ENVIRONMENTAL PRODUCT DECLARATION

as per /ISO 14025/ and /EN 15804/

Owner of the Declaration	wedi GmbH
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
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wedi building board made of extruded rigid polystyrene foam (XPS), coated on both sides with cement mortar and fibre glass fabric

wedi GmbH

Institut Bauen und Umwelt e.V.

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

ECO PLATFORM EPD EN 15804 VERIFIED

1. General Information

wedi GmbH	wedi Building Board
Programme holder IBU - Institut Bauen und Umwelt e.V. Panoramastr. 1 10178 Berlin Germany	**Owner of the declaration** wedi GmbH Hollefeldstraße 51 48282 Emsdetten Germany
Declaration number EPD-WDI-20190016-IAA1-EN	**Declared product / declared unit** 1 m² of 20 mm² thick wedi building board.
This declaration is based on the product category rules: Insulating materials made of foam plastics, 06.2017 (PCR checked and approved by the SVR)	**Scope:** The lifecycle assessment shown in the EPD relates to data for 2016 from the wedi GmbH production facility in Emsdetten, Germany. The owner of the declaration is liable for the basic information and supporting evidence; any liability of the IBU in relation to manufacturer's information, LCA data and supporting evidence is excluded. This document is a translation from German to English. It is based on the original declaration number EPD-WDI-20190016-IAA1-DE. 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.
Issue date 14.08.2019	**Verification** The standard /EN 15804/ serves as the core PCR Independent verification of the declaration and data according to /ISO 14025:2010/ ☐ internally ☒ externally
Valid to 13.08.2024	
 Dipl. Ing. Hans Peters (President of Institut Bauen und Umwelt e.V.)	 Dr.-Ing. Andreas Ciroth (Independent verifier appointed by SVR)
 Dr. Alexander Röder (Managing Director IBU)	

2. Product

2.1 Product description / Product definition

The wedi building board consists of an extruded rigid polystyrene foam core with fibre glass reinforcement on both sides and a cement mortar coating.
Extruded rigid polystyrene foam (XPS) is a plastic foam insulation material which complies with /EN 13164/, which is produced in the form of boards within the bulk density range of 35 kg/m³ (+/-3).
The wedi building board including the coating has an arithmetical density of 177 kg/m³. wedi building boards are supplied in thicknesses from 4 mm to 100 mm and with trimmed edges.

Product according to CPR with ETA

EU Regulation no. 305/2011/CPR applies for placing the product in the market in the EU/EFTA (with the exception of Switzerland). The product requires a Declaration of Performance taking into account /ETA 13/0385/, 12/06*2013, „wedi building board/Fundo sealing system and CE labelling. The respective national regulations apply to its use.

2.2 Application

The wedi building board can be attached to almost any surface, is impervious to water, heat-insulating, light and stable. The wedi building board can be coated with plastering and tiles of all kinds.
The wedi building board is especially suitable for wet areas in baths and wellness facilities. It is used for both new construction and renovation. As a tile carrier component it is deployed on walls, as a partition wall and in floors.
Wedi building boards can be used as a construction element to make bath furniture, wash basins, benches and loungers (heated and unheated), niches and shelves in wet areas in private or public baths and toilet and wellness facilities.

2.3 Technical Data

XPS core constructional data

Name	Value	Unit
Gross density as per /EN 1602/	35	kg/m³
Compressive strength as per /EN	0.25	N/mm²

826/		
Tensile strength as per /EN 1607/	0.45	N/mm²
Modulus of elasticity as per /EN 826/	10 - 18	N/mm²
Water vapour diffusion resistance factor as per /EN 12086/	100	-
Thermal conductivity as per /EN 13164/	0.036	W/(mK)
Creep behaviour or permanent compressive strength as per DIN EN 1606	0.08	N/mm²
Maximum water absorption DIN /EN 12087/	1.5	Vol.-%
Sound reduction index as per /ISO 140-3/	23	dB
Bending stress based on/DIN 53293/	3900	kPa
Adhesive pull strength as per /DIN 1048-2/	0.28	N/mm²

Performance data for the product in accordance with the declaration of performance in relation to its essential characteristics in accordance with /ETA 13/0385/, 12.06.2013, wedi Fundo building board sealing system.
Voluntary information for the product: general test certificate issued by an approved building inspectorate (abP), /abP no. P-25730802.001/, 26/03/2015 wedi building board sealing system, wedi Fundo (not part of the CE labelling).

2.4 Delivery status

Dimensions:
Length: 1200-2600 mm
Width: 600, 900, 1200 mm
Thickness 4-100 mm
Further information at www.wedi.eu

2.5 Base materials / Ancillary materials

Basic materials
The wedi building board has a surface weight of 3.81 kg/m² and consists of the following components:

Name	Value	Unit
Mortar	3.01	kg/m²
XPS core (approx. 35kg/m³)	0.63	kg/m²
Fibre glass reinforcement	0.17	kg/m²

Standard polystyrene (GPPS) [CAS 9003-53-6] with 90 to 95 % mass is used as the main material. This is foamed with the aid of a propellant with approx. 8 % mass. The propellant consists of carbon dioxide [CAS 124-38-9] and halogen-free co-propellants.

Designation	Value	Unit
Polystyrene	90 - 95	%
Propellant	5 – 8	%
Thereof carbon dioxide	40 – 80	%
Thereof co-propellant	20 – 60	%
Flame retardant	0.5 – 3	%
Additives (e.g. colorants)	< 1	%

Alternative flame retardant is deployed as an additive. The XPS receives no HBCD and no other substances of very high concern (SVHC) according to /REACH/. Furthermore, less than 1% of additives such as processing additives and colorants are added to the extrusion process. Polystyrene and the co-propellants are produced from mineral oil and natural gas. It is transported by road or pipeline from manufacturing sites to XPS manufacturers. CO2 is gained from various processes as a by-product and is available in unlimited quantities.

Mass portion of raw /ancillary materials – mortar

Raw/ancillary materials	Mass portion
Cement	~ 2-85 %
Fillers	~ 10-90 %
Gypsum	~ 0-45 %
Additives	~ 0-6 %
Dispersion powder (Mortar group 1)	~ 0-5 %

Does the product contain substances on the list of candidates (as of 28/01/2019) above 0.1 mass-%: no.

Does the product contain further Category 1A or 1B CMR substances which are not on the list of candidates above 0,1 mass-% in at least one subassembly: no.

Were biocide products added to this building product or it has been treated with biocide products (is this therefore a treated product in terms of Biocide Products Ordinance EU/528/2012): no.

2.6 Manufacture

XPS is produced from polystyrene granulate in a continuous extrusion process. The polystyrene is melted and homogenised with the additives in a tandem extruder under high pressure. The propellant is dissolved in the melting process and subsequently discharged through a slot die. The propellant foams up the melt in the ambient temperature due to the strongly reducing counter-pressure caused. The melt cools down in the process and the polystyrene foam solidifies. Closed-cell rigid polystyrene foam is produced. This continues to cool down and can be packaged after removal of the extrusion skin.

Polymer-modified mortar is mixed with water and applied to the XPS core together with the fibre glass fabric to coat the rigid foam board. The dried board can then be cut to size. wedi building boards are packed on pallets with polyethylene foil.

XPS from production cuts and milling dust are recycled directly into production and re-used to produce XPS. Polystyrene is a thermoplastic material and can therefore be recycled simply and cheaply through melting.

2.7 Environment and health during manufacturing

No further steps beyond national work protection regulations are necessary to protect employees' health in all production steps in the manufacture of wedi building boards. The production location is certified to /ISO 9001/ ISO 14001/ and /ISO 50001/.

2.8 Product processing/Installation

Product and application-dependent installation recommendations are described in wedi GmbH brochures, processing notes and product data sheets. These can be obtained directly from wedi GmbH or via the Internet. No specific personal protection is necessary when working with wedi building boards. Building board waste which accrues on building sites

as offcuts should be collected separately and disposed of appropriately.

2.9 Packaging
The packaging consists of polyethylene foil. This should be collected separately and disposed of appropriately.

2.10 Condition of use
All materials used are non-aging and moisture-resistant when fitted so that the insulation performance and the mechanical properties remain unchanged during the entire service life.

2.11 Environment and health during use
In most applications wedi building board is not in direct contact with the environment and with indoor air. Contamination to the detriment of health when using XPS for indoor insulation are not significant according to approved measurements according to the German Committee for Health-Related Evaluation of Building Products (AgBB) schema (/test report no. 52933-001/) (see Chapter 7: VOC emissions).

2.12 Reference service life
The service life of wedi building boards corresponds to the service life of the component in which it is used. This is based on its mechanical rigidity and resistance to the effects of water.

2.13 Extraordinary effects

Fire
wedi building boards are allocated to building material class E in accordance with /DIN EN 13501-1/. Their fire behaviour is further defined as part of general building supervisory approvals.

Fire protection

Name	Value
Building material class nach /EN 13501-1/	E

Water
wedi building boards are chemically neutral, not water-soluble and if used appropriately do not emit any water-soluble substances which could lead to contamination of ground water, rivers and seas. The thermal conductivity of wedi building boards is not practically influenced by the effects of water or steam.

Mechanical destruction
Not relevant for wedi building board products due to their mechanical properties.

2.14 Re-use phase
The manufacturer recommends energetic recycling of the product. The energy contained in polystyrene foam is thus regained which saves additional auxiliary firing in refuse incineration plants. The energy from 1 kg of wedi building boards is equal to that of approximately 1.1 litres of heating oil. The waste heat produced by refuse incineration can be additionally used for both producing electricity and remote heating.

2.15 Disposal
The waste key according to the European Waste Catalogue (/AVV/EWC/) is 170604 – insulating materials with the exception of those which fall under 170601 and 170603.

2.16 Further information
Further information can be found at www.wedi.eu

3. LCA: Calculation rules

3.1 Declared Unit
The declared unit for this study is a wedi building board coated on both sides with a surface area of 1 m² and a thickness of 20 mm.

Declared unit

Name	Value	Unit
Declared unit	1	m^2
Gross density	190	kg/m^3
Conversion factor to 1 kg	0.26	-

The declaration relates to a specific product and does not represent any average for several products. Type according to /PCR Part A/: 1a) Specific product from one production facility of the manufacturer.

3.2 System boundary
The environmental information in this EPD is based on a cradle-to-gate assumption and therefore exclusively includes the modules of the production stage and those of the manufacturing phase A1-A3 as well as Module A5 to describe the End-of-Life process of the packaging material.

A1: Raw materials production and processing
1. Extruded rigid polystyrene foam core
2. Fibre glass fabric reinforcement
3. Plasticised mortar

A2: Transport to manufacturer
Provision of diesel and the use of transport vehicles (trucks) for the specified distances and capacity utilisation are included.

A3: wedi production process
The preparation of preliminary products before composition and the general production process of the building board up to packaging and storage are included.

A5: Construction stage: packaging material End of Life
For the sake of completeness, disposal of the packaging material used in the plant has been included with Module A5.

3.3 Estimates and assumptions
The information on capacity utilisation of the transport vehicles was assumed as an average.
No further assumptions or estimates have been made.

3.4 Cut-off criteria
The latex adhesive used to glue the fibre glass fabric rolls could not be depicted with the available data and

was not included in the LCA after checking the cut-off criteria. With regard to the declared unit, the mass flow relevant to this is significantly smaller than 1% of the overall energy and mass deployment.

3.5 Background data

The background data used originates from the /GaBi software/ (professional database, version number 8.6, service pack 34).

3.6 Data quality

The environmental effects and also the results of the LCA of individual preliminary products were taken from manufacturer and product-specific environmental product declarations and integrated for use into the /GaBi software/.
The background information used to produce the EPD for the preliminary products used originates from 2011, 2012 and 2014.

3.7 Period under review

The data collected for the LCA all relates to 2016.

3.8 Allocation

No allocation processes were performed within the study. The recycling or disposal of waste accrued in relation to the declared unit was included.

3.9 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.

The used background database has to be mentioned.

In principle, a comparison or assessment of EPD data is only possible if all records to be compared were compiled in accordance with /EN 15804/ and the building context or product-specific performance characteristics are included.
All records in this EPD were produced and published in accordance with the specifications of /EN 15804/.
The background database of the /GaBi software/ (professional database, version number 8.6, service pack 34) is to be included.

4. LCA: Scenarios and additional technical information

Installation in buildings (A5)

The packaging materials balanced in Module A3 accrue on the building site as waste as part of use. Thermal recycling is assumed for the disposal of the plastic and paper waste and included accordingly in the balance. The results are shown in Chapter 5.

No further scenarios are declared as part of EPD production

5. LCA: Results

The following tables contain the depiction of the environmental effects and LCA parameters for the declared unit of 1 m² of wedi building board (20 mm thick). The declared lifecycle sections are labelled in the following table with an “X” and the non-declared ones are labelled with “MND” (module not declared).
Module A5 includes the disposal of the packaging material used in the production process in A3.

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	MND	X	MND	MND	MNR	MNR	MNR	MND	MND	MND	MND	MND	MND	MND

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: 1 m² wedi Bauplatte, 20 mm

Parameter	Unit	A1-A3	A5
Global warming potential	[kg CO_2-Eq.]	4.63	0.02
Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	1.40E-8	1.48E-15
Acidification potential of land and water	[kg SO_2-Eq.]	1.00E-2	2.45E-6
Eutrophication potential	[kg $(PO_4)^{3-}$-Eq.]	1.16E-3	5.12E-7
Formation potential of tropospheric ozone photochemical oxidants	[kg ethene-Eq.]	1.54E-3	2.39E-7
Abiotic depletion potential for non-fossil resources	[kg Sb-Eq.]	2.13E-5	1.65E-10
Abiotic depletion potential for fossil resources	[MJ]	93.48	0.01

RESULTS OF THE LCA - RESOURCE USE: 1 m² wedi Bauplatte, 20 mm

Parameter	Unit	A1-A3	A5
Renewable primary energy as energy carrier	[MJ]	0.91	0.00
Renewable primary energy resources as material utilization	[MJ]	7.96	0.00
Total use of renewable primary energy resources	[MJ]	8.87	0.00
Non-renewable primary energy as energy carrier	[MJ]	4.22	0.00
Non-renewable primary energy as material utilization	[MJ]	94.65	0.01
Total use of non-renewable primary energy resources	[MJ]	98.87	0.01
Use of secondary material	[kg]	0.00	0.00
Use of renewable secondary fuels	[MJ]	0.04	0.00
Use of non-renewable secondary fuels	[MJ]	0.46	0.00
Use of net fresh water	[m³]	1.24E-2	5.37E-5

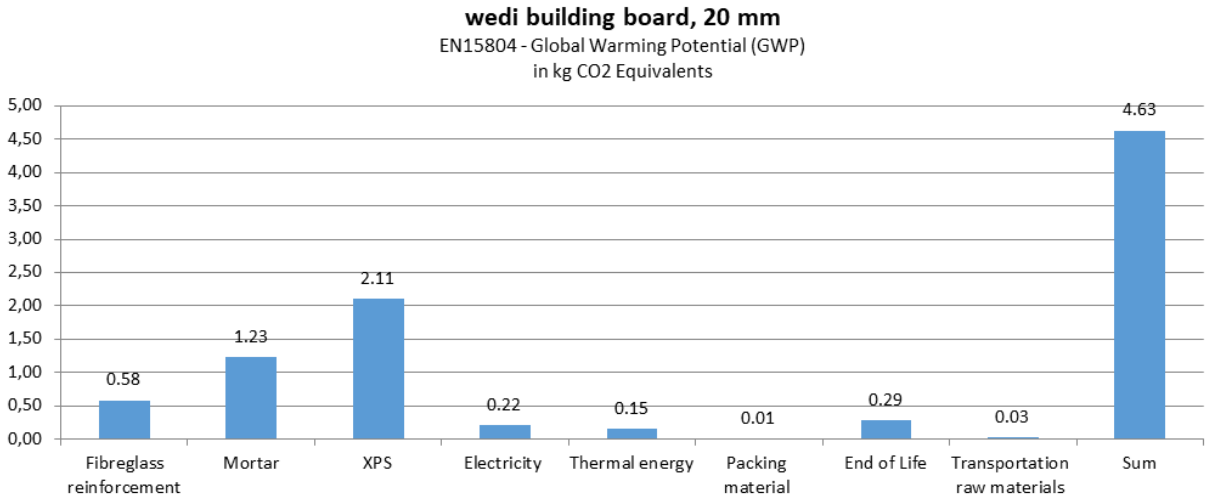
RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: 1 m² wedi Bauplatte, 20 mm

Parameter	Unit	A1-A3	A5
Hazardous waste disposed	[kg]	3.13E-6	4.38E-11
Non-hazardous waste disposed	[kg]	3.84E-2	1.62E-3
Radioactive waste disposed	[kg]	1.32E-3	3.81E-7
Components for re-use	[kg]	0.00	0.00
Materials for recycling	[kg]	0.00	0.00
Materials for energy recovery	[kg]	0.63	0.00
Exported electrical energy	[MJ]	0.00	0.00
Exported thermal energy	[MJ]	0.00	0.00

6. LCA: Interpretation

The manufacturing process mainly comprises the use of pre-products (XPS, mortar, fibre glass fabric) and energetic requirements (electricity and heat) and also loads for packaging and disposal of waste. The quantities involved in the LCA and the indicators for the impact assessment are analysed in the following to identify the main influencing factors in relation to the declared unit. Due to the general relevance of the greenhouse gas potential the main findings of the assessment are shown in the following chart.

The chart shows that XPS with some 45 % contributes the largest share to the global warming potential (GWP) which is above all attributable to the specific production process (see Chapter 2.5). Both further pre-products follow in descending order: the mortar and the fibre glass layer. The processes relevant to production make a small contribution to the GWP since the pre-products are in total already responsible for 85 % of the greenhouse gas emissions.



Generally, it can be said of the results of the LCA that the provision of the pre-products (Module A1) makes the greatest contribution to environmental effects. Above all the XPS has the greatest influence on a large part of the impact categories examined, especially on the global warming and ozone formation potential.

The production of the special mortar also contributes an equally significant share of the environmental impact of the system examined. This becomes clear from the results of ozone depletion and acidification and eutrophication potential, where a large proportion of the emissions are attributable to the mortar. In addition, this contains an appreciable share of the greenhouse gas emissions.

The production of the fibre glass fabric is above all responsible for the accrual of waste. In addition, it makes a decisive contribution to the abiotic depletion potential for non-fossil resources.

7. Requisite evidence

VOC Emissions
Emissions of volatile organic compounds (VOC) from wedi building boards in accordance with the AgBB schema were tested in Spring 2018 by the eco-INSTITUT Germany GmbH (/test report no. 52933-001/). The product tested is suitable for use Indoors.

VOC Emissions

Name	Value	Unit
TVOC (C6 - C16) (28 Tage)	24	µg/m³
Sum SVOC (C16 - C22) (28 Tage)	<5	µg/m³
R (dimensionless)	0.68	-
VOC without NIK	8	µg/m³
Carcinogenic Substances	<1	µg/m³

Management Systems
The production location and head office of wedi GmbH are certified with quality management in accordance with /ISO 9001/ environmental management system in accordance with ISO 14001/ and an energy management system in accordance with /ISO 50001/.

8. References

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DIN EN 1602:2013-05, Thermal insulating products for building applications – Determination of the apparent density

/EN 826/
DIN EN 826:2013-05, Thermal insulating products for building applications – Determination of compression behaviour

/EN 1607/
DIN EN 1607:2013-05, Thermal insulating products for building applications – Determination of tensile strength perpendicular to faces; German version

/EN 12086/
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/ISO 14044/
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/ETA-13/0385/
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Declaration number EPD-DIV-20130096-IBE1-DE

Environmental product declaration (EPD) Extruded hard foam polystyrene (XPS) with flame protection agent as an alternative
Declarations number EPD-FPX-20140157-IBE1-DE

Environmental product declaration (EPD) Fibre glass reinforcement grid
Declaration number EPD-VIT-20160008-IAC1-DE

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General building authority approval certificate no. P-25730802.001, 26.03.2015 wedi building board sealing system, wedi Fundo"

/Test report no. 52933-001/
Expert opinion in accordance with AgBB scheme 2015 Test report no. 52933-001 from eco INSTITUT Germany GmbH, Cologne for the wedi Fundo Integro, 26.03.2018

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