
Ekološko snovanje (Ecodesign) motornih pogonskih sistemov, motornih zaganjalnikov, močnostne elektronike in njihove aplikacije, ki jih ti poganjajo - 1. del: Splošne zahteve za določitev standardov energijske učinkovitosti motorno gnane opreme z uporabo razširjenega proizvodnega pristopa (EPA) in polanalitičnega modela (SAM)

Ecodesign for power drive systems, motor starters, power electronics & their driven applications - Part 1: General requirements for setting energy efficiency standards for power driven equipment using the extended product approach (EPA), and semi analytic model (SAM)

Ökodesign für Antriebssysteme, Motorstarter, Leistungselektronik und deren angetriebene Einrichtungen -- Teil 1: Allgemeine Anforderungen für die Erstellung von Normen zur Energieeffizienz von Ausrüstungen mit Elektroantrieb nach dem erweiterten Produktansatz (EPA) und semi-analytischen Modellen (SAM)

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Ecoconception des entraînements électriques de puissance, des démarreurs de moteur, de l'électronique de puissance et de leurs applications entraînées -- Partie 1: Exigences générales pour définir les normes d'efficacité énergétique d'un équipement entraîné via l'approche produit étendu (EPA) et par le modèle semi-analytique (SAM)

Ta slovenski standard je istoveten z: prEN 50598-1:2013

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| 13.020.99 | Drugi standardi v zvezi z varstvom okolja | Other standards related to environmental protection |
| 31.020 | Elektronske komponente na splošno | Electronic components in general |

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en

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

DRAFT
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ICS

English version

Ecodesign for power drive systems, motor starters, power electronics & their driven applications -

Part 1: General requirements for setting energy efficiency standards for power driven equipment using the extended product approach (EPA), and semi analytic model (SAM)

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les normes d'efficacité énergétique d'un
équipement entraîné via l'approche
produit étendu (EPA) et par le modèle
semi-analytique (SAM)

To be completed

This draft European Standard is submitted to CENELEC members for CENELEC enquiry.
Deadline for CENELEC: 2014-02-21.

It has been drawn up by CLC/TC 22X.

If this draft becomes a European Standard, 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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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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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

This document [prEN 50598-1:2013] has been prepared by CLC/TC 22X "Power electronics".

This document is currently submitted to the Enquiry.

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).

The TC22X Working Group 6 as being the standardization Task Force for dealing with the Mandate M/476 from European Commission for standardization in the field of variable speed drives and/or Power Drive System products has been set a close collaboration with several other technical committees (i.e. CLC/TC2; CLC/TC17B; CEN TC 197) in order to provide a comprehensive standard for energy efficiency and eco design requirements.

Key points:

- Requirements how to achieve technical requirements for energy efficiency of any kind of driven equipment with an embedded motor system

- Requirements for the link from the motor system to the driven equipment in order to determine the Energy Efficiency Index (EEI) of the extended product

- Requirements for the Semi Analytical Model (SAM) of the driven equipment

The Cenelec TC22X Technical Committee has circulated on last 2010-03-31 for a short period of time the CLC/TC22X/Sec0100/DC document including the Mandate M/476 from European Commission for standardization in the field of variable speed drives and/or Power Drive System products.

As the PDS contains also converter driven motors, the additional requirements for setting the energy efficiency for those motors with non sinusoidal fed and the labelling for the whole PDS are also included. This covers the requirements coming from the Mandate M/470.

The document is based on the Cenelec Technical board document referenced BT137/DG8058/INF also reproducing this EC Mandate.

The TC22X Working Group 6 as being the standardization Task Force for dealing with this Mandate has anticipated that a close collaboration with several other technical committees being involved in the driven system (i.e. CEN TC 197: CLC/TC2; CLC/TC17B) is beneficial and follows the system wise progress.

prEN 50598-1:2013 (E)

1 Scope

This part of EN 50598 provides the general requirements to energy efficiency standardization for any extended product by using the guidance of the extended product approach (EPA).

It enables product committees for driven equipment with embedded motor systems (so called extended products) to interface with the relative power losses of the embedded motor system (e.g. PDS) in order to calculate the system energy efficiency for the whole application.

This shall be based on specified calculation models for speed/load profiles, the duty profiles and relative power losses of appropriate torque versus speed operating points.

This part of EN 50598 specifies the methodology of determination of losses of the extended product and its sub-parts.

This part of EN 50598 does not specify requirements for environmental impact declarations.

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.

prEN 50598-2:2013, *Ecodesign for power drive systems, motor starters, power electronics & their driven applications -- Part 2: Energy efficiency indicators for power drive systems and motor starters*

IEC EN 60034-1, *Rotating electrical machines: Rating and specifications*

IEC EN 60034-2, *Rotating electrical machines: Efficiency determination*

IEC EN 61800-2, *Adjustable speed electrical power drive systems - Part 2: General requirements - Rating specifications for low voltage adjustable frequency a.c. power drive systems*

3 Terms, definitions, symbols, units and abbreviated terms

For the purposes of this document, the terms and definitions given in IEC 60050(161) and the following apply.

3.1
Energy Efficiency Index
EEl

value describing the energy efficiency of an application, resulting from the Extended Product Approach (EPA)

Note 1 to entry; If the extended product is a pump system, the EEl is the ratio of the demanded energy (actual plus losses) to the theoretical energy required for the application.

3.2

Extended Product

EP

driven equipment together with its embedded motor system (e.g a PDS) is defined as the extended product, see Figure 1.

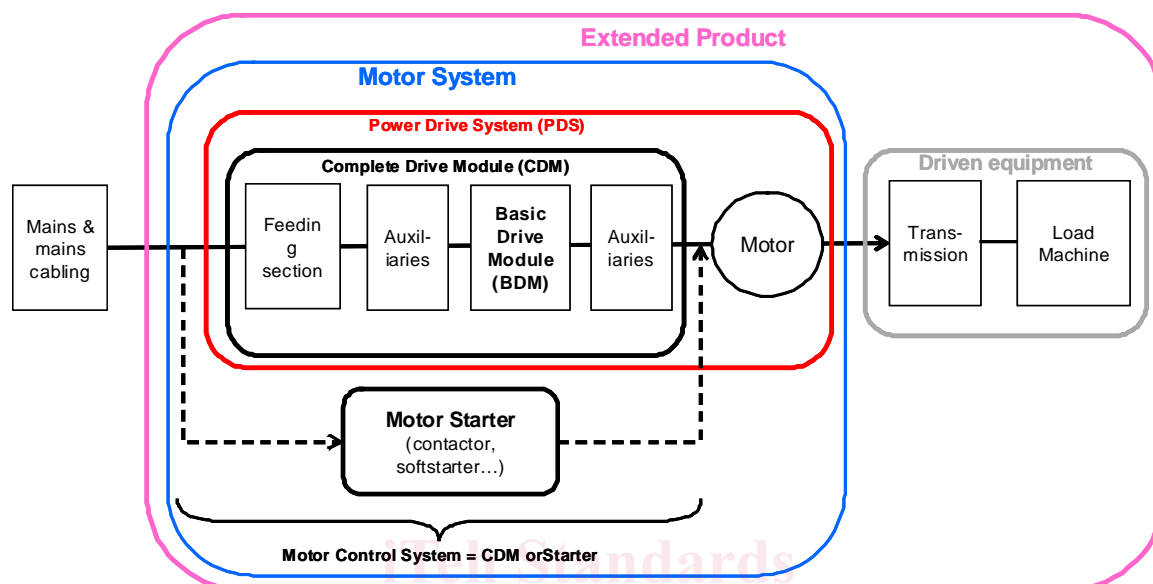


Figure 1 — Illustration of the Extended Product with embedded Motor System

3.3

Extended Product Approach

EPA

methodology to determine the Energy Efficiency Index (EEI) of the Extended Product (EP) using the speed torque profiles of the driven equipment, the relative power losses of the motor system and the duty profile of the application.

3.4

 $P_{\text{Electrical}}$

Power consumption [kW] of an application over time

3.5

 $P_{\text{Electrical Max}}$

Power consumption [kW] at 100 % speed and 100 % load

3.6

 P_i

Power consumption [kW] at operating point i

3.7

 $P_{\text{in,CDM}}$

Input power of the CDM from the power loss measurement

3.8

 $P_{\text{in,PDS}}$

Input power of the PDS from the power loss measurement

3.9

 $P_{\text{L,control}}$

Power losses of the control

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120 **3.10**121 **P_n**

122 Nominal Power of an equipment which is typical for its population of the same rating (see IEC 60034-1
123 for motors)

124 **3.11**125 **$P_{out,CDM}$**

126 Output power of CDM from the power loss measurement

127 **3.12**128 **$P_{out,PDS}$**

129 Output power of PDS from the power loss measurement

130 **3.13**131 **P_r**

132 Rated Power of equipment which is assigned by its manufacturer

133 **3.14**134 **$P_{Reference}$**

135 power consumption used for reference, defined by the extended product committee

136 **3.15**137 **P_L**

138 Electrical power losses with the indices CDM dedicates it to the complete drive module, Mot dedicates
139 it to the motor, Aux dedicates it to the auxiliary devices like cables, transformers or filters. The relative
140 power losses are the per unit losses relative to the nominal power of the device

141 **3.16**142 **$P_{L,CDM}$**

143 Power losses of a CDM

144 **3.17**145 **$P_{L,CDM,determined}$**

146 Power losses of CDM from the power loss determination method

147 **3.18**148 **$p_{L,CDM,relative}$**

149 Power losses of the CDM, referred to its rated apparent power

150 **3.19**151 **$P_{L,inverter}$**

152 Power losses in the inverter section of a CDM

153 **3.20**154 **$P_{L,PDS,determined}$**

155 Power losses of PDS from the power loss determination method

156 **3.21**157 **$P_{LT,Mot}$**

158 Total losses of a motor according to EN 60034-2-1 (edition 2), method 2-1-1B when supplied by a
159 converter (non sinusoidal power supply)

3.22**Semianalytical model****SAM**

determination model for the losses of a motor system or a driven equipment

Note 1 to entry; SAMs include physical and mathematical parameters and calculation algorithm of the subparts of an EP. SAMs are necessary to determine the typical relative power losses of the subparts of an EP in order to determine its overall losses.

3.23 **t_w**

Working time of an equipment

3.24 **T_i**

Torque [Nm] at operating point i

3.25**Timefraction_i**

Percentage of time an extended product is operated at one specific operating point i

4 Requirements for the development of energy efficiency standards for extended products

4.1 General

This document specifies a methodology to determine the Energy Efficiency Index of an application, based on the concept of Semi Analytical Models (SAM). The methodology shall be referred to as the Extended Product Approach (EPA).

The responsibilities and tasks of the different stakeholders creating or using these Extended Products standards, as well as the data flows in-between are required.

a) Specific information about the equipment shall be considered:

- The torque versus speed profile of the driven load as specified by the load manufacturer or Extended Product technical committee.

- The losses of the Motor System or its constituents (Motor, CDM or starter) at reference part-load operating points. These shall be provided by the different manufacturers as specified in EN 50598-2.

b) Information about the driven equipment shall be considered:

- The duty profile of the driven equipment. The Extended product standards committee can for example define typical applications of their Extended Products, each associated with a typical duty profile

c) Extended Product Approach shall be used to determine an energy efficiency indicator (losses, efficiency, energy consumption...):

- EN 50598-2 specifies the methods for the determination of losses of the Motor System using measurement and/or calculations.

- Extended Product standards committees shall define how to combine the losses of the Motor System and the losses of the load to obtain an overall energy efficiency related indicator for the Extended Product within the defined application.