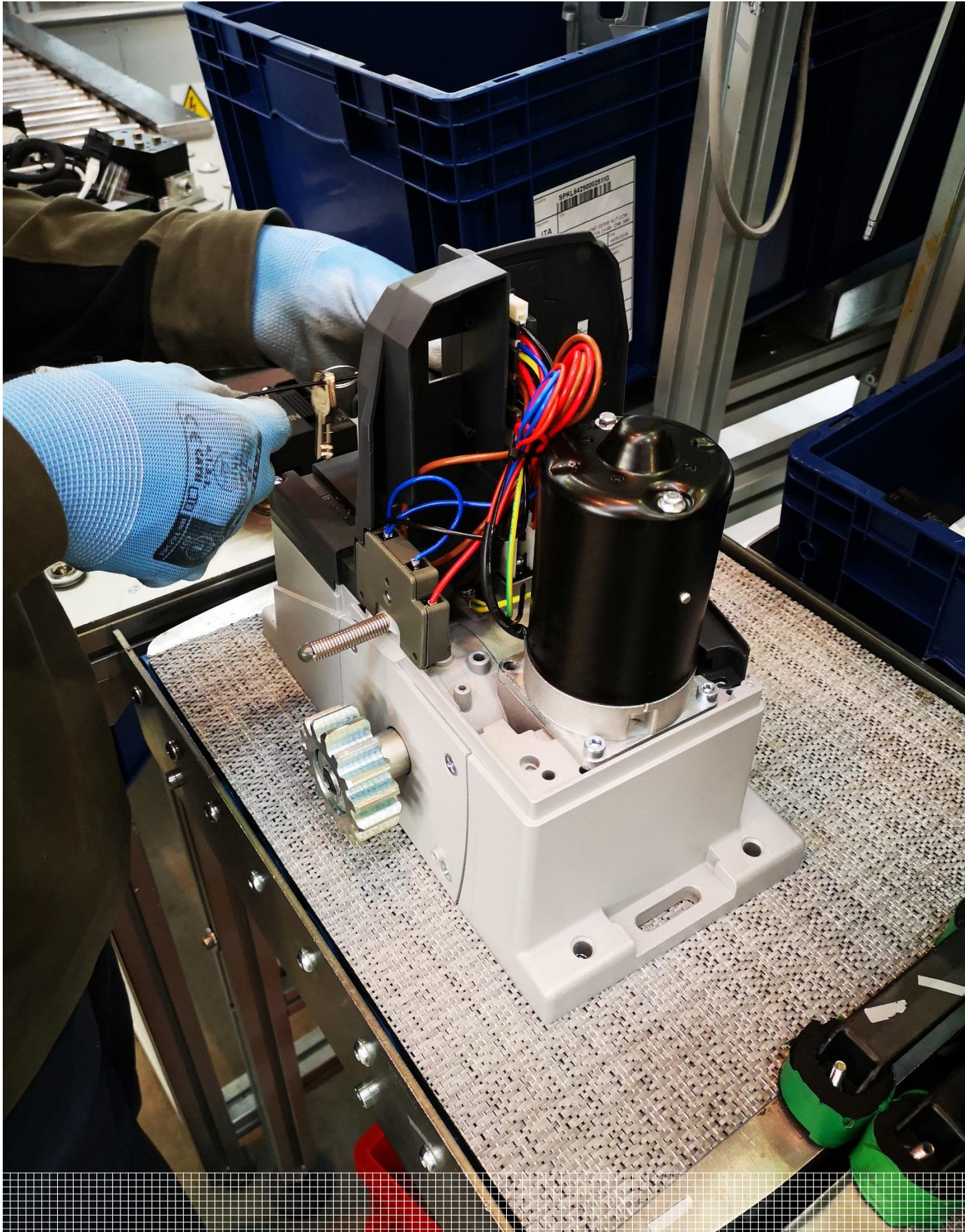


AC AND DC GEAR MOTORS FOR AUTOMATION SYSTEMS

PRODUCT CATEGORY CLASSIFICATION: UN CPC 46111 AND 46112

PCR 2019:11
VERSION 1.0.4

VALID UNTIL: 2025-04-02



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1 INTRODUCTION

This document constitutes Product Category Rules (PCR) developed in the framework of the International EPD® System: a programme for type III environmental declarations¹ according to ISO 14025:2006. Environmental Product Declarations (EPD) are voluntary documents for a company or organisation to present transparent information about the life cycle environmental impact for their goods or services.

The rules for the overall administration and operation of the programme are the General Programme Instructions, publicly available at www.environdec.com. A PCR complements the General Programme Instructions and the standards by providing specific rules, requirements and guidelines for developing an EPD for one or more specific product categories (see Figure 1). A PCR should enable different practitioners using the PCR to generate consistent results when assessing products of the same product category.

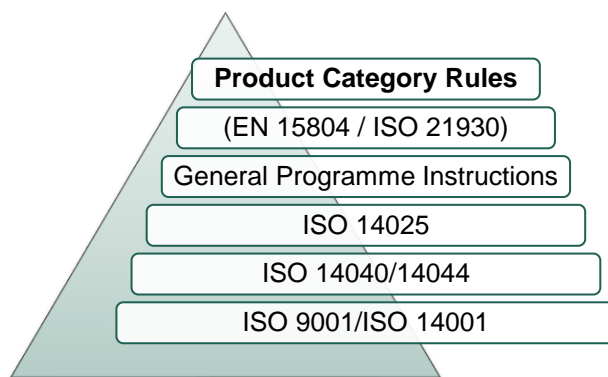


Figure 1 Illustration PCR in relation to the hierarchy of standards and other documents.

Within the present PCR, the following terminology is adopted:

- The term “shall” is used to indicate what is obligatory.
- The term “should” is used to indicate a recommendation, rather than a requirement.
- The term “may” or “can” is used to indicate an option that is permissible

For the definition of terms used in the document, see the normative standards.

A PCR is valid for a pre-determined period of time to ensure that it is updated at regular intervals. The latest version of the PCR is available via www.environdec.com. Stakeholder feedback on PCRs is very much encouraged. Any comments on this PCR document may be given via the PCR Forum at www.environdec.com or sent directly to the PCR moderator during its development or during the period of validity.

Any references to this document should include the PCR registration number, name and version.


The programme operator maintains the copyright of the document to ensure that it is possible to publish, update when necessary, and available to all organisations to develop and register EPDs. Stakeholders participating in PCR development should be acknowledged in the final document and on the website.

¹ Type III environmental declarations in the International EPD® System are referred to as EPD, Environmental Product Declarations.

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2 GENERAL INFORMATION

2.1 ADMINISTRATIVE INFORMATION

Name:	AC and DC gear motors for automation systems installed in a building or not
Registration number and version:	2019:11, version 1.0.4
Programme:	 The International EPD® System
Programme operator:	EPD International AB, Box 210 60, SE-100 31 Stockholm, Sweden. Website: www.environdec.com E-mail: info@environdec.com
PCR Moderators:	Alessandro Gobbo, Nice S.p.A., a.gobbo@niceforyou.com Simona Canzanelli, Ambiente Italia S.r.l., simona.canzanelli@ambienteitalia.it
PCR Committee:	Nice S.p.A., Ambiente Italia S.r.l.
Date of publication and last revision:	2024-08-05 (Version 1.0.4) A version history is available in Section 8.
Valid until:	2025-04-02
Schedule for renewal:	A PCR is valid for a pre-determined period of time to ensure that it is updated at regular intervals. When the PCR is about to expire the PCR moderator shall initiate a discussion with the Secretariat how to proceed with updating the document and renewing its validity. A PCR document may be revised during its period of validity provided significant and well-justified proposals for changes or amendments are presented. See www.environdec.com for up-to-date information and the latest version.
Standards conformance:	<ul style="list-style-type: none">General Programme Instructions of the International EPD® System, version 3.0, based on ISO 14025 and ISO 14040/14044PCR Basic Module, CPC Division 46 Electrical machinery and apparatus, version 3.01, dated 2018-11-06
PCR language(s):	This PCR was developed and is available in English. In case of translated versions the English version takes precedence in case of any discrepancies.

2.2 SCOPE OF PCR

2.2.1 PRODUCT CATEGORY DEFINITION AND DESCRIPTION

This document provides Product Category Rules (PCR) for the assessment of the environmental performance of AC and DC gear motors for automation systems and the declaration of this performance by an EPD. The product category corresponds to a sub-set of codes, which are:

- UN CPC 46111 - Motors of an output not exceeding 37.5 W; other DC motors; DC generators

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- UN CPC 46112 - Universal AC/DC motors of an output exceeding 37.5 W; other AC motors; AC generators (alternators).

Table 1 UN CPC Classification Hierarchy

United Nations Central Product Classification		UN CPC 4611
Section:	4 -	Metal products, machinery and equipment
Division:	46 -	Electrical machinery and apparatus
Group:	461 -	Electric motors, generators and transformers, and parts thereof
Class:	4611 -	Electric motors, generators and the like
Subclasses	46111	Motors of an output not exceeding 37.5 W; other DC motors; DC generators
	46112	Universal AC/DC motors of an output exceeding 37.5 W; other AC motors; AC generators (alternators).

For additional information, see <https://unstats.un.org/unsd/classifications/unsdclassifications/cpcv21.pdf>.

This PCR will focus on **gear motors for the automation systems**.

The product category includes all the electrical equipment (gear motors) which are designed to assure the movement of an opening/closing system. It refers to a product composed by electronic and mechanic parts that are switched on and switched off with the supply of electricity. The equipment assimilates electricity in order to apply a force and make the movement happen.

For instance, the products included in this category can provide the functioning of two main groups of systems: (1) outdoor closures and (2) indoor closures. Examples of the two categories are listed below (not exhaustive list):

- OUTDOOR CLOSURES
 - Swing gates: generally consist of double gates which turn on a hinge for their opening and closure.
 - Sliding gates: generally consist of a single gate which slide on a track along the fence.
 - Barrier gates: linear systems which can rise or lower to control vehicles access to a specific area.
 - Blinds or roller blinds: cover which raise or lower in order to adjusting the amount of light coming in the building.
- INDOOR CLOSURES
 - Awnings: secondary covering extending over a doorway, window, etc., for protection from the weather.
 - Shutters: solid or louvered movable cover for doors or window.
 - Garage doors: usually divided into up-and-over and sectional; they can be open sliding on a track.

This PCR is not compliant with EN 15804 (construction product standard), because the product category is not associated to a building in all cases.

2.2.2 GEOGRAPHICAL REGION

This PCR is applicable to be used globally.

In the related EPD any geographical restrictions or limitations should be indicated and it should correspond to the geographical scenarios used in the LCA model.

The data for the core module shall be representative for the actual production processes and representative for the site/region where the respective process is taking place.

2.2.3 EPD VALIDITY

An EPD based on this PCR shall be valid from its registration and publication at www.environdec.com and for a five year period starting from the date of the verification report ("approval date"), or until the EPD has been de-registered from the International EPD® System.

An EPD shall be updated and re-verified during its validity if changes in technology or other circumstances have led to:

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- an increase of 10% or more of any of the indicators listed in Section 5.4.5.1,
- errors in the declared information, or
- significant changes to the declared product information, content declaration, or additional environmental information.

If such changes have occurred, but the EPD is not updated, the EPD owner shall contact the Secretariat to de-register the EPD.

3 REVIEW AND BACKGROUND INFORMATION

This PCR was developed in accordance with the process described in the General Programme Instructions of the International EPD® System, including PCR review and open consultation.

3.1 PCR REVIEW

3.1.1 VERSION 1.0

PCR review panel:	The Technical Committee of the International EPD® System. A full list of members available on www.environdec.com . The review panel may be contacted via info@environdec.com . Members of the Technical Committee were requested to state any potential conflict of interest with the PCR moderator or PCR committee, and were excused from the review.
Chair of the PCR review:	Gorka Benito Alonso
Review dates:	2019-08-16 until 2019-09-02

3.2 OPEN CONSULTATION

3.2.1 VERSION 1.0

This PCR was available for open consultation from 2019-06-03 until 2019-08-03, during which any stakeholder was able to provide comments by posting on the PCR forum on www.environdec.com or by contacting the PCR moderator.

Stakeholders were invited via e-mail or other means to take part in the open consultation, and were encouraged to forward the invitation to other relevant stakeholders.

3.3 EXISTING PCRS FOR THE PRODUCT CATEGORY

As part of the development of this PCR, existing PCRs were considered in order to avoid overlaps in scope. The existence of such documents was checked in the public PCR listings of the following programmes based on ISO 14025 or similar:

- International EPD® System. www.environdec.com.
- PEP Ecopassport® program. <http://www.pep-ecopassport.org/>
- ASTM International. <https://www.astm.org/>
- EPD Norge. <https://www.epd-norge.no/>
- Institut Bauen und Umwelt (IBU): <https://epd-online.com>

The following existing PCRs were identified:

PCR NAME	PROGRAMME	REGISTRATION NUMBER	SCOPE
Product specific rules for drives for blinds and closures installed in buildings	PEP Ecopassport®	PSR-0006-ed1.1-EN-2015 09 15	Common basis for manufacturers of drives for blinds and closures installed in buildings, when drafting an LCA.
Product Category Rules for preparing an Environmental Product Declaration for	ASTM International	Not available	Information that should be gathered for an environmental declaration of a product group that includes manual revolving doors as well as power-operated revolving doors, sliding doors, swinging, and folding doors for use by

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4 GOAL AND SCOPE, LIFE CYCLE INVENTORY AND LIFE CYCLE IMPACT ASSESSMENT

The goal of this section is to provide specific rules, requirements and guidelines for developing an EPD for the product category as defined in Section 2.2.1.

4.1 FUNCTIONAL UNIT

The functional unit of the product should be a drive capable of assure a rated output equal to 10 W for the movement of an object.

The rated output (or nominal power) shall be calculated as follow:

- For a gear motor that performs a linear movement:

$$P_n = F \cdot v_n$$

Where:

P_n = nominal power [W]
 F = nominal force [N]
 v_n = nominal velocity [m/s]

- For a gear motor that performs an angular movement:

$$P_n = M \cdot \omega_n \quad \text{with} \quad \omega_n = n \cdot \left(\frac{2\pi}{60}\right)$$

Where:

P_n = nominal power [W]
 M = nominal torque [Nm]
 ω_n = nominal angular velocity [rad/s]
60 = seconds in one minute
 n = number of rounds per minute [rpm]

In addition, the following conditions must be satisfied:

- Force, torque, velocity and angular velocity are those declared in the motor nameplate and they are referred to nominal work conditions.
- The velocity/angular velocity is the one which is detected at the nominal force/torque, i.e. measured in the period in which the application moves with a constant velocity – therefore excluding transitory phases of acceleration or deceleration.

All the automation systems to which the PCR refers, are moved by the same product, i.e. a gear motor, hence the same functional unit may be applied to products in this category.

The functional unit shall be stated in the EPD. The environmental impact shall be given per functional unit. A description of the function of the product should be included in the EPD®, if relevant.

4.2 REFERENCE SERVICE LIFE (RSL)

The reference service life (RSL) is defined as 10 years. The RSL shall be declared in the EPD. The concept is further addressed in Section 4.10.3.

4.3 SYSTEM BOUNDARY

The International EPD® System uses an approach where all attributional processes from “cradle to grave” should be included using the principle of “limited loss of information at the final product”. This is especially important in the case of business-to-consumer communication.

The scope of this PCR and EPDs based on it is “cradle to grave”.

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4.3.1 LIFE CYCLE STAGES

For the purpose of different data quality rules and for the presentation of results, the life cycle of products is divided into three different life cycle stages:

- Upstream processes (from cradle-to-gate);
- Core processes (from gate-to-gate)
- Downstream processes (from gate-to-grave)

In the EPD, the environmental performance associated with each of the three life-cycle stages above shall be reported separately. The processes included in the scope of the PCR and belonging to each life cycle stage are described in Sections 4.3.1.1–4.3.1.3.

4.3.1.1. Upstream processes

The following attributional processes are part of the product system and classified as upstream processes:

- Extraction and production of raw material for all main parts and components and its packaging. Main components and all the materials used for the manufacturing of main components shall be characterised. In particular, all the electronic components of the printed circuit boards shall be identified, including the transport distance between the manufacturer and the assembly facility.
- Impacts due to the production of electricity and fuels used in the upstream module
- Production of auxiliary products used such as detergents for cleaning, grease for lubrication, etc.
- Production of semiproducts used in the core process, if applicable
- Manufacturing of primary, secondary and tertiary packaging

Upstream processes not listed may also be included. The production of the raw materials used for production of all product parts shall be included. All elementary flows at resource extraction shall be included, except for the flows that fall under the general cut-off rule in Section 4.5.

4.3.1.2. Core processes

The following attributional processes are part of the product system and classified as core processes:

- External transportation to the core processes
- Assembly/preparation phase of the product unit
- Internal transportation within the factory
- Waste treatment of waste generated during manufacturing/assembly
- Impacts due to the production of electricity and fuels used in the core module
- Every transportation between the organization and possible subcontractors which develop part of the core work

Manufacturing processes not listed may also be included. A minimum of 99% of the total weight of the declared product including packaging shall be included.

The technical system shall not include:

- Manufacturing of production equipment, buildings and other capital goods.
- Business travel of personnel.
- Travel to and from work by personnel.
- Research and development activities, including the production and manufacture of laboratory equipment;
- Maintenance (e.g. of the machines)

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4.3.1.3. Downstream processes

The following attributional processes are part of the product system and classified as downstream processes:

- Transportation from preparation to an average retailer/distribution platform
- Life time operation of the product excluding power losses (more information in Section 4.10.3) and emissions
- Maintenance, replacements of parts, during reference service life (ten years)
- End-of-life processes of any wasted part of the product
- End-of-life processes of packaging waste

Installation phase is excluded from the system boundaries because it consists in a standard operation with a negligible impact.

4.3.2 OTHER BOUNDARY SETTING

4.3.2.1. Boundary towards nature

Boundaries to nature are defined as flows of material and energy resources from nature into the system. Emissions to air, water and soil cross the system boundary when they are emitted from or leaving the product system.

4.3.2.2. Boundaries in the life cycle

See Section 4.3.1. The EPD may present the information divided into additional sub-divisions.

4.3.2.3. Boundaries towards other technical systems

See Section 4.6.2.

4.4 SYSTEM DIAGRAM

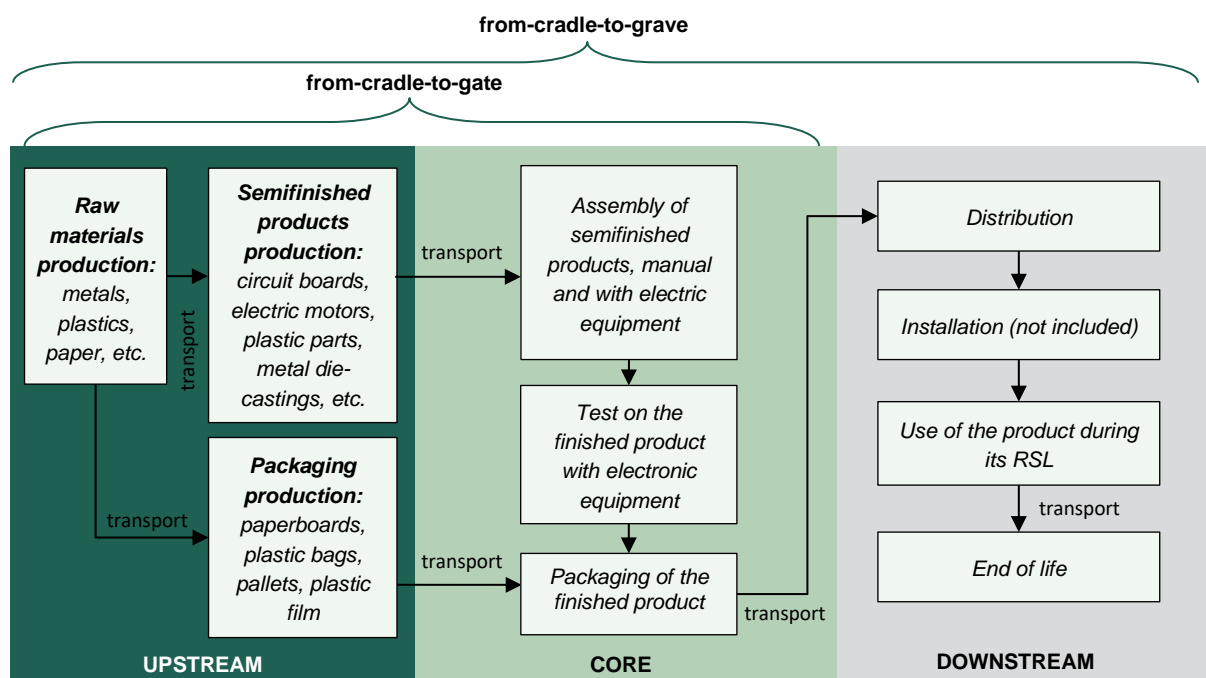


Figure 2 System diagram illustrating the processes that are included in the product system, divided into upstream, core and downstream processes.

4.5 CUT-OFF RULES

Data for elementary flows to and from the product system contributing to a minimum of 99% of the declared environmental impacts shall be included (not including processes that are explicitly outside the system boundary as described in Section 4.3).

The check for cut-off rules in a satisfactory way is through the combination of expert judgment based on experience of similar product systems and a sensitivity analysis in which it is possible to understand how the un-investigated input or output could affect the final results.

4.6 ALLOCATION RULES

4.6.1 CO-PRODUCT ALLOCATION

The following step-wise procedure shall be applied for multifunctional products and multiproduct processes:

1. Allocation shall be avoided, if possible, by dividing the unit process into two or more sub-processes and collecting the environmental data related to these sub-processes.
2. If allocation cannot be avoided, the inputs and outputs of the system shall be partitioned between its different products or functions in a way that reflects the underlying physical relationships between them; i.e. they should reflect the way in which the inputs and outputs are changed by quantitative changes in the products or functions delivered by the system.
3. Where physical relationships alone cannot be established or used as the basis for allocation (or they are too time consuming), Table 2 shall be consulted for key processes. For processes not listed the most suitable allocation procedure shall be used and documented in the LCA project report.

Table 2 Allocation procedure for key processes in the product system, if steps 1 and 2 are not possible.

PROCESS	MAIN PRODUCT AND CO-PRODUCTS	ALLOCATION INSTRUCTION
Assembly	Main product = Gear motor Co-products = other different equipment (not related to the product object of the PCR) that can be assembled on the same production line	Physical allocation

4.6.2 REUSE, RECYCLING, AND RECOVERY

In the framework of the International EPD® System, the methodological choices for allocation for reuse, recycling and recovery have been set according to the polluter pays principle (PPP). This means that the generator of the waste shall carry the full environmental impact until the point in the product's life cycle at which the waste is transported to a scrapyard or the gate of a waste processing plant (collection site). The subsequent user of the waste shall carry the environmental impact from the processing and refinement of the waste but not the environmental impact caused in the "earlier" life cycles. See General Programme Instruction for further information and examples.

4.7 DATA QUALITY REQUIREMENTS

An LCA calculation requires two different kinds of information:

- data related to the **environmental aspects** of the considered system (such materials or energy flows that enter the production system). These data usually come from the company that is performing the LCA calculation.
- data related to the **life cycle impacts** of the material or energy flows that enter the production system. These data usually come from databases.

Data on environmental aspects shall be as specific as possible and shall be representative of the studied process.

Data on the life cycle of materials or energy inputs are classified into three categories – specific data, selected generic data, and proxy data, defined as follows:

- **specific data** (also referred to as "primary data" or "site-specific data") – data gathered from the actual manufacturing plant where product-specific processes are carried out, and data from other parts of the life cycle traced to the specific product system under study, e.g. materials or electricity provided by a contracted supplier that is able to provide data for the actual delivered services, transportation that takes place based on actual fuel consumption, and related emissions, etc.,

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- **generic data** (sometimes referred to as “secondary data”), divided into:
 - **selected generic data** – data from commonly available data sources (e.g. commercial databases and free databases) that fulfil prescribed data quality characteristics for precision, completeness, and,
 - **proxy data** – data from commonly available data sources (e.g. commercial databases and free databases) that do not fulfil all of the data quality characteristics of “selected generic data”.

As a general rule, specific data shall always be used, if available, after performing a data quality assessment. It is mandatory to use specific data for the core processes as defined above. For the upstream processes, downstream processes, and infrastructure, generic data may also be used if specific data are not available.

Any data used should preferably represent average values for a specific reference year. However, the way these data are generated could vary, e.g. over time, and in such cases they should have the form of a representative annual average value for a specified reference period. Such deviations should be declared.

4.7.1 RULES FOR USING GENERIC DATA

The attributional LCA approach in the International EPD® System forms the basic prerequisites for selecting generic data. To allow the classification of generic data as “selected generic data”, they shall fulfil selected prescribed characteristics for precision, completeness, and representativeness (temporal, geographical, and technological), such as:

- the reference year must be as current as possible and preferably assessed to be representative for at least the validity period of the EPD,
- the cut-off criteria to be met on the level of the modelled product system are the qualitative coverage of at least 99% of energy, mass, and overall environmental relevance of the flows,
- completeness in which the inventory data set should, in principle, cover all elementary flows that contribute to a relevant degree of the impact categories, and
- the representativeness of the resulting inventory in the given temporal, technological, and geographical reference should, as a general principle, be better than $\pm 5\%$ of the environmental impact of fully representative data.

Section 4.8 provides a list of recommended databases/data sets to be used for generic data.

If selected generic data that meets the requirements of the International EPD® System are not available as the necessary input data, proxy data may be used and documented. The environmental impacts associated with proxy data shall not exceed 10% of the overall environmental impact from the product system.

The EPD may include a data quality declaration to demonstrate the share of specific data, selected generic data and proxy data for the environmental impacts.

4.8 RECOMMENDED DATABASES FOR GENERIC DATA

All commercial or publicly available databases that meet the data quality requirements may be used. The specifications and the version of the database shall be reported in the EPD.

The EPD may include a data quality declaration to demonstrate the share of specific data, selected generic data and proxy data for the environmental impacts.

If relevant, the EPD may include a reference to the database(s) used.

4.9 IMPACT CATEGORIES AND IMPACT ASSESSMENT

The EPD shall declare the default impact categories as described in the General Programme Instructions. The characterisation models and factors to use for the default impact categories are available on www.environdec.com and shall be updated on a regular basis based on the latest developments in LCA methodology and ensuring the market stability of EPDs. The source and version of the characterisation models and the factors used shall be reported in the EPD. Alternative regional life cycle impact assessment methods and characterisation factors are allowed to be calculated and displayed in addition to the default list. If so, the EPD shall contain an explanation of the difference between the different sets of indicators, as they may appear to the reader to display duplicate information.

4.10 OTHER CALCULATION RULES AND SCENARIOS

4.10.1 UPSTREAM PROCESSES

The following requirements apply to the upstream processes:

- Data referring to processes and activities upstream in a supply chain over which an organisation has direct management control shall be specific and collected on site.
- Data referring to contractors that supply main parts, packaging, or main auxiliaries should be requested from the contractor as specific data, as well as infrastructure, where relevant.
- The transport of main parts and components along the supply chain to a distribution point (e.g. a stockroom or warehouse) where the final delivery to the manufacturer can take place based on the actual transportation mode, distance from the supplier, and vehicle load.
- In case specific data is lacking, selected generic data may be used. If this is also lacking, proxy data may be used.
- For the electricity used in the upstream processes, electricity production impacts shall be accounted for in this priority when specific data are used in the upstream processes:
 1. Specific electricity mix as generated, or purchased, from an electricity supplier, demonstrated by a Guarantee of Origin (or similar, where reliability, traceability, and the avoidance of double-counting are ensured) as provided by the electricity supplier. If no specific mix is purchased, the residual electricity mix from the electricity supplier shall be used.²
 2. National residual electricity mix or residual electricity mix on the market
 3. National electricity production mix or electricity mix on the market.

The mix of electricity used in upstream processes shall be documented in the EPD, where relevant.

- Packaging: specific data shall be used for the consumer packaging production if it is under the direct control of the organization or if the environmental impact related to the consumer packaging production is more than 10% of the total product environmental indicators. In other cases, generic data may be used. When consumer packaging shows the organization's logo, the LCA report should report the exerted/non exerted direct control on the production of consumer packaging by the organization.

4.10.2 CORE PROCESSES

The following requirements apply to the core processes:

- Specific data shall be used for the assembly of the product and for the manufacture of main parts as well as for on-site generation of steam, heat, electricity, etc., where relevant.
- For the electricity used in the core processes, electricity production impacts shall be accounted for in this priority:
 1. Specific electricity mix as generated, or purchased, from an electricity supplier, demonstrated by a Guarantee of Origin (or similar, where reliability, traceability, and the avoidance of double-counting are ensured) as provided by the electricity supplier. If no specific mix is purchased, the residual electricity mix from the electricity supplier shall be used.³
 2. National residual electricity mix or residual electricity mix on the market
 3. National electricity production mix or electricity mix on the market.

The mix of electricity used in the core processes shall be documented in the EPD, where relevant.

- Transport from the final delivery point of raw materials, chemicals, main parts, and components (see above regarding upstream processes) to the manufacturing plant/place of service provision should be based on the actual transportation mode, distance from the supplier, and vehicle load, if available.

² The residual electricity mix is the mix when all contract-specific electricity that has been sold to other customers has been subtracted from the total production mix of the electricity supplier.

³ The residual electricity mix is the mix when all contract-specific electricity that has been sold to other customers has been subtracted from the total production mix of the electricity supplier.

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- Waste treatment processes of manufacturing waste should be based on specific data, if available.

4.10.3 DOWNSTREAM PROCESSES

The following requirements apply to the downstream processes:

- Data for the use stage are usually based on scenarios, but specific data should be used when available and relevant.

Results of the use phase shall be declared separately in the EPD.

Based on the technical information regarding the product, energy consumption the use phase shall be calculated as follow:

$$\text{Consumption [kWh/y]} = \left[\left(\frac{P_m}{1000} \times t_m \right) + \left(\frac{P_s}{1000} \times t_s \right) \right] \times 24 \times 365$$

Where:

P_m = electric power assimilated in the motion phase [W]

t_m = motion ratio [%]

P_s = electric power assimilated in the stand-by phase [W]

t_s = stand-by ratio [%]

Consumption during the motion phase shall be measured under the standard test conditions defined in IEC 60335-2-103 + IEC 60335-1, EN 60335-2-103 + EN 60335-1.

Consumption during the standby phase is measured in compliance with the test conditions defined by the international standard CEI IEC 62301: *Household electrical appliances - Measurement of standby power*.

Motion ratio is a measure of the period the gear motor spends applying a force/torque to move an object, i. e. an automation system. It shall be calculated as:

$$t_m = \frac{T \times C}{3600 \times 24}$$

Where:

T = time for performing one operating cycle [seconds]

C = number of cycles per day [number]

Stand-by ratio shall be therefore calculated as:

$$t_s = 1 - t_m$$

The presented formula refers to the electricity that the product consumes in one year; the complete use phase shall be therefore calculated for the service life. The product, if used properly by the consumer, granted a specific number of operating cycles, defined as the complete operation of opening and closing; based on the value of total operating cycles and the operating cycles granted in one year, it can be estimated the number of years the gear motor can be used, i. e. its reference service life (RSL): for the present product category, service life is equal to 10 years. Then, the use phase shall be integrated with this information as reported below:

$$\text{Consumption (kWh)} = \left\{ \left[\left(\frac{P_m}{1000} \times t_m \right) + \left(\frac{P_s}{1000} \times t_s \right) \right] \times 24 \times 365 \right\} \times RSL$$

- Data on the pollutant emissions from the use stage should be based on documented tests, verified studies in conjunction with average or typical product use, or recommendations concerning suitable product use. Whenever applicable, test methods shall be internationally recognised.
- The use of electricity in the region/country where the product is used (as specified in the geographical scope of the EPD) shall be accounted for in the following priority:
 - National residual electricity mix or residual mix on the market
 - National electricity production mix or electricity mix on the market

The mix of electricity used in the downstream processes shall be documented in the EPD, where relevant.

- The transport of the product to the customer shall be described in the reference PCR, which should reflect the actual situation to the best extent possible. The following priority should be used:

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1. Actual transportation distances and types.
 2. Calculated as the average distance of a product of that product type transported by different means of transport modes.
 3. Calculated as a fixed long transport, such as 1 000 km transport by lorry or 10 000 km by airplane, according to product type.
- Scenarios for the end-of-life stage shall be technically and economically practicable and compliant with current regulations in the relevant geographical region based on the geographical scope of the EPD.

Information regarding the end-of-life local scenario should be investigated: possible scenarios of landfill, incineration, recycling, reuse, remanufacturing or other shall be determined. In order to outline the most accurate end-of-life scenarios related to the specific country, the investigation should be based on waste management primary data, if they are publicly broadcasted or if it is possible to acquire the information at a reasonable cost.

If the country-specific information is unavailable, it should be conducted a literature study in order to cover as much as possible the specific region end-of-life scenario. If there is lack of literature referring to a certain region, than it should be used a specific subdivision between major waste treatment and key assumptions regarding the end-of-life stage scenario shall be documented.

5 CONTENT AND FORMAT OF EPD

EPDs based on this PCR shall contain the information described in this section. Flexibility is allowed in the formatting and layout provided that the EPD still includes the prescribed information. A generic template for EPDs is available via www.environdec.com

As a general rule the EPD content:

- shall be in line with the requirements and guidelines in ISO 14020 (Environmental labels and declarations - General principles),
- shall be verifiable, accurate, relevant and not misleading, and
- shall not include rating, judgements or direct comparison with other products.

An EPD should be made with a reasonable number of pages for the intended audience and use.

5.1 EPD LANGUAGES

EPDs should be published in English, but may also be published in additional languages. If the EPD is not available in English, it shall contain an executive summary in English including the main content of the EPD. This summary is part of the EPD and thus subject to the same verification procedure.

5.2 UNITS AND QUANTITIES

The following requirements apply for units and quantities:

- The International System of Units (SI units) shall be used, e.g., kilograms (kg), Joules (J) and metres (m). Reasonable multiples of SI units may be decided in the PCR to improve readability, e.g., grams (g) or megajoules (MJ). The following exceptions apply:
 - Resources used for energy input (primary energy) should be expressed as kilowatt-hours (kWh) or megajoules (MJ), including renewable energy sources, e.g., hydropower, wind power and geothermal power.
 - Water use should be expressed in cubic metres (m³)
 - Temperature should be expressed in degrees Celsius (°C),
 - Time should be expressed in the units most practical, e.g., seconds, minutes, hours, days or years.
- Three significant figures⁴ should be adopted for all results, the number of significant digits shall be appropriate and consistent.
- The thousand separator and decimal mark in the EPD shall follow one of the following styles (a number with six significant figures shown for illustration):
 - SI style (French version): 1 234,56
 - SI style (English version): 1 234.56

In case of potential confusion or intended use of the EPD in markets where different symbols are used, the EPD shall state what symbols are used for thousand separator and decimal mark.
- Dates and times presented in the EPD should follow the format in ISO 8601. For years, the prescribed format is YYYY-MM-DD, e.g., 2017-03-26 for March 26th, 2017.
- The result tables shall:
 - Only contain values or the letters "INA" (Indicator Not Assessed). It is not possible to specify INA for mandatory indicators. INA shall only be used for voluntary parameters that are not quantified because no data is available.⁵
 - Contain no blank cells, hyphens, less than or greater than signs or letters (except "INA").

⁴ Significant figures are those digits that carry meaning contributing to its precision. For example with two significant digits, the result of 123.45 shall be displayed as 120, and 0.12345 shall be displayed as 0.12. In scientific notation, these two examples would be displayed as $1.2 \cdot 10^2$ and $1.2 \cdot 10^{-2}$.

⁵ This requirement does not intend to give guidance on what indicators are mandated ("shall") or voluntary.

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- Use the value 0 only for parameters that have been calculated to be zero.
- Footnotes shall be used to explain any limitation to the result value.

5.3 USE OF IMAGES IN EPD

Images used in the EPD, especially pictures featured on the cover page, may in themselves be interpreted as an environmental claim. Images such as trees, mountains, wildlife that are not related to the declared product should therefore be used with caution and in compliance with national legislation and best available practices in the markets in which the EPD is intended to be used.

5.4 EPD REPORTING FORMAT

The reporting format of the EPD shall include the following sections:

- Cover page (see Section 5.4.1)
- Programme information (see Section 5.4.2)
- Product information (see Section 5.4.3)
- Content declaration (see Section 5.4.4)
- Environmental performance (see Section 5.4.5)
- Additional environmental information (see Section 5.4.6)
- References (see Section 5.4.9)

The following information shall be included, when applicable:

- Information related to Sector EPDs (see Section 5.4.7)
- Differences versus previous versions (see Section 5.4.8)
- Executive summary in English (see Section 5.4.10)

5.4.1 COVER PAGE

The cover page shall include:

- Product name and image,
- Name and logotype of EPD owner,
- The text "Environmental Product Declaration" and/or "EPD"
- *Programme: The International EPD® System, www.environdec.com,*
- *Programme operator: EPD International AB*
- Logotype of the International EPD® System,
- EPD registration number as issued by the programme operator⁶,
- *Date of publication (issue): 20XX-YY-ZZ,*
- *Date of revision: 20XX-YY-ZZ, when applicable,*
- *Date of validity: 20XX-YY-ZZ*
- A note that "An EPD should provide current information, and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com."

⁶ The EPD shall not include a "registration number" if such is provided by the certification body, as this may be confused with the registration number issued by the programme operator.

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- A statement of conformity with ISO 14025,

5.4.2 PROGRAMME INFORMATION

The programme information section of the EPD shall include:

- Address of programme operator: *EPD International AB, Box 210 60, SE-100 31 Stockholm, Sweden, E-mail: info@environdec.com*
- The following mandatory statement from ISO 14025: “EPDs within the same product category but from different programmes may not be comparable.”
- A statement that the EPD owner has the sole ownership, liability and responsibility of the EPD
- Information about verification⁷ and reference PCR in a table with the following format and contents:

Product category rules (PCR): <name, registration number, version and UN CPC code(s)>
PCR review was conducted by: <name and organisation of the review chair, and information on how to contact the chair through the programme operator>
Independent third-party verification of the declaration and data, according to ISO 14025:2006: <input type="checkbox"/> EPD process certification <input type="checkbox"/> EPD verification
Third party verifier: <name, organisation and signature of the third party verifier> <i>In case of certification bodies:</i> Accredited by: <name of the accreditation body and accreditation number, if applicable>. <i>In case of individual verifiers:</i> Approved by: The International EPD® System Technical Committee, supported by the Secretariat
Procedure for follow-up of data during EPD validity involves third party verifier: <input type="checkbox"/> Yes <input type="checkbox"/> No

5.4.3 PRODUCT INFORMATION

The product information section of the EPD shall include:

- Main materials composing the product and its packaging and substances intentionally added that are classified as hazardous according to applicable national or international regulations shall be stated;
- It shall be declared a detailed subdivision of materials that compose the product, which contain at least the following information (not exhaustive list):

TYPE OF MATERIAL	QUANTITY
Metals	%
Plastics	%
Cables and connectors	%
Printed circuit boards	%
Paper	%
Others	%

⁷ If the EPD has been verified by an approved individual verifier who has received contractual assistance from a certification body that is not accredited, this certification body shall not be included in this table.

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- Address and contact information to EPD owner,
- Description of the organisation. This may include information on products- or management system-related certifications (e.g. ISO 14024 Type I environmental labels, ISO 9001- and 14001-certificates and EMAS-registrations) and other relevant work the organisation wants to communicate (e.g. SA 8000, supply-chain management and social responsibility),
- Name and location of production site,
- Product identification by name, and an unambiguous identification of the product by standards, concessions or other means,
- Identification of the product according to the UN CPC scheme system. Other relevant codes for product classification may also be included, e.g.
 - Common Procurement Vocabulary (CPV),
 - United Nations Standard Products and Services Code® (UNSPSC),
 - Classification of Products by Activity (NACE/CPA) or
 - Australian and New Zealand Standard Industrial Classification (ANZSIC),
- Description of the product, its application/intended use and technical functions, e.g. expected service life time,
- Geographical scope of the EPD, i.e., for which geographical location(s) of use and end-of-life the product's performance has been calculated,
- Functional unit or declared unit,
- Reference service life (RSL),
- Declaration of the year(s) covered by the data used for the LCA calculation and other relevant reference years,
- Reference to the main database(s) for generic data and LCA software used, if relevant,
- System diagram of the processes included in the LCA, divided into the life cycle stages,
- Description if the EPD system boundary is "cradle-to-gate", "cradle-to-gate with options" or "cradle-to-grave",
- Information on which life cycle stages are not considered (if any), with a justification of the omission,
- Relevant websites for more information or explanatory materials.

This section may also include:

- Name and contact information of organisation carrying out the underlying LCA study,
- Additional information about the underlying LCA-based information, such as assumptions, cut-off rules, data quality and allocation.

5.4.4 CONTENT DECLARATION

The content declaration shall have the form of a list of materials and chemical substances including information on their environmental and hazardous properties. The gross weight of material shall be declared in the EPD at a minimum of 99 % of one unit of product.

Information on the hazardous properties of materials and chemical substances should follow the requirements given in the latest revision of the Globally Harmonized System of Classification and Labelling of Chemicals (GHS)⁸, issued by United Nations or national or regional applications of the GHS.

As an example, the following regulations should be used for EPDs intended to be used in the European Union:

- Regulation (EC) No 1907/2006 of the European parliament and of the council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)

⁸ The GHS document is available on www.unece.org.

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- Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures

5.4.4.1. Information about recycled materials

When a product is made in whole or in part with recycled materials, the provenience of the materials (pre-consumer or post-consumer) shall be presented in the EPD as part of the content declaration.

To avoid any misunderstanding about which material may be considered “recycled material”, the guidance given in ISO 14021 shall be taken into account. In brief, the standard states that:

- only pre-consumer or post-consumer materials (scraps) shall be considered in the accounting of the recycled materials, and
- materials coming from scrap reutilisation (such as rework, regrind, or scrap generated in a process and capable of being reclaimed within the same process that generated it) shall not be considered as recycled content.

5.4.4.2. Information about packaging

As packaging is strongly connected with the product, the producer shall provide information about packaging in the EPD, when applicable. Packaging may be classified as:

- Distribution Packaging: packaging designed to contain one or more articles or packages, or bulk materials, for the purposes of transport, handling and/or distribution (ISO 21067-1:2016, Par. 2.2.6)
- Consumer Packaging: packaging constituting, with its content, a sales unit for the final user or consumer at the point of retail (ISO 21067-1:2016, Par. 2.2.7).

Consumer packaging is generally the outcome of eco-design processes, or other activities, under direct control of the organisation. Many critical categories with strict legal requirements belong to consumer packaging category like food contact packaging and pharmaceutical packaging.

The type and function of packaging shall be reported in the EPD.

A statement of the source of the materials (pre-consumer or post-consumer) shall be presented in the EPD when the packaging is made in whole or in part by recycled materials.

5.4.5 ENVIRONMENTAL PERFORMANCE

5.4.5.1. Environmental impacts

EPD shall declare the environmental impact indicators, per functional unit, per life-cycle stage and in aggregated form, using the default impact categories, impact assessments methods and characterisation factors available at www.environdec.com/indicators. The source and version of the impact assessment methods and characterisation factors used shall be reported in the EPD.

Alternative regional life cycle impact assessment methods and characterisation factors may be calculated and displayed in addition to the default list. If so, the EPD shall contain an explanation of the differences between the declared sets of indicators, as they may appear to the reader to display duplicate information.

5.4.5.2. Use of resources

The EPD shall declare the mandatory, and may declare the optional, indicators for resource use listed at www.environdec.com/indicators per functional unit, per life-cycle stage and in aggregated form.

5.4.5.3. Waste production and output flows

Waste generated along the whole life cycle production chains shall be treated following the technical specifications described in the GPI. The EPD may declare the optional indicators for waste production and output flows as listed at www.environdec.com/indicators per functional unit, per life-cycle stage and in aggregated form.


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5.4.5.4. Other environmental indicators

No other environmental indicators are required in this PCR.

5.4.6 ADDITIONAL INFORMATION

Other relevant additional information may be included in the EPD. Some examples are listed below:

- Conformity tests results; i. e. dielectric rigidity test and continuity test, following EN 60335-1;
-  marking
- NF certification
- ETL certification
- UL certification
- FCC label

5.4.7 INFORMATION RELATED TO SECTOR EPDS

For sector EPDs, the following information shall also be included:

- a list of the contributing manufacturers that the Sector EPD covers,
- a description of how the selection of the sites/products has been done and how the average has been determined, and
- a statement that the document covers average values for an entire or partial product category (specifying the percentage of representativeness) and, hence, the declared product is an average that is not available for purchase on the market.

5.4.8 DIFFERENCES VERSUS PREVIOUS VERSIONS

For EPDs that have been updated, the following information shall also be included:

- a description of the differences versus previously published versions, e.g. a description of the percentage change in results and the main reason for the change;
- a revision date on the cover page

5.4.9 REFERENCES

This section shall include a list of references, including the General Programme Instructions (including version number), standards and PCR (registration number, name and version). The source and version of the characterisation models and the factors used shall be reported in the EPD.

5.4.10 EXECUTIVE SUMMARY IN ENGLISH

For EPDs published in another language than English, an executive summary in English shall be included.

The executive summary should contain relevant summarised information related to the programme, product, environmental performance, additional information, information related to sector EPDs, references and differences versus previous versions.

6 GLOSSARY

AC	Alternating Current
AP	Acidification potential
CEI	Comitato Elettronico Italiano
CO ₂	Carbon dioxide
CPC	Central product classification
DC	Direct Current
EPD	Environmental product declaration
EN	European Standard
ETL	Electrical Testing Laboratories
EP	Eutrophication potential
FCC	Federal Communications Commission
ISO	International Organization for Standardization
kg	kilogram
kWh	kilowatt hour
LCA	Life cycle assessment
LCI	Life cycle inventory
MJ	Megajoule
N	Newton
NMVOG	Non-Methane Volatile Organic Compounds
PCR	Product Category Rules
POCP	Formation potential of tropospheric ozone
PO ₄ ³⁻	Phosphate
rad	Radian
rpm	Revolutions per minute
s	Second
Sb	Antimony
SI	The International System of Units
SO ₂	Sulphur dioxide
UL	Underwriters Laboratories
UN	United Nations
W	Watt

Parameters for calculations:

P_n = rated output (or nominal power) [W]

F = nominal force [N]

v_n = nominal velocity [m/s]

M = nominal torque [Nm]

ω_n = nominal angular velocity [rpm]

P_m = electric power assimilated in the motion phase [W]

t_m = motion ratio [%]

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Ps = electric power assimilated in the motion phase [W]

ts = stand-by ratio [%]

T = time for performing one operating cycle [seconds]

C = number of cycles per day [number]

7 REFERENCES

CEN (2013), EN 15804:2012+A1:2013, Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products

EN 60335-1:2010+AMD1:2013+AMD2:2016, Household and similar electrical appliances - Safety - Part 1:General requirements

EN 60335-2-103:2019, Household and similar electrical appliances - Safety - Part 2-103: Particular requirements for drives for gates, doors and windows.

EPD International (2017) General Programme Instructions for the International EPD® System. Version 3.0, dated 2017-12-11. www.environdec.com

Guidance for Product Category Rule Development (2013), Ingwersen, W., Subramanian, V., editors. Product Category Rule Guidance Development Initiative. Version 1.0. <http://www.pcrguidance.org>

IEC 60335-1:2010+AMD1:2013+AMD2:2016, Household and similar electrical appliances - Safety - Part 1:General requirements

IEC 60335-2-103:2015+AMD1:2017: Particular requirements for drives for gates, doors and windows.

IEC 62301:2011, Household electrical appliances - Measurement of standby power

ISO (2000), ISO 14020:2000, Environmental labels and declarations – General principles

ISO (2004), ISO 8601:2004 Data elements and interchange formats – Information interchange – Representation of dates and times

ISO (2006a), ISO 14025:2006, Environmental labels and declarations – Type III environmental declarations – Principles and procedures

ISO (2006b), ISO 14040:2006, Environmental management – Life cycle assessment – Principles and framework

ISO (2006c), ISO 14044: 2006, Environmental management – Life cycle assessment – Requirements and guidelines

ISO (2013), ISO/TS 14067:2013, Greenhouse gases – Carbon footprint of products – Requirements and guidelines for quantification and communication

ISO (2014), ISO 14046:2014, Environmental management – Water footprint – Principles, requirements and guidelines

ISO (2017), ISO 21930:2017, Sustainability in buildings and civil engineering works -- Core rules for environmental product declarations of construction products and services

PCR Guidance -Texts for Building Related Products and Services; Part B: Requirements on the EPD for Automatic doors, automatic gates, and revolving door systems; Version 1.6 07/30/14; Institut Bauen und Umwelt e.V.

PEP-PSR Product Specific Rules for Drives for Blinds and Closures Installed in Buildings; ref. PSR-0006-ed1.1-EN-2015 09 15

Barkmeyer, M., Kaluza, A., Pastewski, N., Thiede, S., & Herrmann, C., 2017. *Assessment of end-of-life strategies for automation technology components*. Procedia CIRP, 61, 34-39.

Olivetti, E., Duan, H., & Kirchain, R., 2013. *Exploration of carbon footprint of electrical products: guidance document for product attribute to impact algorithm methodology*. A publication of the Materials Systems Laboratory, Massachusetts Institute of Technology, Cambridge.

Nice SpA, *Life Cycle Assessment di quattro motori per l'automazione domestica*. Ambiente Italia

8 VERSION HISTORY OF PCR

VERSION 1.0, 2019-10-02

Original version of PCR published.

VERSION 1.01, 2019-10-14

Cover image added.

VERSION 1.02, 2019-12-03

Erroneous equations in Section 4.1 (page 8) and Section 4.10.3 (page 14) have been corrected.

VERSION 1.0.3, 2023-07-06

- Change of PCR Moderators.
- Prolonged validity period with 1 year, until 2024-10-02, due to the initiation of an updating process (to update the PCR to version 2.0.0 and prolong its validity with another 4 years).
- Editorial changes, including changes in Sections 5.4.5.1 to 5.4.5.3, to clarify the indicator list at www.environdec.com applies also for the indicators of resource use, waste production and other output flows.

VERSION 1.0.4, 2024-08-05

- Change of one of the PCR Moderators.
- Prolonged validity period with another 6 months, until 2025-04-02, as the updating process has been delayed while awaiting version 5.0.0 of the GPI.

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