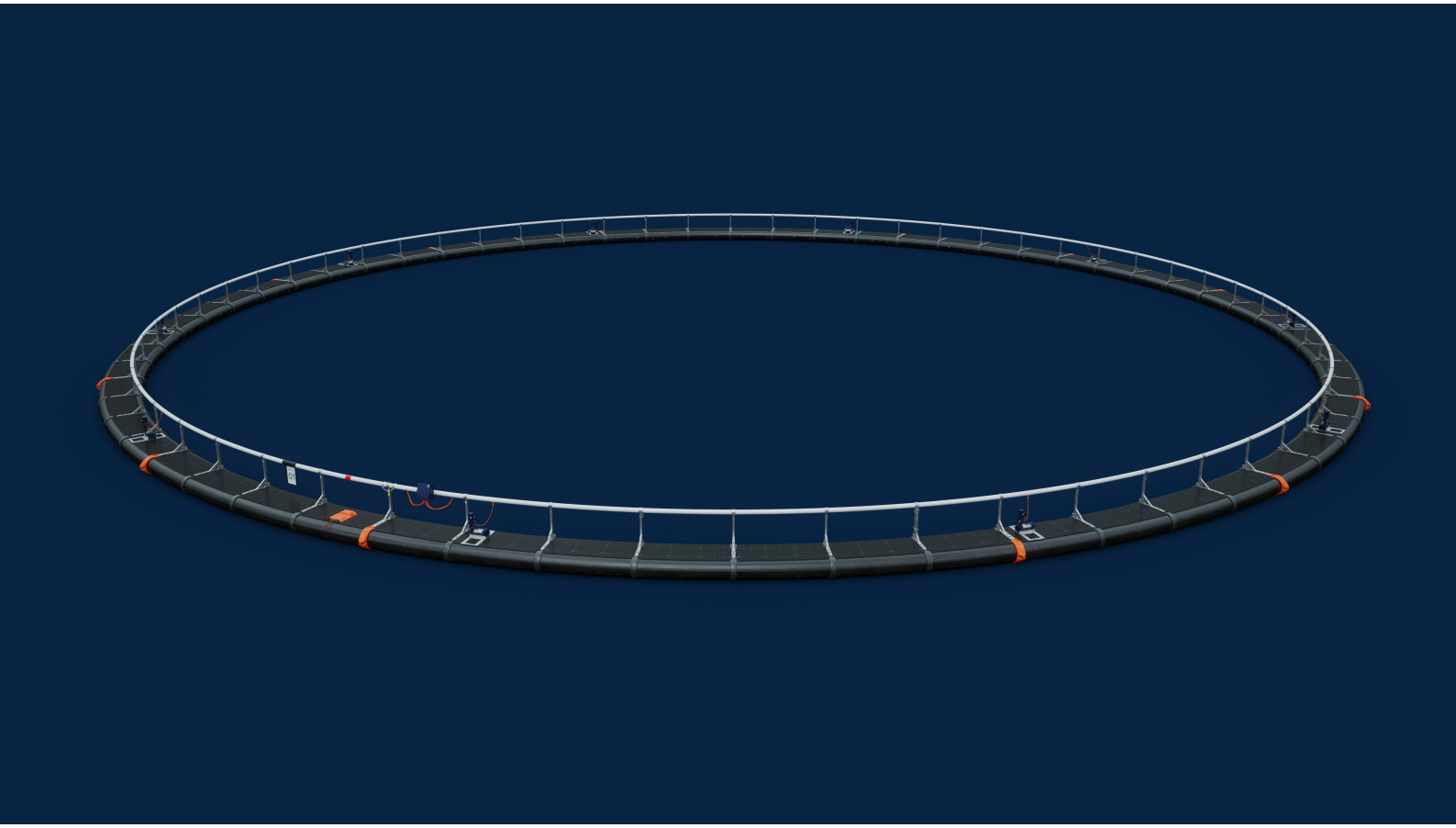
epd-norge
Global program operatør

Environmental product declaration

in accordance with ISO 14025 and EN 15804+A2

Floating Collar - FR560-157



The Norwegian EPD Foundation

Owner of the declaration:
Scale Aquaculture AS

Product:
Floating Collar - FR560-157

Declared unit:
1 pcs

This declaration is based on Product Category Rules:
CEN Standard EN 15804:2012+A2:2019 serves as core PCR
NPCR 031:2023 Part B for sea-based aquaculture infrastructure and components

Program operator:
The Norwegian EPD Foundation

Declaration number:

NEPD-4785-4038-EN

Registration number:

NEPD-4785-4038-EN

Issue date: 16.08.2023

Valid to: 16.08.2028

EPD Software:
LCA.no EPD generator ID: 69876

General information

Product

Floating Collar - FR560-157

Owner of the declaration:

Scale Aquaculture AS
Contact person: Hanne Digre
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Program operator:

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The Norwegian EPD Foundation
Phone: +47 23 08 80 00
web: post@epd-norge.no

Manufacturer:

Scale Aquaculture AS

Declaration number: NEPD-4785-4038-EN

Place of production:

Scale Aquaculture AS
Beddingen 16
7042 Trondheim, Norway

This declaration is based on Product Category Rules:

CEN Standard EN 15804:2012+A2:2019 serves as core PCR
NPCR 031:2023 Part B for sea-based aquaculture infrastructure and components

Management system:

ISO 9001 and ISO 14001

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.

Organisation no:

929 013 581

Declared unit:

1 pcs Floating Collar - FR560-157

Issue date: 16.08.2023

Declared unit with option:

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

Valid to: 16.08.2028

Year of study:

2022

Functional unit:

1 piece of floating collar FR560-157, manufactured and delivered at the sea-farm, including waste treatment at end-of-life.

Comparability:

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

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

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: June Valla

Reviewer of company-specific input data and EPD: Hanne Digre

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: NEPDT65.

Third party verifier:

Elisabet Amat – GREENIZE projects

(no signature required)

Approved:

Håkon Hauan
Managing Director of EPD-Norway

Product

Product description:

Floating collar - FR560-157

Scale AQ FR / FRPL pens may be adapted to all localities, from sheltered to very exposed areas. You are free to choose the cage that is best suited to your operation and your area, to ensure that the investment is optimal.

As one of few suppliers of equipment to the fish farming industry, ScaleAQ is an approved supplier of pens , nets and mooring equipment. Both at home as well as abroad, we exclusively employ certified plastic welders with considerable experience of cage assembly. Our certificates are approved in accordance with the requirements of NS 9415.

The floating collar is a key element of a fish farm pen. The pen consist of a floating collar, sinker tube (optional) and net.

Scale AQs floating collars combines the flexibility and durability of high density polyethylene plastic pipes with strong steel brackets.

• Adaptable to local conditions.

• The construction has double pipes (floating rings / collar) and a hand rail made from HDPE100.

• All-welded steel brackets are fitted with steel rods and chain around the full cage circumference. Extreme loads from the moorings are absorbed by the custom-made mooring brackets and are distributed further throughout the full circumference of the cage.

• The steel brackets counteract ovalisation of the pen, maintains the flexibility and prevents the pen from breaking.

• Bushings between the brackets and the floating collars reduce friction. The floating collars move freely in the brackets, both in case of twisting as well as longitudinal motion. The handrail tube is also able to move freely relative to the brackets.

• In order to maintain the buoyancy in case of damage or puncture, both pipes are filled with specially made polystyrene.

• The floating collar is fitted with anti-slip walkways throughout the full circumference.

Product specification

Materials	kg	%
Plastic - Polypropylene with filler	3427,68	10,05
Plastic - Polystyrene expandable (EPS)	641,28	1,88
Metal - Steel	8712,80	25,55
Plastic pipe - HDPE	21321,90	62,52
Total	34103,66	

Technical data:

Scale AQ FR500-157

Inner float pipe: HDPE100 ø560mm SDR 17
Outer float pipe: HDPE100 ø560mm SDR13.6
Hand rail: HDPE100 ø140mm SDR11
Brackets: Galvanized steel brackets, total 60pcs, incl. 12pcs mooring.
Circumference: 157m

Total weight of floating collar : 33 986.66 kg

Market:

Norway.

Reference service life, product

20 years.

Reference service life, building or construction works

There are no standard service life for sea-based aquaculture farm. Each components have different service life and are repaired/replaced according to the regulations in NS9415-2021.

LCA: Calculation rules

Declared unit:

1 pcs Floating Collar - FR560-157

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:

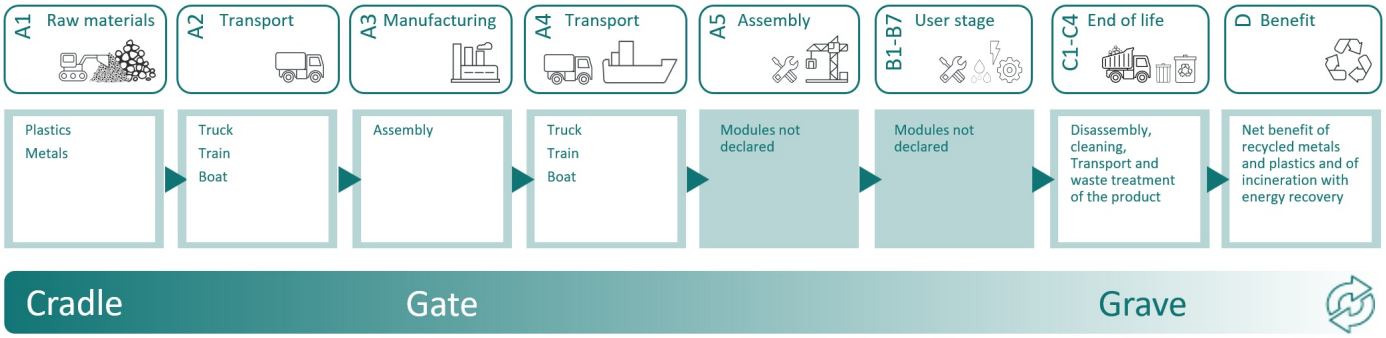
Specific data for the product composition are provided by the manufacturer. The data represent the production of the declared product and were collected for EPD development in the year of study. Background data is based on EPDs according to EN 15804 and different LCA databases. The data quality of the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

Materials	Source	Data quality	Year
Metal - Steel	ecoinvent 3.6	Database	2019
Plastic - Polypropylene with filler	ecoinvent 3.6	Database	2019
Plastic - Polystyrene expandable (EPS)	ecoinvent 3.6	Database	2019
Plastic pipe - HDPE	Production data + ecoinvent 3.6	Supplier data + database	2021

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

System boundary:



Additional technical information:

The use of components made of plastic compose a risk of releasing microplastic into the ocean during its user phase. We have complete control over our sold floating collars, where no loss of equipment occurs.

As one of the industry's largest suppliers, we are daily aware of our responsibility to minimize the footprint of our business. In our sustainability pledges, we aim to reduce the release of plastic into nature and increase the recycling of our products. We have established "Scale Circular" as an initiative for increased sustainability and a circular economy. We have committed ourselves to several of the UN's sustainability goals, two of which are sustainability goal number 12, which is about responsible consumption and production, and number 13 stop climate change.

ScaleAQ is certified according to ISO 14001, environmental management, and is an approved Global GAP supplier.

A user manual is included with the purchase of the product.

For more information regarding our environmental work, please visit our site on https://scaleaq.com/sustainability/#scale-on-sustainability.

LCA: Scenarios and additional technical information

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

Module A4 = a default travel distance of 200 Nm (370.4 km) of sea freight is added to ensure distribution between the assembly site and the production location at sea (the assembly site is next to a dock). Floating collars are dragged through the sea due to their size.

Module C1 = disassembly of the floating collar from the farm is estimated to require two hours of service vessel aquaculture operations. In addition, a default travel distance of 1 Nm (1.852 km) of sea freight is added to cover the transport between the production location at sea and the nearest dock. Floating collars are dragged through the sea due to their size. Additional diesel combustion is added to account for the disassembly of the floating collar at the dock.

Module C2 = a default travel distance of 300 km by truck is added to ensure transport between the dock and the waste treatment facility.

Modules C3 and C4 = Waste treatment of the product follows the default values provided in NPCR 031 part B for aquaculture infrastructure and components, table 3. This table specified how different types of product categories and raw materials will likely be treated during the end-of-life phases. 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.

Module D = The recyclability of plastics and metals 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)
Ship, aquaculture transport, service vessel, 24 meters, with tugging (kgkm) - Global	20,0 %	370	1,080	l/tkm	400,03

De-construction demolition (C1)	Unit	Value			
Aquaculture operation, service vessel, 24 meter, product de-construction (per hour) - Global	h/DU	2,00			
Diesel, burned (L)	L/DU	150,00			
Ship, aquaculture transport, service vessel, 24 meters, with tugging (kgkm) - Global	kgkm/DU	62943,29			

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			
Plastic compound, PP and filler, to recycling (kg)	kg	3256,30			
Polyethylene to recycling (kg)	kg	20255,81			
Polystyrene expandable to recycling (kg)	kg	609,22			
Steel to recycling (kg)	kg	7841,52			
Waste treatment of expanded polystyrene (EPS), incineration with energy recovery and fly ash extraction (kg)	kg	32,06			
Waste treatment of plastic mixture, incineration with energy recovery and fly ash extraction (kg)	kg	171,38			
Waste treatment of polyethylene (PE), incineration with energy recovery and fly ash extraction (kg)	kg	1066,10			
Waste treatment per kg of non-impregnated aquaculture components, washing process (kg) - Norway	kg	33462,38			

Disposal (C4)	Unit	Value			
Landfilling of ashes from incineration of expanded polystyrene (EPS), process per kg ashes and residues - C4 (kg)	kg	1,16			
Landfilling of ashes from incineration of Plastic mixture, process per kg ashes and residues (kg)	kg	5,99			
Landfilling of ashes from incineration of Polyethylene (PE), process per kg ashes and residues (kg)	kg	37,57			
Landfilling of steel (kg)	kg	871,28			

Benefits and loads beyond the system boundaries (D)	Unit	Value			
Substitution of acrylonitrile butadiene styrene, ABS, granulate (kg)	kg	976,89			
Substitution of electricity (MJ)	MJ	2379,45			
Substitution of expandable polystyrene, EPS, granulate (kg)	kg	609,22			
Substitution of Polyethylene, HDPE granulate (kg)	kg	20255,81			
Substitution of Polypropylene, PP granulate (kg)	kg	2279,41			
Substitution of primary steel with net scrap (kg)	kg	2307,14			
Substitution of thermal energy, district heating (MJ)	MJ	35998,74			

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	C1	C2	C3	C4	D
	GWP-total	kg CO_2 -eq	1,00E+05	4,74E+03	5,37E+02	4,36E+04	1,43E+03	1,67E+03	6,55E+03	5,92E+00	-5,51E+04
	GWP-fossil	kg CO_2 -eq	9,86E+04	4,74E+03	5,37E+02	4,35E+04	1,43E+03	1,67E+03	6,54E+03	5,91E+00	-5,48E+04
	GWP-biogenic	kg CO_2 -eq	1,43E+03	1,61E+00	2,62E-01	8,18E+00	3,09E-01	6,89E-01	9,30E+00	4,32E-03	-2,70E+02
	GWP-luluc	kg CO_2 -eq	6,09E+01	2,55E+00	6,61E-02	1,58E+01	5,36E-01	5,93E-01	1,78E+00	1,06E-03	-2,20E+01
	ODP	kg CFC11 -eq	4,38E-03	1,04E-03	1,15E-04	9,50E-03	3,10E-04	3,77E-04	3,80E-04	2,04E-06	-1,52E+01
	AP	mol H+ -eq	4,19E+02	8,96E+01	5,59E+00	1,50E+03	3,63E+01	4,79E+00	2,12E+01	4,39E-02	-1,99E+02
	EP-FreshWater	kg P -eq	3,17E+00	2,80E-02	2,35E-03	1,15E-01	4,99E-03	1,33E-02	7,48E-02	5,75E-05	-1,04E+00
	EP-Marine	kg N -eq	7,76E+01	2,17E+01	2,45E+00	3,63E+02	9,88E+00	9,47E-01	5,18E+00	1,60E-02	-3,45E+01
	EP-Terrestial	mol N -eq	8,40E+02	2,42E+02	2,69E+01	3,97E+03	1,08E+02	1,06E+01	6,14E+01	1,77E-01	-3,78E+02
	POCP	kg NMVOC -eq	3,41E+02	6,44E+01	7,40E+00	1,04E+03	2,88E+01	4,06E+00	1,81E+01	5,04E-02	-1,83E+02
	ADP-minerals&metals[1]	kg Sb -eq	4,38E+01	7,91E-02	1,25E-03	1,80E-01	6,31E-03	4,60E-02	1,57E-01	4,47E-05	-4,53E-01
	ADP-fossil[1]	MJ	2,36E+06	6,56E+04	7,38E+03	5,94E+05	1,96E+04	2,52E+04	5,10E+04	1,40E+02	-1,76E+06
	WDP[1]	m^3	2,46E+06	3,83E+04	1,56E+04	1,00E+05	3,79E+03	2,44E+04	2,37E+05	4,61E+02	-1,56E+06

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	C1	C2	C3	C4	D
	PM	Disease incidence	4,65E-03	1,33E-04	1,47E-04	1,04E-02	3,61E-04	1,02E-04	3,04E-04	8,67E-07	-1,92E-03
	IRP[2]	kgBq U235 -eq	2,66E+03	2,84E+02	3,27E+01	2,58E+03	8,44E+01	1,10E+02	1,14E+02	6,15E-01	-1,05E+03
	ETP-fw[1]	CTUe	2,47E+06	4,34E+04	4,36E+03	3,12E+05	1,08E+04	1,87E+04	5,55E+04	9,62E+01	-4,61E+05
	HTP-c[1]	CTUh	2,03E-04	0,00E+00	1,72E-07	3,78E-05	9,33E-07	0,00E+00	3,45E-06	3,58E-09	-2,59E-05
	HTP-nc[1]	CTUh	2,89E-03	2,66E-05	4,08E-06	2,64E-04	9,84E-06	2,04E-05	4,20E-05	1,03E-07	-5,30E-05
	SQP[1]	dimensionless	2,55E+05	2,74E+04	9,67E+02	7,64E+04	2,55E+03	1,76E+04	8,36E+03	4,92E+02	-7,19E+04

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)

"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
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	C1	C2	C3	C4	D
	PERE	MJ	1,12E+05	6,91E+02	1,08E+03	2,61E+03	1,07E+02	3,60E+02	1,67E+04	3,01E+00	-4,73E+04
	PERM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	PERT	MJ	1,12E+05	6,91E+02	1,08E+03	2,61E+03	1,07E+02	3,60E+02	1,67E+04	3,01E+00	-4,73E+04
	PENRE	MJ	1,30E+06	6,57E+04	7,38E+03	5,94E+05	1,96E+04	2,52E+04	5,10E+04	1,40E+02	-8,95E+05
	PENRM	MJ	1,05E+06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-1,05E+06	0,00E+00	-9,35E+05
	PENRT	MJ	2,36E+06	6,57E+04	7,38E+03	5,94E+05	1,96E+04	2,52E+04	-1,00E+06	1,40E+02	-1,83E+06
	SM	kg	5,56E+03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-8,86E+01
	RSF	MJ	5,31E+02	2,22E+01	1,79E+00	0,00E+00	9,71E-01	1,29E+01	4,05E+01	6,71E-02	-1,47E+03
	NRSF	MJ	-1,36E+04	1,35E+02	1,63E+01	0,00E+00	1,43E+01	4,61E+01	0,00E+00	4,07E+00	1,38E+03
	FW	m^3	1,33E+03	5,22E+00	8,16E+00	2,38E+01	9,89E-01	2,69E+00	1,55E+02	1,61E-01	-6,62E+02

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	C1	C2	C3	C4	D
	HWD	kg	2,98E+02	3,09E+00	2,76E-01	1,72E+01	6,37E-01	1,30E+00	8,23E+00	3,29E+01	-4,91E+01
	NHWD	kg	1,28E+04	1,67E+03	1,49E+01	7,76E+02	3,08E+01	1,22E+03	3,51E+02	8,90E+02	-2,71E+03
	RWD	kg	2,43E+00	4,52E-01	5,14E-02	4,21E+00	1,37E-01	1,72E-01	1,28E-01	1,16E-04	-9,38E-01

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

"Reading example: 9,0 E-03 = 9,0*10-3 = 0,009"
*INA Indicator Not Assessed

End of life - Output flow

Indicator		Unit	A1	A2	A3	A4	C1	C2	C3	C4	D
	CRU	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	0,00E+00
	MFR	kg	0,00E+00	0,00E+00	1,64E+00	0,00E+00	0,00E+00	0,00E+00	3,20E+04	0,00E+00	-1,55E+01
	MER	kg	0,00E+00	0,00E+00	4,02E-06	0,00E+00	0,00E+00	0,00E+00	1,27E+03	0,00E+00	-5,89E+01
	EEE	MJ	0,00E+00	0,00E+00	5,59E-01	0,00E+00	0,00E+00	0,00E+00	2,38E+03	0,00E+00	-8,81E+01
	EET	MJ	0,00E+00	0,00E+00	8,45E+00	0,00E+00	0,00E+00	0,00E+00	3,60E+04	0,00E+00	-1,33E+03

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*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	0,00E+00

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 CO2-eq/kWh

Dangerous substances

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

Indoor environment

Additional Environmental Information

Additional environmental impact indicators required in NPCR Part A for construction products										
Indicator	**Unit**	A1	A2	A3	A4	C1	C2	C3	C4	D
GWPIOBC	kg CO_2 -eq	9,76E+04	4,74E+03	5,36E+02	4,36E+04	1,43E+03	1,67E+03	6,55E+03	2,76E+00	-5,38E+04

GWP-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.

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