Environmental Product Declaration for Hercules Grundläggning AB

Concrete Pile HP 270-0416

According to EN 15804:2012+A2:2019/AC:2021, ISO 14025, ISO 14040 and ISO 14044
Program operator: The International EPD® System, www.environdec.com
Declaration owner: Hercules Grundläggning AB

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EPD INFORMATION

Declared unit:	1 metre of concrete pile HP 270-0416
Service Life:	100 years
PCR:	PCR 2019:14. Construction products. Version 1.3.4, 2024-04-30, the International EPD System C-PCR-003 (to PCR 2019:14). Concrete and concrete elements (EN 16757:2022), Version 2024-04-30, the International EPD System
Program operator:	The International EPD® System, operated by EPD International AB Box 210 60

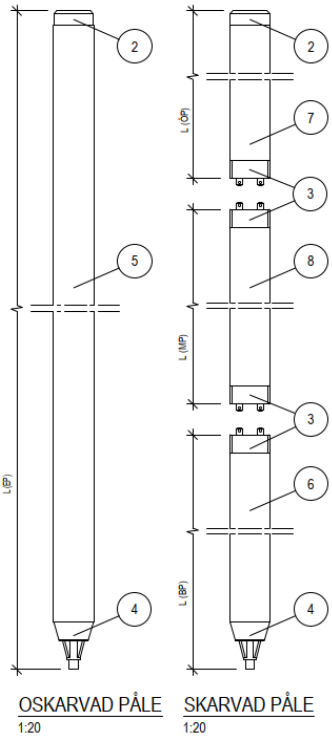
Declared product

The declared product is a concrete pile including fitting elements manufactured in Hercules Grundläggning ABs (hereafter named Hercules) plant in Västerås, Sweden.

In addition to the plant declared, this EPD includes additional LCA results for the concrete pile produced at the Hercules plant in Ucklum.

Declared unit

The declared unit is 1 metre of concrete pile HP 270-0416.



1- Lifting loop;
2- Crack ring;
3- Pile joint,
4- Rock shoe;
5- Single Pile;
6- Bottom Pile;
7- Top Pile;
8-Middle Pile

Figure 1. Design of the Hercules concrete pile.

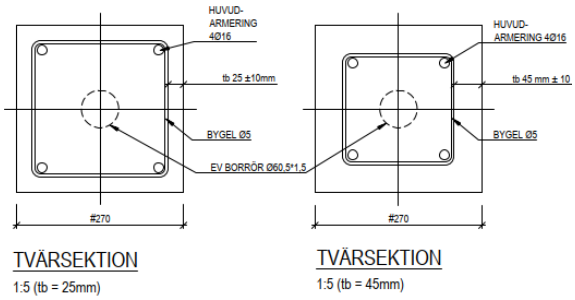


Figure 2. Design of the cross-section Hercules concrete pile.

Product information

Concrete piles are used to transfer loads from a structure to a bearing soil layer or rock. Hercules piles are CE marked according to SS-EN 12794. Other relevant standards are SS-EN 206, SS-EN 13369, SS 137003, SS 137005.

A content declaration is presented in Table 3. The products contain no substances of very high concern (SVHC) according to REACH.

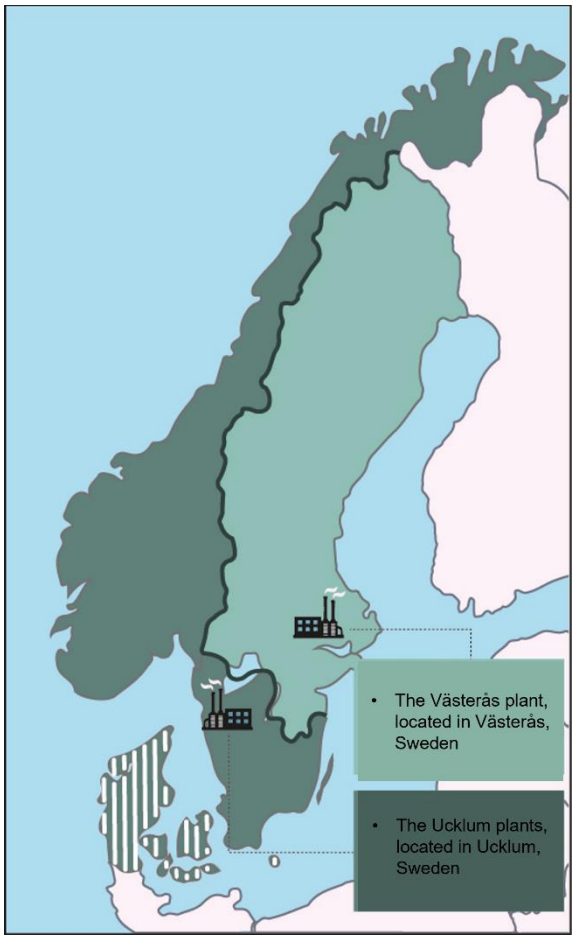


Figure 3. Map showing the geographical location of the Hercules plants in Ucklum and Västerås in Sweden.

Manufacturing process

The first step in the manufacturing process is to straighten and cut the longitudinal reinforcement wires from coil. The transverse wire is then welded into the longitudinal reinforcement to create a square cage. The reinforcement cages are placed in the casting beds together with fitting elements. The concrete is poured into the casting beds, and the beds are covered during the curing process. After the piles have been removed from the beds, they are stacked to harden and reach the required compressive strength. The manufacturing process of the concrete pile is described in Figure 4.

Table 1. Conversion factor to mass of the concrete pile declared (the dimensions refer to a length of 1 metre).

Pile type	Characteristics	Concrete cover (mm)	Weight (kg/metre)	Dimensions (mm)
HP 270-0416	4 rebars x 16 mm	25/45	184	270x270

Table 2: Exposure class for the concrete pile declared.

Exposure class	Min concrete strength class	Max water/cement ratio
XC2, XF1	C50/60	0,45

Table 3. Content information of the concrete pile declared.

Product components	Inherent substances	Weight %	Post-consumer material, weight%	Biogenic material, weight %	CAS no	REACH no	REACH classification
Coarse and fine aggregate	Granite, porphyry	76	0	0	-	N/A	Not classified
Cement CEM II/B-M (S-LL) 52.5 N (Viridiscement)	Cement Clinker (65-79%)	18	0	0	65997-15-1	N/A	H315, H318, H335
	Granulated blast furnace slag and limestone (21-35%)		0	0	65996-69-2	N/A	Not classified
	Other 0-5%)		0	0	-	N/A	Not classified
Water (fresh)	Water	7	0	0	-	N/A	Not classified
Steel parts (reinforcement)	-	4	0	0	-	N/A	Not classified
Additives CHRYSO®Fluid Premia 205	1,2-Benzisothiazol-3(2H)-one	0,1	0	0	2634-33-5	613-088-00-6	GHS05, GHS07, GHS09, H302, H315, H318, H317, H400
Packaging materials							
Packaging material is negligible.							

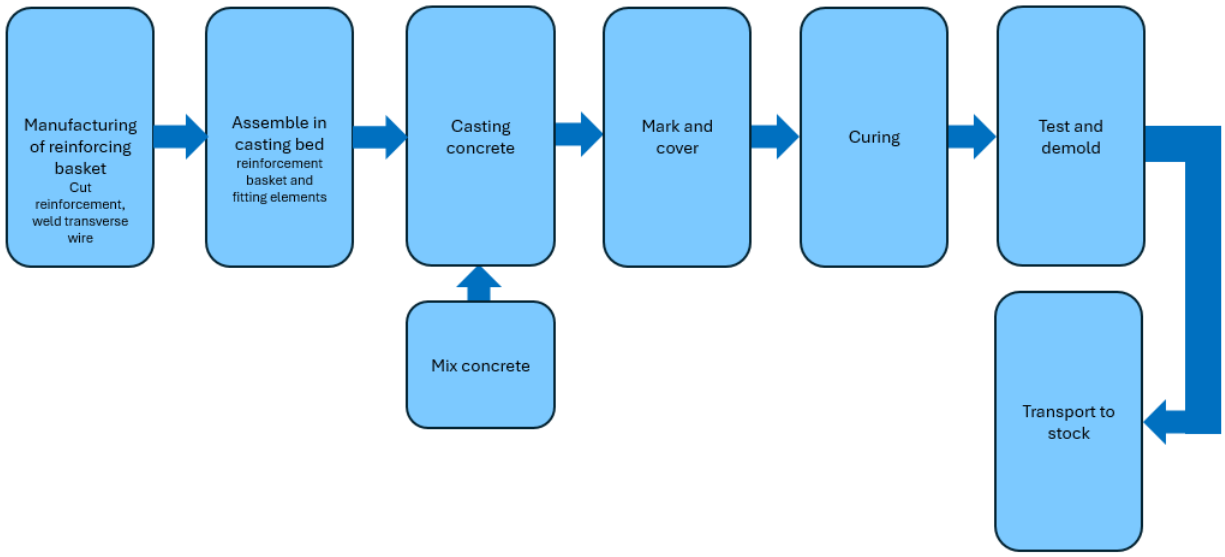


Figure 4. Flowchart of the manufacturing activities.

System boundary

The EPD is based on an LCA model described in the background report (see reference list). The EPD type is a "cradle-to-gate with options, modules C1–C4, module D and with optional modules (A1–A3 + C + D and additional modules)". The additional modules are A4 and A5, see Table 4. The product system under study is presented in Figure 5.

Data that represent the current production process at the site are used. All input data used in the LCA model (e.g. raw materials and production data) that Hercules has influence over are site specific data for the production year 2022. The geographical scope, i.e. location(s) of use and end-of-life performance, is Sweden.

The environmental impact from infrastructure, construction, production equipment and tools that are not directly consumed in the production process are not accounted for in the EPD. Neither are personnel-related impacts, such as transportation to and from work.

Table 4. Modules of the life cycle included in the EPD (X = declared module; ND = Not declared).

	Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Manufacturing	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Future reuse, recycling or energy recovery potentials
Module	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	X	X	X	X	X
Geography	SE	SE	SE	SE	SE								SE	SE	SE	SE	SE
Specific data %	71%																
Variation - products	N/A																
Variation - sites	N/A																

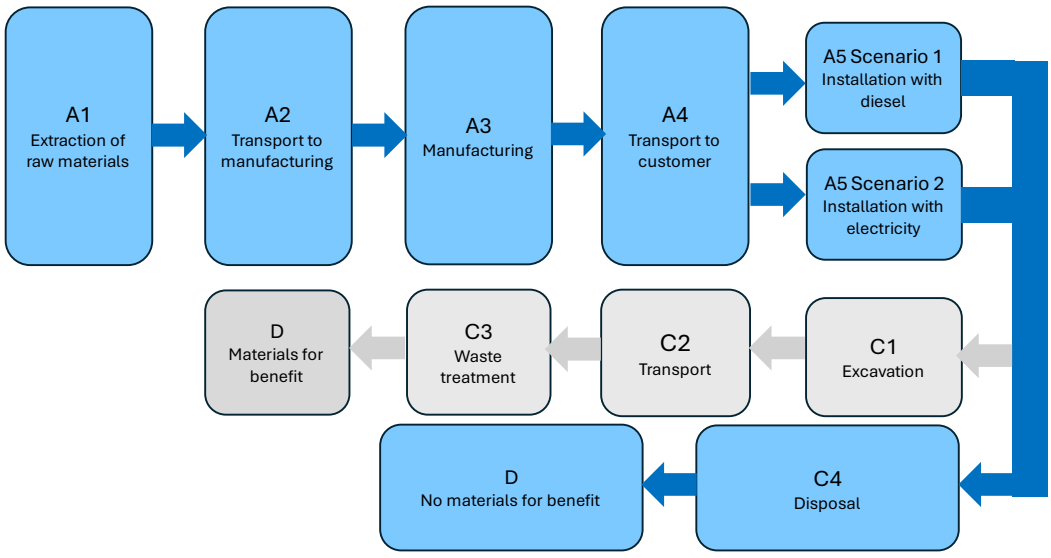


Figure 5. System boundaries for the studied product system.

Allocation

For all raw materials, allocation by mass and net calorific value has been applied. More information is available in the background report. The manufacturing of Hercules concrete piles leads to some co-products, see Table 6.

Table 6: Co-products.

Co-product	Västerås
Concrete	Roadside barrier blocks

The co-products make a very low contribution to the overall revenue (less than 5% of the input flow to the unit process) and they have therefore been disregarded in the calculation model in accordance with EN 15804:2012+A2:2019/AC:2021. A small amount of concrete also goes directly to waste during the manufacturing process of the concrete piles. The waste from that concrete is included in the LCA calculations. The concrete mix is the same for all product variations produced at the manufacturing site.

Cut-offs

In the assessment, all available data from the production process are considered, i.e. all raw materials, ancillary materials[1], and energy consumption, using the best available LCI "LCA for Experts" datasets. A cut off has been made for concrete used to produce co-products.

Software and database

The LCA software "LCA for Experts" and its integrated database from Sphera has been used in the LCA modelling. See the list of references.

Data quality

Overall, the data quality can be described as good. The model is based on site-specific data provided by Hercules for the year 2022, except for data on waste. Waste data was calculated based on an average from the last three years, since this was assumed to be most accurate. Data is collected by operational experts on the site.

Electricity in manufacturing

Site-specific volumes for electricity in manufacturing are modelled using generic data for residual electricity mix in Sweden. The mix includes infrastructure for electricity. The LCA data in Table 7 are generic values from "LCA for experts".

Table 7. Electricity in manufacturing (A3).

Energy source	LCA data (g CO2 eq./kWh)
Electricity mix	42

Assumptions and approximations

Module A1

Various oils and lubricants used in the production process, are approximated with a dataset for lubricants since no dataset or EPD were found for hydraulic oil or grease and the impact is judged to be similar.

Module A2

All the material transport distances have been estimated based on data from the suppliers. Transport distances to the manufacturing site have been approximated together with operational experts at the site.

Module A3

The reinforcement preparation from the reinforcement coils does not generate any waste, as the reinforcement is welded together. Metal waste reported in Module A3 originates from the packaging of transverse wire and reinforcement coils and is sent to recycling.

Rock shoe and pile joint flows are based upon average data based on the yearly production volumes.

Module A4

The concrete pile is transported from manufacturing to construction site by truck with an average transport distance based on the most common transport route, see Table 8.

Table 8: Transport distance for Module A4.

Site	km	Transport type
Västerås	120	Truck-trailer, 34-40 t gross

Module A5

Data for the included scenarios is based upon average data collected from piling machines used in different soil conditions. Soil conditions for the reference year represent a variety of projects and locations, thus covering a spectrum of different conditions where both lower and higher energy usage per metre piling is included.

Scenario 1: The concrete pile is installed with a construction machine running on fossil diesel. Based on data on consumption and operating hours from five machines, assumptions on average operation hours and metre piling per week result in 0,195 litre diesel per metre concrete pile.

Scenario 2: The concrete pile is installed with an electric construction machine. Using the same approach as in Scenario 1, data from one machine resulted in 0,829 kWh per metre concrete pile.

Module C1-4 & D

Based upon operational expertise on the site, this LCA study assumes that all concrete and reinforcement stays in the ground and is not extracted for recycling or reuse at the end of life. The product releases no dangerous substances to indoor air, soil or water during its use stage. The product needs no maintenance or service. Therefore, the net output flow for module C and D per declared unit is zero.

[1] Ancillary materials are materials providing necessary support to the production.

The results of the life cycle assessment, based on the declared unit, can be found in Table 10 (core environmental indicators), Table 11 (resource use) and Table 12 (output flows and waste categories). The results present the declared product concrete pile HP 270-0416 manufactured in Västerås plant. The results have been calculated based on the characterization factors of EN 15804, version EF 3.1.

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

The LCA results are aggregated for module A1-A3, A4, A5, C& D as required by the PCR 2019:14.

The impact categories to be studied and documented are pre-defined in PCR 2019:14 for Construction products, version 1.3.4 and C-PCR-003 (to PCR 2019:14), Concrete and concrete elements (EN 16757:2022).

Most of the impact in the "Global warming potential" category originates from the production of the cement and of the steel parts (in descending order).

In the "Acidification potential" category, most of the impact originates from the production of the cement and the steel parts and from transport (in descending order).

Most of the impact in the "Eutrophication potential" category also originates from the production of the cement and the steel parts and from transport (in descending order).

Most of the impact in the "Photochemical ozone creation potential" category originates from the production of the steel parts and the cement (in descending order).

Most of the impact in the "Ozone depletion potential" category originates from the production of the additive, the steel parts, energy and the cement (in descending order).

In the "Depletion of abiotic resources (elements)" category, the impact originates mainly from the production of the cement. In the "Depletion of abiotic resources (fossil)" category, the impact is from the production of the steel parts and the cement.

In the "Total use of renewable primary energy (PERT)" category, most of the impact is from the production of cement.

Most of the radioactive waste originates from the electricity used in the manufacturing process and from the steel parts (in descending order).

The hazardous waste disposed originates mainly from the production of the additive. The non-hazardous waste disposed originates mainly from the production of the aggregates and from the production of the cement (in descending order).

Disclaimer: It is not recommended to use results of module A1-A3 without considering module C.

Table 9: Classification of disclaimers to the declaration of core and additional environmental impact indicators.

ILCD classification	Indicator	Disclaimer
ILCD Type 1	Global warming potential (GWP)	None
	Depletion potential of the stratospheric ozone layer (ODP)	None
	Potential incidence of disease due to PM emissions (PM)	None
ILCD Type 2	Acidification potential, Accumulated Exceedance (AP)	None
	Eutrophication potential, Fraction of nutrients reaching freshwater end compartment (EP-freshwater)	None
	Eutrophication potential, Fraction of nutrients reaching marine end compartment (EP-marine)	None
	Eutrophication potential, Accumulated Exceedance (EP-terrestrial)	None
	Formation potential of tropospheric ozone (POCP)	None
	Potential Human exposure efficiency relative to U235 (IRP)	1*
ILCD Type 3	Abiotic depletion potential for non-fossil resources (ADP-minerals&metals)	2**
	Abiotic depletion potential for fossil resources (ADP-fossil)	2**
	Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	2**
	Potential Comparative Toxic Unit for ecosystems (ETP-fw)	2**
	Potential Comparative Toxic Unit for humans (HTP-c)	2**
	Potential Comparative Toxic Unit for humans (HTP-nc)	2**
	Potential Soil quality index (SQP)	2**

*Disclaimer 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.

**Disclaimer 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.

Table 10: Results of the LCA (modules A1-A3, A4-A5, C and D) – Core environmental indicators per declared unit of the declared product (HP 270-0416) including fitting elements.

Core environmental indicators			HP 270-0416 Västerås								
Impact category		Unit	A1-A3	A4	A5 S1[2]	A5 S2[2]	C1	C2	C3	C4	D
Climate change	GWP-Total	kg CO_2 eq	24,3	1,6	0,7	3,5E-02	0	0	0	0	0
	GWP-Fossil	kg CO_2 eq	24,3	1,6	0,7	3,5E-02	0	0	0	0	0
	GWP-Biogenic[1]	kg CO_2 eq	0	0	0	0	0	0	0	0	0
	GWP-Land use and land use change	kg CO_2 eq	1,3	1,5E-02	5,3E-03	1,2E-05	0	0	0	0	0
	GWP-GHG	kg CO_2 eq	24,3	1,6	0,7	3,5E-02	0	0	0	0	0
Ozone depletion		kg CFC 11 eq	0,0	1,4E-13	7,5E-14	6,5E-13	0	0	0	0	0
Acidification		mol H^+ eq.	0,1	5,5E-03	1,7E-03	1,2E-04	0	0	0	0	0
Eutrophication aquatic freshwater		kg P eq.	0,0	5,8E-06	2,1E-06	7,5E-07	0	0	0	0	0
Eutrophication aquatic marine		kg N eq.	0,0	2,5E-03	7,8E-04	4,3E-05	0	0	0	0	0
Eutrophication terrestrial		mol N eq.	0,3	2,8E-02	8,8E-03	3,7E-04	0	0	0	0	0
Photochemical ozone formation		kg NMVOC eq.	0,0	5,0E-03	2,5E-03	9,3E-05	0	0	0	0	0
Depletion of abiotic resources - minerals and metals		kg Sb eq.	0,0	1,0E-07	3,8E-08	2,0E-08	0	0	0	0	0
Depletion of abiotic resources - fossil fuels		MJ, net calorific value	153,5	21,8	7,8	3,8	0	0	0	0	0
Water use		m^3 world eq. deprived	2148,1	1,8E-02	6,9E-03	3,0E-02	0	0	0	0	0

Table 11: Results of the LCA (modules A1-A3, A4-A5, C and D) – Resource use indicators per declared unit of the declared product (HP 270- 0416) including fitting elements.

Use of resources		HP 270-0416 Västerås								
Impact category	Unit	A1-A3	A4	A5 S1[2]	A5 S2[2]	C1	C2	C3	C4	D
Use of renewable primary energy excl. renewable primary energy resources used as raw materials	MJ, net calorific value	51,9	1,5	0,6	3,4	0	0	0	0	0
Use of renewable primary energy as raw materials	MJ, net calorific value	0,1	0	0,6	0	0	0	0	0	0
Total use of renewable primary energy	MJ, net calorific value	42,4	1,5	7,8	3,4	0	0	0	0	0
Use of non-renewable primary energy excl. non-renewable primary energy resources used as raw materials	MJ, net calorific value	204,6	21,8	7,8	3,8	0	0	0	0	0
Use of non-renewable primary energy as raw materials	MJ, net calorific value	0	0	6,2E-04	4,9E-03	0	0	0	0	0
Total use of non-renewable primary energy	MJ, net calorific value	157,3	21,8	0	3,8	0	0	0	0	0
Use of secondary material	kg	7,0	0	0	0	0	0	0	0	0
Use of renewable secondary fuels	MJ, net calorific value	9,8	0	0	0	0	0	0	0	0
Use of non-renewable secondary fuels	MJ, net calorific value	58,1	0	0	0	0	0	0	0	0
Use of net fresh water	m^3	0,1	1,7E-03	0	4,9E-03	0	0	0	0	0

[1]: This indicator is set to zero, due to inconsistencies in the dataset used delivered by Sphera. Though, net result over the life cycle is zero since carbon uptake and emission is zero during a life-cycle.

[2]: S1= Scenario 1, S2=Scenario 2. For the product declared, scenario 1 is applied for the modules declared.

Table 12: Results of the LCA (modules A1-A3, A4-A5, C and D) – Waste categories and output flows per declared unit of the declared product (HP 270-0416) including fitting elements.

Waste categories & output flows		HP 270-0416 Västerås								
Impact category	**Unit**	**A1-A3**	**A4**	**A5 S1[2]**	**A5 S2[2]**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	6,2E-03	8,1E-11	7,1E-11	8,1E-11	0	0	0	0	0
Non-hazardous waste disposed	kg	6,5	3,1E-03	0	0	0	0	0	0	0
Radioactive waste disposed	kg	8,3E-03	2,8E-05	2,5E-05	2,8E-05	0	0	0	0	0
Components for re-use	kg	0	0	0	0	0	0	0	0	0
Materials for recycling	kg	0,2	0	0	0	0	0	0	0	0
Materials for energy recovery	kg	1,4	0	0	0	0	0	0	0	0
Exported energy	MJ per energy carrier	0	0	0	0	0	0	0	0	0

Table 13: Additional environmental impact indicators are only declared in the General background report.

Impact category	Unit	Module A1-D
Particulate matter emissions	Disease incidence	Not declared in EPD, see Background Report
Ionizing radiation, human health	kBq U235 eq.	Not declared in EPD, see Background Report
Eco-toxicity (freshwater)	CTUe	Not declared in EPD, see Background Report
Human toxicity, cancer effects	CTUh	Not declared in EPD, see Background Report
Human toxicity, non-cancer effects	CTUh	Not declared in EPD, see Background Report
Land use related impacts/Soil quality	dimensionless	Not declared in EPD, see Background Report

[2]: S1= Scenario 1, S2=Scenario 2. For the product declared, scenario 1 is applied for the modules declared.

ADDITIONAL ENVIRONMENTAL INFORMATION

The additional environmental information contains LCA results converted per 1000 kg pile (Table 14). Core environmental indicators for concrete pile HP 270-0416 from the site in Ucklum are presented in Table 15-17. Results for core environmental indicators for the concrete pile declared with a scenario where the fitting elements (rock shoe/pile joint) are not included, are presented in Table 18. The climate impact from the fitting elements only (rock shoe, pile joint) are presented in Table 19, based on the EPD from the supplier (see reference list). The climate impact is calculated based on the average amount of fitting elements in concrete pile HP 270-0416. LCA results for the concrete production for one meter of pile are presented in Table 20. Results for other environmental indicators and additional environmental performance data are available upon request.

Table 14: LCA results for the concrete pile with an average amount of fitting elements included, per metre and per 1000 kg.

Core environmental indicators			A1-A3			
			Per declared unit (metre)		Per 1000 kg pile	
Impact category		Unit	Ucklum	Västerås	Ucklum	Västerås
Climate change	GWP-Total	kg CO2 eq	25,2	24,3	136,6	131,4

Table 15: Results of the LCA (modules A1-A3, A4-A5, C and D) – Core environmental indicators per one metre of concrete pile HP 270-0416 for the site in Ucklum including fitting elements.

Core environmental indicators			HP 270-0416 Ucklum								
Impact category		Unit	A1-A3	A4	A5 S1[2]	A5 S2[2]	C1	C2	C3	C4	D
Climate change	GWP-Total	kg CO_2 eq	25,2	1,4	0,7	3,5E-02	0	0	0	0	0
	GWP-Fossil	kg CO_2 eq	25,2	1,4	0,7	3,5E-02	0	0	0	0	0
	GWP-Biogenic[1]	kg CO_2 eq	0	0	0,	0	0	0	0	0	0
	GWP-Land use and land use change	kg CO_2 eq	1,3	0,013	5,3E-03	1,2E-05	0	0	0	0	0
	GWP-GHG	kg CO_2 eq	25,2	1,4	0,7	3,5E-02	0	0	0	0	0
Ozone depletion		kg CFC 11 eq	4,1E-07	1,2E-13	7,5E-14	6,5E-13	0	0	0	0	0
Acidification		mol H^+ eq.	0,1	4,8E-03	1,7E-03	1,2E-04	0	0	0	0	0
Eutrophication aquatic freshwater		kg P eq.	7,5E-04	5,1E-06	2,1E-06	7,5E-07	0	0	0	0	0
Eutrophication aquatic marine		kg N eq.	3,0E-02	2,2E-03	7,8E-04	4,3E-05	0	0	0	0	0
Eutrophication terrestrial		mol N eq.	0,3	2,5E-02	8,8E-03	3,7E-04	0	0	0	0	0
Photochemical ozone formation		kg NMVOC eq.	3,2E-02	4,3E-03	2,5E-03	9,3E-05	0	0	0	0	0
Depletion of abiotic resources - minerals and metals		kg Sb eq.	6,9E-06	9,1E-08	3,8E-08	2,0E-08	0	0	0	0	0
Depletion of abiotic resources - fossil fuels		MJ, net calorific value	159,9	19,0	7,8	3,8	0	0	0	0	0
Water use		m^3 world eq. deprived	2225,4	1,6E-02	6,9E-03	3,0E-02	0	0	0	0	0

[1]: This indicator is set to zero, due to inconsistencies in the dataset used delivered by Sphera. Though, net result over the life cycle is zero since carbon uptake and emission is zero during a life-cycle.

[2]: S1= Scenario 1, S2=Scenario 2. For the product declared, scenario 1 is applied for the modules declared.

Table 16: Results of the LCA (modules A1-A3, A4-A5, C and D) – Resource use indicators per one metre of concrete pile HP 270-0416 for the site in Ucklum including fitting elements.

Use of resources		HP 270-0416 Ucklum								
Impact category	**Unit**	**A1-A3**	**A4**	**A5 S1[2]**	**A5 S2[2]**	**C1**	**C2**	**C3**	**C4**	**D**
Use of renewable primary energy excl. renewable primary energy resources used as raw materials	MJ, net calorific value	53,7	1,3	0,6	3,4	0	0	0	0	0
Use of renewable primary energy as raw materials	MJ, net calorific value	0,1	0	0,6	0	0	0	0	0	0
Total use of renewable primary energy	MJ, net calorific value	43,9	1,3	7,8	3,4	0	0	0	0	0
Use of non-renewable primary energy excl. non-renewable primary energy resources used as raw materials	MJ, net calorific value	212,7	19,1	7,8	3,8	0	0	0	0	0
Use of non-renewable primary energy as raw materials	MJ, net calorific value	1,1E-04	0	6,2E-04	4,9E-03	0	0	0	0	0
Total use of non-renewable primary energy	MJ, net calorific value	163,7	19,1	0	3,8	0	0	0	0	0
Use of secondary material	kg	7,2	0	0	0	0	0	0	0	0
Use of renewable secondary fuels	MJ, net calorific value	10,1	0	0	0	0	0	0	0	0
Use of non-renewable secondary fuels	MJ, net calorific value	60,2	0	0	0	0	0	0	0	0
Use of net fresh water	m^3	0,1	1,5E-03	0,0E+00	4,9E-03	0	0	0	0	0

Table 17: Results of the LCA (modules A1-A3, A4-A5, C and D) – Waste categories and output flows per one metre of concrete pile HP 270-0416 for the site in Ucklum including fitting elements.

Waste categories & output flows		HP 270-0416 Ucklum								
Impact category	**Unit**	**A1-A3**	**A4**	**A5 S1[2]**	**A5 S2[2]**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	6,4E-03	7,1E-11	2,4E-11	-7,2E-10	0	0	0	0	0
Non-hazardous waste disposed	kg	6,9E+00	2,8E-03	1,2E-03	4,4E-03	0	0	0	0	0
Radioactive waste disposed	kg	8,7E-03	2,5E-05	1,5E-05	1,3E-03	0	0	0	0	0
Components for re-use	kg	0	0	0	0	0	0	0	0	0
Materials for recycling	kg	1,5E-01	0	0	0	0	0	0	0	0
Materials for energy recovery	kg	1,4E+00	0	0	0	0	0	0	0	0
Exported energy	MJ per energy carrier	1,1E-05	0	0	0	0	0	0	0	0

[1]: This indicator is set to zero, due to inconsistencies in the dataset used delivered by Sphera. Though, net result over the life cycle is zero since carbon uptake and emission is zero during a life-cycle.

[2]: S1= Scenario 1, S2=Scenario 2. For the product declared, scenario 1 is applied for the modules declared.

Table 18: Results of the LCA (modules A1-A3, A4-A5, C and D) – Core environmental indicators per one metre of concrete pile HP 270-0416 for the sites in Västerås and Ucklum *excluding* fitting elements.

Core environmental indicators			**HP 270-0416**	
Impact category		**Unit**	**A1-A3**	
			Ucklum	Västerås
Climate change	GWP-Total	kg CO_2 eq	23,9	23,0
	GWP-Fossil	kg CO_2 eq	23,9	23,0
	GWP-Biogenic[1]	kg CO_2 eq	0,0	0,0
	GWP-Land use and land use change	kg CO_2 eq	1,0E-02	1,2E-02
	GWP-GHG	kg CO_2 eq	23,9	23,0

Table 19: LCA results for an average amount of fitting elements (rock shoe, pile joint) per one metre concrete pile HP 270-0416.

Core environmental indicators			**A1-A3**			
			Per declared unit (metre)		**Per 1000 kg concrete pile**	
Impact category		Unit	Rock Shoe	Pile joint	Rock Shoe	Pile joint
Climate change	GWP-Total	kg CO_2 eq	1,22	1,36	6,95	7,77

Table 20: LCA results for the concrete production for one metre of concrete pile HP 270-0416.

Core environmental indicators (Concrete production)			**A1-A3**			
			Per declared unit (metre)		**Per m³ kg concrete[1]**	
Impact category		Unit	Ucklum	Västerås	Ucklum	Västerås
Climate change	GWP-Total	kg CO_2 eq	19,3	18,5	254	243
	GWP-Fossil	kg CO_2 eq	19,3	18,5	254	243
	GWP-Biogenic*	kg CO_2 eq	0	0	0	0
	GWP-Land use and land use change	kg CO_2 eq	0,015	0,006	0,196	0,083
	GWP-GHG**	kg CO_2 eq	19,3	18,5	254	243

[1]: The conversion factor for 1 m^3 of concrete is 2300 kg.

VERIFICATION DETAILS

CEN standard EN 15804 served as the core PCR	
PCR:	Product Category Rules PCR 2019:14. Construction products. Version 1.3.4, 2024-04-30, the International EPD System
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
Sub-PCR	C-PCR-003 (to PCR 2019:14). Concrete and concrete elements (EN 16757:2022), Version 2024-04-30, the International EPD System
Sub-PCR review was conducted by:	PCR Committee: WBCSD Cement Sustainability Initiative Moderator: International EPD® System
LCA practitioner:	Sofia Dahling, NCC Teknik
LCA accountability:	Sara Bjurström, Hercules Grundläggning AB
Independent verification of the declaration and data, according to ISO 14025:	□ EPD process certification (Internal) ☒ EPD verification (External)
Third party verifier:	Bureau Veritas Certification Sweden AB (accredited by SWEDAC with accreditation number 1236)
Accredited or approved by:	SWEDAC
The follow-up of data during the EPD validity involves third party verifier	□ No ☒ Yes

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ABOUT THE EPD

This EPD is developed by Hercules Grundläggning AB. The EPD has been drawn up in accordance with Product Category Rules PCR 2019:14 for Construction products, version 1.3.4 (PCR 2019:14) and Complementary Product Category Rules C-PCR-003 (to PCR 2019:14) for Concrete and concrete elements (EN 16757:2022) (C-PCR-003). The program operator is the International EPD® System (see www.environdec.com for more information). The aim of this EPD is to provide objective and reliable information on the environmental impact of the production of the Hercules concrete piles.

As this EPD is based on data for the production of Hercules concrete piles in the plants owned by Hercules, the results may not be representative of concrete piles produced at the concrete pile plants of other companies.

ABOUT HERCULES GRUNDLÄGGNING AB

Hercules Grundläggning AB is department of NCC Infrastructure, which in turn is a business area within Nordic Construction Company, NCC AB.

Hercules is one of the leading deep foundation companies on the Nordic market. Using methods such as piling, support structures and foundation reinforcement, it helps its customers to lay the foundation for future buildings and facilities. A competence that makes Hercules unique is NCC's internal consultant NCC Engineering that assists in design and optimizing of complex infrastructure projects. Hercules is also one of the largest manufacturers and suppliers of precast concrete piles on the Nordic Market. It is essential for Hercules to be able to fulfil certain market requirements.

Hercules Quality, Environmental and Health and Safety Management System has for a long time been certified according to SS-EN ISO 9001:2015, 14001:2015 and 45001:2018.

The quality of the Hercules concrete piles is guaranteed by Nordcert through appropriate Product Quality Certification, SS-EN 12794, a document that specifies the maximum and minimum tolerances of the concrete piles with regards to the following criteria: bending resistance of the finished product; concrete resistance; resistance to freezing; product straightness.
For more information, visit www.hercules.se

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DIFFERENCES VERSUS PREVIOUS VERSIONS

Date of revision	Description of difference versus previous versions
2020-01-28	Original version
2025-01-03	Major update of the EPD to align with the new currently valid version of the PCR. The update includes changes in the concrete production regarding cement, energy consumption and transports. The EPD focusses on one product variation and one manufacturing site.