

Environmental Product Declaration


INTERNATIONAL EPD SYSTEM



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

INSULATED PRECAST CONCRETE WALL

from

INHUS Prefab OÜ



Programme:	The International EPD System, www.environdec.com
Programme operator:	EPD International AB
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An EPD may be updated or depublished if conditions change. To find the latest version of the EPD and to confirm its validity, see www.environdec.com



GENERAL INFORMATION

Programme Information	
Programme:	The International EPD System
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Product Category Rules (PCR)
CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product Category Rules (PCR): <i>PCR 2019:14 Construction products (EN 15804+A2) (version 2.0.1) (2.0.1), UN CPC code - 37550</i>
PCR review was conducted by: <i>The Technical Committee of the International EPD System. See www.environdec.com for a list of members. Review chair: C Rob Rouwette (chair), Noa Meron (co-chair). The review panel may be contacted via the Secretariat www.environdec.com/contact.</i>
c-PCR: <i>PCR 2019:14-c-PCR-003 Being updated - Concrete and concrete elements (EN 16757) (1.0.0)</i>
c-PCR review was conducted by: <i>This c-PCR was developed within CEN standardisation and adopted as a complementary PCR by the International EPD System. No additional open consultation or review was conducted beyond the CEN standardisation process.</i>

Third-party Verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via:
<input checked="" type="checkbox"/> Individual EPD verification without a pre-verified LCA/EPD tool
Third-party verifier: Anni Oviir, Rangi Maja OÜ
Approved by: International EPD System
Procedure for follow-up of data during EPD validity involves third party verifier:
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

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

EPDs within the same product category but published in different EPD programmes, may not be comparable. For two EPDs to be comparable, they shall be based on the same PCR (including the same first-digit 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 identical scope in terms of included life-cycle stages (unless the excluded life-cycle stage is demonstrated to be insignificant); apply identical impact assessment methods (including the same version of characterisation factors); and be valid at the time of comparison.

For further information about comparability, see EN 15804 and ISO 14025.

INFORMATION ABOUT EPD OWNER

Owner of the EPD: INHUS Prefab OÜ

Address: Betooni st. 7, 50411 Tartu, Estonia

Contact: prefab@inhus.eu

Address and contact information of the LCA practitioner commissioned by the EPD owner:
Urté Valdavičė, UAB Vesta Consulting

Description of the organization: INHUS Prefab is a manufacturing company implementing various architectural ideas of buildings, producing brick, coloured, matrix and graphic concrete facade elements, which make every building unique. The company has extensive experience in developing a variety of concrete structures and elements, including prefabricated wall elements, hollow core and balcony slabs, stair and linear structural elements.

Key facts about INHUS Prefab:

- 3 factories in Vilnius, Kaunas and Tartu (Žarijų str. 6, 02300 Vilnius, Bituko str. 5, 52366 Kaunas and Betooni 7, 50411 Tartu)
- 321 000 m² of wall panel produced annually
- 316 800 m² of hollow core slabs produced annually
- 8 150 m³ of frame constructions produced annually

INHUS Prefab is part of INHUS - one of the leading design-build project developers in the Nordic region, with sales of 90 million euros and approximately 850 employees in 2025. INHUS collaborates with the largest Lithuanian and Scandinavian construction companies, and real estate developers to bring simplicity to design-build delivery.

INHUS vision is to construct buildings without the need for traditional construction sites - a world where clients only have to focus on their ideas, not the technical execution. Sustainability is at the core of this vision, as it requires rethinking construction processes, materials, and the roles of employees. The company pursues a holistic approach, making net-positive investments across all three dimensions of sustainability: social, environmental, and economic.

To maximize value for customers and the environment, INHUS takes full responsibility for the entire production process - from the design and manufacturing of building components to the development of logistics solutions and, ultimately, construction itself. The company continuously innovates in production methods, implements modern technologies, ensures efficient resource use, and invests in employee development. INHUS has also developed a carbon reduction strategy, outlining its planned actions and commitments through 2030.

Product-related or management system-related certifications: Finally, the company is a member of Lithuanian Builders Association, Lithuanian Construction Industry Association and is recognized for meeting the management system standards - ISO 9001: 2015 (Quality management systems), ISO 14001: 2015 (Environmental management systems) and ISO 45001:2018 – (Occupational health and safety management systems).

PRODUCT INFORMATION

Product name: Insulated precast concrete wall

UN CPC code: 37550 – prefabricated structural components for building or civil engineering, of cement, concrete or artificial stone

Product description: Insulated wall elements are two and three-layer thermo-insulated exterior wall elements, to the bearing interior layer of which a non-bearing exterior layer has been hung by stainless steel anchors.

This EPD covers insulated precast concrete wall elements manufactured using concrete classes ranging from C25/30 to C50/60, and insulation types such as PIR, mineral wool, XPS, EPS and PF.

Products application: Wall elements are used mainly at the construction of dwelling houses but also non-residential buildings. The building speed will increase considerably by building from precast wall elements, whereas it is possible to produce the exterior enclosures of a building with an adequate heat retention, which is very important in terms of energy conservation. Also, the exterior facade of a building with exterior walls made of insulated precast concrete wall elements does not need any supplementary finishing. The quality of products is secured by factory production control. The factory production control includes regular control of all the used equipment and the production process itself and the testing of raw materials.

Technical specification: Insulated precast concrete wall consists of:

- a base panel, which transmits its own permanent load and the load of the facing panel (if present) to the structure. The base panel is connected to the facing panel by a rod system.
- a concrete facing panel (if present), which is the outer element of the three-layer wall. The facing panel can be plane surface, matrix surface, washed surface, graphical surface, brick surface. Facing concrete surface can be made of coloured concrete.
- thermal insulation attached to the base panel.

Insulated precast concrete wall can be of various sizes, with one or more window openings and/or one or more door openings, with or without console. Also, product can be produced with electrical installation. The products are manufactured in the following dimensions and technical features:

- Concrete layer: C25/30 - C50/60; thickness (total inner and outer layer) 160 mm - 400 mm;
- Height: 300 mm - 4300 mm;
- Length: 300 mm - 11500 mm;
- Insulation: PIR, mineral wool, XPS, EPS and Phenolic foam; thickness 70 mm - 300 mm;

Information on fire protection according to EN 13501:

- class of construction material: A1, A2, B, C, D, E and F;
- flaming dripping: d0, d1 and d2;
- smoke development: s1, s2 and s3.

Product Standards: Insulated precast concrete wall elements are certified and manufactured in accordance with the harmonized European standard EN 14992 Precast concrete products - Wall elements. It holds the CE mark and the declaration of performance issued by the manufacturer in accordance with requirements of Regulation (EU) No. 305.2011 of the European Parliament and of the Council issued on 2011 March 9th.

Name and location of production site(s): INHUS Prefab OÜ Betooni 7, 51014 Tartu, Estonia

References to any relevant websites for more information or explanatory materials: Visit <https://www.inhusprefab.eu/en> to learn more.

CONTENT DECLARATION

In the brackets the range of material composition within the product group is declared, in addition to the worst-case (3-layer wall, 160 mm concrete layer, class C50/60, insulation 300 mm) product composition.

The declared unit is 1 tonne of the worst-case product.

Product content	Mass, kg	Post-consumer recycled material, mass-% of product	Biogenic material, mass-% of product	Biogenic material, kg C / product
Cement	161,19 (136,97-192,62)	0	0	0
Sand	308,04 (318,89-806,86)	0	0	0
Granite	401,44 (0-483,69)	0	0	0
Insulation	22,63 (3,36-25,54)	0	0	0
Water	63,89 (63,89-94,17)	0	0	0
Reinforcement	40,60 (32,01-40,60)	0,42	0	0
Additives	2,21 (1,30-3,51)	0	0	0
TOTAL	1000,00	0,42	0	0

Total recycled steel content is 62,11% and total recycled material content (post- and pre-consumer) in product is 2,52%.

Packaging materials	Weight, kg	Weight-% (versus the product)	Biogenic material, kg C / product
¹ Wood	3,98	0,40%	1,64
Plastic packaging	0,001	0,00%	0
TOTAL	3,98	0,40%	1,64

¹ Global Warming Potential biogenic: -936,73 kg CO_{2e} / m³, density – 620,00 kg/m³

Note. 1 kg biogenic carbon in the product/packaging is equivalent to the uptake of 44/12 kg of CO₂.

Products does not contain any REACH SVHC substances in amounts greater than 0,1% (1000 ppm).

LCA INFORMATION

Declared unit: the declared unit of the study is 1 tonne of the product supplied to the client. The mass of the product per declared unit is 1000.00 kg.

Time representativeness: primary data was collected internally. The production data refers to the time period of May 2024 – April 2025.

Geographical scope: The geographical scope for modules A1-A2 is based on global data, while modules A3, C1–C4, and module D are based on European data.

Database(s) and LCA software used: The Ecoinvent database provides the life cycle inventory data for the raw and processed materials obtained from the background system. The used databases are Ecoinvent 3.11, and One Click LCA. The LCA software used is One Click LCA (version 0.48.0).

Description of system boundaries: cradle-to-gate with modules C1-C4 and module D.

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	GLO	GLO	EU	-	-	-	-	-	-	-	-	-	EU	EU	EU	EU	EU
Primary data used	47,13%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	>10%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-

Description of the system boundary (X = Included in LCA; ND = Module Not declared)

Note. Based on PCR 2019:14 Construction products section 2.2.2.4. Table 2 for type b) EPD A4-A5, B modules are optional to declare, therefore excluded due to lack of relevance.

Data quality: The EPD covers products manufactured in one factory in Tartu (Estonia) which provided data for the period of May 2024 – April 2025. The data collection has been done internally and thoroughly. The data is based on yearly production amounts and extrapolations of measurements on specific machines and plants. The EPD covers raw material supply and transport on a Global scale, and product production and end-of-life on a Europe scale. During the manufacturing process, formwork is prepared, reinforcement and insulation are placed, and concrete is mixed and poured. The elements are compacted, cured under controlled conditions, then demoulded, finished, and inspected. The site is powered by residual mix and renewable solar panel energy, additionally district heating and natural gas for heating, diesel for mobile machinery is used. Background data was sourced from the ecoinvent 3.11, and One Click LCA databases. No poor or very poor data was found during the assessment of relevant

data using PEF method (EN 15804:2012+A2:2019, Annex E, only E.2). The data quality assessment is done in accordance with EN 15941:2024. Overall, the data quality can be described as good. The EN 15804 reference package used is based on EF 3.1.

Share of primary data used: The share of primary data is calculated based on GWP-GHG results. It is a simplified indicator for data quality that supports the use of more primary data, to increase the representativeness of and comparability between EPDs. Note that the indicator does not capture all relevant aspects of data quality and is not comparable across product categories. Declaration of data sources, reference years, data categories, and share of primary data is presented below.

Process	Source type	Source	Reference year	Data category	Share of primary data, of GWP-GHG results for A1-A3
Production of cement (A1)	EPD	Confidential	2024	Primary data	9,34%
Production of reinforcement steel (A1)	EPDs / database	Confidential / ecoinvent 3.11	1997-2024	Primary / secondary data	2,53%
Production of Insulation (A1)	EPD	Confidential	2019	Primary data	6,52%
Production of aggregates (A1)	Database	Ecoinvent v 3.11	1994-2024	Secondary data	0,00%
Production of additives (A1)	EPDs	Confidential	2021-2023	Primary data	0,27%
Transport of raw materials to manufacturing site (A2)	Database	Ecoinvent v. 3.11	2009-2024	Primary data	24,11%
Production of packaging (A3)	Databases	Ecoinvent v. 3.11 / OneClickLCA	1993-2024	Secondary data	0,00%
Production ancillary materials (A3)	Database	Ecoinvent v. 3.11	1997-2024	Secondary data	0,00%
Energy used in manufacturing of product (A3)	Database	Ecoinvent v. 3.11	1996-2024	Primary data	4,36%
Waste and wastewater treatment (A3)	Database	Ecoinvent v. 3.11	1993-2024	Secondary data	0,00%
Total share of primary data, of GWP-GHG results for A1-A3					47,13%

Note. Ecoinvent datapoints are based on older background flows, but updated in 2024 (v.3)

The reported share of primary data is associated with uncertainty, as one or several EPDs that are used as data source lack information on the share of primary data used.

Cut-off criteria: The study does not exclude any modules or processes that are mandatory according to the applicable Standards and PCR. No hazardous materials or substances are excluded. All major raw materials, auxiliary materials (where applicable), and energy inputs, as well as emissions and outputs from the unit processes for which data are available, are fully included in the calculation. No input or output flows were excluded based on cut-off criteria.

Allocation, estimates and assumptions:

Allocation is required if some material, energy, and waste data cannot be measured separately for the product under investigation. In this study, as per EN 15804:2012+A2:2019, allocation is conducted in the following order:

1. Allocation should be avoided
2. Allocation should be based on physical properties (e.g. mass, volume) when the difference in revenue is small
3. Allocation should be based on economic values

The allocations used in this study follow the system model 'Allocation, cut-off, 15804:2012+A2:2019'.

The methodological choices for allocation for reuse, recycling and recovery have been set according to the polluter pays principle (PPP).

The origin of the recycled content (pre- vs post-consumer) is unknown; therefore, a conservative approach was taken by assuming the entire recycled portion is post-consumer scrap, in accordance with

PCR 2.0.1 section 4.5.3. Under this assumption, the scrap is treated as waste, and waste allocation is applied, meaning no environmental burdens are assigned to the recycled input.

Scenarios included in the LCA are based on realistic scenarios which are currently in use and are representative for one of the most likely scenario alternatives.

The environmental impacts of capital goods (e.g., production equipment, recycling machinery) and infrastructure (e.g., recycling facilities, transportation systems) have not been included in this assessment.

Carbonation is not taken into account in the calculations. Carbonation is a natural process occurring when carbon dioxide is emitted during cement production is rebound to the concrete during use and end of life stages of a building.

Calculation rules for averaging data:

The EPD is an EPD of multiple products, based on the worst-case product. The worst-case product calculations were chosen because the difference (in %) between products with different insulation types, insulation thicknesses, and concrete strength classes exceeds 10%.

The analysed product group includes insulated wall elements differing in concrete strength (C25/30-C50/60), insulation type (PIR, mineral wool, XPS, EPS and phenolic foam) and insulation thickness (70-300 mm). For modules A-D, calculations were performed using the boundary values of the product range, including the lowest and highest concrete strength classes (C25/30 and C50/60), the minimum and maximum concrete layer thicknesses (160-400 mm), the lowest and highest reinforcement content, and the minimum and maximum insulation thicknesses for each insulation type.

The worst-case configuration was identified as a wall element with a 160 mm concrete layer of strength class C50/60 combined with 300 mm insulation. However, as different configurations resulted in the highest impacts for different environmental indicators, an assembled worst-case approach per indicator has been applied. For each declared environmental indicator and for modules A-C, the maximum value among the assessed variants is reported in the EPD. For module D, the lowest benefit of avoided processes and the highest associated loads are declared to ensure a conservative representation.

Consequently, the declared results do not represent one single physical product configuration but a conservative envelope composed of the highest impacts per indicator across the product group. This ensures that the results are valid and conservative for all product variants covered by this EPD.

The grouped products have identical or similar functions, are manufactured by a single company at one production site and follow the same major production processes within the A3 (core) module. Allocation was performed based on production weight (mass allocation).

Product life cycle

Product stage (A1-A3)

A1: This module considers the extraction and processing of raw materials.

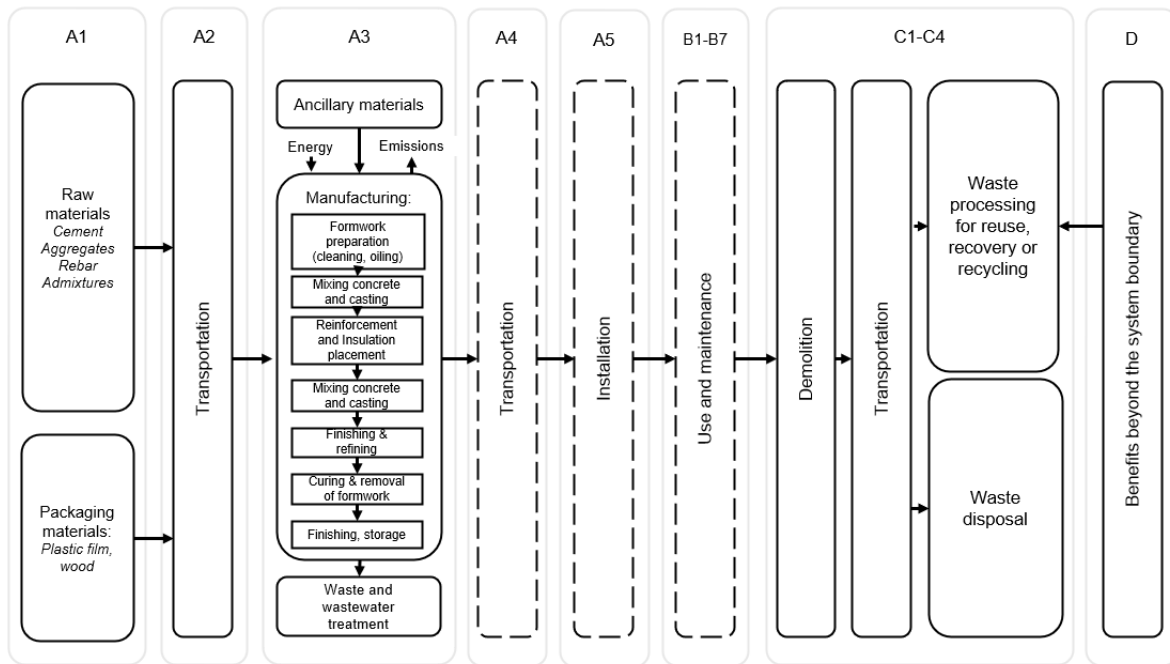
A2: The raw materials are transported to the manufacturing plant. In this case the model includes road transportation of each raw material.

A3: This module includes the manufacture of products and packaging. It has considered all the energy consumption and waste generated in the production plant.

Manufacturing process

The production of the precast concrete elements begins with the preparation of the casting mold, which includes cleaning and oiling the casting platform. Then the mixing of concrete and the casting of the outer concrete layer into the mould follows. Thermal insulation is then placed, followed by the installation of reinforcement and the casting of the inner concrete layer. After curing under controlled conditions, the wall elements are demoulded, finished according to project requirements, quality-controlled, and prepared for transport to the construction site.

See the manufacturing diagram below.



Note. The dashed lines indicated that construction and use stage (A4–A5, B1–B7 modules) were not assessed, as their inclusion is not applicable for this type of EPD (as specified in PCR 2019:14 Construction products (EN 15804+A2), version 2.0.1).

Construction process stage (A4-A5)

A4: This EPD does not cover the Transport module.

A5: This EPD does not cover the Installation module.

Use stage (B1-B7)

B1-B7: This EPD does not cover the Use stage.

End of life stage (C1-C4, D)

C1: Deconstruction, dismantling, demolition

Consumption of fuel in demolition process is calculated according to transported mass. Energy consumption for demolition is 10,00 kWh/tonne. The source of energy is diesel fuel burned in building machines.

C2: Transport of the discarded product to the processing site

It is assumed that no mass loss occurs during the use phase; therefore, the product at end of life has the same weight as the declared product. All end-of-life products are considered to be transported to the nearest available waste management facilities, such as recycling, incineration or landfill sites. The transport distance to the nearest recycling or disposal facility (80 km) and the transport mode (lorry) are based on the reference values provided in PCR 2019:14, Table 4.

C3: Waste processing for reuse, recovery, and/or recycling

According to the European Commission Waste Framework Directive, by 2020 the preparation for reuse, recycling, and other material recovery of non-hazardous construction and demolition waste shall reach a minimum of 70 % by weight. Therefore, it is assumed that 70 % of the concrete waste is recycled. In accordance with EN 16757:2022 (6.3.9.4.1), this corresponds to the sub-scenario "Substitution of natural aggregates in fresh concrete", as the concrete waste is processed into gravel fractions that replace natural aggregates.

For reinforcing steel, based on EuRIC data¹, it is assumed that 90 % of the steel is recycled.

The environmental benefits associated with the substitution of primary materials are reported in Module D. A yield factor of 0,9 is applied, assuming 10 % material losses during the recovery process.

C4: Discharge (disposal)

According to the European Commission Waste Framework Directive, it is assumed that 30 % of the concrete is collected together with construction waste and sent to landfill. In line with EuRIC data, it is further assumed that 10 % of the reinforcing steel is also sent to landfill. The insulation is assumed to be treated by the following technologies: 3% of open burning, 24% of open dump, 13% of sanitary landfill, 61% of municipal incineration (without energy recovery).

Benefits and loads beyond the system boundary (D):

In the context of end-of-life scenario D, it is assumed that steel is recovered, subsequently fully recycled into post-consumer waste and has been modelled to avoid use of primary materials. The mass of the primary materials in the product is used to prevent double counting. The concrete has been modelled to avoid gravel production. The impact of concrete crushing for use as gravel is also considered.

¹ EuRIC. (2020, February). Metal Recycling Factsheet. European Circular Economy Stakeholder Platform. Retrieved from <https://circulareconomy.europa.eu/platform/en/knowledge/metal-recycling-factsheet-euric>

ENVIRONMENTAL PERFORMANCE

LCA results of the product(s) - main environmental performance results

Mandatory impact category indicators according to EN 15804, EF 3.1

Results per declared unit																
Indicator	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP- total	kg CO ₂ eq.	3,23E+02	ND	ND	ND	ND	ND	ND	ND	ND	ND	3,62E+00	8,52E+00	3,74E+00	5,55E+01	-1,83E+01
GWP- fossil	kg CO ₂ eq.	3,22E+02	ND	ND	ND	ND	ND	ND	ND	ND	ND	3,62E+00	8,52E+00	3,74E+00	5,55E+01	-1,83E+01
GWP- biogenic	kg CO ₂ eq.	7,25E-01	ND	ND	ND	ND	ND	ND	ND	ND	ND	6,90E-04	1,90E-03	0,00E+00	-1,08E-19	0,00E+00
GWP- luluc	kg CO ₂ eq.	6,92E-01	ND	ND	ND	ND	ND	ND	ND	ND	ND	3,71E-04	3,81E-03	1,31E-03	1,62E-03	-7,38E-03
ODP	kg CFC 11 eq.	1,38E-04	ND	ND	ND	ND	ND	ND	ND	ND	ND	5,38E-08	1,26E-07	5,43E-08	9,59E-08	-8,64E-08
AP	mol H+ eq.	2,45E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	3,24E-02	2,91E-02	3,59E-02	9,24E-02	-8,67E-02
EP-freshwater	kg P eq.	3,57E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	1,17E-04	6,63E-04	6,41E-04	4,06E-04	-1,11E-02
EP-marine	kg N eq.	4,07E-01	ND	ND	ND	ND	ND	ND	ND	ND	ND	1,51E-02	9,55E-03	1,43E-02	2,49E-01	-1,99E-02
EP-terrestrial	mol N eq.	9,33E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	1,65E-01	1,04E-01	1,58E-01	4,95E-01	-2,27E-01
POCP	kg NMVOC eq.	1,29E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	4,94E-02	4,28E-02	4,71E-02	1,28E-01	-7,06E-02
ADP-minerals&metals	kg Sb eq.	9,05E-03	ND	ND	ND	ND	ND	ND	ND	ND	ND	1,30E-06	2,38E-05	5,92E-05	8,39E-06	-1,72E-04
ADP-fossil	MJ	4,52E+03	ND	ND	ND	ND	ND	ND	ND	ND	ND	4,72E+01	1,24E+02	4,91E+01	7,32E+01	-1,87E+02
WDP	m ³	1,25E+04	ND	ND	ND	ND	ND	ND	ND	ND	ND	1,21E-01	6,11E-01	3,14E-01	5,13E+00	-1,17E+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															

Note: A comma (",") is used as the decimal separator throughout this report. ND = Module Not declared. The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks. The results of the end-of-life stage (modules C1-C4) should be considered when using the results of the product stage (modules A1-A3). A portion of data used in this EPD is based on data derived from a 3.0 version of the Emission Factor (EF) database. The use of the older EF version was assessed and determined to yield results that are either identical or conservative in comparison to those that would be obtained using the current EF version 3.1. The biogenic carbon contained in packaging materials in module A3 has been accounted for and balanced within the same life cycle stage (A1-A3). EN 15804+A2 disclaimer for Abiotic depletion and Water use and optional indicators except Particulate matter and Ionizing radiation, human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

Additional mandatory and voluntary impact category indicators, EF 3.1

Results per declared unit																
Indicator	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Particulate matter	Incidence	2,65E-05	ND	ND	ND	ND	ND	ND	ND	ND	ND	9,25E-07	8,53E-07	5,82E-06	5,26E-07	-1,49E-06
Ionizing radiation	kBq U235e	3,04E+01	ND	ND	ND	ND	ND	ND	ND	ND	ND	2,01E-02	1,08E-01	1,12E-01	5,46E-02	-1,35E-02
Ecotoxicity (freshwater)	CTUe	5,68E+03	ND	ND	ND	ND	ND	ND	ND	ND	ND	2,69E+01	1,75E+01	7,61E+01	2,66E+02	-7,48E+02
Human toxicity, cancer	CTUh	4,13E-07	ND	ND	ND	ND	ND	ND	ND	ND	ND	3,69E-10	1,41E-09	1,03E-09	2,88E-08	-3,44E-09
Human tox. non-cancer	CTUh	4,85E-06	ND	ND	ND	ND	ND	ND	ND	ND	ND	5,80E-09	8,01E-08	5,46E-08	2,25E-07	-1,33E-07
SQP	-	3,19E+03	ND	ND	ND	ND	ND	ND	ND	ND	ND	3,12E+00	1,25E+02	2,38E+01	9,96E+01	-1,06E+02

EN 15804+A2 disclaimer for Ionizing radiation, human health. This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator

Resource use indicators

Results per declared unit																
Indicator	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	MJ	3,65E+02	ND	ND	ND	ND	ND	ND	ND	ND	ND	2,96E-01	1,69E+00	2,27E+00	1,00E+00	-1,66E+01
PERM	MJ	3,01E+01	ND	ND	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	-1,87E-01	-8,02E-02	0,00E+00
PERT	MJ	3,95E+02	ND	ND	ND	ND	ND	ND	ND	ND	ND	2,96E-01	1,69E+00	2,08E+00	9,05E-01	-1,66E+01
PENRE	MJ	4,03E+03	ND	ND	ND	ND	ND	ND	ND	ND	ND	4,72E+01	1,24E+02	4,91E+01	5,06E+01	-1,87E+02
PENRM	MJ	1,16E+03	ND	ND	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	-7,65E+00	-2,41E+01	0,00E+00
PENRT	MJ	5,19E+03	ND	ND	ND	ND	ND	ND	ND	ND	ND	4,72E+01	1,24E+02	4,15E+01	2,65E+01	-1,87E+02
SM	kg	3,97E+01	ND	ND	ND	ND	ND	ND	ND	ND	ND	1,95E-02	5,26E-02	2,92E-02	2,26E-02	5,95E+02
RSF	MJ	2,70E+02	ND	ND	ND	ND	ND	ND	ND	ND	ND	5,12E-05	6,69E-04	6,72E-04	5,74E-04	-1,72E-03
NRSF	MJ	2,79E+02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m ³	3,61E+02	ND	ND	ND	ND	ND	ND	ND	ND	ND	3,02E-03	1,83E-02	7,40E-03	9,60E-02	-2,51E-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; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water															

Note. Option A was chosen for the calculations of the primary energy indicators. according to on Annex 3 of PCR 2019:14

Waste indicators

Results per declared unit																
Indicator	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste disposed	kg	3,15E+01	ND	ND	ND	ND	ND	ND	ND	ND	ND	5,29E-02	2,10E-01	1,16E-01	8,46E-01	-4,77E+00
Non-hazardous waste disposed	kg	4,76E+02	ND	ND	ND	ND	ND	ND	ND	ND	ND	7,71E-01	3,88E+00	3,50E+00	3,10E+02	-6,13E+01
Radioactive waste disposed	kg	2,24E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	4,93E-06	2,64E-05	2,84E-05	1,35E-05	4,71E-06

Output flow indicators

Results per declared unit																
Indicator	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Components for re-use	kg	0,00E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Material for recycling	kg	5,25E+01	ND	ND	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	6,90E+02	0,00E+00	0,00E+00
Materials for energy recovery	kg	3,73E-07	ND	ND	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy, electricity	MJ	0,00E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy, thermal	MJ	0,00E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Additional indicator – GWP-GHG

Results per declared unit																
Indicator	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-GHG	kg CO ₂ eq.	3,22E+02	ND	ND	ND	ND	ND	ND	ND	ND	ND	3,62E+00	8,52E+00	3,74E+00	5,55E+01	-1,83E+01

Note. This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO₂ is set to zero.

Additional LCA results (other environmental performance results) of the product(s)

Additional results for end-of-life 100% scenarios for modules C1-C4, D

End-of-life scenario documentation (corresponding scenario 100% recycling)

Scenario parameter	Value (scenario 100% recycling)	Value (scenario 100% disposal)
Collection process – kg collected separately	1000,00	1000,00
Collection process – kg collected with mixed waste	-	-
Recovery process – kg for re-use	-	-
Recovery process – kg for recycling	1000,00	-
Recovery process – kg for energy recovery	-	-
Disposal (total) – kg for final deposition	-	1000,00
Scenario assumptions e.g. transportation	80 km	80 km

Note. Yield factor = 0,9 (assuming 10% of material is lost in the recycling process)

Mandatory impact category indicators according to EN 15804 (scenario 100% recycling)

Results per declared unit						
Indicator	Unit	C1	C2	C3	C4	D
GWP- total	kg CO ₂ eq.	3,62E+00	8,52E+00	5,08E+00	0,00E+00	-1,43E+03
GWP-fossil	kg CO ₂ eq.	3,62E+00	8,52E+00	5,08E+00	0,00E+00	-1,42E+03
GWP-biogenic	kg CO ₂ eq.	6,90E-04	1,90E-03	-1,08E-19	0,00E+00	0,00E+00
GWP- luluc	kg CO ₂ eq.	3,71E-04	3,81E-03	1,48E-03	0,00E+00	-2,24E-01
ODP	kg CFC 11 eq.	5,38E-08	1,26E-07	7,41E-08	0,00E+00	-4,73E-06
AP	mol H+ eq.	3,24E-02	2,91E-02	4,80E-02	0,00E+00	-5,78E+00
EP-freshwater	kg P eq.	1,17E-04	6,63E-04	7,02E-04	0,00E+00	-1,03E+00
EP- marine	kg N eq.	1,51E-02	9,55E-03	1,99E-02	0,00E+00	-1,29E+00
EP-terrestrial	mol N eq.	1,65E-01	1,04E-01	2,18E-01	0,00E+00	-1,40E+01
POCP	kg NMVOC eq.	4,94E-02	4,28E-02	6,52E-02	0,00E+00	-4,76E+00
ADP-minerals & metals	kg Sb eq.	1,30E-06	2,38E-05	6,17E-05	0,00E+00	-1,56E-02
ADP-fossil	MJ	4,72E+01	1,24E+02	6,66E+01	0,00E+00	-1,32E+04
WDP	m ³	1,21E-01	6,11E-01	3,66E-01	0,00E+00	-3,22E+02

Mandatory impact category indicators according to EN 15804 (scenario 100% disposal)

Results per declared unit						
Indicator	Unit	C1	C2	C3	C4	D
GWP- total	kg CO ₂ eq.	3,62E+00	8,52E+00	0,00E+00	6,26E+00	0,00E+00
GWP-fossil	kg CO ₂ eq.	3,62E+00	8,52E+00	0,00E+00	6,26E+00	0,00E+00
GWP-biogenic	kg CO ₂ eq.	6,90E-04	1,90E-03	0,00E+00	-1,08E-19	0,00E+00
GWP- luluc	kg CO ₂ eq.	3,71E-04	3,81E-03	0,00E+00	3,58E-03	0,00E+00
ODP	kg CFC 11 eq.	5,38E-08	1,26E-07	0,00E+00	1,74E-07	0,00E+00
AP	mol H+ eq.	3,24E-02	2,91E-02	0,00E+00	4,38E-02	0,00E+00
EP-freshwater	kg P eq.	1,17E-04	6,63E-04	0,00E+00	5,46E-04	0,00E+00
EP- marine	kg N eq.	1,51E-02	9,55E-03	0,00E+00	1,68E-02	0,00E+00
EP-terrestrial	mol N eq.	1,65E-01	1,04E-01	0,00E+00	1,84E-01	0,00E+00
POCP	kg NMVOC eq.	4,94E-02	4,28E-02	0,00E+00	6,63E-02	0,00E+00
ADP-minerals & metals	kg Sb eq.	1,30E-06	2,38E-05	0,00E+00	9,35E-06	0,00E+00
ADP-fossil	MJ	4,72E+01	1,24E+02	0,00E+00	1,53E+02	0,00E+00
WDP	m ³	1,21E-01	6,11E-01	0,00E+00	6,49E+00	0,00E+00

ADDITIONAL ENVIRONMENTAL INFORMATION

Manufacturing energy scenario documentation

Scenario parameter	Value	Source
Grid electricity (national average mix)	0,6700 kg CO ₂ e / kWh	Data sources: ecoinvent 3.11 Country: Estonia
On-site solar electricity (photovoltaic panels)	0,0774 kg CO ₂ e / kWh	Data sources: ecoinvent 3.11 Country: World
Natural gas heat for industrial production	0,2714 kg CO ₂ e / kWh	Data sources: ecoinvent 3.11 Country: Estonia
District heating (Estonia)	0,0764 kg CO ₂ e / kWh	Data sources: OneCickLCA Country: Estonia
Diesel fuel for mobile machinery	0,3600 kg CO ₂ e / kWh	Data sources: ecoinvent 3.11 Country: World

End of life scenario documentation (worst-case scenario)

Scenario parameter	Value
Collection process – kg collected separately	1000,00
Collection process – kg collected with mixed waste	0
Recovery process – kg for re-use	0
Recovery process – kg for recycling	689,65
Recovery process – kg for energy recovery	0
Disposal (total) – kg for final deposition	310,35
Scenario assumptions e.g. transportation	For materials not to be incinerated: 80 km with an average lorry

Note. Yield factor = 0,9 (assuming 10% of material is lost in the recycling process)

ABBREVIATIONS

Abbreviation	Definition
General Abbreviations	
EN	European Norm (Standard)
EPD	Environmental Product Declaration
EF	Environmental Footprint
ISO	International Organization for Standardization
LCA	Life Cycle Assessment
PCR	Product Category Rules
c-PCR	Complementary Product Category Rules
CEN	European Committee for Standardization
CPC	Central product classification
Environmental Impact Indicators (EN 15804)	
GHG	Greenhouse gas
GWP	Global Warming Potential (kg CO ₂ eq.)
GWP-fossil	Global Warming Potential from fossil sources (kg CO ₂ eq.)
GWP-biogenic	Global Warming Potential from biogenic sources (kg CO ₂ eq.)
GWP-luluc	Global Warming Potential from land use and land use change (kg CO ₂ eq.)
GWP-total	Total Global Warming Potential (kg CO ₂ eq.)
GWP-GHG	Global Warming Potential for greenhouse gases (kg CO ₂ eq.)
ODP	Ozone Depletion Potential (kg CFC-11 eq.)
AP	Acidification Potential (mol H ⁺ eq.)
EP	Eutrophication Potential
EP-freshwater	Freshwater eutrophication potential (kg P eq.)
EP-marine	Marine eutrophication potential (kg N eq.)
EP-terrestrial	Terrestrial eutrophication potential (mol N eq.)
POCP	Photochemical Ozone Creation Potential (kg NMVOC eq.)
ADP	Abiotic Depletion Potential
ADP-minerals&metals	Abiotic depletion potential for non-fossil resources (kg Sb eq.)
ADP-fossil	Abiotic depletion potential for fossil resources (MJ)
WDP	Water Deprivation Potential (m ³)
Resource Use Indicators	
PERE	Use of renewable primary energy excluding renewable primary energy resources used as raw materials (MJ)
PERM	Use of renewable primary energy resources used as raw materials (MJ)
PERT	Total use of renewable primary energy resources (MJ)
PENRE	Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials (MJ)
PENRM	Use of non-renewable primary energy resources used as raw materials (MJ)
PENRT	Total use of non-renewable primary energy resources (MJ)
SM	Use of secondary material (kg)
RSF	Use of renewable secondary fuels (MJ)
NRSF	Use of non-renewable secondary fuels (MJ)
FW	Use of net fresh water (m ³)
Waste Indicators	
HW	Hazardous Waste (disposed) (kg)
NHW	Non-Hazardous Waste (disposed) (kg)
RW	Radioactive Waste (disposed) (kg)
Output Flow Indicators	
CFR	Components for Reuse (kg)
MR	Material for Recycling (kg)
MER	Materials for Energy Recovery (kg)
EEE	Exported Energy, Electricity (MJ)
EET	Exported Energy, Thermal (MJ)
Lifecycle Stages / Modules	
A1	Raw material supply
A2	Transport
A3	Manufacturing
A4	Transport to site

Abbreviation	Definition
A5	Construction/Installation
B1	Use
B2	Maintenance
B3	Repair
B4	Replacement
B5	Refurbishment
B6	Operational energy use
B7	Operational water use
C1	Deconstruction/Demolition
C2	Transport to waste processing
C3	Waste processing
C4	Disposal
D	Reuse-Recovery-Recycling potential
Other Relevant Terms	
SVHC	Substances of Very High Concern
EC No.	European Community Number
MJ	Megajoule
kg	Kilogram
m ³	Cubic Meter
NM VOC	Non-Methane Volatile Organic Compounds
Sb eq.	Antimony Equivalents
P eq.	Phosphorus Equivalents
N eq.	Nitrogen Equivalents
CFC-11 eq.	Chlorofluorocarbon-11 Equivalents
CO ₂ eq.	Carbon Dioxide Equivalents
kg C	Kilograms of Carbon
kg CO ₂ eq.	Kilograms of Carbon Dioxide Equivalent
ND	Not Declared
REACH	Registration, Evaluation, Authorisation, and Restriction of Chemicals
ppm	Parts per million
PEF	Product Environmental Footprint
PPP	Polluter pays principle
EU	Europe
GLO	Global

REFERENCES

- a) ISO 14025:2010 Environmental labels and declarations – Type III environmental declarations Principles and procedures.
- b) ISO 14040:2006 Environmental management. Life cycle assessment. Principles and frameworks.
- c) ISO 14044:2006 Environmental management. Life cycle assessment. Requirements and guidelines.
- d) General Programme Instructions of International EPD System (version 5.0.1) (2025-02-07)
- e) PCR 2019:14 Construction products (EN 15804+A2) (version 2.0.1) (2025-06-05)
- f) PCR 2019:14-c-PCR-003 Being updated - Concrete and concrete elements (EN 16757) (1.0.0) (2025-04-08)
- g) EN 15804+A2 Sustainability in construction works – Environmental product declarations – Core rules for the product category of construction products.
- h) EN 15941:2024 Sustainability of construction works – Environmental product declarations – Data quality requirements and communication.
- i) EN 16757:2022 Sustainability of construction works – Environmental product declarations – Product Category Rules for concrete and concrete elements.
- j) European Commission. (2008). Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives. Official Journal of the European Union. L 312. 3–30. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32008L0098>
- k) EuRIC. (2020, February). Metal Recycling Factsheet. European Circular Economy Stakeholder Platform. Retrieved from <https://circulareconomy.europa.eu/platform/en/knowledge/metal-recycling-factsheet-euric>
- l) OECD. (2024). Unlocking potential in the global scrap steel market. Organisation for Economic Co-operation and Development. https://www.oecd.org/content/dam/oecd/en/publications/reports/2024/12/unlocking-potential-in-the-global-scrap-steel-market_b7014135/d7557242-en.pdf
- m) Life-cycle assessment background report "Precast concrete products"
- n) Ecoinvent database v3.11 (2024) and One Click LCA database.

VERSION HISTORY

Original Version of the EPD, 2026-04-07

