Environmental Product Declaration

In accordance with ISO 14025 and EN 15804:2012+A2:2019 for:

Precast concrete products – Insulated walls

from

Perdanga, UAB

Programme:	The International EPD® System, www.environdec.com
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Environmental Product Declaration

This is an Environmental Product Declaration for precast concrete product – insulated wall, produced by Perdanga, UAB. The declaration is registered in accordance with the EPD programme of the International EPD® System and the Product Category Rules for Construction Products 2019:14, version 1.1. The EPD are used in both business-to-business (B2B) and business-to-consumer (B2C) communication.

Company information

Owner of the EPD:
Perdanga, UAB
e-mail: *valaitis@perdanga.lt*
www.perdanga.lt

Description of the organisation: The factory counts its age since 1961. Since 1992 the enterprise has been registered as the Limited Liability Company "Perdanga". Perdanga is the one of the largest producers of concrete products in Lithuania with a turnover of 28 MEUR. In year 2003 company established second factory in Vilnius. The Company's products were used in major construction projects: Klaipeda city waste-water treatment plant, Butinge Oil Terminal, Mazeikiai Refinery, Klaipeda Container Terminal, Cruise Terminal, production facilities of foreign capital companies "Philip Morris", Master Foods. Perdanga production is also exported to neighbouring countries – Latvia, Russia, Sweden, and Norway. Company has implemented Quality management systems EN ISO 9001:2015 and EN ISO 14001:2015
Name and location of production site(s): Perdanga, UAB Dubysos str. 27, 91181 Klaipeda, Lithuania

Product-related or management system-related certifications: Insulated walls are produced according to requirements of EN 14992. Common aspects which apply to all precast products are specified in EN 13369 and EN 206-1.

Product information

Product name: Insulated wall

Product description: The external partitions of buildings play a crucial role in the energy consumption of a building. Reinforced concrete facades are an excellent heat exchanger that absorbs excess heat and returns it to the room when the temperature drops. Insulated wall elements are used as a part or whole building facade structure for various types of buildings:
- dwelling houses,
- industrial buildings,
- public buildings,
- warehouses.

Another important feature of facade elements is the aesthetic appearance. Modern technologies applied in the factory of Perdanga, UAB allow to give any architectural expression to the elements of prefabricated reinforced concrete and thus ensure that the architect's ideas will be implemented, and the customer's expectations will be met. Perdanga, UAB offers three-layer insulated exterior walls with a wide variety of facade finishes:
a) Natural concrete is left,
b) Paintable surface. Such a surface, after installation, may be painted or impregnated,
c) With a finishing with ceramic tiles or clinker bricks,
d) Various surface texture,

e) Exposed concrete texture,
f) Graphic concrete,
g) Surface of colored concrete,
h) Polished concrete surface.

Thermal insulation layer has a thickness of 100 ÷ 430 mm, depending on the requirements for thermal resistance. Polystyrene, semi-rigid stone wool, polyisocyanurate panels (PIR) are used for this layer. Walls with polystyrene thermal insulation are most often used in places with increased risk of moisture (basement, plinth elements). At the request of customers, expanded polystyrene can also be used in other wall constructions of the building.
Stone wool with ventilation grooves is used for thermal insulation of walls above ground line. This wool is specially adapted to produce prefabricated reinforced concrete walls. Ventilation grooves are cut in stone wool on the façade side and the entire surface is covered with glass fabric. This forms a ventilated façade, which allows the removal of accumulated and accidental moisture from the wall structure during production or installation.
The overall height of such walls, calculated for transportation by dedicated vehicles, is regulated up to 3.20 m and the length is 8 m. Higher walls are transported as oversized products.
The dimensions and weight of the composite walls shall be designed considering the reach of the arm of the lifting crane provided for the object and the lifting power curve.
Cable loops are used for wall-walls connection (vertical seam). These loops in both walls are designed at the same height, every 150-600 mm, depending on the calculations. When the outer has windows openings, window fasteners are required.
Flexible and lintel connectors are used to bond concrete layers. They are selected according to the thickness of the thermal insulation material and the height of the product (according to calculations).
We select the required flexible connection from catalogues. It is desirable to have as few different flexible links as possible per project. Their length can be adjusted by cutting through the connecting wave. The dimensions of the insulation material are considered when making connections. This helps to avoid the loss of thermal insulation material.
When reinforcing, one steel mesh is placed in the outer layer, two meshes in the inner layer.
During the production of insulated walls, niches for radiators, communications, ducts for electrical installation can be installed. Steel inserts for fixing balcony railings or other structures can be placed in the required places.
Low noise level in residential houses built from precast concrete elements ensures comfortable conditions for work and rest.
Three-layer walls are manufactured according to design parameters.
Generally, layer thicknesses are accepted as follows:
- Outer (finishing) layer of concrete - 70-100 mm,
- Insulation material - 100-430 mm,
- Inner (supporting) layer of concrete - 100-200 mm.

UN CPC code: 375

Geographical scope: Europe

LCA information

Functional unit / declared unit: In accordance with the PCR the declared unit is 1 metric tonne of the product.

Reference service life: The reference service life for the insulation wall is set at 100 years.

Time representativeness: Primary data was collected internally. The production data refers to the average of the year 2020.

Database(s) and LCA software used: The Ecoinvent database provides the life cycle inventory data for the raw and process materials obtained from the background system. The used database is Ecoinvent 3.6. The LCA software used is One Click LCA.

Description of system boundaries:
Cradle to gate with options, modules C1-C4 and module D. The LCA was carried out considering the Product stage phases (A1, A2, A3), Distribution (A4), End of life (C1, C2, C3, C4), Potential environmental benefits (D) in accordance with EN 15804.

Modules declared:

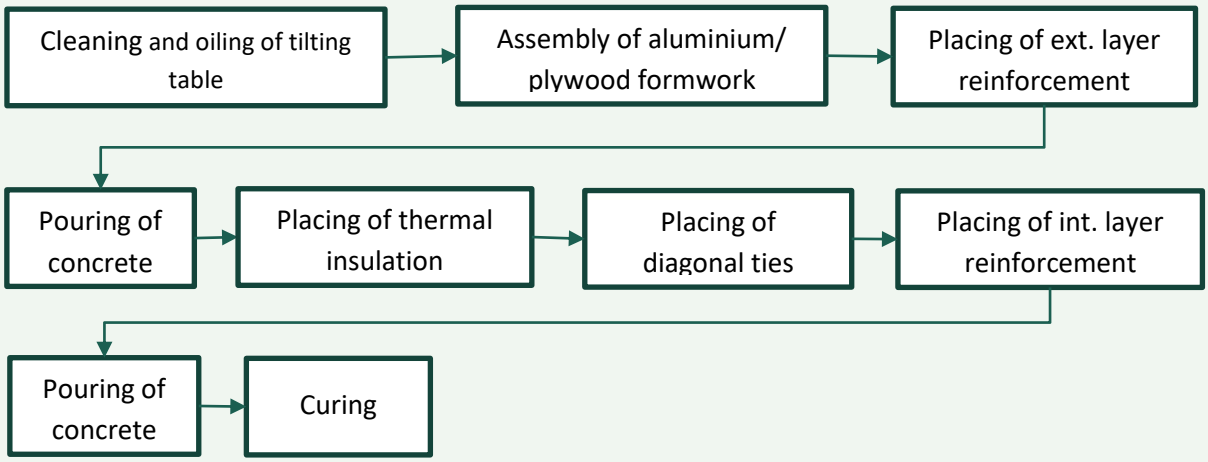
	Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	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	X	MND	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X

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

Data quality: The foreground data collected internally is based on yearly production amounts and extrapolations of measurements on specific machines and plants. Overall, the data quality can be described as good. The primary data collection has been done thoroughly.

Cut-off criteria: Life cycle inventory data for a minimum of 99% of total material and energy input flows have been included in the life cycle analysis. Although only materials having in summa less than 1% of weight of product were not used in calculations.

System diagram:



Product stage:

A1: This stage considers the extraction and processing of raw materials as well as energy consumption.
A2: The raw materials are transported to the manufacturing plant. In this case, the model includes road transportation of each raw material.
A3: This stage includes the manufacture of products and packaging. It also considers the energy consumption and waste generated at production plant.

Production process description

Insulated walls are produced on tilting tables. Before every casting table should be cleaned from small concrete particles, rust and excess oil. Water based oil is used for surface oiling. Desirable geometrical shape and height of element is exceeded by using aluminium frame moulds with plywood surface. Windows, doors openings are planned by setting additional moulds for them. Depending on architectural solution different kind of membranes, tiles or other material are put on table surface. External layer reinforcement mesh is fixed in projected position. External layer concrete is poured into mould. After levelling is done, thermal insulation slabs are put on top. Stainless steel inner-outer concrete layer diagonal ties are installed in insulation joints. Reinforcement of inner layer is put in design position. Pipes for electrical wires and boxes for electrical sockets also can be casted in. Wire loops and steel inserts for connection between structural elements or other special purposes are placed in designed position. After pouring of concrete initial levelling is done manually. Shock vibration is used for concrete compaction. Free surface is mechanically trowelled to get desirable surface quality. After releasing from mould small finishing works are done. Insulated walls are delivered to production stockyard or directly to construction site.

Construction process stage:
A4: This stage includes transport from the production gate to the construction site where the product shall be installed. Transportation is calculated based on data form manufacturer and a scenario with the parameters described in the following table. The transportation doesn't cause losses as products are packaged properly.

Parameter	Value/Description
Vehicle type used for transport	EURO 5 truck with a trailer with an average load of 16-32t
Distance	100 % of production: Truck – 127 km.
Capacity utilization	56 % of the capacity in volume (truck),

Use stage:
In normal use scenario, it is assumed that no maintenance (B2), repair (B3), replacement (B4) and refurbishment (B5) is needed.

End of Life stage:
This stage includes the following modules:

C1: Deconstruction, dismantling, demolition

Consumption of fuel in demolition process is calculated according to transported mass. Energy consumption demolition is 10 kWh for 1000 kg. The source of energy is diesel fuel used by work machines.

C2: Transport of the discarded product to the processing site

It is estimated that there is no mass loss during the use of the product, therefore the end-of-life product is assumed that it has the same weight with the declared product. All the end-of-life product is assumed to be sent to the closest facilities such as recycling and landfill. Transportation distance to the closest disposal area is estimated as 50 km and the transportation method is lorry which is the most common.

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

Based on Europe average 90% of steel are transformed into secondary material in a recycling plant. According to European Commission Waste Framework Directive by 2020, the preparing for re-use, recycling and other material recovery of non-hazardous construction and demolition waste shall be increased to a minimum of 70 % by weight. It is assumed that 70% of the concrete waste is recycled.

C4: Discharge (disposal)

The remaining 30 % of concrete and 10 % of steel are assumed to be sent to the landfill.

Benefits and loads beyond the system boundary (D):

Benefits of recyclable waste generated in the phase C3 are considered in the phase D. The recycled steel has been modelled to avoid use of primary materials. The scrap content in the studied product has been acknowledged and only the mass of primary steel in the product provides the benefit to avoid double counting. 70 % of concrete is assumed to be converted into a raw material.

Content information

Product components	Weight, kg	Weight, %
Cement	150.93	15.09
Gravel	71.49	7.15
Breakstone	184.37	18.44
Sand	340.8	34.08
Reinforcement	45.95	4.96
Water	66.42	6.64
Thermal insulation*	15.06	1.51
Micro air	0.15	0.015
Additives	1.23	0.123
TOTAL	1000	100

* Depending on thermal insulation material type the amount of insulation material can vary.

No dangerous substances from the candidate list of SVHC for Authorisation are used in the product

Packaging

Distribution packaging: wooden gaskets.

After use, packaging materials can be re-used or recycled.

Environmental Information

The results are presented in the tables below according to insulation materials – stone wool, PIR insulation and EPS insulation.

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

Results per functional or declared unit (stone wool)											
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
GWP – total	kg CO2e	2.36E2	4.30E0	5.21E0	2.45E2	1.14E1	3.3E0	4.55E0	3.63E0	1.64E0	-3.61E1
GWP – fossil	kg CO2e	2.34E2	4.29E0	4.93E0	2.43E2	1.15E1	3.3E0	4.54E0	3.69E0	1.63E0	-3.62E1
GWP – biogenic	kg CO2e	2.02E0	8.6E-3	2.58E-1	2.29E0	8.38E-3	9.17E-4	3.3E-3	-5.78E-2	3.24E-3	3.22E-2
GWP – LULUC	kg CO2e	8.39E-2	2.29E-3	1.35E-2	9.96E-2	3.47E-3	2.79E-4	1.37E-3	1.38E-3	4.85E-4	-1.31E-2
Ozone depletion pot.	kg CFC11e	1.13E-5	9.01E-7	5.18E-7	1.27E-5	2.71E-6	7.12E-7	1.07E-6	7.23E-7	6.73E-7	-1.49E-6
Acidification potential	mol H+e	1.02E0	2.28E-2	2.99E-2	1.07E0	4.85E-2	3.45E-2	1.91E-2	4.03E-2	1.55E-2	-1.87E-1
EP-freshwater[2)]	kg Pe	6.65E-3	7.33E-5	3.82E-4	7.1E-3	9.39E-5	1.33E-5	3.7E-5	8.12E-5	1.97E-5	-2.19E-3
EP-marine	kg Ne	1.88E-1	7.33E-3	6.63E-3	2.02E-1	1.46E-2	1.52E-2	5.75E-3	1.50E-2	5.34E-3	-3.69E-2
EP-terrestrial	mol Ne	2.42E0	8.10E-2	8.00E-2	2.58E0	1.61E-1	1.67E-1	6.35E-2	1.67E-1	5.88E-2	-4.33E-1
POCP (“smog”)	kg NMVOCe	7.38E-1	2.42E-2	2.44E-2	7.87E-1	5.19E-2	4.59E-2	2.04E-2	4.58E-2	1.71E-2	-1.84E-1
ADP-minerals & metals	kg Sbe	2.91E-3	6.33E-5	6.57E-5	3.04E-3	1.97E-4	5.03E-6	7.75E-5	6.06E-5	1.49E-5	-1.16E-3
ADP-fossil resources	MJ	1.73E3	6.58E1	7.42E1	1.87E3	1.80E2	4.54E1	7.07E1	5.08E1	4.57E1	-3.30E2
Water use[1)]	m3e depr.	7.24E1	3.60E-1	2.14E0	7.49E1	6.68E-1	8.46E-2	2.63E-1	2.69E-1	2.11E0	-2.42E1

Results per functional or declared unit (PIR)											
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
GWP – total	kg CO2e	2.86E2	3.95E0	5.21E0	2.95E2	1.14E1	3.30E0	4.55E0	3.63E0	4.65E0	-3.61E1
GWP – fossil	kg CO2e	2.82E2	3.94E0	4.93E0	2.91E2	1.15E1	3.30E0	4.54E0	3.69E0	4.64E0	-3.62E1
GWP – biogenic	kg CO2e	3.34E0	8.35E-3	2.58E-1	3.61E0	8.38E-3	9.17E-4	3.3E-3	-5.78E-2	5.32E-3	3.22E-2
GWP – LULUC	kg CO2e	1.14E-1	2.18E-3	1.35E-2	1.3E-1	3.47E-3	2.79E-4	1.37E-3	1.38E-3	5.70E-4	-1.31E-2
Ozone depletion pot.	kg CFC11e	2.22E-5	8.19E-7	5.18E-7	2.35E-5	2.71E-6	7.12E-7	1.07E-6	7.23E-7	6.95E-7	-1.49E-6
Acidification potential	mol H+e	1.18E0	2.13E-2	2.99E-2	1.23E0	4.85E-2	3.45E-2	1.91E-2	4.03E-2	1.64E-2	-1.87E-1
EP-freshwater[2)]	kg Pe	1.07E-2	7.04E-5	3.82E-4	1.11E-2	9.39E-5	1.33E-5	3.70E-5	8.12E-5	2.25E-5	-2.19E-3
EP-marine	kg Ne	3.04E-1	6.89E-3	6.63E-3	3.18E-1	1.46E-2	1.52E-2	5.75E-3	1.5E-2	6.38E-3	-3.69E-2
EP-terrestrial	mol Ne	2.78E0	7.62E-2	8.00E-2	2.93E0	1.61E-1	1.67E-1	6.35E-2	1.67E-1	6.18E-2	-4.33E-1
POCP (“smog”)	kg NMVOCe	9.44E-1	2.27E-2	2.44E-2	9.91E-1	5.19E-2	4.59E-2	2.04E-2	4.58E-2	1.86E-2	-1.84E-1
ADP-minerals & metals	kg Sbe	3.65E-3	5.73E-5	6.57E-5	3.78E-3	1.97E-4	5.03E-6	7.75E-5	6.06E-5	1.63E-5	-1.16E-3
ADP-fossil resources	MJ	2.97E3	6.03E1	7.42E1	3.10E3	1.80E2	4.54E1	7.07E1	5.08E1	4.78E1	-3.3E2
Water use[1)]	m3e depr.	1.27E2	3.40E-1	2.14E0	1.3E2	6.68E-1	8.46E-2	2.63E-1	2.69E-1	2.2E0	-2.42E1

Results per functional or declared unit (EPS)											
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
GWP – total	kg CO2e	2.13E2	3.69E0	5.21E0	2.22E2	1.14E1	3.30E0	4.55E0	3.63E0	4.65E0	-3.61E1
GWP – fossil	kg CO2e	2.10E2	3.68E0	4.93E0	2.19E2	1.15E1	3.30E0	4.54E0	3.69E0	4.64E0	-3.62E1
GWP – biogenic	kg CO2e	2.39E0	8.16E-3	2.58E-1	2.65E0	8.38E-3	9.17E-4	3.30E-3	-5.78E-2	5.32E-3	3.22E-2
GWP – LULUC	kg CO2e	6.03E-2	2.10E-3	1.35E-2	7.59E-2	3.47E-3	2.79E-4	1.37E-3	1.38E-3	5.7E-4	-1.31E-2
Ozone depletion pot.	kg CFC11e	8.85E-6	7.58E-7	5.18E-7	1.01E-5	2.71E-6	7.12E-7	1.07E-6	7.23E-7	6.95E-7	-1.49E-6
Acidification potential	mol H+e	6.93E-1	2.02E-2	2.99E-2	7.43E-1	4.85E-2	3.45E-2	1.91E-2	4.03E-2	1.64E-2	-1.87E-1
EP-freshwater[2)]	kg Pe	5.06E-3	6.83E-5	3.82E-4	5.51E-3	9.39E-5	1.33E-5	3.70E-5	8.12E-5	2.25E-5	-2.19E-3
EP-marine	kg Ne	1.60E-1	6.56E-3	6.63E-3	1.73E-1	1.46E-2	1.52E-2	5.75E-3	1.50E-2	6.38E-3	-3.69E-2
EP-terrestrial	mol Ne	1.86E0	7.26E-2	8.00E-2	2.01E0	1.61E-1	1.67E-1	6.35E-2	1.67E-1	6.18E-2	-4.33E-1
POCP (“smog”)	kg NMVOCe	5.86E-1	2.15E-2	2.44E-2	6.32E-1	5.19E-2	4.59E-2	2.04E-2	4.58E-2	1.86E-2	-1.84E-1
ADP-minerals & metals	kg Sbe	1.85E-3	5.29E-5	6.57E-5	1.97E-3	1.97E-4	5.03E-6	7.75E-5	6.06E-5	1.63E-5	-1.16E-3
ADP-fossil resources	MJ	1.90E3	5.63E1	7.42E1	2.03E3	1.80E2	4.54E1	7.07E1	5.08E1	4.78E1	-3.30E2
Water use[1)]	m3e depr.	6.44E1	3.25E-1	2.14E0	6.68E1	6.68E-1	8.46E-2	2.63E-1	2.69E-1	2.20E0	-2.42E1

EN 15804+A2 disclaimer for Abiotic depletion and Water use indicators and all 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. Eutrophication aquatic freshwater is calculated and reported as kg P-eq, as the referenced characterisation in EN 15804+A2 requires (“EUTREND model, Struijs et al., 2009b, as implemented in ReCiPe”) uses the unit kg P eq. The EN 15804+A2 standard reporting table mistakenly labels the data as kg PO4 eq. Multiply by 3,07 to get PO4e.

USE OF NATURAL RESOURCES

Results per functional or declared unit (stone wool)											
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Renew. PER as energy	MJ	1.26E2	2.01E0	9.50E1	2.23E2	2.26E0	2.45E-1	8.90E-1	2.42E0	3.69E-1	-3.18E1
Renew. PER as material	MJ	0.00	0.00	8.57E1	8.57E1	0.00	0.00	0.00	0.00	0.00	0.00
Total use of renew. PER	MJ	1.26E2	2.01E0	1.81E2	3.09E2	2.26E0	2.45E-1	8.90E-1	2.42E0	3.69E-1	-3.18E1
Non-re. PER as energy	MJ	1.73E3	6.58E1	7.42E1	1.87E3	1.80E2	4.54E1	7.07E1	5.08E1	4.57E1	-3.30E2
Non-re. PER as material	MJ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total use of non-re. PER	MJ	1.73E3	6.58E1	7.42E1	1.87E3	1.80E2	4.54E1	7.07E1	5.08E1	4.57E1	-3.30E2
Secondary materials	kg	1.93E1	0.00	0.00	1.93E1	0.00	0.00	0.00	0.00	0.00	1.23E1
Renew. secondary fuels	MJ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Non-ren. secondary fuels	MJ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Use of net fresh water	m3	3.20E0	1.60E-2	3.26E-2	3.25E0	3.74E-2	4.01E-3	1.47E-2	9.01E-3	5.00E-2	-9.98E-1

PER abbreviation stands for primary energy resources

Results per functional or declared unit (PIR)											
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Renew. PER as energy	MJ	1.99E2	1.95E0	9.50E1	2.96E2	2.26E0	2.45E-1	8.90E-1	2.42E0	4.36E-1	-3.18E1
Renew. PER as material	MJ	0.00	0.00	8.57E1	8.57E1	0.00	0.00	0.00	0.00	0.00	0.00
Total use of renew. PER	MJ	1.99E2	1.95E0	1.81E2	3.82E2	2.26E0	2.45E-1	8.9E-1	2.42E0	4.36E-1	-3.18E1
Non-re. PER as energy	MJ	2.46E3	6.03E1	7.42E1	2.60E3	1.80E2	4.54E1	7.07E1	5.08E1	4.78E1	-3.30E2
Non-re. PER as material	MJ	5.04E2	0.00	0.00	5.04E2	0.00	0.00	0.00	0.00	0.00	0.00
Total use of non-re. PER	MJ	2.97E3	6.03E1	7.42E1	3.10E3	1.80E2	4.54E1	7.07E1	5.08E1	4.78E1	-3.30E2
Secondary materials	kg	1.95E1	0.00	0.00	1.95E1	0.00	0.00	0.00	0.00	0.00	1.23E1
Renew. secondary fuels	MJ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Non-ren. secondary fuels	MJ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Use of net fresh water	m3	3.53E0	1.49E-2	3.26E-2	3.57E0	3.74E-2	4.01E-3	1.47E-2	9.01E-3	5.24E-2	-9.98E-1

Results per functional or declared unit (EPS)											
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Renew. PER as energy	MJ	1.04E2	1.90E0	9.50E1	2.01E2	2.26E0	2.45E-1	8.90E-1	2.42E0	4.36E-1	-3.18E1
Renew. PER as material	MJ	3.87E0	0.00	8.57E1	8.96E1	0.00	0.00	0.00	0.00	0.00	0.00
Total use of renew. PER	MJ	1.08E2	1.90E0	1.81E2	2.90E2	2.26E0	2.45E-1	8.90E-1	2.42E0	4.36E-1	-3.18E1
Non-re. PER as energy	MJ	1.57E3	5.63E1	7.42E1	1.70E3	1.80E2	4.54E1	7.07E1	5.08E1	4.78E1	-3.30E2
Non-re. PER as material	MJ	3.30E2	0.00	0.00	3.30E2	0.00	0.00	0.00	0.00	0.00	0.00
Total use of non-re. PER	MJ	1.90E3	5.63E1	7.42E1	2.03E3	1.80E2	4.54E1	7.07E1	5.08E1	4.78E1	-3.30E2
Secondary materials	kg	1.91E1	0.00	0.00	1.91E1	0.00	0.00	0.00	0.00	0.00	1.23E1
Renew. secondary fuels	MJ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Non-ren. secondary fuels	MJ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Use of net fresh water	m3	1.30E2	1.40E-2	3.26E-2	1.30E2	3.74E-2	4.01E-3	1.47E-2	9.01E-3	5.24E-2	-9.98E-1

END OF LIFE – WASTE

Results per functional or declared unit (stone wool)											
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste	kg	2.28E1	1.19E-1	2.51E-1	2.32E1	1.74E-1	4.88E-2	6.87E-2	0.00	4.26E-2	-1.23E1
Non-hazardous waste	kg	3.13E2	7.57E0	9.97E0	3.30E2	1.93E1	5.22E-1	7.60E0	0.00	3.10E2	-1.17E2
Radioactive waste	kg	5.70E-3	4.36E-4	2.09E-4	6.34E-3	1.23E-3	3.18E-4	4.85E-4	0.00	3.02E-4	-4.1E-4

Results per functional or declared unit (PIR)											
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste	kg	2.53E1	1.14E-1	2.51E-1	2.57E1	1.74E-1	4.88E-2	6.87E-2	0.00	4.91E-2	-1.23E1
Non-hazardous waste	kg	3.87E2	6.99E0	9.97E0	4.04E2	1.93E1	5.22E-1	7.60E0	0.00	3.10E2	-1.17E2
Radioactive waste	kg	8.35E-3	3.99E-4	2.09E-4	8.96E-3	1.23E-3	3.18E-4	4.85E-4	0.00	3.13E-4	-4.10E-4

Results per functional or declared unit (EPS)											
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste	kg	2.01E1	1.10E-1	2.51E-1	2.04E1	1.74E-1	4.88E-2	6.87E-2	0.00	4.91E-2	-1.23E1
Non-hazardous waste	kg	2.44E2	6.56E0	9.97E0	2.61E2	1.93E1	5.22E-1	7.60E0	0.00	3.10E2	-1.17E2
Radioactive waste	kg	5.14E-3	3.71E-4	2.09E-4	5.72E-3	1.23E-3	3.18E-4	4.85E-4	0.00	3.13E-4	-4.10E-4

END OF LIFE – OUTPUT FLOWS

Results per functional or declared unit (stone wool, PIR, EPS)											
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Materials for recycling	kg	0.00	0.00	2.45E0	2.45E0	0.00	0.00	0.00	7.08E2	0.00	0.00
Materials for energy rec	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Exported energy	MJ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

ENVIRONMENTAL IMPACTS – EN 15804+A1, CML / ISO 21930

Results per functional or declared unit (stone wool)											
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Global Warming Pot.	kg CO2e	2.29E2	4.24E0	4.83E0	2.38E2	1.14E1	3.27E0	4.50E0	3.65E0	1.60E0	-3.47E1
Ozone depletion Pot.	kg CFC11e	9.79E-6	7.26E-7	4.37E-7	1.10E-5	2.16E-6	5.63E-7	8.49E-7	5.80E-7	5.33E-7	-1.32E-6
Acidification	kg SO2e	7.81E-1	1.35E-2	2.29E-2	8.17E-1	2.35E-2	4.87E-3	9.25E-3	1.16E-2	6.46E-3	-1.46E-1
Eutrophication	kg PO4 3e	2.80E-1	3.84E-3	1.02E-2	2.94E-1	4.74E-3	8.57E-4	1.87E-3	3.83E-3	1.25E-3	-9.66E-2
POCP (“smog”)	kg C2H4e	5.56E-2	6.66E-4	1.75E-3	5.81E-2	1.49E-3	5.01E-4	5.86E-4	7.66E-4	4.74E-4	-2.19E-2
ADP-elements	kg Sbe	2.91E-3	6.33E-5	6.57E-5	3.04E-3	1.97E-4	5.03E-6	7.75E-5	6.06E-5	1.49E-5	-1.16E-3
ADP-fossil	MJ	1.73E3	6.58E1	7.42E1	1.87E3	1.80E2	4.54E1	7.07E1	5.08E1	4.57E1	-3.30E2

Results per functional or declared unit (PIR)											
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Global Warming Pot.	kg CO2e	2.75E2	3.90E0	4.83E0	2.83E2	1.14E1	3.27E0	4.50E0	3.65E0	3.70E0	-3.47E1
Ozone depletion Pot.	kg CFC11e	2.56E-5	6.61E-7	4.37E-7	2.67E-5	2.16E-6	5.63E-7	8.49E-7	5.80E-7	5.51E-7	-1.32E-6
Acidification	kg SO2e	9.18E-1	1.28E-2	2.29E-2	9.54E-1	2.35E-2	4.87E-3	9.25E-3	1.16E-2	8.74E-3	-1.46E-1
Eutrophication	kg PO4 3e	3.85E-1	3.70E-3	1.02E-2	3.99E-1	4.74E-3	8.57E-4	1.87E-3	3.83E-3	1.13E-1	-9.66E-2
POCP (“smog”)	kg C2H4e	1.14E-1	6.21E-4	1.75E-3	1.17E-1	1.49E-3	5.01E-4	5.86E-4	7.66E-4	9.00E-4	-2.19E-2
ADP-elements	kg Sbe	3.65E-3	5.73E-5	6.57E-5	3.78E-3	1.97E-4	5.03E-6	7.75E-5	6.06E-5	1.63E-5	-1.16E-3
ADP-fossil	MJ	2.97E3	6.03E1	7.42E1	3.10E3	1.80E2	4.54E1	7.07E1	5.08E1	4.78E1	-3.30E2

Results per functional or declared unit (EPS)											
Impact category	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Global Warming Pot.	kg CO2e	2.07E2	3.64E0	4.83E0	2.15E2	1.14E1	3.27E0	4.50E0	3.65E0	3.70E0	-3.47E1
Ozone depletion Pot.	kg CFC11e	7.68E-6	6.13E-7	4.37E-7	8.73E-6	2.16E-6	5.63E-7	8.49E-7	5.80E-7	5.51E-7	-1.32E-6
Acidification	kg SO2e	5.22E-1	1.22E-2	2.29E-2	5.57E-1	2.35E-2	4.87E-3	9.25E-3	1.16E-2	8.74E-3	-1.46E-1
Eutrophication	kg PO4 3e	2.20E-1	3.59E-3	1.02E-2	2.33E-1	4.74E-3	8.57E-4	1.87E-3	3.83E-3	1.13E-1	-9.66E-2
POCP (“smog”)	kg C2H4e	4.68E-2	5.87E-4	1.75E-3	4.91E-2	1.49E-3	5.01E-4	5.86E-4	7.66E-4	9.00E-4	-2.19E-2
ADP-elements	kg Sbe	1.85E-3	5.29E-5	6.57E-5	1.97E-3	1.97E-4	5.03E-6	7.75E-5	6.06E-5	1.63E-5	-1.16E-3
ADP-fossil	MJ	1.90E3	5.63E1	7.42E1	2.03E3	1.80E2	4.54E1	7.07E1	5.08E1	4.78E1	-3.30E2

General information

Programme information

Programme:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	***www.environdec.com***
E-mail:	***info@environdec.com***

CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product category rules (PCR): PCR 2019:14 Construction products (version 1.1); Complementary PCR (c-PCR):C-PCR-003 (TO PCR 2019:14) - Concrete and concrete elements, version: 2019-12-20;
PCR review was conducted by: The International EPD® System
Independent third-party verification of the declaration and data, according to ISO 14025:2006: ☐ EPD process certification ☒ EPD verification
Third party verifier: Vladimir Kočí, LCA Studio 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 from different 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.

References

- General Programme Instructions of the International EPD® System. Version 4.0;
- PCR 2019:14 Construction products (version 1.1)
- EN 15804:2012+A2:2019 Sustainability of construction works. Environmental product declarations. Core rules for the product category of construction products.
- ISO 14020:2001 Environmental labels and declarations – General principles.
- ISO 14040:2006 Environmental management. Life cycle assessment. Principles and frameworks.
- ISO 14044:2006 Environmental management. Life Cycle Assessment. Requirements and guidelines.
- ISO 14025:2010 Environmental labels and declarations. Type III environmental declarations. Principles and procedures.

Tools and database

- One Click LCA tool;
- Ecoinvent 3.6 database

Contact information

EPD owner:	Perdanga, UAB www.perdanga.lt	
LCA author:	Vesta Consulting, UAB www.vestaconsulting.lt	
Programme operator:	The International EPD® System https://www.environdec.com	

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