

# Environmental product declaration

in accordance with ISO 14025 and EN 15804+A2

## Lineal Start kit



**Owner of the declaration:**

SG Armaturen AS

**Product:**

Lineal Start kit

**Declared unit:**

1 pcs

**This declaration is based on Product Category Rules:**

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

IBU PCR - Part B for luminaires, lamps, and components for luminaires

**Program operator:**

The Norwegian EPD Foundation

**Declaration number:**

NEPD-5035-4371-EN

**Registration number:**

NEPD-5035-4371-EN

**Issue date:** 25.09.2023

**Valid to:** 25.09.2028

**EPD Software:**

LCA.no EPD generator ID: 72749

## General information

### Product

Lineal Start kit

### Program operator:

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

**Declaration number:** NEPD-5035-4371-EN

### This declaration is based on Product Category Rules:

CEN Standard EN 15804:2012+A2:2019 serves as core PCR  
IBU PCR - Part B for luminaires, lamps, and components for  
luminaires

### 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 pcs Lineal Start kit

### Declared unit with option:

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

### Functional unit:

1 Lineal Start kit manufactured and installed, including waste  
treatment at end-of-life.

### 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: NEPDT41.

Third party verifier:

Vito D'Incognito - Take Care International  
(no signature required)

### Owner of the declaration:

SG Armaturen AS  
Contact person: Audun Skare  
Phone: +47 90021243  
e-mail: [audun.skare@sg-as.no](mailto:audun.skare@sg-as.no)

### Manufacturer:

SG Armaturen AS  
Skytterheia 25  
4790 Lillesand, Norway

### Place of production:

SG Armaturen production site Odense (Denmark)  
Egestubben 26  
5270 Odense, Denmark

### Management system:

### Organisation no:

958560931

**Issue date:** 25.09.2023

**Valid to:** 25.09.2028

### 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.

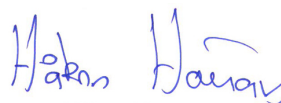
### Development and verification of EPD:

The declaration is created using EPD tool lca.tools ver EPD2021.09,  
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: Sabrina Loman Hansen

Reviewer of company-specific input data and EPD: Peter Søre  
Mikkelsen - SG Armaturen AS

### Approved:



Håkon Hauan  
Managing Director of EPD-Norway

## Product

### Product description:

The Lineal Start kit is a luminaire installation kit and is essential when installing the different kinds of Lineal products.

Control/Dimming type: DALI. Colour: White. Mounting: Indoor. Cable: Cable 5x0,75mm<sup>2</sup> Halogen free.

The EPD also covers the following product:

EAN: 5703821178006 - Lineal Start kit Black DALI

### Product specification

Materials	kg	%
Coating materials	0,00	0,65
Plastic - Polyethylene (LDPE)	0,01	1,43
Metal - Steel	0,04	9,85
Metal - Aluminium wrought alloy	0,08	20,60
Electronic - Wire	0,20	51,08
Metal - Steel low alloy	0,02	5,53
Plastic - Polyamide	0,00	0,25
Electronic - Connector	0,01	1,50
Metal - Stainless steel	0,03	8,73
Plastic - Polycarbonate (PC)	0,00	0,40
Total	0,40	

Packaging	kg	%
Packaging - Cardboard	0,10	100,00
Total incl. packaging	0,50	

### Technical data:

Link to product data on our website:

<https://www.sg-as.com/products/lineal-surface-suspended-cubic/8249044955>

### Market:

Nordic + Northwestern Europe

### Reference service life, product

The reference service life is not relevant for this luminaire installation kit.

### Reference service life, building or construction works

60 years. Standard service life for buildings according to the PCR Part A of EPD Norway.

## LCA: Calculation rules

### Declared unit:

1 pcs Lineal Start kit

### 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%) can be excluded. 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:

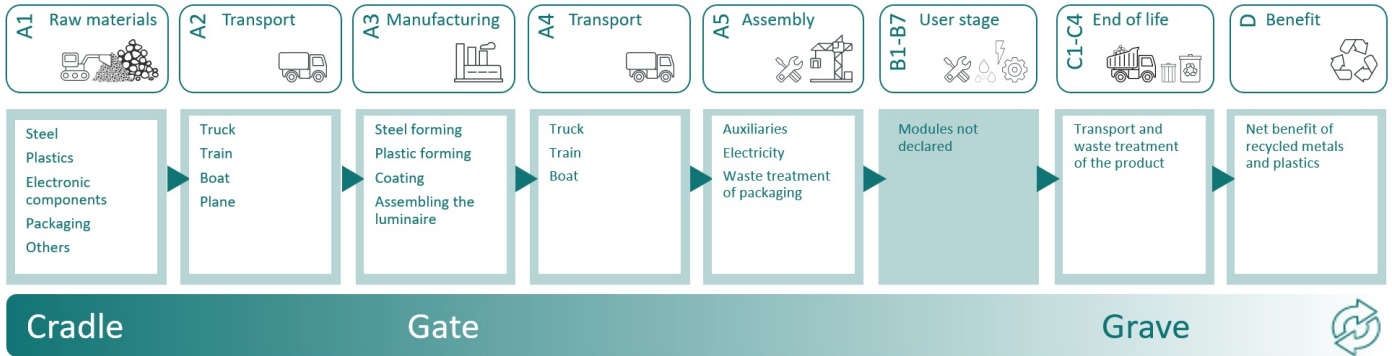
Specific data for the product composition are provided by the manufacturer. The data represent the production of the declared product and were collected for EPD development in the year of study. Background data is based on EPDs according to EN 15804 and different LCA databases. The data quality of the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

Materials	Source	Data quality	Year
Coating materials	Ecoinvent 3.6	Database	2019
Electronic - Connector	ecoinvent 3.6	Database	2019
Metal - Stainless steel	ecoinvent 3.6	Database	2019
Metal - Steel	ecoinvent 3.6	Database	2019
Metal - Steel low alloy	ecoinvent 3.6	Database	2019
Packaging - Cardboard	ecoinvent 3.6	Database	2019
Plastic - Polyamide	ecoinvent 3.6	Database	2019
Plastic - Polycarbonate (PC)	ecoinvent 3.6	Database	2019
Plastic - Polyethylene (LDPE)	ecoinvent 3.6	Database	2019
Electronic - Wire	Material composition + ecoinvent 3.6	Supplier data + database	2019
Metal - Stainless steel	Modified ecoinvent 3.6	Database	2019
Metal - Aluminium wrought alloy	Modified ecoinvent 3.6	Supplier data + 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:**

Link to the user manual on our website, for proper use of the product:  
[https://www.sg-as.com/assets/product/default/data/130338\\_Lineal%20Surface-Suspended%20Cubic/20/130338\\_Lineal%20Cubic\\_User%20Manual.pdf](https://www.sg-as.com/assets/product/default/data/130338_Lineal%20Surface-Suspended%20Cubic/20/130338_Lineal%20Cubic_User%20Manual.pdf)

## LCA: Scenarios and additional technical information

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

Module A4 = Transportation is done by truck (1000 km) from the production site in Odense, Denmark to the warehouse in Lillesand, Norway or to the warehouse in Mechelen, Belgium + 800 km for Nordic / Northwestern Europe Market.

Module A5 = Installation is performed in the Nordic / Northwestern Europe Market and done by manual labor, with the use of electrical machines, that fall under the cut-off criteria of 1% and is therefore neglected. Packaging of the final product consist of a corrugated board box.

Module C1 = The de-installation of the luminaire is done by manual labor, with the help of electrical machines. The use of portable electrical devices (e.g., drill) usually have low energy requirements falling under the cut-off-criterion of 1% and is therefore neglected.

Module C2 = Transportation from building site to the waste treatment facility with an average distance of 300km.




Modules C3 and C4 = Waste treatment of the product follows the default values provided in EN 50693, Product Category Rules for life cycle assessments of electronic and electrical products and systems, table G.4. This table specified how different types of raw materials used in A1 will likely be treated during the end-of-life of the product. 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 metals, plastics, and electronic components 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 plastic insulation and other parts 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 %	1800	0,043	l/tkm	77,40
Assembly (A5)	Unit	Value			
Waste, cardboard and paper, to average treatment - A5 including transport (kg)	kg	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) - Europe	36,7 %	300	0,043	l/tkm	12,90
Waste processing (C3)	Unit	Value			
Aluminium to recycling (kg)	kg	0,06			
Copper to recycling (kg)	kg	0,07			
Steel to recycling (kg)	kg	0,08			
Waste treatment of hazardous waste, incineration with fly ash extraction (kg)	kg	0,00			
Waste treatment of plastic mixture, incineration with energy recovery and fly ash extraction (kg)	kg	0,05			
Waste treatment of polyethylene (PE), incineration with energy recovery and fly ash extraction (kg)	kg	0,00			
Waste treatment per kg used electronic components, manual separation (kg)	kg	0,21			
Disposal (C4)	Unit	Value			
Landfilling of aluminium (kg)	kg	0,02			
Landfilling of ashes from incineration of Hazardous waste, process per kg ashes and residues - C4 (kg)	kg	0,00			
Landfilling of ashes from incineration of Plastic mixture, process per kg ashes and residues (kg)	kg	0,00			
Landfilling of ashes from incineration of Polyethylene (PE), process per kg ashes and residues (kg)	kg	0,00			
Landfilling of copper (kg)	kg	0,04			
Landfilling of plastic mixture (kg)	kg	0,05			
Landfilling of steel (kg)	kg	0,02			
Benefits and loads beyond the system boundaries (D)	Unit	Value			
Substitution of electricity (MJ)	MJ	0,08			
Substitution of primary aluminium with net scrap (kg)	kg	0,06			
Substitution of primary copper with net scrap (kg)	kg	0,05			
Substitution of primary steel with net scrap (kg)	kg	0,06			
Substitution of thermal energy, district heating (MJ)	MJ	1,28			

## 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 <sub>2</sub> -eq	3,41E+00	4,86E-02	2,51E-01	1,47E-01	1,70E-01	0	2,45E-02	1,64E-01	7,71E-03	-7,11E-01	
 GWP-fossil	kg CO <sub>2</sub> -eq	3,52E+00	4,86E-02	2,38E-01	1,47E-01	1,61E-03	0	2,45E-02	1,64E-01	7,71E-03	-6,98E-01	
 GWP-biogenic	kg CO <sub>2</sub> -eq	-1,21E-01	1,51E-05	1,25E-02	6,08E-05	1,69E-01	0	1,01E-05	9,59E-05	6,46E-07	-2,93E-03	
 GWP-luluc	kg CO <sub>2</sub> -eq	8,79E-03	2,93E-05	7,26E-04	5,23E-05	5,32E-07	0	8,71E-06	5,17E-05	6,34E-07	-1,01E-02	
 ODP	kg CFC11-eq	1,82E-07	1,05E-08	1,25E-08	3,33E-08	3,39E-10	0	5,54E-09	2,08E-09	5,31E-10	-5,43E-04	
 AP	mol H <sup>+</sup> -eq	4,37E-02	1,20E-03	8,93E-04	4,22E-04	7,61E-06	0	7,03E-05	1,74E-04	1,45E-05	-2,27E-02	
 EP-FreshWater	kg P -eq	3,26E-04	2,51E-07	1,66E-05	1,17E-06	1,32E-08	0	1,96E-07	1,67E-06	3,07E-08	-1,52E-04	
 EP-Marine	kg N -eq	4,60E-03	2,93E-04	1,75E-04	8,35E-05	2,52E-06	0	1,39E-05	3,83E-05	1,16E-05	-1,30E-03	
 EP-Terrestrial	mol N -eq	5,92E-02	3,26E-03	2,31E-03	9,34E-04	2,73E-05	0	1,56E-04	4,20E-04	5,77E-05	-1,77E-02	
 POCP	kg NMVOC-eq	1,59E-02	8,55E-04	5,28E-04	3,58E-04	7,84E-06	0	5,96E-05	1,09E-04	1,77E-05	-5,28E-03	
 ADP-minerals&metals <sup>1</sup>	kg Sb -eq	4,27E-04	6,21E-07	1,77E-06	4,06E-06	3,91E-08	0	6,76E-07	1,19E-07	1,41E-08	-1,06E-04	
 ADP-fossil <sup>1</sup>	MJ	3,98E+01	6,51E-01	3,14E+00	2,22E+00	2,25E-02	0	3,70E-01	3,96E-01	4,27E-02	-8,18E+00	
 WDP <sup>1</sup>	m <sup>3</sup>	2,22E+02	2,79E-01	3,81E+01	2,15E+00	2,85E-02	0	3,58E-01	1,45E+00	8,85E-01	-2,85E+02	

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<sup>-3</sup> = 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

The product is compliant with the European RoHS Directive 2011/65/EU on Restriction of the use of certain Hazardous Substances in Electrical and Electronic equipment and with the European REACH regulation (EC) No 1907/2006 on Registration, Evaluation, Authorization and Restriction of Chemicals.

### Additional environmental impact indicators

Indicator	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
 PM	Disease incidence	2,94E-07	7,87E-10	1,07E-08	8,99E-09	1,12E-10	0	1,50E-09	1,24E-09	2,59E-10	-8,27E-08
 IRP <sup>2</sup>	kgBq U235 -eq	1,01E-01	2,81E-03	1,32E-02	9,70E-03	9,62E-05	0	1,62E-03	1,75E-03	2,61E-04	-3,00E-02
 ETP-fw <sup>1</sup>	CTUe	4,15E+02	4,10E-01	5,42E+00	1,65E+00	3,00E-02	0	2,74E-01	8,74E-01	5,43E+01	-1,85E+02
 HTP-c <sup>1</sup>	CTUh	1,36E-08	0,00E+00	1,08E-10	0,00E+00	1,00E-12	0	0,00E+00	1,90E-11	2,00E-12	-4,07E-09
 HTP-nc <sup>1</sup>	CTUh	4,98E-07	1,57E-10	3,90E-09	1,80E-09	3,80E-11	0	3,00E-10	6,18E-10	5,70E-11	-2,18E-07
 SQP <sup>1</sup>	dimensionless	1,71E+01	1,97E-01	5,34E+00	1,55E+00	1,51E-02	0	2,59E-01	6,72E-02	1,01E-01	-3,01E+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<sup>-3</sup> = 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	5,56E+00	5,86E-03	3,14E+00	3,18E-02	3,70E-04	0	5,30E-03	4,46E-02	4,77E-03	-3,46E+00	
 PERM	MJ	8,15E-01	0,00E+00	0,00E+00	0,00E+00	-8,15E-01	0	0,00E+00	0,00E+00	0,00E+00	0,00E+00	
 PERT	MJ	6,37E+00	5,86E-03	3,14E+00	3,18E-02	-8,15E-01	0	5,30E-03	4,46E-02	4,77E-03	-3,46E+00	
 PENRE	MJ	3,81E+01	6,51E-01	3,14E+00	2,22E+00	2,25E-02	0	3,70E-01	3,97E-01	4,27E-02	-8,18E+00	
 PENRM	MJ	1,80E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0	0,00E+00	-1,80E+00	0,00E+00	0,00E+00	
 PENRT	MJ	3,98E+01	6,51E-01	4,00E+00	2,22E+00	2,25E-02	0	3,70E-01	-1,40E+00	4,27E-02	-8,18E+00	
 SM	kg	7,75E-02	0,00E+00	2,98E-05	0,00E+00	0,00E+00	0	0,00E+00	0,00E+00	4,44E-04	3,28E-02	
 RSF	MJ	6,03E-02	1,75E-04	7,91E-02	1,14E-03	1,23E-05	0	1,89E-04	1,13E-03	9,86E-05	4,44E-03	
 NRSF	MJ	5,80E-02	1,40E-03	7,24E-02	4,07E-03	5,06E-05	0	6,78E-04	0,00E+00	1,90E-05	4,11E-02	
 FW	m <sup>3</sup>	5,46E-02	4,45E-05	8,55E-03	2,37E-04	1,06E-05	0	3,96E-05	3,63E-04	5,56E-05	-1,66E-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<sup>-3</sup> = 0,009"

\*INA Indicator Not Assessed

### End of life - Waste






Indicator	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
 HWD	kg	2,70E-02	2,95E-05	2,25E-03	1,14E-04	0,00E+00	0	1,91E-05	0,00E+00	3,42E-03	5,37E-04
 NHWD	kg	9,35E-01	1,05E-02	2,10E-02	1,08E-01	9,94E-02	0	1,80E-02	2,60E-03	1,44E-01	-2,33E-01
 RWD	kg	9,53E-05	4,50E-06	8,99E-06	1,51E-05	0,00E+00	0	2,52E-06	0,00E+00	2,86E-07	-2,81E-05

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	2,64E-06	0,00E+00	1,55E-02	0,00E+00	9,25E-02	0	0,00E+00	2,01E-01	5,71E-06	-1,28E-03
 MER	kg	1,70E-07	0,00E+00	8,98E-07	0,00E+00	6,95E-03	0	0,00E+00	5,71E-02	1,12E-05	-1,69E-04
 EEE	MJ	1,20E-06	0,00E+00	7,05E-03	0,00E+00	5,69E-03	0	0,00E+00	8,49E-02	1,06E-04	-4,15E-04
 EET	MJ	1,81E-05	0,00E+00	1,07E-01	0,00E+00	8,60E-02	0	0,00E+00	1,28E+00	1,61E-03	-6,27E-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 =  $9,0 \cdot 10^{-3} = 0,009$

\*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	4,60E-02

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO<sub>2</sub>

## 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, Denmark (kWh)	ecoinvent 3.6	338,20	g CO <sub>2</sub> -eq/kWh

### Dangerous substances

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

### Indoor environment

No effect on 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 <sub>2</sub> -eq	3,58E+00	4,86E-02	3,08E-01	1,47E-01	0,00E+00	0	2,45E-02	1,64E-01	1,89E-03	-6,61E-01

GWPIOBC: 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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