ENVIRONMENTAL PRODUCT DECLARATION

In accordance with ISO 14025 ISO 21930 EN 15804

epd-norge.no
The Norwegian EPD Foundation

Owner of the declaration	Norgips Norge AS
Publisher	The Norwegian EPD Foundation
Declaration number	NEPD-110-177-EN, updated
Issue date	15.06.2015
Valid to	15.06.2020

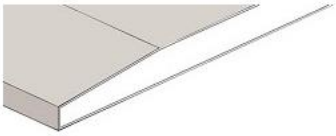
Norgips Hardboard/Hard type IR and Norgips Floorboard/Gulv type DIR

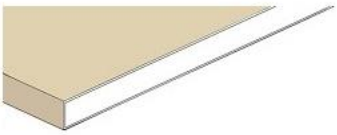
Product

NORGIPS

Norgips Norge AS

Owner of the declaration





General information

Product
Norgips Hardboard/Hard type IR and
Norgips Floorboard/Gulv type DIR

Owner of the declaration
Norgips Norge AS
Contact person: Johan Arvidsson
Phone: +4733784800
e-mail: Johan.Arvidsson@norgips.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
Norgips Norge AS
Postboks 655 Strømsø
3003 Drammen

Declaration number:
NEPD-110-177-EN, updated

Place of production:
Norgips Norge AS, Svelvik

This declaration is based on Product Category Rules:
EN 15804:2012+A1:2013 serve as core PCR
NPCR 10:2013 rev 1, PCR for Building boards

Management system:

Declared unit:

Org. No:
NO 986034757 MVA

Declared unit with option:

Issue date
15.06.2015

Functional unit:
1 m^2 of installed plasterboard used during 60 years

Valid to
15.06.2020

The EPD has been worked out by:

Mie Vold

Østfoldforskning
SUSTAINABLE INNOVATION

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

Year of study:
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 ☐

sign

Independent verifier approved by EPD Norway

Approved

Dagfinn Malnes
Managing Director of EPD-Norway

Functional unit
1 m^2 of installed plasterboard during 60 years

Key environmental indicators	Unit	Cradle to gate A1-A3		Transport A4 (360 km)	
		Hard 13	Floorboard	Hard 13	Floorboard
Global warming	kg CO_2 -eq.	2,7	3,1	0,5	0,6
Energy use	MJ	53,2	61,3	7,5	8,8
Dangerous substances	**	*	*		
Recycled raw materials	kg	11,9	13,9		
	%	99,1	99,2		

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

Product

Product description, Hard 13:
Gypsum plasterboard composed of a reinforced plaster core with high density to achieve enhanced strength and surface hardness. The front and back paper liners are overlapped and glued together on the backside of the board. The board is classified for use in fire-rated construction and will provide excellent sound insulation. For use in schools, daycare, areas with impact resistance requirements.

Product description, Floorboard 13:
Gypsum plasterboard composed of a reinforced plaster core with high density to achieve enhanced strength and surface hardness. The front and back paper liners are overlapped and glued together on the backside of the board. The board is particularly suitable for use as subfloor under ceramic tiles in dry conditions and as noise impact insulation for floor construction.

Technical data:
The product is in compliance with EN 520

	Hard 13	Floorboard 13
Weight:	12,0 kg/m^2 ± 2 %,	14 kg/m^2 ± 2 %,
Thickness:	12,5 mm ± 0,5 mm	

For more information from the product data sheet, see www.norgips.no / www.norgips.se

Product specification

Materials (excl water)	Hard 13		Floorboard 13	
	kg/m^2	%	kg/m^2	%
Gypsum (REA)	11,5	95,9	13,4	95,8
Cardboard	0,4	3,2	0,5	3,4
Glass fibre reinforcement	0,020	0,2	0,025	0,2
Div additives (total)	0,08	0,7	0,08	0,6
Totalt	12	100	14	100

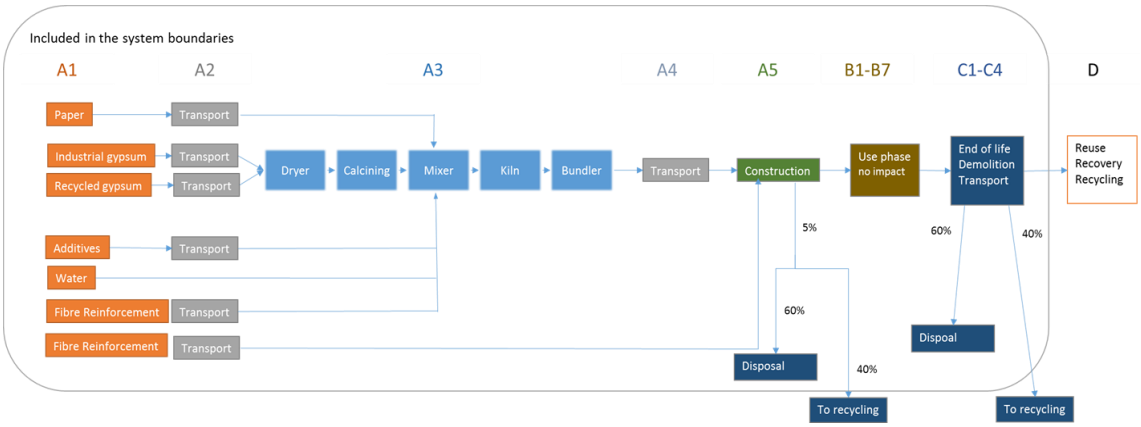
Market:
Norway and Sweden

Reference service life:
60 years

LCA: Calculation rules

Functional unit:
1 m^2 of installed plasterboard during 60 years

System boundary:
Industrial gypsum and recycled gypsum are mixed and dried before the mixture is calcined. The calcined gypsum is transferred to the mixer where water and additives are added. The slurry is distributed to a plasterboard liner where the edges are folded and a new layer of plasterboard liner is glued on to form a sandwich. The board line is continuous transferred along the production line, cut to suitable lengths and dried in a kiln. The dried boards are cut to the correct lengths and stacked in pallets.



Scenarios for user phase (B1-B7) and end of life (C1-C4) are decribed in scenarios below

Data quality:
Specific data for products and mass flows are from 2013. Data sources: Ecoinvent 2.2/SimaPro software (generic). Ecoinvent 2.2 processes are created 2003-2007. Upstream data for raw materials are significant for the LCA results in this study; these are modelled using Ecoinvent processes. EcoInvent 2.2 is used since EcoInvent 3 had important data gaps when the assessment was completed.
Impact assessment methods are in accordance with EN 15804:2012 + A1:2013

Allocation:
The allocation is made in accordance with the provisions of EN 15804. Incoming energy and water and waste production in-house production is allocated equally among all products through mass allocation. 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.

Cut-off criteria:
All major raw materials and all the essential energy is included. Also production processes for raw materials and energy flows that are included with very small amounts (<1%) are included.

LCA: Scenarios and additional technical information

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

Transport from production place to user (A4)
Transport of building products from manufacturer to building site (distance estimated to 360 km)

Type	Capacity utilisation (incl. return)	Type of vehicle	Distance km	Fuel/Energy	Value (l/t)
Truck	Average European capacity utilisation	Lorry >32 metric ton	360	0,02 l/tkm	7,6
Railway				kWh/tkm	
Boat				l/tkm	

Installation in the building (A5)
Data on energy consumption on the building site is based on lifting the board into the building information given by Norgips Norge AS. An average energy consumption value of 0,00121 MJ/m² ($3*10^{-4}$ kWh/m^2) shall be applied. It is assumed 5% loss in implementation.

	Unit	Hard 13	Floorboard 13
Auxiliary	kg		
Water consumption	m^3		
Electricity consumption	kWh	3E-04	3E-04
Other energy carriers	MJ		
Material loss	kg	0,00	0,00
Output materials from waste	kg	0,00	0,00
Dust in the air	kg		

User phase B1-B7
All modules in user phase have been assessed, but the product will not need maintenance, repair or replacement during the user phase. Therfor the environmental impact for the user phase is zero.

	Unit	Hard 13	Floorboard 13
Replacement cycle*		1	1
Electricity consumption	kWh		
Replacement of worn parts			

* Number or RSL (Reference Service Life)

End of Life (C1, C3, C4)
When the product is discarded and its original function is lost, it can be processed further in a waste management system. The flows of the recycled material will then become inputs into the production of the next product. For Norgips building boards it has been assumed that 40 % of all materials from demolition will be reused/recycled and the rest will be sent to disposal.

	Unit	Hard 13	Floorboard 13
Hazardous waste disposed			
Collected as mixed construction was			
Reuse			
Recycling		4,8	5,6
Energy recovery			
To landfill		7,2	8,4

Transport to waste processing (C2)

Type	Capacity utilisation (incl. return)	Type of vehicle	Distance km	Fuel/Energy	Value
Truck	Average European capacity utilisation	Lorry >32 metric ton	50	0,02 kg/tkm	1,2
Railway				kWh/tkm	
Boat				l/tkm	

LCA: Results Hard 13

All modules from rawmaterial production to end of life are included. The modules in user phase have no impacts since nothing happens during user phase.

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

Product stage			Construction		Use stage							End of life stage				Beyond the
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	x	x	x	x	x	x	x	x	x	x	x	MND

Environmental impact for Hard 13

Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
GWP	kg CO_2-eq.	2,7	0,48	1,2E-05	0	1,2E-05	6,4E-02	0	0,051
ODP	kg CFC11 -eq.	1,8E-07	7,9E-08	9,0E-13	0	9,0E-13	1,1E-08	0	1,5E-08
POCP	kg C_2H_4-eq.	3,4E-04	6,3E-05	1,8E-09	0	1,8E-09	8,4E-06	0	1,1E-05
AP	kg SO_2-eq.	2,2E-03	5,1E-04	1,6E-08	0	1,6E-08	5,5E-05	0	7,4E-05
EP	kg PO_4^{3-}-eq.	5,7E-03	1,9E-03	3,7E-08	0	3,7E-08	2,0E-04	0	3,0E-04
ADPM	kg Sb-eq.	1,6E-06	1,4E-06	4,3E-11	0	4,3E-11	1,9E-07	0	5,5E-08
ADPE	MJ	48	7,2	1,3E-04	0	1,3E-04	0,96	0	1,3

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 for Hard 13

Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
RPEE	MJ	3,8	0,10	1,2E-03	0	1,2E-03	0,014	0	0,011
RPEM	MJ	0,34	1,0E-02	3,9E-05	0	3,9E-05	1,39E-03	0	1,1E-03
TPE	MJ	4,1	0,113	1,3E-03	0	1,3E-03	0,015	0	0,012
NRPE	MJ	49	7,41	1,7E-04	0	1,7E-04	0,99	0	1,29
NRPM	MJ	0,22	0,00	0	0	0	0	0	0
TRPE	MJ	50	7,41	1,7E-04	0	1,7E-04	0,99	0	1,29
SM	kg	12,6	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0
NRSF	MJ	-5,8E-03	0	0	0	0	0	0	0
W	m^3	0,016	2,3E-03	1,9E-07	0	0	3,0E-04	0	0

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 - Output flow for Hard 13

Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
HW	kg	4,8E-05	8,6E-06	4,6E-10	0	4,6E-10	1,1E-06	0	5,2E-07
NHW	kg	0,56	8,7E-02	1,5E-05	0	1,5E-05	1,1E-02	0	7,2
RW	kg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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

End of life - Output flow for Hard 13

Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
CR	kg	0	0	0	0	0	0	0	0
MR	kg	0,24	0	0	0	0	0	4,8	0
MER	kg	1,6E-05	0	0	0	0	0	0	0
EEE	MJ	0	0	0	0	0	0	0	0
ETE	MJ	0	0	0	0	0	0	0	0

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 = $9{,}0 \cdot 10^{-3}$ = 0,009

LCA: Results for Floorboard 13

All modules from rawmaterial production to end of life are included. The modules in user phase have no impacts since nothing happens during user phase.

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

Product stage			Construction		Use stage							End of life stage				Beyond the
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	x	x	x	x	x	x	x	x	x	x	x	MND

Environmental impact for Floorboard 13

Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
GWP	kg CO_2-eq.	3,1	0,56	1,2E-05	0	1,2E-05	0,075	0	0,060
ODP	kg CFC11 -eq.	2,0E-07	9,2E-08	9,0E-13	0	9,0E-13	1,2E-08	0	1,8E-08
POCP	kg C_2H_4-eq.	3,6E-04	7,4E-05	1,8E-09	0	1,8E-09	9,8E-06	0	1,3E-05
AP	kg SO_2-eq.	2,5E-03	6,0E-04	1,6E-08	0	1,6E-08	6,4E-05	0	8,7E-05
EP	kg PO_4^{3-}-eq.	6,5E-03	2,2E-03	3,7E-08	0	3,7E-08	2,3E-04	0	3,5E-04
ADPM	kg Sb-eq.	1,8E-06	1,7E-06	4,3E-11	0	4,3E-11	2,2E-07	0	6,4E-08
ADPE	MJ	56	8,4	1,3E-04	0	1,3E-04	1,12	0	1,5

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 for Floorboard 13

Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
RPEE	MJ	4,1	0,12	1,2E-03	0	1,2E-03	0,016	0	0,012
RPEM	MJ	0,36	1,2E-02	3,9E-05	0	3,9E-05	1,62E-03	0	1,2E-03
TPE	MJ	4,5	0,13	1,3E-03	0	1,3E-03	0,017	0	0,014
NRPE	MJ	57	8,64	1,7E-04	0	1,7E-04	1,16	0	1,5
NRPM	MJ	0,16	0	0	0	0	0	0	0
TRPE	MJ	57	8,6	1,7E-04	0	1,7E-04	1,16	0	1,5
SM	kg	15	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0
NRSF	MJ	-4,3E-03	0	0	0	0	0	0	0
W	m^3	0,018	2,7E-03	1,9E-07	0	0	3,5E-04	0	0

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 for Floorboard 13

Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
HW	kg	4,58E-05	1,0E-05	4,6E-10	0	4,6E-10	1,3E-06	0	6,1E-07
NHW	kg	0,65	1,0E-01	1,5E-05	0	1,5E-05	1,3E-02	0	8,4
RW	kg	0	0	0	0	0	0	0	0

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

End of life - Output flow for Floorboard 13

Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4
CR	kg	0	0	0	0	0	0	0	0
MR	kg	0,28	0	0	0	0	0	5,6	0
MER	kg	1,6E-05	0	0	0	0	0	0	0
EEE	MJ	0	0	0	0	0	0	0	0
ETE	MJ	0	0	0	0	0	0	0	0

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 = $9{,}0 \cdot 10^{-3}$ = 0,009

Additional Norwegian requirements

Electricity

The following data from ecoinvent v2 for Norwegian production mix included import,Electricity, medium voltage, at grid/kWh/NO/s". import, production of transmission lines, in addition to direct emissions and loss in grid are included. Characterisation factors stated in EN 15804:2012+A1:2013 are used.

Greenhouse gas emissions: 36 g CO_2 - eq./kWh

Dangerous substances

None of the following substances have been added to the product: Substances on the REACH Candidate list (per 17.12.2014) of substances of very high concern or substances on the Norwegian Priority list (per 04.12.2014) 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 to building site is in accordance with scenario description A4 360 km

Indoor environment

TVOC	<10	µg/m²h	Measured after 3 days
Formaldehyde	<10	µg/m²h	
Ammonia	22	µg/m²h	
Carcinogenic compounds	<2	µg/m²h	
Classified as category	M1	Classification according to EN 15251:2007	

Noise	No information	dB(A)

* Emissions are measured for Norgips Plasterboard 13 Type A (STD), report from SP 23.01.2009

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*

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*

ISO 21930:2007 *Sustainability in building construction - Environmental declaration of building products*

PCR *NPCR 10:2013 rev 1, PCR for Building boards, www.EPD-Norge.no*

Vold, M, 2014 *Livsløpsdata for Gipsplater fra Norgips, Bakgrunnsdata for miljødeklarasjon*

epd-norge.no The Norwegian EPD Foundation	**Program holder and publisher** The Norwegian EPD Foundation Post Box 5250 Majorstuen, 0303 Oslo Norway	Phone: e-mail: web	+47 23 08 82 92 post@epd-norge.no www.epd-norge.no
NORGIPS	**Owner of the declaration** Norgips Norge AS Postboks 655 Strømsø 3003 Drammen	Phone: Fax e-mail: web	+47 33 78 48 00 Norgips@norgips.com www.norgips.no
Østfoldforskning SUSTAINABLE INNOVATION	**Author of the Life Cycle Assessment** Mie Vold Ostfoldforskning AS Stadion 4, 1671 Kråkerøy	Phone: Fax e-mail: web	+47 414 69 800 +47 69 34 24 94 mie@ostfoldforskning.no www.ostfoldforskning.no