ENVIRONMENTAL PRODUCT DECLARATION

as per /ISO 14025/ and /EN 15804/

Owner of the Declaration	**Cementa AB, HeidelbergCement Group**
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
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Portland Limestone Cement CEM II/A-LL 42.5 R

Cementa AB, HeidelbergCement Group

Institut Bauen und Umwelt e.V.

www.ibu-epd.com / https://epd-online.com

General Information

Cementa AB, HeidelbergCement Group

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Declaration number
EPD-HCG-20190045-CAA1-EN

This declaration is based on the product category rules:
Cement, 07.2014
(PCR checked and approved by the SVR)

Issue date
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Valid to
05/05/2024

Prof. Dr.-Ing. Horst J. Bossenmayer
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Dr. Alexander Röder
(Head of Board IBU)

CEM II/A-LL 42.5 R

Owner of the declaration
Cementa AB
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SE-100 74 Stockholm

Declared product / declared unit
1 metric t of CEM II/A-LL 42.5 R

Scope:
This Environmental Product Declaration (EPD) covers the product life cycle stages A1-A3. It is valid for CEM II/A-LL 42.5 R bulk Portland limestone cement, manufactured by Cementa AB in the plant Skövde, Sweden, in 2017. This analysis relies on transparent, plausible and documented basis data. All the model assumptions, which influence the results, are declared. The life cycle assessment is representative for the products introduced in the declaration for the given system boundaries.

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

Verification

The standard /EN 15804/ serves as the core PCR
Independent verification of the declaration and data according to /ISO 14025:2010/
☐ internally ☒ externally

Dr. Eva Schmincke
(Independent verifier appointed by SVR)

Product

Product description / Product definition
Cement is a hydraulic binder. It consists of finely ground, non-metallic inorganic compounds. Cement is produced by grinding cement clinker and other main or minor constituents. When water is added to cement, a cement paste is formed, which sets and hardens by means of hydration reactions. After hardening, it retains its strength and stability even under water. The declared product is a cement conforming with the composition of Portland limestone cement CEM II/A-LL 42.5 R manufactured by Cementa in the plant Skövde in 2017. The calculation is based on plant-specific data. The considered cement belongs to the main cement type CEM II/A-LL in accordance with /EN 197-1/.

For the placing on the market of the product in the European Union/European Free Trade Association EU/EFTA (with the exception of Switzerland) Regulation /(EU) No. 305/2011 (CPR)/[BS1] applies. The product needs a Declaration of Performance taking into consideration /EN 197-1/ and the CE-marking. For the application and use the respective national provisions apply.

Application
The application of cement has a large variety. It is mainly used as binder for concrete and mortar. The application in concrete is regulated in /EN 206/. According to this standard, general suitability is established for cement conforming to /EN 197-1/.

Technical Data
The declared cement corresponds to the 42.5 standard compressive strength class with high early strength development (R) in accordance with /EN 197-1/.

Constructional data

Name	Value	Unit
Strength class acc. to /EN 197-1/	42.5	N/mm²

Performance data of the product in accordance with the Declaration of Performance with respect to its Essential Characteristics according to /EN 197-1/.

Base materials / Ancillary materials
Clinker: 80 - 94 %
Cement clinker is made of a raw material mixture that is added to the cement kiln and sintered at a temperature of 1400 °C. The basic materials for the production of cement clinker consist of calcium oxide (CaO), silicon dioxide (SiO2) and small amounts of aluminum oxide (Al2O3) and iron oxide (Fe2O3). Raw materials that provide these constituents are limestone, chalk and clay or limestone marl as its natural occurring mixture.

Limestone: 6 - 20 %

Gypsum/Anhydrite/Residual gypsum: 0 - 5 %
Gypsum and anhydrite are added as setting regulators to cement. Many cement plants use residual gypsum from flue gas desulfurization as well.

No substances according to the /Candidate List of Substances of Very High Concern for Authorisation/ are used in cement.

Reference service life
This study covers the production stage information (from A1 to A3) of the product. As no use stage is declared, the reference service life for cement is irrelevant.

LCA: Calculation rules

Declared Unit
The declared unit is 1 metric t of CEM II/A-LL 42.5 R.

Declared unit

Name	Value	Unit
Declared unit	1	t
Conversion factor to 1 kg	0.001	-

System boundary
Type of EPD: cradle-to-gate

For the modeling of cement both specific production data from HeidelbergCement and background data (especially for upstream processes) have been used. For life cycle modeling of the considered product, the verified World Business Council for Sustainable Development-Cement Sustainability Initiative /WBCSD-CSI/ online tool for EPDs of concrete and cement is used. The tool was developed by Quantis and is owned by the Cement Sustainability Initiative (CSI) of the World Business Council for Sustainable Development. The life cycle assessment in the tool has been implemented in compliance with /EN 15804/, the General Programme Instructions (GPI 2.5) for the International EPD® System, the product category rules /UN CPC 375 Concrete/ and /UN CPC 3744 Cement/.

A significant factor regarding primary data collection is the emission measurement directly at plant. In line with the official regulations, regular data collections are established at HeidelbergCement group. The emission data of the clinker burning process are included in this LCA study. Preferably directly measured kiln emission values in the specific plant are considered. Noise, landscape impact, vibration etc. are not within the scope of this study. In case that specific kiln emission data are not available, default values are automatically used by the /WBCSD-CSI/ tool.

The selected system boundaries comprise the production of cement including raw material extraction up to the finished product at the factory gate.

The product stage contains:
Module A1: Extraction and processing of raw materials.
Module A2: Transport of raw materials to the factory gate and internal transport.
Module A3: Cement production.
The construction stage, the use stage and the disposal stage are not included in the life cycle assessment of cement.

Comparability
Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to /EN 15804/ and the building context, respectively the product-specific characteristics of performance, are taken into account.

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LCA: Scenarios and additional technical information

The development of scenarios has to be made on the finished product (e.g. concrete) and not on the upstream product cement.

LCA: Results

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE NOT DECLARED)

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	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	MNR	MNR	MNR	MND	MND	MND	MND	MND	MND	MND

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: 1 metric t CEM II/A-LL 42.5 R

Parameter	Unit	A1-A3
Global warming potential	[kg CO_2-Eq.]	7.59E+2
Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	1.36E-5
Acidification potential of land and water	[kg SO_2-Eq.]	6.23E-1
Eutrophication potential	[kg $(PO_4)^{3-}$-Eq.]	2.33E-1
Formation potential of tropospheric ozone photochemical oxidants	[kg ethene-Eq.]	8.22E-2
Abiotic depletion potential for non-fossil resources	[kg Sb-Eq.]	1.07E-4
Abiotic depletion potential for fossil resources	[MJ]	1.54E+3

RESULTS OF THE LCA - RESOURCE USE: 1 metric t CEM II/A-LL 42.5 R

Parameter	Unit	A1-A3
Renewable primary energy as energy carrier	[MJ]	3.76E+2
Renewable primary energy resources as material utilization	[MJ]	0.00E+0
Total use of renewable primary energy resources	[MJ]	3.76E+2
Non-renewable primary energy as energy carrier	[MJ]	2.13E+3
Non-renewable primary energy as material utilization	[MJ]	0.00E+0
Total use of non-renewable primary energy resources	[MJ]	2.13E+3
Use of secondary material	[kg]	1.48E+1
Use of renewable secondary fuels	[MJ]	5.05E+2
Use of non-renewable secondary fuels	[MJ]	7.31E+2
Use of net fresh water	[m^3]	4.95E+0

RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: 1 metric t CEM II/A-LL 42.5 R

Parameter	Unit	A1-A3
Hazardous waste disposed	[kg]	2.22E-2
Non-hazardous waste disposed	[kg]	1.31E-1
Radioactive waste disposed	[kg]	0.00E+0
Components for re-use	[kg]	0.00E+0
Materials for recycling	[kg]	8.21E-4
Materials for energy recovery	[kg]	0.00E+0
Exported electrical energy	[MJ]	0.00E+0
Exported thermal energy	[MJ]	0.00E+0

Remark to Global warming potential:
This includes 55.3 kg CO2-eq. from the incineration of wastes in clinker production. According to the polluter-pays-principle /EN 15804/ that would be assigned to the production system, which has caused the waste. In this EPD the CO_2 contribution is not subtracted. This is to ensure comparability across countries of calculated global warming potentials for cements even if the used secondary fuels in other countries do not have waste status.

Remark to Waste categories:
The waste indicators account for wastes from clinker and cement manufacturing only.

References

/IBU 2016/
IBU (2016): General Programme Instructions for the Preparation of EPDs at the Institut Bauen und Umwelt e.V., Version 1.1 Institut Bauen und Umwelt e.V., Berlin.
www.ibu-epd.de

/ISO 14025/
DIN EN /ISO 14025:2011-10/, Environmental labels and declarations — Type III environmental declarations — Principles and procedures

/EN 15804/
/EN 15804:2012-04+A1 2013/, Sustainability of construction works — Environmental Product

Declarations — Core rules for the product category of construction products

/EN 197-1:2011/
Cement - part 1: Composition specification and conformity criteria for common cements

/EN 206:2013/
Concrete: Specification, performance, production and conformity

/General principles/
for the EPD range of Institut Bauen und Umwelt e.V. (IBU), 2013-04
www.ibu-epd.com

/WBCSD-CSI/
Cement Sustainability Initiative (CSI) of World Business Council for Sustainable Development
http://www.wbcsdcement.org/

/PCR 2012:01/
Product Category Rules according to ISO 14025: Construction products and construction services, version 2.01, 2012:01
http://environdec.com/en/PCR/Detail/?Pcr=8098

/UN CPC 3744 Cement/
Product Category Rules for Cement, 2010,
http://environdec.com/en/PCR/Detail/pcr2010-09

/UN CPC 375 Concrete/
Product Category Rules for Unreinforced Concrete, WBCSD Cement Sustainability Initiative, 2013
http://environdec.com/en/PCR/Detail/pcr2013-02

/Candidate List of Substances of Very High Concern for Authorisation/
European Chemical Agency, 2014
www.echa.europa.eu/web/guest/candidate-list-table

/(EU) No. 305/2011 (CPR)/
Regulation (EU) No 305/2011 of the European Paliament and of the council of 9 March 2011 laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/EEC

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