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The Norwegian EPD Foundation

ENVIRONMENTAL PRODUCT DECLARATION

in accordance with ISO 14025, ISO 21930 and EN 15804

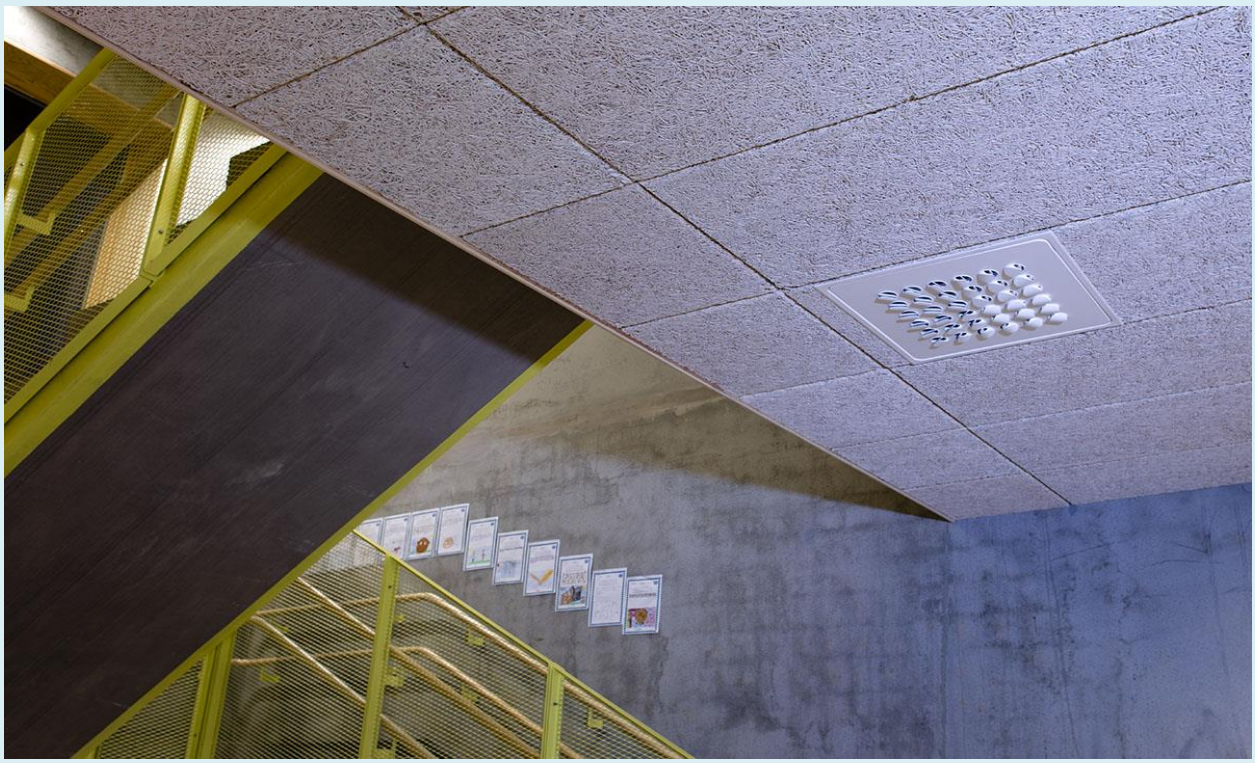
Owner of the declaration:	Träullit AB
Program operator:	The Norwegian EPD Foundation
Publisher:	The Norwegian EPD Foundation
Declaration number:	NEPD-1554-595-EN
Registration number:	NEPD-1554-595-EN
ECO Platform reference number:	-
Issue date:	24.05.2018
Valid to:	24.05.2023

Semullit/Träullit/Baux - White Natural

Wood wool cement panels and wall systems

Träullit AB

www.epd-norge.no



General information

Product:
Semullit/Träullit/Baux - White Natural

Wood wool cement panels and wall systems

Owner of the declaration:
Träullit AB
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Träullit AB
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Sweden

Declaration number:
NEPD-1554-595-EN

Place of production:
Österbymo, Sweden

ECO Platform reference number:

Management system:

This declaration is based on Product Category Rules:
CEN Standard EN 15804 serves as core PCR
NPCR 010 Building boards rev1 (12/2013)

Organisation no:
556064-0806

Statement of liability:
The owner of the declaration shall be liable for the underlying information and evidence. EPD Norway shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

Issue date:
24.05.2018

Valid to:
24.05.2023

Declared unit:
1 ton of White Natural wood wool cement constructions.

Year of study:
2017-2018

Declared unit with option:

Comparability:
EPD of construction products may not be comparable if they do not comply with EN 15804 and are seen in a building context.

Functional unit:
1 ton of White Natural acoustic wood wool cement constructions from cradle-to-grave, with a reference service life of 60 years.

The EPD has been worked out by:
Vegard Ruttenborg
Norwegian Institute of Wood Technology

Vegard Ruttenborg

Treteknisk

Verification:
The CEN Norm EN 15804 serves as the core PCR. Independent verification of the declaration and data, according to ISO14025:2010

☐ internal ☑ external

Third party verifier:
Oddbjørn Dahlstrøm, Asplan Viak AS
(Independent verifier approved by EPD Norway)

Approved

Håkon Hauan
Managing Director of EPD-Norway

Product

Product description:
Semullit is used in constructions such as complete exterior wall systems, interior/exterior cladding, joists, roofs, interior/exterior ceilings and as internal sound absorbers.

For more information about the different Semullit wood wool cement products, please visit:
www.semullit.no
www.träullit.se
www.baux.se

Product specification:
White Natural products are manufactured with white Portland cement.

Materials	kg	%
Spruce, dry weight	340	34,00
White Portland cement, dry weight	500	50,00
Lime	103	10,30
Water	57	5,70
Total, product	**1000**	**100,00**
Wood packaging	13,58	
Paperboard packaging	0,4	
Total, included packaging	**1013,98**	

Technical data:
Available in thicknesses of 25, 50, 70, 100 and 150mm.
For wall systems: 400mm and 600mm.
The density is 400 kg/m3.

The product is produced according to NS 3919 - Classification of fire resistance and reaction to fire.

Example:

Calculate results from tonnes to m^2 with a preferred thickness:

$$\text{kg } CO_2\text{-eq (per m}^2\text{)} = \frac{\text{Density x Thickness}}{\text{kg CO2-eq (per tonn) x 1000}}$$

Market:
Global.

Reference service life, product:
The reference service life of the product is equal to the buildng reference service life.

Reference service life, building:
The reference service life of the building is set to 60 years.

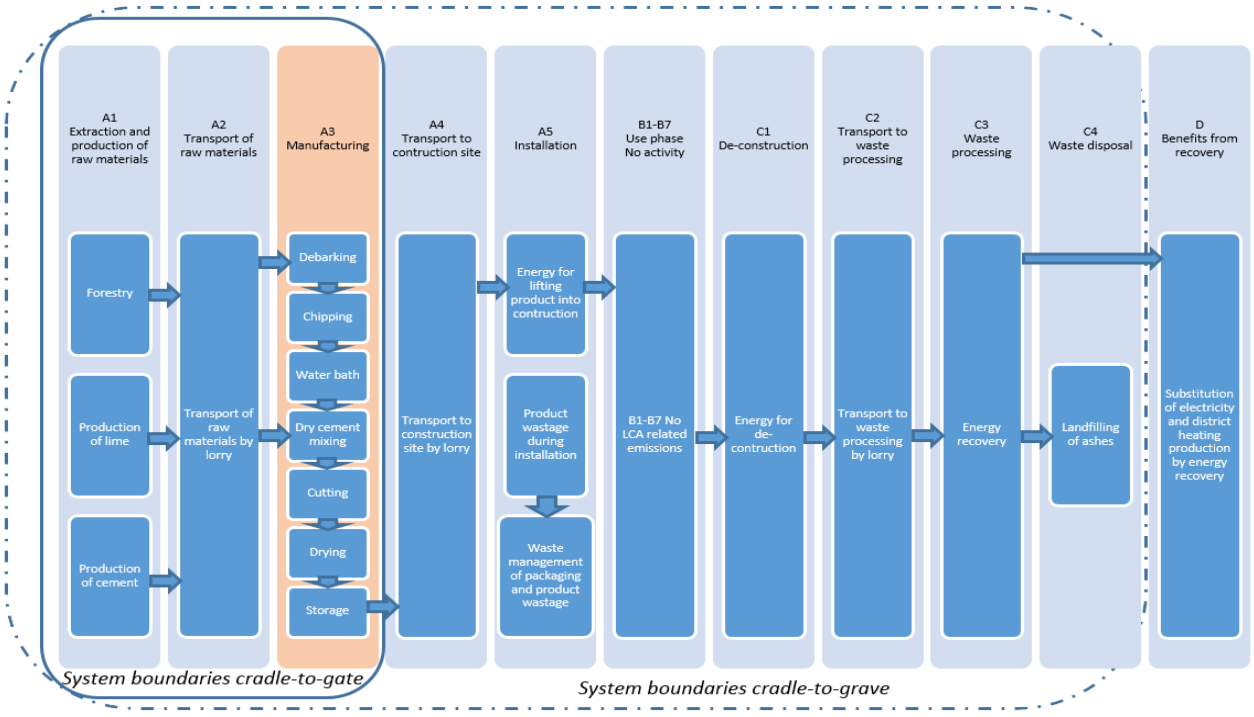
LCA: Calculation rules

Declared unit:
1 ton of White Natural wood wool cement constructions.

System boundary:
A flow chart with the system bounadries are shown bellow in figure 1.

Module D i calculated based on exported energy from waste processing substituting average electricity and district heating production.

Figure 1: Flow diagram according to the modular approach



Data quality:
Manufacturing data for the issued product is based on average data for 2016. The data used for the production of cement is collected from an EPD (NEPD-00162E) for the specific product, which is compliant with EN 15804. Data for exported energy from waste processing are based on Statistics Norway which is representative for 2015 (2016a, b, c). The rest of the data is from Ecoinvent v3.3, recycled content (2016).

Cut-off criteria:
All major raw materials and all the essential energy is included. The production process for raw materials and energy flows that are included with very small amounts (<1%) are not included. This cut-off rule does not apply for hazardous materials and substances. The production facility in A3 has been initially excluded from the study.

Allocation:
The allocation is made in accordance with the provisions of EN 15804. Incoming energy and water and waste production sub-divisioned when possible and allocated with economic allocation when the difference in revenue is high. Effects of primary production of recycled materials allocated to the main product in which the material was used. The recycling process and transportation of the material is allocated to this analysis.

Calculation of biogenic carbon content:
Sequestration and emissions of biogenic carbon is calculated according to EN16485:2014. This approach is based on the modularity principle in EN15804:2012 that states that all environmental aspects and impacts are declared in the life cycle where they appear. The calculation of biogenic carbon content and conversion to carbon dioxide is done according to NS-EN 16449:2014. Net contribution to GWP from biogenic carbon by each module is shown on page 8. The timber originates from sustainable forestry and has PEFC certified traceability.

LCA: Scenarios and additional technical information

The following information describe the scenarios in the different modules of the EPD.

It is assumed a transport from manufacturing to Oslo on large lorry and then to a building site in Oslo on a medium lorry.

Transport from production place to user (A4)

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance km	Fuel/Energy consumption		
Lorry	53	EURO 5, >32 tonnes	500	0,0228	l/tkm	
Lorry	26	EURO 5, 16-32 tonnes	50	0,048	l/tkm	

The assembly at building site includes 5 % product wastage, energy for lifting and waste management of packaging and wastage.

There are no LCA-related envrironmental impacts during use phase.

Assembly (A5)

	Unit	Value
Auxiliary	kg	
Water consumption	m^3	
Electricity consumption	MJ	2,00
Other energy carriers	MJ	
Material loss	kg	50
Output materials from waste treatment	kg	13,98
Dust in the air	kg	

Use (B1)

	Unit	Value

The product requires normally no maintenance or repair.

Maintenance (B2)/Repair (B3)

	Unit	Value
Maintenance cycle*		0
Auxiliary	kg	0
Other resources	kg	0
Water consumption	m^3	0
Electricity consumption	kWh	0
Other energy carriers	MJ	0
Material loss	kg	0

In a typical scenario it is assumed that there will be no replacement or refurbishment with the product.

Replacement (B4)/Refurbishment (B5)

	Unit	Value
Replacement cycle*		0
Electricity consumption	kWh	0
Replacement of worn parts	0	0

* Number or RSL (Reference Service Life)

The product has no operational energy use and water consumption.

Operational energy (B6) and water consumption (B7)

	Unit	Value
Water consumption	m^3	
Electricity consumption	kWh	
Other energy carriers	MJ	
Power output of equipment	kW	

The waste processing is assumed as wood waste treated with incineration with energy recovery. Ash from incineraiton is disposed in landfill.

End of Life (C1, C3, C4)

	Unit	Value
Hazardous waste disposed	kg	
Collected as mixed construction waste	kg	1000
Reuse	kg	
Recycling	kg	
Energy recovery	kg	1000
To landfill	kg	

The transport of wood waste is based on average distance for Norway in 2007 and was 85 km (Raadal et al., 2009).

Transport to waste processing (C2)

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance km	Fuel/Energy consumption	
Lorry	Unspecified	Uspecified	85	0,045 l/tkm	

The benefits of exported energy from energy recovery is calculated with substiution of Norwegian electricity market mix on medium voltage and Norwegian district heating mix. The energy exported and the district heating mix is representative for the year 2015.

Benefits and loads beyond the system boundaries (D)

	Unit	Value
Substitution of electricity	MJ	547
Substitution of district heating	MJ	3759
Substitution of raw materials	kg	0

LCA: Results

The results for global warming in A1-A3 gives large contribution of the sequestration of carbon dioxide during wood growth, while the same amount gives an large contribution when emitted during waste treatment in C3. The amount of net contribution of biogenic carbon to each module is shown on page 8.

System boundaries (X=included, MND= module not declared, MNR=module not relevant)

Product stage			Assemby stage		Use stage							End of life stage				Beyond the system boundaries
Raw materials	Transport	Manufacturing	Transport	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

Environmental impact

Parameter	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5
GWP	kg CO_2-eqv	1,09E+02	5,22E+01	4,57E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
ODP	kg CFC11-eqv	2,53E-05	1,03E-05	1,94E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
POCP	kg C_2H_4-eqv	1,60E-01	8,48E-03	6,36E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
AP	kg SO_2-eqv	2,08E+00	1,70E-01	6,72E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EP	kg PO_4^{3-}-eqv	2,70E-01	2,81E-02	1,21E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
ADPM	kg Sb-eqv	7,53E-04	1,10E-04	6,59E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
ADPE	MJ	4,64E+03	8,65E+02	1,61E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Environmental impact

Parameter	Unit	B6	B7	C1	C2	C3	C4		D
GWP	kg CO_2-eqv	0,00E+00	0,00E+00	2,04E-02	1,09E+01	6,33E+02	4,70E+00		-2,63E+01
ODP	kg CFC11-eqv	0,00E+00	0,00E+00	2,11E-09	2,04E-06	1,29E-06	1,36E-06		-3,18E-06
POCP	kg C_2H_4-eqv	0,00E+00	0,00E+00	4,91E-06	1,86E-03	6,63E-03	1,63E-03		-1,48E-02
AP	kg SO_2-eqv	0,00E+00	0,00E+00	9,92E-05	4,35E-02	1,11E-01	3,30E-02		-1,60E-01
EP	kg PO_4^{3-}-eqv	0,00E+00	0,00E+00	2,04E-05	7,50E-03	2,55E-02	5,36E-03		-3,79E-02
ADPM	kg Sb-eqv	0,00E+00	0,00E+00	2,84E-07	3,05E-05	2,58E-05	5,56E-06		-1,11E-04
ADPE	MJ	0,00E+00	0,00E+00	2,11E-01	1,77E+02	1,28E+02	1,40E+02		-3,30E+02

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

Resource use

Parameter	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5
RPEE	MJ	6,13E+03	1,28E+01	6,18E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RPEM	MJ	6,74E+03	0,00E+00	1,08E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
TPE	MJ	1,29E+04	1,28E+01	6,29E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRPE	MJ	6,45E+03	8,95E+02	2,60E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRPM	MJ	1,74E-01	0,00E+00	8,70E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
TRPE	MJ	6,45E+03	8,95E+02	2,60E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
SM	kg	2,70E+01	0,00E+00	2,47E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	MJ	2,29E+02	0,00E+00	1,56E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF	MJ	2,97E-02	0,00E+00	2,04E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
W	m^3	3,65E+00	1,72E-01	2,27E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Resource use

Parameter	Unit	B6	B7	C1	C2	C3	C4		D
RPEE	MJ	0,00E+00	0,00E+00	2,33E+00	2,27E+00	6,43E+03	3,50E+00		-2,26E+03
RPEM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-6,53E+03	0,00E+00		0,00E+00
TPE	MJ	0,00E+00	0,00E+00	2,33E+00	2,27E+00	-9,18E+01	3,50E+00		-2,26E+03
NRPE	MJ	0,00E+00	0,00E+00	2,95E-01	1,80E+02	1,32E+02	1,43E+02		-3,85E+02
NRPM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00		0,00E+00
TRPE	MJ	0,00E+00	0,00E+00	2,95E-01	1,80E+02	1,32E+02	1,43E+02		-3,85E+02
SM	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00		0,00E+00
RSF	MJ	0,00E+00	0,00E+00	3,04E-03	0,00E+00	9,54E-01	0,00E+00		-1,71E+03
NRSF	MJ	0,00E+00	0,00E+00	2,02E-03	0,00E+00	6,36E-01	0,00E+00		-1,14E+03
W	m^3	0,00E+00	0,00E+00	1,74E-02	3,29E-02	2,17E-01	1,57E-01		-9,53E+00

RPEE Renewable primary energy resources used as energy carrier; RPEM Renewable primary energy resources used as raw materials; TPE Total use of renewable primary energy resources; NRPE Non renewable primary energy resources used as energy carrier; NRPM Non renewable primary energy resources used as materials; TRPE Total use of non renewable primary energy resources; SM Use of secondary materials; RSF Use of renewable secondary fuels; NRSF Use of non renewable secondary fuels; W Use of net fresh water

End of life - Waste

Parameter	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5
HW	kg	4,89E+00	4,92E-02	3,60E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NHW	kg	5,13E+01	6,76E+01	6,72E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RW	kg	3,31E-02	6,02E-03	2,04E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

End of life - Waste

Parameter	Unit	B6	B7	C1	C2	C3	C4		D
HW	kg	0,00E+00	0,00E+00	1,03E-04	4,93E-03	1,80E+00	7,12E+02		-1,49E-01
NHW	kg	0,00E+00	0,00E+00	1,43E-02	1,05E+01	1,11E+01	1,23E+00		-9,10E+00
RW	kg	0,00E+00	0,00E+00	1,60E-06	1,16E-03	6,20E-04	7,72E-04		-1,74E-03

HW Hazardous waste disposed; NHW Non hazardous waste disposed; RW Radioactive waste disposed

End of life - Output flow

Parameter	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5
CR	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MR	kg	8,70E-01	0,00E+00	4,08E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MER	kg	6,60E-02	0,00E+00	1,36E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EEE	MJ	2,24E+01	0,00E+00	2,84E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
ETE	MJ	1,50E+02	0,00E+00	1,95E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

End of life - Output flow

Parameter	Unit	B6	B7	C1	C2	C3	C4		D
CR	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00		0,00E+00
MR	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00		0,00E+00
MER	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00		0,00E+00
EEE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,47E+02	0,00E+00		-5,47E+02
ETE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,76E+03	0,00E+00		-3,76E+03

CR Components for reuse; MR Materials for recycling; MER Materials for energy recovery; EEE Exported electric energy; ETE Exported thermal energy

Reading example: 9.0 E-03 = $9.0*10^{-3}$ = 0.009

Additional Norwegian requirements

Greenhous gas emission from the use of electricity in the manufacturing phase
National production mix with import, on low woltage (production of transmission lines, in addition to direct emissions and losses in grid) is applied for electricity in the manufacturing prosess (A3).

Data source	Amount	Unit
Ecoinvent v3.3 (August 2016)	52.9	gram CO_2-eqv/kWh

Dangerous substances

☑ The product contains no substances given by the REACH Candidate list or the Norwegian priority list

☐ The product contains substances given by the REACH Candidate list or the Norwegian priority list that are less than 0.1 % by weight.

☐ The product contain dangerous substances, more then 0.1% by weight, given by the REACH Candidate List or the Norwegian Priority list, see table.

☐ The product contains no substances given by the REACH Candidate list or the Norwegian priority list. The product is classified as hazardous waste (Avfallsforskiften, Annex III), see table.

Transport
Transport from production site to a construction site according to scenario A4: 550 km

Indoor environment
The product has been tested for emissions after 28 days of volatile organic compounds (VOC and VVOC/SVOC), carciogenic substances (VOC- substances, EU Regulation No 1272/2008 Annex VI, cat 1A and 1B) formaldehyde and acetaldehyde (ISO 16000-3:2011). Evaluation according to CEN/TS 16516:2013 (EU-LCI values). The results show an emission rate of 0.014 mg/m2h for TVOC, < 0.001 mg/m2h for formaldehyde and < 0.001 mg/m2h for CME 1A+1B. These test results comply with the requirments in M1, classification of air-handling components operated by The Building Information Foundation RTS sr.

Carbon footprint
To increase the transparency of the climate impacts, the GWP indicator has been divided into sub-indicators:
GWP-IOBC Climate impacts calculated according to instant oxidation principle
GWP-BC Climate impacts calculated from the net impacts of sequestration and emission of biogenic carbon

Climate impact

Parameter	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5
GWP-IOBC	kg CO_2-ekv	7,53E+02	5,22E+01	2,62E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
GWP-BC	kg CO_2-ekv	-6,44E+02	0,00E+00	1,95E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
GWP	kg CO_2-ekv	1,09E+02	5,22E+01	4,57E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Climate impact

Parameter	Unit	B6	B7	C1	C2	C3	C4		D
GWP-IOBC	kg CO_2-ekv	0,00E+00	0,00E+00	2,04E-02	1,09E+01	1,01E+01	4,70E+00		-2,63E+01
GWP-BC	kg CO_2-ekv	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,23E+02	0,00E+00		0,00E+00
GWP	kg CO_2-ekv	0,00E+00	0,00E+00	2,04E-02	1,09E+01	6,33E+02	4,70E+00		-2,63E+01

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ISO 14044:2006	*Environmental management - Life cycle assessment - Requirements and guidelines*
EN 15804:2012+A1:2013	*Sustainability of construction works - Environmental product declaration - Core rules for the product category of construction products*
ISO 21930:2007	*Sustainability in building construction - Environmental declaration of building products*
NS-EN 16485:2014	*Round and sawn timber - Environmental Product Declarations - Product category rules for wood and wood-based products for use in construction*
NS-EN 16449:2014	*Wood and wood-based products - Calculation of the biogenic carbon content of wood and conversion to carbon dioxide*
NPCR010 rev1	*Product category rules for building boards*
Ecoinvent v3.3	*Swiss Centre of Life Cycle Inventories. www.ecoinvent.ch*
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NEPD-00162E (2014)	*Environmental product declaration for Aalborg White cement from Aalborg Portland AS. The Norwegian EPD Foundation.*

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