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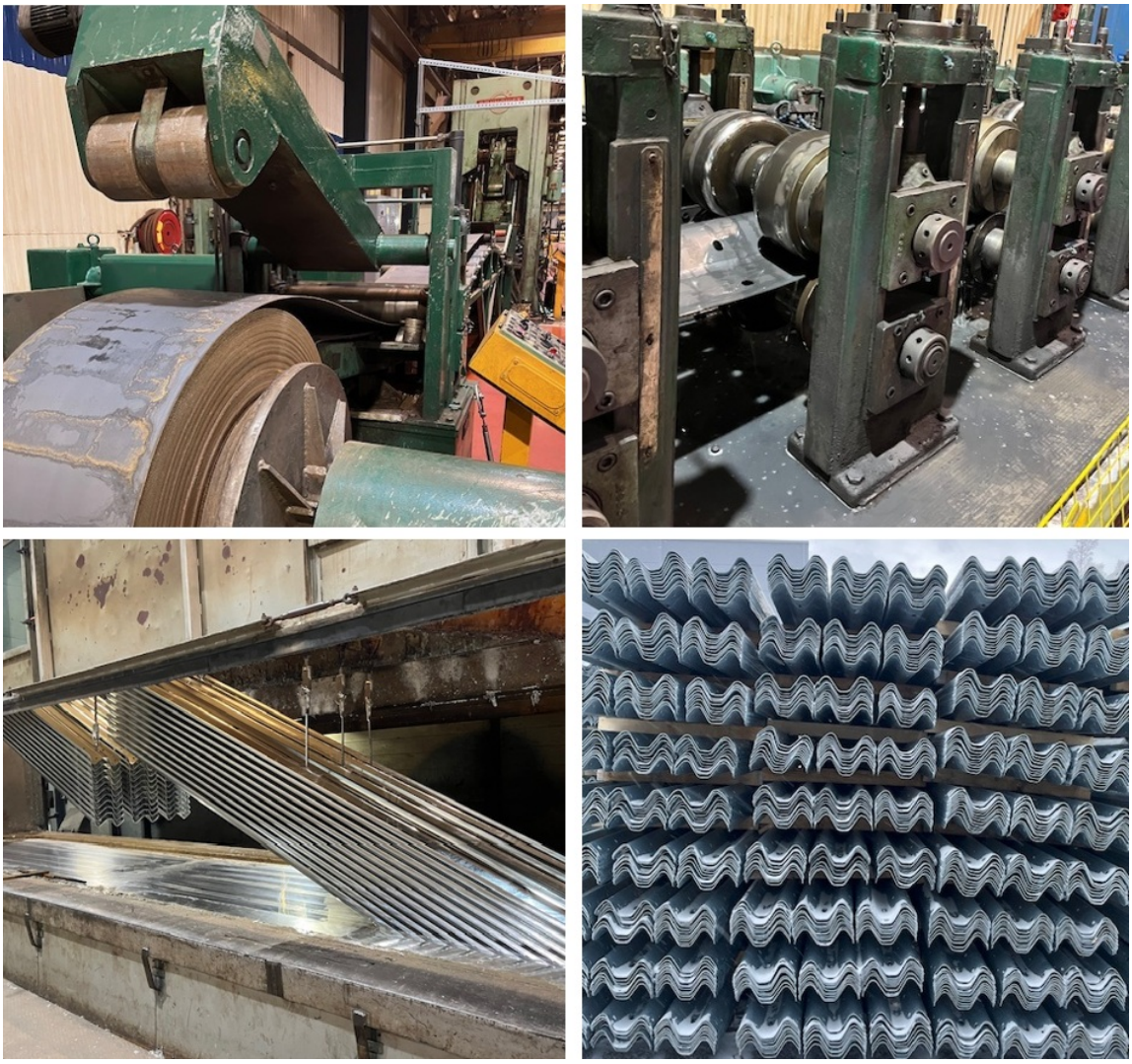
Environmental product declaration

In accordance with ISO 14025 and EN15804+A2

Road restraint system



SAFEROAD

Owner of the declaration:
Saferoad Vik Ørsta AS

Product:
Road restraint system

Declared unit:
1 kg

This declaration is based on Product Category Rules:
CEN Standard EN 15804:2012+A2:2019 serves as core PCR
NPCR 013:2021 Part B for Steel and aluminium construction products

Program operator:
EPD-Global

Declaration number:

Issue date:

Valid to:

EPD software:
LCAno EPD generator ID: 1271620

EPD-Global

General information

Product

Road restraint system

Owner of the declaration:

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Program operator:

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Manufacturer:

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PB 193
No-6150 Ørsta, Norway, Norway

Declaration number:

Place of production:

Vik Ørsta AS, Vik
Elvagata 20
6893 Vik i Sogn, Norway

This declaration is based on Product Category Rules:

CEN Standard EN 15804:2012+A2:2019 serves as core PCR
NPCR 013:2021 Part B for Steel and aluminium construction products

Management system:

NS-EN ISO 9001:2015 NS-EN ISO 14001:2015

Statement of liability:

The owner of the declaration shall be liable for the underlying information and evidence. EPD-Global shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

Organisation no:

985001952

Declared unit:

1 kg Road restraint system

Issue date:

Declared unit with option:

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

Valid to:

Year of study:

2025

Functional unit:

1kg Road restraint system

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-Global'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-Global, and iii) the process is reviewed annually by an independent third party verifier. See Appendix G of EPD-Global'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-Global. Approval number:

Developer of EPD: Daniel Fossberg

Reviewer of company-specific input data and EPD: Fredrik Green Høyum

Verification of EPD tool:

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

Approved:

Third party verifier:

Alexander Borg, Asplan Viak AS

(no signature required)

Product

Product description:

Road restraint systems are used both as onesided and doublesided guardrails. Our systems have been crash-tested and CE-approved.
We deliver A-profile beams, posts in different C-profiles and sigma profile.

The road restraint systems are intended to be installed in soil, but can also be delivered with baseplates for mounting on concrete. This Environmental Product Declaration covers a variety of systems, and each system must be installed according to their respective installation manual.

Product specification

This Environmental Product Declaration covers a family of steel road restraint systems (W-beam guardrails). All variants are based on a corrugated steel rail (W-beam) mounted on steel posts. The primary material is carbon steel in hot-rolled coils for rails, posts, spacers and plates. Components are hot-dip galvanized to provide long-term corrosion protection.

Materials	kg	%
Metal - Steel	0.9419	94.19
Metal - Zinc	0.05812	5.81
Total	1.00	100.00

Technical data:

Our Road Restraint systems uses carbon steel, in both S235 and S355 qualities. Posts and beams are based on hot-rolled coil, that are rollformed into the desired profile. The thickness of the guardrail ranges from 2,5 mm to 3mm. The thickness of the post ranges from 4mm to 5mm.

On average the carbon steel in posts contribute approximately 34% of the systemweight, and guardrails approximately 58%. Posts and beams galvanized in Vik adds 6,29% of weight in Zinc, to the component. The rest of the weight comes from fasteners, that are included in this EPD. This may vary, based on how our systems are designed, and especially how many median barriers that are in our portfolio at a given time. This EPD has used the longest post available for each system.

The system weight varies depending on project-specific requirements.

The functional unit of this EPD is 1kg Road restraint system. This EPD therefore covers several road restraint systems, as listed below.
To convert units from kg CO2 -eq pr. 1kg to kg CO2 -eq pr. 1m, the following calculation must be done:
System weight pr. m. * kg CO2 -eq pr. kg. = kg CO2 -eq pr. m.

System name	Working width	Containment level
Vik – W3 CC4	N2	W3
Vik – W3 CC2	N2	W3
Vik et	H2	W3
Vik eo - N2	N2	W1
Vik eo - L2	L2	W4
Vik eo - H2	H2	W4
Vik ep N2 CC6	N2	W4
Vik ep L1 CC4	L1	W3
Vik ep H1 CC4	H1	W3
Vik ep N2 CC4	N2	W2
MegaRail eq	H2	W4
MegaRail do	H2	W2
MegaRail dp	N2	W2
MegaRail dp	H2	W4
MegaRail dp	L2	W4

Market:

Nordic Markets, but also the rest of the world.

Reference service life, product

30 years.

Reference service life, building or construction works

Not relevant.

LCA: Calculation rules

Declared unit:

1 kg Road restraint system

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:

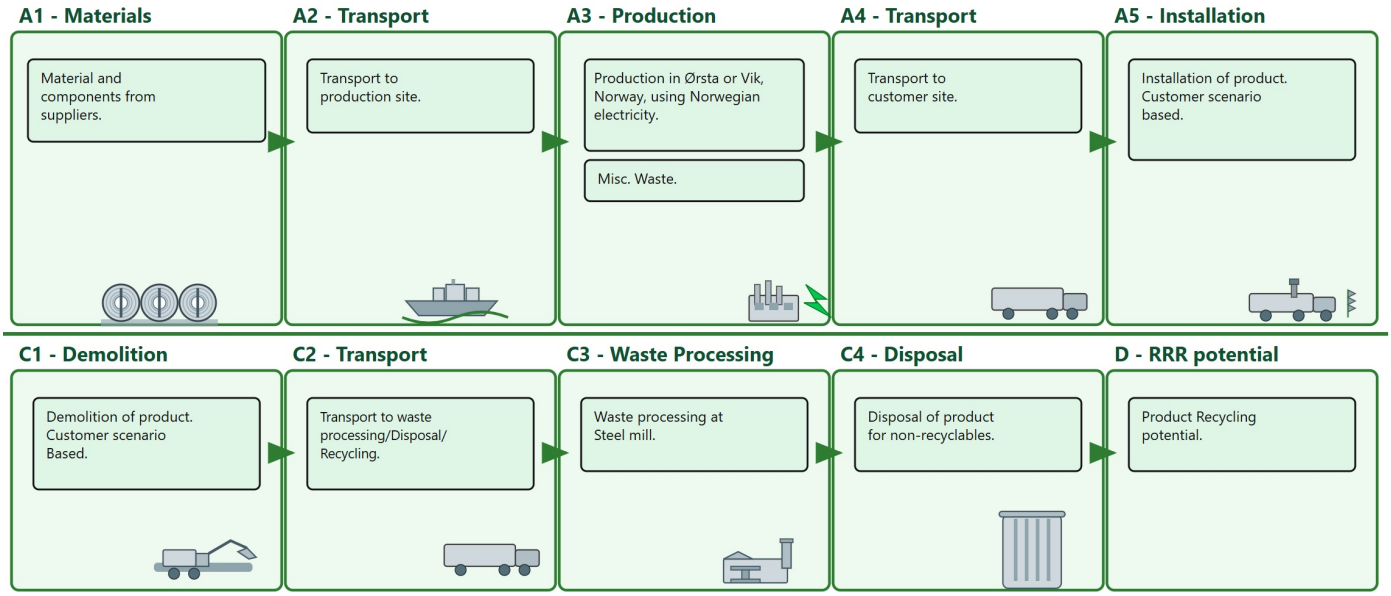
Specific data for the product composition are provided by the manufacturer. The data represent the production of the declared product and were collected for EPD development in the year of study. Background data is based on EPDs according to EN 15804 and different LCA databases. The data quality of the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

Materials	Source	Data quality	Year
Metal - Steel	BREG EN EPD No.000079	EPD	2021
Metal - Steel	ecoinvent 3.6	Database	2019
Metal - Zinc	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	MND	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.

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)	36.7 %	300.00	0.043	l/tkm	12.90

De-construction demolition (C1)	Unit	Value			
Diesel, burned (L)	L	0.10			

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)	36.7 %	50.00	0.043	l/tkm	2.15

Waste processing (C3)	Unit	Value			
Materials to recycling (kg)	kg	0.8316			
Materials to recycling (kg)	kg	0.06842			

Disposal (C4)	Unit	Value			
Waste, scrap steel, to landfill (kg)	kg	0.0924			
Waste, scrap steel, to landfill (kg)	kg	0.007602			

Benefits and loads beyond the system boundaries (D)	Unit	Value			
Substitution of primary steel with net scrap (kg)	kg	0.09794			
Substitution of zinc (kg) - RoW	kg	0.04953			
Substitution of primary steel with net scrap (kg)	kg	0.005549			

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-A3	A4	C1	C2	C3	C4	D
	GWP-total	kg CO_2 -eq	1.44E+00	4.90E-02	3.54E-01	8.17E-03	0.00E+00	4.29E-04	-2.64E-01
	GWP-fossil	kg CO_2 -eq	1.43E+00	4.90E-02	3.53E-01	8.17E-03	0.00E+00	4.28E-04	-2.62E-01
	GWP-biogenic	kg CO_2 -eq	5.08E-03	2.03E-05	6.63E-05	3.38E-06	0.00E+00	3.64E-07	-1.51E-03
	GWP-luluc	kg CO_2 -eq	1.14E-03	1.74E-05	2.79E-05	2.91E-06	0.00E+00	8.40E-08	-5.48E-04
	ODP	kg CFC11 -eq	3.85E-08	1.11E-08	7.63E-08	1.85E-09	0.00E+00	2.08E-10	-1.52E-08
	AP	mol H+ -eq	1.12E-02	1.41E-04	3.70E-03	2.35E-05	0.00E+00	4.18E-06	-2.04E-03
	EP-FreshWater	kg P -eq	2.62E-05	3.92E-07	1.29E-06	6.53E-08	0.00E+00	3.20E-09	-2.41E-05
	EP-Marine	kg N -eq	2.30E-03	2.79E-05	1.63E-03	4.64E-06	0.00E+00	1.57E-06	-4.42E-04
	EP-Terrestial	mol N -eq	2.36E-02	3.12E-04	1.79E-02	5.19E-05	0.00E+00	1.73E-05	-4.85E-03
	POCP	kg NMVOC -eq	6.44E-03	1.19E-04	4.92E-03	1.99E-05	0.00E+00	4.94E-06	-1.49E-03
	ADP-minerals&metals[1]	kg Sb-eq	4.58E-03	1.35E-06	5.42E-07	2.26E-07	0.00E+00	3.79E-09	-3.83E-03
	ADP-fossil[1]	MJ	1.58E+01	7.41E-01	4.86E+00	1.23E-01	0.00E+00	1.38E-02	-3.16E+00
	WDP[1]	m^3	9.24E+00	7.17E-01	1.03E+00	1.19E-01	0.00E+00	2.91E-02	3.03E-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"

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-A3	A4	C1	C2	C3	C4	D
	PM	Disease incidence	9.76E-08	3.00E-09	9.78E-08	5.00E-10	0.00E+00	8.90E-11	-1.53E-08
	IRP[2]	kgBq U235 -eq	3.49E-02	3.24E-03	2.08E-02	5.40E-04	0.00E+00	6.00E-05	-1.59E-02
	ETP-fw[1]	CTUe	1.43E+01	5.49E-01	2.66E+00	9.15E-02	0.00E+00	6.83E-03	-1.41E+01
	HTP-c[1]	CTUh	2.21E-09	0.00E+00	1.03E-10	0.00E+00	0.00E+00	0.00E+00	-1.40E-09
	HTP-nc[1]	CTUh	4.58E-08	6.00E-10	2.44E-09	1.00E-10	0.00E+00	3.00E-12	-1.29E-08
	SQP[1]	dimensionless	2.41E+00	5.18E-01	6.17E-01	8.64E-02	0.00E+00	5.04E-02	-1.10E+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)

"Reading example: 9.0 E-03 = 9.0*10-3 = 0.009"

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-A3	A4	C1	C2	C3	C4	D
	PERE	MJ	2.85E+00	1.06E-02	2.63E-02	1.77E-03	0.00E+00	2.13E-04	-3.72E-01
	PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	PERT	MJ	2.85E+00	1.06E-02	2.63E-02	1.77E-03	0.00E+00	2.13E-04	-3.72E-01
	PENRE	MJ	1.58E+01	7.41E-01	4.86E+00	1.23E-01	0.00E+00	1.38E-02	-3.16E+00
	PENRM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	PENRT	MJ	1.58E+01	7.41E-01	4.86E+00	1.23E-01	0.00E+00	1.38E-02	-3.16E+00
	SM	kg	7.66E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	RSF	MJ	1.27E-02	3.79E-04	6.47E-04	6.32E-05	0.00E+00	4.39E-06	-3.94E-03
	NRSF	MJ	-1.43E-02	1.36E-03	9.53E-03	2.26E-04	0.00E+00	1.26E-05	1.12E-01
	FW	m^3	1.71E-01	7.92E-05	2.50E-04	1.32E-05	0.00E+00	1.65E-05	-4.93E-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"

End of life - Waste									
Indicator		Unit	A1-A3	A4	C1	C2	C3	C4	D
	HWD	kg	2.96E-03	3.82E-05	1.43E-04	6.37E-06	0.00E+00	0.00E+00	-2.63E-03
	NHWD	kg	9.14E-02	3.60E-02	5.76E-03	6.01E-03	0.00E+00	1.00E-01	-6.79E-02
	RWD	kg	8.31E-05	5.05E-06	3.38E-05	8.41E-07	0.00E+00	0.00E+00	-1.12E-05

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"

End of life - Output flow									
Indicator		Unit	A1-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
	MFR	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.00E-01	0.00E+00	0.00E+00
	MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	EEE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	EET	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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*10-3 = 0.009"

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	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.

Indoor environment

Not relevant.

Additional Environmental Information

Additional environmental impact indicators required in NPCR Part A for construction products								
Indicator	**Unit**	A1-A3	A4	C1	C2	C3	C4	D
GWPIOBC	kg CO_2 -eq	1.44E+00	4.90E-02	3.54E-01	8.17E-03	0.00E+00	4.29E-04	-2.64E-01

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.

Bibliography

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NPCR 013 Part B for Steel and Aluminium Construction Products , Ver. 4.0, 06.10.2021, EPD Norway.

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