

ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804

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Çimsa REFRO40® - Calcium Aluminate Cement
Çimsa Çimento San. ve Tic. A.Ş.



General Information

Çimsa Çimento Sanayi ve Ticaret A.Ş

Programme holder

IBU - Institut Bauen und Umwelt e.V.
Panoramastr. 1
10178 Berlin
Germany

Declaration number

EPD-CIS-20160031-CAA1-EN

This Declaration is based on the Product Category Rules:

Cement, 07.2014
(PCR tested and approved by the SVR)

Issue date

03/11/2015

Valid to

02/11/2020



Prof. Dr.-Ing. Horst J. Bossenmayer
(President of Institut Bauen und Umwelt e.V.)



Dr. Burkhard Lehmann
(Managing Director IBU)

Çimsa REFRO40® - Calcium Aluminate Cement

Owner of the Declaration

Çimsa Çimento San. ve Tic. A.Ş.
Toroşlar Mah. Tekke Cad. Yenitaşkent Mersin - Turkey

Declared product / Declared unit

Çimsa REFRO40® Calcium Aluminate Cement / 1 t

Scope:

Within this study a life cycle analysis according to ISO 14040/44 is performed for Çimsa REFRO40® - Calcium Aluminate Cement produced by Çimsa Çimento San. ve Tic. A.Ş. at the production plant located in Mersin. 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 life cycle assessment covers the manufacturing of the products from cradle to gate. 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



Manfred Russ
(Independent verifier appointed by SVR)

Product

Product description

The declared product is Çimsa REFRO40 - Calcium Aluminate Cement (REFRO40) manufactured in accordance with /EN14647/. REFRO40 is defined under the special cement class. Calcium aluminate cement is composed of hydraulic calcium aluminates as main constituent.

Cement is the adhesive or glue which, when sets, binds particles of fine aggregate together to produce mortar. When mixed with water the cement forms a paste called the fine matrix. Cements are hydraulic materials, this means that they depend upon a reaction with water rather than air for strengthening. When water is added to cement a chemical reaction called hydration commences immediately. The reaction continues while water is still present. After hardening, it retains its strength and stability even under water.

Application

The main uses of REFRO40 are for the manufacturing of building chemicals, refractory and precast products. It offers high early strength and controllable setting time which are important features for building

chemicals producers. Another important use is inner plating of sewage pipes in the precast form where resistance to acid and sulphate attacks is paramount. Due to its high alumina content, REFRO40 can resist up to 1300 °C. Therefore, it presents an economic and viable solution for the industrial floorings that requires high temperatures.

Technical Data

REFRO40 is a calcium aluminate cement which is classified under the special cements. With its 6 and 24 hours of high strength values, it has the strength that is much higher than the Portland Cement in accordance with /EN 197-1/.

Constructional data

Name	Value	Unit
6 Hours of Compressive Strength acc. to DIN EN 197-1	43.0	MPa
24 Hours of Compressive Strength acc. to DIN EN 197-1	70.0	MPa

Base materials / Ancillary materials

Clinker: 100 %
Cement clinker is made of a raw material mixture that is added to the cement kiln and sintered at a temperature of 1700 °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 and bauxite as its natural occurring mixture.

Reference service life

The present study covers the manufacturing (A1-A3) stage information 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 t of Çimsa REFRO40® - Calcium Aluminate Cement.

Declared unit

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

System boundary

Type of EPD: cradle to gate

The system boundary includes the production of Çimsa REFRO40® Calcium Aluminate Cement from extraction of raw material to the production of finished packaged product at the factory gate (cradle to gate).

In this study, the product stage information modules A1, A2 and A3 are considered. These modules include

raw material extraction and processing (A1), transport of the raw materials to the manufacturer (A2), manufacturing of the product which includes raw material mixing and grinding, preheating, firing and cement grinding (A3), energy and water consumption, waste management, air and water emissions from processing and energy combustion (A3), and the packaging of the product for final delivery (A3).

The construction stage, the use stage and the disposal stage are not included in the life cycle assessment of REFRO40.

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.

LCA: Scenarios and additional technical information

As this EPD focuses on the upstream and manufacturing stage only (modules A1-A3), it was not necessary to develop product level scenarios. No information on modules A4, B1-B7, C1-C4 & D is provided in this section of the EPD.

To improve the data quality, where relevant, Ecoinvent specific datasets were modified by Metsims to Turkish conditions based on the latest energy mix.

LCA: Results

The table below give the LCA results for environmental impacts, resource use as well as output flows & wastes categories for the modules that are declared in this study.

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: REFRO40 / 1 t

Parameter	Unit	A1-A3
Global warming potential	[kg CO ₂ -Eq.]	1.13E+3
Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	1.29E-4
Acidification potential of land and water	[kg SO ₂ -Eq.]	5.80E+0
Eutrophication potential	[kg (PO ₄) ³ -Eq.]	1.06E+0
Formation potential of tropospheric ozone photochemical oxidants	[kg ethene-Eq.]	2.40E-1
Abiotic depletion potential for non-fossil resources	[kg Sb-Eq.]	1.91E-4
Abiotic depletion potential for fossil resources	[MJ]	1.23E+4

RESULTS OF THE LCA - RESOURCE USE: REFRO40 / 1 t

Parameter	Unit	A1-A3
Renewable primary energy as energy carrier	[MJ]	6.04E+2
Renewable primary energy resources as material utilization	[MJ]	0.00E+0
Total use of renewable primary energy resources	[MJ]	6.04E+2
Non-renewable primary energy as energy carrier	[MJ]	1.23E+4
Non-renewable primary energy as material utilization	[MJ]	0.00E+0
Total use of non-renewable primary energy resources	[MJ]	1.23E+4
Use of secondary material	[kg]	0.00E+0
Use of renewable secondary fuels	[MJ]	0.00E+0
Use of non-renewable secondary fuels	[MJ]	0.00E+0
Use of net fresh water	[m ³]	7.82E-1

RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: REFRO40 / 1 t

Parameter	Unit	A1-A3
Hazardous waste disposed	[kg]	7.14E-5
Non-hazardous waste disposed	[kg]	1.00E-2
Radioactive waste disposed	[kg]	-
Components for re-use	[kg]	-
Materials for recycling	[kg]	-
Materials for energy recovery	[kg]	-
Exported electrical energy	[MJ]	-
Exported thermal energy	[MJ]	-

Note1: The total use of net fresh water including upstream processes is 2.25m³. Due to question on data quality from upstream processes, only manufacturing fresh water use is given. The total is provided for full transparency.
 Note2: Waste flows represents only manufacturing data due to no reliable data from upstream processes(A1&A2).

References

ISO 14040/44

DIN EN ISO 14040:2006-10, Environmental management - Life cycle assessment - Principles and framework (ISO 14040:2006) and Requirements and guidelines (ISO 14044:2006)

EN 197-1:2011

Cement - part 1: Composition specification and conformity criteria for common cements

EN 14647:2010

Calcium aluminat cement. Composition, specifications and conformity criteria

Institut Bauen und Umwelt

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

General principles

for the EPD range of Institut Bauen und Umwelt e.V. (IBU), 2013/04
www.bau-umwelt.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

PCR Part A

Institut Bauen und Umwelt e.V., Berlin (pub.): Product Category Rules for Construction Products from the range of Environmental Product Declarations of Institut Bauen und Umwelt (IBU), Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Background Report. April 2013 www.bau-umwelt.de

PCR Part B

Institut Bauen und Umwelt e.V., Berlin (pub.): PCR Guidance-Texts for Building-Related Products and Services From the range of Environmental Product Declarations of Institute Construction and Environment e.V. (IBU), Part B: Requirements on the EPD for Cement. July 2014 www.bau-umwelt.de

**Publisher**

Institut Bauen und Umwelt e.V.
Panoramastr. 1
10178 Berlin
Germany

Tel +49 (0)30 3087748- 0
Fax +49 (0)30 3087748- 29
Mail info@bau-umwelt.com
Web www.bau-umwelt.com

**Programme holder**

Institut Bauen und Umwelt e.V.
Panoramastr 1
10178 Berlin
Germany

Tel +49 (0)30 - 3087748- 0
Fax +49 (0)30 – 3087748 - 29
Mail info@bau-umwelt.com
Web www.bau-umwelt.com

**Author of the Life Cycle Assessment**

Metsims Sustainability Consulting
Elmas Studio Levent, Sanayi Mah.,
Sultan Selim Cad. Lalegöl Sok. No: 7
D: 18
34415 Istanbul
Turkey

Tel +90 212 281 1333
Fax -
Mail infoTR@metsims.com
Web www.metsims.com

**Owner of the Declaration**

Çimsa Çimento Sanayi ve Ticaret A.S
Toroslur Mah. Tekke Cad. Yenitaskent
-
33260 Mersin
Turkey

Tel +90 324 454 0060
Fax +90 324 454 0075
Mail customer@cimsa.com.tr
Web www.cimsa.com.tr