

Environmental Product Declaration



In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021 for:

Ready-mixed concrete C25/30

from

JSC “Betono centras”



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An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com



General information

Programme information

Programme:	The International EPD® System
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Accountabilities for PCR, LCA and independent, third-party verification
Product Category Rules (PCR)
CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product Category Rules (PCR): PCR 2019:14 Construction products (version 1.3.4, 2024-04-30) c-PCR-003 Concrete and concrete elements (EN 16757:2022) (version 2024-04-30) UN CPC code: 375
PCR review was conducted by: The Technical Committee of the International EPD® System. See www.environdec.com for a list of members. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact
Life Cycle Assessment (LCA)
LCA accountability: TICPRO, UAB
Third-party verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: ☒ EPD verification by individual verifier Third-party verifier: Silvia Vilčekova Approved by: The International EPD® System
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 registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

Company information

Owner of the EPD:

JSC "Betono centras"

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Description of the organisation:

The company JSC "Betono centras" – the company was founded in 1955 when, by the decision of the Vilnius Construction Trust, the Vilnius Reinforced Concrete Products Factory No. 2 was established, which combined seven separate small concrete and mortar production units. In 1957, several additional small factories were also connected. The production sites were in various districts: Verkiu st., Subaciaus st., Lentvario st., and Naujoji Vilnia. They had separate concrete-mortar batching plants, lime works, rebar and forming workshops with outdoor sites, and an asphalt concrete production workshop. At that time, eleven production sites supplied products to the construction organizations of Vilnius city.

In 1992, the company was privatized and renamed AB "Markuciai". The company built a rebar production workshop and modernized its production technologies. In 1999, after acquiring a new production line from the "HESS" company, it began to produce landscaping elements using a vibro-pressing method: paving stones and sidewalk tiles.

In May 2000, a new, state-of-the-art concrete production line, manufactured and installed by the renowned German company "LIEBHERR," started operating in the Baltic States.

Over the course of its activity, "Markuciai" became one of the leading construction material manufacturing companies in the country, accumulating vast experience in the production of concrete mixes and reinforced concrete structures.

Since 2007, to more flexibly meet customer needs and adapt to changing market conditions, the production and design activities of reinforced concrete products have been separated from the production and supply of ready-mixed concrete.

The company makes ready-mixed concrete which is material formed by mixing cement, coarse and fine aggregates and water, with or without the incorporation of admixtures, additions, or fibers, which develops its properties by hydration. Mainly the company produces designed ready-mix concrete which is delivered in a fresh state to the user and the required properties and additional characteristics if any are specified to the producer who is responsible for providing a concrete conforming to the required properties and additional characteristics. Also, the JSC "Betono centras" can produce prescribed concrete which composition of the concrete and the constituent materials to be used are specified to the producer who is responsible for providing a concrete with the specified composition.



Product-related or management system-related certifications:

The company is certified and complies with:

- EN 206:2013+A2:2016 “Concrete – Specification, performance, production and conformity” and LST 1974:2012 “Rules for the Application LST EN 206-1 and Additional National Requirements” – for ready-mixed concrete;
- EN 13877-1:2023 “Concrete pavements – Part 1: Materials”;
- ISO 9001:2015 “Quality management systems – Requirements”;
- ISO 14001:2015 “Environmental management systems – Requirements with guidance for use”;
- ISO 45001:2018 “Occupational health and safety management systems – Requirements with guidance for use”.

Name and location of production site(s):

Following production locations of JSC “Betono centras” are considered in this study: Vilnius, Kaunas, Klaipeda, Siauliai, Panevezys and Mazeikiai. The company also operates 2 mobile units (“EUROMIX 3300” and “EUROMIX 4000”), capable of being set up in a short time at large and/or strategic construction sites.



Product information

Product name:

Ready-mixed concrete C25/30.

Product identification:

This EPD includes the concrete types provided below:

- LST EN 206-C25/30-XC2-XC3(LT)-XC4(LT)-CI0,4-D_{max}4-[S1;S2;S3;S4],
- LST EN 206-C25/30-X0-XC1-CI0,2-D_{max}8-[S1;S2],
- LST EN 206-C25/30-XC2-W8(LT)-CI0,2-D_{max}8-S2,
- LST EN 206-C25/30-XC2-CI0,2-D_{max}8-[S3;S4],
- LST EN 206-C25/30-XC2-XF2-F150(LT)-CI0,2-D_{max}8-S3
- LST EN 206-C25/30-XC2-W8(LT)-CI0,2-D_{max}8-[S3;S4],
- LST EN 206-C25/30-XC2-XF2-F150(LT)-CI0,2-D_{max}8-S4,
- LST EN 206-C25/30-XC1(LT)-XC2(LT)-CI0,2-D_{max}16-S1,
- LST EN 206-C25/30-XC2-XC3(LT)-XC4(LT)-CI0,2-D_{max}16-[S2;S3;S4]
- LST EN 206-C25/30-XC4(LT)-W8(LT)-CI0,2-D_{max} 16-[S2;S3;S4],
- LST EN 206-C25/30-XC4(LT)-XF2(LT)-F150(LT)-W10(LT)-CI0,2-D_{max} 16-[S2;S3;S4],
- LST EN 206-C25/30-XC1(LT)-XC2(LT)-CI0,20-D_{max}32-S1,
- LST EN 206-C25/30-XC1-XC2(LT)-XC3(LT)-CI0,20-D_{max}32-S2,
- LST EN 206-C25/30-XC1-XC2(LT)-XC3(LT)-XC4(LT)-CI0,20-D_{max}32-[S3;S4],
- LST EN 206-C25/30-XC2(LT)-W8(LT)-CI 0,20-D_{max}32-[S1;S2;S3;S4],
- LST EN 206-C25/30-XC1-XC2(LT)-XC3(LT)-XC4(LT)-XF2-F150(LT)-W8(LT)-CI0,20-D_{max}32-[S2;S3;S4].

The actual density of the concrete types presented ranges from 2100 kg/m³ to 2409 kg/m³. The average of density range is 2255 kg/m³.

Product description:

This EPD is developed for normal weight ready-mixed concrete in conformity with the EN 206:2013+A2:2021, LST 1974:2012 and EN 13877-1 standards. It applies to concrete for structures cast in situ, precast structures, and structural precast products for buildings and civil engineering structures. The EN 206:2013+A2:2021 standard does not cover ready-mixed concrete for aerated/foamed/refractory concrete and concrete with density less than 800 kg/m³. Thus, these product types are not comprised by this LCA study.

Ready-mixed concrete is a composite material consists of cement, coarse and fine aggregates, water and admixtures. The entire concrete mix production process is automated. Approved recipes are entered in the concrete unit's computer. Once the mix recipe is selected, the ingredients are automatically weighed and then the final mixing of the concrete mix is carried out. The ready-mixed concrete is then poured into a truck or truck-mixer.

UN CPC code:

375.

Geographical scope:

Lithuania.

LCA information

Functional unit / declared unit:

The declared unit is 1 m³ of ready-mixed concrete.

Time representativeness:

The data used in this study is for the full year of 2023.

Data quality:

Material	Source	Source type	Reference year
Cement	Supplier	EPD	2023

Cement	Supplier	EPD	2020
Aggregate	Professional database (Sphera)	Database	2023
Aggregate	Supplier	EPD	2021
Water	Professional database (Sphera)	Database	2024
Admixture	Supplier	EPD	2021
Admixture	Supplier	EPD	2021
Admixture	Supplier	EPD	2021
Admixture	Supplier	EPD	2021
Gas	Professional database (Sphera)	Database	2024

Database(s) and LCA software used:

LCA for Experts (version 10.9.0.20).

Cut-off rules:

The study includes all major raw material and energy consumption. All inputs and outputs of the unit processes which data are available for are included in the calculation. There is no neglected unit process more than 1% of total mass and energy flows. The total neglected input and output flows do also not exceed 5% of energy usage or mass, so more than 95 % of flows were included. The life cycle analysis includes all industrial processes from raw material acquisition to production and end-of-life stages. Manufacture of equipment used in production, in buildings or any other capital good, transportation of personnel to the plant, the maintenance and operation of capital equipment, personnel-related activities are excluded.

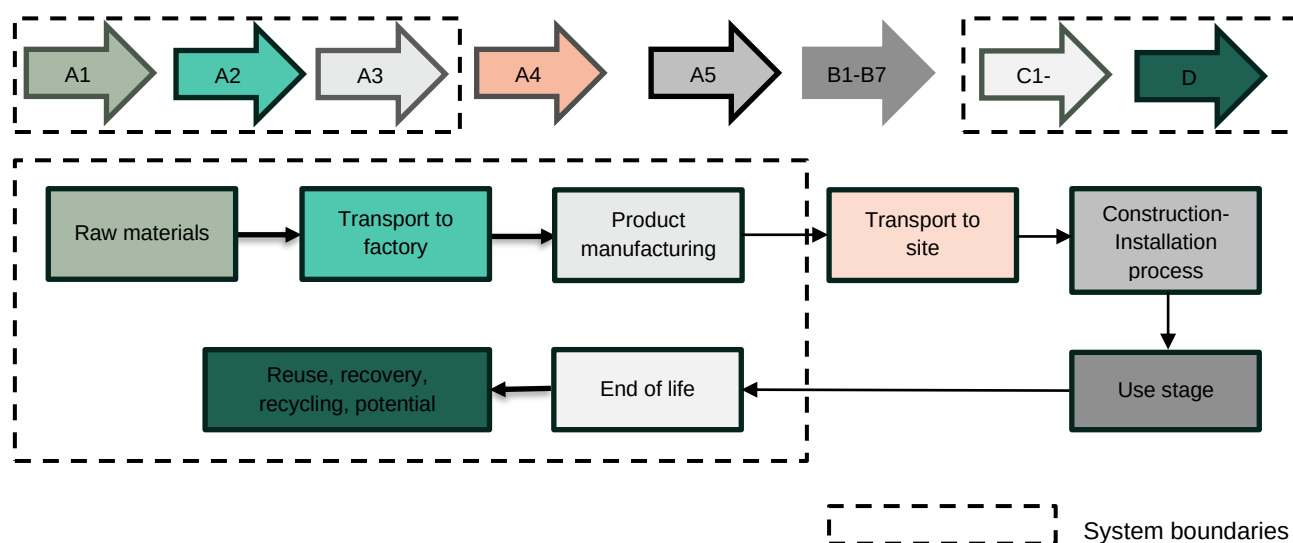
Electricity mix:

The electricity used at the permanent manufacturing site is modelled with the most recent (2023) Lithuanian residual electricity mix. For permanent batching plant the electricity is based on solar 1,55 %, nuclear 9,67 %, FO unspecified 6,77 %, FO hard coal 29,73 %, FO lignite 0,08 %, FO gas 48,38 %, FO oil 3,83 %. GWP-GHG impact of the used electricity mix is 583 g CO₂/kWh. In the mobile concrete units are used diesel generator to generate the electricity.

Description of system boundaries:

This EPD covers cradle to gate (A1-A3) with modules C1-C4 and module D.

System diagram:



A1-A3 Product stage:

- A1 – covers the production of raw materials: cement, aggregates, water and admixtures.
- A2 – the transportation involves the delivery impact of raw materials from the supplier to the concrete batching plant.
- A3 – a typical concrete batching unit consists of scales and mixers where cement, aggregates, water and admixtures are weighed and mixed in specific proportions to produce concrete with specific technical characteristics. The cement is stored in separate silos depending on the quality type and added to the mixer via screw conveyors while the water and admixtures via pumps. Aggregates of different granulometry and type are stored in distinct piles. The moisture content of the aggregates is checked automatically to adjust the amount of water added to the mix. After the required mixing time, the concrete is loaded to the mixer truck and must be delivered within under normal environmental conditions, max 2 hours to the construction site. Quality control is carried out both in raw materials, in technological processes, and in the final product.

Modules A4-A5 Construction process stage:

These modules are not covered in this study.

Modules B1-B7 Use stage:

These modules are not covered in this study.

Modules C1-C4 End of life stage:

- C1 – This stage includes deconstruction, dismantling and demolition. Consumption of fuel in the demolition process is estimated based on dismantled mass.
- C2 – This refers to the transport of the demolished concrete for the demolition site to the waste processing site. A conservative assumption of 50 km by lorry, 34-40 metric tons, was used.
- C3 – 90 % of concrete is transformed into secondary material in a recycling plant by crushing.
- C4 – 10 % of the treated concrete is residue that cannot be recycled and is assumed to be landfilled.

Module D Benefits and Loads:

Module D is defined as benefits and loads beyond the product system boundary, and solely serves as an informative module. Benefits of recycled EoL product generated in C3 are considered in stage D. The recycled concrete has been modelled to avoid use of primary materials. The considered scenario in module D is to use recycled crushed concrete in the road constructions by substituting, in this case, natural gravel.

Modules declared, geographical scope, share of specific data (in GWP-GHG results) and data variation (in GWP-GHG results):

	Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	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	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	LT	LT	LT	-	-	-	-	-	-	-	-	-	LT	LT	LT	LT	LT
Specific data used	87 %			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	N/A			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	N/A			-	-	-	-	-	-	-	-	-	-	-	-	-	-

More information: X= included, ND= module not declared (module not considered in LCA study)

Content information

Product components	Weight, %	Post-consumer material, weight-%	Biogenic material, weight-% and kg C/kg
Cement	6,8	0	0
Aggregates	89,3	0	0
Water	3,8	0	0
Admixture	0,1	0	0
TOTAL	100	0	0
Packaging materials	Weight, %	Post-consumer material, weight-%	Biogenic material, weight-% and kg C/kg
None (delivered by mixer truck)	0	0	0
TOTAL	0	0	0

Dangerous substances from the candidate list of SVHC for Authorisation	EC No.	CAS No.	Weight-% per functional or declared unit
No presence in the product	ND	ND	0

Results of the environmental performance indicators

Mandatory impact category indicators according to EN 15804

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
GWP-fossil	kg CO ₂ eq.	1.55E+02	7.23E+00	1.80E+01	1.13E+01	7.00E+00	-8.05E+00
GWP-biogenic	kg CO ₂ eq.	3.41E+00	-2.69E+00	-4.57E-01	-2.14E-01	-4.82E-02	1.74E-01
GWP-luluc	kg CO ₂ eq.	8.52E-01	6.56E-01	2.98E-01	1.53E-01	4.20E-02	-6.49E-02
GWP-total	kg CO ₂ eq.	1.54E+02	5.20E+00	1.78E+01	1.12E+01	6.99E+00	-7.94E+00
ODP	kg CFC 11 eq.	5.72E-07	4.21E-12	1.79E-12	2.04E-11	1.89E-11	-5.91E-11
AP	mol H ⁺ eq.	2.94E-01	2.58E-02	1.57E-02	5.65E-02	4.97E-02	-4.14E-02
EP-freshwater	kg P eq.	1.29E-02	1.67E-04	7.56E-05	4.39E-05	1.59E-05	-3.21E-05
EP-marine	kg N eq.	7.44E-02	5.73E-03	4.32E-03	2.60E-02	1.28E-02	-1.48E-02
EP-terrestrial	mol N eq.	8.18E-01	7.54E-02	5.56E-02	2.87E-01	1.41E-01	-1.64E-01
POCP	kg NMVOC eq.	2.17E-01	2.40E-02	1.46E-02	7.19E-02	3.91E-02	-4.03E-02
ADP-minerals&metals*	kg Sb eq.	2.38E-05	3.32E-06	1.51E-06	1.18E-05	4.53E-07	-8.79E-07
ADP-fossil*	MJ	3.70E+03	5.09E+02	2.31E+02	2.11E+02	9.23E+01	-1.22E+02
WDP*	m ³	1.37E+01	5.84E-01	2.64E-01	2.16E+00	8.01E-01	-9.72E-01
Acronyms	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						

Additional mandatory and voluntary impact category indicators

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
GHG-GWP	kg CO ₂ eq.	1.56E+02	7.88E+00	1.83E+01	1.14E+01	7.04E+00	-8.12E+00

Resource use indicators

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
PERE	MJ	2.43E+02	4.33E+01	1.96E+01	2.25E+01	1.61E+01	-4.52E+01
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	2.43E+02	4.33E+01	1.96E+01	2.25E+01	1.61E+01	-4.52E+01
PENRE	MJ	3.83E+03	5.09E+02	2.31E+02	2.11E+02	9.23E+01	-1.22E+02
PENRM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	3.83E+03	5.09E+02	2.31E+02	2.11E+02	9.23E+01	-1.22E+02
SM	kg	3.27E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	1.80E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	1.52E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m ³	3.88E-01	4.84E-02	2.20E-02	6.29E-02	2.45E-02	-3.97E-02
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; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water						

Waste indicators

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Hazardous waste disposed	kg	6.53E-03	1.69E-08	7.48E-09	3.05E-08	2.30E-08	-7.91E-08
Non-hazardous waste disposed	kg	2.25E+02	7.95E-02	3.60E-02	5.80E-02	4.68E+02	-1.70E+02
Radioactive waste disposed	kg	2.65E-02	7.04E-04	2.99E-04	2.66E-03	9.69E-04	-8.08E-03

Output flow indicators

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Material for recycling	kg	7.84E-06	0.00E+00	0.00E+00	3.67E+03	0.00E+00	-4.08E+03
Materials for energy recovery	kg	1.61E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, electricity	MJ	6.21E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, thermal	MJ	9.40E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Additional environmental performance indicators

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Particulate matter	kg	5.23E-06	3.02E-07	1.61E-07	1.11E-06	6.23E-07	-2.45E-06
Ionising radiation, human health	kg	3.41E+00	9.62E-02	4.17E-02	4.22E-01	1.12E-01	-1.31E+00
Ecotoxicity, freshwater	kg	6.30E+02	3.75E+02	1.70E+02	1.47E+02	5.32E+01	-6.28E+01
Human toxicity, cancer	MJ	2.36E-08	7.51E-09	3.41E-09	3.22E-09	1.26E-09	-2.05E-09
Human toxicity, non-cancer	MJ	1.37E-06	3.35E-07	1.52E-07	1.18E-07	4.85E-08	-8.26E-08
Land use	Pt	3.74E+02	2.52E+02	1.14E+02	6.61E+01	2.54E+01	-5.00E+01

References

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ISO 14040:2006 Environmental management. Life cycle assessment. Principles and framework.

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ISO 14020:2023 Environmental statements and programmes for products. Principles and general requirements.

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EN 13877-1:2023 “Concrete pavements – Part 1: Materials”.

LST 1974:2012 “Rules for the Application LST EN 206-1 and Additional National Requirements”.

Software Sphera LCA for Experts (version 10.9.0.20).

Professional Database 2024.

