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ROOFS and WALLS

steel tiles, panel roof tiles,
panel with standing seam, trapezoidal sheets and cassettes



Owner of the EPD

Pruszyński Sp. z o.o.
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ITB is the verified member of The European Platform for EPD program operators and LCA practitioner www.eco-platform.org

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): modules A1-A3, C3, C4 and D according to EN 15804 (Cradle to Gate with options)

The year of preparing the EPD: 2019

Product standard: PN-EN 1090-1+A1:2012, PN-EN 14782:2008

Service Life: 45 years

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

Declared unit: 1 m²

Reasons for performing LCA: B2B

MANUFACTURER



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

Pruszyński Sp. z o. o. 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 extremely 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

Trapezoidal steel sheets:

The profiled trapezoidal steel sheets are used as roofs, load-bearing part of sandwich roofs made – high trapezoidal metal sheet and as the elements of elevations.

- Thickness of the steel from 0,50 mm to 1,50 mm
- Grade of steel minimum S250GD
- Height from 6 mm to 200 mm

Assortment:

- Elevation - T6, T7, T8, T14, T18, T18DR, T20, T35E, T35EL, T40, T45, T45P, T50P, T55P, T60P,
- Roofs - T14, T18, T18DR, T20, T35, T40, T45, T45P T50P, T55P, T60P
- Construction profiles - T50P, T55P, T60P, T80, T92P, T130, T135P, T150, T155, T160, T200

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All the above-mentioned sheets are offered with metallic organic coatings. Pruszyński Sp. z o. o. from mills receive flat sheets in coils covered with organic coatings. At the plant only the sheets are profiled.

Steel cassettes:

The steel cassettes are used as the load bearing part of light curtain walls.

- thickness of the steel from 0,70 mm to 1,50 mm
- grade of steel minimum S280GD

Assortment:

- KS500 and KS600
 - KS500/90, KS500/100, KS500/110, KS500/120, KS500/130, KS500/140, KS500/150, KS500/160, KS500/200
 - KS600/90, KS600/100, KS600/110, KS600/120, KS600/130, KS600/140, KS600/150, KS600/160, KS600/200
- KS500P and KS600P
 - KS500/110P, KS500/120P, KS500/140P, KS500/150P, KS500/160P, KS500/180P, KS500/200P
 - KS600/110P, KS600/120P, KS600/140P, KS600/150P, KS600/160P, KS600/180P, KS600/200P

All the above-mentioned sheets are offered with metallic organic coatings. PRUSZYŃSKI Sp. z o. o. from mills receive flat sheets in coils covered with organic coatings. At the plant only the sheets are profiled.

Tiles:

- using – roofs
- thickness of the steel 0,50 mm
- grade of steel from DX51D to DX54D

Assortment:

- REN, LOARA, FIORD, REGLE, MODUS, OPTIMA, RUBIN, SZAFIR, GRYF, TUR and KARO.

All the above-mentioned tiles are offered with metallic organic coatings. PRUSZYŃSKI Sp. z o. o. from mills receive flat sheets in coils covered with organic coatings. At the plant only the sheets are profiled.

TECHNICAL PROPERTIES and CERTIFICATES

Technical properties of profiled steel sheets (tiles, trapezoidal steel sheets, cassettes) in the field of:

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

are detailed in the technical catalog *Production profile* which can be downloaded at www.pruszynski.com.pl.

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Profiled steel sheets are manufactured in accordance with EN 14782 and EN 1090, CE marked and the Declaration of Performance is issued.

In addition:

- profiled steel sheets have HYGIENIC CERTIFICATE No 77/322/83/2015
- The company PRUSZYŃSKI Sp. z o. o. has the CERTIFICATE No J - 1581/4/2019 according to PN – EN ISO 9001:2015-10

APPLICATIONS

Profiled steel sheets are used in buildings industry as:

- Curtain walls,
- Internal partition walls,
- Roofs
- Load-bearing part of sandwich roofs made – high trapezoidal metal sheet
- 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.

The use of profiled steel sheets in the construction industry is due to the benefits of both small mass, as well as the specificity of raising partitions from these products.

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 steel tiles, panel roof tiles, panel with standing seam, trapezoidal sheets and cassettes is a line process in 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 61% were allocated to the steel tiles, panel roof tiles, panel with standing seam, trapezoidal sheets and cassettes production. Utilization of packaging material was taken into consideration. Module A2 includes transport of raw materials such as steel products, chemicals, additives 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 61% was allocated to the of the steel tiles, panel roof tiles, panel with standing seam, trapezoidal sheets and cassettes 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”, modules A1-A3, C3, C4 and D (Cradle to Gate with options) according to EN 15804+A1 and ITB-PCRA. The details of the system limits are provided in the product background report. All materials, energy consumption, emissions and wastes inventoried in factories were included in the calculation. 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 the production as well as transportation of employees were excluded from the LCA.

A1 and A2 Modules: Raw materials supply and transport

Steel sheets and wrapping foil come from Polish and foreign suppliers while polymeric non-woven preventing condensation of water vapour come from foreign suppliers. Means of transport include trucks with load: <10t, 10 – 16t and >16t. For calculation purposes Polish and European fuel averages were applied.

A3: Production

The production process of the steel tiles, panel roof tiles, panel with standing seam, trapezoidal sheets and cassettes is carried out on the dedicated lines. One line is intended for one type of the steel profile. Each line consists four parts:

- Decoiler – the section for the flat steel sheet in coils
- Profiling section – the space where the flat steel sheet is shaped according to the order
- Cutting section – the place where the shaped steel sheet is cut according to the order
- packing section

Average production speeds: tiles – c.a. 10 m/min, cassettes – c.a.10 m/min, trapezoidal steel and sheets – c.a. 20 m/min

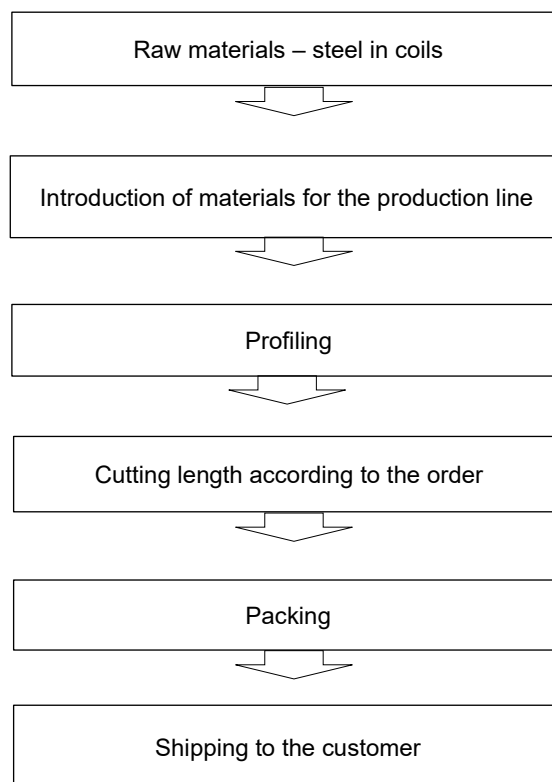


Fig. 2. A scheme of manufacturing of the steel tiles, panel roof tiles, panel with standing seam, trapezoidal sheets and cassettes by Pruszyński Sp. z o.o.. in factory in Sokołów (Poland).

C3 – C4: End of life

At the end of life the steel tiles, panel roof tiles, panel with standing seam, trapezoidal sheets and cassettes can be deconstructed with the use of electrical tools. It is assumed that 100% of the material is recovered – 98% of the resulting steel scrap undergo recycling after cutting

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and shredding while the remaining 2% is forwarded to landfill in the form of mixed construction and demolition wastes.

Table 1. End-of-life scenario for the steel tiles, panel roof tiles, panel with standing seam, trapezoidal sheets and cassettes.

Component	Material recovery	Recycling	Landfilling
Steel scrap	100%	98%	2%

D: Re-use, recovery, recycling potential

Benefits and loads beyond the system boundary 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 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 used to for the LCA originate from verified Pruszyński Sp. z o.o. inventory data.

Assumptions and estimates

The impacts of the representative the steel tiles, panel roof tiles, panel with standing seam, trapezoidal sheets and cassettes were aggregated using weighted average. Impacts were inventoried and calculated for all products of the steel tiles, panel roof tiles, panel with standing seam and trapezoidal sheets.

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, ITB-Data. Specific data quality analysis was a part of ISO 14001 audit.

LIFE CYCLE ASSESSMENT (LCA) – Results

Declared unit

The declaration refers to declared unit (DU) – 1 m² of the steel tiles, panel roof tiles, panel with standing seam, trapezoidal sheets and cassettes produced by Pruszyński Sp. z o.o.

Table 2. System boundaries for the environmental characteristic of the steel tiles, panel roof tiles, panel with standing seam, trapezoidal sheets and cassettes

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

**Steel tiles, panel roof tiles, panel with standing seam,
trapezoidal sheets and cassettes
with thickness 0.4 mm**

Environmental impacts: (DU) 1 m²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Global warming potential	[kg CO ₂ eq.]	8.05E+00	2.05E-02	1.35E-01	8.21E+00	6.61E-03	1.70E-04	-3.52E+00
Depletion potential of the stratospheric ozone layer	[kg CFC 11 eq.]	1.77E-10	0.00E+00	0.00E+00	1.77E-10	2.22E-12	5.90E-11	3.52E-08
Acidification potential of soil and water	[kg SO ₂ eq.]	2.13E-02	1.49E-04	1.16E-06	2.14E-02	2.23E-05	1.27E-06	-7.79E-03
Formation potential of tropospheric ozone	[kg Ethene eq.]	3.63E-03	1.09E-05	0.00E+00	3.64E-03	1.72E-06	1.17E-07	-9.84E-04
Eutrophication potential	[kg (PO ₄) ³⁻ eq.]	1.95E-03	2.64E-05	4.37E-10	1.97E-03	2.57E-06	2.65E-07	-1.15E-03
Abiotic depletion potential (ADP-elements) for non-fossil resources	[kg Sb eq.]	4.52E-04	0.00E+00	0.00E+00	4.52E-04	2.47E-09	1.86E-10	2.93E-04
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	[MJ]	7.29E+01	1.69E-01	1.58E+00	7.46E+01	6.31E-02	5.12E-03	-2.91E+01
Environmental aspects on resource use: (DU) 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]	4.44E+00	1.19E-02	7.52E-02	5.53E+00	3.08E-02	1.20E-04	3.05E+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]	7.53E+01	1.78E-01	1.66E+00	9.38E+01	1.11E-01	5.36E-03	-2.03E+01
Use of secondary material	[kg]	2.56E-01	0.00E+00	0.00E+00	3.20E-01	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	[MJ]	8.82E-06	8.89E-03	0.00E+00	8.82E-06	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	[MJ]	7.51E-05	0.00E+00	0.00E+00	7.51E-05	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: (DU) 1 m²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Hazardous waste disposed	[kg]	1.49E-05	1.30E-04	8.75E-04	1.02E-03	1.01E-09	3.37E-09	-9.34E-04
Non-hazardous waste disposed	[kg]	3.60E-02	1.21E-01	8.18E-07	1.57E-01	6.50E-02	6.89E-04	-2.56E-01
Radioactive waste disposed	[kg]	8.43E-04	0.00E+00	0.00E+00	8.43E-04	1.44E-05	3.43E-08	-2.03E-03
Components for re-use	[kg]	0.00E+00	0.00E+00	6.27E-02	6.27E-02	3.13E-02	0.00E+00	0.00E+00
Materials for recycling	[kg]	0.00E+00	0.00E+00	5.91E-03	5.91E-03	3.07E+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

**Steel tiles, panel roof tiles, panel with standing seam,
trapezoidal sheets and cassettes
with thickness 0.5 mm**

Environmental impacts: (DU) 1 m²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Global warming potential	[kg CO ₂ eq.]	1.01E+01	2.05E-02	1.35E-01	1.02E+01	8.26E-03	2.12E-04	-4.41E+00
Depletion potential of the stratospheric ozone layer	[kg CFC 11 eq.]	1.81E-10	0.00E+00	0.00E+00	1.81E-10	2.77E-12	7.38E-11	4.40E-08
Acidification potential of soil and water	[kg SO ₂ eq.]	2.49E-02	1.49E-04	1.16E-06	2.50E-02	2.78E-05	1.58E-06	-9.74E-03
Formation potential of tropospheric ozone	[kg Ethene eq.]	4.20E-03	1.09E-05	0.00E+00	4.21E-03	2.15E-06	1.46E-07	-1.23E-03
Eutrophication potential	[kg (PO ₄) ³⁻ eq.]	2.32E-03	2.64E-05	4.37E-10	2.34E-03	3.22E-06	3.31E-07	-1.43E-03
Abiotic depletion potential (ADP-elements) for non-fossil resources	[kg Sb eq.]	5.54E-04	0.00E+00	0.00E+00	5.54E-04	3.09E-09	2.33E-10	3.66E-04
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	[MJ]	9.09E+01	1.69E-01	1.58E+00	9.26E+01	7.89E-02	6.40E-03	-3.63E+01
Environmental aspects on resource use: (DU) 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]	5.53E+00	1.19E-02	7.52E-02	5,62E+00	3.86E-02	1.50E-04	3.81E+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]	9.38E+01	1.78E-01	1.66E+00	9,57E+01	1,39E-01	6,70E-03	-2,54E+01
Use of secondary material	[kg]	3.20E-01	0.00E+00	0.00E+00	3,20E-01	0,00E+00	0,00E+00	0,00E+00
Use of renewable secondary fuels	[MJ]	8.82E-06	8.89E-03	0.00E+00	8,90E-03	0,00E+00	0,00E+00	0,00E+00
Use of non-renewable secondary fuels	[MJ]	7.51E-05	0.00E+00	0.00E+00	7,51E-05	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: (DU) 1 m²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Hazardous waste disposed	[kg]	1.49E-05	1.30E-04	8.75E-04	1.02E-03	1.26E-09	4.21E-09	-1.17E-03
Non-hazardous waste disposed	[kg]	4.50E-02	1.21E-01	8.18E-07	1.66E-01	8.13E-02	8.61E-04	-3.20E-01
Radioactive waste disposed	[kg]	1.05E-03	0.00E+00	0.00E+00	1.05E-03	1.80E-05	4.29E-08	-2.54E-03
Components for re-use	[kg]	0.00E+00	0.00E+00	6.27E-02	6.27E-02	3.91E-02	0.00E+00	0.00E+00
Materials for recycling	[kg]	0.00E+00	0.00E+00	5.91E-03	5.91E-03	3.83E+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

**Steel tiles, panel roof tiles, panel with standing seam,
trapezoidal sheets and cassettes
with thickness 0.63 mm**

Environmental impacts: (DU) 1 m²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Global warming potential	[kg CO ₂ eq.]	1.27E+01	2.05E-02	1.35E-01	1.28E+01	1.04E-02	2.67E-04	-5.55E+00
Depletion potential of the stratospheric ozone layer	[kg CFC 11 eq.]	1.86E-10	0.00E+00	0.00E+00	1.86E-10	3.49E-12	9.30E-11	5.54E-08
Acidification potential of soil and water	[kg SO ₂ eq.]	2.95E-02	1.49E-04	1.16E-06	2.96E-02	3.51E-05	2.00E-06	-1.23E-02
Formation potential of tropospheric ozone	[kg Ethene eq.]	4.94E-03	1.09E-05	0.00E+00	4.95E-03	2.71E-06	1.84E-07	-1.55E-03
Eutrophication potential	[kg (PO ₄) ³⁻ eq.]	2.80E-03	2.64E-05	4.37E-10	2.82E-03	4.05E-06	4.17E-07	-1.81E-03
Abiotic depletion potential (ADP-elements) for non-fossil resources	[kg Sb eq.]	6.86E-04	0.00E+00	0.00E+00	6.86E-04	3.89E-09	2.93E-10	4.62E-04
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	[MJ]	1.14E+02	1.69E-01	1.58E+00	1.16E+02	9.94E-02	8.06E-03	-4.58E+01
Environmental aspects on resource use: (DU) 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]	6.96E+00	1.19E-02	7.52E-02	7.04E+00	4.86E-02	1.88E-04	4.81E+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]	1.18E+02	1.78E-01	1.66E+00	1.20E+02	1.75E-01	8.44E-03	-3.20E+01
Use of secondary material	[kg]	4.03E-01	0.00E+00	0.00E+00	4.03E-01	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	[MJ]	8.82E-06	8.89E-03	0.00E+00	8.90E-03	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	[MJ]	7.51E-05	0.00E+00	0.00E+00	7.51E-05	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: (DU) 1 m²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Hazardous waste disposed	[kg]	1.49E-05	1.30E-04	8.75E-04	1.02E-03	1.59E-09	5.30E-09	-1.47E-03
Non-hazardous waste disposed	[kg]	5.67E-02	1.21E-01	8.18E-07	1.78E-01	1.02E-01	1.08E-03	-4.04E-01
Radioactive waste disposed	[kg]	1.32E-03	0.00E+00	0.00E+00	1.32E-03	2.27E-05	5.41E-08	-3.20E-03
Components for re-use	[kg]	0.00E+00	0.00E+00	6.27E-02	6.27E-02	4.93E-02	0.00E+00	0.00E+00
Materials for recycling	[kg]	0.00E+00	0.00E+00	5.91E-03	5.91E-03	4.83E+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

**Steel tiles, panel roof tiles, panel with standing seam,
trapezoidal sheets and cassettes
with thickness 0.7 mm**

Environmental impacts: (DU) 1 m²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Global warming potential	[kg CO ₂ eq.]	1.41E+01	2.05E-02	1.35E-01	1.42E+01	1.16E-02	2.97E-04	-6.17E+00
Depletion potential of the stratospheric ozone layer	[kg CFC 11 eq.]	1.89E-10	0.00E+00	0.00E+00	1.89E-10	3.88E-12	1.03E-10	6.15E-08
Acidification potential of soil and water	[kg SO ₂ eq.]	3.20E-02	1.49E-04	1.16E-06	3.21E-02	3.89E-05	2.22E-06	-1.36E-02
Formation potential of tropospheric ozone	[kg Ethene eq.]	5.34E-03	1.09E-05	0.00E+00	5.36E-03	3.02E-06	2.04E-07	-1.72E-03
Eutrophication potential	[kg (PO ₄) ³⁻ eq.]	3.06E-03	2.64E-05	4.37E-10	3.08E-03	4.50E-06	4.64E-07	-2.01E-03
Abiotic depletion potential (ADP-elements) for non-fossil resources	[kg Sb eq.]	7.57E-04	0.00E+00	0.00E+00	7.57E-04	4.33E-09	3.26E-10	5.13E-04
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	[MJ]	1.27E+02	1.69E-01	1.58E+00	1.29E+02	1.10E-01	8.96E-03	-5.08E+01
Environmental aspects on resource use: (DU) 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]	7.72E+00	1.19E-02	7.52E-02	7.81E+00	5.40E-02	2.09E-04	5.34E+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]	1.31E+02	1.78E-01	1.66E+00	1.33E+02	1.94E-01	9.37E-03	-3.56E+01
Use of secondary material	[kg]	4.48E-01	0.00E+00	0.00E+00	4.48E-01	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	[MJ]	8.82E-06	8.89E-03	0.00E+00	8.90E-03	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	[MJ]	7.51E-05	0.00E+00	0.00E+00	7.51E-05	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: (DU) 1 m²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Hazardous waste disposed	[kg]	1.49E-05	1.30E-04	8.75E-04	1.02E-03	1.76E-09	5.89E-09	-1.64E-03
Non-hazardous waste disposed	[kg]	6.30E-02	1.21E-01	8.18E-07	1.84E-01	1.14E-01	1.21E-03	-4.48E-01
Radioactive waste disposed	[kg]	1.46E-03	0.00E+00	0.00E+00	1.46E-03	2.52E-05	6.01E-08	-3.55E-03
Components for re-use	[kg]	0.00E+00	0.00E+00	6.27E-02	6.27E-02	5.48E-02	0.00E+00	0.00E+00
Materials for recycling	[kg]	0.00E+00	0.00E+00	5.91E-03	5.91E-03	5.37E+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

**Steel tiles, panel roof tiles, panel with standing seam,
trapezoidal sheets and cassettes
with thickness 0.75 mm**

Environmental impacts: (DU) 1 m²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Global warming potential	[kg CO ₂ eq.]	1.51E+01	2.05E-02	1.35E-01	1.52E+01	1.24E-02	3.18E-04	-6.61E+00
Depletion potential of the stratospheric ozone layer	[kg CFC 11 eq.]	1.91E-10	0.00E+00	0.00E+00	1.91E-10	4.16E-12	1.11E-10	6.59E-08
Acidification potential of soil and water	[kg SO ₂ eq.]	3.38E-02	1.49E-04	1.16E-06	3.39E-02	4.17E-05	2.38E-06	-1.46E-02
Formation potential of tropospheric ozone	[kg Ethene eq.]	5.63E-03	1.09E-05	0.00E+00	5.64E-03	3.23E-06	2.19E-07	-1.85E-03
Eutrophication potential	[kg (PO ₄) ³⁻ eq.]	3.24E-03	2.64E-05	4.37E-10	3.27E-03	4.82E-06	4.97E-07	-2.15E-03
Abiotic depletion potential (ADP-elements) for non-fossil resources	[kg Sb eq.]	8.08E-04	0.00E+00	0.00E+00	8.08E-04	4.64E-09	3.49E-10	5.50E-04
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	[MJ]	1.36E+02	1.69E-01	1.58E+00	1.38E+02	1.18E-01	9.59E-03	-5.45E+01
Environmental aspects on resource use: (DU) 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]	8.27E+00	1.19E-02	7.52E-02	8.36E+00	5.78E-02	2.24E-04	5.72E+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]	1.40E+02	1.78E-01	1.66E+00	1.42E+02	2.08E-01	1.00E-02	-3.81E+01
Use of secondary material	[kg]	4.80E-01	0.00E+00	0.00E+00	4.80E-01	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	[MJ]	8.82E-06	8.89E-03	0.00E+00	8.90E-03	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	[MJ]	7.51E-05	0.00E+00	0.00E+00	7.51E-05	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: (DU) 1 m²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Hazardous waste disposed	[kg]	1.49E-05	1.30E-04	8.75E-04	1.02E-03	1.89E-09	6.31E-09	-1.75E-03
Non-hazardous waste disposed	[kg]	6.75E-02	1.21E-01	8.18E-07	1.88E-01	1.22E-01	1.29E-03	-4.80E-01
Radioactive waste disposed	[kg]	1.56E-03	0.00E+00	0.00E+00	1.56E-03	2.70E-05	6.44E-08	-3.81E-03
Components for re-use	[kg]	0.00E+00	0.00E+00	6.27E-02	6.27E-02	5.87E-02	0.00E+00	0.00E+00
Materials for recycling	[kg]	0.00E+00	0.00E+00	5.91E-03	5.91E-03	5.75E+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

Steel tiles, panel roof tiles, panel with standing seam, trapezoidal sheets and cassettes with thickness 0.8 mm

Environmental impacts: (DU) 1 m ²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Global warming potential	[kg CO ₂ eq.]	1.61E+01	2.05E-02	1.35E-01	1.62E+01	1.32E-02	3.39E-04	-7.05E+00
Depletion potential of the stratospheric ozone layer	[kg CFC 11 eq.]	1.93E-10	0.00E+00	0.00E+00	1.93E-10	4.44E-12	1.18E-10	7.03E-08
Acidification potential of soil and water	[kg SO ₂ eq.]	3.56E-02	1.49E-04	1.16E-06	3.57E-02	4.45E-05	2.54E-06	-1.56E-02
Formation potential of tropospheric ozone	[kg Ethene eq.]	5.92E-03	1.09E-05	0.00E+00	5.93E-03	3.45E-06	2.33E-07	-1.97E-03
Eutrophication potential	[kg (PO ₄) ³⁻ eq.]	3.43E-03	2.64E-05	4.37E-10	3.45E-03	5.15E-06	5.30E-07	-2.29E-03
Abiotic depletion potential (ADP-elements) for non-fossil resources	[kg Sb eq.]	8.59E-04	0.00E+00	0.00E+00	8.59E-04	4.95E-09	3.73E-10	5.86E-04
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	[MJ]	1.45E+02	1.69E-01	1.58E+00	1.47E+02	1.26E-01	1.02E-02	-5.81E+01
Environmental aspects on resource use: (DU) 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]	8.82E+00	1.19E-02	7.52E-02	8.90E+00	6.17E-02	2.39E-04	6.10E+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]	1.49E+02	1.78E-01	1.66E+00	1.51E+02	2.22E-01	1.07E-02	-4.07E+01
Use of secondary material	[kg]	5.12E-01	0.00E+00	0.00E+00	5.12E-01	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	[MJ]	8.82E-06	8.89E-03	0.00E+00	8.90E-03	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	[MJ]	7.51E-05	0.00E+00	0.00E+00	7.51E-05	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: (DU) 1 m ²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Hazardous waste disposed	[kg]	1.49E-05	1.30E-04	8.75E-04	1.02E-03	2.02E-09	6.73E-09	-1.87E-03
Non-hazardous waste disposed	[kg]	7.20E-02	1.21E-01	8.18E-07	1.93E-01	1.30E-01	1.38E-03	-5.12E-01
Radioactive waste disposed	[kg]	1.67E-03	0.00E+00	0.00E+00	1.67E-03	2.88E-05	6.87E-08	-4.06E-03
Components for re-use	[kg]	0.00E+00	0.00E+00	6.27E-02	6.27E-02	6.26E-02	0.00E+00	0.00E+00
Materials for recycling	[kg]	0.00E+00	0.00E+00	5.91E-03	5.91E-03	6.13E+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

Steel tiles, panel roof tiles, panel with standing seam, trapezoidal sheets and cassettes with thickness 0.88 mm

Environmental impacts: (DU) 1 m²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Global warming potential	[kg CO ₂ eq.]	1.77E+01	2.05E-02	1.35E-01	1.78E+01	1.45E-02	3.73E-04	-7.75E+00
Depletion potential of the stratospheric ozone layer	[kg CFC 11 eq.]	1.96E-10	0.00E+00	0.00E+00	1.96E-10	4.88E-12	1.30E-10	7.74E-08
Acidification potential of soil and water	[kg SO ₂ eq.]	3.84E-02	1.49E-04	1.16E-06	3.86E-02	4.90E-05	2.79E-06	-1.71E-02
Formation potential of tropospheric ozone	[kg Ethene eq.]	6.38E-03	1.09E-05	0.00E+00	6.39E-03	3.79E-06	2.56E-07	-2.17E-03
Eutrophication potential	[kg (PO ₄) ³⁻ eq.]	3.72E-03	2.64E-05	4.37E-10	3.75E-03	5.66E-06	5.83E-07	-2.52E-03
Abiotic depletion potential (ADP-elements) for non-fossil resources	[kg Sb eq.]	9.40E-04	0.00E+00	0.00E+00	9.40E-04	5.44E-09	4.10E-10	6.45E-04
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	[MJ]	1.59E+02	1.69E-01	1.58E+00	1.61E+02	1.39E-01	1.13E-02	-6.39E+01
Environmental aspects on resource use: (DU) 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]	9.69E+00	1.19E-02	7.52E-02	9.78E+00	6.79E-02	2.63E-04	6.71E+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]	1.64E+02	1.78E-01	1.66E+00	1.66E+02	2.44E-01	1.18E-02	-4.47E+01
Use of secondary material	[kg]	5.63E-01	0.00E+00	0.00E+00	5.63E-01	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	[MJ]	8.82E-06	8.89E-03	0.00E+00	8.90E-03	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	[MJ]	7.51E-05	0.00E+00	0.00E+00	7.51E-05	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: (DU) 1 m²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Hazardous waste disposed	[kg]	1.50E-05	1.30E-04	8.75E-04	1.02E-03	2.22E-09	7.41E-09	-2.06E-03
Non-hazardous waste disposed	[kg]	7.92E-02	1.21E-01	8.18E-07	2.00E-01	1.43E-01	1.52E-03	-5.64E-01
Radioactive waste disposed	[kg]	1.83E-03	0.00E+00	0.00E+00	1.83E-03	3.16E-05	7.56E-08	-4.47E-03
Components for re-use	[kg]	0.00E+00	0.00E+00	6.27E-02	6.27E-02	6.89E-02	0.00E+00	0.00E+00
Materials for recycling	[kg]	0.00E+00	0.00E+00	5.91E-03	5.91E-03	6.75E+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

Steel tiles, panel roof tiles, panel with standing seam, trapezoidal sheets and cassettes with thickness 1.0 mm

Environmental impacts: (DU) 1 m ²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Global warming potential	[kg CO ₂ eq.]	2.01E+01	2.05E-02	1.35E-01	2.02E+01	1.65E-02	4.24E-04	-8.81E+00
Depletion potential of the stratospheric ozone layer	[kg CFC 11 eq.]	2.01E-10	0.00E+00	0.00E+00	2.01E-10	5.55E-12	1.48E-10	8.79E-08
Acidification potential of soil and water	[kg SO ₂ eq.]	4.27E-02	1.49E-04	1.16E-06	4.28E-02	5.56E-05	3.17E-06	-1.95E-02
Formation potential of tropospheric ozone	[kg Ethene eq.]	7.06E-03	1.09E-05	0.00E+00	7.07E-03	4.31E-06	2.91E-07	-2.46E-03
Eutrophication potential	[kg (PO ₄) ³⁻ eq.]	4.16E-03	2.64E-05	4.37E-10	4.19E-03	6.43E-06	6.63E-07	-2.87E-03
Abiotic depletion potential (ADP-elements) for non-fossil resources	[kg Sb eq.]	1.06E-03	0.00E+00	0.00E+00	1.06E-03	6.18E-09	4.66E-10	7.33E-04
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	[MJ]	1.81E+02	1.69E-01	1.58E+00	1.83E+02	1.58E-01	1.28E-02	-7.26E+01
Environmental aspects on resource use: (DU) 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]	1.10E+01	1.19E-02	7.52E-02	1.11E+01	7.71E-02	2.99E-04	7.63E+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]	1.87E+02	1.78E-01	1.66E+00	1.88E+02	2.77E-01	1.34E-02	-5.08E+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]	8.82E-06	8.89E-03	0.00E+00	8.90E-03	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	[MJ]	7.51E-05	0.00E+00	0.00E+00	7.51E-05	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: (DU) 1 m ²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Hazardous waste disposed	[kg]	1.50E-05	1.30E-04	8.75E-04	1.02E-03	2.52E-09	8.41E-09	-2.34E-03
Non-hazardous waste disposed	[kg]	9.00E-02	1.21E-01	8.18E-07	2.11E-01	1.63E-01	1.72E-03	-6.41E-01
Radioactive waste disposed	[kg]	2.08E-03	0.00E+00	0.00E+00	2.08E-03	3.60E-05	8.59E-08	-5.08E-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

Steel tiles, panel roof tiles, panel with standing seam, trapezoidal sheets and cassettes with thickness 1.15 mm

Environmental impacts: (DU) 1 m ²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Global warming potential	[kg CO ₂ eq.]	2.31E+01	2.05E-02	1.35E-01	2.32E+01	1.90E-02	4.88E-04	-1.01E+01
Depletion potential of the stratospheric ozone layer	[kg CFC 11 eq.]	2.07E-10	0.00E+00	0.00E+00	2.07E-10	6.38E-12	1.70E-10	1.01E-07
Acidification potential of soil and water	[kg SO ₂ eq.]	4.80E-02	1.49E-04	1.16E-06	4.82E-02	6.40E-05	3.64E-06	-2.24E-02
Formation potential of tropospheric ozone	[kg Ethene eq.]	7.92E-03	1.09E-05	0.00E+00	7.93E-03	4.95E-06	3.35E-07	-2.83E-03
Eutrophication potential	[kg (PO ₄) ³⁻ eq.]	4.72E-03	2.64E-05	4.37E-10	4.74E-03	7.40E-06	7.62E-07	-3.30E-03
Abiotic depletion potential (ADP-elements) for non-fossil resources	[kg Sb eq.]	1.22E-03	0.00E+00	0.00E+00	1.22E-03	7.11E-09	5.36E-10	8.43E-04
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	[MJ]	2.08E+02	1.69E-01	1.58E+00	2.10E+02	1.81E-01	1.47E-02	-8.35E+01
Environmental aspects on resource use: (DU) 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]	1.27E+01	1.19E-02	7.52E-02	1.27E+01	8.87E-02	3.44E-04	8.77E+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]	2.14E+02	1.78E-01	1.66E+00	2.16E+02	3.19E-01	1.54E-02	-5.85E+01
Use of secondary material	[kg]	7.35E-01	0.00E+00	0.00E+00	7.35E-01	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	[MJ]	8.82E-06	8.89E-03	0.00E+00	8.90E-03	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	[MJ]	7.51E-05	0.00E+00	0.00E+00	0.00E+00	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: (DU) 1 m ²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Hazardous waste disposed	[kg]	1.50E-05	1.30E-04	8.75E-04	1.02E-03	2.90E-09	9.68E-09	-2.69E-03
Non-hazardous waste disposed	[kg]	1.03E-01	1.21E-01	8.18E-07	2.24E-01	1.87E-01	1.98E-03	-7.37E-01
Radioactive waste disposed	[kg]	2.39E-03	0.00E+00	0.00E+00	2.39E-03	4.14E-05	9.88E-08	-5.84E-03
Components for re-use	[kg]	0.00E+00	0.00E+00	6.27E-02	6.27E-02	9.00E-02	0.00E+00	0.00E+00
Materials for recycling	[kg]	0.00E+00	0.00E+00	5.91E-03	5.91E-03	8.82E+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

Steel tiles, panel roof tiles, panel with standing seam, trapezoidal sheets and cassettes with thickness 1.25 mm

Environmental impacts: (DU) 1 m²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Global warming potential	[kg CO ₂ eq.]	2.51E+01	2.05E-02	1.35E-01	2.52E+01	2.06E-02	5.30E-04	-1.10E+01
Depletion potential of the stratospheric ozone layer	[kg CFC 11 eq.]	2.11E-10	0.00E+00	0.00E+00	2.11E-10	6.93E-12	1.84E-10	1.10E-07
Acidification potential of soil and water	[kg SO ₂ eq.]	5.16E-02	1.49E-04	1.16E-06	5.18E-02	6.95E-05	3.96E-06	-2.44E-02
Formation potential of tropospheric ozone	[kg Ethene eq.]	8.50E-03	1.09E-05	0.00E+00	8.51E-03	5.39E-06	3.64E-07	-3.08E-03
Eutrophication potential	[kg (PO ₄) ³⁻ eq.]	5.09E-03	2.64E-05	4.37E-10	5.11E-03	8.04E-06	8.28E-07	-3.58E-03
Abiotic depletion potential (ADP-elements) for non-fossil resources	[kg Sb eq.]	1.32E-03	0.00E+00	0.00E+00	1.32E-03	7.73E-09	5.82E-10	9.16E-04
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	[MJ]	2.26E+02	1.69E-01	1.58E+00	2.28E+02	1.97E-01	1.60E-02	-9.08E+01
Environmental aspects on resource use: (DU) 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]	1.37E+01	1.19E-02	7.52E-02	1.38E+01	9.64E-02	3.74E-04	9.54E+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]	2.33E+02	1.78E-01	1.66E+00	2.35E+02	3.46E-01	1.67E-02	-6.35E+01
Use of secondary material	[kg]	7.99E-01	0.00E+00	0.00E+00	7.99E-01	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	[MJ]	8.82E-06	8.89E-03	0.00E+00	8.90E-03	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	[MJ]	7.51E-05	0.00E+00	0.00E+00	7.51E-05	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: (DU) 1 m²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Hazardous waste disposed	[kg]	1.50E-05	1.30E-04	8.75E-04	1.02E-03	3.15E-09	1.05E-08	-2.92E-03
Non-hazardous waste disposed	[kg]	1.12E-01	1.21E-01	8.18E-07	2.33E-01	2.03E-01	2.15E-03	-8.01E-01
Radioactive waste disposed	[kg]	2.59E-03	0.00E+00	0.00E+00	2.59E-03	4.49E-05	1.07E-07	-6.35E-03
Components for re-use	[kg]	0.00E+00	0.00E+00	6.27E-02	6.27E-02	9.78E-02	0.00E+00	0.00E+00
Materials for recycling	[kg]	0.00E+00	0.00E+00	5.91E-03	5.91E-03	9.59E+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

Steel tiles, panel roof tiles, panel with standing seam, trapezoidal sheets and cassettes with thickness 1.50 mm

Environmental impacts: (DU) 1 m ²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Global warming potential	[kg CO ₂ eq.]	3.01E+01	2.05E-02	1.35E-01	3.02E+01	2.48E-02	6.36E-04	-1.32E+01
Depletion potential of the stratospheric ozone layer	[kg CFC 11 eq.]	2.21E-10	0.00E+00	0.00E+00	2.21E-10	8.32E-12	2.21E-10	1.32E-07
Acidification potential of soil and water	[kg SO ₂ eq.]	6.05E-02	1.49E-04	1.16E-06	6.07E-02	8.35E-05	4.75E-06	-2.92E-02
Formation potential of tropospheric ozone	[kg Ethene eq.]	9.93E-03	1.09E-05	0.00E+00	9.94E-03	6.46E-06	4.37E-07	-3.69E-03
Eutrophication potential	[kg (PO ₄) ³⁻ eq.]	6.01E-03	2.64E-05	4.37E-10	6.04E-03	9.65E-06	9.94E-07	-4.30E-03
Abiotic depletion potential (ADP-elements) for non-fossil resources	[kg Sb eq.]	1.57E-03	0.00E+00	0.00E+00	1.57E-03	9.27E-09	6.99E-10	1.10E-03
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	[MJ]	2.71E+02	1.69E-01	1.58E+00	2.73E+02	2.37E-01	1.92E-02	-1.09E+02
Environmental aspects on resource use: (DU) 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]	1.65E+01	1.19E-02	7.52E-02	1.66E+01	1.16E-01	4.49E-04	1.14E+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]	2.79E+02	1.78E-01	1.66E+00	2.81E+02	4.16E-01	2.01E-02	-7.62E+01
Use of secondary material	[kg]	9.58E-01	0.00E+00	0.00E+00	9.58E-01	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	[MJ]	8.82E-06	8.89E-03	0.00E+00	8.90E-03	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	[MJ]	7.51E-05	0.00E+00	0.00E+00	7.51E-05	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: (DU) 1 m ²								
Indicator	Unit	A1	A2	A3	A1-A3	C3	C4	D
Hazardous waste disposed	[kg]	1.50E-05	1.30E-04	8.75E-04	1.02E-03	3.78E-09	1.26E-08	-3.50E-03
Non-hazardous waste disposed	[kg]	1.35E-01	1.21E-01	8.18E-07	2.56E-01	2.44E-01	2.58E-03	-9.61E-01
Radioactive waste disposed	[kg]	3.11E-03	0.00E+00	0.00E+00	3.11E-03	5.39E-05	1.29E-07	-7.62E-03
Components for re-use	[kg]	0.00E+00	0.00E+00	6.27E-02	6.27E-02	1.17E-01	0.00E+00	0.00E+00
Materials for recycling	[kg]	0.00E+00	0.00E+00	5.91E-03	5.91E-03	1.15E+01	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

Type III Environmental Product Declaration ITB No. 151/2021

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 14782:2008 - Samonośne blachy metalowe do pokryć dachowych, okładzin zewnętrznych i wewnętrznych -- Charakterystyka wyrobu i wymagań
- PN-EN 1090-1+A1:2012 - Wykonanie konstrukcji stalowych i aluminiowych -- Część 1: Zasady oceny zgodności elementów konstrukcyjnych
- World Steel Association 2017 Life Cycle inventory methodology report for steel products

p.o. KIEROWNIKA
Zakładu Fizyki Ciepłej, Akustyki i Środowiska
dr inż. Agnieszka Winkler-Skałna



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Thermal Physics, Acoustics and Environment Department
02-656 Warsaw, Ksawerów 21

CERTIFICATE No 098/2019

of TYPE III ENVIRONMENTAL DECLARATION

Product:

**ROOFS and WALLS steel tiles, panel roof tiles, panel with standing seam,
trapezoidal sheets and cassettes**

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