

ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804

Owner of the Declaration	PU Europe
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-PUE-201400121-CBE1-EN
Issue date	20.06.2014
Valid to	19.06.2019

Double steel sheet faced sandwich panel with a core made of polyurethane (density 42 kg/m³; thickness 11.5 cm)

PU Europe

www.bau-umwelt.com / <https://epd-online.com>



General Information

PU Europe

Double steel sheet faced sandwich panels with a core made of polyurethane (density 42 kg/m³; thickness 11.5 cm)

Programme holder

IBU - Institut Bauen und Umwelt e.V.
Panoramastr. 1
10178 Berlin
Germany

Owner of the Declaration

PU Europe
Av. E. Van Nieuwenhuysse 6
1160 Brussels (Belgium)

Declaration number

EPD-PUE-201400121-CBE1-EN

Declared product / Declared unit

1 m² prefabricated sandwich panel with a thermal insulating core made of polyurethane (PU) rigid foam (thickness of 11.5 cm) and double faced with steel sheet and polyester coating.

The data presented here provide a complete picture of the performance during production, installation and end-of-life.

This Declaration is based on the Product Category Rules:

Insulating materials made of foam plastics, 07-2013 (PCR tested and approved by the independent expert committee)

Scope:

This EPD is a generic association EPD covering double steel sheet faced sandwich panels with a core made of PU produced by PU Europe members. These members represent about 40 % of this market segment and use similar production techniques across Europe.

The EPD therefore represents an average of these producers.

Issue date

20.06.2014

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.

Valid to

19.06.2019

Verification

The CEN Norm EN 15804 serves as the core PCR

Independent verification of the declaration according to ISO 14025

internally externally



Prof. Dr.-Ing. Horst J. Bossenmayer
(President of Institut Bauen und Umwelt e.V.)



Dr. Burkhard Lehmann
(Managing Director IBU)



Prof. Dr. Birgit Grahl
(Independent tester appointed by SVA)

Product

Product description

Polyurethane (PU) is a high-performance thermal insulation material offering the lowest thermal conductivity of insulation products commonly available in the market.

The product covered by this EPD is a prefabricated double steel sheet faced sandwich panel with a core made of PU. During the manufacturing process the PU core expands, auto adhesively bonding and laminating completely to the metal facings, forming a single strong semi-structural unit. These panels are able to guarantee continuity of insulation and factory engineered airtight joints.

Application

The sandwich panels covered by this EPD are applied according to /EN 14509/ (Self-supporting double skin metal faced insulating panels – Factory made products – Specifications) in wall and roof applications of commercial and residential building.

Technical Data

In this Life Cycle Assessment, a double steel sheet faced sandwich panel with a core made of PU with the following properties has been regarded:

Constructional data

Name	Value	Unit
Gross density	42	kg/m ³
Thermal conductivity	0.023	W/(mK)

Base materials / Ancillary materials

Core material (about 35 % of the weight of the declared unit):

Closed-cell polyurethane foam made from MDI (60.5 %), polyols (29 %), pentane (5 %) and additives (5.5 %).

Facing (about 65 % of the weight of the declared unit):

Steel sheet (8.9 kg/m²) with polyester coating (0.1 kg/m²).

The double steel sheet faced sandwich panel with a core of insulating PU does not contain substances which are included in the "Candidate List of Substances of Very High Concern for Authorisation".

Default values on packaging (use and waste), production waste, air emission and energy used are arithmetic averages of the inputs and outputs per ton produced over one reference year from different PU Europe manufacturers. Since the same machinery and similar process conditions are applied across Europe, using same base chemicals/materials, they can be considered valid.

Reference service life

The reference service life is 50 years.

LCA: Calculation rules

Declared Unit

The declared unit is 1 m² of double steel sheet faced sandwich panel with a core of insulating PU and with the following specifications:

Declared unit

Name	Value	Unit
Declared unit	1	m ²
Gross density	42	kg/m ³
Conversion factor to 1 kg	0.0723	m ² /kg
Thickness	11.5	cm
Thermal conductivity	0.023	W/mK
Weight of declared unit	13.8	kg/m ²

This provides a thermal resistance R = 5 m² K/W.

The LCI data used in this report is the weighted average of the data supplied by the individual members of PU Europe, who manufacture products meeting this specification. The product is manufactured in accordance to /EN 14509/ "Self-supporting double skin metal faced insulating panels – Factory made products – Specifications".

System boundary

This life cycle assessment for the production of the double steel sheet faced polyurethane sandwich panel considers the life cycle from the supply of raw materials to the manufacturer's gate (cradle-to-gate with options). It also includes the transport to the construction site, the installation and the end-of-life stage of the used double steel sheet faced

polyurethane sandwich panel. The life cycle is split into the following individual phases:

- A1 - Raw material formulation (foam materials)
- A2 - Raw material transport
- A3 - Production of the double steel sheet faced polyurethane sandwich panel (energy demands, waste, auxiliaries, etc.) and packaging material
- A4 - Transport system house to warehouse and from warehouse to the construction site
- A5 - Emissions during installation and packaging disposal
- C2 - Transport of the used product from the building site to the waste management site
- C3/C4 - End-of-life: waste management (thermal recovery)
- D - Benefits and loads beyond system boundary

For the end-of-life it is assumed that the steel proportion is recycled with credit for the recycling potential declared in module D and the PU proportion is incinerated (module C4) with credit given for energy substitution in module D.

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: Scenarios and additional technical information

Transport to the building site (A4)

Name	Value	Unit
Litres of fuel	0.00159	l/100km
Transport distance	500	km
Capacity utilisation (including empty runs)	85	%
Gross density of products transported (foam)	42	kg/m ³

Installation into the building (A5)

Name	Value	Unit
Material loss	2 %	kg

End of life (C1-C4)

Name	Value	Unit
Reuse	0	kg
Recycling	7.99	kg
Energy recovery	4.93	kg
Landfilling	0	kg
Waste processing (power from grid for shredding)	2.76	KJ

LCA: Results

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

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 ¹⁾	Refurbishment ¹⁾	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	MND	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: 1 m² installed double steel sheet faced sandwich panel with a core made of PU (thickness 11.5 cm)

Parameter	Unit	A1 - A3	A4	A5	C2	C3	C4	D
GWP	[kg CO ₂ -Eq.]	37.5	1.03	0.357	0.201	0.37	10.9	-18.6
ODP	[kg CFC11-Eq.]	2.43E-5	1.79E-11	9.53E-12	3.5E-12	3.32E-10	1.08E-10	-1.11E-9
AP	[kg SO ₂ -Eq.]	1.15E-1	6.0E-3	1.34E-4	1.17E-3	1.75E-3	4.44E-3	-6.34E-2
EP	[kg (PO ₄) ⁻³ -Eq.]	1.26E-2	1.43E-3	2.57E-5	2.79E-4	9.23E-5	1.1E-3	-5.09E-3
POCP	[kg Ethen Eq.]	2.53E-2	-2.39E-3	9.02E-6	-4.66E-4	1.03E-4	2.97E-4	-8.58E-3
ADPE	[kg Sb Eq.]	1.81E-3	3.82E-8	3.17E-9	7.47E-9	5.09E-8	7.61E-8	-7.91E-7
ADPF	[MJ]	580	14.1	0.154	2.76	4.2	2.67	-201

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

RESULTS OF THE LCA - RESOURCE USE: 1 m² installed double steel sheet faced sandwich panel with a core made of PU (thickness 11.5 cm)

Parameter	Unit	A1 - A3	A4	A5	C2	C3	C4	D
PERE	[MJ]	23.2	-	-	-	-	-	-
PERM	[MJ]	0	-	-	-	-	-	-
PERT	[MJ]	23.2	0.556	0.027	0.109	1.09	0.169	-4.81
PENRE	[MJ]	489	-	-	-	-	-	-
PENRM	[MJ]	121	-	-	-	-	-	-
PENRT	[MJ]	610	14.2	0.211	2.77	6.53	3.01	-208
SM	[kg]	-	-	-	-	-	-	-
RSF	[MJ]	0	0	0	0	0	0	0
NRSF	[MJ]	0	0	0	0	0	0	0
FW	[m ³]	-	-	-	-	-	-	-

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

RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES:

1 m² installed double steel sheet faced sandwich panel with a core made of PU (thickness 11.5 cm)

Parameter	Unit	A1 - A3	A4	A5	C2	C3	C4	D
HWD	[kg]	-	-	-	-	-	-	-
NHWD	[kg]	-	-	-	-	-	-	-
RWD	[kg]	-	-	-	-	-	-	-
CRU	[kg]	-	-	-	-	-	-	0
MFR	[kg]	-	-	-	-	-	-	7.99
MER	[kg]	-	-	-	-	-	-	4.93
EEE	[MJ]	0	0	0.567	0	0	16.2	-
EET	[MJ]	0	0	1.56	0	0	44.4	-

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

References

Institut Bauen und Umwelt

Institut Bauen und Umwelt e.V., Berlin (pub.):
Generation of Environmental Product Declarations
(EPDs);

General principles

for the EPD range of Institut Bauen und Umwelt e.V.
(IBU), 2013-04
www.bau-umwelt.de

PCR Part A

Institut Bauen und Umwelt e.V., Königswinter (pub.):
Product Category Rules for Construction Products
from the range of Environmental Product Declarations
of Institut Bauen und Umwelt (IBU), Part A: Calculation
Rules for the Life Cycle Assessment and
Requirements on the Background Report. April 2013
www.bau-umwelt.de

ISO 14025

DIN EN ISO 14025:2011-10: Environmental labels and
declarations — Type III environmental declarations —
Principles and procedures

EN 15804

EN 15804:2012-04+A1 2013: Sustainability of
construction works — Environmental Product

Declarations — Core rules for the product category of
construction products

PCR Part B

PCR Guidance-Texts for Building-Related Products
and Services; Part B: Requirements on the EPD for
Insulating materials made of foam plastics; Institute
Construction and Environment e.V. (IBU). Version 1.4,
7th July 2013
<https://epd-online.com>

EN 14509

EN 14509:2009-04: Self-supporting double skin metal
faced insulating panels – Factory made products –
Specifications

GaBi 6 2013

PE INTERNATIONAL AG; GaBi 6: Software-System
and Database for Life Cycle Engineering. Copyright,
TM. Stuttgart, Echterdingen, 1992-2013

GaBi 6 2013B

GaBi 6: Documentation of GaBi 6: Software-System
and Database for Life Cycle Engineering. Copyright,
TM. Stuttgart, Echterdingen, 1992-2013
<http://documentation.gabi-software.com/>

**Publisher**

Institut Bauen und Umwelt e.V.
Panoramastr. 1
10178 Berlin
Germany

Tel +49 (0)30 3087748- 0
Fax +49 (0)30 3087748- 29
Mail info@bau-umwelt.com
Web www.bau-umwelt.com

**Programme holder**

Institut Bauen und Umwelt e.V.
Panoramastr. 1
10178 Berlin
Germany

Tel +49 (0)30 - 3087748- 0
Fax +49 (0)30 – 3087748 - 29
Mail info@bau-umwelt.com
Web www.bau-umwelt.com

**Author of the Life Cycle Assessment**

PE INTERNATIONAL AG
Hauptstraße 111 -113
70771 Leinfelden-Echterdingen
Germany

Tel +49 711 34 18 17-0
Fax +49 711 34 18 17-25
Mail info@pe-international.com
Web www.pe-international.com

**Owner of the Declaration**

PU Europe
Av. E. Van Nieuwenhuysse 6
1160 Brussels
Belgium

Tel +32 2 676 72 71
Fax +32 2 676 74 79
Mail secretariat@pu-europe.eu
Web www.pu-europe.eu