ENVIRONMENTAL PRODUCT DECLARATION

as per /ISO 14025/ and /EN 15804/

Owner of the Declaration	Eternit NV
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
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Valid to	21/07/2024

EQUITONE [TECTIVA] fibre cement sheets

ETEX

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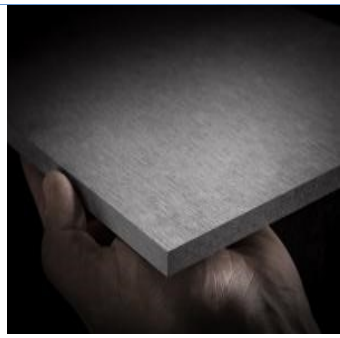

1. General Information

Eternit NV	EQUITONE [TECTIVA]
Programme holder IBU - Institut Bauen und Umwelt e.V. Panoramastr. 1 10178 Berlin Germany	**Owner of the declaration** Eternit NV Kuiermansstraat 1 1880 Kapelle-op-den-Bos Belgium
Declaration number EPD-ETE-20190007-ICA1-EN	**Declared product / declared unit** The production of 1 m^2 of a "EQUITONE [TECTIVA]" fibre cement sheets and it's related impacts over cradle-to-grave life cycle stages, where the product's expected average reference service life is of 50 years
This declaration is based on the product category rules: Fibre cement / Fibre concrete, 07.2014 (PCR checked and approved by the SVR)	**Scope:** This EPD presents the EQUITONE [TECTIVA] fibre cement sheets. This product is an autoclaved calcium silicate Eternit fibre cement sheets produced by ETEX Services NV at Kapelle-op-den-Bos factory in Belgium and sold in Germany.
Issue date 22/07/2019	The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.
Valid to 21/07/2024	**Verification** The standard /EN 15804/ serves as the core PCR Independent verification of the declaration and data according to /ISO 14025:2010/ ☐ internally ☒ externally
 Dipl. Ing. Hans Peters (President of Institut Bauen und Umwelt e.V.)	
 Dr. Alexander Röder (Head of Board IBU)	 Mr Carl-Otto Neven (Independent verifier appointed by SVR)

2. Product

2.1 Product description / Product definition

EQUITONE [TECTIVA] is an autoclaved calcium silicate Eternit fibre cement sheet produced at Kapelle-op-den-Bos production plant, Belgium. The study is based on the annual production of Tectiva from 2016, where all data reported are calculated as total value per site based on production volumes. It is 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: TE00, TE 10, TE 20, TE 30, TE 40, TE 50, TE 60, TE 80 and TE 90 made in 8mm or 12mm thick boards. Only pigment composition changes from a EQUITONE [TECTIVA] product to the other.

All products from this range:

- have been manufactured according to the same industrial process;
- have homogenous physical properties;
- have the same density;
- have been in the European market since 2007;
- have been produced in a unique factory (Kapelle-op-den-Bos) since 2007.

For the placing on the market of the product in the EU/EFTA (with the exception of Switzerland) Regulation (EU) No. 305/2011 (CPR) applies. The construction product is covered by the harmonised EN 12467:2012 +A1:2016 +A2:2006 'Fibre-cement flat sheets', Declaration of performance No. S650_01_153_V02 from 01/08/2015, in line with EN 12467:2012. For the application and use the respective national provisions apply.

2.2 Application

The EQUITONE [TECTIVA] product is mainly used as a *cladding sheet for ventilated exterior claddings and ceilings and insulated lightweight facade-systems*. The board 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 an *exterior ceiling* and as a *finishing board for roof eaves and verges*. In a minor application, the EQUITONE [TECTIVA] can be used as *protection for insulated foundations*.

2.3 Technical Data

The following tables include technical data specific to the EQUITONE [TECTIVA] product.

Constructional data

Name	Value	Unit
Thermal conductivity	39	W/(mK)
Water vapour diffusion resistance factor acc. to /DIN V 4108-4:2007/, /ISO 12572:2016/	214	-
Gross density (min)	1580	kg/m^3
Flexural strength 32 - 22	32 - 22	N/mm^2
Modulus of elasticity	14000	N/mm^2
Moisture content at 23 °C, 80% humidity	6	M.-%
Coefficient of thermal expansion	10	10^{-6}K^{-1}
Chemical resistance similar to concrete C 35/45	-	-
Ageing resistance similar to concrete C 35/45	-	-
Permanent temperature resistance	80	°C

Product according to the CPR, based on a hEN: EN 12467:2012 + A1:2016 + A2:2006 'Fibre-cement flat sheets'.

Performance data of the product in accordance with the declaration of performance with respect to its essential characteristics according to /EN 12467 "Fibre-cement flat sheets - Product specifications and test methods".

Tolerances rectified trimmed, in accordance with EN 12467, factory supplied			
Property	**Value/ Unit**		
Thickness 8 mm panel	± 0.5 mm		
Length	± 3 mm		
Width	± 3 mm		
Squareness	1.0 mm/m		
Technical properties			
Minimum density	dry	EN 12467	1,580 kg/m^3
Characteristic bending strength parallel	ambient	EN 12467	32.0 N/mm²
Characteristic bending strength perpendicular	ambient	EN 12467	22.0 N/mm²
Mean module of elasticity parallel	ambient	EN 12467	> 14,000 N/mm²
Mean module of elasticity perpendicular	ambient	EN 12467	> 12,000 N/mm²
Hygric movement	0-100% avg		1.60 mm/m
Water absorption of uncoated panel	0-100%		< 25 %
Classification			
Durability classification	EN 12467		Category A
Strength classification	EN 12467		Class 5
Reaction to fire	EN 13501-1		A2-s1-d0
Extra tests			
Water impermeability test	EN 12467		Pass
Warm water test	EN 12467		Pass
Soak-dry test	EN 12467		Pass
Freeze-thaw test for category A panel	EN 12467		Pass
Thermal movement α	< 0,01 mm/mK		
Thermal conductivity λ	0,390 W/mK		

2.4 Delivery status

Dimensions		
Thickness	8 mm	
Weight (air-dried)	14.22 kg/m²	
Not rectified – untrimmed	1,240 mm x 2,520 mm	1,240 mm x 3,070 mm
Rectified – trimmed	1,220 mm x 2,500 mm	1,220 mm x 3,050 mm

2.5 Base materials / Ancillary materials

Base materials included in the composition of EQUITONE [TECTIVA] are:

- Sand: 25-40 %
- Lime: < 10 %
- Pigments: 10 %
- Cement: 25-40 %
- Cellulose: < 10 %
- Wollastonite: <10 %
- Clay: <10 %
- Water: 5-20 %
- Other - Approx. 5%

No substances of very high concern (SVHC) are used in the composition of the product.

2.6 Manufacture

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.

2.7 Environment and health during manufacturing

Environmental, occupational health, safety and quality management at the different Kapelle-op-den-Bos plant are in accordance with the following standards:

- **ISO 14001:2015**
- **ISO 9001:2015**
- **OHSAS 18001:2007**

During the entire manufacturing process, no other health protection measures extending beyond the legally specified industrial protection measures for commercial enterprises are required.
· Air: Any dust arising is collected in filter systems and partially recycled. Emissions are significantly lower than the limit values specified by the VLAREM II.
· Water/Ground: Water incurred during manufacturing and plant cleaning is treated mechanically in waste water treatment systems on the plant site and re-used in the production process.
· Noise: Noise emitted by the production equipment into the environment is below the permissible limit values.

2.8 Product processing/Installation

The product use and installation instructions shall be followed for the specific applications where EQUITONE [TECTIVA] is used.
Build-up alternatives are presented below, and annexes will present the environmental profiles of these build-ups for use at building level.

- Build scenario 1: Fastening of EQUITONE panels to facades using EQUITONE UNI-screw (EN 14567) or A2 (304) Stainless Steel ISR T20 Torx TTAP® screw fixed to a sub-construction of wooden framing. These recommendations apply to the most common areas of application.Consumption per m²: 2,389 kg wood, 0,033kg stainless steel screws and 0,018kg EPDM sealing tape.
- Build scenario 2: Fastening of EQUITONE panels to facades using Aluminium or Stainless Steel EQUITONE UNI-rivets fixed to a sub construction of adjustable aluminium rails and brackets. Consumption per m²: 1,610kg aluminium, 0,016kg aluminium rivets and 0,018kg Ethylen-Propylen-Dien-Monomer (EPDM) sealing tape.

2.9 Packaging

The final Tectiva product is placed on a custom-size, not re-usable wooden pallet. On each pallet there are 10 Tectiva boards placed, and the boards are separated from each other through a paper/carton sheet. The entire pallet with the Tectiva boards are tied together with a PE strap.

Packaging material per functional unit:
Pallet - 0,2278 kg
Carton - 0,0146 kg
PE strap 0,0012 kg.

2.10 Condition of use

Maintenance requirement will depend on the specific design and application. Usually, EQUITONE [TECTIVA] won't change the composition of the materials and thus no maintenance is needed.

2.11 Environment and health during use

Environmental protection: According to the current state of knowledge, hazards for water, air and soil cannot arise when processed as designated (please refer to the section on Requisite evidence).
Health protection: There are no known health risks attributable to the base materials used and their performance in use when the construction products are used as designated (please also refer to the section on Requisite evidence).

2.12 Reference service life

Tectiva is a rather new product on the market (°2007), and there is no extensive evidence yet regarding its service life. It is estimated that the reference service life of Tectiva is the average building life time of 50 years. This is also in line with the category in BBSR with the code 335.511.

There are no influences on the aging of the product when applied in accordance with the rules of technology.

2.13 Extraordinary effects

Fire

Product classification of EQUITONE [TECTIVA] in relation to its reaction to fire behavior, according to EN 13501-1+A1:2007 is presented below:

Fire protection

Name	Value
Building material class	A2
Burning droplets	d0
Smoke gas development	s1

Water

Tests on the product performance including possible impacts on the environment following the unforeseeable influence of water, e.g. flooding showed that no risks are expected to occur in terms of environment and human health.

Mechanical destruction

In case of mechanical destruction, no risks are expected to occur in terms of environment and human health.

2.14 Re-use phase

Studies showed that EQUITONE [TECTIVA] products can be re-used and recycled. Depending on the mounting system the fibre cement products can be removed non-destructively by unscrewing or opening the studs.
The current EPD assumes 100% landfilling of the product at its end of life.

2.15 Disposal

Tectiva boards are 100% landfilled. The waste is classified under code 10 13 11 according to the European Waste Catalogue (EWC). The build-up follows the end-of-life scenario for metals or wooden materials in Germany.

2.16 Further information

Additional information on EQUITONE [TECTIVA] can be found at: www.EQUITONE.com

3. LCA: Calculation rules

3.1 Declared Unit

The functional unit is defined as: the production of 1 m² (thickness 8 mm)of a "EQUITONE [TECTIVA]" sheets and it's related impacts over cradle-to-grave life cycle stages, where the product's expected average reference service life is of 50 years.

Annexes to the EPD include also the environmental profiles for the two build-up alternatives: wooden frame with steel screws and aluminium frame with aluminium rivlets, both on an EPDM layer.

Declared unit

Name	Value	Unit
Declared unit	1	m²
Gross density 8 mm thickness sheet	14,22	kg/m2
Conversion factor to 1 kg	0,0703	

This product is representative for Belgium, where data were collected for 2016.

3.2 System boundary

This is a cradle to grave EPD for the EQUITONE [TECTIVA] with the following life cycle stages included: A1, A2, A3, A4, A5, B1-7, C1, C2, C3, C4 and D.

For A1, A2 and A3 specific quantities and distances were collected by ETEX NV and processed by VITO. For transportation the default capacity utilisation factor of the transportation datasets was used, as all transportations were mass-based.

Besides this, in the annexes the environmental profile of the two possible build-up options are provided, to be used when calculations at building level are necessary. For the build-up scenarios the following life cycle stages are included: A1, A2, A3, A4, C2, C3, C4 and D. The impacts related to the life cycle stages A5, B1-7 and C1 are fully allocated to the EQUITONE [TECTIVA] product.

3.3 Estimates and assumptions

The large majority of the raw materials were modeled with Ecoinvent 3.4 datasets. In very few instances (pigments) no specific dataset was found in the database, and a proxy was used instead.

All operating data, i.e. all of the starting materials used, thermal energy, internal fuel consumption, and electricity consumption, all direct waste as well as all emission measurements available were taken into account in the analyses.

The packaging materials that include biogenic carbon are the wooden boards and cardboard packaging. No uptake nor
release of biogenic carbon is modeled. The biogenic carbon contained in the packaging material of the raw materials (from A1) exit the system during the production phase (in A3), with the EoL of the respective packaging materials. The biogenic carbon contained in the packaging material of the Tectiva boards (from A3) exits the system at installation (in A5), with the EoL of the respective packaging materials. The packaging materials that include biogenic carbon are the wooden boards and paper packaging.

3.4 Cut-off criteria

The set-up of the study aimed at the minimum at the cut-off criteria of 1 % of renewable and non-renewable primary energy usage and 1 % of the total mass input of that unit process, in line with EN 15804. During the data collection process all known inputs and outputs were accounted for, and the only processes not taken into consideration in the foreground are listed below:*Accidental pollutions* are often difficult to distinguish from emissions that occur under normal conditions (accidental pollutions are not measured and reported separately) and are therefore not considered in this study.

- 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.
- The packaging of the raw materials for the build-up is not considered in this study being under the cut-off criteria.

- A sensitivity analysis was done during the LCI of Cedral and concluded that the wearable sieves and cutting knives had a neglectable impact, less then 1%, on each damage category. For this reason these inputs were omitted from this study.

3.5 Background data

The life cycle assessment of EQUITONE [TECTIVA] was done using **SimaPro 8.5** software and **Ecoinvent 3.4** database.

3.6 Data quality

In the LCA study, different levels of data requirements and data collection exist. Distinction is made between company-specific, application-specific and generic data.

Etex company-specific data:
Company-specific data concern the data for the production of the Tectiva board. Data for the production process have been delivered to VITO by Etex in a questionnaire format. The EPD is developed with industrial data from 2016.
Collected data is of very good quality. Background data are of very good quality as well, with few exceptions where are of good quality, for the cases where we had to use proxies.

Application-specific data
Application specific data deals with all life cycle phases from the transportation of the packed Tectiva to the construction site, transport to end of life (EOL) treatment and the final EOL treatment scenario. Some of the related scenarios (for transport to construction site, construction process, use stage, and demolition process) were provided by Etex, other were developed together by VITO and Etex based on specific sources. Data quality is therefore of very good quality wherever specific distances and EOL scenarios were provided, and of good quality where average distances and PCRs default scenarios were used.

Generic data
VITO will collect publicly available generic data for all background processes such as the production of electricity, transportation by means of a specific truck, etc. The main LCI source for this kind of background processes will be the **Ecoinvent v3.4** database.
Data quality of the generic data is of good quality. Geography is respected for electricity mixes throughout the system. The time representativeness is that of the Ecoinvent generic datasets, where only valid datasets were used. Same applies to precision and completeness, as improving these quality criteria for the specific study is beyond the scope of this study.

3.7 Period under review
Data were collected for 2016 for the production process of EQUITONE [TECTIVA] in Belgium.

3.8 Allocation
At Etex, different types of cement fiber products are produced. However Tectiva products are produced only on certain production lines, with no co-products being produced as part of the process. 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.

3.9 Comparability
Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to /EN 15804/ and the building context, respectively the product-specific characteristics of performance, are taken into account.

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4. LCA: Scenarios and additional technical information

Transport to the building site (A4)
For this EPD the EQUITONE [TECTIVA] product is installed in Germany. The transport to the building site of the Tectiva products and the additional build-up components is done by truck in 2 steps: (1) from the Etex plant to the merchant, with a big truck (16-32 t), (2) from the merchant to the building site (85% with a big truck (16-32 t) and 15% with a small truck (3,5 - 7,5 t)).

Name	Value	Unit
Plant to the merchant - distance	545	km
Merchant to the building site - distance	35	km

Installation into the building (A5)
The installation involves an amount of 0,0216 kWh per screw used to fix the EQUITONE [TECTIVA] product, where 15 screws are necessary for the functional unit. The dataset used to model the impacts is “Electricity, low voltage {DE}| market for | Cut-off, S”.
During the installation, depending on how the EQUITONE [TECTIVA] 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 [TECTIVA] product is transported to End of Life (EoL) and disposed of in line with the EoL scenarios for Germany.

Name	Value	Unit
Electricity consumption	0,0216 kWh per screw	kWh

Use phase (B1-7)
Over the 50 years of reference service life (RSL), if correctly installed, there are no impacts for the use phase.

End of life
Dismantling (C1)
The dismantling of Tectiva involves the same amount of energy as for the installation, which is 0,0216 kWh per screw, where 15 screws are used.

Transport to EOL (C2)
The scenarios for the transport to EoL of the Tectiva product as well as of the packaging waste is presented below, where the transport mode is a truck, 16-32 t.
- to recycling - 800 km
- to incineration - 150 km
- to landfill - 50 km

For the EoL of the packaging materials the following distances applied:
- to recycling - 200 km
- to incineration - 100 km in Belgium and 150 km in Germany
- to landfill - 50 km

Waste processing (C3) and disposal (C4)
At the end of life of the building the Tectiva product together with the build-up components are disposed of according to the EoL scenarios**.** The EoL scenario for Tectiva is in line with the current situation, where Tectiva is not recycled, neither used as secondary fuel.

Name	Value	Unit
Collected separately waste type	-	kg
Landfilling EQUITONE TECTIVA	100%	kg

Reuse, recovery and/or recycling potentials (D), relevant scenario information
The following materials contribute to the potential benefits in module D:

Name	Value	Unit
Packaging of raw materials and Tectiva product for recycling	1,566	kg
Packaging of raw materials and Tectiva product for energy recovery	2,026	kg
Materials for recycling for build-up 1	-	kg
Materials for recycling for build-up 1	-	kg
Materials for energy recovery for build-up 1	-	kg

5. LCA: Results

1 m² EQUITONE [TECTIVA] product

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE NOT DECLARED)

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	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
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: 1 m2 "EQUITONE [TECTIVA]" sheets

Parameter	Unit	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP	[kg CO_2-Eq.]	6.86E+0	5.25E-1	6.75E-1	1.56E+0	1.20E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.98E-1	1.16E-1	0.00E+0	7.83E-2	-3.00E-1
ODP	[kg CFC11-Eq.]	4.34E-7	9.09E-8	2.39E-7	2.90E-7	1.21E-7	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	9.23E-9	2.15E-8	0.00E+0	2.93E-8	-3.22E-8
AP	[kg SO_2-Eq.]	3.09E-2	6.15E-3	2.26E-3	4.99E-3	5.20E-3	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	6.17E-4	3.69E-4	0.00E+0	5.19E-4	-7.24E-4
EP	[kg $(PO_4)^{3-}$-Eq.]	3.56E-3	6.14E-4	6.01E-4	8.31E-4	7.77E-4	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.85E-4	6.16E-5	0.00E+0	9.97E-5	-7.58E-5
POCP	[kg ethene-Eq.]	1.56E-3	2.45E-4	1.30E-4	2.55E-4	2.42E-4	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.68E-5	1.89E-5	0.00E+0	2.00E-5	-6.14E-5
ADPE	[kg Sb-Eq.]	1.81E-5	9.77E-7	9.67E-7	4.88E-6	2.85E-6	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	2.86E-7	3.53E-7	0.00E+0	1.02E-7	-1.48E-7
ADPF	[MJ]	4.92E+1	8.08E+0	1.83E+1	2.50E+1	1.29E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	2.22E+0	1.85E+0	0.00E+0	2.37E+0	-7.79E+0

Caption	GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources

RESULTS OF THE LCA - RESOURCE USE: 1 m2 "EQUITONE [TECTIVA]" sheets

Parameter	Unit	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
PERM	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
PERT	[MJ]	4.61E+1	1.45E-1	6.64E+0	3.44E-1	5.76E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	4.16E-1	2.54E-2	0.00E+0	7.11E-2	-2.96E+0
PENRE	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
PENRM	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
PENRT	[MJ]	6.61E+1	8.04E+0	3.24E+1	2.42E+1	1.76E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	3.87E+0	1.79E+0	0.00E+0	2.71E+0	-9.88E+0
SM	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
RSF	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
NRSF	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
FW	[m^3]	9.63E-2	1.51E-3	8.15E-3	4.44E-3	1.27E-2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.24E-3	3.28E-4	0.00E+0	2.55E-3	-1.61E-3

Caption	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 = Use of net fresh water

RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: 1 m2 "EQUITONE [TECTIVA]" sheets

Parameter	Unit	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	[kg]	1.14E-4	4.76E-6	2.86E-5	1.42E-5	2.75E-5	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.10E-5	1.04E-6	0.00E+0	1.15E-6	-4.98E-6
NHWD	[kg]	1.29E+0	2.25E-1	1.28E-1	1.13E+0	1.75E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.04E-2	8.47E-2	0.00E+0	1.42E+1	5.69E-4
RWD	[kg]	2.60E-4	5.25E-5	1.96E-4	1.65E-4	8.43E-5	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.28E-5	1.23E-5	0.00E+0	1.99E-5	-2.57E-5
CRU	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
MFR	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.57E+0
MER	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	2.03E+0
EEE	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
EET	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0

Caption	HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EEE = Exported thermal energy

6. LCA: Interpretation

The impact assessment phase of LCA is aimed at evaluating the significance of potential environmental impacts using the LCI results. In general, this process involves associating inventory data of specific environmental impact categories with category indicators, thereby attempting to quantify these impacts. The impact assessment and the interpretation of this study are performed according to the ISO 14040 and ISO 14044 guidelines (ISO, 2006).
The impact assessment results are relative expressions and do not predict impacts on category end-points, the exceeding of thresholds, safety margins or risks but predicts *potential* environmental damages (impacts) related to the system under study.
For this LCA study the different environmental impact categories presented in the EN 15804:2012+A1:2013 were used.
The production data involves up-to-date primary data from 2016 supplied by Eternit N.V. for the Kapelle-op-den-Boss plant.
The calculation of the environmental impact categories accounted for the inputs to and the outputs from the system for 50 years from the year for which the data set is deemed representative. Long term emissions were not considered, as per the recommendations of EN 15804.
This environmental profile shows the contribution of the various steps in the life cycle, per environmental impact category. For each category, the total contribution of the system is always set at 100% and the relative contributions of the various life cycle phases are visible.
For Tectiva, the raw materials used in the formulation mix has the highest contribution on all impact categories followed by the transportation of the raw materials and the production process of Tectiva.
Outside the system's boundaries, module D shows benefits from the energy recovery and recycling processes which are related to packaging materials for Tectiva and to the build-up options.
Secondary raw materials are not used for the manufacturing of EQUITONE Tectiva. Secondary fuels are used in the upstream process of cement manufacturing.
During the manufacturing of the product around 0,014 m3 of water is used. The water is used as process water and for mixing the cement.
Non-hazardous waste represents the largest amount of waste flows due to the landfill of the product.
Radioactive waste is exclusively incurred when generating electricity in nuclear power plants.
The overall data quality is good, with corresponding consistent data records being available for almost all of the preliminary products and auxiliaries used.

7. Requisite evidence

The cement boards produced by Eternit are very similar in terms of inputs (raw materials), production process, use and disposal. For this reason the overall tests done for these boards are considered to be rated the same for similar products, such as EQUITONE [TECTIVA], [Natura], [Cedral], and other cement boards from the same family.

Specific tests and measurements performed for [Cedral] are presented below, and they were accepted as representative for [Tectiva] as well.

Measuring agency / Protocol / Date: Hygiene-Institut des Ruhrgebietes, Gelsenkirchen; No. A-234757-13- To,12.09.2013.

Result: the result of the analyses of leaching by the panels examined in accordance with DIN 38414, Part 4 indicate that the eluate allocation values for class I landfills in the Landfill Ordinance are adhered to with regard to any landfilling of non-recyclable residual construction panels. In term of use in construction, a comparison of the leaching data with the limit and guideline values outlined in the German Drinking Water Ordinance date 21 May 2001 indicate that the limit values are exceeded concerning the pH value and concentration
of water-soluble organic ingredients.
The façade panels are only used in outdoor applications. Evidence of VOC emissions is therefore not of relevance.

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