EPD
INTERNATIONAL EPD SYSTEM

aalborgportland
CEMENTIR HOLDING

ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH

EN 15804:2012+A2:2019/AC:2021 & ISO 14025

FLYASH FOR CONCRETE – EN450

AALBORG PORTLAND A/S, CEMENTIR HOLDING

Programme: *International EPD System, www.environdec.com*	*Programme operator:* ***EPD International AB***	*EPD registration number:* *EPD-IES-0027856*	*Version date:* *2026-02-01*	*Valid until:* *2031-01-28*	*Geographical scope:* ***Europe***

An EPD may be updated or depublished if conditions change.
To find the latest version of the EPD and to confirm its validity, see www.environdec.com.

gcca Global Cement and Concrete Association

ECO PLATFORM EPD VERIFIED

GENERAL INFORMATION

INFORMATION ABOUT EPD OWNER

EPD owner	Aalborg Portland A/S, Cementir Holding
Address	Aalborg Portland A/S, Rørdalsvej 44, 9220 Aalborg, Denmark
Contact details	cement@aalborgportland.dk
Website	www.aalborgportland.dk

PRODUCT IDENTIFICATION

Product name	Flyash for Concrete
Additional label(s)	CEM EN450:2012
Product number / reference	0615-CPR-9810
Place(s) of production	Aalborg, Denmark
CPC code	37440 Fly ash, slag and similar industrial residues

The International EPD System

EPDs within the same product category but published in different EPD programmes, may not be comparable. For two EPDs to be comparable, they shall be based on the same PCR (including the same first-digit version number) or be based on fully aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have identical scope in terms of included life-cycle stages (unless the excluded life-cycle stage is demonstrated to be insignificant); apply identical impact assessment methods (including the same version of characterisation factors); and be valid at the time of comparison.

EPD INFORMATION

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

EPD program operator	The International EPD System
EPD standards	This EPD is in accordance with EN 15804+A2 and ISO 14025 standards.
Product category rules	CEN standard EN 15804 serves as the core Product Category Rules (PCR). In addition, Construction products (EN 15804+A2) version 2.0.1 is used.
PCR review	Conducted by Technical Committee of the International EPD System. See www.environdec.com for members.
EN 15804 reference package	LCIA characterisation factors using EF 3.1 for CFs used in the PEF framework
LCA practitioner	Morten Frederiksen, Aalborg Portland A/S
EPD verification	External and independent verification of the declaration and data, according to ISO 14025:2006 via EPD verification through individual EPD verification with a pre-verified LCA/EPD tool
Verification date	2026.01.28
EPD verifier	Stefan Emil Danielsson, SDG Consulting
EPD number	EPD-IES-0027856
Publishing date	2026.02.01
Revision date	2026.02.01
EPD valid until	2031.01.28

PRODUCT INFORMATION

PRODUCT DESCRIPTION

Flyash for concrete is a Supplementary Cementitious Material (SCM), certified according to EN450:2012and approved for use in Danish Concrete standard DS:206:2025. The Flyash is delivered bulk.

The Flyash is an inevitable co-product extracted from filters in coal fired powerplants. Aalborg Portland is collecting Flyash from powerplants within Europe, mixing and testing the quality to offer EN450 compliant flyash ready for use in concrete.

PRODUCT APPLICATION

Flyash for concrete can be used for concrete in most exposure classes according to national regulations on concrete standards.

TECHNICAL SPECIFICATIONS AND PHYSICAL PROPERTIES OF THE PRODUCT

Flyash for concrete is certified according to EN450:2012 with the following categorization:

- LOI: Category A
- Fineness: Category N

For further information see www.aalborgportland.dk/fly-ash/

PRODUCT STANDARDS

Aalborg Portland analyse and certify Flyash for Concrete is according to the standard EN450:2012

CONTENT DECLARATION

Product content*	Weight, kg	Pre-consumer, recycled %	Post-consumer recycled %	Biogenic %	Bio carbon, kg
Flyash	1000	100	0	0	0

*Bulk product. No packaging materials.

SUBSTANCES, REACH - VERY HIGH CONCERN

The product does not contain any REACH SVHC substances in amounts greater than 0,1% (1000 ppm).

PRODUCT LIFE-CYCLE

MANUFACTURING AND PACKAGING (A1-A3)

Flyash is an unavoidable co-product extracted from powerplants fired by hard coal. Hard coal is extracted and transported from mining areas to powerplant. Hard coal is burned in powerplant to generate primary product Electricity. Pulverized coal is blown into the boiler's combustion chamber where it generates heat and produce a molten mineral residue. When the flue gas is cooled the molten mineral residue harden and form ash. The ash is collected by filters before releasing the flue gas to the atmosphere.

The Flyash by-product is collected in silos and transported for re-use in target markets in large vessels and stored in dispatch-silos, tested and certified.

TRANSPORT AND INSTALLATION (A4-A5)

Flyash is an intermediate product – typically used in construction of buildings or infrastructure. Distribution to concrete plants is done trucks. Transportation burden will vary significantly depending on the point of delivery and should be modelled separately for each consumer. Burdens from A4 transportation are not declared in this EPD.

PRODUCT USE AND MAINTENANCE (B1-B7)

As it is unknown which application flyash is eventually used for, no other lifecycle phases are relevant to cover, and they are marked as “Not declared”.

PRODUCT END OF LIFE (C1-C4, D)

The end-of-life modules (C1-C4, and D) are omitted as the material fulfils the exemption criteria based on EN 15804+A2.

PRODUCT SYSTEM

This EPD reflect the following “Cradle to gate” environmental burdens:

- A1: Extraction, transport and combustion of hard coal in powerplant – with Economic allocation according to EcoPlatform LCA rules
- A2: Transportation of Flyash from powerplant to Aalborg Portland
- A3: Test & certify Flyash batches (no energy, emissions or waste)

LIFE-CYCLE ASSESSMENT

LIFE-CYCLE ASSESSMENT INFORMATION

Period for data	2025
Declared unit	1000 kg Flyash for Concrete
Mass per declared unit	1000 kg
Database and LCA software	GCCA EPD Tool for Cement and Concrete (v5.2), International Version EcoInvent 3.10

SYSTEM BOUNDARY

This EPD covers cradle-to-gate scope with following modules; A1 (Raw material supply), A2 (Transport) and A3 (Manufacturing). As flyash is an intermediate product, no other lifecycle phases are relevant to cover.

Module	A1 Raw materials	A2 Transport	A3 Manufacturing	A4 Transport	A5 Assembly	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstr./demol.	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, Recovery, Recycling potential
Modules declared	x	x	x	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Geography	Europe	Europe	DK														
Share of primary data	49%																
Variation – products	0%																
Variation - sites	0%																

Not declared = ND

DATA QUALITY & SOURCES USED

Process	Source type	Source	Ref. year	Data category	% of A1-A3 GWP-GHG
A1 Production of raw mat.	Collected & Database	Market prices, GCCA EPD tool / Ecoinvent v3.10	2022-24	Secondary	51%
A2 Transport of raw mat.	Collected & Database	EPD owner + Ecoinvent v3.10	2025	Primary	49%
A3 Test & certify	Collected data	EPD owner	2025	Primary	0%

The share of primary data is calculated based on GWP-GHG results. It is a simplified indicator for data quality that supports the use of more primary data, to increase the representativeness of and comparability between EPDs. Note that the indicator does not capture all relevant aspects of data quality and is not comparable across product categories.

CUT-OFF CRITERIA

The data quality is generally good using a combination primary data where available and recent generic EcoInvent data where primary data is not available. All raw materials are included. The 1% cut-off rule does not apply for hazardous materials and substances. All flows with environmental significance are included.

LCA APPROACH APPLIED

This Flyash EPD is prepared with mandatory economic allocation of the accumulated environmental burdens from original production process generating the by-product. This is according to the LCA Calculation rules 2.0 (December 2024) enforced by ECO Platform and now adopted in the Environdec PCR 2.0.1.

The economic allocation is performed according to ISO 14044 and PCR 2.0.1 referencing to a longer period to prevent impact from short term market fluctuations. The powerplant revenue from primary product (energy) and by-product (flyash) have been assessed for the most recent 3-year period 2022-24 with public data sources available. Relevant data in good quality was found, but the assessment of market prices will involve some uncertainly, so a conservative approach was applied in the allocation factor.

LCA is based on primary data from manufacturer. When primary data is not available, recent generic data from EcoInvent 3.10 (2024) is used. The burdens from inbound transportation are modelled using primary data on transportation distances and transportation method in combination with generic inventory data from Ecoinvent.

AVERAGES AND VARIABILITY

EPD is based on averaged data to eliminate risk of seasonality impact and random fluctuations. A1 economic allocation burdens from powerplant is averaged over a 3 year period, while the A2 burdens reflect the most recent calendar year 2025 – aligned with the geography reflected in A1 and the expected setup for future supplies.

ENVIRONMENTAL IMPACT DATA

Note: The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks.

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, EF 3.1

Impact category	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Global Warming Potential, total (net)*	kg $CO_{2\text{-eq}}$	9,32E+01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Global Warming Potential, fossil (net)*	kg $CO_{2\text{-eq}}$	9,32E+01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Global Warming Potential, biogenic (net)*	kg $CO_{2\text{-eq}}$	0,00E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Global Warming Potential, land use and land use change	kg $CO_{2\text{-eq}}$	3,07E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Depletion potential of the stratospheric ozone layer	kg $CFC11_{\text{-eq}}$	7,26E-07	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acidification potential, Accumulated Exceedance	mol $H^{+}_{\text{-eq}}$	1,74E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Eutrophication potential, fraction of nutrients reaching freshwater end compartment	kg $P_{\text{-eq}}$	7,12E-03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Eutrophication potential, fraction of nutrients reaching marine end compartment	kg $N_{\text{-eq}}$	3,60E-01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Eutrophication potential, Accumulated Exceedance	mol $N_{\text{-eq}}$	3,97E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Formation potential of tropospheric ozone	kg $NMVOC_{\text{-eq}}$	1,09E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Abiotic depletion potential for non- fossil resources**	kg $Sb_{\text{-eq}}$	6,00E-05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Abiotic depletion potential for fossil resources potential**	MJ	1,02E+03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Water (user) deprivation potential, deprivation-weighted water consumption**	$m^3_{\text{-eq}}$ depr.	5,00E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

* The indicated values (net values) do not include the greenhouse gas emissions from the incineration of secondary fuels at clinker production. The gross GWP-tot (including the emissions from the incineration of secondary fuels at clinker production) is 92.02 kg CO_2–eq. The gross GWP-fos is 91.99 kg CO_2-eq. The gross GWP-bio is 0 kg CO_2-eq.

**EN 15804+A2 disclaimer for Abiotic depletion and Water use indicators and all optional indicators except Particulate matter and Ionizing radiation, human health. 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 the indicator.

ADDITIONAL (OPTIONAL) ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, EF 3.1

Impact category	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Potential incidence of disease due to PM emissions	Incidence	1,94E-06	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Potential Human exposure efficiency relative to U235	kBq $U235_{-eq}$	3,73E-01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Potential Comparative Toxic Unit for ecosystems	CTU_{-eq}	2,05E+02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Potential Comparative Toxic Unit for humans - cancer	CTUh	2,39E-07	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Potential Comparative Toxic Unit for humans - non-cancer	CTUh	3,80E-07	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Potential soil quality index	dimensionless	1,25E+02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

EN 15804+A2 disclaimer for Ionizing radiation, human health. 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.

USE OF NATURAL RESOURCES

Impact category	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Use of renewable primary energy excl. renewable primary energy resources used as raw materials	MJ	9,97E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Use of renewable primary energy resources used as raw materials	MJ	0,00E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total use of renewable primary energy resources	MJ	9,97E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Use of non-renewable primary energy excl. non-renewable primary energy res. used as raw mat.	MJ	1,02E+03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Use of non-renewable primary energy resources used as raw materials	MJ	0,00E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total use of non-renewable primary energy resources	MJ	1,02E+03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Use of secondary materials	kg	1,00E+03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Use of renewable secondary fuels	MJ	0,00E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Use of non-renewable secondary fuels	MJ	0,00E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Net use of fresh water	m^3	1,18E-01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

END OF LIFE – WASTE

Impact category	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste	kg	0,00E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Non-hazardous waste	kg	0,00E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Radioactive waste	kg	8,77E-05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Components for reuse	kg	0,00E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Materials for recycling	kg	0,00E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Materials for energy recovery	kg	0,00E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Exported electrical energy	MJ	0,00E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Exported thermal energy	MJ	0,00E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ENVIRONMENTAL IMPACTS – GWP-GHG - THE INTERNATIONAL EPD SYSTEM

Impact category	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-GHG (net)*	kg $CO_{2\text{-eq}}$	9,32E+01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

* The indicated values (net values) do not include the greenhouse gas emissions from the incineration of secondary fuels at clinker production. The gross GWP-GHG (including the emissions from the incineration of secondary fuels at clinker production) is 92.02 kg CO_2–eq.

GWP-GHG indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO2 is set to zero.

SCENARIO DOCUMENTATION

Manufacturing energy scenario documentation

Scenario parameter	Value
Electricity data source and quality	n/a
Electricity gram $CO_{2\text{-}eq}$ / kWh	n/a
District heating data source and quality	n/a
District heating $CO_{2\text{-}e}$q / kWh	n/a

Transport scenario documentation

Scenario parameter	Value
Transport, freight, lorry 16-32 tonnes, EURO 6,kg $CO_{2\text{-}eq}$ / t-km	n/a
Transport, freight, sea, bulk carrier for dry goods, kg $CO_{2\text{-}eq}$ / t-km	n/a
A4 average transport $CO_{2\text{-}eq}$ emissions, kg $CO_{2\text{-}eq}$ / t-km	n/a
A4 average transport distance, km	n/a
Transport capacity utilization, %	n/a
Bulk density of transported products, kg/m^3	n/a
Volume capacity utilization factor for nested package products, %	n/a

End of life scenario documentation

Scenario parameter	Value
Collection process – kg collected separately	n/a
Collection process – kg collected with mixed waste	n/a
Recovery process – kg for re-use	n/a
Recovery process – kg for recycling	n/a
Recovery process – kg for energy recovery	n/a
Disposal (total) – kg for final deposition	n/a
Scenario assumptions e.g. transportation	n/a

BIBLIOGRAPHY

ISO 14025:2010 Environmental labels and declarations – Type III environmental declarations. Principles and procedures.

ISO 14040:2006 Environmental management. Life cycle assessment. Principles and frameworks.

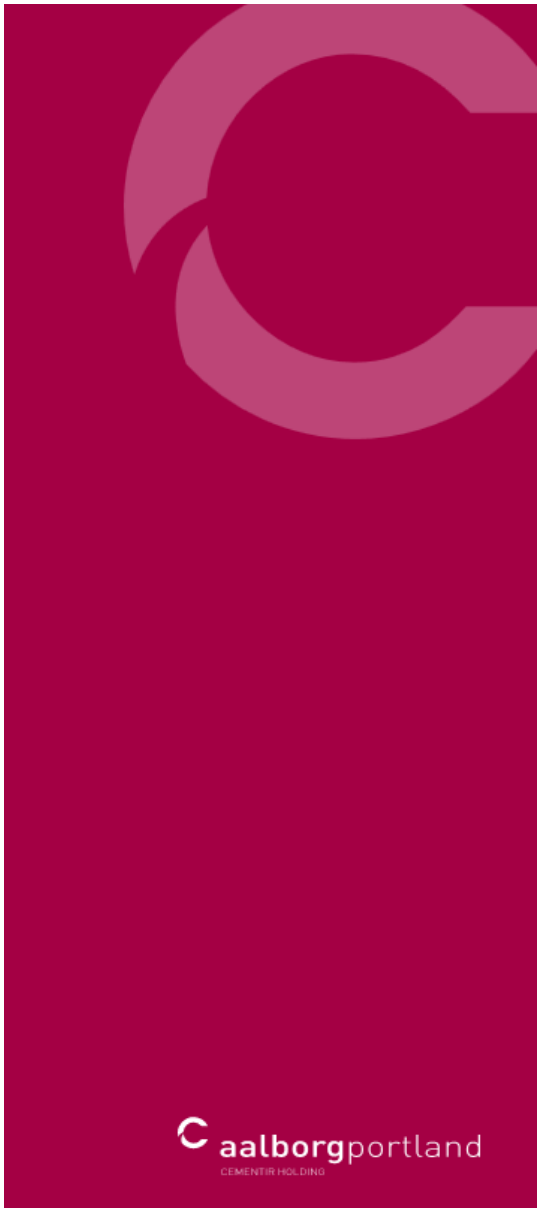
ISO 14044:2006 Environmental management. Life cycle assessment. Requirements and guidelines.

GCCA EPD tool v5.2 database incl. EcoInvent database v3.10

EN 15804:2012+A2:2019 Sustainability in construction works – Environmental product declarations – Core rules for the product category of construction products.

IES PCR 2019:14 Construction products, version 2.0.1 (2025-06-05).

EcoPlatform LCA Calculation rules 2.0 (December 2024)



VERSION HISTORY

Current version is the initial version for this product.

ABOUT THE MANUFACTURER

Aalborg Portland is the only cement factory in Denmark. The past 135 years it has been producing high quality grey and white cement from multiple kilns, where the main clinker raw material, limestone and sand, is sourced locally. Since 2004 it is owned by Cementir Group along with 10 other cement factories globally. The annual cement production exceeds 2 million tons sold in domestic and regional markets. The distribution is based on silo terminal across Denmark and Europe. Aalborg Portland proactively pursuing decarbonisation of cements, while maintaining a high performance in target applications. The latest examples are FutureCEM® (2020), SOLID (2021) and White D-Carb® (2024).

EPD AUTHOR AND CONTRIBUTORS

Manufacturer	Aalborg Portland, Cementir Holding
EPD author	Morten Frederiksen, Aalborg Portland A/S, Denmark
EPD verifier	Stefan Emil Danielsson, SDG Consulting
EPD program operator	The International EPD System
Background data	This EPD is based GCCA EPD tool v 5.2 incl. Ecoinvent v.3.10
LCA software	The LCA and EPD have been created using GCCA Industry EPD Tool for Cement and Concrete (v5.2), International Version - Pre-Verified for International EPD System

VERIFICATION STATEMENT

VERIFICATION PROCESS FOR THIS EPD

This EPD has been verified in accordance with ISO 14025 by an independent, third-party verifier by reviewing results, documents and compliancy with EN 15804, ISO 14025 and ISO 14040/14044, following the process and checklists of the program operator for:

- This Environmental Product Declaration
- The Life-Cycle Assessment used in this EPD
- The background report (project report) for this EPD

VERIFICATION OVERVIEW

Following independent third party has verified this specific EPD:

EPD verification information	Answer
Independent EPD verifier	Stefan Emil Danielsson, SDG Consulting
EPD verification started on	2025.12.23
EPD verification completed on	2026.01.28
Supply-chain specific data %	49%
Approver of the EPD verifier	The International EPD System

Author & tool verification	Answer
EPD author	Morten Frederiksen
EPD author training completion	2023.05.31
EPD Generator module	GCCA EPD Tool for Cement and Concrete (v5.2), International Version
Independent software verifier	Rillo & Pretato, Studio Fieschi & soci Srl.
Software verification date	2025.06.24

VERIFICATION AND REGISTRATION (ENVIRONDEC)

ISO standard ISO 21930 and CEN standard EN 15804 serves as the core Product Category Rules (PCR)	
PCR	PCR 2019:14 Construction products, version 2.0.1
PCR review was conducted by:	The Technical Committee of the International EPD® System. See www.environdec.com/TC for a list of members. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact.
Independent third-party verification of the declaration and data, according to ISO 14025:2006:	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal certification ☑ External verification
Third party verifier	Stefan Emil Danielsson, SDG Consulting
	Approved by: The International EPD® System Technical Committee, supported by the Secretariat
Procedure for follow-up during EPD validity involves third party verifier	☐ yes ☑ no

EPD INTERNATIONAL EPD SYSTEM

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