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

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CONTENTS

FOREWORD 3
INTRODUCTION 5
1 Scope 7
2 Normative references 7
3 Terms, definitions and symbols 8
3.1 Terms and definitions 8
3.2 Symbols 9
4 Requirements for the development of energy efficiency standards for extended products 11
4.1 General 11
4.2 Responsibility of the extended product standard or technical committee 12
4.3 Elements to achieve the extended product approach 13
5 The semi analytic model (SAM) of the extended product 14
6 Requirements for the semi analytic model (SAM) of the motor system 15
6.1 General 15
6.2 Operating points of the PDS 15
6.3 Requirements if the motor system contains no CDM 16
7 Merging the semi analytic models (SAMs) to the extended product approach 17
7.1 General 17
7.2 Speed versus torque loss points of a motor system 18
7.3 How to determine intermediate speed versus torque loss points of a motor system 19
7.3.1 General 19
7.3.2 Loss determination by maximum losses of neighbouring loss points 20
7.3.3 Loss determination by two-dimensional interpolation of losses of neighbouring loss points 20
7.3.4 PDS loss calculation in the field weakening range up to 200 % of rated speed 21
Annex A (informative) Example of how to apply the SAM in the EPA for pump systems with a required speed versus torque loss points using the PDS 22
Annex B (informative) Calculation of the energy consumption based on the duty profile 24
Annex C (informative) Basic torque and power versus speed profiles, operating points over time 25
C.1 General 25
C.2 Basic torque and power versus speed profiles 25
C.3 Operating points over time 26
C.4 Definition of the operating points over time 26
C.4.1 General 26
C.4.2 Calculation of the energy consumption based on the operating points over time 27
C.4.3 Example of loss calculation for different operating points over time 27
Annex D (informative) Examples of indexing and evaluation of energy consumption 30
D.1 Indices 30
D.2 Evaluation of the energy consumption 30
Bibliography 33

Figure 1 – Illustration of core requirements of energy efficiency standardization 5

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Figure 2 – Illustration of the extended product with embedded motor system 8
Figure 3 – Stakeholders and responsibilities for determination of the energy efficiency indicator for an extended product 12
Figure 4 – Illustration of the operating points (shaft speed, torque) for the determination of relative losses of the power drive system (PDS) 16
Figure 5 – Speed versus torque relative power loss operating points to determine the motor starter or soft starter losses 17
Figure 6 – Responsibilities and workflow to derive the energy efficiency indicator (EEI) of an extended product 18
Figure 7 – Four segments of deviating operating points of a PDS 19
Figure 8 – Two-dimensional interpolation for deviating operating points 20
Figure A.1 – Three points of relative losses and shaded area of interest for the pump manufacturers while defining their EEI (energy efficiency index) 22
Figure A.2 – Example – How the SAMs of the PDS and the pump system interact with the resulting efficiency index of a pump system 23
Figure C.1 – Typical basic torque and power vs. speed profiles 25
Figure C.2 – Example of operating points over time 26

Table 1 – Illustration of how to combine essential elements of the efficiency contributions 14
Table C.1 – Operating points over time for the investigated examples 27
Table C.2 – Losses in the specified operating points for configuration 1 28
Table C.3 – Losses in the specified operating points for configuration 2 28
Table D.1 – Example of avoided emissions with a pump 31

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

FOREWORD

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IEC 61800-9-1 has been prepared by subcommittee 22G: Adjustable speed electric drive systems (PDS), of IEC technical committee 22: Power electronic systems and equipment. It is an International Standard.

It has the status of a group energy efficiency publication in accordance with IEC Guide 118.

This second edition cancels and replaces the first edition published in 2017. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) addition of Annex D - Examples of indexing and evaluation of energy consumption;
b) correction of errors of symbols in several formulas and tables.

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The text of this International Standard is based on the following documents:

Draft	Report on voting
22G/525/CDV	22G/536/RVC

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

Words **in bold** in the text are defined in Clause 3.

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 document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

– reconfirmed,
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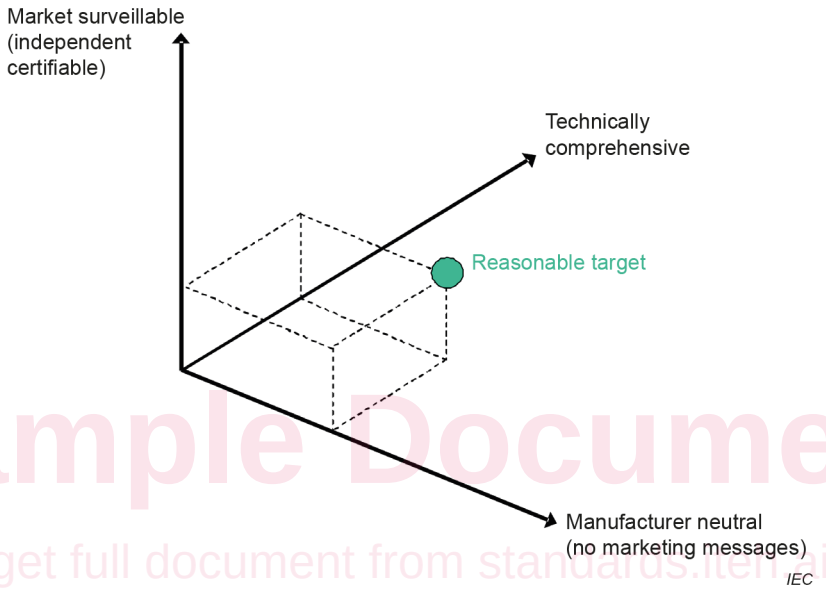
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INTRODUCTION

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 1. The work has been agreed to provide a reasonable target as a best compromise.



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Figure 1 – Illustration of core requirements of energy efficiency standardization

The IEC 61800 series does 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 DC power drive systems
– Part 2: General requirements - Rating specifications for adjustable speed AC power drive systems
– Part 3: EMC requirements and specific test methods for PDS and machine tools
– 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

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Some parts are 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 part 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 document 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**) consists of the following subparts:

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

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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**).

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 profile**s 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 document.

This document is a group energy efficiency publication as defined in IEC Guide 118 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.

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2 Normative references

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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* (available at www.electropedia.org)

IEC 60034-2-3:2024, *Rotating electrical machines - Part 2-3: Specific test methods for determining losses and efficiency of converter-fed AC motors*

IEC 61800-9-2:2023, *Adjustable speed electrical power drive systems (PDS) - Part 9-2: Ecodesign for motor systems - Energy efficiency determination and classification*
IEC 61800-9-2:2023/AMD1:2025

IEC Guide 118, *Preparation of basic and group energy efficiency publications including energy efficiency aspects*

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