



Registration Number: DAP 008:2022



## Mineral Wool coated with aluminium and kraft paper

ISSUE DATE: 30/09/2022

VALID UNTIL: 29/09/2027

**VOLCALIS – ISOLAMENTOS MINERAIS, S.A.**



**Volcalis**  
isolamentos minerais

  
**centroHabitat**  
Plataforma para a Construção Sustentável

VERSION 1.1. EDITION JULY 2015



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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>  | VOLCALIS – Isolamentos Minerais, S.A.  |
| <b>Production site:</b>  | Industrial Area of Bustos, Azurveira, 3770-011 Bustos - Portugal   |
| <b>Address (head office):</b>                                    | Industrial Area of Bustos, Azurveira, 3770-011 Bustos - Portugal   |
| <b>Telephone:</b>  | Industrial Area of Bustos: +351 234 751 533<br>Eng.º José Ávila e Sousa +351 236 210 160   |
| <b>E-mail:</b>   | geral@volcalis.pt  |
| <b>Website:</b>  | www.volcalis.pt  |
| <b>Logo:</b>   | <br>isolamentos minerais  |
| <b>Information concerning the applicable management Systems:</b> | Environmental Management System (EN ISO 14001:2015) – Certificate Nr.: A - 0944 valid until 18/07/2025, issued by EIC (Empresa internacional de Certificação, SA)<br>Quality Management System (EN ISO 9001:2015) - Certificate Nr.: E -6172 valid until 18/07/2025, by EIC  |
| <b>Specific aspects regarding the production:</b>                | SIC Code 23140: MANUFACTURE OF GLASS FIBRES  |
| <b>Organization's environmental policy:</b>                      | <p>Volcalis - Isolamentos Minerais S.A. intends to reconcile economic growth, the satisfaction of all interested parties and environmental concerns, committing itself to adopt a socially and ethically responsible management model.</p> <p>To ensure compliance with this objective, the organization has developed the following guidelines:</p> <ol style="list-style-type: none"> <li>1. Satisfy customers' requirements in order to promote their satisfaction and exceed their expectations, respecting and promoting environmental protection and social responsibility;</li> <li>2. Comply with professionalism and rigor the applicable legislation and regulations on Quality and Environment, as well as other signed compliance obligations;</li> <li>3. Promote the continuous improvement of the Integrated Management System, reviewing the established objectives, the adequacy to the context of the organization, addressing the risks and opportunities inherent to its activity, optimizing the production process and periodically evaluating its significant environmental aspects and impacts;</li> </ol> |

4. Provide all workers with a work environment that promotes equal opportunities, under principles of mutual respect, and that promotes excellence in performance and recognition of the commitment that employees place in a daily basis;
  5. Apply good environmental management practices, with special attention to waste management, focusing on reduction, reuse and recycling, and the preservation of natural resources;
  6. Establish itself in the market, through the high quality and innovation of its products, technical support and compliance with established deadlines;
  7. Promote and communicate this Policy with interested parties, in order to comply with the Quality and Environment requirements of Volcalis - Isolamentos Minerais, S.A.
- The Administration of Volcalis - Isolamentos Minerais, S.A., undertakes the commitment to periodically review this Integrated Management System Policy, to ensure its effectiveness, being this documented, implemented, maintained and communicated as appropriate.



### 1.3. Information concerning the EPD

|  |  |
|--|--|
| <b>Authors:</b>  | CERIS - Civil Engineering Research and Innovation for Sustainability, Vera Durão and José Dinis Silvestre  |
| <b>Contact of the authors:</b>   | Av. Rovisco Pais   1049-001 Lisboa<br>Phone contact: +351 218 419 709; E-mail: jose.silvestre@tecnico.ulisboa.pt   |
| <b>Emission date:</b>  | 30/09/2022   |
| <b>Registration date:</b>  | 14/10/2022   |
| <b>Registration number:</b>  | DAP 008:2022   |
| <b>Valid until:</b>  | 29/09/2027   |
| <b>Representativity of the EPD (location, manufacturer, group of manufacturers):</b> | This is the cradle-to-gate EPD of one (1) product produced in one (1) industrial unit belonging to a single producer (Volcalis - Isolamentos Minerais, S.A). |
| <b>Where to consult explanatory material:</b>  | www.volcalis.pt  |
| <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

| Certification Body  | Verifier (s)  |
|---|---|
|  |  |
| (CERTIF – Associação para a Certificação)   | (Ricardo Mateus)  |

### 1.5. EPD Registration


| Program Operator   |
|--|
|  |
| (Plataforma para a Construção Sustentável)   |

## 1.6. PCR of reference

|   |   |
|---|---|
| <b>Name:</b>  | <ol style="list-style-type: none"> <li>1. PCR: Basic module for construction products and services</li> <li>2. PCR: Thermal Insulation</li> </ol>   |
| <b>Emission date:</b>                                     | <ol style="list-style-type: none"> <li>1. September 2015</li> <li>2. December 2014</li> </ol>   |
| <b>Number of registration on the data base:</b>           | <ol style="list-style-type: none"> <li>1. RCP-mb001</li> <li>2. RCP004:2014</li> </ol>  |
| <b>Version:</b>   | <ol style="list-style-type: none"> <li>1. Version 2.1</li> <li>2. Version 1.2</li> </ol>  |
| <b>Identification and contact of the coordinator (s):</b> | <ol style="list-style-type: none"> <li>1. PCR: basic module for construction products and services <ul style="list-style-type: none"> <li>• Marisa Almeida   <a href="mailto:marisa@ctcv.pt">marisa@ctcv.pt</a></li> <li>• Luís Arroja   <a href="mailto:arroja@ua.pt">arroja@ua.pt</a></li> <li>• José Silvestre   <a href="mailto:jds@civil.ist.utl.pt">jds@civil.ist.utl.pt</a></li> </ul> </li> <li>2. PCR: Thermal Insulation <ul style="list-style-type: none"> <li>• José Dinis Silvestre   <a href="mailto:jose.silvestre@ist.utl.pt">jose.silvestre@ist.utl.pt</a></li> <li>• Manuel Duarte Pinheiro   <a href="mailto:manuel.pinheiro@ist.utl.pt">manuel.pinheiro@ist.utl.pt</a></li> </ul> </li> </ol>   |
| <b>Identification and contact of the authors:</b>         | <ol style="list-style-type: none"> <li>1. PCR: basic module for construction products and services <ul style="list-style-type: none"> <li>• Marisa Almeida   <a href="mailto:marisa@ctcv.pt">marisa@ctcv.pt</a></li> <li>• Luís Arroja   <a href="mailto:arroja@ua.pt">arroja@ua.pt</a></li> <li>• José Silvestre   <a href="mailto:jds@civil.ist.utl.pt">jds@civil.ist.utl.pt</a></li> <li>• Fausto Freire</li> <li>• Cristina Rocha</li> <li>• Ana Paula Duarte</li> <li>• Ana Cláudia Dias</li> <li>• Helena Gervásio</li> <li>• Victor Ferreira</li> <li>• Ricardo Mateus</li> <li>• António Baio Dias</li> </ul> </li> <li>2. PCR: Thermal Insulation <ul style="list-style-type: none"> <li>• José Dinis Silvestre   <a href="mailto:jose.silvestre@ist.utl.pt">jose.silvestre@ist.utl.pt</a></li> <li>• Manuel Duarte Pinheiro   <a href="mailto:manuel.pinheiro@ist.utl.pt">manuel.pinheiro@ist.utl.pt</a></li> </ul> </li> </ol> |
| <b>Composition of the Sector Panel:</b>                   | <ol style="list-style-type: none"> <li>2. PCR: Thermal Insulation <ul style="list-style-type: none"> <li>• Amorim Isolamentos</li> <li>• Sofalca - Soc. Central de Produtos de Cortiça, Lda.</li> <li>• Argex – Argila Expandida, S.A.</li> <li>• Sonae Industria, SGPS, S.A.</li> <li>• IberFibran – Poliestireno Extrudido, S.A.</li> <li>• MasterBlock</li> <li>• Termolan – Isolamentos termo-acústicos, S.A.</li> <li>• Eurofoam – Indústria de poliestireno extrudido, Lda</li> <li>• KnaufInsulation</li> </ul> </li> </ol>  |
| <b>Consultation period:</b>                               | <ol style="list-style-type: none"> <li>1. 18/11/2015 - 18/01/2016</li> <li>2. 01/08/2013 - 30/11/2013</li> </ol>  |
| <b>Valid until:</b>                                       | <ol style="list-style-type: none"> <li>1. December of 2022</li> <li>2. December of 2022</li> </ol>  |



## 1.7. Information concerning the product/product class

| <b>Identification of the product:</b>                                       | Mineral wool (MW), coated with aluminium and kraft paper, density 14.5 kg/m <sup>3</sup> (Volcalis Easy), thickness of 60 mm.   |   |                      |                   |       |                    |  |              |                      |              |              |               |      |     |               |  |                      |   |       |       |           |        |    |    |                  |  |            |           |   |                            |     |  |
|---|---|---|----------------------|-------------------|-------|--------------------|--|--------------|----------------------|--------------|--------------|---------------|------|-----|---------------|--|----------------------|---|-------|-------|-----------|--------|----|----|------------------|--|------------|-----------|---|----------------------------|-----|--|
| <b>Illustration of the product:</b>   |    |   |                      |                   |       |                    |  |              |                      |              |              |               |      |     |               |  |                      |   |       |       |           |        |    |    |                  |  |            |           |   |                            |     |  |
| <b>Brief description of the product:</b>                                    | <p>Volcalis MW is a last generation sand and binder insulation product, coated with aluminium and kraft paper, available in rolls and panels. Its good thermal performance contributes to the comfort and thermal and acoustic efficiency of buildings and reduces energy consumption.</p> <p>This MW is a natural, ecological, long-lasting, and inert product that does not degrade or rot; and is lightweight. Its main benefits are:</p> <ul style="list-style-type: none"> <li>• Due to its internal structure, it is an excellent acoustic insulation;</li> <li>• Fire resistant, not combustible or conductive to heat;</li> <li>• Results from a sustainable process that uses raw materials and advanced technologies of high efficiency;</li> <li>• It's a 100% recyclable product.</li> </ul> <p>For the purpose of this EPD, the results indicated refer to 1 m<sup>2</sup> of product from the range with the lower density, (Volcalis Easy) with 60 mm thickness. Because the production process is the same for all products, it is possible to have the LCA results (per m<sup>2</sup>) for the products with distinct thicknesses using a conversion factor, as indicated in the table below.</p> <p><b>Table 1:</b> Factor to apply to LCA results for different product ranges and thicknesses (in relation to the values presented for aluminium and kraft coated MW in this EPD)</p> <table border="1"> <thead> <tr> <th>Range of product</th> <th>Thickness (mm)</th> <th>Conversion factor</th> </tr> </thead> <tbody> <tr> <td rowspan="5">Easy</td> <td>50</td> <td>0.81</td> </tr> <tr> <td><b>60</b></td> <td><b>1.00</b></td> </tr> <tr> <td>80</td> <td>1.13</td> </tr> <tr> <td>100</td> <td>1.37</td> </tr> <tr> <td>200</td> <td>2.51</td> </tr> </tbody> </table> | Range of product                          | Thickness (mm)       | Conversion factor | Easy  | 50                 | 0.81   | <b>60</b>    | <b>1.00</b>          | 80           | 1.13         | 100           | 1.37 | 200 | 2.51          |  |                      |   |       |       |           |        |    |    |                  |  |            |           |   |                            |     |  |
| Range of product  | Thickness (mm)  | Conversion factor                         |                      |                   |       |                    |  |              |                      |              |              |               |      |     |               |  |                      |   |       |       |           |        |    |    |                  |  |            |           |   |                            |     |  |
| Easy  | 50  | 0.81                                      |                      |                   |       |                    |  |              |                      |              |              |               |      |     |               |  |                      |   |       |       |           |        |    |    |                  |  |            |           |   |                            |     |  |
|   | <b>60</b>   | <b>1.00</b>                               |                      |                   |       |                    |  |              |                      |              |              |               |      |     |               |  |                      |   |       |       |           |        |    |    |                  |  |            |           |   |                            |     |  |
|   | 80  | 1.13                                      |                      |                   |       |                    |  |              |                      |              |              |               |      |     |               |  |                      |   |       |       |           |        |    |    |                  |  |            |           |   |                            |     |  |
|   | 100   | 1.37                                      |                      |                   |       |                    |  |              |                      |              |              |               |      |     |               |  |                      |   |       |       |           |        |    |    |                  |  |            |           |   |                            |     |  |
|   | 200   | 2.51                                      |                      |                   |       |                    |  |              |                      |              |              |               |      |     |               |  |                      |   |       |       |           |        |    |    |                  |  |            |           |   |                            |     |  |
| <b>Main technical characteristics of the product:</b>                       | <p>The main technical characteristics of the product are presented in Table 2.</p> <p><b>Table 2:</b> Summary of the product's technical characteristics (Easy range of products)<br/>(Source: <a href="https://www.volcalis.pt/categoria_file/dop_71_40rakx_rev03-676.pdf">https://www.volcalis.pt/categoria_file/dop_71_40rakx_rev03-676.pdf</a>)</p> <table border="1"> <thead> <tr> <th>Essential characteristics (EN 13162:2012)</th> <th>Test Procedures</th> <th>Declared value</th> <th>Units</th> </tr> </thead> <tbody> <tr> <td rowspan="4">Thermal resistance</td> <td rowspan="4">Thickness – Thermal resistance<br/>EN 12667<br/>or<br/>EN 12939</td> <td>50 mm – 1.25</td> <td rowspan="4">m<sup>2</sup>.K/ W</td> </tr> <tr> <td>60 mm – 1.50</td> </tr> <tr> <td>80 mm – 2.00</td> </tr> <tr> <td>100 mm – 2.50</td> </tr> <tr> <td></td> <td></td> <td>200 mm – 5.00</td> <td></td> </tr> <tr> <td>Thermal conductivity</td> <td>-</td> <td>0.040</td> <td>W/m.K</td> </tr> <tr> <td>Thickness</td> <td>EN 823</td> <td>T1</td> <td>mm</td> </tr> <tr> <td>Reaction to fire</td> <td>Reaction to fire<br/>EN 13501-1 and<br/>EN 15715</td> <td>B – s1, d0</td> <td>Euroclass</td> </tr> <tr> <td>Durability of reaction to fire against heat, weathering, ageing/degradation</td> <td>Durability characteristics</td> <td>NPD</td> <td></td> </tr> </tbody> </table>   | Essential characteristics (EN 13162:2012) | Test Procedures      | Declared value    | Units | Thermal resistance | Thickness – Thermal resistance<br>EN 12667<br>or<br>EN 12939 | 50 mm – 1.25 | m <sup>2</sup> .K/ W | 60 mm – 1.50 | 80 mm – 2.00 | 100 mm – 2.50 |      |     | 200 mm – 5.00 |  | Thermal conductivity | - | 0.040 | W/m.K | Thickness | EN 823 | T1 | mm | Reaction to fire | Reaction to fire<br>EN 13501-1 and<br>EN 15715 | B – s1, d0 | Euroclass | Durability of reaction to fire against heat, weathering, ageing/degradation | Durability characteristics | NPD |  |
| Essential characteristics (EN 13162:2012)                                   | Test Procedures   | Declared value                            | Units                |                   |       |                    |  |              |                      |              |              |               |      |     |               |  |                      |   |       |       |           |        |    |    |                  |  |            |           |   |                            |     |  |
| Thermal resistance  | Thickness – Thermal resistance<br>EN 12667<br>or<br>EN 12939  | 50 mm – 1.25                              | m <sup>2</sup> .K/ W |                   |       |                    |  |              |                      |              |              |               |      |     |               |  |                      |   |       |       |           |        |    |    |                  |  |            |           |   |                            |     |  |
|   |   | 60 mm – 1.50                              |                      |                   |       |                    |  |              |                      |              |              |               |      |     |               |  |                      |   |       |       |           |        |    |    |                  |  |            |           |   |                            |     |  |
|   |   | 80 mm – 2.00                              |                      |                   |       |                    |  |              |                      |              |              |               |      |     |               |  |                      |   |       |       |           |        |    |    |                  |  |            |           |   |                            |     |  |
|   |   | 100 mm – 2.50                             |                      |                   |       |                    |  |              |                      |              |              |               |      |     |               |  |                      |   |       |       |           |        |    |    |                  |  |            |           |   |                            |     |  |
|   |   | 200 mm – 5.00                             |                      |                   |       |                    |  |              |                      |              |              |               |      |     |               |  |                      |   |       |       |           |        |    |    |                  |  |            |           |   |                            |     |  |
| Thermal conductivity  | -   | 0.040                                     | W/m.K                |                   |       |                    |  |              |                      |              |              |               |      |     |               |  |                      |   |       |       |           |        |    |    |                  |  |            |           |   |                            |     |  |
| Thickness   | EN 823  | T1  | mm                   |                   |       |                    |  |              |                      |              |              |               |      |     |               |  |                      |   |       |       |           |        |    |    |                  |  |            |           |   |                            |     |  |
| Reaction to fire  | Reaction to fire<br>EN 13501-1 and<br>EN 15715  | B – s1, d0                                | Euroclass            |                   |       |                    |  |              |                      |              |              |               |      |     |               |  |                      |   |       |       |           |        |    |    |                  |  |            |           |   |                            |     |  |
| Durability of reaction to fire against heat, weathering, ageing/degradation | Durability characteristics  | NPD                                       |                      |                   |       |                    |  |              |                      |              |              |               |      |     |               |  |                      |   |       |       |           |        |    |    |                  |  |            |           |   |                            |     |  |

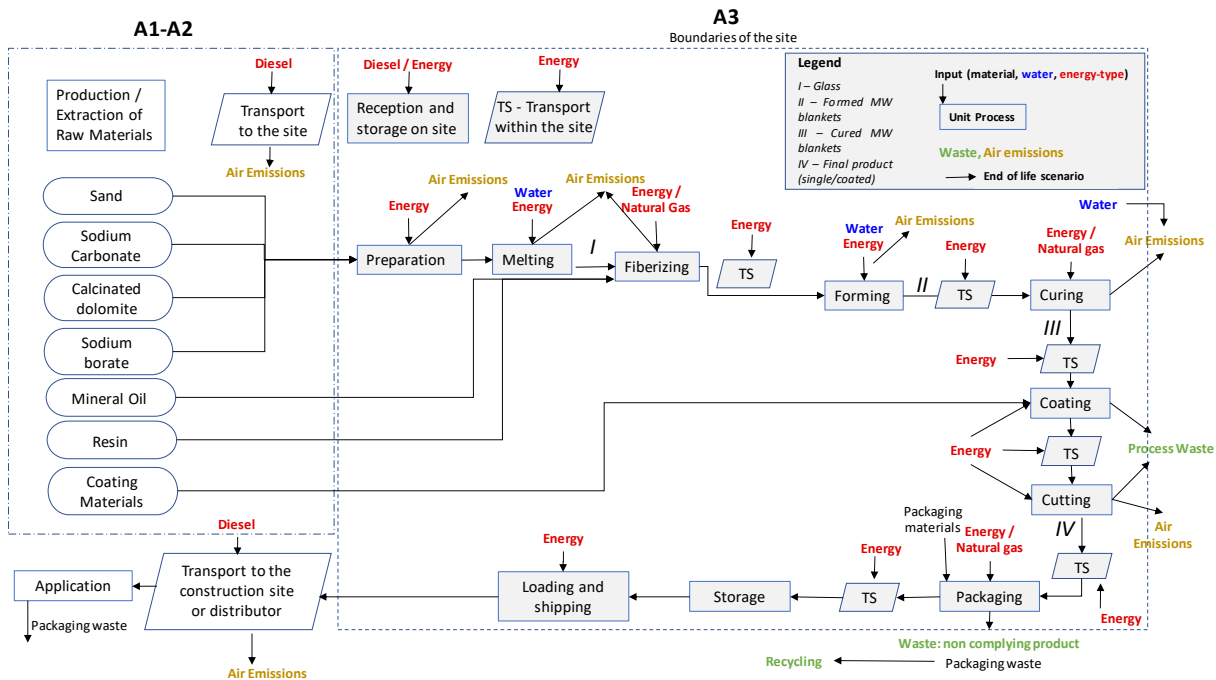
|   | Essential characteristics<br>(EN 13162:2012)   | Test<br>Procedures          | Declared value | Units                |
|---|--|-----------------------------|----------------|----------------------|
| <b>Durability of thermal resistance against heat, weathering, ageing/degradation</b>                | Thermal conductivity and resistance  | -                           |                |                      |
|   | Durability characteristics (for dimensional stability, thickness only)   | -                           | NPD            | -                    |
| <b>Compressive strength</b>   | Compressive stress/<br>Compressive strength  | EN 826                      | NPD            | kPa                  |
|   | Point load   | EN 12430                    | NPD            | kPa                  |
| <b>Tensile/flexural strength</b>  | Tensile strength perpendicular to faces (also in handling and installation)  | EN 1607                     | NPD            | kPa                  |
| <b>Durability of compressive strength against ageing/degradation</b>                                | Compressive creep  | EN 1606                     | NPD            | kPa                  |
| <b>Water permeability</b>   | Short-term water absorption  | EN 1609                     | NPD            | kg/m <sup>2</sup>    |
|   | Long-term water absorption   | EN 12087                    | NPD            | kg/m <sup>2</sup>    |
| <b>Water vapour permeability</b>  | Water vapour transmissions   | EN 12086                    | Z9             | (factor)             |
| <b>Impact noise transmissions index (for floors)</b>  | Dynamic stiffness  | EN 29052-1                  | NPD            | MN/m <sup>3</sup>    |
|   | Thickness, DI  | EN 12431                    | NPD            | mm                   |
|   | Compressibility  | -                           | NPD            | mm                   |
|   | Air flow resistivity   | EN 29053                    | NPD            | kPa.S/m <sup>2</sup> |
| <b>Acoustic absorption index</b>  | Sound absorption   | EN ISO 354;<br>EN ISO 11654 | NPD            |                      |
| <b>Direct airborne sound insulation index</b>   | Air flow resistivity   | -                           | NPD            | -                    |
| <b>Release of dangerous substances to the indoor environment</b>                                    | Release of dangerous substances  | -                           | NPD            |                      |
| <b>NPD – Performance not determined</b>   |  |                             |                |                      |
| <b>Description of the products' application:</b>  | Volcalis' MW coated with aluminium and kraft paper can be used in pitched roofs.   |                             |                |                      |
| <b>Reference service life:</b>  | Not specified  |                             |                |                      |
| <b>Placing on the market / Rules of application in the market / Technical rules of the product:</b> | <ul style="list-style-type: none"> <li>Decision No. 768/2008 / EC of the European Parliament and of the Council of 9 July 2008</li> <li>Regulation (EC) No 764/2008 of the European Parliament and of the Council of 9 July 2008</li> <li>Regulation (EC) No 765/2008 of the European Parliament and of the Council of 9 July 2008</li> <li>Regulation (EU) No 305/2011 of the European Parliament and of the Council of 9 March 2011 and its amendments.</li> <li>Technical Product Standards: <ul style="list-style-type: none"> <li>EN 13162: 2012 + A1 2015 - Thermal insulation products for buildings - factory made mineral wool products – specification.</li> </ul> </li> </ul> |                             |                |                      |
| <b>Quality control:</b>   | Quality control is assured according with the technical standards of the product.  |                             |                |                      |
| <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>   | One square meter (1 m <sup>2</sup> ) of MW coated with aluminium and kraft paper, with the thickness 60 mm and bulk density of 14.5 kg/m <sup>3</sup> , packed, at the out gate of the production site  |
| <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 meet the cut-off criteria of 1% use of renewable and non-renewable primary energy and 1% of the total input mass of the unit process where they occur, with a maximum of 5% energy and mass use in the considered stages (A1-A3):</p> <ul style="list-style-type: none"> <li>• Construction of industrial infrastructures, manufacture and exchange of equipment and machinery;</li> <li>• Impacts of infrastructure (vehicle manufacturing, road maintenance) associated with the transport of pre-products and raw materials;</li> <li>• The consumption of energy, water or waste and effluents produced in administrative areas and laboratories was also not considered, since they are not directly associated with the production process;</li> <li>• Transport of small consumables to the industrial unit;</li> <li>• Other negligible flows, considering their contribution below the cut-off criteria.</li> </ul> |
| <b>Assumption and limitations:</b>  | This EPD represents one (1) product that is produced in one (1) manufacturing unit and may have different thicknesses.  |
| <b>Quality and other characteristics about the information used in the LCA:</b> | <p>Production data was collected for the year of 2020, from internal and official records and is according to with the reality.</p> <p>Generic data used belongs to Ecoinvent v3.5, ELCD, USLCI and Simapro industrial database (Industry data 2.0), and meets the quality criteria (age, geographical and technology coverage, plausibility, etc.) for generic data.</p>   |
| <b>Allocation rules:</b>  | The manufacturing plant where the mineral wool coated with aluminium and kraft is produced also produces uncoated mineral wool and mineral wool with three other alternative coatings. Concerning the allocation between these co-products, for all materials and energy that are used in all of them, the principle of mass allocation was applied. For materials that are only used in one of the coating alternatives (or two, in the case of kraft paper), the material was allocated only to that product.   |
| <b>Comparability of EPD for construction products:</b>                          | 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.  |

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



**Figure 1.** Life cycle stages of Volcalis' mineral wool production process

The following paragraphs describe the life cycle stages studied for the development of this EPD.

After raw and ancillary materials arrive at the industrial site, they are stored on site in bulk (sand) and in silos. Raw materials are weighed and mixed in the mixer. This mixture is fed to the melting furnace. The molten glass is drained and goes through a feeding channel that ensures temperature control before fiberizing. The glass flows through the exit holes in the feed channel, through heated platinum rings. After leaving the platinum ring, the glass goes through the fiberizer, which, due to centrifugal force, allows the extraction of the fibres, through its holes.

The fibres are sprayed with organic additives, which promote their aggregation. Subsequently, they are confined and sent to perforated drums forming a fibre blanket (forming process). After the blanket is formed, it is sent to the curing oven. In the curing oven, the polymerization (curing) of organic additives takes place and the thickness of the product is calibrated.

Leaving the curing oven, the cured glass wool blanket goes to a cooling zone. Following this, the blanket is trimmed on its sideboards to give it an even width. Downstream, the product is cut by saws and by a guillotine cutter, to the desired width and length, according to the requests for panels or roll.

The final stage of the MW production corresponds to the packaging stage. The product to be sold in rolls goes to a winder, is compressed and then wrapped in polyethylene film. The product to be sold in panel is stacked through the stacker, which after compression is wrapped in polyethylene film.

After this primary packaging, the packages go to a multipack system where sets of roll packages and sets of panel packages are created. They are compressed by a compactor, palletized and finally plasticized in the encapsulator. The pallets are stored in the finished product warehouse and are subsequently dispatched.

Transport to the construction site or the distributor is outside of the boundaries of this EPD.

## 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   |
| ✓                   | ✓         | ✓             | ✖                          | ✖                                 | ✖         | ✖           | ✖      | ✖           | ✖             | ✖                      | ✖                     | ✖                            | ✖         | ✖                | ✖        | ✖   |

## 2.2. Parameters describing environmental impacts

|                     |              | Global warming potential; GWP<br>kg CO <sub>2</sub> equiv. | Depletion potential of the stratospheric ozone layer; ODP<br>kg CFC 11 equiv. | Acidification potential of soil and water, AP<br>kg SO <sub>2</sub> equiv. | Eutrophication potential, EP<br>kg (PO <sub>4</sub> ) <sup>3-</sup> equiv. | Formation potential of tropospheric ozone, POCP<br>kg C <sub>2</sub> H <sub>4</sub> equiv. | Abiotic depletion potential for non-fossil resources<br>kg Sb equiv. | Abiotic depletion potential for fossil resources<br>MJ, P.C.I. |
|---------------------|--------------|--|---|--|--|--|--|--|
| Raw material supply | A1           | 5.67E-01   | 4.76E-08  | 2.99E-03   | 1.15E-03   | 1.32E-04   | 2.27E-06   | 8.86E+00   |
| Transport           | A2           | 2.47E-02   | 5.00E-11  | 1.11E-04   | 2.53E-05   | 7.87E-06   | 9.83E-10   | 3.47E-01   |
| Manufacturing       | A3           | 8.24E-01   | 5.34E-08  | 4.15E-03   | 2.67E-04   | 1.98E-04   | 1.47E-07   | 1.11E+01   |
| <b>Total</b>        | <b>Total</b> | 1.42E+00   | 1.01E-07  | 7.25E-03   | 1.44E-03   | 3.39E-04   | 2.41E-06   | 2.03E+01   |

LEGEND:

 Product stage


NOTES: P.C.I. – Low Heating Value (LHV).

Units expressed per declared unit (1 m<sup>2</sup>).

## 2.3. Parameters describing resource use

|                     |              | 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, L.H.V.     | MJ, L.H.V. | MJ, L.H.V. | MJ, L.H.V. | MJ, L.H.V. | MJ, L.H.V. | kg  | MJ, P.C.I. | MJ, P.C.I. | m <sup>3</sup>         |
| Raw material supply | A1           | 4.83E+00       | 0.00E+00   | 4.83E+00   | 1.03E+01   | 0.00E+00   | 1.03E+01   | 0.00E+00  | 0.00E+00   | 0.00E+00   | -1.81E-04              |
| Transport           | A2           | 3.94E-04       | 0.00E+00   | 3.94E-04   | 3.48E-01   | 0.00E+00   | 3.48E-01   | 0.00E+00  | 0.00E+00   | 0.00E+00   | -3.54E-06              |
| Manufacturing       | A3           | 3.62E+00       | 1.87E+00   | 5.49E+00   | 9.33E+00   | 1.96E+00   | 1.13E+01   | 0.00E+00  | 0.00E+00   | 0.00E+00   | 1.94E-06               |
| <b>Total</b>        | <b>Total</b> | 8.44E+00       | 1.87E+00   | 1.03E+01   | 2.00E+01   | 1.96E+00   | 2.19E+01   | 0.00E+00  | 0.00E+00   | 0.00E+00   | -1.83E-04              |

LEGEND:

 Product stage

EPR = use of renewable primary energy excluding renewable primary energy resources used as raw materials;

RR = use of renewable primary energy resources used as raw materials;

TRR = total use of renewable primary energy resources (EPR + RR);

EPNR = use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials;

RNR = use of non-renewable primary energy resources used as raw materials;

TRNR = total use of non-renewable primary energy resources (EPRN + RNR);

MS = use of secondary material;

CSR = use of renewable secondary fuels;

CSNR = use of non-renewable secondary fuels;


Net use of fresh water = use of freshwater resources

\* Not applicable to processes in this factory

NOTE: Units expressed per declared unit (1 m<sup>2</sup>).

## 2.4. Other environmental information describing different waste categories

|                     |              | Hazardous waste disposed<br>kg | Non-hazardous waste disposed<br>kg | Radioactive waste disposed<br>kg |
|---------------------|--------------|--------------------------------|------------------------------------|----------------------------------|
| Raw material supply | A1           | 7.33E-06                       | 6.27E-02                           | 2.19E-05                         |
| Transport           | A2           | 0.00E+00                       | 3.06E-08                           | 0.00E+00                         |
| Manufacturing       | A3           | 8.37E-04                       | 2.63E-02                           | 1.74E-05                         |
| <b>Total</b>        | <b>Total</b> | 8.45E-04                       | 8.90E-02                           | 3.93E-05                         |

LEGEND:  
 Product stage

**NOTE:** Units expressed per declared unit (1 m<sup>2</sup>).

## 2.5. Other environmental information describing output flows

| Parameters                    | Units*                 | Results  |
|-------------------------------|------------------------|----------|
| Components for re-use         | kg/m <sup>3</sup> Prod | 0.00E+00 |
| Materials for recycling       | kg/m <sup>3</sup> Prod | 5.66E-03 |
| Radioactive waste disposed    | kg/m <sup>3</sup> Prod | 0.00E+00 |
| Materials for energy recovery | kg/m <sup>3</sup> Prod | 0.00E+00 |
| Exported energy               | MJ by energy carrier   | 0.00E+00 |

\* expressed by declared unit (1 m<sup>2</sup>)

### **3. SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION**

This EPD evaluates only the production stage of the product, integrating stages A1 to A3. Thus, the following scenarios of the construction stage (modules A4 and A5), stage of use (B1 to B7) and end of life stage (C1 to C4), are not applicable.

#### **3.1. Additional environmental information about the release of dangerous substances**

There are no known toxic effects of this product. Due to its properties, no danger to the environment is expected.

#### **3.2. Certifications**

VOLCALIS, S.A. has implemented their Environmental Management System (EN ISO 14001:2015), certified by EIC (Empresa internacional de Certificação, SA), with the Certificate Nr.: A - 0698 valid until 18/07/2022. They have also implemented and certified their Quality Management System (EN ISO 9001:2015) with the Certificate Nr.: E - 5088 valid until 18/07/2022, by EIC.

The product was awarded the Sustainability Label by the Sustainable Construction Portal, for complying with 9 of its 10 sustainability principles.

#### **3.3. End-of-life management**

The product shall be treated as a construction waste in accordance with national regulations. It shall be referred to using the European Waste Code (EWC): 17 06 04 - insulation materials other than those mentioned in 17 06 01 and 17 06 03 (meaning, containing no asbestos or hazardous substances). Packaging not contaminated with other materials shall be recycled.



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- ✓ EN ISO 14020:2005 - Environmental labels and declarations - General principles (EN ISO 14020:2005).
- ✓ EN ISO 14021:2016 - Environmental labels and declarations - Self declarations (Type II environmental declarations).
- ✓ EN ISO 14024:2018 - Environmental labels and declarations - Type I environmental declarations - Principles and procedures.
- ✓ EN ISO 14050:2010 - Environmental management – Vocabulary.
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- ✓ ISO 21930:2017 - Sustainability in building construction - Environmental declaration of building products.
- ✓ Wernet, G., Bauer, C., Steubing, B., Reinhard, J., Moreno-Ruiz, E., and Weidema, B., 2016. The Ecoinvent database version 3 (part I): overview and methodology. The International Journal of Life Cycle Assessment, [online] 21(9), pp.1218–1230.