

ENVIRONMENTAL PRODUCT DECLARATION



According to ISO 14025 and EN 15804

Registered under the scope of mutual recognition between
The International EPD® System and The Norwegian EPD Foundation

Program operator: The Norwegian EPD Foundation

Publisher: International EPD® System

Declaration number: NEPD-1418-467-EN

Registration number: S-P-01968

Issue date: 2017-10-06

Valid to: 2022-10-06

LAVALKALI SULFATBESTANDIG cement

Aalborg Portland A/S



General information

Product:

LAVALKALI SULFATBESTANDIG cement
CEM I 42,5 N - SR5 (EA)

Program operator:

The Norwegian EPD Foundation
Post Box 5250 Majorstuen, 0303 Oslo
Phone: +47 23 08 80 00
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Declaration number:

NEPD-1418-467-EN

ECO Platform reference number:

-

This declaration is based on Product Category Rules:

CEN Standard EN 15804 serves as core PCR together with
UN CPC 3744 CEMENT, v. 2.1 with the registration number
2010:09 developed by the Centre for the Development of
Product Sustainability

Statement of liability:

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

Declared unit:

1000 kg LAVALKALI SULFATBESTANDIG cement

Declared unit with option:**Functional unit:****Verification:**

The CEN Norm EN 15804 serves as the core PCR.
Independent verification of the declaration and data, according
to ISO14025:2010

☐

internal

☒

external

Third party verifier:

sign

Linda Høibye, Senior specialist, Environment and EHS, COWI A/S (DK)
(Independent verifier approved by EPD Norway)

Owner of the declaration:

Aalborg Portland A/S
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Manufacturer:

Aalborg Portland A/S
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e-mail: cement@aalborgportland.dk

Place of production:

Aalborg, Denmark

Management system:

DS/EN ISO 9001, DS/EN ISO 14001, EMAS III
OHSAS 18001, DS/EN ISO 50001, DS/EN 197-1/-2

Organisation no:

CVR 36428112

Issue date:

06.10.2017

Valid to:

06.10.2022

Year of study:

2015

Comparability:

EPD of construction products may not be comparable if they
not comply with EN 15804 and seen in a building context.

The EPD has been worked out by:

Romain Sacchi
Research and Quality Center, Cementir Holding S.p.A
Aalborg, Denmark

 **aalborgportland**
CEMENTIR HOLDING

Approved

Håkon Hauan
Managing Director of EPD-Norway

Product

Product description:

Grey Portland cement (CAS-Nr. 65997-15-1)

LOW-ALKALI cement (LAV-ALKALI SULFATBESTANDIG in Danish) is a grey Portland cement, with a strength class of 42.5 N with high sulphate-resistance and low heat generation. The LOW-ALKALI cement can be used for all purposes and in all environmental classes. The LOW-ALKALI cement is specially designed for concrete used for plant constructions and other structures prone to alkali reactions, bridges or structures in contact with sulphate-rich groundwater.

Product specification:

The main raw materials are chalk (CaCO₃) and secondary materials like fly ash from production of heat and power.

Materials	kg	%
Chalk	1234	78
Fly ash	133	8
Sand	117	7
Gypsum	52	3
Other primary materials	48	3
Other secondary materials	<1	<1

Technical data:

1000 kg cement (CEM I 42,5 N - SR5 (EA))

Declarations and other technical information can be downloaded from

<http://www.aalborgportland.dk/default.aspx?m=2&i=332>

Market:

Norway/Europe

Material Safety Data Sheet:

Available online at:

http://www.aalborgportland.dk/media/pdf_filer/portlandcement_er_sds_gb_12_20_2016_2.1.pdf

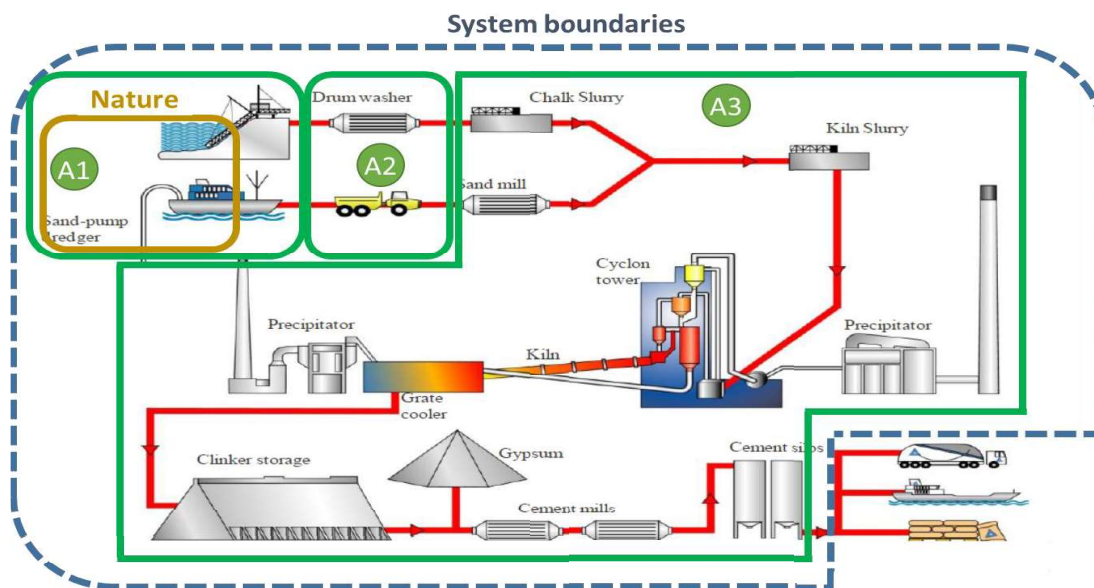
LCA: Calculation rules

Declared unit:

1000 kg LAVALKALI SULFATBESTANDIG® cement

System boundary:

The overall system boundaries include extraction and transportation of raw materials as well as all manufacturing processes (cradle-to-gate)
See figure below for details.



Process description:

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 1,450 °C to sinter the materials into clinker. 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 to form the finished cement powder.

Allocation:

The allocation is made in accordance with the provisions of EN 15804. The environmental burden associated to co-products used in the product system was defined either based on physical properties (energy or mass) when the difference in economic return between co-products is small, or on their economic values otherwise. For End-Of-Life waste used in the product system, the End-Of-Waste state starts with any necessary conditioning and preparation processes of the material to be suitable for reuse, as well as its supply.

Cut-off criteria:

All major raw materials and all the essential energy flows are included. The 1% cut-off rule does not apply for hazardous materials and substances: as such, all flows that have an 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. The only noticeable input that has been omitted is the water consumption at the slurry preparation level (it is not a net uptake of water from the freshwater network).

Data quality:

Data concerning first level transforming activities (cement factory) have been obtained directly from the cement producer for the year 2015. Background processes, e.g. electricity generation, have been sourced from statistics provided, among others, by the Danish Ministry of Energy, for the year 2015. Also, the preparation of certain fuels has been approximated from scientific literature with a publication date within 5 years of the year 2015. Additional background processes have been modeled with the use of Ecoinvent v.3.2 LCI database with a time validity span that covers the year 2015.

LCA: Results

The declaration only considers cradle-to-gate environmental impacts, including modules A1-A3 as required in EN 15804.

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

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

Environmental impact

Parameter	Unit	A1	A2	A3	A1- A3
GWP	kg CO ₂ -eqv	7.51E+01	1.90E+01	8.31E+02	9.25E+02
ODP	kg CFC11-eqv	7.26E-06	1.73E-07	0.00E+00	7.44E-06
POCP	kg C ₂ H ₄ -eqv	1.27E-02	1.27E-02	1.85E-02	4.81E-02
AP	kg SO ₂ -eqv	2.9E-01	4.33E-01	4.34E-01	1.15E+00
EP	kg PO ₄ ³⁻ -eqv	5.20E-01	3.83E-02	1.10E-01	6.68E-01
ADPM	kg Sb-eqv	1.30E+00	0.00E+00	0.00E+00	1.30E-04
ADPE	MJ	3.33E+03	0.00E+00	0.00E+00	3.33E+03

GWP Global warming potential; ODP Depletion potential of the stratospheric ozone layer; POCP Formation potential of tropospheric photochemical oxidants; AP Acidification potential of land and water; EP Eutrophication potential; ADPM Abiotic depletion potential for non fossil resources; ADPE Abiotic depletion potential for fossil resources

Resource use

Parameter	Unit	A1	A2	A3	A1-A3
RPEE	MJ	3.33E+02	0.00E+00	0.00E+00	3.32E+02
RPEM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TPE	MJ	3.33E+02	0.00E+00	0.00E+00	3.32E+02
NRPE	MJ	3.33E+03	0.00E+00	0.00E+00	3.33E+03
NRPM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TRPE	MJ	3.33E+03	0.00E+00	0.00E+00	3.33E+03
SM	kg	0.00E+00	0.00E+00	1.76E+02	1.76E+02
RSF	MJ	2.24E+01	0.00E+00	8.33E+02	8.56E+02
NRSF	MJ	9.31E+00	0.00E+00	9.83E+02	9.92E+02
W	m ³	2.88E+00	0.00E+00	0.00E+00	2.88E+00

RPEE Renewable primary energy resources used as energy carrier; RPEM Renewable primary energy resources used as raw materials; TPE Total use of renewable primary energy resources; NRPE Non renewable primary energy resources used as energy carrier; NRPM Non renewable primary energy resources used as materials; TRPE Total use of non renewable primary energy resources; SM Use of secondary materials; RSF Use of renewable secondary fuels; NRSF Use of non renewable secondary fuels; W Use of net fresh water

End of life - Waste

Parameter	Unit	A1	A2	A3	A1- A3
HW	kg	0.00E+00	0.00E+00	2.00E-02	2.00E-02
NHW	kg	0.00E+00	0.00E+00	2.40E+00	2.40E+00
RW	kg	4.24E-08	0.00E+00	0.00E+00	4.24E-08

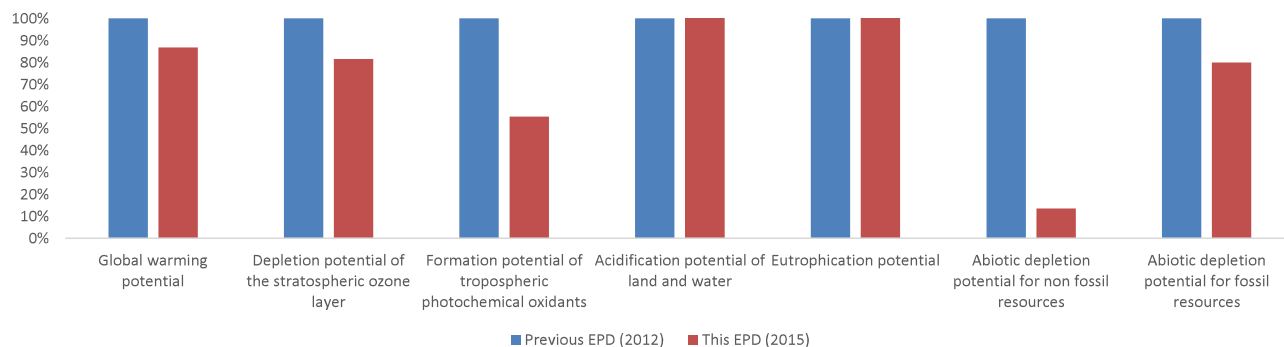
HW Hazardous waste disposed; NHW Non hazardous waste disposed; RW Radioactive waste disposed

End of life - Output flow

Parameter	Unit	A1	A2	A3	A1- A3
CR	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MR	kg	0.00E+00	0.00E+00	1.30E+00	1.30E+00
MER	kg	0.00E+00	0.00E+00	6.00E-01	6.00E-01
EEE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ETE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00

CR Components for reuse; MR Materials for recycling; MER Materials for energy recovery; EEE Exported electric energy; ETE Exported thermal energy

Reading example: 9,0 E-03 = $9,0 \cdot 10^{-3}$ = 0,009



Additional Norwegian requirements

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

National production mix from the Danish Ministry of Energy official statistics (ens.dk), including imports from NO, SE and DE, low voltage (production of transmission lines, in addition to direct emissions and losses in grid) of applied electricity for the manufacturing process (A3).

Data source	Amount	Unit
Danish Ministry of Energy, 2015	237	g CO ₂ -eqv/kWh

Dangerous substances

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.

http://www.aalborgportland.dk/media/pdf_filer/reach_erklaering_epd.pdf

Release to waters and soil

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

Indoor environment





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 harmonised test methods according to the provisions of the respective technical committees for European product standards are not available.

Carbon footprint

The carbon footprint of the declared product has been carried out as part of this EPD. It refers to the impact category Global Warming and the indicator GWP.

Bibliography

ISO 14025:2010	<i>Environmental labels and declarations - Type III environmental declarations - Principles and procedures</i>
ISO 14044:2006	<i>Environmental management - Life cycle assessment - Requirements and guidelines</i>
EN 15804:2012+A1:2013	<i>Sustainability of construction works - Environmental product declaration - Core rules for the product category of construction products</i>
ISO 21930:2007	<i>Sustainability in building construction - Environmental declaration of building products</i>
Sacchi R (2017)	Life Cycle Assessment report 2015. Project report, January 2017
UN CPC 3744 CEMENT	Cement Product Category Rule (http://environdec.com/en/PCR/Detail/?Pcr=5942). Accessed in October 2016. Valid until May 2018.
ecoinvent Version 3	Wernet, G., Bauer, C., Steubing, B., Reinhard, J., Moreno-Ruiz, E., and Weidema, B., 2016. The ecoinvent database version 3 (part I): overview and methodology. The International Journal of Life Cycle Assessment, [online] 21(9), pp.1218–1230.

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