B-EPD ENVIRONMENTAL PRODUCT DECLARATION

# ETEX
# CEDRAL fibre cement sheets

The production and installation of 1 $m^2$ (thickness 10 mm overlap, 12mm non-overlap) of a “Cedral” panel and its related impacts over cradle-to-grave life cycle stages, over a reference service life of 60 years.

Issued 07.10.2021
Valid until 07.10.2026

Third party verified
Conform to EN 15804+A2, NBN/DTD B08-001 and ISO14025

| Modules declared Cradle-to-grave | | | | | |
|---|---|---|---|---|---|
| A123 | A4 | A5 | B | C | D |
| • | • | • | • | • | • |

[B-EPD n° 21-0135-02-00-00-EN]

OWNER OF THIS ENVIRONMENTAL PRODUCT DECLARATION
**Etex services**

EPD PROGRAM OPERATOR
**Federal Public Service of Health, Food Chain Safety and Environment**
www.b-epd.be

The intended use of this EPD is to communicate scientifically based environmental information for construction products, for the purpose of assessing the environmental performance of buildings. This EPD is only valid when registered on www.b-epd.be. The FPS Public Health cannot be held responsible for the information provided by the owner of the EPD.

# PRODUCT DESCRIPTION

## PRODUCT NAME
Cedral

## PRODUCT DESCRIPTION
Cedral sidings are steam-hardened cellulose-reinforced fibre cement planks produced at Kapelle-op-den-Bos production plant, Belgium. They exist in two finishes: smooth or structured (wood relief). Planks are coated and available in various colours.

## INTENDED USE
Cedral sidings are used as board-like façade cladding for back-ventilated façades. For both smooth and structured panels two installation methods are provided. The “click” application has a tongue and groove system, while the “lap” application foresees an overlap of the panels. The results of the LCA are valid for both Click and Lap application, and are based on a weighted average of the market shares of both products. In both cases the weight of 1m² installed CEDRAL is 19,5 kg or 0,0195 ton. The overlap of the “lap” application is exactly compensated by the board being 2 mm thinner than the “click” application.

## REFERENCE FLOW / DECLARED UNIT
The functional unit is defined as: the production and installation of 1 $m^2$ (thickness 10 mm overlap, 12mm non-overlap) of a “CEDRAL” sheets and its related impacts over cradle-to-grave life cycle stages, where the product’s expected average reference service life is of 60 years.

Packaging is included.

The weight per reference flow is 19,5 kg.
The minimum (dry) density of the product is 1300 kg / $m^3$.
Dimensions of the panel per FU: 1 m² of thickness 10 mm overlap, 12mm non-overlap

## INSTALLATION
The product is installed according to the following scenario(s): fixation of the panel to a framework in wood or metal. This EPD declares the screws and energy consumption to fixate the panels, but does not include the framework. This may lead to the need of additional products and materials for which the impact is not included in this EPD and which shall be taken into account at building level. The different frameworks are described in the chapter “Additional technical information for scenario development at building”.

## IMAGES OF THE PRODUCT AND ITS INSTALLATION

## COMPOSITION AND CONTENT

| Components | Composition / content / ingredients | Quantity |
|---|---|---|
| Product | *- Sand*<br>*- Cement*<br>*- Cellulose*<br>*- Internal production waste*<br>*- Wollastonite*<br>*- Aluminium hydroxide*<br>*- Primer*<br>*- Water*<br>*- Others* | *30 -40%*<br>*20 - 30%*<br>*<10%*<br>*<5%*<br>*<5%*<br>*<5%*<br>*<5%*<br>*15-20%*<br>*<1%* |
| Fixation materials | *-Cedral click: inox clips*<br>*Or*<br>*-Cedral lap: inox screws* | *10 p*<br><br>*12,5 p* |
| Jointing materials | *NA* | */* |
| Treatments | *NA* | */* |
| Packaging | *- Pallet*<br>*- PE cover foil*<br>*- PE plastic foam layers*<br>*- PE band on a carton roll* | *0,6787 kg*<br>*0,0041 kg*<br>*0,1545 kg*<br>*0,1620 kg* |

The product does not contain materials listed in the “Candidate list of Substances of Very High Concern for authorization”.

## REFERENCE SERVICE LIFE

The reference service life is estimated at 60 years.

CEDRAL is a rather new product on the market (°2007), and there is not yet extensive evidence regarding its reference service life. However there are some studies that suggest that it is feasible to assume that this product lasts for the average lifetime of a building[1].

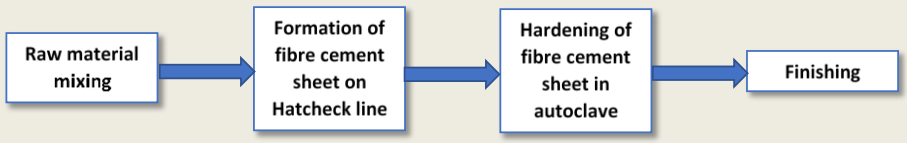
The RSL is valid under normal conditions of use.

## DESCRIPTION OF GEOGRAPHICAL REPRESENTATIVITY

The EPD is representative for the Belgian market.

## DESCRIPTION OF THE PRODUCTION PROCESS AND TECHNOLOGY

Cedral Click and Lap Cedral are manufactured largely in accordance with an automated winding process: the raw materials are mixed with water to prepare a homogenous mixture. Rotating screen cylinders are immersed in this fibre cement pulp which drain internally. The screen surface is covered in a thin film of fibre cement which is transferred onto an infinite conveyor belt from where it is conveyed to a format roller which is gradually covered in an increasingly thicker layer of fibre cement. Once the requisite material thickness is achieved, the still moist and malleable fibre cement layer (fibre cement fleece) is separated and removed from the format roller. The fibres cement fleece is cut to size. Leftovers are returned to the production process preventing any waste from being incurred. The panels are then set aside for curing before stacking on pallets and steam-hardened in an autoclave for approx. two hours. The setting time lasts approx. three days. Waste from damaged or broken panels is recycled by an external company as raw material for cement production. For the Click application a tongue and groove closure is milled out from the panels. Finally the façade panels are coated in acrylic paint.




[1] ‘Durability of Autoclaved Cellulose Fiber Cement Composites’, A.M.Cooke, Managing Director, Building Materials and Technology Pty Ltd, Sydney, NSW, Australia

# TECHNICAL DATA / PHYSICAL CHARACTERISTICS

| Technical property | Standard | Value | Unit | Comment |
|---|---|---|---|---|
| **Gross density dry (min)** | EN12467 | 1300 | $kg/m^3$ | |
| **Standard panel thickness (“lap” system)** | | 10 | mm | |
| **Standard panel thickness (“click” system)** | | 12 | mm | |
| **Thermal conductivity** | | 0.212 | W/(mK) | |
| **Flexural strength parallel** | EN12467 | 23 | $N/mm^2$ | |
| **Flexural strength perpendicular** | EN12467 | 11 | $N/mm^2$ | |
| **Modulus of elasticity parallel** | EN12467 | 7500 | $N/mm^2$ | |
| **Modulus of elasticity perpendicular** | EN12467 | 5500 | $N/mm^2$ | |
| **Coefficient of thermal expansion** | | <0.01 | 10-6K-1 | |

# LCA STUDY

## DATE OF LCA STUDY
September 2021

## SOFTWARE
For the calculation of the LCA results, the software program SimaPro 9.1.1.1 (PRé Consultants, 2021) has been used in combination with a specific LCA software program for ETEX.

## INFORMATION ON ALLOCATION
At Etex, different types of cement fiber products are produced. However CEDRAL products are produced only on certain production lines, with no co-products being produced as part of the process. Only facility level data were available for electricity use, the use of natural gas, etc. The facility level data have been allocated to the analyzed product using their respective annual production volume (physical relationship), therefore volume allocation is applied. Material inputs and outputs which were not available at the product level, such as waste, were allocated similarly, by mass allocation.

## INFORMATION ON CUT OFF
Following processes were considered below the cut-off:
- Transport of packaging of raw materials
- The metal templates in which the boards are produced need to be greased periodically. The template oil is considered below cut-off
- Packaging and transport of ancillary materials used during installation
- Waste treatment of ancillary materials used during installation
- Wearable sieves and cutting knives

## INFORMATION ON EXCLUDED PROCESSES
Following processes were excluded for the inventory:
- Infrastructure and land use of the factory
-
- Environmental impacts caused by the personnel of the production plants are not included in the LCA, e.g. waste from the cafeteria and sanitary installations, accidental pollution caused by human mistakes, or environmental effects caused by commuter traffic

## INFORMATION ON BIOGENIC CARBON MODELLING
The fibre cement panels contain cellulose, which is a biobased material. Uptake of biogenic $CO_2$ within cellulose is reported in module A1, release of biogenic $CO_2$ related to this flow is reported in C4.
The fibre cement panels are transported using wooden pallets and a carton coverage. Uptake of biogenic $CO_2$ within these pallets and carton is reported in module A3, release in module A5.

| | Biogenic carbon content (kg C / FU) |
|---|---|
| Biogenic carbon content in product (at the gate) | 4,71E-01 |
| Biogenic carbon content in accompanying packaging (at the gate) | 3,03E-01 |

## INFORMATION ON CARBON OFFSETTING
Carbon offsetting is not allowed in the EN 15804 and hence not taken into account in the calculations.

## ADDITIONAL OR DEVIATING CHARACTERISATION FACTORS
The characterization factors from EC-JRC were applied. No additional or deviating characterization factors were used.

# DATA

## SPECIFICITY

The data used for the LCA are specific for this product which is manufactured by a single manufacturer in a single production site.

## PERIOD OF DATA COLLECTION

Manufacturer specific data have been collected for the year 2016.

## INFORMATION ON DATA COLLECTION

Company specific data for the product stage have been collected by Eternit and were provided to VITO through an excel file. The LCI data has been checked by the EPD verifier (Evert Vermaut, Vinçotte). VITO uses publicly available generic data for all background processes such as the production of electricity, transportation by means of a specific truck, etc. Primary data is used for modules A1, A2, A3, and A5. The rest of the study is based on scenarios (module A4, modules B1-B7, modules C1-C4, and module D).

## DATABASE USED FOR BACKGROUND DATA

The main LCI source used in this study is the Ecoinvent 3.6 database (Wernet et al., 2019).

## ENERGY MIX

The Belgian electricity mix (consumption mix + import) has been used to model electricity use in life cycle stages A3, A5, C1, C3, C4 and D. The used record is the ecoinvent record 'Electricity, low voltage {BE}| market for | Cut-off, U' (Wernet et al., 2016).

## PRODUCTION SITES

The production site is located at Kuiermansstraat 1, 1880 Kapelle-op-den-Bos, Belgium.

## SYSTEM BOUNDARIES

| Product stage | | | Construction installation stage | | Use stage | | | | | | | End of life stage | | | | | Beyond the system boundaries |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Raw materials | Transport | Manufacturing | Transport | Construction installation stage | Use | Maintenance | Repair | Replacement | Refurbishment | Operational energy use | Operational water use | De-construction demolition | Transport | Waste processing | Disposal | | Reuse-Recovery-Recycling-potential |
| A1 | A2 | A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | | D |
| ☒ | ☒ | ☒ | ☒ | ☒ | ☒ | ☒ | ☒ | ☒ | ☒ | ☒ | ☒ | ☒ | ☒ | ☒ | ☒ | | ☒ |

X = included in the EPD
MND = module not declared

CEDRAL uses production waste from other production lines in the ETEX factory, so does contain recycled content.

In the default end-of-life scenario as described by the B-PCR 100% is landfilled, so the end-of-waste state is not reached.

The production waste is partly externally recycled. However, it has been assumed that the recycled waste has no economic value, so 100% of the impacts of the production are allocated to the product and 0% to recycled production waste.

# POTENTIAL ENVIRONMENTAL IMPACTS PER REFERENCE FLOW

| | Production | | | Construction process stage | | Use stage | | | | | | | End-of-life stage | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A1 Raw material | A2 Transport | A3 manufacturing | A4 Transport | A5 Installation | B1 Use | B2 Maintenance | B3 Repair | B4 Replacement | B5 Refurbishment | B6 Operational energy use | B7 Operational water use | C1 Deconstruction / demolition | C2 Transport | C3 Waste processing | C4 Disposal | D Reuse, recovery, recycling | Total excl module D |
| *GWP total (kg CO2 equiv/FU)* | 4,87E+00 | 4,74E-01 | 1,82E+00 | 3,44E-01 | 2,77E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 5,46E-03 | 2,61E-01 | 7,18E-05 | 1,83E+00 | -5,39E-01 | 1,24E+01 |
| *GWP fossil (kg CO2 equiv/FU)* | 6,74E+00 | 4,74E-01 | 2,76E+00 | 3,44E-01 | 1,65E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 5,42E-03 | 2,61E-01 | 7,14E-05 | 1,08E-01 | -5,41E-01 | 1,23E+01 |
| *GWP biogenic (kg CO2 equiv/FU)* | -1,88E+00 | 1,86E-04 | -9,39E-01 | 1,45E-04 | 1,12E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 2,15E-05 | 1,06E-04 | 2,74E-07 | 1,73E+00 | 2,71E-03 | 2,79E-02 |
| *GWP luluc (kg CO2 equiv/FU)* | 1,04E-02 | 3,41E-04 | 2,76E-03 | 1,21E-04 | 1,10E-03 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,29E-05 | 9,11E-05 | 1,64E-07 | 5,94E-05 | -5,46E-04 | 1,49E-02 |
| *ODP (kg CFC 11 equiv/FU)* | 3,56E-07 | 9,86E-08 | 3,63E-07 | 7,86E-08 | 8,86E-08 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,13E-09 | 5,92E-08 | 1,46E-11 | 4,58E-08 | -5,45E-08 | 1,09E-06 |
| *AP (mol $H^+$ eq)* | 2,19E-02 | 9,20E-03 | 6,12E-03 | 1,41E-03 | 5,44E-03 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,35E-05 | 1,06E-03 | 1,92E-07 | 9,28E-04 | -1,53E-03 | 4,60E-02 |
| *EP - freshwater (kg P-equiv/FU)* | 1,92E-04 | 3,13E-06 | 7,27E-05 | 2,79E-06 | 3,69E-05 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,44E-07 | 2,05E-06 | 1,93E-09 | 1,15E-06 | -9,03E-06 | 3,11E-04 |
| *EP - marine (kg N-equiv/FU)* | 5,20E-03 | 2,46E-03 | 1,80E-03 | 4,17E-04 | 1,17E-03 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 2,77E-06 | 3,16E-04 | 4,14E-08 | 3,44E-04 | -3,39E-04 | 1,17E-02 |
| *EP - terrestrial (mol N-equiv/FU)* | 5,92E-02 | 2,73E-02 | 1,68E-02 | 4,62E-03 | 1,29E-02 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 3,40E-05 | 3,49E-03 | 5,01E-07 | 3,81E-03 | -3,81E-03 | 1,28E-01 |
| *POCP (kg NMVOC equiv/FU)* | 1,54E-02 | 7,18E-03 | 6,04E-03 | 1,44E-03 | 3,77E-03 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 8,70E-06 | 1,07E-03 | 1,35E-07 | 1,08E-03 | -1,57E-03 | 3,60E-02 |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *ADP Elements (kg Sb equiv/FU)* | 3,88E-06 | 5,57E-07 | 1,20E-06 | 6,42E-07 | 1,23E-05 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,42E-08 | 5,07E-07 | 1,94E-10 | 1,10E-07 | -7,07E-07 | 1,92E-05 |
| *ADP fossil fuels (MJ/FU)* | 5,17E+01 | 6,47E+00 | 7,51E+01 | 5,23E+00 | 1,39E+01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 2,16E-01 | 3,93E+00 | 2,76E-03 | 3,49E+00 | -1,43E+01 | 1,60E+02 |
| *WDP ($m^3$ water eq deprived /FU)* | 3,03E+00 | 1,48E-02 | 6,41E-01 | 1,58E-02 | 2,78E-01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 2,06E-03 | 1,09E-02 | 2,63E-05 | 1,52E-02 | -1,99E-01 | 4,00E+00 |

GWP total = total Global Warming Potential (Climate Change); GWP-luluc = Global Warming Potential (Climate Change) land use and land use change; ODP = Ozone Depletion Potential; AP = Acidification Potential for Soil and Water; EP = Eutrophication Potential; POCP = Photochemical Ozone Creation; ADPE = Abiotic Depletion Potential – Elements; ADPF = Abiotic Depletion Potential – Fossil Fuels; WDP = water use (Water (user) deprivation potential, deprivation-weighted water consumption)

# RESOURCE USE

| | Production | | | Construction process | | Use stage | | | | | | | End-of-life stage | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A1 Raw material | A2 Transport | A3 manufacturing | A4 Transport | A5 Installation | B1 Use | B2 Maintenance | B3 Repair | B4 Replacement | B5 Refurbishment | B6 Operational energy use | B7 Operational water use | C1 Deconstruction / demolition | C2 Transport | C3 Waste processing | C4 Disposal | D Reuse, recovery, recycling | Total excl module D |
| *PERE (MJ/FU, net calorific value)* | 3,00E+01 | 7,67E-02 | 1,08E+01 | 7,33E-02 | 7,30E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 2,33E-02 | 5,43E-02 | 2,95E-04 | 1,18E-01 | -9,47E+00 | 4,85E+01 |
| *PERM (MJ/FU, net calorific value)* | 1,64E+01 | 0,00E+00 | 9,50E+00 | 0,00E+00 | -2,51E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 2,34E+01 |
| *PERT (MJ/FU, net calorific value)* | 4,64E+01 | 7,67E-02 | 2,03E+01 | 7,33E-02 | 4,80E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 2,33E-02 | 5,43E-02 | 2,95E-04 | 1,18E-01 | -9,47E+00 | 7,18E+01 |
| *PENRE (MJ/FU, net calorific value)* | 5,81E+01 | 6,50E+00 | 6,61E+01 | 5,27E+00 | 2,36E+01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 2,28E-01 | 3,95E+00 | 2,91E-03 | 3,51E+00 | -1,52E+01 | 1,67E+02 |
| *PENRM (MJ/FU, net calorific value)* | 3,95E-02 | 0,00E+00 | 1,36E+01 | 0,00E+00 | -7,50E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 6,15E+00 |
| *PENRT (MJ/FU, net calorific value)* | 5,81E+01 | 6,50E+00 | 7,97E+01 | 5,27E+00 | 1,61E+01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 2,28E-01 | 3,95E+00 | 2,91E-03 | 3,51E+00 | -1,52E+01 | 1,73E+02 |
| *SM (kg/FU)* | 2,88E-02 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,76E+00 | 2,88E-02 |
| *RSF (MJ/FU, net calorific value)* | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *NRSF (MJ/FU, net calorific value)* | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| *FW ($m^3$ water eq/FU)* | 1,58E-01 | 3,37E-04 | 5,97E-02 | 4,04E-04 | 1,38E-02 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 6,18E-05 | 2,84E-04 | 7,87E-07 | 3,37E-03 | -3,19E-03 | 2,36E-01 |

PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Net use of fresh water

# WASTE CATEGORIES & OUTPUT FLOWS

| | Production | | | Construction process stage | | Use stage | | | | | | | End-of-life stage | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A1 Raw material | A2 Transport | A3 manufacturing | A4 Transport | A5 Installation | B1 Use | B2 Maintenance | B3 Repair | B4 Replacement | B5 Refurbishment | B6 Operational energy use | B7 Operational water use | C1 Deconstruction / demolition | C2 Transport | C3 Waste processing | C4 Disposal | D Reuse, recovery, recycling | Total excl module D |
| *Hazardous waste disposed (kg/FU)* | 4,08E-05 | 1,18E-05 | 5,51E-05 | 1,34E-05 | 1,89E-05 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,66E-07 | 1,03E-05 | 2,27E-09 | 3,82E-06 | -1,53E-05 | 1,54E-04 |
| *Non-hazardous waste disposed (kg/FU)* | 4,88E-01 | 1,37E-01 | 1,55E-01 | 3,10E-01 | 1,62E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 3,89E-04 | 1,88E-01 | 5,41E-06 | 1,95E+01 | -3,09E-02 | 2,24E+01 |
| *Radioactive waste disposed (kg/FU)* | 2,25E-04 | 4,45E-05 | 3,09E-04 | 3,56E-05 | 5,68E-05 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 2,08E-06 | 2,68E-05 | 2,64E-08 | 2,58E-05 | -3,90E-05 | 7,26E-04 |
| *Components for re-use (kg/FU)* | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| *Materials for recycling (kg/FU)* | 0,00E+00 | 0,00E+00 | 1,13E+00 | 0,00E+00 | 5,80E-01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 7,51E-02 | 0,00E+00 | -1,79E+00 | 1,79E+00 |
| *Materials for energy recovery (kg/FU)* | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| *Exported energy (MJ/FU)* | 0,00E+00 | 0,00E+00 | 7,11E-03 | 0,00E+00 | 3,59E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | -3,60E+00 | 3,60E+00 |

# IMPACT CATEGORIES ADDITIONAL TO EN 15804

| | | Production | | | Construction process | | Use stage | | | | | | | End-of-life stage | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | A1 Raw material | A2 Transport | A3 manufacturing | A4 Transport | A5 Installation | B1 Use | B2 Maintenance | B3 Repair | B4 Replacement | B5 Refurbishment | B6 Operational energy use | B7 Operational water use | C1 Deconstruction / demolition | C2 Transport | C3 Waste processing | C4 Disposal | D Reuse, recovery, recycling | Total excl module D |
|  | *PM (disease incidence)* | 2,22E-07 | 2,29E-08 | 6,70E-08 | 2,57E-08 | 6,13E-08 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 6,64E-11 | 1,81E-08 | 1,27E-12 | 1,94E-08 | -1,56E-08 | 4,36E-07 |
|  | *IRHH (kg U235 eq/FU)* | 2,45E-01 | 2,82E-02 | 3,71E-01 | 2,29E-02 | 5,98E-02 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 2,44E-03 | 1,72E-02 | 3,10E-05 | 2,01E-02 | -4,29E-02 | 7,66E-01 |
|  | *ETF (CTUe/FU)* | 1,50E+02 | 4,71E+00 | 2,66E+01 | 4,24E+00 | 2,74E+01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 9,45E-02 | 3,14E+00 | 1,29E-03 | 1,87E+00 | -4,52E+00 | 2,18E+02 |
|  | *HTCE (CTUh/FU)* | 3,10E-09 | 2,38E-10 | 1,09E-09 | 1,17E-10 | 7,78E-09 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 2,22E-12 | 8,84E-11 | 4,58E-14 | 4,49E-11 | -4,20E-10 | 1,25E-08 |
|  | *HTnCE (CTUh/FU)* | 8,82E-08 | 4,52E-09 | 1,56E-08 | 4,66E-09 | 3,12E-08 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 6,12E-11 | 3,43E-09 | 8,84E-13 | 1,08E-09 | -4,64E-09 | 1,49E-07 |
|  | *Land Use Related impacts (dimensionless)* | 2,76E+02 | 2,86E+00 | 1,36E+02 | 4,31E+00 | 2,49E+01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 5,71E-02 | 2,71E+00 | 1,85E-03 | 6,43E+00 | -7,19E+01 | 4,53E+02 |

HTCE = Human Toxicity – cancer effects; HTnCE = Human Toxicity – non cancer effects; ETF = Ecotoxicity – freshwater; (potential comparative toxic unit)
PM = Particulate Matter (Potential incidence of disease due to PM emissions );
IRHH = Ionizing Radiation – human health effects (Potential Human exposure efficiency relative to U235 );

| | | |
|---|---|---|
|  | *Global Warming Potential* | *The global warming potential of a gas refers to the total contribution to global warming resulting from the emission of one unit of that gas relative to one unit of the reference gas, carbon dioxide, which is assigned a value of 1.*<br><br>*It is split up in 4:*<br><br>- *Global Warming Potential total (GWP-total) which is the sum of GWP-fossil, GWP-biogenic and GWP-luluc*<br>- *Global Warming Potential fossil fuels (GWP-fossil) : The global warming potential related to greenhouse gas (GHG) emissions to any media originating from the oxidation and/or reduction of fossil fuels by means of their transformation or degradation (e.g. combustion, digestion, landfilling, etc).*<br>- *Global Warming Potential biogenic (GWP-biogenic) : The global warming potential related to carbon emissions to air (CO2, CO and CH4) originating from the oxidation and/or reduction of aboveground biomass by means of its transformation or degradation (e.g. combustion, digestion, composting, landfilling) and CO2 uptake from the atmosphere through photosynthesis during biomass growth – i.e. corresponding to the carbon content of products, biofuels or above ground plant residues such as litter and dead wood.[2]*<br>- *Global Warming Potential land use and land use change (GWP-luluc): The global warming potential related to carbon uptakes and emissions (CO2, CO and CH4) originating from carbon stock changes caused by land use change and land use. This sub-category includes biogenic carbon exchanges from deforestation, road construction or other soil activities (including soil carbon emissions).* |
|  | *Ozone Depletion* | *Destruction of the stratospheric ozone layer which shields the earth from ultraviolet radiation harmful to life. This destruction of ozone is caused by the breakdown of certain chlorine and/or bromine containing compounds (chlorofluorocarbonsor halons), Which break down when they reach the stratosphere and then catalytically destroy ozone molecules.* |
|  | *Acidification potential* | *Acid depositions have negative impacts on natural ecosystems and the man-made environment incl. buildings. The main sources for emissions of acidifying substances are agriculture and fossil fuel combustion used for electricity production, heating and transport.* |
|  | *Eutrophication potential* | *The potential to cause over-fertilization of water and soil, which can result in increased growth of biomass and following adverse effects.*<br><br>*It is split up in 3:*<br><br>- *Eutrophication potential – freshwater: The potential to cause over-fertilization of freshwater, which can result in increased growth of biomass and following adverse effects.*<br>- *Eutrophication potential – marine: The potential to cause over-fertilization of marine water, which can result in increased growth of biomass and following adverse effects.*<br>- *Eutrophication potential – terrestrial: The potential to cause over-fertilization of soil, which can result in increased growth of biomass and following adverse effects.* |
|  | *Photochemical ozone creation* | *Chemical reactions brought about by the light energy of the sun creating photochemical smog. The reaction of nitrogen oxides with hydrocarbons in the presence of sunlight to form ozone is an example of a photochemical reaction.* |
|  | *Abiotic depletion potential for non-fossil ressources* | *Consumption of non-renewable resources, thereby lowering their availability for future generations. Expressed in comparison to Antimonium (Sb).*<br><br>*The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.* |
|  | *Abiotic depletion potential for fossil ressources* | *Measure for the depletion of fossil fuels such as oil, natural gas, and coal. The stock of the fossil fuels is formed by the total amount of fossil fuels, expressed in Megajoules (MJ).*<br><br>*The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.* |
|  | *Ecotoxicity for aquatic fresh water* | *The impacts of chemical substances on ecosystems (freshwater).*<br><br>*The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.* |
|  | *Human toxicity (carcinogenic effects)* | *The impacts of chemical substances on human health via three parts of the environment: air, soil and water.* |

[2] Carbon exchanges from native forests shall be modelled under GWP - luluc (including connected soil emissions, derived products or residues), while their $CO_2$ uptake is excluded.

| | | |
|---|---|---|
| | | *The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.* |
|  | *Human toxicity (non-carcinogenic effects)* | *The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.* |
|  | *Particulate matter* | *Accounts for the adverse health effects on human health caused by emissions of Particulate Matter (PM) and its precursors (NOx, SOx, NH3)* |
|  | *Resource depletion (water)* | *Accounts for water use related to local scarcity of water as freshwater is a scarce resource in some regions, while in others it is not.*<br><br>*The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.* |
|  | *Ionizing radiation - human health effects* | *This impact category deals mainly with the eventual impact on human health of low dose ionizing radiation of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.* |
|  | *Land use related impacts* | *The indicator is the "soil quality index" which is the result of an aggregation of following four aspects:*<br>- *Biotic production*<br>- *Erosion resistance*<br>- *Mechanical filtration*<br>- *Groundwater*<br>*The aggregation is done based on a JRC model. The four aspects are quantified through the LANCA model for land use.*<br><br>*The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.* |

# DETAILS OF THE UNDERLYING SCENARIOS USED TO CALCULATE THE IMPACTS

## A1 – RAW MATERIAL SUPPLY

This module takes into account the extraction and processing of all raw materials and energy which occur upstream to the studied manufacturing process.

## A2 – TRANSPORT TO THE MANUFACTURER

The raw materials are transported to the manufacturing site.

## A3 – MANUFACTURING

This module takes into account the production process.

## A4 – TRANSPORT TO THE BUILDING SITE

| | | | |
|---|---|---|---|
| *Fuel type and consumption of vehicle or vehicle type used for transport* | Truck 16-32 ton EURO 5 (0,260 l/km) | Truck >32 ton EURO 5 (0,366 l/km) | Truck 7.5-16 ton EURO 5 (0,186 l/km) |
| *Distance* | 100 (40% from factory to construction site)<br><br>35 (60%*85% from supplier to construction site) | 100 (60% from factory to supplier) | 35 (60%*15% from supplier to construction site) |
| *Capacity utilisation (including empty returns)* | 50% | 50% | 50% |
| *Bulk density of transported products* | Ecoinvent | Ecoinvent | Ecoinvent |
| *Volume capacity utilisation factor* | Ecoinvent | Ecoinvent | Ecoinvent |

The B-PCR provides default transport scenarios for the transport to the building site for cases where specific data on transport are missing. The B-PCR provides scenario's for this life cycle stage. Fibre cement panels are categorized as 'loose products' in table 5 of the B-PCR. The following transport steps apply:

- 40% directly to the construction site over 100 km with a 16-32 ton lorry (ecoinvent record: 'Transport, freight, lorry 16-32 metric ton, EURO5 {RER}| transport, freight, lorry 16-32 metric ton, EURO5 | Cut-off, U')
- 60% to a supplier over 100 km with a >32 ton lorry (ecoinvent record: 'Transport, freight, lorry >32 metric ton, EURO5 {RER}| transport, freight, lorry >32 metric ton, EURO5 | Cut-off, U')
- 85% of these 60% is transported over 35 km from supplier to construction site with a 16-32 ton lorry (ecoinvent record: 'Transport, freight, lorry 16-32 metric ton, EURO5 {RER}| transport, freight, lorry 16-32 metric ton, EURO5 | Cut-off, U')
- 15% of these 60% is transported over 35 km from supplier to construction site with a 7.5-16 ton lorry (ecoinvent record: 'Transport, freight, lorry 7.5-16 metric ton, EURO5 {RER}| transport, freight, lorry 7.5-16 metric ton, EURO5 | Cut-off, U')

## A5 – INSTALLATION IN THE BUILDING

12,5 inox screws are necessary per functional unit for Cedral lap and 10 inox clips are necessary for Cedral clip. In this EPD an average has been considered by including 50% of the screws (6,25 screws or 0,019 kg) and 50% of the clips (5 clips or 0,060 kg). For the installation of 1m² CEDRAL product, 0.022 kWh of electricity is declared. The dataset used to model the impacts is 'Electricity, low voltage {BE}| market for | Cut-off, U'.

During the installation, depending on how the CEDRAL sheets are cut, there is a loss rate between 5-30%, depending on the building shape. For this EPD an average loss rate of 10% is used.

All packaging material for the CEDRAL product is transported to End of Life (EoL) and disposed of in line with the B-PCR default EoL scenarios for Belgium.

| Parts of the installation | quantity | Description |
|---|---|---|
| Processes necessary for the installation of the product | *0,022 kWh* | *energy needed to fix the screws* |
| Fixation materials | *6,25*<br>*5* | *Screws*<br>*Clips* |
| Material losses | *10%* | *Average material losses* |
| Packaging | *- Pallet*<br>*- PE cover foil*<br>*- PE plastic foam layers*<br>*- PE band on a carton roll* | *0,6787 kg*<br>*0,0041 kg*<br>*0,1545 kg*<br>*0,1620 kg* |

| | | |
|---|---|---|
| *Ancillary materials for installation (specified by material);* | 12,5 Screws<br>10 clips | |
| *Water use* | None | |
| *Other resource use* | 10% losses | |
| *Quantitative description of energy type (regional mix) and consumption during the installation process* | 0,022 kWh electricity, low voltage | |
| *Waste materials on the building site before waste processing, generated by the product's installation (specified by type)* | packaging waste:<br>*0,6787* kg wood | packaging waste:<br>0,321 kg plastic |
| *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)* | 60% recycling<br>20% incinerated | 35% recycling<br>60% incinerated<br>5% landfill |
| *Direct emissions to ambient air, soil and water* | None | None |
| *Distance* | Not applicable | Not applicable |

## B – USE STAGE (EXCLUDING POTENTIAL SAVINGS)

B1: No emissions during the use phase.
B2: The product does not require maintenance.
B3: The product does not require repair.
B4: No replacement required.
B5: No refurbishment
B6: The product does not require operational energy use.
B7: No operational water use.

## C: End of life

The default scenario for Cement fibre boards from NBN/DTD B08-001 is used to model the End-of-life of the boards. The default scenario for metals from NBN/DTD B08-001 is used to model the End-of-life of the screws and the clips.

C1: The dismantling of EQUITONE [tectiva] involves the same amount of energy as for the installation, which is 0,022 kWh.
C2: The default scenario for fibre cement boards from NBN/DTD B08-001 describes that the end-of-life waste is transported to a sorting facility over a distance of 30 km. Afterwards, 100% of the fibre cement boards and 5% of the metal screws and clips are transported to a landfill over a distance of 50 km.
C3: No recycling/reuse of fibre cement boards, 95% recycling of metal screws
C4: 100% landfill of fibre cement boards, 5% landfill of metal screws

| Module C2 – Transport to waste processing | | | | | |
|---|---|---|---|---|---|
| Type of vehicle (truck/boat/etc.) | Fuel consumption (litres/km) | Distance (km) | Capacity utilisation (%) | Density of products (kg/m$^3$) | Assumptions |
| Truck 16-32 ton | 0,260 l diesel/km | 80 | 50% | Ecoinvent scenario | Ecoinvent scenario |

| End-of-life modules – C3 and C4 | | |
|---|---|---|
| Parameter | Unit | Value |
| Wastes collected separately | kg | 0,079 |
| Wastes collected as mixed construction waste | kg | 19,5 |
| Waste for re-use | kg | 0 |
| Waste for recycling | kg | 0,075 |
| Waste for energy recovery | kg | 0 |
| Waste for final disposal | kg | 19,5 |

## D – Benefits and loads beyond the system boundaries

In module D, the benefits and loads beyond the system boundaries are quantified. Following waste streams are considered after their end-of-waste: wooden pallets in A3 and A5 (of which 60% is recycled), plastic packaging in A3 and A5 (of which 35% is recycled), paper and cardboard in A3 (of which 95% is recycled), steel cables in A3 (of which 95% is recycled) and metal screws and clips (of which 95% is recycled.

| | |
|---|---|
| *Quantitative description of the loads beyond the system boundaries* | Treatment of 0,078 kg of scrap steel to prepare it for to prepare it for recycling at the remelter |
| | Sorting of 0,408 kg of waste wood to prepare it for recycling |
| | Treatment of 0,113 kg plastic to prepare it for recycling |
| *Quantitative description of the benefits beyond the system boundaries* | Avoided production of 2,40 MJ of heat using natural gas |
| | Avoided production of 1,20 MJ of Belgian electricity mix |
| | Avoided production of 0,078 kg primary steel |
| | Avoided production of 0,408 kg primary softwood |
| | Avoided production of 0,113 kg primary polypropylene/ polypropylene granulates |

## ADDITIONAL INFORMATION ON RELEASE OF DANGEROUS SUBSTANCES TO INDOOR AIR, SOIL AND WATER DURING THE USE STAGE

### INDOOR AIR

Under normal conditions of use, CEDRAL products do not cause any adverse health effects or release of volatile organic compounds (VOCs) to indoor air.

### SOIL AND WATER

No environmental impact to water, air or soil is expected due to the extremely low metal release from the low maintenance requirements.

## DEMONSTRATION OF VERIFICATION

| |
|---|
| EN 15804+A2 serves as the core PCR |
| Independent verification of the environmental declaration and data according to standard EN ISO 14025:2010<br><br>Internal ☐ External ☒ |
| Third party verifier: Evert Vermaut (Vincotte)<br>Jan Olieslagerslaan 35<br>1800 Vilvoorde, Belgium<br><br>evermaut@vincotte.be |

# ADDITIONAL TECHNICAL INFORMATION FOR SCENARIO DEVELOPMENT

This EPD does not include the framework on which the panels are installed. At building level the impact of the framework should be added. If specific information on quantities is missing, following weights can be used. The values are applicable for exterior wall cladding.

Wooden framework

| Components | quantity | Description |
|---|---|---|
| Wooden frame | *2,4 kg* | |
| EPDM sealing tape | *0,018 kg* | |

Steel framework

| Components | quantity | Description |
|---|---|---|
| Steel frame | *2,48 kg* | |
| PVC foam | *0,02 kg* | |

# APPLICATION UNIT

This paragraph gives information on the applied product and how the reference flow and table with impacts relate to different applications. The table below gives an overview of the standard thicknesses, the thickness range and the ratio to the declared unit of 1 $m^2$ for each application. The environmental impact is proportional with the thickness.

| Application | Standard thickness | Thickness range | Ratio to the declared unit of 1 $m^2$ |
|---|---|---|---|
| Exterior wall covering ("lap" system) | *10 mm* | / | *1* |
| Exterior wall covering ("click" system) | *12 mm* | / | *1* |

# ADDITIONAL INFORMATION ON REVERSIBILITY

*For the application and installation as described in this EPD a qualitative assessment of the reversibility is given. Following 4 indicators shall be used (based on BAMB – buildings as material banks). The assessment is applicable for exterior wall cladding and for all frameworks.*

| | | |
|---|---|---|
| Reversibility | - | *Reversible with light repairable damage (fixation with screws, bolts and dowels)* |
| Simplicity of disassembly | - | *simple - no specific dismantling tools required* |
| Speed of disassembly | - | *speedy disassembly* |
| Ease of handling (size and weight) | - | *can be handled manually, but size and/or weight requires two or more workers* |
| Robustness of material (material resistance to disassembly) | - | *the material resists well during disassembly* |

# BIBLIOGRAPHY


- ISO 14040:2006: Environmental Management-Life Cycle Assessment-Principles and framework.
- ISO 14044:2006: Environmental Management-Life Cycle Assessment-Requirements and guidelines.
- ISO 14025:2006: Environmental labels and Declarations-Type III Environmental Declarations-Principles and procedures.
- NBN EN 15804+A2:2019
- NBN/DTD B 08-001 (BE-PCR)
- CEN/TR 16970:2016. Sustainability of construction works - Guidance for the implementation of EN 15804
- Durability of Autoclaved Cellulose Fiber Cement Composites, A.M.Cooke, Managing Director, Building Materials and Technology Pty Ltd, Sydney, NSW, Australia
- Information sheet http://noam.equitone.com/file.php?id=05baa7d0-7e8c-47af-bd2d-b00a6737a2d2
- EN 12467:2012 + A1:2018 Fibre-cement flat sheets - Product specifications and test methods
- EN 13501-1+A1:2007 Fire classification of construction products and building elements. Classification using test data from reaction to fire test
- 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. Available at: <http://link.springer.com/10.1007/s11367-016-1087-8> .
- Landesanstalt für Umwelt, Messungen und Naturschutz Baden -Württemberg, Steckbrief „Asbestfreie Faserzementprodukte“
- Environment-related material performance of Building elements, project for the Flemish Waste Agency (2012), based on Debacker et. Al., 2012. Milieugerelateerde Materiaalprestatie van Gebouwelementen. In opdracht van OVAM.
- European Life Cycle Database (ELCD) v3.2, April 2018
- Industry 2.0 data: This library contains data as collected by industry associations, such as Plastics Europe, World Steel, ERASM and International Molybdenum Association (IMOA). Several datasets were updated and added in April 2015, September 2015, March 2016, December 2017, April 2018 and December 2019.

# General information

| | |
|---|---|
| Owner of the EPD,<br>Responsible for the data, LCA and information | **Etex services**<br>**Kuiermansstraat 1**<br>**1880 Kapelle-op-den-Bos**<br>**Belgium**<br>Tel : +32 (0) 15 71 82 83;<br>*For more information you can contact Peggy Van De velde, peggy.vandevelde@etexgroup.com* |
| EPD program<br>Program operator<br>Publisher of this EPD | **B-EPD**<br>Federal Public Service of Health / DG Environment<br>Galileelaan 5/2<br>1210 Brussels<br>Belgium<br><br>www.environmentalproductdeclarations.eu |
| Contact programma operator | epd@environment.belgium.be |
| Based on following PCR documents | EN 15804+A2:2019<br>NBN/DTD B 08-001 and its complement |
| PCR review conducted by | Federal Public Service of Health and Environment &<br>PCR Review committee |
| Author(s) of the LCA and EPD | Arthur De Jaegher, arthur@enperas.com |
| Identification of the project report | Life cycle assessment of CEDRAL (VITO, 07-09-21) |
| Verification | External independent verification of the declaration and data according to EN ISO 14025 and relevant PCR documents |
| Name of the third party verifier<br>Date of verification | Evert Vermaut (Vinçotte<br>08.09.2021 |
| **www.b-epd.be** | **www.environmentalproductdeclarations.eu** |

*Comparing EPDs is not possible unless they are conform to the same PCR and taking into account the building context.*
*The program operator cannot be held responsible for the information supplied by the owner of the EPD nor LCA practitioner.*

LCA practitioner

www.vito.be
www.enperas.be

Building calculator of the regional authorities

www.totem-building.be

Federal Public Service of Health, Food Chain Safety and Environment

www.b-epd.be

Dieter De Lathauwer
((Signature