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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: Program operator:	Aulis Lundell Oy
Publisher:	The Norwegian EPD Foundation
Declaration number:	The Norwegian EPD Foundation NEPD-1906-832-EN
Registration number:	NEPD-1906-832-EN
ECO Platform reference number:	-
Issue date:	22.10.2019
Valid to:	22.10.2024

Light weight steel profile DX51D+Z

Aulis Lundell Oy

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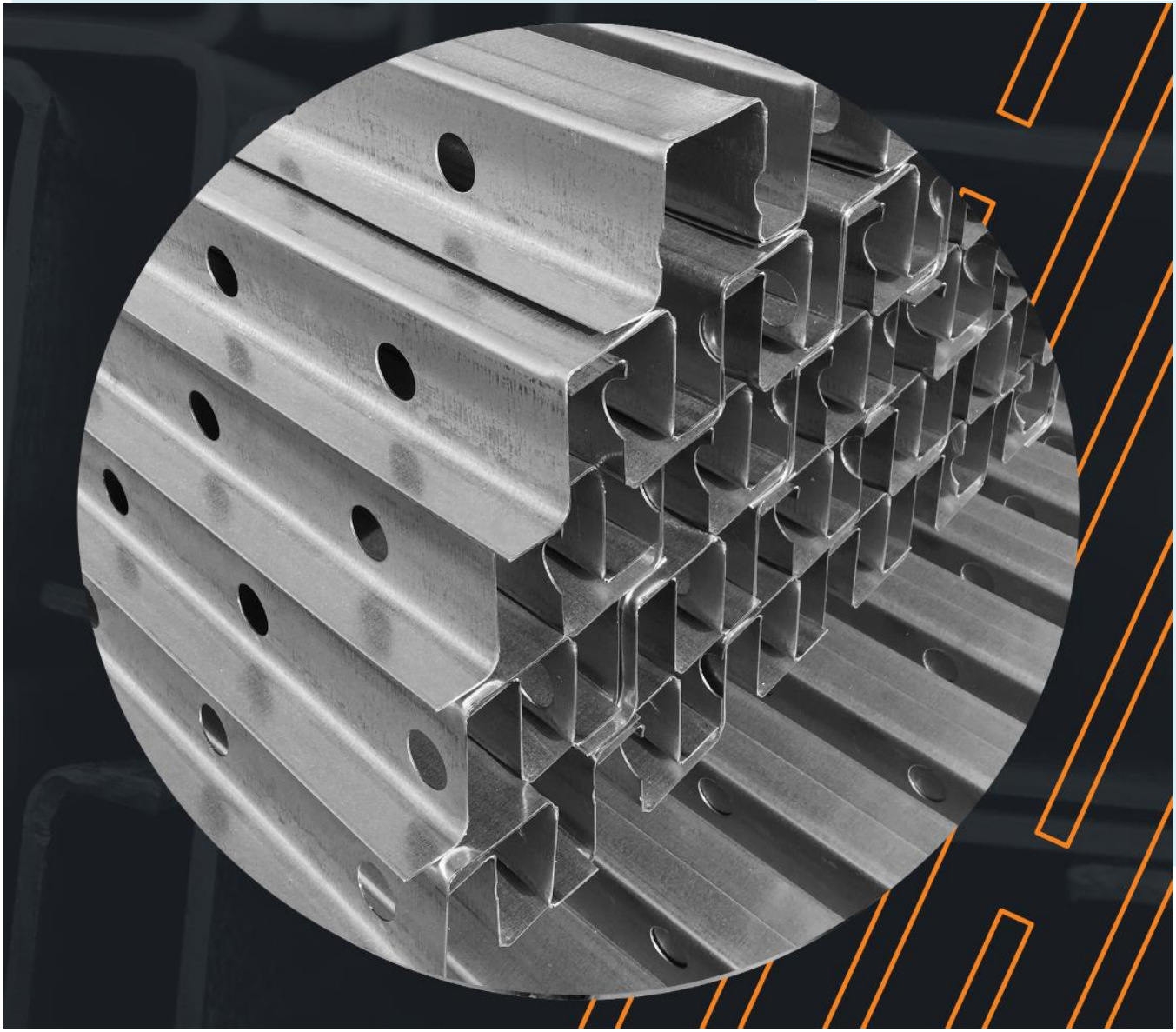

General information

Product:
Light weight steel profile DX51D+Z

Program operator:
The Norwegian EPD Foundation
Post Box 5250 Majorstuen, 0303 Oslo
Phone: +47 97722020
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Declaration number: NEPD-1906-832-EN

ECO Platform reference number:

This declaration is based on Product Category Rules:
CEN Standard EN 15804:2012 +A1:2013
NPCR Construction products and services – Part A – April 2017
NPCR 013:2019 Part B for steel and aluminium construction products version 3.0

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:

Declared unit with option:
1 kg

Functional unit:

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:
Selamawit Mamo Fufa
Selamawit Mamo Fufa, PhD
(Independent verifier approved by EPD Norway)

Owner of the declaration:
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Place of production:
Lohja, Finland

Management system:

Organisation no:
0351049-5

Issue date: 22.10.2019

Valid to: 22.10.2024

Year of study:
2018

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

The EPD has been worked out by:
Anastasia Sipari,
Bionova Ltd

Approved
Håkon Hauan
Managing Director of EPD-Norway

Product

Product description :

Light weight steel profiles DX51+Z are used to be applied as part assemblies in internal walls and ceiling constructions. Typical applications are residential buildings, industrial and commercial buildings, sports facilities, schools and hospitals.

This EPD represents light weight steel profiles DX51+Z manufactured by Aulis Lundell Oy at their production site in Lohja, Finland. Following products are covered with this EPD: LR, GK, FR, SK, Purlins (L, C, U, Z), HTL, HTLRuode, HTLN, HTLUNR, HTLR, HTLP, XHTL. Products with sealants are not included in the scope of this EPD.

The product is made of galvanized steel plate (DX51+ Z 275 g/m^2). The product is available in thicknesses range from 0,5mm to 2mm. Thickness of studied average product is 1mm. Effect of thickness variety on LCIA results for product stage (A1-A3) are less than +/- 10%.

Material	kg	%
Steel	1	100

Technical data :

The manufacturing of steel profiles comprises the cutting, cold forming punching of the steel plate to desired shape and size. The metal zinc coating improves corrosion resistance and extends service life of the product. More information can be found from CE-declaration or Declaration of Performance on www.aulislundell.fi/products.

Product standards:

EN 14195 Metal framing components for gypsum board systems - Definitions, requirements and test methods

EN 14353 Metal beads and feature profiles for use with gypsum plasterboards - Definitions, requirements and test methods

Market:

Finland and other Nordic countries

Reference service life of product:

The most important factors in evaluating service life of steel materials in dry and moderately humid conditions are design, execution and maintenance. If installed properly and moisture exposure is low or moderate, the service life of the steel profiles is 100 years at minimum.

Mass of different Light weight steel profiles DX51+Z product can be used in order to define environmental impacts per meter. Data is presented for some steel profiles in the table below. More information about products can be found at the website https://www.aulislundell.fi/products.

Product	kg/m	Product	kg/m
HTL 25/70 x 0,7	0,88	HTL Ruode 25/70 x 0,7	0,88
HTL 25/70 x 1,0	1,25	HTL Ruode 25/70 x 1,0	1,25
HTL 25/70 x 1,2	1,49	HTL Ruode 25/70 x 1,2	1,49
HTL 21/40 x 0,7	0,67	HTL Ruode 21/40 x 0,7	0,67
HTL 21/40 x 1,0	0,94	HTL Ruode 21/40 x 1,0	0,94
HTL 21/40 x 1,2	1,12	HTL Ruode 21/40 x 1,2	1,12
HTL 30/40 x 0,7	0,77	HTLRuode 30/40 x 0,7	0,77
HTL 30/40 x 1,0	1,09	HTLRuode 30/40 x 1,0	1,09
HTL 30/40 x 1,2	1,3	HTLRuode 30/40 x 1,2	1,3
HTL 30/40 x 1,5	1,6	HTLRuode 30/40 x 1,5	1,6

In order to calculate emissions of certain type of steel profile used in construction the following equation can be applied:

*Length of profile * mass of the product (kg/m)*environmental impact (e.g kgCO2e/kg)*

LCA: Calculation rules

Declared unit: 1kg

System boundary: Cradle to gate with options (A1-A4, C1-C4, D).

Data quality:

Data is collected and treated according standard EN 15804:2012. The data is representative according to temporal, geographical and technological requirements.

Temporal: Manufacturing data (A3) represents calendar year 2018, and was supplied by producer. Data collected from production facility covers consumption of raw-materials, energy and water, amount of generated waste. No average data has been used for different locations. Emission data was taken from Ecoinvent-database and represents generic data. Generic data has been created or updated within the last 5 years. Calculations have been carried out using One Click LCA.

Geographical: Electricity data represents Finland. Steel raw materials and other materials from module A1 and A3 represent European data.

Technological: Data represents technology in use. Steel profiles are made of galvanized steel plate with cold forming technic by folding, punching and splitting to required size. The main difference between products is their shape and thickness. Variety in results related to electricity consumption of steel plate shaping and steel plate thickness is less than +/- 10% for environmental impacts of different LCIA categories of production stage (A1-A3).

Allocation:

The allocation is made in accordance with the provisions of EN 15804. Incoming energy, water consumption allocation based on revenue allocation. Waste production and ancillary materials at manufacturing facility are allocated equally among all products through mass allocation and partly revenue 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.

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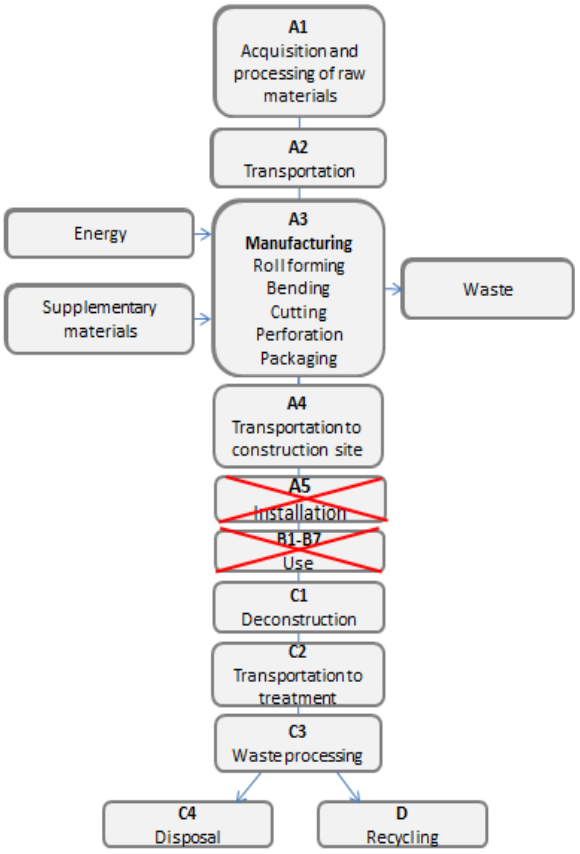
Cut-off criteria:

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.



LCA: Scenarios and additional technical information

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

A3. Transportation distance of waste produced in manufacturing phase was assumed base on location of nearest waste treatment station and waste incineration facility. Distance was measured with help of online map service. Assumption of waste transportation method was assumed base on existing practice used by waste management companies.

	Transportation distance, km	Transportation method
Waste from manufacturing facility (A3)		
Recyclable waste	20	Lorry >16 ton, EURO 6
Waste to incineration	80	Lorry >16 ton, EURO 6

A4 The transportation distance is defined according to scenario, described in NPCR 013 (2019) part 6.3.8.1. According to the calculation rules distance for domestic use in Finland is estimated to be 300 km. Transportation method is assumed to be lorry. According to producer transportation doesn't cause losses as product are packaged properly.

A4	Capacity utilisation (incl. return)%	Type of vehicle incl. emission class	Distance, km	Fuel consumption, l/tkm
Truck	0,55	Lorry >32 ton, EURO 6	300	0,0226

C2. Distance for transportation to treatment (C2) is assumed to be 250 km. This is an average distance which considers the fact that recycling facilities are still quite few and therefore the distances are longer compared to other disposal routes (EeGuide 2012). Truck modelled as 32 ton trailer (common in long haul transportation).

C2	Capacity utilisation (incl. return)%	Type of vehicle incl. emission class	Distance, km	Fuel consumption, l/tkm
Truck	0,55	Lorry >32 ton, EURO 6	250	0,0226

End of life (C1-C4) and benefits (D)

It was assumed that building machine was used in deconstruction process. The share of steel sent for material recycling is 100 %. Steel profiles were collected as mixed construction waste and delivered to sorting facility, where 98% of products were separated for recycling and 2% left in the process as waste and landfilled.

		Unit
Diesel consumption (C1)	0,004	kWh/kg
Steel tor recycling (C3)	0,98	kg/kg
Steel to landfill disposal (C4)	0,02	kg/kg
Primary steel replaced by secondary (D)	0,74 (0,98*0,75)	kg/kg

LCA: Results

The results of a life cycle assessment are relative. They do not predict impact on category endpoints, exceeding of limit values, safety margins, or risks. The impacts are presented per declared unit, 1 kg of product. The impacts are mainly caused by the raw material production process (A1).

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

Product stage			Assembly 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

Environmental impact

Parameter	Unit	A1- A3	A4	C1	C2	C3	C4	D
GWP	kg CO_2 –eqv	2,12E+00	2,51E-02	1,33E-03	2,07E-02	5,99E-02	1,33E-03	-1,32E+00
ODP	kg CFC11-eqv	1,36E-07	5,17E-09	2,39E-10	4,26E-09	1,03E-08	2,54E-10	-6,32E-08
POCP	kg C_2H_4 -eqv	1,27E-03	3,86E-06	2,66E-07	3,19E-06	1,19E-05	2,82E-07	-9,54E-04
AP	kg SO_2 -eqv	9,46E-03	6,38E-05	1,01E-05	5,26E-05	4,43E-04	9,83E-06	-5,44E-03
EP	kg PO_4^{3}--eqv	1,14E-03	8,82E-06	2,17E-06	7,27E-06	9,39E-05	2,07E-06	-5,50E-04
ADPM	kg Sb-eqv	1,07E-03	1,63E-07	8,97E-10	1,34E-07	4,31E-08	1,64E-09	-8,06E-07
ADPE	MJ	2,91E+01	4,12E-01	1,91E-02	3,40E-01	8,59E-01	2,06E-02	-1,88E+01

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	C1	C2	C3	C4	D
RPEE	MJ	1,92E+00	0,00E+00	1,12E-04	0,00E+00	8,91E-03	1,97E-04	-2,41E-01
RPEM	MJ	3,12E-03	7,44E-03	0,00E+00	6,14E-03	0,00E+00	0,00E+00	0,00E+00
TPE	MJ	1,92E+00	7,44E-03	1,12E-04	6,14E-03	8,91E-03	1,97E-04	-2,41E-01
NRPE	MJ	3,17E+01	0,00E+00	1,93E-02	0,00E+00	8,72E-01	2,08E-02	-1,90E+01
NRPM	MJ	1,79E-01	4,25E-01	0,00E+00	3,51E-01	0,00E+00	0,00E+00	0,00E+00
TRPE	MJ	3,19E+01	4,25E-01	1,93E-02	3,51E-01	8,72E-01	2,08E-02	-1,90E+01
SM	kg	2,46E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF	MJ	1,53E+00	6,69E-04	3,44E-05	5,52E-04	1,50E-03	3,52E-05	-1,55E+00
W	m^3	2,35E-02	9,24E-05	2,71E-06	7,62E-05	1,34E-04	5,95E-06	-2,27E-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 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	C1	C2	C3	C4	D
HW	kg	6,90E-04	1,12E-05	3,06E-06	9,20E-06	1,31E-04	2,87E-06	-2,85E-04
NHW	kg	1,25E-01	3,68E-02	1,01E-05	3,04E-02	5,09E-04	4,01E-02	-3,92E-02
RW	kg	6,93E-05	3,01E-06	1,35E-07	2,49E-06	5,88E-06	1,44E-07	-1,47E-05

HW Hazardous waste disposed; NHW Non hazardous waste disposed; RW Radioactive waste disposed

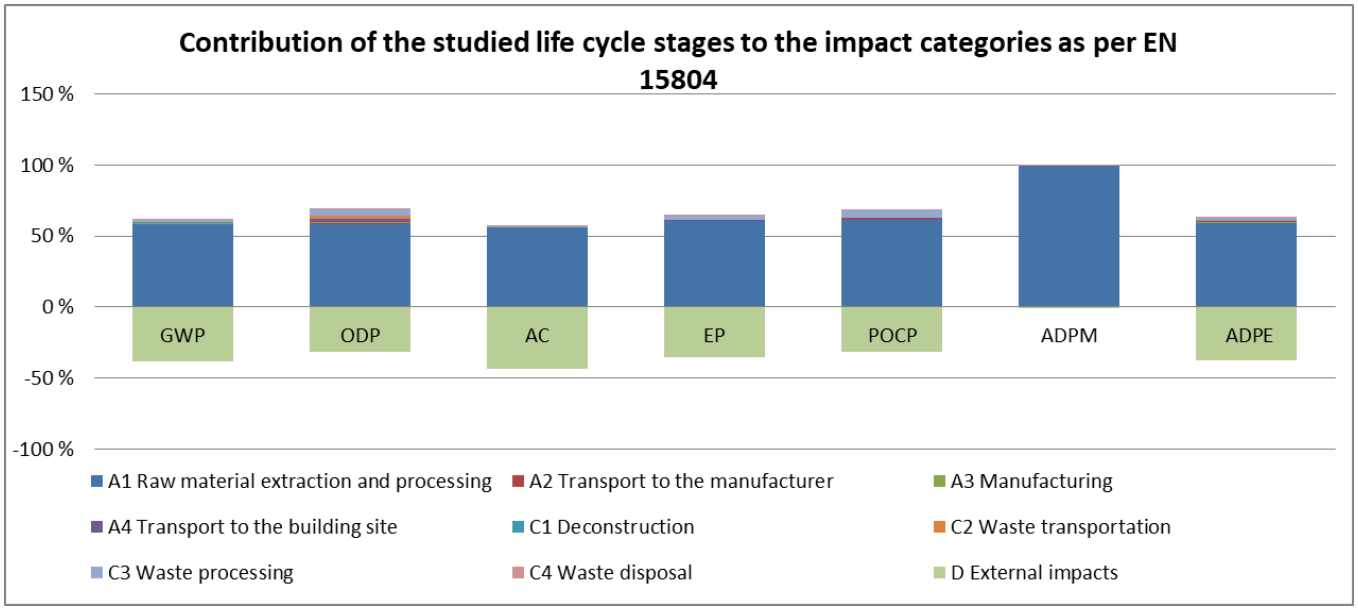
End of life –Output flow

Parameter	Unit	A1- A3	A4	C1	C2	C3	C4	D
CR	kg	INA	INA	INA	INA	INA	INA	INA
MR	kg	1,13E-01	INA	INA	INA	9,80E-01	INA	INA
MER	kg	2,08E-03	INA	INA	INA	INA	INA	INA
EEE	MJ	INA	INA	INA	INA	INA	INA	INA
ETE	MJ	INA	INA	INA	INA	INA	INA	INA

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

The LCIA results indicate that most of the impacts of steel profile are dominated by the raw material production (A1), as can be seen in the figure below. Over 91% of GWP comes from steel production as steel manufacturing is quite energy intensive process. Waste processing at the end-of life (C3) is the second most significant source of emissions. The contribution of other life cycle stages is negligible.



Additional Norwegian requirements

Greenhous gas emission from the use of electricity in the manufacturing phase Finnish national production mix from import, medium voltage (production of transmission lines, in addition to direct emissions and losses in grid) of applied electricity for the manufacturing process (A3).

Data source	Amount	Unit
Ecoinvent v3.4 (2017), Finland	0,236	kg CO2-eqv/kWh

Dangerous substances

X	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).

Indoor environment

No tests has been carried out on the product concerning indoor climate - Not relevant.

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+A1	Sustainability in construction works – Environmental product declarations – Core rules for the product category of construction products.
ISO 21930:2007	Sustainability in building construction - Environmental declaration of building products
NPCR 013:2019	Part B Product Category Rules for steel and aluminium construction products version 3.0,
NPCR Part A (2017)	Construction products and services
Sipari, A (2019)	Life Cycle Assessment Report: Steel profiles

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