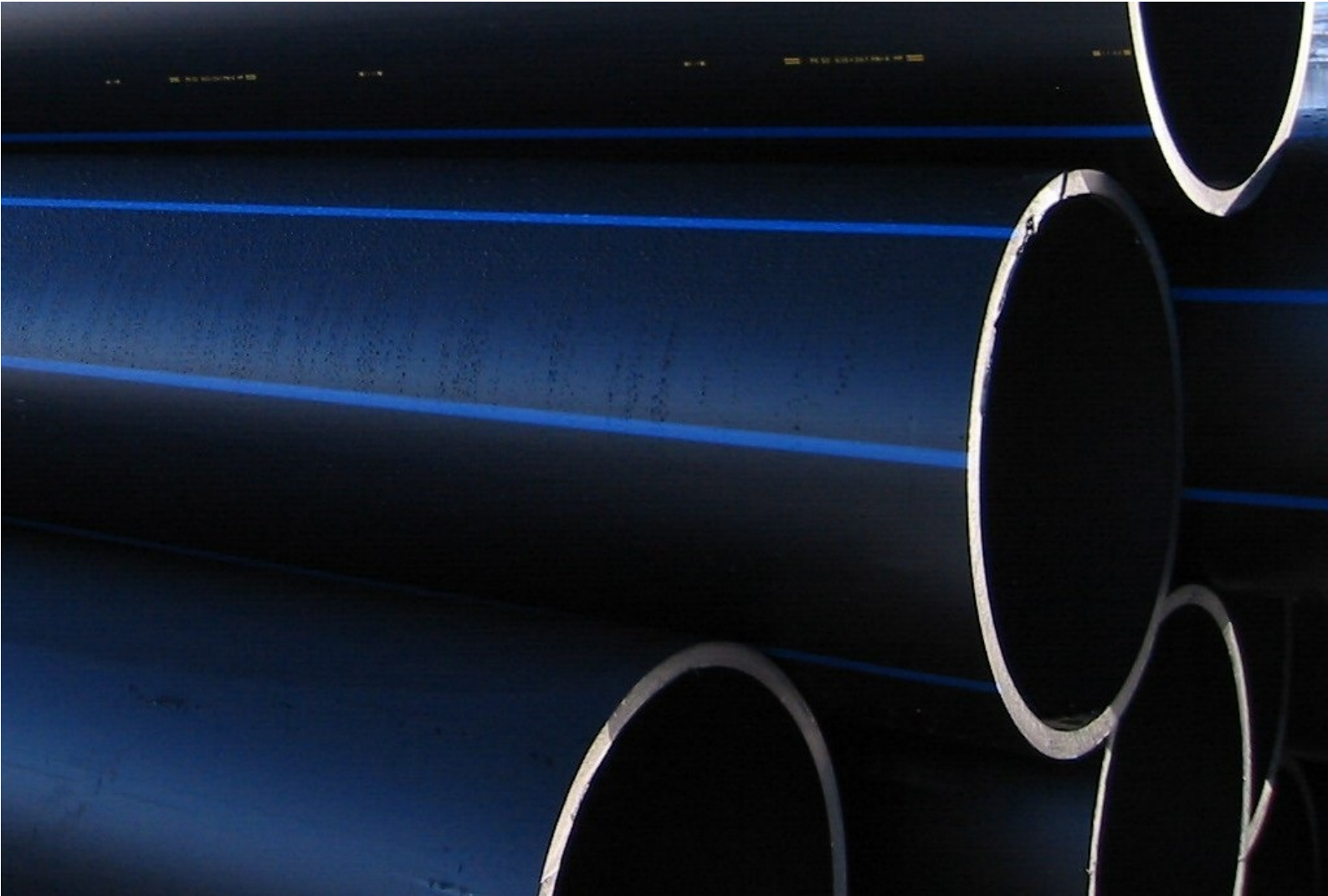


Environmental product declaration

in accordance with ISO 14025 and EN 15804+A2

Extruded PE 100 pipe and pipe systems



AKVAGROUP™
HELGELAND PLAST

The Norwegian EPD Foundation

Owner of the declaration:

AKVA group ASA

Product:

Extruded PE 100 pipe and pipe systems

Declared unit:

1 kg

This declaration is based on Product Category Rules:

CEN Standard EN 15804:2012+A2:2019 serves as core PCR

NPCR Part A: Construction products and services (application for plastic products)

Program operator:

The Norwegian EPD Foundation

Declaration number:

NEPD-6122-5391-EN

Registration number:

NEPD-6122-5391-EN

Issue date: 20.02.2024

Valid to: 20.02.2029

EPD software:

LCAno EPD generator ID: 169481

General information

Product:

Extruded PE 100 pipe and pipe systems

Program operator:

Post Box 5250 Majorstuen, 0303 Oslo, Norway
The Norwegian EPD Foundation
Phone: +47 23 08 80 00
web: post@epd-norge.no

Declaration number:

NEPD-6122-5391-EN

This declaration is based on Product Category Rules:

CEN Standard EN 15804:2012+A2:2019 serves as core PCR
NPCR Part A: Construction products and services (application for plastic products)

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.

Declared unit:

1 kg Extruded PE 100 pipe and pipe systems

Declared unit with option:

A1,A2,A3,A4,A5,C1,C2,C3,C4,D

Functional unit:

Not applicable.

General information on verification of EPD from EPD tools:

Independent verification of data, other environmental information and the declaration according to ISO 14025:2010, § 8.1.3 and § 8.1.4. Verification of each EPD is made according to EPD-Norway's guidelines for verification and approval requiring that tools are i) integrated into the company's environmental management system, ii) the procedures for use of the EPD tool are approved by EPD-Norway, and iii) the process is reviewed annually by an independent third party verifier. See Appendix G of EPD-Norway's General Programme Instructions for further information on EPD tools

Verification of EPD tool:

Independent third party verification of the EPD tool, background data and test-EPD in accordance with EPDNorway's procedures and guidelines for verification and approval of EPD tools. Approval number: NEPDT68.

Third party verifier:

Elisabet Amat, GREENIZE projects

(no signature required)

Owner of the declaration:

AKVA group ASA
Contact person: Trude Olafsen
Phone: +47 91557400
e-mail: tolafsen@akvagroup.com

Manufacturer:

Helgeland Plast AS
Båsmosjyven 4
8616 Mo I Rana, Norway

Place of production:

AKVA group production site Mo i Rana (Norway)
Båsmosjyven 4
8616 Mo i Rana, Norway

Management system:

AKVA group ASA sea-based nordic: ISO 9001:2015; Helgeland Plast: ISO 9001:2015 and ISO 14001:2015; Egersund Net AS: ISO 9001:2015 and ISO 14001:2015.

Organisation no:

931 693 670

Issue date: 20.02.2024

Valid to: 20.02.2029

Year of study:

2022

Comparability:

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

Development and verification of EPD:

The declaration is created using EPD tool lca.tools ver EPD2022.03, developed by LCA.no. The EPD tool is integrated in the company's management system, and has been approved by EPD Norway.

Developer of EPD: Adrienne Mathea Løkås

Reviewer of company-specific input data and EPD: Elisabet Amat

Approved:

Håkon Hauan
Managing Director of EPD-Norway

Product:

Product description:

PE 100 Pipes and parts installed under ground, above ground, in water and in complete pipe systems for several industries. Applied for water supply and drainage under pressure, non-pressure drains, sewers and surface water systems, aquaculture, land based fish farming and cable protection.

Product specification:

PE 100, Polyethylene HDPE and packaging.

Materials	kg	%
Plastic - Polyethylene (HDPE)	1,00	100,00
Total	1,00	

Packaging	kg	%
Packaging - HDPE parts	0,00	25,20
Packaging - Plastic straps	0,00	9,34
Packaging - Wood	0,00	65,45
Total incl. packaging	1,00	

Technical data:

Production in accordance to EN 12201.

For more information, visit our website: <https://www.akvagroup.com/sea-based/marine-infrastructure/pipes/>

Market:

Norway.

Reference service life, product:

The service lifetime of the pipe or pipe system is at least 100 years, subject to relevant installation procedures being followed, and under normal operations.

Reference service life, building or construction works:

Not relevant.

LCA: Calculation rules

Declared unit:

1 kg Extruded PE 100 pipe and pipe systems

Cut-off criteria:

All major raw materials and all the essential energy is included. The production processes for raw materials and energy flows with very small amounts (less than 1%) are not included. These cut-off criteria do 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 allocated equally among all products through mass allocation. Effects of primary production of recycled materials is allocated to the main product in which the material was used. The recycling process and transportation of the material is allocated to this analysis.

Data quality:

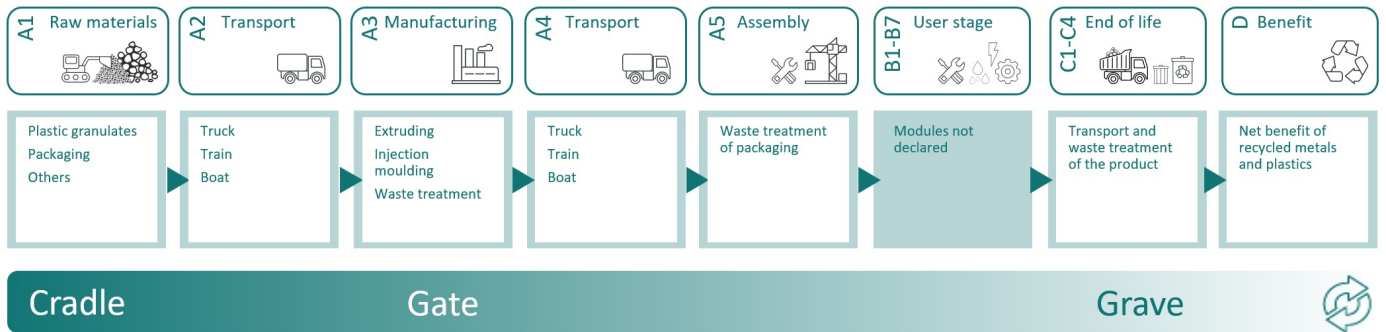
Specific data for the product composition are provided by the manufacturer. The data represent the production of the declared product and were collected for EPD development in the year of study. Background data is based on EPDs according to EN 15804 and different LCA databases. The data quality of the raw materials in A1 is presented in the table below.

Materials	Source	Data quality	Year
Packaging - HDPE parts	ecoinvent 3.6	Database	2019
Packaging - Plastic straps	ecoinvent 3.6	Database	2019
Packaging - Wood	ecoinvent 3.6	Database	2019
Plastic - Polyethylene (HDPE)	ecoinvent 3.6	Database	2019

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	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

System boundary:



Additional technical information:

LCA: Scenarios and additional technical information

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

Module A4 = An average distance between the factory and the market is considered.

Module A5 = Installation activities are excluded from this EPD, only the waste treatment of packaging has been accounted for. This EPD has been calculated per kg plastic pipes to cover a wide range of product dimensions. Contact Helgeland Plast to get a project/product specific EPD with dimension specific installation results.

Module C1 = Excavation activities are excluded from this EPD. This EPD has been calculated per kg plastic pipes to cover a wide range of product dimensions. Contact Helgeland Plast to get a project/product specific EPD with dimension specific de-construction results.

Module C2 = An average distance between the market and the waste treatment facility is considered.

Modules C3 and C4 = Waste treatments in C3 include material recycling and incineration with and without energy recovery and fly ash extraction. Disposal in C4 consist of landfilling of different waste fractions and of ashes. In this EPD a conservative waste treatment scenario has been applied with 50% of the plastic been sent to incineration with energy recovery and 50% being sent to landfilling.

Module D = The recyclability of plastics allows the producers a credit for the net scrap that is produced at the end of a product's life. The benefits from recycling of net scrap are described in formula from EN 15804:2012+A2:2019. Substitution of heat and electricity generated by the incineration with energy recovery of plastics is also calculated in module D.

Transport from production place to user (A4)	Capacity utilisation (incl. return) %	Distance (km)	Fuel/Energy Consumption	Unit	Value (Liter/tonne)
Truck, 16-32 tonnes, EURO 6 (km) - Europe	36,7 %	300	0,043	l/tkm	12,90
Assembly (A5)					
	Unit	Value			
Waste, packaging, PET straps, to average treatment - A5 including transport (kg)	kg	0,00			
Waste, packaging, polyethylene, PE plastic parts, to average treatment (kg) - A5 including transport (kg)	kg	0,00			
Waste, packaging, wood to average treatment - A5 including transport (kg)	kg	0,00			
Transport to waste processing (C2)					
	Capacity utilisation (incl. return) %	Distance (km)	Fuel/Energy Consumption	Unit	Value (Liter/tonne)
Truck, 16-32 tonnes, EURO 6 (km) - Europe	36,7 %	300	0,043	l/tkm	12,90
Waste processing (C3)					
	Unit	Value			
Waste treatment of polyethylene (PE), incineration with energy recovery and fly ash extraction (kg)	kg	0,50			
Disposal (C4)					
	Unit	Value			
Landfilling of ashes from incineration of Polyethylene (PE), process per kg ashes and residues (kg)	kg	0,02			
Landfilling of plastic mixture (kg)	kg	0,50			
Benefits and loads beyond the system boundaries (D)					
	Unit	Value			
Substitution of electricity, in Norway (MJ)	MJ	0,97			
Substitution of thermal energy, district heating, in Norway (MJ)	MJ	14,67			

LCA: Results

The LCA results are presented below for the declared unit defined on page 2 of the EPD document.

Environmental impact												
Indicator	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D	
 GWP-total	kg CO ₂ -eq	2,02E+00	1,23E-01	2,59E-02	4,90E-02	2,99E-03	0	4,90E-02	1,51E+00	5,81E-02	-8,81E-02	
 GWP-fossil	kg CO ₂ -eq	2,01E+00	1,23E-01	2,48E-02	4,90E-02	1,29E-04	0	4,90E-02	1,51E+00	5,81E-02	-8,50E-02	
 GWP-biogenic	kg CO ₂ -eq	7,63E-03	5,73E-05	9,95E-04	2,03E-05	2,86E-03	0	2,03E-05	1,22E-05	5,60E-06	-1,76E-04	
 GWP-luluc	kg CO ₂ -eq	6,24E-04	6,75E-05	7,98E-05	1,74E-05	1,89E-08	0	1,74E-05	1,79E-06	1,26E-06	-2,93E-03	
 ODP	kg CFC11-eq	5,12E-08	2,36E-08	1,46E-09	1,11E-08	1,20E-11	0	1,11E-08	1,16E-09	1,66E-09	-6,20E-03	
 AP	mol H ⁺ -eq	7,21E-03	2,24E-03	1,56E-04	1,41E-04	5,02E-07	0	1,41E-04	1,89E-04	4,21E-05	-7,01E-04	
 EP-FreshWater	kg P -eq	3,42E-05	1,20E-06	1,44E-06	3,92E-07	7,66E-10	0	3,92E-07	1,16E-07	6,45E-08	-7,56E-06	
 EP-Marine	kg N -eq	1,23E-03	6,74E-04	1,91E-05	2,79E-05	2,62E-07	0	2,79E-05	9,07E-05	7,43E-05	-2,29E-04	
 EP-Terrestrial	mol N -eq	1,38E-02	7,46E-03	2,34E-04	3,12E-04	2,21E-06	0	3,12E-04	9,81E-04	1,66E-04	-2,48E-03	
 POCP	kg NMVOC-eq	6,70E-03	1,97E-03	6,35E-05	1,19E-04	5,92E-07	0	1,19E-04	2,35E-04	5,93E-05	-6,83E-04	
 ADP-minerals&metals ¹	kg Sb-eq	1,80E-05	1,10E-06	1,44E-06	1,35E-06	1,23E-09	0	1,35E-06	5,28E-08	4,31E-08	-8,46E-07	
 ADP-fossil ¹	MJ	7,09E+01	1,63E+00	2,79E-01	7,41E-01	9,15E-04	0	7,41E-01	9,87E-02	1,24E-01	-1,22E+00	
 WDP ¹	m ³	7,49E+01	9,77E-01	4,54E+01	7,17E-01	2,05E-03	0	7,17E-01	2,23E-01	1,06E+00	-1,51E+01	







GWP-total = Global Warming Potential total; GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption

"Reading example: 9,0 E-03 = 9,0*10⁻³ = 0,009"

*INA Indicator Not Assessed

1. The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator

Remarks to environmental impacts:











Additional environmental impact indicators												
Indicator	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D	
 PM	Disease incidence	5,97E-08	8,83E-09	1,14E-09	3,00E-09	6,00E-12	0	3,00E-09	7,40E-10	8,24E-10	-4,25E-08	
 IRP ²	kgBq U235 -eq	4,73E-02	6,89E-03	4,81E-03	3,24E-03	3,61E-06	0	3,24E-03	1,67E-04	5,96E-04	-7,77E-03	
 ETP-fw ¹	CTUe	1,11E+01	1,30E+00	1,21E+00	5,49E-01	9,82E-04	0	5,49E-01	2,95E-01	1,54E-01	-6,61E+00	
 HTP-c ¹	CTUh	5,42E-10	0,00E+00	5,90E-11	0,00E+00	0,00E+00	0	0,00E+00	3,40E-11	4,00E-12	-1,21E-10	
 HTP-nc ¹	CTUh	1,23E-08	1,71E-09	1,41E-09	6,00E-10	4,00E-12	0	6,00E-10	1,27E-09	1,19E-10	-6,34E-09	
 SQP ¹	dimensionless	2,38E+00	7,30E-01	1,38E-01	5,18E-01	8,95E-04	0	5,18E-01	1,20E-02	4,59E-01	-8,13E+00	

PM = Particulate Matter emissions; IRP = Ionizing radiation – human health; ETP-fw = Eco toxicity – freshwater; HTP-c = Human toxicity – cancer effects; HTP-nc = Human toxicity – non cancer effects; SQP = Potential Soil Quality Index (dimensionless)

¹Reading example: 9,0 E-03 = 9,0*10⁻³ = 0,009"

*INA Indicator Not Assessed




1. The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator
2. This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

Resource use												
Indicator	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D	
 PERE	MJ	1,22E+00	3,05E-02	3,35E+00	1,06E-02	2,03E-05	0	1,06E-02	2,90E-03	5,83E-03	-7,51E+00	
 PERM	MJ	2,62E-02	0,00E+00	0,00E+00	0,00E+00	-2,62E-02	0	0,00E+00	0,00E+00	0,00E+00	0,00E+00	
 PERT	MJ	1,25E+00	3,05E-02	3,35E+00	1,06E-02	-2,62E-02	0	1,06E-02	2,90E-03	5,83E-03	-7,51E+00	
 PENRE	MJ	3,15E+01	1,63E+00	2,79E-01	7,41E-01	9,15E-04	0	7,41E-01	9,87E-02	1,24E-01	-1,22E+00	
 PENRM	MJ	4,25E+01	0,00E+00	0,00E+00	0,00E+00	-3,68E-02	0	0,00E+00	-4,23E+01	0,00E+00	0,00E+00	
 PENRT	MJ	7,40E+01	1,63E+00	2,79E-01	7,41E-01	-3,58E-02	0	7,41E-01	-4,22E+01	1,24E-01	-1,22E+00	
 SM	kg	2,74E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0	0,00E+00	0,00E+00	5,49E-05	0,00E+00	
 RSF	MJ	7,07E-02	6,90E-04	2,79E-03	3,79E-04	5,69E-07	0	3,79E-04	8,17E-05	1,23E-04	-1,32E-03	
 NRSF	MJ	8,99E-03	4,89E-03	6,74E-03	1,36E-03	4,60E-06	0	1,36E-03	0,00E+00	1,97E-03	-4,45E-01	
 FW	m ³	2,43E-02	2,01E-04	2,75E-02	7,92E-05	6,02E-07	0	7,92E-05	2,79E-04	1,51E-04	-9,05E-03	

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 materials; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Net use of fresh water

*Reading example: 9,0 E-03 = 9,0*10⁻³ = 0,009"






*INA Indicator Not Assessed

End of life - Waste												
Indicator	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D	
	HWD	kg	1,38E-03	1,12E-04	1,14E-03	3,82E-05	0,00E+00	0	3,82E-05	0,00E+00	1,49E-02	-5,72E-05
	NHWD	kg	6,39E-02	2,10E-02	2,22E-02	3,60E-02	2,86E-03	0	3,60E-02	0,00E+00	5,09E-01	-2,87E-02
	RWD	kg	4,22E-05	1,07E-05	2,43E-06	5,05E-06	0,00E+00	0	5,05E-06	0,00E+00	8,10E-07	-6,37E-06

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed

*Reading example: 9,0 E-03 = $9,0 \cdot 10^{-3} = 0,009$

*INA Indicator Not Assessed

End of life - Output flow												
Indicator	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D	
	CRU	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	MFR	kg	0,00E+00	0,00E+00	7,56E-03	0,00E+00	5,05E-04	0	0,00E+00	0,00E+00	4,48E-05	0,00E+00
	MER	kg	0,00E+00	0,00E+00	7,12E-03	0,00E+00	1,87E-03	0	0,00E+00	5,00E-01	1,10E-06	0,00E+00
	EEE	MJ	0,00E+00	0,00E+00	5,49E-03	0,00E+00	1,31E-03	0	0,00E+00	9,70E-01	7,12E-05	0,00E+00
	EET	MJ	0,00E+00	0,00E+00	8,30E-02	0,00E+00	1,98E-02	0	0,00E+00	1,47E+01	1,08E-03	0,00E+00

CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported energy electrical; EET = Exported energy thermal

*Reading example: 9,0 E-03 = $9,0 \cdot 10^{-3} = 0,009$

*INA Indicator Not Assessed

Biogenic Carbon Content		
Indicator	Unit	At the factory gate
Biogenic carbon content in product	kg C	0,00E+00
Biogenic carbon content in accompanying packaging	kg C	7,80E-04

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO₂

Additional requirements

Greenhouse gas emissions from the use of electricity in the manufacturing phase:

National production mix from import, low voltage (production of transmission lines, in addition to direct emissions and losses in grid) of applied electricity for the manufacturing process (A3).

Electricity mix	Data source	Amount	Unit
Electricity, Norway (kWh)	ecoinvent 3.6	24,33	g CO ₂ -eq/kWh

Dangerous substances:

The product contains no substances given by the REACH Candidate list.

Indoor environment:

Additional Environmental Information






Additional environmental impact indicators required in NPCR Part A for construction products											
Indicator	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
GWPIOBC	kg CO ₂ -eq	1,90E+00	1,23E-01	2,58E-02	4,90E-02	1,29E-04	0	4,90E-02	1,51E+00	5,81E-02	-8,69E-02

GWPI-IOBC: Global warming potential calculated according to the principle of instantaneous oxidation. In order to increase the transparency of biogenic carbon contribution to climate impact, the indicator GWP-IOBC is required as it declares climate impacts calculated according to the principle of instantaneous oxidation. GWP-IOBC is also referred to as GWP-GHG in context to Swedish public procurement legislation.

Bibliography

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 ISO 14044:2006 Environmental management - Life cycle assessment - Requirements and guidelines.
 EN 15804:2012+A2:2019 Environmental product declaration - Core rules for the product category of construction products.
 ISO 21930:2017 Sustainability in buildings and civil engineering works - Core rules for environmental product declarations of construction products.
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 NPCR Part A: Construction products and services. Ver. 2.0. March 2021, EPD-Norge.

Data for EPD originated from BOM and actual consumptions of reference year.

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