

**PRODUCT CATEGORY RULES (PCR) – BASIC MODULE**

**CONSTRUCTION PRODUCTS AND SERVICES**

ACCORDING TO THE EN 15804:2012 + A1:2013



Version 2.1

Aveiro, November 2020

### Developed version

Version	Comments	Issue date
1.0	EN 15804 rules adaptation to the Portuguese rules. Guide document to prepare other specific PCR documents for the product category.	05.10.2012 – October 2012
1.0	Information update according to the specific PCR documents developing.	22.02.2013 – February 2013
2.0.	Change of the context and objectives of the document. Contents update according to the standard EN 15804:2012 + A1:2013. Introduction of new considerations about LCA.	15.12.2015 – December 2015
2.1	Extension of the document's validity period	18.11.2020 – November 2020

### Contact

#### **DAPHabitat System**

Departamento de Engenharia Civil – Universidade de Aveiro

3810 – 198 Aveiro

Portugal

[www.daphabitat.pt](http://www.daphabitat.pt)

[deptecnico@centrohabitat.net](mailto:deptecnico@centrohabitat.net)

## INDEX

<b>1. INTRODUCTION</b>	<b>1</b>
<b>2. ABBREVIATIONS</b>	<b>2</b>
<b>3. CONTEXT</b>	<b>2</b>
<b>4. CONTEXT AND OBJECTIVE</b>	<b>3</b>
<b>5. LCA CALCULATION RULES</b>	<b>4</b>
5.1. LIFE CYCLE STEPS AND INFORMATION MODULES ACCORDING TO EN 15804:2012+A1:2013	4
5.2. FUNCTIONAL UNIT	5
5.3. DECLARED UNIT	5
5.3.1. REFERENCE SERVICE LIFE	5
5.4. SYSTEM BOUNDARIES	6
5.4.1. LIFE CYCLE STAGES	8
A. Product Stage (Mandatory)	8
B. Construction process stage	9
C. Use stage	10
D. Modules step of using information for the construction of the components (B1-B5)	10
E. Information modules of use stage concerning the exploitation of construction (B6-B7)	12
F. End of life stage	13
G. Benefits and environmental loads beyond the system boundaries – D module	14
5.5. CUT-OFF CRITERIA	14
5.6. DATA SELECTION/ DATA DESCRIPTION	15
5.7. DATA QUALITY REQUIREMENT	16
5.8. DEVELOPMENT SCENARIOS AT THE PRODUCT LEVEL	17
<b>6. LIFE CYCLE INVENTORY</b>	<b>18</b>
6.1. DATA COLLECTION	18
6.2. CALCULATION PROCEDURE	18
6.3. ALLOCATION RULES	18
6.3.1. COPRODUCTS ALLOCATION	19
6.3.2. ALLOCATION FOR MULTIPLE-INPUT PROCESSES	19
6.3.3. ALLOCATION IN CASE OF REUSE, RECYCLING AND RECOVERY	19
<b>7. LIFE CYCLE IMPACT ASSESSMENT</b>	<b>20</b>
<b>8. EPD CONTENT</b>	<b>21</b>
8.1. DECLARATION OF ENVIRONMENTAL PARAMETERS DERIVED FROM LCA	22
8.1.1. RULES FOR THE INFORMATION DECLARATION OF THE LCA BY MODULE	22

8.1.2.	PARAMETERS DESCRIBING THE POTENTIAL ENVIRONMENTAL IMPACTS.....	22
8.1.3.	PARAMETERS DESCRIBING THE USE OF RESOURCES .....	23
8.1.4.	OTHER ENVIRONMENTAL INFORMATION THAT DESCRIBE THE DIFFERENT WASTE CATEGORIES AND OUTPUT FLOWS .....	24
8.1.5.	ADDITIONAL TECHNICAL SCENARIOS AND INFORMATION .....	24
8.1.5.1.	Construction process stage .....	24
8.1.5.1.1.	A4) Transport .....	24
8.1.5.1.2.	A5) Installation process.....	25
8.1.5.2.	Use stage (B1 – B7).....	25
8.1.5.2.1.	Reference Service Life (RSL) .....	25
8.1.5.2.2.	B1) Utilização .....	26
8.1.5.2.3.	B3) Repair.....	27
8.1.5.2.4.	B4) Replacement.....	27
8.1.5.2.5.	B5) Rehabilitation/renovation .....	27
8.1.5.2.6.	B6) Energy needs and B7) Waster consumption, during the operation stage.....	28
8.1.5.3.	End of life stage .....	28
8.1.5.4.	D module .....	29
8.1.6.	ADDITIONAL ENVIRONMENTAL INFORMATION .....	29
8.1.7.	ENVIRONMENTAL INFORMATION ON THE RELEASE OF HAZARDOUS SUBSTANCE.....	29
8.1.7.1.	Indoor air.....	29
8.1.7.2.	Soil and water.....	30
8.1.8.	AGGREGATION OF INFORMATION MODULES.....	30
8.1.9.	INFORMATION RELATED WITH THE EPD VERIFICATION AND REGISTRATION .....	30
8.1.10.	COMPARABILITY BETWEEN EPD .....	31
8.2.	ADDITIONAL RULES FOR AVERAGE EPDs.....	31
<b>9.</b>	<b>LIFE CYCLE INTERPRETATION.....</b>	<b>31</b>
<b>10.</b>	<b>PROJECT REPORT .....</b>	<b>32</b>
<b>11.</b>	<b>EPD VERIFICATION AND VALIDATION .....</b>	<b>32</b>
<b>12.</b>	<b>UNITS.....</b>	<b>33</b>
<b>13.</b>	<b>REFERENCES.....</b>	<b>33</b>

## ÍNDICE DE TABELAS

<b>TABLE 1.</b> INFORMATION MODULES (SOURCE: EN 15804:2012+A1:2013) .....	4
<b>TABLE 2.</b> DIFFERENT EPD TYPOLOGIES ACCORDING WITH THE INFORMATION MODULES INCLUDED .....	7
<b>TABLE 3.</b> GENERIC DATA APPLICATION AND SPECIFIC DATA.....	16
<b>TABLE 4.</b> PARAMETERS AND ENVIRONMENTAL IMPACTS.....	23
<b>TABLE 5.</b> PARAMETERS ABOUT THE USE OF RESOURCES.....	23
<b>TABLE 6.</b> PARAMETERS RELATED WITH DIFFERENT WASTE CATEGORY .....	24
<b>TABLE 7.</b> PARAMETERS THAT DESCRIBE OTHER OUTPUT FLOWS.....	24
<b>TABLE 8.</b> PARAMETERS THAT DESCRIBE THE TRANSPORT TO THE CONSTRUCTION SITE .....	25
<b>TABLE 9.</b> INSTALLATION OF THE PRODUCT IN THE LOCAL.....	25
<b>TABLE 10.</b> PARAMETERS ABOUT RSL .....	26
<b>TABLE 11.</b> PARAMETERS ABOUT THE MAINTENANCE PROCESS .....	27
<b>TABLE 12.</b> PARAMETERS ABOUT THE REPAIR PROCESS .....	27
<b>TABLE 13.</b> PARAMETERS ABOUT REPLACEMENT.....	27
<b>TABLE 14.</b> PARAMETERS FOR THE REHABILITATION7RENOVATION.....	28
<b>TABLE 15.</b> PARAMETERS FOR THE ENERGY USE (B6) AND WATER CONSUMPTION (B7).....	28
<b>TABLE 16.</b> PARAMETERS FOR THE END OF LIFE STAGE .....	29

## TABELA DE ESQUEMAS

<b>FIGURE 1.</b> CONTEXT OF THE USE OF A PCR - BASIC MODULE DOCUMENT AND A SPECIFIC PCR. ....	3
---	---

## 1. INTRODUCTION

The DAPHabitat System is a Portuguese registration program of Type III Environmental Product Declarations (EPD) for product from habitat field. The Habitat field includes all the products and services involved in buildings and construction works.

This national registration program allows any company or interest entity the development or approval of Product Category Rules (PCR) and the registration of EPD, independent from its home country.

An EPD presents information about environmental performance of products over the life cycle, demonstrating quantitatively, the environmental impacts caused by the product during its service life. In Europe, an EPD for construction products and services must be elaborated according with the requirements of the EN 15804, his standard being considered "core PCR". This standard was published in 2012 and reviewed in 2013 by CEN (*European Committee for Standardization*) and is part of a set of standards dedicated to the assessment of the sustainability of construction work, both at the product and at building level.

The concept adopted by DAPHabitat System for the EPD elaboration, is that these documents must give the environmental data of products based in studies of Life Cycle Assessment (LCA), and these studies must guide through a set of specific rules, determined since 2012 by the standard EN 15804. Consolidating this idea, an EPD to be registered in DAPHabitat must be elaborated based on PCR's, available on DAPHabitat System or, if this situation is not possible, must be elaborated according with the present document and the standard EN 15804.

This document, PCR – basic module for construction products and services, is part of the official documentation and the work of DAPHabitat System, stablishing the general rules for the elaboration of the studies of Life Cycle Assessment according to the referred standard, the EN 15804, for construction products and services.

## 2. ABBREVIATIONS





EPD	Environmental Product Declaration
PCR	Product Category Rules
LCA	Life Cycle Assessment
RSL	Reference Service Life
LCI	Life Cycle Inventory
LCIA	Life Cycle Impact Assessment

## 3. CONTEXT

The present document (PCR – basic module specific for construction products and services) was prepared based on the EN 15804, and its general content is applicable to any specific PCR document developed by DAPHabitat System. If the PCR basic module document does not specify some requirements considered important for the elaboration of a comparable EPD in the DAPHabitat System and, if there is no specific PCR document for a certain product category, the entity may develop or promote a LCA study according to the principles of the **PCR – basic module for construction products and services of DAPHabitat System**, together with the EN 15804.

A specific PCR document for a certain product category, in the context of construction products and services, must define, at least, the Reference Service Life, the functional unit and the declared unit, relevant to the group of products that represents. All the specific PCR have to be published in the DAPHabitat System database and submitted to a public consultation process through the PCR Forum (tool available at [www.daphabitat.pt](http://www.daphabitat.pt)), as well as submitted to the Technical Committee evaluation.

The LCA supporting study is based on the present document that is in agreement with the standards that are listed below:

-  NP ISO 14025:2009 – “Rótulos e declarações ambientais – Declarações ambientais Tipo III – Princípios e procedimentos”<sup>1</sup>;
-  ISO 21930:2007 – “Building Construction – Sustainability in building construction”;
-  EN 15804:2012 + A1:2013 – “Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products”;
-  NP EN ISO 14044:2010 – “Gestão ambiental – Avaliação do ciclo de vida – Requisitos e linhas de orientação”<sup>2</sup>;

---

### Nota

<sup>1</sup> ISO 14025:2009 – “Environmental labels and declarations – Type III environmental declarations – Principles and procedures”

<sup>2</sup> ISO 14044:2006 – “Environmental management – Life cycle assessment – Requirements and guidelines”

- ☰ NP EN ISO 14040:2008 – “Gestão ambiental - Avaliação do ciclo de vida - Princípios e enquadramento”<sup>3</sup>;
- ☰ CEN/TR 15941 – “Sustainability of construction works – Environmental product declarations – Methodology and Data for Generic Data”. CEN/TR 15941:2010;
- ☰ EN 15942:2011 – “Sustainability of construction works. Environmental product declarations. Communication format business-to-business”.

#### 4. CONTEXT AND OBJECTIVE

This document specifies the general calculation rules, according to the EN 15804, for conducting LCA studies supporting the preparation of an EPD to be registered in DAPHabitat System, for all construction products and services for buildings and other construction works, stablishing guidance for the elaboration of the Project Report delivering the EPD for the verification assessment.

In the DAPHabitat System, the LCA study of a product must be conducted according to:

- ☰ the “PCR: basic module for construction products and services (updates version)” document or by,
- ☰ the respective specific PCR and the support of the PCR: basic module.

Figure 1 represents the context of the use of a PCR – basic module document or the specific PCR document.

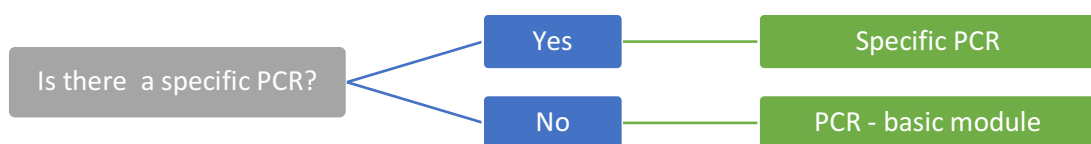


Figure 1. Context of the use of a PCR - basic module document and a specific PCR.

It is allowed the elaboration of an EPD based on the PCR – basic module if:

- ☰ there are no specific PCR document in DAPHabitat system or other registration program belonging to ECOPlatform;
- ☰ there is a PCR document in other registration program belonging to ECOPlatform that can't be recognized and adopted.

<sup>3</sup> ISO 14040:2009 - “Environmental management – life cycle assessment – Principles and framework”



However, it should always be efforts for the achievement of specific CPR documents, once these allows to focuses the LCA study for a determined product category, making this work more concise, consistent, restricted and economic.

## 5. LCA CALCULATION RULES

### 5.1. Life cycle steps and information modules according to EN 15804:2012+A1:2013

The environmental information to declare an EPD can include all the life cycle steps of the product, i.e., from cradle-to-grave. However, it is assumed that an EPD should report at least the life cycle corresponding to cradle-to-gate. All the life cycle steps considered should be reported in the EPD in the form of information modules (Table 1).

**Table 1.** Information modules (source: EN 15804:2012+A1:2013)

Module	Life cycle steps
<b>A1 – A3</b> Product stage	<b>A1)</b> Raw materials supply
	<b>A2)</b> Transport
	<b>A3)</b> Production
<b>A4 – A5</b> Construction process stage	<b>A4)</b> Transport
	<b>A5)</b> Construction installation process
<b>B</b> Use stage	<b>B1)</b> Use
	<b>B2)</b> Maintenance
	<b>B3)</b> Repair
	<b>B4)</b> Replacement
	<b>B5)</b> Refurbishment
	<b>B6)</b> Operational energy use
	<b>B7)</b> Operational water use
<b>C</b> End of life stage	<b>C1)</b> Deconstruction, Demolition
	<b>C2)</b> Transport of the product
	<b>C3)</b> Waste processing
	<b>C4)</b> Waste Disposal
<b>D</b> BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY	<b>D)</b> Re-use, recovery, recycling potential

## 5.2. Functional Unit

The functional unit provides a reference for the quantification of the environmental performance of the product, being required for a cradle-to-grave EPD. This unit is defined in a specific PCR document following the guidance of EN 15804, no point 6.3.1.

The functional unit expresses the function or the performance characteristics of the product in a quantifiable manner. For construction products the functional units is identified according to the function that a certain product can perform in the building and other construction works. The functional unit of a construction product must be based on its Reference Service Life (RSL) (see 5.3.1.) or the building RSL, according to the conditions of use defined.

For a functional unit to be well defined, the product and the materials must be well specified, and this must be precise and objective so that the product is unequivocal and unambiguous identified.

The specific PCR indicates which functional unit to use for the LCA of the product studying, considering the technical and functional characteristics of the product type.

## 5.3. Declared Unit

The declared unit is used instead of the functional unit when the exact function of the product or the utilization scenarios aren't clearly identified, or are unknown or aren't considered in the objectives of the EPD. This type of unit should only be applied to a "cradle-to-gate" EPD or a "cradle-to-gate with options" EPD. The declared unit must be related with the typical applications of the product.

The declared unit must be one of the listed in the point 6.3.2 of the EN 15804 standard. When choosing for a different declared unit, this choice should be duly justified. An EPD should provide additional information that allows the conversion of the unit in one or more "type of units".

### 5.3.1. Reference Service Life

The information about the Reference Service Life (RSL) of a construction product is determined according to the product function in the use stage and it is provided by the manufacturer (this information must be verifiable). The RSL should express the technical and functional performance of the construction system, being established according to standards. To estimate the RSL value the specifications of the standards ISO 15686-1, ISO 15686-2, ISO 15686-7 e ISO 15686-8 must be followed, as well as other requirements established in standards and legislation about construction products.<sup>4</sup>

The Reference Service Life of a product depends on the properties and characteristics of a certain product and its reference conditions, thus it shall also be declared. Thus, it should be noted in the EPD

---



<sup>4</sup> In the ANNEX A of the standard EN 15804:2012\*A1:2013 we can find some requirements and guidance lines to estimate the RSL.

that the information about the reference product RSL only is valid with the declared reference conditions.




#### 5.4. System Boundaries

The system boundaries determine which information modules and unit processes that should be include in the LCS. IT should be define the detail level in which the unit processes should be studied. The criteria used to stablish the system boundaries should be identified and duly substantiated in the Project Report.

The system boundaries, according to 6.3.4.1 in the EN 15804, should be based on two principles:

-  Principle of "modularity" – the processes that influence the environmental performance of products throughout their life cycle, should be charged to the life cycle of the module where they occur. All aspects and environmental impacts are declared in the life cycle stage where they occur;
-  The "polluter-payer" principle - waste processing procedures should be allocated where they are generated until the end-of-waste status is reached.

The boundary definition can lead to three EPD types (Table 2):

-  Cradle-to-gate EPD – where is only mandatory to consider the information module A1 to A3;
-  Cradle-to gate EPD with options - where is only mandatory to consider the information module A1 to A3, being subsequently selected some optional modules;
-  Cradle-to-grave EPD – where the entire information module, from A to C are mandatory.

**Table 2.** Different EPD typologies according with the information modules included

Module	Life Cycle Stages	EPD type		
		Cradle-to-gate	Cradle-to-gate with options	Cradle-to-grave
		Declared Unit/ Functional Unit	Declared Unit/ Functional Unit	Functional Unit
A1 – A3 Product stage	A1) Raw materials supply	Mandatory	Mandatory	Mandatory
	A2) Transport			
	A3) Production			
A4 – A5 Construction process stage	A4) Transport	-	Optional	Mandatory
	A5) Construction installation process			
B Use stage <sup>5</sup>	B1) Use	-	Optional	Mandatory
	B2) Maintenance			
	B3) Repair			
	B4) Replacement			
	B5) Refurbishment			
	B6) Operational energy use			
	B7) Operational water use			
C End of life stage	C1) Deconstruction, Demolition	-	Optional	Mandatory
	C2) Transport of the product			
	C3) Waste processing			
	C4) Waste Disposal			
D BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY	D) Reuse, recovery, recycling potential	-	Optional	Optional

If it is established that certain information module(s) aren't relevant to evaluate the environmental performance of a product, that (those) module(s) should be declared as "not relevant". To that (those) module(s) shouldn't be assigned a result of zero value, but the notation "not relevant". These situations should be documented in the Project Report.

The construction process stage, the use stage and the end of life stage are optional for a cradle-to-gate with options EPD, but it should be identified and specified separately from the product stage.

In a cradle-to-grave EPD, it should be considered all stages of the life cycle, and the environmental impacts should be presented separately, in order to ensure comparability between the EPD.

In the specific PCR documents there are examples of unit processes to consider in certain modules in any of the stages, in order to illustrate what is intended for the LCA study and thus for the EPD . Within the system boundary definition must be made a description for each module included in the life cycle

**Nota**

<sup>5</sup> In the Use stage (B1-B7) it is mandatory to consider the RSL

stages of the product, as well as the establishment of a flowchart to include both in the Project Report as in the EPD.

#### 5.4.1. Life cycle stages

The description here in is a general one, since not all the above processes are relevant or sufficient for all types of construction products. In the specific PCR to be developed, it is possible to add or reduce unit processes to consider for the specific product category.

##### A. Product Stage (Mandatory)



The product stage is composed by information modules related to the extraction and processing of raw materials, its transport until the production site and the product production.

To this life cycle stage some important considerations are listed:

- ❖ The product stage is completed with the product finalization and ready to be delivered (including the package);
- ❖ The residual heat emission doesn't need to be declared, being considered indirectly in the energy consumption;
- ❖ The waste production that is reintroduced in the production process, replacing raw materials, has to be included within the system boundaries (closed loop). They are recorded as secondary material;
- ❖ Benefits and charges allocated to coproducts cannot be declared in the module D. If this allocation cannot be performed clearly, other methods must be used but must be duly justified. As a general adopted rule, the benefits and loads resulting from the A1 -A3 module should not be considered in module D (see EN 15804 point 6.3.4.2);
- ❖ For products with incorporated biogenic carbon, this carbon approach should consider the EN 16485:2014 e EN 16449:2014 standards;
- ❖ The useful energy obtained from the energy recovery of waste production generated in A1 -A3 modules can be considered in a closed loop within the A1 -A3 module, but only until the amount of energy (MJ) which is required for production (assumption: the product of stage A1 - A3 is considered as a module) . For the energy that exceeds the amount consumed in a closed loop, an economic allocation between the excess energy flows and the flow of product can be made.

For each information submodule the following processes are indicated:

##### ❖ A1) Extraction and processing of raw material:

-  Extraction and processing of raw material and production and processing of biomass;
-  Reuse of products or materials of previous production systems;

- ☰ Secondary materials processing used as inputs in the product manufacture, but not included in the processes that made part of the waste processing in previous production systems;
- ☰ Electricity production, steam and from primary energy resources , including their extraction, refining and transportation;
- ☰ Energy recovery or other recovery process from secondary fuels, but not including processes which are part of the waste processing in previous production systems.

❖ **Transport to the production site:**

- ☰ Transports to the factory gate and internal transports.

❖ **A3) Production:**

- ☰ Production of auxiliary materials and pre-products (if applicable);
- ☰ Product and coproduct production;
- ☰ Package production (if applicable, included for raw materials).

❖ **A1-A3):**

- ☰ Waste processing by the end-of-waste status or their final destination, including any packaging not associated with the exit of the product.

**B. Construction process stage**

The construction stage is an optional stage and includes the information modules about the transport of products to the construction site and its installation in the building or in other construction works, including all materials supply and energy, as well the waste processing by the end of waste status or their final destination.

For each information submodule the following process are indicated:

❖ **A4) Transport:**

- ☰ Transport from the factory gate until the construction site (for example work). This should include an estimative of transport of all goods necessary since the end of product stage to the construction site, including any shipping to distributors, shops, etc. The transport of persons doesn't need be considered.

❖ **A5) Product installation process:**

- ☰ Product installation in the building or other construction work, including the production and transport of auxiliary materials and any energy or water required for the installation or operation of the construction site.

❖ **A4-A5):**

- ☰ the loss of construction products (additional production processes to compensate for the loss of products);
- ☰ storage of the products, including the provision of heating and cooling and humidity control among others, so that the conditions remain storage of the same;
- ☰ Waste processing resulting from product packaging and product losses by the end of waste status or final destination.

The defined scenarios and foundations established for the calculation shall be properly documented in the Project Report, and properly presented in the EPD, as indicated in section 7.3.2.1 and 7.3.2.2 of the EN 15804:2012 + A1:2013, in Tables 7 and 8.

**C. Use stage**

The use stage is an optional step and is constituted by information modules covering the period from the delivery of the building or construction works as completed to its deconstruction or demolition. The duration of the use stage relative to the product may be different from the required lifetime of the building or construction work (for which the construction was designed).

The use stage includes information modules related to the function of the products, equipment and construction services. This step also includes protection, conservation, monitoring and building control or other construction work, for example modules that describe the operation of the building for services such as heating, cooling, lighting, water supply and internal transport (supplied by example by stairs and elevators) . Also should include maintenance (including cleaning), repair, replacement and rehabilitation.

The information modules are grouped on the B1 to B5 and B6 B7. In the case of deviations from the group of information on these two sets of modules (recognizing the possible difficulty of separating the processes with associated impacts on defined information modules) this should be properly declared and justified in the EPD.

**D. Modules step of using information for the construction of the components (B1-B5)**

For each information submodule to indicate the following procedures:

❖ **B1) Use of the installed product:**

- ☰ the module relative to the "use of the installed product" covers the aspects and environmental impacts of building components (or other construction work) during their normal use (planned) , (emissions into the environment not covered by modules B2 -B7).

❖ **B2) Maintenance:**

☰ the information module on "maintenance" covers information of all the techniques or actions during the lifetime of the product, in order to maintain the same operating conditions, as well as the preservation of aesthetic characteristics of the product, for example cleaning or other kind of preventive maintenance. The consumption of energy and water cleaning should be reported in this chapter and not in B6 and B7 information modules. It is also in this chapter that the production and transport of necessary ancillary products as well as the transport and management of any waste produced during the various types of maintenance should be considered.

❖ **B3) Repair:**

☰ The information module about the "repair" consists of the compilation of environmental aspects and impacts resulting from a product repair process or when part of the product is damaged to which resume a necessary condition to perform its function ( including its technical requirements and functional ) . This module also covers a production and transport of auxiliary products, required use of water and energy as well as transport and management of any residual produced in the repair actions. This module also must include the repair to preserve the aesthetic qualities of the product.

**Note:** The change of damaged components (partial or total) an element should be assigned to the information module concerning the repair, while the total exchange element should be assigned to the information module about the replacement.

❖ **B4) Replacement:**

☰ The "replacement" module considers the aspects and environmental impacts related to the replacement of a construction product, so that it resumes its condition to technical and functional performance, for total replacement of a construction element. In the case of replacing the entire construction element, part of a concerted plan of the building (or other construction work), that should be considered as a rehabilitation/renovation (report to the information module B5). The production and transport of auxiliary materials necessary to this stage, use of water and energy, as well the transport and management of any produced waste, should be considered.

❖ **B5) Rehabilitation/Renovation:**

The "rehabilitation" module covers all the activities included in concerted plan maintenance, repair and/or replacement related to a significant part or to all building or other construction works. The restoration activities should be included in this module. The production and auxiliary product



transportation needed, use of water and energy, the transport and management of any waste produced should be considered.

#### **E. Information modules of use stage concerning the exploitation of construction (B6-B7)**

In this information modules only energy and water consumed directly by the studied product can be considered (for example, the energy savings resulting from the thermal isolation application shouldn't be declared in this module).

For each information submodule, the following modules are indicated:

##### **❖ B6) Energy consumed with the integrated operation of technical systems in the building operational stage:**

The "Energy consumed with the integrated operation of technical systems in the building" module should include, according to the EN 15804, the energy consumption during operation of the product (technical system integrated in the building), as well the aspects and environmental impacts which are associated, including the process and transport of waste produced by the energy use.

The integrated technical system in the buildings that support its operation or of a construction work, include the heating, cooling, ventilation, lighting, hot water and other systems for sanitation, protection, fire safety, internal transport and other as specified in EN 15804.

The aspects related to the production, transport and required equipment installation to supply energy to the building must be assigned to the modules A1-A5. The energy consumption during the maintenance activities, repair, replacement or rehabilitation of equipment must be accounted in the modules B2-B5. The aspects related to the waste process and final equipment removal (required to supply energy to the building) should be assigned to the modules C1-C4.

##### **❖ B7) Water consumption by the integrated technical systems in the building operational stage:**

The boundary module of "Water consumption by the integrated technical systems in the building operational stage", according to the EN 15804, should include the water consumed during the product operation (integrated technical system in the building), as well the aspects and environmental impacts associated to that consumption, considering the water use cycle, including the production and water transportation and the collection and treatment of waste water.

The integrated technical system in the building that support the building operation, include the technical systems of the buildings for cooling, ventilation, humidification, sanitary hot water and others sanitation systems, the protection, security against fire and internal transport.

## F. End of life stage

The product “end-of-life” stage begins when it is replaced, dismantled or deconstructed and doesn’t present any other functionality. This may also begin with the end of life of the building, in function of the scenario choice of end of life of the product.

According to EN 15804, during the end of life stage of the product or the building, all outputs resulting from the disassembly, of deconstruction or demolition of the building, maintenance process, repair, replacement or rehabilitation, all waste, all the construction products, materials or construction elements, etc., leaving the building are considered waste. However, these outputs reach the end of waste status when they meet all of the following criteria in accordance with EN 15804:

- ☰ The material, product or element of construction recovered is generally used for specific ends;
- ☰ There is a market or a search, identified for example by a positive economic value, for such material, product or repaired construction element;
- ☰ The material, product or recovered construction element meets the technical requirements for the specific use, complies with regulations and existing product standards;
- ☰ The material use, product or recovered construction element won’t have negative global impacts on the environment or human health.

The boundary of end of life of the system about the module D is fixed at the point where the outputs, i.e. the materials or secondary fuels, reach the end of waste status (see section 6.3.4.5. of EN 15804, Note 2).

The end of life stage includes the following optional information modules:

### ❖ C1) Deconstruction and demolition:

- ☰ The “deconstruction and demolition” module, include the dismantling or demolition of the product present in the construction, including the initial separation of the materials on site;

### ❖ C2) Transport of the product:

- ☰ The “transport of the product” module in the context of waste management could be translated, for example, in the product transport from the local of deconstruction or demolition to a recycling installation, and the transport for its final disposal.

### ❖ C3) Waste processing:

- ☰ The “waste processing” module includes the waste fraction collection from deconstruction and processing of waste from materials flows for reuse, recycling and energy recovery. The waste processing should be modeled and the elementary flows should be included in the inventory. The materials for the recovery of energy are identified based on the efficiency of energy recovery above 60%, respecting the existing regulation. The materials that allow a recovery of energy with efficiency over 60% aren’t considered as materials for the energy recovery.

Note: the impacts associated to the waste valuation processes (after the end of waste status) and the benefits associated shouldn't be considered in this module.

❖ **C4) Waste disposal:**

☰ The "waste disposal" module includes the elimination process including the physics pre-treatment of waste that can't be recovery or reuse and the elimination local management.

The loads (for example, emissions) induced by the waste disposal in the module C4 are as part of the product system under study, according to the "polluter pays principle". However, if this process generates energy, such as heat and electricity generated by incineration or by landfill of waste, the potential benefits arising from the use of this energy in the following product system are assigned to the D module product under study and are calculated using the "substitution method" (expansion system) considering average values.

**G. Benefits and environmental loads beyond the system boundaries – D module**

The information module "D" regard to the benefits or to the loads for environmental created by reused products, recycled materials and/or energy transfer to the outside of the product system (as secondary materials or fuels). This module allows the recognition of the reuse concept, recycling and recovery used at construction, through the indication of potential benefits avoid with the future use of materials and primary fuels, considering the loads associated to the processes of recycling and recovery beyond the studied product system.

It is considered essential the following considerations:

- ❖ All the benefits and liquid loads declared results in the liquid flows, leaving the product system which weren't attributed as coproducts and who have reached the end of waste status, must be included in the D module (see point 6.3.4.6. of the EN 15804);
- ❖ The impacts avoided associated to the coproducts attributed shouldn't be included in D module;
- ❖ For receiving the benefits resulting from recycling/product additional processing in the D module, the treatment of the product must be declared in C module;
- ❖ In the D module, the benefits resulting from exported energy from waste elimination processes declared in C4 module (see EN 15804, point 6.4.3.3., note 1) are also considered;
- ❖ In the D module, the environmental damages (liquid value) avoided resulting from flows leaving the system (that is, mainly from the modules A5 and C3) minus the flows that entering the system (i.e., mainly module A1) should be declared.

**5.5. Cut-off criteria**

The cut-off criteria of inputs and outputs of the LCA study, the information modules and any additional information, stablish the materials and energy flows, associated to a product system, which may be

excluded. These criteria shouldn't be applied to hide data, but to make the calculation process more efficient.

When all the inventory data are available, it should be included in the calculation. If there are gaps in the data, conservative assumptions can be used, based on average data and generic data, which should be documented and well-founded.





When it is not possible to fill those gaps or the data is insufficient, according with the point 6.3.5 of the EN 15804, the cut-off criteria for each unitary process should be 1% of the total of consumed energy and 1% of the total mass of inputs. However, for each information module (A1-A3, A4-A5, B1-B5, B6-B7, C1-C4 and D) it cannot exceed a total of 5% of energy and mass flows excluded. Use of the exclusion criteria should be based on considerations or expert opinions.

For energy and mass flows with potential to cause significant environmental impacts, cannot be use the cut-off criteria.

## 5.6. Data selection/ Data description

Wherever it is possible, real and specific data unit processes must be used, or average data obtained from specific production processes. They may be used to present data representing generic database of the LCA studies, in the absence of the specific data and where these are representative for the purpose (Table 3).

In addition, apply the following rules in accordance with EN 15804 (section 6.3.6.):



-  An EPD describing a specific product should be calculated using specific data at least for the process over which the producer has influence. It can be use generic data for the processes which the producer cannot has influence, for example the process that deal with the production of essential goods which are inputs, for example the extraction of raw materials or the production of electricity, often referred to as upstream data;
-  A specific covering all life cycle stages (cradle-to-grave) can be calculated using generic data for certain downstream processes, for example the waste incineration. For comparability reasons the calculation of the use stage should be based in the additional technical information (see item 7.3. of the EN 15804);
-  The additional technical information for the elaboration of scenarios of the life cycle stages of the building should be specific information or average specific information when an average product or product class are declared;
-  A documentation related to technological representation, geographic and temporal relative to generic data should be provided in the project report.

**Table 3.** Generic data application and specific data

Module	A1 – A3		A4 e A5	B1 – B7	C1 – C4
	Production of goods and raw materials	Production	Installation	Use	End-of-life
Process type	upstream	Process on which the producer has influence	downstream		
Type of data	Generic data	Medium or specific data/real	Generic data		







**Note:** For a proper selection and characterization of the data should consult the requirements of CEN/TR 15941 “Sustainability of construction works – Environmental product declarations – Methodology for selection and use of generic data”.

The generic data can be obtained:

-  in databases of LCA, namely European Life Cycle Database (ELCD) promoted by the European Commission and others like Ecoinvent , GaBi;
-  in others sources (for example: stoichiometric models, patents, legal limits, technical standards, encyclopedias, or data from other DAP registration programs).

### 5.7. Data quality requirement

The quality of the data used to calculate an EPD should be treated in the project report (see section 8 and the EN 14044:2006, section 4.2.3.6.). Besides, apply to construction products the following specific requirements:

-  Should be representative and the most updated possible. In case of generic data, this shouldn't have more than 10 years and the specific data shouldn't have more than 5 years;
-  The compiled data set should refer to an average 1 (one) year (if used other reference periods this should be duly justified);
-  The time period, during which the inputs and outputs of the system should be account for, it is 100 years, counting from the year for which the data set is representative. Only should consider an higher time period if it is relevant;
-  An technological representative should reflect the product reality or the declared product class;
-  For an average data including several unit production, the geographic scope should represent the average or general data of the region(s) where the unit(s) production are;
-  An average EPD (as defined in the General Instructions for the DAPHabitat System in the chapter typology) should be calculated using the representative data of the declared products in the EPD;

- ☰ For generic data, the guidance lines for their selection and use are supplied in the CEN/TR 15941. The likelihood of generic data should be checked;
- ☰ the data set using should be completed and according with the system boundaries defined;
- ☰ The energy and material flows should be based in a 12 months average. Continuous measurements and rules for dosing or measuring, power monitoring, shopping lists or lists of waste can be taken as a database;
- ☰ The outputs, for example, the emissions, that weren't a target of continuous measures, can be collected through individuals representative measures. These measurements should be executed in the same reference year such as energy and recovery materials flow and must be performed with representative values of the product(s). If there are no measurements, it is allowed an technical or scientific approach that emissions can be estimated using stoichiometric equations;
- ☰ Extraordinary accidents and incidents don't have to be considered.

**Note:** These criteria apply with without prejudice of the requirements of the CEN/TR 15941 "Sustainability of construction works – Environmental product declarations – Methodology for selection and use of generic data" and the requirements of the ISO 14044:2006.

### 5.8. Development scenarios at the product level

If it is considered in the LCA other steps in addition to the product of step (A1 -A3), the evaluation of the environmental performance of these steps should be supported by appropriate scenarios, which will be fully described in the EPD.

If an average scenario is defined (from two or more individual scenarios) in any of the stages or modules in addition to the production stage, the impact assessment should be presented by individual scenario, in addition to aggregate results and weighted in terms of average scenario.

A scenario should be realistic and representative of one of the most likely alternatives. For example, if there are three different applications, to be declared the most representative application or all three scenarios. The scenarios should not include processes or procedures that are not commonly used or has not been shown to be viable.

For example:





**Transport scenario A4:** The transport from the factory to the construction site. The product will be transported in a truck with respect to Euro 4 standard with a 25 ton load capacity. The average distance traveled is 100 km. The trip back will not be considered.

**Use scenario B1:** Relatively to use, if the product is cleaned periodically (e.g., once a week for domestic use, once a day for commercial use), the time interval specified by the manufacturer must be obtained.

## 6. LIFE CYCLE INVENTORY

The inventory analysis involves procedures for the collection and data calculation for the quantification of the relevant inputs and outputs of the product system.

In the Project Report (according to EN 15804 point 8.2) should be in the following information relative to LCIA:

-  Qualitative/quantitative description of the unit processes required for modelling the life cycle stages of the declared unit, taking into account the requirements of EN ISO 14025 on confidentiality of data;
-  Generic data sources or literature used in the LCA realization;
-  Data validation, including:
  - ❖ Data quality validation; and
  - ❖ Missing data processing;
-  Principles and allocation procedures, including:
  - ❖ Documentation and justification of allocation procedures; and
  - ❖ Uniform application of allocation procedures.

### 6.1. Data collection

The data collected for the inventory can be measured, calculated or estimated and, aim to quantify the inputs and outputs of a unit process. For this reason, all the data included in the inventory must be collected for each unit process considered in the boundary of the system. The collected data can have different sources, so it is necessary to document their origin and their reference year. If it is necessary to use generic data, the sources that are used must be properly referenced.

### 6.2. Calculation procedure




All calculation procedures and assumptions should be documented. These procedures should be applied consistently throughout the study, according to the requirements and guidelines described in section 4.3.3 of the ISO 14044:2006.

When inputs and outputs of fuel become into inputs and outputs of energy, the lower calorific value of the fuel must be applied in accordance with the accepted and scientifically based specific values for combustible material.

### 6.3. Allocation rules

The allocation should be avoided, whenever possible, through the subdivision of the unit process to be allocated into two or more sub-processes, or expanding the system boundaries in order to include the additional functions related to the coproducts.

According to the EN 15804, when allocation cannot be avoided, it should be made based on:

-  the physical properties (e.g., mass and volume) when the difference of recipes generated by coproducts is low (less than 9%);
-  in all other cases the allocation must be based on economic values;
-  the material flows that have specific inherent properties, for example elemental composition and energy content (e.g., content of biogenic carbon), should always be allocated in order to reflect the physical flows, whatever the chosen allocation for the process.

Allocation procedures used must be properly specified, justified and documented.

The sum of the inputs and outputs of a unit process after the accomplishment of the allocation must be equal to the sum of the inputs and outputs of the unit process before the allocation rules are applied, i.e. double counting or omitting inputs and outputs through the application of allocation rules is not allowed.

### 6.3.1. Coproducts allocation




The allocation of coproducts should be carried out considering the guidelines of EN 15804, point 6.4.3.2.

### 6.3.2. Allocation for multiple-input processes

Different products are produced together in a single process, for example, in a waste incineration plant, a central biomass or a waste disposal site. The allocation must be based on the physical properties of the material flow. If necessary, the environmental impact of the inputs is allocated so as to refer its influence on the following production process.

### 6.3.3. Allocation in case of reuse, recycling and recovery

The allocation procedure for these processes must be carried out according to the guidelines outlined by the EN 15804 in paragraph 6.4.3.3. However, some further considerations are described:

- ❖ Secondary Materials:
  -  The collection and sorting of waste should be allocated to the waste disposal system of the previous product system.
- ❖ Waste production:
  -  The production of waste for which a sale can be achieved must be considered as a coproduct;
  -  The production of waste with no market value should be treated as waste (since it does not reach the end of waste status), even if it is transferred to external processes of recycling or energy recovery. In any case, the benefits could not be attributed to the substitution of other energy sources;



- ☰ Packaging waste (one way), generated in the production and that have to be deposited should be treated as waste, even if transferred to an external recycling process or energy recovery (without allocation of material or energy savings).
- ❖ Waste on site (construction site)
  - ☰ Waste on the construction site that return to the place of production are considered as a closed loop and don't need any allocation. In the case of residues which replace materials (e.g. Raw materials) are included in the inventory analysis ;
  - ☰ Waste on the construction site that have no market value should be calculated as residues, even if transferred to external processes of recycling or recovery of energy. Shouldn't be in the D module;
  - ☰ Packaging waste from other modules which aren't A1-A3, should be calculated as a residue, even if transferred to external processes of recycling or energy recovery. In any case, the benefits could be attributed by the replacement of other energetic sources;
- ❖ Demolition waste
  - ☰ For the reuse and recycling of construction materials after the end of life stage, the close loop procedure shouldn't be used. Benefits and loads of recycling are attributed to D module.

## 7. LIFE CYCLE IMPACT ASSESSMENT

The Life Cycle Impact Assessment (LCIA) evaluates the significance of potential environmental impacts using the results of the inventory of the product life cycle. This review associates inventory data to specific categories of environmental impact and the category of indicators for understanding the impacts.

The impact categories to consider according to the EN 15804 (point 6.5.) are:

- ☰ Global Warming Potential;
- ☰ Ozone Depletion Potential;
- ☰ Acidification Potential of soil and water;
- ☰ Eutrophication Potential;
- ☰ Photochemical Ozone Creation Potential;
- ☰ Potential for abiotic depletion of resources - elements (ADP elements) for non-fossil re-sources;
- ☰ Potential for abiotic depletion of resources - fossil fuels (ADP fossil fuels).

The environmental impact should be held, mandatorily, according to the point 6.5 of the EN 15804, last version. The characterization factors using are included in the Annex C of the EN 15804:2012 + A1:2013.

If the specific values are known for the impact category of Potential for abiotic depletion of resources - fossil fuels (ADP fossil fuels) this should be used and duly documented and justified.

Additional and specific factors can be used in order to achieve consistency between the LCI data and characterizing factors available.

Note: The characterization factors for fossil fuels are based in lower calorific values (LCV) at the point of extraction of these fuels.

In the Project Report, according to EN 15804 point 8.2, the contents listed below regarding the Life Cycle Impact Assessment under study should be presented and justified:

- ☰ LCIA procedures, calculations and results of the study;
- ☰ respect the results of the LCIA and the results of the LCI;
- ☰ refer to all models characterization, characterization factors and methods, as defined by European Standard 15804;
- ☰ Mention stating that the LCIA results are relative terms and do not predict the final impact by category exceed the limit values, safety margins or risks.

## 8. EPD CONTENT

According to the EN 15804 and the EN 15942, the EPD should declare general information relative to the following issues:

- ☰ Name and address of the manufacturer(s);
- ☰ Description of the use of the construction product/ product class and the functional unit or declared to which the data relates;
- ☰ Identification of the construction product/product class by its name (including any product code) and a simple visual representation of the construction product/product class to which the data relates;
- ☰ Description of the main components and/or product materials;
- ☰ Name of the program used as well the name and address of the program operator and, when relevant, the logo and web page;
- ☰ Issue date of the declaration and validity period up to 5 years;
- ☰ information indicating the stages are not considered, if the statement is not based on an LCA covering all stages of the life cycle;
- ☰ mention indicating that the construction product EPD may not be comparable if they are not in accordance with EN 15804 and this PCR document;
- ☰ declaration of the content in materials of the product should at least enumerate the substances contained in the product that are in the " List of substances of very high concern

candidates for authorization" (under REACH) when the content exceeds the limits for registration by the European Chemicals Agency;

 Information indicating where the explanatory elements can be obtained.




This information should be declared according to the requirements indicated in the General Instruction for DAPHabitat System and with the EPD template at [www.daphabitat.pt](http://www.daphabitat.pt) for formatting and presentation of content in the EPD.

## **8.1. Declaration of environmental parameters derived from LCA**

The additional information about the environmental performance of the product is based on a LCA study, setting up: the functional unit or the declared unit; life cycle stages and the inputs and outputs flow diagram; parameters that describe the potentials environmental impacts; parameters that describe the resources use; parameters that describe the waste production; other consider environmental parameters; additional environmental information.

### **8.1.1. Rules for the information declaration of the LCA by module**

In order to facilitate the environmental impacts assessment at different stages of life cycle is required to provide the information in a modular way. An EPD should specify which type of study stated:

-  Cradle-to-gate EPD: in this case shouldn't be declared the Reference Service Life (RSL), being declared as "not specified";
-  Cradle-to-gate with options EPD: the RSL should be declared, if the scenarios relative to the modules A1-A3 and B1-B5 have been defined;
-  Cradle-to-grave EPD: in this case an EPD covers all the stages of the life cycle including all the modules of stages A to C, being necessary to declare the RSL.

The D module, although optional, can be included in any type of above-mentioned EPD.

In some cases, certain modules can be relevant for the environmental performance of a product. In these situations, the module should be declared as "not relevant", this should not be seen as a result of zero.

### **8.1.2. Parameters describing the potential environmental impacts**

The information related with the environmental impacts are expressed by categories of impact from the LCA study, in which are used characterization factors (chapter 7). The impacts categories, as well, the unit in which are expressed are defined in the Table 4.

**Table 4.** Parameters and environmental impacts

Impact category	Parameters	Unitary parameter expressed by functional/declared unit
Global Warming	Global Warming Potential (GWP)	kg CO <sub>2</sub> equiv.
Ozone Depletion	Ozone Depletion Potential (ODP)	kg CFC 11 equiv.
Acidification	Acidification Potential of soil and water (AP)	kg SO <sub>2</sub> equiv.
Eutrophication	Eutrophication Potential (EP)	kg (PO <sub>4</sub> <sup>3-</sup> ) equiv.
Photochemical Ozone Creation	Photochemical Ozone Creation Potential (POCP)	kg ethene (C <sub>2</sub> H <sub>4</sub> ) equiv.
Abiotic depletion of resources - elements (ADP elements) for non-fossil re-sources	Potential for abiotic depletion of resources - elements (ADP elements) for non-fossil re-sources	kg Sb equiv.
Abiotic depletion of resources - fossil fuels (ADP fossil fuels)	Potential for abiotic depletion of resources - fossil fuels (ADP fossil fuels)	MJ, calorific value ([Hi] lower calorific value)

### 8.1.3. Parameters describing the use of resources

The following parameters describe the use of renewable and non-renewable materials, renewable and non-renewable primary energy and water and are compiled based on the LCA study of the inventory data. The information to include in an EPD should be according to Table 5.

**Table 5.** Parameters about the use of resources

Parameter	Parameter unit expressed by functional/declared unit
Use of renewable primary energy excluding the renewable primary energy resources used as raw materials	MJ, calorific value ([Hi] lower calorific value)
Use of renewable primary energy resources used as raw materials	MJ, calorific value ([Hi] lower calorific value)
Total use of renewable primary energy (primary energy and renewable primary energy resources used as raw materials)	MJ, calorific value ([Hi] lower calorific value)
Use of non-renewable primary energy excluding the non-renewable primary energy resources used as raw materials	MJ, calorific value ([Hi] lower calorific value)
Use of non-renewable primary energy resources used as raw materials	MJ, calorific value ([Hi] lower calorific value)
Total use of non-renewable primary energy (primary energy and non-renewable primary energy resources used as raw materials)	MJ, calorific value ([Hi] lower calorific value)
Use of secondary materials	kg
Use of renewable secondary fuels	MJ, calorific value ([Hi] lower calorific value)
22 Product Category Rules for Construction Products, Part A Use of non-renewable secondary fuels	MJ, poder calorífico inferior (PCI)
Use of fresh water resources*	m <sup>3</sup>

\*The calculation of this indicator must be realized according to the EN 14046. The parameter contains: evaporation (e.g. cooling towers), evapotranspiration (evaporation of irrigation water), and incorporated fresh water (e.g. in concrete), fresh water drain into the ocean.

#### 8.1.4. Other environmental information that describe the different waste categories and output flows

The parameters that describe the waste categories and other materials flows are output flows, resulting from the life cycle inventory of the product. Even though the final waste disposal is not included in the product system boundaries, the amount of waste deposited must be accounted through the parameters that are presented. These parameters should be included in the EPD as shown in Table 6 and Table 7.

**Table 6.** Parameters related with different waste category

Parameters	Parameters unit expressed by functional/declared unit
Hazardous waste for disposal	kg
Disposed of non-hazardous waste	kg
Disposed of radioactive waste	kg

**Nota 1:** The characteristic to consider in the hazardous waste classification should be consulted in the *European Waste Framework Directive*.

**Nota 2: Disposed hazardous waste** – Hazardous waste amount disposed in a location with a class III or IV. Radioactive waste are not included. **Disposed of non-hazardous waste** – non-hazardous waste amount that aren't disposed in a location with a class 0, I or II. **Disposed of radioactive waste** – Amount of radioactive waste disposed.

**Table 7.** Parameters that describe other output flows

Parameters	Parameters unit expressed by functional/declared unit
Reuse components	kg
Recycling materials	kg
Energy recover materials	kg
Exported energy	MJ, by energetic vector

#### 8.1.5. Additional technical scenarios and information

The additional technical information support the scenario development based on calculus and declared parameters from LCA defined in this section, relative to the additional stage of the life cycle. If the EPD include all the life cycle stages, all relevant optional modules should be calculated based on appropriated scenarios and the respective parameters of LCA should be declared.

##### 8.1.5.1. Construction process stage

###### 8.1.5.1.1. A4) Transport

If an EPD include additional technical information relative to the transport from the factory gate to the construction site, the scenario specification of transport should contain the information presented in Table 8.

**Table 8.** Parameters that describe the transport to the construction site

Parameters	Parameters unit expressed by functional/declared unit
Type of used vehicle (according to the European Directive 2007/37/EC)	Not applicable
Fuel type	
Fuel consumption	l/ km (liter of fuel by distance)
Travelled distance	km
Capacity utilization ( round trip)	% (useful load)
cargo transported	kg
volume transported	m <sup>3</sup>
Charge Density	kg/m <sup>3</sup>

#### 8.1.5.1.2. A5) Installation process

If an EPD include the additional technical information relative to the installation of the product in the building, the respective scenario specification should have the presented information in the Table 9.

**Table 9.** Installation of the product in the local

Parameters	Parameters unit expressed by functional/declared unit
Accessories materials for installation (specified by materials)	kg or other units, as appropriate
Water use	m <sup>3</sup>
Other resources used	kg
Quantitative description of energy sources (regional energy mix) and respective consumption during the installation process	kWh ou MJ
Waste production at the construction site resulting from the product installation and before processing (specified by waste type)	kg
Materials output (specified by type) as a result of waste processing on site, for example for recycling, energy recovery, landfill, disposal	kg
Direct emissions to the air, soil and water	kg

#### 8.1.5.2. Use stage (B1 – B7)

##### 8.1.5.2.1. Reference Service Life (RSL)


The description of reference service life can be based on collected data with medium value or at the beginning or end of life of the service. The conditions of reference to achieve the technical performance and the declared functional and the declared RSL should include the indicated data in Table 10.


**Table 10.** Parameters about RSL

Parameters	Parameters unit expressed by functional/declared unit
Reference service life	years
Declared properties of the product (at the factory gate), finishing, etc.	Appropriated unit
Application parameters (if instructed by the manufacturer), including reference to appropriate practices	Appropriated unit
The quality of estimated work when installed in accordance with the instructions of the producer	Appropriated unit
External environmental conditions (for outdoor applications), for example, climatic conditions, pollutants, orientation of the building, temperature, etc.	Appropriated unit
Indoor environmental conditions (for indoor applications), for example temperature, humidity, chemical exposure, etc.	Appropriated unit
Conditions of use for example frequency of use, mechanical exposure, etc.	Appropriated unit
Maintenance, for example required frequency, type, quality and component replacement	Unidade apropriada

#### 8.1.5.2.2. B1) Utilização

The B1 concern to environmental emissions from the current use of the product installed in the building, for example, release of substances of the facades, roof, walls or other parts of the building. This module does not include the emissions from the use of energy and water.

 For products exposed to the air inside buildings after installation the information to be provided in order to support the use scenario is as follows: emissions into the indoor air in accordance with the rules on the measurement of emissions of hazardous substances regulated by construction material using harmonized testing methods in accordance with the provisions of the respective technical committees of European product standards (where these standards are not available, this information may be omitted);



 For products in contact with the ground or water after installation the information to be provided in order to support the use scenario is as follows: release to the soil and water in accordance with the standards relative to the measurement of hazardous substances emissions by construction materials using harmonized testing methods in accordance with the provisions of the respective technical committees of European product standards (where these standards are not available, this information may be omitted).

If an EPD include information relative to products that need maintenance, repair, replacement or rehabilitation, the scenario(s) specification should contain at least the parameters described in the Table 11, Table 12 and Table 13.

**Table 11.** Parameters about the maintenance process

Parameters	Parameters unit expressed by functional/declared unit
Cycle maintenance	Number of times during the RSL or per year
Auxiliary materials for maintenance, for example cleaning detergents	kg/cycle
Waste resulting from the maintenance process (please specify materials)	kg
Freshwater liquid consumption during maintenance	m <sup>3</sup>
Power consumption during maintenance operations, for example in vacuum cleaning	KWh ou kWh/cycle

#### 8.1.5.2.3. B3) Repair

-  description of repair process or indication of where this information can be obtained;
-  description of the inspection process or indication of where this information can be obtained.

**Table 12.** Parameters about the repair process


Parameters	Parameters unit expressed by functional/declared unit
Repair cycle	Number of times during the RSL or per year
Auxiliary materials for repair, for example lubricants (specify material)	kg ou kg/cycle
Waste resulting from the repair process (specify materials)	kg
Freshwater liquid consumption during repair	m <sup>3</sup>
Power consumption (specify type of energy) during repair work, e.g. operations with machinery, etc.	kWh/RSL ou kWh/cycle

#### 8.1.5.2.4. B4) Replacement

**Table 13.** Parameters about replacement

Parameters	Parameters unit expressed by functional/declared unit
Replacement Cycle	Number of times during the RSL or per year
Waste resulting from the replacement process (please specify materials)	kg
Power consumption ( specify type of energy ) during the substitution , for example operations with machinery , etc.	kWh/RSL or kWh/cycle
Replacement of worn parts during the product's life cycle ( specify materials ) , for example zinc, steel plates , etc.	kg

#### 8.1.5.2.5. B5) Rehabilitation/renovation

-  Description of the rehabilitation/renovation process or indication of where this information can be obtained.



**Table 14.** Parameters for the rehabilitation/renovation

Parameters	Parameters unit expressed by functional/declared unit
Rehabilitation cycle	Number of times during the RSL or per year
Materials used in rehabilitation, for example lubricants (specify material)	kg or kg/cycle
Waste derived from the rehabilitation process (specify materials)	kg
Power consumption (specify type of energy) during rehabilitation, for example operations with machinery, etc.	kWh/RSL or kWh/cycle

Other assumptions necessary for the scenario development (in appropriated units) can be defined.

In an EPD include additional technical information relative to the technical systems integrated in the building that use energy and water consumption during the building operation, the specification of the respective scenario(s) should contain the information presented in the Table 15.

#### 8.1.5.2.6. B6) Energy needs and B7) Waster consumption, during the operation stage

**Table 15.** Parameters for the energy use (B6) and water consumption (B7)

Parameters	Parameters unit expressed by functional/declared unit
Auxiliary materials specified per kg material	kg or appropriated units
Freshwater fluid consumption	m <sup>3</sup>
Type of energy consumed, e.g. electricity, natural gas, etc.	kWh
Power equipment	kW
Performance characteristics, for example energy efficiency, emissions, performance variation depending on capacity utilization, etc.	Appropriated units

Other assumptions necessary for the scenario(s) development (in appropriated units) for B6 and B7 can be developed and duly indicated in the EPD.

#### 8.1.5.3. End of life stage

If an EPD include additional technical information relative to the end of life stages, the specifications of the respective scenario(s) should contained the information as indicated in Table 16.

**Table 16.** Parameters for the end of life stage

Parameters	Parameters unit expressed by functional/declared unit
Collection procedures specified by type	kg of separately collected material
	kg of gathered material in the mix of construction waste
Recovery process specified by type	kg for reuse
	kg for recycling
Final destination specified by type	kg to energy recovery
	Kg of product or material for final disposal

Other assumptions necessary for the scenario(s) development (in appropriated units):

The scenarios should only model processes that are economically and technically viable. If two or more end of life processes is defined, the impact assessment should be presented by process, besides the result aggregate and weighted to all processes.

#### 8.1.5.4. D module

If an EPD include additional technical information related to the benefits and environmental loads beyond the system boundaries, the additional information necessary for the description of the respective scenarios should be included in the EPD.

#### 8.1.6. Additional environmental information

It should be included in the EPD additional information related to the environmental aspects (if relevant), in addition to environmental information of LCA, LCI or information modules.

Example 1: identification of hazards and environmental risks resulting from product handling at each life cycle stage.

Example 2: Identification of the amount of carbon removed from the atmosphere during the growth of the biomass that remains stored in the product (biogenic carbon).

Example 3: Identification of the amount of carbon removed from the atmosphere and fixed by the product during the life cycle.


#### 8.1.7. Environmental information on the release of hazardous substance

The additional environmental information to declare in an EPD about the release of hazardous substances refer essentially to the environmental impacts caused in the indoor air of the buildings, soil and groundwater during product use stage.

##### 8.1.7.1. Indoor air

The type of information to declare should refer to the exposed product to the indoor air after its installation in the buildings during the use stage, to support scenarios defined for this stage of the


product life cycle, in regard to the health of users of the building level. Thus it is considered important to state the following types of information:

 emissions to indoor air released by construction products in accordance with the rules on monitoring of emissions of regulated hazardous substances using standard test methods in accordance with the provisions of the Technical Committees in charge of the preparation of European standards of products or national regulations , when available.

**Note:** This information can be declared in the EPD when there are no horizontal rules on the measurement of release of regulated hazardous substances using standard test methods in accordance with the provisions of the Technical Committees responsible for European standards products or national regulations.

#### **8.1.7.2. Soil and water**

This type of additional environmental information should be supplied for products that could be in touch with the soil or emit substances to the groundwater, after its installation in the buildings (and other construction works) during the use stage, to support scenarios defined at this stage of the product life cycle, with regard to soil and water pollution to the building level. Thus it is considered important to state the following types of information:

 Emissions to land and water, released by construction products in accordance with the standards relative to monitoring the regulated dangerous substances emissions regulated by construction products using harmonized test methods in accordance with the provisions of the Technical Committees responsible for preparing the European product standards or national regulations when available.

**Note:** An EPD cannot presented such information in the absence of horizontal rules on the measurement of release of hazardous substances using harmonized testing methods in accordance with the provisions of the Technical Committees responsible for European standards products or national regulations.

#### **8.1.8. Aggregation of information modules**

The declared indicated in the individual information modules of a product life cycle stages, A1 to A5, B1 to B7, C1 to C4 and D module, shouldn't be aggregated to get a total or subtotal of the life cycle stages A,B, C or D, with exception of information modules A1, A2 and A3 that could be aggregated.

#### **8.1.9. Information related with the EPD verification and registration**

All the information to include in the EPD, related with the verification and registration, is detailed in the document about the General Instruction of the DAPHabitat System, available on [www.daphabitat.pt](http://www.daphabitat.pt).

### 8.1.10. Comparability between EPD








The product comparability based on EPD is defined by the contribution they have for the environmental performance of the building. Thus, comparing the environmental performance of building products using the information of EPD should be based on the use of the product and its impact on the building and should consider the entire life cycle (all information modules). The EPD allows to compare the environmental performance of products based on its life cycle subject to compliance with certain conditions, which are described in the General Instructions of DAPHabitat System and EN 15804.

### 8.2. Additional rules for average EPDs

When an EPD is representative of more than one production unit and/or representative of a product class, the information available on the EPD should be unambiguous so that it is transparent, giving to the user the necessary information on the correct use of the declared information and the average EPD representative.



The EPD, in order to declare the average environmental performance of a product class, should include a mention in this regard in the EPD and it is recommended that this is accompanied with a description of the variety/variability of the LCIA results, if this is significant (according to EN 15804, 7.1. i)).




An average EPD must still declare additional information about:

-  how was done the selection of production units and/or the product class;
-  average technical characteristics and the range of variation for the product class (such as density, heat resistance);
-  the number of production units included in the EPD; and/or;
-  the names of the manufacturers or brands entities;
-  the relative volume of production covered by the EPD;
-  geographical coverage;
-  The product group to which the EPD is relevant.

## 9. LIFE CYCLE INTERPRETATION

The life cycle interpretation stage should supply consistent results with the defined objective and context, allowing obtaining the best conclusions about the environmental performance of the product. The LCA study results should be interpreted in the Project Report, as mentioned in the EN 15804 point 8.2., describing at least:

-  the results interpretation;
-  assumptions and limitations associated with the interpretation results as reported in the EPD, both in relation to the system and with the data;

-  the variance compared to the average of the LCIA results should be described, if the generic data come from various sources or refer to a range of similar products;
-  quality data assessment;
-  full transparency in terms of choice of values, justifications and expert reviews.

## 10. PROJECT REPORT

The project report should be systematic and complete to support the verification procedure of an EPD. The project report must register the LCA and additional information, as stated in the EPD, according to EN 15804. This must be made available to the certification body recognized by DAPHabitat System respecting the confidentiality requirements specified in EN ISO 14025.

The elements of the Project Report should follow the requirements of the EN 15804 as well as the indications described in the document General Instructions of DAPHabitat System, available at [www.daphabitat.pt](http://www.daphabitat.pt).

## 11. EPD VERIFICATION AND VALIDATION

An EPD needs to be verified by an independent third party in order to guarantee the reliability of the document content, considering the consumer as one of the potential audiences. The verification procedure is reflected in the confirmation through the provision of objective evidence that specified that the requirements have been satisfied. This process is coordinated by a certification body recognized as independent from the stakeholders.

Only after the decision of the EPD validation, issued by the certification body, it is allowed the document registration in DAPHabitat System so that environmental performance information and quantitative data contained in this environmental label can be in public [www.daphabitat.pt](http://www.daphabitat.pt).

The EPD is valid for up to five years from its issue date. After this period, should be reviewed and verified by a verifier according to the General Instructions DAPHabitat System. However, if during the period of validity of an EPD, if you notice any considerable change (greater than or less than 10% in one or more parameters stated in the EPD) in the environmental performance of the product, this must be updated. If after 5 years of validity does not verify the existence of significant changes in data, the EPD will not need to be recalculated.

## 12. UNITS

The SI units should be used. The basic units to be used are: meter (m), kilogram (kg), molecular weight (mole). All resources must be expressed in kg with the exception:

- ☰ of energy resources must be used kWh or MJ;
- ☰ the temperature should be expressed in Celsius degrees;
- ☰ time should be expressed as a rating scale: minutes, hours , days, or years.

## 13. REFERENCES

- ☰ NP ISO 14025:2009 – “Rótulos e declarações ambientais – Declarações ambientais Tipo III – Princípios e procedimentos”;
- ☰ ISO 21930:2007 – “*Building Construction – Sustainability in building construction*”;
- ☰ EN 15804:2012 + A1:2013 – “*Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products*”;
- ☰ NP EN ISO 14044:2010 – “Gestão ambiental – Avaliação do ciclo de vida – Requisitos e linhas de orientação”;
- ☰ NP EN ISO 14040:2008 – “Gestão ambiental - Avaliação do ciclo de vida - Princípios e enquadramento”;
- ☰ Instruções Gerais do Sistema DAPHabitat. Versão 1.0.; Edition March 2013 (em revisão);
- ☰ Product Category Rules and PCR Basic Module – Construction products and construction services. Version 1.0. 2012 (The International EPD System).