



# Environmental Product Declaration

## 270 Concrete middle Pile Type 8 from Centrum Pile AB

*In accordance with ISO 14025 and EN 15804:2012+A1:2013*



Programme:	The International EPD® System, <a href="http://www.environdec.com">www.environdec.com</a>
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## General information

### Programme information

<b>Programme:</b>	The International EPD® System
<b>Address:</b>	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
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CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product category rules (PCR): PCR 2012:01. Construction products and construction services. Version 2.3, the International EPD System, Date 2018-11-15 Sub-PCR to PCR 2012:01 Concrete and concrete elements (EN 16757:2017), PCR 2012:01-SUB-PCR-G, the International EPD System, Date 2018-11-22
PCR review was conducted by: PCR Committee: IVL Swedish Environmental Research Institute, Swedish Environmental Protection Agency, SP Trä, Swedish Wood Preservation Institute, Swedisol, SCDA, Svenskt Limträ AB, SSAB Moderator: Martin Erlandsson, IVL Swedish Environmental Research Institute
Independent third-party verification of the declaration and data, according to ISO 14025:2006:  <input type="checkbox"/> EPD process certification <input checked="" type="checkbox"/> EPD verification
Third party verifier: Bureau Veritas  Accredited by: <i>SWEDAC, accreditation number 1236</i>  <i>In case of recognized individual verifiers:</i> Approved by: The International EPD® System
Procedure for follow-up of data during EPD validity involves third party verifier:  <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but from different programs may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804. For further information about comparability, see EN 15804 and ISO 14025.

An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at [www.environdec.com](http://www.environdec.com)

**Environmental Product Declarations (EPD)** present transparent, verified and comparable information about the life-cycle environmental impact of products.

The International EPD® System is a global program for environmental declarations based on ISO 14025 and EN 15804. Our online database currently contains more than 1100 EPDs for a wide range of product categories by organizations in 45 countries.



## Company information

Owner of the EPD: Centrum Pile AB

Website: [www.centrumpile.se](http://www.centrumpile.se)

**Description of the organization:** Since the start in 2008, Centrum Pile AB has established itself as one of the largest suppliers of concrete piles on the Swedish market.

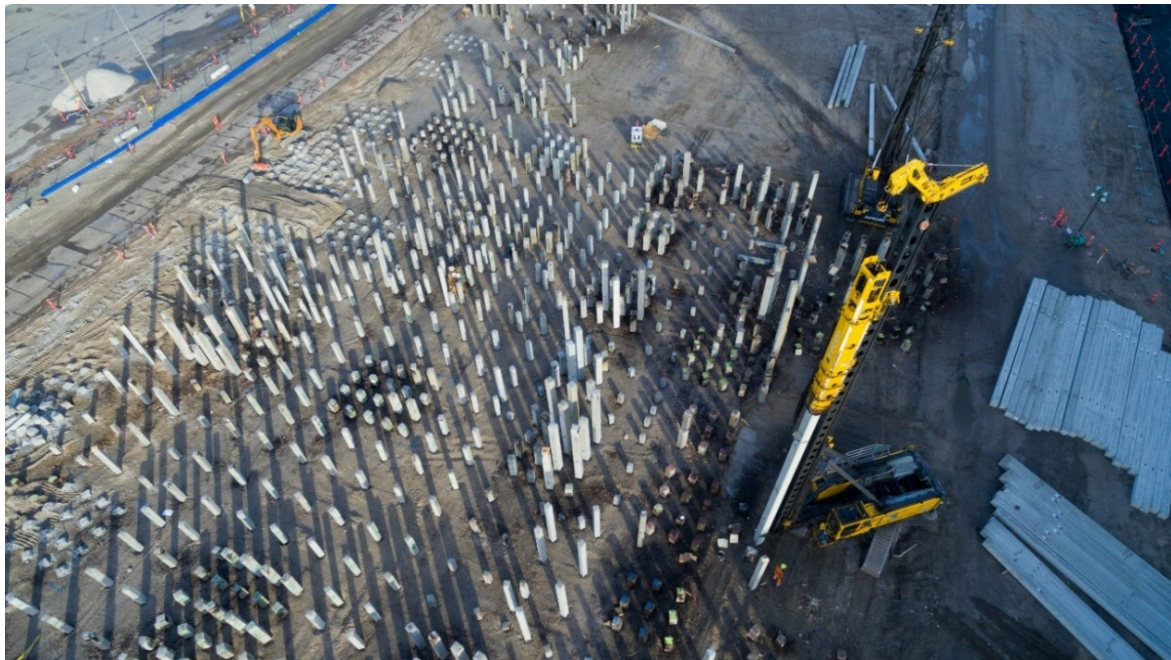
Centrum Pile AB is part of the Centrum Group, which with its factories in five different countries is Europe's largest manufacturer of concrete piles for the foundation of industrial and commercial premises, apartment buildings, infrastructure, and wind turbines.

Centrum Pile AB invests in continuous development in process and product to be a leader and set the standard in the market. Quality, flexibility, and short delivery times are the basis of Centrum's business.

**Product-related or management system-related certifications:** The product is CE certified. The manufacturing is certified according to SS-EN 12794 Concrete Piles, and SS-EN 13369:2018. Centrum Pile AB is certified according to ISO 14001:2015 and energy mapping according to STEMFS 2014:2. The product is certified according to Byggvarudeklaration bvd 3.

## Product information

Concrete piles are used as foundation for new buildings on sites with soft or loose soil conditions. They are driven into the ground. The number of concrete piles needed depends on the geological conditions at the construction site and the size and form of the construction. The concrete piles are reinforced with steel cages and other components depending on the length and demands of the concrete pile. Centrum Pile AB offers a standardized pile system that fulfils the requirements from construction by a variation in length and dimension of the prefabricated pile.



## LCA information

<b>Declared Unit</b>	The declared unit is 1m of concrete pile. The total weight is 184 kg. The declared unit is based on a 13 m 270 pile type 8.
<b>Product group classification</b>	UN CPC 37550
<b>Goal and Scope</b>	The result will be used to understand where the environmental burden for the products occur during the life cycle and aim to lay a road map for development to reduce this burden. The result will be communicated by the International EPD system.  The audience is construction companies.
<b>Manufacturing Site</b>	Centrum Pile AB, Kollanda, Sweden.
<b>Geographical Area</b>	Europe
<b>Compliant with</b>	This EPD follows the “Book-keeping” LCA approach which is defined as an attributional LCA in the ISO 14040 standard.  The EPD is compliant with: <ul style="list-style-type: none"> <li>• ISO 14025</li> <li>• EN 15804:2012+A1:2013</li> <li>• Product Category Rules PCR 2012:01. Construction products and construction services. Version 2.33</li> <li>• Sub-PCR to PCR 2012:01. Version 2.31</li> </ul> Concrete and concrete elements (EN 16757:2017)
<b>Cut-Off Rules</b>	The procedure below is followed for the exclusion of inputs and outputs according to the EN 15804:2012+A1:2013 standard: <ul style="list-style-type: none"> <li>- In the case of insufficient input data or data gaps for a unit process, the cut-off criterion is 1 % of renewable and non-renewable primary energy usage and 1 % of the total mass input to that unit process.</li> <li>- The maximum neglected input flows per declared module (A1- A5) is 5 % of energy usage and mass.</li> </ul>
<b>Background Data</b>	The data quality of the background data is considered good. All site-specific data is collected from the year 2020. ecoinvent is the world’s biggest LCI data library and the latest and most updated version was used. ecoinvent’s data library contain data for the specific geographical regions relevant for this study.  The assessment considers all available data from the production process, including all raw materials and auxiliary materials used as well as the energy consumption in relation to available ecoinvent 3.7 datasets for the manufacture of concrete piles.  The background data from ecoinvent 3.7 are from 2016-2020
<b>Electricity data</b>	Electricity consumption in A3 module comes from hydropower.

<b>Allocations</b>	<p>Polluter Pays / Allocation by Classification</p> <p>Two allocation rules are applied:            1) the raw material necessary for the manufacture is allocated by mass of the declared unit            2) the energy necessary for the manufacture is allocated in MJ byt total production mass during the period Oct 1<sup>st</sup> 2019 – Sep 30<sup>th</sup> 2020.</p>
<b>Impact Assessment methods</b>	<p>Resource use values are calculated from Cumulative Energy Demand V1.11.</p> <p>Potential environmental impacts are calculated with Environmental Footprint 3.0 method as implemented in SimaPro 9.2.</p>
<b>Based on LCA Report</b>	Miljögiraff LCA Report 940 Centrum Pile AB
<b>LCA Practitioner</b>	Viktor Hakkarainen, Miljögiraff AB
<b>Software</b>	SimaPro 9.2

The product documented within this EPD contains no substances in the REACH Candidate list. Furthermore, the product does not contain any substances from the Norwegian priority list.

The estimated impact results are only relative statements which do not indicate the end points of the impact categories, exceeding threshold values, safety margins or risks.

This EPD follows Cradle to gate (A1–A3) + A4 & A5 boundaries. See figure below for information about included modules.

	Product stage		Construction process stage			Use stage							End of life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	
Modules	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules declared	X	X	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Geography	Europe	SE	SE	Europe	Europe	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Specific data	>90%					-	-	-	-	-	-	-	-	-	-	-	-

Figure 1, shows an overview of the included and accounted life cycle phases.

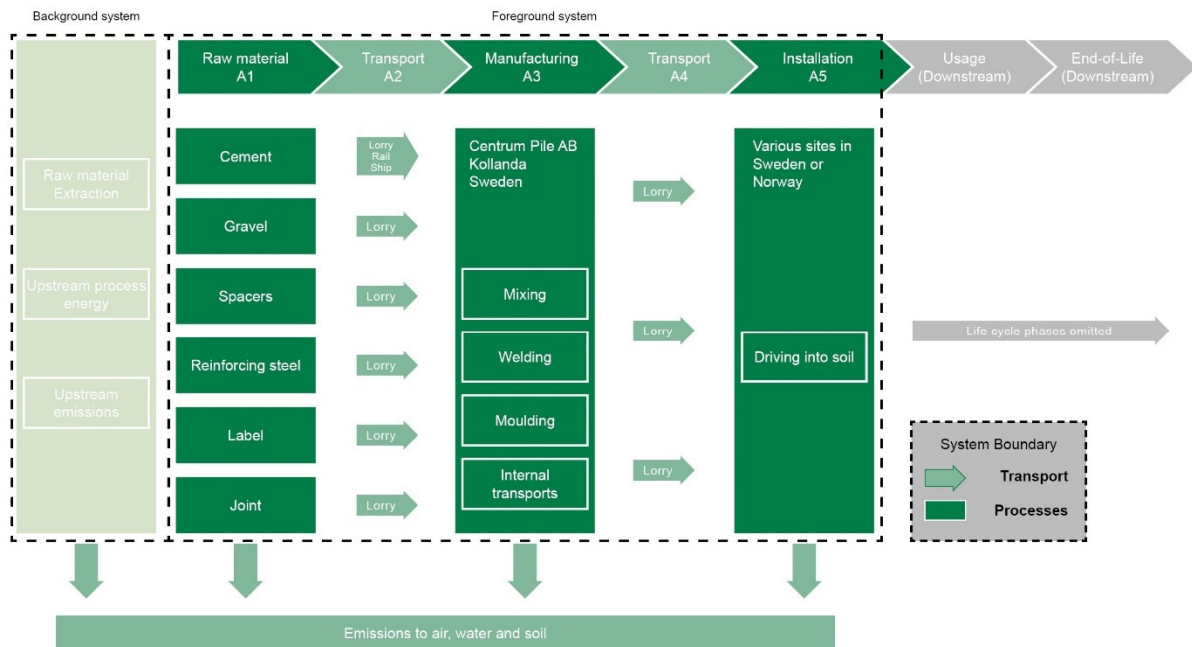


Figure 2, shows what is included in the different modules

## Content information

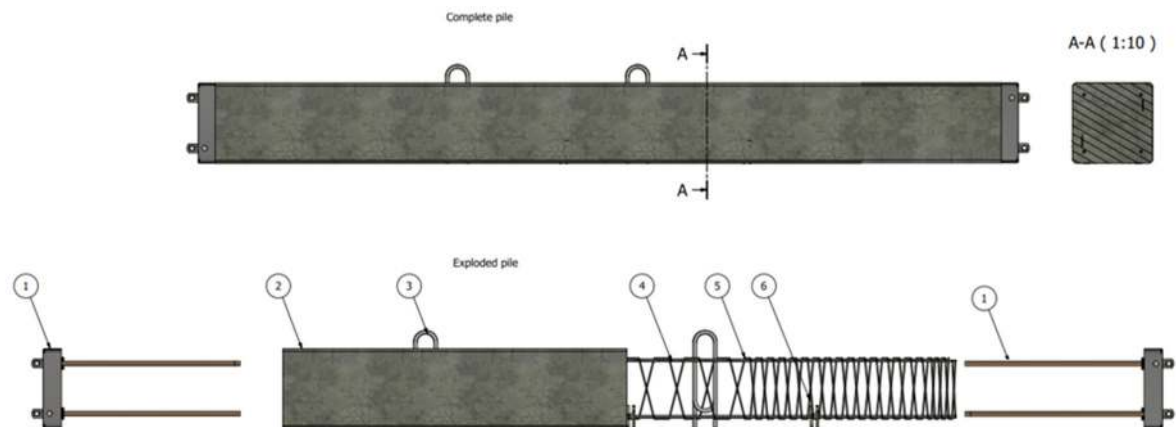
The main components of the concrete pile can be seen in Table 1. The two biggest components are concrete which stands for 94,1% of the concrete pile and reinforcing steel which stands for 4,5 % of the total weight.

Product components	Weight (kg)	Weight %
<b>Concrete*</b>	171,9	<b>94,1</b>
<i>Gravel (0/2, 0/4, 8/16)</i>	123	66,8
<i>Cement</i>	34	18,5
<i>Plasticizer</i>	0,46	0,3
<i>Air entrainer</i>	0,25	0,1
<i>Water</i>	14,2	7,7
<b>Reinforcing cage</b>	8,2	<b>4,5</b>
<b>2 x CPG-joint</b>	2,49	<b>1,4</b>
<b>Lifting Loop</b>	0,11	<b>0,06</b>
<b>Spacers, label tray and label</b>	0,005	<b>0,003</b>
<b>Total product weight:</b>	182,7	<b>100</b>

\*The concrete has a density of 2391 kg per m<sup>3</sup>.

Table 1: Content declaration for 1 m concrete pile (270 middle pile type 8)





1	CPG KX-XXX-X Joint (2x)
2	Concrete
3	Lifting hook
4	Ø12mm Reinforcement B500C
5	Ø5mm Helical reinforcement B500AB
6	Spacers PE-HD or concrete

Figure 3: Structure of a Centrum Pile concrete middle pile

In this EPD, data input for several materials are sourced from previous EPDs, for a complete list see Table 2

Material or component	Name of EPD	Author of EPD	EPD Owner	EPD-programme	Publication number	Date of EPD
Cement	Rapidcement CEM I 52,5 R	LCA.no AS	Schwenk Sverige AB	EPD-Norge	NEPD-2205-1014-NO	2020-05-19
Plasticizer	Concrete admixtures – Plasticizers and Superplasticizers	Thinkstep AG	European Federation of Concrete Admixtures Associations Ltd. (EFCA)	Institut Bauen und Umwelt e.V. (IBU)	EPD-EFC-20150091-IAG1-EN	2015-09-14
Air entrainer	Concrete admixtures – Air entrainers	Thinkstep AG	European Federation of Concrete Admixtures Associations Ltd. (EFCA)	Institut Bauen und Umwelt e.V. (IBU)	EPD-EFC-20150086-IAG1-EN	2015-09-14
CPG Joint	CPG-Box-4-270-0	Danish Technological Institute	Centrum Pæle A/S	EPD Denmark	MD-21005-DA	2021-03-10
Reinforcing cage	Betonstahlmatten und Gitterträger	LCEE Life Cycle Engineering Experts GmbH	Baustahlgewehr GmbH	ift Rosenheim GmbH	EPD-BMG-10.2	2018-09-17

Table 2: List of EPDs used as input data

**Manufacturing** is done in Kollanda, Sweden. The raw materials for the concrete are combined in a concrete mixer. Then, the concrete is poured into specific molds on top of the reinforcing steel. The reinforcing steel is produced using together a welding robot and cut to predefined lengths. When the piles are ready, they are lifted out of the molds and transported to the warehouse where they await transportation to the construction site.

A total of 1,16kWh electricity is used to produce 1m of concrete pile in the manufacturing process. The electricity comes from hydropower. 0,15 kWh heat from oil and 0,18 kg of oil is added and used in the manufacturing process.

In total 0,15% waste is generated. The waste is reused as material for the construction of roads.

The finished concrete piles are loaded to trucks without any transport protection.

For a flowchart of the activities, see figure below:

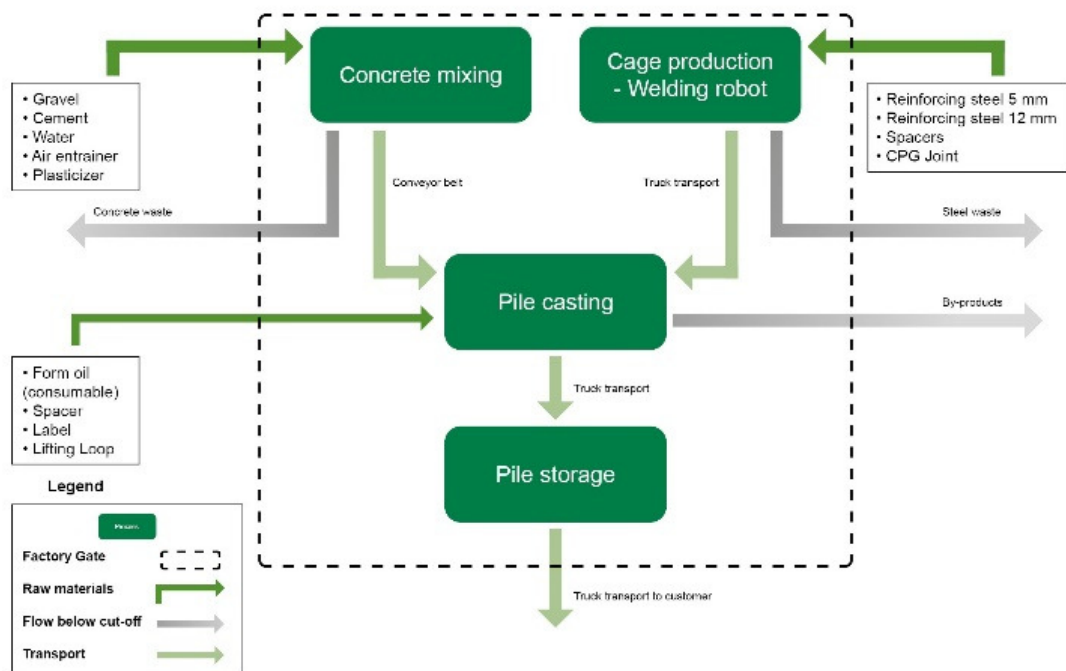


Figure 4: Flowchart of manufacturing activities.

## Environmental Information

Potential environmental impact – mandatory indicators according to EN 15804

### Results per functional or declared unit

Indicator	Unit	A1	A2	A3	A1-A3 tot	A4	A5
<b>GWP</b>	kg CO <sub>2</sub> eq.	34,68	3,55	0,48	38,70	4,57	0,73
<b>ODP</b>	kg CFC 11 eq.	2,95E-07	7,70E-07	1,79E-07	1,24E-06	1,04E-06	1,48E-07
<b>AP</b>	SO <sub>2</sub> eq	0,051	0,015	0,002	0,068	0,014	0,007
<b>EP-freshwater</b>	kg PO <sub>4</sub> <sup>-3</sup> eq	0,008	0,001	0,000	0,009	0,001	0,000
<b>POCP</b>	kg ethene eq	0,010	0,012	0,003	0,025	0,011	0,007
<b>ADP-minerals &amp; metals*</b>	kg Sb eq	1,80E-05	1,27E-05	4,65E-06	3,53E-05	1,64E-05	4,44E-06
<b>ADP-fossil*</b>	MJ	158	52	14	224	69	10
<b>Acronyms</b>	GWP = Global Warming Potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; POCP = Formation potential of tropospheric ozone; ADP-minerals & metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential						

\* Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.

## Use of resources

### Results per functional or declared unit

Indicator	Unit	A1	A2	A3	A1-A3 tot	A4	A5
<b>PERE</b>	MJ	39,2	0,8	4,7	44,7	0,9	0,1
<b>PERM</b>	MJ	0,0	0,0	0,0	0,0	0,0	0,0
<b>PERT</b>	MJ	39,2	0,8	4,7	44,7	0,9	0,1
<b>PENRE</b>	MJ	180,9	55,3	14,9	251,0	73,2	10,3
<b>PENRM</b>	MJ.	2,8	0,0	0,0	2,8	0,0	0,0
<b>PENRT</b>	MJ	183,7	55,3	14,9	253,8	73,2	10,3
<b>SM</b>	kg	14,2	0,0	0,0	14,2	0,0	0,0
<b>RSF</b>	MJ	17,7	0,0	0,0	17,7	0,0	0,0
<b>NRSF</b>	MJ	39,2	0,8	4,7	44,7	0,9	0,1
<b>FW</b>	m <sup>3</sup>	0,0	0,0	0,0	0,0	0,0	0,0
<b>Acronyms</b>	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 re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water						

## Waste production and output flows

### Waste production

#### Results per functional or declared unit

Indicator	Unit	A1	A2	A3	A1-A3 tot	A4	A5
Hazardous waste disposed	kg	0,4	0,0	0,0	0,4	0,0	0,0
Non-hazardous waste disposed	kg	19,7	0,0	0,0	19,7	0,0	0,0
Radioactive waste disposed	kg	0,0	0,0	0,0	0,0	0,0	0,0

## Information on biogenic carbon content

#### Results per functional or declared unit

BIOGENIC CARBON CONTENT	Unit	QUANTITY
Biogenic carbon content in product	kg C	0
Biogenic carbon content in packaging	kg C	0

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

## Additional information

### Information on transports to Oslo

Type	Capacity utilization	Type of vehicle	Distance km	Fuel/Energy use	Unit	Value (l/t)	Kg CO <sub>2</sub> -eqv./DU
Truck	50%	Truck 16-32 ton, EURO5	275 km	0,045	l/tkm	12,38	8,38

### Information on electricity dataset

Electricity source	Unit	Amount used in A3	Total GWP
Swedish renewables	0,0283 kg CO <sub>2</sub> ,eq/kWh	<0,00004%	0,033 kg CO <sub>2</sub> ,eq/kWh

## Content of dangerous substances

The product contains substances that are less than 0.1% by weight given by the REACH Candidate or the Norwegian priority list.

Dangerous substances from the REACH candidate list or the Norwegian Priority List	CAS No.	Quantity (concentration, wt%/FU(DU)).
Chromium VI <sup>1</sup>	18540-29-9	<0,00004%

<sup>1</sup> Source (Swedish): <https://schwenk.se/wp-content/uploads/sites/3/2020/03/SDB-Cement-kromreducerad-2021.pdf>

## References

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