B-EPD ENVIRONMENTAL PRODUCT DECLARATION

SVK
FIBER CEMENT FLAT SHEETS

1 m² of fiber cement flat sheets with a thickness of 8 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_006_00_01_EN]

SVK Experts in fibre cement

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 fiber cement flat sheets with a thickness of 8 mm (tolerance -0,2 mm to +0,2 mm), with commercial names: Ornimat, Decoboard, Puro Plus.

PRODUCT DESCRIPTION AND INTENDED USE

SVK fiber cement panels are manufactured from a homogeneous mixture of Portland cement, selected reinforcement fibers, additives and water. This mixture is transmitted in thin layers under constant pressure to a format roller by means of a sieve cylinder machine (Hatschek) until the required panel thickness is obtained. The panels are double pressed and harden at least 4 weeks under normal atmospheric conditions. Subsequently they are extra dried to minimize the dimensional movements. The panels are produced with a maximal format of 3085mmx1235mm untrimmed and must be trimmed prior to installation.
The LCIA results presented in this EPD are results for 1 m² fiber cement flat sheets with a thickness of 8 mm (tolerance -0,2 mm to +0,2 mm). No overlap has been taken into account.

This is a specific EPD from SVK.

REFERENCE FLOW / DECLARED UNIT

This Environmental Product Declaration (EPD) describes the environmental impacts of 1 m² of fiber cement flat sheets with a thickness of 8 mm, providing protection and decoration in a roof or façade 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 14,6 kg.

INSTALLATION

Installation and ancillary materials for installation are included.
Following materials are needed for mounting and/or installing the product: screws.

IMAGES OF THE PRODUCT AND ITS INSTALLATION

COMPOSITION AND CONTENT

Components	Composition / content / ingredients	Quantity
Product	Cement	70-75 %
	Cellulose	3-4 %
	Fibers	1,8-2,2 %
	Filler	16-23 %
Packaging	PE foil	8,05E-03 kg/m²
	PP strap	1,92E-03 kg/m²
	Softwood pallets	1,11E-01 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 fiber 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 fiber 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 fibers 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).

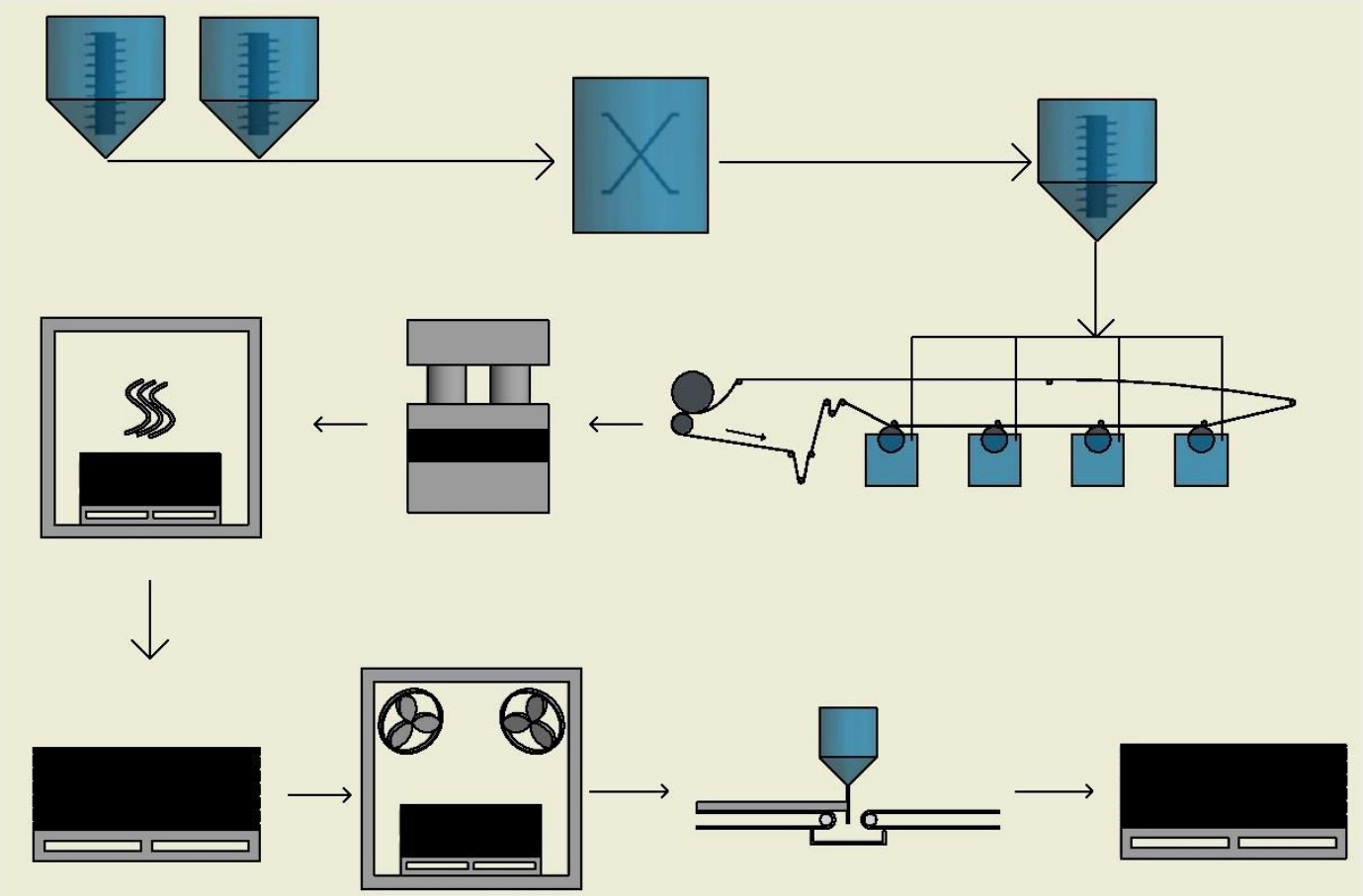
The conditions under which this RSL is valid are as following: natural aging conditions.

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 fiber cement flat sheets 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

Fiber 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 the first curing in a maturing chamber at slightly elevated temperatures and humidity, the fiber cement sheets are destacked and piled on wooden pallets to further cure in the warehouse for 28 days. The sheets are dried to a moisture content < 5% before coating or otherwise finishing.



TECHNICAL DATA / PHYSICAL CHARACTERISTICS

Technical property	Standard	Value	Unit	Comment
Thickness		8	mm	Tolerance: -0,2 mm to +0,2 mm
Bending strength	EN 12467	24	N/mm²	Average of 2 directions
Elasticity modulus	EN 12467	14000	N/mm²	
Density	EN 12467	1700	kg/m³	minimum
Fire reaction	EN 13501-1			A2-s1,d0
Thermal conductivity		0,37	W/mK	

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 analyzed 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 flat sheets 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 flat sheets 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.

For EN 15804+A2 include following table:

	Biogenic carbon content (kg C / FU)
Biogenic carbon content in product (at the gate)	3,78E-01 kg C/FU
Biogenic carbon content in accompagnying packaging (at the gate)	1,12E-01 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 2016.

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					
	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)	1,05E+01	4,85E-01	3,16E+00	2,31E-01	9,22E-01	MND	1,76E+00	MND	0,00E+00	MND	0,00E+00	MND	4,80E-02	1,95E-01	0,00E+00	9,40E-02	0,00E+00	1,74E+01
GWP fossil (kg CO2 equiv/FU)	1,10E+01	4,85E-01	3,56E+00	2,30E-01	8,99E-01	MND	1,75E+00	MND	0,00E+00	MND	0,00E+00	MND	4,80E-02	1,95E-01	0,00E+00	9,36E-02	0,00E+00	1,82E+01
GWP biogenic (kg CO2 equiv/FU)	-4,58E-01	1,88E-04	-4,04E-01	1,38E-04	2,24E-02	MND	1,13E-02	MND	0,00E+00	MND	0,00E+00	MND	1,33E-05	1,04E-04	0,00E+00	3,49E-04	0,00E+00	-8,28E-01
GWP luluc (kg CO2 equiv/FU)	6,90E-03	3,57E-04	3,05E-03	7,67E-05	7,80E-04	MND	9,63E-04	MND	0,00E+00	MND	0,00E+00	MND	3,78E-06	6,81E-05	0,00E+00	5,33E-05	0,00E+00	1,22E-02
ODP (kg CFC 11 equiv/FU)	5,35E-07	1,01E-07	5,63E-07	5,29E-08	7,21E-08	MND	1,34E-07	MND	0,00E+00	MND	0,00E+00	MND	1,04E-08	4,42E-08	0,00E+00	3,51E-08	0,00E+00	1,55E-06
AP (mol H^+ eq)	4,07E-02	9,73E-03	1,18E-02	9,50E-04	3,90E-03	MND	1,42E-02	MND	0,00E+00	MND	0,00E+00	MND	5,02E-04	7,96E-04	0,00E+00	7,98E-04	0,00E+00	8,34E-02
EP - freshwater (kg P eq /FU)	2,61E-04	3,15E-06	5,06E-05	1,80E-06	2,09E-05	MND	8,45E-05	MND	0,00E+00	MND	0,00E+00	MND	1,75E-07	1,53E-06	0,00E+00	1,24E-06	0,00E+00	4,25E-04
EP - marine (kg N – eq /FU)	8,35E-03	2,56E-03	2,30E-03	2,83E-04	8,19E-04	MND	2,12E-03	MND	0,00E+00	MND	0,00E+00	MND	2,22E-04	2,36E-04	0,00E+00	2,73E-04	0,00E+00	1,72E-02
EP - terrestrial (mol N eq /FU)	9,07E-02	2,84E-02	3,90E-02	3,13E-03	9,69E-03	MND	1,84E-02	MND	0,00E+00	MND	0,00E+00	MND	2,43E-03	2,61E-03	0,00E+00	3,01E-03	0,00E+00	1,97E-01
POCP (kg Ethene equiv/FU)	2,70E-02	7,49E-03	7,65E-03	9,74E-04	2,66E-03	MND	7,07E-03	MND	0,00E+00	MND	0,00E+00	MND	6,69E-04	7,99E-04	0,00E+00	8,71E-04	0,00E+00	5,52E-02

ADP Elements (kg Sb equiv/FU)	6,66E-05	5,17E-06	5,30E-04	5,52E-06	3,53E-05	MND	2,61E-05	MND	0,00E+00	MND	0,00E+00	MND	7,36E-08	5,27E-06	0,00E+00	8,70E-07	0,00E+00	6,75E-04
ADP fossil fuels (MJ/FU)	9,55E+01	6,64E+00	7,26E+01	3,51E+00	1,03E+01	MND	2,92E+01	MND	0,00E+00	MND	0,00E+00	MND	6,61E-01	2,94E+00	0,00E+00	2,73E+00	0,00E+00	2,24E+02
WDP (m^3 water eq deprived /FU)	3,53E+00	6,95E-02	5,46E-01	1,04E-02	2,41E-01	MND	1,08E+00	MND	0,00E+00	MND	0,00E+00	MND	8,85E-04	8,17E-03	0,00E+00	1,02E-01	0,00E+00	5,59E+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)	1,96E+01	7,50E-02	9,75E+00	4,71E-02	1,75E+00	MND	1,83E+00	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	0,00E+00	0,00E+00	3,51E-03	0,00E+00	3,30E+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)	1,96E+01	7,50E-02	9,75E+00	4,71E-02	1,75E+00	MND	1,83E+00	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	0,00E+00	0,00E+00	3,51E-03	0,00E+00	3,30E+01
PENRE (MJ/FU, net calorific value)	1,09E+02	6,67E+00	7,93E+01	3,53E+00	1,16E+01	MND	3,29E+01	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	0,00E+00	0,00E+00	6,56E-01	0,00E+00	2,44E+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)	1,09E+02	6,67E+00	7,93E+01	3,53E+00	1,16E+01	MND	3,29E+01	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	0,00E+00	0,00E+00	6,56E-01	0,00E+00	2,44E+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)	9,32E-02	1,80E-03	1,71E-02	3,59E-04	6,57E-03	MND	2,83E-02	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	0,00E+00	0,00E+00	2,60E-05	0,00E+00	1,47E-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)	6,08E-05	1,13E-05	1,56E-04	8,96E-06	1,49E-05	MND	1,50E-05	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	0,00E+00	0,00E+00	1,80E-06	0,00E+00	2,69E-04
Non-hazardous waste disposed (kg/FU)	7,39E-01	2,23E-01	8,59E-01	2,15E-01	9,57E-01	MND	4,13E-01	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	0,00E+00	0,00E+00	8,00E-04	0,00E+00	3,41E+00
Radioactive waste disposed (kg/FU)	2,92E-04	4,56E-05	3,82E-04	2,39E-05	4,16E-05	MND	5,94E-05	MND	0,00E+00	MND	0,00E+00	MND	0,00E+00	0,00E+00	0,00E+00	4,59E-06	0,00E+00	8,48E-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	5,12E-03	0,00E+00	6,99E-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	7,50E-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	3,52E-03	0,00E+00	2,59E-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	2,62E-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)*	2,81E-07	2,35E-08	1,20E-07	1,76E-08	3,24E-08	MND	9,53E-08	MND	0,00E+00	MND	0,00E+00	MND	7,11E-08	1,35E-08	0,00E+00	1,52E-08	0,00E+00	6,69E-07
	*IRHH (kg U235 eq/FU)*	2,75E-01	2,89E-02	4,26E-01	1,53E-02	4,13E-02	MND	6,21E-02	MND	0,00E+00	MND	0,00E+00	MND	2,83E-03	1,28E-02	0,00E+00	1,50E-02	0,00E+00	8,80E-01
	*ETF (CTUe/FU)*	1,70E+02	4,79E+00	3,54E+01	2,81E+00	1,44E+01	MND	5,64E+01	MND	0,00E+00	MND	0,00E+00	MND	3,98E-01	2,35E+00	0,00E+00	1,67E+00	0,00E+00	2,88E+02
	*HTCE (CTUh/FU)*	1,20E-08	2,27E-10	1,79E-09	7,59E-11	2,33E-09	MND	1,01E-08	MND	0,00E+00	MND	0,00E+00	MND	1,39E-11	6,61E-11	0,00E+00	4,20E-11	0,00E+00	2,66E-08
	*HTnCE (CTUh/FU)*	1,53E-07	4,43E-09	2,92E-08	3,11E-09	1,45E-08	MND	7,11E-08	MND	0,00E+00	MND	0,00E+00	MND	3,42E-10	2,56E-09	0,00E+00	1,18E-09	0,00E+00	2,79E-07
	*Land Use Related impacts (dimension less)*	1,12E+02	3,95E+00	5,43E+02	2,97E+00	3,40E+01	MND	5,71E+00	MND	0,00E+00	MND	0,00E+00	MND	8,43E-02	2,02E+00	0,00E+00	4,87E+00	0,00E+00	7,09E+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.* *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 0,364 l diesel / km	Truck 16-32 ton 0,256 l diesel / km	Truck 7,5-16 ton 0,185 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. Fiber 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	2,1E-02 kg	*Inox screw*
Packaging	8,05E-03 kg	PE foil
	1,92E-03 kg	PP strap
	1,11E-01 kg	Softwood pallets

Ancillary materials for installation (specified by material);	Inox screw 2,1E-02 kg		
Water use	Not applicable		
Other resource use	5% material losses		
Quantitative description of energy type (regional mix) and consumption during the installation process	Electricity for drilling – assumed neglegible		
Waste materials on the building site before waste processing, generated by the product's installation (specified by type)	Fiber cement flat sheet 0,73 kg 5% material loss	Softwood pallet 0,0617 kg	PE-foil 0,00776 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	0 % to landfill 40% incineration 40% 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 flat sheets are used as roofing or façade cladding. A 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 (rinsing with soap and water), 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 flat sheets (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 14,6 kg sheet.
C2-C4: The default scenario provided by the B-PCR describes for the sheets 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	14,6
Waste for re-use	kg	0
Waste for recycling	kg	0
Waste for energy recovery	kg	0
Waste for final disposal	kg	14,6

D – BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES

There are no benefits and loads beyond the system boundaries.

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 flat sheet with no overlap and how the reference flow and table with impacts relate to their use in outer walls. The table below gives an overview of the fiber cement flat sheet dimensions, thicknesses and the ratio to the declared unit of 1 m^2.

Fiber cement flat sheet dimensions	Thickness	Ratio to the declared unit of 1 m^2 (based on standard thickness)
2,52 x 1,22 m	8 mm	0,99
3,07 x 1,22 m	8 mm	0,99
3,085 x 1,235 m	8 mm	0,99
2,535 x 1,235	8 mm	0,99
2,535 x 1,235 m	10 mm	1,24
2,52 x 1,22m	10 mm	1,24
3,07 x 1,22 m	10 mm	1,24
2,52 x 1,22 m	12 mm	1,49
3,085 x 1,235 m	10 mm	1,24
3,07 x 1,22 m	12 mm	1,49
3,085 x 1,235 m	12 mm	1,49
2,535 x 1,235 m	12 mm	1,49

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 fiber cement flat sheet

Type of attachment	Reversibility	Simplicity of dissasembly	Speed of dissasembly	Ease of handling (size and weight)	Robustness of material (material resistance to disassembly)
Screws, rivets	*Reversible with light repairable damage*	*Simple dissassembly - use of dismantling tools required*	*speedy disassembly*	*Can be handled manually, but size and/or weight may require more than one worker*	*The material resists well during disassembly*
Glued	*Non reversible fixing*	*Complex dissassembly - requires specific tools and/or several workers*	*Rather slow disassembly*	*Can be handled manually, but size and/or weight may require more than one worker*	*Disassembly is possible but generates inevitable damage to the material*

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General information

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Based on following PCR documents	EN 15804+A2:2019 NBN/DTD B 08-001 and its complement Insert others
PCR review conducted by	Federal Public Service of Health and Environment & PCR Review committee
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Name of the third party verifier Date of verification	Evert Vermaut Vinçotte 29.01.2021
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.

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