

ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804+A2

Owner of the Declaration	European Association for Panels and Profiles e. V. (PPA-Europe)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-PPA-20240128-CBG1-EN
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Valid to	18/07/2029

Double skin steel faced sandwich panels with a core made of polyurethane
PPA-Europe

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ECO PLATFORM

EPD
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General Information

PPA-Europe

Programme holder

IBU – Institut Bauen und Umwelt e.V.
Hegelplatz 1
10117 Berlin
Germany

Declaration number

EPD-PPA-20240128-CBG1-EN

This declaration is based on the product category rules:

Double skin metal faced sandwich panels, 01/08/2021
(PCR checked and approved by the SVR)

Issue date

19/07/2024

Valid to

18/07/2029



Dipl.-Ing. Hans Peters
(Chairman of Institut Bauen und Umwelt e.V.)

Double skin steel faced sandwich panels with a core made of polyurethane

Owner of the declaration

European Association for Panels and Profiles e. V. (PPA-Europe)
Europark Fichtenhain A 13a
47807 Krefeld
Germany

Declared product / declared unit

1 m² prefabricated double skin steel faced sandwich panels with an insulating core made of polyurethane rigid foam

Scope:

This document is an association EPD for 1 m² of PU Core sandwich panel with 100 mm thickness and it represents an average EPD, based on vertical averaging of the specific producer datasets under consideration of the yearly production amounts. Its applicability is limited to continuously produced double skin steel faced sandwich panels with an insulating core made of polyurethane, which are manufactured by member companies of the European Association for Panels and Profiles.

The following member companies of the European Association for Panels and Profiles have provided data for the year 2022:

1. ArcelorMittal Group, Construction Division
 - ArcelorMittal Construction Austria
 - ArcelorMittal Construction Belgium
 - ArcelorMittal Construction Deutschland
 - ArcelorMittal Construcción España
 - ArcelorMittal Construction France
 - Arcelormittal Construction Polska
 - ArcelorMittal Construção Portugal
 - Europerfil
 - Pflaum & Söhne Bausysteme
2. Assan Panel Sanayi ve Ticaret
3. Brucha
4. Fischer Profil
5. Huurre Iberica
6. ISOCAB France (Kingspan Group)
7. Isolpack
8. Joris Ide Belgium (Joris Ide Group)
9. Metecno Bausysteme
10. Montana Bausysteme
11. PAGOUNI
12. SAB-profiel

These companies are representative for the European production of steel faced sandwich panels with polyurethane core.

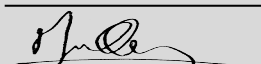
This EPD comprises an annex with LCA results for two additional sandwich panel thicknesses: 40 mm and 160 mm. Additionally, the EPD annex contains LCA results for 1 kg steel sheet used for the panel faces and 1 m³ polyurethane (PU) used for the panel core, which allows the combination and estimation of LCA results for different panel variations.

The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

The EPD was created according to the specifications of EN 15804+A2. In the following, the standard will be simplified as *EN 15804*.

Verification

The standard EN 15804 serves as the core PCR	
Independent verification of the declaration and data according to ISO 14025:2011	
<input type="checkbox"/>	internally
<input checked="" type="checkbox"/>	externally

Florian Pronold
(Managing Director Institut Bauen und Umwelt e.V.)

Mr Olivier Muller,
(Independent verifier)

Product

Product description/Product definition

The EPD applies to prefabricated double-skin steel faced sandwich panels with a core made of polyurethane, which are produced by member companies of PPA-Europe.

The profiled internal and external faces are made of a core of steel, which is protected against corrosion with zinc and organic coatings. The thermal insulating core is made of polyurethane rigid foam according to /EN 13165/ with sealing tapes. The core is bonded to the steel sheets on both sides, to ensure a certain resistance to shear forces of the panel.

The LCA is based on vertical averaging of the specific producer datasets under consideration of the respective yearly production amounts. For the placing of the product on the market in the European Union/European Free Trade Association (EU/EFTA) (with the exception of Switzerland), /CPR/ applies. The product needs a Declaration of Performance taking into consideration /EN 14509/ and the CE-marking. The data listed in the respective Declaration of Performance apply.

For the application and use, the respective national provisions apply.

Application

The products are used for self-supporting and structural applications in roof, wall and ceiling structures.

Sandwich panels in wall and roof applications take on tasks of the building physics, especially sound, heat and moisture safety. They simultaneously perform the function of air tightness of the building envelope.

Technical Data

Technical specifications for sandwich panels with a core made of polyurethane are:

- /EN 14509/
- /EN 13165/

Constructional Data

Name	Value	Unit
Density of the insulation	36 - 43	kg/m ³
Thickness of the element, when the outer layers are flat, this is the overall height of the element (D); on heavily profiled elements, this is the continuous core thickness without profile (dc)	100	mm
Thickness of the inner layer	0.5	mm
Weight	12.6	kg/m ²
Thickness of the outer layer	0.6	mm

Performance data of the product in accordance with the declaration of performance with respect to its essential

characteristics according to EN 14509

Base materials/Ancillary materials

Composition of the sandwich panels:

Material	Thickness of the element
	100mm
Steel sheet	68%
Thermal insulation core	32%

Steel sheet according to EN 10346:

S280 GD to S350 GD

Metallic coating according to EN 10346:

Zinc Z275, coating 275 g/m²

The zinc layer has a content of at least 99 weight percent zinc and a typical thickness of 20 µm.

Organic coating according to EN 10169:

Polyester (SP), coil coating, 25 µm on the application side and max. 15 µm on the backside.

Thermal insulation core according to EN 13165:

Rigid polyurethane foam mainly made of isocyanate and polyol

The panels contain sealing tapes (amount on total weight < 0,6 %).

The product does not contain any SVHCs (Substances of Very High Concern) REACH.

Reference service life

Double-skin steel faced sandwich panels used in lightweight metal constructions must withstand a term of protection of at least 15 years. The term of protection is the period until first slight renewals in the surface are required, only if there is no need of frequent inspections and service.

The term of protection depends on the location, weather conditions and the quality of the coating.

Double-skin steel faced sandwich panels exhibit an estimated service life of 50 years depending on the use conditions.

The information in this section does not refer to a reference service life according to ISO 15686.

LCA: Calculation rules

Declared Unit

The declared unit is 1 m² of sandwich panel. The averaging is done based on the yearly production volume per company.

Declared unit

Name	Value	Unit
Declared unit	1	m ²
Surface weight of the panel (total value)	12.6	kg/m ²
Conversion factor to 1 kg	0.079	-

Conversion factor is 1/12.6

System boundary

Type of the EPD: cradle to gate - with options, module C1-C4 and module D (A1-A3, C, D and additional modules A4 and A5).

Production stage (modules A1-A3) includes processes that provide materials and energy input for the system, manufacturing and transport processes up to the factory gate, as well as waste processing.

Module A4: Delivery to the construction site with a transport distance of 100 km.

Module A5: Disposal of transport packaging at the construction site and energy for installation.

Module C1: Dismantling with the use of machinery (diesel driven).

Module C2: Transport to the site of end-of-life treatment-transport distance of 50 km.

Module C3: Metal recycling of the steel sheets and incineration of the PU core material with energy recovery.

Module D: Potential benefits for substitution processes or recycling materials from modules A5 and C3.

For the end of life, it is assumed that the steel proportion is recycled with benefits for the recycling potential declared in module D and the PU proportion is incinerated (module C3) with benefits given for energy substitution in module D.

Geographic Representativeness

Land or region, in which the declared product system is manufactured, used or handled at the end of the product's lifespan: Europe

Comparability

Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to *EN 15804* and the building context, respectively the product-specific characteristics of performance, are taken into account. *LCA FE* (fka GaBi) software and databases *Sphera LCA FE* were used as calculation basis.

LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon

Information on describing the biogenic Carbon Content at factory gate

Name	Value	Unit
Biogenic carbon content in accompanying packaging	0.042	kg C

Note: 1 kg of biogenic carbon is equivalent to 44/12 kg of CO₂

The following technical information is a basis for the declared modules.

Transport to the building site (A4)

Name	Value	Unit
Transport distance	100	km
Capacity utilisation (including empty runs)	61	%

Installation (A5)

The following packaging material is considered in A1-A3: polystyrene, polyethylene foil, cardboard and wooden pallets.

A5 covers the treatment of packaging material at the point of installation.

Installation into the building (A5)

Name	Value	Unit
Output substances following waste treatment on site	0.185	kg
Machineries for installation - diesel driven	0.233	kg/m ²

End of life (C1-C4)

Name	Value	Unit
Machineries for dismantling - diesel driven	0.233	kg/m ²
Collected separately waste type	12.6	kg
Recycling	7.89	kg
Energy recovery	4.05	kg
Landfilling	-	kg

Reuse, recovery or recycling potential (D)

Resulting potential benefits and loads for the metal recycling as well as the thermal treatment of PU are declared in module D.

LCA: Results

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE OR INDICATOR NOT DECLARED; MNR = MODULE NOT RELEVANT)

Product stage			Construction process stage		Use stage							End of life stage				Benefits and loads beyond the system boundaries
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction 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
X	X	X	X	X	MND	MND	MNR	MNR	MNR	MND	MND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 m² PU sandwich panel 100 mm (12.6 kg/m²)

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	kg CO ₂ eq	3.41E+01	9.11E-02	7.17E-02	8.26E-01	4.55E-02	8.92E+00	0	-1.49E+01
GWP-fossil	kg CO ₂ eq	3.4E+01	9E-02	3.43E-02	8.15E-01	4.5E-02	8.92E+00	0	-1.49E+01
GWP-biogenic	kg CO ₂ eq	4.37E-02	2.66E-04	3.74E-02	3.21E-03	1.33E-04	6.39E-04	0	9.05E-03
GWP-luluc	kg CO ₂ eq	1.64E-02	8.34E-04	-6.73E-07	7.53E-03	4.17E-04	1.43E-05	0	-6.45E-03
ODP	kg CFC11 eq	2.3E-11	1.17E-14	2.83E-14	1.06E-13	5.86E-15	7.2E-13	0	1.9E-11
AP	mol H ⁺ eq	1.3E-01	1.16E-04	3.92E-05	4.77E-03	5.78E-05	5.26E-03	0	-3.05E-02
EP-freshwater	kg P eq	6.74E-05	3.29E-07	8.09E-09	2.97E-06	1.65E-07	1.95E-07	0	-5.75E-06
EP-marine	kg N eq	3.23E-02	3.92E-05	1.51E-05	2.33E-03	1.96E-05	2.55E-03	0	-8.05E-03
EP-terrestrial	mol N eq	3.48E-01	4.71E-04	1.91E-04	2.58E-02	2.36E-04	2.93E-02	0	-8.98E-02
POCP	kg NMVOC eq	1E-01	9.96E-05	3.88E-05	6.19E-03	4.98E-05	6.54E-03	0	-2.51E-02
ADPE	kg Sb eq	5.46E-04	5.93E-09	4.69E-11	5.36E-08	2.96E-09	6.86E-09	0	8.78E-06
ADPF	MJ	5.3E+02	1.23E+00	3.91E-02	1.11E+01	6.13E-01	2.36E+00	0	-1.4E+02
WDP	m ³ world eq deprived	2.09E+00	1.09E-03	1.22E-02	9.83E-03	5.44E-04	8.78E-01	0	1.56E-01

GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential)

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 m² PU sandwich panel 100 mm (12.6 kg/m²)

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	3.17E+01	8.92E-02	1.54E+00	8.06E-01	4.46E-02	4.8E-01	0	-8.83E-01
PERM	MJ	1.56E+00	0	-1.53E+00	0	0	-3.6E-02	0	0
PERT	MJ	3.33E+01	8.92E-02	1.32E-02	8.06E-01	4.46E-02	4.44E-01	0	-8.83E-01
PENRE	MJ	4.26E+02	1.23E+00	3.27E+00	1.11E+01	6.15E-01	1.04E+02	0	-1.41E+02
PENRM	MJ	1.05E+02	0	-3.23E+00	0	0	-1.02E+02	0	0
PENRT	MJ	5.32E+02	1.23E+00	3.9E-02	1.11E+01	6.15E-01	2.36E+00	0	-1.41E+02
SM	kg	2.13E+00	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0
FW	m ³	9.27E-02	9.77E-05	2.86E-04	8.83E-04	4.89E-05	2.07E-02	0	-8.54E-03

PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water

RESULTS OF THE LCA - WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 m² PU sandwich panel 100 mm (12.6 kg/m²)

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	kg	7.09E-06	3.81E-12	4.14E-13	3.44E-11	1.91E-12	2.08E-10	0	-3.29E-09
NHWD	kg	1.15E+00	1.88E-04	4.63E-03	1.7E-03	9.38E-05	4.49E-02	0	-3.69E-01
RWD	kg	6.69E-03	2.3E-06	1.38E-06	2.08E-05	1.15E-06	9.67E-05	0	-2.71E-03
CRU	kg	0	0	0	0	0	0	0	0
MFR	kg	1.11E-01	0	0	0	0	7.89E+00	0	0
MER	kg	0	0	0	0	0	0	0	0
EEE	MJ	0	0	9.01E-02	0	0	1.54E+01	0	0
EET	MJ	0	0	2.12E-01	0	0	2.76E+01	0	0

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy

**RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional:
1 m² PU sandwich panel 100 mm (12.6 kg/m²)**

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	Disease incidence	1.93E-06	8.45E-10	2.25E-10	9.51E-08	4.23E-10	1.46E-08	0	-4.25E-07
IR	kBq U235 eq	7.64E-01	3.43E-04	1.48E-04	3.1E-03	1.72E-04	1.53E-02	0	-6.44E-01
ETP-fw	CTUe	2.47E+02	8.71E-01	1.44E-02	7.87E+00	4.35E-01	7.95E-01	0	-3.07E+01
HTP-c	CTUh	2.78E-08	1.78E-11	1.63E-12	1.61E-10	8.91E-12	6.13E-11	0	-2.27E-08
HTP-nc	CTUh	4.55E-07	9.49E-10	2.23E-10	1.06E-08	4.74E-10	2.08E-09	0	-6.15E-08
SQP	SQP	6.46E+01	5.12E-01	1.31E-02	4.63E+00	2.56E-01	5.15E-01	0	-1.32E+00

PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index

Disclaimer 1 – concerning Potential Human exposure efficiency relative to U235 (IRP) - This impact category deals mainly with the eventual impact of low-dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure or radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, radon and from some construction materials is also not measured by this indicator.

Disclaimer 2 – concerning (ADP-minerals&metals, ADP-fossil, WDP, ETP-fw, HTP-c, HTP-nc, SQP) - The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high as there is limited experience with the indicator.

References

EN 10169

Continuously organic coated (coil coated) steel flat products - Technical delivery conditions

EN 10346

Continuously hot-dip coated steel flat products for cold forming - Technical delivery conditions

EN 13165

Thermal insulation products for buildings - Factory made rigid polyurethane foam (PU) products - Specification

EN ISO 14044

Environmental management - Life cycle assessment - Requirements and guidelines

EN 14509

Self-supporting double skin metal faced insulating panels - Factory made products - Specifications

EN 15804+A2

EN 15804+A2:2019-04: Sustainability of construction works - Environmental Product Declarations - Core rules for the product category of construction products

CPR

REGULATION (EU) No 305/2011 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 9 March 2011 laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/EEC

LCA FE Software and Database

LCA FE software-system and CUP 2023.1 databases, University of Stuttgart and Sphera Solutions GmbH, Leinfelden-Echterdingen, 2023 (<https://sphera.com/product-sustainability-gabi-data-search/>)

PCR - Part A

Calculation rules for the Life Cycle Assessment and Requirements on the Background Report, v1.3, Institut Bauen und Umwelt e.V., www.bau-umwelt.com, August 2021

PCR - Part B

Double skin metal faced sandwich panels, Institut Bauen und Umwelt e.V., www.bau-umwelt.com, v8., October 2023

REACH

Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals



ArcelorMittal





A Tata Steel Enterprise



A Tata Steel Enterprise



Building Value



By Kingspan



A Tata Steel Enterprise





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Annex for double skin steel faced sandwich panels with a core made of polyurethane

- Polyurethane sandwich panel 40mm thickness
- Polyurethane sandwich panel 160mm thickness
- 1 kg steel sheet
- 1 m³ polyurethane core

to the

ENVIRONMENTAL PRODUCT DECLARATION

as per /ISO 14025/ and /EN 15804+A2/

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General information

This document is a public annex to the EPD with the declaration number EPD-PPA-20240128-CBG1-EN. It contains the LCA results for additional thicknesses of polyurethane sandwich panels (40mm, 160mm).

Additionally, the annex provides separate results for 1 kg of steel sheet used for the panel faces and 1 m³ of polyurethane rigid foam used as core of the panel..

The LCA data were based on production data from the year 2022.

The annex includes the individual results for steel sheet (1 kg) and PU core (1 m³). The PU core declared in this annex includes transportation of chemical components to production site, and production processes. The values for 1kg of steel sheet and 1 m³ of PU core can be used to estimate the LCA results for products with different thicknesses.

The following formula describes how results for different thicknesses can be estimated:

$$R_x = M_s * R_s + T_c * R_c$$

R_x= Results of different thickness sandwich panel at different indicators

M_s= Mass of steel

R_s= Results of 1kg steel

T_c = Thickness of PU core (in m)

R_c= Results of 1m³ PU core

The formula shall be used for all indicators and for the following modules : A1-A3, A4, A5, C2, C3, C4 and D.

Additionally, installation and deconstruction impacts (for A5 and C1) are mentioned separately and declared per m² of product. The user can directly use these results without scaling. The impacts from installation (A5) shall be summed with the scaled impacts from A5 in the polyurethane core results (EOL of packaging materials).

General information on sandwich panels

This annex contains the LCA results for:

- Polyurethane sandwich panel 40mm thickness
- Polyurethane sandwich panel 160mm thickness
- 1 kg steel sheet
- 1 m³ polyurethane core

Technical data for sandwich panel PU 40

Technical specifications for sandwich panels with a core made of polyurethane are:

- EN 14509
- EN 13165

Constructional data

Name	Value	Unit
Density of the insulation	36-43	kg/m ³
Thickness of the element, when the outer layers are flat, this is the overall height of the element (D); on heavily profiled elements, this is the continuous core thickness without profile (dc)	40	mm
Thickness of the inner layer	0.5	mm
Weight	10.18	kg/m ²
Thickness of the outer layer	0.6	mm

Composition of the sandwich panels

- Steel sheet 85%
- Core material 15%

Technical specifications for sandwich panels with a core made of polyurethane are:

- EN 14509
- EN 13165

Constructional data

Name	Value	Unit
Density of the insulation	36-43	kg/m ³
Thickness of the element, when the outer layers are flat, this is the overall height of the element (D); on heavily profiled elements, this is the continuous core thickness without profile (dc)	160	mm
Thickness of the inner layer	0.5	mm
Weight	16.35	kg/m ²
Thickness of the outer layer	0.6	mm

Composition of the sandwich panels

- Steel sheet 60%
- Core material 40%

Technical data for 1 kg steel sheet

- Steel sheet according to EN 10346: S280 GD to S350 GD with organic coating according to EN 10169.

Technical data for 1 m³ PU core

- Rigid polyurethane foam mainly made of isocyanate and polyol
- Density: 36-43 kg/m³

Technical data for sandwich panel PU 160

1. LCA: Calculation rules

Declared unit

Product name	Name	Value	Unit
PU 40	Declared unit	1	m ²
	Surface weight of the panel (total value)	10.18	kg/m ²
PU 160	Declared unit	1	m ²
	Surface weight of the panel (total value)	16.35	kg/m ²
Steel sheet	Declared unit	1	kg
PU Core	Declared unit	1	m ³

2. LCA: Scenarios and additional technical information

Information on describing the biogenic carbon content at factory gate

Product name	Name	Value	Unit
PU 40	Biogenic carbon content in accompanying packaging	0.047	kg C
PU 160	Biogenic carbon content in accompanying packaging	0.039	kg C
1 kg steel sheet	Biogenic carbon content in accompanying packaging	-	kg C
1m ³ PU core with aux	Biogenic carbon content in accompanying packaging	1.20	kg C

The following technical information is a basis for the declared modules.

Transport to the building site (A4)

The transport to building site A4 is standardized and can be scaled up to building level. Hence, it is considered to be 100 km.

Name	Value	Unit
Transport distance	100	km
Capacity utilisation (including empty runs)	61	%

Installation (A5)

The following packaging material is considered in A1-A3: polystyrene, polyethylene foil, cardboard and wooden pallet.

A5 covers the treatment of packaging material at the point of installation. Additionally, installation is done by diesel driven machinery with consumption of 0,233kg/m² panel.

Installation into the building (A5)

Product name	Name	Value	Unit
PU 40	Output substances following waste treatment on site	0.172	kg
PU 160	Output substances following waste treatment on site	0.178	kg
1kg steel sheet	Output substances following waste treatment on site	-	kg
1m ³ PU core with aux.	Output substances following waste treatment on site	4.34	kg

End of life (C1-C4)

Deconstruction done by the same machine, as for installation, with same consumption.

Product name	Name	Value	Unit
PU 40	Collected separately waste type	10.18	kg
	Recycling	8.56	kg
	Energy recovery	1.62	kg
	Landfilling	-	kg
PU 160	Collected separately waste type	16.35	kg
	Recycling	8.54	kg
	Energy recovery	7.81	kg
	Landfilling	-	kg
1kg steel sheet	Collected separately waste type	1	kg
	Recycling	1	kg
	Energy recovery	-	kg
	Landfilling	-	kg

1m ³ PU core with aux.	Collected separately waste type	43	kg
	Recycling	-	kg
	Energy recovery	43	kg
	Landfilling	-	kg

Reuse, recovery or recycling potential (D)

Resulting potential benefits and loads for the metal recycling are declared in module D.

3. LCA: Results

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; ND = MODULE OR INDICATOR NOT DECLARED; MNR = MODULE NOT RELEVANT)

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction 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
X	X	X	X	X	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2 1m² polyurethane sandwich panel 40mm thickness

Core Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	[kg CO ₂ -Eq.]	2,67E+01	7,38E-02	5,61E-02	8,26E-01	3,69E-02	4,76E+00	0,00E+00	-1,47E+01
GWP-fossil	[kg CO ₂ -Eq.]	2,67E+01	7,29E-02	2,68E-02	8,15E-01	3,64E-02	4,76E+00	0,00E+00	-1,47E+01
GWP-biogenic	[kg CO ₂ -Eq.]	2,99E-02	2,15E-04	2,93E-02	3,21E-03	1,08E-04	3,41E-04	0,00E+00	1,87E-02
GWP-luluc	[kg CO ₂ -Eq.]	1,12E-02	6,75E-04	-5,26E-07	7,53E-03	3,38E-04	7,61E-06	0,00E+00	-6,44E-03
ODP	[kg CFC11-Eq.]	2,11E-11	9,49E-15	2,22E-14	1,06E-13	4,74E-15	3,84E-13	0,00E+00	3,15E-11
AP	[mol H ⁺ -Eq.]	1,23E-01	9,36E-05	3,06E-05	4,77E-03	4,68E-05	2,80E-03	0,00E+00	-3,16E-02
EP-freshwater	[kg P-Eq.]	3,85E-05	2,67E-07	6,32E-09	2,97E-06	1,33E-07	1,04E-07	0,00E+00	-3,51E-06
EP-marine	[kg N-Eq.]	3,00E-02	3,17E-05	1,18E-05	2,33E-03	1,59E-05	1,36E-03	0,00E+00	-8,04E-03
EP-terrestrial	[mol N-Eq.]	3,25E-01	3,82E-04	1,49E-04	2,58E-02	1,91E-04	1,56E-02	0,00E+00	-8,88E-02
POCP	[kg NMVOC-Eq.]	9,17E-02	8,07E-05	3,04E-05	6,19E-03	4,03E-05	3,49E-03	0,00E+00	-2,57E-02
ADPE	[kg Sb-Eq.]	5,11E-04	4,80E-09	3,66E-11	5,36E-08	2,40E-09	3,66E-09	0,00E+00	5,85E-06
ADPF	[MJ]	3,48E+02	9,93E-01	3,06E-02	1,11E+01	4,97E-01	1,26E+00	0,00E+00	-1,24E+02
WDP	[m ³ world-Eq deprived]	1,31E+00	8,81E-04	9,53E-03	9,83E-03	4,41E-04	4,69E-01	0,00E+00	7,22E-02

Caption: GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1m² polyurethane sandwich panel 40mm thickness

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	[MJ]	2,38E+01	7,23E-02	1,80E+00	8,06E-01	3,62E-02	2,37E-01	0,00E+00	8,19E+00
PERM	[MJ]	1,79E+00	0,00E+00	-1,79E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	[MJ]	2,56E+01	7,23E-02	1,03E-02	8,06E-01	3,62E-02	2,37E-01	0,00E+00	8,19E+00
PENRE	[MJ]	3,02E+02	9,97E-01	2,49E+00	1,11E+01	4,99E-01	4,53E+01	0,00E+00	-1,25E+02
PENRM	[MJ]	4,66E+01	0,00E+00	-2,46E+00	0,00E+00	0,00E+00	-4,41E+01	0,00E+00	0,00E+00
PENRT	[MJ]	3,49E+02	9,97E-01	3,05E-02	1,11E+01	4,99E-01	1,26E+00	0,00E+00	-1,25E+02
SM	[kg]	1,99E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	[MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF	[MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	[m ³]	5,47E-02	7,92E-05	2,24E-04	8,83E-04	3,96E-05	1,10E-02	0,00E+00	-7,12E-03

Caption: PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water

RESULTS OF THE LCA - WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1m² polyurethane sandwich panel 40mm thickness

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	[kg]	6,61E-06	3,09E-12	3,24E-13	3,44E-11	1,54E-12	1,11E-10	0,00E+00	-1,87E-09
NHWD	[kg]	1,01E+00	1,52E-04	3,62E-03	1,70E-03	7,60E-05	2,40E-02	0,00E+00	-1,83E-01
RWD	[kg]	4,53E-03	1,87E-06	1,08E-06	2,08E-05	9,33E-07	5,16E-05	0,00E+00	-5,03E-04
CRU	[kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MFR	[kg]	6,10E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,02E+00	0,00E+00	0,00E+00
MER	[kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EEE	[MJ]	0,00E+00	0,00E+00	7,05E-02	0,00E+00	0,00E+00	8,23E+00	0,00E+00	0,00E+00
EET	[MJ]	0,00E+00	0,00E+00	1,66E-01	0,00E+00	0,00E+00	1,47E+01	0,00E+00	0,00E+00

Caption: HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy

RESULTS OF THE LCA - additional impact categories according to EN 15804+A2-optional: polyurethane sandwich panel 40mm thickness

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	[Disease Incidence]	1,91E-06	6,85E-10	1,76E-10	9,51E-08	3,42E-10	7,77E-09	0,00E+00	-4,51E-07
IRP	[kBq U235-Eq.]	5,32E-01	2,78E-04	1,15E-04	3,10E-03	1,39E-04	8,16E-03	0,00E+00	-2,51E-01
ETP-fw	[CTUe]	1,27E+02	7,06E-01	1,12E-02	7,87E+00	3,53E-01	4,24E-01	0,00E+00	-2,54E+01
HTP-c	[CTUh]	2,45E-08	1,44E-11	1,28E-12	1,61E-10	7,22E-12	3,27E-11	0,00E+00	-2,31E-08
HTP-nc	[CTUh]	3,41E-07	7,69E-10	1,74E-10	1,06E-08	3,84E-10	1,11E-09	0,00E+00	-6,92E-08
SQP	[-]	5,07E+01	4,15E-01	1,03E-02	4,63E+00	2,08E-01	2,75E-01	0,00E+00	4,31E+00

Caption	PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index								
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RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1m² polyurethane sandwich panel 160mm thickness

Core Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	[kg CO2-Eq.]	3,93E+01	1,19E-01	1,46E-01	8,26E-01	5,93E-02	1,40E+01	0,00E+00	-1,96E+01
GWP-fossil	[kg CO2-Eq.]	3,93E+01	1,17E-01	6,99E-02	8,15E-01	5,85E-02	1,40E+01	0,00E+00	-1,96E+01
GWP-biogenic	[kg CO2-Eq.]	2,03E-02	3,46E-04	7,63E-02	3,21E-03	1,73E-04	1,00E-03	0,00E+00	3,95E-03
GWP-luluc	[kg CO2-Eq.]	2,00E-02	1,09E-03	-1,37E-06	7,53E-03	5,43E-04	2,24E-05	0,00E+00	-7,73E-03
ODP	[kg CFC11-Eq.]	2,31E-11	1,52E-14	5,77E-14	1,06E-13	7,62E-15	1,13E-12	0,00E+00	1,27E-11
AP	[mol H+-Eq.]	1,53E-01	1,50E-04	7,99E-05	4,77E-03	7,52E-05	8,24E-03	0,00E+00	-3,93E-02
EP-freshwater	[kg P-Eq.]	9,27E-05	4,28E-07	1,65E-08	2,97E-06	2,14E-07	3,07E-07	0,00E+00	-8,97E-06
EP-marine	[kg N-Eq.]	3,81E-02	5,10E-05	3,07E-05	2,33E-03	2,55E-05	4,00E-03	0,00E+00	-1,03E-02
EP-terrestrial	[mol N-Eq.]	4,09E-01	6,13E-04	3,89E-04	2,58E-02	3,07E-04	4,60E-02	0,00E+00	-1,14E-01
POCP	[kg NMVOC-Eq.]	1,18E-01	1,30E-04	7,92E-05	6,19E-03	6,48E-05	1,03E-02	0,00E+00	-3,22E-02
ADPE	[kg Sb-Eq.]	5,37E-04	7,72E-09	9,55E-11	5,36E-08	3,86E-09	1,08E-08	0,00E+00	8,45E-06
ADPF	[MJ]	6,78E+02	1,60E+00	7,97E-02	1,11E+01	7,98E-01	3,70E+00	0,00E+00	-1,95E+02
WDP	[m ³ world-Eq deprived]	2,85E+00	1,42E-03	2,48E-02	9,83E-03	7,08E-04	1,38E+00	0,00E+00	-7,29E-02

Caption	GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential								
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RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1m² polyurethane sandwich panel 160mm thickness

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	[MJ]	3,66E+01	1,16E-01	1,46E+00	8,06E-01	5,81E-02	6,96E-01	0,00E+00	-7,31E+00
PERM	[MJ]	1,43E+00	0,00E+00	-1,43E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	[MJ]	3,80E+01	1,16E-01	2,69E-02	8,06E-01	5,81E-02	6,96E-01	0,00E+00	-7,31E+00
PENRE	[MJ]	5,22E+02	1,60E+00	3,65E+00	1,11E+01	8,01E-01	1,57E+02	0,00E+00	-1,97E+02
PENRM	[MJ]	1,57E+02	0,00E+00	-3,57E+00	0,00E+00	0,00E+00	-1,54E+02	0,00E+00	0,00E+00
PENRT	[MJ]	6,79E+02	1,60E+00	7,95E-02	1,11E+01	8,01E-01	3,70E+00	0,00E+00	-1,97E+02
SM	[kg]	2,09E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	[MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF	[MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	[m ³]	1,27E-01	1,27E-04	5,83E-04	8,83E-04	6,36E-05	3,24E-02	0,00E+00	-1,87E-02

Caption	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water								
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RESULTS OF THE LCA - WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1m² polyurethane sandwich panel 160mm thickness

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	[kg]	7,02E-06	4,96E-12	8,45E-13	3,44E-11	2,48E-12	3,27E-10	0,00E+00	-5,14E-09
NHWD	[kg]	1,21E+00	2,44E-04	9,43E-03	1,70E-03	1,22E-04	7,04E-02	0,00E+00	-3,44E-01
RWD	[kg]	8,07E-03	3,00E-06	2,82E-06	2,08E-05	1,50E-06	1,52E-04	0,00E+00	-4,98E-03
CRU	[kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MFR	[kg]	1,20E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,35E+00	0,00E+00	0,00E+00
MER	[kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EEE	[MJ]	0,00E+00	0,00E+00	1,84E-01	0,00E+00	0,00E+00	2,42E+01	0,00E+00	0,00E+00
EET	[MJ]	0,00E+00	0,00E+00	4,32E-01	0,00E+00	0,00E+00	4,33E+01	0,00E+00	0,00E+00

Caption	HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy								
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RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional: 1m² polyurethane sandwich panel 160mm thickness

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	[Disease Incidence]	2,24E-06	1,10E-09	4,60E-10	9,51E-08	5,50E-10	2,29E-08	0,00E+00	-5,39E-07
IRP	[kBq U235-Eq.]	9,09E-01	4,47E-04	3,01E-04	3,10E-03	2,24E-04	2,40E-02	0,00E+00	-1,04E+00
ETP-fw	[CTUe]	3,28E+02	1,13E+00	2,93E-02	7,87E+00	5,67E-01	1,25E+00	0,00E+00	-4,18E+01
HTP-c	[CTUh]	2,90E-08	2,32E-11	3,33E-12	1,61E-10	1,16E-11	9,61E-11	0,00E+00	-2,74E-08
HTP-nc	[CTUh]	5,30E-07	1,23E-09	4,54E-10	1,06E-08	6,17E-10	3,26E-09	0,00E+00	-9,07E-08
SQP	[-]	7,28E+01	6,67E-01	2,68E-02	4,63E+00	3,33E-01	8,08E-01	0,00E+00	-5,88E+00

Caption	PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index
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RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2 1 kg steel sheet

Core Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	[kg CO ₂ -Eq.]	2,70E+00	7,25E-03			3,62E-03	0,00E+00	0,00E+00	-1,70E+00
GWP-fossil	[kg CO ₂ -Eq.]	2,70E+00	7,16E-03			3,58E-03	0,00E+00	0,00E+00	-1,70E+00
GWP-biogenic	[kg CO ₂ -Eq.]	1,54E-03	2,12E-05			1,06E-05	0,00E+00	0,00E+00	3,76E-03
GWP-luluc	[kg CO ₂ -Eq.]	1,09E-03	6,64E-05			3,32E-05	0,00E+00	0,00E+00	-8,31E-04
ODP	[kg CFC11-Eq.]	1,99E-12	9,32E-16			4,66E-16	0,00E+00	0,00E+00	5,94E-12
AP	[mol H ⁺ -Eq.]	6,42E-03	9,20E-06			4,60E-06	0,00E+00	0,00E+00	-3,86E-03
EP-freshwater	[kg P-Eq.]	2,11E-06	2,62E-08			1,31E-08	0,00E+00	0,00E+00	-9,00E-08
EP-marine	[kg N-Eq.]	1,57E-03	3,12E-06			1,56E-06	0,00E+00	0,00E+00	-9,72E-04
EP-terrestrial	[mol N-Eq.]	1,70E-02	3,75E-05			1,88E-05	0,00E+00	0,00E+00	-1,08E-02
POCP	[kg NMVOC-Eq.]	5,01E-03	7,93E-06			3,96E-06	0,00E+00	0,00E+00	-3,15E-03
ADPE	[kg Sb-Eq.]	6,65E-05	4,72E-10			2,36E-10	0,00E+00	0,00E+00	7,78E-07
ADPF	[MJ]	2,50E+01	9,76E-02			4,88E-02	0,00E+00	0,00E+00	-1,20E+01
WDP	[m ³ world-Eq deprived]	8,15E-02	8,66E-05			4,33E-05	0,00E+00	0,00E+00	3,09E-02

Caption	GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential
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RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 kg steel sheet

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	[MJ]	2,02E+00	7,10E-03			3,55E-03	0,00E+00	0,00E+00	2,31E+00
PERM	[MJ]	0,00E+00	0,00E+00			0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	[MJ]	2,02E+00	7,10E-03			3,55E-03	0,00E+00	0,00E+00	2,31E+00
PENRE	[MJ]	2,52E+01	9,80E-02			4,90E-02	0,00E+00	0,00E+00	-1,22E+01
PENRM	[MJ]	0,00E+00	0,00E+00			0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	[MJ]	2,52E+01	9,80E-02			4,90E-02	0,00E+00	0,00E+00	-1,22E+01
SM	[kg]	1,85E-01	0,00E+00			0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	[MJ]	0,00E+00	0,00E+00			0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF	[MJ]	0,00E+00	0,00E+00			0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	[m ³]	3,05E-03	7,78E-06			3,89E-06	0,00E+00	0,00E+00	5,58E-05

Caption	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water
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RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 kg steel sheet

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	[kg]	8,47E-07	3,03E-13			1,52E-13	0,00E+00	0,00E+00	-1,52E-11
NHWD	[kg]	1,21E-01	1,49E-05			7,47E-06	0,00E+00	0,00E+00	-2,16E-02
RWD	[kg]	2,58E-04	1,83E-07			9,17E-08	0,00E+00	0,00E+00	2,65E-04
CRU	[kg]	0,00E+00	0,00E+00			0,00E+00	0,00E+00	0,00E+00	0,00E+00
MFR	[kg]	6,10E-02	0,00E+00			0,00E+00	1,00E+00	0,00E+00	0,00E+00
MER	[kg]	0,00E+00	0,00E+00			0,00E+00	0,00E+00	0,00E+00	0,00E+00
EEE	[MJ]	0,00E+00	0,00E+00			0,00E+00	0,00E+00	0,00E+00	0,00E+00
EET	[MJ]	0,00E+00	0,00E+00			0,00E+00	0,00E+00	0,00E+00	0,00E+00

Caption	HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy
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**RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional:
1 kg steel sheet**

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	[Disease Incidence]	9,00E-08	6,73E-11			3,36E-11	0,00E+00	0,00E+00	-5,68E-08
IRP	[kBq U235-Eq.]	2,50E-02	2,73E-05			1,37E-05	0,00E+00	0,00E+00	2,22E-02
ETP-fw	[CTUe]	4,82E+00	6,93E-02			3,47E-02	0,00E+00	0,00E+00	-2,41E+00
HTP-c	[CTUh]	3,18E-09	1,42E-12			7,09E-13	0,00E+00	0,00E+00	-2,98E-09
HTP-nc	[CTUh]	3,37E-08	7,55E-11			3,78E-11	0,00E+00	0,00E+00	-7,65E-09
SQP	[-]	2,11E+00	4,08E-02			2,04E-02	0,00E+00	0,00E+00	1,38E+00
Caption	PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index								

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1m³ PU core with auxiliary processes

Core Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	[kg CO2-Eq.]	1,43E+02	3,12E-01	6,81E+00		1,56E-01	9,48E+01	0,00E+00	-3,74E+01
GWP-fossil	[kg CO2-Eq.]	1,39E+02	3,08E-01	3,26E+00		1,54E-01	9,48E+01	0,00E+00	-3,72E+01
GWP-biogenic	[kg CO2-Eq.]	3,80E+00	9,10E-04	3,55E+00		4,55E-04	6,80E-03	0,00E+00	-2,01E-01
GWP-luluc	[kg CO2-Eq.]	9,28E-02	2,85E-03	-6,39E-05		1,43E-03	1,52E-04	0,00E+00	-2,39E-03
ODP	[kg CFC11-Eq.]	6,52E-11	4,01E-14	2,69E-12		2,00E-14	7,65E-12	0,00E+00	-2,82E-10
AP	[mol H ⁺ -Eq.]	2,42E-01	3,95E-04	3,72E-03		1,98E-04	5,59E-02	0,00E+00	-4,55E-02
EP-freshwater	[kg P-Eq.]	5,75E-04	1,13E-06	7,68E-07		5,63E-07	2,08E-06	0,00E+00	-5,72E-05
EP-marine	[kg N-Eq.]	7,32E-02	1,34E-04	1,43E-03		6,70E-05	2,71E-02	0,00E+00	-1,34E-02
EP-terrestrial	[mol N-Eq.]	7,58E-01	1,61E-03	1,81E-02		8,06E-04	3,12E-01	0,00E+00	-1,43E-01
POCP	[kg NMVOC-Eq.]	3,69E-01	3,41E-04	3,69E-03		1,70E-04	6,96E-02	0,00E+00	-3,73E-02
ADPE	[kg Sb-Eq.]	1,81E-05	2,03E-08	4,45E-09		1,01E-08	7,29E-08	0,00E+00	-2,55E-06
ADPF	[MJ]	3,83E+03	4,20E+00	3,71E+00		2,10E+00	2,51E+01	0,00E+00	-6,80E+02
WDP	[m ³ world-Eq deprived]	1,69E+01	3,72E-03	1,16E+00		1,86E-03	9,34E+00	0,00E+00	-3,38E+00

Caption	GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential								
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RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1m³ polyurethane core with auxiliary processes

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	[MJ]	1,90E+02	3,05E-01	1,45E+02		1,53E-01	5,10E+00	0,00E+00	-1,89E+02
PERM	[MJ]	1,44E+02	0,00E+00	-1,43E+02		0,00E+00	-3,80E-01	0,00E+00	0,00E+00
PERT	[MJ]	3,33E+02	3,05E-01	1,25E+00		1,53E-01	4,72E+00	0,00E+00	-1,89E+02
PENRE	[MJ]	2,46E+03	4,21E+00	3,11E+02		2,11E+00	1,10E+03	0,00E+00	-6,80E+02
PENRM	[MJ]	1,38E+03	0,00E+00	-3,07E+02		0,00E+00	-1,08E+03	0,00E+00	0,00E+00
PENRT	[MJ]	3,84E+03	4,21E+00	3,70E+00		2,11E+00	2,51E+01	0,00E+00	-6,80E+02
SM	[kg]	0,00E+00	0,00E+00	0,00E+00		0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	[MJ]	0,00E+00	0,00E+00	0,00E+00		0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF	[MJ]	0,00E+00	0,00E+00	0,00E+00		0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	[m ³]	7,95E-01	3,35E-04	2,72E-02		1,67E-04	2,20E-01	0,00E+00	-1,56E-01

Caption	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water								
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**RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2:
1m³ polyurethane core with auxiliary processes**

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	[kg]	1,87E-06	1,30E-11	3,93E-11		6,52E-12	2,21E-09	0,00E+00	-3,87E-08
NHWD	[kg]	1,50E+00	6,42E-04	4,39E-01		3,21E-04	4,77E-01	0,00E+00	-3,25E-01
RWD	[kg]	3,86E-02	7,89E-06	1,31E-04		3,94E-06	1,03E-03	0,00E+00	-5,27E-02
CRU	[kg]	0,00E+00	0,00E+00	0,00E+00		0,00E+00	0,00E+00	0,00E+00	0,00E+00
MFR	[kg]	0,00E+00	0,00E+00	0,00E+00		0,00E+00	0,00E+00	0,00E+00	0,00E+00
MER	[kg]	0,00E+00	0,00E+00	0,00E+00		0,00E+00	0,00E+00	0,00E+00	0,00E+00
EEE	[MJ]	0,00E+00	0,00E+00	8,55E+00		0,00E+00	1,64E+02	0,00E+00	0,00E+00
EET	[MJ]	0,00E+00	0,00E+00	2,01E+01		0,00E+00	2,93E+02	0,00E+00	0,00E+00

Caption	HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy								
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**RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional:
1m³ polyurethane core with auxiliary processes**

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	[Disease Incidence]	3,54E-06	2,89E-09	2,14E-08		1,45E-09	1,55E-07	0,00E+00	-3,87E-07
IRP	[kBq U235-Eq.]	4,06E+00	1,18E-03	1,40E-02		5,88E-04	1,63E-01	0,00E+00	-8,72E+00
ETP-fw	[CTUe]	2,40E+03	2,98E+00	1,36E+00		1,49E+00	8,45E+00	0,00E+00	-1,46E+02
HTP-c	[CTUh]	4,31E-08	6,10E-11	1,55E-10		3,05E-11	6,51E-10	0,00E+00	-7,33E-09
HTP-nc	[CTUh]	2,05E-06	3,25E-09	2,12E-08		1,62E-09	2,21E-08	0,00E+00	-2,32E-07
SQP	[-]	2,30E+03	1,75E+00	1,25E+00		8,77E-01	5,48E+00	0,00E+00	-1,25E+02

Caption	PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index
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RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2 1m² polyurethane sandwich panel: Additional results from installation and deconstruction

Core Indicator	Unit	A5	C1
GWP-total	[kg CO ₂ -Eq.]	8,26E-01	8,26E-01
GWP-fossil	[kg CO ₂ -Eq.]	8,15E-01	8,15E-01
GWP-biogenic	[kg CO ₂ -Eq.]	3,21E-03	3,21E-03
GWP-luluc	[kg CO ₂ -Eq.]	7,53E-03	7,53E-03
ODP	[kg CFC11-Eq.]	1,06E-13	1,06E-13
AP	[mol H ⁺ -Eq.]	4,77E-03	4,77E-03
EP-freshwater	[kg P-Eq.]	2,97E-06	2,97E-06
EP-marine	[kg N-Eq.]	2,33E-03	2,33E-03
EP-terrestrial	[mol N-Eq.]	2,58E-02	2,58E-02
POCP	[kg NMVOC-Eq.]	6,19E-03	6,19E-03
ADPE	[kg Sb-Eq.]	5,36E-08	5,36E-08
ADPF	[MJ]	1,11E+01	1,11E+01
WDP	[m ³ world-Eq deprived]	9,83E-03	9,83E-03

Caption	GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential
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RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1m² polyurethane sandwich panel: Additional results from installation and deconstruction

Indicator	Unit	A5	C1
PERE	[MJ]	8,06E-01	8,06E-01
PERM	[MJ]	0,00E+00	0,00E+00
PERT	[MJ]	8,06E-01	8,06E-01
PENRE	[MJ]	1,11E+01	1,11E+01
PENRM	[MJ]	0,00E+00	0,00E+00
PENRT	[MJ]	1,11E+01	1,11E+01
SM	[kg]	0,00E+00	0,00E+00
RSF	[MJ]	0,00E+00	0,00E+00
NRSF	[MJ]	0,00E+00	0,00E+00
FW	[m ³]	8,83E-04	8,83E-04

Caption	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water
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RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1m² polyurethane sandwich panel: Additional results from installation and deconstruction

Indicator	Unit	A5	C1
HWD	[kg]	3,44E-11	3,44E-11
NHWD	[kg]	1,70E-03	1,70E-03
RWD	[kg]	2,08E-05	2,08E-05
CRU	[kg]	0,00E+00	0,00E+00
MFR	[kg]	0,00E+00	0,00E+00
MER	[kg]	0,00E+00	0,00E+00
EEE	[MJ]	0,00E+00	0,00E+00
EET	[MJ]	0,00E+00	0,00E+00

Caption	HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy
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RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional: 1m² polyurethane sandwich panel: Additional results from installation and deconstruction

Indicator	Unit	A5	C1
PM	[Disease Incidence]	9,51E-08	9,51E-08
IRP	[kBq U235-Eq.]	3,10E-03	3,10E-03
ETP-fw	[CTUe]	7,87E+00	7,87E+00
HTP-c	[CTUh]	1,61E-10	1,61E-10
HTP-nc	[CTUh]	1,06E-08	1,06E-08
SQP	[-]	4,63E+00	4,63E+00

Caption	PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index
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Disclaimer 1 – for the indicator “Potential Human exposure efficiency relative to U235”.
This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure or radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, radon and from some construction materials is also not measured by this indicator.

Disclaimer 2 – for the indicators “abiotic depletion potential for non-fossil resources”, “abiotic depletion potential for fossil resources”, “water (user) deprivation potential, deprivation-weighted water consumption”, “potential comparative toxic unit for ecosystems”, “potential comparative toxic unit for humans – cancerogenic”, “Potential comparative toxic unit for humans - not cancerogenic”, “potential soil quality index”.
The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high as there is limited experience with the indicator.