

ETEX

EQUITONE [linea] and EQUITONE [lunara] fibre cement sheets

The production and installation of 1 m² (thickness 10 mm) of a “EQUITONE [linea]” and “EQUITONE [lunara]” panel and its related impacts over cradle-to-grave life cycle stages, over a reference service life of 60 years.

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Third party verified
Conform to EN 15804+A2, NBN/DTD B08-001 and ISO 14025

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

[B-EPD n° 21-0135-01-00-00-EN]

etex services

OWNER OF THIS ENVIRONMENTAL PRODUCT DECLARATION
Etex services



EPD PROGRAM OPERATOR
**Federal Public Service of Health, Food Chain Safety
and Environment**
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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

EQUITONE [linea] and EQUITONE [lunara]

PRODUCT DESCRIPTION

EQUITONE [linea] and EQUITONE [lunara] are autoclaved calcium silicate fibre cement sheets produced at Kapelle-op-den-Bos production plant, Belgium. They are mainly made of sand, cement, cellulose, wollastonite, clay and lime. This product is used as panel for exterior (and interior) walls covering. This average product is representative of the following colour range: TE 20, TE 60, and TE 90 made in 10mm thick boards. Pigment composition and the surface finishing changes from a EQUITONE [linea] / EQUITONE [lunara] to the other.

INTENDED USE

EQUITONE [linea] and EQUITONE [lunara] products are mainly used as a cladding sheet for ventilated exterior claddings and ceilings and insulated lightweight facade-systems. The panel itself is fixed to a back-structure in wood or metal. This back-structure is mounted on a supporting wall in a massive construction (such as bricks, concrete, ...), lightweight skeleton (steel, wood) or prefabricated solutions. The application field is new construction and renovation of low, middle high and high rise buildings. It is also used as exterior ceiling and as a finishing board for roof eaves and verges. In a minor application, the EQUITONE [linea] and EQUITONE [lunara] can be used as protection for insulated foundations.

REFERENCE FLOW / DECLARED UNIT

The functional unit is defined as: the production and installation of 1 m² (thickness 10 mm) of a "EQUITONE [linea] and EQUITONE [lunara]" sheets and its related impacts over cradle-to-grave life cycle stages, where the product's expected average reference service life is of 60 years.

Packaging is included.

The weight per reference flow is 15,7 kg.

The minimum (dry) density of the product is 1580 kg / m³.

Dimensions of the panel per FU: 1 m² of thickness 10 mm

INSTALLATION

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

IMAGES OF THE PRODUCT AND ITS INSTALLATION



COMPOSITION AND CONTENT

Components	Composition / content / ingredients	Quantity
Product	<ul style="list-style-type: none"> - Sand - Cement - Pigments - Lime - Cellulose - Wollastonite - Clay - Water - Other 	<ul style="list-style-type: none"> 25 - 40% 25 - 40% <10% <10% <10% <10% <10% 5 - 20% Appr 5%
Fixation materials	- Screws for wooden substructure)- Rivets (for metal substructure)	6 p
Jointing materials	NA	/
Treatments	NA	/
Packaging	<ul style="list-style-type: none"> - Pallet - Carton - PE strap 	<ul style="list-style-type: none"> 0,2278 kg 0,315 kg 0,0012 kg

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

REFERENCE SERVICE LIFE

The reference service life is estimated at 60 years.

EQUITONE [linea] / EQUITONE [lunara] is a rather new product on the market (°2007), and there is not yet extensive evidence regarding its reference service life. However there are some studies that suggest that it is feasible to assume that this product lasts for the average lifetime of a building¹.

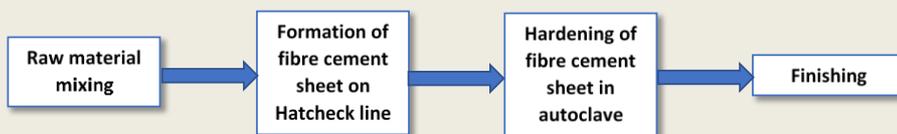
The RSL is valid under normal conditions of use.

DESCRIPTION OF GEOGRAPHICAL REPRESENTATIVITY

The EPD is representative for the Belgian market.

DESCRIPTION OF THE PRODUCTION PROCESS AND TECHNOLOGY

Façade panels made of fiber cement are manufactured largely in accordance to an automated winding process: the raw materials are mixed with water to prepare a homogenous mixture. Rotating screen cylinders are immersed in this fiber cement pulp which drain internally. The screen surface is covered in a thin film of fiber cement which is transferred onto an infinite conveyor belt from where it is conveyed to a format roller which is gradually covered in an increasingly thicker layer of fiber cement. Once the requisite material thickness is achieved, the still moist and malleable fiber cement layer (fiber cement fleece) is separated and removed from the format roller. The fiber cement fleece is cut to size. Leftovers are returned to the production process preventing any waste from being incurred. The sheets are then laid on templates, pressed and steam-hardened in an autoclave. The façade panels are then calibrated, sanded and hydrophobated before being packed and shipped to the customer.



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

TECHNICAL DATA / PHYSICAL CHARACTERISTICS

Technical property	Standard	Value	Unit	Comment
Gross density dry (min)	EN12467	1580	kg/m ³	
Standard panel thickness		10	mm	
Thermal conductivity		0.39	W/(mK)	
Water vapour diffusion resistance factor acc. to DIN V 4108-4, EN ISO 12572	DIN 4108-4, EN ISO 12572	214	-	
Flexural strength parallel	EN12467	32	N/mm ²	
Flexural strength perpendicular	EN12467	22	N/mm ²	
Modulus of elasticity parallel	EN12467	> 14000	N/mm ²	
Modulus of elasticity perpendicular	EN12467	> 12000	N/mm ²	
Moisture content at 23 °C, 80% humidity		6	M.-%	
Coefficient of thermal expansion		10	10-6K-1	
Chemical resistance		similar to concrete C 35/45	-	
Ageing resistance		similar to concrete C 35/45	-	
Permanent temperature resistance		80	°C	

LCA STUDY

DATE OF LCA STUDY

September 2021

SOFTWARE

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

INFORMATION ON ALLOCATION

At Etex, different types of cement fiber products are produced. However EQUITONE [linea] / EQUITONE [lunara] products are produced only on certain production lines. Only facility level data were available for electricity use, the use of natural gas, etc. The facility level data have been allocated to the analyzed product using their respective annual production volume (physical relationship), therefore volume allocation is applied. Material inputs and outputs which were not available at the product level, such as waste, were allocated similarly, by mass allocation.

INFORMATION ON CUT OFF

Following processes were considered below the cut-off:

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

INFORMATION ON EXCLUDED PROCESSES

Following processes were excluded for the inventory:

- Infrastructure and land use of the factory
- Environmental impacts caused by the personnel of the production plants are not included in the LCA, e.g. waste from the cafeteria and sanitary installations, accidental pollution caused by human mistakes, or environmental effects caused by commuter traffic

INFORMATION ON BIOGENIC CARBON MODELLING

The fibre cement panels contain cellulose, which is a biobased material. Uptake of biogenic CO₂ within cellulose is reported in module A1, release of biogenic CO₂ related to this flow is reported in C4.

The fibre cement panels are transported using wooden pallets and a carton coverage. Uptake of biogenic CO₂ within these pallets and carton is reported in module A3, release in module A5.

Biogenic carbon content (kg C / FU)	
Biogenic carbon content in product (at the gate)	4,77E-01
Biogenic carbon content in accompanying packaging (at the gate)	2,41E-01

INFORMATION ON CARBON OFFSETTING

Carbon offsetting is not allowed in the EN 15804 and hence not taken into account in the calculations.

ADDITIONAL OR DEVIATING CHARACTERISATION FACTORS

The characterization factors from EC-JRC were applied. No additional or deviating characterization factors were used.

DATA

SPECIFICITY

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

PERIOD OF DATA COLLECTION

Manufacturer specific data have been collected for the year 2016.

INFORMATION ON DATA COLLECTION

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

DATABASE USED FOR BACKGROUND DATA

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

ENERGY MIX

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

PRODUCTION SITES

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

SYSTEM BOUNDARIES

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

X = included in the EPD
MND = module not declared

EQUITONE [linea] / EQUITONE [lunara] does not contain recycled content.

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

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

POTENTIAL ENVIRONMENTAL IMPACTS PER REFERENCE FLOW

		Production			Construction process stage		Use stage							End-of-life stage				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 CO ₂ equiv/FU)	6,87E+00	8,55E-01	1,75E+00	2,72E-01	2,25E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,62E-03	2,10E-01	1,20E-05	1,83E+00	-1,27E-01	1,41E+01
	GWP fossil (kg CO ₂ equiv/FU)	8,99E+00	8,54E-01	2,22E+00	2,72E-01	1,36E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,60E-03	2,09E-01	1,19E-05	8,70E-02	-1,26E-01	1,40E+01
	GWP biogenic (kg CO ₂ equiv/FU)	-2,12E+00	3,10E-04	-4,70E-01	1,15E-04	8,91E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,03E-05	8,54E-05	4,57E-08	1,75E+00	-4,75E-04	4,60E-02
	GWP luluc (kg CO ₂ equiv/FU)	1,22E-02	5,13E-04	8,58E-03	9,53E-05	2,23E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,19E-06	7,32E-05	2,73E-08	4,78E-05	-4,49E-04	2,38E-02
	ODP (kg CFC 11 equiv/FU)	7,27E-07	1,81E-07	3,39E-07	6,21E-08	1,47E-07	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,43E-10	4,76E-08	2,44E-12	3,69E-08	-2,00E-08	1,54E-06
	AP (mol H ⁺ eq)	4,39E-02	1,63E-02	5,65E-03	1,12E-03	7,45E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,47E-06	8,56E-04	3,21E-08	7,47E-04	-7,53E-04	7,60E-02
	EP freshwater (kg P-equiv/FU)	2,78E-04	5,34E-06	9,55E-05	2,20E-06	4,23E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,93E-08	1,65E-06	3,22E-10	9,23E-07	-6,90E-06	4,26E-04
	EP marine (kg N-equiv/FU)	7,36E-03	4,31E-03	1,69E-03	3,30E-04	1,54E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,33E-06	2,54E-04	6,92E-09	2,77E-04	-2,35E-04	1,58E-02
	EP terrestrial (mol N-equiv/FU)	8,23E-02	4,78E-02	1,50E-02	3,65E-03	1,68E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,63E-05	2,81E-03	8,37E-08	3,06E-03	-2,63E-03	1,71E-01
	POCP (kg NMVOC equiv/FU)	2,31E-02	1,26E-02	3,71E-03	1,14E-03	4,61E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,18E-06	8,60E-04	2,25E-08	8,72E-04	-7,75E-04	4,69E-02

	ADP Elements (kg Sb equiv/FU)	6,72E-06	1,10E-06	1,12E-06	5,07E-07	3,01E-06	0,00E+00	6,81E-09	4,08E-07	3,24E-11	8,88E-08	-2,33E-07	1,30E-05							
	ADP fossil fuels (MJ/FU)	7,26E+01	1,18E+01	5,01E+01	4,13E+00	1,57E+01	0,00E+00	1,04E-01	3,16E+00	4,60E-04	2,81E+00	-2,12E+00	1,60E+02							
	WDP (m ³ water eq deprived /FU)	4,95E+00	2,63E-02	2,59E-01	1,25E-02	5,43E-01	0,00E+00	9,88E-04	8,79E-03	4,40E-06	1,22E-02	-2,48E-01	5,81E+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				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			
<i>PERE</i> (MJ/FU, net calorific value)	3,70E+01	1,31E-01	3,94E+00	5,79E-02	7,24E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,12E-02	4,36E-02	4,93E-05	9,48E-02	-1,09E+01	4,86E+01	
<i>PERM</i> (MJ/FU, net calorific value)	1,86E+01	0,00E+00	8,19E+00	0,00E+00	-1,86E-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	0,00E+00	0,00E+00	0,00E+00	2,66E+01
<i>PERT</i> (MJ/FU, net calorific value)	5,56E+01	1,31E-01	1,21E+01	5,79E-02	7,06E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,12E-02	4,36E-02	4,93E-05	9,48E-02	-1,09E+01	7,52E+01	
<i>PENRE</i> (MJ/FU, net calorific value)	8,37E+01	1,19E+01	5,46E+01	4,16E+00	1,76E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,09E-01	3,18E+00	4,87E-04	2,83E+00	-2,33E+00	1,78E+02	
<i>PENRM</i> (MJ/FU, net calorific value)	8,32E-02	0,00E+00	1,52E-04	0,00E+00	-2,59E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,75E-02
<i>PENRT</i> (MJ/FU, net calorific value)	8,38E+01	1,19E+01	5,46E+01	4,16E+00	1,76E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,09E-01	3,18E+00	4,87E-04	2,83E+00	-2,33E+00	1,78E+02	
<i>SM</i> (kg/FU)	5,64E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,39E+00	5,64E-03	
<i>RSF</i> (MJ/FU, net calorific value)	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

<i>NRSF (MJ/FU, net calorific value)</i>	0,00E+00	0,00E+00	0,00E+00																
<i>FW (m³ water eq/FU)</i>	1,26E-01	6,31E-04	1,82E-02	3,19E-04	1,53E-02	0,00E+00	2,97E-05	2,28E-04	1,32E-07	2,72E-03	-5,88E-03	1,63E-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
<i>Hazardous waste disposed (kg/FU)</i>	6,48E-05	2,18E-05	4,63E-05	1,06E-05	1,77E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,99E-08	8,28E-06	3,80E-10	3,08E-06	-4,99E-06	1,73E-04
<i>Non-hazardous waste disposed (kg/FU)</i>	1,61E+00	2,93E-01	1,25E-01	2,45E-01	1,91E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,87E-04	1,51E-01	9,04E-07	1,57E+01	-3,38E-02	2,00E+01
<i>Radioactive waste disposed (kg/FU)</i>	3,35E-04	8,14E-05	2,87E-04	2,81E-05	8,23E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,99E-07	2,15E-05	4,41E-09	2,08E-05	-1,13E-05	8,56E-04
<i>Components for re-use (kg/FU)</i>	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
<i>Materials for recycling (kg/FU)</i>	0,00E+00	0,00E+00	9,02E-01	0,00E+00	4,82E-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	1,25E-02	0,00E+00	-1,40E+00	1,40E+00
<i>Materials for energy recovery (kg/FU)</i>	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
<i>Exported energy (MJ/FU)</i>	0,00E+00	0,00E+00	1,55E-02	0,00E+00	4,67E-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	0,00E+00	-4,83E-01	4,83E-01

IMPACT CATEGORIES ADDITIONAL TO EN 15804

		Production			Construction process		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							
	PM (disease incidence)	3,33E-07	4,66E-08	4,38E-08	2,03E-08	5,48E-08	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,19E-11	1,46E-08	2,12E-13	1,56E-08	-2,02E-08	5,28E-07
	IRHH (kg U235 eq/FU)	3,31E-01	5,14E-02	3,26E-01	1,81E-02	8,09E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,17E-03	1,38E-02	5,17E-06	1,62E-02	-1,09E-02	8,39E-01
	ETF (CTUe/FU)	2,04E+02	8,63E+00	2,61E+01	3,35E+00	2,77E+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	0,00E+00	0,00E+00	4,54E-02	2,53E+00	2,15E-04	1,51E+00	-3,14E+00	2,74E+02
	HTCE (CTUh/FU)	1,46E-08	4,36E-10	7,02E-10	9,28E-11	2,86E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,07E-12	7,11E-11	7,65E-15	3,62E-11	-1,48E-10	1,88E-08
	HTnCE (CTUh/FU)	1,49E-07	8,71E-09	1,44E-08	3,68E-09	2,22E-08	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,94E-11	2,76E-09	1,48E-13	8,73E-10	-1,95E-09	2,01E-07
	Land Use Related impacts (dimensionless)	3,24E+02	5,20E+00	6,79E+01	3,40E+00	4,14E+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	0,00E+00	0,00E+00	2,74E-02	2,18E+00	3,08E-04	5,17E+00	-7,66E+01	4,49E+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);

	<p>Global Warming Potential</p>	<p>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.</p> <p>It is split up in 4:</p> <ul style="list-style-type: none"> - 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.² - 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).
	<p>Ozone Depletion</p>	<p>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 (chlorofluorocarbons or halons), which break down when they reach the stratosphere and then catalytically destroy ozone molecules.</p>
	<p>Acidification potential</p>	<p>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.</p>
	<p>Eutrophication potential</p>	<p>The potential to cause over-fertilization of water and soil, which can result in increased growth of biomass and following adverse effects.</p> <p>It is split up in 3:</p> <ul style="list-style-type: none"> - 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.
	<p>Photochemical ozone creation</p>	<p>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.</p>
	<p>Abiotic depletion potential for non-fossil resources</p>	<p>Consumption of non-renewable resources, thereby lowering their availability for future generations. Expressed in comparison to Antimony (Sb).</p> <p>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 experience with the indicator.</p>
	<p>Abiotic depletion potential for fossil resources</p>	<p>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).</p> <p>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 experience with the indicator.</p>
	<p>Ecotoxicity for aquatic fresh water</p>	<p>The impacts of chemical substances on ecosystems (freshwater).</p> <p>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 experience with the indicator.</p>
	<p>Human toxicity (carcinogenic effects)</p>	<p>The impacts of chemical substances on human health via three parts of the environment: air, soil and water.</p>

² 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.

		<i>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.</i>
	<i>Human toxicity (non-carcinogenic effects)</i>	<i>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.</i>
	<i>Particulate matter</i>	<i>Accounts for the adverse health effects on human health caused by emissions of Particulate Matter (PM) and its precursors (NOx, SOx, NH3)</i>
	<i>Resource depletion (water)</i>	<i>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.</i> <i>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.</i>
	<i>Ionizing radiation - human health effects</i>	<i>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.</i>
	<i>Land use related impacts</i>	<i>The indicator is the “soil quality index” which is the result of an aggregation of following four aspects:</i> <ul style="list-style-type: none"> - <i>Biotic production</i> - <i>Erosion resistance</i> - <i>Mechanical filtration</i> - <i>Groundwater</i> <i>The aggregation is done based on a JRC model. The four aspects are quantified through the LANCA model for land use.</i> <i>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.</i>

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.

ETEX uses different pigments to colour their fibre cement panels. Due to the lack of appropriate proxies for many of the pigments the model prorated the content up to 100% for the Titanium dioxide and Ferrite, which are available in Ecoinvent. Considering that Titanium dioxide has an overall higher contribution than the other pigments, this is a worst case scenario. The impacts of the pigments will be thus overestimated.

A2 – TRANSPORT TO THE MANUFACTURER

The raw materials are transported to the manufacturing site.

A3 – MANUFACTURING

This module takes into account the production process.

A4 – TRANSPORT TO THE BUILDING SITE

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

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

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

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

A5 – INSTALLATION IN THE BUILDING

The installation involves an amount of 0,00176 kWh per screw used to fix the EQUITONE [linea] / EQUITONE [lunara] product, where 6 screws are necessary for the functional unit. The dataset used to model the impacts is "Electricity, low voltage {BE} market for | Cut-off, U".

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

All packaging material for the EQUITONE [linea] / EQUITONE [lunara] product is transported to End of Life (EoL) and disposed of in line with the B-PCR default EoL scenarios for Belgium.

Parts of the installation	quantity	Description
Processes necessary for the installation of the product	0,01056 kWh	energy needed to fix the screws
Fixation materials	6	Screws
Material losses	10%	Average material losses
Packaging	0,2278 kg 0,315 kg 0,0012 kg	Wooden pallet Cardboard - PE strap

Ancillary materials for installation (specified by material);	6 Screws		
Water use	None		
Other resource use	10% losses		
Quantitative description of energy type (regional mix) and consumption during the installation process	0,01056 kWh electricity, low voltage		
Waste materials on the building site before waste processing, generated by the product's installation (specified by type)	packaging waste: 0,2278 kg wood	packaging waste: 0,315 kg cardboard	packaging waste: 0,0012 kg plastic
Output materials (specified by type) as result of waste processing at the building site e.g. of collection for recycling, for energy recovery, disposal (specified by route)	60% recycling 20% incinerated	95% recycling 5% incinerated	35% recycling 60% incinerated 5% landfill
Direct emissions to ambient air, soil and water	None	None	None
Distance	Not applicable	Not applicable	Not applicable

B – USE STAGE (EXCLUDING POTENTIAL SAVINGS)

- B1: No emissions during the use phase.
 B2: The product does not require maintenance.
 B3: The product does not require repair.
 B4: No replacement required.

- B5: No refurbishment
- B6: The product does not require operational energy use.
- B7: No operational water use.

C: END OF LIFE

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

C1: The dismantling of **EQUITONE [linea]** / **EQUITONE [Iunara]** involves the same amount of energy as for the installation, which is 0,01056 kWh.

C2: The default scenario for fibre cement boards from NBN/DTD B08-001 describes that the end-of-life waste is transported to a sorting facility over a distance of 30 km. Afterwards, 100% of the fibre cement boards and 5% of the metal screws is transported to a landfill over a distance of 50 km.

C3: No recycling/reuse of fibre cement boards, 95% recycling of metal screws

C4: 100% landfill of fibre cement boards, 5% landfill of metal screws

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

End-of-life modules – C3 and C4		
Parameter	Unit	Value
Wastes collected separately	kg	0,0132
Wastes collected as mixed construction waste	kg	15,7
Waste for re-use	kg	0
Waste for recycling	kg	0,0125
Waste for energy recovery	kg	0
Waste for final disposal	kg	15,7

D – BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES

In module D, the benefits and loads beyond the system boundaries are quantified. Following waste streams are considered after their end-of-waste: wooden pallets in A3 and A5 (of which 60% is recycled), plastic packaging in A3 and A5 (of which 35% is recycled), paper and cardboard in A3 and A5 (of which 95% is recycled), steel cables in A3 (of which 95% is recycled) and metal screws in C3 (of which 95% is recycled).

<i>Quantitative description of the loads beyond the system boundaries</i>	Treatment of 0,01534 kg of scrap steel to prepare it for recycling at the remelter
	Sorting of 0,14 kg of waste wood to prepare it for recycling
	Treatment of 0,0011 kg plastic to prepare it for recycling
<i>Quantitative description of the benefits beyond the system boundaries</i>	Avoided production of 0,33 MJ of heat using natural gas
	Avoided production of 0,16 MJ of Belgian electricity mix
	Avoided production of 0,01534 kg primary steel
	Avoided production of 0,14 kg primary softwood
	Avoided production of 0,0011 kg primary polypropylene/polypropylene granulates
	Avoided production of 0,30 kg primary sulfate pulp

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

INDOOR AIR

Under normal conditions of use, EQUITONE [linea] / EQUITONE [lunara] products do not cause any adverse health effects or release of volatile organic compounds (VOCs) to indoor air.

SOIL AND WATER

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

DEMONSTRATION OF VERIFICATION

EN 15804+A2 serves as the core PCR
Independent verification of the environmental declaration and data according to standard EN ISO 14025:2010
Internal <input type="checkbox"/> External <input checked="" type="checkbox"/>
Third party verifier: Evert Vermaut (Vincotte) Jan Olieslagerslaan 35 1800 Vilvoorde, Belgium evermaut@vincotte.be

ADDITIONAL TECHNICAL INFORMATION FOR SCENARIO DEVELOPMENT

This EPD does not include the framework on which the panels are installed. At building level the impact of the framework should be added. If specific information on quantities is missing, following weights can be used. The values are applicable for exterior wall cladding and ceilings. Note that the screws to attach the boards to the framework are already included in the EPD.

Wooden framework

Components	quantity	Description
Wooden frame	2,4 kg	
EPDM sealing tape	0,018 kg	UV protection of the joints

Aluminium framework

Components	quantity	Description
Aluminium profiles	1,61 kg	
PVC foam	0,02 kg	The foam strip is designed to create a watertight seal even with minimal force applied. It also minimizes vibrations from the facade panel and prevents contact between uncoated fiber cement and the aluminum support structure.

Steel framework

Components	quantity	Description
Steel frame	2,48 kg	
PVC foam	0,02 kg	The foam strip is designed to create a watertight seal even with minimal force applied. It also minimizes vibrations from the facade panel and prevents contact between uncoated fiber cement and the aluminum support structure.

APPLICATION UNIT

This paragraph gives information on the applied product and how the reference flow and table with impacts relate to different applications. The table below gives an overview of the standard thicknesses, the thickness range and the ratio to the declared unit of 1 m² for each application. The environmental impact is proportional with the thickness.

Application	Standard thickness	Thickness range	Ratio to the declared unit of 1 m ²
Exterior wall covering	10 mm	8 and 10 mm	1
Ceilings	10 mm	8 and 10 mm	1

ADDITIONAL INFORMATION ON REVERSIBILITY

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

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

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PCR Review committee

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Identification of the project report

Life cycle assessment of EQUITONE [linea] /
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Verification

External independent verification of the declaration and data
according to EN ISO 14025 and relevant PCR documents

Name of the third party verifier
Date of verification

Evert Vermaut (Vinçotte)
08.09.2021

www.b-epd.be

www.environmentalproductdeclarations.eu

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

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