Environmental Product Declaration

In accordance with ISO 14025 and EN 15804:2012+A2:2019 for:

Prefabricated concrete wall

from

AF Prefab i Mälardalen

Programme:	The International EPD® System, www.environdec.com
Programme operator:	EPD International AB
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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

General information

Programme information

Programme:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	www.environdec.com
E-mail:	info@environdec.com

CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product category rules (PCR): *PCR 2019:14, v.1.1 Construction Products and Construction Services* *c-PCR-003, version 2019-12-20*
PCR review was conducted by: The Technical Committee of the International EPD® System. Chair of the PCR review is Claudia A. Peña. The review panel may be contacted via info@environdec.com
Independent third-party verification of the declaration and data, according to ISO 14025:2006: ☐ EPD process certification ☒ EPD verification
Third party verifier: David Althoff Palm, Ramboll *In case of recognised individual verifiers:* Approved by: The International EPD® System
Procedure for follow-up of data during EPD validity involves third party verifier: ☐ Yes ☒ No

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

EPDs within the same product category but from different programmes 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.

Company information

Owner of the EPD:
AF Prefab i Mälardalen

Contact:
Jimmy Högberg
Jimmy.hogberg@afprefab.se
+46 70 650 30 15

Description of the organisation:
AF Prefab i Mälardalen is a part of the industrial group AF-Gruppe which is a fast-growing actor within the construction sector. *AF Prefab i Mälardalen* produces different kinds of concrete elements such as concrete piles, balcony slabs and special products in concrete.

Product-related or management system-related certifications:
The product is produced in accordance to SS EN 14992. The prefabricated concrete wall is also registered at Byggvarubedömningen and SundaHus, two organisations that supply information regarding sustainability for construction products.

Name and location of production site(s):
Nykvarn, Sweden

Product information

Product name:
Prefabricated concrete wall

Product description and identification:
Massive wall elements of reinforced concrete used for building houses.

UN CPC code:
UN CPC 375

LCA information

Declared unit:
1 tonne (1000 kg) of prefabricated concrete wall

The EPD is an average EPD. The amount of rebar can vary.

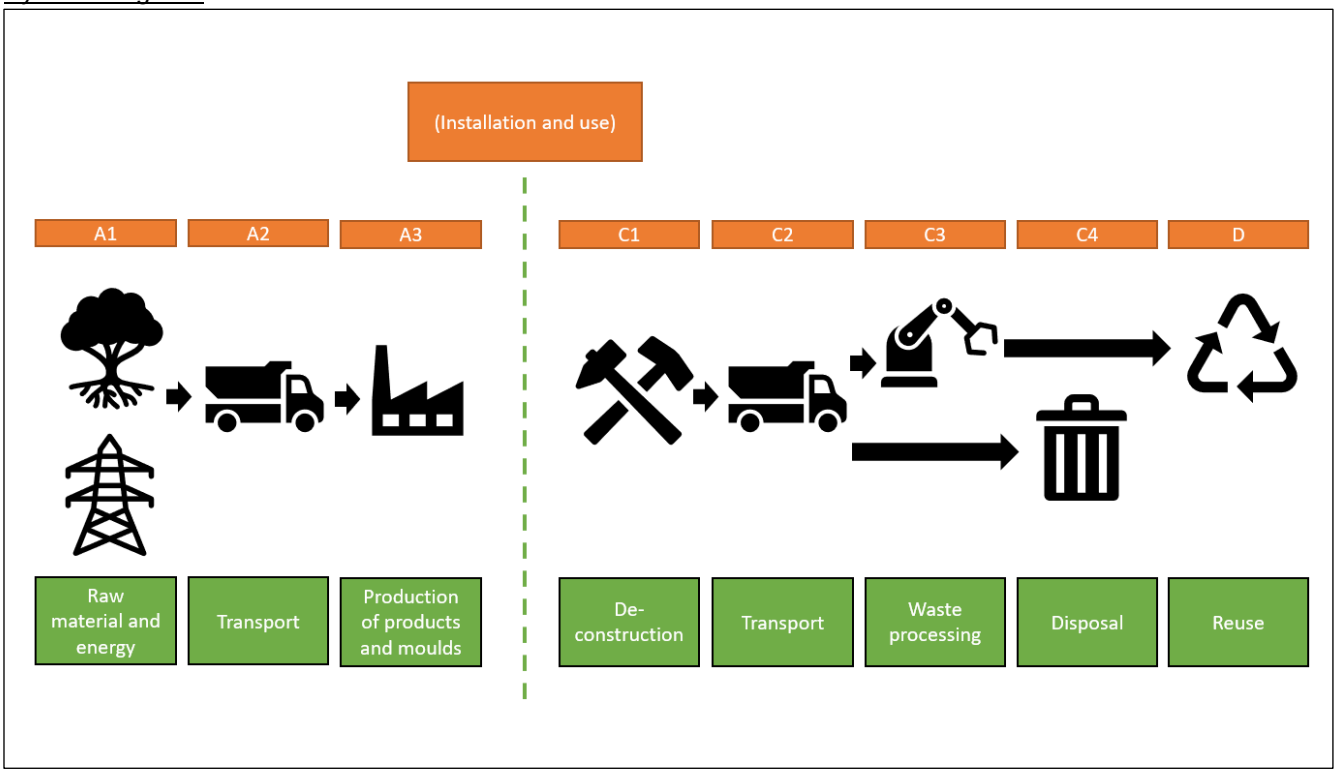
Reference service life:
Not applicable

Time representativeness:
Production during 2020 and 2021.

Database(s) and LCA software used:
Simapro version 9.2.0.2 together with Ecoinvent v. 3.7.1

Description of system boundaries:
Cradle to gate with modules C1-C4 and module D (A1-A3 + C + D)

System diagram:



Included	Excluded
Regarding Production, A1-A3 • Construction of production site • Production of all consumed raw materials for the product • Production of consumable materials used in moulds • Production of materials that end up as waste at the production site • Energy and fuels • Transportation to the production site • Management of waste • Direct emissions from combustion of fuels	**Regarding Production, A1-A3** • Purchase of tools or workwear is not included **A4-A5 Transport to construction site and installation is not included** **B1-B7 Use of the product is not included**
Regarding End-of-life stage, C1-C4 • Deconstruction/crushing of the product • Transport to waste treatment • Waste processing • Disposal, landfilling of inert materials	
Regarding Benefits and loads beyond the system boundary, D • Recycling of steel • Replacement of steel production • Replacement of filling material (gravel)	

Allocation:

At the production site, other concrete products that are very similar to the prefabricated concrete wall are being produced. Therefore, mass allocation has been used to divide energy usage and waste generation between the produced products.

Major assumptions:

- The lifespan of the production site is assumed to be 50 years.
- For transports within Sweden, 26 % of the diesel consist of biofuel accordance to greenhouse gas reduction mandate. The biofuel is assumed to be HVO.
- The transport distance to the waste treatment site is 50 km.
- The consumption of diesel for demolition in C1 is assumed to be 10 kWh/tonne.
- 80 % of the concrete is reused as filling material and the remaining is landfilled.
- The energy use of crushing concrete in C3 is assumed to be 2 kWh/tonne.
- It is assumed that 95 % of the steel is recycled in C3, the remaining is landfilled.

Electricity mix

The company purchases electricity produced from renewable resources. The mix is presented below.

	Share [%]
Hydro power	63,75
Biobased power	36,24
Wind power	0,01

The electricity mix has a climate impact of 50 g CO_2 eq. per kWh.

LCA practitioners:

Ida Adolfsson and Marcus Öhlén at Tyréns AB

Modules declared, geographical scope, share of specific data (in GWP-GHG indicator) and data variation:

	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	Reuse-Recovery-Recycling-potential
Module	**A1**	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Modules declared	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	SE/ EU	SE	SE	-	-	-	-	-	-	-	-	-	SE	SE	SE/ EU	SE/ EU	SE/EU
Specific data used	More than 65 %					-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	Less than 10 %					-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	Not relevant					-	-	-	-	-	-	-	-	-	-	-	-

Content information

Product components	Weight, kg	Post-consumer material, weight-%	Renewable material, weight-%
Crushed material, gravel	678,7	100%	0
Cement	188,5	100%	0
Reinforcement steel	50	100%	0
Steel (attachments)	2,59	100%	0
Plasticiser	4,71	100%	0
HDPE	0,04	100%	0
Water	75,4	100%	0
TOTAL	1000	100%	0

No packaging material is used for this product. The product does neither contain any substances from the candidate list of SVHC for authorization.

Environmental Information

Potential environmental impact – mandatory indicators according to EN 15804

Results per declared unit, 1 tonne							
Indicator	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-fossil	kg CO_2 eq.	2,27E+02	3,29E+00	6,54E+00	3,36E+00	8,13E-01	-4,02E+01
GWP-biogenic	kg CO_2 eq.	8,27E+00	2,60E-03	1,51E+00	2,65E-03	6,46E-03	3,04E-02
GWP-luluc	kg CO_2 eq.	5,14E-01	2,62E-04	2,71E-03	2,67E-04	1,67E-04	-1,94E-02
GWP-total	kg CO_2 eq.	2,36E+02	3,29E+00	8,05E+00	3,36E+00	8,20E-01	-4,02E+01
ODP	kg CFC 11 eq.	1,60E-05	7,10E-07	1,44E-06	7,25E-07	3,97E-07	-1,91E-06
AP	mol H^+ eq.	9,06E-01	3,43E-02	1,95E-02	3,50E-02	7,95E-03	-1,61E-01
EP-freshwater*	kg P eq.	4,01E-02	9,95E-05	5,36E-04	1,01E-04	5,07E-05	-1,89E-02
EP-marine	kg N eq.	2,43E-01	1,52E-02	4,33E-03	1,55E-02	3,02E-03	-3,73E-02
EP-terrestrial	mol N eq.	2,91E+00	1,67E-01	4,70E-02	1,70E-01	3,31E-02	-3,92E-01
POCP	kg NMVOC eq.	7,86E-01	4,58E-02	1,79E-02	4,67E-02	9,47E-03	-1,76E-01
ADP-minerals&metals**	kg Sb eq.	8,72E-04	1,33E-06	2,96E-05	1,36E-06	1,53E-06	-1,03E-04
ADP-fossil*	MJ	1,63E+03	4,52E+01	9,80E+01	4,62E+01	2,64E+01	-4,15E+02
WDP	m^3	2,97E+01	5,80E-02	3,40E-01	5,92E-02	7,98E-02	-1,65E+01
Acronyms	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						

** Can be converted via: kg P eq. = 0,33 kg PO_4 eq.*

*** 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.*

Potential environmental impact – additional mandatory and voluntary indicators

Results per declared unit, 1 tonne							
Indicator	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-GHG[1]	kg CO_2 eq.	2,26E+02	3,26E+00	6,49E+00	3,33E+00	8,03E-01	-3,87E+01

Use of resources

Results per declared unit, 1 tonne							
Indicator	**Unit**	**A1**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	4,21E+02	2,34E-01	1,62E+00	2,39E-01	5,20E-01	-1,92E+01
PERM	MJ	4,25E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	4,21E+02	2,34E-01	1,62E+00	2,39E-01	5,20E-01	-1,92E+01
PENRE	MJ	1,72E+03	4,81E+01	1,04E+02	4,90E+01	2,80E+01	-4,38E+02
PENRM	MJ.	5,41E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	1,72E+03	4,81E+01	1,04E+02	4,90E+01	2,80E+01	-4,38E+02
SM	kg	3,14E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	MJ	1,54E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m^3	7,54E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Acronyms	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						

[1] The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus almost equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

Waste production and output flows

Waste production

Results per declared unit, 1 tonne							
Indicator	**Unit**	**A1**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	7,76E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Non-hazardous waste disposed	kg	8,95E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Radioactive waste disposed	kg	1,01E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Output flows

Indicator	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Material for recycling	kg	1,59E-02	0,00E+00	0,00E+00	8,08E+02	0,00E+00	0,00E+00
Materials for energy recovery	kg	2,73E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy, electricity	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy, thermal	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Information on biogenic carbon content

Results per declared unit, 1 tonne		
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_2.

References

General Programme Instructions of the International EPD® System. Version 3.01.

PCR 2019:14, v.1.1 Construction Products

SS-EN 15804:2012+A2:2019

SS-EN 16757:2017

PCR 2019:14-c-PCR-003 c-PCR-003 Concrete and concrete elements (EN 16757) (2019-12-20)

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