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Interested committees:

Title: BS EN IEC 63058 Switchgear and controlgear and their assemblies for low voltage - Environmental aspects

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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/Figure/ Table/Note	Type of comment	Commend (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	

PROJECT NUMBER: IEC 63058 ED1	
DATE OF CIRCULATION: 2024-05-24	CLOSING DATE FOR COMMENTS: 2024-08-16
SUPERSEDES DOCUMENTS: 121/128/CD, 121/140A/CC	

IEC TC 121 : SWITCHGEAR AND CONTROLGEAR AND THEIR ASSEMBLIES FOR LOW VOLTAGE	
SECRETARIAT: France	SECRETARY: Mr Michaël LAHEURTE
OF INTEREST TO THE FOLLOWING COMMITTEES: TC 2, TC 22, TC 44, TC 65, TC 85, TC 111, SC 121A, SC 121B	PROPOSED HORIZONTAL STANDARD: ☐ Other TC/SCs are requested to indicate their interest, if any, in this CD to the secretary.
FUNCTIONS CONCERNED: ☐ EMC ☒ ENVIRONMENT ☐ QUALITY ASSURANCE ☐ SAFETY	

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TITLE:

Switchgear and controlgear and their assemblies for low voltage - Environmental aspects

NOTE FROM TC/SC OFFICERS:

TC121 Officers support circulation of CD2 for project IEC 63058 ED1.

NC experts are kindly requested to refer their comments to line number.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

SWITCHGEAR AND CONTROLGEAR AND THEIR ASSEMBLIES FOR LOW VOLTAGE –

Environmental aspects

FOREWORD

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International Standard IEC 63058 has been prepared by IEC technical committee 121: Switchgear and controlgear and their assemblies for low voltage.

This edition cancels and replaces the technical specification published in 2021.

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

- new definitions relevant for material efficiency (3.1.47 to 3.1.68),
- new Section 6 on material efficiency,
- new Annex F - Environmental information for information exchange,
- new Annex G - Assessment of carbon footprint for switchgear and controlgear

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

FDIS	Report on voting
121/xxx/FDIS	121/xxx/RVD

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/standardsdev/publications.

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,
- withdrawn,
- replaced by a revised edition, or
- amended.

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INTRODUCTION

Increasingly, there is a focus on preserving the natural environment for the good of future generations. For this to be achieved, efficient use of energy and materials throughout the life cycle of every product and process to conserve world's finite natural resources is essential. In addition, release of substances and materials that might be harmful for the environment or induce climatic changes are to be avoided or minimized. From conception to end of life of a product, the environmental impact of all the relevant processes should be considered, including how materials are disposed of or recovered for future use.

In order to contribute to conserving natural resources, manufacturers of low-voltage switchgear and controlgear and their assemblies should ensure an environmentally conscious design (ECD) involving:

- phasing-out or minimizing use of hazardous substances or materials;
- efficient use of energy and materials in the manufacture of products;
- ensuring the lowest practical energy consumption by the products while they are in use;
- at the end of product life, the possibility, as far as practical, of recycling materials for future use, and sorting hazardous components requiring a specific treatment.

Declarations and ECD are increasingly required and in some instances mandated. These can take several forms, for example, Type II or Type III environmental declaration, material declaration (MD). In some business, Green Public Procurement (GPP) is applicable and/or ECD is part of the ISO 14001 certification. Some countries and regions are also actively pushing for environmental conservation, for example, the European Union through its Ecodesign Directive and China through Ecodesign Initiative. Systematic demands for ECD will be required by most, if not all customers, in the medium term.

Assessing the environmental impact of low-voltage switchgear and controlgear and their assemblies is part of an ECD process. ECD requires the identification, measurement and reporting of particular impacts. IEC 62430 describes the basic principles of ECD, with the goal of reducing the potential environmental impacts of products.

Generally, the environmental impact of low-voltage switchgear and controlgear and their assemblies is very low compared with that of the overall system into which they are incorporated and the processes to which they contribute. The lifetime impact of processes such as the air-conditioning of a building, the manufacture of steel or shipping far exceed that of the manufacture and use of any associated low-voltage switchgear and controlgear.

Even though low-voltage switchgear and controlgear and their assemblies have a relatively minor impact on the environment, there is a market need for appropriate methods for managing these environmental matters. A simplified means of estimating the environmental impacts is required together with readily available data to make the stakeholder's, for example contractor's, installer's and end user's, task of assessing environmental impacts at system level easier.

Specific rules for assessing the environmental impacts and providing appropriate data for low-voltage switchgear and controlgear and their assemblies are among the purposes of this document. These rules establish a common evaluation scheme of their environmental impacts in terms of characterized impact indicators (e.g. CO₂-equivalents, ozone depletion) over their whole life cycle.

SWITCHGEAR AND CONTROLGEAR AND THEIR ASSEMBLIES FOR LOW VOLTAGE –

Environmental aspects

1 Scope

This document provides methods and process for manufacturers of low-voltage switchgear and controlgear and their assemblies in evaluating and improving the environmental impact of their products, and in enabling effective communication using common references for environmental information throughout the supply chain.

This document provides:

- guidance on the process and general aspects to implement environmentally-conscious product design principles, as given in IEC 62430, essential for low-voltage switchgear and controlgear and their assemblies;
- the Product Specific Rules (PSR) for Life Cycle Assessment (LCA), to be used for environmental declarations, and for quantitative ECD;
- standard environmental impact data derived from case studies and a means of using them, to allow assessment of impacts at a system level, where specific data for a device is missing;
- common rules for communicating information about the presence of regulated substances and the materials contained in the product, according to IEC 62474;
- rules and guidance on communicating information about the end of life treatment of the product;
- guidance and uses cases for addressing circular economy and material efficiency;
- preferred communication rules of environmental information, including a data model.

This document does not provide:

- The general methods and the process to execute the LCA, provided by ISO 14040 and ISO 14044.

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 60050-904, *International Electrotechnical Vocabulary (IEV) – Part 904: Environmental standardization for electrical and electronic products and systems* (available at www.electropedia.org)

IEC 61439-1:2020, *Low-voltage switchgear and controlgear assemblies – Part 1: General rules*

IEC 62430:2019, *Environmentally conscious design (ECD) – Principles, requirements and guidance*

IEC 62474:2018, *Material declaration for products of and for the electrotechnical industry*

IEC 62474-DB¹, *Material declaration for products of and for the electrotechnical industry* (available at <http://std.iec.ch/iec62474>)

IEC TR 62635:2012, *Guidelines for end-of-life information provided by manufacturers and recyclers and for recyclability rate calculation of electrical and electronic equipment*

ISO 14006, *Environmental management systems – Guidelines for incorporating ecodesign*

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

ISO 14025:2006, *Environmental labels and declarations – Type III environmental declarations – Principles and procedures*

ISO 14040:2006, *Environmental management – Life cycle assessment – Principles and framework*

ISO 14044:2006, *Environmental management – Life cycle assessment – Requirements and guidelines*

ISO 14044:2006/AMD1:2017

ISO 14044:2006/AMD2:2020

ISO 14045:2012, *Environmental management – Eco-efficiency assessment of product systems – Principles, requirements and guidelines*

ISO 14067:2018, *Greenhouse gases — Carbon footprint of products — Requirements and guidelines for quantification*

EN 45558:2019, *General method to declare the use of critical raw materials in energy-related products*

IEC 63366², *Product category rules for life cycle assessments of electronic and electrical products and systems*

Reference Life Cycle Data System (ILCD) Handbook, *Recommendations for Life Cycle Impact Assessment in the European context. First edition November 2011. EUR 24571*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-904 and the following apply.

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

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

3.1.1

low-voltage switchgear and controlgear assembly assembly

combination of one or more low-voltage switching devices together with associated control, measuring, signalling, protective, regulating equipment, with all the internal electrical and

¹ "DB" refers to the IEC on-line database.

² Under development: current stage CDV

mechanical interconnections and structural parts, as defined by the original manufacturer, which can be assembled in accordance with the original manufacturer's instructions

Note 1 to entry: Throughout this document, the term assembly(s) is used for a low-voltage switchgear and controlgear assembly(s)

Note 2 to entry: The term "switching device" includes mechanical switching devices and semiconductor switching devices, e.g. soft starters, semiconductor relays, frequency converters. The auxiliary circuits may also include electro-mechanical devices, e.g. control relays, terminal blocks, and electronic devices, e.g. electronic motor control devices, electronic measurement and protection devices, bus communication, programmable logic controller systems.

[SOURCE: IEC 61439-1:2020, 3.1.1]

3.1.2

declarable substance group

group of substances included in the IEC 62474-DB at the date the material declaration is made

Note 1 to entry: Substance group is multiple CAS # (for example Lead compounds).

3.1.3

end of life

state of a product when it is finally removed from its intended use or original purpose

[SOURCE: IEC 60050-901:2013-11, 901-07-15]

3.1.4

end of life treatment

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 62635:2012, 3.3, modified – Hyphens in term deleted, insertion of Note 1 to entry.]

3.1.5

energy recovery

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

Note 1 to entry: Waste incinerators producing hot water, steam and/or electricity are common means for energy recovery.

[SOURCE: IEC 60050-904:2014, 904-04-03]

3.1.6

environment

surroundings in which a product or system exists, including air, water, land, natural resources, flora, fauna, humans and their interrelation

[SOURCE: IEC 60050-904:2014, 904-01-01].

3.1.7

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: IEC 60050-904:2014, 904-01-02].

3.1.8

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: ISO 14021:2016, 3.1.4]

3.1.9

environmentally conscious design

systematic approach which considers environmental aspects in the design and development with the aim to reduce adverse environmental impacts throughout the life cycle of a product

Note 1 to entry: Other terminology used worldwide with the same meaning includes ecodesign, design for environment (DFE), green design and environmentally sustainable design.

[SOURCE: IEC 62430:2019, 3.1.1, modified – Abbreviated term "ECD" and Note 2 to entry deleted.]

3.1.10

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: ISO 14025:2006, 3.3, modified – "Type III" removed from the term and "(program instructions)" added to the definition.]

3.1.11

environmental impact

change to the environment, whether adverse or beneficial, wholly or partly resulting from environmental aspects

[SOURCE: IEC 60050-904:2014, 904-01-03].

3.1.12

environmental declaration

claim which indicates the environmental aspects of a product or a 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.

3.1.13

Type II environmental declaration

environmental declaration providing self-declared environmental claims according to ISO 14021:2016

3.1.14

Type III environmental declaration

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 is used, including program instructions and product category rules. The predetermined parameters are based on ISO 14040 and ISO 14044.

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

[SOURCE: ISO 14025:2006, 3.2, modified – Note 1 to entry modified.]

3.1.15

environmental management system

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

[SOURCE: ISO 14001:2015, 3.1.2]

3.1.16

LCA functional unit

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

[SOURCE: ISO 14040:2006, 3.20, modified – Addition of "LCA" in term.]

3.1.17**standard data**

secondary data applicable to a homogeneous product family as resulting from a study

3.1.18**specific data**

data directly collected, measured or estimated for a specific product

3.1.19**hazardous substance**

substance that can adversely impact the environment with immediate or retarded effect

3.1.20**homogeneous 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, for example electrical ratings or weight

3.1.21**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 has to be kept for justification purposes in terms of environmental declaration verification or market surveillance

3.1.22**life cycle**

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

[SOURCE: ISO 14040:2006, 3.1]

3.1.23**life cycle assessment**

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

[SOURCE: ISO 14040:2006, 3.2, modified – Abbreviated term "LCA" deleted.]

3.1.24**life cycle inventory**

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.

Note 2 to entry: LCI according to the ILCD Guidelines are available in the Life Cycle Data Network (LCDN).

3.1.25**life cycle stage**

element of a life cycle

EXAMPLE Raw material acquisition and production, manufacturing, packaging and distribution, installation and use, maintenance and upgrading, and end of life.

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

3.1.26**material**

substance or mixture of substances within a product or product part

[SOURCE: IEC 62474:2018, 3.15]

3.1.27**material class**

defined classification of materials that are established in the referenced IEC 62474 database for purposes of inventorying aspects of a product, such that no two classes contain the same materials

[SOURCE: IEC 62474:2018, 3.16, modified – Deletion of the note to entry.]

3.1.28**organization**

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

[SOURCE: ISO 9000:2015, 3.2.1, modified – Notes 1 and 2 to entry deleted.]

3.1.29**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 document, 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: ISO 14021:2016, 3.1.13]

3.1.30**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: ISO 9000:2015, 3.4.1, modified – "that use inputs to deliver an intended result" replaced with "which transform inputs into outputs", Notes 1, 3, 5 and 6 to entry deleted, Note 2 to entry shortened.]

3.1.31**product**

goods or service

Note 1 to entry: in this document product includes also assemblies.

[SOURCE: ISO 14024:2018, 3.2, modified - note added]

3.1.32**product category**

group of products that can fulfil equivalent functions

[SOURCE: ISO 14025:2006, 3.12]

3.1.33**product category rules**

set of specific rules, requirements and guidelines for developing Type II/Type III environmental declarations and/or for quantitative analysis within an ECD process, for one or more product categories

[SOURCE: ISO 14025:2006, 3.5, modified – Abbreviated term "PCR" deleted, "Type II/" and "and/or for quantitative analysis within an ECD process" added.]

3.1.34**product family**

subgroup of a product category, technologically or functionally similar products

Note 1 to entry: Basic product families are defined by product standards in IEC 60947 (all parts). Further families can be defined by the manufacturers.

3.1.35**program operator**

body or bodies that conduct a Type III environmental declaration program

[SOURCE: ISO 14025:2006, 3.4, modified – Note to entry deleted.]

3.1.36**product specific rules**

specific set of rules and requirements applicable to a product family, complementing product category rules for life cycle assessment

3.1.37**use phase**

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

3.1.38**recycling**

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

[SOURCE: IEC Guide 109:2012, 3.15]

3.1.39**recyclability**

potential of items or materials to be recycled as defined by the relevant standards and regulations in force

Note 1 to entry: The adjective of "recyclability" is "recyclable".

[SOURCE: EN 17615:2022-06, 3.208]

3.1.40**recyclability rate**

ratio of recyclable product mass to total product mass

[SOURCE: IEC TR 62635:2012, 3.14]

3.1.41**recovery**

operation by which waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfill a particular function, or waste being prepared to fulfill that function, in the plant or in the wider economy

Note 1 to entry: Recovery operations include recycling and energy recovery.

[SOURCE: IEC TR 62635:2012, 3.9, modified – Note 1 to entry added.]

3.1.42**recoverability**

ability of a waste product to be recovered, based on actual practices

[SOURCE: IEC TR 62635:2012, 3.11]

3.1.43**recoverability rate**

ratio of recoverable products, product parts, materials mass to total waste product mass reprocessed

[SOURCE: IEC TR 62635:2012, 3.12]

3.1.44**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: IEC 62474:2018, 3.28]

3.1.45**raw material**

primary or secondary material that is used to manufacture a product

Note 1 to entry: Secondary material includes recycled material.

[SOURCE: ISO 14040:2006, 3.15, modified – "produce" replaced with "manufacture".]

3.1.46**waste**

material or object which the holder discards or intends or is required to discard

[SOURCE: IEC TR 62635:2012, 3.20]

3.1.47**reference service life****RSL**

service life of a product, component, assembly or system which is known to be expected under a particular set, i.e. a reference set, of in-use conditions and which can form the basis for estimating the service life under other in-use conditions

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: ISO 15686-1:2011, 3.22, modified, a note to entry has been added]

3.1.48**material circulation**

closed-loop approach where products or their constituent parts are reprocessed and brought back to use for the same or other purpose

Note 1 to entry: The term "constituent parts" refers to sub-assemblies, parts or materials used to fabricate a product.

Note 2 to entry: Reprocessing involves the restoration or modification of the functionality of the product or its constituent parts, and may consist of repairing, rework, replacement of worn parts, and/or upgrade of software, firmware and/or hardware as well as materials recycling. Reprocessing includes all phases of the life cycle of a product from, for example, repair, reuse and remanufacturing, up to recycling. It excludes disposal.

Note 3 to entry: Material circulation could improve material efficiency.

[SOURCE: ISO 14009:2020, 3.2.13]

3.1.49**material efficiency**

minimization of the use of (natural) resources, maximizing the lifetime of products and optimized material circulation strategies

[SOURCE: ISO 14009:2020, 3.2.13; modified – "by" replaced by ",", and "through" by "and"]

3.1.50**durability****<of a product>**

ability to function as required, under defined conditions of use, maintenance and repair, until a limiting state is reached

Note 1 to entry: The degree to which maintenance and repair are within the scope of durability will vary by product or product-group.

406 Note 2 to entry: Durability can be expressed in units appropriate to the part or product concerned, e.g. calendar time,
407 operating cycles, distance run, etc. The units should always be clearly stated.

408 [SOURCE: EN 45550:2020; 4.2.1.1, modified: Note 2 deleted]

409 **3.1.51**

410 **limiting event**

411 occurrence which results in a primary or secondary function no longer being delivered

412 Note 1 to entry: Examples of limiting events are failure, wear-out failure or deviation of any analogue signal.

413 [SOURCE: EN 45550:2020; 4.2.1.3]

414 **3.1.52**

415 **limiting state**

416 condition after one or more limiting event(s)

417 Note 1 to entry: A limiting state can be changed to a functional state by maintenance or repair.

418 Note 2 to entry: A limiting state can change to EoL-status, if maintenance or repair is no longer viable due to socio-
419 economic or technical reasons.

420 [SOURCE: EN 45550:2020; 4.2.1.4, modified: “of the ErP” in Note 1 deleted]

421 **3.1.53**

422 **primary function**

423 function fulfilling the intended use

424 Note 1 to entry: There can be more than one primary function.

425 Note 2 to entry: examples of primary function for circuit breakers are: conducting the current, breaking normal and
426 fault currents, providing isolation,

427 [SOURCE: EN 45550:2020; 4.2.2.1, modified: Note 2 added]

428 **3.1.54**

429 **secondary function**

430 function that enables the primary function(s)

431 Note 1 to entry: examples of secondary function are: current and voltage measurement, ...,

432 [SOURCE: EN 62542:2017; 5.14, modified: “supplements or enhances” deleted, Note 1 added]

433 **3.1.55**

434 **tertiary function**

435 function other than a primary or a secondary function

436 Note 1 to entry: examples of tertiary function are communication, displays,

437 Note 2 to entry: classification of functions into primary, secondary and tertiary shall be done at system level,
438 Communication is a tertiary function at product level, but can secondary at system level as enabling system operation.

439 [SOURCE: EN 62542:2017; 5.16, modified examples deleted, Notes added]

440 **3.1.56**

441 **reuse**

442 process by which a product or its parts, having reached the end of their first use, are used for
443 the same purpose for which they were conceived

444 Note 1 to entry: Reuse after second or subsequent usage is also considered as reuse, but normal, regular or sporadic
445 use is not considered as reuse

446 [SOURCE: CLC/TR 45550:2020; 4.4.3]

447 **3.1.57**

448 **repair**

449 process of returning a faulty product to a condition where it can fulfil its intended use

450 [SOURCE: CLC/TR 45550:2020; 4.4.4]

3.1.58**upgrade**

process of enhancing the functionality, performance, capacity or aesthetics of a product

Note 1 to entry: An upgrade to a product may involve changes to its software, firmware and/or hardware.

Note 2 to entry: Refer to the “Blue Guide” [3] for conditions under which a product is considered as a new product when placing it on the market after upgrading it.

[SOURCE: CLC/TR 45550:2020; 4.4.5]

3.1.59**critical raw material**

materials which, according to a defined classification methodology, are economically important, and have a high-risk associated with their supply

[SOURCE: EN 45558; 4.4.4 - modified: Note to entry removed]

3.1.60**remanufacturing**

industrial process to create a product by combining different parts from used products and including, where necessary, new parts

Note 1 to entry: Remanufacturing also occurs when at least one change is made which influences the safety or original performance of an existing product.

Note 2 to entry: The product shall be given a new identity (for example serial or type number).

[SOURCE: IEC 193-06-014]

3.1.61**refurbishing**

functional or aesthetical maintenance or repair of an item to restore to original, upgraded, or other predetermined form and functionality

[SOURCE: IEC 904-04-09]

3.1.62**Energy efficiency****EE**

ratio or other quantitative relationship between an output of performance, service, goods or energy, and an input of energy taking into account the driving parameters and the boundaries

Note 1 to entry: Both input and output need to be clearly specified in quantity and quality, and be measurable.

EXAMPLE Conversion efficiency: energy required/energy used; output/input; theoretical energy used to operate/energy used to operate.

[SOURCE: ISO/IEC 13273-1:2015, 3.4.1, modified – Insertion of “taking into account the driving parameters and the boundaries”, symbol “Ef” renamed to “EE”, and “Efficiency conversion energy” renamed to “Conversion efficiency” in example.]

3.1.63**primary material**

material made from virgin raw material(s)

[SOURCE: EN 45557; 3.1.1.1]

3.1.64**recycled material**

material which is pre-consumer, post-consumer or post-industrial

Note 1 to entry: The terms “recycled material” and “secondary material” have the same meaning in this document.

[SOURCE: EN 45557; 3.1.1.2 modified, post-industrial case added]

3.1.65**pre-consumer material**

material diverted from the waste generated during a manufacturing process excluding reutilization of materials such as rework, regrind or scrap generated in a process and being reincorporated in the same process that generated it

Note 1 to entry: Same process means the same manufacturing operation for the same type of product in the same or different physical location.

[SOURCE: EN 45557; 3.1.1.3]

3.1.66**post-industrial recycled material**

material diverted from the waste stream during a manufacturing process, excluding reutilization of materials such as rework, regrind or scrap generated in a process and capable of being reclaimed within the same process that generated it

[SOURCE: ISO 1382:2020, 3.375]

3.1.67**post-consumer material**

material recovered from waste generated by households or by commercial, industrial and institutional facilities in their role as end-users of a finished product

Note 1 to entry: This includes returns of products, or parts thereof, from the distribution of finished products for end-users.

[SOURCE: EN 45557; 3.1.1.4]

3.1.68**maintenance**

combination of all technical and management actions intended to retain an item in, or restore it to, a state in which it can perform as required

Note 1 to entry: Management is assumed to include supervision activities.

[SOURCE: IEC 192-06-01]

3.1.69**carbon footprint of a product**

sum of GHG emissions and GHG removals in a product system, expressed as CO₂ equivalents and based on a life cycle assessment using the single impact category of climate change

Note 1 to entry: A CFP can be disaggregated into a set of figures identifying specific GHG emissions and removals (see Table 1). A CFP can also be disaggregated into the stages of the life cycle.

Note 2 to entry: The results of the quantification of the CFP are documented in the CFP study report expressed in mass of CO₂e per functional unit.

[SOURCE: ISO 14067:2018, 3.1.1.1]

3.1.70**useful life**

time interval of an asset, from its first use to the end of life, where user requirements are no longer met due to economics of operation and maintenance, or obsolescence

[SOURCE: this definition is from IEC TR 62978:2017, the term “end-of-useful life” is under consideration by TC1/JWG2, see 1/2513/NP]

3.2 Abbreviated terms

CAS	chemical abstracts service
CFP	carbon footprint of a product
CRM	critical raw material
EEE	electrical and electronic equipment
ECD	environmentally conscious design

EOL	end of life
EPD	environmental product declaration
GPP	green public procurement
GWP	global warming potential
ILCD	international life cycle data
LCA	life cycle assessment
LCA FU	LCA functional unit
LCDN	life cycle data network
LCI	life cycle inventory
LCIA	life cycle impact assessment
MD	material declaration
OHS	occupational health and safety
PCR	product category rules
PSR	product specific rules
RSL	reference service life
SG&CG	switchgear and controlgear

4 Environmental aspects of switchgear and controlgear and their assemblies

4.1 Product description and classification

In a broad sense, switchgears are switching devices intended for use in connection with generation, transmission, distribution and conversion of electrical energy in buildings and industrial area. Controlgear are products for controlling various energy consuming equipment, such as motors and motor-driven applications, primarily in the industrial areas, but also in household appliances.

Figure 1 shows the product families for low-voltage SG&CG in the scope of this document.

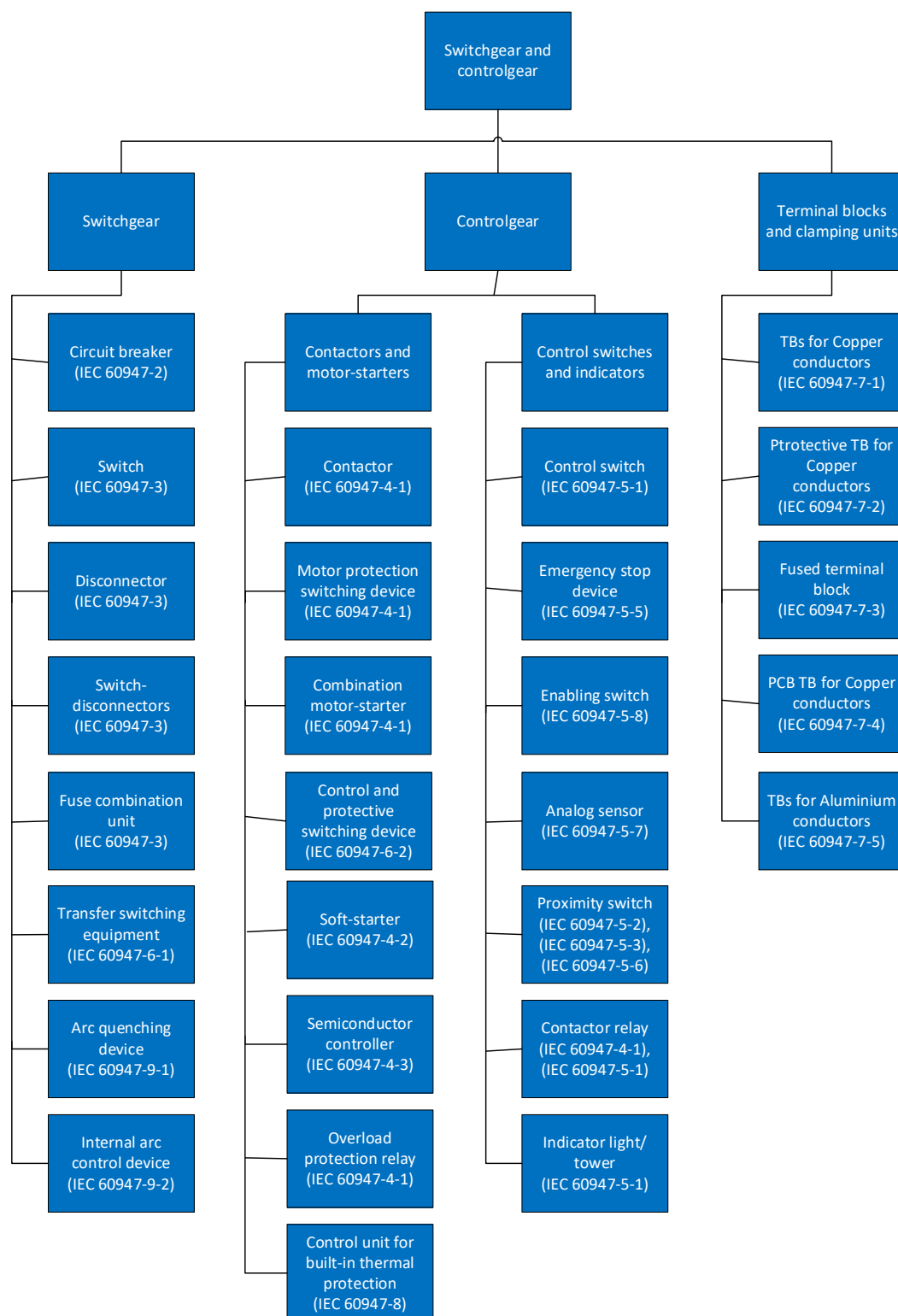


Figure 1 – Overview of the defined product families of low-voltage SG&CG

Low-voltage SG&CG assemblies are combinations of switchgear and/or controlgear and other electrical components (e.g. sensors, meters, relays), completely assembled with all internal electrical and mechanical interconnections, with one or more incoming and outgoing circuits, intended for distributing, protecting, managing and controlling power according to the needs of a specific application.

Assemblies incorporate combinations of devices and components to suit the needs of the application and safety requirements. When there is a need to assess impact for an assembly,

the basic principles of this document are applied to the complete assembly, including any devices manufactured in accordance with their relevant standards.

Low-voltage SG&CG assemblies are considered as one product family. A classification of low-voltage SG&CG assemblies in the scope of this document is shown in Figure 2.

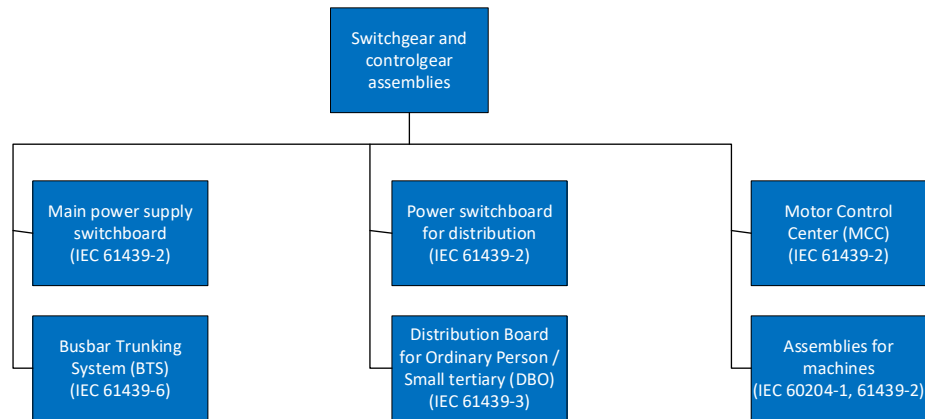


Figure 2 – Classification of low-voltage SG&CG assemblies

4.2 Environmental aspects

Even though the impacts of low-voltage SG&CG and their assemblies on the environment is relatively small compared to that of the other components of the electrical system, their widespread use requires measures are taken to minimize such impacts.

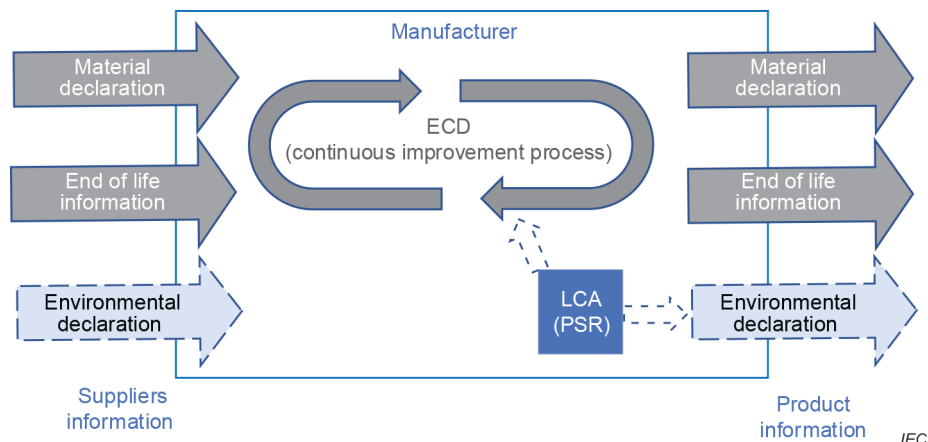


Figure 3 – ECD considering upstream and downstream product information

The systematic approach to the design and development of products, aimed at minimizing their negative environmental impact is known as ECD. ECD process and requirements for electrical and electronic Equipment (EEE) are described in IEC 62430. The ECD process for low-voltage SG&CG and their assemblies is briefly introduced in Clause 5 and more deeply explained in Annex A.

In addition, this document also addresses tools and processes supporting ECD, which are summarized in Figure 3 and Table 1 together with the corresponding relevant sections and reference standards.

Table 1 – Overview of the standard structure, the content and the corresponding clauses

Topic	Description	Clause	Reference
ECD	Environmentally conscious design	5 Annex A	IEC 62430 ISO 14006 ISO 14040 ISO 14044
LCA	Product specific rules	7 Annex B Annex C	ISO 14040 ISO 14044 ISO 14045
MD (in XML format)	Declarable substances and material classes	8 Annex E	IEC 62474
EOL information	Information for end of life treatment	9 Annex D	IEC TR 62635
CFP	Carbon footprint	Annex G	IEC 63372
Environmental declaration	Type II environmental declaration	A	ISO 14021
	Type III environmental declaration	a	ISO 14025
a Format and content of environmental declaration are not addressed in this document.			

LCA can be used as a tool to assess environmental impacts in quantitative ECD. IEC 63366 defines PCR for electrical and electronic equipment, and Clause 7 and Annex B of this document provide PSR to be used in the LCA of low-voltage SG&CG and their assemblies, taking into account certain aspects of those products. In particular, for low-voltage SG&CG and their assemblies, some of the main potential environmental impacts – e.g. GWP – are dominated by the power losses in the use phase, that depend on the current level. Therefore, typical use scenarios are given in Annex B, providing the reference load rate, use-time rate and lifetime.

NOTE 1 The LCA environmental impacts evaluated with the PSR in Clause 7 can also be used in a Type III EPD as per ISO 14025.

An effective ECD process can extend across the whole supply chain through effective communication of environmental information. In order to reduce the environmental impact of their products, for example to phase out potentially hazardous substances or to limit their use, manufacturers need to establish an effective communication with their suppliers to collect information about the composition of raw materials and components used in their products.

NOTE 2 Manufacturers also need such material information to ensure and declare compliance of their products to an increasing number of substance regulations.

The communication and declaration of material composition information is known as material declaration. Clause 8 provides guidance on MD of low-voltage SG&CG and their assemblies, according to IEC 62474.

IEC 62474 establishes standard reporting requirements, data model and format of material declaration, to facilitate transfer and processing of data. Compilation of MD of products is easier if IEC 62474 is thoroughly applied throughout the supply chain.

Another aspect to be considered in ECD is the possibility of recycling and energy recovery of low-voltage switchgear and controlgear and their assemblies at EOL. This requires that recyclability and recoverability rates are optimized during the design phase, in line with the state of the art.

In addition, manufacturers may communicate further information and instructions to EOL operators (decommissioning operators and/or recyclers), to improve recycling and recovery rates and to mitigate possible OHS risks during decommissioning the low-voltage switchgear and controlgear and their assemblies and subsequent treatment. Therefore, material