

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)
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**wedi Fundo floor-level shower element made of extruded rigid polystyrene foam (XPS), coated on both sides with polymer cement mortar and fibre glass fabric
wedi GmbH**

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



1. General Information

<p>wedi GmbH</p> <p>Programme holder IBU - Institut Bauen und Umwelt e.V. Panoramastr. 1 10178 Berlin Germany</p> <hr/> <p>Declaration number EPD-WDI-20190017-IAA1-EN</p> <hr/> <p>This declaration is based on the product category rules: Insulating materials made of foam plastics, 06.2017 (PCR checked and approved by the SVR)</p> <hr/> <p>Issue date 14/08/2019</p> <hr/> <p>Valid to 13/08/2024</p> <hr/> <p></p> <hr/> <p>Dipl. Ing. Hans Peters (President of Institut Bauen und Umwelt e.V.)</p> <hr/> <p></p> <hr/> <p>Dr. Alexander Röder (Managing Director IBU)</p>	<p>wedi Fundo</p> <p>Owner of the declaration wedi GmbH Hollefeldstraße 51 48282 Emsdetten Germany</p> <hr/> <p>Declared product / declared unit 1 m² wedi Fundo floor-level shower 40 mm thick.</p> <hr/> <p>Scope: The reference period for the data collected is 2017. The data originates from the Emsdetten works in North Rhine-Westphalia, Germany.</p> <p>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.</p> <hr/> <p>Verification</p> <p>The standard /EN 15804/ serves as the core PCR</p> <p>Independent verification of the declaration and data according to /ISO 14025:2010/</p> <p><input type="checkbox"/> internally <input checked="" type="checkbox"/> externally</p> <hr/> <p></p> <hr/> <p>Dr.-Ing. Andreas Ciroth (Independent verifier appointed by SVR)</p>
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2. Product

2.1 Product description / Product definition

The wedi Fundo floor-level shower element consists of an extruded rigid polystyrene foam core with double-sided fibre glass reinforcement and a polymer cement mortar layer. Extruded rigid polystyrene foam (XPS) is a plastic foam insulating material which is produced in compliance with /EN 13164/, which is produced in the form of the raw density region of 35 kg/m³ (+/-3). wedi Fundo floor-level showers are supplied in different dimensions.

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

2.2 Application

The wedi Fundo floor-level shower element is deployed in wet rooms and sanitary areas. The wedi Fundo system can be installed on almost any foundation as an individually tileable, floor-level shower system. The system includes a rigid polystyrene foam core with a special polymer cement mortar coating including a prescribed surface slope. The respective national regulations apply to its use.

(Further information at www.wedi.eu)

2.3 Technical Data

Constructional data for the XPS core

Name	Value	Unit
Gross density nach /EN 1602/	35	kg/m ³
Compressive strength nach /EN 826/	0.25	N/mm ²
Tensile strength nach /EN 1607/	0.45	N/mm ²
Modulus of elasticity nach /EN 826/	10 - 18	N/mm ²
Water vapour diffusion resistance factor nach /EN 12086/	100	-
Thermal conductivity nach /EN 13164/	0.036	W/(mK)
Creep behaviour or permanent compressive strength nach DIN EN 1606	0.08	N/mm ²
Maximum water absorption nach /EN 12087/	1.5	Vol.-%
Sound reduction index to /ISO 140-3/	23	dB
Bending load based on /DIN 53293/	3900	kPa
Adhesive strength to /DIN 1048-2/	0.28	N/mm ²

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 building board /Fundo floor-level shower sealing systems.

Voluntary information for the product: General building authority approval (abP), /abP no. P-25730802.001/, 26/03/2015 wedi building board and wedi Fundo sealing systems (not part of the CE labelling).

2.4 Delivery status

wedi Fundo floor-level shower elements are available in different standard sizes such as 900x900 mm, 1000x1000 mm, 1800x900 mm and also individual special sizes in the point and line drainage version. (further information at www.wedi.eu)

2.5 Base materials / Ancillary materials

Raw materials / Ancillary materials	Share
Mortar	2,79 kg/m ²
XPS core with approx. 35 kg/m	1.36 kg/m ²
Fibre glass reinforcement	0.23 kg/m ²
Dispersion	0.6 kg/m ²
Water	0.3 kg/m ²
Sand	0.66 kg/m ²

Raw materials /Ancillary materials mass portion-XPS

Name	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	%

Standard polystyrene (GPPS) [CAS 9003-53-6] with 90 to 95 % mass is used as the main raw 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. 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.

Raw materials /Ancillary materials mass portion - Mortar

Raw materials / Ancillary materials	mass portion
Cement	~ 2-85 %
Filler materials	~ 10-90 %
Plaster	~ 0-45 %
Additives	~ 0-6 %
Dispersion powder (mortar group 1)	~ 0-5 %

Raw materials /Ancillary materials mass portion:

Dispersion

Raw materials/ Ancillary materials	mass portion
Plastic dispersion (Solid content)	5-65 %
Natural resins, natural resin derivate	0-25 %
Mineral fillers	0-60 %
Pigments	0-35 %
Water	15-95 %
Auxiliary materials	1-5 %

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.

As a first step a prescribed gradient is applied to the XPS base board. To coat the floor-level shower element, polymer-modified cement mortar is mixed with water and dispersion and applied to both sides of the XPS core together with the fibre glass fabric. The dried floor-level shower element can then be cut to size. wedi floor-level shower elements are packed individually in cardboard and piled 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 Fundo floor-level shower elements. 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 Fundo floor-level shower elements. Floor-level shower element waste which accrues on building sites as offcuts should be collected separately and disposed of appropriately.

2.9 Packaging

The packaging consists of cardboard. This should be collected separately and disposed of appropriately. Cardboard can then be recycled.

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 Fundo floor level showers are 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. 52933-005/) (see Chapter 7: VOC emissions).

2.12 Reference service life

The service life of wedi Fundo floor level showers 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 Fundo floor level showers are classified as 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 Fundo floor-level showers are chemically neutral, not water-soluble and do not emit any water-soluble substances which could lead to contamination of ground water, rivers and seas. The thermal conductivity of wedi Fundo floor-level shower elements is not practically influenced by the effects of water or steam.

Mechanical destruction

Not relevant for wedi Fundo floor-level showers with their good 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 Fundo floor-level showers 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 is available at www.wedi.eu.

3. LCA: Calculation rules

3.1 Declared Unit

The declared unit of this study is a triple-coated floor-level shower system with a surface area of 1 m² and a thickness of 40 mm. The manufacturer's system designation is wedi Fundo.

Declared unit

Name	Value	Unit
Declared unit (volume)	1	m ²
Declared unit	1	m ²
Declared unit	1	m ²
Gross density	141	kg/m ³
Conversion factor to 1 kg	0.18	-

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 with Dispersion
4. Quartz sand

A2: Transport to manufacturer

The provision of diesel and the use of transport vehicles (trucks) over the specified distances have been included.

A3: wedi production process

The preparation of preliminary products before composition and the general production process 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.

The data on the wedi production process was determined from measurements and calculations from 2017. Excellent data quality and also data quantity can be assumed.

3.7 Period under review

The data collected for the LCA all relates to 2017.

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 or elsewhere 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 wedi Fundo (40 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).

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 Fundo, 40 mm

Parameter	Unit	A1-A3	A5
Global warming potential	[kg CO ₂ -Eq.]	10.50	1.54
Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	9.81E-8	7.33E-14
Acidification potential of land and water	[kg SO ₂ -Eq.]	2.50E-2	2.88E-4
Eutrophication potential	[kg (PO ₄) ³ -Eq.]	3.00E-3	5.82E-5
Formation potential of tropospheric ozone photochemical oxidants	[kg ethene-Eq.]	4.00E-3	2.06E-5
Abiotic depletion potential for non-fossil resources	[kg Sb-Eq.]	9.42E-5	8.65E-9
Abiotic depletion potential for fossil resources	[MJ]	235.00	0.44

RESULTS OF THE LCA - RESOURCE USE: 1 m² wedi Fundo, 40 mm

Parameter	Unit	A1-A3	A5
Renewable primary energy as energy carrier	[MJ]	16.80	0.09
Renewable primary energy resources as material utilization	[MJ]	14.60	0.00
Total use of renewable primary energy resources	[MJ]	31.40	0.09
Non-renewable primary energy as energy carrier	[MJ]	191.90	0.49
Non-renewable primary energy as material utilization	[MJ]	60.00	0.00
Total use of non-renewable primary energy resources	[MJ]	251.90	0.49
Use of secondary material	[kg]	0.00	0.00
Use of renewable secondary fuels	[MJ]	0.03	0.00
Use of non-renewable secondary fuels	[MJ]	0.33	0.00
Use of net fresh water	[m ³]	4.90E-2	4.00E-3

RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES:

1 m² wedi Fundo, 40 mm

Parameter	Unit	A1-A3	A5
Hazardous waste disposed	[kg]	4.26E-6	1.14E-9
Non-hazardous waste disposed	[kg]	0.23	0.03
Radioactive waste disposed	[kg]	5.00E-3	1.98E-5
Components for re-use	[kg]	0.00	0.00
Materials for recycling	[kg]	0.00	0.00
Materials for energy recovery	[kg]	1.36	0.00
Exported electrical energy	[MJ]	0.00	0.00
Exported thermal energy	[MJ]	0.00	0.00

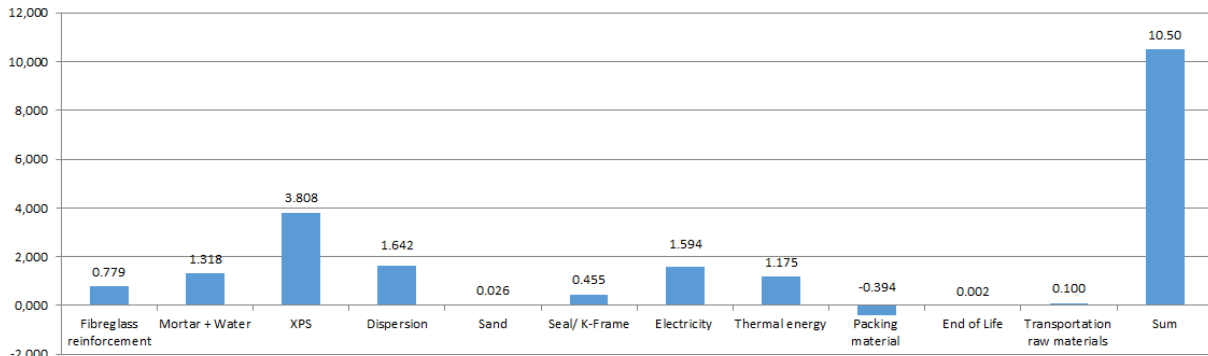
6. LCA: Interpretation

The manufacturing process mainly comprises the use of pre-products (XPS, mortar with dispersion additives, fibre glass fabric, sand and the seal inserts for the outflow) 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.

wedi Fundo, 40 mm (A1-A3)

EN15804 - Global Warming Potential (GWP)
in kg CO2 Equivalents



The chart shows that the XPS contributes the greatest proportion of global warming potential per declared unit, which is above all attributable to the specific production process (see Chapter 2.5). In comparison, the processes relevant for production (Module A3) make only a small contribution to GWP as the pre-products are together already responsible for 87 % of greenhouse gas emissions.

Generally, it can be said of the results of the LCA and the impact assessment that the provision of the pre-products (Module A1) makes the greatest contribution to the environmental effects.

Above all, the XPS has the greatest influence on a large part of the impact categories examined, especially on the greenhouse gas and ozone formation potential.

The production of special mortar also contributes an equally significant share of the environmental impacts of the system examined, above all in connection with the dispersion used as an additive.

The production of the fibre glass reinforcement fabric is mainly responsible for the production of waste. In addition, it makes a relevant contribution to the abiotic depletion of non-fossil resources.

7. Requisite evidence

7.1 VOC emissions

Emissions of volatile organic compounds (VOC) from wedi Fundo in accordance with the AgBB schema were tested in Spring 2018 by the eco-INSTITUT Germany GmbH (/test report no. 52933-005/). The product tested is suitable for use Indoors.

The *wedi Fundo Integro* was tested as an example for the Fundo series of products as this represents the worst case in the view of the manufacturer.

VOC emissions

Name	Value	Unit
TVOC (C6 - C16) (28 days)	6	µg/m ³
Sum SVOC (C16 - C22) (28 days)	<5	µg/m ³
R (dimensionless)	0.05	-
VOC without NIK	5	µg/m ³
Carcinogenic Substances	<1	µg/m ³

7.2 Management systems

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

8. References

The literature referred to in this environmental product declaration is quoted in full based on the following sources. Standards already cited in full in the EPD with regard to verification and technical properties do not need to be quoted in full again here.

/IBU 2016/

IBU (2016): General Programme Instructions for the Preparation of EPDs at the Institut Bauen und Umwelt e.V., Version 1.1 Institut Bauen und Umwelt e.V., Berlin.
www.ibu-epd.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

/ISO 9001/

DIN EN ISO 9001:2015, Quality management systems – Requirements (ISO 9001:2015).

/ISO 14001/

DIN EN ISO 14001:2015, environmental management systems – Requirements with instructions on use.

/ISO 50001/

DIN EN ISO 50001:2011, Energy management systems – Requirements with instructions on use.

/EN 13164/

DIN EN 13164:2015-04, Thermal insulation products for buildings – Factory-made extruded polystyrene foam (XPS) products - Specification

/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

/EN 12086/

DIN EN 12086:2013-06, Thermal insulating products for building applications – Determination of water vapour transmission properties

/EN 12087/

DIN EN 12087:2013-06, Thermal insulating products for building applications – Determination of long-term water absorption by immersion:

/EN 12088/

DIN EN 12088:2013-06, Thermal insulating products for building applications – Determination of long-term water absorption by diffusion

/EN 13501-1/

DIN EN 13501-1:2010-01, Fire classification of construction products and building elements – Part 1: Classification using data from reaction to fire tests

/AVV/

Ordinance on the European Waste Catalogue (Waste Catalogue Ordinance - AVV)

/GaBi-Software/

Software and database (professional database, version number 8.6, Service Pack 34) for integrated

balancing, University of Stuttgart and thinkstep AG, 2017, Documentation of the GaBi ts records in the database, 2017.

/PCR Part A/

Product category rules for building products Part A, calculation rules for the LCA and requirements of the project report, version 1.6, 2017-04, Institut Bauen und Umwelt e.V.

/ISO 14044/

DIN EN ISO 14044:2006, Environmental management – LCA – requirements and instructions

/ETA-13/0385/

ETA-13/0385. Wedi Fundo European technical approval, June 2018

Environmental product declaration (EPD) Group 1 modified mineral mortar

Declaration number EPD-DIV-20130096-IBE1-DE

Environmental product declaration (EPD) Extruded hard foam polystyrene (XPS) with flame protection agent as an alternative

Declaration number EPD-FPX-20140157-IBE1-DE

Environmental product declaration (EPD) Fibre glass reinforcement grid

Declaration number EPD-VIT-20160008-IAC1-DE

/abP no. P-25730802.001/

general building authority approval certificate no. P-25730802.001, 26.03.2015 “wedi building board sealing system, wedi Fundo”

/Test report no. 52933-005/

Expert opinion in accordance with AgBB schema 2015 Test report no. 52933-005 from eco-INSTITUT Germany GmbH, Cologne for the wedi Fundo Integro, 09.04.2018 no. P-25730802.001



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