Approved as an American National Standard
ANSI Approval Date: December 14, 2022

ANSI/NEMA 61800-9-1-2017

Adjustable Speed Electrical Power Drive Systems

Part 9-1: Ecodesign for power drive systems, motor starters, power electronics and their driven applications – General requirements for setting energy efficiency standards for power driven equipment using the extended product approach (EPA) and semi analytic model (SAM)

Published by

National Electrical Manufacturers Association
1300 North 17th Street, Suite 900
Rosslyn, Virginia 22209

www.nema.org

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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- withdrawn,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.

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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 the reasonable target as a best compromise.

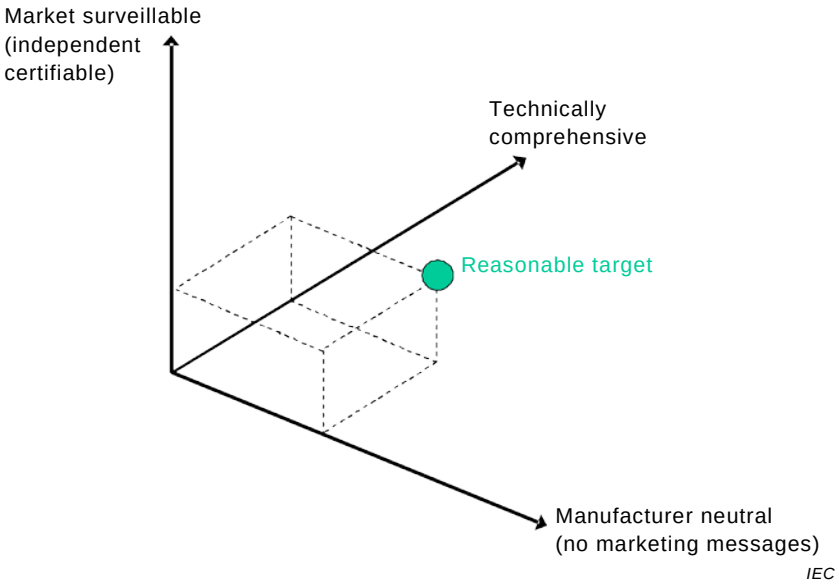

Figure 1 – Illustration of core requirements of energy efficiency standardization

IEC 61800 (all parts) 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 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 4: General requirements – Rating specifications for a.c. power drive systems above 1 000 V a.c. and not exceeding 35 kV*
– *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 power drive systems, motor starters, power electronics and their driven applications*

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. Other 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 power drive systems, motor starters, power electronics and their driven applications) will consist of the following subparts:

– *Part 9-1: General requirements for setting energy efficiency standards for power driven equipment using the extended product approach (EPA) and semi analytic model (SAM)*
– *Part 9-2: Energy efficiency indicators for power drive systems and motor starters*

ADJUSTABLE SPEED ELECTRICAL POWER DRIVE SYSTEMS –

Part 9-1: Ecodesign of power drive systems, motor starters, power electronics and their driven applications – General requirements for setting energy efficiency standards for power driven equipment using the extended product approach (EPA) and semi analytic model (SAM)

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 profiles and relative power losses of appropriate torque versus speed operating points.

This document specifies the methodology of determination of losses of the extended product and its sub-parts.

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

This document does not specify requirements for environmental impact declarations.

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