Pekabex

Environmental Product Declaration
Type III ITB No. 134/2020

Prefabricated structures: single-, double- and triple-layered walls

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ITB is the verified member of The European Platform for EPD program operators and LCA practitioner
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www.pekabex.pl

Basic Information

This declaration is the type III Environmental Product Declaration (EPD) based on PN-EN 15804 and verified according to ISO 14025 by an external auditor.

It contains the information on the impacts of the declared construction materials on the environment. Their aspects were verified by the independent body according to ISO 14025. Basically, a comparison or evaluation of EPD data is possible only if all the compared data were created according to PN-EN 15804 (see point 5.3 of the standard).

Life cycle analysis (LCA): A1-A3, C3, C4 and D according to PN-EN 15804 (Cradle to Gate with options)
The year of preparing the EPD: 2020
Product standard: PN-EN 14992, PN-EN 13369
Service Life: 50 years for standard products
PCR: ITB-PCR A (PCR based on PN-EN 15804)
Declared unit: 1 tonne
Reasons for performing LCA: B2B
Representativeness: Polish product

Manufacturer

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Pekabex S.A. is a manufacturer of prefabricated structures in Poland.

The company produces traditional reinforced elements, as well as modern prestressed elements used in enclosed structures (e.g. production and storage halls, offices, trade objects, railway stations, parking places), engineering objects (e.g. bridges, tunnels), and atypical designs. We offer wide range of standard products and realize special orders for individual designs. Pekabex S.A. possesses five production plants located in Poznań, Gdańsk, Bielsko-Biała, Mszczonów and Marktzeuln.

Fig 1. A view of Pekabex S.A. (Poland).

Product description and application

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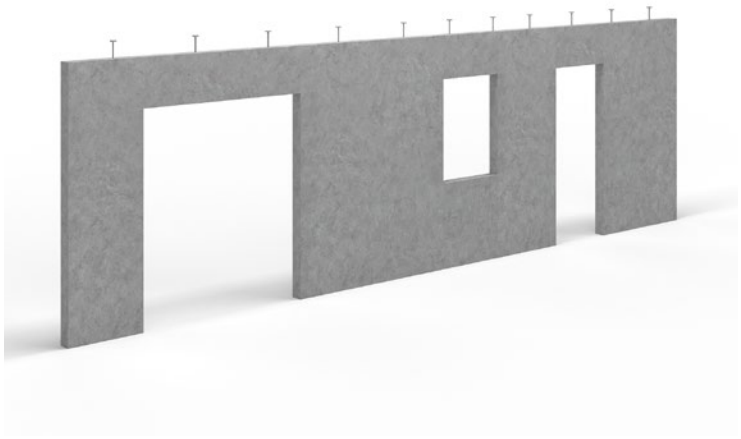
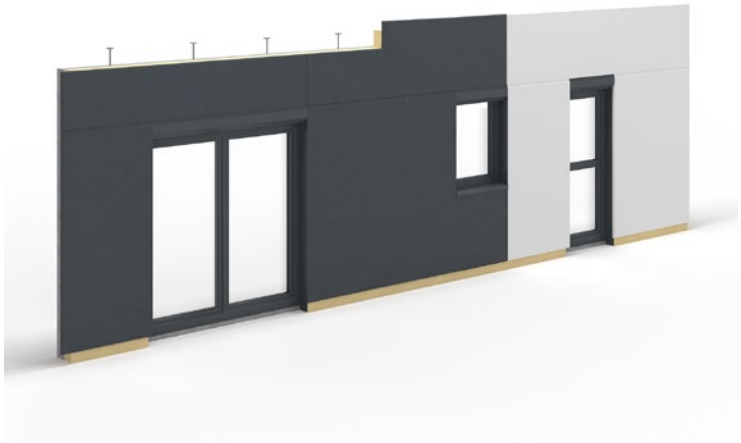
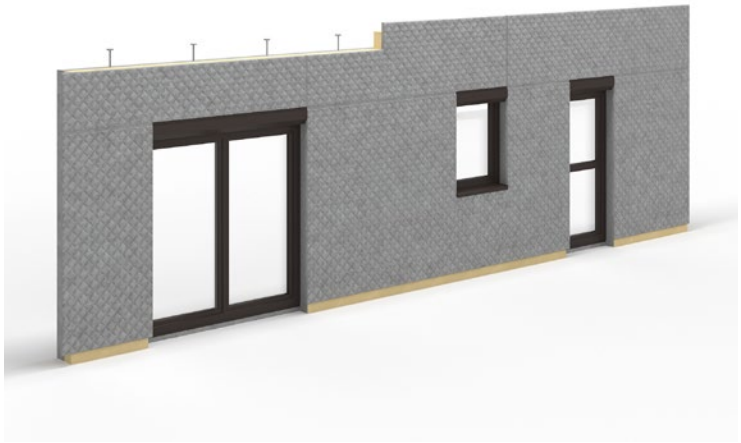


Single-layered walls consist only of carrying layer. The prefabricated elements may have holes for windows and doors practically in any dimensions and shapes. Depending on the element thickness and method of filling the joints the fire resistance is up to REI 240. Single walls are available in various sizes.

Double-layered walls consist of carrying and insulating layers. The prefabricated elements may have holes for windows and doors practically in any dimensions and shapes. Depending on the element thickness and method of filling the joints the fire resistance is up to REI 240. Isolated wall is a half sandwich wall element that consist of 2 layers – load bearing concrete layer and insulation layer. Walls are available in various sizes and different types of insulation.



Triple-layered walls consist of carrying and insulating layers. The prefabricated elements may have holes for windows and doors practically in any dimensions and shapes. Depending on the element thickness and method of filling the joints the fire resistance is up to REI 240. Isolated wall is a half sandwich wall element that consist of 2 layers – load bearing concrete layer and insulation layer. Walls are available in various sizes and different types of insulation.



Triple-layered walls with texture consist of carrying, insulating, and facade layers. Additionally the facade layer is finished with mineral plasters, washed stone, or imprints of decorative stencils. The prefabricated elements may have holes for windows and doors practically in any dimensions and shapes.Depending on the element thickness and method of filling the joints the fire resistance is up to REI 240. Walls are available in various sizes and different types of insulation.

Life Cycle Assessment (LCA) – general rules applied

Allocation

The allocation rules used for this EPD are based on general ITB PCR A. Production of the single-, double- and triple-layered walls is a line process in a production plan of Pekabex S.A., located in Gdańsk (Poland). All impacts from raw materials extraction are allocated in A1 module of the LCA. Impacts from line production of Pekabex S.A. were inventoried and 17.6%, 2.2% and 7.6% were allocated to the single-, double- and triple-layered walls production, respectively. Utilization of packaging material was taken into consideration. Module A2 includes transport of raw materials from their suppliers to of Pekabex S.A. in Gdańsk. Energy production was allocated to Module 1, while energy supply, emissions and wastes were inventoried and were allocated to module A3.

System limits

The life cycle analysis of the declared products covers "Product Stage", A1-A3, C3, C4 and D modules (Cradle to Gate with options) in accordance with PN-EN 15804+A1:2014-04 and ITB PCR A. The details of systems limits are provided in product technical report. All materials and energy consumption inventoried in factories were included in the calculations. In the assessment, all significant parameters from gathered production data are considered, i.e. all material used per formulation, utilized thermal energy, internal fuel and electric power consumption, direct production waste, and all available emission measurements. It can be assumed that the total sum of omitted processes does not exceed 5% of all impact categories. In accordance with PN-EN 15804+A1:2014-04, machines and facilities (capital goods) required for and during production are excluded, as is transportation of employees.

A1 and A2 Modules: Raw materials supply and transport

Raw materials such as: gravel, sand, granite, limestone, bricks, steel elements, wood-based element, mineral wool, additives, ancillary materials and packaging materials come from both Polish and foreign suppliers. Means of transport include trucks with load: <10t, 10 – 16t and >16. For calculation purposes Polish and European fuel averages are applied.

A3: Production

All of the components for precast production are coming to Pekabex by wheels deliveries or by train. Material for production is stored in designated for it places. Each of them is described in detail, exactly what material is to be there (e.g. aggregate entanglements, cement silos or designated zones for steel types, grades or diameters). Reinforcement elements are made partially automatically and manually. Ready reinforcements are placed in previously individually prepared forms. Concrete is poured into the prepared forms. which must meet the requirements imposed on him. Concrete is produced in a professional and automatic concrete mixing plant. Ready elements are kept in the formwork until the minimum design parameters are achieved. After evacuation, each element is checked by the quality control department, and then taken to an external warehouse, and then directly to the customer for the construction site.

A scheme of manufacturing of the prefabricated structures: single-, double- and triple-layered walls by Pekabex BET S.A.

C3, C4 and D Modules: End-of-life scenarios:

At the end of life brick walls, single walls, isolated walls and sandwich walls are deconstructed with the use of electrical tools. It is assumed that 98% of the materials is recovered and undergo re-use, recycling, incineration and landfilling according to the Polish treatment practice of industrial wastes - Table X. The remaining 2% is forwarded to landfill in the form of mixed construction and demolition wastes. It is assumed that recovered concrete waste can be used as aggregates for road foundation or ballast instead of primary sand/gravel. Benefits and loads beyond the system boundary (D) of steel scrap were calculated using a net scrap formulation proposed by World Steel Association where the net scrap is determined as a difference between the amount of steel recycled at end-of-life and the scrap input from previous product life cycle (assumed 70%). Impacts of materials that constitute less than 0.7% of the total system flows was not taken into consideration.

Table 1. End-of-life scenarios for brick walls, single walls, isolated walls and sandwich walls

Product	Material recover	Re-use	Recycling	Incineration	Landfilling
Concrete waste	98%	95%	0%	0%	5%
Steel	98%	0%	95%	0%	5%
Insulation foam	98%	0%	0%	100%	0%
Mineral wool	98%	0%	0%	0%	100%

Data collection period

The data for manufacture of the declared products refer to period between 01.01.2019 – 31.12.2019 (1 year). The life cycle assessments were prepared for Poland as reference area.

Data quality

The values determined to calculate the LCA originate from verified Pekabex S.A. inventory data.

Assumptions and estimates

The impacts of the representative single-, double- and triple-layered walls were aggregated using weighted average. Impacts were inventoried and calculated for all single-, double- and triple-layered walls.

Calculation rules

LCA was done in accordance with ITB PCR A document.

Databases

The data for the processes come from the following databases: Ecoinvent v 3.7, specific EPDs, ITB-Data. Specific data quality analysis was a part of external ISO 14001 audit.

LIFE CYCLE ASSESSMENT (LCA) – Results

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Declared unit

The declaration refers to declared unit (DU) – 1 tonne of the single-, double- and triple-layered walls manufactured by Pekabex S.A.

Table 2. System boundaries for the environmental characteristic the single-, double- and triple-layered walls.

Environmental assessment information (MNA – Module not assessed, MD – Module Declared, INA – Indicator Not Assessed)

Product stage			Construction process		Use stage							End of life				Benefits and loads beyond the system boundary
Raw material supply	Transport	Manufacturing	Transport to construction site	Construction-installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	Transport	Waste processing	Disposal	Reuse-recovery-recycling potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
MD	MD	MD	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MD	MD	MD

Prefabricated single-layered walls

Environmental impacts: (DU) 1 tonne

Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Global warming potential	kg CO2 eq.	2,66E+02	5,35E+00	1,44E+01	2,85E+02	4,94E+00	2,53E-01	-3,80E+01
Depletion potential of the stratospheric ozone layer	kg CFC 11 eq.	8,78E-06	0,00E+00	0,00E+00	8,78E-06	7,57E-07	8,38E-08	-1,33E-06
Acidification potential of soil and water	kg SO2 eq.	5,87E-01	3,90E-02	2,17E-02	6,48E-01	3,54E-02	1,83E-03	-3,40E-01
Formation potential of tropospheric ozone	kg Ethene eq.	1,77E-01	2,85E-03	1,28E-07	1,80E-01	1,57E-03	1,38E-04	-1,79E-02
Eutrophication potential	kg (PO4)3- eq.	5,27E-02	6,89E-03	1,77E-03	6,14E-02	9,61E-03	3,93E-04	-2,96E-02
Abiotic depletion potential (ADP-elements) for non-fossil resources	kg Sb eq.	4,71E-01	0,00E+00	5,35E-05	4,71E-01	2,34E-04	2,80E-06	-1,58E-03
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	MJ	1,37E+03	3,85E+01	1,48E+02	1,56E+03	6,82E+01	7,22E+00	-2,01E+02

Environmental aspects on resource use: (DU) 1 tonne

Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Use of renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	9,88E+01	1,12E-03	1,53E+01	1,14E+02	3,70E+00	1,32E-01	-1,76E+01
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Use of non-renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	1,55E+03	4,04E+01	1,56E+02	1,74E+03	6,98E+01	7,57E+00	-5,05E+02
Use of secondary material	kg	4,91E+01	0,00E+00	0,00E+00	4,91E+01	0,00E+00	0,00E+00	0,00E+00
Use of renewable secondary fuels	MJ	1,43E+02	2,02E+00	0,00E+00	1,45E+02	0,00E+00	0,00E+00	0,00E+00
Use of non-renewable secondary fuels	MJ	2,07E+02	0,00E+00	0,00E+00	2,07E+02	0,00E+00	0,00E+00	0,00E+00
Net use of fresh water	m3	INA	INA	INA	INA	INA	INA	INA

Other environmental information describing waste categories: (DU) 1 tonne

Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Hazardous waste disposed	kg	2,06E-02	1,51E-09	2,91E-03	2,35E-02	1,80E-04	1,06E-05	-1,43E-03
Non-hazardous waste disposed	kg	5,67E+00	1,40E-06	2,12E+00	7,79E+00	5,46E-01	4,90E+01	-3,92E+00
Radioactive waste disposed	kg	7,87E-03	0,00E+00	0,00E+00	7,87E-03	4,30E-04	4,74E-05	-3,51E-03
Components for re-use	kg	1,01E-04	0,00E+00	0,00E+00	1,01E-04	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	6,74E-01	0,00E+00	6,82E+00	7,49E+00	0,00E+00	0,00E+00	0,00E+00
Materials for energy recover	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy	MJ per energy carrier	INA	INA	INA	INA	INA	INA	INA

Prefabricated double-layered walls

Environmental impacts: (DU) 1 tonne

Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Global warming potential	kg CO2 eq.	2,77E+02	5,29E+00	1,44E+01	2,97E+02	4,92E+00	2,52E-01	-3,79E+01
Depletion potential of the stratospheric ozone layer	kg CFC 11 eq.	8,84E-06	0,00E+00	0,00E+00	8,84E-06	7,54E-07	8,34E-08	-1,32E-06
Acidification potential of soil and water	kg SO2 eq.	6,14E-01	3,87E-02	2,17E-02	6,74E-01	3,53E-02	1,82E-03	-3,40E-01
Formation potential of tropospheric ozone	kg Ethene eq.	2,80E-01	2,81E-03	1,28E-07	2,83E-01	1,56E-03	1,37E-04	-1,78E-02
Eutrophication potential	kg (PO4)3- eq.	5,52E-02	6,83E-03	1,77E-03	6,38E-02	9,58E-03	3,91E-04	-2,95E-02
Abiotic depletion potential (ADP-elements) for non-fossil resources	kg Sb eq.	4,71E-01	0,00E+00	5,35E-05	4,71E-01	2,34E-04	2,79E-06	-1,58E-03
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	MJ	1,87E+03	4,93E+01	1,48E+02	2,07E+03	6,79E+01	7,19E+00	-2,00E+02

Environmental aspects on resource use: (DU) 1 tonne

Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Use of renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	1,04E+02	1,71E-02	1,53E+01	1,19E+02	3,70E+00	1,32E-01	-1,75E+01
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Use of non-renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	1,89E+03	5,18E+01	1,56E+02	2,10E+03	6,95E+01	7,54E+00	-5,04E+02
Use of secondary material	kg	4,91E+01	0,00E+00	0,00E+00	4,91E+01	0,00E+00	0,00E+00	0,00E+00
Use of renewable secondary fuels	MJ	1,43E+02	2,59E+00	0,00E+00	1,45E+02	0,00E+00	0,00E+00	0,00E+00
Use of non-renewable secondary fuels	MJ	2,07E+02	0,00E+00	0,00E+00	2,07E+02	0,00E+00	0,00E+00	0,00E+00
Net use of fresh water	m3	INA	INA	INA	INA	INA	INA	INA

Other environmental information describing waste categories: (DU) 1 tonne

Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Hazardous waste disposed	kg	2,33E-02	1,94E-09	2,91E-03	2,62E-02	1,79E-04	1,06E-05	-1,42E-03
Non-hazardous waste disposed	kg	5,71E+00	1,80E-06	2,12E+00	7,83E+00	5,46E-01	4,87E+01	-3,90E+00
Radioactive waste disposed	kg	1,15E-02	0,00E+00	0,00E+00	1,15E-02	4,28E-04	4,71E-05	-3,51E-03
Components for re-use	kg	1,01E-04	0,00E+00	0,00E+00	1,01E-04	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	6,74E-01	0,00E+00	6,82E+00	7,49E+00	0,00E+00	0,00E+00	0,00E+00
Materials for energy recover	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy	MJ per energy carrier	INA	INA	INA	INA	INA	INA	INA

Prefabricated triple-layered walls

Environmental impacts: (DU) 1 tonne

Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Global warming potential	kg CO2 eq.	2,63E+02	5,32E+00	1,46E+01	2,83E+02	5,19E+00	2,73E-01	-3,90E+01
Depletion potential of the stratospheric ozone layer	kg CFC 11 eq.	8,81E-06	0,00E+00	0,00E+00	8,81E-06	7,59E-07	8,37E-08	-1,33E-06
Acidification potential of soil and water	kg SO2 eq.	6,24E-01	3,89E-02	2,26E-02	6,85E-01	3,57E-02	1,96E-03	-3,50E-01
Formation potential of tropospheric ozone	kg Ethene eq.	2,11E-01	2,82E-03	1,34E-07	2,14E-01	1,59E-03	1,51E-04	-1,83E-02
Eutrophication potential	kg (PO4)3- eq.	5,60E-02	6,86E-03	1,84E-03	6,47E-02	9,72E-03	4,09E-04	-3,00E-02
Abiotic depletion potential (ADP-elements) for non-fossil resources	kg Sb eq.	4,76E-01	0,00E+00	5,39E-05	4,76E-01	2,42E-04	2,81E-06	-1,62E-03
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	MJ	1,63E+03	9,71E+01	1,49E+02	1,88E+03	6,86E+01	7,50E+00	-2,04E+02

Environmental aspects on resource use: (DU) 1 tonne

Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Use of renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	1,06E+02	8,24E-02	1,54E+01	1,21E+02	3,81E+00	1,53E-01	-1,81E+01
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Use of non-renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	1,72E+03	1,02E+02	1,57E+02	1,98E+03	7,02E+01	7,85E+00	-5,18E+02
Use of secondary material	kg	5,09E+01	0,00E+00	0,00E+00	5,09E+01	0,00E+00	0,00E+00	0,00E+00
Use of renewable secondary fuels	MJ	1,43E+02	5,10E+00	0,00E+00	1,48E+02	0,00E+00	0,00E+00	0,00E+00
Use of non-renewable secondary fuels	MJ	2,07E+02	0,00E+00	0,00E+00	2,07E+02	0,00E+00	0,00E+00	0,00E+00
Net use of fresh water	m3	INA	INA	INA	INA	INA	INA	INA

Other environmental information describing waste categories: (DU) 1 tonne

Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Hazardous waste disposed	kg	3,34E-02	3,81E-09	2,93E-03	3,63E-02	1,81E-04	2,16E-04	-1,45E-03
Non-hazardous waste disposed	kg	6,06E+00	3,54E-06	2,14E+00	8,20E+00	5,65E-01	5,04E+01	-3,92E+00
Radioactive waste disposed	kg	1,05E-02	0,00E+00	0,00E+00	1,05E-02	4,34E-04	5,24E-05	-3,73E-03
Components for re-use	kg	1,01E-04	0,00E+00	0,00E+00	1,01E-04	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	8,60E-01	0,00E+00	6,87E+00	7,73E+00	0,00E+00	0,00E+00	0,00E+00
Materials for energy recover	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,80E-02	0,00E+00	0,00E+00
Exported energy	MJ per energy carrier	INA	INA	INA	INA	INA	INA	INA

Prefabricated brick wall

Environmental impacts: (DU) 1 tonne

Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Global warming potential	kg CO2 eq.	2,88E+02	4,28E+00	1,43E+01	3,07E+02	4,56E+00	2,53E-01	-2,80E+01
Depletion potential of the stratospheric ozone layer	kg CFC 11 eq.	6,12E-06	0,00E+00	0,00E+00	6,12E-06	7,25E-07	8,38E-08	-1,34E-06
Acidification potential of soil and water	kg SO2 eq.	6,51E-01	3,12E-02	2,17E-02	7,04E-01	3,31E-02	1,83E-03	-2,41E-01
Formation potential of tropospheric ozone	kg Ethene eq.	1,38E-01	2,27E-03	1,28E-07	1,40E-01	1,43E-03	1,38E-04	-1,31E-02
Eutrophication potential	kg (PO4)3- eq.	6,72E-02	5,51E-03	1,77E-03	7,45E-02	8,56E-03	3,93E-04	-2,53E-02
Abiotic depletion potential (ADP-elements) for non-fossil resources	kg Sb eq.	3,17E-01	0,00E+00	5,28E-05	3,17E-01	1,52E-04	2,80E-06	-1,15E-03
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	MJ	3,18E+03	2,80E+01	1,47E+02	3,36E+03	6,28E+01	7,22E+00	-1,85E+02

Environmental aspects on resource use: (DU) 1 tonne

Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Use of renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	4,22E+02	5,34E-02	1,51E+01	4,37E+02	2,59E+00	1,32E-01	-1,49E+01
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Use of non-renewable primary energy resources used as raw materials	MJ	INA	INA	INA	INA	INA	INA	INA
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	3,49E+03	2,94E+01	1,54E+02	3,68E+03	6,51E+01	7,57E+00	-3,76E+02
Use of secondary material	kg	3,17E+01	0,00E+00	0,00E+00	3,17E+01	0,00E+00	0,00E+00	0,00E+00
Use of renewable secondary fuels	MJ	9,61E+01	1,47E+00	0,00E+00	9,76E+01	0,00E+00	0,00E+00	0,00E+00
Use of non-renewable secondary fuels	MJ	1,40E+02	0,00E+00	0,00E+00	1,40E+02	0,00E+00	0,00E+00	0,00E+00
Net use of fresh water	m3	INA	INA	INA	INA	INA	INA	INA

Other environmental information describing waste categories: (DU) 1 tonne

Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Hazardous waste disposed	kg	4,08E-02	1,10E-09	2,88E-03	4,37E-02	1,67E-04	1,06E-05	-1,17E-03
Non-hazardous waste disposed	kg	6,36E+00	1,02E-06	2,10E+00	8,46E+00	3,71E-01	4,90E+01	-3,81E+00
Radioactive waste disposed	kg	5,01E-03	0,00E+00	0,00E+00	5,01E-03	4,10E-04	4,74E-05	-2,53E-03
Components for re-use	kg	6,41E-05	0,00E+00	0,00E+00	6,41E-05	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	4,29E-01	0,00E+00	6,74E+00	7,16E+00	0,00E+00	0,00E+00	0,00E+00
Materials for energy recover	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy	MJ per energy carrier	INA	INA	INA	INA	INA	INA	INA

Verification

The process of verification of this EPD is in accordance with ISO 14025 and ISO 21930. After verification, this EPD is valid for a 5-year-period. EPD does not have to be recalculated after 5 years, if the underlying data have not changed significantly.

TThe basis for LCA analysis was PN-EN 15804 and ITB PCR A
Independent verification corresponding to ISO 14025 (subclause 8.1.3.) ☒ external ☐ internal
External verification of EPD: Ph.D. Halina Prejzner Input data verification, LCI audit, LCA: Ph.D. Eng. Justyna Tomaszewska, j.tomaszewska@itb.pl Verification of LCA: Ph.D. Eng. Michał Piasecki, m.piasecki@itb.pl

Normative references

- ITB PCR A General Product Category Rules for Construction Products
- ISO 14025:2006 Environmental labels and declarations – Type III environmental declarations – Principles and procedures
- ISO 21930:2017 Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services
- ISO 14044:2006 Environmental management – Life cycle assessment – Requirements and guidelines
- ISO 15686-1:2011 Buildings and constructed assets – Service life planning – Part 1: General principles
- and framework
- ISO 15686-8:2008 Buildings and constructed assets – Service life planning – Part 8: Reference service life and service-life estimation
- PN-EN 15804+A1:2014-04 - Zrównoważoność obiektów budowlanych – Deklaracje środowiskowe wyrobu – Podstawowe zasady kategoryzacji wyrobów budowlanych
- PN-EN 15804+A2:2020-03 Zrównoważenie robót budowlanych – Deklaracje środowiskowe wyrobu – Podstawowe zasady kategoryzacji wyrobów budowlanych
- PN-EN 15942:2012 Sustainability of construction works – Environmental product declarations – Communication format business-to-business
- KOBiZE Wskaźniki emisyjności CO2, SO2, NOx, CO i pyłu całkowitego dla energii elektrycznej, grudzień 2018
- World Steel Association 2017 Life Cycle inventory methodology report for steel products

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