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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:	Skumtech AS
Program operator:	The Norwegain EPD Foundation
Publisher:	The Norwegian EPD Foundation
Declaration number:	NEPD-2915-1608-EN
Registration number:	NEPD-2915-1608-EN
ECO Platform reference number:	-
Issue date:	24.06.2021
Valid to:	24.06.2026

ISOLON TX Cross-linked PE foam

Skumtech AS

www.epd-norge.no

General information

Product:
ISOLON TX Cross-linked PE foam

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Norway

Declaration number:
NEPD-2915-1608-EN

Place of production:
Rygge, Norge

ECO Platform reference number:

Management system:
-

This declaration is based on Product Category Rules:
CEN Standard EN 15804 serves as core PCR
NPCR010 v3.0 Building boards (04/2019).

Organisation no:
NO 879 951 992 MVA

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:
24.06.2021

Valid to:
24.06.2026

Declared unit:

Year of study:
2020-2021

Declared unit with option:
1 m2 of PE-foam with 45 mm thickness, installed and waste treated at end of life.

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

Functional unit:

The EPD has been worked out by:
Lars G. F. Tellnes

NORSUS

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:
Alexander Borg
Alexander Borg, Asplan Viak AS
(Independent verifier approved by EPD Norway)

Approved
Håkon Hauan
Managing Director of EPD-Norway

Product

Product description:
PE-foam is used for water and frost protection in tunnels. The foam is made by expanding polyetylene into boards and these are then welded into larger sheets.

Technical data:
The density of the product is 28-30 kg/m3.

Product specification:
The life cycle assessment is performed on 45 mm thick sheets.

Market:
Norway and Nordic countries. The scenario is based on use in Norway.

Reference service life:
The product has been tested and evaluated to have a life time of 120 years in tunnels with Scandinavian conditions.

Materials	kg	%
PE-foam board	1,305	83,07 %
PE-foam skirt	0,266	16,93 %
Total for product	1,571	100 %
Plastic packaging	0,001	
Total product + packaging	1,572	

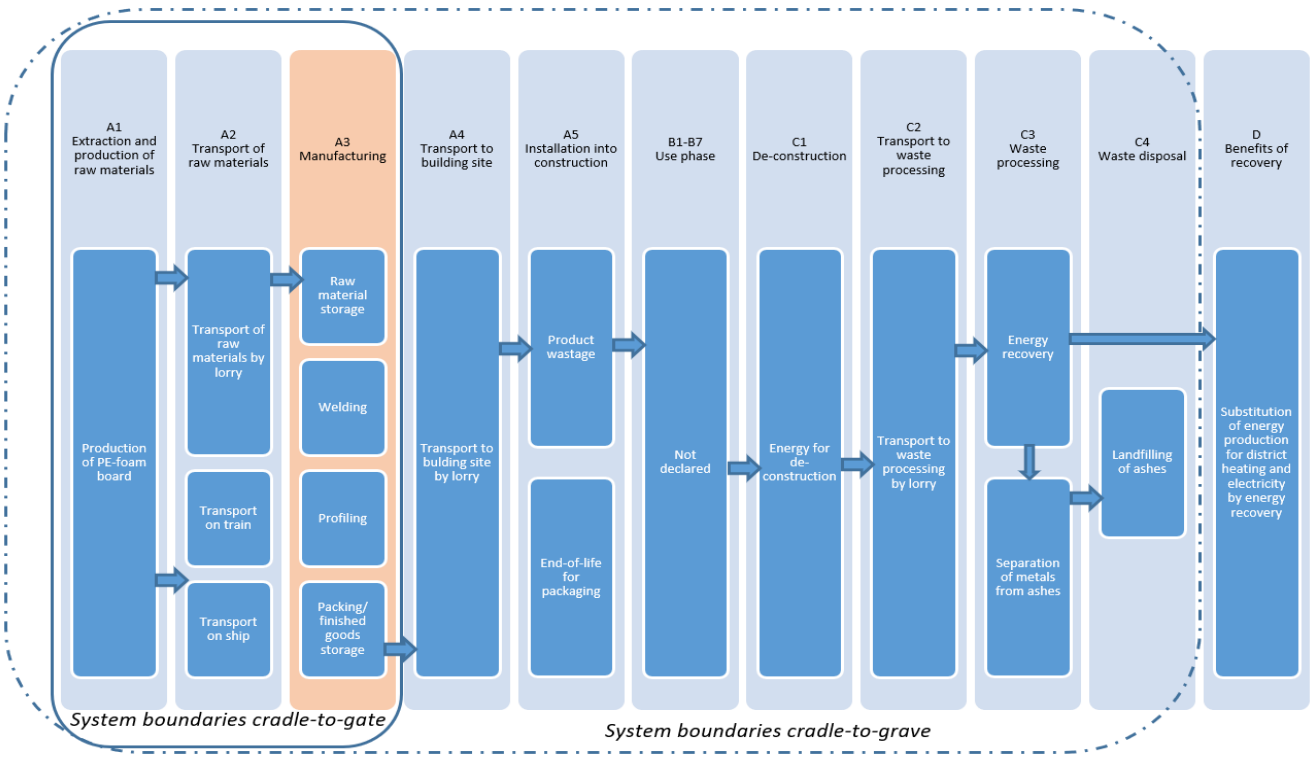
Recalculating:
Recalculating the results to other thicknesses can be done based on weight. The table below shows the weight of different thicknesses at room temperature [kg/m2].

Thickness	Without skirt	With skirt
40 mm	1,16	1,43
45 mm	1,31	1,57
50 mm	1,45	1,72
60 mm	1,74	2,01
70 mm	2,03	2,3

LCA: Calculation rules

Declared unit with option:
1 m2 of PE-foam with 45 mm thickness, installed and waste treated at end of life.

System boundary:
Flow chart for the complete life cycle (A1-C4) with system boundaries are shown in the figure below. Module D is also declared outsitde the life cycle with energy substitution from recovery and is further explained in the scenarios.



Data quality:
Manfaucturing data was collected in 2020 and with 2019 as reference year. For PE-foam production, this is based on specific data from Berkosan. Other data are from ecoinvent v3.6, released in 2019, but with some changes to improve representativeness.

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:
The allocation is made in accordance with the provisions of EN 15804. Incoming energy and water and waste production in-house is first sub-divided and then 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.

Calculation of biogenic carbon:
The product does not contain biogenic carbon.

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 production to building site of 520 km.

Transport from production place to user (A4)

Type	Capacity utilisation of weight (incl. return) %	Type of vehicle	Distance km	Fuel/Energy consumption	Unit
Truck	8 %	EURO5, >32t	520	0,29	l/tkm
Truck					l/tkm

Module A5 is included with 5 % product wastage and packaging waste treatment. It is also included a diesel power machinery for installation.

Module B1 is not declared.

Assembly (A5)

	Unit	Value
Auxiliary	kg	0
Water consumption	m^3	0
Electricity consumption	MJ	0
Other energy carriers	MJ	4
Material loss	kg	0,08
Output materials from waste treatment	kg	0,0011
Dust in the air	kg	0

Use (B1)

	Unit	Value
Relevant emissions during use	kg	MND

Module B2 and B3 are not declared.

Module B4 and B5 are not declared.

Maintenance (B2)/Repair (B3)

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

Replacement (B4)/Refurbishment (B5)

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

* Number or RSL (Reference Service Life)

Module B6 and B7 are not declared.

The foam can be energy recovered or recycled. The most common treatment is energy recovery and the scenario is for a municipal incinerator.

Operational energy (B6) and water consumption (B7)

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

End of Life (C1, C3, C4)

	Unit	Value
Hazardous waste disposed	kg	0
Collected as mixed construction waste	kg	1,6
Reuse	kg	0
Recycling	kg	0
Energy recovery	kg	1,6
To landfill	kg	0

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

Transport to waste processing (C2)

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance km	Fuel/Energy consumption	Unit
Truck		Unspecified	85	0,027	l/tkm

The benefits from exported energy from municipal incineration was calculated from amounts in 2018 and that substiututes Norwegian electricity mix and district heating mix.

Benefits and loads beyond the system boundaries (D)

	Unit	Value
Substitution of electric energy	MJ	6
Substitution of thermal energy	MJ	43
Substitution of raw materials	kg	0
Substitution of fuels	kg	0
Substiution of products	kg	0

LCA: Results

The results for the life cycle assessment per declared unit is shown below.

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	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X

Environmental impact

Parameter	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5
GWP	kg CO_2 -eqv	1,46E+01	5,61E-01	1,38E+00	MND	MND	MND	MND	MND
ODP	kg CFC11-eqv	2,58E-06	1,06E-07	1,99E-07	MND	MND	MND	MND	MND
POCP	kg C_2H_4 -eqv	4,90E-03	7,42E-05	3,47E-04	MND	MND	MND	MND	MND
AP	kg SO_2 -eqv	9,75E-02	1,85E-03	6,65E-03	MND	MND	MND	MND	MND
EP	kg PO_4^{3-}-eqv	1,98E-02	3,03E-04	1,36E-03	MND	MND	MND	MND	MND
ADPM	kg Sb-eqv	4,57E-04	9,67E-06	2,41E-05	MND	MND	MND	MND	MND
ADPE	MJ	2,47E+02	8,65E+00	1,80E+01	MND	MND	MND	MND	MND

Environmental impact

Parameter	Unit	B6	B7	C1	C2	C3	C4		D
GWP	kg CO_2 -eqv	MND	MND	8,70E-03	1,74E-02	4,75E+00	6,23E-04		-4,31E-01
ODP	kg CFC11-eqv	MND	MND	1,51E-09	3,23E-09	3,63E-09	1,59E-10		-4,99E-08
POCP	kg C_2H_4 -eqv	MND	MND	1,46E-06	2,51E-06	6,74E-06	1,59E-07		-6,60E-04
AP	kg SO_2 -eqv	MND	MND	6,57E-05	7,50E-05	4,30E-04	3,60E-06		-2,84E-03
EP	kg PO_4^{3-}-eqv	MND	MND	1,44E-05	1,38E-05	1,42E-04	6,16E-07		-9,23E-04
ADPM	kg Sb-eqv	MND	MND	1,35E-08	4,55E-07	7,81E-07	1,08E-08		-2,76E-06
ADPE	MJ	MND	MND	1,20E-01	2,64E-01	4,15E-01	1,44E-02		-5,10E+00

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	1,22E+01	1,11E-01	6,47E-01	MND	MND	MND	MND	MND
RPEM	MJ	1,43E-01	0,00E+00	7,13E-03	MND	MND	MND	MND	MND
TPE	MJ	1,24E+01	1,11E-01	6,55E-01	MND	MND	MND	MND	MND
NRPE	MJ	1,99E+02	8,82E+00	1,90E+01	MND	MND	MND	MND	MND
NRPM	MJ	6,88E+01	0,00E+00	6,47E-02	MND	MND	MND	MND	MND
TRPE	MJ	2,68E+02	8,82E+00	1,91E+01	MND	MND	MND	MND	MND
SM	kg	0,00E+00	0,00E+00	0,00E+00	MND	MND	MND	MND	MND
RSF	MJ	0,00E+00	0,00E+00	0,00E+00	MND	MND	MND	MND	MND
NRSF	MJ	0,00E+00	0,00E+00	0,00E+00	MND	MND	MND	MND	MND
W	m^3	2,41E-01	1,00E-03	1,24E-02	MND	MND	MND	MND	MND

Resource use

Parameter	Unit	B6	B7	C1	C2	C3	C4		D
RPEE	MJ	MND	MND	6,56E-04	3,88E-03	9,03E-03	1,67E-04		-4,48E+01
RPEM	MJ	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00		0,00E+00
TPE	MJ	MND	MND	6,56E-04	3,88E-03	9,03E-03	1,67E-04		-4,48E+01
NRPE	MJ	MND	MND	1,21E-01	2,70E-01	6,80E+01	1,46E-02		-6,35E+00
NRPM	MJ	MND	MND	0,00E+00	0,00E+00	-6,76E+01	0,00E+00		0,00E+00
TRPE	MJ	MND	MND	1,21E-01	2,70E-01	4,23E-01	1,46E-02		-6,35E+00
SM	kg	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00		0,00E+00
RSF	MJ	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00		-2,04E-03
NRSF	MJ	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00		0,00E+00
W	m^3	MND	MND	6,24E-06	3,05E-05	4,18E-04	1,25E-05		-1,41E-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	B1	B2	B3	B4	B5
HW	kg	2,41E-04	2,14E-05	2,76E-05	MND	MND	MND	MND	MND
NHW	kg	5,87E+00	8,12E-01	3,76E-01	MND	MND	MND	MND	MND
RW	kg	5,73E-04	6,02E-05	6,80E-05	MND	MND	MND	MND	MND

End of life - Waste

Parameter	Unit	B6	B7	C1	C2	C3	C4		D
HW	kg	MND	MND	3,30E-07	6,90E-07	4,74E-06	2,47E-08		-6,33E-06
NHW	kg	MND	MND	5,47E-04	1,82E-02	3,41E-02	5,12E-02		-2,39E-01
RW	kg	MND	MND	8,41E-07	1,83E-06	8,04E-07	8,96E-08		-3,45E-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	B1	B2	B3	B4	B5
CR	kg	0,00E+00	0,00E+00	0,00E+00	MND	MND	MND	MND	MND
MR	kg	2,25E-04	0,00E+00	1,04E-03	MND	MND	MND	MND	MND
MER	kg	0,00E+00	0,00E+00	0,00E+00	MND	MND	MND	MND	MND
EEE	MJ	3,59E-01	0,00E+00	3,15E-01	MND	MND	MND	MND	MND
ETE	MJ	3,95E+00	0,00E+00	2,24E+00	MND	MND	MND	MND	MND

Parameter	Unit	B6	B7	C1	C2	C3	C4		D
CR	kg	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00		0,00E+00
MR	kg	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00		0,00E+00
MER	kg	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00		0,00E+00
EEE	MJ	MND	MND	0,00E+00	0,00E+00	5,94E+00	0,00E+00		-6,23E+00
ETE	MJ	MND	MND	0,00E+00	0,00E+00	4,09E+01	0,00E+00		-4,30E+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

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

Data source	Amount	Unit
Ecoinvent v3.6 (2019)	22,3	g 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
Central storage is the same location as the factory. 0 km

Indoor environment
The use of the product is not relevant for emissions to indoor air.

Carbon footprint
No additional parameters are declared.

Bibliography

ISO 14025:2010	*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+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*
NPCR010 V3.0	*Product category rules for building boards, 2019*
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