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ENVIRONMENTAL PRODUCT DECLARATION

In accordance with ISO 14025 and EN 15804+A2

Märker Zement GmbH
CEM I 52,5 N

Märker

Owner of the declaration
Märker Zement GmbH
Oskar-Märker-Str. 24
86655 Harburg
Germany

Product
CEM I 52,5 N

Declared product / Declared unit
1 t

This declaration is based on Product Category Rules
EN 15804:2012 + A2:2019,
NPCR Part A:2021 ,
EN 16908:2017+A1:2022

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

Declaration number
NEPD-11396-11396-2

Registration number
NEPD-11396-11396-2

Issue date
08.04.2026

Valid to
07.04.2031

EPD Software
Emidat Platform v1.0.0

General Information

Product
CEM I 52,5 N

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Declaration Number
NEPD-11396-11396-2

This declaration is based on Product Category Rules
EN 15804:2012 + A2:2019,
NPCR Part A:2021 ,
EN 16908:2017+A1:2022

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.

Declared unit
1 t

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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Oskar-Märker-Str. 24
86655 Harburg, Germany

Place of production
Harburg (Schwaben), Germany

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

Issue date
08.04.2026

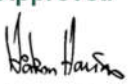
Valid to
07.04.2031

Year of study
2023

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: Dr. Sabine Heuschkel
Reviewer of company-specific input data and EPD: Wolfgang Gentner

Approved

Håkon Hauan, The Norwegian EPD Foundation

Product

Product description

The cement under consideration is classified as CEM I according to the main cement types of EN 197-1. Cement is a hydraulically hardening binder. It consists of a mixture of finely ground, non-metallic inorganic components.

For the cement production, clinker is ground finely, either alone or with other main components. A sulfate carrier is added to the ground material to regulate its setting. Gypsum or anhydrite from natural deposits or from flue gas desulfurization plants is used normally for this purpose. The finished cement is usually stored in silos, from which it is shipped in bags or bulk containers.

After the addition of water, a suspension (cement paste) is formed, which, due to the onset of hydration reactions, solidifies and hardens both in air and underwater and remains permanently solid. The declared product is a Portland cement with a composition that corresponds to the average composition of cement produced in 2023. The composition of the cement varies only slightly even when comparing several years.

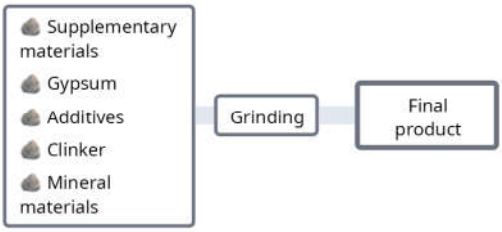
For placing the product on the market in the EU/EFTA (excluding Switzerland), Regulation (EU) No. 305/2011 (CPR) applies. The product requires a declaration of performance in accordance with DIN EN 197-1:2011, Cement - Part 1: Composition, requirements and conformity criteria of normal cement, and CE marking. The respective national regulations apply to its use.

Application description

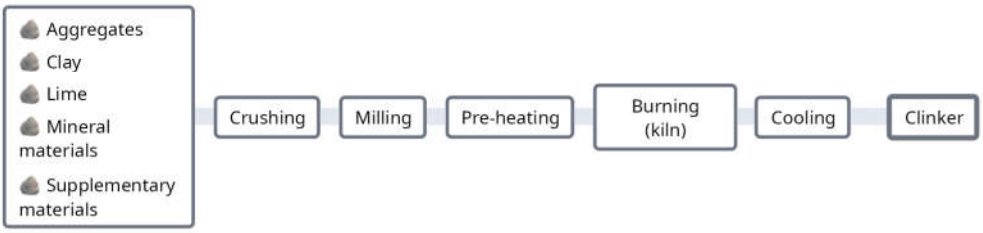
Cement is the key ingredient in concrete. When mixed with water and aggregates such as sand and gravel, it forms a paste that binds the aggregates together to create concrete. Cement can also be mixed with sand and water to create mortar or grout, used as a bonding agent between bricks, stones, or concrete blocks in masonry construction. Cement can also be used to stabilise and improve the properties of soil in construction projects. Soil-cement mixtures are created by mixing cement with soil to increase its strength, durability, and load-bearing capacity. This technique is commonly used in road construction, building foundations, and slope stabilisation.

The Portland cement CEM I 52.5 N is used as a binder for the production of concrete, reinforced concrete, clamping concrete and cement mortar as well as cement screed. The use of cement in concrete is described for Germany in the current version of DIN EN 206 and DIN 1045-2.

Production process



Upstream production processes



Product specification

Name of ingredient	Share of total weight	Country of origin
Additives	0 - 5 %	Germany
Clinker	89 - 100 %	Germany
Gypsum	5 - 11 %	Germany
Mineral materials	0 - 5 %	Germany
Supplementary materials	0 - 5 %	Germany

Technical data

	Unit	Value
Compressive Strength (Prisms, EN 196-1)	N / mm^2	52.5
Density	kg / m^3	3140

The product is produced according to the harmonized standard EN 197-1.

Market

Germany

Recipients

B2B

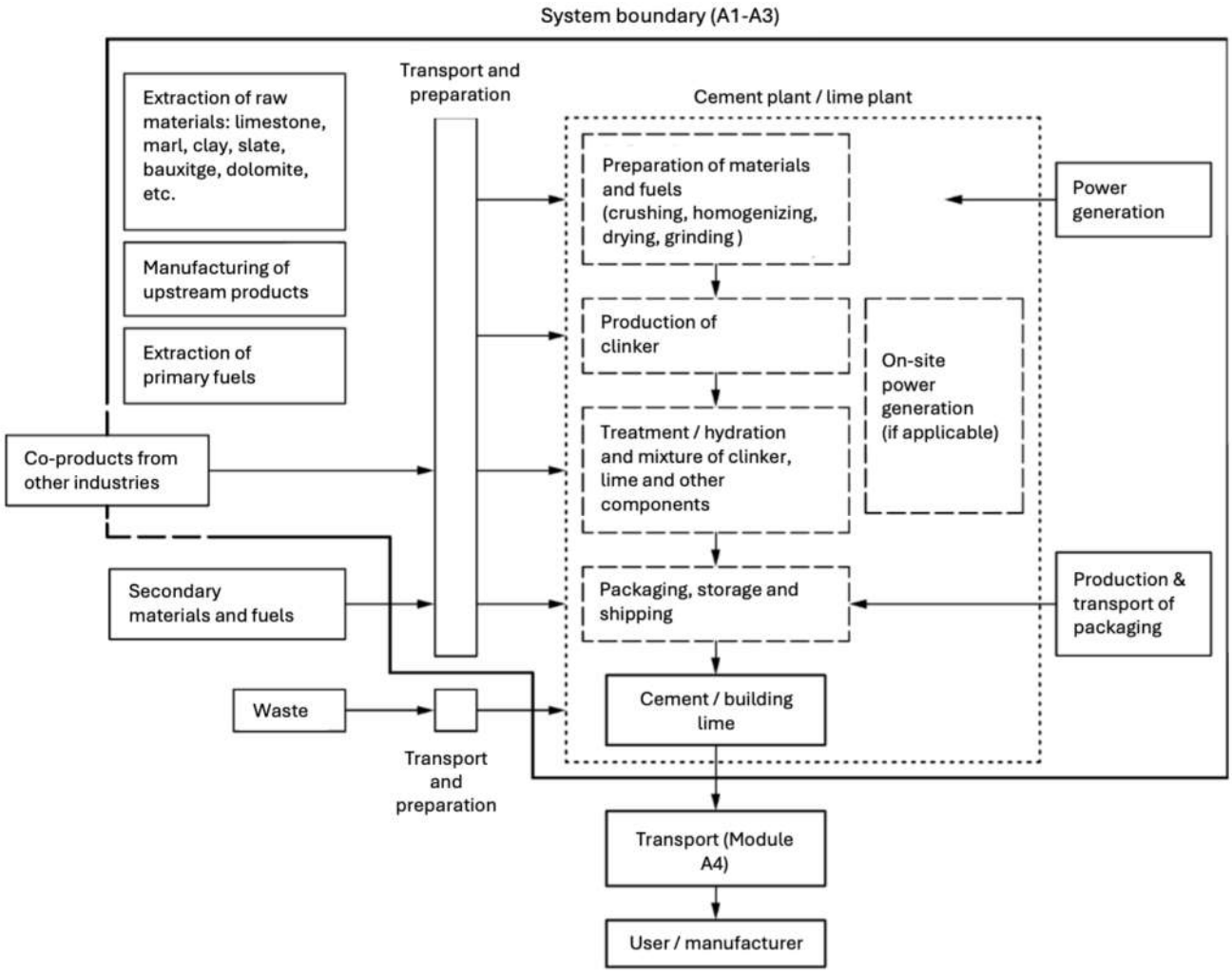
LCA: Calculation rules

Declared unit
1 t

Product lifetime
Not declared

Reference service life
Not declared

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 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
Additives	Poor	ecoinvent 3.10	2023
Gypsum	Poor	ecoinvent 3.10	2023
Mineral materials	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	MND	MND	MND	MND	MND	MND	MND	MND	MND	x	x	x	x	x
Geography			DE	MND	MND	MND	MND	MND	MND	MND	MND	MND	DE	DE	DE	DE	DE

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

Type of EPD: Cradle to gate with options, modules C1-C4, and D

Stage of Material Production and Construction

Module A1: Extraction and transport of raw materials and fuels, Clinker production, Production of secondary constituents, Production of additives, Production of consumables

Module A2: Transport of constituents, additives, and consumables

Module A3: Cement production, Preparation of cement for delivery

Disposal Stage

Module C1: Demolition/Dismantling

Module C2: Transportation of waste

Module C3: Recycling/Incineration

Module C4: Landfill

Cut-off criteria

No cut-offs were applied.

Allocation

Foreground inventory data (energy and fuels, ancillary materials, emissions and waste) was collected at the production-process level. Using the total output of the production process in 2023, these flows are allocated to the reference product based on mass.

LCA: Scenarios and additional technical information

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

Demolition (C1)	Value	Unit
Diesel required to demolish 1 kg of concrete	0.06	MJ / kg
PM 10 emissions during the demolishment of 1 kg of concrete	6.00e-05	kg / kg
PM 2.5 emissions during the demolishment of 1 kg of concrete	1.70e-05	kg / kg

Transport to the waste facility (C2)	Value	Unit
Mass to landfill	900.00	kg
Mass to recycling	100.00	kg
Distance to recycling	50.00	km
Distance to landfill	50.00	km
Truck: Activity	transport, freight, lorry >32 metric ton, EURO6	-
Truck: Capacity utilization	53.30	%
Truck: Distance	50.00	km
Truck: Energy demand	1.58	MJ / t*km

Waste processing (C3)	Value	Unit
Material for recycling	100.00	kg
Recycling rate	10.00	%

Disposal (C4)	Value	Unit
Material for landfill	900.00	kg

Reuse, recovery and/or recycling potentials (D)	Value	Unit
Amount of secondary material that the system takes in	16.36	kg
Substitution of gravel	98.36	kg

Calculation of benefits and loads per EN 15804+A2.

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	C1	C2	C3	C4	D
GWP-total (net)	kg CO_2-eq.	5.76e+02	6.13e+00	5.18e+00	4.53e-01	5.77e+00	-2.02e-01
GWP-fossil (net)	kg CO_2-eq.	5.76e+02	6.13e+00	5.18e+00	4.38e-01	5.63e+00	-1.95e-01
GWP-biogenic (net)	kg CO_2-eq.	1.33e-01	6.12e-04	2.60e-03	1.52e-02	1.37e-01	-6.19e-03
GWP-luluc	kg CO_2-eq.	1.41e-02	5.33e-04	1.84e-03	3.81e-05	2.92e-03	-2.20e-05
ODP	kg CFC-11-Eq	1.00e-06	9.38e-08	1.08e-07	6.70e-09	1.63e-07	-2.76e-09
AP	mol H+-Eq	5.88e-01	5.53e-02	1.22e-02	3.95e-03	3.99e-02	-1.69e-03
EP-freshwater	kg P-Eq	6.37e-02	1.79e-04	3.64e-04	1.28e-05	4.67e-04	-8.63e-06
EP-marine	kg N-Eq	2.50e-01	2.57e-02	3.21e-03	1.83e-03	1.52e-02	-6.69e-04
EP-terrestrial	mol N-Eq	2.69e+00	2.81e-01	3.47e-02	2.01e-02	1.66e-01	-7.82e-03
POCP	kg NMVOC-Eq	6.82e-01	8.38e-02	2.12e-02	5.98e-03	5.94e-02	-2.23e-03
ADPE	kg Sb-Eq	2.85e-03	2.20e-06	1.48e-05	1.57e-07	8.93e-06	-2.00e-06
ADPF	MJ, net calorific value	1.12e+03	8.02e+01	7.77e+01	5.73e+00	1.38e+02	-2.85e+00
WDP	m^3 world Eq deprived	9.07e+00	1.96e-01	3.90e-01	1.40e-02	3.86e-01	-1.38e-01

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 148.85 kg CO_2 eq. from the combustion of the fossil fraction of waste-derived fuels during clinker production. 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	C1	C2	C3	C4	D
PM	disease incidence	3.83e-06	8.92e-06	5.04e-07	8.56e-07	9.07e-07	-4.63e-08
IRP	kBq U235-Eq	3.55e+00	3.59e-02	9.44e-02	2.56e-03	8.80e-02	-3.29e-02
ETP-fw	CTUe	2.69e+02	1.14e+01	1.84e+01	8.11e-01	1.89e+01	-1.41e+00
HTP-c	CTUh	2.62e-07	2.40e-08	3.31e-08	1.71e-09	2.54e-08	-3.18e-09
HTP-nc	CTUh	1.31e-06	1.09e-08	5.13e-08	7.77e-10	2.48e-08	-1.85e-09
SQP	dimensionless	2.28e+02	5.62e+00	7.82e+01	4.01e-01	2.72e+02	-6.44e+00

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	C1	C2	C3	C4	D
PERE	MJ	1.78e+01	4.90e-01	1.23e+00	3.50e-02	1.28e+00	-9.33e-01
PERM	MJ	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00
PERT	MJ	1.78e+01	4.90e-01	1.23e+00	3.50e-02	1.28e+00	-9.33e-01
PENRE	MJ	1.10e+03	8.02e+01	7.77e+01	5.73e+00	1.38e+02	-2.85e+00
PENRM	MJ	1.44e+01	0.00e+00	0.00e+00	-1.44e+00	0.00e+00	0.00e+00
PENRT	MJ	1.12e+03	8.02e+01	7.77e+01	4.29e+00	1.38e+02	-2.85e+00
SM	kg	8.30e+01	0.00e+00	0.00e+00	0.00e+00	0.00e+00	9.84e+01
RSF	MJ	1.32e+03	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00
NRSF	MJ	1.93e+03	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00
FW	m^3	4.53e-01	5.21e-03	1.13e-02	3.72e-04	1.43e-01	-1.40e-01

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	C1	C2	C3	C4	D
HWD	kg	6.10e-02	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00
NHWD	kg	9.91e-01	0.00e+00	0.00e+00	0.00e+00	9.00e+02	0.00e+00
RWD	kg	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	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
MFR	kg	6.60e-01	0.00e+00	0.00e+00	1.00e+02	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
EEE	MJ	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	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	4.15e-02	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, high voltage, residual mix (DE)	33.58	0.84
(location-based)	(ecoinvent: market for electricity, high voltage (DE))	(33.58)	(0.47)

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

Electricity consumption in upstream production processes:

Electricity	Emission Factor [kg CO_2e/kWh]
ecoinvent: electricity, high voltage, residual mix (DE)	0.84

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	C1	C2	C3	C4	D
GWP-IOBC	kg CO_2-eq.	5.35e+02	6.13e+00	5.18e+00	4.38e-01	5.63e+00	-1.96e-01

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

Gross and net global warming potential

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
GWP-total (gross)	kg CO_2-eq.	7.25e+02	6.13e+00	5.18e+00	4.53e-01	5.77e+00	-2.02e-01
GWP-fossil (gross)	kg CO_2-eq.	7.25e+02	6.13e+00	5.18e+00	4.38e-01	5.63e+00	-1.95e-01
GWP-biogenic (gross)	kg CO_2-eq.	1.33e-01	6.12e-04	2.60e-03	1.52e-02	1.37e-01	-6.19e-03
GWP-total (net)	kg CO_2-eq.	5.76e+02	6.13e+00	5.18e+00	4.53e-01	5.77e+00	-2.02e-01
GWP-fossil (net)	kg CO_2-eq.	5.76e+02	6.13e+00	5.18e+00	4.38e-01	5.63e+00	-1.95e-01
GWP-biogenic (net)	kg CO_2-eq.	1.33e-01	6.12e-04	2.60e-03	1.52e-02	1.37e-01	-6.19e-03

GWP-total (gross): Global Warming Potential - total (gross) , **GWP-fossil (gross)**: Global warming potential - fossil (gross) , **GWP-biogenic (gross)**: Global Warming Potential - biogenic (gross) , **GWP-total (net)**: Global Warming Potential - total (net) , **GWP-fossil (net)**: Global warming potential - fossil (net) , **GWP-biogenic (net)**: Global Warming Potential - biogenic (net)

Bibliography

CEN/TR 15941:2010	Sustainability of construction works - Environmental product declarations - Methodology for selection and use of generic data
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.
EN 16908:2017+A1:2022	Cement and building lime – Environmental product declarations – Product category rules complementary to EN 15804.

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