epd-norge.no
The Norwegian EPD Foundation

ENVIRONMENTAL PRODUCT DECLARATION

in accordance with ISO 14025, ISO 21930 and EN 15804

Owner of the Declaration	Fibo AS
Program operator	The Norwegian EPD Foundation
Publisher	The Norwegian EPD Foundation
Declaration number	NEPD00281E
ECO EPD Ref. No.	00000146
Issue date	19.11.2014
Valid to	19.11.2019

Fibo wall panels

Fibo AS

www.epd-norge.no

General information

Product
Fibo wall panels

Owner of the declaration
Fibo AS
Contact person: Kevin Hægeland
Phone: +47 38 34 33 00
e-mail: kha@fibosystem.com

Program holder
The Norwegian EPD Foundation
Post Box 5250 Majorstuen, 0303 Oslo
Phone: +47 23 08 82 92
e-mail: post@epd-norge.no

Manufacturer
Fibo
Industriveien 2, NO-4580 Lyngdal
Norway

Declaration number:
NEPD00281E

Place of production:
Lyngdal, Norway

This declaration is based on Product Category Rules:
CEN Standard EN 15804 serve as core PCR
NPCR010 (12/2013)

Management system:
NS-EN ISO 9001:2008, PEFC ST 2002:2013

Declared unit:
Production of 1 m^2 wall panel with an thickness of 10.2 mm

Org. No:
NO 964 193 991 MVA

Declared unit with option:
1 m^2 wall panel with an thickness of 10.2 mm and an expected lifetime of 20 years.

Issue date
19.11.2014

Functional unit:

Valid to
19.11.2019

The EPD has been worked out by:
Lars G. F. Tellnes
Norwegian Institute of Wood Technology

Treteknisk

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

Year of study:
2013-2014

Verification:
Independent verification of data, other environmental information and EPD has been carried out in accordance with ISO14025, 8.1.3 and 8.1.4

externally ☑ internally ☐

Christofer Skaar, PhD
(Independent verifier approved by EPD Norway)

Approved

Dagfinn Malnes
Managing Director of EPD-Norway

Declared unit:
Production of 1 m2 wall panel with an thickness of 10.2 mm

Key environmental indicators	Unit	Cradle to gate A1 - A3	Transport *****	Module C4
Global warming	kg CO_2 -eqv	2,97†	0,04	14,54†
Energy use	MJ	417	0,75	162
Dangerous substances	*	-	-	-
Share of renewables in energy use	%	35	1	76
Indoor air classification	-	Not measured	-	-

† Includes sequestration/emissions of 12 kg CO_2 through photosynthesis (A1-A3)/combustion (C4).

* The product contains no substances from the REACH Candidate list or the Norwegian priority list

***** Transport from production site to central warehouse in Norway. See explanation on page 7.

Product

Product description:
Fibo wall panels are a waterproof panel system based on plywood covered with high-pressure laminate (HPL) on the front and a thinner layer of HPL on the back.

Fibo wall panels can be used as water proof layer on walls in bathrooms. The panels are also suitable for wardrobes, washing rooms, cleaning rooms, laboratories, commercial kitchen, sport facilities, camping sites, hotels, schools, etc.

Technical data:
Plywood have 7 layers of veener in accordance to NS-EN 13986 with water resistant glue, a thickness of 9 mm and a density of 700 kg/m^3. HPL in accordance to EN 438-3 with thickness on 0,7 mm fronside and 0,5 mm on the backside. The density of the HPL is 1350 kg/m^3.

Standard format is 2400 mm x 600 mm with an thickness of 10,2 mm and a density of 790 kg/m^3.

Product specification
Wall panels are made both as bathroom panels in a size of 60 cm x 240 cm and as kitchenboard in a size of 60 cm x 58 cm.

Materials	kg	%
Plywood	6,3	74,56
High-pressure laminates	1,62	19,17
Glue	0,33	3,91
Wood packaging	0,14	1,66
Plastic packaging	0,06	0,71
Total	8,45	100

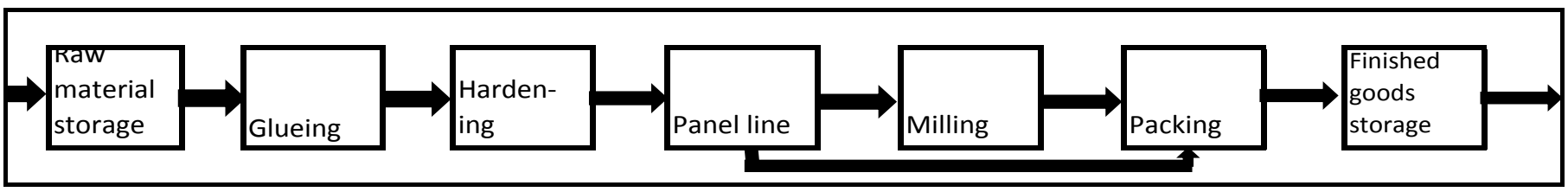
Market:
Norway and North-Europe. The scenarios are based on the Norwegian market.

Reference service life:
Expected lifetime is 20 years.

LCA: Calculation rules

Declared unit with option:
1 m2 wall panel with an thickness of 10.2 mm and an expected lifetime of 20 years.

System boundary:
Flow chart of the production (A3) of wall panels at Fibo-Trespo are shown below, while the rest of the modules are shown on page 5. Modul D is calculated by energy substitution and is explained in the scenarios.



Data quality:
Production data for Fibo is based on the average in 2013. Data for production and incineration of HPL is collected from a EPD from 2012 and that is compliant with EN 15804. Data for the production of plywood and transport is collected from Ecoinvent v2.2 released in 2010. The generic production data for plywood was controlled with specifc data from one supplier and found representative, but the glue type was changed in the inventory to phenol-formaldehyde. The waste incineration of plywood is with data from ELCD 3.0, released in 2013.

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.

Allocation:
Allocation is done in accordance to NS-EN 15804:2012. In the production chain of wood, this is economic allocation and the values used are the default in Ecoinvent v2.2.

Calculation of biogenic carbon:
Sequestration and release of biogenic carbon is calculated according to EN 16449:2014. For plywood this is calculated to be 1136 kg CO_2 per m^3, which gives 10,23 per DE. For HPL is is assumed 1,66 kg CO_2 per kg paper and then it is estimated that 66% of the HPL is paper, which gives 1,77 kg CO_2 per DE. In total 12 kg CO_2 per DE is sequestrated in A1-A3 and emitted in C4.

Estimates and assumptions:
All key assumptions and estimates are either presented in the EPD or can be found in NPCR010 (12/2013)

LCA: Scenarios and additional technical information

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

Transport to building site is based on a scenario with transport from the factory to a builders' merchant in Oslo and then an additional 20 km to a building site.

Transport from production place to user (A4)

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance km	Fuel/Energy consumption	Value (l/t)
Truck	75	Lorry, >32t, EURO4	400	0,026 l/tkm	10,4
Truck	39	Lorry, 3,5-7,5t, EURO4	20	0,11 l/tkm	2,2

It is assumed 1 MJ of electricity use at building site and that 10% of the wall panels are wasted. Also aluminium profiles and sealing compound are used in installation.

Installation in the building (A5)

	Unit	Value
Auxiliary aluminium profile and sealing	kg	0,05
Water consumption	m^3	
Electricity consumption	MJ	0,1
Other energy carriers	MJ	
Material loss	kg	0,845
Output materials from waste treatment	kg	
Dust in the air	kg	

Replacement (B4)/Refurbishment (B5)

	Unit	Value
Replacement cycle*	År	20
Electricity consumption	kWh	
Replacement of worn parts		

* Number or RSL (Reference Service Life)

Transport of waste to treatment is based on the average in 2007 on 85 km. The type of vehicle is the same as used for construction waste scenarios in Ecoinvent v2.2.

Transport to waste processing (C2)

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance km	Fuel/Energy consumption	Value (l/t)
Truck	50	Lastebil, 20-32t	85	0,05 l/tkm	4,25

Benefits beyond life cycle is based on the substitution of energy production as a result of exported energy from energy recovery in A5/C4. The energy production that is substituted is Norwegian electricity consumption mix for electric energy and Norwegian district heating mix for thermal energy.

Wall panels are collected as mixed construction waste at building site and treated with incineration with energy recovery. All disposal activities are included in C4, while C3 have no technical activity.

Benefits and loads beyond the system boundaries (D)

	Unit	Value
Substitution of electric energy	MJ	18
Substitution of thermal energy	MJ	54

End of Life (C1, C3, C4)

	Unit	Value
Hazardous waste disposed	kg	
Collected as mixed construction waste	kg	8,25
Reuse	kg	
Recycling	kg	
Energy recovery	kg	8,25
To landfill	kg	

LCA: Results

The results for global warming potential in A1-A3 have large contribution from the sequestration of 12 kg carbon dioxide during wood growth, the same amount are accounted as emitted during waste incineration in C4.

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

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
X	X	X	X	X	MND	MND	MND	MND	MND	MNR	MNR	X	X	X	X	X

Environmental impact

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP	kg CO_2 -eqv	2,97E+00	4,36E-01	2,09E+00	1,19E-03	1,37E-01	0,00E+00	1,46E+01	-7,92E-01
ODP	kg CFC11-eqv	8,29E-07	7,08E-08	1,14E-07	1,06E-10	2,22E-08	0,00E+00	2,11E-08	-8,92E-08
POCP	kg C_2H_4 -eqv	7,66E-03	5,71E-05	9,09E-04	1,42E-07	2,63E-05	0,00E+00	3,26E-04	-1,16E-04
AP	kg SO_2 -eqv	6,46E-02	1,70E-03	8,60E-03	2,77E-06	7,51E-04	0,00E+00	5,43E-03	-2,29E-03
EP	kg PO_4^{3-}-eqv	1,25E-02	3,45E-04	1,56E-03	5,77E-07	1,65E-04	0,00E+00	1,11E-03	-5,00E-04
ADPM	kg Sb-eqv	2,04E-05	1,41E-06	2,84E-06	3,62E-09	3,24E-07	0,00E+00	-3,45E-07	-1,25E-06
ADPE	MJ	2,69E+02	6,60E+00	3,19E+01	1,60E-02	2,03E+00	0,00E+00	4,92E+00	-1,11E+01

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	C1	C2	C3	C4	D
RPEE	MJ	1,48E+02	1,02E-01	2,78E+01	1,06E-01	2,65E-02	0,00E+00	1,24E+02	-4,64E+01
RPEM	MJ	1,23E+02					0,00E+00	-1,23E+02	
TPE	MJ	2,71E+02	1,02E-01	2,78E+01	1,06E-01	2,65E-02	0,00E+00	1,14E-01	-4,64E+01
NRPE	MJ	2,69E+02	7,42E+00	3,58E+01	2,20E-02	2,28E+00	0,00E+00	3,82E+01	-1,40E+01
NRPM	MJ	3,26E+01					0,00E+00	-3,26E+01	
TRPE	MJ	3,01E+02	7,42E+00	3,58E+01	2,20E-02	2,28E+00	0,00E+00	5,61E+00	-1,40E+01
SM	kg						0,00E+00		
RSF	MJ	2,71E-04		2,71E-05			0,00E+00	2,25E-07	
NRSF	MJ	9,12E-04		9,13E-05			0,00E+00	7,56E-07	
W	m^3	2,95E+01	5,94E-01	8,74E+00	3,77E-02	1,53E-01	0,00E+00	5,28E-02	-1,21E+01

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	C1	C2	C3	C4	D
HW	kg	3,66E-02	1,94E-04	7,23E-03	6,12E-07	4,45E-05	0,00E+00	5,97E-02	-1,43E-03
NHW	kg	8,25E+00	5,51E-02	8,79E-01	1,00E-03	1,48E-02	0,00E+00	6,05E-02	-3,25E-01
RW	kg	3,85E-03	6,17E-06	3,98E-04	9,59E-08	1,64E-06	0,00E+00	1,81E-05	-3,59E-05

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

End of life - Output flow

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
CR	kg								
MR	kg								
MER	kg								
EEE	MJ			1,60E+00				1,60E+01	-1,76E+01
ETE	MJ			4,90E+00				4,90E+01	-5,40E+01

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

Electricity
Norwegian consumption mix at medium voltage is used at the production site and is calculated based on the average for 2008-2010, with some adjustment to be equal to emission factors published by EPD-Norway.

Greenhouse gas emissions: 0,0117 kg CO_2 - eqv/MJ

Dangerous substances
None of the following substances have been added to the product: Substances on the REACH Candidate list of substances of very high concern (of 16.06.2014) or substances on the Norwegian Priority list (of 11.11.2013) or substances that lead to the product being classified as hazardous waste. The chemical content of the product complies with regulatory levels as given in the Norwegian Product Regulations.

Transport
Transport from production site to central warehouse in Norway is: 50 km
This transport scenario is not realistic, but is calculated this way based on requirements from EPD-Norway.

Indoor environment
Test for the emissions from the product to the indoor environment have not been performed.
According to SINTEF Technical approval nr. 2289, the product have been evaluated not to release particles, gases or radiation that gives an negative impact on the the indoor climate or have health implications.

Carbon footprint
Carbon footprint has not been worked out for the product.

Bibliography

ISO 14025:2006 — *Environmental labels and declarations - Type III environmental declarations - Principles and procedures*

ISO 14044:2006 — Environmental management - Life cycle assessment - Requirements and guidelines

EN 15804:2012 — *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*

Tellnes, L. G. F. — *LCA-report for Fibo-Trespo. LCA-report nr. 321143-1 from Norwegian Institute of Wood Technology, Oslo, Norway.*

NPCR010 (12/2013) — *Product category rules for building boards, december 2013.The Norwegian EPD Foundation, Oslo, Norway.*

NS-EN 16485:2014 — *Round and sawn timber - Envrionmental Product Declaration - Product category rules for wood and wood- based products fo ruse in constructin.*

NS-EN 16449:2014 — *Wood and wood-based products - Calculation of the biogenic carbon content of wood and conversion to carbon dioxide.*

ICDLI (2012) — *EPD Decorative High-Pressure Laminates. Internaitonal Committee of the Decorative Laminates Industry (ICDLI).*

Ecoinvent v2.2 (2010) — *European Centre of Life Cycle Inventories. http://www.ecoinvent.ch*

ELCD 3.0 (2013) — *European reference Life-Cycle Database. http://eplca.jrc.ec.europa.eu/ELCD3/*

NS-EN 13986:2004 — *Wood-based panels for use in construction - Characteristics, evaluation of conformity and marketing*

NS-EN 438-3:2005 — *High-pressure decorative laminates (HPL) - Sheets based on thermosetting resins (usually called Laminates) - Part 3: Classification and specification of laminates less than 2 mm thick inteded for bonding to supporting substrates*

epd-norge.no
The Norwegian EPD Foundation

Program holder and publisher
The Norwegian EPD Foundation
Post Box 5250 Majorstuen, 0303 Oslo
Norway
Phone: +47 23 08 82 92
e-mail: post@epd-norge.no
web www.epd-norge.no

Owner of the declaration
Fibo AS
Industriveien 2, 4580 Lyngdal
Norway
Phone: +47 38 34 33 00
Fax +47 38 34 33 11
e-mail: ordre@fibosystem.com
web www.fibosystem.com

Author of the Life Cycle Assessment
Lars G. F. Tellnes
Norsk Treteknisk Institutt
P.B. 113 Blindern, NO-0314, Oslo, Norway
Phone: +47 98 85 33 33
Fax
e-mail: firmapost@treteknisk.no
web www.treteknisk.no