

Environmental product declaration

in accordance with ISO 14025 and EN 15804+A2

ANLÆGSBETON (C35/45 Slump Concrete in Aggressive Environmental Exposure Class)



The Norwegian EPD Foundation

Owner of the declaration:

Unicon A/S

Product:

ANLÆGSBETON (C35/45 Slump Concrete in Aggressive Environmental Exposure Class)

Declared unit:

1 m³

This declaration is based on Product Category Rules:

CEN Standard EN 15804:2012+A2:2019 serves as core PCR
NPCR 020:2021 Part B for Concrete and concrete elements

Program operator:

The Norwegian EPD Foundation

Declaration number:

NEPD-5334-4646-EN

Registration number:

NEPD-5334-4646-EN

Issue date: 06.11.2023

Valid to: 06.11.2028

ver-020124

EPD Software:

LCA.no EPD generator ID: 69264

General information

Product

ANLÆGSBETON (C35/45 Slump Concrete in Aggressive Environmental Exposure Class)

Program operator:

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

Declaration number:

NEPD-5334-4646-EN

This declaration is based on Product Category Rules:

CEN Standard EN 15804:2012+A2:2019 serves as core PCR
NPCR 020:2021 Part B for Concrete and concrete elements

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 m3 ANLÆGSBETON (C35/45 Slump Concrete in Aggressive Environmental Exposure Class)

Declared unit with option:

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

Functional unit:

Not Declared

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 EPD Norway's procedures and guidelines for verification and approval of EPD tools.

Third party verifier:

Jane Anderson, Construction LCA Ltd

(no signature required)

Owner of the declaration:

Unicon A/S
Contact person: Camilla Hjørringgaard
Phone: +45 24 29 13 09
e-mail: camilla.hjoerringgaard@unicon.dk

Manufacturer:

Unicon A/S
Ulvehavevej 61
7100 Vejle, Denmark

Place of production:

Unicon Danmark

, Denmark

Management system:

ISO 9001, DS/EN 206, DS/EN 206 DK NA

Organisation no:

16 06 49 39

Issue date:

06.11.2023

Valid to:

06.11.2028

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.

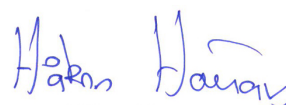
Development and verification of EPD:

The declaration is created using EPD tool lca.tools ver EPD2022.03, 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: Camilla Hjørringgaard

Reviewer of company-specific input data and EPD: Denisse Aurora Páez Gómez

Approved:



Håkon Hauan
Managing Director of EPD-Norway

Product

Product description:

This is a specific product EPD for the concrete type:

Aggressive 35 MPa slump concrete with AALBORG SOLID cement (CEM II/A-V 42,5 N).

This product-EPD covers all variants of this concrete type with and without pozzolans as fly ash and micro silica. This product-EPD also covers all available consistency and Dmax variants of the concrete type.

For more information, see UNICON's publications:

<https://www.unicon.dk/produkter-services/publikationer/>

Year of Study is December 2022 to November 2023.

Product specification

100% ready mixed concrete

Materials	Value	Unit
Ready mixed concrete	2280	kg/m3

Technical data:

Exposure classes:

X0, XC1, XC2, XC3, XC4, XF1, XF2, XF3, XS1, XS2, XD1, XA1, XA2

Market:

Denmark

Reference service life, product

100 years

(ref. DS/EN 16757:2022 Annex F)

Reference service life, building or construction works

50 years

LCA: Calculation rules

Declared unit:

1 m3 ANLÆGSBETON (C35/45 Slump Concrete in Aggressive Environmental Exposure Class)

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%) are not included. 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:

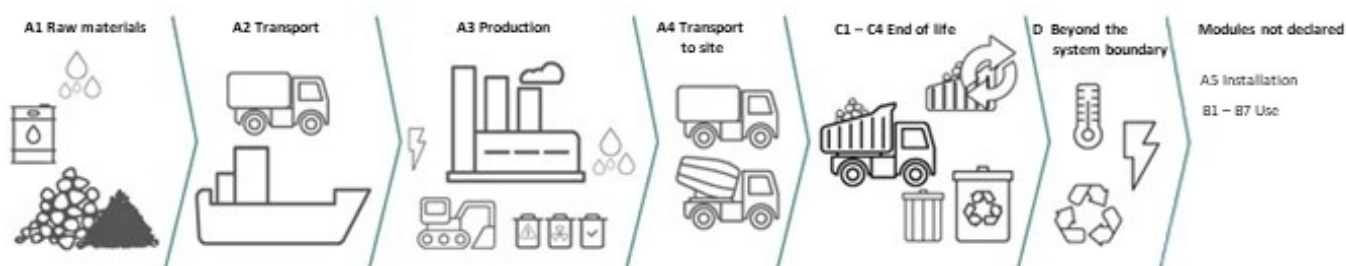
Specific data for the product composition are provided by the manufacturer. The data represent the production of the declared product and were collected for EPD development in the year of study. Background data is based on EPDs according to EN 15804 and different LCA databases. The data quality of the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

Materials	Source	Data quality	Year
Additives	ecoinvent 3.6	Database	2019
Aggregate	ecoinvent 3.6	Database	2019
Sand	ecoinvent 3.6	Database	2019
Water	ecoinvent 3.6	Database	2019
Chemical	EPD-EFC-20210193-IBG1-EN	EPD	2021
Chemical	EPD-EFC-20210195-IBG1-EN	EPD	2021
Chemical	EPD-EFC-20210198-IBG1-EN	EPD	2021
Fiber	MD-20010-EN	EPD	2020
Pigments and Fillers	MD-20026-DA	EPD	2020
Cement	S-P-09883	EPD	2022

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	MND	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X	

System boundary:



Additional technical information:

Further specification and technical information can be supplied with a concrete declaration upon request.
E-mail: kundecenter@unicon.dk

Concrete produced according to the exposure classes X0, XC1, XC2, XC3, XC4, XF1, XF2, XF3, XS1, XS2, XD1, XA1, XA2 can be used for the following environments according to DS/EN 206 DK NA:

Concrete inside buildings with very low air humidity in heated rooms (X0), concrete inside buildings with low air humidity in unheated rooms or soil-covered concrete foundations and terrain decks permanently in soil without flowing water or permanently submerged in water (XC1), concrete exposed to long-term contact with water (XC2), concrete inside buildings with moderate or high air humidity or concrete outdoors sheltered from rain (XC3), concrete subjected to water contact which is not included in XC3 e.g. external walls, facades, balconies, etc. (XC4), concrete exposed to airborne chloride from de-icing agents, areas with limited de-icing or in close proximity to areas being deiced (XD1), concrete exposed to airborne salt from seawater (XS1), concrete exposed to permanent contact with seawater (XS2), vertical concrete surfaces exposed to rain and freezing (XF1), vertical concrete surfaces exposed to freezing and airborne chloride from de-icing agents (XF2), horizontal concrete surfaces exposed to rain and freezing (XF3), concrete exposed to natural soil and groundwater with a slightly aggressive chemical environment (XA1), as well as concrete exposed to natural soil and groundwater with a moderately aggressive chemical environment (XA2).

This EPD is produced in compliance with Dansk Beton's EPD guidelines (Dansk Betons EPD Retningslinjer). These guidelines are made in collaboration with all members of Dansk Beton, who are using the EPD tool, and ensure a consistent procedure for data collection and calculation across the Danish concrete industry.



LCA: Scenarios and additional technical information

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

Transport from production place to user (A4)	Capacity utilisation (incl. return) %	Distance (km)	Fuel/Energy Consumption	Unit	Value (Liter/tonne)
Concrete truck, EURO 6 (km) - Europe	53,3 %	17	0,023	l/tkm	0,39
De-construction demolition (C1)		Unit	Value		
Demolition of building per kg of cement-based product, C1 (kg)	kg/DU	2280,00			
Transport to waste processing (C2)	Capacity utilisation (incl. return) %	Distance (km)	Fuel/Energy Consumption	Unit	Value (Liter/tonne)
Truck, over 32 tonnes, EURO 5 (km) - Europe	53,3 %	25	0,023	l/tkm	0,58
Waste processing (C3)		Unit	Value		
Waste treatment of cement-based product after demolition, C3 (kg)	kg	2206,13			
Disposal (C4)		Unit	Value		
Waste, concrete, to landfill (kg)	kg	73,87			
Benefits and loads beyond the system boundaries (D)		Unit	Value		
Substitution of primary aggregates, gravel round (kg)	kg	2206,13			

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	C1	C2	C3	C4	D	
 GWP-total	kg CO ₂ -eq	3,25E+02	3,52E+01	2,95E+00	3,40E+00	9,12E+00	5,18E+00	1,59E+00	3,17E-01	-5,15E+00	
 GWP-fossil	kg CO ₂ -eq	3,25E+02	3,52E+01	2,93E+00	3,40E+00	9,12E+00	5,18E+00	1,57E+00	3,16E-01	-5,05E+00	
 GWP-biogenic	kg CO ₂ -eq	2,41E-01	7,77E-03	2,35E-02	1,45E-03	1,71E-03	2,13E-03	1,35E-02	2,69E-04	-1,01E-01	
 GWP-luluc	kg CO ₂ -eq	1,06E-01	6,36E-03	2,24E-03	1,03E-03	7,19E-04	1,51E-03	2,17E-03	6,20E-05	-3,41E-03	
 ODP	kg CFC11 -eq	6,06E-06	7,72E-06	3,32E-07	8,19E-07	1,97E-06	1,20E-06	3,09E-07	1,54E-07	-9,20E-07	
 AP	mol H+ -eq	1,15E+00	8,04E-01	1,57E-02	1,09E-02	9,54E-02	2,18E-02	1,27E-02	3,09E-03	-4,55E-02	
 EP-FreshWater	kg P -eq	1,10E-02	1,22E-04	1,34E-04	2,70E-05	3,32E-05	3,95E-05	9,90E-05	2,36E-06	-1,34E-04	
 EP-Marine	kg N -eq	1,86E-01	1,85E-01	3,66E-03	2,39E-03	4,21E-02	6,55E-03	3,72E-03	1,16E-03	-1,58E-02	
 EP-Terrestrial	mol N -eq	2,14E+00	2,06E+00	4,37E-02	2,67E-02	4,56E-01	7,24E-02	4,28E-02	1,28E-02	-1,85E-01	
 POCP	kg NMVOC -eq	5,69E-01	5,39E-01	1,14E-02	1,05E-02	1,27E-01	2,33E-02	1,15E-02	3,65E-03	-4,89E-02	
 ADP-minerals&metals ¹	kg Sb -eq	1,54E-03	2,13E-04	1,60E-05	6,05E-05	1,40E-05	8,85E-05	1,99E-05	2,80E-06	-4,48E-04	
 ADP-fossil ¹	MJ	1,90E+03	4,81E+02	4,07E+01	5,52E+01	1,26E+02	8,06E+01	4,86E+01	1,02E+01	-8,54E+01	
 WDP ¹	m ³	4,24E+03	1,87E+02	3,28E+02	4,23E+01	2,67E+01	6,18E+01	5,37E+03	2,15E+01	-4,01E+03	

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*10⁻³ = 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

No remarks











Additional environmental impact indicators											
Indicator	Unit	A1	A2	A3	A4	C1	C2	C3	C4	D	
 PM	Disease incidence	9,09E-06	1,70E-06	1,94E-07	3,12E-07	1,16E-05	4,56E-07	2,03E-07	6,57E-08	-9,68E-07	
 IRP ²	kgBq U235 -eq	3,43E+00	2,10E+00	1,66E-01	2,41E-01	5,47E-01	3,52E-01	8,16E-01	4,43E-02	-7,84E-01	
 ETP-fw ¹	CTUe	5,88E+03	2,69E+02	4,53E+01	4,03E+01	6,86E+01	5,89E+01	3,45E+01	5,05E+00	-8,80E+01	
 HTP-c ¹	CTUh	5,11E-08	0,00E+00	1,07E-09	0,00E+00	2,28E-09	0,00E+00	2,21E-09	1,48E-10	-4,41E-09	
 HTP-nc ¹	CTUh	1,19E-06	1,12E-07	3,08E-08	3,90E-08	6,38E-08	5,70E-08	3,09E-08	2,96E-09	-1,08E-07	
 SQP ¹	dimensionless	1,65E+02	2,21E+02	4,99E+01	6,32E+01	1,53E+01	9,24E+01	2,75E+01	3,72E+01	1,94E+02	

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*10⁻³ = 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	C1	C2	C3	C4	D	
 PERE	MJ	5,40E+02	3,07E+00	1,82E+01	6,94E-01	6,84E-01	1,01E+00	2,50E+01	1,57E-01	-2,00E+01	
 PERM	MJ	3,74E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	
 PERT	MJ	5,40E+02	3,07E+00	1,82E+01	6,94E-01	6,84E-01	1,01E+00	2,50E+01	1,57E-01	-2,00E+01	
 PENRE	MJ	1,92E+03	4,81E+02	4,07E+01	5,52E+01	1,26E+02	8,06E+01	4,87E+01	1,02E+01	-9,02E+01	
 PENRM	MJ	2,98E+01	0,00E+00	-3,89E-02	0,00E+00	0,00E+00	0,00E+00	-4,32E+00	0,00E+00	0,00E+00	
 PENRT	MJ	1,95E+03	4,81E+02	4,07E+01	5,52E+01	1,26E+02	8,06E+01	4,43E+01	1,02E+01	-9,02E+01	
 SM	kg	1,16E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	
 RSF	MJ	2,34E+02	1,24E-01	6,63E-01	2,43E-02	0,00E+00	3,55E-02	0,00E+00	3,25E-03	-4,09E-01	
 NRSF	MJ	3,48E+02	4,02E-01	2,00E-02	8,13E-02	0,00E+00	1,19E-01	0,00E+00	9,33E-03	-4,20E-01	
 FW	m ³	2,24E+00	2,25E-02	6,96E-02	6,28E-03	6,46E-03	9,18E-03	8,33E-02	1,22E-02	-3,14E+00	

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*10⁻³ = 0,009"






*INA Indicator Not Assessed

End of life - Waste											
Indicator	Unit	A1	A2	A3	A4	C1	C2	C3	C4	D	
	HWD	kg	8,82E+00	1,66E-02	1,69E-02	3,02E-03	3,70E-03	4,41E-03	4,86E-03	0,00E+00	-2,06E-02
	NHWD	kg	3,66E+02	1,40E+01	2,42E+01	4,79E+00	1,49E-01	7,01E+00	1,54E-01	7,39E+01	-6,25E-01
	RWD	kg	7,38E-03	3,38E-03	1,48E-04	3,77E-04	8,72E-04	5,50E-04	5,14E-04	0,00E+00	-6,78E-04

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	C1	C2	C3	C4	D	
	CRU	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	MFR	kg	0,00E+00	0,00E+00	2,38E-02	0,00E+00	0,00E+00	0,00E+00	2,21E+03	0,00E+00	0,00E+00
	MER	kg	0,00E+00	0,00E+00	5,62E-07	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	EEE	MJ	0,00E+00	0,00E+00	3,71E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	EET	MJ	0,00E+00	0,00E+00	5,61E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

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	2,52E-02

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO₂

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 ₂ -eq/kWh

Dangerous substances

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

Indoor environment

No remarks






Additional Environmental Information

Additional environmental impact indicators required in NPCR Part A for construction products										
Indicator	Unit	A1	A2	A3	A4	C1	C2	C3	C4	D
GWPIOBC	kg CO ₂ -eq	3,26E+02	3,52E+01	3,41E+00	3,40E+00	9,12E+00	5,18E+00	1,57E+00	3,17E-01	-5,40E+00

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.

Bibliography

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 ISO 14044:2006 Environmental management - Life cycle assessment - Requirements and guidelines.
 EN 15804:2012+A2:2019 Environmental product declaration - Core rules for the product category of construction products.
 ISO 21930:2017 Sustainability in buildings and civil engineering works - Core rules for environmental product declarations of construction products.
 ecoinvent v3, Allocation, cut-off by classification, Swiss Centre of Life Cycle Inventories.
 Iversen et al., (2021) eEPD v2021.09 Background information for EPD generator tool system verification, LCA.no Report number: 07.21
 Vold et al., (2022) EPD generator for concrete and concrete elements
 Background information for EPD generator application and LCA data, LCA.no report number: 06.22
 NPCR Part A: Construction products and services. Ver. 2.0. April 2021, EPD-Norge.
 NPCR 020 Part B for concrete and concrete elements, Ver. 3.0, 20.09.2021, EPD Norway.

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