

PACKAGING
PRODUCT CATEGORY CLASSIFICATION: MULTIPLE CPC

PCR 2019:13
VERSION 1.1.3

VALID UNTIL: 2025-05-08



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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 (EPDs) 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.

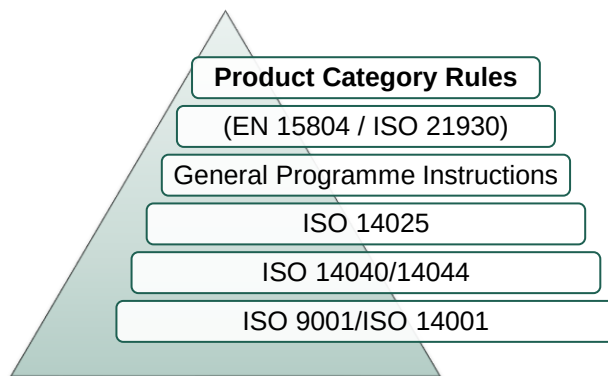


Figure 1 Illustration of PCR in relation to the hierarchy of standards and other documents.

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.

2 GENERAL INFORMATION

2.1 ADMINISTRATIVE INFORMATION

Name:	Packaging
Registration number and version:	2019:13, version 1.1.3
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 Moderator:	Anna Bortoluzzi, Università degli Studi di Milano - Department of Chemistry, anna.bortoluzzi@quotasette.it
PCR Committee:	ApE-PACKAGING WORKING GROUP (Università degli Studi di Milano - Department of Chemistry -- http://www.ape.unimi.it/lca-studies/), QUOTA SETTE Srl
Date of publication and last revision:	2024-08-08 (version 1.1.3) A version history is available in Section 8.
Valid until:	2025-05-08
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:	General Programme Instructions of the International EPD® System, version 3.0, based on ISO 14025 and ISO 14040/14044
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 INTRODUCTION TO THE PACKAGING SECTOR

The packaging sector is marked by extreme complexity and continuous product and process innovation. Packaging and packaging activities involve all industrial sector stakeholders: packaging manufacturers, users and end consumers. In particular, packaging manufacturers come up with new packaging products and new solutions through intense design and co-design work in collaboration with their customers. In the packaging sector, it is therefore crucial to establish shared rules that are capable of addressing the diverse needs of users and, concurrently, to recognize the innovative proposals coming from the packaging manufacturers.

That is why this document has been developed through a multi-code (UN CPC codes) and multi-material approach. The framework of the document is based on the main functions of packaging as stated in the ISO definition. "Packaging": product to be used for the

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containment, protection, handling, delivery, storage, transport and presentation of goods, from raw materials to processed goods, from the producer to the user or consumer, including processor, assembler or other intermediary.

This PCR has been developed with a modular approach regarding the life cycle stages and the system boundaries definition. A declared unit is based on technical characteristics relevant for any packaging purpose and is extendable to a functional unit to include intended use, use phase and end-of-life.

The chart below shows the main functions of packaging and allows for a first general classification of packaging products (source of definitions: ISO 21067-1).

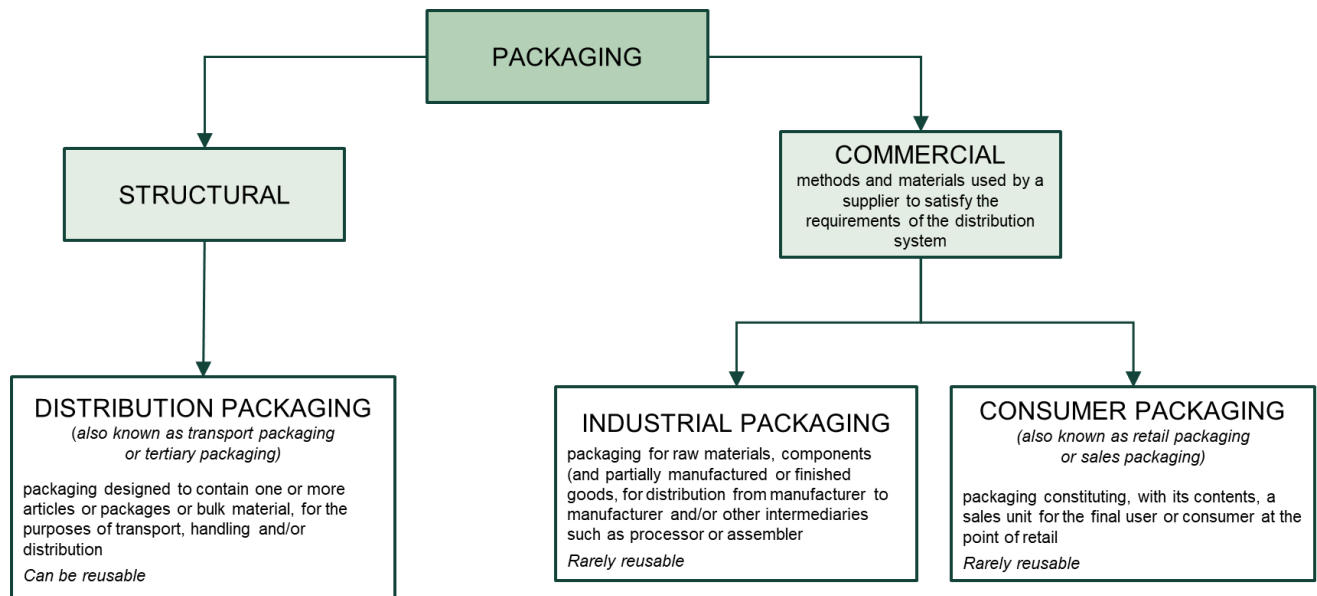


Figure 2 Main functions of packaging.

Below are reported the terms and definitions relevant to this PCR, taken from the ISO standards that apply to packaging (e.g. ISO 21067-1, ISO 21067-2, ISO 18601):

- **packaging (product):** product to be used for the containment, protection, handling, delivery, storage, transport and presentation of goods, from raw materials to processed goods, from the producer to the user or consumer, including processor, assembler or other intermediary
- **packaging (operation):** operations involved in the preparation of goods for containment, protection, handling, delivery, storage, transport and presentation of goods, from raw materials to processed goods, from the producer to the user or consumer
- **primary packaging:** packaging designed to come into direct contact with the product
- **secondary packaging:** packaging designed to contain one or more primary packaging together with any protective materials where required
- **packaging component:** part of packaging that can be separated by hand or by using simple physical means
- **component:** part, assembly or raw material that is a constituent of a higher-level assembly
- **packaging constituent:** part from which packaging or its components are made and which cannot be separated by hand or by using simple physical means [SOURCE: ISO 18601]
- **reuse:** operation by which packaging is refilled or used for the same purpose for which it was conceived, with or without the support of auxiliary products present on the market enabling the packaging to be refilled.
- **reusable packaging:** packaging or packaging component which has been designed to accomplish or proves its ability to accomplish a minimum number of trips or rotations in a system for reuse

Note 1: In order to be considered reusable, a packaging product must possess specific characteristics, documented in the product technical specifications. In any case, reusability must be identified as a designed-in property of the product. Further definitions related to reuse are given in Annex 2.

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- *recyclable*: characteristic of a product, packaging or associated component that can be diverted from the waste stream through available processes and programmes and can be collected, processed and returned to use in the form of raw materials or products

2.2.2 PRODUCT CATEGORY DEFINITION AND DESCRIPTION

This document provides Product Category Rules (PCR) for the assessment of the environmental performance of packaging and the declaration of this performance by an EPD.

The framework of this document is based on the main functions of packaging as stated in the ISO definition². The product group definition is therefore: *"Packaging" product to be used for the containment, protection, handling, delivery, storage, transport and presentation of goods, from raw materials to processed goods, from the producer to the user or consumer, including processor, assembler or other intermediary.*

All packaging products, which fall under the above reported ISO definitions, are included in the scope of the PCR independently of their material composition, dimensions or service life. In general, all products that are covered by a harmonized standard according to the packaging products regulation (or the earlier packaging products directive) could, however, be considered as packaging. Some examples of packaging products are provided in Annex 3.

Note 2: A product is considered packaging if it performs all or part of the functions included in the definition of packaging given above.

This PCR covers both packaging products intended for single use and products destined for reuse, provided they have been explicitly designed for multiple use cycles.

The recycling of a product for the same original purpose, after transformation into secondary raw material, is not considered reuse, and, as such, does not fall within the scope of this PCR. Reuse by the consumer that changes the purpose of the original packaging (for example the domestic use of containers designed to be managed exclusively on industrial lines) is outside of the scope of this PCR. In these cases it is not possible to guarantee the same levels of safety envisaged in the packaging design.

Also outside the scope of this PCR are all products that are not usable for the handling of goods and are thus not covered by the definition of packaging as stated above. Moreover, environmental impacts related to the product contained in the packaging (goods, food, etc.) are outside the purpose of this PCR.

Note 3: According to the General Programme Instructions, this PCR may contain information on the potential benefits gained from the end-of-life recycling of a product covered by an EPD (see par. 5.4.6)

As this PCR covers a very generic product category, with a wide range of packaging products, it is difficult to classify according to UN CPC classification. The UN CPC codes on packaging have the following drawbacks:

- Not all codes are available (e.g. incomplete classification of materials)
- Descriptions are often non-existent or incomplete.
- Innovative solutions (such as smart active packaging) are not covered.

To overcome these structural problems in the UN CPC classification, a three-step model has been developed (Figure 3), which allows to easily identify the most appropriate CPC code for each packaging product. A few examples are provided in Table 1, and the typical cases occurring most often are considered in Annex 3.

² ISO 21067-1, Packaging – Vocabulary- Part 1: general terms

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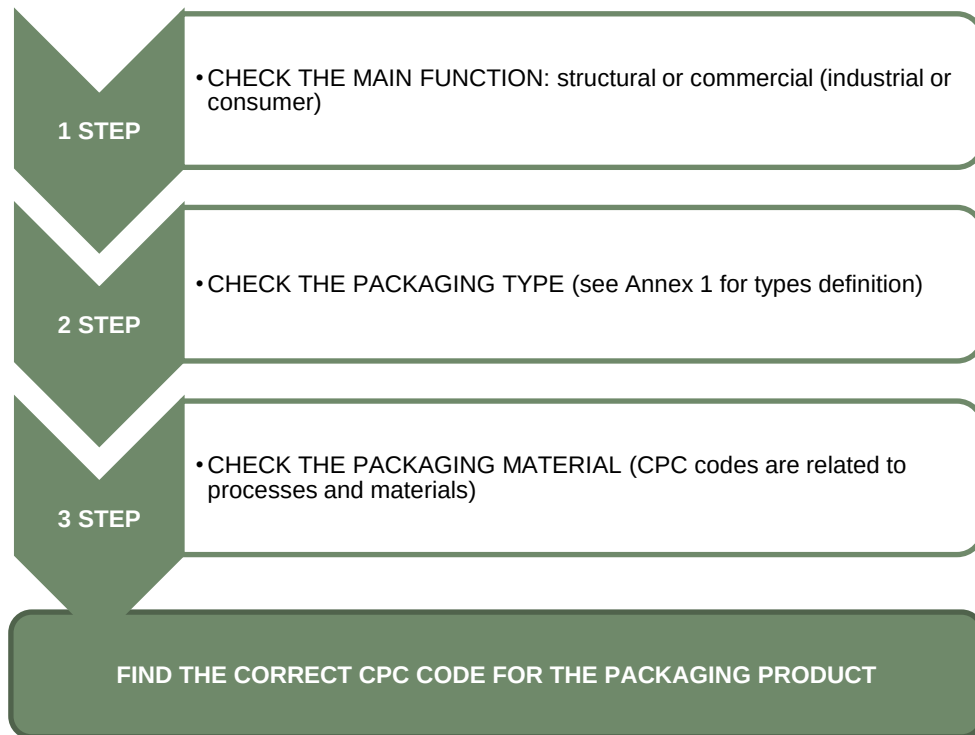


Figure 3 “3-step diagram” of the procedure for finding the correct CPC code.

The UN CPC codes given below have been obtained using the 3-step approach (Figure 3). They are a non-exhaustive list; other CPC codes may also be relevant for this PCR.

STRUCTURAL PACKAGING		
It can also be defined as distribution packaging or transport packaging (tertiary packaging as informal definition)		
MAIN FUNCTION <u>STRUCTURAL</u>	TYPE	APPLICABLE CPC CODES (listed for different materials)
	TANKS, RESERVOIRS AND CONTAINERS	42210 - 364
	PALLETS, BOX PALLETS AND OTHER LOAD BOARDS	317 -364
	CASKS, BARRELS, VATS, TUBS	317- 364
	SACKS AND BAGS	36410 - 32152
	PACKING CASES, BOXES, CRATES, DRUMS AND SIMILAR PACKINGS	317 – 32153– 364 - 422
	PAPER AND PAPERBOARD (used as tertiary packaging)	3219
	PLATES, FOILS, SHEETS, FILMS OF METALS AND/OR PLASTICS (used as tertiary packaging)	36390 – 41535 - 36390
COMMERCIAL PACKAGING		
It includes 2 categories: industrial packaging and consumer packaging (primary and secondary packaging as informal definition)		
MAIN FUNCTION <u>COMMERCIAL</u>	TYPE	APPLICABLE CPC CODES (listed for different materials)
	CARTONS, BOXES, CASES AND OTHER PACKING CONTAINERS	32153 - 364

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3 PCR 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:	Maurizio Fieschi
Review dates:	2019-08-15 until 2019-09-20

3.2 OPEN CONSULTATION

3.2.1 VERSION 1.0

This PCR was available for open consultation from 2018-10-30 until 2019-01-15, 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. The following stakeholders provided comments during the open consultation, and agreed to be listed as contributors to the PCR and at www.environdec.com:

- Fabrice Rivet & Romeo Pavanello, FEVE - The European Container Glass Federation
- Lena Nover & Romeo Pavanello, MPE - Metal Packaging Europe

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
- GlobalEPD
- EPD Norway
- IBU
- PEP ecopassport®
- EarthSure
- EDF
- KEITI Environmental Declaration of Products
- JEMAI EcoLeaf
- JEMAI CFP Program
- UL Environment
- ASTM International EPD Program
- NSF International National Center for Sustainability Standards EPD

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- SM Transparency Report Program
- FPIInnovations EPD Program on wood building products
- ICC Evaluation Service Environmental Product Declaration Program
- Carbon Leadership Forum PCRs
- BRE Global EN EPD Verification Scheme
- DAPcons®
- SCS Global Services

The following existing PCRs have been identified:

PCR NAME	PROGRAMME	REGISTRATION NUMBER
Closable flexible plastic packaging	International EPD® System	2017:05
Beverage cartons	International EPD® System	2011:04
Containers of paper and paperboard, n.e.c.	International EPD® System	2010:17
Crates for food	International EPD® System	2018:02

These already existing PCRs on the packaging sector can potentially remain valid as stand-alone PCRs and can be gradually made compliant with this PCR.

3.4 REASONING FOR DEVELOPMENT OF PCR

This PCR was developed in order to enable the publication of Environmental Product Declarations (EPDs) for this product category based on ISO 14025, ISO 14040/14044 and other relevant standards to be used in different applications and target audiences.

3.5 UNDERLYING STUDIES

The methodological choices made during the development of this PCR (functional unit/declared unit, system boundary, allocation methods, impact categories, data quality rules, etc.) in this PCR were primarily based on the following underlying studies:

- PEF Working Group, *Packaging Working Group guidance document*, Ver. 1.0, May 2016
- Sustainable Packaging Coalition, *Definition of Sustainable Packaging*, Ver. 2.0, August 2011
- UNEP Life Cycle Initiative, *An Analysis of Life Cycle Assessment in Packaging for Food & Beverage Applications*, 2013

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 DECLARED UNIT / FUNCTIONAL UNIT

4.1.1 DECLARED UNIT

The declared unit is applicable for an EPD that covers a “cradle-to-gate” and “cradle-to-gate with options” LCA.

The declared unit is 1 (one) packaging product unit.

The following technical information supports the declared unit definition and shall be reported in the EPD, if applicable:

- Base material of packaging product (e.g. polymer, wood, etc.)
- External dimensions of the packaging product (m)
- Internal volume of the packaging product (l)
- Weight of packaging product (kg)
- Maximum load (kg)
- Compression values (e.g. results of the compression test based on ISO 12048 or equivalent)
- Stacking values (e.g. results of the stacking test based on ISO 12048 or equivalent).

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

4.1.2 FUNCTIONAL UNIT

The functional unit is applicable for an EPD that covers a “cradle-to-grave” LCA. In the case of consumer packaging or reusable packaging,⁴ a cradle-to-grave LCA with a functional unit shall be performed.

The functional unit is 1 (one) packaging product unit.

The packaging application (the sector(s) in which the packaging can be used and the types of content it is suitable for) and use (the types of technology that are suitable) shall be clearly declared in the EPD.

The following technical information supports the functional unit definition and shall be reported in the EPD, if applicable:

- Base material of packaging product (e.g. polymer, wood, etc.)
- External dimensions of the packaging product (m)
- Internal volume of the packaging product (l)
- Weight of packaging product (kg)
- Maximum load (kg)
- Compression values (e.g. results of the compression test based on ISO 12048 or equivalent)
- Stacking values (e.g. results of the stacking test based on ISO 12048 or equivalent).

In case a functional unit (cradle-to-grave LCA) is used, the following information shall also be included in order to increase comparability:

- Number of uses of the reusable packaging during its lifetime
- Maximum transportable load during the lifetime

⁴ See the definition of reusable packaging at 2.2.1

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An optional additional functional unit may be used, taking into consideration the quantity of volume transported in the life cycle of the packaging and should be declared as total volume or its units. The numbers of reuses and the total volume considered shall be declared in the EPD.

For two-dimensional (flat) products such as films or sheet an alternative declared/functional unit of 1 (one) m² of product with the related thickness and unit weight in g/m² may be used only if the EPD owner is not able to identify the final packaging product unit such as in the case of industrial packaging sold without branded printing⁵.

Note 5: In the case of reusable packaging, the number of uses declared in the EPD must coincide with the legal approval of the product and/or the supply specifications. If this information is not available from the abovementioned sources, the indicator for the reconditioning of all the packaging parts in the rotation cycles (restoration) shall be used. Rotation is defined⁶ as the cycle undergone by reusable packaging from filling/loading to filling/loading.

Note 6: The number of reuses depends on safety aspects and the use of filling/reuse technologies.

4.2 REFERENCE SERVICE LIFE (RSL)

Not applicable for this product category.

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 gate, cradle to gate with options or cradle to grave.

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 this PCR an additional division of the three main life cycle stages is used and is based on “life cycle modules” A1-C3.

This PCR allows for an optional LCA scope reported in the EPD:

- a “cradle-to-gate” EPD: Modules A1 to A3
- a “cradle-to-gate with options” EPD: Modules A1 to A3 plus other selected optional modules, e.g. end-of-life modules C1 to C3
- a “cradle-to-grave” EPD: All Modules, A to C

See Table 2 for further details.

In the EPD, the environmental performance associated with each of the three life cycle stages above shall be reported separately. The environmental performance associated with each of the modules considered (from A1 to C3) may be reported separately.

In some cases, certain modules may not be relevant to the environmental performance of a product. In such cases, the irrelevant module shall be declared as “Module Not Declared, MND”. Such a declaration shall not be regarded as an indicator result of zero.

⁵ flat packaging products can be sold preformed or in the form of reels or flat sheets but, in any case, they are all designed for containment, protection, handling, delivery, storage, transport and presentation of goods even if the final function is not necessarily performed in the same phase of the life cycle. For consumer packaging, in most cases, the package (product unit) is clearly identifiable since it coincides with the printed image and therefore the declared/functional unit shall be 1 packaging product unit so as to maximize comparability with similar products, having the same application. In the case of industrial packaging, where there is no print that identifies the package and the packaging product can be used for various applications, the alternative declared/functional unit of 1 m² may be used.

⁶ ISO 21067-2:2016, Packaging – Vocabulary- Part 2: Packaging and the environment terms

Life cycle stage	Life cycle module	Life cycle module group	EPD type	
			Declared unit: Cradle-Gate, Cradle-Gate with options	Functional unit: Cradle-Grave
Upstream	A1) Raw material supply	A1-A3) Product stage	Mandatory	Mandatory
Core	A2) Transport			
	A3) Manufacturing			
Downstream	A4) Transport to forming or filling	A4-A5) Forming stage	Mandatory	Mandatory
	A5) Forming (*) If present (final forming is outside of the company boundaries)			
	B1) Filling operation			
	B2) Distribution of filled packaging	B1-B5) Use stage	Optional	Mandatory
	B3) Transport to reconditioning			
	B4) Reconditioning (**)			
	B5) Transport to re-filling point			
	C1) Disassembling / sorting	C1-C3) End of life stage	Optional	Mandatory
	C2) Transport to recovery/disposal			
	C3) Final disposal			

(*) Both phase A3 and phase A5 (if present) are to be considered packaging production phases. In fact, packaging production is considered completed only upon conclusion of all the phases that will allow the product to accomplish its final function for the intended use.

(**) Reconditioning⁷: operations necessary to restore a reusable packaging to a functional state for further reuse.

Table 2 The life cycle of a packaging product divided into three life cycle stages according to the General Programme Instructions and four life cycle module groups

When the Forming processes (A5), or one of their phases, are performed concurrently (e.g. on the same production line or in the same plant) with the Filling processes (B1), the environmental impacts from both processes shall be included in the system boundaries.

As reported at section 2.2.2, the EPD can be issued both by the single packaging manufacturer and by the packaging user. These two cases evidently present a different system boundary setting, mainly for the life cycle modules A3 and A5, depending on the real situation taken into consideration for the preparation of the LCA model. Furthermore, there may also be other cases that require adapting the system boundaries in accordance with the production processes of the specific supply chain, always in compliance with the rules of this PCR.

In the case of reusable packaging, only one reuse cycle shall be considered in the LCA calculation (from A1 to B5), and not all the uses of the reusable packaging during its lifetime, because it mainly depends on the customer's choices. In order to enable comparability for reusable packaging, it is mandatory to declare in the EPD all the technical information listed and the number of uses of the reusable packaging during its lifetime, as reported in paragraph 4.1.2.

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.

A few examples of system boundary definitions for specific packaging products are given in Annex 3.

4.3.1.1. Upstream processes

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

⁷ ISO 21067-2:2016, Packaging – Vocabulary - Part 2: Packaging and the environment terms

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A1) Raw material supply

- Extraction of resources
- Growing and harvesting of renewable resources (e.g. agricultural planting)
- Recycling processes of secondary materials from a previous product system (e.g. plastics recycling)⁸
- Transport of resources to refinement
- Refinement of resources
- Impacts due to the production of electricity and fuels used in the upstream module
- Production of auxiliary products used such as detergents for cleaning, etc.
- Production of semiproductions used in the core process, if applicable
- Manufacturing of primary and secondary packaging
- Waste treatment of waste generated during upstream processes

Upstream processes not listed may also 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:

A2) Transportation

- External transportation to the core processes and internal transport

A3) Manufacturing

- Product and process design and development activities (if relevant)
- Manufacturing of the product
- Storage and handling of materials, storage and packaging of final product
- Production of additives used in auxiliary core processes (e.g. chemicals for internal plant water treatment)
- Maintenance (e.g. of the machines)
- Waste treatment of waste generated during manufacturing;
- Impacts due to the production of electricity and fuels used in the core module

Manufacturing processes not listed may also be included. The production of the raw materials used for production of all product parts shall be included. A minimum of 99% of the total weight of the declared product including packaging⁹ 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.

4.3.1.3. Downstream processes

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

A4) Transport

- Transportation from the production site gate to forming or filling site.

⁸ Not including those processes that are part of waste processing in the previous product system, referring to the "polluter pays principle".

⁹ This refers to the packaging of the packaging product under study.

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A5) Packaging forming¹⁰

- Final forming of the packaging product.

B1) Filling operation

- Filling of the packaging unit with any kind of matter in any physical state (liquid, solid, or gas), including any packaging closing/welding operations.
- The energy consumption, the production of the packaging components (e.g. lid, closing film) and the packaging material wasted in the filling process shall be included.

B2) Distribution of filled packaging

- Transportation from filling to an average retailer/distribution platform.

Note 7: The environmental impacts related to the distribution of the filled packaging shall be allocated to the packaging and to the transported product (without packaging) according to their masses. The burden related to the distribution of the content of the packaging is then excluded from the environmental impacts of the distribution of the filled packaging.

The transport of the packaging product by the consumer is excluded.

B3) Transport to reconditioning

- Transportation from the collecting site gate to the reconditioning site.

B4) Reconditioning

- Operations necessary to restore a reusable packaging to a functional state for further reuse. Reconditioning covers the combination of all typically planned technical and associated administrative activities and actions during the service life.

Note 8: In the case of reusable packaging, only one reuse cycle shall be considered in the LCA calculation.

B5) Transport to re-filling point

- Transportation from the reconditioning site gate to the refilling site.

C1) Disassembling/sorting

- Operations for the separation of packaging product components and subsequent sorting.

C2) Transport to recovery/disposal

Transportation of the discarded product accounts for part of waste processing, e.g. to a recycling site or to final sorting yard or disposal

Note 9: A packaging product becomes waste when all the functions that it can perform and that are clearly stated in the definition of packaging have been exhausted.

C3) Final disposal

- Waste disposal including physical pre-treatment and management of the disposal site. Emissions from waste disposal are considered part of the product system under study and therefore are part of this module, according to the "polluter pays principle".

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.

¹⁰ Only if final forming is outside of the company boundaries.

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4.3.2.3. Boundaries towards other technical systems

See Section 4.6.2.

4.4 SYSTEM DIAGRAM

The system diagram changes depending on the packaging product covered by the EPD and, for that reason, has not been reported in this PCR. Table 2 in paragraph 4.3.1 shows the processes that are included in the product system. Furthermore, a few examples of system boundary definitions for specific packaging products are presented in Annex 3.

A system diagram of the processes included in the LCA for the specific packaging product, divided into life cycle stages, shall be reported in the EPD.

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 multiprocesses:

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 relationship cannot be established or used as the basis for allocation (or they are too time consuming), the inputs should be allocated between the products and functions in a way that reflects other relationships between them. For example, input and output data might be allocated between co-products in proportion to the economic value of the products. If the 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 method shall be justified and described in the LCA report. In case an allocation different from the physical relationship allocation is used, it shall be declared in the EPD.

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.

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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.,
- **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

No recommended databases for generic data have been identified for the product category, since the PCR includes many different packaging products and consequently a wide range of databases could be relevant.

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.
- 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.¹¹
 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.

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.¹²
 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.
- 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:

¹¹ 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.

¹² 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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- If the forming stage (A5) is considered to be within the system boundaries (final forming outside the company) specific data shall be used for the forming stage (A5). In fact, packaging production is considered completed only upon conclusion of all the phases that allow the product to perform its final function for the intended use.
- In the case of reusable packaging, only one reuse cycle shall be considered in the LCA calculation (from A1 to B5), and not all the uses of the reusable packaging during its lifetime because it mainly depends on the customer's choices. In order to enable comparability for reusable packaging, it is mandatory to declare in the EPD all the technical information listed and the number of uses of the reusable packaging during its lifetime, as reported in paragraph 4.1.2.
- Data for the use stage are usually based on scenarios, but specific data should be used when available and relevant.
- 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 order of 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) provided by the electricity supplier. If no specific mix is purchased, the residual electricity mix from the electricity supplier shall be used.¹³
 2. National residual electricity mix or residual mix on the market
 3. National electricity production mix or electricity mix on the marketThe mix of electricity used in the downstream processes shall be documented in the EPD, where relevant.
- The transport of the product to the customer should reflect the actual situation to the best extent possible. The following priority should be used:
 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. Key assumptions regarding the end-of-life stage scenario shall be documented.

¹³ 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.

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 figures¹⁴ 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.¹⁵
 - Contain no blank cells, hyphens, less than or greater than signs or letters (except "INA").
 - 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.

¹⁴ 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 $1.2 \cdot 10^{-2}$.

¹⁵ This requirement does not intend to give guidance on what indicators are mandated ("shall") or voluntary.

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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 operator¹⁶,
- *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."
- A statement of conformity with ISO 14025,

5.4.2 PROGRAMME INFORMATION

The programme information section of the EPD shall include:

¹⁶ 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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- 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.
- The following statement: “The environmental impacts of different EPDs can be compared only taking into account all the technical information supporting the declared/functional unit definition as requested by the PCR.”
- Only for reusable packaging, the following statement: “The calculated environmental impacts refer to only one reuse of the packaging.”
- Information about verification¹⁷ 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: ☐ EPD process certification ☐ EPD verification
Third party verifier: <name, organisation and signature of the third party verifier> In case of certification bodies: Accredited by: <name of the accreditation body and accreditation number, if applicable>. In case of individual verifiers: 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: ☐ Yes ☐ No

5.4.3 PRODUCT INFORMATION

The product information section of the EPD shall include:

- 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(s),
- 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,

¹⁷ 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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- 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 and all the applicable technical information (see 4.1.1 and 4.1.2),
- Reference service life (RSL), if applicable,
- 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)¹⁸, 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)
- 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

If the packaging product is for food contact, the Verifier shall check that the declaration of conformity is compliant with the intended use. The declaration of conformity shall comply with applicable legislation and shall contain references to the substances potentially released from the packaging.

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.

¹⁸ The GHS document is available on www.unece.org.

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5.4.4.2. Information about packaging¹⁹

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

The EPD shall declare the environmental impact indicators, per declared/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 declared/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 declared/functional unit, per life-cycle stage and in aggregated form.

5.4.5.4. Other environmental indicators

The EPD may report other environmental indicators. Such indicators should be based on international standards or similar methodologies developed in a transparent procedure. Reference to the chosen indicators and methodologies shall be reported.

An estimation of the avoided impacts/benefits related to material recycling may be made and declared separately as an additional environmental indicator. Estimation methods used for calculating the avoided impacts shall be presented in the LCA report. Only methods derived from LCA-based calculation shall be used.

5.4.6 ADDITIONAL INFORMATION

An EPD may contain additional information not derived from the LCA-based calculations. The part of the EPD describing additional information may include various issues. Examples of these are:

- the release of dangerous substances into indoor air, soil, and water during the use stage, instructions for proper use of the product, e.g. to minimise energy or water consumption or to improve the durability of the product,
- instructions for proper maintenance and service of the product,
- information on key parts of the product that determine its durability,
- information on recycling including, e.g. suitable procedures for recycling the entire product or selected parts and
- information on a suitable method of reuse of the product (or parts of the products) and procedures for disposal as waste at the end of its life cycle,
- information regarding disposal of the product, or inherent materials, and any other information considered necessary to minimise the product's end-of-life impacts, and
- a more detailed description of an organisation's overall environmental, such as:

¹⁹ This refers to the packaging of the packaging product under study.

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- the existence of a quality or environmental management system or any type of organised environmental activity,
- any activity related to supply chain management, social responsibility, etc., and
- information on where interested parties may find more details about the organisation's environmental work.

It is recommended to add information enabling the possibility to make comparisons with sector benchmarks or, if not available, with benchmarks of common products and services preferably based on the concept of functional unit or declared unit, which is useful for scaling the environmental impacts of different activities, products, and services.

A comparison between different EPDs can only be made for packaging products that perform the same function and the same applications as reported in the technical data sheet (e.g., distribution conditions (chilled or ambient), possibility of pasteurization, modified atmosphere, food contact).

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).

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.

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6 GLOSSARY

AP	Acidification potential
C ₂ H ₄	Ethylene
CO ₂	Carbon dioxide
CPC	Central product classification
EP	Eutrophication potential
EPD	Environmental product declaration
GWP	Global warming potential
ISO	International Organization for Standardization
kg	kilogram
kWh	kilowatt hour
LCA	Life cycle assessment
LCI	Life Cycle Inventory
MJ	Megajoule
PCR	Product Category Rules
POCP	Formation potential of tropospheric ozone
PO ₄ ³⁻	Phosphate
PPP	Polluter Pays Principle
Sb	Antimony
SI	The International System of Units
SO ₂	Sulphur dioxide
UN	United Nations
LCI	Life Cycle Inventory
Sb	Antimony

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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.

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>

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

ISO 21067-1:2016, *Packaging – Vocabulary - Part 1: General terms*

ISO 21067-2:2016, *Packaging – Vocabulary - Part 2: Packaging and the environment terms*

ISO 18601:2013, Packaging and the environment – General requirements for the use of ISO standards in the field of packaging and the environment

PEF Working Group, *Packaging Working Group guidance document*, Ver. 1.0, May 2016

Sustainable Packaging Coalition, *Definition of Sustainable Packaging*, Ver. 2.0, August 2011

UNEP Life Cycle Initiative, *An Analysis of Life Cycle Assessment in Packaging for Food & Beverage Applications*, 2013

CAST Project, *Guidelines for the application of the Regulation (EC) 2023/2006 to the supply chain of materials and articles intended to come into contact with food*, Rapporti ISTISAN 11/37

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8 VERSION HISTORY OF PCR

VERSION 1.0, 2019-11-08

Original version of the PCR.

VERSION 1.1, 2020-12-17

- Clarification added in Sections 2.2.2 and 2.2.3 about the preparation of an EPD also for a packaging component.
- Inclusion in Section 2.2.2, Table 1 of an example of CPC codes for flat packaging products.
- Inclusion in Section 4.1.2 of an alternative declared/functional unit for two-dimensional (flat) products such as films or sheet.
- Clarification added in Section 4.3.1 about the different system boundary setting when the EPD owner is an individual manufacturer or a packaging user.
- Clarification added in Section 4.3.1.3 about packaging closing/welding operations.
- Other minor editorial changes.

VERSION 1.1.1, 2023-07-06

- Change of E-mail address to PCR Moderator.
- 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 1.1.2, 2023-11-10

- Prolonged validity with one year, until 2024-11-08, due to the initiation of an updating process.
- Minor editorial changes.

VERSION 1.1.3, 2024-08-08

- Prolonged validity with another six months, until 2025-05-08, due to a delay in the updating process.

ANNEX 1 – TYPES OF PACKAGING DEFINITIONS

This annex contains the definitions of the terms related to the types of packaging as given in the ISOs relevant to the packaging sector (for instance, ISO 21067-1, ISO 21067-2, ISO 18601). Only a few of these terms and definitions are used in the PCR. All the others are included for the sake of completeness.

- *bag (or sack)*: flexible packaging of single or multiple layers or plies, generally enclosed on all sides except one, forming an opening that may or may not be sealed after filling
- *bale*: shaped unit of compressed articles or materials bound with cord, strapping or metal ties under tension
- *barrel (or cask or keg)*: packaging of circular cross-section, with greater length than breadth, with convex sides and two ends of equal diameter
- *bottle*: rigid packaging, typically of glass or plastic, having a comparatively narrow neck or mouth, with a closure and usually no handle
- *jar*: rigid packaging of glass, plastic or earthenware with a wide mouth
- *ampoule*: small packaging usually made of glass or plastic capable of being hermetically sealed
- *box*: rigid packaging with rectangular or polygonal sides, usually completely enclosing the contents
- *carton*: folding collapsible packaging generally made from boxboard
- *case*: non-specific term for transport packaging, often used to refer to a box
- *crate*: transport packaging with incomplete surfaces
- *wirebound box*: box whose parts are reinforced and connected to each other by means of tempered wires
- *bundle*: number of articles bound with materials under tension, which also may be wrapped
- *can*: small primary packaging, usually cylindrical and usually made of metal
- *drum*: cylindrical packaging whose bottom end is permanently fixed to the body and top end (head) is either removable or non-removable
- *non-removable head drum (or tight head drum)*: cylindrical packaging whose ends are permanently fixed to the body, with one or more openings for filling, emptying and venting in the top end (head) and which may also include body openings for the same purposes
- *removable head drum (or open head drum)*: drum whose bottom end is permanently fixed to the body and whose top end can be removed as a lid (head)
- *pail (or nesting drum)*: packaging of circular cross-section, tapered or cylindrical, and may be equipped with a lid and usually a handle
- *jerrycan*: metal or plastics primary packaging of rectangular or polygonal cross-section for products
- *tube*: cylindrical packaging whose ends may be a different material to the body
- *collapsible tube*: flexible packaging having a nozzle and cap at one end and closed at the other, serving as both container and dispenser
- *tray*: stiff layer material for dividing and holding multi packages

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ANNEX 2 – TERMS RELATED TO REUSE OF PACKAGING

This annex contains the definitions of the terms related to the reuse of packaging as given in the ISOs relevant to the packaging sector (for instance, ISO 21067-1, ISO 21067-2, ISO 18601). Only a few of these terms and definitions are used in the PCR. All the others are included for the sake of completeness.

- *reuse*: operation by which packaging is refilled or used for the same purpose for which it was conceived, with or without the support of auxiliary products present on the market enabling the packaging to be refilled
- *reusable packaging*: packaging or packaging component which has been designed to accomplish or proves its ability to accomplish a minimum number of trips or rotations in a system for reuse
- *rotation*: cycle undergone by reusable packaging from filling/loading to filling/loading
- *packaging used for the same purpose*: packaging which, having completed a rotation, is subsequently reused with the original conception, in a system for reuse
- *reconditioning*: operations necessary to restore a reusable packaging to a functional state for further reuse
- *returnable packaging item RPI*: any material used for the "protection" of goods during handling, delivery, storage and transport that is returned for further usage
- *returnable transport item RTI*: any product for the purposes of transport, handling and/or distribution of one or more products or product packages that are returned for further usage

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ANNEX 3 – EXAMPLES OF PACKAGING PRODUCTS AND HOW TO USE THIS PCR

EXAMPLE 1 – WOOD PALLET

EXAMPLE OF PRODUCT	MAIN FUNCTION	ADDITIONAL CLASSIFICATION CRITERIA: type of packaging	ADDITIONAL CLASSIFICATION CRITERIA: material	APPLICABLE CPC CODE	SINGLE USE/ REUSABLE	FUNCTIONAL/DECLARED UNIT	SYSTEM BOUNDARIES	MAIN CORE PROCESSES (A3)
Wood pallet	STRUCTURAL, DISTRIBUTION PACKAGING	PALLET	WOOD	317(00)	SINGLE USE	DECLARED or FUNCTIONAL (\$4.1.1, \$4.1.2)	- cradle-to-gate - or cradle-to-gate with options - or cradle-to-grave (\$ 4.3)	- Cutoff sawing - Debarking - cutting to size - Assembly and nailing - Printing (\$ 4.3 - the above processes are typically A3)
					REUSABLE	FUNCTIONAL (\$4.1.2)	cradle-to-grave (\$ 4.3)	
NOTE								
- A wood pallet is a typical example of structural packaging that can undergo several reuse cycles and for which reconditioning indicators are calculated as part of the logistics activities. For wood pallets, reference should be made to the legal approval confirmed by a stamp, which indicates whether a pallet is approved for reuse.								

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PRODUCT CATEGORY CLASSIFICATION: MULTIPLE CPC

EXAMPLE 2 – FOLDING CARTON BOX (RECYCLED)

EXAMPLE OF PRODUCT	MAIN FUNCTION	ADDITIONAL CLASSIFICATION CRITERIA: type of packaging	ADDITIONAL CLASSIFICATION CRITERIA: material	APPLICABLE CPC CODE	SINGLE USE/ REUSABLE	FUNCTIONAL/DECLARED UNIT	SYSTEM BOUNDARIES	MAIN CORE PROCESSES (A3)
Folding carton box (recycled)	COMMERCIAL, INDUSTRIAL	BOX (typical of commercial packaging),	PAPER	32153	SINGLE USE	DECLARED or FUNCTIONAL (\$4.1.1, \$4.1.2)	- cradle-to-gate - or cradle-to-gate with options - or cradle-to-grave (\$ 4.3)	- Deinking process - Mixture preparation - Patina cooking - Coating - Manufacturing (Paper Machine) - Surface sizing - Finish and setting up (\$ 4.3 - the above processes are typically A3)
	COMMERCIAL, CONSUMER	CASE (typical of industrial packaging)			SINGLE USE	FUNCTIONAL (\$4.1.2)	cradle-to-grave (\$ 4.3)	
NOTE - A folding carton box is often combined with other packaging to form a pluripack (e.g. a carton box containing 3 pieces to make a single sales unit). This PCR recommends that the various components of a pluripack should be treated as independent packaging and, as such, each should have its own EPD (par. 2.2.2).								

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PRODUCT CATEGORY CLASSIFICATION: MULTIPLE CPC

EXAMPLE 3 – GLASS BOTTLE

EXAMPLE OF PRODUCT	MAIN FUNCTION	ADDITIONAL CLASSIFICATION CRITERIA: type of packaging	ADDITIONAL CLASSIFICATION CRITERIA: material	APPLICABLE CPC CODE	SINGLE USE/ REUSABLE	FUNCTIONAL/DECLARED UNIT	SYSTEM BOUNDARIES	MAIN CORE PROCESSES (A3)
Glass bottle	COMMERCIAL, INDUSTRIAL	BOTTLE	GLASS	37191	SINGLE USE	DECLARED or FUNCTIONAL (§4.1.1, §4.1.2)	- cradle-to-gate - or cradle-to-gate with options - or cradle-to-grave (§ 4.3)	- Proportioning of glass batch - Melting of raw materials and refining - Thermal conditioning of the molten glass - Gob-cutting of melted glass and forming - Annealing - Quality control - Packaging/ palletting
					REUSABLE	FUNCTIONAL (§4.1.2)	cradle-to-grave (§ 4.3)	
	COMMERCIAL, CONSUMER				SINGLE USE	FUNCTIONAL (§4.1.2)	cradle-to-grave (§ 4.3)	
					REUSABLE	FUNCTIONAL (§4.1.2)	cradle-to-grave (§ 4.3)	
NOTE - A glass bottle is sometimes designed in collaboration with the company-user in such a way as to foster brand recognition through an exclusive shape. In such cases, the company-user of the packaging controls both the design phase and the final forming phase, and may therefore be an EPD Owner (par. 2.2.2)								

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PRODUCT CATEGORY CLASSIFICATION: MULTIPLE CPC

EXAMPLE 4 – THREE-PIECE CAN

EXAMPLE OF PRODUCT	MAIN FUNCTION	ADDITIONAL CLASSIFICATION CRITERIA: type of packaging	ADDITIONAL CLASSIFICATION CRITERIA: material	APPLICABLE CPC CODE	SINGLE USE/ REUSABLE	FUNCTIONAL/DECLARED UNIT	SYSTEM BOUNDARIES	MAIN CORE PROCESSES (A3)
Three-piece can	COMMERCIAL, CONSUMER	CAN	METAL, STEEL	4293	SINGLE USE	FUNCTIONAL (\$4.1.2)	cradle-to-grave (\$ 4.3)	- Preparation of the metallic laminate - Lithopainting of the laminate foil (or utilization of raw tinplate) - Electro welding of the metal cylinder - Junctions' protection with coatings and drying - Moulding of the electrowelded cylinder - Seam lidding - Packing, labelling (§ 4.3 - the above processes are typically A3)
NOTE - A three-piece can is often combined with other types of packaging to form a pluripack (example, a folding carton box used to assemble 3 pieces into a single sales unit). This PCR recommends that the various components of a pluripack should be treated as independent packaging and, as such, each should have its own EPD (par. 2.2.2).								

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PRODUCT CATEGORY CLASSIFICATION: MULTIPLE CPC

EXAMPLE 5 – PET BOTTLE

EXAMPLE OF PRODUCT	MAIN FUNCTION	ADDITIONAL CLASSIFICATION CRITERIA: type of packaging	ADDITIONAL CLASSIFICATION CRITERIA: material	APPLICABLE CPC CODE	SINGLE USE/ REUSABLE	FUNCTIONAL/DECLARED UNIT	SYSTEM BOUNDARIES	MAIN CORE PROCESSES (A3)
PET Bottle	COMMERCIAL, CONSUMER	BOTTLE	PLASTIC	36490	SINGLE USE	FUNCTIONAL (§4.1.2)	cradle-to-grave (§ 4.3)	- Polymer dehumidifying - Injection moulding (§ 4.2- the above processes are typically A3) - Blow moulding (§ 4.3 - the above processes are typically A5)
NOTE - A PET bottle is sometimes co-designed in collaboration with the company-user, in such a way as to foster brand recognition through an exclusive shape and/or special labelling and can be classified as consumer packaging. In such cases, the company-user of the packaging controls both the design phase and the final forming phase and may therefore be an EPD Owner (par.2.2.2).								

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PRODUCT CATEGORY CLASSIFICATION: MULTIPLE CPC

EXAMPLE 6 – ALUMINIUM COLLAPSIBLE TUBE or MULTI-LAYER COLLAPSIBLE TUBE

EXAMPLE OF PRODUCT	MAIN FUNCTION	ADDITIONAL CLASSIFICATION CRITERIA: type of packaging	ADDITIONAL CLASSIFICATION CRITERIA: material	APPLICABLE CPC CODE	SINGLE USE/ REUSABLE	FUNCTIONAL/DECLARED UNIT	SYSTEM BOUNDARIES	MAIN CORE PROCESSES (A3)
Collapsible tube or multi-layer collapsible tube	COMMERCIAL, CONSUMER	TUBE	METAL, ALUMINIUM	4299	SINGLE USE	FUNCTIONAL (\$4.1.2)	cradle-to-grave (§ 4.3)	- Impact extrusion - Trimmer and threading - Annealing of aluminium and lubricant sublimation - Internal lacquering - Coating enamel application - Offset printing - Cap application - Latex-ring application - Waxing and conical shape process - Packing - Labelling (§ 4.3- the above processes are typically A3)
NOTE - A collapsible tube is sometimes co-designed in collaboration with the company-user, in such a way as to foster brand recognition through an exclusive shape and/or special labelling and can be classified as consumer packaging. In such cases, the company-user of the packaging controls both the design phase and the final forming phase and may therefore be an EPD Owner (par. 2.2.2).								

ANNEX 4 – EXAMPLES OF MULTI-MATERIAL PACKAGING PRODUCTS AND HOW TO USE THIS PCR

To better understand the rules in chapter 2.2.2 some examples are given below. The following definitions, taken from paragraph 2.2.1, are useful for understanding the examples:

- *primary packaging*: packaging designed to come into direct contact with the product
- *secondary packaging*: packaging designed to contain one or more primary packagings together with any protective materials where required
- *packaging component*: part of packaging that can be separated by hand or by using simple physical means
- *component*: part, assembly or raw material that is a constituent of a higher-level assembly
- *packaging constituent*: part from which packaging or its components are made and which cannot be separated by hand or by using simple physical means [SOURCE: ISO 18601]

NOTE: The definition of primary packaging and secondary packaging is an aid to identify in detail the packaging solution used. However this approach to packaging classification is not very useful for LCA studies since the product function is never identified through these definitions. It is therefore preferable to describe the packaging through the packaging function using the definitions of "packaging constituent" and "component" which imply the identification of the specific function performed by the packaging solution.

Here below is reported in italics the text of the PCR in chapter 2.2.2 with some application examples (in bold):

Furthermore, during the preparation of an EPD for a packaging product, the following rules shall be taken into account:

- *In case of complex sales units, it will be possible to prepare a single EPD only in those cases where the packaging constituent (that is, the main part of the packaging product) can be singled out. The packaging constituent performs the packaging function and can be assembled with packaging components (other parts of the packaging product) which perform specific functions, such as stoppers and lids. Indeed, the role of packaging components is to complete the sales unit and they are considered auxiliary materials subject to supply. (See definitions par. 2.2.1)*

EXAMPLE: A single sales unit consisting of: 500g yoghurt pot with aluminium lid (for shelf life) and polymer lid (for refrigerated storage after opening). For this single sales unit only one EPD will be prepared in which the yogurt pot is identified as a constituent and the two lids are auxiliaries and therefore are identified as components.

- *In case of complex sales units (requiring, for instance, both primary and secondary packaging), several EPDs may be needed if a number of processes are involved in the production of the various types of packaging that make up the sales unit.*

EXAMPLE: A single sales unit consisting of: two yoghurt polymer pots (constituent, primary packaging) with aluminium lids (component packaging) and printed paperboard (constituent, secondary packaging with specific closure role and packaging protection role of the sales unit). In this case two EPDs are needed (one for each packaging constituent): one for the primary packaging in polymer and one for the secondary packaging in printed paperboard. The aluminium lids are inserted in the EPD of the polymer packaging as components.

- *.In the special case of consumer packaging, where the user takes on the responsibility for packaging co-design and packaging making in the final packaging forming and/or assembly phases, the packaging user can be equated to the packaging manufacturer, and thus, in this case, may be an EPD Owner.*

In the special case of consumer packaging, two approaches to the publication of EPDs can be envisioned: EPDs prepared by individual manufacturers restricted to the packaging components under their responsibility, and EPDs prepared by the packaging user, who can demonstrate its role in the core processes and prepares the EPD on the consumer packaging sales unit.

EXAMPLE: glass bottle identifying the "brand" that binds the packaging manufacturer to the design patented by the user company that markets the sales unit under its own responsibility (for example, by affixing its own brand). In this case, the user's design choices affect the creation of the packaging and the related environmental performances. The design of the product and of the production process is therefore an activity that involves the co-design collaboration between the user and the packaging manufacturer. Both therefore can promote the publication of an EPD.

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