SVK ENVIRONMENTAL PRODUCT DECLARATION

ROOF / BRICK / PAVER / FACADE / BLOCK

Wienerberger

ENVIRONMENTAL PRODUCT DECLARATION

SVK FIBRE CEMENT FLAT SHEETS

1 m² of fiber cement flat sheets with a thickness of 8 mm

Issued 30.09.2019
Valid until 30.09.2024

Third party verified
Conform to EN 15804+A1 and NBN/DTD B08-001

Cradle to gate with options

[B-EPD n° 2019-00010]

OWNER OF THIS ENVIRONMENTAL PRODUCT DECLARATION
SVK nv

EPD PROGRAM OPERATOR
Federale Overheidsdienst Volksgezondheid, Veiligheid van de Voedselketen en Leefmilieu
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.

PRODUCT DESCRIPTION

PRODUCT NAME

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

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

The weight per reference flow is 14,6 kg.

PRODUCT DESCRIPTION

SVK fibre cement panels are manufactured from a homogeneous mixture of Portland cement, selected reinforcement fibres, 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 fibre cement flat sheets with a thickness of 8 mm (tolerance -0,2 mm to +0,2 mm). No overlap has been taken into account.

IMAGES OF THE PRODUCT AND ITS INSTALLATION

COMPOSITION AND CONTENT

The main components of the product are

Material/chemical input	%
Cement	70-75
Cellulose	3-4
Fibres	1,8-2,2
Filler	16-23

The product packaging consists of PE foil and PP strap. Softwood pallets are used during transportation of the product.

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

REFERENCE SERVICE LIFE

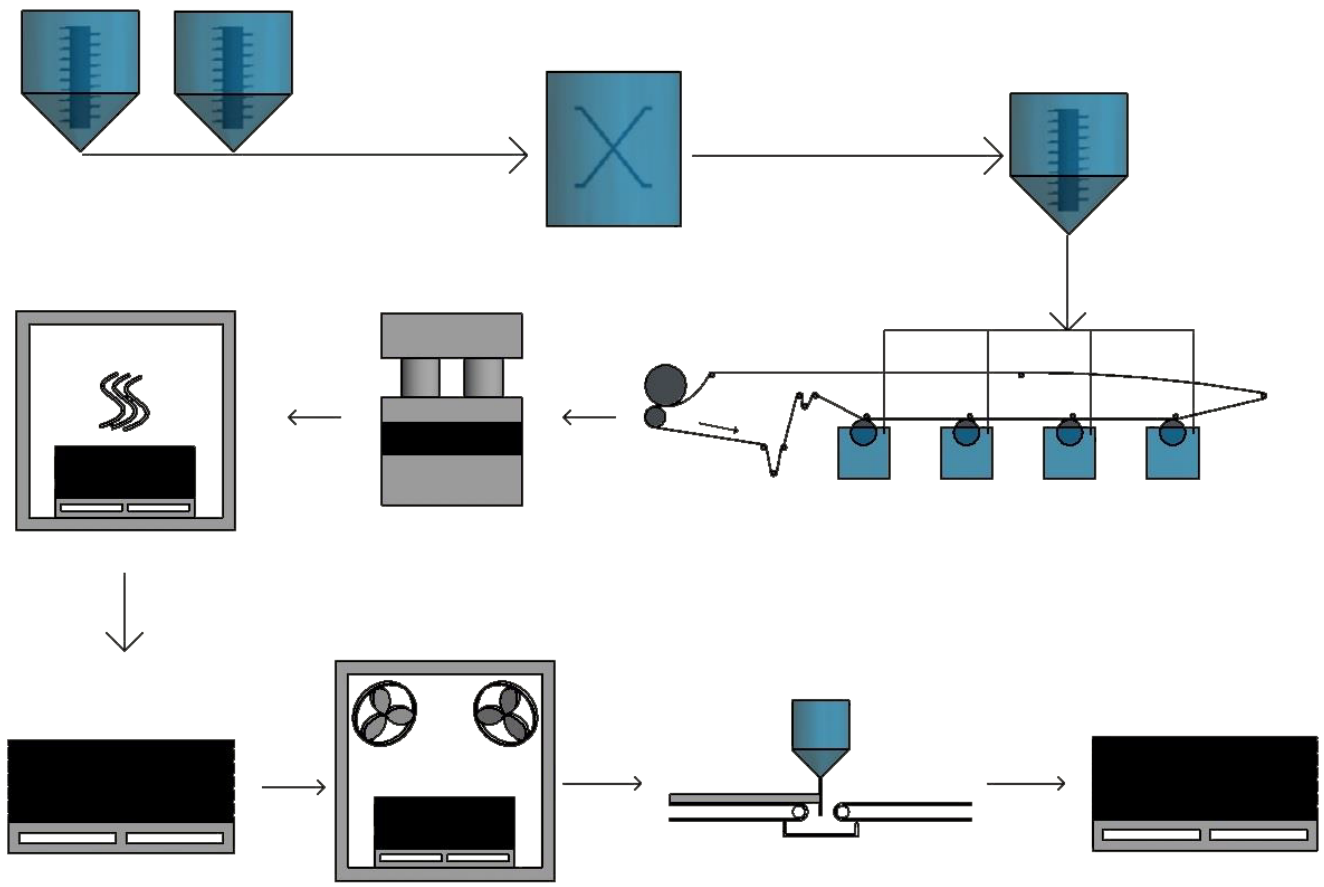
The reference service life is estimated at 60 years.

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 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 the first curing 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 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
August 2019

SOFTWARE
For the calculation of the LCA results, the software program SimaPro 9.0.0.3 (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+A1. .

INFORMATION 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.

ADDITIONAL OR DEVIATING CHARACTERISATION FACTORS
For the CEN indicators all CF are conform to EN 15804+A1. For toxicity the characterization factors from USEtox v1.01 have been used. Particulate matter is calculated using Riskpoll (Humbert, 2009). Water resource depletion is calculated using the Swiss Ecological Scarcity method (Frischknecht, 2008). Ionizing radiation is calculated using characterization factors developed by Frischknecth et al. (2000). Land use occupation and transformation Soil Organic Matter is calculated using Milà i Canals et al. (2007). Land use occupation and transformation biodiversity is calculated using a method established by Kölner (2000). The characterization factors in this method were changed into 1.

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.

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 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.

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 v3.5 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 v3.4 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
GWP	1,08E+01	5,29E-01	3,66E+00	2,27E-01	8,95E-01	MND	1,66E+00	MND	0,00E+00	MND	0,00E+00	MND	4,80E-02	1,92E-01	0,00E+00	9,50E-02	0,00E+00
ODP	4,99E-07	8,96E-08	6,05E-07	4,25E-08	7,07E-08	MND	1,37E-07	MND	0,00E+00	MND	0,00E+00	MND	8,72E-09	3,55E-08	0,00E+00	3,26E-08	0,00E+00
AP	3,42E-02	7,49E-03	9,70E-03	7,38E-04	3,23E-03	MND	1,21E-02	MND	0,00E+00	MND	0,00E+00	MND	3,65E-04	6,18E-04	0,00E+00	6,48E-04	0,00E+00
EP	4,65E-03	7,62E-04	1,68E-03	1,22E-04	4,34E-04	MND	1,35E-03	MND	0,00E+00	MND	0,00E+00	MND	7,89E-05	1,03E-04	0,00E+00	1,13E-04	0,00E+00
POCP	2,84E-03	3,17E-04	7,16E-04	6,45E-05	2,48E-04	MND	1,14E-03	MND	0,00E+00	MND	0,00E+00	MND	2,21E-05	5,20E-05	0,00E+00	5,01E-05	0,00E+00
ADP elements	1,42E-05	3,96E-07	4,73E-05	6,03E-07	5,84E-06	MND	6,80E-06	MND	0,00E+00	MND	0,00E+00	MND	1,62E-08	5,76E-07	0,00E+00	1,21E-07	0,00E+00
ADP fossil fuels	1,00E+02	7,79E+00	5,59E+01	3,52E+00	1,00E+01	MND	2,99E+01	MND	0,00E+00	MND	0,00E+00	MND	6,93E-01	2,94E+00	0,00E+00	2,59E+00	0,00E+00

GWP = Global Warming Potential (Climate 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;

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
PERE	1,94E+01	1,50E-01	8,82E+00	3,68E-02	1,69E+00	MND	1,77E+00	MND	0,00E+00	MND	0,00E+00	MND	1,00E+00	3,05E-02	0,00E+00	6,24E-02	0,00E+00
PERM	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
PERT	1,94E+01	1,50E-01	8,82E+00	3,68E-02	1,69E+00	MND	1,77E+00	MND	0,00E+00	MND	0,00E+00	MND	4,01E-03	3,05E-02	0,00E+00	6,24E-02	0,00E+00
PENRE	1,11E+02	8,08E+00	8,27E+01	3,57E+00	1,21E+01	MND	3,35E+01	MND	0,00E+00	MND	0,00E+00	MND	6,99E-01	2,98E+00	0,00E+00	3,03E+00	0,00E+00
PENRM	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
PENRT	1,11E+02	8,08E+00	8,27E+01	3,57E+00	1,21E+01	MND	3,35E+01	MND	0,00E+00	MND	0,00E+00	MND	6,99E-01	2,98E+00	0,00E+00	3,03E+00	0,00E+00
SM	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
RSF	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
NRSF	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
FW	8,52E-02	2,75E-03	1,74E-02	5,87E-04	6,20E-03	MND	2,55E-02	MND	0,00E+00	MND	0,00E+00	MND	8,91E-05	4,67E-04	0,00E+00	2,61E-03	0,00E+00

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
Hazardous waste disposed kg/FU	6,68E-05	4,73E-06	1,09E-04	2,18E-06	1,20E-05	MND	1,86E-05	MND	0,00E+00	MND	0,00E+00	MND	3,13E-07	1,87E-06	0,00E+00	2,01E-06	0,00E+00
Non-hazardous waste disposed kg/FU	7,13E-01	2,19E-01	8,24E-01	2,14E-01	9,55E-01	MND	4,15E-01	MND	0,00E+00	MND	0,00E+00	MND	7,66E-04	1,39E-01	0,00E+00	1,46E+01	0,00E+00
Radioactive waste disposed kg/FU	3,10E-04	5,22E-05	4,06E-04	2,40E-05	4,45E-05	MND	6,47E-05	MND	0,00E+00	MND	0,00E+00	MND	4,88E-06	2,00E-05	0,00E+00	2,15E-05	0,00E+00
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	/
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	/
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	/
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	/

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
	PM	4,00E-03	4,62E-04	1,20E-03	1,15E-04	4,66E-04	MND	0,00E+00	MND	1,44E-03	MND	0,00E+00	MND	8,70E-04	9,14E-05	0,00E+00	9,24E-05	0,00E+00
	IRHH	2,87E-01	3,51E-02	4,27E-01	1,52E-02	4,25E-02	MND	0,00E+00	MND	6,59E-02	MND	0,00E+00	MND	3,03E-03	1,26E-02	0,00E+00	1,60E-02	0,00E+00
	ETF	8,90E+00	6,07E-01	1,17E+00	6,29E-01	1,19E+00	MND	0,00E+00	MND	7,07E+00	MND	0,00E+00	MND	9,77E-03	4,76E-01	0,00E+00	5,09E-02	0,00E+00
	HTCE	1,00E+02	7,79E+00	5,59E+01	3,52E+00	1,00E+01	MND	0,00E+00	MND	4,79E-07	MND	0,00E+00	MND	3,55E-10	1,44E-09	0,00E+00	1,18E-09	0,00E+00
	HTnCE	5,15E-07	3,74E-09	4,06E-08	1,65E-09	7,70E-08	MND	0,00E+00	MND	2,77E-07	MND	0,00E+00	MND	1,42E-09	2,87E-08	0,00E+00	6,31E-09	0,00E+00
	WRD	-1,93E-03	-4,56E-05	-3,42E-02	-4,76E-04	-2,30E-03	MND	0,00E+00	MND	-7,96E-04	MND	0,00E+00	MND	-4,21E-06	-4,60E-04	0,00E+00	2,88E-04	0,00E+00
	LUO – SOM	6,77E+00	3,18E-01	4,15E+01	2,33E-01	2,50E+00	MND	0,00E+00	MND	3,98E-01	MND	0,00E+00	MND	1,86E-03	1,53E-01	0,00E+00	2,51E-01	0,00E+00
	LUO – B, all	3,76E-01	1,83E-02	2,35E+00	1,35E-02	1,42E-01	MND	0,00E+00	MND	2,24E-02	MND	0,00E+00	MND	1,06E-04	8,89E-03	0,00E+00	1,43E-02	0,00E+00
	LUT – SOM	6,49E+00	1,33E+00	2,48E+02	6,98E-01	1,31E+01	MND	0,00E+00	MND	1,25E+00	MND	0,00E+00	MND	1,16E-01	5,59E-01	0,00E+00	2,60E+00	0,00E+00
	LUT – B, all	-5,29E-03	-4,22E-04	-1,49E-01	7,70E-04	-9,61E-03	MND	0,00E+00	MND	8,87E-04	MND	0,00E+00	MND	3,38E-04	6,50E-04	0,00E+00	-1,93E-02	0,00E+00

	LUO – B, u	6,12E-02	2,11E-02	2,63E+00	1,58E-02	1,39E-01	MND	0,00E+00	MND	1,62E-02	MND	0,00E+00	MND	1,08E-04	1,04E-02	0,00E+00	1,61E-02	0,00E+00
	LUO – B, a	2,50E-03	1,19E-04	2,16E-04	2,03E-05	2,85E-04	MND	0,00E+00	MND	3,90E-05	MND	0,00E+00	MND	5,24E-07	1,94E-05	0,00E+00	4,26E-06	0,00E+00
	LUO – B, f	2,92E+00	4,02E-03	1,32E+00	1,56E-03	2,19E-01	MND	0,00E+00	MND	7,92E-02	MND	0,00E+00	MND	1,28E-04	1,36E-03	0,00E+00	6,92E-03	0,00E+00
	LUT – B, tr r	-6,79E-11	0,00E+00	0,00E+00	0,00E+00	-3,39E-12	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

HTCE = Human Toxicity – cancer effects; HTnCE = Human Toxicity – non cancer effects; ETF = Ecotoxicity – freshwater; PM = Particulate Matter; IRHH = Ionizing Radiation – human health effects; WRD = Water Resource Depletion: LUO – SOM = Land Use Occupation – SOM; LUO – B, all: Land Use Occupation – biodiversity ALL; LUO – B, u: Land Use Occupation – biodiversity Urban; LUO – B, a: Land Use Occupation – biodiversity agricultural; LUO – B, f: Land Use Occupation – biodiversity forest; LUT – SOM = Land Use Transformation – SOM; LUT – B all = Land Use Transformation – Biodiversity ALL; LUT – B, u = Land Use Transformation – Biodiversity Urban; LUT – B, a = Land Use Transformation – Biodiversity agricultural; LUT – B, f = Land Use Transformation – Biodiversity forest; LUT – B, tr r = Land Use Transformation – Biodiversity transition rainforest

Environmental impact categories explained

	*Global Warming Potential*	*kg CO_2 equiv/FU*	*GWP*	*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.*
	*Ozone Depletion*	*kg CFC 11 equiv/FU*	*ODP*	*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*	*kg SO_2 equiv/FU*	*AP*	*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*	*kg $(PO4)^{3-}$ equiv/FU*	*EP*	*Excessive enrichment of waters and continental surfaces with nutrients, and the associated adverse biological effects.*
	*Photochemical ozone creation*	*kg Ethene equiv/FU*	*POCP*	*Chemical reactions brought about by the light energy of the sun. 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*	*kg Sb equiv/FU*	*ADP elements*	*Consumption of non-renewable resources, thereby lowering their availability for future generations.*
	*Abiotic depletion potential for fossil ressources*	*MJ/FU*	*ADP fossil fuels*	
	*Ecotoxicity for aquatic fresh water*	*CTUe/FU*	*ETF*	
	*Human toxicity (carcinogenic effects)*	*CTUh/FU*	*HTCE*	
	*Human toxicity (non-carcinogenic effects)*	*CTUh/FU*	*HTnCE*	
	*Particulate matter*	*kg $PM_{2.5}$ eq/FU*	*PM*	
	*Resource depletion (water)*	*m^3 water eq/FU*	*WRD*	
	*Ionizing radiation - human health effects*	*kg U235 eq/FU*	*IRHH*	
	*Land use: transformation - SOM*	*kg C deficit/FU*	*LUO – SOM*	
	*Land use: occupation - biodiversity, ALL*	*PDF*m^2a/FU*	*LUO – B, all*	
	*Land use: occupation - SOM*	*kg C deficit/FU*	*LUT – SOM*	
	*Land use: transform. - biodiversity, ALL*	*PDF*m^2/FU*	*LUT – B, all*	
	Land use: occupation – biodiversity / urban, industry	*m^2a/FU*	*LUO – B, u*	*Flow (Characterization factor = 1)*
	Land use: occupation – biodiversity / agriculture	*m^2a/FU*	*LUO – B, a*	*Flow (Characterization factor = 1)*
	Land use: occupation – biodiversity / forest	*m^2a/FU*	*LUO – B, f*	*Flow (Characterization factor = 1)*
	Land use: transfomration – biodiversity / tropical forrest	*m^2/FU*	*LUT – B, tr r*	*Flow (Characterization factor = 1)*

UPTAKE AND EMISSIONS ASSOCIATED WITH BIOGENIC CARBON CONTENT

Indicator	Unit	A1 – Raw materials	A2 – Transport raw materials	A3 - Production	A4 – Transport to installation	A5 - Installation	B 2 - Maintenance	B 4 - Replacement	B 6 – Operational energy use	C1 - Demolition	C2 – Transport to end-of-life	C3 – Waste processing	C4 - Disposal	Module D
Uptake and emissions associated with biogenic carbon content of the biobased product	kg CO_2 eq.	-6,16E-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	0,00E+00	6,16E-01	0,00E+00
Uptake and emissions associated with biogenic carbon content of the biobased packaging	kg CO_2 eq.	-1,67E-03	0,00E+00	-1,89E-01	0,00E+00	1,91E-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
Since there is not yet sufficiently robust LCI data available to enable a coherent automatic calculation of the biogenic carbon emissions and removals, emissions and removals of biogenic carbon are presented only for the amounts present in the biomaterial in the finished construction product and in its packaging, and not for the amounts of biomaterial input required to make the product (e.g. packaging of raw materials used in A1-A3, biogenic carbon emissions and removals from grid electricity production).														

SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION

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. 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 > 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

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

Ancillary materials for installation (specified by material);	Inox screw		
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)	Fibre 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	Insert information		

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).

C: END OF LIFE

The default scenario provided by the B-PCR, being 100% to landfill 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.

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	0,00E+00
Wastes collected as mixed construction waste	kg	1,46E+01
Waste for re-use	kg	0,00E+00
Waste for recycling	kg	0,00E+00
Waste for energy recovery	kg	0,00E+00
Waste for final disposal	kg	1,46E-01

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+A1 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 (Vincotte) Jan Olieslagerslaan 35 1800 Vilvoorde, Belgium evermaut@vincotte.be

ADDITIONAL INFORMATION – LCA INTERPRETATION

Optional

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+A1:2014
- NBN/DTD B 08-001 (BE-PCR)
- Allacker K., Debacker W., Delem L., De Nocker L., De Troyer F., Janssens A., Peeters K., Van Dessel J., Servaes R, Rossi E., Deproost M., Bronchart S. 2018. Environmental profile of building elements, update 2017. 46p.
- CEN/TR 16970:2016. Sustainability of construction works - Guidance for the implementation of EN 15804
- De Lhoneux B., Akers S., Alderweireldt L., Carmeliet J., Hikasa J., Kalbskopf R., Li V., Vidts D. 2003. Durability of synthetic fibers in fiber-cement building materials 2003 – Engineering with fibers – Spring Symp. Advanced flexible mat. and structures, Loughborough/UK
- Doka G. 2009. Life Cycle Inventories of Waste Treatment Services. Ecoinvent report No. 13. Swiss Centre for Life Cycle Inventories, Dübendorf, 2009.
- EN15804:2012+A1:2013. CEN TC 350. Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products. European standard.
- EN 16485:2014. Round and sawn timber - Environmental Product Declarations - Product category rules for wood and wood-based products for use in construction.
- Frischknecht R, Steiner R, & Jungbluth N, The Ecological Scarcity Method - Eco-Factors. 2008 A method for impact assessment in LCA. 2009, Federal Office for the Environment FOEN: Zürich und Bern.
- Humbert, S. 2009. Geographically Differentiated Life-cycle Impact Assessment of Human Health. Doctoral dissertation, University of California, Berkeley, Berkeley, California, USA.
- JRC. 2018. https://eplca.jrc.ec.europa.eu/ELCD3/
- Kalbskopf R., De Lhoneux B., Van der Heyden L., Alderweireldt L. (Redco NV). 2002. Durability of Fiber-Cement Roofing Products – 2002 – Inorganic-bonded wood and fiber composite materials Conference
- Milà i Canals L., Romanyà J. and Cowell S.J. (2007): Method for assessing impacts on life support functions (LSF) related to the use of 'fertile land' in Life Cycle Assessment (LCA). Journal of Cleaner Production 15: 1426-1440.
- NBN/DTD B 08-001:2017. Delem L., Wastiels L. 2016. B-PCR. Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products – National annex to NBN EN 15804+A1.
- Peeters, K., Damen L. 2019. Life cycle assessment of SVK fibre cement flat sheets.
- Rosenbaum R.K., Bachmann T.M., Gold L.S., Huijbregts M.A.J., Jolliet O., Juraske R., Köhler A., Larsen H.F., MacLeod M., Margni M., McKone T.E., Payet J., Schuhmacher M., van de Meent D. and Hauschild M.Z. (2008): USEtox - The UNEP-SETAC toxicity model: recommended characterisation factors for human toxicity and freshwater ecotoxicity in Life Cycle Impact Assessment. International Journal of Life Cycle Assessment 13(7): 532-546, 2008
- Servaes, R., Allacker, K., Debacker, W., Delem L., De Nocker, L., De Troyer, F. Janssen, A., Peeters, K., Spirinckx, C., Van Dessel, J. (2013). Milieuprofiel van gebouwelementen. Te raadplegen via: www.ovam.be/materiaalprestatie-gebouwen.
- Van der Heyden L. 2012. Fibre cement: a perfectly recyclable building material – 2012 - Conference Paper for the International Inorganic-bonded fiber composites Conference - (Service Life and Performance Review – BRE)
- 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> .

General information

Owner of the EPD, Responsible for the data, LCA and information	**SVK nv** **Aarschotstraat 114** **9100 Sint-Niklaas** **Belgium** Tel : insert telephone number; *For more information you can contact Carry Peeters* Carry.Peeters@svk.be
EPD program Program operator Publisher of this EPD	**B-EPD** **FOD Volksgezondheid** Victor Hortaplein 40 bus 10 1060 Brussel België www.environmentalproductdeclarations.eu
Contact program operator	epd@environment.belgium.be
on following PCR documents	**NBN DTD B 08-001** NBN/DTD B08-001
PCR review conducted by	Federal Public Service of Health and Environment & PCR Review committee
Author of the LCA and EPD	Karolien Peeters (VITO), Lisa Damen (VITO) Karolien.Peeters@vito.be
Identification of the project report	Life cycle assessment of SVK fibre cement flat sheets (VITO, 2019)
Verification	EN 15804:2012+A1:2013 serves as the core PCR External independent verification of the declaration and data according to EN ISO 14025
Name of the third party verifier Date of verification	Evert Vermaut (Vinçotte) 24.09.2019

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.

SVK Experts in fibre cement

vito

LCA practitioner

totem CREATE | EVALUATE | INNOVATE

Building calculator of the regional authorities

www.totem-building.be

.be

Federale Overheidsdienst Volksgezondheid, Veiligheid van de Voedselketen en Leefmilieu

www.b-epd.be