ENVIRONMENTAL PRODUCT DECLARATION

as per /ISO 14025/ and /EN 15804/

Owner of the Declaration	**European Association for Panels and Profiles e. V. (PPA-Europe)**
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
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Valid to	13.09.2023

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

European Association for Panels and Profiles (PPA-Europe)

Institut Bauen und Umwelt e.V.

www.ibu-epd.com / https://epd-online.com

European Association for Panels and Profiles

General Information

European Association for Panels and Profiles

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

Declaration number
EPD-PPA-20180076-CBG2-EN

This Declaration is based on the Product Category Rules:
Double skin metal faced sandwich panels, 07.2014
(PCR tested and approved by the SVR)

Issue date
14.09.2018

Valid to
13.09.2023

Prof. Dr.-Ing. Horst J. Bossenmayer
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Double skin steel faced sandwich panels with a core made of polyurethane

Owner of the Declaration
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47807 Krefeld
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Declared product / Declared unit
1m² prefabricated double skin steel faced sandwich panels with an insulating core made of polyurethane rigid foam

Scope:
This document is an association EPD and it represents an average EPD. 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 sixteen member companies of the European Association for Panels and Profiles have provided data for the year 2016:

1. ArcelorMittal Construction Deutschland
2. Falk Bouwsystemen
3. Fischer Profil
4. Hoesch Bausysteme
5. Huurre Iberica
6. ISOCAB France
7. Isolpack
8. ISOPAN Deutschland
9. Italpannelli
10. Metecno Bausysteme
11. Montana Bausysteme
12. N.V. Joris Ide Belgium
13. Romakowski
14. SAB-profiel
15. Salzgitter Bauelemente
16. Trimo.

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

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.

Verification

The CEN Norm /EN 15804/ serves as the core PCR
Independent verification of the declaration according to /ISO 14025/
☐ internally ☒ externally

Mr Carl-Otto Neven
(Independent verifier appointed by SVR)

European Association for Panels and Profiles

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 material is made of polyurethane according to /EN 13165/ with sealing tapes. The core is bonded on both sides with resistance to shear forces to the profiled steel sheets.
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 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 structural, self-supporting and non-supporting 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	41 - 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
Calculation value for thermal conductivity of the insulation	0.0242	W/(mK)
Heat transfer coefficient of the total element incl. thermal bridges due to overlapping and fixing elements	0.2537	W/(m^{2}K)
Thickness of the inner layer	0.5	mm
Weight	13.3	kg/m²
Thickness of the outer layer	0.6	mm

Base materials / Ancillary materials

Composition of the sandwich panels:

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

Steel 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 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 40 – 45 years depending on the use conditions, according to the /BBSR table/.

LCA: Calculation rules

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

Declared unit

Name	Value	Unit
Declared unit	1	m^2
Surface weight of the panel (total value)	13.3	kg/m²
Conversion factor to 1 kg	0.075	-

Type of EPD: 2a) Declaration of a specific product as an average from several manufacturers´ plants.

System boundary
Type of the EPD: cradle to gate - with options
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.
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 C3) 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.

. GaBi 8 software and databases /GaBi ts/ were used as calculation basis.

Factors for different thicknesses
The LCA results for the sandwich element declared in the EPD refer to a thickness of 100mm. In order to enable the user of the EPD to calculate the results for different thicknesses the factors in the following table can be used for the calculation. For A1-A3, A4, C and D the LCA results of the declared product (thickness 100 mm) have to be multiplied with these factors.The composition of the 40mm product is: 84% steel sheet, 16% core material.The composition of the 160mm product is: 59% steel sheet, 41% core material.

Impact Categories	Modules A1-A3		Module A4		Module C4		Module D	
	PU 40	PU 160	PU 40	PU 160	PU 40	PU 160	PU 40	PU 160
GWP	0,8	1,18	0,81	1,16	0,4	1,23	0,87	1,17
ODP	0,4	1,49	0,81	1,16	0,4	1,23	0,66	1,19
AP	0,86	1,13	0,81	1,16	0,4	1,23	0,95	1,16
EP	0,8	1,17	0,81	1,16	0,4	1,23	0,93	1,16
POCP	0,83	1,17	0,81	1,16	0,4	1,23	0,97	1,16
ADPE	0,99	1,01	0,81	1,16	0,4	1,23	2,32	0,99
ADPF	0,69	1,25	0,81	1,16	0,4	1,23	0,83	1,17

The declared results for A5 are valid for all product variations.

LCA: Scenarios and additional technical information

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)	85	%

Installation (A5)
The following packaging material is considered in A1-A3:
Paper: 0.4 g/m² profile
Polystyrene: 0.02 kg/m² profile
PVC Bans: 0.03 kg/m² profile
Polyethylene film 0.07 kg/m² profile
Wooden pallets 0.6 kg/m² profile
A5 covers the recycling of packaging material at the point of installation. The export of biogenic carbon dioxide from the packaging material is declared in the table of results in module A5. Recycling potential of the packaging material is neglected and not quantified in module D.

End of life (C1-C4)

Name	Value	Unit
Collected separately waste type	13.3	kg
Recycling	8.3	kg
Energy recovery	4.3	kg
Landfilling	0	kg
Scrap content (not credited)	0.7	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 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	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	MND	MND	X	MND	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: 1 m² PU sandwich panel 100 mm (13.3 kg/m²)

Parameter	Unit	A1-A3	A4	A5	C3	D
Global warming potential	[kg CO_2-Eq.]	33.39	0.07	1.04	9.54	-17.43
Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	2.02E-5	2.39E-14	IND	1.74E-12	-1.42E-10
Acidification potential of land and water	[kg SO_2-Eq.]	1.06E-1	3.02E-4	IND	3.83E-3	-5.79E-2
Eutrophication potential	[kg $(PO_4)^{3-}$-Eq.]	1.10E-2	7.51E-5	IND	9.73E-4	-4.71E-3
Formation potential of tropospheric ozone photochemical oxidants	[kg ethene-Eq.]	1.44E-2	-1.11E-4	IND	2.44E-4	-8.01E-3
Abiotic depletion potential for non-fossil resources	[kg Sb-Eq.]	1.70E-3	5.74E-9	IND	7.80E-8	3.88E-7
Abiotic depletion potential for fossil resources	[MJ]	541.59	0.99	IND	2.24	-181.52

RESULTS OF THE LCA - RESOURCE USE: 1 m² PU sandwich panel 100 mm (13.3 kg/m²)

Parameter	Unit	A1-A3	A4	A5	C3	D
Renewable primary energy as energy carrier	[MJ]	31.73	0.05	IND	0.29	-3.31
Renewable primary energy resources as material utilization	[MJ]	6.96	0.00	IND	0.00	0.00
Total use of renewable primary energy resources	[MJ]	38.69	0.05	IND	0.29	-3.31
Non-renewable primary energy as energy carrier	[MJ]	446.40	0.99	IND	122.94	-188.80
Non-renewable primary energy as material utilization	[MJ]	120.98	0.00	IND	-120.42	0.00
Total use of non-renewable primary energy resources	[MJ]	567.38	0.99	IND	2.52	-188.80
Use of secondary material	[kg]	7.12E-1	0.00E+0	1.12E+0	0.00E+0	7.56E+0
Use of renewable secondary fuels	[MJ]	0.00E+0	0.00E+0	IND	0.00E+0	0.00E+0
Use of non-renewable secondary fuels	[MJ]	0.00E+0	0.00E+0	IND	0.00E+0	0.00E+0
Use of net fresh water	[m³]	1.79E-1	9.20E-5	IND	2.21E-2	-2.33E-2

RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: 1 m² PU sandwich panel 100 mm (13.3 kg/m²)

Parameter	Unit	A1-A3	A4	A5	C3	D
Hazardous waste disposed	[kg]	1.09E-5	5.20E-8	IND	1.03E-9	-1.07E-7
Non-hazardous waste disposed	[kg]	4.50E-1	7.56E-5	IND	9.82E-3	2.02E-1
Radioactive waste disposed	[kg]	1.04E-2	1.36E-6	IND	1.15E-4	-2.90E-3
Components for re-use	[kg]	0.00	0.00	IND	0.00	0.00
Materials for recycling	[kg]	0.00	0.00	IND	8.27	0.00
Materials for energy recovery	[kg]	0.00	0.00	IND	0.00	0.00
Exported electrical energy	[MJ]	0.00	0.00	IND	14.36	0.00
Exported thermal energy	[MJ]	0.00	0.00	IND	33.06	0.00

The CO_2 incorporation by using natural packaging materials (wooden pallets, paper) represent 3.1% of the GWP A1-A3.

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