EPD®
THE INTERNATIONAL EPD® SYSTEM

aalborgportland
CEMENTIR HOLDING

ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025 / ISO 21930

AALBORG RAPID® CEMENT

AALBORG PORTLAND A/S, CEMENTIR HOLDING

Programme: The International EPD® System, www.environdec.com	Programme operator: **EPD International AB**	EPD registration number: S-P-06379	Publication date: 2022-11-10	Valid until: 2027-11-10	Geographical scope: **Denmark**

An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com.

epd-norway
Global Program Operator

Publisher: The Norwegian EPD Foundation
Registration number: NEPD-3899-2859-EN

GENERAL INFORMATION

MANUFACTURER INFORMATION

Manufacturer	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	Aalborg RAPID® cement
Additional label(s)	CEM I 52,5 N
Product number / reference	0615-CPR-9806.1
Place(s) of production	Aalborg, Denmark
CPC code	3744

The International EPD System
EPDs within the same product category but from different programmes may not be comparable.

EPD INFORMATION

The EPD owner has the sole ownership, liability, and responsibility for the EPD. Construction products EPDs may not be comparable if they do not comply with EN 15804 and if they are not compared in a building context

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	The CEN standard EN 15804 serves as the core PCR. In addition, the Int'l EPD System PCR 2019:14 Construction products, version 1.11 (05.02.2021) is used. c-PCR 001 Cement & building lime
EPD author	Stefan Emil Danielsson, Research and Quality Center, Cementir Holding S.p.A Aalborg, Denmark
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal certification ☑ External verification
Verification date	2022-11-10
EPD verifier	Silvia Vilčeková, Silcert, s.r.o.
EPD number	S-P-06379
ECO Platform nr.	-
Publishing date	2022-11-10
EPD valid until	2027-11-10

PRODUCT INFORMATION

PRODUCT DESCRIPTION

The Aalborg RAPID® cement is a CEM I 52,5 N reaching a 28-day strength of above 52,5 MPa.

PRODUCT APPLICATION

It can be used in concrete for all purposes and in all environmental classes, and is especially recommended for:

- Reinforced concrete structures
- Concreting in cold weather
- Precast concrete blocks
- Heavy precast concrete elements

TECHNICAL SPECIFICATIONS AND PHYSICAL PROPERTIES OF THE PRODUCT

Product sheet for the cement can be retrieved here:
https://www.aalborgportland.dk/downloads/ydeevnedeklarationer/

Further information can be found at www.aalborgportland.dk

PRODUCT STANDARDS

The Aalborg RAPID® cement is manufactured according to the requirements in the European standard DS/EN 197-1

PRODUCT RAW MATERIAL COMPOSITION

Product and Packaging Material	Weight, kg	Post-consumer %	Renewable %	Country Region of origin
Clinker	950 - 1000	0	0	Denmark, Europe
Other constituents	0 - 50	0	0	Denmark

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass- %	Material origin
Metals	<0,1	Europe, World
Minerals	97	Denmark
Fossil materials	3	Denmark, Europe
Bio-based materials	0	-

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)

Portland cement is made by heating, in a cement kiln, a mixture of raw materials (mainly limestone or chalk) to a calcining temperature of above 600°C and then a fusion temperature, which is about 1450°C to sinter the materials into grey clinker. The production process is a so-called wet process due to the wet limestone used. To achieve the desired setting qualities in the finished product, a quantity of gypsum or anhydrite is added to the clinker and the mixture is finely ground.

TRANSPORT AND INSTALLATION (A4-A5)

Only distribution to end customers is considered (A4). Transportation happens by ship to silo in Norway from where it is distributed by truck to several locations. The transport impact is partitioned according to flow volume and distances and displayed in the table at the “Scenario documentation” of this EPD.

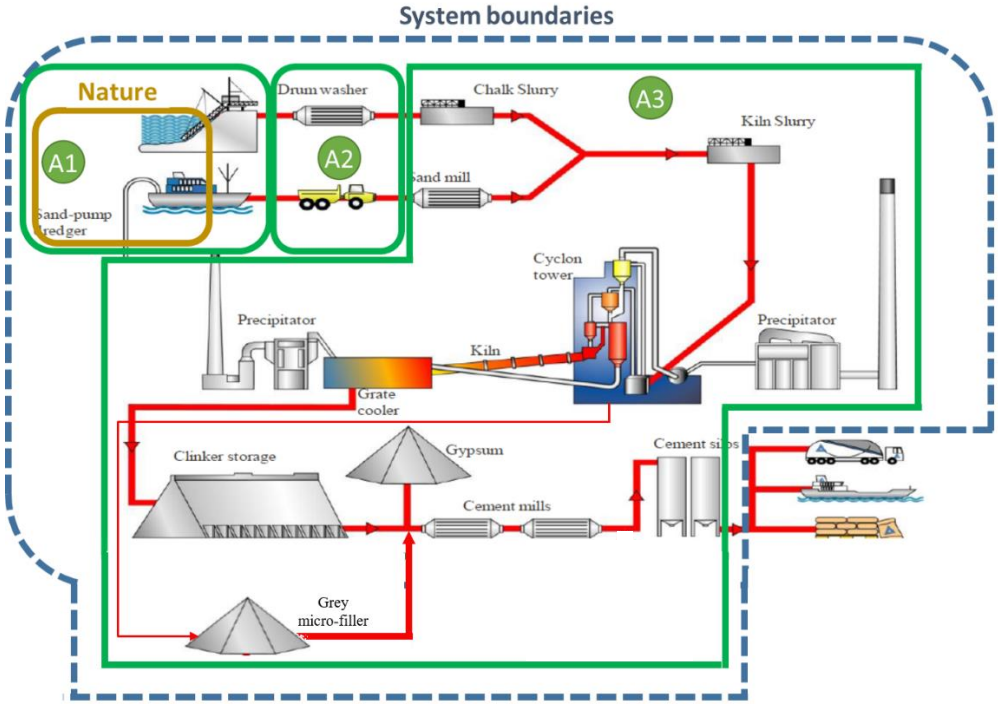
PRODUCT USE AND MAINTENANCE (B1-B7)

As cement is an intermediate product, no other lifecycle phases are relevant to cover. Air, soil and water impacts during the use phase have not been studied. As such they are marked as “Modules Not Relevant”

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.

MANUFACTURING PROCESS



LIFE-CYCLE ASSESSMENT

LIFE-CYCLE ASSESSMENT INFORMATION

Period for data	2020
Declared unit	1000 kg Aalborg RAPID® cement, CEM I 52,5 N (bulk)
Mass per declared unit	1000 kg

BIOGENIC CARBON CONTENT

The product and its packaging do not have biogenic carbon content.

SYSTEM BOUNDARY

This EPD covers cradle-to-gate with options scope with following modules; A1 (Raw material supply), A2 (Transport) and A3 (Manufacturing). As cement is an intermediate product, no other lifecycle phases are relevant to cover. Only A4 is also included as per the recommendation in EN 15804+A2.

Modules not declared = MND. Modules not relevant = MNR.

Product stage			Assembly stage		Use stage							End of life stage				Beyond the system boundaries		
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	D	D
x	x	x	x	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstr./demol.	Transport	Waste processing	Disposal	Reuse	Recovery	Recycling

CUT-OFF CRITERIA

All major raw materials and essential energy flows are included. The 1% cut-off rule does not apply for hazardous materials and substances: as such, all flows with environmental significance are included. All solid waste emissions, including those that weight less than 1% of the sum of the masses of the inputs, are reported in the end-results.

ALLOCATION, ESTIMATES AND ASSUMPTIONS

Allocation is required if some material, energy, and waste data cannot be measured separately for the product under investigation. In this study, as per EN 15804, allocation is conducted in the following order;

1. Allocation should be avoided.
2. Allocation should be based on physical properties (e.g. mass, volume) when the difference in revenue is small.

3. Allocation should be based on economic values.

Allocation is made in accordance with the provisions of EN 15804+A2 and the PCR. According to the “polluter pays principle” burdens from alternative fuels are excluded. However, the burden from its incineration is voluntarily added to the GWP category in A3 to be directly comparable with most other EPD’s.

The data quality is generally high as most are retrieved directly from the Manufacturer and are well below the cut-off criteria. Additional background processes such as transportation and electricity consumption have been modelled using Ecoinvent v.3.6 LCI database, all with less than 2 years old data.

AVERAGES AND VARIABILITY

Essentially, for this EPD, minor inputs such as electricity, internal transport, and waste have been averaged over the entire cement and clinker production of Aalborg Portland.

The International EPD System additional data requirements

Data specificity and GWP-GHG variability for GWP-GHG for A1-A3.

Supply-chain specific data for GWP-GHG	95 %
Variation in GWP-GHG between products	n/a
Variation in GWP-GHG between sites	n/a

ENVIRONMENTAL IMPACT DATA

NOTE: ENVIRONMENTAL IMPACTS - EN 15804+A1, CML / ISO 21930 ARE PRESENTED IN ANNEX.

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Climate change – total	kg $CO_{2\text{-eq}}$	1,08E+01	1,62E+01	7,76E+02	8,03E+02	2,44E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Climate change – fossil	kg $CO_{2\text{-eq}}$	1,08E+01	1,62E+01	7,74E+02	8,01E+02	2,46E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Climate change – biogenic	kg $CO_{2\text{-eq}}$	-9,64E-03	3,20E-04	2,37E+00	2,36E+00	8,49E-04	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Climate change – LULUC	kg $CO_{2\text{-eq}}$	1,32E-02	8,69E-03	6,32E-02	8,51E-02	1,09E-03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Ozone depletion	kg $CFC11_{\text{-eq}}$	2,47E-06	3,38E-06	6,73E-06	1,26E-05	5,46E-07	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Acidification	mol $H^{+}_{\text{-eq}}$	7,14E-02	2,02E-01	1,86E+00	2,13E+00	2,13E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Eutrophication, aquatic freshwater	kg $PO_{4\text{-eq}}$	1,38E-03	1,50E-04	1,06E-02	1,21E-02	1,91E-05	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Eutrophication, aquatic marine	kg $N_{\text{-eq}}$	1,02E-02	5,40E-02	2,39E-01	3,03E-01	5,39E-03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Eutrophication, terrestrial	mol $N_{\text{-eq}}$	1,15E-01	5,99E-01	2,73E+00	3,45E+00	5,99E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Photochemical ozone formation	kg $NMVOC_{\text{-eq}}$	3,00E-02	1,63E-01	9,73E-01	1,17E+00	1,69E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Abiotic depletion, minerals & metals	kg $Sb_{\text{-eq}}$	1,21E-03	2,93E-04	2,58E-04	1,76E-03	5,84E-05	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Abiotic depletion of fossil resources	MJ	2,39E+02	2,27E+02	2,13E+03	2,60E+03	3,60E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Water use	$m^3_{\text{-eq}}$ depr.	1,44E+01	8,84E-01	1,01E+01	2,54E+01	1,12E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

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.

The GWP parameter (A1-A3) for the cement content includes 77,4 kg $CO_{2\text{-eq.}}$ from the combustion of fossil part of alternative fuels during clinker production. In accordance with the "polluter pays" principle / EN 15804 /, the emissions will be added to the production system that caused the waste. In this EPD, the fossil CO_2 contribution from alternative fuels has not been deducted. This makes it easier to compare calculated global warming potential of the cement regardless of the status of the waste in different countries. The net total GWP (without alternative fuel contribution) is 651 kg $CO_{2\text{-eq}}$ per ton cement.

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

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Particulate matter	Incidence	6,46E-07	1,02E-06	2,09E-05	2,26E-05	1,54E-07	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Ionizing radiation, human health	kBq U235-eq	6,95E-01	9,80E-01	3,62E+00	5,29E+00	1,57E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Eco-toxicity (freshwater)	CTU-eq	2,75E+02	1,82E+02	6,38E+03	6,84E+03	2,71E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Human toxicity, cancer effects	CTUh	1,24E-08	8,46E-09	5,60E-07	5,81E-07	9,74E-10	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Human toxicity, non-cancer effects	CTUh	1,90E-07	1,94E-07	2,31E-06	2,70E-06	2,96E-08	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Land use related impacts/soil quality	-	1,14E+02	1,31E+02	2,63E+02	5,08E+02	2,54E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

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	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Renewable PER used as energy	MJ	7,95E+00	3,57E+00	4,12E+02	4,24E+02	4,72E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Renewable PER used as materials	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Total use of renewable PER	MJ	7,95E+00	3,57E+00	4,12E+02	4,24E+02	4,72E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Non-renew. PER used as energy	MJ	2,39E+02	2,27E+02	2,13E+03	2,60E+03	3,60E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Non-renew. PER used as materials	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Total use of non-renewable PER	MJ	2,39E+02	2,27E+02	2,13E+03	2,60E+03	3,60E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Use of secondary materials	kg	5,04E-02	0,00E+00	0,00E+00	5,04E-02	0,00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Use of renewable secondary fuels	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Use of non-renew. secondary fuels	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Use of net fresh water	m^3	2,02E-01	4,00E-02	3,82E-01	6,24E-01	5,76E-03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

PER abbreviation stands for primary energy resources

END OF LIFE – WASTE

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste	kg	1,01E+00	3,51E-01	2,03E+01	2,17E+01	3,85E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Non-hazardous waste	kg	1,11E+01	1,27E+01	4,38E+02	4,62E+02	2,21E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Radioactive waste	kg	9,15E-04	1,53E-03	3,13E-03	5,57E-03	2,48E-04	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Components for reuse	kg	0,00E+00	0,00E+00	2,07E+01	2,07E+01	0,00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Materials for recycling	kg	9,25E-04	0,00E+00	4,36E+00	4,36E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Materials for energy recovery	kg	0,00E+00	0,00E+00	2,23E+00	2,23E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Exported energy	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

ENVIRONMENTAL IMPACTS – GWP-GHG - THE INTERNATIONAL EPD SYSTEM

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-GHG	kg $CO_{2\text{-eq}}$	1,08E+01	1,62E+01	7,74E+02	8,01E+02	2,46E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

8) This indicator includes all greenhouse gases excluding biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product as defined by IPCC AR 5 (IPCC 2013) This indicator Is almost equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

SCENARIO DOCUMENTATION

Manufacturing energy scenario documentation

Scenario parameter	Value
Electricity data source and quality	Ecoinvent v.3.6 data has been applied as the only valid dataset
Electricity $CO_{2\text{-eq}}$ / kWh	0,32
District heating data source and quality	n/a
District heating $CO_{2\text{-eq}}$ / kWh	n/a

Transport scenario documentation

Scenario parameter	Value
Transport, freight, lorry 16-32 tonnes, EURO 5, kg $CO_{2\text{-eq}}$ / t-km	0,1668
Transport, freight, sea, bulk carrier for dry goods, kg $CO_{2\text{-eq}}$ / t-km	0,00939
A4 average transport $CO_{2\text{-eq}}$ emissions, kg $CO_{2\text{-eq}}$ / t-km	0,0180
A4 average transport distance, km	149
Transport capacity utilization, %	36%
Bulk density of transported products, kg/m^3	2790
Volume capacity utilization factor for nested package products, %	100

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.

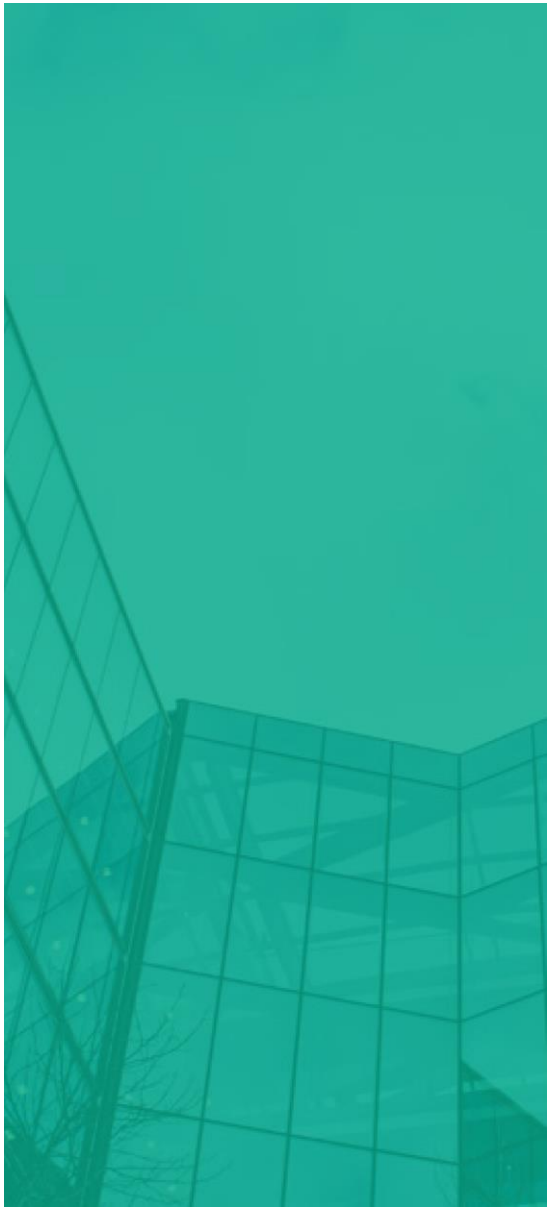
ISO 14040:2006 Environmental management. Life cycle assessment. Principles and frameworks.

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

Ecoinvent database v3.6 and One Click LCA database.

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

IES EPD System PCR 2019:14 Construction products, version 1.11 (05.02.2021) is used. c-PCR 001 Cement & building lime



ABOUT THE MANUFACTURER

Aalborg Portland is the only cement factory in Denmark. The past 130 years it has been producing a wide variety of grey cements in its kiln and premium white cement in its six white cement 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 is 2,4 million tons and the markets are both domestic, regional and global, and the domestic infrastructure is supported by seven Aalborg Portland owed silos across Denmark. In its Research and Quality Centre cements from all factories across the Group are being tested, and the development of low carbon cements is taking place, the latest one FUTURECEM™ launched in 2020 – a calcined clay cement with a 30% lower CO_2 footprint compared to traditional cements.

EPD AUTHOR AND CONTRIBUTORS

Manufacturer	Aalborg Portland, Cementir Holding
EPD author	Stefan Emil Danielsson, Research and Quality Center, Cementir Holding S.p.A Aalborg, Denmark
EPD verifier	Silvia Vilčeková, Silcert, s.r.o.
EPD program operator	The International EPD System
Background data	This EPD is based on Ecoinvent 3.6 (cut-off) and One Click LCA databases.
LCA software	The LCA and EPD have been created using One Click LCA Pre-Verified EPD Generator for Cementitious Products

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

Why does verification transparency matter? Read more online.

VERIFICATION OVERVIEW

Following independent third party has verified this specific EPD:

EPD verification information	Answer
Independent EPD verifier	Silvia Vilčeková, Silcert, s.r.o.
EPD verification started on	2022-10-19
EPD verification completed on	2022-11-10
Supply-chain specific data %	95%
Approver of the EPD verifier	The International EPD System

Author & tool verification	Answer
EPD author	Stefan Emil Danielsson
EPD author training completion	2020-09-10
EPD Generator module	Cement, cement mixes & building lime
Independent software verifier	Ugo Pretato, Studio Fieschi & soci Srl.
Software verification date	2021-05-11

THIRD-PARTY VERIFICATION STATEMENT

I hereby confirm that, following detailed examination, I have not established any relevant deviations by the studied Environmental Product Declaration (EPD), its LCA and project report, in terms of

- the data collected and used in the LCA calculations,
- the way the LCA-based calculations have been carried out,
- the presentation of environmental data in the EPD, and
- other additional environmental information, as present

with respect to the procedural and methodological requirements in ISO 14025:2010 and EN 15804:2012+A2:2019.

I confirm that the company-specific data has been examined as regards plausibility and consistency; the declaration owner is responsible for its factual integrity and legal compliance.

I confirm that I have sufficient knowledge and experience of construction products, this specific product category, the construction industry, relevant standards, and the geographical area of the EPD to carry out this verification.

I confirm my independence in my role as verifier; I have not been involved in the execution of the LCA or in the development of the declaration and have no conflicts of interest regarding this verification.

Silvia Vilčeková, Silcert, s.r.o.

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 1.11
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	Silvia Vilčeková, Silcert, s.r.o.
	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 AB, Box 210 60, SE-100 31 Stockholm, Sweden, E-mail: info@environdec.com

ANNEX

ENVIRONMENTAL IMPACTS - EN 15804+A1, CML / ISO 21930

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Global warming potential	kg $CO_{2\text{-eq}}$	1,07E+01	1,61E+01	7,65E+02	7,92E+02	2,44E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Depletion of stratospheric ozone	kg CFC-11-eq	1,99E-06	2,69E-06	6,17E-06	1,08E-05	4,34E-07	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Acidification	kg $SO_{2\text{-eq}}$	5,87E-02	1,45E-01	1,59E+00	1,79E+00	1,47E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Eutrophication	kg $PO_{4\text{-eq}}$	1,91E-02	2,00E-02	3,44E-01	3,83E-01	1,92E-03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Photochemical ozone formation	kg $C_2H_{4\text{-eq}}$	2,60E-03	4,87E-03	8,21E-02	8,96E-02	5,61E-04	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Abiotic depletion of non-fossil res.	kg $Sb_{\text{-eq}}$	1,21E-03	2,93E-04	2,58E-04	1,76E-03	5,84E-05	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Abiotic depletion of fossil resources	MJ	2,39E+02	2,27E+02	2,13E+03	2,60E+03	3,60E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

The GWP parameter (A1-A3) for the cement content includes 77,2 kg $CO_{2\text{-eq.}}$ from the combustion of fossil part of alternative fuels during clinker production. In accordance with the "polluter pays" principle / EN 15804 /, the emissions will be added to the production system that caused the waste. In this EPD, the fossil CO_2 contribution from alternative fuels has not been deducted. This makes it easier to compare calculated global warming potential of the cement regardless of the status of the waste in different countries. The net total GWP (without alternative fuel contribution) is 645 kg $CO_{2\text{-eq}}$ per ton cement.

ANNEX 1

ANNEX 1: Self declaration from EPD owner

Specific Norwegian requirements

1 Applied electricity data set used in the manufacturing phase

The electricity mix for the electricity used in manufacturing (A3) is the electricity grid mix

<89 g CO_2 eqv/MJ – 320 g CO_2 eqv/kWh>

Table 8. Manufacturing energy scenario

Scenario parameter	Value
Electricity data source and quality	Ecoinvent v3.6 data has been applied as the only valid dataset
Electricity CO_{2e} / kWh	0,32
District heating data source and quality	n/a
District heating CO2e / kWh	n/a

2 Content of dangerous substances

- ✓ The product contains no substances given by the REACH Candidate list or the Norwegian priority list.
- ☐ X The product contains substances that are less than 0.1% by weight given by the REACH Candidate or the Norwegian priority list.
- ☐ The product contains dangerous substances more than 0.1% by weight given in the REACH candidate list or the Norwegian Priority List, concentrations is given in the EPD:

Dangerous substances from the REACH candidate list or the Norwegian Priority List	CAS No.	Quantity (concentration, wt%/FU(DU)).
Substance 1	n/a	n/a
Substance n	n/a	n/a

Aalborg Portland is conscious of the REACH directive and the impact of the REACH directive on which Aalborg Portland´s business and products have been evaluated. Aalborg Portland certifies that it is not using any chemicals that fall under the REACH regulation.
However, Aalborg Portland continues to evaluate, research and review to fulfil the demands of the regulation, including the Candidate List of Substance of Very High Concern. See the certification letter from the link below.
https://www.aalborgportland.dk/wp-content/uploads/2019/01/4_REACH-Statement.pdf

3 Transport from the place of manufacture to a central warehouse

Transport distance, and CO_2-eqv./DU from transport of the product from factory gate to central warehouse in Oslo shall be given. The following table shall be included in the EPD:

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance km	Fuel/Energy use	Unit	Value (l/t)	Kg CO2-eqv./DU
Boat**	50	Transport, freight, sea, bulk carrier	420 out + 420 return	0,00384	kg/t-km		10*
Truck							
Railway							
Rail							
Air							
Total			840				10

* 0,012 kg/ton-km x 840 km.

** Central warehouse is silo terminal located directly at port.

Transport from factory port to Central warehouse in Oslo

The ship leaves Aalborg full (4000 tons) to reach Oslo (420 km) and returns empty. The specific fuel consumption as well as emissions of CO2, NOx and SOx have been calculated based on the engine manufacturer specifications:

	Distance [km]	Capacity utilisation [%]	Bulk density [kg/m³]	Fuel consumption [kg fuel/trip]	per ton transported [kg/t]	Fuel consumption [kg/ton-km, exhaust]	CO_2 [kg/ton-km, exhaust]	NO_x [kg/ton-km, exhaust]	SO_x [kg/ton-km, exhaust]
From Aalborg to Oslo	420	100%	3010	5000	1.25	0.00298	0.0094	1.19e-4	3.57e-06
From Oslo to Aalborg	420	0%	0	1448	0.36	0.00086	0.0027	4.30e-5	7.75e-07
Sum (return trip, per ton-km)						0.00384	0.0121	1.62e-04	4.35e-06

4 Impact on the indoor environment

☐ Indoor air emission testing has been performed; specify test method and reference; M1, _____

☐ No test has being performed

X Not relevant; specify

The EPD does not give information on release of dangerous substances to indoor air because the horizontal standards on measurement of release of regulated dangerous substances from construction products using harmonized test methods according to the provisions of the respective technical committees for European product standards are not available.