INTERBETON
A TITAN GROUP COMPANY

Environmental Product Declaration

EPD®

THE INTERNATIONAL EPD® SYSTEM

for Ready Mixed Concrete C30/37-SR & C35/45-SR

Programme The International EPD® System
Programme operator: EPD International AB
EPD registration number: S-P-08336
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in accordance with ISO14025 and EN 15804:2012+A2:2019

ECO PLATFORM EPD VERIFIED


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General information

Programme	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	www.environdec.com
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CEN standard EN 15804 serves as the Core Product Category Rules (PCR)	
Product Category Rules (PCR)	PCR 2019:14 Construction products (EN 15804:A2); Version 1.11; 2021-02-05 c-PCR-003 Concrete and concrete elements (EN 16757); Version 2019-12-20 UN CPC: 375
PCR review was conducted by the Technical Committee of the International EPD System.	
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: ☑ EPD verification by accredited certification body	
Third party verification	Eurocert S.A. is an approved certification body accountable for the third-party verification. The certification body is accredited by: ESYD, Accreditation number 21-8
Procedure for follow-up of data during EPD validity involves third party verifier: ☑ Yes ☐ No	

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but from diff erent programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804. For further information about comparability, see EN 15804 and ISO 14025.

Environmental Product Declaration in accordance with ISO 14025 and EN 15804. This EPD is in accordance to the corresponding LCA analysis.

Company information

Owner of the EPD	**Interbeton Building Materials S.A., a member of TITAN Group.** 22A Halkidos Str., 11143 Athens, Greece
Contact	Katsakou Martha, Quality Assurance & Control Manager Concrete Operations, Titan Greece, T: +30 210 259 1456, E: main@interbeton.gr
Description of the organisation	Building materials manufacturer
Product-related or management system-related certifications	Product group classification: UN CPC 375, The CEN standard EN 15804 serves as the core Product Category Rules, PCR 2019:14 Construction products (EN 15804:A2); Version 1.11; 2021-02-05 c-PCR-001 Cement and Building Lime (EN 16908:2017) 2019-12-20, c-PCR-003 Concrete and Concrete Elements (EN 16757), Version 2019-12-20, PCR review was conducted by The Technical Committee of the International EPD® System and Independent third-party verification of the declaration and data in accordance with ISO 14025:2006.

Intoduction

Building on more than 120 years of industry experience and driven by its commitment to sustainable growth, TITAN Group has become an international cement and building materials producer, serving customers in more than 25 countries worldwide through a network of 14 integrated cement plants and three cement grinding plants. TITAN also operates quarries, ready-mix plants, terminals, and other production and distribution facilities. We create value by transforming raw materials into products – cement, concrete, aggregates, dry mortars and other building materials. We serve society's need for safe, durable, resilient, and aff ordable housing and infrastructure.

Climate change has mobilized organizations, in many sectors, towards a carbon-neutral future. In 2020, the Global Cement and Concrete Association (GCCA) announced its members' Climate ambition to drive down the CO_2 footprint of operations and products and deliver carbon-neutral concrete to society by 2050. Meanwhile, there is a growing need for enhanced transparency of environmental performance of building materials, such as greenhouse gas (GHG) emissions. Cement is the key ingredient in manufacturing concrete, the second most used commodity in the word and among the major contributors to the embodied GHG of buildings and infrastructure works.

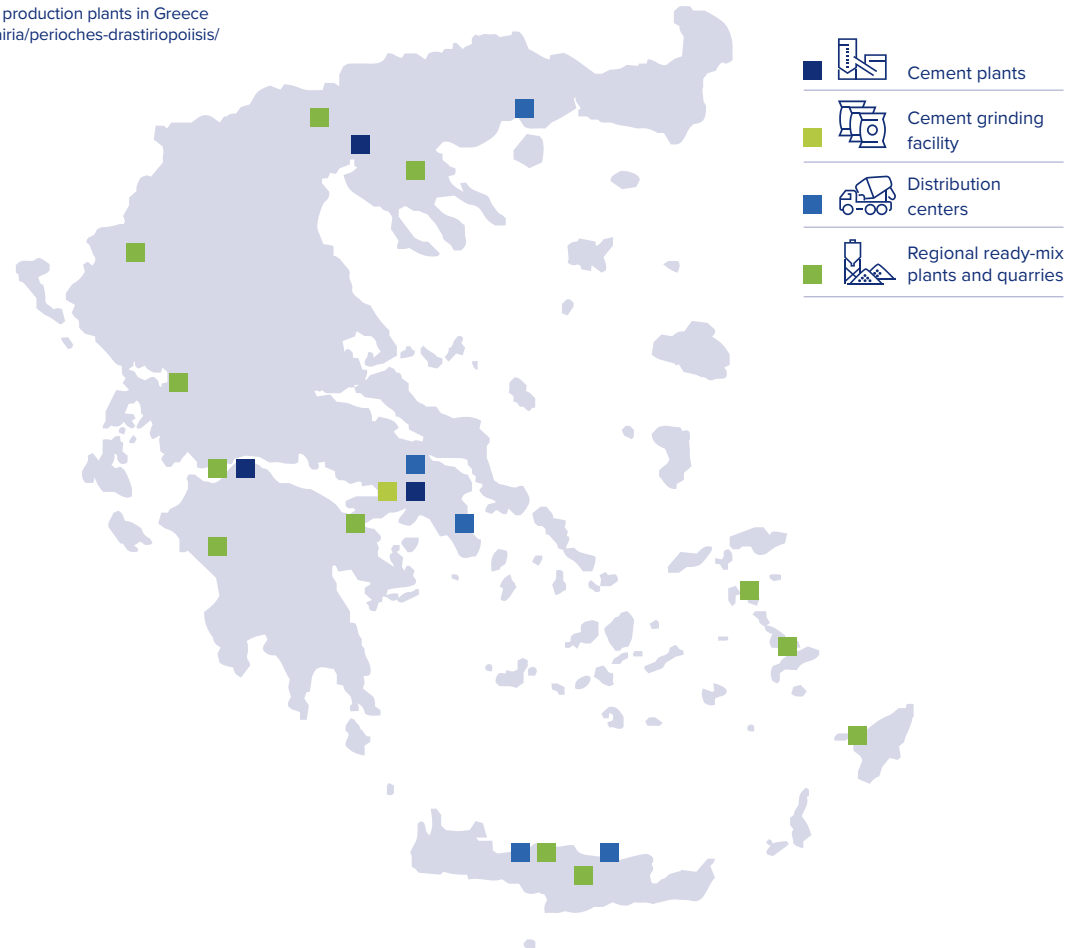
TITAN is working across the built environment value chain to deliver a carbon-neutral future in a circular economy, life cycle context. Aiming for a 35% reduction of the net direct specific CO_2 emissions by 2030 (compared to 1990 levels), TITAN has defi ned a road map for developing lowcarbon cementitious products and collaborating in carbon capture R&D projects at the cement plants. The publication of the ready-mixed concrete Environmental Product Declaration (EPD) is an important milestone in the road map, helping to communicate to customers the environmental performance of INTERBETON concretes.

Cement, concrete and other building materials EPDs will help shape the way the construction industry analyses the environmental impact of buildings and infrastructure works, now and in the future. Our EPDs will also provide a rigorous, science-based framework for driving environmental improvement throughout TITAN's and INTERBETON's sites and supply chain, off ering at the same time an advantage to customers wanting to be leaders in the sustainable infrastructure and building industry.

Geographical Scope: National (Greece)

All of INTERBETON's readymix concrete production plants in Greece are available at https://interbeton.gr/i-etairia/perioches-drastiriopoiisis/

1 METAMORFOSI, Attiki
2 KOROPI, Attiki
3 PAIANIA, Attiki
4 MALAKASA, Attiki
5 MANDRA, Attiki
6 HELLINIKO, Attiki
7 THERMI, Thessaloniki
8 NEOCHOROUDA, Thessaloniki
9 RAIDESTOS, Thessaloniki
10 NEA EFKARPIA, Thessaloniki
11 FLOGITA, Chalkidiki
12 KASSANDRINO, Chalkidiki
13 VOLOS-OBRIA, Magnisia
14 LAMIA, Fthiotida
15 KORINTHOS, Korinthia
16 XYLOKASTRO, Korinthia
17 THERIANO, Achaia
18 KALITHEA, Achaia
19 DREPANO, Achaia
20 AMALIADA, Hleia
21 PYRGOS, Hleia
22 BIPE IOANNINON, Ioannina
23 KOSKINOU, Rodos
24 KALATHOS, Rodos
25 GENNADI, Rodos
26 ANTIMAXEIA, Kos
27 MESSARIA, Kos
28 BIPE HERAKLION, Heraklion
29 ZOFOROI, Heraklion
30 LATZIMAS, Rethymno



3 Cement plants
1 Cement Grinding Facility
30 Ready-mix Plants
25 Quarries
1 Dry mortar Plant
2 Processed engineered fuel facilities

Product information

Product name:
30A25C1000258 - C30/37, XA2, S5, coarse aggregate, #1, SR
30A25C1000259 - C30/37, XA2, S5, coarse aggregate, #2, SR
35A27C100P256 - C35/45, XA2, Piles, SF1, coarse aggregate, #1, SR
35A27C100P257 - C35/45, XA2, Piles, SF1, coarse aggregate, #2, SR
35A25C1000260 - C35/45, XA2, S5, coarse aggregate, #3, SR
35A25C1000261 - C35/45, XA2, S5, coarse aggregate, #4, SR

Product identification:
Compressive Strength 28 days (Mpa): 37, 45

Product description:
Concrete is a material formed by mixing cement, coarse and fine aggregate and water, with or without the incorporation of admixtures and additions. Fresh concrete is manufactured at ready-mix batch plants and is delivered to the construction sites in a liquid state. Fresh concrete is placed, compacted and hardened in the desired shape, via a chemical reaction: the hydration of cement. The cement is the binding agent in concrete: it is a finely ground powder that when hydrated forms a paste that sets, hardens, and adheres to other materials and after hardening retains its strength even underwater. It is used as the main raw material in the production of concrete, mortar, grouts and plasters.

This is an average EPD for the declared products which comply with the requirements of ELOT EN 206 and the Concrete Technology Regulation KTS 2016. These specific concrete mix designs are produced nationwide by Interbeton Building Materials S.A.

These specific types of concrete have a wide range of applications and are mainly utilized in civil engineering works and in residential and commercial construction.

The product is delivered in bulk with ready-mix trucks.

The technical characteristics and composition of the product are shown in the table below. Product declarations and certificates can be found on the company's website www.interbeton.gr

Technical characteristics according to ELOT EN 206 and the Concrete Technology Regulation KTS 2016			
Mechanical properties	Characteristic Compressive Strength fck, cube (Mpa)	37	45
Product Density	Kg/m³	2,360	2,360

UN CPC code: 375

Content Information

Product	Concrete Density (Kg/m³)	Cement (kg)	Coarse Aggregate (kg)	Fine Aggregate (kg)	Water (kg)	Admixtures (kg)
30A25C1000258 - C30/37, XA2, S5, coarse aggregate, #1, SR	2,360	14.3-15.3%	33-36%	42-45%	7-8%	0.25%
30A25C1000259 - C30/37, XA2, S5, coarse aggregate, #2, SR	2,360	15.3-16.3%	32-35%	42-45%	7-8%	0.25%
35A27C100P256 - C35/45, XA2, Piles, SF1, coarse aggregate, #1, SR	2,360	17.3-18.3%	31-34%	41-44%	7-8%	0.30%
35A27C100P257 - C35/45, XA2, Piles, SF1, coarse aggregate, #2, SR	2,360	16.3-17.3%	32-35%	41-44%	7-8%	0.30%
35A25C1000260 - C35/45, XA2, S5, coarse aggregate, #3, SR	2,360	15.5-16.5%	32-35%	42-45%	7-8%	0.40%
35A25C1000261 - C35/45, XA2, S5, coarse aggregate, #4, SR	2,360	15.0-16.0%	33-36%	42-45%	7-8%	0.40%

LCA information

Functional unit / declared unit: The declared unit is one (1) cubic meter (m^3).

Reference service life: 50 years.

Production Process: Interbeton manufactures ready-mixed concrete in state-of-the-art facilities in Greece. The production process is fully automated to ensure superior quality products, conforming to the national and European concrete standards. The raw materials (cement, aggregates, water, admixtures etc.) are accurately weighed according to the proprietary Interbeton mix designs to produce ready-mixed concrete with specific characteristics (strength, durability, finishability, pumpability etc.). Once manufactured, the fresh concrete is transported with concrete trucks to the construction sites. The production process is exactly the same at every Interbeton production facility.

Time representativeness: The data used in this study cover from December 2021 to December 2022.

Database(s) and LCA software used: GCCA Industry EPD Tool for Cement and Concrete and Ecoinvent database (v.3.5).

Goal and scope: This EPD evaluates the environmental impacts of one cubic meter of concrete from Cradle to grave, and module D (A+B+C+D).

Data quality: ISO 14044 was applied in terms of data collection and quality requirements. The data concerning the modules A1 (raw material supply), A2 (transportation) and A3 (product manufacturing) were provided by Interbeton Building Materials S.A., incorporating cement EPD data for Titan Cement Company S.A. and involved all input and output materials to each ready-mix plant, the consumed utilities (energy and the distances and means of transport for each input stream. Regarding electricity mix, the latest (2020) national residual electricity mix as published in DAPEEP SA, were utilized (https://www.dapeep.gr/ viosimi-anaptixi/energeiako-meigma/). The background data for the module A1 e.g. raw materials (amount used by type) as well energy consumption, waste production and transport distances of raw materials and aggregates from cement plants, quarries have been obtained from the company's ERP system and correspond the exact and accurate mix designs for each ready-mix plant. Core indicators for every cement type / cement sourcing plant are obtained from the TITAN CEMENT S.A. publicly available cement EPDs.

The GCCA Environmental Product Declaration tool (v3.1). GCCA's Industry EPD Tool for Cement and Concrete is a web-based calculation tool for EPDs of clinker, cement, concrete, mortars and precast elements, available in both International and North American versions. The present report refers to the International version only.

The latter complies with the latest cement and concrete PCRs registered at the International EPD® System (Environdec), namely c-PCR-001 Cement and building limes (EN 16908) for cement and c-PCR003 Concrete and concrete elements (EN 16757) for concrete and precast elements, both registered as complementary PCRs of PCR 2019:14 Construction products (EN 15804+A2).

The GCCA EPD tool (v3.1) is developed by Quantis https://quantis-intl.com/ and verified by Studio Fieschi http://www.studiofieschi.it/en. The International EPD® System, which provides the framework to develop and publish EPDs based on ISO 14025 and EN 15804, gives the final approval of the tool's compliance with the rules. The underpinning database for the GCCA EPD tool is the version of the Ecoinvent database (v.3.5) and cement manufacturing data obtained through the GNR process (https://gccassociation.org/sustainabilityinnovation/ gnr-gcca-in-numbers/).

The database of Ecoinvent v.3.5 was used to complete any missing data. Generic data used in this study concerning:

- CO_2 emission factors for different transportation way
- CO_2 emission factors for plant diesel and raw materials
- Specific emission factor of used energy mix (kg CO_2/kWh)
- CO_2 emission factors for conventional transport to the construction site (ready mix truck)
- CO_2 emission factors for energy and fuels used during construction
- Water and waste-water usage during construction
- Recarbonation during use (B)
- Fuels, emissions and recarbonation during end of life (C) (demolition, transport, waste processing and disposal)
- Recarbonation and emissions for Benefits and Loads (D).

There is no missing data for this concrete mix, since all the required raw data were provided from the ERP system (SAP) that company uses. Data collection and processing for EPD and LCA development is performed according to INTERBETON quality systems.

Geographical scope: National (Greece)

Allocations: The allocation is performed according to the PCR. As no co-products are produced, the flow of materials and energy and the associated release of substances and energy into the environment is related exclusively to the concrete produced. No by-products occur during ready mix concrete production; therefore, there is no need for allocations in by-products.

The study does not include the followings:

- Capital equipment production
- Equipment maintenance
- Human labour and employee transport

Assumptions: This EPD Process is certified using GCCA international modelling of energy use and environmental impact to obtain a suitable estimation for products manufactured.

Pre-defined cement and clinker data provided by the GCCA tool are used for TITAN cements manufactured at Kamari, Patras and Thessaloniki cement plants.

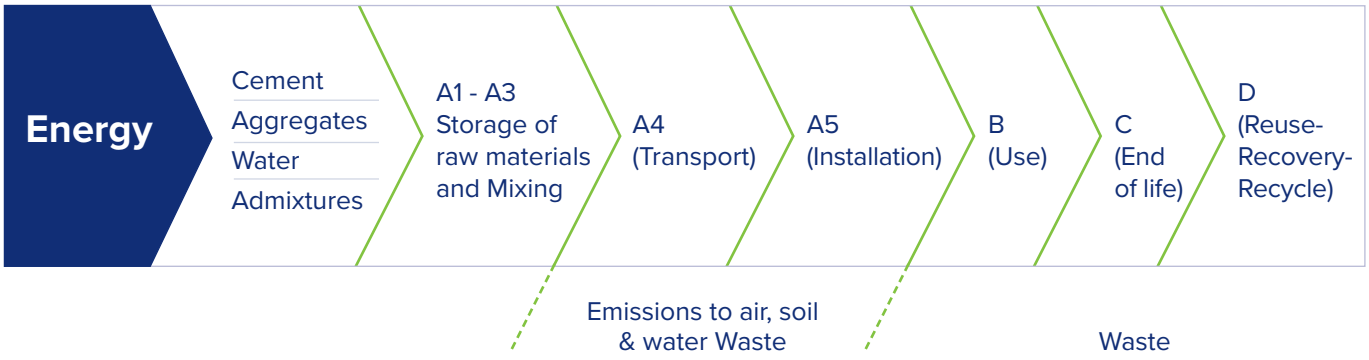
- All modelling assumptions adopted from the GCCA Tool.
- Raw material (inbound) transport distances are generated from ERP data and are accurate across operations.
- For generic EPDs, travel from concrete production site to customer site is calculated at 10 km, the average travel distance across operations.
- Concrete mixes are assumed to use an equal amount of site fuel and energy and responsible for an equal amount of waste flows from A to D.
- The calculation of the bill of materials for every plant is based on ERP data. The concrete mix design (materials percentage participation) was defined by the pre-verified and automated ERP system (SAP) that company uses.
- Water usage in batching operations is, per mix design.

Regarding road transportation, a ready-mix truck with a 9 m^3 concrete capacity, EURO4, was used. The representative plant is defined via systematic methodologies, well described and documented within the relevant LCA content, taking into consideration material sourcing, sales volumes and geographic specificity.

Cut-off rules: The cut-off rule for insufficient data or data gaps that are less than 1% of the total input mass or mass per module was applied. In case of insufficient input data or data gaps for a unit process, the cut-off criteria was defined as 1% of renewable and non-renewable primary energy usage and 1% of the total mass input of that unit process. The total of neglected input flows for the stages 'cradle through gate' were calculated to be less than 5% of energy usage and mass." (EN 15804:2012+A2:2019). Regarding the LCA model, the default cut-off criteria are applied for all processes from the Ecoinvent database. In addition, all custom processes developed for the specific purposes of the project are consistent with the rules and guidelines of the Ecoinvent database, and hence the same cut-off criteria are applied.

Comparability: EPD performance for construction products that they do not comply with EN 15804 may not be comparable. EPDs from separate programs but within the same product category may not be comparable as well.

Description of system boundaries: The scope of this study is "Cradle to grave" covering A1-A5, B1-B7, C1-C4 and D.



System diagram

The scope of this study is Cradle to grave, A1-A5, B1-B7, C1-C4 and D.

	Product stage			Construction process stage		Use stage							End-of-life stage				Resource recovery stage
	Raw Materials Supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction and demolition	Transport	Waste processing for reuse, recovery and/or recycling	Disposal	Reuse-Recovery-Recycling potential
Module	**A1**	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Modules declared	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	A1-A3			**A4-A5**		**B1-B7**							**C1-C4**				**D**

X = included, MND = module not declared.

The final product does not contain dangerous substances of high concern from the candidate list of SVHC for Authorization.

- **A1-A3 Product stage**

  - A1 Raw materials supply: this module takes into account the extraction and processing of raw materials and the associated energy that is produced prior to manufacturing concrete.

  - A2 Transport: this module includes the transport of the different raw materials from the supplier to the ready-mix plant.

  - A3 Manufacturing: this module includes the consumption of energy and water during the concrete manufacturing process, as well as the transport and management of the factory-produced waste. The manufacture of concrete or mortar consists mainly of a mixing process of different components.

- **A4-A5 Construction process**

  - A4 Transport

PARAMETERS FOR A4 - TRANSPORT	
PARAMETER	VALUE / DESCRIPTION
Fuel type and consumption of vehicle used for transport, e.g. ready-mix truck, aggregates or cement truck, vessel etc.	Truck of 32 tn. Fuel consumption according to GCCA model
Distance (Delivery/ready-mix truck)	Ready-mix truck, 10 Km (declared average)
Capacity Utilization (including empty returns)	100%
Bulk density of transported concrete	Expressed in LCA information section
Volume capacity utilization factor	99%

  - A5 Construction/Installation The product is directly transferred from the truck to the construction site

PARAMETERS FOR A5 - CONSTRUCTION / INSTALLATION	
PARAMETER	VALUE / DESCRIPTION
Auxiliary materials for installation	No auxiliary material used
Use of water	669 lt/m^3
Use of waste\water	0,669 lt/m^3
Use of other resources	No other resource consumption
Quantitative description of the energy (regional mix) and the consumption during the installation	Electricity: 2.776 Kwh/m^3
Quantitative description of diesel and the consumption during the installation	Diesel: 1.669 lt/m^3
Wastage of materials at job site before waste processing, generated by the product's installation	Product losses 1%

- B Use stage: the product's fix CO_2, by carbonatation during the use phase (B1), and do not require maintenance (B2), repair (B3), replacement (B4), refurbishment (B5), operational energy use (B6) or operational water use (B7) during its Reference Service Life.

  CO_2 by carbonatation of cement during the use phase has been included as required in c-PCR, following the methodology explained in EN 16757.

- C End of life stage

  - C1 Deconstruction/demolition: the use of diesel during the demolition process has been included.

  - C2 Transport to waste processing: the model use for the transportation (see A4, transportation to the building site) is applied.

  - C3 Waste processing for reuse, recovery and/or recycling: the product is 50% recycled.

  - C4 Disposal: the product is 50% landfilled.

PARAMETERS FOR C End of life	
PARAMETER	VALUE / DESCRIPTION
Collection process specified by type	The product is collected mixed with construction waste
Recovery system specified by type	50% recycled
Disposal specified by type	50% landfilled
Assumptions for scenario development (e.g. transportation)	16-32 tn truck, Fuel consumption according to GCCA model
Diesel in building/demolition equipment	2.674 lt / m^3
Transport distances (truck)	31.5 km

- D Reuse-Recovery-Recycling potential the product is recycled in 50% . As a consequence, the module D has been calculated where the results of recycled content that the product already includes has been taken into account. The avoided product is considered crushed aggregate.

PRODUCT DATA SOURCES			In Accordance with Environdec c-PCR-003 Concrete, concrete elements (EN | 16757), ISO 14025 and EN15804:A2		
LCA Stage	**Input/output**	**Sub Process**	**Data Source**	**Temporal Scope**	**Quality**
Product Description	Product description and specific density		INTERBETON ERP report Bill of Materials (BoM) and material specific data	August 2020 to July 2021	High
A1	Raw Materials	Background modeling data	INTERBETON internal Quality Assurance database, ERP systems	August 2020 to July 2021	High
A2	Cement and Aggregate Transport	Background modeling data	Actual transport distances - ERP invoices to haulers. Sea trasport based on port-to-port distances	2019, 2020, 2021	High
A3	Concrete Batching	Electricity	Provider Invoices	2016, 2017, 2018	High
		Diesel	Supplier Invoices	2018	High
		Water	Utility Invoices	2018	High
		Electricity sources	As published in DAPEEP SA	2020	High
	Waste	Background Data	Invoices for waste transportation	August 2020 to July 2021	Medium
A4-A5 Construction	Outbound travel distance	Background modeling data	Average distances to construction sites	August 2020 to July 2021	High
B Use	Re-carbonation*	Modeling data	Default GCCA Quantis tool settings	N/A	Proxy-Medium
C1. End of Life Demolition	Demolition		Default GCCA Quantis tool settings	N/A	Proxy-Medium
C2. End of Life Transport	Transport		Default GCCA Quantis tool settings	N/A	Proxy-Medium
C3. End of Life Waste Processing	Recycling Rate at End of life		Default GCCA Quantis tool settings	N/A	Proxy-Medium
C4. End of Life Disposal	Disposal Rate at End of life		Default GCCA Quantis tool settings	N/A	Proxy-Medium
D. Benefits and Loads			Default GCCA Quantis tool settings	N/A	N/A
GENERAL	General	General	Ecoinvent database	As updated	Secondary, High

* Regarding recarbonation benefits the scenaria are $10m^2$ free surface per m^3 of concrete and 50 years of Reference Life Cycle.

Environmental information

The following tables contain the environmental indicators for the following plants: Mandra, Metamorfosi, Koropi, Paiania, Helliniko.

All ready-mix plants have lower than ±10% differences between the environmental indicators for the product mix designs described in the EPD. They are presented in the same EPD using the impacts of an environmentally representative plant. The following environmental information are for the representative plant and its associated mix design, based on criteria of 1) Importance and relevance of the cement supplying plant and 2) Relevance of raw material transport. No allocation was needed.

For construction services, the total value of A1-A3 shall be replaced with the total value of A1-A5.

C30/37, XA2, S5, SR

Core environmental impact indicators

Indicator	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-tot	kg $CO_{2\ eq.}$	2,08E+02	2,07E+00	9,65E+00	-6,24E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,99E+00	8,81E+00	3,22E+00	-3,34E-01	-9,03E+00
GWP-GHG	kg $CO_{2\ eq.}$	2,08E+02	2,07E+00	9,65E+00	-6,24E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,99E+00	8,81E+00	3,22E+00	-3,34E-01	-9,03E+00
GWP-fos	kg $CO_{2\ eq.}$	2,08E+02	2,07E+00	9,64E+00	-6,24E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,99E+00	8,80E+00	3,20E+00	-3,42E-01	-8,97E+00
GWP-bio	kg $CO_{2\ eq.}$	6,85E-02	8,38E-04	4,62E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,60E-03	6,45E-03	1,24E-02	4,28E-03	-3,62E-02
GWP-luc	kg $CO_{2\ eq.}$	4,07E-02	7,25E-04	3,55E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,13E-03	5,25E-03	9,42E-03	3,48E-03	-1,57E-02
ODP	kg $CFC_{11\ eq.}$	8,70E-06	4,08E-07	1,38E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,62E-06	1,52E-06	2,38E-07	2,11E-06	-6,15E-07
AP	mol H^+ eq.	7,15E-01	6,83E-03	7,99E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,42E-02	4,11E-02	2,53E-02	6,21E-02	-6,37E-02
EP-fw[1]	kg $PO_{4\ eq.}$	1,94E-02	1,59E-04	1,31E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,02E-04	1,21E-03	1,96E-03	7,58E-04	-3,77E-03
EP-mar	kg N eq.	1,45E-03	1,39E-05	6,46E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,34E-05	8,91E-05	1,36E-04	7,16E-05	-2,44E-04
EP-ter	mol N eq.	2,05E+00	1,51E-02	3,22E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,44E-01	1,15E-01	4,71E-02	2,22E-01	-1,59E-01
POCP	kg $NMVOC_{eq.}$	4,94E-01	6,15E-03	8,83E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,22E-01	3,79E-02	1,32E-02	6,53E-02	-4,04E-02
ADPE[2]	kg $Sb_{eq.}$	1,74E-04	3,99E-06	7,47E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,66E-06	1,59E-05	2,94E-06	7,06E-06	-1,03E-04
ADPF[2]	MJ	1,03E+03	3,38E+01	1,27E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,30E+02	1,35E+02	4,90E+01	1,80E+02	-1,03E+02
WDP[2]	m^3 eq.	9,25E+01	2,49E-01	-1,14E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,67E-01	1,17E+00	6,87E-01	8,71E+00	-1,75E+01

GWP-GHG = Global Warming Potential GHG; GHG **GWP-total** = Global Warming Potential total; **GWP-fossil** = Global Warming Potential fossil fuels; **GWP-biogenic** = Global Warming Potential biogenic; **GWP-luluc** = Global Warming Potential land use and land use change; **ODP** = Depletion potential of the stratospheric ozone layer; **AP** = Acidification potential, Accumulated Exceedance; **EP-freshwater** = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; **EP-marine** = Eutrophication potential, fraction of nutrients reaching marine end compartment; **EP-terrestrial** = Eutrophication potential, Accumulated Exceedance; **POCP** = Formation potential of tropospheric ozone; **ADP-minerals&metals** = Abiotic depletion potential for non-fossil resources; **ADP-fossil** = Abiotic depletion for fossil resources potential; **WDP** = Water (user) deprivation potential, deprivation-weighted water consumption

[1] Eutrophication aquatic freshwater shall be given in both kg PO_4^{-3} eq and kg P eq.

[2] The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

Use of resources

Indicator	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	MJ	7,26E+01	4,85E-01	7,53E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,59E-01	3,38E+00	5,35E+00	4,68E+00	-8,46E+00
PERM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	7,26E+01	4,85E-01	7,53E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,59E-01	3,38E+00	5,35E+00	4,68E+00	-8,46E+00
PENRE	MJ	1,03E+03	3,38E+01	1,27E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,30E+02	1,35E+02	4,90E+01	1,80E+02	-1,03E+02
PENRM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	1,03E+03	3,38E+01	1,27E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,30E+02	1,35E+02	4,90E+01	1,80E+02	-1,03E+02
SM	kg	2,71E+01	0,00E+00	2,71E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	MJ	7,38E+01	0,00E+00	7,38E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF	MJ	1,55E+02	0,00E+00	1,55E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NFW	m^3	2,22E+00	7,44E-03	1,20E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,99E-02	3,60E-02	2,78E-02	2,03E-01	-4,19E-01

Acronyms: PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; **PERM** = Use of renewable primary energy resources used as raw materials; **PERT** = Total use of renewable primary energy resources; **PENRE** = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; **PENRM** = Use of non-renewable primary energy resources used as raw materials; **PENRT** = Total use of non-renewable primary energy re-sources; **NFW** = Use of net fresh water

Other environmental information describing waste categories

Indicator	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NHWD	kg	0,00E+00	0,00E+00	1,21E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,21E+03	0,00E+00
RWD	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Acronyms: HWD = Hazardous waste disposed; **NHWD** = Non-hazardous waste disposed; **RWD** = Radioactive waste disposed

Outputs

Indicator	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
CRU	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MR	kg	2,84E-01	0,00E+00	1,18E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,18E+03	0,00E+00	0,00E+00
MER	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EEE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EET	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Acronyms: CRU = Components for re-use; **MR** = Materials for recycling; **MER** = Materials for energy recovery; **EEE** = Exported electrical energy; **EET** = Exported thermal energy

Environmental information

The following tables contain the environmental indicators for the following plants: Mandra, Metamorfosi, Koropi, Paiania, Helliniko.

All ready-mix plants have lower than ±10% differences between the environmental indicators for the product mix designs described in the EPD. They are presented in the same EPD using the impacts of an environmentally representative plant. The following environmental information are for the representative plant and its associated mix design, based on criteria of 1) Importance and relevance of the cement supplying plant and 2) Relevance of raw material transport. No allocation was needed.

For construction services, the total value of A1-A3 shall be replaced with the total value of A1-A5.

C35/45, XA2, S5, SR

Core environmental impact indicators

Indicator	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-tot	kg $CO_{2\ eq.}$	2,23E+02	2,07E+00	9,79E+00	-6,77E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,99E+00	8,81E+00	3,15E+00	-9,18E-01	-9,03E+00
GWP-GHG	kg $CO_{2\ eq.}$	2,23E+02	2,07E+00	9,79E+00	-6,77E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,99E+00	8,81E+00	3,15E+00	-9,18E-01	-9,03E+00
GWP-fos	kg $CO_{2\ eq.}$	2,23E+02	2,07E+00	9,78E+00	-6,77E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,99E+00	8,80E+00	3,13E+00	-9,26E-01	-8,97E+00
GWP-bio	kg $CO_{2\ eq.}$	7,00E-02	8,38E-04	4,63E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,60E-03	6,45E-03	1,24E-02	4,28E-03	-3,62E-02
GWP-luc	kg $CO_{2\ eq.}$	4,16E-02	7,25E-04	3,56E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,13E-03	5,25E-03	9,42E-03	3,48E-03	-1,57E-02
ODP	kg $CFC_{11\ eq.}$	9,20E-06	4,08E-07	1,39E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,62E-06	1,52E-06	2,38E-07	2,11E-06	-6,15E-07
AP	mol $H^+_{\ eq.}$	7,64E-01	6,83E-03	8,04E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,42E-02	4,11E-02	2,53E-02	6,21E-02	-6,37E-02
EP-fw[1]	kg $PO_{4\ eq.}$	2,04E-02	1,59E-04	1,32E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,02E-04	1,21E-03	1,96E-03	7,58E-04	-3,77E-03
EP-mar	kg $N_{\ eq.}$	1,53E-03	1,39E-05	6,47E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,34E-05	8,91E-05	1,36E-04	7,16E-05	-2,44E-04
EP-ter	mol $N_{eq.}$	2,20E+00	1,51E-02	3,23E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,44E-01	1,15E-01	4,71E-02	2,22E-01	-1,59E-01
POCP	kg $NMVOC_{eq.}$	5,27E-01	6,15E-03	8,86E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,22E-01	3,79E-02	1,32E-02	6,53E-02	-4,04E-02
ADPE[2]	kg $Sb_{eq.}$	1,78E-04	3,99E-06	7,51E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,66E-06	1,59E-05	2,94E-06	7,06E-06	-1,03E-04
ADPF[2]	MJ	1,09E+03	3,38E+01	1,27E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,30E+02	1,35E+02	4,90E+01	1,80E+02	-1,03E+02
WDP[2]	$m^3_{\ eq.}$	9,23E+01	2,49E-01	-1,14E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,67E-01	1,17E+00	6,87E-01	8,71E+00	-1,75E+01

GWP-GHG = Global Warming Potential GHG; GHG **GWP-total** = Global Warming Potential total; **GWP-fossil** = Global Warming Potential fossil fuels; **GWP-biogenic** = Global Warming Potential biogenic; **GWP-luluc** = Global Warming Potential land use and land use change; **ODP** = Depletion potential of the stratospheric ozone layer; **AP** = Acidification potential, Accumulated Exceedance; **EP-freshwater** = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; **EP-marine** = Eutrophication potential, fraction of nutrients reaching marine end compartment; **EP-terrestrial** = Eutrophication potential, Accumulated Exceedance; **POCP** = Formation potential of tropospheric ozone; **ADP-minerals&metals** = Abiotic depletion potential for non-fossil resources; **ADP-fossil** = Abiotic depletion for fossil resources potential; **WDP** = Water (user) deprivation potential, deprivation-weighted water consumption

[1] Eutrophication aquatic freshwater shall be given in both kg PO_4^{-3} eq and kg P eq.

[2] The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

Use of resources

Indicator	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	MJ	7,71E+01	4,85E-01	7,58E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,59E-01	3,38E+00	5,35E+00	4,68E+00	-8,46E+00
PERM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	7,71E+01	4,85E-01	7,58E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,59E-01	3,38E+00	5,35E+00	4,68E+00	-8,46E+00
PENRE	MJ	1,09E+03	3,38E+01	1,27E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,30E+02	1,35E+02	4,90E+01	1,80E+02	-1,03E+02
PENRM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	1,09E+03	3,38E+01	1,27E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,30E+02	1,35E+02	4,90E+01	1,80E+02	-1,03E+02
SM	kg	3,32E+01	0,00E+00	3,32E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	MJ	8,01E+01	0,00E+00	8,01E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF	MJ	1,68E+02	0,00E+00	1,68E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NFW	m^3	2,22E+00	7,44E-03	1,20E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,99E-02	3,60E-02	2,78E-02	2,03E-01	-4,19E-01

Acronyms: PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; **PERM** = Use of renewable primary energy resources used as raw materials; **PERT** = Total use of renewable primary energy resources; **PENRE** = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; **PENRM** = Use of non-renewable primary energy resources used as raw materials; **PENRT** = Total use of non-renewable primary energy re-sources; **NFW** = Use of net fresh water

Other environmental information describing waste categories

Indicator	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NHWD	kg	0,00E+00	0,00E+00	1,22E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,22E+03	0,00E+00
RWD	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Acronyms: HWD = Hazardous waste disposed; **NHWD** = Non-hazardous waste disposed; **RWD** = Radioactive waste disposed

Outputs

Indicator	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
CRU	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MR	kg	3,08E-01	0,00E+00	1,18E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,18E+03	0,00E+00	0,00E+00
MER	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EEE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EET	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Acronyms: CRU = Components for re-use; **MR** = Materials for recycling; **MER** = Materials for energy recovery; **EEE** = Exported electrical energy; **EET** = Exported thermal energy

Additional information

Interbeton Building Materials S.A. hereby declares that all ready-mix concrete products are in compliance with the REACH Regulation (EC) No 1907/2006, concerning the Registration, Evaluation, Authorization and Restriction of Chemicals. Concrete does not contain any Substances of Very High Concern (SVHC) currently on the candidate list. REACH SVHC list is not static and is updated frequently, thus the Company will continue to evaluate, research and review to fulfil the demands of the regulation. More information about cement safety handling is available at the Safety Data Sheet (SDS) published at the company's website www.interbeton.gr.

Differences versus previous versions

First EPD version – No previous versions

References

GPI v.4.0: 2021-03-29 General Programme Instructions of the International EPD® System

PCR 2019:14 v.1.11 Product Category rules | Construction products | The International EPD® System

EN 15804:2012+A2:2019 Sustainability of construction works - Environmental Product Declarations - Core rules for the product category of construction products

EN 197-1:2011 Cement - Part 1: Composition, specifications and conformity criteria for common cements

c-PCR-001 Cement and building lime (EN 16908:2017) Version 2019-12-20

c-PCR-003 Concrete and concrete elements (EN 16757) Version 2019-12-20

EN 16908:2017 Cement and building lime - Environmental product declarations - Product category rules complementary to EN 15804

EN 16757:2017 Sustainability of construction works - Environmental product declarations - Product Category Rules for concrete and concrete elements

ISO 14020:2000 Environmental labels and declarations - General principles

ISO 14025:2006 Environmental labels and declarations - Type III environmental declarations - Principles and procedures

ISO 14040:2006 Environmental management - Life Cycle Assessment - Principles and framework

ISO 14044:2006 Environmental management - Life Cycle Assessment - Requirements and guidelines

Industry EPD Tool for Cement and Concrete (https://concrete-epd-tool.org/)

User Guide (v3.1, International version, 10 November 2021)

LCA Model (v3.1, International version, 10 November 2021)

LCA Database (v3.1, International version, 10 November 2021)

DAPEEP SA: Renewable Energy Sources Operator & Guarantees of Origin | Greece | www.dapeep.gr

ELOT EN 206 EN 206+A1 Concrete – Part 1: Specification, performance, production and conformity

Hellenic Concrete Technology Regulation KTS 2016

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Environmental Product Declaration

for Ready Mixed Concrete C30/37-SR & C35/45-SR

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