BS EN 50598-3:2015

BSI Standards Publication

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

Part 3: Quantitative eco design approach through life cycle assessment including product category rules and the content of environmental declarations

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National foreword

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The UK participation in its preparation was entrusted to Technical Committee PEL/22, Power electronics.

A list of organizations represented on this committee can be obtained on request to its secretary.

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English Version

Ecodesign for power drive systems, motor starters, power electronics and their driven applications - Part 3: Quantitative eco design approach through life cycle assessment including product category rules and the content of environmental declarations

Ecoconception des entraînements électriques de puissance, des démarreurs de moteur, de l'électronique de puissance et de leurs applications entraînées - Partie 3: Approche quantitative d'écoconception par l'évaluation du cycle de vie, comprenant les règles relatives aux catégories de produits et le contenu des déclarations environnementales

Ökodesign für Antriebssysteme, Motorstarter, Leistungselektronik und deren angetriebene Einrichtungen - Teil 3: Quantitativer Ökodesign-Ansatz mittels Ökobilanz einschließlich Produktkategorieregeln und des Inhaltes von Umweltdeklarationen

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Foreword

This document (EN 50598-3:2015) 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) 2016-01-05
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2018-01-05

This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association.

CLC/TC 22X/WG 6 as the standardization Task Force dealing with Mandate M/476 from the European Commission for standardization in the field of variable speed drives and/or power drive system products has been setting 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.

Key points:

— requirements on how to implement an environmentally conscious design process;

— requirements for environmental declarations, including product category rules for the underlying life cycle assessment of PDS;

— requirements on how to use environmental declarations in the extended product approach.

Within CLC/TC 22X/WG 6 a Task Force (TF2) has been set up for dealing with the environmental aspects of ecodesign through harmonized methods of assessing a product’s environmental performance and providing an environmental declaration for components of a motor system.

Since currently no horizontal approach on environmental declarations and no underlying life cycle assessment, within the standard basic and motor system specific product category rules, as required by EN ISO 14025, have been defined. If the approach is standardized for electronic and electro technical equipment through a harmonized standard (e.g. by CLC/TC 111X), the basic category rules (Clause 7) will become obsolete; however, this standard to be issued applies instead. Furthermore, product specific requirements, e.g. defined in Annex C, still need to be followed.

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

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.

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Introduction

Technical Committee CLC/TC 22X has circulated on 2010-03-31 for a short period of time the CLC/TC22X/Sec0100/DC document including 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 additional requirements for measuring of the energy efficiency of those motors with non-sinusoidal supply and the labelling for the whole PDS are also included. This covers the requirements coming from Mandate M/470.

The horizontal ecodesign mandate, M/495, has been accepted at the end of 2011 by CEN and CENELEC, and requires to provide harmonized methods for measuring a product's environmental performance with a life cycle assessment and to provide an environmental footprint.

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

CLC/TC 22X Working Group 6 as the standardization Task Force dealing with this Mandate has anticipated that a close collaboration with several other technical committees (i.e. CLC/TC 2; CLC/TC 17B) should be set.

Therefore CLC/TC 22X Committee has taken its responsibility for this field and has started a standardization work to clarify all 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 in the field of these tasks are illustrated in Figure 1. The work has been agreed to provide the reasonable target as a best compromise in this field.

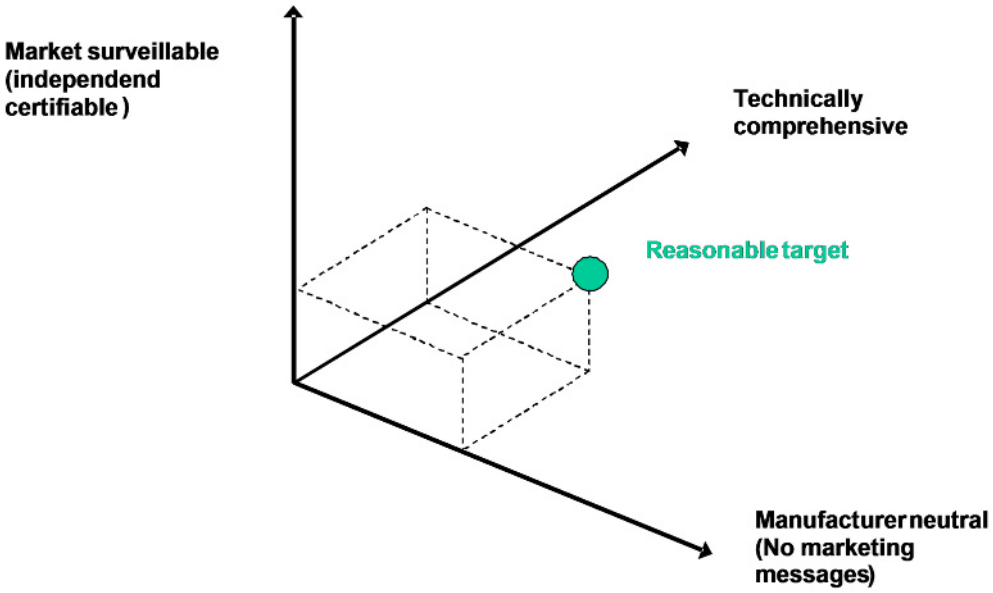

Figure 1 — Illustration of controversial requirements for the Energy related product (ErP) Standardization

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EN 50598 is developed under the CENELEC projects number 24602 to 24604 for compliance with requirements from the horizontal mandate M/495. EN 50598 "*Ecodesign for power drive systems, motor starters, power electronics & their driven applications*" consists 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 analytic 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 parts together will provide the appropriate set of standards also covering the individual mandates M/470, M/476, M/498, M/500 already in reference within Mandate M/495 and the upcoming mandates for standardization of other power driven applications.

Table 1 — Mandates of the European Commission given to CEN, CENELEC and ETSI and how they are solved by the individual parts of the standardization of CLC/TC 22X/WG 6

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	✓	✓	(✓)

NOTE Geared motors (motor plus gearbox) are 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.

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1 Scope

This part of EN 50598 specifies the process and requirements to implement environmentally conscious product design principles, to evaluate ecodesign performance and to communicate potential environmental impacts 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 and low voltage (up to 1 000 V) applications over the whole life cycle.

It defines the content for 2 different environmental declarations based on EN ISO 14021:

— The basic version - which, in this context, will be referred to as an environmental declaration type II, with basic data and qualitative statements on ecodesign.

— The full version - which, in this context, will be referred to as an environmental declaration type II+, based upon a life cycle assessment and including quantitatively evaluated potential environmental impacts. For that the general principles of EN ISO 14025 are taken into account and product category rules [PCR] for motor system components are included to ensure a harmonized approach.

This part of EN 50598 is harmonized with the applicable generic and horizontal environmental standards and contains the additional details relevant in this context for the above mentioned products.

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.

EN 50598-1, *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)*

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

EN ISO 14020, *Environmental labels and declarations — General principles (ISO 14020)*

EN ISO 14021, *Environmental labels and declarations — Self-declared environmental claims (Type II environmental labelling) (ISO 14021)*

EN ISO 14025, *Environmental labels and declarations — Type III environmental declarations - Principles and procedures (ISO 14025)*

EN ISO 14040, *Environmental management — Life cycle assessment — Principles and framework (ISO 14040)*

EN ISO 14044, *Environmental management — Life cycle assessment — Requirements and guidelines (ISO 14044)*

IEC 60050-161, *International Electrotechnical Vocabulary (IEV) — Chapter 161: Electromagnetic compatibility*

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EN 62430:2009, *Environmentally conscious design for electrical and electronic products (IEC 62430:2009)*

IEC/TR 62635, *Guidelines for end-of-life information provided by manufacturers and recyclers and for recyclability rate calculation of electrical and electronic equipment*

EN 62474, *Material declaration for products of and for the electrotechnical industry (IEC 62474)*

3 Terms and definitions

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

3.1
declared unit
referenced unit (device) in the environmental declaration

Note 1 to entry: The declared unit might differ from the functional unit in terms of the declaration. In the LCA the environmental impacts are broken down to the functional unit, this is then aggregated for the declaration for the declared unit.

3.2
end of life
EoL
life cycle stage of a product starting when it is removed from its intended use phase

[SOURCE: IEC/TR 62635]

3.3
end of life treatment
any operation after a waste has been handed over to a facility for product and product part reuse, material recycling, energy recovery and residue disposal

Note 1 to entry: This includes dismantling, material separation and disposal.

[SOURCE: IEC/TR 62635]

3.4
environment
surroundings in which an organization operates, including air, water, land, natural resources, flora, fauna, humans and their interrelation

Note 1 to entry: Surroundings in this context extend from within an organization to the global system.

[SOURCE: EN ISO 14001:2004, 3.5]

3.5
environmental aspect
element of an organization's activities or products that can interact with the environment

Note 1 to entry: A significant environmental aspect has or can have a significant environmental impact.

[SOURCE: EN ISO 14001:2004, 3.6, modified]

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3.6
environmental claim
statement, symbol or graphic that indicates an environmental aspect of a product, a component or packaging

Note 1 to entry: An environmental claim may be made on product or packaging labels, through product literature, technical bulletins, advertising, publicity, telemarketing, as well as through digital or electronic media such as the Internet.

[SOURCE: EN ISO 14021:1999, 3.1.4]

3.7
environmentally conscious design
ECD
systematic approach which takes into account environmental aspects in the design and development process with the aim to reduce adverse environmental impacts

[SOURCE: EN 62430:2009]

3.8
environmentally conscious design tool
formalized method which facilitates qualitative or quantitative analysis, comparison and/or solution finding during the ECD process

3.9
environmental declaration program
voluntary program for the development and use of type III environmental declarations based on a set of operating rules (program instructions)

[SOURCE: EN ISO 14025:2010]

3.10
environmental impact
any change to the environment, whether adverse or beneficial, wholly or partly resulting from an organization's environmental aspects

[SOURCE: EN ISO 14001:2004, 3.7]

3.11
environmental label
environmental declaration
claim which indicates the environmental aspects of a product or service, for example a type I, a type II or a type III environmental declaration or a product environmental footprint

Note 1 to entry: An environmental label or declaration may take the form of a statement, symbol or graphic on a product or package label, in product literature, in technical bulletins, in advertising or in publicity, amongst other things.

[SOURCE: EN ISO 14020:2001, modified]

3.12
environmental declaration type II
environmental declaration providing self-declared environmental claims

[SOURCE: EN ISO 14021]

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3.13
environmental declaration type II+
environmental declaration providing quantified environmental data using predetermined parameters (product category rules as a part of a product standard) and, where relevant, additional environmental information

Note 1 to entry: This kind of declaration is based on EN ISO 14021 but takes into account the basic principles of EN ISO 14025, such as the life cycle assessment basis, PCR and the verification. But in contrast to a type III environmental declaration, an internal declaration process verification is sufficient and no declaration program needs to be joined. The predetermined parameters (PCR) are based on the EN ISO 14040 series, which includes EN ISO 14040 and EN ISO 14044.

Note 2 to entry: The additional environmental information may be quantitative or qualitative.

3.14
environmental declaration type III
environmental declaration providing quantified environmental data using predetermined parameters and, where relevant, additional environmental information

Note 1 to entry: For a type III declaration an environmental declaration program including program instructions and product category rules are necessary The predetermined parameters are based on the EN ISO 14040 series, which includes EN ISO 14040 and EN ISO 14044.

Note 2 to entry: The additional environmental information may be quantitative or qualitative.

[SOURCE: EN ISO 14025:2010, modified]

3.15
environmental declaration verification
process to verify the environmental declarations concerning the fulfilment of the requirements set out in the corresponding standards

Note 1 to entry: This is based upon the basic principles of EN ISO 14025 for type III environmental declarations, but type III environmental declarations require an environmental declaration program, setting out the stipulations for the verification in terms of the declaration program.

Note 2 to entry: A verification is also mandatory for environmental declarations in terms of this standard and takes place through internal process verification.

3.16
environmental management system
part of the overall management system that includes organizational structure, planning activities, responsibilities, practices, procedure, processes, and resources for developing, implementing, achieving, reviewing and maintaining the environmental policy

[SOURCE: EN ISO 14001:2004, 3.8, modified]

3.17
environmental parameter
quantifiable attribute of an environmental aspect

Note 1 to entry: Environmental parameters include the type and quantity of materials used (weight, volume), power consumption, emissions, rate of recyclability, etc.

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3.18
extended product
EP
driven equipment with its included motor system (e.g. a PDS, a motor starter), see Figure 2

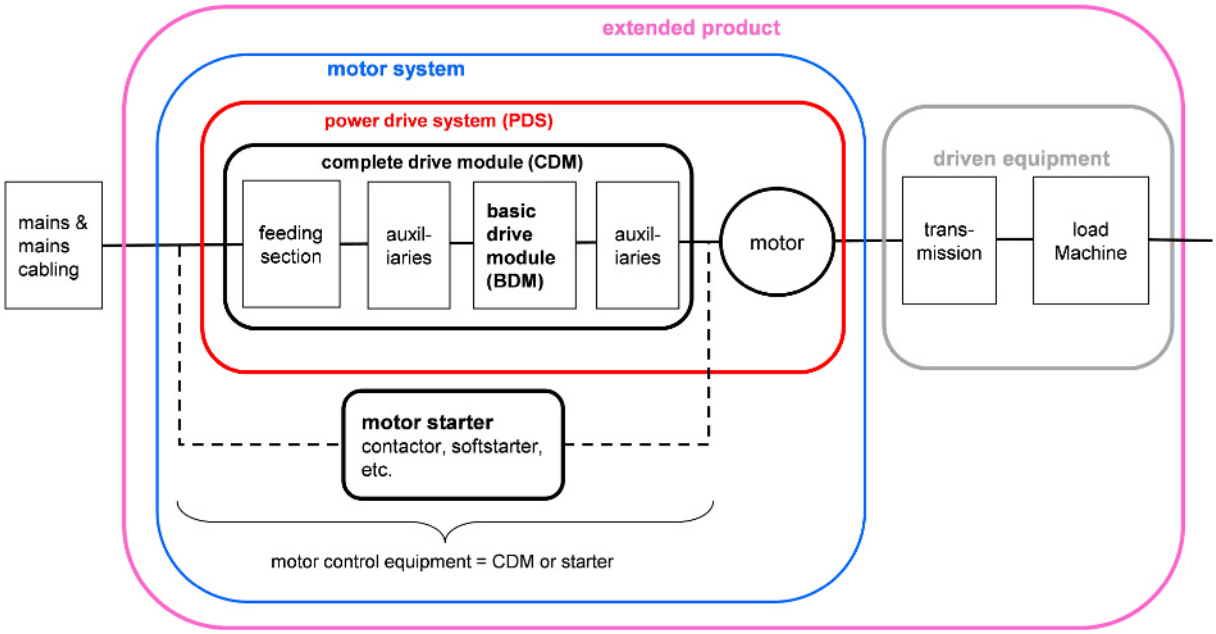

Figure 2 — Illustration of the extended product including a motor system

[SOURCE: EN 50598-1]

3.19
functional unit
quantified performance of a product system for use as a reference unit

Note 1 to entry: For example one product providing a certain function like power in kW.

[SOURCE: EN ISO 14040:2006]

3.20
hazardous substances and preparations
substance or preparation that can adversely impact the environment with immediate or retarded effect

[SOURCE: IEC Guide 109:2003, modified]

3.21
homogenous product family
subgroup of a product family where the environmental aspects can reasonably be expected to be similar and therefore scalable over the group through a function of certain parameter, e.g. power or weight

3.22
LCA report
accompanying document to the life cycle assessment as a basis to the environmental declaration giving further detailed information about the inputs, outputs, used LCI-data and the made assumptions in regards to this standard

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Note 1 to entry: This LCA report is not meant for external communication but has to be kept for justification proposes in terms of environmental declaration verification or market surveillance.

3.23
life cycle
consecutive and interlinked stages of a product system, from raw material acquisition or generation from natural resources to the final disposal

[SOURCE: EN ISO 14040:2006]

3.24
life cycle assessment
LCA
compilation and evaluation of the inputs, outputs and the potential environmental impacts of a product system throughout its life cycle

[SOURCE: EN ISO 14040:2006]

3.25
life cycle inventory
LCI
inventory of flows from and to nature for a product system

Note 1 to entry: Inventory flows include inputs of water, energy, and raw materials, and releases to air, land, and water.

3.26
life cycle stage
element of a life cycle

Note 1 to entry: The phrase 'life cycle phase' is sometimes used interchangeably with 'life cycle stage'.

Note 2 to entry: Examples of life cycle stages are: raw material acquisition and production; manufacturing; packaging and distribution; installation and use, maintenance and upgrading and end of life.

3.27
life cycle thinking
LCT
consideration of all relevant environmental aspects during the entire life cycle of products

[SOURCE: IEC Guide 109:2003, modified]

3.28
material
substance or mixture within a product or product part

[SOURCE: IEC 62674]

3.29
motor system
motor system is part of the extended product (3.18) as defined in EN 50598-2 and consists of motor starter devices (contactor, soft starters) and/or a complete drive module and motor

3.30
organization
group of people and facilities with an arrangement of responsibilities, authorities and relationships

[SOURCE: EN ISO 9000:2005, 3.3.1, modified]

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3.31
packaging
material that is used to protect or contain a product during transportation, storage, marketing or use

Note 1 to entry: For the purposes of this International Standard, the term “packaging” also includes any item that is physically attached to, or included with, a product or its container for the purpose of marketing the product or communicating information about the product.

[SOURCE: EN ISO 14021]

3.32
process
set of interrelated or interacting activities which transform inputs into outputs

Note 1 to entry: Inputs to a process are generally outputs of other processes.

Note 2 to entry: Processes in an organization are generally planned and carried out under controlled conditions to add value.

[SOURCE: EN ISO 9000:2005, 3.4.1, modified]

3.33
product
any goods or service

[SOURCE: EN ISO 14024:2000]

3.34
product category
group of products that can fulfil equivalent functions

[SOURCE: EN ISO 14025:2010]

3.35
product category rules
PCR
set of specific rules, requirements and guidelines for developing type II+/type III environmental declarations for one (product specific rules) or more (basic/core product category rules) product categories

[SOURCE: EN ISO 14025, modified]

3.36
product family
subgroup of a product category – technologically or functionally similar products

3.37
program operator
body or bodies that conduct a Type III environmental declaration program (3.18)

[SOURCE: EN ISO 14025:2010]

3.38
product specific rules
PSR
product specific set of rules and requirements, based upon basic product category rules for a type II+/type III environmental declaration and underlying life cycle assessment

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3.39
use phase
life cycle stage of a product starting when it has been put into service and finishing at end of life

3.40
recycling
processing of waste materials for the original purpose or for other purposes, excluding energy recovery

[SOURCE: EN ISO 15270:2007, modified]

3.41
stakeholder
individual, group or organization that has an interest in an organization or activity

Note 1 to entry: Usually a stakeholder can affect or is affected by the organization or the activity.

[SOURCE: EN ISO 14050, 3.5, modified]

3.42
substance
chemical element and its compounds in the natural state or obtained by any manufacturing process, including any additive necessary to preserve its stability and any impurity deriving from the process used, but excluding any solvent which may be separated without affecting the stability of the *substance* or changing its composition

Note 1 to entry: Definition taken from the United Nations' Globally harmonized System of Classification and Labelling (GHS).

3.43
raw material
primary or secondary material that is used to manufacture a product

Note 1 to entry: Secondary material includes recycled material.

[SOURCE: EN ISO 14040]

3.44
waste
substances or objects which the holder intends or is required to dispose of

Note 1 to entry: This definition is taken from the *Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal* (22 March 1989), but is not confined in this European Standard to hazardous waste.

4 Description of the elements of ecodesign and environmental declarations of a motor system

4.1 General

The process of declaring the potential environmental impact or stating environmental claims of the components of a motor system in an environmental declaration or footprint is the outcome of an environmentally conscious design (ECD) process. The components of a motor system, including amongst others, the auxiliaries, the motor starters, the complete drive module (CDM) and the motor, derived from its definition in EN 50598-1, is the scope of the standard.

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