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ENVIRONMENTAL PRODUCT DECLARATION

In accordance with ISO 14025 and EN 15804+A2

Centrum Pæle A/S
1 meter steel reinforced fundation Pile in B3 25 x 25 type 06, with 06 rebar

CENTRUM

Owner of the declaration
Centrum Pæle A/S
Grønlandsvej 96
7100 Vejle
Denmark

Product
1 meter steel reinforced fundation Pile in B3 25 x 25 type 06, with 06 rebar

Declared product / Functional unit
1 m

This declaration is based on Product Category Rules
EN 15804:2012 + A2:2019,
NPCR Part A:2021 ,
NPCR 020 Part B for Concrete and Concrete Elements ,
EN 16757:2022

Program operator:
EPD Global
Majorstuen P.O. Box 5250
N-0303 Oslo
Norway

Declaration number
NEPD-11650-11650-2

Registration number
NEPD-11650-11650-2

Issue date
05.05.2026

Valid to
04.05.2031

EPD Software
Emidat Platform v1.0.0

General Information

Product
1 meter steel reinforced fundation Pile in B3 25 x 25 type 06, with 06 rebar

Program Operator
EPD Global
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Declaration Number
NEPD-11650-11650-2

This declaration is based on Product Category Rules
EN 15804:2012 + A2:2019,
NPCR Part A:2021 ,
NPCR 020 Part B for Concrete and Concrete Elements ,
EN 16757:2022

Statements
The owner of the declaration shall be liable for the underlying information and evidence. The Norwegian EPD Foundation shall not be liable with respect to manufacturer, life cycle assessment data and evidences.

Functional unit
1 m with a reference service life of 100 years

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 Global'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 Global, and iii) the process is reviewed annually by an independent third party verifier. See Appendix G of EPD Global's General Programme Instructions for further information on EPD tools.

Verification of EPD tool
Charlotte Merlin, FORCE Technology
(no signature required)

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Manufacturer
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Grønlandsvej 96
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Place of production
Vejle, Denmark

Management system
ISO 9001 , ISO 14001 , ISO 50001 , ISO 45001

Issue date
05.05.2026

Valid to
04.05.2031

Year of study
2024

Comparability
EPDs of construction products may not be comparable if they do not comply with EN 15804 and are not seen in a building context. EPD data may not be comparable if the datasets used are not developed in accordance with EN 15804 and if the background systems are not based on the same database (including primary and secondary data).

Development and verification of EPD
The declaration was created using the Emidat EPD tool v1.0, developed by Emidat GmbH. The EPD tool has been approved by EPD Global.

Developer of EPD: Civ. Eng. Emile Fabrice Angue
Reviewer of company-specific input data and EPD: Civ. Eng. Jacob Dam Jacobsen

Approved

Håkon Hauan, The Norwegian EPD Foundation

Product

Product description

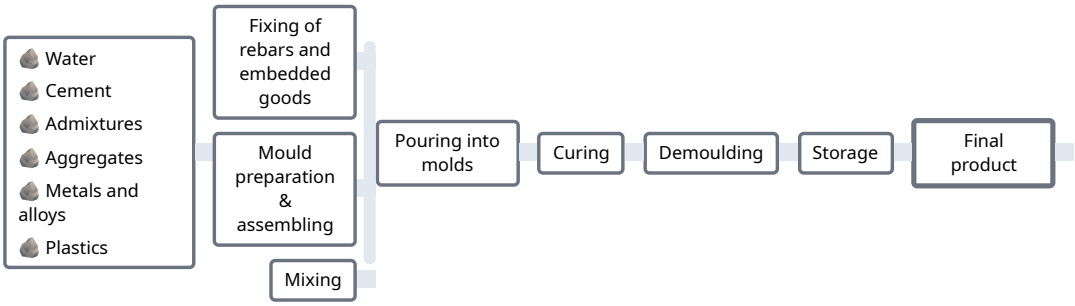
A precast pile is a long, slender structural element made of reinforced concrete, manufactured off-site and driven into the ground to transfer loads from a structure to deeper, more stable soil layers. These piles are pre-engineered for high strength and durability, making them ideal for projects requiring deep foundation systems.

No packaging was included for the modeled product.

Application description

Precast piles are used in the foundations of buildings, bridges, marine structures, and industrial facilities where soil conditions demand deep load transfer. They are commonly applied in coastal and offshore projects, such as docks, piers, and seawalls, as well as in infrastructure works like retaining walls and rail or road embankments. Their versatility and reliability make them suitable for challenging geotechnical conditions.

Production process



Product specification

Name of ingredient	Share of total weight	Country of origin
Admixtures	0 - 2 %	Denmark
Aggregates	50 - 80 %	Denmark
Cement	10 - 25 %	Germany
Metals and alloys	2 - 10 %	Germany
Plastics	0 - 2 %	Various
Water	2 - 10 %	Denmark

Technical data

	Unit	Value
Compressive Strength (Cylinder)	N / mm²	64.9
Density	kg / m³	2330
Surface exposed to air	m²	1.125
Total mass	kg	147.2

Market

Denmark

Recipients

B2B

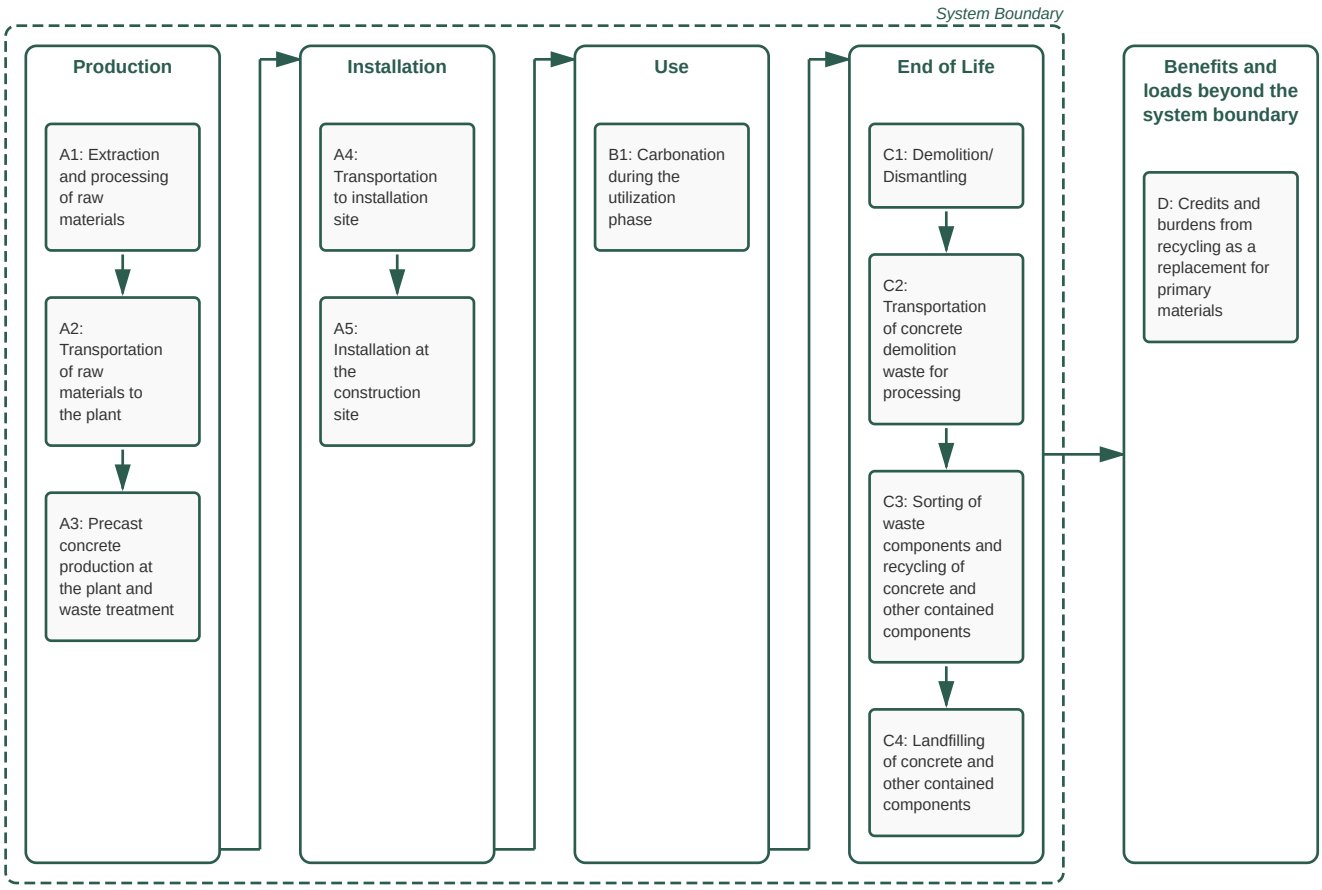
LCA: Calculation rules

Functional unit
1 m

Product lifetime
Not declared

Reference service life
100 years

System boundary



Data quality
The foreground data are based on extensive and detailed data collection at the production site of the manufacturer, covering key processes such as raw material sourcing, formulation, and manufacturing. These foreground data are fully linked with corresponding datasets from the background database (ecoinvent 3.10) or with EN15804+A2-compliant EPDs, ensuring consistency, reliability, and maintaining alignment with the latest industry standards.

The following EN15804+A2-compliant EPDs are used as datasets in this EPD:

Element	Year
Cement	2025
Metals and alloys	2022
Admixtures	2024
Admixtures	2022
Aggregates	2022
Aggregates	2022
Metals and alloys	2022
Admixtures	2024

The overall data representativeness is rated as good with an overall score of 4.00/5 , in accordance with EN 15804+A2 Annex E guidance on data quality assessment, considering geographical, technical, and temporal representativeness.

The following table discloses all processes or activities assessed with very poor or poor data representativeness according to EN 15804+A2, as well as those assessed as fair that contribute more than 30 % to any core impact indicator in A1–A3:

Element	Minimal Representativeness	Source	Year
Admixtures	Very poor	ecoinvent 3.10	2023
Admixtures	Poor	ecoinvent 3.10	2023
Aggregates	Poor	ecoinvent 3.10	2023
Manufacturing fuels	Poor	ecoinvent 3.10	2023
Metals and alloys	Poor	ecoinvent 3.10	2023

System boundaries (X=included, MND=module not declared)

	Production			Installation		Use stage							End-of-Life				Next product system
	Raw material supply	Transport	Manufacturing	Transport	Installation Process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational Energy Use	Operational Water Use	Demolition	Transport	Waste Processing	Disposal	Benefits and loads beyond the system boundary
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	x	MND	MND	MND	MND	MND	MND	x	x	x	x	x
Geography			DK	DK	DK	DK	MND	MND	MND	MND	MND	MND	DK	DK	DK	DK	DK

For the geographies modeled in A1 and A2, refer to *Product specification*.

Type of EPD: Cradle to gate with options, modules A4, A5, B1, C1-C4 + D

Stage of Material Production and Construction

Module A1: Extraction and processing of raw materials

Module A2: Transportation of raw materials to the plant

Module A3: Precast concrete production at the plant and waste treatment

Module A4: Transportation to installation site

Module A5: Installation at the construction site

Use Stage

Module B1: Carbonation during the utilization phase
Disposal Stage
Module C1: Demolition/Dismantling
Module C2: Transportation of concrete demolition waste for processing
Module C3: Sorting of waste components and recycling of concrete and other contained components
Module C4: Landfilling of concrete and other contained components
Credits and burdens outside the system boundaries
Module D: Credits and burdens from recycling as a replacement for primary materials

Cut-off criteria

Environmental impacts of the following processes are considered to be negligible: minor auxiliary materials used during installation (sealants, adhesives, or fasteners) , minor water use for cleaning precast concrete elements .

Allocation

Foreground inventory data (energy and fuels, ancillary materials, emissions and waste) was collected at the production process level. Mass-based allocation was applied to allocate the total output of the production process in 2024 to the reference product.

Key assumptions and estimates

Production process flows are allocated to the reference product, as described under allocation. The mass-based allocation assumes a uniform distribution of production impacts across co-products. Foreground inventory data is checked for consistency of production process, to ensure the validity of the allocated results.

LCA: Scenarios and additional technical information

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

Transport to the building site (A4)	Value	Unit
Transported mass	147.20	kg
Truck: Distance	300.00	km
Truck: Energy demand	1.58	MJ / t*km
Truck: Activity	transport, freight, lorry >32 metric ton, EURO6	-
Truck: Capacity utilization	53.30	%

Installation into the building (A5)	Value	Unit
Energy consumption: Diesel	6.36	MJ
Auxiliary materials: Lubricating oil	3.24e-03	kg
Waste: Mineral oil	3.24e-03	kg
Water consumption	-	kg
Formwork	-	kg
Falsework	-	kg

As the product is not packaged, no treatment of packaging waste is included in module A5. Installation-related material losses are considered negligible, as the precast concrete elements are delivered fully assembled from the factory. The energy consumption during installation is associated with the energy required by a crane to lift them into place. The crane is powered by generators driven by a diesel engine and an alternator. Assuming an average of 12 minutes of crane operating per tonne of precast concrete (2 to 5 minutes for lifting and positioning, and 7 to 10 minutes for installation and adjustments), we use the ecoinvent dataset 'machine operation, diesel, >= 18.64 kW and < 74.57 kW, steady-state (GLO)' to get the stated assumptions for A5.

Use of the installed product (B1)	Value	Unit
Reference use period	100.00	years
Application	Engineerings structures, in the ground	
Degree of carbonatation (Dc)	0.85	-
Cement absorption factor	0.49	kg CO_2 / kg Cement
k-factor	0.50	mm / √year
Correction factor	1.00	-
Surface area of concrete	1.12	m^2

Calculation of carbonatation according to EN 16757. k-factor results from the concrete's compressive strength and its application. The cement absorption factor (maximum theoretical CO2 uptake) depends on the average clinker content in cement. The correction factor results from cement substitutes in the recipe.

Demolition (C1)	Value	Unit
Diesel for deconstruction	-	kg

The product remains in the ground at its end-of-life.

Reuse, recovery and/or recycling potentials (D)	Value	Unit
Amount of secondary material that the system takes in	8.82	kg
Installation: Material eligible for recycling/reuse credits	0	kg
End-of-life: Material eligible for recycling/reuse credits	0	kg
Production: Exported energy eligible for credits	0.02	MJ
Installation: Exported energy eligible for credits	0	MJ
End-of-life: Exported energy eligible for credits	0	MJ
Substitution of electricity production, grid mix	1.33e-03	MJ
Substitution of heat production from natural gas	0.02	MJ

Calculation of loads and benefits per EN 15804+A2. Materials that entered the product system as secondary materials in A1 do not yield credits in module D.

LCA: Results

The following results are based on the market-based electricity approach applied to the foreground system (A3). Further details on electricity data are provided in the Additional Requirements section.

Core environmental impact indicators

Indicator	Unit	A1-A3	A4	A5	B1	C1	C2	C3	C4	D
GWP-total (net)	kg CO_2-eq.	2.60e+01	4.58e+00	6.52e-01	-5.73e-02	0.00e+00	0.00e+00	0.00e+00	0.00e+00	-1.45e-03
GWP-fossil (net)	kg CO_2-eq.	2.60e+01	4.57e+00	6.52e-01	-5.73e-02	0.00e+00	0.00e+00	0.00e+00	0.00e+00	-1.44e-03
GWP-biogenic (net)	kg CO_2-eq.	-2.38e-03	2.29e-03	7.87e-05	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	-4.19e-06
GWP-luluc	kg CO_2-eq.	8.38e-03	1.62e-03	5.90e-05	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	-3.50e-07
ODP	kg CFC-11-Eq	1.71e-07	9.53e-08	1.00e-08	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	-6.09e-11
AP	mol H+-Eq	4.81e-02	1.08e-02	5.77e-03	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	-1.20e-06
EP-freshwater	kg P-Eq	4.74e-03	3.22e-04	2.03e-05	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	-5.82e-08
EP-marine	kg N-Eq	1.65e-02	2.83e-03	2.67e-03	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	-4.02e-07
EP-terrestrial	mol N-Eq	1.77e-01	3.06e-02	2.92e-02	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	-4.32e-06
POCP	kg NMVOC-Eq	5.16e-02	1.88e-02	8.81e-03	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	-2.62e-06
ADPE	kg Sb-Eq	5.89e-05	1.31e-05	2.76e-07	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	-9.60e-10
ADPF	MJ, net calorific value	2.46e+02	6.87e+01	8.54e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	-2.29e-02
WDP	m^3 world Eq deprived	1.31e+00	3.45e-01	2.19e-02	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	-1.31e-04

GWP-total (net): Global Warming Potential - total (net) , **GWP-fossil (net)**: Global warming potential - fossil (net) , **GWP-biogenic (net)**: Global Warming Potential - biogenic (net) , **GWP-luluc**: Global Warming Potential - luluc , **ODP**: Depletion potential of the stratospheric ozone layer , **AP**: Acidification potential, Accumulated Exceedance , **EP-freshwater**: Eutrophication potential - freshwater , **EP-marine**: Eutrophication potential - marine , **EP-terrestrial**: Eutrophication potential - terrestrial , **POCP**: Photochemical Ozone Creation Potential , **ADPE**: Abiotic depletion potential - non-fossil resources , **ADPF**: Abiotic depletion potential - fossil resources , **WDP**: Water (user) deprivation potential

Remarks to environmental impacts

Net values are declared for the GWP indicators in modules A1–A3. These values exclude 4.72 kg CO_2 eq. from the combustion of the fossil fraction of waste-derived fuels. In accordance with the "polluter pays" principle of EN 15804+A2, these emissions are attributed to the system generating the waste. The corresponding gross values for the GWP indicators are provided as additional environmental information in the table "Environmental impacts – Gross".

Additional indicators

Indicator	Unit	A1-A3	A4	A5	B1	C1	C2	C3	C4	D
PM	disease incidence	ND	4.45e-07	1.64e-07	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	-8.08e-12
IRP	kBq U235-Eq	ND	8.34e-02	4.22e-03	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	-2.95e-05
ETP-fw	CTUe	ND	1.63e+01	1.21e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	-1.39e-03
HTP-c	CTUh	ND	2.93e-08	2.52e-09	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	-2.37e-12
HTP-nc	CTUh	ND	4.53e-08	1.20e-09	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	-2.51e-12
SQP	dimensionless	ND	6.90e+01	6.05e-01	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	-1.91e-03

PM: Potential incidence of disease due to PM emissions , **IRP**: Potential Human exposure efficiency relative to U235 , **ETP-fw**: Potential Comparative Toxic Unit for ecosystems , **HTP-c**: Potential Comparative Toxic Unit for humans - cancer effects , **HTP-nc**: Potential Comparative Toxic Unit for humans - non-cancer effects , **SQP**: Potential Soil quality index . **IRP**: 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. **ETP-fw**, **HTP-c**, **HTP-nc** and **SQP**: The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experienced with these indicators.

Use of resources

Indicator	Unit	A1-A3	A4	A5	B1	C1	C2	C3	C4	D
PERE	MJ	4.18e+01	1.09e+00	5.63e-02	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	-1.48e-03
PERM	MJ	6.33e-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	4.24e+01	1.09e+00	5.63e-02	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	-1.48e-03
PENRE	MJ	2.45e+02	6.87e+01	8.54e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	-2.29e-02
PENRM	MJ	4.30e+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
PENRT	MJ	2.49e+02	6.87e+01	8.54e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	-2.29e-02
SM	kg	1.76e+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
RSF	MJ	1.67e+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
NRSF	MJ	5.72e+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
FW	m^3	1.78e-01	9.98e-03	5.84e-04	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	-4.19e-06

PERE: Primary energy resources - renewable: use as energy carrier , **PERM**: Primary energy resources - renewable: used as raw materials , **PERT**: Primary energy resources - renewable: total , **PENRE**: Primary energy resources - non-renewable: use as energy carrier , **PENRM**: Primary energy resources - non-renewable: used as raw materials , **PENRT**: Primary energy resources - non-renewable: total , **SM**: Use of secondary material , **RSF**: Renewable secondary fuels , **NRSF**: Non-renewable secondary fuels , **FW**: Net use of fresh water

Waste flows

Indicator	Unit	A1-A3	A4	A5	B1	C1	C2	C3	C4	D
HWD	kg	1.05e-03	0.00e+00	3.24e-03	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00
NHWD	kg	1.72e-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
RWD	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

HWD: Hazardous waste disposed , **NHWD**: Non hazardous waste disposed , **RWD**: Radioactive waste disposed

Output flows

Indicator	Unit	A1-A3	A4	A5	B1	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	5.02e-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
MER	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
EEE	MJ	1.33e-03	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00
EET	MJ	1.80e-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

CRU: Components for re-use , **MFR**: Materials for recycling , **MER**: Materials for energy recovery , **EEE**: Exported electrical energy , **EET**: Exported thermal energy

Name	Value	Unit
Biogenic carbon content in product	0.00e+00	kg C
Biogenic carbon content in accompanying packaging	0.00e+00	kg C

Additional requirements

Greenhouse gas emissions from the use of electricity in the manufacturing phase

Electricity consumption in the manufacturing phase is composed from the sources below. This EPD follows the market-based approach.

Approach	Electricity	Quantity [kWh]	Emission Factor [kg CO_2e/kWh]
market-based	ecoinvent: electricity production, wind, >3MW turbine, onshore (DK)	0.53	0.02
(location-based)	(ecoinvent: market for electricity, medium voltage (DK))	(0.53)	(0.16)

Rows marked with () are provided for reference and not used in the assessment.

Dangerous substances

The product contains no hazardous substances given by the REACH Candidate List or the Norwegian Priority List.

Additional environmental information

Additional environmental impact indicators required in NPCR Part A for construction products

Indicator	Unit	A1-A3	A4	A5	B1	C1	C2	C3	C4	D
GWP-IOBC	kg CO_2-eq.	2.98e+01	4.58e+00	6.52e-01	-5.73e-02	0.00e+00	0.00e+00	0.00e+00	0.00e+00	-1.44e-03

GWP-IOBC: Global Warming Potential - Instantaneous oxidation of biogenic carbon

Gross and net global warming potential (A1-A3)

Indicator	Unit	Gross	Net
GWP-total	kg CO_2-eq.	3.07e+01	2.60e+01
GWP-fossil	kg CO_2-eq.	2.97e+01	2.60e+01
GWP-biogenic	kg CO_2-eq.	1.00e+00	-2.38e-03

Bibliography

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EN 15804:2012+A2:2019	Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
EN 15942:2022-04	Sustainability of construction works - Environmental product declarations - Communication format business-to-business
ISO 14025:2011-10	Environmental labels and declarations - Type III environmental declarations - Principles and procedures
ISO 14040:2021-02	Environmental management - Life cycle assessment - Principles and framework
ISO 14044:2021-02	Environmental management - Life cycle assessment - Requirements and guidelines
EF 3.1	Environmental Footprint (EF) Life Cycle Impact Assessment method - Characterisation Factors version 3.1, European Commission, Joint Research Centre (JRC)
ecoinvent 3.10	ecoinvent, Zurich, Switzerland, database version 3.10
NPCR Part A:2021	Construction products and services, Version 2.0. Issue date: 24.03.2021; validity extended to 24.03.2026.
NPCR 020:2021	Product category rules, Part B: Concrete and concrete elements. Issue date: 20.09.2021; validity extended to 30.06.2026.
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