/motor (RM) and the reference CDM (RCDM) are defined and can be used to determine the efficiency class of a motor system when one of its constituents is unknown;
- the requirements for determining the losses of a real PDS are given and are classified in comparison to the RPDS;
- the requirements for the type testing and the content of user documentation;
- some illustrations of losses in an overall system as an example are given in annexes;
- information about system and drive topologies are given in annexes.

Specific data for power losses of RCDM, RM, RPDS and IE/IES-classes are given for low voltages (100 V up and equal to 1 000 V), single axis AC/AC power drive systems with three phase induction motors. Geared motors need to be treated as standard motors.

All provided reference data is derived from PDS with induction motors, but valid for all types of PDS with other types of motors.

High voltage equipment does not need to be assessed in this edition of the document.

In EN 50598-3, the methodology for eco-design for environmental impact is defined.

NOTE The 50598 series does not cover energy efficiency classification of driven equipment, but provides input for the assessment of extended product approach.

2 Normative references

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 As it is intended by the working group to process this document, once finalized, as an IEC Standard, some normative references are given even in case if no European harmonized document exists.

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