

EPD – Environmental Product Declaration

FCK 30 MPA BR.1 ABAT 10+-2 BY VOTORANTIM CIMENTOS

Registration number: S-P-00896

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CONCRETE

EPD®



CONCRETE FCK 30 MPA BR.1 10+-2

1. COMPANY

Votorantim Cimentos is the market leader in cement in Brazil and the eighth largest global producer in terms of installed capacity, according to the Global Cement Report 2013 data. The company is part of the Votorantim Group and is present in 14 countries through the South America, North America, Europe, Asia and Africa. It is a large industry that produces cement, concrete, aggregates and complementary products such as mortar and lime.

Engemix, our concrete business, is one of the biggest names in the segment in Brazil; we are present in the country's main projects. Standing out in the fabrication of dosed concrete in central and operating with our centrals spread across the country, offering the best solutions, products and services.

Votorantim Cimentos has 23 units certified in ISO 9001 (Quality Management System), 10 units certified in ISO 14001 (Environmental Management System), 6 units certified in OHSAS 18001 (Occupational Health and Safety), 1 unit certified in ISO 50001 (Energy Management), 1 unit certified in SA 8000 (Social Accountability), and other certifications such: Greenguard, ECO and Energy Star (Votorantim Cimentos Integrated Report, 2012).

The company is in constant development in order to guarantee the sustainable practices (one of the 4 pillars of the Votorantim Cimentos) and has a commitment to certify, in ISO 14001, 100% of its units by 2020.

2. PRODUCT

The concrete FCK 30 MPA BR.1 ABAT 10+-2 is used for works subject to aggressive and humid environments and marine works. It is recommended for plain concrete, reinforced or machined, concrete structures in general, foundations, piles, underground galleries, cement mortar and coating, lean concrete for passenger and coating.

It can be integrated in the following products:

- Reinforced mortar
- Coating and bricklaying mortar
- Mortars and concrete to aggressive environments (such as seawater and sewage)
- Mortar for the laying of tiles
- Reinforced concrete with structural function

2.1. FUNCTIONAL UNIT AND STUDIED SYSTEM

The life cycle assessment is based on the WBCSD-CSI Tool for concrete and cement EPDs, version 1.4, dated 08/11/2017 (thereafter referred to as "the tool"), verified as compliant in accordance with the PCRs (PCR 2012:01 Construction products and Construction services v.2.2, PCR 2013:02 Concrete v.1.02, PCR 2010:09 Cement v.2.1., hereafter the PCR) and the General Programme Instructions (GPI 2.5) for the International EPD® System. This tool may be accessed at the following address: <https://concrete-epd-tool.org/>.

The functional unit is 1 cubic meter of concrete, defined in accordance with the tool. The Reference Service Life (RSL) is not specified.

The following figure shows the studied system, split between 3 categories: A1 raw material supply, A2 transport and A3 core processes.

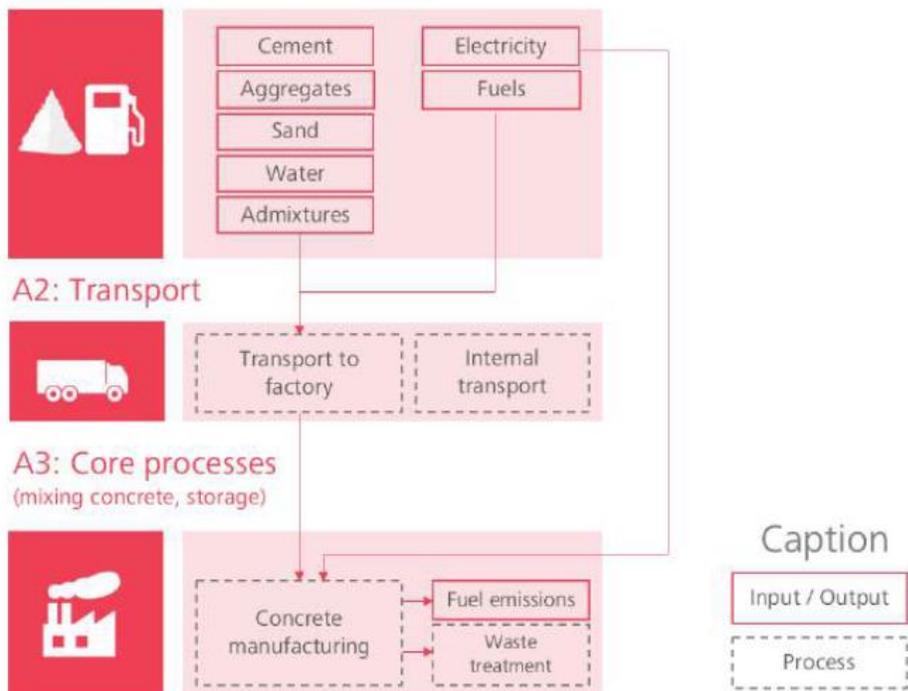


2.2. LIFE CYCLE STAGES

SYSTEM BOUNDARIES

The system boundaries are presented in the following figure.

A1: Raw material supply



UPSTREAM PROCESSES: RAW MATERIAL ACQUISITION AND REFINEMENT

Cement, aggregates (sand and gravel), and additives are produced on other sites and then transported

CORE PROCESSES: CONCRETE PRODUCTION



Input 1

The concrete is produced by mixing cement, aggregates (sand and gravel), water and additives - the most used is a plasticizer that, besides giving plasticity to the mixture, delays the onset of the concrete handhold, allowing their delivery within two hours and a half. The receipt of the materials that compound the concrete is carried out in the central ordinance by a person who is trained in the company's procedures. The material is checked and only then discharged to respective storage sites. The incoming materials are tested in the Quality Control Laboratory, according to the technical standards and operational procedures of the company.

Aggregates storage and transport to the hopper 2

The raw materials, sand, gravel and rubber are stocked in aggregate bays, and then the wheel loader carries the aggregate to the hopper, which supplies the aggregate cash. All the raw materials have their own box, and an automated system alerts when one of the boxes has low inventory and needs to be replenished.

Loading station 3

The materials that compound the concrete are separated and weighed in the aggregate box and transported by conveyor to the loading station, which are inserted into the concrete mixer. The water and the additive are also added, as well as cement that falling from the silos that are located just above. This entire process is automated and controlled by the control room. After this, the concrete is mixed for about ten minutes.

Output 4

With the concrete mixed and ready to be delivered, the mixer goes to the concierge where it is placed the seal – guarantee for the costumer that the truck left the central and reached the delivery place without being misplaced and be given the invoice correctly.

3. CONTENT DECLARATION

COMPONENT	CAS NUMBER	CONCENTRATION RANGE
Portland Cement	65997-15-1	9% - 14%
Natural Aggregate	Mixture	43% - 49%
Sand	99439-28-8	32% - 38%
Polyfunctional Admixture	Mixture	0.05% - 0.15%
Water	7732-18-5	5% - 10%

4. ENVIRONMENTAL PERFORMANCE-RELATED INFORMATION

The cradle-to-gate life cycle stages are broken down into 3 life cycle stages using terminology from EN 15804:

- A1: raw material extraction and processing, processing of secondary material input
- A2: transport to the manufacturer
- A3: manufacturing, including impacts from direct energy generation and waste disposal

This environmental performance-related information is representative of concrete production in 2016 calculated with the WBCSD-CSI Tool for concrete and cement EPDs. Additional information on the impact calculation are available in the tool documentation (WBCSD CSI 2015).

In agreement with the PCR, the environmental impact indicators are calculated using characterization factors from the latest CML baseline indicators from the Institute of Environmental Sciences, Faculty of Science, University of Leiden, Netherlands (CML 2001 v4.21). CEN standard EN 15804 served as the core PCR.

EPDs of construction products may not be comparable if they do not comply with the requirements of comparability set in EN 15804.

4.1. USE OF RESOURCES

RESOURCE USE	Total (A1-A3)	UNIT
Renewable primary energy used as energy resource	2.02E+02	MJ
Renewable primary energy used as raw materials	0.00E+00	MJ
Total renewable primary energy	2.02E+02	MJ
Non-renewable primary energy used as energy resource	1.41E+03	MJ
Non-renewable primary energy used as raw materials	0.00E+00	MJ
Total non-renewable primary energy	1.41E+03	MJ
Secondary material	5.20E+01	kg
Renewable secondary fuels	0.00E+00	MJ
Non-renewable secondary fuels	0.00E+00	MJ
Net fresh water	6.05E+00	m ³

4.2. POTENTIAL ENVIRONMENTAL IMPACTS

ENVIRONMENTAL IMPACTS	Total (A1-A3)	UNIT
Global warming potential, GWP (100 years)	2.67E+02	kg CO ₂ -eq.
Depletion potential of the stratospheric ozone layer, ODP	1.54E-05	kg CFC 11-eq.
Acidification potential of soil and water, AP	7.16E-01	kg SO ₂ -eq.
Eutrophication potential, EP	1.33E-01	kg PO ₄ ³⁻ -eq.
Formation potential of tropospheric ozone, POCP	3.58E-02	kg C ₂ H ₄ -eq
Abiotic depletion potential for non-fossil resources, ADP-elements	3.23E-04	kg Sb-eq.
Abiotic depletion potential for fossil resources, ADP-fossil fuels	1.37E+03	MJ

4.3. WASTE PRODUCTION

WASTE*	Total (A1-A3)	UNIT
Hazardous waste disposed	0.00E+00	kg
Non-hazardous waste disposed	1.10E-02	kg
Radioactive waste disposed	0.00E+00	kg

*The contribution of activities situated upstream of the clinker manufacturing are not included in the results.

4.4. OTHER ENVIRONMENTAL INDICATORS

OUTPUT FLOWS	Total (A1-A3)	UNIT
Components for re-use	0.00E+00	kg
Materials for recycling	2.48E-01	kg
Materials for energy recovery	0.00E+00	kg
Exported energy	0.00E+00	MJ

5. ADDITIONAL INFORMATION

The production of FCK 30 MPA BR.1 ABAT 10+-2 is in line with Votorantim Cimentos vision, which includes Customer Focus, Empowered People, Best in Class Operations and Sustainable Practices. We believe that cement production must use clean technologies that constantly improve natural resource allocation, reduce emissions and waste. The company invests in R&D to develop new technologies and improve existing ones to promote eco-efficiency in its processes and products. Moreover, we are committed to protecting water sources and biodiversity, through the management of protected areas in the vicinity of our units.

6. PROGRAMME-RELATED INFORMATION

PROGRAMME:	THE INTERNATIONAL EPD® SYSTEM EPD INTERNATIONAL AB BOX 210 60 SE-100 31 STOCKHOLM SWEDEN WWW.ENVIRONDEC.COM
EPD registration number:	S-P-00896
Published:	2016-06-20
Valid until:	2021-06-20
Revision date:	2017-12-21
Product Category Rules:	PCR 2013:02 Concrete v.1.02
Product group classification:	UN CPC 375 CONCRETE
Reference year for data:	2016
Geographical scope:	Brazil

PRODUCT CATEGORY RULES (PCR): PCR 2013:02 CONCRETE V.1.02

PCR review was conducted by:

The Technical Committee of the International EPD® System. Chair: Massimo Marino Contact via info@environdec.com.

Independent verification of the declaration and data, according to ISO 14025:2006:

EPD Process Certification (internal)

EPD Verification (external)

Third party verifier:

Maurizio Fieschi, fieschi@studiofieschi.it, www.studiofieschi.it

Accredited by:

The International EPD® System

See PCR for detailed requirements.

6.1. MANDATORY STATEMENTS

EPDs within the same product category but from different programmes may not be comparable.

6.2. CONTACT INFORMATION

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PROGRAMME OPERATOR:



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7. REFERENCES

General Programme Instructions of the International EPD[®] System. Version 2.5.

PCR 2013:02. Concrete v.1.02

WBCSD-CSI (2015) WBCSD-CSI tool for EPDs of concrete and cement: LCA core model and database report v1.4

VOTORANTIM CIMENTOS. Integrated Report 2012. Published in October 2013. São Paulo.

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For us, sustainability means achieving our growth ambitions, in the following way: taking the present and future needs of society into account; offering eco-efficient and innovative building materials, and services, to our customers; acting in an ethical, transparent manner and in accordance with the laws and regulations; providing a motivating, healthy and safe work environment for our employees and contract staff; supporting our local communities and encouraging their progress.