



DECLARATION NUMBER: DAP 003:2016

## EXPANDED CORK GRANULES

ISSUE DATE: 2016-10-06

VALID UNTIL: 2021-10-05

AMORIM ISOLAMENTOS, S.A.





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## 1. GENERAL INFORMATION

### 1.1. The DAPHabitat System

|                          |                                                                                                                                                                                                                 |                                                                                                                                                         |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Program operator:</b> | Associação Plataforma para a Construção Sustentável<br><a href="http://www.centrohabitat.net">www.centrohabitat.net</a><br><a href="mailto:centrohabitat@centrohabitat.net">centrohabitat@centrohabitat.net</a> | <br><b>centroHabitat</b><br>Plataforma para a Construção Sustentável |
| <b>Address:</b>          | Departamento Engenharia Civil<br>Universidade de Aveiro<br>3810-193 Aveiro                                                                                                                                      |                                                                                                                                                         |
| <b>Email address:</b>    | <a href="mailto:deptecnico@centrohabitat.net">deptecnico@centrohabitat.net</a>                                                                                                                                  |                                                                                                                                                         |
| <b>Telephone number:</b> | (+351) 234 401 576                                                                                                                                                                                              |                                                                                                                                                         |
| <b>Website:</b>          | <a href="http://www.daphabitat.pt">www.daphabitat.pt</a>                                                                                                                                                        |                                                                                                                                                         |
| <b>Logo:</b>             |                                                                                                                               |                                                                                                                                                         |

### 1.2. EPD OWNER

|                                                                  |                                                                                                                                                                                           |
|------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Name of the owner:</b>                                        | Amorim Isolamentos, S.A.                                                                                                                                                                  |
| <b>Production site:</b>                                          | Industrial Unit of Vendas Novas: Estrada de Lavre, km 6 – Apartado 7, 7080-026 Vendas Novas, Portugal<br>Industrial Unit of Silves: Vale de Lama – Apartado 27, 8300-999 Silves, Portugal |
| <b>Address (head office):</b>                                    | Industrial Unit of Vendas Novas: Estrada de Lavre, km 6 – Apartado 7, 7080-026 Vendas Novas, Portugal                                                                                     |
| <b>Telephone:</b>                                                | Industrial Unit of Vendas Novas: +351 265 809 220<br>Industrial Unit of Silves: +351 282 440 720                                                                                          |
| <b>E-mail:</b>                                                   | <a href="mailto:geral.aisol@amorim.com">geral.aisol@amorim.com</a>                                                                                                                        |
| <b>Website:</b>                                                  | <a href="http://www.amorimisolamentos.com">www.amorimisolamentos.com</a>                                                                                                                  |
| <b>Logo:</b>                                                     |                                                                                                        |
| <b>Information concerning the applicable management Systems:</b> | ISO 9001: Quality Management Systems (Silves industrial plant)                                                                                                                            |
| <b>Specific aspects regarding the production:</b>                | CAE 16295 – Manufacture of other cork products                                                                                                                                            |

**Organization's environmental policy:**

In view of promoting the sustained growth and progress of its activities, Amorim Isolamentos commits to comply with the following principles:



- Laboring in compliance with all significant regulations regarding the environment, as well as the application of best practices in environmental management, with a view to continuous improvement of its environmental performance.
- Analyze the environmental implications of their activities to minimize gaseous emissions.
- Manage effectively the waste from their activity.
- Commitment to a better management of their activities on the environment, thus contributing to sustainable development.
- Awareness of its employees regarding their individual and collective responsibilities in protecting the environment and improving the quality of life.
- To promote the rational and efficient use of energy, water and other natural resources, through continuous improvement programs or using more economic technologies, if feasible.
- Comply with legal, regulatory and others that the company subscribes, keeping in mind the company's business sense.
- Provide and maintain a harmonious atmosphere with the neighborhood and the local community and collaborate with public or private entities in activities aimed at improving the environmental performance of the company.
- Ensure the dissemination of this environmental policy to all employees and stakeholders.

Through incorporating environmental legislation, Amorim Isolamentos shall periodically review its objectives and strategic principles.

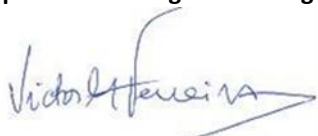
### 1.3. Information concerning the EPD

|                                                                                      |                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Authors:</b>                                                                      | Amorim Isolamentos, S.A.<br>S+A Green Lab                                                                                                                                                                                                                                                                                                                            |
| <b>Contact of the authors:</b>                                                       | 1. Amorim Isolamentos, S.A.<br>Industrial Unit of Vendas Novas: +351 265 809 220<br>Industrial Unit of Silves: +351 282 440 720<br>Carlos Manuel Silva: E. <a href="mailto:cmanuel.aisol@amorim.com">cmanuel.aisol@amorim.com</a><br>2. S+A Green Lab<br>T. +351 213 939 340/9<br>Marta Matos: E. <a href="mailto:mmatos@greenlab.com.pt">mmatos@greenlab.com.pt</a> |
| <b>Emission date:</b>                                                                | 2016-10-06                                                                                                                                                                                                                                                                                                                                                           |
| <b>Registration date:</b>                                                            | 2016-11-30                                                                                                                                                                                                                                                                                                                                                           |
| <b>Registration number:</b>                                                          | DAP 003:2016                                                                                                                                                                                                                                                                                                                                                         |
| <b>Valid until:</b>                                                                  | 2021-10-05                                                                                                                                                                                                                                                                                                                                                           |
| <b>Representativity of the EPD (location, manufacturer, group of manufacturers):</b> | EPD of one (1) product produced in two (2) industrial units belonging to a single producer (Amorim Isolamentos).                                                                                                                                                                                                                                                     |
| <b>Where to consult explanatory material:</b>                                        | <a href="http://www.amorimisolamentos.com">www.amorimisolamentos.com</a>                                                                                                                                                                                                                                                                                             |
| <b>Type of EPD:</b>                                                                  | EPD from cradle-to-gate (A1-A3)                                                                                                                                                                                                                                                                                                                                      |

### 1.4. Demonstration of the verification

|                                                                                                           |                                                                                      |
|-----------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| External independent verification, accordingly with the standard ISO 14025:2009 and EN 15804:2012+A1:2013 |                                                                                      |
| <b>Certification body</b>                                                                                 | <b>Verifier (s)</b>                                                                  |
|                        |  |
| (CERTIF – Associação para a Certificação)                                                                 | (Marisa Almeida   José Dinis Silvestre)                                              |

### 1.5. EPD Registration


|                                                                                     |
|-------------------------------------------------------------------------------------|
| <b>Operador de Programa de registo</b>                                              |
|  |
| (Plataforma para a Construção Sustentável)                                          |

## 1.6. PCR of reference

|                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Name:</b>                                              | PCR: Basic module for construction products and services<br>PCR: Thermal Insulation                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Emission date:</b>                                     | Edition of September 2015<br>Edition of December 2014                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Number of registration on the data base:</b>           | RCP-mb001<br>RCP004:2014                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Version:</b>                                           | Version 2.0.<br>Version 1.1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Identification and contact of the coordinator (s):</b> | PCR: basic module for construction products and services<br>Luis Arroja   <a href="mailto:arroja@ua.pt">arroja@ua.pt</a><br>Marisa Almeida   <a href="mailto:marisa@ctcv.pt">marisa@ctcv.pt</a><br>José Silvestre   <a href="mailto:jds@civil.ist.utl.pt">jds@civil.ist.utl.pt</a><br><br>PCR: Thermal Insulation<br>José Dinis Silvestre<br>Manuel Duarte Pinheiro                                                                                                                                                         |
| <b>Identification and contact of the authors:</b>         | PCR: basic module for construction products and services<br>Marisa Almeida   <a href="mailto:marisa@ctcv.pt">marisa@ctcv.pt</a><br>Luis Arroja   <a href="mailto:arroja@ua.pt">arroja@ua.pt</a><br>José Silvestre   <a href="mailto:jds@civil.ist.utl.pt">jds@civil.ist.utl.pt</a><br>Fausto Freire<br>Cristina Rocha<br>Ana Paula Duarte<br>Ana Cláudia Dias<br>Helena Gervásio<br>Victor Ferreira<br>Ricardo Mateus<br>António Baio Dias<br><br>PCR: Thermal Insulation<br>José Dinis Silvestre<br>Manuel Duarte Pinheiro |
| <b>Composition of the Sector Panel:</b>                   | PCR: Thermal Insulation:<br><ul style="list-style-type: none"> <li>• Amorim Isolamentos</li> <li>• Sofalca-Aglomerados de Cortiça, ACE</li> <li>• Argex-Argila Expandida, S.A.</li> <li>• IberFibran-Poliestireno Extrudido, S.A.</li> <li>• Termolan-Isolamentos termo-acústicos, S.A.</li> <li>• Eurofoam-Indústria de poliestireno extrudido, Lda</li> <li>• Knauf Insulation</li> </ul>                                                                                                                                 |
| <b>Consultation period:</b>                               | 18/11/2015 - 18/01/2016<br>01/08/2013 - 30/11/2013                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Valid until:</b>                                       | January of 2021<br>February of 2019                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |



## 1.7. Information concerning the product/product class

| <b>Identification of the product:</b>                                                               | Expanded Cork Granules with an average density of 70 kg/m <sup>3</sup> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |            |                   |                                      |                 |                       |                           |                                                |                                                         |                               |         |
|-----------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-------------------|--------------------------------------|-----------------|-----------------------|---------------------------|------------------------------------------------|---------------------------------------------------------|-------------------------------|---------|
| <b>Illustration of the product:</b>                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |            |                   |                                      |                 |                       |                           |                                                |                                                         |                               |         |
| <b>Brief description of the product:</b>                                                            | <p>The Expanded Cork Granules is a lightweight fill solution with acoustic insulation properties to be used in screeds, flooring and interior double walls. It is a 100% recyclable and ecological product from a renewable feedstock, since the cork oak bark extract is included in its life cycle.</p> <p><b>Table 1: Composition of the product expanded cork granules:</b></p> <table border="1"> <thead> <tr> <th>Component</th> <th>Percentage (mass)</th> </tr> </thead> <tbody> <tr> <td>Cork (suberin, lignin and cellulose)</td> <td>100%</td> </tr> </tbody> </table> <p>This EPD indicates the average of the values of two plants, Vendas Novas and Silves. The environmental impacts indicated in the EPD are proportional to the density of the material.</p> | Component  | Percentage (mass) | Cork (suberin, lignin and cellulose) | 100%            |                       |                           |                                                |                                                         |                               |         |
| Component                                                                                           | Percentage (mass)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |            |                   |                                      |                 |                       |                           |                                                |                                                         |                               |         |
| Cork (suberin, lignin and cellulose)                                                                | 100%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |            |                   |                                      |                 |                       |                           |                                                |                                                         |                               |         |
| <b>Main technical characteristics of the product:</b>                                               | <p><b>Table 2: Technical characteristics – expanded cork granules.</b></p> <table border="1"> <thead> <tr> <th>Properties</th> <th>Results</th> </tr> </thead> <tbody> <tr> <td>Thermal conductivity (EN12667)</td> <td>0,040 W/ (m.°C)</td> </tr> <tr> <td>Density(NP EN 1007-3)</td> <td>60 – 70 kg/m<sup>3</sup></td> </tr> <tr> <td>Granulometric analysis (EN933-1 e NP ISO 2030)</td> <td>0-3; 3-5; 3-10; 3-15 mm (possibility of other calibers)</td> </tr> <tr> <td>Reaction to fire (EN 13501-1)</td> <td>Class E</td> </tr> </tbody> </table>                                                                                                                                                                                                                     | Properties | Results           | Thermal conductivity (EN12667)       | 0,040 W/ (m.°C) | Density(NP EN 1007-3) | 60 – 70 kg/m <sup>3</sup> | Granulometric analysis (EN933-1 e NP ISO 2030) | 0-3; 3-5; 3-10; 3-15 mm (possibility of other calibers) | Reaction to fire (EN 13501-1) | Class E |
| Properties                                                                                          | Results                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |            |                   |                                      |                 |                       |                           |                                                |                                                         |                               |         |
| Thermal conductivity (EN12667)                                                                      | 0,040 W/ (m.°C)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |            |                   |                                      |                 |                       |                           |                                                |                                                         |                               |         |
| Density(NP EN 1007-3)                                                                               | 60 – 70 kg/m <sup>3</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |            |                   |                                      |                 |                       |                           |                                                |                                                         |                               |         |
| Granulometric analysis (EN933-1 e NP ISO 2030)                                                      | 0-3; 3-5; 3-10; 3-15 mm (possibility of other calibers)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |            |                   |                                      |                 |                       |                           |                                                |                                                         |                               |         |
| Reaction to fire (EN 13501-1)                                                                       | Class E                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |            |                   |                                      |                 |                       |                           |                                                |                                                         |                               |         |
| <b>Description of the products application:</b>                                                     | <p>Thermal insulation and/or sound in the following applications:</p> <ul style="list-style-type: none"> <li>• Pitched roof with loose fill insulation between joists</li> <li>• Filling the internal double walls with Expanded Cork Granules</li> <li>• Rustic decorative floor</li> <li>• Between joists loose fill</li> <li>• Lightweight concrete – Screed filling</li> <li>• Filling plasterboard partitions</li> </ul>                                                                                                                                                                                                                                                                                                                                                                              |            |                   |                                      |                 |                       |                           |                                                |                                                         |                               |         |
| <b>Reference service life:</b>                                                                      | Not specified                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |            |                   |                                      |                 |                       |                           |                                                |                                                         |                               |         |
| <b>Placing on the market / Rules of application in the market / Technical rules of the product:</b> | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |            |                   |                                      |                 |                       |                           |                                                |                                                         |                               |         |
| <b>Quality control:</b>                                                                             | According with Technical Product Standards                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |            |                   |                                      |                 |                       |                           |                                                |                                                         |                               |         |
| <b>Special delivery conditions:</b>                                                                 | Not applicable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |            |                   |                                      |                 |                       |                           |                                                |                                                         |                               |         |
| <b>Components and substances to declare:</b>                                                        | Not applicable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |            |                   |                                      |                 |                       |                           |                                                |                                                         |                               |         |
| <b>History of the LCA studies:</b>                                                                  | --                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |            |                   |                                      |                 |                       |                           |                                                |                                                         |                               |         |

## 2. ENVIRONMENTAL PERFORMANCE OF THE PRODUCT

### 2.1. Calculation rules of the LCA

|                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Declared unit:</b>                                                           | 1 m <sup>3</sup> of expanded cork granules with a density of 70 kg/m <sup>3</sup> (including packaging)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Functional unit:</b>                                                         | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>System boundaries:</b>                                                       | EPD from cradle-to-gate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Criteria for the exclusion:</b>                                              | <p>The following processes were not considered in this study, since they fall under the cut-off criteria:</p> <ul style="list-style-type: none"> <li>• Construction of industrial infrastructures and manufacture of equipment and machinery;</li> <li>• The burdens of infrastructures (vehicle manufacturing, road maintenance) associated to transportation of pre-products and raw materials;</li> <li>• Water consumption and wastewater in administrative areas and laboratories was also not considered, since these burdens are not directly associated to the production process (all products);</li> <li>• Raw material packaging was considered negligible and falling in the cut-off criteria, since the raw materials with a higher percentage (in weight) in the products analysed are bought in bulk.</li> <li>• Packaging of products used to treat the water in the boiler of Amorim Isolamentos was also not considered in the model, since the quantities of these products are negligible, making their packaging also insignificant in the overall impacts;</li> <li>• The dataset used to model the cork extraction includes consumption of electricity and diesel in equipment, however, there is no information showing that these consumptions include the energy used in the separation process of cork from wood, a process which the manufacturer does not have information;</li> <li>• The grinding stage results in cork powder, soil, stones and sand. The waste of soil, stones and sand produced are not accounted and do not result in additional impacts, since they go back to their origin and are inert materials;</li> <li>• Wastewater basic treatment and release to a water stream (Silves) was not considered, since it represented less than 0,3% of the total impacts;</li> <li>• Sanders used in the process is also negligible;</li> <li>• Also paper and cardboard in packaging stage were not considered, since the amount of paper used in labeling is irrelevant and the cardboard is only used to pack a small amount of products.</li> </ul> |
| <b>Assumption and limitations:</b>                                              | <p>For the cases on which producers have no influence or specific information such as the extraction of raw materials and the production of electricity, generic data were used databases Ecoinvent v2.2 and v3.</p> <p>Environmental impacts indicated in this DAP are a simple average of the impacts of production of the ICB in the industrial units of Vendas Novas and Silves.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Quality and other characteristics about the information used in the LCA:</b> | <p>The collected production data are for 2014 and are in line with reality. The generic data used belong to Ecoinvent v3 databases and meet the quality criteria (age, geographical and technology coverage, plausibility, etc.) generic data.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Allocation rules:</b>                                                        | <p>In 2014, at the plant in Vendas Novas produced ICB (74.6% mass production), cork granules (24.2%) and coconut fibers (1.3%). In Silves unit it was produced only ICB (79.2%) and cork granules (20.8%). The production of ICB results in the production of two co-products, cork powder and granulated cork. The cork powder has a negligible market value in relation to the ICB and the cork granules, so that environmental burdens are allocated entirely to them. For inputs and outputs common to the ICB and granules, it was made an allocation of impacts, considering a percentage of annual output associated only with cork products. For the inputs and outputs common to all products, it was also carried out a weight allocation of impacts considering all manufactured products including coconut fibers, in Vendas Novas.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Comparability of EPD for construction products:</b>                          | <p>The EPD of construction products and services cannot be comparable in case they are not produced according to EN 15804 and EN 15942 and according to the comparability conditions determined by ISO 14025.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

**2.1.1. Flow diagram of input and output of the processes**

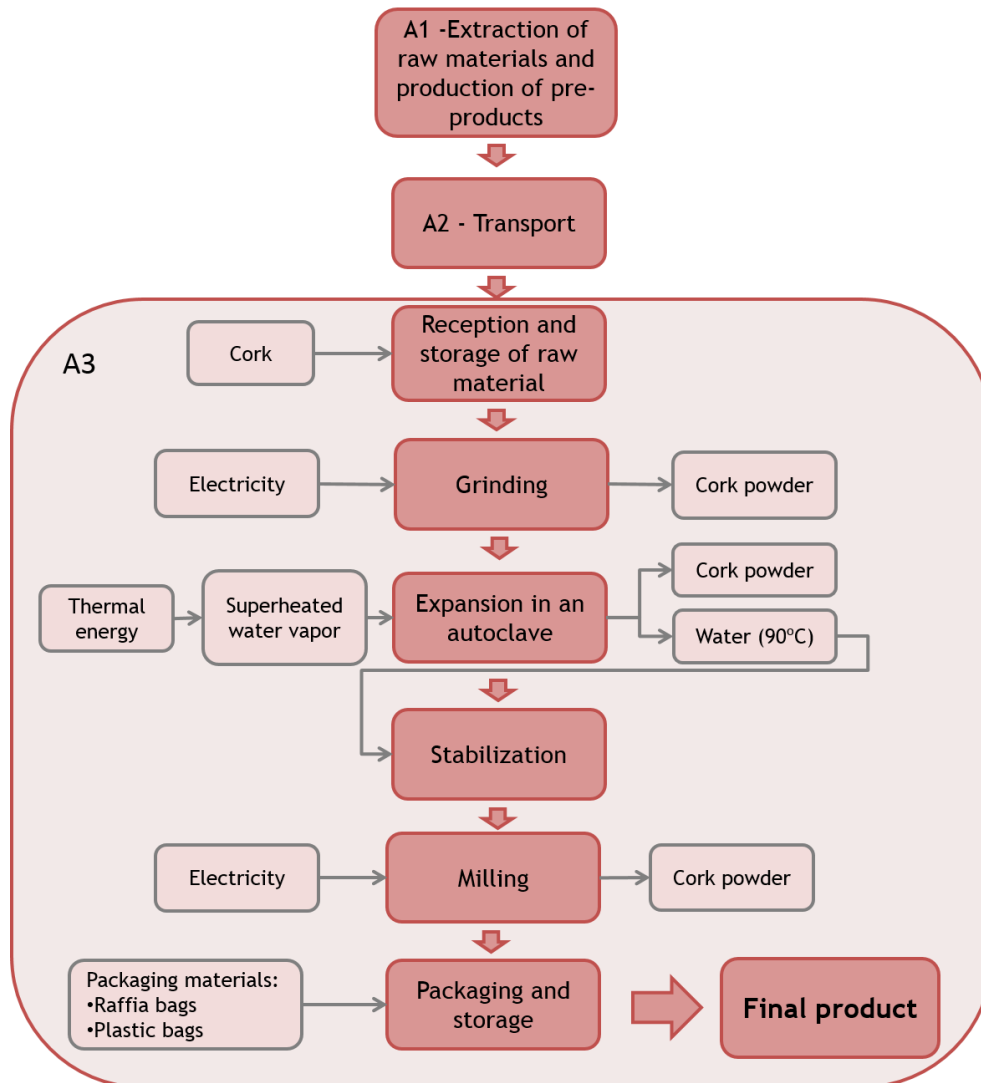


Figure 1: Product stage of the product expanded cork granules (A1-A3)

## 2.1.2. Description of the system boundaries

(✓= included; ✗= 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                                             |
| ✓                   | ✓         | ✓             | ✗                          | ✗                                 | ✗         | ✗           | ✗      | ✗           | ✗             | ✗                      | ✗                     | ✗                            | ✗         | ✗                | ✗        | ✗                                             |

Expanded cork granules are a natural product since the cork granules are aggregated solely by the action of the natural resins contained in cork.

The first stage of the production process consists in extraction of cork from the cork oak. This operation can be performed manually or with electric equipment. After this procedure, cork is transported to the industrial unit by truck and is stored. In the factory the cork is ground into granules with the appropriate size and placed in an autoclave. Under the effect of pressure and superheated steam the granules expand and are agglomerated, originating blocks. This process occurs only with the natural resin (suberin) of the raw material, meaning that it does not require any extra use of any adhesives. Once formed, the blocks are forwarded to cooling stage, where recycled water is injected at a temperature of approximately 90°C. The stabilization phase, requiring any use of energy, occurs by placing the blocks in the tunnel and then in a ventilated space. The cork granules can be a result of material losses during the process of shaping the block and can also be produced by milling the blocks into granules of the desired sizes. After this stage, the product is packed in plastic or raffia bags.


## 2.2. Parameters describing environmental impacts

|                                                                                                                                                                                                                                                                        | Product | Global warming potential; GWP              | Depletion potential of the stratospheric ozone layer; ODP | Acidification potential of soil and water, AP | Eutrophication potential, EP | Formation potential of tropospheric ozone, POCP | Abiotic depletion potential for non-fossil resources | Abiotic depletion potential for fossil resources |               |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|--------------------------------------------|-----------------------------------------------------------|-----------------------------------------------|------------------------------|-------------------------------------------------|------------------------------------------------------|--------------------------------------------------|---------------|
|                                                                                                                                                                                                                                                                        |         |                                            |                                                           |                                               |                              |                                                 |                                                      |                                                  | kg CO2 equiv. |
| Raw material supply<br>Transport<br>Manufacturing                                                                                                                                                                                                                      | A1-A3   | 1 m <sup>3</sup> of expanded cork granules | -1,19E+02                                                 | 4,06E-06                                      | 6,78E-01                     | 2,02E-01                                        | 3,81E-02                                             | 4,25E-05                                         | 4,73E+02      |
| <p>LEGEND:</p> <p><span style="display: inline-block; width: 10px; height: 10px; background-color: #d9ead3; border: 1px solid #000;"></span> Product stage</p> <p>NOTES: P.C.I. – Low Heating Value (LHV).<br/>Units expressed per declared unit (1m<sup>3</sup>).</p> |         |                                            |                                                           |                                               |                              |                                                 |                                                      |                                                  |               |

## 2.3 Parameters describing resource use

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Product | Primary energy                             |            |            |            |            |            | Secondary materials and fuels, and use of water |            |            |                        |          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|--------------------------------------------|------------|------------|------------|------------|------------|-------------------------------------------------|------------|------------|------------------------|----------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |         | EPR                                        | RR         | TRR        | EPNR       | RNR        | TRNR       | MS                                              | CSR        | CSNR       | Net use of fresh water |          |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |         | MJ, P.C.I.                                 | MJ, P.C.I. | MJ, P.C.I. | MJ, P.C.I. | MJ, P.C.I. | MJ, P.C.I. | kg                                              | MJ, P.C.I. | MJ, P.C.I. | m <sup>3</sup>         |          |
| Raw material supply<br>Transport<br>Manufacturing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | A1-A3   | 1 m <sup>3</sup> of expanded cork granules | 5,81E+02   | 3,53E+03   | 4,11E+03   | 5,37E+02   | 2,39E+00   | 5,39E+02                                        | 0,00E+00   | 0,00E+00   | 0,00E+00               | 1,05E+00 |
| <p>LEGEND:</p> <p><span style="display: inline-block; width: 10px; height: 10px; background-color: #d9ead3; border: 1px solid #000;"></span> Product stage</p> <p>EPR = use of renewable primary energy excluding renewable primary energy resources used as raw materials;<br/> RR = use of renewable primary energy resources used as raw materials;<br/> TRR = total use of renewable primary energy resources (EPR + RR);<br/> EPNR = use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials;<br/> RNR = use of non-renewable primary energy resources used as raw materials;<br/> TRNR = total use of non-renewable primary energy resources (EPNR + RNR);<br/> MS = use of secondary material;<br/> CSR = use of renewable secondary fuels;<br/> CSNR = use of non-renewable secondary fuels.</p> <p>NOTE: Units expressed per declared unit (1m<sup>3</sup>).</p> |         |                                            |            |            |            |            |            |                                                 |            |            |                        |          |

## 2.4. Other environmental information describing different waste categories

|                     |        | Product                                                                                                                                                                              | Hazardous waste disposed<br>kg | Non hazardous waste disposed<br>kg | Radioactive waste disposed<br>kg |
|---------------------|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|------------------------------------|----------------------------------|
| Raw material supply | A1- A3 | 1 m <sup>3</sup> of expanded cork granules                                                                                                                                           | 6,05E-04                       | 6,08E+00                           | 3,50E-03                         |
| Transport           |        |                                                                                                                                                                                      |                                |                                    |                                  |
| Manufacturing       |        |                                                                                                                                                                                      |                                |                                    |                                  |
|                     |        | <p>LEGEND:<br/>  Product stage</p> <p>NOTE: Units expressed per declared unit (1m<sup>3</sup>).</p> |                                |                                    |                                  |

## 2.5. Other environmental information describing output flows

| Parameters                                                                                                    | Units*                | Results  |
|---------------------------------------------------------------------------------------------------------------|-----------------------|----------|
| Components for re-use                                                                                         | kg                    | **       |
| Materials for recycling                                                                                       | kg                    | 0,00E+00 |
| Radioactive waste disposed                                                                                    | kg                    | 3,50E-03 |
| Materials for energy recovery                                                                                 | kg                    | **       |
| Exported energy                                                                                               | MJ per energy carrier | **       |
| <p>* expressed by declared unit (1m<sup>3</sup>).</p> <p>** Not applicable to processes in this factories</p> |                       |          |

### 3. SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION

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

| Parameters                                                                                                   | Units*                                                                                                         | Results |
|--------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|---------|
| 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, Commission Directive 2007/37/EC (European Emission Standard) | N/A     |
| Distance                                                                                                     | km                                                                                                             | N/A     |
| Capacity utilization (including empty returns)                                                               | %                                                                                                              | N/A     |
| Bulk density of transported products                                                                         | kg/m <sup>3</sup>                                                                                              | N/A     |
| Volume capacity utilisation factor (factor=1 or < 1 or > 1 for compressed or nested packaged products)       | Not applicable                                                                                                 | N/A     |
| * expressed per declared unit                                                                                |                                                                                                                |         |

#### 3.2. A5 Installation of the product in the building – Construction process stage

| Parameters                                                                                                                                                                   | Units*                           | Results |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|---------|
| Ancillary materials for installation (specified by material)                                                                                                                 | kg or other units as appropriate | N/A     |
| Water use                                                                                                                                                                    | m <sup>3</sup>                   | N/A     |
| Other resource use                                                                                                                                                           | kg                               | N/A     |
| Quantitative description of energy type (regional mix) and consumption during the installation process                                                                       | kWh ou MJ                        | N/A     |
| Waste of materials on the building site before waste processing, generated by the product's installation (specified by type)                                                 | kg                               | N/A     |
| Output materials (specified by type) as result of waste processing at the building site e.g. of collection for recycling, for energy recovery, disposal (specified by route) | kg                               | N/A     |
| Direct emissions to ambient air, soil and water                                                                                                                              | kg                               | N/A     |
| * expressed per declared unit                                                                                                                                                |                                  |         |

#### 3.3. B1 Use stage

(Relevant information about the use of the product) if applicable

### 3.4. B2 Maintenance

| Maintenance process                                                                                                                 | (Description or source where description can be found) |         |
|-------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|---------|
| Process                                                                                                                             | Units*                                                 | Results |
| Maintenance cycle                                                                                                                   | Number per RSL or year                                 | N/A     |
| Ancillary materials for maintenance e.g. cleaning agent, specify materials                                                          | kg/cycle                                               | N/A     |
| Waste material resulting from maintenance (specify materials)                                                                       | kg                                                     | N/A     |
| Net fresh water consumption during maintenance                                                                                      | m <sup>3</sup>                                         | N/A     |
| Energy input during maintenance e.g. vacuum cleaning, energy carrier type, e.g. electricity, and amount, if applicable and relevant | kWh                                                    | N/A     |
| <sup>1</sup> Description of other scenarios                                                                                         | Units as appropriate                                   | N/A     |
| * expressed per declared unit                                                                                                       |                                                        |         |

### 3.5. B3 Repair

| Repair process                                                                                     | (Description or source where description can be found)  |         |
|----------------------------------------------------------------------------------------------------|---------------------------------------------------------|---------|
| Inspection process                                                                                 | (Description or source where description can be found)) |         |
| Process                                                                                            | Units*                                                  | Results |
| Repair cycle                                                                                       | Number per RSL or year                                  | N/A     |
| Ancillary materials, e.g. lubricant, specific materials                                            | Kg or kg/ cycle                                         | N/A     |
| Waste material resulting from repair (specify materials)                                           | kg                                                      | N/A     |
| Net fresh water consumption during repair                                                          | m <sup>3</sup>                                          | N/A     |
| Energy input during repair, e.g. crane activity, energy carrier type, e.g. electricity, and amount | kWh /RSL, kWh / cycle                                   | N/A     |
| <sup>2</sup> Description of other scenarios                                                        | units as appropriate                                    | N/A     |
| * expressed per declared unit                                                                      |                                                         |         |

<sup>1</sup> In case there are no more described scenarios, this line should be eliminated in the final document.

<sup>2</sup> In case there is no more described scenarios, this line should be eliminated in the final document



### 3.6. B4 Replacement

| Process                                                                                                                           | Units*                 | Results |
|-----------------------------------------------------------------------------------------------------------------------------------|------------------------|---------|
| Replacement cycle                                                                                                                 | Number per RSL or year | N/A     |
| Energy input during replacement, e.g. crane activity, energy carrier type, e.g. electricity and amount if applicable and relevant | kWh                    | N/A     |
| Exchange of worn parts during the product's life cycle, e.g. zinc galvanized steel sheet, specify materials                       | kg                     | N/A     |
| <sup>5</sup> Description of other scenarios                                                                                       | units as appropriate   | N/A     |
| * expressed per declared unit                                                                                                     |                        |         |

### 3.7. B5 Refurbishment

Refurbishment process (Description or source where description can be found)

| Process                                                                                                                  | Units*                 | Results |
|--------------------------------------------------------------------------------------------------------------------------|------------------------|---------|
| Refurbishment cycle                                                                                                      | Number per RSL or year | N/A     |
| Energy input during refurbishment, energy carrier type e.g. electricity, and amount if applicable and relevant           | kWh                    | N/A     |
| Material input for refurbishment e.g. bricks, including ancillary materials for the refurbishment process e.g. lubricant | kg or kg/cycle         | N/A     |
| Waste material during from refurbishment                                                                                 | kg                     | N/A     |
| <sup>3</sup> Further assumptions for scenario development e.g. frequency and time period of use, number of occupants     | units as appropriate   | N/A     |
| * expressed per declared unit                                                                                            |                        |         |

### 3.8. B6 Use of energy

| Parameters                                                                                                            | Units*                     | Results |
|-----------------------------------------------------------------------------------------------------------------------|----------------------------|---------|
| Ancillary materials specified by material                                                                             | kg or units as appropriate | N/A     |
| Net fresh water consumption                                                                                           | m <sup>3</sup>             | N/A     |
| Type of energy carrier e.g. electricity, natural gas, district heating                                                | kWh                        | N/A     |
| Power output of equipment                                                                                             | kW                         | N/A     |
| Characteristic performance e.g. energy efficiency, emissions, variation of performance with capacity utilization, etc | units as appropriate       | N/A     |
| <sup>6</sup> Further assumptions for scenario development e.g. frequency and period of use, number of occupants       | units as appropriate       | N/A     |
| * expressed per declared unit                                                                                         |                            |         |

<sup>3</sup> In case there are no more described scenarios, this line should be eliminated in the final document.

### 3.9. Use of water

| Parameters                                                                                                             | Units*                     | Results |
|------------------------------------------------------------------------------------------------------------------------|----------------------------|---------|
| Ancillary materials specified by material                                                                              | kg or units as appropriate | N/A     |
| Net fresh water consumption                                                                                            | m <sup>3</sup>             | N/A     |
| Type of energy carrier e.g. electricity, natural gas, district                                                         | kWh                        | N/A     |
| Power output of equipment                                                                                              | kW                         | N/A     |
| Characteristic performance e.g. energy efficiency, emissions, variation of performance with capacity utilization, etc. | units as appropriate       | N/A     |
| <sup>6</sup> Further assumptions for scenario development e.g. frequency and period of use, number of occupants        | units as appropriate       | N/A     |
| * expressed per declared unit                                                                                          |                            |         |

### 3.10. [C1 – C4] End of life of the product

| Processes                                                             | Units*                                      | Results |
|-----------------------------------------------------------------------|---------------------------------------------|---------|
| Collection process specified by type                                  | kg collected separately                     | N/A     |
|                                                                       | kg collected with mixed construction waste  | N/A     |
| Recovery system specified by type                                     | kg for re-use                               | N/A     |
|                                                                       | kg for recycling                            | N/A     |
|                                                                       | kg for energy recovery                      | N/A     |
| Disposal specified by type                                            | kg product or material for final deposition | N/A     |
| <sup>4</sup> Assumptions for scenario development e.g. transportation | units as appropriate                        | N/A     |
| Definition of scenario <sup>7</sup>                                   | units as appropriate                        | N/A     |
| * expressed per declared unit                                         |                                             |         |

<sup>4</sup> In case there is no more described scenarios, this line should be eliminated in the final document

### 3.11. Additional information on release of dangerous substances to indoor air, soil and water during the use stage

| Scenario title                                                                                                                                                                                                                                                                                                                                       | Parameters                                  | Units*               | Results |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|----------------------|---------|
| <b>Release scenario</b><br><b>Indoor air</b>                                                                                                                                                                                                                                                                                                         | <b>Test results according to CEN/TC 351</b> |                      | N/A     |
|                                                                                                                                                                                                                                                                                                                                                      | Description scenario 1 <sup>7</sup>         | units as appropriate | N/A     |
|                                                                                                                                                                                                                                                                                                                                                      | Description scenario n <sup>7</sup>         | units as appropriate | N/A     |
| <b>Release scenario</b><br><b>Soil</b>                                                                                                                                                                                                                                                                                                               | <b>Test results according to CEN/TC 351</b> |                      | N/A     |
|                                                                                                                                                                                                                                                                                                                                                      | Description scenario 1 <sup>7</sup>         | units as appropriate | N/A     |
|                                                                                                                                                                                                                                                                                                                                                      | Description scenario n <sup>7</sup>         | units as appropriate | N/A     |
| <b>Release scenario</b><br><b>Water</b>                                                                                                                                                                                                                                                                                                              | <b>Test results according to CEN/TC 351</b> | (...)                | N/A     |
|                                                                                                                                                                                                                                                                                                                                                      | Description scenario 1 <sup>7</sup>         | units as appropriate | N/A     |
|                                                                                                                                                                                                                                                                                                                                                      | Description scenario n <sup>7</sup>         | units as appropriate | N/A     |
| * expressed per declared unit                                                                                                                                                                                                                                                                                                                        |                                             |                      |         |
| <b>Note:</b> Emissions to indoor air and releases to soil and water according to the horizontal standards on measurement of release of regulated dangerous substances from construction products using harmonised testing methods according to the provisions of the respective Technical Committees for European product standards, when available. |                                             |                      |         |

## REFERENCES

- ✓ General Instructions of the DAPHabitat System, Version 1.0, Edition March 2013 (in [www.daphabitat.pt](http://www.daphabitat.pt));
- ✓ **PCR – basic module for construction products and services.** DAPHabitat System. Version 2.0, September 2015 (in [www.daphabitat.pt](http://www.daphabitat.pt));
- ✓ **PCR – thermal insulation.** DAPHabitat System. Version 1.0., March 2013 (in Portuguese);
- ✓ **ISO 14025:2009** Environmental declarations and labels – Type III environmental declarations – Principles and procedures;
- ✓ **EN 15804:2012+A1:2013** Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products;
- ✓ **EN 15942:2011** Sustainability of construction works – Environmental product declarations – Communication format business-to-business.