PRODUCT CATEGORY RULES (PCR)
DATE 2019-07-24

LIFTS (ELEVATORS)

PRODUCT CLASSIFICATION: UN CPC 4354

2015:05
VERSION 1.1

VALID UNTIL: 2020-10-14

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LIST OF ABBREVIATIONS

CPC	Central Product Classification
EFESME	European Federation for Elevator Small and Medium-sized Enterprises
ELA	European Lift Association
ELCA	European Lifts Components Association
EN	European Standards
EOL	End-of-Life
EPD®	Environmental Product Declaration
EZ	Express zone
FU	Functional unit
GHS	Globally Harmonized System of Classification and Labelling of Chemicals
GPI	General Programme Instructions
ISO	International Organization for Standardization
LCA	Life Cycle Assessment
LCI	Life Cycle Inventory
LCIA	Life Cycle Impact Assessment
NCV	Net Calorific Value
OECD	Organisation for Economic Co-operation and Development
PCR	Product Category Rules
PWB	Printed Wiring Board
RSL	Designed Referent Service Life
UC	Usage Category
VDI	Verein Deutscher Ingenieure

GENERAL INTRODUCTION TO PRODUCT CATEGORY RULES IN THE INTERNATIONAL EPD® SYSTEM

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

The rules for the overall administration and operation of the program are the General Programme Instructions, publicatlly available at the website (www.environdec.com). In addition to ISO 14025, the International EPD® System adheres to the following international standards:

- ISO 9001, Quality management systems
- ISO 14001, Environmental management systems
- ISO 14040, LCA - Principles and procedures
- ISO 14044, LCA - Requirements and guidelines

For construction products, the International EPD® System also allows the use of EN 15804 (Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products) and ISO 21930 (Environmental declaration of building products) as underlying standards. The compliance with these and other standards shall be clearly stated in each PCR and EPD® where it is relevant.

A PCR is defined in ISO 14025 as a set of specific rules, requirements and guidelines for developing Type III environmental declarations for one or more product categories. The PCR document specifies the rules for the underlying life cycle assessment (LCA) and sets minimum requirements on EPDs for a specific product group that are more detailed than the standards and the General Programme Instructions.

PCRs in the International EPD® System are developed in English in accordance with the procedure described in the General Programme Instructions. All PCR documents have a maximum period of validity after which the document shall be revisited.

EPDs are developed and registered based on a valid PCR. An EPD® shall be based on the latest version of the PCR, and refer to the version number and date of the PCR used. The production of new PCR versions does not affect the certification period of EPDs that are already published.

This PCR document is publically available at www.environdec.com. The PCR document is a living document. If relevant changes in the LCA methodology or in the technology for the product category occur, the document will be revised and the new version will be published on the website.

Stakeholder feedback on PCRs is very much encouraged. Any comments to this PCR document may be given on the PCR Forum on www.environdec.com or directly to the PCR moderator during its developmend or during the period of validity.

Within the present PCR, the following terminology is adopted, as defined by the Guidance for Product Category Rules Development v1.0:

- 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.

1 GENERAL INFORMATION

Table 1-1 General information regarding the PCR development process

Name:	Lifts (Elevators)
Programme operator:	The International EPD® System, www.environdec.com. E-mail: info@environdec.com
Publication date:	2015-10-14 (Version 1.1)
Registration no:	2015:05
This PCR was prepared by (PCR Committee):	The ELA PCR for Lifts Working Group with the input from (alphabetically ordered): - Blain Hydraulics - EFESME - ELCA - GMV S.p.A. - Hydroware AB - KONE - Orona - OSMA Aufzüge - Otis Elevator Company - Schindler Elevators Ltd. - Schmitt+Sohn Aufzüge - ThyssenKrupp Elevator - VFA-Interlift - WITTUR Holding GmbH Carbotech AG Dr. Ana Maria Lorente Lafuente Instituto Tecnológico de Aragón IQ Consult GmbH Technische Universität Berlin
Appointed PCR moderator:	Stella Bedeuer, ELA, S.Bedeur@ela-aisbl.org
Open consultation period:	1st consultation period: 2013-12-06 – 2014-04-11 2nd consultation period: 2014-05-01 – 2014-06-30 3rd consultation period: 2015-05-05 – 2015-07-05
Contributors during open consultation (only list with their approval)	Dr. Ana Maria Lorente Lafuente WITTUR Holding GmbH
Review panel for this PCR:	The Technical Committee of the International EPD® System. Full list of TC members available on www.environdec.com/TC
The PCR is valid within the following geographical region	Global
Valid until:	2020-10-14
Language:	English only (no translation in other languages is foreseen)
More information on this PCR's website:	http://environdec.com/en/PCR/Detail/pcr2015-05

The development of this PCR document has been led by the PCR Working group at ELA. Different representatives of the lift sector, such as electric and hydraulic lift manufacturers, lift component manufacturers, lift associations and other stakeholders like research centres and consultants have been involved in the process.

The development of this PCR has been discussed at several meetings at ELA and open face-to-face workshops, where all relevant stakeholders have been invited. Additionally, telephone conferences and electronic correspondence have been a constant means used to exchange ideas and information.

The objective is to provide a PCR for lifts that fits the needs of the sector (lifts manufacturers – big, medium and small companies and lift component manufacturers), and of their main customers in the construction industry.

This document provides a PCR for the assessment and declaration of the environmental performance (by means of an EPD®) of **lifts (elevators[1])**, which is a sub-set of **UN CPC 4354 Lifts, skip hoists, escalators and moving walkways,** More information about the product group can be found in Section 2.

This PCR complies with the General Programme Instruction of the International EPD® System, version 2.01, dated 2013-09-18 and it is based on the requirements and guidelines given in "PCR Basic Module, CPC Division 43: General-purpose machinery", version 2.0, dated 2013-10-24

Other reference documents available in the public domain considered during the development of this document are:

- EN 15804:2012+A1:2013[2] - Sustainability of construction works. Environmental product declarations. Core rules for the product category of construction products PCR for Construction products and construction services.
- ISO 21930:2007 Sustainability in building construction – Environmental declaration of building products.
- Guidance for Product Category Rules Development v1.0 (www.pcrguidance.org) and conformity assessment.
- Lorente Lafuente A.M., Núñez Bruis, J.L. Environmental impact of lifts. Symposium on Lift and Escalator Technologies. Northampton: September 2014
- Lorente Lafuente, A-M, doctorate thesis deposited at EINA, University of Zaragoza entitled: Life Cycle Analysis and Energy Modelling of Lifts. September 2013[3]
- Product Category Rules for Lifts (Elevators). Version 1.2 Draft PCR for open Consultation (Date: 2014-05-05). Available on http://www.environdec.com/en/PCR/Detail/?Pcr=9211
- Product Category Rules for multiple UN CPC CODES Construction Products and Construction Services. Version 2.0 Draft for open consultation (Date 2014-11-18)

There are no existing PCRs for the same CPC code used as a reference to the present PCR.

As the construction industry is the main customer of the lift sector, the above-listed standard EN 15804 and ISO 21930 are used as underlying standards whenever their requirements fit the characteristics of the product considered in this PCR. Full conformance of this PCR with the above-mentioned standards is not intended.

This PCR also specifies further and additional minimum requirements on EPDs specific of the product group defined below, complementary to the above mentioned general requirement documents.

Preparing a PCR for lifts will help avoiding inconsistencies between companies when reporting LCA results and increases transparency. Furthermore, it will help avoiding abuse of LCA's for unjustified marketing purposes or for gaining unfair competitive advantages.

This PCR document is publicly available on www.environdec.com. The PCR document is a living document. If relevant changes in the LCA methodology or in the technology for the product category occur, the document will be revised and any changes will be published on the website.

Any comments to this PCR document may be given on the PCR Forum on www.environdec.com or directly to the PCR Moderator during the period of validity. The PCR Moderator should initiate a revision process before the validity time expires to give due time for announcing and collecting comments.

[1] The term "elevator" corresponds to the American word for "lift" in British English (according to Lifts Directive 2014/33/EU)

[2] Further referred to only as EN 15804

[3] See full reference to the document in Section 0

EPDs shall be based on the latest version of the PCR, and refer to the version number and date of the PCR used. The production of new PCR versions does not affect the certification period of EPDs that are already published.

1.1 OWNERSHIP, RESPONSIBILITY AND LIABILITY FOR THE EPD®

A company[4] or a group of companies producing an EPD® based on this PCR are the sole owners and have liability and responsibility for their EPD®.

2 DEFINITION OF THE PRODUCT GROUP

The product category is defined under UN CPC Ver.2 classification:

- Section: 4 - Metal products, machinery and equipment
  - Division: 43 - General-purpose machinery
    - Group: 435 - Lifting and handling equipment and parts thereof
      - Class: 4354 - Lifts, skip hoists, escalators and moving walkways

More information on CPC is available on http://unstats.un.org/unsd/cr/registry/cpc-2.asp

UN CPC 4354 Lifts, skip hoists, escalators and moving walkways includes many different types of machinery. However, the scope of this PCR is limited to machinery defined as **lifts (elevators)**, since production technologies and functionality are specific. Therefore, the PCR cannot be used for other type of products (e.g. skip hoists, escalators or moving walkways) classified under the same UN CPC 4354.

Lifts covered by this PCR can be designed for transportation of persons or freights (goods and materials), or both and can have vertical or inclined trajectories[5]. This PCR can be applied for **new lifts** (for details, see Section 3.2.1) and for **modernized lifts**. The latter are composed of components, which are used for lift modernization purposes (for details, see Section 3.2.2).

Lift systems consist of subsystems and components, which may be grouped differently depending on the product structure definition, applied by the respective company (lift manufacturer). The company shall define and disclose the configuration of the product under analysis in a tabular or schematic format in the EPD®. In case of declaring modernized lift, this shall show clearly what components are replaced and what components remain the same.

The product group and UN CPC code shall be specified in the EPD®. Moreover, the EPD® shall clearly describe the new or modernized lift system considered and its scope of application using as a minimum the mandatory performance characteristics listed in Section 2.2.

2.1 SPECIFICATION OF THE COMPANY

Information about the company issuing the EPD® shall be specified in the EPD®, including a description of the company and a description of its overall environmental work, as follows:

Mandatory information:

- Name and address of the company

Voluntary information:

- Short description of the company

[4] Under “the company” henceforth the following description, according to the Lift Directive 2014/33/EU, Article 2, point 6 shall apply: ”...‘installer’ means the natural or legal person who takes responsibility for the design, manufacture, installation and placing on the market of the lift...

[5] Inclined elevators are to be considered as such that travel at an angle of inclination ”of more than 15 degree to the horizontal” (as per Lift Directive 2014/33/EU), ”not more than 15° to the vertical” (as per EN81), or ”of 70 deg or less from the horizontal” (as per ASME A17.1)

- Geographical location of suppliers / manufacturing sites/ customers
- Information about ISO 14001 and/or EMAS certificates of manufacturing sites considered in the core module
- Specific aspects regarding the production
- Company logotype

2.2 SPECIFICATION OF THE PRODUCT

The product-related part of the EPD® shall include the following mandatory information (Table 2-1):

Table 2-1 Mandatory information required for the specification of the product

Index	Values	Representative values chosen in case of ranges
Type of installation	*e.g. new specific lift, new generic lift or modernized lift*	
Commercial name	*As stated in the operating manual or sales catalogue*	
Main purpose	*e.g. transport of passengers / goods / both (passengers & goods)*	
Type of lift	*e.g. electric or hydraulic*	
Type of drive system	*e.g. gearless traction / geared traction / hydraulic*	
Rated load (fixed or range)	*e.g. 320 … 1000 kg*	*e.g. 320 kg*
Rated speed (fixed or range)	*e.g. 0.4 … 1.25 m/s*	*e.g. 0,5 m/s*
Number of stops (fixed or range)	*e.g. 2 … 21*	*e.g. 2*
Travelled height (fixed or range)	*e.g. 5…60 m*	*e.g. 50 m*
Number of operating days per year (fixed or range)	*e.g. 50…365*	*e.g. 365*
Applied usage category (UC) according to ISO 25745-2	*e.g. 1…6*	*e.g. 1*
Designed Reference Service Life (RSL)	*e.g. 15 years*	
Geographic region of intended installation	*Region, e.g. specific country or continent*	
Additional information		
Recommended application (main market) ▪ Building rise (typical) ▪ Building type	*e.g. low-rise residential* ▪ *low- (2..6 floors) / mid- (7..20 floors) / high- rise (> 20 floors)* ▪ *residential / commercial / office / administrative / hotel / hospital / shopping centre / transportation / industrial*	
Optional equipment	*List if the unit has optional equipment, different than the one listed under the commercial name in the sales catalogue*	
Additional requirements	*e.g. seismic lift, evacuation lift or similar*	

In addition, the following voluntary information may be disclosed:

- Relevant Type I and Type II environmental labels awarded to the product

Any claims made about the product shall be verifiable.

3 FUNCTIONAL UNIT AND LIFT CONFIGURATIONS

3.1 FUNCTIONAL UNIT

According to ISO 14040:2006, LCA is a relative approach, which is structured around a functional unit (FU). The FU is defined as a "quantified performance of a product system for use as a reference unit". All subsequent analyses then refer to that FU, as all inputs and outputs in the life cycle inventory (LCI) and consequently the life cycle impact assessment (LCIA) profile are related to the FU.

This reference is necessary to ensure comparability of LCA results. This is particularly critical when different systems are being assessed, to ensure that such comparisons are made on a common basis. Comparability is therefore only achievable, if the FU and the following performance characteristics are equivalent:

- Usage Category (UC)
- Travelling height
- Number of stops
- Rated load
- Rated speed
- Geographic region[6]

The function of a lift is the transportation of persons, freights or both. Based on this, the FU is defined as **the transportation of a load over a distance, expressed in tonne [t] over a kilometre [km] travelled, i.e. tonne-kilometre [tkm]**[7] over a vertical (or inclined) trajectory. In this regard, LCA results shall be presented per 1 [tkm] (see also Section 8). To do so, first the total number of FU shall be calculated according to the formulas and predetermined parameters shown below in the following steps:

1) Calculation of the average car load $\%Q$ [t]:

$$\%Q = \frac{Q}{1000} \times [\text{Percentage from Table 3 of ISO } 25745-2]$$

where Q is the lift rated load [kg].

2) Calculation of the one-way average travel distance for target installation s_{av} [m]:

$$s_{av} = s_{rc} \times [\text{Percentage from Table 2 of ISO } 25745-2]$$

where s_{rc} is the one-way travel distance of the reference cycle according to ISO 25745-1 [m] (lift height).

3) Calculation of the distance travelled by the lift during the service life s_{RSL} [km]:

$$s_{RSL} = \frac{s_{av}}{1000} \times \mathrm{n_d} \times \mathrm{d_{op}} \times RSL$$

where n_d is the number of trips per day according to the selected usage category (defined in Table 1 of ISO 25745-2) and d_{op} is the number of operating days per year. Finally, RSL is the designed service life [years] declared for the lift in the EPD®.

4) Ultimately, calculation of the number of FU [tkm]:

$$FU = \%Q \times s_{RSL}$$

[6] In case of comparability, the equivalence of the geographic region is important due to the specifics of the energy mix used

[7] Should the information of the lift use be available in units of passengers (load) and floor transported (distance), these can be easily converted to the functional unit [tkm] multiplying the average number of passengers by the average weight per passenger and the average number of floors by the average floor height of the building.

The calculation of the number of FU shall be documented in a transparent and reproducible manner in the EPD®. The values used for this calculation shall be in accordance with the values used for the estimation of the energy consumed by the lift during the use phase (information module D-4, see Figure 6-1 and Section 7.3).

As indicated, the most of the predetermined parameters are defined in ISO 25745-2. This Standard is selected as the valid reference at international level for both the estimation of the lifts energy consumption and for the calculation of the FU. It gives tables of average distance travelled and average weight transported.

In its current version, the standard does not give figures for lifts installed in buildings with express zones (EZs). Until definition is provided in a standard or a peer reviewed publication, providing additional information for these cases that are currently excluded from ISO 25745-2, the following formula from Lorente Lafuente (2013) has been agreed to be followed by the industry:

$$d_{av\_EZ} = d_{av\_woEZ} + k \times d_{EZ}$$

d_{av_EZ} is the average distance travelled [m], d_{av_woEZ} is the average distance travelled, if the building did not have EZs (i.e. s_{av} according to ISO 25745-2) and d_{EZ} is the height of the EZ. k is a coefficient calculated by means of simulations.

3.2 LIFT CONFIGURATIONS

The present PCR can be used for the issuing of EPDs of:

- **New lifts**, or
- **Modernized lifts**[8].

3.2.1 NEW LIFTS

In case of new lifts, the company shall decide whether it wants to declare the environmental performance of a **specific lift** (designed for a specific installation and having already fixed parameters) or a **generic lift**[9] (i.e. selected by the company from their product portfolio and covering a given range of products and performance characteristics). In both cases, new lift shall imply complete lift system. The type of lift under declaration shall be clearly stated in the EPD®, followed by the disclosure of the performance characteristics according to Section 2.2.

In case of generic lift, more than one UC, as well as ranges of other performance characteristics (such as e.g. rated load, rated speed or number of stops) can be applicable. Therefore, the EPD® shall clearly specify the selected values of UCs, the respective performance characteristics and/or their ranges. Further, LCA results shall be reported for each selected UC. Moreover, the EPD® shall describe whether the results cover the whole range (and even combinations of ranges) of the performance characteristics or not. If not, the limited representativity of the results shall be indicated.

3.2.2 MODERNIZED LIFTS

Lifts are products with a long operation time, during which not only preventive, but also corrective maintenance is needed. These repair interventions cannot be programmed or foreseen, because they depend on the building application and users´ behaviour. Additionally, the lift owner may freely decide to make changes in the equipment to e.g. improve its safety, performance (better passengers service), comfort (better ride quality), efficiency (less energy consumption), aesthetics or to extend its life (replacement of worn components).

These activities clearly depend on the product use and are not under the control of the company supplying the original lift. For this reason, they have been excluded as part of the life cycle boundaries of a complete lift system (see Section 6) and shall be considered as a new incomplete lift product (i.e. modernized lift) that is made up only of a set of parts or components for modernisation with their own lifecycle phases and useful life. A modernisation is thus defined as a component or group of components used for modular modernisation.

[8] A set of lift components aimed to replace the original ones

[9] This is often referred to by the lift industry as “model lift”, however, this term is not used in this PCR, because according to Directive 2014/33/EU ”...‘model lift’ means a representative lift whose technical documentation shows the way in which the essential health and safety requirements set out in Annex I will be met for lifts which conform to the model lift defined by objective parameters and which uses identical safety components for lift…”

The above-mentioned modernisation sets of parts or components needed to modernize a lift usually focus on hoisting components (machinery, ropes, diverting pulleys, over speed governor, etc.), electrification, cars, doors, signalisation or components, which significantly contribute to an increase in the life span of the lift.

In case of modernization, the EPD® shall clearly describe what original components remain in the installation and what parts or components are being replaced, as well as the effects that these replacements would have in the different life cycle phases of the lift (e.g. higher or lower energy consumption during the RSL, or extended RSL, etc.). This content shall be defined and disclosed by the manufacturer. Modernization can be applied for specific lifts only. Nevertheless, the same rules, as described in Section 3.2.1 shall apply.

4 CONTENT DECLARATION

The gross weight of material shall be declared in the EPD® at a minimum of 95% of one unit of product (excluding spare parts). Moreover, the EPD® shall include a declaration of the lift composition[10] in quantitative terms (percentage of the total weight, considering all lifecycle phases and according to the cut off rules described in Section 6), grouped at least according to the following categories:

- Ferrous metals
- Non-ferrous metals
- Plastics and rubbers
- Inorganic materials (e.g. concrete)
- Organic materials (e.g. paper or wood)
- Lubricants (e.g. oils and greases), paintings, coatings, adhesives and fillers
- Electric and electronic equipment
- Batteries and accumulators
- Refrigerants in car air conditioners (if any)
- Other materials[11]

Proprietary materials and substances covered by exclusive legal rights including patent and trademarks can be reported as ”Other materials”.

The lift manufacturer can be more specific in the reporting of the lifts material composition if wished.

Additionally, disclosure of information on hazardous substances (defined by CAS-number) of materials and chemical substances is optional. Nevertheless, if disclosed, such information should follow the requirements given in the latest revision of the Globally Harmonized System of Classification and Labelling of Chemicals (GHS[12]), issued by the UN or national or regional applications of the GHS.

Lifts put on certain markets can be subject of further local regulations or specific requirements of stakeholders. In such cases, additional requirements to declare the content of certain substances may be needed. This can be done in an annex of the EPD®.

The lift company may declare “recycled material” content, if this material is diverted from the waste stream during a manufacturing process (pre-consumer) or by end users of the product (post-consumer), as described in Chapter 4.3.1 of GPI.

[10] A detailed bill of materials shall be available in the LCA report.

[11] Other materials include those, for which the material contents cannot be established.

[12] GHS document available in http://www.unece.org

5 UNITS AND QUANTITIES

The International System of Units (SI[13] units) shall be used:

- [kWh] or [MWh] for electricity demand and consumption
- [MJ] for consumption of primary energy resources
- [kg] for mass, except [m^3] for water
- [m] or [km] for distance
- Time shall be expressed in practical units depending on the assessment scale e.g. years [y], days [d], hours [h] or seconds [s]

A maximum of three significant digits shall be used when reporting LCA results. Numbers should be rounded in respect of their scientific significance.

6 GENERAL SYSTEM BOUNDARIES

The International EPD® System has adopted an LCA calculation procedure, which is separated into three different life cycle stages:

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

These three life cycle stages and respective processes are split into information modules[14]. Each of these modules covers all unit processes that are part of the life cycle of the lift system under declaration. These are presented in Figure 6-1 below. In the EPD®, the environmental performance associated with each of the three life-cycle stages above shall be reported separately. To identify the relevance of including infrastructure process, the general cut-off rules defined in Section 6.1 shall be applied. Additional requirements for the disclosure of the product's environmental performance are given in Section 8.

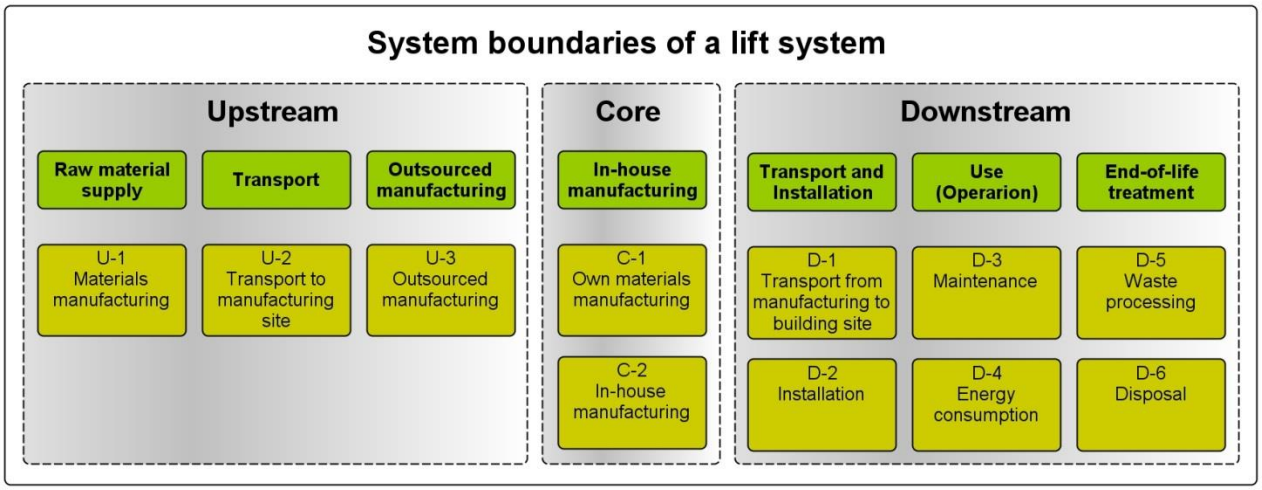

Figure 6-1: General system boundaries

[13] Definition: http://en.wikipedia.org/wiki/International_System_of_Units

[14] As defined by ISO 14025 and EN 15804

In order to facilitate the use of the PCR, upstream information modules are indicated as **U**, whereas the core and downstream ones are indicated as **C** and **D**, respectively. Due to certain similarities with EN 15804, the equivalence with the standard's information modules can be observed in Table 6-1.

Table 6-1 Mapping of the information module nomenclature between the PCR and EN 15804

	Upstream			**Core**		**Downstream**					
PCR Lifts	U-1	U-2	U-3	C-1	C-2	D-1	D-2	D-3	D-4	D-5	D-6
EN 15804	A1	A2	A3	A1	A3	A4	A5	B2	B6	C3[15]	C4

In this PCR, the in-house production phase (information modules **C-1** and **C-2**), including the production of spare parts, is considered as core processes (gate-to-gate), due to the direct influence of the manufacturer. Upstream processes (cradle-to-gate) include raw materials supply and manufacturing (**U-1**), transport (**U-2**), and outsourced manufacturing of components (**U-3**). Transportation to building construction site (**D-1**), installation (**D-2**), use phase (energy consumption (**D-4**) and preventive maintenance (**D-3**)), and end-of-life treatment (waste processing (**D-5**) and disposal (**D-6**)) are considered as downstream processes (gate-to-grave).

6.1 GENERAL CUT OFF RULES

The total mass of the lift materials inventoried shall equal the total mass of the lift.

All inflows and outflows, for which data are available, shall be included in the calculations. Special emphasis shall be given on material and energy flows that are known to have large impact.

If data are not available, conservative assumptions with generic data may be used for the upstream and downstream processes. All such assumptions shall be documented. Possible approaches to inventory the [%] of the weight, whose material composition might not be known (maximum 5%) are:

- Assume that the material composition to the [%] of the lift, for which data are unknown, equals the average of the rest [%] of the lift inventoried.
- Classify the material according to the class/group where it belongs (plastic, metal, paint, etc.) and assign the material composition of the class/group with the highest environmental impact.

[15] Including C1 & C2 of EN 15804, if relevant and as described in Section 7.3

7 DESCRIPTION OF UPSTREAM, CORE AND DOWNSTREAM PROCESSES

7.1 UPSTREAM PROCESSES

The upstream processes include the inflow of raw materials, auxiliary materials, energy and water needed for the production of the lift (but not under full operational control of the company) expressed through the following information modules:

RAW MATERIAL SUPPLY:

- **U-1 Materials manufacturing**: Extraction and production of raw material for parts and components, as well as for spare parts or components needed for maintenance activities (D-3) during the operation (use) phase.

TRANSPORT:

- **U-2 Transport to manufacturing site (outsourced and in-house):** Transportation from direct suppliers; i.e. from previous production or extraction process. Earlier transport journeys[16] should be included in module U-1.

Transport distances can be based on actual data or on scenario defined by the company.

OUTSOURCED MANUFACTURING:

- **U-3 Outsourced manufacturing:** Outsourced manufacturing and assembly of components (including spare parts or components needed for maintenance activities (D-3)) in state ready for transportation to the lift manufacturing site, including:
  - Production of the energy (electricity, heat, steam, fuel, etc.) consumed and use of water
  - Production of operating[17] and auxiliary[18] materials consumed
  - Production of intermediate packaging materials
  - Direct emissions to air, water or soils
  - Treatment of waste generated from the manufacturing and assembly of main parts

U-2 and U-3 shall cover tier 1 suppliers as a minimum.

Processes that can be excluded:

- Production, maintenance, and disposal of outsourced manufacturing infrastructure (buildings, machinery and capital goods), and internal transportation of materials and components between factories and internal transportation within the factories

7.1.1 INFORMATION REQUIREMENTS FOR COMPONENT MANUFACTURERS

The component manufacturer shall provide the lift manufacturer with the following information:

- Information of materials used (mandatory)
- Information of manufacturing processes (not needed as long as this process is allocated to the upstream module. Data can be estimated by the lift manufacturer)
- Declaration of the component useful life

[16] Example: transport of raw materials, finished and semi-finished parts to in-house and outsourced manufacturing locations of main components, in particular air cargo transport such as e.g. electrical and electronic equipment & PWBs from South East Asia

[17] Operating materials include materials and substances required to maintain the operation of manufacturing processes and activities. Operating materials do not end up in the final product like auxiliary and raw materials. Examples of operating materials include cooling and cutting fluids, lubricants (oils & greases), cleaning agents & rags, etc.

[18] Auxiliary materials include materials that end up in the final product, but in low quantities and fulfil supporting functions such as paints, varnishes, powder for powder coating, welding rod, screws, etc.

- Information on the necessary maintenance activities to guarantee a correct operation during the declared useful life
- Information regarding dismantling activities necessary for the management of the component end of life

Alternatively, if there is an agreement between the customer and the supplier, the component manufacturer can directly provide the lift manufacturer with data of the environmental impact of their components. If this is case, the component manufacturer shall follow the rules of this PCR for the calculation of such environmental impacts, as if they were components for modernization[19]. It is recommended that the component manufacturer use the same background generic data sources (i.e. databases) as the lift manufacturer (see Section 7.5).

System boundaries, cut-off rules, allocation rules and data quality rules for these upstream processes are summarized in Table 7-1.

7.2 CORE PROCESSES

The core processes include the inflow of raw materials, auxiliary materials, energy and water needed for the production of the lift (which are fully under the operational control of the company) expressed through the following information modules:

IN-HOUSE MANUFACTURING:

- **C-1 Own materials manufacturing:** Extraction and production of company own raw materials, used for parts and components, as well as spare parts or components needed for maintenance activities (D-3) during the operation phase, including:
  - Production and use of energy (electricity, gas, heat, steam, fuel, etc.) and water
  - Production and use of operating and auxiliary materials consumed
  - Production of intermediate packaging materials
  - Direct emissions to air, water or soils
  - Treatment of waste generated from the manufacturing and assembly of main parts
- **C-2 In-house manufacturing:** In-house manufacturing and assembly of components (including spare parts or components needed for maintenance activities (D-3)) in state ready for transportation to building site, including:
  - Production and use of energy (electricity, gas, heat, steam, fuel, etc.) and water
  - Production and use of operating and auxiliary materials consumed
  - Production of intermediate packaging materials
  - Direct emissions to air, water or soils
  - Treatment of waste generated from the manufacturing and assembly of main parts

Processes excluded are:

- Internal transportation between the company's own factories, if the impact is below the general 5% cut-off threshold
- Production, maintenance, and disposal of infrastructure (buildings, machinery and capital goods) at the sites where the product is manufactured
- Business travel of personnel and travel to and from work by personnel
- Indirect activities (like administration, sales, research and development activities etc.)

System boundaries, cut-off rules, allocation rules and data quality rules for these core processes are summarized in Table 7-1.

[19] This PCR, however, cannot be used for the development of EPDs of single components.

7.3 DOWNSTREAM PROCESSES

The downstream processes include the inflow of raw materials, auxiliary materials, energy and water needed for the operation of the lift (which is no more under full control of the company) and its further end-of-life treatment, expressed through the following information modules:

TRANSPORT AND INSTALLATION:

- **D-1 Transport from manufacturing to building site**: Transportation of the product from the manufacturing site to the building site, including:
  - Production of packaging materials necessary to protect the lift components during their transport from the manufacturing site to the building site
- **D-2 Installation:** Installation of the product, including:
  - Auxiliary materials and energy used during the installation of the lift and
  - Treatment of waste generated from the lift packaging materials

USE (OPERATION):

- **D-3 Maintenance (preventive)**: Including:
  - Transportation of the lift workers from their working place to the building site
  - Auxiliary materials and energy used for the lift maintenance activities
  - Treatment of waste generated from the spare parts packaging

The expected maintenance activities, number and type of spare parts expected to ensure a good functioning of the lift during the useful lifetime declared by the manufacturer shall be communicated to the lift customer and be reported in the LCA.

- **D-4 Energy consumption:** Expected energy consumption of the lift calculated according to ISO 25745-2; the calculation of the energy consumption shall be carried out, based on the same choice of performance characteristic values as for the calculation of the FU;

Regarding module D-4, the LCA inventory shall contain as a minimum the following:

- Clear documentation of power and energy measurements in the underlying LCA report.
- Clear documentation of electricity demand calculation in the underlying LCA report (as per ISO 25745-2).

If **due to the existence of an EZ or an uneven distribution of population,** different number of starts, average distance travelled or load transported than those provided by ISO 25745-2 are applied, these shall be reported and justified in the EPD®. For lifts installed in buildings with EZs, value of *k* from ANNEX A – VALUE OF K shall be used as a reference, as long as ISO 25745-2 keeps these special cases excluded from its scope.

In case of an EPD® for a specific lift, in which a **customized estimation of the energy consumption** has been made, any deviation to this calculation method shall be reported and justified in the EPD®.

In the case of **modernisations**, the energy consumption of the lift after the modernisation (i.e. with the new components) shall be calculated and disclosed. The alteration compared to the first calculation may be declared in the EPD®.

END-OF-LIFE (EOL) TREATMENT:

- **D-5 Waste Processing:** For re-use, recycling or energy recovery, according to a generic scenario defined by the company, including as preliminary steps the disassembly and transport to waste processing, if relevant.
- **D-6 Disposal (incineration or landfill):** According to a generic scenario defined by the company.

Each company shall define its own EOL (waste treatment) scenario, considering the specifics of the geographical region where the lift is installed (or intended to be installed). The EOL scenario shall be clearly documented and justified in the EPD® describing the final method of disposal, i.e. recycling, incineration and/or landfill.

Processes excluded are:

- Production, maintenance, and disposal of infrastructure (buildings, machinery and capital goods) at the sites where the product is disposed

The downstream processes shall be based on relevant scenarios for the geographical area in which the EPD® is valid.

System boundaries, cut-off rules, allocation rules and data quality rules for these downstream processes are summarized in Table 7-1.

7.4 REQUIREMENTS FOR THE UPSTREAM, CORE AND DOWNSTREAM PROCESSES

Table 7-1 indicates the system boundaries (in the lift life cycle, in time, towards nature, towards geography and towards other technical systems) as well as the cut-off rules, allocation rules, data quality rules and other calculation rules for generic data to be applied when conducting the inventory of the processes of Sections 7.1 to 7.3.

Table 7-1 Overview of the requirements for the upstream, core and downstream processes

	Upstream	Core	Downstream
System boundaries			
in the life cycle	As a minimum, the processes listed in Section 7.1 (information modules U-1 – U-3) shall be included.	As a minimum, the processes listed in Section 7.2 (information modules C-1 – C-2) shall be included.	As a minimum, the processes listed in Section 7.3 (information modules D-1 – D-6) shall be included.
in time		The LCI data should be representative for the period, for which the EPD® is valid.	
towards nature[20]		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.	
towards geography		The data shall be representative for the actual production processes and for the site/region where the respective process is taking place. When this information is not available, background data can be reported, provided that it is mentioned in the EPD®.	
towards other technical systems		▪ If there is an inflow of recycled material to the production system in the production/manufacturing phase, the recycling process and the transportation from the recycling process to where the material is used shall be included. ▪ If there is an outflow of material to recycling, the transportation of the material to the recycling process shall be included. The material going to recycling is then an outflow from the production system.	
Cut off rules	The general cut-off rules of chapter 6.1 apply.		

[20] Boundaries towards 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.

Allocation rules	When using generic data, a description of allocation rules applied shall be given in the LCA report referring to the allocation method applied in the underlying LCI database. The allocation factor of input and output flows during outsourced manufacturing and assembly (U-3) shall be calculated by following the same rules as described in the Core processes.	If allocation cannot be avoided, allocation methods based on physical relation are preferred to others. System expansion is not allowed, due to the concept of modularity and the book-keeping LCA approach (attributional LCA) of the International EPD® System. The allocation factor of input and output flows during in-house manufacturing (C-2) can be done by applying a more detailed process description and separating the different production lines. If that is not possible, the allocation may be based on mass criteria or man-hours used for the production of each co-product. If mass criteria are applied, the allocation factor shall be calculated as the total mass of flows for the specific lift (elevator) or component divided by the total mass of all lifts (elevators) or components produced at the given production site. The use of economic allocation criteria should be avoided, because of its sensibility to market specific conditions. If economical allocation has been used, a specific sensitivity analysis shall be provided to the verifier and the monitoring of the relationship between results and current economic value shall be documented and updated. The allocation procedures shall be documented in the LCA report and the EPD®. In case of economical allocation, the EPD® shall explain the reference values that shall be used.	Recycled content (or cut-off) approach shall be applied for the end-of-life stage, i.e. no allocation shall be made for materials subject to material recycling or energy recovery and these shall be regarded as outputs from the product system. The general principles to follow for the allocation of environmental burdens between product systems are: ▪ The environmental impact associated with the treatment of wastes not being used as a resource in another product system lies with the generator ▪ The environmental impact associated with the processing of the waste into resource for subsequent use lies with the user of that resource If a company performs extraordinary efforts to recycling and reuse their lift material[21], the end-of-life recycling or avoided burden approach can be applied in order to account for impacts and benefits associated with recycling and reuse of material[22]. If reported, such information should be disclosed under Section 8.5

[21] Continued use of e.g. landing doors, car or counterweight after modernisation shall not be considered as extraordinary practice, but business as usual.
[22] See EN 15804, clause 6.4.3.3 “allocation procedure of reuse, recycling and recovery” and Module D for reference

Data quality rules	Selected generic data can be used, e.g. data from commonly available data sources such as commercial databases and free databases, describing specific raw materials or processes usually referring to the system under study or to other systems equivalent from a technical point of view. For more information, see requirements in Section 7.5. For the electricity used there are two alternatives: the upstream company buys the energy from the electricity mix on the market or from a specific supplier. While in the first case the national electricity mix shall be adopted (if not already included in the generic process dataset), in the second case a specific energy mix could be used, if available.	Specific data (also referred to as primary[23]) shall be used for the core module. Specific data are gathered from the actual manufacturing plant(s), where 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 from a contracted supplier being able to provide data for the actual delivered services, transportation taking place based on the actual fuel consumption and related emissions, etc. The requirements for specific data also include actual product weights, gross amounts of raw materials used (including material losses) and amounts of waste, etc. If no specific data is available to account for material losses (cuttings, wastage, residues, etc.) mass of materials used in the main components shall be accounted for with an increase of 5%. For the electricity used, there are two alternatives: the company buys the energy from the electricity mix on the market or from a specific electricity mix of a supplier. While in the first case the national electricity production mix shall be adopted, in the second case a specific energy mix could be used if available. The data should be verifiable by invoice or similar. If specific data are not available or if the electricity bought is not specified for parts of the core module, the electricity mix used in those parts shall be approximated as the OECD electricity mix in the country of manufacture. The energy mix shall be documented. An uncertainty and quality analysis of the data used shall be performed and documented in the LCA report complementing data checks for completeness, sensitivity and consistency in accordance with ISO 14044, clause 4.5.3. Generic collection data on physical information must not exceed 10% of the core process life cycle inventory on the bases of the overall environmental impact from the product system	Accuracy of energy measurements and demand calculations shall comply with the requirements of ISO 25745-1 (+/- 10%). For the calculation of the environmental impact of the energy consumption during the operation phase (D-4), the energy mix should ideally correspond to the actual one of the geographic region where the specific lift is installed. For generic lifts, the energy mix for the geographic region where the lift is intended to be installed and used shall be used. In all cases, the applied energy mix shall be declared in the EPD®. It is acceptable to use 100% generic upstream data for electricity production, whereas quantity of energy used shall be primary/ system specific modelled data.
	Data regarding electricity use and electricity mixes shall be in line with the requirements of GPI and as described in Table 7-1. Moreover, any electricity LCI data used (both specific and generic) shall include transmission and distribution losses and should correspond to the specific voltage level used and represent the mix effectively supplied at grid (consumption not production mix, i.e. accounting for electricity imports and exports of a country).		

[23] Definition of all types of data (specific, generic or secondary) used in the present PCR is also given in Section A.5, page 34 of GPI.

7.5 RULES FOR USING GENERIC DATA

The book-keeping (attributional) LCA approach in the International EPD® System forms the basic prerequisites for selecting generic data. For allowing the use of selected generic data selected prescribed characteristics for precision, completeness and representativeness must be fulfilled and demonstrated, including but not limited to:

- Reference year to be as actual as possible, preferably being representative for at least 5 years;
- Cut-off criteria to be met on the level of the modelled product system are the qualitative coverage of at least 95% of-both the energy, the mass, and the overall relevance of the flows;
- Completeness where the inventory data set should in principle cover all elementary flows that contribute to a relevant degree of the impact categories, and
- Representativeness of the resulting inventory for the good or service in the given geographical reference should, as a general principle, be better than +/-5%
- Data calculated with system expansion should not be used, but if no other data is available, any negative flows should be changed to zero;

Generic data[24] are generally accepted including the data sources below:

*Table 7–2 Selected generic data sources**

Material	Database
Metals: alloys, ferrous, non-ferrous; Chemicals : organic, inorganic; Transports : road, rail, water, air; Waste disposal	Ecoinvent EIME European Aluminium Association ELCD Gemis thinkstep – GaBi IDEMAT NREL's U.S. LCI database Ökobau.dat ProBas World Steel Association
Plastics and rubbers	See above PlasticsEurope (formerly APME)
Electricity	Ecoinvent thinkstep – GaBi OECD statistics International Energy Agency statistics
Electronic components	Ecoinvent thinkstep – GaBi

*Selected generic data sources shall comply with the data quality requirements as per GPIs clause A.5.1 and EN 15804 clause 6.3.7.

The EPD® should include references to the generic database (and version) used and identify the unit processes represented. How the different materials were assigned to the respective generic LCI process data sets shall be documented in the LCA report.

It is highly recommended to use datasets that are consistent, e.g. consistent within one database for the entire LCA and to include a data quality table in the LCA study to compare the quality of the data used in the study versus the data quality requirements listed in this PCR. Deviations shall be registered. An uncertainty and quality analysis of the data used shall be performed and documented in the LCA report complementing data checks for completeness, sensitivity and consistency in accordance with ISO 14044, clause 4.5.3.

[24] In case of using data from Ecoinvent v3.01, allocation, cut-off by classification shall be used, corresponding to the recycling content approach used in ecoinvent v.2.2 and older. This shall be in force also in the downstream module.

If specific data on recycled content of raw materials (U-1) is known, generic datasets shall be adapted accordingly and values and origin of the data have to be declared in the EPD®. If specific recycled content is unknown, average recycled content of datasets is acceptable. In the latter case it has to be declared in the EPD® that average recycled and not specific recycled contents were used for LCIA and respective average values and origin of average data have to be declared in the EPD®.

Data regarding components manufactured and/or assembled by sub-suppliers (U-3) can be approximated by own manufacturing data of comparable processes and be applied instead of using specific data from the sub-supplier, or in combination with (other) generic data (e.g. metal working process data of ecoinvent) representative for the sub-supplier's manufacturing process. In such a case, this shall be made transparent in the EPD®.

For the transportation module U-2 and D-1, use of specific data is recommended as a minimum for the specific distance and specific mass transported, and optionally for loading rates and empty return rates of the respective means of transportation (else predetermined value used by the underlying LCI background data is acceptable, e.g. average loading rate of 100%, and an empty return rate of 0%). Selection of generic LCI data within a transportation category shall reflect as close as possible the geographical context of the representative unit, e.g. with regard to lorry capacities (e.g. 17 t, 40 t, etc.) or emission classes (e.g. EURO 3, EURO 5, etc.) and shall be transparently documented in the LCA report. This should allow reflecting benefits of efforts of regional manufacturing with shorter transport distances and of own 'clean' cargo fleet efforts or those of 3rd party logistic service providers hired.

If these data sources do not supply the necessary data, other generic data may be used, but shall be clearly documented. The environmental impact of the processes where the other generic data are used must not exceed 10% of the overall environmental impact from the product system.

7.6 SUMMARY OF INVENTORY DATA NEEDED FOR EACH MODULE

Table 7-3 shows a summary of the processes that need to be inventoried together with the background data that shall be used in each case. In addition, the table indicates the equivalent EN 15804 modules numbering.

Table 7-3. List of inventory data needed per information module

Module	EN 15804	Data to be collected for the inventory	Background data
U-1	A1	Lift inventory (including spare parts used in maintenance). Type of materials and total weight of each material	Data on material extraction and processing
U-2	A2	Location of suppliers of outsourced components (transport distances) and type of transportation (e.g. capacity, loading rate, emission class, etc.)	Transport data
U-3	A3	Inventory of components manufactured by outsourced manufacturers	Data on industrial processes and components production
C-1	A1	Primary company data on materials manufacturing processes (energy, water, auxiliaries, emissions, waste, etc.)	Material, energy and waste infrastructure data
C-2	A3	Primary company data on components manufacturing and assembly processes (energy, water, auxiliaries, emissions, waste, etc.)	Material, energy and waste infrastructure data
D-1	A4	For generic lifts: average distance (using company statistical data) between manufacturing site and building site; For specific new and modernized lifts specific distance between manufacturing site and building site. In any case, including type of transportation (e.g. capacity, loading rate, emission class, etc.)	Transport data
D-2	A5	Consumables and energy used during installation + displacements of installation personal	Data of materials, transport and energy infrastructure
D-3	B2	Consumables and energy used during preventive maintenance + displacements of installation personal	Data of materials, transport and energy infrastructure
D-4	B6	Calculation of energy demand following ISO 25745-2 as indicated in chapter 7.3 and selection of energy mix at the geographic region of installation and use.	Energy infrastructure data
D-5 & D-6	C3[25] & C4	End-of-life scenario, defined by the company	End-of-life infrastructure data

[25] Including C1 & C2, if relevant and as described in Section 7.3

8 ENVIRONMENTAL PERFORMANCE-RELATED INFORMATION

The potential environmental impacts shall be reported per FU, i.e. 1 [tkm] (by dividing the LCIA profile by the number of FU), separately for each of the three stages: upstream, core and downstream.

In addition, the potential environmental impacts shall be reported in absolute figures (i.e. total values) for the complete product over its RSL (e.g. “New lift in operation for 25 years”) as specified in Table 2-1, separately for each of the three stages: upstream, core and downstream.

Following the approach of EN 15804, the environmental information shall be subdivided into the different information modules as indicated on Figure 6-1 (see Table 6-1 for equivalences between the modules described in EN 15804 and in this PCR).

These rules shall apply to each sub-section of the current Section 8.

Annex B provides exemplary tables for results disclosure on the use of resources (Section 8.1), the potential environmental impacts (Section 8.2) and the waste production and output flows (Section 8.4). Results tables per FU and in absolute figures shall be properly indicated and declared separately from each other in the EPD®.

8.1 USE OF RESOURCES

The following environmental indicators apply data based on the LCI. They describe the use of renewable and non-renewable material resources, renewable and non-renewable primary energy and water.

The following are required and shall be included in the EPD® as follows:

- Non-renewable resources
  - Material resources
  - Energy resources (used for energy conversion purposes)
- Renewable resources
  - Material resources
  - Energy resources (used for energy conversion purposes)
- Secondary resources[26]
  - Material resources
  - Energy resources (used for energy conversion purposes)
- Recovered energy[26] flows (such thermal) expressed in MJ, net calorific value

The following can be disclosed optionally:

- Water use divided in:
  - Total amount of water
  - Direct amount of water used by the core process

The following requirements on the resource declaration also apply:

- all parameters for resource consumption shall be expressed in mass, with the exception of renewable energy resources used for the generation of hydroelectric, wind electricity and solar energy, which shall be expressed in MJ_{NCV};
- all parameters shall not be aggregated but reported separately. Resources, which contribute for less than 5 % in each category can be included in the resources list as “other”.

[26] As defined per GPI, Annex F

- Nuclear power shall be reported among the non-renewable energy resources as kg of uranium calculated by converting the thermal energy (MJ) considering a reactor of III generation with an efficiency of 33 %.

8.2 POTENTIAL ENVIRONMENTAL IMPACTS

The following environmental impact categories shall be reported in the EPD®:

- Emission of greenhouse gases (expressed as the sum of global warming potential (GWP), 100 years, in carbon dioxide (CO_2) equivalents)
- Emission of acidifying substances (expressed as the sum of acidification potential (AP) in sulphur dioxide (SO_2) equivalents)
- Emission of substances to water contributing to oxygen depletion (expressed as the sum of eutrophication potential (EP) in phosphate (PO_4^{3-}) equivalents)
- Emission of gases that contribute to the creation of ground-level ozone (expressed as the sum of ozone-creation potential (POCP), ethylene (C_2H_4)-equivalents)
- Depletion of abiotic resources (expressed as abiotic depletion potential ADP) for:
  - ADP-elements for non-fossil resources (includes all non-renewable, abiotic material resources (i.e. excepting fossil resources) in kg Antimony (Sb) equivalents)
  - ADP-fossil fuels for fossil resources in MJ, net calorific value

The International EPD® System defines the characterisation models and factors that shall be used. They are available on the Operator's webpage (http://goo.gl/7Yh6qB). Reference of impact assessment methods applied shall be disclosed for each impact category, e.g. "ICCP 2007 100 year horizon" for calculation of the GWP. However, in addition to the default ones, environmental impacts can be voluntarily disclosed by using alternative LCIA methods in order to fulfil the needs of local markets, e.g.:

- ELCD is applicable for Europe
- The US Environment Protection Agency recommends methods used in TRACI
- In Australia, the Building Products Innovation Council has published applicable impact assessment methods for that region

8.2.1 SPECIFICATIONS FOR GWP CALCULATIONS

Both emissions to the atmosphere and removals from the atmosphere shall be accounted for the assessment of the overall GHG emissions of the product being assessed, if the sensitivity analysis performed demonstrates relevance with regard to the general cut-off rules, as defined in Section 6.1. This assessment shall include the gases arising from both fossil and biogenic sources for all products, with the exception of human food and animal feed products. Emissions and removals of biogenic carbon shall be reported separately

Where some or all removed carbon will not be emitted to the atmosphere within the 100-year assessment period, the portion of carbon not emitted to the atmosphere during that period shall be treated as stored carbon. Following issues shall be taken into account:

- carbon storage might arise where biogenic carbon forms part or all of a product (e.g. wood fibre in a table), or where atmospheric carbon is taken up by a product over its life cycle (e.g. cement);
- while forest management activities might result in additional carbon storage in managed forests through the retention of forest biomass, this potential source of storage is not included in the scope of the International EPD® System;
- GHG emissions offset mechanism shall not be used at any point in the assessment of the GHG emissions of the product. The organisation could declare its participation to some offsetting program in the other information section of the EPD® or single issue EPD.

8.3 OTHER ENVIRONMENTAL INDICATORS

Emission of ozone-depleting gases (expressed as the sum of ozone-depletion potential (ODP) in mass of CFC-11 equivalents) may be voluntary reported.

Human toxicity potential and ecotoxicity potential indicators may be voluntarily reported, too. If reported, methodology, impact category and unit shall be clearly indicated. Should any human toxicity or ecotoxicity indicators be reported, name and version of background LCI database used shall be clearly indicated, interpretation of results shown shall be given and limitations of results shown shall be explained in order to avoid any misleading conclusions or misuse of results shown. Moreover, due to the high uncertainty of the human toxicity and ecotixity methods, the comparison of EPDs based on this criterion is very limited and should be avoided.

Despite the impact assessment methods chosen, the latest available versions shall be used.

8.4 WASTE PRODUCTION AND OUTPUT FLOWS

The parameters describing waste categories and other material flows are output flows derived from LCI. They are required and shall be included in the EPD® as follows:

- Hazardous waste[27] disposed in kg
- Non-hazardous waste disposed in kg

Definition of and distinguishing between hazardous and non-hazardous waste categories shall follow EU legislation referenced in the footnote below or equivalent pertaining legislation in the country or geographic region, where the lift is intended to be installed and shall be documented in the EPD®.

8.5 ADDITIONAL ENVIRONMENTAL INFORMATION

Additional environmental information can optionally also include recommendations for energy saving measures. Other environmental information describing different waste categories and output flows may be declared as follows:

- Components potentially suitable for re-use (e.g. counterweight filling blocks, landing door frames); in kg and % of total system weight as installed
- Materials potentially suitable for recycling (e.g. all ferrous and non-ferrous parts) in kg and % of total system weight as installed
- Materials potentially suitable for energy recovery (e.g. used oils, plastic parts); in kg and % of total system weight as installed
- Exported energy; in MJ per energy carrier

Additional environmental information can also include a more detailed description of an organization's overall environmental work.

Information about the potential environmental benefit (avoided burden) from material recycling and energy recovery of certain materials can be included in this section. Moreover, any extraordinary efforts performed by the company for recycling and reuse of their lift material, such as e.g. voluntary take back programs of the lift company for recycling, refurbishment and reuse of PWBs and e-waste can be declared in the EPD®.

Additional information that is identified as an important environmental aspect of the product or information asked by the customer and other stakeholders can be addressed in the EPD®.

[27] Hazardous waste is defined by EU Directive 91/689/EEC (hazardous waste directive) and 75/442/EEC (waste oils directive) within the European Waste Framework Directive 2008/98/EC

9 CONTENT OF THE EPD®

As a general rule the EPD® content:

- must be verifiable;
- must not include rating, judgements or direct comparison with other products.

EPD®s can be published on several languages, but if the EPD® document is not available in English, the organisation shall provide a summary in English including the main content of the EPD® to be available on www.environdec.com.

The EPD® cover page (if existent) shall as a minimum include relevant information about the product, such as name and an image, the EPD® logotype and date of publication and validity.

9.1 PROGRAMME RELATED INFORMATION

The programme- related part of the EPD® shall include:

- Reference to the International EPD® System as the programme operator
- EPD® logotype as specified in Annex E of the General Programme Instructions
- Reference PCR document(s) and CPC codes
- EPD® registration number as provided by the Secretariat
- Date of publication and indication of the period of validity. If relevant, the revision schedule may be indicated.
- Declaration of the year(s) covered by the data used for the LCA calculation
- Geographical scope of application of the EPD®
- Information about the year or reference period of the underlying data to the EPD®
- Reference to the website – www.environdec.com – and other relevant websites for more information

9.2 PRODUCT-RELATED INFORMATION

9.2.1 SPECIFICATION OF THE COMPANY

See Section 2.1.

9.2.2 SPECIFICATION OF THE PRODUCT

See Section 2.2.

9.2.3 FUNCTIONAL UNIT AND LIFT CONFIGURATIONS

See Section 3.

9.2.4 CONTENT DECLARATION

See Section 4.

9.3 ENVIRONMENTAL PERFORMANCE-RELATED INFORMATION

9.3.1 USE OF RESOURCES

See Section 8.1. Exemplary table for disclosure the use of resources is presented in Annex B.

9.3.2 POTENTIAL ENVIRONMENTAL IMPACTS

See Section 8.2. Exemplary table for results disclosure on potential environmental impacts is presented in Annex B (Table B-1).

9.3.3 OTHER ENVIRONMENTAL INDICATORS

See Section 8.3. Exemplary table for results disclosure on other environmental indicators is presented Annex B (Table B-2).

9.3.4 WASTE PRODUCTION

See Section 8.4. Exemplary table for results disclosure on waste production is presented in Annex B (Table B-3)

9.3.5 ADDITIONAL ENVIRONMENTAL INFORMATION

See Section 8.5.

9.4 RECYCLING AND WASTE TREATMENT DECLARATION

See Section 7.3, information modules D-5 and D-6.

9.5 MANDATORY STATEMENTS

The following information is mandatory to include in the EPD®:

- any omission of life cycle stages not making the EPD® cover the full life cycle, with a justification of the omission,
- means of obtaining explanatory materials, e.g. references to chosen methodologies,
- description of the minimum performance characteristics for comparability, as defined in Section 3.1
- in case of generic lifts, statement if the results refer to the complete range of parameters or only to part of it,
- a statement that “EPDs within the same product category, but from different programmes may not be comparable”.

The EPD® shall also give the following information about the verification process:

Product Category Rules (PCR) review was conducted by: *The Technical Committee of the International EPD® System. Review chair: Maurizio Fieschi* *Contact via info@environdec.com.*
Independent verification of the declaration and data, according to ISO 14025:2006: □ EPD process certification □ EPD verification
Third party verifier: *Name and contact information* Accredited or approved by: *Name of the accreditation body. For individual verifiers: “The International EPD® System”*

9.6 DIFFERENCES VERSUS PREVIOUS VERSIONS OF THE EPD®

The main causes for changes in environmental performance in comparison with previous EPD® versions shall be described.

9.7 REFERENCES

The EPD® shall, if relevant, refer to:

- The underlying LCA
- The name, CPC code and version number of the PCR used
- Other documents that verify and complement the EPD®
- Instruction for recycling, if relevant
- The General Programme instructions of the International EPD® System

10 VALIDITY OF THE EPD®

The validity of the EPD® is set at three years after which the declaration must necessarily be revised and reissued.

During the validity period surveillance follow up shall be agreed with the verifier in order to evaluate if the content are still consistent with the current situation. It is not necessary to perform a full LCA, only the monitoring of main parameters is requested. The surveillance verification could be organised as documental check aimed to the evaluation of the main environmental aspects relevant for the LCA calculation.

The EPD® shall be updated if any one of the mandatory environmental-performance-related indicators declared in the EPD® has changed by more than+/- 10% (see Section 8 of the PCR at hand) compared with those published in the current EPD®.

11 CHANGES IN THIS PCR DOCUMENT

VERSION 1.0, 2015-10-14

Original version.

VERSION 1.1, 2019-10-14

- Extended validity as per Section 5.5.2.1. of the General Programme Instructions. An update is in progress that will make the PCR compliant with the latest General Programme Instructions and other relevant developments.
- Editorial changes

12 BIBLIOGRAPHY

Relevant normative references:

Reference	Title	Version
2014/33/EU	Directive 2014/33/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to lifts and safety components for lifts (Lifts Directive)	2014
ASME A17.1	Safety Code for Elevators and Escalators	2007
EN 15804+A1	Sustainability of construction works. Environmental product declarations. Core rules for the product category of construction products	2012+ 2013
EN 15978	Sustainability of construction works – Assessment of environmental performance of buildings – Calculation methods	2011
EN/TR 15941	Sustainability of construction works – Environmental product declarations – Methodology for selection and use of generic data	2010
EN-81 series	Safety rules for the construction and installation of lifts	1998
ISO 14020	Environmental labels and declarations - General principles	2000
ISO 14021	Environmental labels and declarations – Self-declared environmental claims (Type II environmental labelling)	1999
ISO 21930	Sustainability in building construction – Environmental declaration of building products.	2007
ISO 25745-1	Energy performance of lifts, escalators and moving walks – Part 1: Energy measurement and verification	2012
ISO 25745-2	Energy performance of lifts, escalators and moving walks – Part 2: Energy calculation and classification for lifts (elevators)	2014

Other relevant references:

Lorente Lafuente A.M., Núñez Bruis, J.L. (2014), Environmental impact of lifts. Symposium on Lift and Escalator Technologies. Northampton: September 2014

Lorente Lafuente, A-M (2013), doctorate thesis deposited at EINA, University of Zaragoza entitled: Life Cycle Analysis and Energy Modelling of Lifts. September 2013[28]

[28] This Doctoral thesis (see full title below) is available for download at www.lorente-lafuente.com or by request sending an e-mail to anamarial@t-online.de

Title: "Life Cycle Analysis and Energy Modelling of Lifts. Including.

- New methodological approach for the assessment of the lifts usage phase based on the influence of traffic
- Proposed summary tables for regulatory use fitting existing building classification systems
- Product Category Rules proposal for conducting comparable LCAs and issue of Type III environmental Statements"

ANNEX A – VALUE OF *K*

*Table A-1 Values of k for the calculation of the average distance travelled in installations with EZ**

Usage category		**1-3**	**4**	**5**	**6**
Value of k	EZ ≤ 75 m	N.A.	0,4	0,25	0,18
	75 m ≤ EZ ≤ 120 m	N.A.	0,3	0,18	0,14

* Source: Lorente Lafuente (2013)

ANNEX B – RESULTS OF THE LCA

Table B-1 Table of results – Use of resources

Environmental indicator	Unit	Upstream			Core		Downstream						Total Life Cycle
	PCR Lifts	U-1	U-2	U-3	C-1	C-2	D-1	D-2	D-3	D-4	D-5	D-6	
	EN 15804	A1	A2	A3	A1	A3	A4	A5	B2	B6	C3	C4	
Non-renewable material resources	kg												
Non-renewable energy resources (used for energy conversion purposes)	MJ_{NCV}												
Renewable material resources	kg												
Renewable energy resources (used for energy conversion purposes)	MJ_{NCV}												
Secondary material resources	kg												
Secondary energy resources (used for energy conversion purposes)	MJ_{NCV}												
Recovered energy flows (such as thermal)	MJ_{NCV}												
Optional: Total amount of water	m^3												
Optional: Direct amount of water used by the core process	m^3												

Table B-2 Table of results – Potential environmental impacts

Impact category (see Section 8.2 for the full definitions)	**Unit**	**Upstream**			**Core**		**Downstream**						**Total Life Cycle**
	PCR Lifts	**U-1**	**U-2**	**U-3**	**C-1**	**C-2**	**D-1**	**D-2**	**D-3**	**D-4**	**D-5**	**D-6**	
	EN 15804	A1	A2	A3	A1	A3	A4	A5	B2	B6	C3	C4	
Global warming potential (GWP, 100 years)	kg CO_2-eq.												
Acidification potential (AP)	kg SO_2-eq.												
Eutrophication potential (EP)	kg $(PO_4)^{3-}$-eq.												
Photochemical ozone creation potential (POCP)	kg C_2H_4-eq.												
Abiotic resource depletion potential (ADP) – Elements	kg Sb-eq.												
Abiotic resource depletion potential (ADP) – Fossil fuels	MJ_{NCV}												
Optional: additional voluntary indicators (e.g. TRACI, USETox, etc.)	-												

Table B-3 Table of results – Waste production and output flows

Environmental indicator	Unit	Upstream			Core		Downstream						Total Life Cycle
	PCR Lifts	U-1	U-2	U-3	C-1	C-2	D-1	D-2	D-3	D-4	D-5	D-6	
	EN 15804	A1	A2	A3	A1	A3	A4	A5	B2	B6	C3	C4	
Waste flows													
Hazardous waste disposed	kg												
Non-hazardous waste disposed	kg												
Optional: Other output flows													
Components potentially suitable for re-use	kg												
Materials potentially suitable for recycling	kg												
Materials potentially suitable for energy recovery	kg												
Exported energy	MJ per energy carrier												
Other output flows identified as important	-												

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