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Sandwich panels PWS-W, PWS-W "EKO" and PWS-WA



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Basic information

This declaration is the type III Environmental Product Declaration (EPD) based on 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 EN 15804 (see point 5.3 of the standard).

Life cycle analysis (LCA): A1-A3, C3, C4 and D modules in accordance with EN 15804 (Cradle to Gate with options)

The year of preparing the EPD: 2019

Product standard: PN-EN 14509

Service Life: 45 years

PCR: ITB-PCR A (PCR based on EN 15804)

Declared unit: 1 m²

Reasons for performing LCA: B2B

Representativeness: Polish product

MANUFACTURER



Fig. 1. A view of the Pruszyński Sp. z o.o. production hall in Sokółów (Poland).

Pruszyński Sp. z o. o. is the Polish producer of construction products. The core of the activities are: steel roofing, elevation, trapezoidal steel sheets, sandwich panels and cold-formed profiles.

Since the beginning of the activity, Pruszyński Sp. z o. o. has paid the attention to the importance of the highest quality of its products and long-term relationships with customers. The commercial offer is wide therefore the products can be combined into systems that provide investors with complete solutions at site and shorten the finishing of the project.

PRODUCT DESCRIPTION

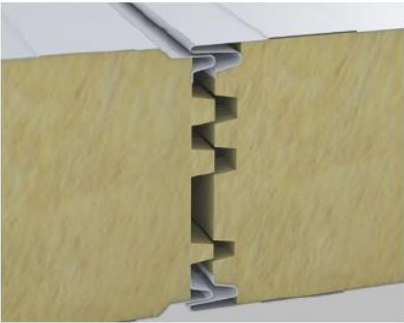
Wall panels

Sandwich panels system with mineral wool core (MW) in metal facings from production of Pruszyński Sp. z o. o. includes wall panels with visible joint: PWS – W, PWS – W “EKO” and PWS - WA .

Basic modular widths are:

- Wall panel 1150 mm.

In the case of wall panels PWS – WA the internal steel facing is perforated.

Types of PWS-W panels			
Name	PWS-W	PWS-W-EKO	PWS-WA
joint			
core (kg/m ³)	mineral wool with density of 120	mineral wool with density of 80	mineral wool with density of 120
thickness (mm)	60/80/100/120/150/180/210/240	100/120/150/180/210/240	60/80/100/120/150
effective width (mm)	1150		
thickness of the facing (mm)	0,50		
range of external profiling	T-trapezoidal/ M-micro-trapezoidal/ F-wave		
range of internal profiling	T-trapezoidal/ M-micro-trapezoidal		P - floor
anti-corrosion coating	Glossy polyester, polyurethane, PVDF, Colorcoat HPS200 Ultra®, aluzinc		

TECHNICAL PROPERTIES and CERTIFICATES

All technical properties of PWS – W, PWS – W “EKO”, PWS - WA sandwich panels in the field of:

- fire reaction,
- fire resistance,
- flame propagation,
- thermal physics,
- acoustic insulation,
- corrosion resistance,
- statics

are detailed in the technical catalog *Sandwich panels with mineral wool core* which can be downloaded at www.pruszynski.com.pl.

PWS – W, PWS – W “EKO” sandwich panels are manufactured in accordance with EN 14509, CE marked and the Declaration of Performance is issued.

PWS – WA sandwich panels are manufactured in accordance with Technical Approval AT – 15 – 8519/2015, B marked and National Declaration of Performance is issued.

In addition:

- PWS – W, PWS – W “EKO” panels have HYGIENIC CERTIFICATE No 202/322/206/2019
- PWS – WA panels have HYGIENIC CERTIFICATE No 129/322/135/2015
- The company PRUSZYŃSKI Sp. z o. o. has the CERTIFICATE No J – 1581/4/2019 according to PN – EN ISO 9001:2015-10

APPLICATION

Sandwich panels are constructed from materials which consist of construction elements (external steel facings) and construction – insulation layers (core of the panel). The idea of sandwich panels is permanent connection construction of facings with core on whole surface in order to get the static collaboration among them.

Sandwich panels are used in the buildings industry as:

- curtain walls,
- internal partition walls,
- occasionally as load-bearing walls (in the case of single-storey small buildings such a small cubic chambers, backyard facilities, rarely cottages),
- suspended ceiling elements.

In the buildings of various uses, which include objects:

- one-storey (multi-storey) industrial buildings,
- public utilities (sport and entertainment halls, large commercial halls, swimming pools, etc.),
- agricultural construction,
- special construction (e.g. cooling towers, back office buildings construction, floating military containers, etc.).

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 PWS-W, PWS-W “EKO” and PWS-WA sandwich panels is a line process in one factory of Pruszyński Sp. z o.o. in Sokołów (Poland). Allocation was done on product mass basis. All impacts from raw materials extraction are allocated in A1 module of the LCA. 100% of impacts from line production of Pruszyński Sp. z o.o. were inventoried and 1.02% were allocated to the PWS-W, PWS-W “EKO” and PWS-WA sandwich panels production. Utilization of packaging material was taken into consideration. Module A2 includes transport of raw materials such as steel products, mineral wool and ancillary materials from their suppliers to Pruszyński Sp. z o.o. in Sokołów. Municipal wastes of factory were allocated to module A3. Energy supply was inventoried for whole factory and 1.02% was allocated to the PWS-W, PWS-W “EKO” and PWS-WA sandwich panels production. Emissions in the factory are measured 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) accordance with EN 15804+A1 and ITB PCR A. The details of systems limits are provided in product technical report. All materials and energy consumption inventoried in factories and were included in calculation. 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 EN 15804+A1, 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

Steel sheets, mineral wool, PU adhesive and wrapping foil come from Polish and foreign suppliers. Data on transport of the different products to the manufacturing plants is collected and modelled for factory by assessor. For calculation purposes Polish and European fuel averages are applied.

A3: Production

Production of the PWS-W, PWS-W “EKO” and PWS-WA sandwich panels with mineral wool (MW) core was launched in 2008. The production process is carried out continuously, fully automated line. The steel facings are connected to the core using a two-part polyurethane glue. The adhesive consumption from 0.25 to 0.35 kg/m². The glue is applied on the steel facings (their internal part) with performed edges and main profile with simultaneous shaping the final shape of the mineral wool inside the joints. Maximum production speed is up to 5.0 m/min.

Steel facings are produced from thicknesses from 0.50 mm to 0.60 mm and covered with metallic and organic protective coatings. The protective coatings are offered in number of different colours so that they can meet the most sophisticated investors expectations.

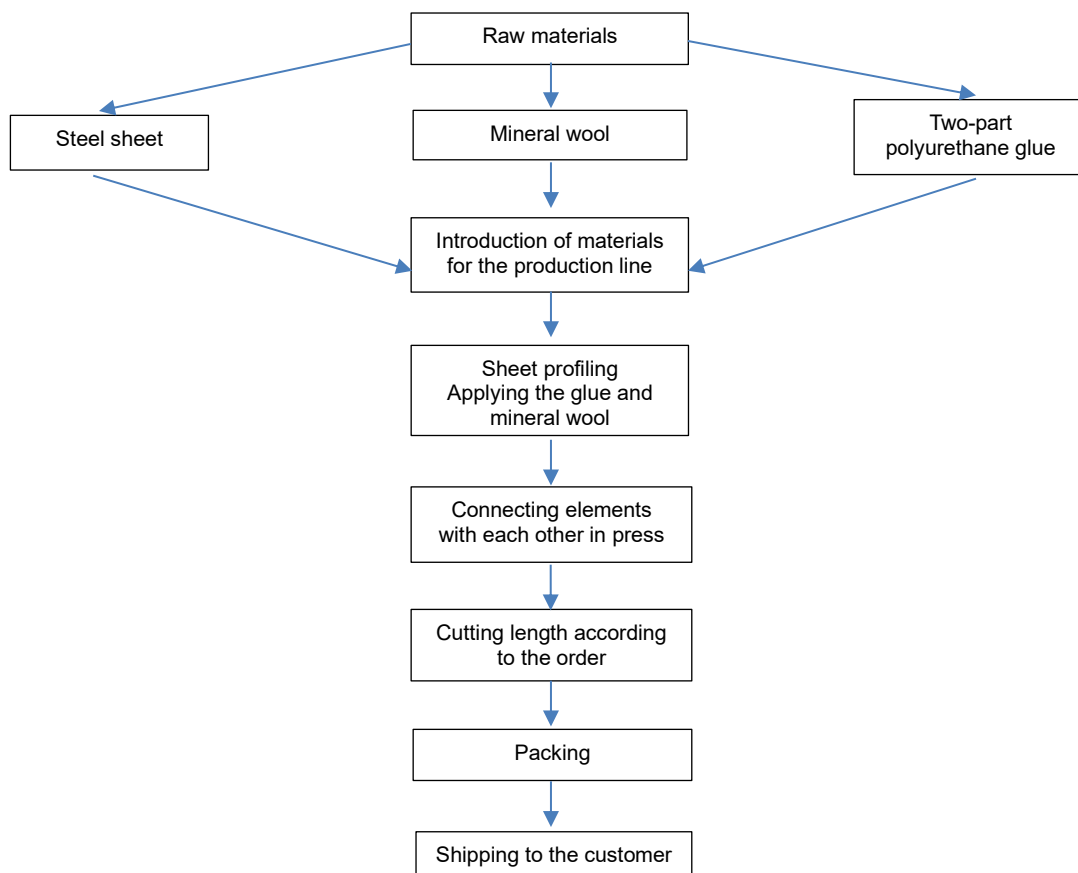


Fig. 2. A scheme of manufacturing of the sandwich panels PWS-W, PWS-W “EKO” and PWS-WA by Pruszyński Sp. z o.o. in factory in Sokołów (Poland).

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C3 – C4: End of life

Parameter	Contribution	Value	
		PWS-W, PWS-WA	PWS-W “EKO”
Collection rate	100%	14.7 – 33.1 kg	12.0 – 23.2 kg
Mixed construction waste	2%	0.3 – 0.7 kg	0.2 – 0.5 kg
Recycling	98% of facing	7.7 kg	
Landfilling	2% of facing, 100% of core	7.0 – 25.4 kg	4.3 – 15.5 kg

D: Re-use, recovery, recycling potential

Benefits and loads beyond the system boundary were calculated for steel facing 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 85%).

Data collection period

The data for manufacture of the declared products refer to period between 01.01.2018 – 31.12.2018 (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 Pruszyński Sp. z o.o. inventory data.

Assumptions and estimates

The impacts of the PWS-W, PWS-W “EKO” and PWS-WA sandwich panels were aggregated using weighted average. Impacts were inventoried and calculated for all products of the PWS-W, PWS-W “EKO” and PWS-WA sandwich panels.

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.3.5, specific EPDs, ELCD, ÖKOBAUDAT, Ullmann’s, ITB-Data. Specific data quality analysis was a part of external ISO 14001 audit. Characterization factors are CML ver. 4.2 based on EN 15804:2013+A1 version (PN-EN 15804+A1:2014-04).

LIFE CYCLE ASSESSMENT (LCA) – Results

Declared unit

The declaration refers to functional unit (FU) – 1 m² of the PWS-W, PWS-W “EKO” and PWS-WA sandwich panels (facing: 0.5 mm) manufactured by Pruszyński Sp. z o.o.

Table 1. System boundaries for the environmental characteristic of the sandwich panels.

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	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

**PWS-W and PWS-WA sandwich panels
with thickness 60 mm**

Environmental impacts: (FU) 1 m²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Global warming potential	[kg CO ₂ eq.]	3.05E+01	4.70E-01	1.35E-01	3.11E+01	1.65E-02	8.85E-02	-8.90E+00
Depletion potential of the stratospheric ozone layer	[kg CFC 11 eq.]	3.42E-08	0.00E+00	0.00E+00	3.42E-08	5.55E-12	1.51E-10	8.88E-08
Acidification potential of soil and water	[kg SO ₂ eq.]	9.25E-01	3.48E-03	1.16E-06	9.29E-01	5.56E-05	5.85E-04	-1.97E-02
Formation potential of tropospheric ozone	[kg Ethene eq.]	1.69E-01	2.41E-04	0.00E+00	1.69E-01	4.31E-06	5.67E-05	-2.49E-03
Eutrophication potential	[kg (PO ₄) ³⁻ eq.]	6.88E-02	6.15E-04	4.37E-10	6.94E-02	6.43E-06	8.45E-05	-2.90E-03
Abiotic depletion potential (ADP-elements) for non-fossil resources	[kg Sb eq.]	6.45E-03	0.00E+00	0.00E+00	6.45E-03	6.18E-09	3.38E-08	7.40E-04
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	[MJ]	3.44E+02	1.11E+01	1.58E+00	3.57E+02	1.58E-01	1.25E+00	-7.34E+01
Environmental aspects on resource use: (FU) 1 m²								
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]	3.40E+01	7.80E-01	7.52E-02	3.49E+01	7.71E-02	1.24E-01	7.71E+00
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]	3.66E+02	1.17E+01	1.66E+00	3.79E+02	2.77E-01	1.29E+00	-5.13E+01
Use of secondary material	[kg]	6.39E-01	0.00E+00	0.00E+00	6.39E-01	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	[MJ]	8.93E-04	5.85E-01	0.00E+00	5.86E-01	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	[MJ]	7.05E-03	0.00E+00	0.00E+00	7.05E-03	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water	[m ³]	INA	INA	INA	INA	INA	INA	INA
Other environmental information describing waste categories: (FU) 1 m²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Hazardous waste disposed	[kg]	3.61E-03	1.43E-04	8.75E-04	4.63E-03	2.52E-09	4.14E-07	-2.36E-03
Non-hazardous waste disposed	[kg]	5.69E+00	1.33E-01	8.18E-07	5.83E+00	1.63E-01	6.94E+00	-6.47E-01
Radioactive waste disposed	[kg]	4.42E-03	0.00E+00	0.00E+00	4.42E-03	3.60E-05	1.96E-05	-5.13E-03
Components for re-use	[kg]	0.00E+00	0.00E+00	6.27E-02	6.27E-02	7.83E-02	0.00E+00	0.00E+00
Materials for recycling	[kg]	0.00E+00	0.00E+00	5.91E-03	5.91E-03	7.67E+00	0.00E+00	0.00E+00
Materials for energy recover	[kg]	0.00E+00	0.00E+00	1.29E-02	1.29E-02	0.00E+00	0.00E+00	0.00E+00
Exported energy	[MJ per energy carrier]	INA	INA	INA	INA	INA	INA	INA

**PWS-W and PWS-WA sandwich panels
with thickness 80 mm**

Environmental impacts: (FU) 1 m ²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Global warming potential	[kg CO ₂ eq.]	3.26E+01	4.70E-01	1.35E-01	3.32E+01	1.65E-02	1.18E-01	-8.90E+00
Depletion potential of the stratospheric ozone layer	[kg CFC 11 eq.]	3.42E-08	0.00E+00	0.00E+00	3.42E-08	5.55E-12	1.51E-10	8.88E-08
Acidification potential of soil and water	[kg SO ₂ eq.]	9.46E-01	3.48E-03	1.16E-06	9.50E-01	5.56E-05	7.79E-04	-1.97E-02
Formation potential of tropospheric ozone	[kg Ethene eq.]	1.71E-01	2.41E-04	0.00E+00	1.71E-01	4.31E-06	7.55E-05	-2.49E-03
Eutrophication potential	[kg (PO ₄) ³⁻ eq.]	7.18E-02	6.15E-04	4.37E-10	7.24E-02	6.43E-06	1.13E-04	-2.90E-03
Abiotic depletion potential (ADP-elements) for non-fossil resources	[kg Sb eq.]	6.45E-03	0.00E+00	0.00E+00	6.45E-03	6.18E-09	4.49E-08	7.40E-04
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	[MJ]	3.85E+02	1.11E+01	1.58E+00	3.98E+02	1.58E-01	1.66E+00	-7.34E+01
Environmental aspects on resource use: (FU) 1 m ²								
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]	4.12E+01	7.80E-01	7.52E-02	4.20E+01	7.71E-02	1.65E-01	7.71E+00
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]	4.09E+02	1.17E+01	1.66E+00	4.22E+02	2.77E-01	1.72E+00	-5.13E+01
Use of secondary material	[kg]	6.39E-01	0.00E+00	0.00E+00	6.39E-01	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	[MJ]	8.93E-04	5.85E-01	0.00E+00	5.86E-01	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	[MJ]	7.05E-03	0.00E+00	0.00E+00	7.05E-03	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water	[m ³]	INA	INA	INA	INA	INA	INA	INA
Other environmental information describing waste categories: (FU) 1 m ²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Hazardous waste disposed	[kg]	4.23E-03	1.43E-04	8.75E-04	5.24E-03	2.52E-09	5.49E-07	-2.36E-03
Non-hazardous waste disposed	[kg]	6.66E+00	1.33E-01	8.18E-07	6.80E+00	1.63E-01	9.26E+00	-6.47E-01
Radioactive waste disposed	[kg]	4.92E-03	0.00E+00	0.00E+00	4.92E-03	3.60E-05	2.62E-05	-5.13E-03
Components for re-use	[kg]	0.00E+00	0.00E+00	6.27E-02	6.27E-02	7.83E-02	0.00E+00	0.00E+00
Materials for recycling	[kg]	0.00E+00	0.00E+00	5.91E-03	5.91E-03	7.67E+00	0.00E+00	0.00E+00
Materials for energy recover	[kg]	0.00E+00	0.00E+00	1.29E-02	1.29E-02	0.00E+00	0.00E+00	0.00E+00
Exported energy	[MJ per energy carrier]	INA	INA	INA	INA	INA	INA	INA

**PWS-W and PWS-WA sandwich panels
with thickness 100 mm**

Environmental impacts: (FU) 1 m ²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Global warming potential	[kg CO ₂ eq.]	3.53E+01	4.70E-01	1.35E-01	3.59E+01	1.65E-02	1.47E-01	-8.90E+00
Depletion potential of the stratospheric ozone layer	[kg CFC 11 eq.]	3.42E-08	0.00E+00	0.00E+00	3.42E-08	5.55E-12	1.52E-10	8.88E-08
Acidification potential of soil and water	[kg SO ₂ eq.]	9.68E-01	3.48E-03	1.16E-06	9.71E-01	5.56E-05	9.73E-04	-1.97E-02
Formation potential of tropospheric ozone	[kg Ethene eq.]	1.72E-01	2.41E-04	0.00E+00	1.72E-01	4.31E-06	9.43E-05	-2.49E-03
Eutrophication potential	[kg (PO ₄) ³⁻ eq.]	7.47E-02	6.15E-04	4.37E-10	7.53E-02	6.43E-06	1.41E-04	-2.90E-03
Abiotic depletion potential (ADP-elements) for non-fossil resources	[kg Sb eq.]	6.45E-03	0.00E+00	0.00E+00	6.45E-03	6.18E-09	5.60E-08	7.40E-04
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	[MJ]	4.27E+02	1.11E+01	1.58E+00	4.39E+02	1.58E-01	2.07E+00	-7.34E+01
Environmental aspects on resource use: (FU) 1 m ²								
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]	4.84E+01	7.80E-01	7.52E-02	4.92E+01	7.71E-02	2.06E-01	7.71E+00
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]	4.51E+02	1.17E+01	1.66E+00	4.65E+02	2.77E-01	2.14E+00	-5.13E+01
Use of secondary material	[kg]	6.39E-01	0.00E+00	0.00E+00	6.39E-01	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	[MJ]	8.93E-04	5.85E-01	0.00E+00	5.86E-01	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	[MJ]	7.05E-03	0.00E+00	0.00E+00	7.05E-03	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water	[m ³]	INA	INA	INA	INA	INA	INA	INA
Other environmental information describing waste categories: (FU) 1 m ²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Hazardous waste disposed	[kg]	4.84E-03	1.43E-04	8.75E-04	5.86E-03	2.52E-09	6.84E-07	-2.36E-03
Non-hazardous waste disposed	[kg]	7.63E+00	1.33E-01	8.18E-07	7.77E+00	1.63E-01	1.16E+01	-6.47E-01
Radioactive waste disposed	[kg]	5.41E-03	0.00E+00	0.00E+00	5.41E-03	3.60E-05	3.27E-05	-5.13E-03
Components for re-use	[kg]	0.00E+00	0.00E+00	6.27E-02	6.27E-02	7.83E-02	0.00E+00	0.00E+00
Materials for recycling	[kg]	0.00E+00	0.00E+00	5.91E-03	5.91E-03	7.67E+00	0.00E+00	0.00E+00
Materials for energy recover	[kg]	0.00E+00	0.00E+00	1.29E-02	1.29E-02	0.00E+00	0.00E+00	0.00E+00
Exported energy	[MJ per energy carrier]	INA	INA	INA	INA	INA	INA	INA

**PWS-W and PWS-WA sandwich panels
with thickness 120 mm**

Environmental impacts: (FU) 1 m²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Global warming potential	[kg CO ₂ eq.]	3.80E+01	4.70E-01	1.35E-01	3.86E+01	1.65E-02	1.77E-01	-8.90E+00
Depletion potential of the stratospheric ozone layer	[kg CFC 11 eq.]	3.42E-08	0.00E+00	0.00E+00	3.42E-08	5.55E-12	1.52E-10	8.88E-08
Acidification potential of soil and water	[kg SO ₂ eq.]	9.89E-01	3.48E-03	1.16E-06	9.92E-01	5.56E-05	1.17E-03	-1.97E-02
Formation potential of tropospheric ozone	[kg Ethene eq.]	1.74E-01	2.41E-04	0.00E+00	1.74E-01	4.31E-06	1.13E-04	-2.49E-03
Eutrophication potential	[kg (PO ₄) ³⁻ eq.]	7.76E-02	6.15E-04	4.37E-10	7.83E-02	6.43E-06	1.69E-04	-2.90E-03
Abiotic depletion potential (ADP-elements) for non-fossil resources	[kg Sb eq.]	6.45E-03	0.00E+00	0.00E+0	6.45E-03	6.18E-09	6.71E-08	7.40E-04
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	[MJ]	4.68E+02	1.11E+01	1.58E+00	4.81E+02	1.58E-01	2.48E+00	-7.34E+01
Environmental aspects on resource use: (FU) 1 m²								
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]	5.55E+01	7.80E-01	7.52E-02	5.64E+01	7.71E-02	2.47E-01	7.71E+00
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]	4.94E+02	1.17E+01	1.66E+00	5.07E+02	2.77E-01	2.57E+00	-5.13E+01
Use of secondary material	[kg]	6.39E-01	0.00E+00	0.00E+00	6.39E-01	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	[MJ]	8.93E-04	5.85E-01	0.00E+00	5.86E-01	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	[MJ]	7.05E-03	0.00E+00	0.00E+00	7.05E-03	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water	[m ³]	INA	INA	INA	INA	INA	INA	INA
Other environmental information describing waste categories: (FU) 1 m²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Hazardous waste disposed	[kg]	5.45E-03	1.43E-04	8.75E-04	6.47E-03	2.52E-09	8.20E-07	-2.36E-03
Non-hazardous waste disposed	[kg]	8.60E+00	1.33E-01	8.18E-07	8.74E+00	1.63E-01	1.39E+01	-6.47E-01
Radioactive waste disposed	[kg]	5.90E-03	0.00E+00	0.00E+00	5.90E-03	3.60E-05	3.92E-05	-5.13E-03
Components for re-use	[kg]	0.00E+00	0.00E+00	6.27E-02	6.27E-02	7.83E-02	0.00E+00	0.00E+00
Materials for recycling	[kg]	0.00E+00	0.00E+00	5.91E-03	5.91E-03	7.67E+00	0.00E+00	0.00E+00
Materials for energy recover	[kg]	0.00E+00	0.00E+00	1.29E-02	1.29E-02	0.00E+00	0.00E+00	0.00E+00
Exported energy	[MJ per energy carrier]	INA	INA	INA	INA	INA	INA	INA

**PWS-W and PWS-WA sandwich panels
with thickness 150 mm**

Environmental impacts: (FU) 1 m ²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Global warming potential	[kg CO ₂ eq.]	4.19E+01	4.70E-01	1.35E-01	4.26E+01	1.65E-02	2.21E-01	-8.90E+00
Depletion potential of the stratospheric ozone layer	[kg CFC 11 eq.]	3.43E-08	0.00E+00	0.00E+00	3.43E-08	5.55E-12	1.53E-10	8.88E-08
Acidification potential of soil and water	[kg SO ₂ eq.]	1.02E+00	3.48E-03	1.16E-06	1.02E+00	5.56E-05	1.46E-03	-1.97E-02
Formation potential of tropospheric ozone	[kg Ethene eq.]	1.76E-01	2.41E-04	0.00E+00	1.76E-01	4.31E-06	1.41E-04	-2.49E-03
Eutrophication potential	[kg (PO ₄) ³⁻ eq.]	8.20E-02	6.15E-04	4.37E-10	8.27E-02	6.43E-06	2.11E-04	-2.90E-03
Abiotic depletion potential (ADP-elements) for non-fossil resources	[kg Sb eq.]	6.45E-03	0.00E+00	0.00E+00	6.45E-03	6.18E-09	8.38E-08	7.40E-04
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	[MJ]	5.30E+02	1.11E+01	1.58E+00	5.43E+02	1.58E-01	3.10E+00	-7.34E+01
Environmental aspects on resource use: (FU) 1 m ²								
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]	6.63E+01	7.80E-01	7.52E-02	6.72E+01	7.71E-02	3.09E-01	7.71E+00
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]	5.58E+02	1.17E+01	1.66E+00	5.71E+02	2.77E-01	3.21E+00	-5.13E+01
Use of secondary material	[kg]	6.39E-01	0.00E+00	0.00E+00	6.39E-01	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	[MJ]	8.93E-04	5.85E-01	0.00E+00	5.86E-01	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	[MJ]	7.05E-03	0.00E+00	0.00E+00	7.05E-03	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water	[m ³]	INA	INA	INA	INA	INA	INA	INA
Other environmental information describing waste categories: (FU) 1 m ²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Hazardous waste disposed	[kg]	6.37E-03	1.43E-04	8.75E-04	7.39E-03	2.52E-09	1.02E-06	-2.36E-03
Non-hazardous waste disposed	[kg]	1.01E+01	1.33E-01	8.18E-07	1.02E+01	1.63E-01	1.74E+01	-6.47E-01
Radioactive waste disposed	[kg]	6.65E-03	0.00E+00	0.00E+00	6.65E-03	3.60E-05	4.90E-05	-5.13E-03
Components for re-use	[kg]	0.00E+00	0.00E+00	6.27E-02	6.27E-02	7.83E-02	0.00E+00	0.00E+00
Materials for recycling	[kg]	0.00E+00	0.00E+00	5.91E-03	5.91E-03	7.67E+00	0.00E+00	0.00E+00
Materials for energy recover	[kg]	0.00E+00	0.00E+00	1.29E-02	1.29E-02	0.00E+00	0.00E+00	0.00E+00
Exported energy	[MJ per energy carrier]	INA	INA	INA	INA	INA	INA	INA

**PWS-W sandwich panels
with thickness 180 mm**

Environmental impacts: (FU) 1 m²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Global warming potential	[kg CO ₂ eq.]	4.59E+01	4.70E-01	1.35E-01	4.65E+01	1.65E-02	2.65E-01	-8.90E+00
Depletion potential of the stratospheric ozone layer	[kg CFC 11 eq.]	3.43E-08	0.00E+00	0.00E+00	3.43E-08	5.55E-12	1.54E-10	8.88E-08
Acidification potential of soil and water	[kg SO ₂ eq.]	1.05E+00	3.48E-03	1.16E-06	1.06E+00	5.56E-05	1.75E-03	-1.97E-02
Formation potential of tropospheric ozone	[kg Ethene eq.]	1.78E-01	2.41E-04	0.00E+00	1.79E-01	4.31E-06	1.70E-04	-2.49E-03
Eutrophication potential	[kg (PO ₄) ³⁻ eq.]	8.64E-02	6.15E-04	4.37E-10	8.71E-02	6.43E-06	2.53E-04	-2.90E-03
Abiotic depletion potential (ADP-elements) for non-fossil resources	[kg Sb eq.]	6.45E-03	0.00E+00	0.00E+00	6.45E-03	6.18E-09	1.00E-07	7.40E-04
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	[MJ]	5.92E+02	1.11E+01	1.58E+00	6.05E+02	1.58E-01	3.72E+00	-7.34E+01
Environmental aspects on resource use: (FU) 1 m²								
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]	7.71E+01	7.80E-01	7.52E-02	7.79E+01	7.71E-02	3.71E-01	7.71E+00
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]	6.22E+02	1.17E+01	1.66E+00	6.35E+02	2.77E-01	3.85E+00	-5.13E+01
Use of secondary material	[kg]	6.39E-01	0.00E+00	0.00E+00	6.39E-01	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	[MJ]	8.93E-04	5.85E-01	0.00E+00	5.86E-01	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	[MJ]	7.05E-03	0.00E+00	0.00E+00	7.05E-03	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water	[m ³]	INA	INA	INA	INA	INA	INA	INA
Other environmental information describing waste categories: (FU) 1 m²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Hazardous waste disposed	[kg]	7.28E-03	1.43E-04	8.75E-04	8.30E-03	2.52E-09	1.23E-06	-2.36E-03
Non-hazardous waste disposed	[kg]	1.15E+01	1.33E-01	8.18E-07	1.16E+01	1.63E-01	2.08E+01	-6.47E-01
Radioactive waste disposed	[kg]	7.39E-03	0.00E+00	0.00E+00	7.39E-03	3.60E-05	5.88E-05	-5.13E-03
Components for re-use	[kg]	0.00E+00	0.00E+00	6.27E-02	6.27E-02	7.83E-02	0.00E+00	0.00E+00
Materials for recycling	[kg]	0.00E+00	0.00E+00	5.91E-03	5.91E-03	7.67E+00	0.00E+00	0.00E+00
Materials for energy recover	[kg]	0.00E+00	0.00E+00	1.29E-02	1.29E-02	0.00E+00	0.00E+00	0.00E+00
Exported energy	[MJ per energy carrier]	INA	INA	INA	INA	INA	INA	INA

PWS-W sandwich panels
with thickness 210 mm

Environmental impacts: (FU) 1 m ²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Global warming potential	[kg CO ₂ eq.]	4.86E+01	4.70E-01	1.35E-01	4.92E+01	1.65E-02	2.94E-01	-8.90E+00
Depletion potential of the stratospheric ozone layer	[kg CFC 11 eq.]	3.43E-08	0.00E+00	0.00E+00	3.43E-08	5.55E-12	1.54E-10	8.88E-08
Acidification potential of soil and water	[kg SO ₂ eq.]	1.07E+00	3.48E-03	1.16E-06	1.08E+00	5.56E-05	1.94E-03	-1.97E-02
Formation potential of tropospheric ozone	[kg Ethene eq.]	1.80E-01	2.41E-04	0.00E+00	1.80E-01	4.31E-06	1.88E-04	-2.49E-03
Eutrophication potential	[kg (PO ₄) ³⁻ eq.]	8.94E-02	6.15E-04	4.37E-10	9.00E-02	6.43E-06	2.81E-04	-2.90E-03
Abiotic depletion potential (ADP-elements) for non-fossil resources	[kg Sb eq.]	6.45E-03	0.00E+00	0.00E+00	6.45E-03	6.18E-09	1.12E-07	7.40E-04
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	[MJ]	6.34E+02	1.11E+01	1.58E+00	6.46E+02	1.58E-01	4.13E+00	-7.34E+01
Environmental aspects on resource use: (FU) 1 m ²								
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]	8.43E+01	7.80E-01	7.52E-02	8.51E+01	7.71E-02	4.12E-01	7.71E+00
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]	6.64E+02	1.17E+01	1.66E+00	6.78E+02	2.77E-01	4.28E+00	-5.13E+01
Use of secondary material	[kg]	6.39E-01	0.00E+00	0.00E+00	6.39E-01	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	[MJ]	8.93E-04	5.85E-01	0.00E+00	5.86E-01	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	[MJ]	7.05E-03	0.00E+00	0.00E+00	7.05E-03	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water	[m ³]	INA	INA	INA	INA	INA	INA	INA
Other environmental information describing waste categories: (FU) 1 m ²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Hazardous waste disposed	[kg]	7.90E-03	1.43E-04	8.75E-04	8.91E-03	2.52E-09	1.36E-06	-2.36E-03
Non-hazardous waste disposed	[kg]	1.25E+01	1.33E-01	8.18E-07	1.26E+01	1.63E-01	2.32E+01	-6.47E-01
Radioactive waste disposed	[kg]	7.88E-03	0.00E+00	0.00E+00	7.88E-03	3.60E-05	6.53E-05	-5.13E-03
Components for re-use	[kg]	0.00E+00	0.00E+00	6.27E-02	6.27E-02	7.83E-02	0.00E+00	0.00E+00
Materials for recycling	[kg]	0.00E+00	0.00E+00	5.91E-03	5.91E-03	7.67E+00	0.00E+00	0.00E+00
Materials for energy recover	[kg]	0.00E+00	0.00E+00	1.29E-02	1.29E-02	0.00E+00	0.00E+00	0.00E+00
Exported energy	[MJ per energy carrier]	INA	INA	INA	INA	INA	INA	INA

PWS-W sandwich panels
with thickness 240 mm

Environmental impacts: (FU) 1 m ²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Global warming potential	[kg CO ₂ eq.]	5.13E+01	4.70E-01	1.35E-01	5.19E+01	1.65E-02	3.24E-01	-8.90E+00
Depletion potential of the stratospheric ozone layer	[kg CFC 11 eq.]	3.44E-08	0.00E+00	0.00E+00	3.44E-08	5.55E-12	1.55E-10	8.88E-08
Acidification potential of soil and water	[kg SO ₂ eq.]	1.09E+00	3.48E-03	1.16E-06	1.10E+00	5.56E-05	2.14E-03	-1.97E-02
Formation potential of tropospheric ozone	[kg Ethene eq.]	1.81E-01	2.41E-04	0.00E+00	1.82E-01	4.31E-06	2.07E-04	-2.49E-03
Eutrophication potential	[kg (PO ₄) ³⁻ eq.]	9.23E-02	6.15E-04	4.37E-10	9.29E-02	6.43E-06	3.09E-04	-2.90E-03
Abiotic depletion potential (ADP-elements) for non-fossil resources	[kg Sb eq.]	6.45E-03	0.00E+00	0.00E+00	6.45E-03	6.18E-09	1.23E-07	7.40E-04
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	[MJ]	6.75E+02	1.11E+01	1.58E+00	6.88E+02	1.58E-01	4.54E+00	-7.34E+01
Environmental aspects on resource use: (FU) 1 m ²								
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]	9.14E+01	7.80E-01	7.52E-02	9.23E+01	7.71E-02	4.53E-01	7.71E+00
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]	7.07E+02	1.17E+01	1.66E+00	7.20E+02	2.77E-01	4.70E+00	-5.13E+01
Use of secondary material	[kg]	6.39E-01	0.00E+00	0.00E+00	6.39E-01	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	[MJ]	8.93E-04	5.85E-01	0.00E+00	5.86E-01	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	[MJ]	7.05E-03	0.00E+00	0.00E+00	7.05E-03	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water	[m ³]	INA	INA	INA	INA	INA	INA	INA
Other environmental information describing waste categories: (FU) 1 m ²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Hazardous waste disposed	[kg]	8.51E-03	1.43E-04	8.75E-04	9.53E-03	2.52E-09	1.50E-06	-2.36E-03
Non-hazardous waste disposed	[kg]	1.35E+01	1.33E-01	8.18E-07	1.36E+01	1.63E-01	2.55E+01	-6.47E-01
Radioactive waste disposed	[kg]	8.37E-03	0.00E+00	0.00E+00	8.37E-03	3.60E-05	7.19E-05	-5.13E-03
Components for re-use	[kg]	0.00E+00	0.00E+00	6.27E-02	6.27E-02	7.83E-02	0.00E+00	0.00E+00
Materials for recycling	[kg]	0.00E+00	0.00E+00	5.91E-03	5.91E-03	7.67E+00	0.00E+00	0.00E+00
Materials for energy recover	[kg]	0.00E+00	0.00E+00	1.29E-02	1.29E-02	0.00E+00	0.00E+00	0.00E+00
Exported energy	[MJ per energy carrier]	INA	INA	INA	INA	INA	INA	INA

**PWS-W “EKO” sandwich panels
with thickness 100 mm**

Environmental impacts: (FU) 1 m ²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Global warming potential	[kg CO ₂ eq.]	3.09E+01	4.70E-01	1.35E-01	3.15E+01	1.65E-02	1.13E-01	-8.90E+00
Depletion potential of the stratospheric ozone layer	[kg CFC 11 eq.]	3.41E-08	0.00E+00	0.00E+00	3.41E-08	5.55E-12	1.49E-10	8.88E-08
Acidification potential of soil and water	[kg SO ₂ eq.]	9.11E-01	3.48E-03	1.16E-06	9.14E-01	5.56E-05	6.71E-04	-1.97E-02
Formation potential of tropospheric ozone	[kg Ethene eq.]	1.68E-01	2.41E-04	0.00E+00	1.69E-01	4.31E-06	5.28E-05	-2.49E-03
Eutrophication potential	[kg (PO ₄) ³⁻ eq.]	6.50E-02	6.15E-04	4.37E-10	6.56E-02	6.43E-06	9.16E-05	-2.90E-03
Abiotic depletion potential (ADP-elements) for non-fossil resources	[kg Sb eq.]	6.45E-03	0.00E+00	0.00E+00	6.45E-03	6.18E-09	4.09E-08	7.40E-04
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	[MJ]	3.43E+02	1.11E+01	1.58E+00	3.55E+02	1.58E-01	1.47E+00	-7.34E+01
Environmental aspects on resource use: (FU) 1 m ²								
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]	2.84E+01	7.80E-01	7.52E-02	2.93E+01	7.71E-02	1.76E-01	7.71E+00
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]	3.71E+02	1.17E+01	1.66E+00	3.84E+02	2.77E-01	1.52E+00	-5.13E+01
Use of secondary material	[kg]	6.39E-01	0.00E+00	0.00E+00	6.39E-01	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	[MJ]	8.93E-04	5.85E-01	0.00E+00	5.86E-01	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	[MJ]	7.05E-03	0.00E+00	0.00E+00	7.05E-03	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water	[m ³]	INA	INA	INA	INA	INA	INA	INA
Other environmental information describing waste categories: (FU) 1 m ²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Hazardous waste disposed	[kg]	2.97E-03	1.43E-04	8.75E-04	3.99E-03	2.52E-09	3.24E-08	-2.36E-03
Non-hazardous waste disposed	[kg]	4.35E+00	1.33E-01	8.18E-07	4.49E+00	1.63E-01	7.00E+00	-6.47E-01
Radioactive waste disposed	[kg]	7.19E-03	0.00E+00	0.00E+00	7.19E-03	3.60E-05	2.07E-05	-5.13E-03
Components for re-use	[kg]	0.00E+00	0.00E+00	6.27E-02	6.27E-02	7.83E-02	0.00E+00	0.00E+00
Materials for recycling	[kg]	0.00E+00	0.00E+00	5.91E-03	5.91E-03	7.67E+00	0.00E+00	0.00E+00
Materials for energy recover	[kg]	0.00E+00	0.00E+00	1.29E-02	1.29E-02	0.00E+00	0.00E+00	0.00E+00
Exported energy	[MJ per energy carrier]	INA	INA	INA	INA	INA	INA	INA

**PWS-W “EKO” sandwich panels
with thickness 120 mm**

Environmental impacts: (FU) 1 m ²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Global warming potential	[kg CO ₂ eq.]	3.27E+01	4.70E-01	1.35E-01	3.33E+01	1.65E-02	1.36E-01	-8.90E+00
Depletion potential of the stratospheric ozone layer	[kg CFC 11 eq.]	3.41E-08	0.00E+00	0.00E+00	3.41E-08	5.55E-12	1.49E-10	8.88E-08
Acidification potential of soil and water	[kg SO ₂ eq.]	9.21E-01	3.48E-03	1.16E-06	9.24E-01	5.56E-05	8.04E-04	-1.97E-02
Formation potential of tropospheric ozone	[kg Ethene eq.]	1.69E-01	2.41E-04	0.00E+00	1.69E-01	4.31E-06	6.34E-05	-2.49E-03
Eutrophication potential	[kg (PO ₄) ³⁻ eq.]	6.60E-02	6.15E-04	4.37E-10	6.66E-02	6.43E-06	1.10E-04	-2.90E-03
Abiotic depletion potential (ADP-elements) for non-fossil resources	[kg Sb eq.]	6.45E-03	0.00E+00	0.00E+00	6.45E-03	6.18E-09	4.90E-08	7.40E-04
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	[MJ]	3.67E+02	1.11E+01	1.58E+00	3.80E+02	1.58E-01	1.76E+00	-7.34E+01
Environmental aspects on resource use: (FU) 1 m ²								
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]	3.16E+01	7.80E-01	7.52E-02	3.24E+01	7.71E-02	2.11E-01	7.71E+00
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]	3.98E+02	1.17E+01	1.66E+00	4.11E+02	2.77E-01	1.82E+00	-5.13E+01
Use of secondary material	[kg]	6.39E-01	0.00E+00	0.00E+00	6.39E-01	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	[MJ]	8.93E-04	5.85E-01	0.00E+00	5.86E-01	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	[MJ]	7.05E-03	0.00E+00	0.00E+00	7.05E-03	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water	[m ³]	INA	INA	INA	INA	INA	INA	INA
Other environmental information describing waste categories: (FU) 1 m ²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Hazardous waste disposed	[kg]	3.21E-03	1.43E-04	8.75E-04	4.23E-03	2.52E-09	3.72E-08	-2.36E-03
Non-hazardous waste disposed	[kg]	4.67E+00	1.33E-01	8.18E-07	4.80E+00	1.63E-01	8.41E+00	-6.47E-01
Radioactive waste disposed	[kg]	8.04E-03	0.00E+00	0.00E+00	8.04E-03	3.60E-05	2.48E-05	-5.13E-03
Components for re-use	[kg]	0.00E+00	0.00E+00	6.27E-02	6.27E-02	7.83E-02	0.00E+00	0.00E+00
Materials for recycling	[kg]	0.00E+00	0.00E+00	5.91E-03	5.91E-03	7.67E+00	0.00E+00	0.00E+00
Materials for energy recover	[kg]	0.00E+00	0.00E+00	1.29E-02	1.29E-02	0.00E+00	0.00E+00	0.00E+00
Exported energy	[MJ per energy carrier]	INA	INA	INA	INA	INA	INA	INA

**PWS-W “EKO” sandwich panels
with thickness 150 mm**

Environmental impacts: (FU) 1 m ²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Global warming potential	[kg CO ₂ eq.]	3.54E+01	4.70E-01	1.35E-01	3.60E+01	1.65E-02	1.70E-01	-8.90E+00
Depletion potential of the stratospheric ozone layer	[kg CFC 11 eq.]	3.42E-08	0.00E+00	0.00E+00	3.42E-08	5.55E-12	1.49E-10	8.88E-08
Acidification potential of soil and water	[kg SO ₂ eq.]	9.36E-01	3.48E-03	1.16E-06	9.39E-01	5.56E-05	1.00E-03	-1.97E-02
Formation potential of tropospheric ozone	[kg Ethene eq.]	1.70E-01	2.41E-04	0.00E+00	1.70E-01	4.31E-06	7.91E-05	-2.49E-03
Eutrophication potential	[kg (PO ₄) ³⁻ eq.]	6.74E-02	6.15E-04	4.37E-10	6.81E-02	6.43E-06	1.37E-04	-2.90E-03
Abiotic depletion potential (ADP-elements) for non-fossil resources	[kg Sb eq.]	6.45E-03	0.00E+00	0.00E+00	6.45E-03	6.18E-09	6.12E-08	7.40E-04
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	[MJ]	4.04E+02	1.11E+01	1.58E+00	4.17E+02	1.58E-01	2.20E+00	-7.34E+01
Environmental aspects on resource use: (FU) 1 m ²								
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]	3.64E+01	7.80E-01	7.52E-02	3.72E+01	7.71E-02	2.64E-01	7.71E+00
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]	4.38E+02	1.17E+01	1.66E+00	4.51E+02	2.77E-01	2.28E+00	-5.13E+01
Use of secondary material	[kg]	6.39E-01	0.00E+00	0.00E+00	6.39E-01	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	[MJ]	8.93E-04	5.85E-01	0.00E+00	5.86E-01	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	[MJ]	7.05E-03	0.00E+00	0.00E+00	7.05E-03	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water	[m ³]	INA	INA	INA	INA	INA	INA	INA
Other environmental information describing waste categories: (FU) 1 m ²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Hazardous waste disposed	[kg]	3.57E-03	1.43E-04	8.75E-04	4.58E-03	2.52E-09	4.43E-08	-2.36E-03
Non-hazardous waste disposed	[kg]	5.14E+00	1.33E-01	8.18E-07	5.27E+00	1.63E-01	1.05E+01	-6.47E-01
Radioactive waste disposed	[kg]	9.32E-03	0.00E+00	0.00E+00	9.32E-03	3.60E-05	3.10E-05	-5.13E-03
Components for re-use	[kg]	0.00E+00	0.00E+00	6.27E-02	6.27E-02	7.83E-02	0.00E+00	0.00E+00
Materials for recycling	[kg]	0.00E+00	0.00E+00	5.91E-03	5.91E-03	7.67E+00	0.00E+00	0.00E+00
Materials for energy recover	[kg]	0.00E+00	0.00E+00	1.29E-02	1.29E-02	0.00E+00	0.00E+00	0.00E+00
Exported energy	[MJ per energy carrier]	INA	INA	INA	INA	INA	INA	INA

**PWS-W “EKO” sandwich panels
with thickness 180 mm**

Environmental impacts: (FU) 1 m ²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Global warming potential	[kg CO ₂ eq.]	3.81E+01	4.70E-01	1.35E-01	3.87E+01	1.65E-02	2.04E-01	-8.90E+00
Depletion potential of the stratospheric ozone layer	[kg CFC 11 eq.]	3.42E-08	0.00E+00	0.00E+00	3.42E-08	5.55E-12	1.49E-10	8.88E-08
Acidification potential of soil and water	[kg SO ₂ eq.]	9.51E-01	3.48E-03	1.16E-06	9.54E-01	5.56E-05	1.20E-03	-1.97E-02
Formation potential of tropospheric ozone	[kg Ethene eq.]	1.71E-01	2.41E-04	0.00E+00	1.72E-01	4.31E-06	9.49E-05	-2.49E-03
Eutrophication potential	[kg (PO ₄) ³⁻ eq.]	6.89E-02	6.15E-04	4.37E-10	6.95E-02	6.43E-06	1.64E-04	-2.90E-03
Abiotic depletion potential (ADP-elements) for non-fossil resources	[kg Sb eq.]	6.45E-03	0.00E+00	0.00E+00	6.45E-03	6.18E-09	7.33E-08	7.40E-04
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	[MJ]	4.41E+02	1.11E+01	1.58E+00	4.54E+02	1.58E-01	2.64E+00	-7.34E+01
Environmental aspects on resource use: (FU) 1 m ²								
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]	4.11E+01	7.80E-01	7.52E-02	4.20E+01	7.71E-02	3.17E-01	7.71E+00
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]	4.78E+02	1.17E+01	1.66E+00	4.91E+02	2.77E-01	2.73E+00	-5.13E+01
Use of secondary material	[kg]	6.39E-01	0.00E+00	0.00E+00	6.39E-01	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	[MJ]	8.93E-04	5.85E-01	0.00E+00	5.86E-01	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	[MJ]	7.05E-03	0.00E+00	0.00E+00	7.05E-03	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water	[m ³]	INA	INA	INA	INA	INA	INA	INA
Other environmental information describing waste categories: (FU) 1 m ²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Hazardous waste disposed	[kg]	3.92E-03	1.43E-04	8.75E-04	4.94E-03	2.52E-09	5.15E-08	-2.36E-03
Non-hazardous waste disposed	[kg]	5.61E+00	1.33E-01	8.18E-07	5.74E+00	1.63E-01	1.26E+01	-6.47E-01
Radioactive waste disposed	[kg]	1.06E-02	0.00E+00	0.00E+00	1.06E-02	3.60E-05	3.71E-05	-5.13E-03
Components for re-use	[kg]	0.00E+00	0.00E+00	6.27E-02	6.27E-02	7.83E-02	0.00E+00	0.00E+00
Materials for recycling	[kg]	0.00E+00	0.00E+00	5.91E-03	5.91E-03	7.67E+00	0.00E+00	0.00E+00
Materials for energy recover	[kg]	0.00E+00	0.00E+00	1.29E-02	1.29E-02	0.00E+00	0.00E+00	0.00E+00
Exported energy	[MJ per energy carrier]	INA	INA	INA	INA	INA	INA	INA

**PWS-W “EKO” sandwich panels
with thickness 210 mm**

Environmental impacts: (FU) 1 m ²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Global warming potential	[kg CO ₂ eq.]	3.98E+01	4.70E-01	1.35E-01	4.05E+01	1.65E-02	2.26E-01	-8.90E+00
Depletion potential of the stratospheric ozone layer	[kg CFC 11 eq.]	3.42E-08	0.00E+00	0.00E+00	3.42E-08	5.55E-12	1.49E-10	8.88E-08
Acidification potential of soil and water	[kg SO ₂ eq.]	9.61E-01	3.48E-03	1.16E-06	9.64E-01	5.56E-05	1.34E-03	-1.97E-02
Formation potential of tropospheric ozone	[kg Ethene eq.]	1.72E-01	2.41E-04	0.00E+00	1.72E-01	4.31E-06	1.05E-04	-2.49E-03
Eutrophication potential	[kg (PO ₄) ³⁻ eq.]	6.99E-02	6.15E-04	4.37E-10	7.05E-02	6.43E-06	1.83E-04	-2.90E-03
Abiotic depletion potential (ADP-elements) for non-fossil resources	[kg Sb eq.]	6.45E-03	0.00E+00	0.00E+00	6.45E-03	6.18E-09	8.14E-08	7.40E-04
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	[MJ]	4.66E+02	1.11E+01	1.58E+00	4.78E+02	1.58E-01	2.93E+00	-7.34E+01
Environmental aspects on resource use: (FU) 1 m ²								
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]	4.43E+01	7.80E-01	7.52E-02	4.52E+01	7.71E-02	3.52E-01	7.71E+00
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]	5.04E+02	1.17E+01	1.66E+00	5.17E+02	2.77E-01	3.03E+00	-5.13E+01
Use of secondary material	[kg]	6.39E-01	0.00E+00	0.00E+00	6.39E-01	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	[MJ]	8.93E-04	5.85E-01	0.00E+00	5.86E-01	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	[MJ]	7.05E-03	0.00E+00	0.00E+00	7.05E-03	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water	[m ³]	INA	INA	INA	INA	INA	INA	INA
Other environmental information describing waste categories: (FU) 1 m ²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Hazardous waste disposed	[kg]	4.16E-03	1.43E-04	8.75E-04	5.18E-03	2.52E-09	5.63E-08	-2.36E-03
Non-hazardous waste disposed	[kg]	5.92E+00	1.33E-01	8.18E-07	6.06E+00	1.63E-01	1.40E+01	-6.47E-01
Radioactive waste disposed	[kg]	1.14E-02	0.00E+00	0.00E+00	1.14E-02	3.60E-05	4.13E-05	-5.13E-03
Components for re-use	[kg]	0.00E+00	0.00E+00	6.27E-02	6.27E-02	7.83E-02	0.00E+00	0.00E+00
Materials for recycling	[kg]	0.00E+00	0.00E+00	5.91E-03	5.91E-03	7.67E+00	0.00E+00	0.00E+00
Materials for energy recover	[kg]	0.00E+00	0.00E+00	1.29E-02	1.29E-02	0.00E+00	0.00E+00	0.00E+00
Exported energy	[MJ per energy carrier]	INA	INA	INA	INA	INA	INA	INA

**PWS-W “EKO” sandwich panels
with thickness 240 mm**

Environmental impacts: (FU) 1 m ²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Global warming potential	[kg CO ₂ eq.]	4.16E+01	4.70E-01	1.35E-01	4.22E+01	1.65E-02	2.49E-01	-8.90E+00
Depletion potential of the stratospheric ozone layer	[kg CFC 11 eq.]	3.42E-08	0.00E+00	0.00E+00	3.42E-08	5.55E-12	1.49E-10	8.88E-08
Acidification potential of soil and water	[kg SO ₂ eq.]	9.71E-01	3.48E-03	1.16E-06	9.74E-01	5.56E-05	1.47E-03	-1.97E-02
Formation potential of tropospheric ozone	[kg Ethene eq.]	1.73E-01	2.41E-04	0.00E+00	1.73E-01	4.31E-06	1.16E-04	-2.49E-03
Eutrophication potential	[kg (PO ₄) ³⁻ eq.]	7.09E-02	6.15E-04	4.37E-10	7.15E-02	6.43E-06	2.01E-04	-2.90E-03
Abiotic depletion potential (ADP-elements) for non-fossil resources	[kg Sb eq.]	6.45E-03	0.00E+00	0.00E+00	6.45E-03	6.18E-09	8.95E-08	7.40E-04
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	[MJ]	4.90E+02	1.11E+01	1.58E+00	5.03E+02	1.58E-01	3.22E+00	-7.34E+01
Environmental aspects on resource use: (FU) 1 m ²								
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]	4.75E+01	7.80E-01	7.52E-02	4.83E+01	7.71E-02	3.87E-01	7.71E+00
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]	5.31E+02	1.17E+01	1.66E+00	5.44E+02	2.77E-01	3.33E+00	-5.13E+01
Use of secondary material	[kg]	6.39E-01	0.00E+00	0.00E+00	6.39E-01	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	[MJ]	8.93E-04	5.85E-01	0.00E+00	5.86E-01	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	[MJ]	7.05E-03	0.00E+00	0.00E+00	7.05E-03	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water	[m ³]	INA	INA	INA	INA	INA	INA	INA
Other environmental information describing waste categories: (FU) 1 m ²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Hazardous waste disposed	[kg]	4.40E-03	1.43E-04	8.75E-04	5.42E-03	2.52E-09	6.11E-08	-2.36E-03
Non-hazardous waste disposed	[kg]	6.24E+00	1.33E-01	8.18E-07	6.37E+00	1.63E-01	1.54E+01	-6.47E-01
Radioactive waste disposed	[kg]	1.23E-02	0.00E+00	0.00E+00	1.23E-02	3.60E-05	4.54E-05	-5.13E-03
Components for re-use	[kg]	0.00E+00	0.00E+00	6.27E-02	6.27E-02	7.83E-02	0.00E+00	0.00E+00
Materials for recycling	[kg]	0.00E+00	0.00E+00	5.91E-03	5.91E-03	7.67E+00	0.00E+00	0.00E+00
Materials for energy recover	[kg]	0.00E+00	0.00E+00	1.29E-02	1.29E-02	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.

The basis for LCA analysis was EN 15804 and ITB PCR A
Independent verification corresponding to ISO 14025 (subclause 8.1.3.) <input checked="" type="checkbox"/> external <input type="checkbox"/> internal
External verification of EPD: Ph.D. Eng. Halina Prejzner LCA, LCI audit and input data verification: 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
- EN 15804:2012+A1:2013 Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products
- PN-EN 15942:2012 Sustainability of construction works – Environmental product declarations – Communication format business-to-business
- KOBiZE Wskaźniki emisyjności CO₂, SO₂, NO_x, CO i pyłu całkowitego dla energii elektrycznej, grudzień 2017
- PN-EN 14509:2013-12 - Samonośne izolacyjno-konstrukcyjne płyty warstwowe z dwustronną okładziną metalową -- Wyroby fabryczne -- Specyfikacje
- World Steel Association 2017 Life Cycle inventory methodology report for steel products



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CERTIFICATE No 096/2019 of TYPE III ENVIRONMENTAL DECLARATION

Product:

Sandwich panels PWS-W, PWS-W "EKO" and PWS-WA

Manufacturer:

Pruszyński Sp. z o.o.

Aleje Jerozolimskie 214, 02-486 Warsaw, Poland

confirms the correctness of the data included in the development of
Type III Environmental Declaration and accordance with the requirements of the standard

PN-EN 15804+A1:2014-04

Sustainability of construction works.

Environmental product declarations.

Core rules for the product category of construction products.

This certificate, issued for the first time on 30th August 2019 is valid for 5 years
or until amendment of mentioned Environmental Declaration

Head of the Thermal Physic, Acoustics
and Environment Department

Barbara Pietruszka, PhD



Deputy Director
for Research and Innovation

Krzysztof Kuczyński, PhD

Warsaw, August 2019