SLOVENSKI STANDARD
oSIST prEN IEC 61800-9-1:2023

01-januar-2023

Električni pogonski sistemi z nastavljivo hitrostjo - 9-1. del: Okoljsko primerno načrtovanje pogonskih sistemov - Splošne zahteve za določanje standardov za energijsko učinkovitost

Adjustable speed electrical power drive systems - Part 9-1: Ecodesign for motor systems - General requirements for setting energy efficiency standards

Entraînements électriques de puissance à vitesse variable - Partie 9-1: Écoconception des entraînements électriques de puissance, des démarreurs de moteurs, de l'électronique de puissance et de leurs applications entraînées - Exigences générales pour défi

Ta slovenski standard je istoveten z: prEN IEC 61800-9-1:2022

ICS:

27.015	Energijska učinkovitost. Ohranjanje energije na splošno	Energy efficiency. Energy conservation in general
29.200	Usmerniki. Pretvorniki. Stabilizirano električno napajanje	Rectifiers. Convertors. Stabilized power supply

oSIST prEN IEC 61800-9-1:2023 en,fr,de

22G/464/CDV

COMMITTEE DRAFT FOR VOTE (CDV)

PROJECT NUMBER: **IEC 61800-9-1 ED2**	
DATE OF CIRCULATION: **2022-11-18**	CLOSING DATE FOR VOTING: **2023-02-10**
SUPERSEDES DOCUMENTS: **22G/447/CD, 22G/459/CC**	

IEC SC 22G : ADJUSTABLE SPEED ELECTRIC POWER DRIVE SYSTEMS (PDS)

SECRETARIAT: United States of America	SECRETARY: Mr Christopher Johnson
OF INTEREST TO THE FOLLOWING COMMITTEES: TC 2, SC 121A	PROPOSED HORIZONTAL STANDARD: ☒ Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.

FUNCTIONS CONCERNED:

☐ EMC ☐ ENVIRONMENT ☐ QUALITY ASSURANCE ☐ SAFETY

☒ SUBMITTED FOR CENELEC PARALLEL VOTING

Attention IEC-CENELEC parallel voting

The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) is submitted for parallel voting.

The CENELEC members are invited to vote through the CENELEC online voting system.

☐ NOT SUBMITTED FOR CENELEC PARALLEL VOTING

This document is still under study and subject to change. It should not be used for reference purposes.

Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

TITLE:

Adjustable speed electrical power drive systems – Part 9-1: Ecodesign for motor systems – General requirements for setting energy efficiency standards

PROPOSED STABILITY DATE: 2027

NOTE FROM TC/SC OFFICERS:

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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ADJUSTABLE SPEED ELECTRICAL POWER DRIVE SYSTEMS (PDS) –

Part 9-1: Ecodesign for motor systems – General requirements for setting energy efficiency standards

FOREWORD

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International Standard IEC 61800-9-1 has been prepared by subcommittee 22G: Adjustable speed electric drive systems incorporating semiconductor power converters, of IEC technical committee 22: Power electronic systems and equipment.

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

FDIS	Report on voting
22G/348/FDIS	22G/351/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.

A list of all parts in the IEC 61800 series, published under the general title *Adjustable speed electrical power drive systems*, can be found 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 website 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.

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

IEC SC 22G includes the standardization task force for dealing with energy efficiency of motor systems. It has close collaboration with several other technical committees (for example, IEC TC 2, IEC SC 121A).

IEC SC 22G maintains responsibility for 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 core requirements of energy efficiency standardization are illustrated in Figure I.1. The work has been agreed to provide the reasonable target as a best compromise.

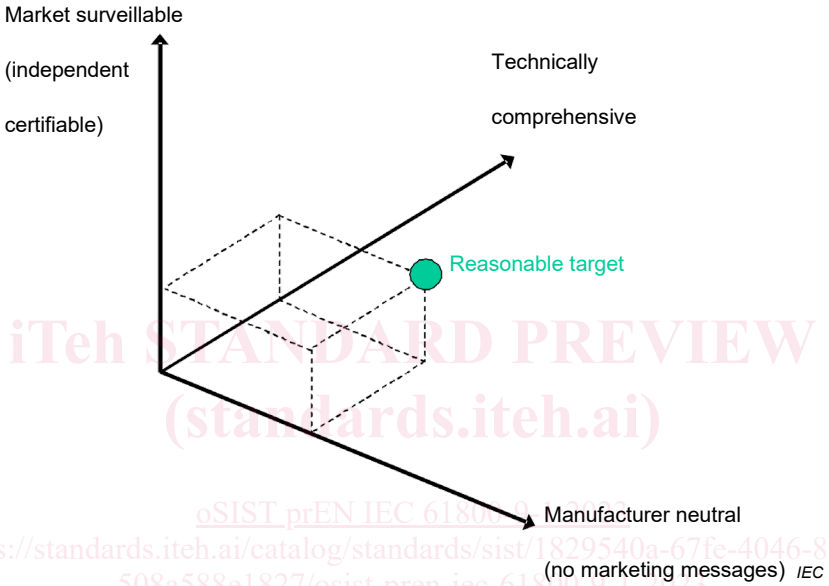

Figure I.1 – Illustration of core requirements of energy efficiency standardization

IEC 61800 (all parts) do not deal with mechanical engineering components.

NOTE Geared motors (motors with directly adapted gearboxes) are treated like power drive systems (converter plus motor). See IEC 60034-30-1 for classification of the losses of a geared motor. The efficiency classes of gearboxes as individual components are under consideration.

IEC 61800-9-1 is a subpart of the IEC 61800 series, which has the following structure:

– *Part 1: General requirements – Rating specifications for low voltage adjustable speed D.C. power drive systems*
– *Part 2: General requirements – Rating specifications for low voltage adjustable speed A.C. power drive systems*
– *Part 3: EMC requirements and specific test methods*
– *Part 5: Safety requirements*
– *Part 6: Guide for determination of types of load duty and corresponding current ratings*
– *Part 7: Generic interface and use of profiles for power drive systems*
– *Part 8: Specification of voltage on the power interface*
– *Part 9: Ecodesign for motor systems*

Each part is further subdivided into several subparts, published either as International Standards or as Technical Specifications or Technical Reports, some of which have already

been published. Others will be published with the part number followed by a dash and a second number identifying the subdivision (for example, IEC 61800-9-2).

This subpart of IEC 61800-9 is an International Standard for characterizing the energy efficiency of motor systems when supplied by a motor starter or by a variable voltage/frequency converter. The goal of this part of IEC 61800-9 is to establish a clear and simple system for the comparison of the energy performance of motor systems that can help manufacturers to improve their products, to give users the necessary transparency and information and to provide a robust reference base for regulators and minimum energy performance standards.

The IEC 61800-9 series (Ecodesign for motor systems) consist of the following subparts:

– *Part 9-1: General requirements for setting energy efficiency standards*
– *Part 9-2: Energy efficiency determination and classification*

ADJUSTABLE SPEED ELECTRICAL POWER DRIVE SYSTEMS (PDS) –

Part 9-1: Ecodesign for motor systems – General requirements for setting energy efficiency standards

1 Scope

This part of IEC 61800 specifies the general methodology to energy efficiency standardization for any extended product by using the guidance of the extended product approach (EPA).

This document is a Group Energy Efficiency Publication as defined in IEC Guide 119 with the energy efficiency function to establish a clear and simple system methodology for the comparison of the energy performance of motor systems to help product and system improvement.

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

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

This document is applicable to motor systems operated by a motor starter or by a converter (power drive system).

This document does not specify requirements for environmental impact declarations.

Power Drive Systems designed to drive DC motors are not included in the Scope of this Standard.

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 60050-161, *International Electrotechnical Vocabulary – Part 161: Electromagnetic compatibility*

IEC 60034-2-1:2014, *Rotating electrical machines – Part 2-1: Standard methods for determining losses and efficiency from tests (excluding machines for traction vehicles)*

IEC 60034-2-3, *Rotating electrical machines – Part 2-3: Specific test methods for determining losses and efficiency of converter-fed AC induction motors*

IEC 61800-9-2:2016, *Adjustable speed electrical power drive systems – Part 9-2: Ecodesign for motor systems – Energy efficiency determination and classification*

IEC TR 62837:2013, *Energy efficiency through automation systems*

IEC Guide 119:2017, *Preparation of energy efficiency publications and the use of basic energy efficiency publications and group energy efficiency publications*

3 Terms, definitions and symbols

3.1 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1.1
duty profile

3.1.2 Annual distribution load points with associated time fraction. The duty profile may consist of only one operating point.
energy efficiency indicator
EEI
A generic value describing the energy efficiency of an extended product operating with a specified duty profile."

Note 1 to entry: Examples of EEI include the Energy Efficiency Index defined by the pump industry to characterize pump systems, or the weighted average electrical power described in Annex B.

3.1.3
extended product
EP
driven equipment together with its connected motor system (e.g. a PDS)

Note 1 to entry: See Figure 1.

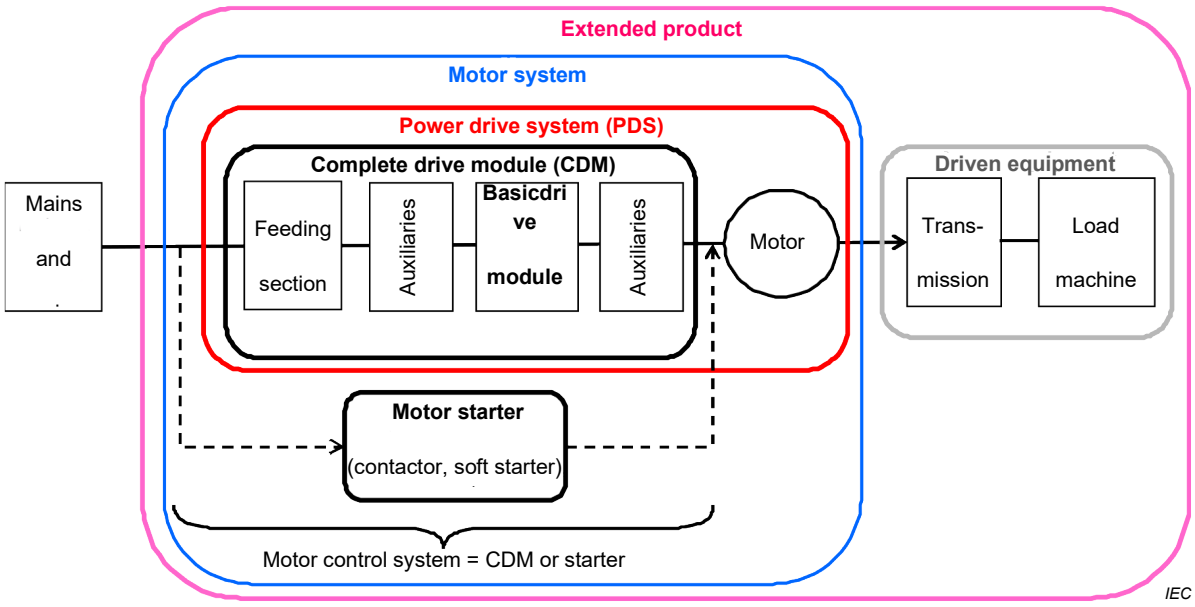

Figure 1 – Illustration of the extended product with embedded motor system

3.1.4
extended product approach
EPA
methodology to determine the energy efficiency indicator (EEI) of the extended product (EP) using the speed torque profiles of the driven equipment, the power losses of the motor system and the duty profile of the application

Note 1 to entry: FEI is used as the energy index for the fan industry

3.1.5
extended product standard committee
body in charge of the standardization of the energy efficiency indicators for a given extended product

Note 1 to entry: Extended product committees can be ISO or IEC technical committees, or other relevant bodies.

3.1.6
load-time profile
fraction of time spent at each operating point during the total operating time or a complete cycle of operation of the extended product

Note 1 to entry: Typically this profile is represented by a histogram.

Note 2 to entry: The standby mode can be included in the load time profile.

3.1.7
motor control equipment
either a CDM or a motor starter

3.1.8
motor system
motor control equipment and motor

3.1.9
semi analytic 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.

3.1.10
transmission
any component (coupling, Gear box, etc.) which connects the motor shaft to the load machine (e.g. pump)

3.2 Symbols

3.2.1
$E_{\text{Electrical}}$
electrical energy [kWh] consumption of an application during a certain runtime period

3.2.2
k_{P}
ratio of the weighted average electrical power consumption $P_{\text{Electrical}}$ of an application to the reference power consumption $P_{\text{Reference}}$