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Product category rules for life cycle assessments of electronic and electrical products and systems

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National foreword

This British Standard is the UK implementation of EN 50693:2019.

The UK participation in its preparation was entrusted to Technical Committee GEL/111, Electrotechnical environment committee.

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

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Product category rules for life cycle assessments of electronic and electrical products and systems

Règles de définition des catégories de produits pour l'analyse du cycle de vie des produits et systèmes électriques et électroniques

Verfahren zur quantitativen, umweltgerechten Produktgestaltung durch Ökobilanzen und Umweltdeklarationen mittels Produktkategorieregeln für elektronische und elektrotechnische Geräte

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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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European foreword

This document (EN 50693:2019) has been prepared by CLC/TC 111X “Environment”.

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)	2020-08-12
• latest date by which the national standards conflicting with this document have to be withdrawn	(dow)	2022-08-12

The TC 111X Working Group 8 has been assigned to deal with the NWIP to define product category core rules for life cycle assessment as basis for environmental declarations. This document has been elaborated to ensure a harmonized and compatible approach through harmonized methods of assessing the environmental performance and providing environmental declarations for electrical and electronic products and systems (EEPS).

Key points:

a) requirements how to conduct life cycle assessments for environmental declarations;

b) requirements how to compile an associated life cycle assessment report;

c) requirements how to develop product specific rules in vertical, product specific technical committees.

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

Future standards defining product specific rules have to be consistent with this standard during their preparation. Any product specific standard already including these topics, e.g. EN 50598-3, should adapt their content to this standard within their usual maintenance circles.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

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Introduction

In the recent years, environmental aspects of electrical and electronic products and systems gained in importance for interested parties, such as customers and regulators.

In addition to qualitative approaches already widely applied in the context of environmental conscious design process, quantitative information on the potential environmental impacts of the full life cycle of products gained further interest. This generates the need to provide harmonized rules for the underlying life cycle assessment (LCA) in order to provide robust and consistent quantitative environmental data on electrical and electronic products and systems (EEPS), as well as to enable data aggregation at system level, like e.g. buildings, power drive systems and control cabinets.

The definition of product category rules (PCR), derived from EN ISO 14025, is an established method for a consistent approach by setting minimum quality standards for life cycle assessment in context to environmental product declarations (EPD) and hence are now defined as core rules in this standard for the variety of electrical and electronic products and systems.

On the base of the overarching PCR set out as core rules for EEPS, product specific rules (PSR) should be elaborated to further detail the requirements for the LCA in the specific context of the products or systems in scope. This can be done e.g. by product specific standardization committees or environmental declaration programs.

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1 Scope

This document defines product category rules (PCR) for electronic and electrical products and systems (EEPS). It specifies the process and requirements on how to conduct life cycle assessment in the context of environmental declarations.

PCR is complemented by additional product-specific rules (PSR), which further define e.g. functional units and default scenarios in the product-specific context. Therefore, it also provides guidance on how to develop PSR in corresponding technical committees.

This document provides common rules for:

a) life cycle assessment (LCA), including the requirements for developing default scenarios;

b) the LCA report;

c) the development of product specific rules.

This document provides further guidelines for environmental declarations.

The basic LCA principles and framework are based on the EN ISO 14040 series of standards (i.e EN ISO 14040 and ISO 14044), and therefore out of scope of the 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.

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

EN ISO 14044:2006, *Environmental management - Life cycle assessment - Requirements and guidelines (ISO 14044:2006)*

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

EN ISO 14021:2016, *Environmental labels and declarations - Self-declared environmental claims (Type II environmental labelling) (ISO 14021:2016)*

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

CEN ISO/TS 14027, *Environmental labels and declarations – Development of product category rules*

3 Terms and definitions

For the purposes of this document, the following terms and definitions 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
collection
means the gathering of waste, including the preliminary sorting and preliminary storage of waste for the purposes of transport to a waste treatment facility

[SOURCE: Directive 2008/98/EC]

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3.2
co-product
two or more products coming from the same unit process or product system

Note 1 to entry: Co-product, by-product and product have the same status and are used for identification of several distinguished flows of products from the same unit process. From co-product, by-product and product, waste is the only output to be distinguished as a non-product.

[SOURCE: EN ISO 14040:2006, 3.10]

3.3
cut-off criteria
specification of the amount of material or energy flow or the level of environmental significance associated with unit processes or product system to be excluded from a study

[SOURCE: EN ISO 14040:2006, 3.18]

3.4
declared unit
quantity of the product used as a reference unit for the environmental declaration when a functional unit cannot be directly used

Note 1 to entry: The declared unit might differ from the functional unit in terms of the declaration.

[SOURCE: EN 15804:2012+A1:2013, 3.8, modified]

3.5
disposal
operation which is not recovery even where the operation has as a secondary consequence the reclamation of substances or energy

Note 1 to entry: Annex I of Directive 2008/98/EC sets 231 out a non-exhaustive list of disposal operations.

[SOURCE: EN 50625-1:2014, 3.12]

3.6
energy recovery
production of useful energy through direct and controlled combustion or other processing of waste

Note 1 to entry: Energy recovery is a recovery operation where the material is used principally as a fuel or other means to generate energy, see R1 of Annex II of Directive 2008/98/EC

[SOURCE: EN 50625-1:2014, 3.14]

3.7
environment
surroundings in which an organization operates, including air, water, land, natural resources, flora, fauna, humans and their interrelationships

Note 1 to entry: Surroundings can extend from within an organization to the local, regional and global system.

Note 2 to entry: Surroundings can be described in terms of biodiversity, ecosystems, climate or other characteristics.

[SOURCE: EN ISO 14001:2015, 3.2.1]

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3.8
environmental aspect
element of an organization's activities or products or services that interacts or can interact with the environment

Note 1 to entry: An environmental aspect can cause (an) environmental impact(s) (3.2.4). A significant environmental aspect is one that has or can have one or more significant environmental impact(s).

Note 2 to entry: Significant environmental aspects are determined by the organization applying one or more criteria.

[SOURCE: EN ISO 14001:2015, 3.2.2]

3.9
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 14021:2016, 3.1.4]

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

[SOURCE: EN ISO 14001:2015, 3.2.4]

3.11
environmental declaration
claim which indicates the environmental aspects of a product or service

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, 2.1]

3.12
environmental management system
part of the management system used to manage environmental aspects, fulfil compliance obligations, and address risks and opportunities

[SOURCE: EN ISO 14001:2015, 3.1.2]

3.13
functional unit
FU
quantified performance of a product system for use as a reference unit

[SOURCE: EN ISO 14040:2006, 3.20]

3.14
hazardous substances and preparations
substance or preparation that can adversely impact the human health and/or the environment with immediate or retarded effect

[SOURCE: IEC Guide 109:2012, modified]

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3.15
homogenous product family
subgroup of a product family based on the underlying technology or build where the environmental impacts can reasonably be expected to be similar and therefore scalable over the group through a function of certain physical characteristics, e.g. power or weight

3.16
interested party
person or organization that can affect, be affected by, or perceive itself to be affected by a decision or activity

EXAMPLE Customers, communities, suppliers, regulators, non-governmental organizations, investors and employees

Note 1 to entry: To “perceive itself to be affected” means the perception has been made known to the organization

[SOURCE: EN ISO 14001:2015, 3.1.6]

3.17
landfill
waste disposal site for the deposit of the waste onto or into land (i.e. underground), including: Internal waste disposal sites (i.e. landfill where a producer of waste is carrying out its own waste disposal at the place of production) and a permanent site (i.e. more than one year) which is used for temporary storage of waste

Note 1 to entry: Excluded are facilities where waste is unloaded in order to permit its preparation for further transport for recovery, treatment or disposal elsewhere, and storage of waste prior to recovery or treatment for a period less than three years as a general rule, or storage of waste prior to disposal for a period less than one year.

[SOURCE: Directive 1999/31/EC]

3.18
LCA report
accompanying document to the life cycle assessment. Used as a complement to the environmental declaration giving further detailed information about the inputs, outputs, used LCI-data and assumptions in regard to this standard

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

3.19
life cycle
consecutive and interlinked stages of a product system, from raw material acquisition or generation from natural resources to final disposal

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

[SOURCE: EN ISO 14040:2006, 3.1]

3.20
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, 3.2]

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3.21
life cycle inventory analysis
LCI
phase of life cycle assessment involving the compilation and quantification of inputs and outputs for a product throughout its life cycle

[SOURCE: EN ISO 14040:2006, 3.3]

3.22
material recovery
any recovery operation, excluding energy recovery and the reprocessing into materials which are to be used as fuel

[SOURCE: EN 50625-1:2014, 3.23; Decision 2011/753/EU]

3.23
organization
person or group of people that has its own functions with responsibilities, authorities and relationships to achieve its objectives

[SOURCE: EN ISO 14001:2015, 3.1.4 - modified]

3.24
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 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 14021:2016, 3.1.13]

3.25
product system
collection of unit processes with elementary and product flows, performing one or more defined functions, and which models the life cycle of a product

[SOURCE: EN ISO 14040:2006, 3.28]

3.26
process
set of interrelated or interacting activities which transforms inputs into outputs

Note 1 to entry: A process can be documented or not.

[SOURCE: EN ISO 14001:2015, 3.3.5]

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3.27
product
output of an organization that can be produced without any transaction taking place between the organization and the customer

Note 1 to entry: Production of a product is achieved without any transaction necessarily taking place between provider and customer, but can often involve this service element upon its delivery to the customer.

Note 2 to entry: The dominant element of a product is that it is generally tangible.

Note 3 to entry: Hardware is tangible and its amount is a countable characteristic (e.g. tyres). Processed materials are tangible and their amount is a continuous characteristic (e.g. fuel and soft drinks). Hardware and processed materials are often referred to as goods. Software consists of information regardless of delivery medium (e.g. computer programme, mobile phone app, instruction manual, dictionary content, musical composition copyright, driver's license).

[SOURCE: ISO 9000:2015, 3.7.6]

3.28
product category
group of products that can fulfil equivalent functions

[SOURCE: EN ISO 14025:2010, 3.12]

3.29
product category rules
PCR
set of specific rules, requirements and guidelines for conducting life cycle assessment to develop environmental declarations for one or more product categories

[SOURCE: EN ISO 14025:2010, 3.5 - modified]

3.30
product family
subgroup of a product category – technologically or functionally similar products

3.31
product specific rules
PSR
set of specific rules, requirements and guidelines, based upon and complementing the PCR, for a specific product family

3.32
raw material
primary or secondary material that is used to produce a product

Note 1 to entry: Secondary material includes recycled material.

[SOURCE: EN ISO 14040:2006, 3.15]

3.33
reference flow
measure of the outputs from processes in a given product system required to fulfil the function expressed by the functional unit

Note 1 to entry: The reference flows translate the abstract functional unit into specific product systems needed to fulfil the required function with a required level of performance

[SOURCE: EN ISO 14040:2006, 3.29 - modified]

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3.34
reference product
product or product system, supplied by the manufacturer, modelled in the LCA and taken as reference to extrapolate the environmental impact of other products or product systems matching the same functional unit (i.e homogeneous product family) and covered by the environmental declaration

[SOURCE: PEP Ecopassport PCR ed.3 - modified]

3.35
reference service life
RSL
service life that may be expected for a product and/or product system according to a particular set, i.e., a reference set, of ambient and operating conditions during use stage and that may be used to estimate the service life under other conditions during the use stage

Note 1 to entry: The reference service life is a theoretical period used for calculation purposes. It can never be compared to the minimum, average or actual service life of the product

[SOURCE: EN 15804:2012+A1:2013, modified]

3.36
substance
chemical elements and their compounds in the natural state or obtained by any production process, including any additive necessary to preserve the stability of the product and any impurities deriving from the process used, but excluding any solvent which may be separated without affecting the stability of the substance or changing its composition

[SOURCE: Globally Harmonized System of Classification and Labelling (GHS):2017, Chapter 1.2, Definitions and Abbreviations]

3.37
waste
any substance or object which the holder discards or intends or is required to discard

[SOURCE: EN 50625-1:2014, 3.39]

3.38
waste electrical and electronic equipment
WEEE
electrical or electronic equipment which is waste within the meaning of Article 3(1) of Directive 2008/98/EC, including all components, sub-assemblies and consumables which are part of the product at the time of discarding

Note 1 to entry: This standard covers whole equipment discarded as WEEE and fractions thereof.

[SOURCE: EN 50625-1:2014, 3.40 – modified]

4 Product life cycle assessment

4.1 General

To quantify the potential environmental impacts caused by EEPS, LCA compliant with EN ISO 14040 and EN ISO 14044 shall be performed. And results can then be used to identify improvement potentials in terms of e.g. environmental conscious product design. In addition, the requirements of this PCR and applicable PSR shall be applied in case the LCA results are further intended to be used in external communication. This is valid when the form of an environmental product declaration (EPD), as laid out in the EN ISO 14021/14025 standards, is used.

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4.2 Product Category Rules

4.2.1 General

The product category rules (PCR) provide a uniform approach to perform the LCA, serving three purposes:

— to ensure a consistent quality of the LCA results,

— to enable data aggregation in larger systems, e.g. buildings or industrial production machinery,

— to serve as basis for environmental declarations using quantitative environmental impacts.

The PCR should be complemented with corresponding, product specific rules (PSR) to further specify assumptions and methodology to be used for specific product families.

Product PSR shall be developed in the respective product technical committees according to the requirements set out in this standard. If there are no PSR available yet but there's the need for quantitative environmental information based on LCA for a certain product group, the LCA practitioner shall complete the missing specifications according to the requirements of EN ISO 14044 and shall disclose his specifications along with the evaluated data.

NOTE For the completion of the missing information various sources might be available, like for instance environmental declaration programs or PSR in standards by other product groups.

4.2.2 Functional unit and reference flow description

A product or system may have several functions and the main function(s) delivered to the user shall be selected for the LCA study.

The functional unit (FU) is the product or system main function(s)' quantified, to which the inputs and outputs are related to.

The functional unit shall be defined by:

a) The main function(s) delivered to the user;

b) The magnitude and level of performance to be achieved for the main function(s). This level shall be quantified and determined according to the market habits, regulatory requirements, standards and/or the technical state of the art;

c) the reference service life (RSL) for the reference product, corresponding to the stipulations set out in ii).

The FU is used as a reference unit to allow comparison between different alternatives (e.g. products, systems or technical solutions) intended to provide the main functions with the required level of performance.

NOTE 1 Some products or systems may have complex FU descriptions, for example multifunctional products such as smartphones.

In PSR development it shall be taken into account that the definition of the RSL could lead to distortions for product groups with a considerable range of product life span, where for some products the environmental impacts would be underestimated, while for others it would be overestimated. Hence this should be reflected in the FU and RSL, as well as the EPD, e.g. by providing annualised data.

Examples of functional units:

1) Motor: To provide (50 kW) of (mechanical power), over (20) years RSL with (260) days of operation per year and (16) operating hours per day.

2) Cables (Energy distribution networks in the area of infrastructures): To transmit energy expressed for 1A over a distance of 1 km for 40 years and a 100 % use rate in accordance with relevant standards (mention the relevant standards or refer the product technical data sheet).

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NOTE 2 Examples taken from CENELEC TC2 Working Group and PEP Ecopassport declaration program. (PCR ed3 - PSR-0001-ed3-EN-2015 10 16)

Each functional unit shall be further specified in product specific rules (PSR) for each product or system family to allow fair assessment and comparison. If no PSR is available, the FU shall be defined and documented according to the requirements mentioned above and ISO standards EN ISO 14040 / EN ISO 14044.

The reference flow describes all the needed flows to fulfil the functional unit. A specific reference flow matches each specific technical solution fulfilling the functional unit.

The reference flow shall include:

a) The quantitative amount of product(s), e.g. specified through their mass in kg, used to fulfil the functional unit: they will be named “reference product”;

b) In addition, intermediate flows, for instance auxiliary materials and packaging, including waste and discarded materials generated at each life cycle stage.

This relationship between functional unit, technical solution and reference flow is further illustrated in Figure 1 through an example.

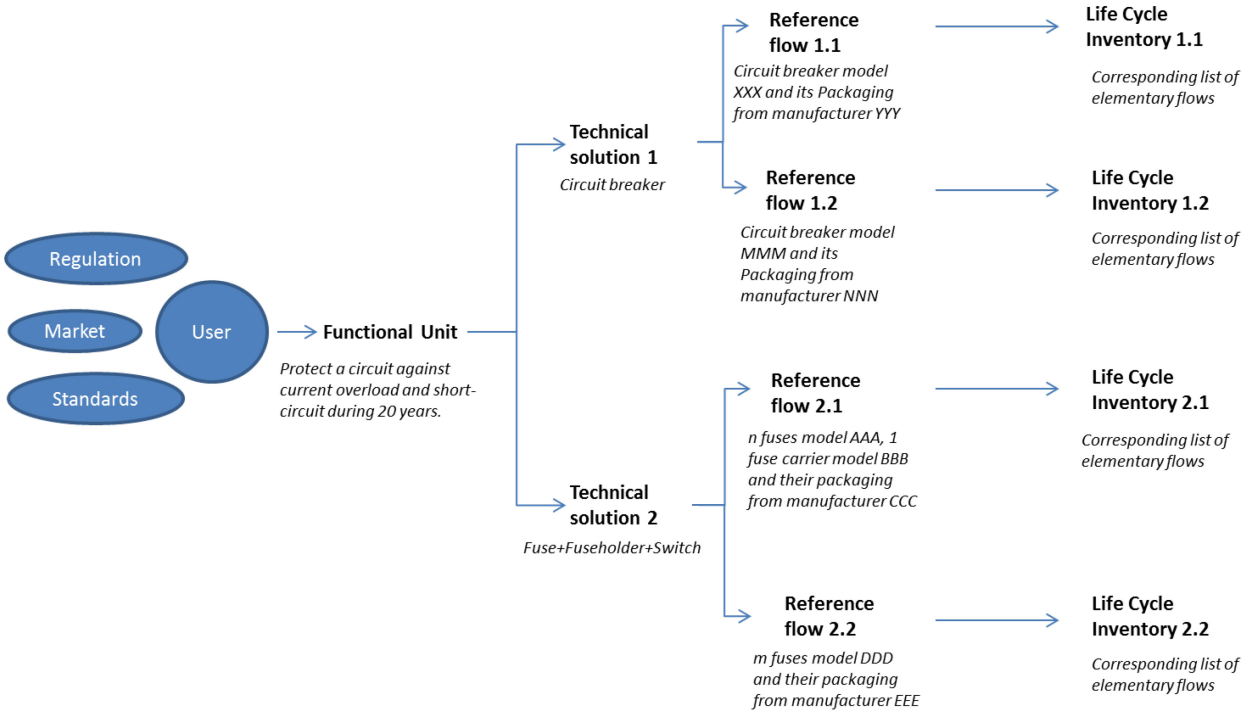

Figure 1 — Graphical visualization of functional unit, technical solution and reference flow relationship

Since this reference flow is very product-system specific it shall be described in detail in product specific rules (PSR).

A product may have several possible functions. Based on the goal and scope of the conducted LCA, the LCA may relate to a specific function and scenario using a functional unit or it may cover a range of functionalities and scenarios using a declared unit (DU). The declared unit shall be used as an alternative to the functional unit if no functional unit can be defined. This is the case when the product can be used in many different ways in the context of its application, or when the precise function of the product or scenarios of the system in which it is integrated is not stated or is unknown.

The declared unit shall clearly mention:

a) The quantity of product;

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