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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Microfine 20
Portland Fly Ash Cement CEM II/A-V 52.5 N
Cementa AB, HeidelbergCement Group

Institut Bauen und Umwelt e.V.

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

General Information

Cementa AB, HeidelbergCement Group

Programme holder
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Declaration number
EPD-HCG-20160237-CAD1-EN

This Declaration is based on the Product Category Rules:
Cement, 07.2014
(PCR tested and approved by the SVR)

Issue date
2016-12-16

Valid to
2021-12-15

Prof. Dr.-Ing. Horst J. Bossenmayer
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Microfine 20

Owner of the Declaration
Cementa AB
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Declared product / Declared unit
1 metric t of CEM II/A-V 52.5 N (Microfine 20)

Scope:
This Environmental Product Declaration (EPD) covers the product life cycle stages A1-A3. It is valid for Microfine 20 bulk cement, manufactured by Cementa AB, Sweden in 2015. It is based on CEM II/A-V 52.5 N (Bascement) produced at the plant Slite and further ground at the plant Degerhamn. 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 CEN Norm /EN 15804/ serves as the core PCR
Independent verification of the declaration according to /ISO 14025/
☐ 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 Microfine 20 is a micro cement. It is produced by grinding /EN 197-1/-compliant CEM II/A-V 52.5 N (Bascement) in mills specially developed for Utrafine cement.

The calculation is based on plant-specific data of 2015.

For the use and application of the product the respective national provisions at the place of use apply.

Application
Microfine 20 is a micro cement with excellent penetration characteristics ideal for extremely demanding injections in rock and soil applications. The unique combination of the special grinding process and the selected clinker produce a cement with an excellent penetration capacity, that makes it ideal to meet the requirements for demanding injections. Microfine 20 is chromate reduced.

Technical Data
Microfine 20 is a very fine microcement. A common cement type that complies with /EN 197-1/ is used as input material for Microfine 20 manufacturing.

Microcements should only be used in conjunction with related admixtures which are used as a setting regulator suitable for injection applications. These admixtures are tailored for initially accelerating the setting reactions and simultaneously controlling the time span to the final set. In terms of facilitating the filling of fine cracks, the "fineness" of the microcement is of primary interest as compared to setting time and rheology.

Performance data of the product with respect to its characteristics in accordance with the relevant technical provision ((No CE-marking)).

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 (SiO_2) and small amounts of aluminum oxide (Al_2O_3) and iron oxide (Fe_2O_3). Raw materials that provide these constituents are limestone, chalk and clay or limestone marl as its natural occurring mixture.

Fly ash: 6 - 20 %
Fly ash is a by-product of coal-fired power generation. It is obtained by electrostatic or mechanical precipitation of dust-like particles from the flue gases. Fly ash V is siliceous in nature having pozzolanic properties. It mainly consists of reactive silicon dioxide (SiO_2≥ 25 % by mass) and aluminium oxide (Al_2O_3). Minor constituents are iron oxide (Fe_2O_3), calcium oxide (CaO) and other compounds. The CaO content is restricted according to /EN 197-1/.

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 Multicem.

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 /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. The used background database has to be mentioned.

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	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: 1 metric t Microfine 20

Parameter	Unit	A1-A3
Global warming potential	[kg CO_2-Eq.]	7.48E+2
Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	1.64E-5
Acidification potential of land and water	[kg SO_2-Eq.]	9.42E-1
Eutrophication potential	[kg $(PO_4)^{3-}$-Eq.]	3.39E-1
Formation potential of tropospheric ozone photochemical oxidants	[kg ethene-Eq.]	1.17E-1
Abiotic depletion potential for non-fossil resources	[kg Sb-Eq.]	1.99E-4
Abiotic depletion potential for fossil resources	[MJ]	3.43E+3

RESULTS OF THE LCA - RESOURCE USE: 1 metric t Microfine 20

Parameter	Unit	A1-A3
Renewable primary energy as energy carrier	[MJ]	8.97E+2
Renewable primary energy resources as material utilization	[MJ]	0.00E+0
Total use of renewable primary energy resources	[MJ]	8.97E+2
Non-renewable primary energy as energy carrier	[MJ]	4.78E+3
Non-renewable primary energy as material utilization	[MJ]	0.00E+0
Total use of non-renewable primary energy resources	[MJ]	4.78E+3
Use of secondary material	[kg]	1.60E+2
Use of renewable secondary fuels	[MJ]	6.01E+2
Use of non-renewable secondary fuels	[MJ]	8.65E+2
Use of net fresh water	[m^3]	2.45E+0

RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: 1 metric t Microfine 20

Parameter	Unit	A1-A3
Hazardous waste disposed	[kg]	0.00E+0
Non-hazardous waste disposed	[kg]	0.00E+0
Radioactive waste disposed	[kg]	0.00E+0
Components for re-use	[kg]	0.00E+0
Materials for recycling	[kg]	0.00E+0
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 106.0 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 CO2 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

Institut Bauen und Umwelt
Institut Bauen und Umwelt e.V., Berlin(pub.): Generation of Environmental Product Declarations (EPDs);
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

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