# DAPHabitat System ENVIRONMENTAL PRODUCT DECLARATION

www.daphabitat.pt

[ACCORDING TO ISO 14025, EN 15804:2012+A2:2019 AND EN 15942]

Declaration number: DAP 007:2024

# POLYMERIC PROFILES FOR WALL AND FLOOR COATINGS

**ISSUE DATE: 12-07-2024** **VALID UNTIL: 11-07-2029**

EPW – Tecnologia de Extrusão, Lda.

Version 1.4. Ed. March 2024

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# 1. GENERAL INFORMATION

## 1.1. The DAPHAbitat System

| | | |
|---|---|---|
| **Program operator:** | Sustainable Construction Platform<br>www.centrohabitat.net<br>geral@clusterhabitat.pt | Cluster Habitat Sustentável |
| **Address:** | Departamento Engenharia Civil<br>Universidade de Aveiro<br>3810-193 Aveiro | |
| **Email address:** | deptecnico@clusterhabitat.pt | |
| **Telephone number:** | (+351) 234 401576 | |
| **Website:** | www.daphabitat.pt | |
| **Logo** | dap habitat | |

## 1.2. EPD owner

| | |
|---|---|
| **Name of the owner:** | EPW — Tecnologia de Extrusão, Lda. |
| **Production site:** | Zona Industrial da Guia, Lotes 6, 7 e 8<br>3105-467 – Guia – Pombal, Portugal |
| **Address (head office):** | Zona Industrial da Guia, Lotes 6, 7 e 8, 3105-467 – Guia – Pombal, Portugal |
| **Telephone:** | Eng. Bruno Pita - +351236 951 421 |
| **E-mail:** | brunopita@epw.pt |
| **Website:** | https://www.epw.pt/en/ |
| **Logo:** | EPW<br>-- |
| **Information concerning the applicable management Systems:** | |
| **Specific aspects regarding the production:** | Division CPC 36 (Rubber and plastic products), Grupo 369, Class 3691, Subclass 36910: Floor coverings of plastics, in rolls or in the form of tiles; wall or ceiling coverings of plastics |
| **Organization's environmental policy:** | |

## 1.3. Information concerning the EPD

| | |
|---|---|
| **Authors:** | CERIS - Civil Engineering Research and Innovation for Sustainability<br>Av. Rovisco Pais \| 1049-001 Lisboa<br>Responsible practitioner(s): José Dinis Silvestre and Marco Frazão Pedroso |
| **Contact of the authors:** | Phone: +351 218 419709<br>E-mail: jose.silvestre@tecnico.ulisboa.pt e marco.pedroso@tecnico.ulisboa.pt |
| **Issue date:** | 12/07/2024 |
| **Registration date:** | 14/10/2024 |
| **Registration number:** | DAP 007:2024 |
| **Valid until:** | 11/07/2029 |
| **Representativity of the EPD (location, manufacturer, group of manufacturers):** | EPD corresponding to the polymeric profiles manufactured at an industrial unit in Guia – Pombal, Portugal. |
| **Where to consult explanatory material:** | - |
| **Type of EPD:** | EPD from cradle to gate, including transportation (A4) and end-of-life (C1 to C4) and module D. |

## 1.4. Demonstration of the verification

| External independent verification, accordingly with the standard ISO 14025:2010 and EN 15804:2012+A2:2019 | |
|---|---|
| Certification Body | Verifier |
| (CERTIF – Associação para a Certificação) | (Helena Gervásio) |

## 1.5. EPD Registration

| |
|---|
| Programme operator |
| (Plataforma para a Construção Sustentável) |

## 1.6. PCR (product category rules) basic model

| | |
|---|---|
| **Name:** | - |
| **Issue date:** | - |
| **Number of registration on the data base:** | - |
| **Version:** | - |
| **Identification and contact of the coordinator (s):** | - |
| **Identification and contact of the authors:** | - |
| **Composition of the Sectorial Panel:** | - |
| **Consultation period:** | - |
| **Valid until:** | - |

CEN standard EN 15804 serves as the core Product Category Rules (PCR)

## 1.7. Relevant c-PCR (Complementary product category rules)

| | |
|---|---|
| **Name:** | 1. Product Category Rules (PCR) – Floor coatings – V.1.2 (2014) – V.2.2. EDITION JUNE 2022<br>2. Product Category Rules (PCR) – Wall coatings – V.1.2 (2014) – V.2.2. EDITION JUNE 2022 |
| **Issue date:** | 1. 10/02/2014<br>2. 10/02/2014 |
| **Number of registration on the data base:** | 1. PCR001:2014<br>2. PCR001:2014 |
| **Version:** | 1. Version 2.2<br>2. Version 2.2 |
| **Identification and contact of the coordinator (s):** | 1. Luís Arroja \| arroja@ua.pt<br>Marisa Almeida \| marisa@ctcv.pt<br>2. Luís Arroja \| arroja@ua.pt<br>Marisa Almeida \| marisa@ctcv.pt |
| **Identification and contact of the authors:** | 1. Marisa Almeida \| marisa@ctcv.pt<br>Luís Arroja \| arroja@ua.pt<br>Ana Cláudia Dias \| acdias@ua.pt<br>2. Marisa Almeida \| marisa@ctcv.pt<br>Luís Arroja \| arroja@ua.pt<br>Ana Cláudia Dias \| acdias@ua.pt |
| **Composition of the Sectorial Panel:** | 1. RMC – Revestimentos de Mármore Compactos, S.A.; Dominó – Indústrias Cerâmicas, S.A.; MAS – Manuel Amorim da Silva, Lda.; Sonae Indústria, SGPS, S.A.; APICER – Associação Portuguesa da Indústria de Cerâmica.<br>2. RMC – Revestimentos de Mármore Compactos, S.A.; Dominó – Indústrias Cerâmicas, S.A.; MAS – Manuel Amorim da Silva, Lda.; Sonae Indústria, SGPS, S.A.; APICER – Associação Portuguesa da Indústria de Cerâmica. |
| **Consultation period:** | 1. 01/08/2013 to 30/11/2013<br>2. 01/08/2013 to 30/11/2013 |
| **Valid until:** | 1. 01/06/2027<br>2. 01/06/2027 |

## 1.8. Information concerning the product/product class

<table>
<tr><td>Identification of the product:</td><td>This EPD covers the polymeric profiles produced at an industrial unit (Guia – Pombal, Portugal).</td></tr>
<tr><td>Illustration of the product:</td><td>  </td></tr>
<tr><td>Brief description of the product:</td><td>The product consists of polymeric base profiles for interior and exterior wall and floor cladding. These profiles can be produced in different colours, presenting a texture similar to natural wood. The production of these panels occurs at an industrial unit located in Guia – Pombal, Portugal.<br>The product consists of polymeric profiles based on wood (40 to 60%), recycled polymer base (40 to 60%), and chemical additives of known composition (10 to 20%) and freely available on the market.<br>The polymeric profiles for interior and exterior wall and floor cladding are available in dimensions of 2300/3200 x 157 x 16 mm. Given their characteristics, these profiles are mainly used for interior and exterior wall and floor cladding, designed to create comfortable environments, and rehabilitate interior and exterior spaces.</td></tr>
<tr><td>Main technical characteristics of the product:</td><td>The technical datasheets of this product are available at: https://www.epw.pt/en/downloads-2/. Table 1 presents some of the product characteristics, and the full list of characteristics can be analysed on the website previously mentioned.<br><br>Table 1: Technical characteristics<br><table><tr><th>DESIGNATION</th><th>VALUE</th><th>UNIT</th></tr><tr><td>HUMIDITY</td><td>0,80</td><td>%</td></tr><tr><td>WARPING</td><td>2</td><td>MM/ML</td></tr><tr><td>DENSITY</td><td>1458</td><td>KG/M$^3$</td></tr><tr><td>IMPACT RESISTANCE</td><td>MAX 0,12</td><td>MM</td></tr><tr><td>VICAT</td><td>85,2</td><td>ºC</td></tr><tr><td>HDT</td><td>74</td><td>ºC</td></tr><tr><td>THERMAL EXPANSION COEFFICIENT</td><td>2,79x10$^{-5}$</td><td>MM/MM ºC</td></tr><tr><td>MARKING</td><td colspan="2">EN 15534-4 PVC W50 UC3</td></tr></table>.</td></tr>
<tr><td>Description of the product's application/use:</td><td>Given their characteristics, these profiles are primarily used for interior and exterior wall and floor cladding, developed to create comfortable environments, and rehabilitate interior and exterior spaces.</td></tr>
<tr><td>Placing on the market / Rules of application in the market / Technical rules of the product:</td><td>• EN 15534-4:2014: Composites made from cellulose-based materials and thermoplastics (usually called wood-polymer composites (WPC) or natural fibre composites (NFC)) - Part 4: Specifications for decking profiles and tiles;</td></tr>
<tr><td>Quality control:</td><td>The quality control follows:<br>• EN 15534-4:2014: Composites made from cellulose-based materials and thermoplastics (usually called wood-polymer composites (WPC) or natural fibre composites (NFC)) - Part 4: Specifications for decking profiles and tiles;</td></tr>
<tr><td>Special delivery conditions:</td><td>-</td></tr>
<tr><td>Components and substances to declare:</td><td>The product consists of polymeric profiles based on wood (40 to 60%), recycled polymer base (40 to 60%), and chemical additives of known composition (10 to 20%), freely available on the market.</td></tr>
</table>

| | |
|---|---|
| **Where explanatory material may be obtained:** | Additional information can be obtained at: https://www.epw.pt/en/downloads-2/. |
| **History of the LCA studies:** | - |

## 1.9. Calculation rules of the LCA

| | |
|---|---|
| **Functional unit:** | - |
| **Declared unit:** | The declared unit adopted for the development of this EPD corresponds to the production of one ton (1 ton) of facade and ceiling cladding profiles, made of polymeric material (wood + polymer + others), with a density of 1.459 kg/m$^3$. |
| **System boundaries:** | This study follows a "cradle-to-gate" approach, also considering its transportation to the United Kingdom (A4), modules C1 to C4 (end-of-life stage), and module D (benefits beyond the system boundary), following EN 15804:2012+A2:2019/AC:2021. |
| **Criteria for the exclusion:** | The LCA developed includes all available data directly associated with the production process of the polymeric profiles. However, the following processes were not considered in this study, as they fall within the cutoff criteria of 1% of renewable and non-renewable primary energy use and 1% of the total mass input of the unit process where they occur, with a maximum of 5% of energy and mass use in the considered stages (A1-A3):<br>- Construction of industrial infrastructure, manufacture, and exchange of equipment and machinery;<br>- Impacts of infrastructure (vehicle manufacturing, road maintenance) associated with the transportation of pre-products and raw materials;<br>- Water consumption or waste and effluents produced in administrative areas and laboratories, as they are not directly associated with the production process;<br>- Transportation of small consumables to the industrial unit;<br>- Other flows considered negligible in modelling due to their contribution below the cutoff criteria.<br>Since the EPD follows a "cradle-to-gate" approach considering modules C1 to C4 and D, all stages of the product lifecycle after they leave the factory are excluded from the scope of the study, including distribution, construction stage (installation of the product in equipment or buildings), and usage processes. |
| **Assumption and limitations** | - |
| **Quality and other characteristics about the information used in the LCA:** | Specific manufacturer data is referenced for the average production of the year 2022. During that year, the polymeric profiles were produced in Guia – Pombal, Portugal. |
| **Allocation rules:** | The industrial facility where these polymeric profiles are manufactured also produces other products, including accessories. Considering this situation, an allocation methodology was used to determine the inputs and outputs associated with the production of these polymeric profiles, considering three different colours, as previously presented.<br><br>Allocation Procedure for Reuse, Recycling, and Recovery: During the production phase (extrusion and cutting), there are losses of the mixture and effluents that are recirculated for reuse in the manufacturing process, in a closed circuit. Benefits associated with the sending of paper, plastic, and metal for recycling were also accounted for, as well as the loads and benefits associated with the recovery of energy from the incineration of "Packaging containing or contaminated by hazardous substances" and "Absorbents, filtering materials (including oil filters without other specifications), cleaning cloths, and protective clothing, contaminated by hazardous substances," present in the Integrated Waste Registration Map (IWRM) under the category of Mixtures of equivalent urban waste. The benefits in module D associated with energy recovery linked to module C3 end-of-life were considered.<br><br>Co-Product Allocation: In this study associated with the production of polymeric profiles, there are no co-products produced during the manufacturing process. However, in the same |

| | |
|---|---|
| | factory, other profiles and accessories are also produced. In this case, the allocation to determine the inputs and outputs associated only with the production of the profiles under study was performed considering the information directly provided by the producer regarding the allocations identified by the company.<br><br>Water Consumption: The water used originates from the collection of rainwater, which is collected and stored in four 30 $m^3$ tanks. The existing water consumption is associated with cleaning and is recirculated in a closed circuit. A loss due to evaporation of about 1 $m^3$ per month is considered, and according to the producer, the need to introduce water from the network is estimated at 15 Liters per ton to compensate for evaporation losses.<br><br>Energy Consumption, Consumables, and Internal Transportation: Electricity consumption, per mass of material produced, was estimated based on the annual consumption of the industrial unit (including internal transportation and operation, including electric forklifts and overhead cranes) and its allocation to profile production. A percentage of the total consumption of the industrial unit was first allocated to the board production line, and then that percentage of the annual electricity consumption was divided by the annual board production, with the final value directly attributable identified by the producer.<br><br>Regarding the consumption of consumables, no significant flows were considered, as the values indicated by the manufacturer were below the cutoff thresholds, although the production and final destination of all waste identified in the Integrated Waste Registry Map (IWRM) for the year 2022 were considered.<br><br>Emissions to Air, Water, and Soil: The profile production process does not produce gas emissions.<br><br>Waste: The production of polymeric profiles, despite resulting in the generation of non-conforming strips and trimmings, is 100% reintegrated. Considering the total waste production for the year recorded in the IWRM and the annual production of these profiles, the amount of waste per profile mass produced was determined.<br><br>Liquid Effluents: The main water consumption is associated with cleaning the extrusion and cutting area. However, the water (mostly originating from rainwater collection) is used in a closed circuit, including the introduction of network water to compensate for losses due to evaporation. These effluents are collected in a settling tank, treated, and reused in the process, in a closed circuit. |
| **Software used for the assessment:** | SimaPro v9.5.0.2 |
| **Background database used for the LCA:** | The databases used have been updated in the last 10 years, mainly in 2023 (Ecoinvent v3.9.1). Regarding technological coverage, all selected datasets involve average European technology or a specific European country (with particular interest in Portugal, when available, given the location of the industrial unit). Whenever possible, the most similar dataset available in the software databases was used, reflecting an average combination of technologies and consumption from European industries (denoted with the suffix RER). The preference for using the Ecoinvent database is mainly related to its recognized reliability. However, for some processes, the most suitable dataset was available in other databases, namely ELCD, which was used to model transportation when not available in Ecoinvent, based on Tremove model v2.7b (2009) and EcoTransIT (2011). |
| **Comparability of EPD for construction products** | The EPD of construction products and services cannot be comparable in case they are not produced according to EN 15804 and EN 15948 and according to the comparability conditions determined by ISO 14025. |

## 1.10. Use of average environmental performance

The present EPD represents the production of polymeric profiles (wood and plastic) at an industrial unit in Pombal - Portugal. Although the same manufacturing process and procedure are followed, there are different commercial

references that may vary in thickness or appearance. However, through their mass (since the declared unit is one ton), it is possible to calculate the associated impacts.

## 1.11. Technical information for Reference Service Life (RSL)

NOT APPLICABLE

## 1.12. Flow diagram of input and output of the processes

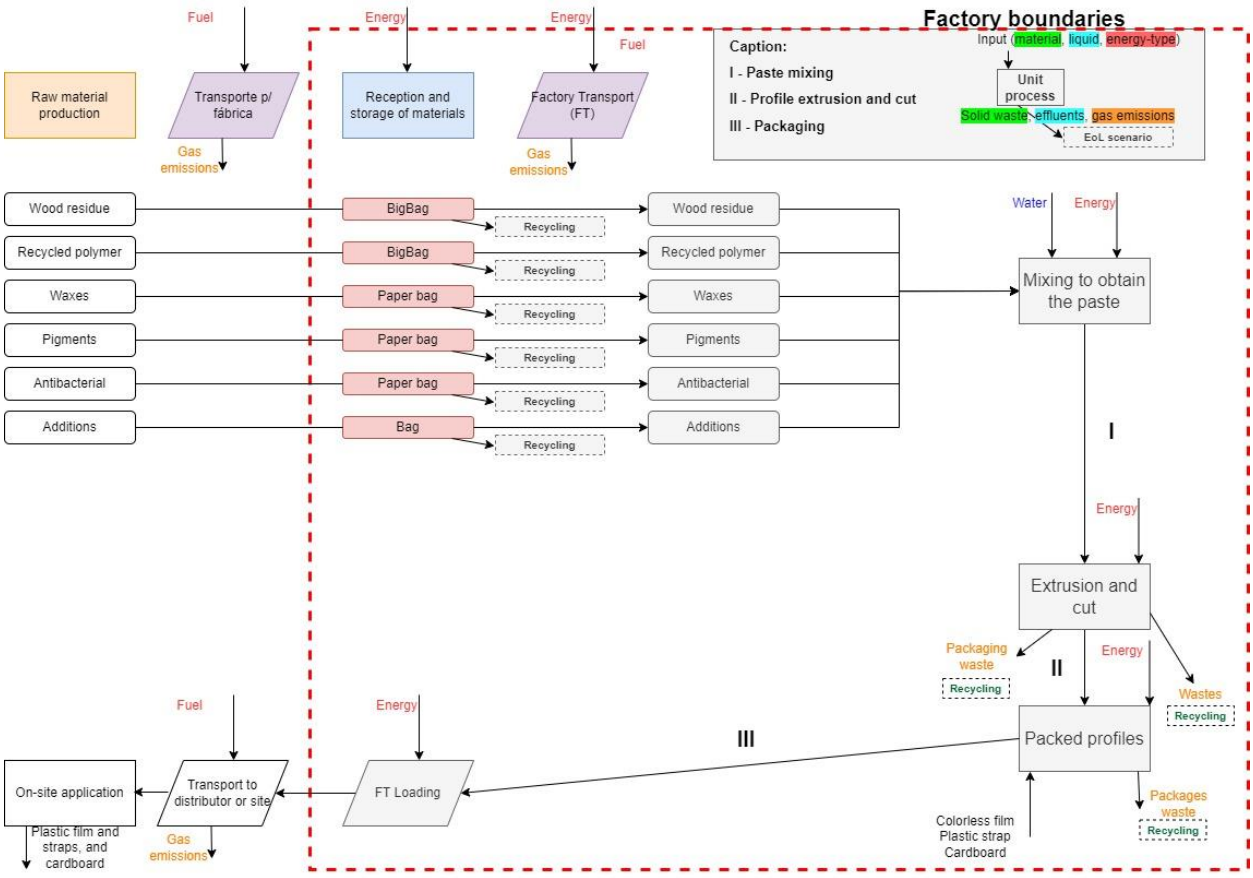


Figure 1: Production system considering the production processes involved to obtain the polymeric profiles (flowchart of the processes flow studied in the LCA analysis conducted for the Pombal site).

## 2. CORE ENVIRONMENTAL IMPACT INDICATORS

### 2.1. DESCRIPTION OF THE SYSTEM BOUNDARIES

(✓= included; ND = module not declared)

| PRODUCT STAGE | | | CONSTRUCTION PROCESS STAGE | | USE STAGE | | | | | | | END OF LIFE STAGE | | | | BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Raw material supply | Transport | Manufacturing | Transport | Construction installation process | Use | Maintenance | Repair | Replacement | Refurbishment | Operational energy use | Operational water use | De-constructions, demolition | Transport | Waste processing | Disposal | Re-use, recovery, recycling potential |
| A1 | A2 | A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
| ✓ | ✓ | ✓ | ✓ | ND | ND | ND | ND | ND | ND | ND | ND | ✓ | ✓ | ✓ | ✓ | ✓ |

The manufacturing process begins when the raw materials arrive at the industrial unit, where they are stored.

The manufacturing process of the polymeric profiles continues with the execution of mixing the raw materials, in the indicated proportions (a formulation that is proprietary and patented), to obtain a paste. This paste proceeds to an extruder that molds the paste and obtains the profiles according to the manufacturing requirements, namely density. Additionally, the obtained profiles are subject to cutting and adjustment to obtain the necessary dimensions. All these procedures are powered by electricity, sourced either from the grid or from photovoltaic panels for self-consumption.

Then, the profiles are packaged using plastic film and straps for subsequent dispatch.

The transportation considered here is to an intermediate storage location in the United Kingdom, from where the respective transports to the clients' work sites will be carried out.

Finally, the impacts associated with the end-of-life stage and the potential benefits associated located outside the system boundary were considered.

#### 2.1.1. JUSTIFICATION FOR THE EXEMPTION TO DECLARE MODULES C1, C2, C3, C4 AND D

Not applicable.

## 2.2. Core environmental impact indicators

| | Global warming potential total; GWP-total | Global warming potential fossil; GWP-fossil | Global warming potential biogenic; GWP-biogenic | Global warming potential land use and land use change; GWP-luluc | Depletion potential of the stratospheric ozone layer; ODP | Acidification potential; AP |
|---|---|---|---|---|---|---|
| Unit | kg $CO_2$ eq. | kg $CO_2$ eq. | kg $CO_2$ eq. | kg $CO_2$ eq. | kg CFC 11 eq. | mol $H^+$ eq. |
| Modules A1-A3 | -2,22E+02 | 5,03E+02 | -7,27E+02 | 2,02E+00 | 8,82E-06 | 2,31E+00 |
| Module A4 | 4,30E+02 | 4,29E+02 | 3,91E-01 | 2,10E-01 | 9,39E-06 | 1,78E+00 |
| Module C1 | 1,24E+01 | 1,22E+01 | 1,76E-01 | 2,20E-03 | 2,66E-07 | 6,11E-02 |
| Module C2 | 9,55E+00 | 9,54E+00 | 8,68E-03 | 4,66E-03 | 2,09E-07 | 3,95E-02 |
| Module C3 | 1,73E+03 | 7,10E+02 | 1,02E+03 | 1,67E-02 | 4,46E-06 | 3,93E-01 |
| Module C4 | 1,37E+01 | 1,36E+01 | 1,22E-01 | 2,26E-03 | 2,94E-07 | 6,47E-02 |
| Module D | -5,93E+02 | -5,90E+02 | -5,20E-01 | -2,76E+00 | -2,15E-05 | -1,60E+00 |

LEGEND:

- Product stage
- Construction process stage
- End - of - life stage
- Benefits and loads beyond the system boundary

NOTES:
Units expressed by declared unit.

| | Eutrophication potential aquatic freshwater; EP-freshwater | Eutrophication potential aquatic marine; EP-marine | Eutrophication potential terrestrial; EP-terrestrial | Formation potential of tropospheric ozone; POCP | Abiotic depletion potential for non-fossil resources ADP-minerals&metals | Abiotic depletion potential for fossil resources potential ADP-fossil | Water (user) deprivation potential; WDP |
|---|---|---|---|---|---|---|---|
| Units | kg P eq. | kg N eq. | mol N eq. | Kg COVNM eq. | kg Sb eq. | MJ, P.C.I | $m^3$ World eq. deprived |
| Modules A1-A3 | 2,09E-02 | 4,45E-01 | 4,81E+00 | 1,73E+00 | 3,09E-03 | 8,28E+03 | 1,76E+02 |
| Module A4 | 3,46E-03 | 6,72E-01 | 7,23E+00 | 2,60E+00 | 1,39E-03 | 6,12E+03 | 2,50E+01 |
| Module C1 | 8,09E-05 | 2,55E-02 | 2,76E-01 | 1,03E-01 | 3,21E-05 | 2,16E+02 | 5,01E+02 |
| Module C2 | 7,68E-05 | 1,49E-02 | 1,61E-01 | 5,78E-02 | 3,08E-05 | 1,36E+02 | 5,55E-01 |
| Module C3 | 5,83E-04 | 1,77E-01 | 1,98E+00 | 5,22E-01 | 8,85E-05 | 1,99E+02 | 9,35E+00 |
| Module C4 | 7,90E-05 | 2,73E-02 | 2,95E-01 | 1,12E-01 | 1,90E-05 | 2,32E+02 | 1,02E+00 |
| Module D | -7,43E-03 | -2,76E-01 | -3,11E+00 | -1,38E+00 | -5,42E-04 | -8,61E+03 | -1,07E+02 |

LEGENDA:

- Product stage
- Construction process stage
- End - of - life stage
- Benefits and loads beyond the system boundary

NOTES: P.C.I. – Net calorific value
Units expressed by declared unit.
"The results obtained for the indicators "Abiotic depletion potential for non-fossil resources (ADP-minerals&metals)", "Abiotic depletion potential for fossil resources potential (ADP-fossil)" and "Water (user) deprivation potential (WDP)" should be used with caution since the uncertainties associated with them are high or there is little experience with the indicator."

## 2.3. Additional environmental impact indicators

| | Potential incidence of disease due to PM emissions<br>PM | Potential Human exposure efficiency relative to U235<br>IRP | Potential Comparative Toxic Unit for ecosystems<br>ETP-fw | Potential Comparative Toxic Unit for humans, cancer effects<br>HTP-c | Potential Comparative Toxic Unit for humans, not cancer effects<br>HTP-nc | Potential soil quality index<br>SQP |
|---|---|---|---|---|---|---|
| Unit | Disease incidence | kBq U 235 eq. | CTUe | CTUh | CTUh | - |
| Modules A1-A3 | 2,41E-05 | 2,70E+01 | 1,94E+03 | 3,80E-07 | 5,71E-06 | 8,30E+03 |
| Module A4 | 3,50E-05 | 3,07E+00 | 2,23E+03 | 1,96E-07 | 4,31E-06 | 3,65E+03 |
| Module C1 | 8,94E-06 | 4,94E-01 | 1,29E+02 | 5,53E-09 | 7,28E-08 | 5,01E+02 |
| Module C2 | 7,79E-07 | 6,82E-02 | 4,95E+01 | 4,36E-09 | 9,58E-08 | 8,10E+01 |
| Module C3 | 2,99E-06 | 4,55E-01 | 1,83E+03 | 3,42E-07 | 1,36E-06 | 5,69E+01 |
| Module C4 | 1,61E-06 | 2,19E-01 | 1,49E+02 | 5,35E-09 | 6,45E-08 | 5,70E+02 |
| Module D | -6,25E-06 | -1,06E+01 | -4,34E+02 | -1,23E-07 | -2,02E-06 | -9,11E+02 |

LEGEND:

- Product stage
- Construction process stage
- End-of-life stage
- Benefits and loads beyond the system boundary

NOTES:
Units expressed by declared unit.
The impact indicator “POTENTIAL HUMAN EXPOSURE EFFICIENCY RELATIVE TO U235” focuses mainly on the possible impact of a low dose of ionising radiation on human health resulting from the nuclear fuel cycle. It does not consider effects arising from possible nuclear accidents, occupational exposure or the disposal of radioactive waste in underground facilities. Potential ionising radiation from soil, radon and some building materials is also not measured by this indicator.
The results of the indicators “POTENTIAL COMPARATIVE TOXIC UNIT FOR ECOSYSTEMS (ETP-FW)”, “POTENTIAL COMPARATIVE TOXIC UNIT FOR HUMANS, CANCER EFFECTS”, “POTENTIAL COMPARATIVE TOXIC UNIT FOR HUMANS, NOT CANCER EFFECTS” and “POTENTIAL SOIL QUALITY INDEX” should be used with caution as the uncertainties associated with them are high or there is little experience with the indicator.

## 2.4. Indicators describing resource use

| | Primary energy | | | | | |
|---|---|---|---|---|---|---|
| | EPR | RR | TRR | EPNR | RNR | TRNR |
| Unit | MJ, P.C.I. | MJ, P.C.I. | MJ, P.C.I. | MJ, P.C.I. | MJ, P.C.I. | MJ, P.C.I. |
| Modules A1-A3 | 3,79E+03 | 0,00E+00 | 3,79E+03 | 8,02E+03 | 2,53E+02 | 8,27E+03 |
| Module A4 | 9,51E+01 | 0,00E+00 | 9,51E+01 | 6,12E+03 | 0,00E+00 | 6,12E+03 |
| Module C1 | 1,99E+01 | 0,00E+00 | 1,99E+01 | 2,17E+02 | 0,00E+00 | 2,17E+02 |
| Module C2 | 2,11E+00 | 0,00E+00 | 2,11E+00 | 1,36E+02 | 0,00E+00 | 1,36E+02 |
| Module C3 | 1,62E+01 | 0,00E+00 | 1,62E+01 | 2,00E+02 | 0,00E+00 | 2,00E+02 |
| Module C4 | 9,25E+00 | 0,00E+00 | 9,25E+00 | 2,32E+02 | 0,00E+00 | 2,32E+02 |
| Module D | -1,62E+03 | 0,00E+00 | -1,62E+03 | -8,61E+03 | 0,00E+00 | -8,61E+03 |

LEGEND:

Product stage

Construction process stage

End-of-life stage

Benefits and loads beyond the system boundary

EPR = use of renewable primary energy excluding renewable primary energy resources used as raw materials; RR = use of renewable primary energy resources used as raw materials; TRR = total use of renewable primary energy resources (EPR + RR); EPNR = use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; RNR = use of non-renewable primary energy resources used as raw materials; TRNR = total use of non-renewable primary energy resources (EPRN + RNR); NOTE: Units expressed by declared units.

| | Secondary materials and fuels, and use of water | | | |
|---|---|---|---|---|
| | MS | CSR | CSNR | Net use of fresh water |
| Unit | kg | MJ, P.C.I. | MJ, P.C.I. | $m^3$ |
| Modules A1-A3 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 5,37E+00 |
| Module A4 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 7,45E-01 |
| Module C1 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 2,76E-01 |
| Module C2 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,66E-02 |
| Module C3 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 6,59E-01 |
| Module C4 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 2,77E-01 |
| Module D | 0,00E+00 | 0,00E+00 | 0,00E+00 | -2,27E+00 |

LEGEND:

Product stage

Construction process stage

End-of-life stage

Benefits and loads beyond the system boundary

MS = use of secondary material; CSR = use of renewable secondary fuels; CSNR = use of non-renewable secondary fuels.
NOTE: Units expressed by declared units.

## 2.5. Other environmental information describing different waste categories

| | Hazardous waste disposed | Non-hazardous waste disposed | Radioactive waste disposed |
|---|---|---|---|
| Unit | kg | kg | kg |
| Modules A1-A3 | 3,40E-02 | 1,51E+02 | 2,08E-02 |
| Module A4 | 3,90E-02 | 2,99E+02 | 1,99E-03 |
| Module C1 | 9,80E-04 | 8,51E+02 | 2,69E-04 |
| Module C2 | 8,66E-04 | 6,65E+00 | 4,42E-05 |
| Module C3 | 1,09E-03 | 1,88E+01 | 3,14E-04 |
| Module C4 | 1,08E-03 | 1,00E+03 | 1,21E-04 |
| Module D | -3,28E-02 | -2,05E+01 | -7,29E-03 |

LEGENDA:

- Product stage
- Construction process stage
- End-of-life stage
- Benefits and loads beyond the system boundary

NOTES:
Units expressed by declared unit.

## 2.6. Environmental information describing output flows

| | Components for re-use | Materials for recycling | Materials for energy recovery | Exported energy |
|---|---|---|---|---|
| | | | | Energy carrier 1 |
| Unit | kg | kg | kg | MJ |
| Modules A1-A3 | 0,00E+00 | 4,19E+01 | 6,96E+00 | 0,00E+00 |
| Module A4 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| Module C1 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| Module C2 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| Module C3 | 0,00E+00 | 0,00E+00 | 8,00E+02 | 0,00E+00 |
| Module C4 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| Module D | 0,00E+00 | 0,00E+00 | 0,00E+00 | 4,92E+03 |

LEGEND:

- Product stage
- Construction process stage
- End-of-life stage
- Benefits and loads beyond the system boundary

NOTES:
Units expressed by declared unit.

## 2.7. Information describing the biogenic carbon content at the factory gate

| Biogenic carbon content* | Units** | Modules A1-A3 (results) |
|---|---|---|
| Biogenic carbon content in product | Kg C | 210.53 |
| Biogenic carbon content in accompanying packaging | Kg C | Not applicable |

* 1 kg biogenic carbon is equivalent to 44/12 kg of $CO_2$.

** This information can be omitted whenever the content of biogenic carbon in the product, or in the respective packaging, is less than 5% of the mass of the product, or the respective packaging.

# 3. SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION

## 3.1. A4 Transport to the building site – Construction process stage

| Parameter | Units*/comments | Results expressed per functional or declared unit |
|---|---|---|
| | | Scenario A4.1 |
| Scenario | Name and description of the scenario | Transport of the polymeric profiles from the manufacturing unit in Guia – Pombal to a storage location in Leicester – England. |
| Related scenario | Name of the scenarios linked to this scenario | A1 to A3 |
| Fuel type and consumption of vehicle or vehicle type used for transport e.g. long-distance truck, boat, etc. | Litre of fuel type per distance, or vehicle type** | Process from Ecoinvent 3 "Transport, freight, lorry 16-32 metric ton, EURO4 {RER}\| transport, freight, lorry 16-32 metric ton, EURO4 \| Cut-off, S" |
| Distance | km | 2.295 |
| Capacity utilization (including empty returns) | % | 100% returns full |
| Bulk density of transported products | $kg/m^3$ | 1459 |
| Volume capacity utilization factor (factor: =1 or < 1 or ≥ 1 for compressed or nested packaged products) | Not applicable | NA |

* expressed per declared unit

** Directive 2007/37/EC (European Emission Standard)

## 3.2. C1 DE-CONSTRUCTION, DEMOLITION – END OF LIFE OF THE PRODUCT

| Parameter | Units/comments | Results expressed per functional or declared unit |
|---|---|---|
| | | Scenario C1.1 |
| Scenario | Name and description of the scenario | Selective demolition of the polymeric profiles of a building, including energy for their removal and emission of particles associated with their removal and handling. |
| Related scenario | Name of the scenarios linked to this scenario | C2.1 |
| Material collected separately | kg | 1000 |
| Material collected with mixed construction waste | kg | - |
| Additional assumptions | units as appropriate | - |

## 3.3. C2 TRANSPORT – END OF LIFE OF THE PRODUCT

| Parameter | Units/comments | Results expressed per functional or declared unit |
|---|---|---|
| | | Scenario C2.1 |
| Scenario | Name and description of the scenario | Transport of waste from these profiles from the demolition site (considered to be in England) to the landfill or energy recovery sites. |
| Related scenario | Name of the scenarios linked to this scenario | C1.1, C3.1 e C4.1 |
| Fuel type and consumption of vehicle or vehicle type used for transport e.g. long-distance truck, boat, etc. | Litre of fuel type per distance, or vehicle type* | Ecoinvent 3 process "Transport, freight, lorry 16-32 metric ton, EURO4 {RER}\| transport, freight, lorry 16-32 metric ton, EURO4 \| Cut-off, S" |
| Distance | km | Avg 30 km |
| Capacity utilization (including empty returns) | % | 100% considering empty return |
| Bulk density of transported products | kg/m³ | NA |
| Volume capacity utilization factor (factor: =1 or < 1 or ≥ 1 for compressed or nested packaged products) | Not applicable | NA |
| Additional assumptions | units as appropriate | - |
| *Commission Directive 2007/37/EC (European Emission Standard) | | |

## 3.4. C3 WASTE PROCESSING FOR REUSE, RECOVERY AND/OR RECYCLING – END OF LIFE OF THE PRODUCT

| Parameter | Units/comments | Results expressed per functional or declared unit |
|---|---|---|
| | | Scenario C3.1 |
| Scenario | Name and description of the scenario | Processing of waste for energy recovery, for the case of 80% of the waste from these polymeric profiles, considering a location in England. |
| Related scenario | Name of the scenarios linked to this scenario | C2.1 and D.1 |
| Material for re-use | kg | - |
| Material for recycling | kg | - |
| Material for energy recovery | kg | 800 (considering 50% wood and 50% plastic, by mass) |
| Additional assumptions | units as appropriate | - |

## 3.5. C4 DISPOSAL – END OF LIFE OF THE PRODUCT

| Parameter | Units/comments | Results expressed per functional or declared unit |
|---|---|---|
| | | Scenario C3.1 |
| Scenario | Name and description of the scenario | Processing of waste for landfill, considering 20% of the waste from these polymeric profiles, in England. |
| Related scenario | Name of the scenarios linked to this scenario | C2.1 |
| Material for final deposition | kg | 200 (considering 50% wood and 50% plastic, by mass) |
| Additional assumptions | units as appropriate | - |

## 3.6. SCENARIO AND TECHNICAL INFORMATION FOR MODULE D

| Parameter | Units/comments | Results expressed per functional or declared unit |
|---|---|---|
| | | Scenario D.1 |
| Scenario | Name and description of the scenario | Benefit of energy recovery in module C3, for the case of 80% of the waste from polymeric profiles for a location in England that supports such interventions. |
| Related scenario | Name of the scenarios linked to this scenario | C3.1 |
| Net output flow specified per material | units as appropriate | 800 |
| Avoid production | units as appropriate | Electricity -2.43 MJ/kg, and heat production -4.89 MJ/kg |
| Location of end-of-waste point | Not applicable | - |
| Point of functional equivalence | Not applicable | - |
| Assumptions | units as appropriate | - |

## 4. REFERENCES


✓ General Instructions of the DAPHabitat System, Version 2.1, Edition August 2023 (in www.daphabitat.pt);

✓ PCR – basic module for construction products and services. DAPHabitat System. Version 2.3, August 2023 (in www.daphabitat.pt);

✓ ISO 14025:2009 Environmental declarations and labels – Type III environmental declarations – Principles and procedures;

✓ EN 15804:2012 + A2:2019 Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products;

✓ EN 15942:2021 Sustainability of construction works – Environmental product declarations – Communication format business-to-business.