

ENVIRONMENTAL PRODUCT DECLARATION

as per /ISO 14025/ and /EN 15804/



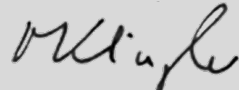
Owner of the Declaration	BOSIG Baukunststoffe GmbH
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-BOB-20170163-IAC1-EN
Issue date	26.02.2018
Valid to	25.02.2024

Phonotherm®
BOSIG Baukunststoffe GmbH

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



1. General Information

<p>BOSIG Baukunststoffe GmbH</p> <hr/> <p>Programme holder IBU - Institut Bauen und Umwelt e.V. Panoramastr. 1 10178 Berlin Germany</p> <hr/> <p>Declaration number EPD-BOB-20170163-IAC1-EN</p> <hr/> <p>This Declaration is based on the Product Category Rules: Insulating materials made of foam plastics, 07.2017 (PCR tested and approved by the SVR)</p> <hr/> <p>Issue date 26.02.2018</p> <hr/> <p>Valid to 25.02.2024</p> <hr/> <p></p> <hr/> <p>Prof. Dr.-Ing. Horst J. Bossenmayer (President of Institut Bauen und Umwelt e.V.)</p> <hr/> <p></p> <hr/> <p>Dr. Burkhard Lehmann (Managing Director IBU)</p>	<p>Phonotherm®</p> <hr/> <p>Owner of the Declaration BOSIG Baukunststoffe GmbH Roland-Schmid-Straße 1 04910 Elsterwerda GERMANY</p> <hr/> <p>Declared product / Declared unit 1 m³ Phonotherm® construction board</p> <hr/> <p>Scope: This document refers to Phonotherm® construction boards made of rigid foam residues, produced by BOSIG Baukunststoffe GmbH in Elsterwerda, Germany. This EPD represents the declaration of a specific product: Phonotherm® construction boards made of Polyurethane rigid foam residues, with the declared unit of 1 m³. The data collection for the ecological assessment occurred plant specific with current annual data. Consequently, the Life Cycle Assessment is representative for Phonotherm® construction boards by BOSIG Baukunststoffe GmbH. 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> <table border="1"> <tr> <td colspan="2">The CEN Norm /EN 15804/ serves as the core PCR</td> </tr> <tr> <td colspan="2">Independent verification of the declaration according to /ISO 14025/</td> </tr> <tr> <td><input type="checkbox"/> internally</td> <td><input checked="" type="checkbox"/> externally</td> </tr> </table> <hr/> <p></p> <hr/> <p>Matthias Klingler (Independent verifier appointed by SVR)</p>	The CEN Norm /EN 15804/ serves as the core PCR		Independent verification of the declaration according to /ISO 14025/		<input type="checkbox"/> internally	<input checked="" type="checkbox"/> externally
The CEN Norm /EN 15804/ serves as the core PCR							
Independent verification of the declaration according to /ISO 14025/							
<input type="checkbox"/> internally	<input checked="" type="checkbox"/> externally						

2. Product

2.1 Product description / Product definition

Phonotherm® construction boards are made of high-quality CFC-, HCFC- and Formaldehyde-free Polyurethane rigid foam (PU) residues. The material characteristics include water resistance, water permeability; insensitivity towards moisture and therefore prevention of putrefaction; isolation and insulation. Phonotherm® has a high stability despite low deadweight. The boards are produced in different dimensions and thicknesses.

For the use and application of the product the respective national provisions at the place of use apply, in Germany for example the Building Codes of the countries and the corresponding national specifications.

This EPD serves as a source of evidence for product-specific requirements for DGNB, LEED and BREEAM certifications in the building sector.

2.2 Application

Phonotherm® boards can be applied as construction boards for indoor and outdoor usage. Due to their

extensive characteristics, the boards allow multiple application possibilities such as in windows, glass facades or within dry and metal construction. Phonotherm® boards can be used as partition walls within wet and moist room areas, edgings on wet and moist room doors, window connection profiles, roller shutter boxes, within facade construction etc.

2.3 Technical Data

The following technical data apply for Phonotherm® boards:

Constructional data

Name	Value	Unit
Gross density	585	kg/m ³
Gross density range	550 - 700 ± 50	kg/m ³
Compressive strength at 10% compression acc. to /EN 826/	ca. 7000 - 8100	kPa
Tensile strength acc. to /EN 826/	not applicable	N/mm ²
Flexural strength	7.8 - 10.5	N/mm ²
Modulus of elasticity acc. to	not applicable	N/mm ²

/EN 826/		
Calculation value for thermal conductivity	0,090/0,110	W/(mK)
Water vapour diffusion resistance factor acc. to /EN 12088/	25	-
Moisture content at 23 °C, 80%	3	M.-%
Sound absorption coefficient (if relevant)	not applicable	%
Thermal conductivity acc. to /EN ISO 12667/ /DIN 52612/	0,083/0,10	W/(mK)
Dynamic rigidity acc. to /EN 29052/	not applicable	MN/mm ³
Creep behaviour or permanent compressive strength acc. to /EN 1606/	not applicable	N/mm ²
Water absorption after diffusion acc. to /EN 12088/	not applicable	Vol.-%
Maximum water absorption acc. to /EN 12091/	12/15	Vol.-%
Water absorption by capillarity acc. to /EN 15801/	not applicable	cm

Performance data of the product with respect to its characteristics in accordance with the relevant technical provision (No CE-marking).

2.4 Delivery status

BOSIG Phonotherm® boards are delivered in the following dimensions:

Standard formats

- 2400 x 1350 mm or 2400 x 1500 mm
- 3600 x 1350 mm or 3600 x 1500 mm

Thicknesses

- RG 500: from 25 mm to 50 mm
- RG 550: from 15 mm to 60 mm
- RG 700: from 10 mm to 50 mm

Further cuttings and thicknesses are available upon request. The product does not underlie the Ordinance of Hazardous Substances or other storage or transport regulations.

2.5 Base materials / Ancillary materials

The most important base materials of BOSIG Phonotherm® boards are:

- PU rigid foam residues: ca. 80 - 85 M.-%
- Polyisocyanat binder: <15 M.-%
- Water: <5 M.-%

2.6 Manufacture

Material processing

The used rigid Polyurethane foam originates from the production residues of the industrial Polyurethane foaming and is sourced by producers throughout Europe. In the production of Phonotherm® the material of PU foam residues are recycled and are pressed to boards. The PU residues are extracted from the storage boxes in the predefined mixing ratio and are transported into the mixing box. The mixture is

comminuted to the required flake size in various mills. The PU material is stored in silos until discharge into the press systems. Arising PU-dust from the production process is added to the production cycle.

Mixture and metering

The metering of individual substances takes place in a continuous mixer, according to the feed material specification of Phonotherm®.

Production within the press system

Premixed material is applied by a gritter on a conveyer belt, where it is pre-condensed and subsequently transferred to the heat press. Thereby the material reacts with the binder under heat and pressure and brings the board into its final format. The following cold press extracts heat from the board and enables a quicker cooling-off of the product.

Board cutting

Finished formatted boards get cut into the standard net format by sawing devices. The clippings are used for the construction of the feeding feet, on which the boards are stored. Alternatively square-shaped timber is used.

Quality control

The Phonotherm® boards are tested for the required quality. The adjusted dimensions, in the length, width and thickness of the boards, are checked manually to ensure compliance with the tolerances after every dimensional change. Additional measuring instruments, like calipers for thickness measurement, are monitored in-house and calibrated accordingly.

2.7 Environment and health during manufacturing

Throughout the manufacturing process, additional measures for health safety - exceeding the legal measures for occupational safety for business enterprises - are not required. In the area of material processing wearing a dusk mask is obligatory. Hand protection gloves must be worn when handling the plates manually. Ear protectors are provided for the employees at every workstation.

Certificates according to /ISO 9001/ Quality Management and /ISO 50001/ Energy Management are present.

2.8 Product processing/Installation

Phonotherm® construction boards can be processed with commercially available woodworking machines with carbide tipped attachments. Dust extraction is recommended during processing.

In addition to machining methods of milling, grinding and sawing machines, Phonotherm® boards are also suitable for gluing, screwing and drilling. Depending on the application area and due to the material characteristics, Phonotherm® boards can be coated with aluminium, plastics, films or liquid coatings. The material is chemically resistant, easy to process and can be laminated and combined with other materials.

2.9 Packaging

The boards get strapped onto the pallet with a steel strip. Each pallet gets furnished with a accompanying document, a covering foil and edge protection.

2.10 Condition of use

Phonotherm® boards are durable construction materials. The material composition does not change during service life.

2.11 Environment and health during use

Environmental hazards for air and soil can be excluded, when the product is used in accordance to intended constructional applications.

For the intended use of the construction product no health impairments are known.

2.12 Reference service life

Based on the useful lives of building components according to the Sustainable Building Assessment System /BBSR-Table 2017/, the service life of Phonotherm® boards is over 50 years.

2.13 Extraordinary effects

Fire

Phontherm® boards meet the building material class B2, according to /DIN 4102/ and building material class E according to /EN 13501-1/. The fire performance does not form burning droplets.

Fire protection

Name	Value
Building material class according to /DIN 4102/	B2
Building material class according to /DIN EN 13501-1/	E
Burning droplets according to /DIN 4102/	d0
Smoke gas development	s2

Water

No water-hazardous, toxic substances are washed-out to the environment and water.

Mechanical destruction

There are no relevant environmental impacts associated with mechanical destruction.

2.14 Re-use phase

The dismantled Phonotherm® boards can be recycled after the end of their service life.

2.15 Disposal

On the construction accumulated remnants of Phonotherm® boards can be returned to the production circle. If the recycling possibilities mentioned above are not practicable, Phonotherm® boards are disposed with regard to the local regulations under the /waste code 17 06 04 (Insulating material other than used under 17 06 01 and 17 06 03/.

2.16 Further information

On the BOSIG-website processing instructions, product data sheets and other technical information are available for download: www.bosig.de www.phonotherm.de

3. LCA: Calculation rules

3.1 Declared Unit

The declaration refers to the production of 1 m³ of Phonotherm® construction boards produced by BOSIG Baukunststoffe GmbH. The average calculation is based on the Phonotherm® construction boards produced in Elsterwerda in the year 2016 and all separately recorded material and energy flows by the producer.

Declared unit

Name	Value	Unit
Declared unit	1	m ³
Gross density	585	kg/m ³

3.2 System boundary

The Life Cycle Assessment considers the system boundaries "cradle to gate" and follows the modular construction system described by /EN 15804/. The LCA takes into account the following modules:

- A1: Raw material supply, processing of input
- A2: Transportation to Manufacturer
- A3: Production

3.3 Estimates and assumptions

Specific data regarding the production process was provided by BOSIG. Missing data was supplemented by estimates based on comparable substitutes or data used from the secondary literature and the database /GaBi 8: 2017/. This include the feet for transportation and the internal Diesel consumption.

3.4 Cut-off criteria

All relevant data, i. e. all applied materials according to the recipe and the energy used originate from the production data acquisition and have been considered within the inventory analysis. For the considered in- and outputs the actual transport distances were used. Material- and energyflows with a proportion of less than 1 % was collected. It can be assumed, that the sum of the neglected processes does not exceed 5 % of the impact categories.

3.5 Background data

Primary data has been provided by BOSIG. All background data required for the Life Cycle Assessment originates from the database of the GaBi-Software /GaBi 8:2017/.

3.6 Data quality

For modelling the Life Cycle of Phonotherm® boards, data has been collected by BOSIG Baukunststoffe GmbH in the manufacturing plant in Elsterwerda from the production year 2016. All other relevant background data has been taken from the database of the /GaBi 8:2017/ software. For the Life Cycle Inventory analysis all input and output flows have been respected. The representativeness and data quality is therefore rated as good.

3.7 Period under review

The quantity of raw materials, input energy and the volume of waste relate to the year 2016. Additional data was taken from the database of /GaBi 8:2017/. It corresponds to best available technology currently available and so is representative for the time period under consideration. The reference area is Germany.

3.8 Allocation

The production of Phonotherm® is based on the recycling of PU production residues from the rigid foam industry. In the LCA the material is therefore used as secondary substance.

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 background database /GaBi 8:2017/ was used.

4. LCA: Scenarios and additional technical information

The following technical information models the basis for the declared modules or can be used for developing specific scenarios within the context of a building appraisal.

The reference service life according to /ISO 15686-1/ could not be determined. The declaration of the service life underlies the Sustainable Building Assessment System /BBSR-Table 2017/.

Service life

Name	Value	Unit
Reference service life (according to ISO 15686-1, -2, -7 and -8)	≥ 50	a

5. LCA: Results

The following table summarizes the results of Life Cycle Assessment. The results refer to 1 m³ of an average-produced Phonotherm® board. The Impact Assessment is based on CML 2001 - April 2015.

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	MND	MND	MND	MNR	MNR	MNR	MND	MND	MND	MND	MND	MND	MND

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: 1 m³ Phonotherm® board

Parameter	Unit	A1	A2	A3
Global warming potential	[kg CO ₂ -Eq.]	3.40E+2	2.32E+1	2.57E+2
Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	4.50E-10	2.94E-12	7.91E-10
Acidification potential of land and water	[kg SO ₂ -Eq.]	4.63E-1	9.84E-2	3.43E-1
Eutrophication potential	[kg (PO ₄) ³ -Eq.]	9.71E-2	2.44E-2	5.46E-2
Formation potential of tropospheric ozone photochemical oxidants	[kg ethene-Eq.]	7.41E-2	-3.66E-2	2.72E-2
Abiotic depletion potential for non-fossil resources	[kg Sb-Eq.]	9.48E-4	2.41E-6	1.07E-4
Abiotic depletion potential for fossil resources	[MJ]	7.62E+3	3.15E+2	2.79E+3

RESULTS OF THE LCA - RESOURCE USE: 1 m³ Phonotherm® board

Parameter	Unit	A1	A2	A3
Renewable primary energy as energy carrier	[MJ]	8.21E+2	2.08E+1	1.14E+3
Renewable primary energy resources as material utilization	[MJ]	9.90E+1	0.00E+0	0.00E+0
Total use of renewable primary energy resources	[MJ]	9.20E+2	2.08E+1	1.14E+3
Non-renewable primary energy as energy carrier	[MJ]	5.60E+3	3.16E+2	3.40E+3
Non-renewable primary energy as material utilization	[MJ]	2.28E+3	0.00E+0	0.00E+0
Total use of non-renewable primary energy resources	[MJ]	7.88E+3	3.16E+2	3.40E+3
Use of secondary material	[kg]	4.94E+2	0.00E+0	0.00E+0
Use of renewable secondary fuels	[MJ]	0.00E+0	0.00E+0	0.00E+0
Use of non-renewable secondary fuels	[MJ]	0.00E+0	0.00E+0	0.00E+0
Use of net fresh water	[m ³]	2.01E+0	2.43E-2	7.79E-1

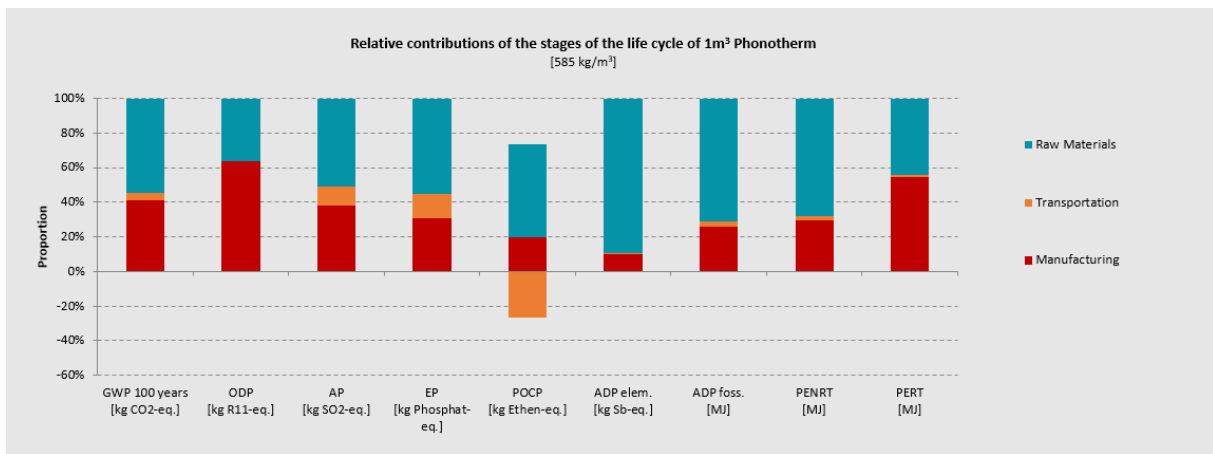
RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES:

1 m³ Phonotherm® board

Parameter	Unit	A1	A2	A3
Hazardous waste disposed	[kg]	6.09E-6	1.99E-5	1.84E-6
Non-hazardous waste disposed	[kg]	5.87E+2	1.74E+0	1.24E+3
Radioactive waste disposed	[kg]	1.04E-1	3.63E-4	2.44E-1
Components for re-use	[kg]	0.00E+0	0.00E+0	0.00E+0
Materials for recycling	[kg]	0.00E+0	0.00E+0	0.00E+0
Materials for energy recovery	[kg]	0.00E+0	0.00E+0	0.00E+0
Exported electrical energy	[MJ]	0.00E+0	0.00E+0	0.00E+0
Exported thermal energy	[MJ]	0.00E+0	0.00E+0	0.00E+0

6. LCA: Interpretation

The following figure shows the relative contributions of different Life Cycle processes and the primary energy demand in the form of a dominance analysis.



Indicators of the impact assessment

The impact categories of the Phonotherm® production are significantly enhanced by the manufacturing process (A1: raw materials supply) and the energy required for the production. Despite the Europe-wide supply of PU rigid foam residues, transportation plays a subordinate role for the environmental impact and the resources.

Global warming potential (GWP)

The greenhouse gas potential is determined to 57 % by the required binder and to 34 % by the use of electricity in the production.

Depletion potential of the stratospheric ozone layer (ODP)

The ODP factor results from the electricity mix Germany, which is characterized by a high proportion (ca. 55 %) of fossil fuels. The binder used in the production has an effect of about 34 % on the ODP factor.

Acidification potential of land and water (AP) and Eutrophication potential (EP)

The AP and EP factors are determined by the raw material supply.

Potential of tropospheric ozone photochemical oxidants (POCP)

The POCP factor is determined by the current input of electricity and the raw material supply. The transport of the material needed for production has a marginal share of the POCP value.

Abiotic depletion potential for non-fossil resources (ADPE)

Besides PU rigid foam residues, water and binder is required in the production of Phonotherm®. Due to the fact, that PU residues is generated waste by the foaming industry, the ADPE factor is determined with 90 % by the binder.

Abiotic depletion potential for fossil resources (ADPF)

The ADPF factor is determined by the input of electricity and the binder.

Total use of non-renewable primary energy resources (PENRT)

For the use of non-renewable primary energy resources, the bulk of the energy needs accumulates from raw material supply (A1) and the production (A3) itself. This is caused by the input of the binder. The transport of the material (A2) has a minor impact.

Total use of renewable primary energy resources (PERT)

The main share of renewable primary energy can be traced back to the electricity need in the production process. The electricity mix of Germany is comprised to one-third of renewable energy.

7. Requisite evidence

Pursuant to the analytical report according to /EN ISO/IEC 17025/, Phonotherm construction plates are Reach-compliant. Tris-chloropropyl phosphate, triethyl phosphate and phenyl-cresyl-phosphate were detected as flame retardants. Evidence has been provided that the listed halogenated flame retardants, silicones, volatile halogenated hydrocarbons (CHC) and volatile organic compounds(VOC) were not conspicuous.

7.1 VOC emissions

The testing laboratory MPA Eberswalde completed the test procedure to AgBB-Scheme for BOSIG Phonotherm® construction boards on 15.11.2017. The following table summarizes the results:

VOC Emissions

Name	Value	Unit
Overview of Results (28 Tage)	-	µg/m ³
TVOC (C6 - C16)	164 - 307	µg/m ³

Sum SVOC (C16 - C22)	0	µg/m ³
R (dimensionless)	1 - 3	-
VOC without NIK	9 - 110	µg/m ³
Carcinogenic Substances	0	µg/m ³

Phonotherm® construction boards RG 500 show the R-value of 1, whereas RG 550 and RG 700 indicate a R-value of 3.

The test method according to the French Regulation / Décret n ° 2011-321 / rated Phonotherm® construction panels with the Emission class of A +.

8. References

DIN EN ISO 14040: 2009-11: Environmental management - Life Cycle Assessment - Principles and framework (ISO 14040:2006); German and English version EN ISO 14040:2006.

DIN EN ISO 14044: 2006-10: Environmental management - Life Cycle Assessment - Requirements and guidelines (ISO 14044:2006); German and English version EN ISO 14044:2006.

DIN EN ISO 9001: Quality management systems - Requirements (ISO 9001:2015); German and English version EN ISO 9001:2015.

DIN EN ISO 50001: Energy management systems - Requirements with guidance for use (ISO 50001:2011); German version EN ISO 50001:2011.

DIN EN ISO/IEC 17025: 2005-08: General requirements for the competence of testing and calibration laboratories (ISO/IEC 17025:2005); German and English version EN ISO/IEC 17025:2005.

DIN EN 310:1993-08: Wood-based panels; determination of modulus of elasticity in bending and of bending strength; German version EN 310:1993

DIN EN 826: 2013-05: Thermal insulating products for building applications - Determination of compression behaviour; German version EN 826:2013.

DIN EN 12088: 2013-06: Thermal insulating products for building applications - Determination of long term water absorption by diffusion; German version EN 12088:2013.

DIN EN 12091: 2013-06: Thermal insulating products for building applications - Determination of freeze-thaw resistance; German version EN 12091:2013.

DIN EN 13501-1:2010-1: Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests; German version EN 13501-1:2007+A1:2009.

DIN EN 15801: 2010-04: Conservation of cultural property - Test methods - Determination of water absorption by capillarity; German version EN 15801:2009.

DIN EN 1606: 2013-05: Thermal insulating products for building applications - Determination of compressive creep; German version EN 1606:2013.

DIN EN 29052-1: 1992-08: Acoustics; determination of dynamic stiffness; part 1: materials used under floating floors in dwellings; german version EN 29052-1:1991.

DIN 4102-1:1998-05: Fire behaviour of building materials and building components - Part 1: Building materials; concepts, requirements and tests.

ISO 15686-1:2011-05: Buildings and constructed assets - Service life planning - Part 1: General principles and framework.

Committee for the Health Assessment of Construction Products (AgBB): Evaluation scheme for VOC from construction products, 2015.

Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR): Service lives of construction components. Service lives of construction components for Life Cycle Assessments according to the assessment system for sustainable construction (BNB), in: Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (ed.), 2017.

GaBi 8:2017: Software and data base for integrated balancing. Thinkstep AG.

Institute Construction and Environment e.V. (ed.): Product category rules for building-related products and service. Part A: Calculation rules for Life Cycle Assessment and requirements on the project report, version 1.4, 2016.

Institute Construction and Environment e.V. (ed.): PCR Guidance-texts for building-related products and service. Part B: Requirements on the EPD for insulating materials made of foam plastics, Version 1.2, 2017.

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.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

**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@ibu-epd.com
Web www.ibu-epd.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@ibu-epd.com
Web www.ibu-epd.com

**Author of the Life Cycle
Assessment**

SUSTAINUM Institut für
zukunftsfähiges Wirtschaften eG
Kreuzbergstraße 37/38
10965 Berlin
Germany

Tel +49 30 2345 74 96
Fax +49 30 2345 74 97
Mail info@sustainum.de
Web www.sustainum.de

**Owner of the Declaration**

BOSIG Baukunststoffe GmbH
Roland-Schmid-Straße 1
04910 Elsterwerda
Germany

Tel +49 35 33 700 0
Fax +49 35 33 700 200
Mail elsterwerda@bosig.de
Web www.bosig.de