

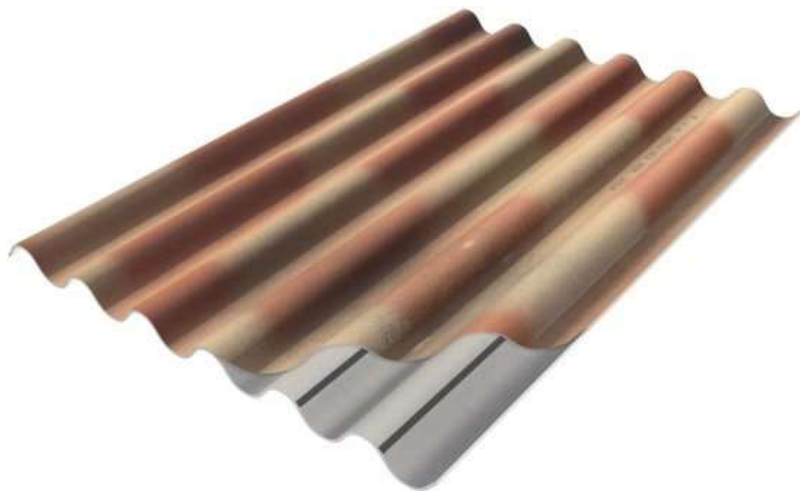


**ENVIRONMENTAL AND HEALTH PRODUCT
DECLARATION**

Publication date:

24 April 2015

Corrugated fiber-cement sheet



Notice

The information contained in this declaration are provided under the responsibility of Edilfibro in accordance to the norm NF EN 15804 + A1 and its national complement norm XP P 01-064/CN.

Any use, partially or in total, of the information provided in this document should at least be accompanied by a full reference to the DEP of origin in addition to the manufacturer who may submit a complete copy.

The norm EN 15804+A1 of CEN operate as Rule for the determinate the product category (PCR).

Reading guide

The following exposition rules are used:

- Values are expressed following the simplify scientific notation:
 $0,00009438 = 9,438 \times 10^{-5} = 9,438 \text{ E-}005$;
- Null values are expressed with 0;
- No null values are expressed with 3 decimals.

List of used abbreviations:

LCA: life cycle assessment

PCR: product category rules

UF: function unit

DEP: environment declaration of the product

The units used for each flow they are:

"m²" square meter

"kg" Kilogram

"g" gram

"mg" milligram

"l" litre

"km" kilometre

"kWh" kilowatt

"MJ" mega joule

Precaution for the use for the DEP for the products comparison

The products DEP cannot be compared if they are not compliance with the norm NF EN 15804+A1.

The norm NF EN 15804+A1 defined in the paragraph §5.3 Comparison of DEP about constructions products, the conditions where the constructions products can be compared, upon the base of the information provided for the DEP:

"A comparison of the environmental performance of construction products using the DEP information must be based upon the use of the products and their impact on the building, and must take into account the whole life cycle (all information modules).

1. General information

This declaration is presented by Edilfibro s.p.a., manufacturer of roofing products, with the technical and scientific support of Esalex S.r.l. The object of the study is a single product: the fiber-cement sheet.

Manufacturer contacts:

EDILFIBRO S.P.A
S.S. n 10 – Km 164,700
27040 Arena Po (Pv), Italy
www.edilfibro.it

Telephone number: +39 0385 272811
Fax: +39 0385 272311

The address indicated above represents the single manufacturing site of the product object of this DEP.

The technical support and the software and programs used for this activity are competence of:

Esalex s.r.l.
Via Cavour, 24
61032 Fano (PU), Italy
info@esalex.eu
www.esalex.eu

The study of the product object of this DEP includes all phases of the norm NF EN15804+A1, literally "from the cradle to the grave", like is indicated in the norm.

The work will not undergo third party verification.

For this activity has been used the SimaPro 8 software for the calculation of environmental required impacts, Excel for the data elaboration and the database Ecoinvent for finding general values.

Publication date: 12 February 2015

The commercial range of products included in this study are the following:

<i>Manufacturer</i>	<i>Product category</i>	<i>Commercial name</i>	<i>Place of the declaration</i>
Edilfibro spa	Tile holder sheet	-Tegolit 200 - Tegolit plus 200 -Tegolit integrale -Tegolit terrechiare 200 -Tegolit 235 -Tegolit plus235 -Tegolit235 flammée terrechiare	Arena Po (PV), Italy
	Roofing sheets	-Plakfort 6 -Plakfort 6 Ruralco terrebrune -Plakfort 6 Ruralco terrechiare -Plakfort6 Colorplus - Setteonde -Ipsilonda (grey) - Ipsilonda (colored)	

2. Description of the functional unit (or declared unit) and of the product.

2.1 Description of the functional unit

Functional unit: 1 m² of corrugated fiber- cement sheet, with average weight of 13,5 Kg.

Construction product nomenclature according to the decree of 23 December 2013 relative of the environmental declaration construction and decoration used in the buildings (JORF n.0302, 29 December 2013, text n.27):

N.	Function	Category	Unit format	Family	Number
4	Roofing/ gasket	Articles for covering in large pieces	m ² of sheets	Fiber-cement	04.01.04

2.2 Product description

The fiber- cement sheets are sheets for roofing civil, industrial and agricultural buildings. They are made of a cement matrix with organic fibers, natural and synthetic, in particular PVA reinforced fibers (polivinilalcol), and do not have any mineral fiber such as asbestos. These corrugated fiber cement sheets have polypropylene strips to give the product a high value of safety.

2.3 Description of the product used.

The fiber-cement sheets are ideal for the roofing of civils, industry and agricultural buildings, in particular for the structures without continuous load-bearing slabs or ceilings installed at the level of the laying surfaces of the slab. The sheets are lightweight and easy to assemble in any situation. They can be fixed upon wooden slats even widely spaced one from the other. They can be used to support tiles of any size with any slope and allow a considerable saving of the tiles. The possibility of colored product allows it to adapt to any situation and makes it suitable in the renovation of modern and ancient buildings, even in historic centers.

2.4 Other technical characteristics not included in the functional unit.

The product is in accordance with the European Regulation for the construction products CPR 305/2011 and CE marked. In particular is in accordance to the norm UNI EN 494 (Corrugated fiber-cement sheet) and EN 15057 (impact resistance test) .

The product has the following characteristics:

- It is not permeable and it is not damageable by frost;
- It is flexible but not deformable;
- It is lightweight but resistant to the impacts at the same time, which eases the assembly activity;
- It is resistant to chemical environmental agents like sulfates and acid rain;
- It is not affected by oxidation phenomenon;
- It is not affected by micro-holes by electrolysis in case of galvanic currents;
- It is sound absorbing;
- it is incombustible (fire reaction: class A1);
- It is steam permeable and have thermal insulation properties, that easily eliminate condensation and drain excess humidity;
- It is rot-proof (inert to fermentation processes, it is not afraid by vegetal and animal microbial agents and is not attacked by insects and rodents);

More details in the 5 to 7 part.

2.5 Description of the main components and / or materials products

Fiber-cement sheets:

Minimum mass: 12,5 Kg

Nominal mass: 13,5 Kg

Maximum mass: 14,5 Kg

For the finished products packing it is used the following material:

Wooden pallets	0,147 kg
Polyethylene film	0,003 kg
Polyester packing straps	3,821 E-005 kg
<i>Total reference stream</i>	<i>0,150 kg</i>

Complementary products for the installation

Self-drilling screws	0,052 kg
Rubber gaskets EPDM	0,006 kg
L-hooks	0,021 kg
<i>Total reference stream</i>	<i>0,079 kg</i>

2.6 Specify if the product contains candidate substances according to the REACH regulation (if higher than 0.1% in the mass)

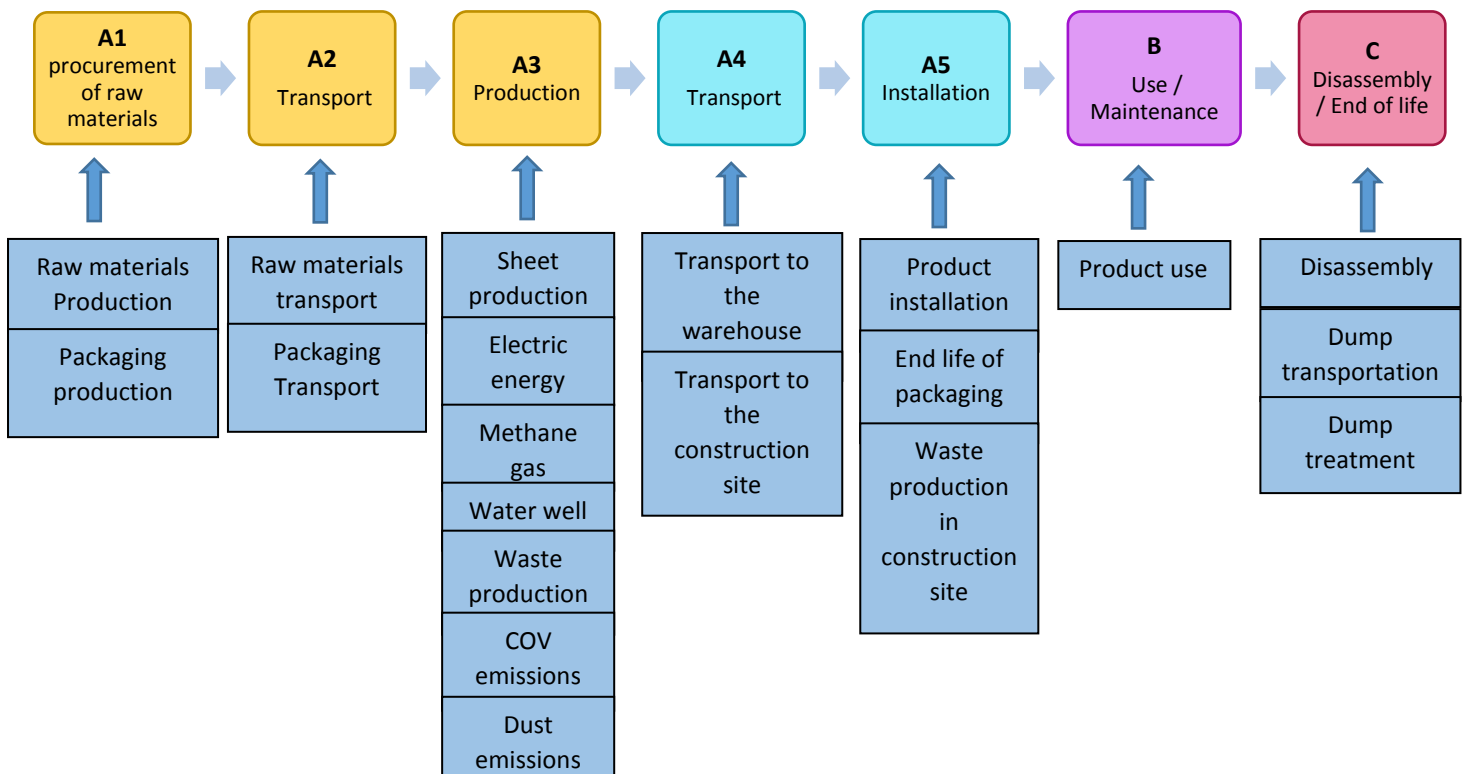
The SVHC concentration in the fiber-cement sheets is under 0,1% mass/mass.

2.7 Reference life span description (if applicable and in accordance with apart 7.2 2 of the norm NF EN 15804 + A1)

Parameter	Value
Reference lifespan	25 years
Declared properties of the product	<p>The product is in accordance with the following norms:</p> <ul style="list-style-type: none"> • European Standard for construction products CRP305/2011 and CE mark according to UNI EN 494. • EN 15057 for the impact resistance. • Norm NF BTU 40.37 Couverture en plaques ondulées en fibres-ciment (FR) • Avis Techniques Tegolit Plus 200 (Document Technique d'Application 5/14-2425) e Avis Techniques Tegolit Plus 235 (Document Technique d'Application 5/14-2426) • It is A+ classified for the intern emissions according to ISO 16000-3/6/9/11 • It also has measured performances according to UNI ISO 8302/91, ISO 140 and 717, EN ISO 12572, ISO 8302/91, EN ISO 1716 (see more details in the 5 to 7 apart) • Its production is in compliance with ISO 9001/2008
Theoretical application parameters (if they are imposed for the manufacturer) including references to appropriate practices	The product may be installed and used according to:

	<ul style="list-style-type: none"> • Norm NF DTU 40.37 Couverture en plaques ondulées en fibres-ciments • Warranty conditions • User's manual • Avis Techniques Tegolit Plus 200 (Document Technique d'Aplication 5/14-2425) e Avis Techniques Tegolit Plus 235 (Document Technique d'Aplication 5/14-2426)
Work quality, if the installation is in accordance with the manufacturer instructions	The product maintains its characteristics for a lifetime without wearing and breaking
Outside environment (for extern applications), for example: bad weather, pollution, exposure to UV rays and wind, building orientation, shading, temperature	the product is normally applied to the outside and is highly resistant: see what has been said above in 2.4 apart or below points 5 to 7
Indoor environment(for internal applications), for example: temperature, humidity, exposure to chemical substances	Can be used to indoor applications too: A1 classify for the intern emissions according to ISO 16000-3/6/9/11
Use conditions, for example: use frequency, mechanic exposition	All type of coverage
Maintenance, for example: frequency required, type, quality and replacement of components	Only manual control of the tightening of the screws to ensure the seal of the gaskets and avoid water infiltration. See Norm UNI 10636 "Corrugated fiber-cement sheets for roofing- installation instructions"

2.7.1 Live cycle stages



2.7.2 Production stages A1- A3

This study was conducted including the following phases, identified in the norm NF EN 15804 + A1:

- A1: procurement of raw materials
- A2: transport of raw materials
- A3: production (step “gate to gate”)

The study has considered together the entire production process of the fiber-cement sheet in which it is not possible to divide the consumption of electricity, methane gas and water for the single phase: moreover, the consistent data of the raw materials input and of products and waste output.

The manufacturing process take the following raw materials: Portland cement, water, microsilica, calcium carbonate to which have to be added process fibers (cellulose and polyethylene) and reinforcement fibers (PVA: polyvinyl alcohol).

In addition to the cellulose, the crumbled cardboard coming from raw material’s packaging is also introduced into the pulp.

The flocculant is added to the mixture, which however will not be included in the formation of the product, but with the function of supporting the process.

At this point, the sheet is formed with special machinery and cut to the optimal size. The sheet is therefore corrugated in the corrugator to give it the correct shape. Afterwards the slabs are separated and sent to the painting, after a preventive heating of the manufactured articles.

In the productive phase are not include the manufacture activities and the machinery’s repair but only manufacture activities under one year interval.

2.7.3 Construction stages A4 – A5

Scenarios have been defined for the downstream phases of the production process (from this point to the end of life): it has been chosen the typical situation encountered on French territory; for each single aspect considered, there may be different methods used which have been divided as a percentage according to the usual cases; moreover, when for a single modality there can be a variability of performances, the worst case from the environmental point of view has always been considered.

Transport stage A4

Before being installed the product is sent by the manufacturer company to destination by train or truck. In particular, there are two cases:

- Scene 1: road transport in Bretagna (France) which corresponds to 80% of shipments;
- Scene 2: road transport, subsequent transport by rail and the last stretch again by road to Bretagna (France), corresponding to 20% of shipments.

Parameter	Unit	Value / description
Carburant type and vehicle consumption or vehicle type used for the transport		Variable, but mostly with freight train and truck (diesel fueled, 12.5 m truck bed, max capacity 250 q)
Distance	km	1) Truck = 1210 km 2) Truck= 67km Train=1055 km Truck = 279 km
Use capacity (including empty return)	%	100%

Density mass of the transported products	Kg / m ³	>1350 kg /m ³
Volume capacity utilization factor (factor: = 1 or <1 or <= 1 for packaged products compressed or inserted into each other)	Not applicable	0,9

Building Installation Stage A5

The installation of a fiber cement sheet on a building can be done in two ways which have both been taken into consideration: through self-drilling screws or L-hooks.

All support types are inserted with an electric screwdriver. The energy necessary to lift the materials onto a roof 6 meters above the ground have also been considered.

Parameter	Unit	Value /description
Installation supports materials	Kg	Hardware: 0.073 (average value) EPDM foam rubber gaskets = 0,006
Water use	m ³	0
Use of other resources	Kg	0
Quantitative description of the energy type (regional mix) and consumption during the installation process	kWh	Screwdriver electric energy = 0,0037 Lifting energy (20% electric, 80% diesel)= 22,20*10 ⁻⁵
Waste materials on the construction site before treatment, generated by the installation of the product (specified by type)	Kg	Fiber-cement scraps = 1,86 Pallets = 0,147 Packaging film = 0,003 Holds in polyester = 3,821E-05
Output material, output (specificity by type) like the result of the waste treatment on the construction site (for example: collection for recycling, for energy recovery, disposal, specified by location)	Kg	Recycle packaging waste =3,04E-03 (Film and hold) Landfill packaging waste = 0,147 (pallets) Landfill fiber- cement = 1,86 kg
Direct emissions to the ambient air, soil and water	Kg	0

2.7.4 Implementation stage (exclusion of potential savings), B1 – B7

Product use B1

Once installed, the product doesn't need any further activity and doesn't produce any impact or consumption of resources.

Maintenance B2

Parameter	Unit	Value/ description
Maintenance process	Description or source where the description can be found	Manual control of the fastening of the screws to ensure the tightness of the gaskets and avoid water infiltration (UNI 10636 standard "corrugated fiber-cement sheets for roofing - installation instructions")
Maintenance cycle	Frequency	2 years
Maintenance support materials (for example: detergent, specific materials)	Kg / cycle	0
Maintenance waste material (specify the material)	Kg	0
Net fresh water consumption during maintenance	m^3	0
Energy input during maintenance, for example: cleaning with the vacuum cleaner, type of energy carrier, for example: electricity or quantity if applicable and relevant	kWh	0

Repair B3

Breakages are not considered as they can only be due to inappropriate use or exceptional disastrous meteorological phenomena.

Replacement B4

There are no worn-out part replacements during the life of the cover.

Renovation B5

There are no renovations during the life of the cover.

Energy and water use B6 – B7

The roof performs its function continuously without the use of energy or water and independently of the number of occupants inside the building

2.7.5 End of life stages C1- C4

Initially there is the unscrewing of the screws that hold the sheet and then the product is sent for disposal. Once removed, the fiber-cement slabs could be recycled if in good condition. However, precise data are not known to date on the avoided materials deriving from possible recycling: in the definition of the scenario, the waste deriving from demolition is therefore sent to the inert landfill.

Parameter	Unit	Value / description
Specific collection process by type	kg separately collected	0
	Kg collected mixed with a construction waste	13,393
Type-specific recovery system	kg for re-use	0
	Kg for recycle	0
	Kg for energy recovery	0
Specific disposal by type	kg for product or material for final storage	Inert material = 13,393
Hypothesis for scenario development, for example: transport	Appropriate unit	30 Km

3. Information for calculating the life cycle analysis

PCR Used	Norm EN 15804 + A1 and XP P01-064/CN
System boundaries	This work takes into consideration phases A1 -A3, from the cradle to the factory gate, phases A4 and A5 of transporting the product to the construction site and its installation, phases B1 -B7 of use of the product, C1 - C4 fi end of life.
Allocations	The allocation rules established by the EN 15804 standard have been respected. Mass allocations were carried out systematically for all inputs and outputs, which were related in units consumed / produced per kg of finished product.
Geographic representation and temporal representation of primary data	In the elaboration of the study specific data were used, collected directly at the production site in Arena Po (Italy), therefore site - specific not referring to the year 2013 n. in the elaboration of the downstream phases of the production process typical scenarios of the use of the product in France were defined. For the generic data, the ECOINVENT database was used. The software SimaPro v.8.0.3.14 and Excel were used to process the results.
Variability of results	Not determined

4. Life cycle analysis results

4.1 Environment impact

Environment impact category	Production stage	Construction stage		Implementation stage							End of life stages			
	Total A1 –A3 Production	A4 transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Renovation	B6 Energy use	B7 Water use	C1 Deconstruction/ demolition	C2 Transport	C3 Treatment of waste	C4 Waste
Global warming (GWP) <i>Kg CO₂ eq/UF</i>	10,089	6,847	1,706E-001	0	0	0	0	0	0	0	2,438E-004	9,641E-002	0	9,646E-002
Reduction of the ozone layer (ODP) <i>Kg CFC 11 eq /UF</i>	5,119E-007	1,035E-006	7,936E-009	0	0	0	0	0	0	0	2,053E-010	1,507E-008	0	2,890E-008
Soil and water acidification (AP) <i>Kg SO₂ eq/UF</i>	3,232E-002	3,054E-002	8,136E-004	0	0	0	0	0	0	0	1,276E-007	4,637E-004	0	5,730E-004
Potential eutrophication (EP) <i>Kg (PO₄)³ eq /UF</i>	7,901E-003	8,475E-003	7,553E-004	0	0	0	0	0	0	0	2,58E-007	1,211E-004	0	1,404E-004
Photochemical ozone formation (POCP) <i>Ethene eq/UF</i>	2,061E-003	1,078E-003	8,106E-005	0	0	0	0	0	0	0	6,057E008	1,487E-005	0	2,108E-005
Depletion of abiotic resources (elements) (ADP)	1,121E-005	2,763E-005	2,290E-006	0	0	0	0	0	0	0	4,619E010	2,425E-007	0	1,038E-007

<i>Kg Sb eq/UF</i>														
Depletion of abiotic resources (fossils) (ADP) <i>MJ/UF</i>	95,537	98,670	2,202	0	0	0	0	0	0	0	3,742E-003	1,384	0	2,398
Air pollution <i>m³/UF</i>	158,981	174,041	12,683	0	0	0	0	0	0	0	3,034E-002	2,322	0	2,637
Water pollution <i>m³/UF</i>	14,841	4,589	8,895E-001	0	0	0	0	0	0	0	4,815E-004	5,132E-002	0	5,248E-002

4.2 Use of resources

Use of resources	Production stage	Construction stage		Implementation stage							End of life stages			
	Total A1 –A3 Production	A4 transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Renovation	B6 Energy use	B7 Water use	C1 Deconstruction/ demolition	C2 Transport	C3 Treatment of waste	C4 Waste
use of renewable primary energy, with the exclusion of renewable primary energy resources used as raw materials <i>MJ/UF</i>	1,245	2,333	0	0	0	0	0	0	0	0	0	2,128E-002	0	1,988E-002
use of renewable primary energy resources used as raw materials <i>MJ/UF</i>	8,143	0	0	0	0	0	0	0	0	0	0	0	0	0
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials) <i>MJ/UF</i>	9,388	2,333	0	0	0	0	0	0	0	0	0	2,128E-002	0	1,988E-002

Use of non-renewable primary energy, excluding non-renewable primary energy resources used as raw materials <i>MJ/UF</i>	107,116	115,955	2,029	0	0	0	0	0	0	0	2,624E-002	1,570	0	2,675
Use of non-renewable primary energy, used as raw materials <i>MJ/UF</i>	219,635	0	2,378E-001	0	0	0	0	0	0	0	0	0	0	0
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials) <i>Kg/UF</i>	326,751	115,955	2,267	0	0	0	0	0	0	0	2,624E-002	1,570	0	2,675
Use of secondary materials <i>MJ/UF</i>	1,476E-003 (cardboard)	0	0	0	0	0	0	0	0	0	0	0	0	0
Use of renewable secondary fuel <i>MJ/UF</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Use of non-renewable secondary fuel <i>MJ/UF</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Net use of freshwater <i>m³/UF</i>	4,624E-003	0	0	0	0	0	0	0	0	0	0	0	0	0

Note: the production of electricity in Italy is taken in consideration for the production phase.

4.3 Waste category

Waste category	Production stage	Construction stage		Implementation stage							End of life stages			
	Total A1 –A3 Production	A4 transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Renovation	B6 Energy use	B7 Water use	C1 Deconstruction/ demolition	C2 Transport	C3 Treatment of waste	C4 Waste
Hazardous waste eliminated(Kg/UF)	2,059E-001	3,270E-001	2,256E-002	0	0	0	0	0	0	0	2,375E-007	2,904E-003	0	2,299E-003
Hazardous waste not eliminated(Kg/UF)	6,039	3,449	7,752E-001	0	0	0	0	0	0	0	2,163E-004	3,800E-002	0	13,633
Radioactive waste eliminated (m ³ /UF)	7,502E-004	1,212E-003	1,188E-05	0	0	0	0	0	0	0	4,766E-07	1,477E-05	0	2,118E-05

Note: the characterization of hazardous and non-hazardous waste is based on the Italian legislative decree 152/06 ss.mm., transposition of the European directive 2008/98 EC "Directive on waste".

4.4 Outgoing flows

Outgoing flows		Production stage	Construction stage		Implementation stage							End of life stages			
		Total A1 –A3 Production	A4 transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Renovation	B6 Energy use	B7 Water use	C1 Deconstruction/ demolition	C2 Transport	C3 Treatment of waste	C4 Waste
Components for reuse (Kg/UF)		3,792E-001	0	0	0	0	0	0	0	0	0	0	0	0	0
Materials for the recycling (Kg /UF)		1,495E-002	0	2,588E-003	0	0	0	0	0	0	0	0	0	0	0
Soil and water acidification (AP) Kg SO ₂ eq/UF		0	0	0	0	0	0	0	0	0	0	0	0	0	0
Exported energy (MJ/UF)	Electricity	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Vapor	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Process gas	0	0	0	0	0	0	0	0	0	0	0	0	0	0

5. Additional information on the release of hazardous substances into indoor air, ground and water for the use phase.

Once installed in the final building, the product does not release any substance into the internal environment.

Indoor Air

The detected class is A + according to the French decree of 19 April 2011. Below are the results of the analyses on the substances released into the indoor environment.

N°		Results		Class references according to the judgment of 19 April 2011 in $\mu\text{g}/\text{m}^3$			
		18 days concentration $\mu\text{g}/\text{m}^3$	Class obtained	C	B	A	A+
	COVT	126	A+	>2000	<2000	<1500	<1000
50-00-0	formaldehyde	<2	A+	>120	<120	<60	<10
75-05-0	acetaldehyde	<2	A+	>400	<400	<300	<200
108-88-3	toluene	<2	A+	>600	<600	<450	<300
127-18-4	tetrachloroethylene	<LQ	A+	>500	<500	<350	<250
100-41-4	ethylbenzene	<LQ	A+	>1500	<1500	<1000	<750
106-42-3 95-47-6	xylenes	<LQ	A+	>400	<400	<300	<200
100-42-5	styrene	<LQ	A+	>500	<500	<350	<250
111-76-2	2 - butoxyethanol	<LQ	A+	>2000	<2000	<1500	<1000
95-63-6	1,2,4-trimethylbenzene	<LQ	A+	>2000	<2000	<1500	<1000
106-46-7	1,4-dichlorobenzene	<LQ	A+	>120	<120	<90	<60

For indoor pollution, a worker test was carried out on 05/09/2013 with report no. 2013-07-036-01 at the "Laboratoire EXCEL". The tests were carried out according to the protocol indicated in the following standards: EN ISO 16000-9: 2006, EN ISO 16000-11: 2006.

Ground and water

There is no significant release of substances in drinking water as the product does not come into contact with water intended for human consumption.

No test concerns the sanitary quality of rainwater, and consequently the soil, in contact with the product during its life, work has been carried out.

6. Contribution of products to the quality of life inside buildings

Product characteristics for the creation of hygrothermal comfort conditions in the building

Thanks to its impermeability to water vapor and its thermal insulation properties, the fiber-cement slab has a remarkable ability to eliminate condensation and drain excess moisture:

Characteristics	Unit of measures	Value	Norm	Note
Permeable to vapor ("W")	$mg/(m^2 \cdot h \cdot Pa)$	1,26	EN ISO 12572	Not coloured sheet
Vapor flow density ("g")	$mg/(m^2 \cdot h)$	1460	EN ISO 12572	Not coloured sheet
Permeable to vapor ("W")	$mg/(m^2 \cdot h \cdot Pa)$	$\geq 0,61$	EN ISO 12572	Coloured sheet
Vapor flow density ("g")	$mg/(m^2 \cdot h)$	≥ 720	EN ISO 12572	Coloured sheet

(Tests performed at ISTITUTO GIORDANO s.p.a. from Bellaria Igea Marina – Italy; test report no. 148532 issued on 24/07/2002)

Thermal conductivity " λ "	$W/(m \cdot K)$	~0,35	ISO 8302/91	
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(Tests performed at ISTITUTO GIORDANO s.p.a. from Bellaria Igea Marina – Italy; test report no. 148532 issued on 31/05/2001)

Product characteristics for creating acoustic comfort conditions in the building

For the acoustic comfort, Edilfibro's sheet has sound level reduction properties:

Characteristics	Unit of measures	Value	Norm	Note
evaluation index " R_w " of the soundproofing power "R"	dB	31	ISO 140 and 717	Evaluation index at 500 HZ in the frequency range between 100 and 3.150 Hz

(Tests performed at ISTITUTO GIORDANO s.p.a. from Bellaria Igea Marina – Italy; test report no. 145754 issued on 05/03/2001)

Product characteristics for creating visual comfort conditions in the building

No tests concerning visual comfort have been carried out. However, the presence of pigments allows the product to adapt to all places and is perfect in the renovation of modern and ancient buildings, even in historic centers on buildings classified as historic and cultural assets. The coloring does not concern only the surface but also the first layer of mass and therefore in case of scratches / abrasions the color is maintained.

Product characteristics for creating olfactory comfort conditions in the building

No odor emission test was performed. The product is not composed of raw materials that emit odors in the surrounding environment (even in places where it is stored in large quantities there is no smell) and in any case, in almost all cases, it is installed far from the users of the building. Moreover, as described below, the product does not undergo alterations over time that could create odors.

7. Additional information

All of the following additional information also has a positive influence on the environment, health and safety.

The product has high durability characteristics, is resistant to bad weather, is resistant to environmental chemical agents such as sulphates and acid rain, is not affected by oxidation phenomena, is not subject to be punctured by electrolysis in case of stray currents.

Characteristics	Unit of measures	Value	Norm	Note
Impermeability to water		Very good	UNI EN 494:2004+A3	possible appearance of traces of moisture on the unexposed surface, especially on recently laid sheet
Sun-rain		No alteration	UNI EN 494+A3	50 cycles of heating to 70 ° C and cooling with rain at room temperature
Freeze-thaw			UNI EN 494+A3	100 cycles with temperature variation from -20 ° + 20 ° C. possible reduction of mechanical resistance not <30%
Soak - dry			UNI EN 494:2004+A3	50 drying cycles at + 60 ° C and subsequent immersion in water. possible reduction of mechanical resistance not greater than 30%
Absorption to water		~25%		
Water dilation	mm/m	~2		From dried to saturated in water
Thermal expansion coefficient	Mm/m.K	~0.017		Tests performed at ISTITUTO GIORDANO s.p.a. from Bellaria Igea Marina (RN) – January 2006
Accelerated corrosion resistance in salt spray	visual evaluation	Intact	UNI ISO 9227	Sample subjected for 1.176 h to exposure in a concentrated salt spray chamber

(The last two tests in the table were performed at ISTITUTO GIORDANO s.p.a. from Bellaria Igea Marina-RN)

Moreover, the sheet is rot-proof. It is inert to fermentation processes, does not fear vegetable and animal microbial agents and is not attacked by insects and rodents.

The fiber-cement sheet is not combustible, essential requirement of European directives.

Characteristics	Unit of measures	Value	Norm	Note
Fire reaction		Level A1	UNI EN 13501-1:2005	requested by UNI EN 494+A3
Higher calorific value	MJ/Kg	<3	EN ISO 1716	

The product is flexible, but non-deformable, it is light and at the same time resistant to shocks (thus making installation and handling operations in general easier):

Characteristics	Unit of measures	Value	Norm	Note
Minimum bending moment	Nm/m	55	UNI EN 494+A3	
Bulk volume mass (density)	Kg/m ³	~1500	UNI EN 494+A3	
Minimum breaking load	N/m	4250	UNI EN 494+A3	Clear span between supports: 1.10m - 23cm wide loading rule
Impact resistance	J	600	EN 15057	Body of 50 kg. drop of 1.2 m