ENVIRONMENTAL PRODUCT DECLARATION

THE INTERNATIONAL EPD® SYSTEM

epd-norge.no
The Norwegian EPD Foundation

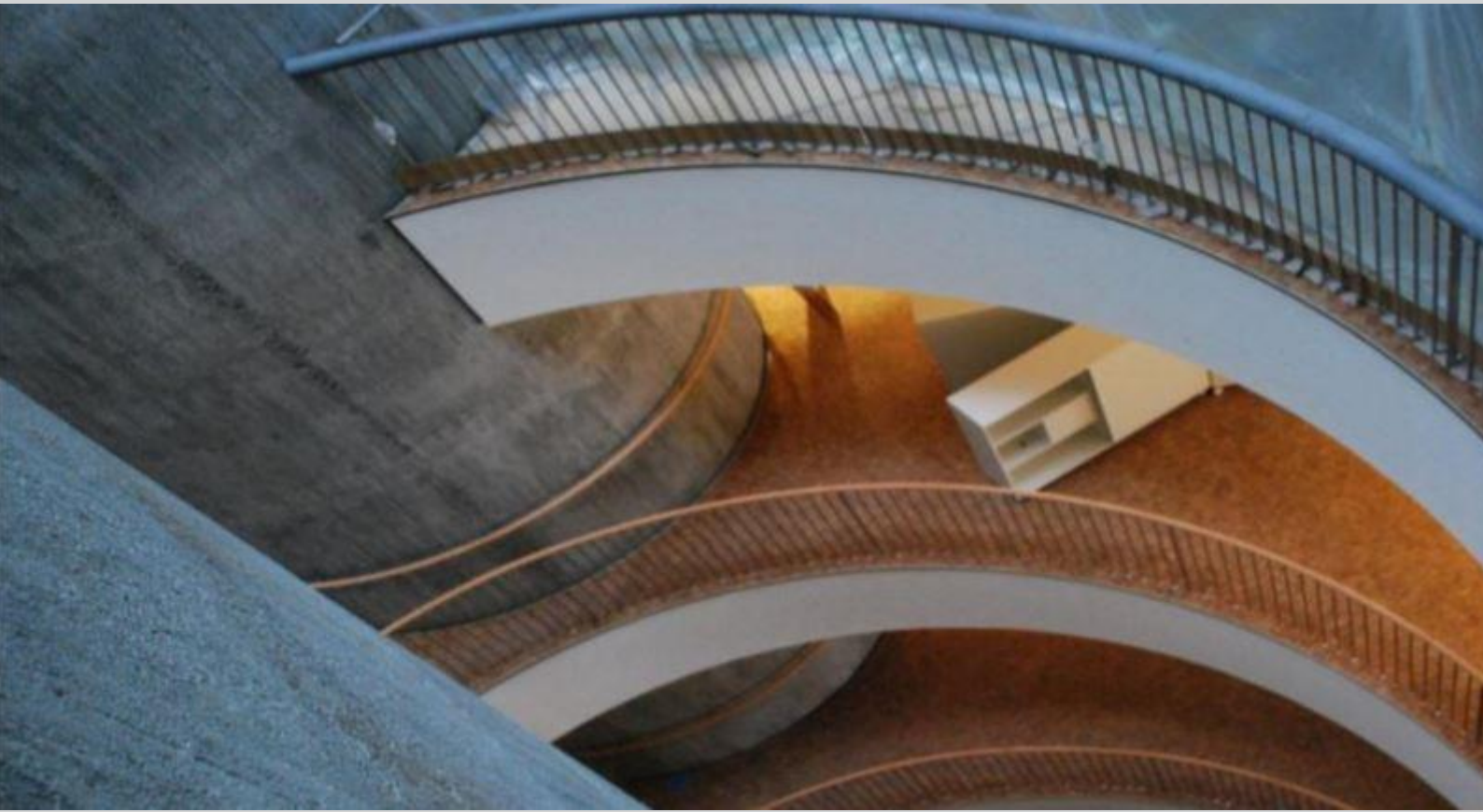
According to ISO 14025 and EN 15804

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-1426-468-EN
Registration number: S-P-01967
Issue date: 2017-10-06
Valid to: 2022-10-06

RAPID® cement

Aalborg Portland A/S



General information

Product:
RAPID® cement
CEM I 52,5 N (LA)

Owner of the declaration:
Aalborg Portland A/S
Contact person: Jesper Sand Damtoft
Phone: +45 99 33 77 34
e-mail: jesper.damtoft@aalborgportland.com

Program operator:
The Norwegian EPD Foundation
Post Box 5250 Majorstuen, 0303 Oslo
Phone: +47 23 08 80 00
e-mail: post@epd-norge.no

Manufacturer:
Aalborg Portland A/S
Rørdalsvej 44, 9220 Aalborg
Phone: +45 98 16 77 77
e-mail: cement@aalborgportland.dk

Declaration number:
NEPD-1426-468-EN

Place of production:
Aalborg, Denmark

ECO Platform reference number:
-

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

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

Organisation no:
CVR 36428112

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.

Issue date:
06.10.2017

Valid to:
06.10.2022

Declared unit:
1000 kg RAPID® cement

Year of study:
2015

Declared unit with option:

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

Functional unit:

The EPD has been worked out by:
Romain Sacchi
Research and Quality Center, Cementir Holding S.p.A
Aalborg, Denmark

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)

Approved

Håkon Hauan
Managing Director of EPD-Norway

Product

Product description:

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

RAPID cement is a grey Portland cement with a strength class of 52.5 MPa. RAPID cement can be used in concrete for all purposes and in all environmental classes.

The RAPID cement is used for ready-mix concrete, but due to a relatively rapid strength development, it can also be used for the production of concrete and concrete products.

Product specification:

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

Materials	kg	%
Chalk	1149	79
Fly ash	164	11
Sand	60	4
Gypsum	53	4
Other primary materials	37	<3
Other secondary materials	<1	<1

Technical data:

1000 kg cement ((CEM I 52,5 N (LA))

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/portlandcementer_sds_gb_12_20_2016_2.1.pdf

LCA: Calculation rules

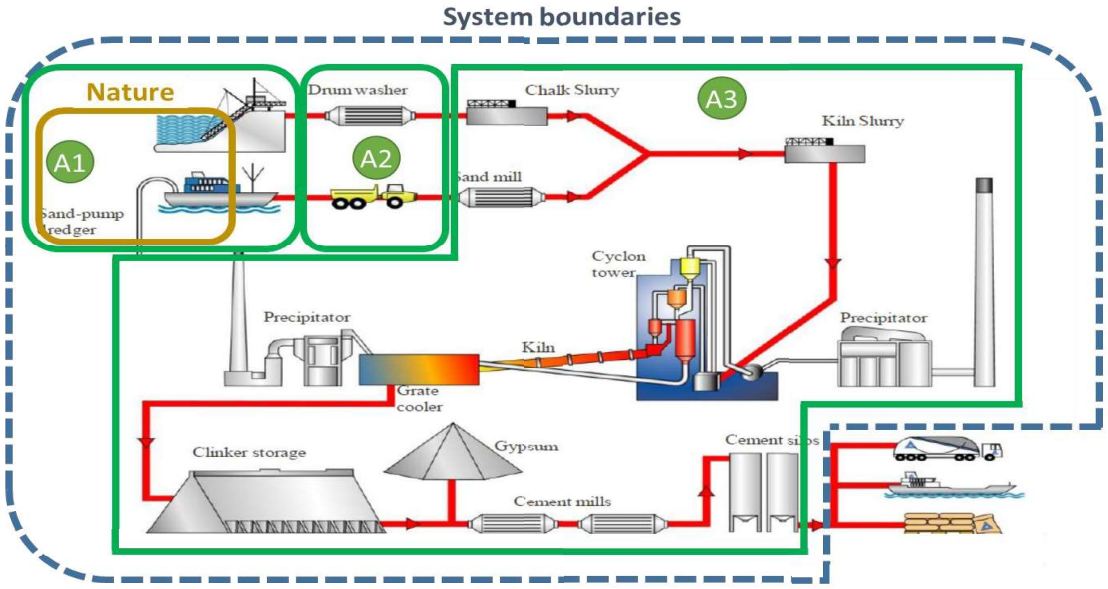
Declared unit:

1000 kg RAPID® 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 environmetal 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			Assemby 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	9.03E+01	1.32E+01	7.56E+02	8.60E+02
ODP	kg CFC11-eqv	1.17E-05	1.87E-07	0.00E+00	1.19E-05
POCP	kg C_2H_4-eqv	1.70E-02	1.02E-02	1.75E-02	4.46E-02
AP	kg SO_2-eqv	3.13E-01	3.31E-01	4.99E-01	1.14E+00
EP	kg PO_4^{3-}-eqv	2.49E-01	2.90E-02	1.26E-01	4.05E-01
ADPM	kg Sb-eqv	1.20E-04	0.00E+00	0.00E+00	1.20E-04
ADPE	MJ	3.47E+03	0.00E+00	0.00E+00	3.47E+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	2.85E+02	0.00E+00	0.00E+00	2.85E+02
RPEM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TPE	MJ	2.85E+02	0.00E+00	0.00E+00	2.85E+02
NRPE	MJ	3.47E+03	0.00E+00	0.00E+00	3.47E+03
NRPM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TRPE	MJ	3.47E+03	0.00E+00	0.00E+00	3.47E+03
SM	kg	2.57E+02	0.00E+00	1.99E+01	2.77E+02
RSF	MJ	4.02E+01	0.00E+00	5.93E+02	6.34E+02
NRSF	MJ	8.07E+00	0.00E+00	7.00E+02	7.08E+02
W	m^3	2.41E+00	0.00E+00	0.00E+00	2.41E+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

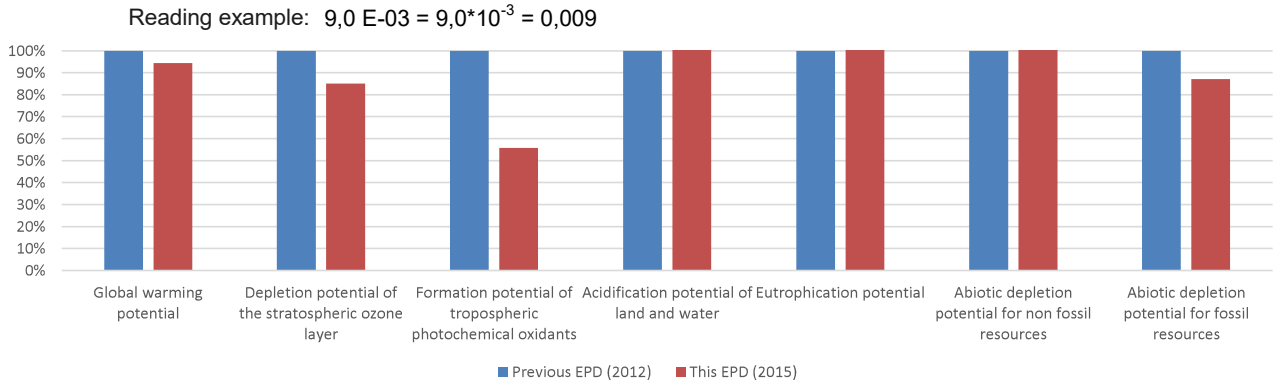
Parameter	Unit	A1	A2	A3	A1- A3
HW	kg	0.00E+00	0.00E+00	2.00E-02	2.00E-02
NHW	kg	0.00E+00	0.00E+00	2.40E+00	2.40E+00
RW	kg	4.24E-08	0.00E+00	0.00E+00	4.24E-08

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



Additional Norwegian requirements

Greenhous 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 woltage (production of transmission lines, in addition to direct emissions and losses in grid) of applied electricity for the manufacturing prosess (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	*Environmental labels and declarations - Type III environmental declarations - Principles and procedures*
ISO 14044:2006	*Environmental management - Life cycle assessment - Requirements and guidelines*
EN 15804:2012+A1:2013	*Sustainability of construction works - Environmental product declaration - Core rules for the product category of construction products*
ISO 21930:2007	*Sustainability in building construction - Environmental declaration of building products*
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.

epd-norge.no The Norwegian EPD Foundation	**Program operator** The Norwegian EPD Foundation Post Box 5250 Majorstuen, 0303 Oslo Norway	Phone: e-mail: web	+47 23 08 82 92 post@epd-norge.no www.epd-norge.no
epd-norge.no The Norwegian EPD Foundation	**Publisher** The Norwegian EPD Foundation Post Box 5250 Majorstuen, 0303 Oslo Norway	Phone: e-mail: web	+47 23 08 82 92 post@epd-norge.no www.epd-norge.no
aalborgportland CEMENTIR HOLDING	**Owner of the declaration** Aalborg Portland A/S Rørdalsvej 44, 9220 Aalborg Denmark	Phone: Fax e-mail: web	+45 99 33 77 34 +45 98 10 11 86 cement@aalborgportland.dk http://www.aalborgportland.dk/
aalborgportland CEMENTIR HOLDING	**Author of the Life Cycle Assessment** Romain Sacchi Research and Quality Center, Cement Holding S.p.A Sølystvej 18, 9220 Aalborg, Denmark	Phone: Fax e-mail: web	+45 91 93 40 83 romain.sacchi@aalborgportland.com http://www.aalborgportland.dk/