SVK
FIBER CEMENT SLATES

1 m² of fiber cement slates with a thickness of 4 mm

Issued 17.03.2021
Valid until 17.03.2026

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

Modules declared					
A123	A4	A5	B2 B4 B6	C	D
•	•	•	•	•	•

[B-EPD n° 21_0073_005_00_01_EN]

OWNER OF THIS ENVIRONMENTAL PRODUCT DECLARATION
SVK nv

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

SVK fibre cement slates with a thickness of 4 mm (tolerance -0,4 mm to +1 mm), with commercial names: Ardonit, Montana, Fasonit, Cromleigh, Alpina, Planalp, Alpiplan. The commercial names can change.

PRODUCT DESCRIPTION AND INTENDED USE

SVK fibre cement slates are small size double pressed fibre-cement flat sheets, with a smooth or textured surface and squared or dressed edges. The natural colour of the slates is grey. The front and the sides of the coated slates are finished with a multi-layer water-based acrylic coating. The underside of the slates is treated with a layer coating and an extra colourless water-repellent layer. SVK slates come in various colours, shapes and dimensions. The LCIA results presented in this EPD are results for 1 m² fibre cement slates with a thickness of 4 mm (tolerance -0,4 mm to +1 mm).

REFERENCE FLOW / DECLARED UNIT

This Environmental Product Declaration (EPD) describes the environmental impacts of 1 m² of fiber cement slates with a thickness of 4 mm, to be used as roof and facade protection during 60 years, produced by SVK nv at their site in Sint-Niklaas.

Packaging is included.
Installation is included.

The weight per reference flow is 8,4 kg.

INSTALLATION

Ancillary materials for fixation and installation are included.
Following materials are needed for mounting and/or installing the product: nails and disk rivets.

IMAGES OF THE PRODUCT AND ITS INSTALLATION

COMPOSITION AND CONTENT

Components	Composition / content / ingredients	Quantity
Product	Cement	70-75 %
	Cellulose	3-4 %
	Fibres	1,8-2,2 %
	Filler	16-23 %
Packaging	PE film	4,26E-03 kg/m²
	PP film	2,65E-03 kg/m²
	Cardboard	1,44E-03 kg/m²
	Softwood laths	8E-05 kg/m²

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.

The fibre-cement slate is on the market for about 35 years In 2003 the results of a study on fibers from fiber cement products naturally aged for 18 years showing no significant degradation of the fibers. Ageing tests conducted on this fibre cement slate show an expected durability of these products equivalent to that of other roof products of mineral origin like ceramic roof tiles (Kalbskopf et al., 2002)); The BRE (Building Research Establishment) has estimated, on the base of a review of the bibliographic data and discussions with producers that it was reasonable to consider the life time of fibres-cement slates at 60 years, comparable with the data used in the models made up for ceramic and concrete roofing tiles (De Lhoneux et al., 2003).

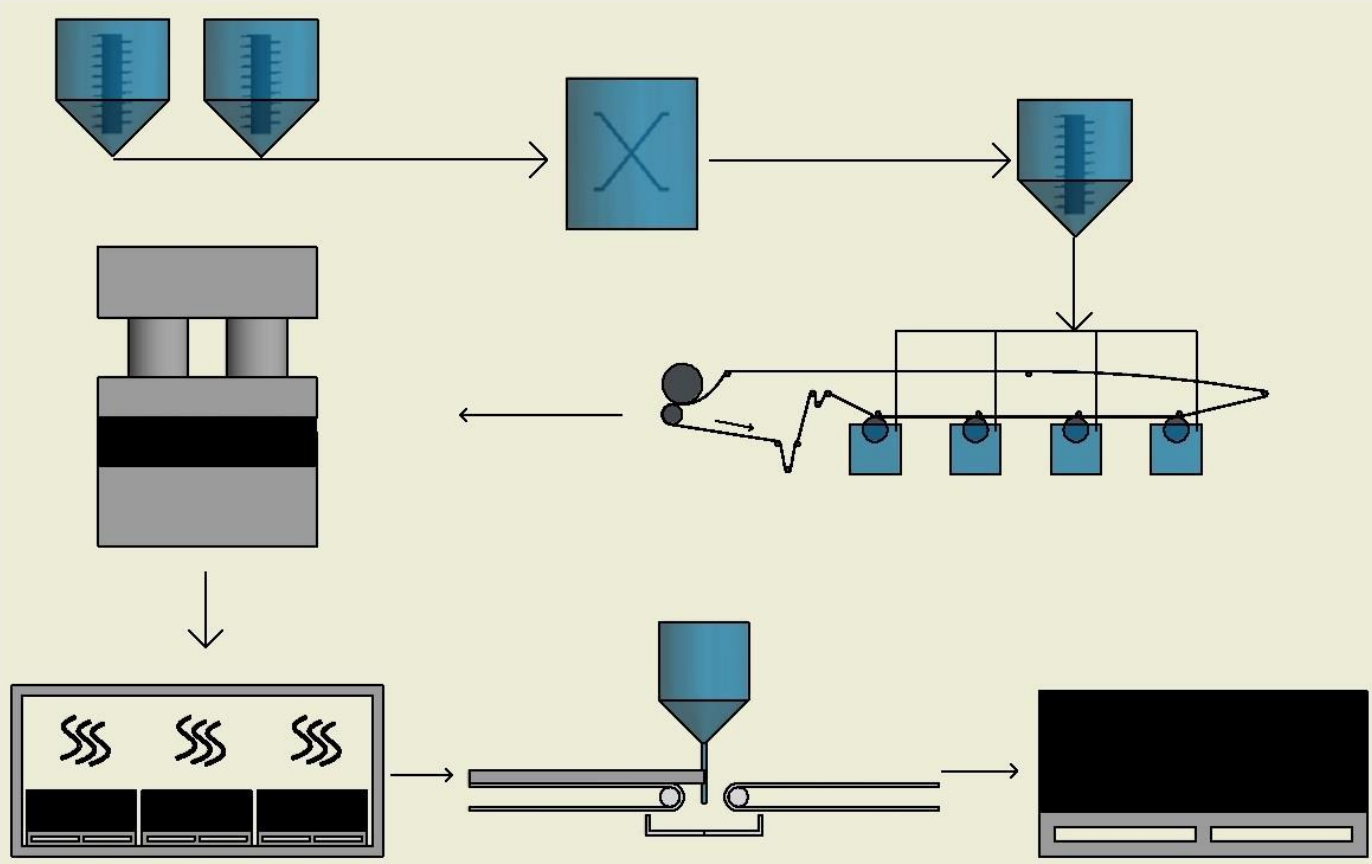
The conditions under which this RSL is valid are as following: natural aging conditions.

DESCRIPTION OF GEOGRAPHICAL REPRESENTATIVITY

The EPD is representative for the Belgian market.
The composed datasets for this life cycle assessment are representative and relevant for fibre cement slates produced by SVK nv. The data describing the direct inputs and outputs of the foreground processes are representative for SVK nv production in Belgium, Sint-Niklaas.

DESCRIPTION OF THE PRODUCTION PROCESS AND TECHNOLOGY

Fibre cement is manufactured by the Hatschek process, by means of forming thin individual filter layers that are subsequently build up to the required thickness. The sheets are cut to size and individually stacked between steel sheets. After pressing the stack of sheets, the first curing takes place in a maturing chamber at slightly elevated temperatures and humidity, the fibre cement sheets are destacked and piled on wooden pallets to further cure in the warehouse for 28 days. The slates are delivered in natural grey or can be coated with a water-based paint.



TECHNICAL DATA / PHYSICAL CHARACTERISTICS

Technical property	Standard	Value	Unit	Comment
Thickness		4	mm	Tolerance: -0,4 mm to +1 mm
Bending moment	EN 492	45	Nm/m	
Elasticity modulus	EN 492	16000	N/mm^2	
Thermal expansion coefficient		0,0075	mm/mK	
Thermal conductivity		0,37	W/mK	
Density	EN 492	>1700	kg/m^3	
Fine reaction	EN 492			A2-s1,d0

LCA STUDY

DATE OF LCA STUDY

November 2020

SOFTWARE

For the calculation of the LCA results, the software program SimaPro 9.1.1.1 (PRé Consultants, 2019) has been used.

INFORMATION ON ALLOCATION

At SVK nv, different types of fiber cement products are produced. Only facility level data were available for the use of electricity, natural gas, etc. The facility level data have been allocated to the analysed product using their respective annual production volume (physical relationship). Material inputs and outputs which were not available at the product level, such as waste, were allocated similarly. For every production at SVK each batch of raw materials is logged, included the quantity. Packaging is quantitatively detailed for the raw materials used and pro finished unity (pallet). Energy usage is allocated through raw material usage and total volume.

INFORMATION ON CUT OFF

The following processes are considered below cut-off: Transport to end-of-life treatment of packaging materials (A3 and A5); Electricity use during installation. Possible energy recovery from packaging materials in module D. The total of neglected input flows is less than 5% of energy usage and mass as prescribed by EN15804+A2.

INFORMATION ON EXCLUDED PROCESSES

Following processes were excluded for the inventory:

- Transport to end-of-life treatment of packaging materials (A3 and A5);
- Electricity use during installation.
- Possible energy recovery from packaging materials in module D.
- Losses during transport are considered to be below cut-off because breakage during transport only rarely occurs.
- 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. Heating or cooling of the plants in order to ensure a comfortable indoor climate for the personnel for example is also neglected.

INFORMATION ON BIOGENIC CARBON MODELLING

The slates contain cellulose, which is a bio-based 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 slates are transported using softwood pallets. Uptake of biogenic CO_2 within these pallets is reported in module A3, release in module A5. Bamboo is used as a packaging material for packaging of some of the raw materials. Uptake of CO_2 by the bamboo packaging material is reported in A1, release in A3.

	Biogenic carbon content (kg C / FU)
Biogenic carbon content in product (at the gate)	2,14E-01 kg C/FU
Biogenic carbon content in accompagnying packaging (at the gate)	3,61E-02 kg C/FU

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 conform EN15804+A2. 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. The life cycle inventory for this study is performed by SVK nv and VITO according to the ISO 14040 and ISO 14044 (data inventory) standards (ISO, 2006). Specific data have been collected for the processes under operational control of SVK nv. Generic data have been used for the processes SVK nv cannot influence..

PERIOD OF DATA COLLECTION

Manufacturer specific data have been collected for the year 2018.

INFORMATION ON DATA COLLECTION

Company specific data for the product stage have been collected by SVK nv and were provided to VITO through an online data collection questionnaire. The LCI data for the product stage have been checked by the EPD verifier (Vinçotte) during a factory visit. VITO uses publicly available generic data for all background processes such as the production of electricity, transportation by means of a specific truck, etc.

DATABASE USED FOR BACKGROUND DATA

The main LCI source used in this study is the Ecoinvent v3.6 database (Wernet et al., 2016). When no representative dataset was available in this database, datasets were used from ELCD v3.2 (JRC, 2018) or adjusted from the Ecoinvent v3.6 database (Wernet et al., 2016).

ENERGY MIX

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

PRODUCTION SITES

SVK (Sint-Niklaas)

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
⊠	⊠	⊠	⊠	⊠	**MND**	⊠	**MND**	⊠	**MND**	⊠	**MND**	⊠	⊠	⊠	⊠		⊠

X = included in the EPD
MND = module not declared

POTENTIAL ENVIRONMENTAL IMPACTS PER REFERENCE FLOW

	Production			Construction process stage		Use stage							End-of-life stage				D Reuse, recovery, recycling	Total excl module D
	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		
GWP total (kg CO2 equiv/FU)	5,16E+00	2,30E-01	1,07E+00	1,33E-01	7,32E-01	MND	4,97E-01	MND	0,00E+00	MND	0,00E+00	MND	2,76E-02	1,12E-01	0,00E+00	5,54E-02	0,00E+00	8,02E+00
GWP fossil (kg CO2 equiv/FU)	5,42E+00	2,30E-01	1,17E+00	1,32E-01	7,06E-01	MND	4,94E-01	MND	0,00E+00	MND	0,00E+00	MND	2,76E-02	1,12E-01	0,00E+00	5,52E-02	0,00E+00	8,35E+00
GWP biogenic (kg CO2 equiv/FU)	-2,58E-01	1,16E-04	-1,09E-01	7,93E-05	2,50E-02	MND	2,92E-03	MND	0,00E+00	MND	0,00E+00	MND	7,66E-06	5,98E-05	0,00E+00	2,01E-04	0,00E+00	-3,38E-01
GWP luluc (kg CO2 equiv/FU)	3,57E-03	1,66E-04	1,46E-03	4,41E-05	1,10E-03	MND	3,97E-04	MND	0,00E+00	MND	0,00E+00	MND	2,18E-06	3,92E-05	0,00E+00	3,08E-05	0,00E+00	6,80E-03
ODP (kg CFC 11 equiv/FU)	2,70E-07	4,94E-08	2,11E-07	3,04E-08	4,83E-08	MND	5,85E-08	MND	0,00E+00	MND	0,00E+00	MND	5,96E-09	2,54E-08	0,00E+00	2,05E-08	0,00E+00	7,19E-07
AP (mol H^+ eq)	2,01E-02	2,33E-03	2,97E-03	5,46E-04	3,47E-03	MND	6,27E-03	MND	0,00E+00	MND	0,00E+00	MND	2,89E-04	4,58E-04	0,00E+00	4,73E-04	0,00E+00	3,69E-02
EP - freshwater (kg P eq /FU)	1,17E-04	1,78E-06	1,93E-05	1,04E-06	2,31E-05	MND	2,45E-05	MND	0,00E+00	MND	0,00E+00	MND	1,01E-07	8,80E-07	0,00E+00	7,19E-07	0,00E+00	1,88E-04
EP - marine (kg N – eq /FU)	3,81E-03	6,71E-04	6,96E-04	1,63E-04	6,52E-04	MND	4,98E-04	MND	0,00E+00	MND	0,00E+00	MND	1,28E-04	1,36E-04	0,00E+00	1,63E-04	0,00E+00	6,91E-03
EP - terrestrial (mol N eq /FU)	4,37E-02	7,43E-03	8,96E-03	1,80E-03	7,44E-03	MND	5,23E-03	MND	0,00E+00	MND	0,00E+00	MND	1,40E-03	1,50E-03	0,00E+00	1,80E-03	0,00E+00	7,93E-02
POCP (kg Ethene equiv/FU)	1,22E-02	2,02E-03	2,30E-03	5,61E-04	2,23E-03	MND	1,93E-03	MND	0,00E+00	MND	0,00E+00	MND	3,85E-04	4,60E-04	0,00E+00	5,20E-04	0,00E+00	2,26E-02
ADP Elements (kg Sb equiv/FU)	3,05E-05	4,76E-06	4,93E-05	3,18E-06	1,98E-05	MND	1,14E-05	MND	0,00E+00	MND	0,00E+00	MND	4,23E-08	3,03E-06	0,00E+00	5,03E-07	0,00E+00	1,22E-04

ADP fossil fuels (MJ/FU)	3,84E+01	3,28E+00	3,11E+01	2,02E+00	7,48E+00	MND	8,55E+00	MND	0,00E+00	MND	0,00E+00	MND	3,80E-01	1,69E+00	0,00E+00	1,59E+00	0,00E+00	9,45E+01
WDP (m³ water eq deprived /FU)	1,75E+00	8,99E-03	2,48E-01	5,97E-03	1,94E-01	MND	5,56E-01	MND	0,00E+00	MND	0,00E+00	MND	5,09E-04	4,70E-03	0,00E+00	5,84E-02	0,00E+00	2,83E+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)	1,05E+01	4,52E-02	3,84E+00	2,71E-02	1,61E+00	MND	7,07E-01	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	0,00E+00	0,00E+00	2,02E-03	0,00E+00	1,68E+01
PERM (MJ/FU, net calorific value)	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT (MJ/FU, net calorific value)	1,05E+01	4,52E-02	3,84E+00	2,71E-02	1,61E+00	MND	7,07E-01	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	0,00E+00	0,00E+00	2,02E-03	0,00E+00	1,68E+01
PENRE (MJ/FU, net calorific value)	4,45E+01	3,31E+00	3,34E+01	2,03E+00	9,00E+00	MND	9,81E+00	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	0,00E+00	0,00E+00	3,78E-01	0,00E+00	1,02E+02
PENRM (MJ/FU, net calorific value)	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT (MJ/FU, net calorific value)	4,45E+01	3,31E+00	3,34E+01	2,03E+00	9,00E+00	MND	9,81E+00	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	0,00E+00	0,00E+00	3,78E-01	0,00E+00	1,02E+02
SM (kg/FU)	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF (MJ/FU, net calorific value)	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	MND	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	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW (m^3 water eq/FU)	4,68E-02	3,27E-04	7,67E-03	2,07E-04	5,41E-03	MND	1,43E-02	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	0,00E+00	0,00E+00	1,50E-05	0,00E+00	7,47E-02

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)	3,03E-05	7,75E-06	3,63E-05	5,16E-06	1,24E-05	MND	6,97E-06	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	0,00E+00	0,00E+00	1,04E-06	0,00E+00	1,00E-04
Non-hazardous waste disposed (kg/FU)	3,71E-01	1,13E-01	1,21E-01	1,24E-01	8,46E-01	MND	2,22E-01	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	0,00E+00	0,00E+00	4,60E-04	0,00E+00	1,80E+00
Radioactive waste disposed (kg/FU)	1,51E-04	2,24E-05	2,20E-04	1,38E-05	2,97E-05	MND	2,71E-05	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	0,00E+00	0,00E+00	2,64E-06	0,00E+00	4,66E-04
Components for re-use (kg/FU)	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	MND	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	1,79E-03	0,00E+00	5,67E-02	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,85E-02
Materials for energy recovery (kg/FU)	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	MND	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	1,36E-02	0,00E+00	1,65E-01	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,79E-01

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)	1,23E-07	1,27E-08	2,71E-08	1,01E-08	3,83E-08	MND	2,79E-08	MND	0,00E+00	MND	0,00E+00	MND	4,09E-08	7,79E-09	0,00E+00	9,13E-09	0,00E+00	2,97E-07
IRHH (kg U235 eq/FU)	1,39E-01	1,43E-02	2,52E-01	8,82E-03	3,02E-02	MND	2,72E-02	MND	0,00E+00	MND	0,00E+00	MND	1,63E-03	7,38E-03	0,00E+00	8,72E-03	0,00E+00	4,90E-01
ETF (CTUe/FU)	7,31E+01	2,57E+00	1,25E+01	1,62E+00	1,63E+01	MND	1,25E+01	MND	0,00E+00	MND	0,00E+00	MND	2,29E-01	1,35E+00	0,00E+00	9,71E-01	0,00E+00	1,21E+02
HTCE (CTUh/FU)	1,88E-09	9,45E-11	3,91E-10	4,37E-11	5,41E-09	MND	9,10E-10	MND	0,00E+00	MND	0,00E+00	MND	8,01E-12	3,80E-11	0,00E+00	2,45E-11	0,00E+00	8,80E-09
HTnCE (CTUh/FU)	5,54E-08	2,58E-09	8,80E-09	1,79E-09	1,92E-08	MND	1,24E-08	MND	0,00E+00	MND	0,00E+00	MND	1,97E-10	1,47E-09	0,00E+00	6,90E-10	0,00E+00	1,03E-07
Land Use Related impacts (dimension less)	6,24E+01	2,04E+00	2,85E+01	1,71E+00	6,79E+00	MND	3,02E+00	MND	0,00E+00	MND	0,00E+00	MND	4,85E-02	1,16E+00	0,00E+00	2,81E+00	0,00E+00	1,08E+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);

Environmental impact categories explained

	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. It is split up in 4: - Global Warming Potential total (GWP-total) which is the sum of GWP-fossil, GWP-biogenic and GWP-luluc - 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). - 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.[1] - 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. It is split up in 3: - Eutrophication potential – freshwater: The potential to cause over-fertilization of freshwater, which can result in increased growth of biomass and following adverse effects. - Eutrophication potential – marine: The potential to cause over-fertilization of marine water, which can result in increased growth of biomass and following adverse effects. - 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). 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). 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). 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.

[1] Carbon exchanges from native forests shall be modelled under GWP - luluc (including connected soil emissions, derived products or residues), while their CO2 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.* *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:* - *Biotic production* - *Erosion resistance* - *Mechanical filtration* - *Groundwater* *The aggregation is done based on a JRC model. The four aspects are quantified through the LANCA model for land use.* *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 0,256 l diesel / km	Truck >32 ton 0,346 l diesel / km	Truck 16-32 ton 0,256 l diesel / km	Truck 7,5-16 ton 0,185 256 l diesel / km
Distance	100 km	100 km	35 km	35 km
Capacity utilisation (including empty returns)	50%	50%	50%	50%
Bulk density of transported products	Ecoinvent	Ecoinvent	Ecoinvent	Ecoinvent
Volume capacity utilisation factor	Ecoinvent	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 boards 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 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')
- 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

At the construction site, packaging materials are released. Also 5% material losses have been taken into account

Parts of the installation	quantity	Description
Fixation materials	*6,89E-02 kg*	*Inox*
Packaging	4,26E-03 kg	PE film
	2,65E-03 kg	PP film
	1,44E-02 kg	Cardboard
	6,77E-02 kg	Softwood laths

Ancillary materials for installation (specified by material);	Nails	Disk rivet	
Water use	Not applicable		
Other resource use	5% material losses		
Quantitative description of energy type (regional mix) and consumption during the installation process			
Waste materials on the building site before waste processing, generated by the product's installation (specified by type)	Fibre cement slate 0,42 kg 5% material loss	Softwoord laths 0,0677 kg Cardboard 0,0143 kg	PE-film 0,00426 kg PP film 0,00265 kg
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)	100% to landfill 0% incineration 0% recycling	Wood: 0 % to landfill 40% incineration 40% recycling Cardboard: 5% incineration; 95% recycling	5 % landfill 60% incineration 35% recycling
Direct emissions to ambient air, soil and water	Not applicable		
Distance			

B – USE STAGE (EXCLUDING POTENTIAL SAVINGS)

The slates are used as roofing or façade cladding. A water-based coating helps minimizing pollution, no maintenance or cleaning is necessary. Depending on the location and application, the user may benefit from a regular maintenance or cleaning, but this is not considered in this study. Within the life span of 60 years, replacement of the coating is necessary. The coating is replaced once in the life time of the slates (assumption).

B1:Not declared
B2:Replacement of the coating is required.
B3:Not declared
B4:No replacement is required
B5:Not declared
B6:No operational energy use needed

C: END OF LIFE

The default scenario provided by the B-PCR has been used as end-of-life scenario. The B-PCR also provides default scenarios for transport of waste which are:

- 30 km with a 16-32 ton EURO 5 lorry from demolition site to sorting plant/crusher/collection point;
- 50 km with a 16-32 ton EURO 5 lorry from sorting plant/crusher/collection point to landfill.

C1: Demolition of 8,4 kg slates.
C2-C4: The default scenario provided by the B-PCR describes for the slates that 100% is landfilled.

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	0,256 l diesel/km	30	50%	ecoinvent scenario	ecoinvent scenario
Truck 16-32 ton	0,256 l diesel/km	50	50%	ecoinvent scenario	ecoinvent scenario

End-of-life modules – C3 and C4		
Parameter	Unit	Value
Wastes collected separately	kg	0
Wastes collected as mixed construction waste	kg	8,4
Waste for re-use	kg	0
Waste for recycling	kg	0
Waste for energy recovery	kg	0
Waste for final disposal	kg	8,4

D – Benefits and loads beyond the system boundaries

No benefits or loads are declared in module D for the fibre cement slates.

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

INDOOR AIR

No emissions to indoor air are expected

SOIL AND WATER

The horizontal standards on measurement of release of regulated dangerous substances from construction products using harmonized test methods are not yet available, therefore the EPD can lack this information (CEN TC 351).

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 Internal ☐ External☒
Third party verifier: Evert Vermaut Jan Olieslagerslaan 35 1800 Vilvoorde evermaut@vincotte.be

APPLICATION UNIT

This paragraph gives information on the fiber cement slate with 4 mm thickness and how the reference flow and table with impacts relate to their use in roofs. The table below gives an overview of the fiber cement slate dimensions, overlap and the ratio to the declared unit of 1 m^2.

Fibre cement flat sheet dimensions (vertical double-lap)	Overlap	Ratio to the declared unit of 1 m^2 (based on standard thickness)
60x32 cm	11 cm	2,42
60x32 cm	13 cm	2,52
60x40 cm	11 cm	2,42
60x40 cm	5 cm	2,16
(60x40 cm	9 cm	2,33
60x40 cm	13 cm	2,53
60x32 cm	5 cm	2,15
60x32 cm	9 cm	2,32
60x30 cm	5 cm	2,15
60x30 cm	9 cm	2,32

ADDITIONAL INFORMATION ON REVERSIBILITY

For the application unit a qualitative assessment of the reversibility can be given (based on BAMB – buildings as material banks). This is shown in the table below.

Table 1: Reversibility of the fibre cement slates

Reversibility	Simplicity of dissassembly	Speed of dissassembly	Ease of handling (size and weight)	Robustness of material (material resistance to disassembly)
Reversible with light repairable damage/ reversible fixing	*Simple dissassembly use of dismantling tools required*	*speedy disassembly*	*Easy to handle manually, one workers is usually sufficient*	*The material resists well during disassembly*

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General information

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