epd-norway
Global Program Operator

ECO PLATFORM EPD VERIFIED

Environmental Product Declaration

In accordance with ISO14025:2006 and EN15804:2012+A2:2019

Siconnect HCP (High Corrosion Protection) Range

Owner of the declaration:
Sikla Corporate Headquarters GmbH

Product name:
Siconnect – High Corrosion Protection (HCP)

Declared unit:
1 kg average of Siconnect HCP

Product category /PCR:
NPCR Part B for Steel and Aluminum Construction Products (references to EN15804+A2)

Program holder and publisher:
The Norwegian EPD foundation

Declaration number:
NEPD-7135-6533-EN

Registration number:
NEPD-7135-6533-EN

Issue date: 12.07.2024

Valid to: 12.07.2029

sikla

The Norwegian
EPD Foundation

General information

Product:
Siconnect - High Corrosion Protection (HCP)

Program operator:
The Norwegian EPD Foundation
Post Box 5250 Majorstuen, 0303 Oslo, Norway
Tlf: +47 23 08 80 00
e-mail: post@epd-norge.no

Declaration number:
NEPD-7135-6533-EN

This declaration is based on Product Category Rules:
NPCR Part B for Steel and Aluminum Construction Products (references to EN15804+A2)

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, life cycle assessment data and evidence.

Declared unit:

Declared unit with option:
1 average kg of Siconnect HCP
Modules A1-A3, A4, C1-C4 and D

Functional unit:
NA

Verification:
Independent verification of the declaration and data, according to ISO14025:2010

internal ☐ external ☒

Silvia Vilčeková
Independent verifier approved by EPD Norway

Owner of the declaration:
Sikla
Contact person: Doreen Volz
Phone: +49 7729 948 437
e-mail: doreen.volz@sikla.com

Manufacturer:
Sikla Corporate Headquarters GmbH
In der Lache 17
78956 Villingen-Schwenningen
Phone: +49 7720 948 0
e-mail: info@sikla.com

Place of production:
Sikla production facilities in Europe

Management system:
ISO 9001:2015

Organization no:
HRB 729698

Issue date:
12.07.2024

Valid to:
12.07.2029

Year of study:
2021-2022

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

The EPD has been worked out by:
Trebostad, M., Elisa, M., Energiråd AS

Approved

Manager of EPD Norway

Product

Product description:

Siconnect is a versatile modular support system for various installation requirements consisting of channels, cantilevers, pipe clamps, fixings, fastenings and other accessories. The Siconnect High Corrosion Protection (HCP) range provides assurance against corrosion: Components designated «HCP» comply with corrosivity category C4 according to EN ISO 12944-2.

Product specification

This EPD covers Siconnect HCP products, which are manufactured from construction steel. The manufacturing process of these products includes cutting, punching, forming, and welding of the steel input. To allocate a specific coating to one of the HCP products, factors such as the products functionality and industry expectations are considered.

Materials	kg	%
Steel, low-alloyed	0.987	98,7
Rubber, synthetic	0.013	1,3

Market:

Global

Reference service life, product:

This EPD does not declare the construction process (A5) and use stages (B1-B7). The lifetime of zinc coated steel will depend on specific application and environmental conditions. Hence, a reference service life is not declared for the product.

Reference service life, building:

N/A

LCA: Calculation rules

Declared unit:

1 average kg of Siconnect HCP

Cut-off criteria:

All major raw materials and all the essential energy are included. The production process for raw materials and energy flows that represent very small amounts (<1%) are not included.

Allocation:

The allocation is made according to the requirements of EN 15804. The energy, water and waste consumption of the company's own production is equally allocated to all products by mass allocation. Effects of primary production of recycled materials are allocated to the main product in which the material is used. The recycling process and transport of the material are allocated to this analysis.

Data quality:

Upstream and core:

Specific data was acquired by using sales data from Sikla for 2021 and 2022. Company specific activity data was acquired from Sikla (2021) together with specific data for product composition and sales data (2021-2022) to make a suitable representation of an average configuration of SiConnect. Upstream supplier activity data is modeled using the corresponding ecoinvent 3.9.1 production and market activity data based on geographic representations for Europe.

Downstream:

Scenarios were developed based on PCR and sales statistics. PCR defaults and database data were used.

Conversion to process flows and LCI:

Conversion to primary flows and environmental impacts was done using OpenLCA (version 1.11.0). Datasets from the ecoinvent v3.9.1 cutoff database with the v.2 EN15804 add-on developed by GreenDelta were selected according to their technological, geographical and temporal representativeness for the assessed process.

Impact assessment:

Open LCA software (version 2.0.1) was used to perform the impact assessment of this LCA. The latter refers to the LCIA characterization models, factors and methods as given in EN15804:2012+A2:2019, labelled 'EN15804 + A2' in Open LCA.

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

Product stage			Assembly stage		Use stage							End of life stage				Benefits & loads beyond system boundary
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:

The scope of the study is cradle to gate with options, described as A1-A3, A4, C1-C4 and D modules. A4 scenario is calculated for average transport in Europe. In addition, impact data per 1 km of global shipment is supplied. Two end-of-life scenarios (C1-C4 + D) are considered, one for recycling (scenario A), and one for 100% reuse of the steel components (scenario B).

Modules A1-A3 considers the life cycle stages from the extraction of raw materials to the point where the finished product is ready for shipment, including all transport stages. Steel scrap from the production processes is treated in a closed loop, so that it is returned to production as an input.

Module A4 considers transport from Sikla's facilities to the end user. Average impacts from transport to customers are given for the European Economic Area (A4EUR). In addition, standard impacts for transport to/from ports (A4PORT) and impacts per km of sea transport (A4SEA) are given for the global market, so that the impact of transport to non-EUR customers can be estimated using the sea distance from Hamburg to the local port.

End-of-Life: Two scenarios are considered for the end-of-life phases (C1-C4 and D), one for a recycling route (scenario A) and one for a product reuse route (scenario B)

Module $C1_A$ and $C1_B$ accounts for the disassembly of Siconnect HCP.

Modules $C2_A$-$C4_A$ includes the transport to scrap handling facility, rubber waste incineration, steel scrap sorting and preparation for remelting, as well as landfilling of rubber incineration residues and a 2% fraction of the steel.

Module D_A includes the impacts of melting and casting of recovered steel scrap, and the potential benefits of avoiding the use of virgin metals for the next product life cycle.

Modules $C2_B$-$C4_B$ accounts for the transport, waste incineration and residue landfilling for the rubber components.

Module D_B includes the loads of transporting and remounting the steel components at a location 30 km from the first location. Loads from production, transport and replacement of the rubber components are included. Potential benefits from avoided production and transport of new steel product are included. Potential maintenance of the reused product is not included.

LCA: Scenarios and additional technical information

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

Transport from production place to assembly/user (A4)

Transport from production place to assembly/user (A4)	Capacity utilisation (incl. return) %	Distance (km)	Fuel/Energy consumption	Unit	Value
Truck_EUR	53%	800	0.0228	l/t*km	14.82
Truck_GLO	53%	847.5	0.0228	l/t*km	19.323
Boat_GLO	70%	x	0.0003	l/t*km HFO	N/A

Calculations for transport to the European market is based on a 50/50 sales share between Germay and the rest of the region. For transport within Germany a distance of 300 km is used, based on the PCR. For the rest of Europe a distance of 1300 km is used. Based on overall sales trends for Sikla, this is a conservative approach, with an overestimation of the actual distance. Data sets from the ecoinvent database were used.

For deliveries to the global market, the transport distance by truck is based on the transport distance from Sikla's plants to Hamburg and a standard transport distance of 300 km from the port of destination to the end user. Sea transport to global customers can be estimated by determining the sea distance from Hamburg to the local port.

Project specific transport data is available from Sikla on request.

End of Life ($C1_A$, $C3_A$, $C4_A$)

	Unit	Value
Hazardous waste disposed	kg	-
Collected as mixed construction waste	kg	0.013
Reuse	kg	-
Recycling	kg	0.967
Energy recovery	kg	-
To landfill	kg	0.02

All SiConnect HCP is disassembled by operation of electrical screwdriver, and transported for waste handling. The rubber is incinerated without energy recovery. All steel scrap is sorted and pressed. 2% of the steel scrap is not recovered and therefore landfilled. The rest of the steel is sent for remelting.

Transport to waste processing ($C2_A$)

Transport from production place to assembly/user (C2)	Capacity utilisation (incl. return) %	Distance (km)	Fuel/Energy consumption	Unit	Value
Truck, lorry 16-32 metric ton, EURO6	37,00%	30	0.0436	l/t*km	1.308

Benefits and loads beyond the system boundaries (D_A)

	Unit	Value
Remelted steel scrap	kg	0.967
Substituted low-alloyed steel	kg	0.856

The recovered steel from the product is assumed to be used as scrap input in the production of secondary steel. Due to losses in the remelting process, this steel substitutes a smaller amount of new steel. Primary steel will have a varying degree of recycled content. For this study, the low-alloyed secondary steel is assumed to replace average European steel produced by blast oxygen furnaces.

Scenarios for reuse

The following information describes the End-of-life modules in the reuse scenario.

End of Life ($C1_B$, $C3_B$, $C4_B$)

	Unit	Value
Hazardous waste disposed	kg	-
Collected as mixed construction waste	kg	0.013
Reuse	kg	0.987
Recycling	kg	-
Energy recovery	kg	-
To landfill	kg	-

After disassembly the rubber components are sent to waste treatment, while all steel components are transported to the new assembly site. Waste rubber is incinerated without energy recovery.

Transport to waste processing ($C2_B$)

Transport from production place to assembly/user (C2)	Capacity utilisation (incl. return) %	Distance (km)	Fuel/Energy consumption	Unit	Value
Truck, lorry 16-32 metric ton, EURO6	37,00%	30	0.0436	l/t*km	1.308

The module only considers the transport of waste rubber to waste treatment. The handling of reusable steel products is considered in the D_B module.

Benefits and loads beyond the system boundaries (D_B)

	Unit	value
Load. New rubber linings, produced and transported	kg	0.013
Load. Transport of reusable Siconnect to new location	kg*km	0.987*30
Load. Reassembly	kg	1
Benefit. Avoided production and transport of Siconnect HCP steel components	kg	0.987

The Siconnect system is adjustable and reusable without material losses or structural degradation, except for the rubber linings. All the steel components are therefore transported to a new assembly site (assumed avg. 30 km) and reassembled (same as dismount in $C1_A$). Production and transport of new rubber linings are included. Reused Siconnect HCP is considered to replace the production and transport of new Siconnect HCP.

Core environmental impact indicators.

Indicator	Unit	A1-A3	$A4_{EUR}$	$A4_{PORT}$	$A4_{SEA}$	$C1_A$	$C2_A$	$C3_A$	$C4_A$	D_A
GWP - total	kg CO2 eq	3.89E+00	8.05E-02	1.02E-05	8.57E-02	5.13E-04	5.55E-03	1.31E-01	1.20E-04	-1.34E+00
GWP - fossil	kg CO2 eq	3.75E+00	8.04E-02	1.02E-05	8.56E-02	4.95E-04	5.54E-03	1.25E-01	1.20E-04	-1.34E+00
GWP - biogenic	kg CO2 eq	1.43E-01	6.16E-05	-2.30E-09	5.29E-05	1.70E-05	4.91E-06	6.26E-03	2.22E-07	3.51E-03
GWP - luluc	kg CO2 eq	3.93E-03	3.92E-05	7.86E-09	4.25E-05	1.24E-06	2.74E-06	2.74E-05	7.33E-08	-2.35E-04
ODP	kg CFC11 eq	8.55E-08	1.82E-09	1.54E-13	1.77E-09	9.44E-12	1.21E-10	4.61E-10	3.53E-12	-2.83E-08
AP	molc H+ eq	1.83E-02	1.99E-04	3.04E-07	2.20E-04	2.84E-06	1.21E-05	2.83E-04	9.08E-07	-5.76E-03
EP- freshwater	kg P eq	6.31E+01	5.87E-01	6.16E-05	6.46E-01	1.89E-03	3.89E-02	3.94E-01	1.41E-03	-1.91E+00
EP -marine	kg N eq	4.15E-03	5.42E-05	7.58E-08	5.91E-05	4.59E-07	3.06E-06	6.55E-05	3.55E-07	-1.29E-03
EP - terrestrial	molc N eq	4.21E-02	5.56E-04	8.39E-07	6.09E-04	4.16E-06	3.11E-05	7.32E-04	3.81E-06	-1.40E-02
POCP	kg NMVOC eq	1.67E-02	3.25E-04	2.27E-07	3.43E-04	1.33E-06	1.88E-05	2.15E-04	1.31E-06	-7.22E-03
ADP-M&M[2]	kg Sb-Eq	1.95E-04	2.30E-07	9.95E-12	2.45E-07	6.03E-09	1.85E-08	1.57E-06	1.72E-10	-1.43E-05
ADP-fossil[2]	MJ	4.85E+01	1.23E+00	1.26E-04	1.31E+00	1.15E-02	7.93E-02	3.17E-01	3.03E-03	-1.22E+01
WDP[2]	m3	1.83E+00	6.31E-03	3.54E-07	6.65E-03	2.85E-04	3.94E-04	8.25E-03	9.54E-06	-2.51E-01

GWP-total: *Global Warming Potential;* ***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; See "additional Norwegian requirements" for indicator given as PO4 eq.* ***EP-marine:*** *Eutrophication potential, fraction of nutrients reaching freshwater end compartment;* ***EP-terrestrial:*** *Eutrophication potential, Accumulated Exceedance;* ***POCP****: Formation potential of tropospheric ozone;* ***ADP-M&M****: Abiotic depletion potential for non-fossil resources (minerals and metals);* ***ADP-fossil:*** *Abiotic depletion potential for fossil resources;* ***WDP:*** *Water deprivation potential, deprivation weighted water consumption*

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

Additional environmental impact indicators

Indicator	Unit	A1-A3	$A4_{EUR}$	$A4_{PORT}$	$A4_{SEA}$	$C1_A$	$C2_A$	$C3_A$	$C4_A$	D_A
PM	Disease incidence	2.46E-07	7.96E-09	2.99E-13	8.46E-09	1.04E-11	4.13E-10	3.67E-09	2.04E-11	-9.25E-08
IRP[1]	kBq U235 eq.	4.71E-01	1.54E-03	5.99E-08	1.48E-03	3.18E-04	1.07E-04	2.75E-03	1.97E-06	5.78E-02
ETP-fw[2]	CTUe	6.31E+01	5.87E-01	6.16E-05	6.46E-01	1.89E-03	3.89E-02	3.94E-01	1.41E-03	-1.91E+00
HTP-c[2]	CTUh	1.92E-08	3.59E-11	4.41E-15	3.82E-11	2.48E-13	2.54E-12	3.83E-11	5.08E-14	1.18E-08
HTP-nc[2]	CTUh	1.03E-07	8.78E-10	3.62E-14	9.38E-10	9.94E-12	5.63E-11	1.77E-09	6.36E-13	-1.09E-08
SQP[2]	Dimensionless	1.97E+01	1.24E+00	9.19E-06	1.31E+00	2.19E-03	4.76E-02	5.83E-01	5.98E-03	-4.22E+00

PM: *Particulate matter emissions;* ***IRP:*** *Ionising radiation, human health;* ***ETP-fw:*** *Ecotoxicity (freshwater);* ***ETP-c:*** *Human toxicity, cancer effects;* ***HTP-nc:*** *Human toxicity, non-cancer effects;* ***SQP:*** *Land use related impacts / soil quality*

[1] 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.

[2] 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

Resource use

Indicator	Unit	A1-A3	$A4_{EUR}$	$A4_{PORT}$	$A4_{SEA}$	$C1_A$	$C2_A$	$C3_A$	$C4_A$	D_A
RPEE	MJ	5.90E+00	1.78E-02	8.83E-07	1.81E-02	2.53E-03	1.24E-03	5.36E-02	4.05E-05	-9.87E-01
RPEM	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
TPE	MJ	5.90E+00	1.78E-02	8.83E-07	1.81E-02	2.53E-03	1.24E-03	5.36E-02	4.05E-05	-9.87E-01
NRPE	MJ	4.72E+01	1.12E+00	1.14E-04	1.19E+00	1.13E-02	7.24E-02	3.00E-01	2.75E-03	-1.20E+01
NRPM	MJ	5,43E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-5,43E-01	0,00E+00	0,00E+00
TRPE	MJ	4,77E+01	1,12E+00	1,14E-04	1,19E+00	1,13E-02	7,24E-02	-2,43E-01	2,75E-03	-1,20E+01
SM	kg	4.60E-01	1.23E-03	8.03E-08	1.19E-03	1.48E-04	8.70E-05	1.79E-03	1.58E-06	8.02E-01
RSF	MJ	1.11E-01	3.00E-04	7.56E-09	2.54E-04	8.57E-05	2.34E-05	7.09E-04	4.01E-07	1.91E-02
NRSF	MJ	3.90E-01	6.22E-04	2.34E-08	6.05E-04	8.51E-05	4.61E-05	8.02E-04	6.73E-07	3.49E-03
W	m3	3.94E-02	1.64E-04	6.95E-09	1.76E-04	9.10E-06	9.58E-06	2.81E-04	3.12E-06	-2.50E-03

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*** *Nonrenewable primary energy resources used as energy carrier;* ***NRPM*** *Nonrenewable 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

Indicator	Unit	A1-A3	$A4_{EUR}$	$A4_{PORT}$	$A4_{SEA}$	$C1_A$	$C2_A$	$C3_A$	$C4_A$	D_A
HW	kg	9.65E-01	1.15E-03	1.26E-07	1.30E-03	1.12E-05	7.44E-05	3.59E-03	3.95E-04	-3.62E-01
NHW	kg	4.36E-01	1.06E-01	1.92E-07	1.12E-01	3.48E-05	3.84E-03	7.34E-03	2.00E-02	-5.41E-02
RW	kg	1.20E-04	3.72E-07	1.37E-11	3.55E-07	8.13E-08	2.59E-08	7.01E-07	4.58E-10	1.50E-05

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

End of life – output flow

Indicator	Unit	A1-A3	$A4_{EUR}$	$A4_{PORT}$	$A4_{SEA}$	$C1_A$	$C2_A$	$C3_A$	$C4_A$	D_A
CR	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
MR	kg	5.00E-01	1.06E-03	7.90E-08	1.02E-03	1.44E-04	7.88E-05	9.80E-01	1.33E-06	-2.11E-01
MER	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
EEE	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
ETE	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

CR *Components for reuse;* ***MR*** *Materials for recycling;* ***MER*** *Materials for energy recovery;* ***EEE*** *Exported electric energy;* ***ETE*** *Exported thermal energy.*

Information describing the biogenic carbon content at the factory gate.

Biogenic carbon content	**Unit**	**Value**
Biogenic carbon content in product	kg C	0.00E+00
Biogenic carbon content in the accompanying packaging	kg C	1.83E-03

Calculations of biogenic carbon content in cardboard is performed according to Soldal, E., & Modahl, S. I (2022).

Additional Results (for reuse Scenario)

Core environmental impact indicators

Indicator	Unit	A1-A3	$A4_{EUR}$	$A4_{PORT}$	$A4_{SEA}$	$C1_B$	$C2_B$	$C3_B$	$C4_B$	D_B
GWP - total	kg CO2 eq	3.89E+00	8.05E-02	1.02E-05	8.57E-02	5.13E-04	3,85E-05	2.56E-05	2.18E-06	-3.61E+00
GWP - fossil	kg CO2 eq	3.75E+00	8.04E-02	1.02E-05	8.56E-02	4.95E-04	3,85E-05	2.56E-05	2.16E-06	-3.47E+00
GWP - biogenic	kg CO2 eq	1.43E-01	6.16E-05	-2.30E-09	5.29E-05	1.70E-05	2,95E-08	6-71E-03	1.85E-08	-1.32E-01
GWP - luluc	kg CO2 eq	3.93E-03	3.92E-05	7.86E-09	4.25E-05	1.24E-06	1,88E-08	1.25E-08	2.70E-10	-2.89E-03
ODP	kg CFC11 eq	8.55E-08	1.82E-09	1.54E-13	1.77E-09	9.44E-12	8,73E-13	5.82E-13	3.11E-14	-8.11E-08
AP	molc H+ eq	1.83E-02	1.99E-04	3.04E-07	2.20E-04	2.84E-06	9,52E-08	6.35E-08	1.90E-08	-1.56E-02
EP- freshwater	kg P eq	6.31E+01	5.87E-01	6.16E-05	6.46E-01	1.89E-03	2,81E-04	1.87E-04	1.25E-05	-2.36E+01
EP -marine	kg N eq	4.15E-03	5.42E-05	7.58E-08	5.91E-05	4.59E-07	2,59E-08	1.73E-08	8.24E-09	-3.52E-03
EP - terrestrial	molc N eq	4.21E-02	5.56E-04	8.39E-07	6.09E-04	4.16E-06	2,66E-07	1.77E-07	8.94E-08	-3.56E-02
POCP	kg NMVOC eq	1.67E-02	3.25E-04	2.27E-07	3.43E-04	1.33E-06	1,55E-07	1.04E-07	2.74E-08	-1.49E-02
ADP-M&M[2]	kg Sb-Eq	1.95E-04	2.30E-07	9.95E-12	2.45E-07	6.03E-09	1,10E-10	7.34E-11	8.67E-13	-5.41E-05
ADP-fossil[2]	MJ	4.85E+01	1.23E+00	1.26E-04	1.31E+00	1.15E-02	5,88E-04	3.92E-04	2.75E-05	-4.35E+01
WDP[2]	m3	1.83E+00	6.31E-03	3.54E-07	6.65E-03	2.85E-04	3,02E-06	2.01E-06	7.24E-08	-1.45E+00

GWP-total: *Global Warming Potential;* ***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; See "additional Norwegian requirements" for indicator given as PO4 eq.* ***EP-marine:*** *Eutrophication potential, fraction of nutrients reaching freshwater end compartment;* ***EP-terrestrial:*** *Eutrophication potential, Accumulated Exceedance;* ***POCP****: Formation potential of tropospheric ozone;* ***ADP-M&M****: Abiotic depletion potential for non-fossil resources (minerals and metals);* ***ADP-fossil:*** *Abiotic depletion potential for fossil resources;* ***WDP:*** *Water deprivation potential, deprivation weighted water consumption*

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

Additional environmental impact indicators

Indicator	Unit	A1-A3	$A4_{EUR}$	$A4_{PORT}$	$A4_{SEA}$	$C1_B$	$C2_B$	$C3_B$	$C4_B$	D_B
PM	Disease incidence	2.46E-07	7.96E-09	2.99E-13	8.46E-09	1.04E-11	3,81E-12	2.54E-12	5.02E-13	-2.35E-07
IRP[1]	kBq U235 eq.	4.71E-01	1.54E-03	5.99E-08	1.48E-03	3.18E-04	7,36E-07	4.91E-07	2.04E-08	-4.06E-01
ETP-fw[2]	CTUe	6.31E+01	5.87E-01	6.16E-05	6.46E-01	1.89E-03	2,81E-04	1.87E-04	1.25E-05	-2.36E+01
HTP-c[2]	CTUh	1.92E-08	3.59E-11	4.41E-15	3.82E-11	2.48E-13	1,72E-14	1.14E-14	7.12E-16	-1.80E-08
HTP-nc[2]	CTUh	1.03E-07	8.78E-10	3.62E-14	9.38E-10	9.94E-12	4,20E-13	2.80E-13	6.79E-15	-6.51E-08
SQP[2]	Dimensionless	1.97E+01	1.24E+00	9.19E-06	1.31E+00	2.19E-03	5,92E-04	3.95E-04	2.50E-05	-1.86E+01

PM: *Particulate matter emissions;* ***IRP:*** *Ionising radiation, human health;* ***ETP-fw:*** *Ecotoxicity (freshwater);* ***ETP-c:*** *Human toxicity, cancer effects;* ***HTP-nc:*** *Human toxicity, non-cancer effects;* ***SQP:*** *Land use related impacts / soil quality*

[1] 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.

[2] 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

Resource use

Parameter	Unit	A1-A3	$A4_{EUR}$	$A4_{PORT}$	$A4_{SEA}$	$C1_B$	$C2_B$	$C3_B$	$C4_B$	D_B
RPEE	MJ	5.90E+00	1.78E-02	8.83E-07	1.81E-02	2.53E-03	8,54E-06	5.69E-06	2.39E-07	-5.24E+00
RPEM	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
TPE	MJ	5.90E+00	1.78E-02	8.83E-07	1.81E-02	2.53E-03	8,54E-06	5.69E-06	2.39E-07	-5.24E+00
NRPE	MJ	4.72E+01	1.12E+00	1.14E-04	1.19E+00	1.13E-02	5,37E-04	3.58E-04	2.52E-05	-4.24E+01
NRPM	MJ	5,43E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-5,43E-01	0,00E+00	0,00E+00
TRPE	MJ	4,77E+01	1,12E+00	1,14E-04	1,19E+00	1,13E-02	5,37E-04	-5,42E-01	2,52E-05	-4,24E+01
SM	kg	4.60E-01	1.23E-03	8.03E-08	1.19E-03	1.48E-04	5,88E-07	3.92E-07	1.74E-07	-4.45E-01
RSF	MJ	1.11E-01	3.00E-04	7.56E-09	2.54E-04	8.57E-05	1,44E-07	9.57E-08	9.57E-08	-1.03E-01
NRSF	MJ	3.90E-01	6.22E-04	2.34E-08	6.05E-04	8.51E-05	2,98E-07	1.98E-07	7.82E-09	-3.56E-01
W	m3	3.94E-02	1.64E-04	6.95E-09	1.76E-04	9.10E-06	7,85E-08	5.23E-08	1.66E-09	-3.06E-02

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*** *Nonrenewable primary energy resources used as energy carrier;* ***NRPM*** *Nonrenewable 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	$A4_{EUR}$	$A4_{PORT}$	$A4_{SEA}$	$C1_B$	$C2_B$	$C3_B$	$C4_B$	D_B
HW	kg	9.65E-01	1.15E-03	1.26E-07	1.30E-03	1.12E-05	5,51E-07	3.67E-07	3.93E-04	-9.34E-01
NHW	kg	4.36E-01	1.06E-01	1.92E-07	1.12E-01	3.48E-05	5,06E-05	3.37E-05	3.10E-04	-5.09E-01
RW	kg	1.20E-04	3.72E-07	1.37E-11	3.55E-07	8.13E-08	1,78E-10	1.19E-10	4.88E-12	-1.04E-04

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

End of life – output flow

Parameter	Unit	A1-A3	$A4_{EUR}$	$A4_{PORT}$	$A4_{SEA}$	$C1_B$	$C2_B$	$C3_B$	$C4_B$	D_B
CR	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.87E-01	0,00E+00	0.00E+00	0.00E+00	9.87E-01
MR	kg	5.00E-01	1.06E-03	7.90E-08	1.02E-03	1.44E-04	5,07E-07	3.38E-07	1.67E-07	-4.85E-01
MER	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
EEE	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
ETE	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

CR *Components for reuse;* ***MR*** *Materials for recycling;* ***MER*** *Materials for energy recovery;* ***EEE*** *Exported electric energy;* ***ETE*** *Exported thermal energy.*

Information describing the biogenic carbon content at the factory gate.

Biogenic carbon content	Unit	Value
Biogenic carbon content in product	kg C	0.00E+00
Biogenic carbon content in the accompanying packaging	kg C	1.83E-03

Calculations of biogenic carbon content in cardboard is performed according to Soldal, E., & Modahl, S. I (2022).

Additional requirements

Location based electricity mix from the use of electricity in manufacturing

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 prosess (foreground/core) per functional unit.

Electricity system	Unit	Value
Germany national electricity grid	kg CO2 -eq/kWh	0.477
Roof-mounted solar PV	kg CO2 -eq/kWh	0.073
Sikla electricity use	kg CO2 -eq/kWh	0.401

Additional environmental impact indicators required for construction products

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. The amount of carbon in product and packaging estimated according to Soldal & Modhal (2022)

Parameter	Unit	A1-A3	$A4_{EUR}$	$A4_{PORT}$	$A4_{SEA}$	$C1_A$	$C2_A$	$C3_A$	$C4_A$	D_A
GWP-IOBC	kg	3.89E+00	8.05E-02	1.02E-05	8.57E-02	5.13E-04	5.55E-03	1.25E-01	1.20E-04	-1.34E+00

GWP-IOBC *Global warming potential calculated according to the principle of instantaneous oxidation.*

Parameter	Unit	A1-A3	$A4_{EUR}$	$A4_{PORT}$	$A4_{SEA}$	$C1_B$	$C2_B$	$C3_B$	$C4_B$	D_B
GWP-IOBC	kg	3.89E+00	8.05E-02	1.02E-05	8.57E-02	5.13E-04	3.85E-05	2.57E-05	2.18E-06	-3.61E+00

GWP-IOBC *Global warming potential calculated according to the principle of instantaneous oxidation.*

NOTE – The amount of biogenic carbon in the product system under investigation is small. GWP-total and GWP-IOBC are therefore equivalent.

Hazardous substances

The declaration is based upon reference to threshold values and/or test results and/or material safety data sheets provided to EPD verifiers. Documentation available upon request to EPD owner.

- ✓ The product contains no substances given by the REACH Candidate list.
- ☐ The product contains substances given by the REACH Candidate list that are less than 0,1 % by weight.
- ☐ The product contains dangerous substances, more then 0,1% by weight, given by the REACH Candidate List, see table.
- ☐ The product contains no substances given by the REACH Candidate list.
- ☐ The product is classified as hazardous waste, see table.

Indoor environment

The product meets the requirements for low emissions.

Carbon footprint

Carbon footprint has not been worked out for the product.

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+A2:2019	Sustainability of construction works - Environmental product declaration - Core rules for the product category of construction products
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epd-norway Global Program Operator	**Program Operator**	tlf	+47 23 08 80 00
	The Norwegian EPD Foundation		
	Post Box 5250 Majorstuen, 0303 Oslo	e-post:	post@epd-norge.no
	Norway	web	www.epd-norge.no
epd-norway Global Program Operator	**Publisher**	tlf	+47 23 08 80 00
	The Norwegian EPD Foundation		
	Post Box 5250 Majorstuen, 0303 Oslo	e-post:	post@epd-norge.no
	Norway	web	www.epd-norge.no
sikla	**Owner of the declaration**	tlf	+49 7720 948 0
	Sikla GmbH	Fax	+49 7720 948 337
	In der Lache 17	e-post:	info@sikla.de
	D-78056 Villingen-Schwenningen	web	www.sikla.com
energiråd	**Author of the life cycle assesment**	tlf	+47 98 25 90 10
	Energiråd AS	Fax	
	Trippevegen 1, 6009 Ålesund	e-post:	harald@energirad.no
	Norway	web	www.energirad.no
ECO PLATFORM EPD VERIFIED	ECO Platform	web	www.eco-platform.org
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