epd-norway
Global Program Operator

ENVIRONMENTAL PRODUCT DECLARATION

In accordance with ISO 14025 and EN 15804+A2

Heidelberg Materials UK – UK average C28/35 CEM I Ready-mixed concrete

Owner of the declaration
Heidelberg Materials UK
Second Floor, Arena Court
SL6 8QZ Maidenhead
United Kingdom

Product
UK average C28/35 CEM I Ready-mixed concrete

Declared product / Declared unit
1 m³ of UK average C28/35 CEM I Ready-mixed concrete

This declaration is based on Product Category Rules
EN 15804:2012 + A2:2019,
NPCR 020 PART B for concrete and concrete elements (v3.0)

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

Declaration number
NEPD-7895-7563-2

Registration number
NEPD-7895-7563-2

Issue date
21.10.2024

Valid to
21.10.2029

EPD Software
Emidat EPD Tool v1.0.0

General Information

Product
UK average C28/35 CEM I Ready-mixed concrete

Program Operator
EPD-Norge
Majorstuen P.O. Box 5250
N-0303 Oslo
Norway
Phone: +47 23 08 80 00
Email: post@epd-norge.no

Declaration Number
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EN 15804:2012 + A2:2019,
NPCR 020 PART B for concrete and concrete elements (v3.0)

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

Declared unit
1 m³ of UK average C28/35 CEM I Ready-mixed concrete

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 EPDNorway'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
Charlotte Merlin, FORCE Technology
(no signature required)

Owner of the declaration
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Manufacturer
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Second Floor, Arena Court
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Place of production
Maidenhead, United Kingdom

Management system
ISO 9001, ISO 14001, ISO 45003, BES 6001, ISO 50001

Issue date
21.10.2024

Valid to
21.10.2029

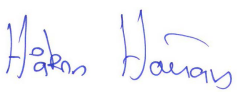
Year of study
2022

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 Norway.

Developer of EPD: Nicola Johnson
Reviewer of company-specific input data and EPD: Dominic Doyle

Approved

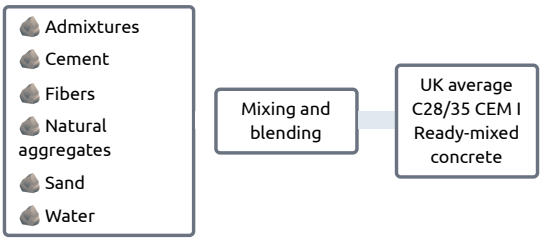


Håkon Hauan, CEO EPD-Norge

Product

Product description

Concrete is a building material made up of several components, including cement, water, sand, gravel, and air. Ready-mixed concrete is manufactured in a batch plant in a controlled environment, using precise mix designs (with the addition of other cementitious materials or chemical admixtures that improve the properties of the concrete), ensuring consistency in quality, strength, and composition. This consistency leads to predictable performance in construction projects. Ready-mixed concrete is then delivered to the construction site in an unhardened state, ready to use, eliminating the need for on-site mixing. This saves time in labour, equipment setup, and material handling, speeding up the construction process. The product is produced according to BS 8500 and BS EN 206. Testing was conducted according to BS EN 12350 and BS EN 12390. Performance data of the product with respect to its characteristics in accordance with the relevant technical provision (no CE-marking).



The most common man-made substance in the world is concrete. Regardless of the magnitude of the construction, it is a necessary component of roads, buildings, bridges, dams, pavements, pipelines, sewers, and other structures. It is made up of naturally occurring aggregates with varying granulometries (sand, fine gravel, and gravel) joined by hydrated cement paste. To improve particular qualities of the fresh or hardened concrete, such as workability, durability, or early and final strength, chemical admixtures can also be used. After manufacture, concrete is workable enough to be transported, poured, pumped, put in place, and compacted at the project site, where it gradually solidifies and gains strength.

Product specification

Name of ingredient	Share of total weight	Country of origin
Admixtures	0 - 2 %	United Kingdom
Cement	10 - 25 %	United Kingdom
Fibers	0 - 2 %	United Kingdom
Natural aggregates	50 - 80 %	United Kingdom
Sand	10 - 25 %	United Kingdom
Water	2 - 10 %	United Kingdom

Technical data

	Unit	Value
Compressive Strength (Cylinder)	N / mm²	28.0
Compressive Strength (Cube)	N / mm²	35.0
Gross Density	kg / m³	2282.0

Market

United Kingdom

Reference service life

50 years

LCA: Calculation rules

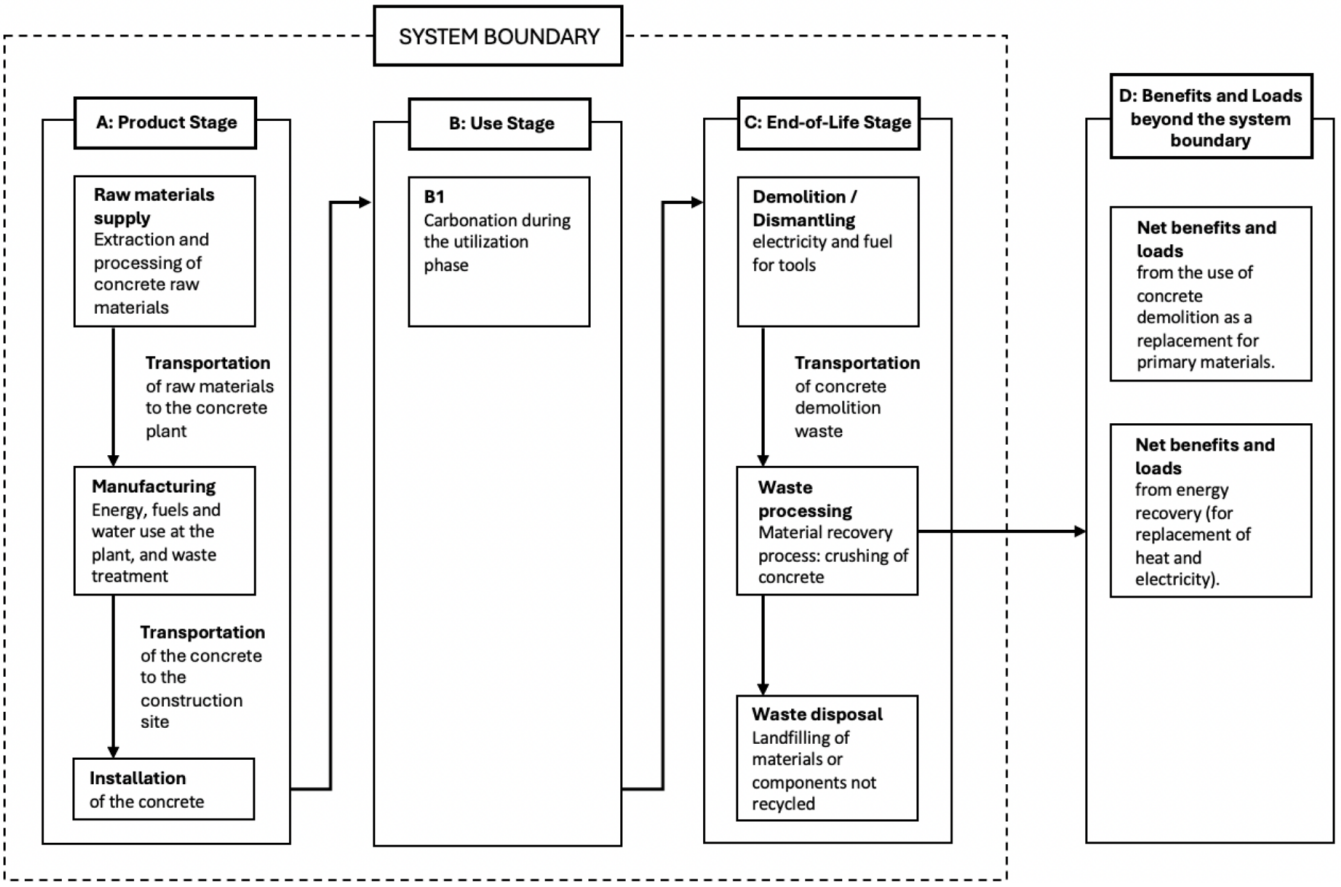
Declared unit

1 m³ of UK average C28/35 CEM I Ready-mixed concrete

Reference service life

50 years

System boundary



Data quality

The Emidat EPD Tool v1.0.0 was used for LCA modeling and calculation. Background data was used from ecoinvent database v3.10.

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			GB	GB	GB	GB	MND	MND	MND	MND	MND	MND	GB	GB	GB	GB	GB

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

Type of EPD: cradle to gate with options, modules C1-C4 and module D (A1-A3, C, D, additional modules A4, A5, and B1)

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: Concrete production at the plant and waste treatment

Module A4: Transportation to the construction site

Module A5: Includes processes associated with concrete installation (e.g., pumping on the construction site), as well as the production, transportation, and treatment of unused concrete

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

Module C4: Disposal of concrete

Credits and burdens outside the system boundaries

Module D: Credits and burdens from the use of demolished concrete as a replacement for primary materials

Cut-off criteria

Environmental impacts of the following processes are considered to be negligible: Production and use of formwork and falsework for the installation of concrete, Materials used for the curing of concrete (e.g. plastics, aluminum).

Allocation

Elementary flows (energy and fuels, ancillary materials and waste) data was collected on production-process-level. Using the total output of the production process in 2022, elementary flows are assigned to 1 declared unit based on volume.

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	2282.00	kg
Fuel consumption	5.09	L / 100km
Average distance from manufacturer to construction site	9.00	km
Transport mode	truck	
Gross density of products transported	2282.00	kg / m³

Formwork and Falsework each contribute less than 1% of the total product CO2 emissions, and are therefore neglected under cut-off rules. (Kaethner, Burridge, 2012). Other sources: Concrete waste: Adams & Hobbs (2023). Electricity, Diesel: Ecoinvent benchmark average.

Installation into the building (A5)	Value	Unit
Formwork	-	kg
Falsework	-	kg
Concrete waste (installation losses, typical wastage rate on site)	1.50	%
Distance to waste landfill facility (for installation losses)	50	km
Amount of electricity to pour 1 m3 of concrete	3	kWh
Amount of diesel to pour 1 m3 of concrete	60	MJ
Water	0.29	m³
Wastewater treatment	0.29	m³

Calculation of carbonization 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.

Use of the installed product (B1)	Value	Unit
Reference use period	50	years
Application	Building, inside, without paint or wallpaper	
Degree of carbonation (Dc)	0.40	-
Cement absorption factor	0.49	kg CO_2 / kg Cement
k-factor	6.60	mm / year^0.5
Correction factor	1	-
Surface area of concrete	5	m²

Carbonation during waste processing is not considered. Recycling rate for concrete of 93% reflects the modeled country. Source: Department for Environment Food & Rural Affairs (DEFRA), UK statistics on waste, May 2022 (https://www.gov.uk/government/statistics/uk-waste-data/uk-statistics-on-waste).

End of life (C1-C4)	Value	Unit
Material for recycling (total)	2113.13	kg
Distance to waste recycling facility	50	km
Material for landfill (total)	168.87	kg
Distance to waste landfill facility	50	km
Concrete to recycling	2113.13	kg
Diesel required to demolish 1 kg of concrete	0.06	MJ / kg
PM 10 emissions during the demolishment of 1 kg of concrete	6.0e-05	kg / kg
PM 2.5 emissions during the demolishment of 1 kg of concrete	1.7e-05	kg / kg

Calculation of benefits and loads per EN 15804+A2.

Reuse, recovery and/or recycling potentials (D)	Value	Unit
Amount of recycled material that system takes in	0	kg
Avoided gravel production	2113.13	kg

LCA: Results

Core environmental impact indicators

Indicator	Unit	A1-3	A4	A5	B1	C1	C2	C3	C4	D
GWP-total	kg CO_2-eq.	295.00 (256.64)*	2.13	11.76	-15.64	13.99	11.83	12.96	1.06	-21.21
GWP-fossil	kg CO_2-eq.	294.79 (256.48)*	2.13	11.74	-15.64	13.99	11.81	12.96	1.06	-21.16
GWP-biogenic	kg CO_2-eq.	0.19 (0.14)*	1.1e-03	0.01	0	1.4e-03	5.9e-03	1.3e-03	1.1e-04	-0.02
GWP-luluc	kg CO_2-eq.	0.02	7.6e-04	2.2e-03	0	1.2e-03	4.2e-03	1.1e-03	5.5e-04	-0.02
ODP	kg CFC-11-Eq	6.5e-06	4.4e-08	2.4e-07	0	2.1e-07	2.5e-07	2.0e-07	3.1e-08	-1.6e-07
AP	mol H+-Eq	0.59	5.0e-03	0.07	0	0.13	0.03	0.12	7.5e-03	-0.13
EP-freshwater	kg P-Eq	0.02	1.5e-04	7.0e-04	0	4.1e-04	8.3e-04	3.8e-04	8.8e-05	-6.5e-03
EP-marine	kg N-Eq	0.03	1.3e-03	0.03	0	0.06	7.3e-03	0.05	2.9e-03	-0.03
EP-terrestrial	mol N-Eq	2.31	0.01	0.33	0	0.64	0.08	0.59	0.03	-0.37
POCP	kg NMVOC-Eq	0.60	8.7e-03	0.10	0	0.19	0.05	0.18	0.01	-0.10
ADPE	kg Sb-Eq	1.2e-04	6.1e-06	8.0e-06	0	5.0e-06	3.4e-05	4.6e-06	1.7e-06	-1.1e-04
ADPF	MJ, net calorific value	1475.31	31.93	132.25	0	182.92	177.38	169.47	25.89	-253.95
WDP	m^3 world Eq deprived	30.33	0.16	0.92	0	0.45	0.89	0.41	0.07	-31.67

GWP-total: Global Warming Potential - total **GWP-fossil**: Global warming potential - fossil **GWP-biogenic**: Global Warming Potential - biogenic **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

* The first value is the gross value - it includes the impact from the incineration of secondary fuels. The value in brackets (net value) does not include the impact from the incineration of secondary fuels.

Additional indicators

Indicator	Unit	A1-3	A4	A5	B1	C1	C2	C3	C4	D
PM	disease incidence	ND	2.1e-07	ND	0	2.0e-05	1.2e-06	1.9e-05	1.7e-07	-2.0e-06
IRP	kBq U235-Eq	ND	0.04	ND	0	0.08	0.22	0.08	0.02	-1.79
ETP-fw	CTUe	ND	7.57	ND	0	25.92	42.03	24.01	3.54	-115.77
HTP-c	CTUh	ND	1.4e-08	ND	0	5.5e-08	7.6e-08	5.1e-08	4.8e-09	-1.9e-07
HTP-nc	CTUh	ND	2.1e-08	ND	0	2.5e-08	1.2e-07	2.3e-08	4.7e-09	-1.7e-07
SQP	dimensionless	ND	32.11	ND	0	12.81	178.38	11.87	50.94	-237.71

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	A1-3	A4	A5	B1	C1	C2	C3	C4	D
PERE	MJ	39.85	0.51	7.72	0	1.12	2.81	1.04	0.24	-23.02
PERM	MJ	0.18	0	2.7e-03	0	0	0	-0.17	0	0
PERT	MJ	40.04	0.51	7.72	0	1.12	2.81	0.87	0.24	-23.02
PENRE	MJ	1468.16	31.93	132.15	0	182.93	177.39	169.47	25.90	-253.96
PENRM	MJ	7.17	0	0.11	0	0	0	-6.64	0	0
PENRT	MJ	1475.33	31.93	132.26	0	182.93	177.39	162.84	25.90	-253.96
SM	kg	0	0	0	0	0	0	0	0	2113.13
RSF	MJ	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0
FW	m³	3.43	4.6e-03	0.07	0	0.01	0.03	0.01	0.03	-0.75

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	A1-3	A4	A5	B1	C1	C2	C3	C4	D
HWD	kg	0.96	0.05	0.16	0	0.20	0.26	0.19	0.03	-1.98
NHWD	kg	22.92	0.93	321.93	0	2.79	5.17	2.59	169.53	-35.41
RWD	kg	ND	9.6e-06	ND	0	2.0e-05	5.3e-05	1.9e-05	4.0e-06	-4.3e-04

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

Output flows

Indicator	Unit	A1-3	A4	A5	B1	C1	C2	C3	C4	D
CRU	kg	0	0	0	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	0	2113.13	0	0
MER	kg	0	0	0	0	0	0	0	0	0
EEE	MJ	0	0	0	0	0	0	0	0	0
EET	MJ	0	0	0	0	0	0	0	0	0

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	kg C
Biogenic carbon content in accompanying packaging	0	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 source below. Electricity is represented by data in ecoinvent 3.10 regionalised for United Kingdom.

Electricity	Unit	Value
Electricity from grid	kg CO_2-eq. / kWh	0.25

Additional environmental information

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

Indicator	Unit	A1-3	A4	A5	B1	C1	C2	C3	C4	D
GWP-IOBC	kg CO_2-eq.	ND	2.13	ND	-15.64	13.99	11.82	12.96	1.06	-21.20

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

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
DIN CENTR 15941:2010-11	Sustainability of construction works - Environmental product declarations - Methodology for selection and use of generic data
DIN EN 15942:2022-04	Sustainability of construction works - Environmental product declarations - Communication format business-to-business
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	ILCD Handbook: https://eplca.jrc.ec.europa.eu/uploads/ILCD-Handbook-LCIA-Background-analysis-online-12March2010.pdf

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