

ENVIRONMENTAL PRODUCT DECLARATION

as per *ISO 14025* and *EN 15804+A1*




Owner of the Declaration	Stiferite
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-STF-20170042-CBA2-EN
Issue date	01/06/2017
Valid to	31/05/2022

STIFERITE Class SK average thick panel
Stiferite

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General Information

<p>Stiferite</p>	<p>STIFERITE Class SK insulation panel</p>
<p>Programme holder IBU – Institut Bauen und Umwelt e.V. Panoramastr. 1 10178 Berlin Germany</p>	<p>Owner of the declaration Stiferite Viale Navigazione Interna 54 35129 Padova PD Italy</p>
<p>Declaration number EPD-STF-20170042-CBA2-EN</p>	<p>Declared product / declared unit STIFERITE CLASS SK expanded rigid polyurethane foam, covered on both sides by saturated fibre glass facers, and produced by Stiferite. The EPD applies to 1 m² The EPD applies to 1 m² of a average thickness of 70 mm PUR sandwich board, i.e. 0.07 m³, with an average density between foam and facing of 34.8 kg/m³.</p>
<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>	<p>Scope: Stiferite produces STIFERITE Class SK that is a high performance insulation board manufactured from closed cell expanded rigid polyurethane foam, covered on both sides by saturated fibre glass facers. The data have been provided by the only Stiferite factory that was located in Padova (Italy) for the year 2015.</p>
<p>Issue date 01/06/2017</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. The EPD was created according to the specifications of <i>EN 15804+A1</i>. In the following, the standard will be simplified as <i>EN 15804</i>.</p>
<p>Valid to 31/05/2022</p>	<p>Verification</p>
	<p>The standard <i>EN 15804</i> serves as the core PCR Independent verification of the declaration and data according to <i>ISO 14025:2010</i></p> <p><input type="checkbox"/> internally <input checked="" type="checkbox"/> externally</p>
<p>Prof. Dr.-Ing. Horst J. Bossenmayer (chairman of Institut Bauen und Umwelt e.V.)</p>  <p>Dr. Burkhard Lehmann (Managing Director Institut Bauen und Umwelt e.V.)</p>	 <p>Prof. Dr. Birgit Grahl (Independent verifier)</p>

Product

Product description/Product definition

STIFERITE'S thermo insulation panels are mainly used in the building/construction sector and that of industrial insulation.

The panels are made of thermo-setting closed cells polyurethane foam (PU) supplied with various types of flexible facers on both sides of the panel. The nature/type of facer contributes to the performance characteristics of the product and its application. Expanded rigid polyurethane foam is distinguished by its' good thermo insulation performance, mechanical resistance, workability, lightness, and durability. The performance of STIFERITE's panels is determined based on the European norm /EN 13165:2012+A1:2015 Thermal insulation products for buildings - Factory made rigid polyurethane foam (PU) products - Specification/.

This EPD refers to STIFERITE's Class SK average

thick panel, made of an insulation component in polyurethane foam using blowing agent Pentane-based, covered on both sides by saturated fibre glass facers.

The saturated fibre glass facer assures perfect adhesiveness to mortar and rendering layers used in External Thermal Insulation Composite Systems (ETICS).

The panel is produced in standard dimensions of 600 x 1200 mm and straight finish edges.

Upon request and for minimum quantities, the panels may be produced in various dimensions, and the borders may be rabbeted along the sides. The surface of the panel may be evened off by sandpaper in order to allow installation to uneven surfaces. STIFERITE Class SK panel is produced by a certified company with systems: /ISO 9001/, /OHSAS 18001/, /ISO 14001/ in its entire line of products.

For the placing on the market of the product in the EU/EFTA (with the exception of Switzerland) Regulation (EU) No. 305/2011 (CPR) applies. The product needs a Declaration of Performance taking into consideration /EN 13165:2012+A1:2015 Thermal insulation products for building- factory made rigid polyurethane foam (PU) products - Specification/ and the CE-marking. For the application and use the respective national provisions apply.

Application

The STIFERITE Class SK panel is recommended in external insulation applications: External walls, ventilated facades, correction of thermal bridges and porches.

STIFERITE's Class SK is used in ETICS applications having ETA certification issued based on /ETAG 004/.

Technical Data

The data provided by the Declaration of Performance apply. In this Life Cycle Assessment, a PU insulation board with the following properties has been regarded:

Constructional data

Name	Value	Unit
Gross density	34.8	kg/m ³
Declared Average Thermal conductivity λ_D acc. to /EN 13165/	0.027	W/mK
Compressive strength at 10% deformation acc. to /EN 826/	> 150	kPa
Tensile strength perpendicular to the face acc. to /EN 1607/	> 80	kPa
Water absorption by total immersion acc. to /EN 12087/	< 2	Vol.-%
Water absorption by partial immersion acc. to /EN 1609/	< 0.1	kg/m ²
Water vapour diffusion resistance factor μ acc. to /EN 12086/	56	
Euroclass reaction to fire acc. to /EN 11925/	E	

This provides a thermal resistance $R = 2.59 \text{ m}^2 \text{ k/W}$.

Base materials/Ancillary materials

Core material (about 93.72 % of the weight of the declared unit):

Closed-cell Polyiso (PIR) rigid foam made from MDI (50-65 %), polyols (20-30 %), pentane (4-5 %) and additives (4-7 %).

Facing (about 6.28 % of the weight of the declared unit): saturated fibre glass consisting of glass fiber (70-80 %) and urea formaldehyde (20-30 %).

The PU board for insulation:

- does not contain substances which are included in the "Candidate List of Substances of Very High Concern for Authorisation" under the European chemicals Regulation /REACH/

Additional declaration according to quoted law: The product is compliant with all requirements indicated at chapter 2.4.2.9 of the /PANGPP 2017/:

- Any blowing agent with Ozone depletion potential >0 is not used in production
- Catalysts lead-based are not used in production
- Flame retardants used in production (belonging to the Organophosphorus class) are not banned by any national or European regulation
- According to the raw materials declarations of suppliers the minimum amount of recycled raw materials based on the insulation board (PU foam and facers) weight is 3 %w and the minimum amount of recycled raw materials based on the PU insulation foam weight is 4 %w (note: this information is not explicitly considered in the LCA and not included in the EPD tables that only refer to recycling content in the foreground system)

Reference service life

The durability of insulation panels is normally at least as long as the lifetime of the building in which it is used. The experimental data show that the reference life is longer than 50 years.

LCA: Calculation rules

Declared Unit

The declared unit is 1 m² with with a average thickness of 70 mm, e. g. 0.07 m³. Corresponding conversion factors are listed in the table below.

Declared unit

Name	Value	Unit
Declared unit	1	m ²
Gross density	34.8	kg/m ³
Volume	0.07	m ³
Declared average thermal conductivity λ_D	0.027	W/mK
Conversion factor to 1 kg	0.411	m ² /kg
Weight of declared unit	2.43	kg/m ²

The LCI data used in this report refer to an average product having an average thickness (materials in the recipes of different thicknesses are weighted according

to the relative production in square meters). The type of declaration is 1 c - declaration of an average product from a manufacturer's plant.

For IBU core EPDs (where clause 3.6 is part of the EPD): for average EPDs, an estimate of the robustness of the LCA values must be made, e.g. concerning variability of the production process, geographical representativeness and the influence of background data and preliminary products compared to the environmental impacts caused by actual production.

System boundary

This life cycle assessment for the production of the polyurethane insulation board 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 PU thermal insulation board. The life cycle is split into the following individual phases:

- A1 - Raw material formulation
- A2 - Raw material transport
- A3 - Production of the insulation board and packaging material
- A4 - Transport to the construction site
- A5 - Emissions and cutting losses during installation and packaging disposal
- C2 - Transport to end of life
- C3/C4 - End-of-Life: waste management (thermal recovery, landfill)
- D - Benefits and loads beyond system boundary

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.

For life cycle modelling of the considered products, the /GaBi 7: Software-System and Database for Life Cycle Engineering/ has been used.

LCA: Scenarios and additional technical information

2) Landfilling 100% (D2)

Transport to the building site (A4)

The distances calculated are weighted average distances according to the overall sales distribution; such distribution is considered similar for all Stiferite products.

Name	Value	Unit
Truck with a capacity of 17.3 tons	271	km
Ferry with a capacity of 1200-10000 dwt payload capacity	144	km
Ship with a capacity of 27500 dwt payload capacity tons	11000	km
Plane with a capacity of 22 ton	0	km

Installation into the building (A5)

Name	Value	Unit
Material loss	0.0487	kg
VOC in the air Pentane	1.27E-06	kg

In case a **reference service life** according to applicable ISO standards is declared then the assumptions and in-use conditions underlying the determined RSL shall be declared. In addition, it shall be stated that the RSL applies for the reference conditions only

The same holds for a service life declared by the manufacturer. Corresponding information related to in-use conditions needs not be provided if a service life taken from the list on service life by *BNB* is declared.

End of life (C1-C4)

The results for the end-of-life are declared for the 2 different scenarios:

Name	Value	Unit
Scenario No 1: Material Incineration	100	%
Scenario No 2: Landfill	100	%

C4: Disposal scenarios used is divided in the 2 sub-scenarios:

- 1) Incineration 100% (C4/1)
- 2) Landfilling 100% (C4/2)

D: Benefits and loads beyond system boundary is divided in the 2 sub-scenarios:

- 1) Incineration 100% (D1)

LCA: Results

The tables below show the results of the LCA. Basic information on all declared modules provides chapter 4. There are two scenarios for the end-of-life (C3, C4 and D) analyzed: Scenario 1 considers 100% incineration, Scenario 2 considers 100% landfill disposal.

For SM, RSF, NRSF, CRU indicators only the foreground system is considered.

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

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	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A1: 1 m² Class SK insulation panel

Parameter	Unit	A1-A3	A4	A5	C2	C3/1	C3/2	C4/1	C4/2	D/1	D/2
GWP	[kg CO ₂ -Eq.]	7.05E+0	5.12E-2	2.10E-1	1.12E-2	0.00E+0	0.00E+0	5.13E+0	1.26E-1	-2.85E+0	-6.42E-2
ODP	[kg CFC11-Eq.]	1.08E-5	3.24E-13	2.17E-7	8.11E-14	0.00E+0	0.00E+0	6.39E-11	4.51E-11	-1.62E-9	-1.08E-11
AP	[kg SO ₂ -Eq.]	1.65E-2	4.63E-4	3.84E-4	2.80E-5	0.00E+0	0.00E+0	2.26E-3	4.35E-4	-6.68E-3	-1.01E-4
EP	[kg (PO ₄) ³ -Eq.]	2.28E-3	6.04E-5	5.48E-5	6.51E-6	0.00E+0	0.00E+0	5.40E-4	5.30E-5	-6.19E-4	-1.12E-5
POCP	[kg ethene-Eq.]	4.22E-3	-5.51E-6	8.84E-5	-7.73E-6	0.00E+0	0.00E+0	1.54E-4	3.65E-5	-5.26E-4	-1.38E-5
ADPE	[kg Sb-Eq.]	2.65E-5	3.23E-9	5.38E-7	8.39E-10	0.00E+0	0.00E+0	7.87E-8	4.38E-8	-7.68E-7	-1.73E-8
ADPF	[MJ]	1.58E+2	6.86E-1	3.34E+0	1.54E-1	0.00E+0	0.00E+0	2.11E+0	1.26E+0	-3.46E+1	-1.49E+0

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 - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A1: 1 m² Class SK insulation panel

Parameter	Unit	A1-A3	A4	A5	C2	C3/1	C3/2	C4/1	C4/2	D/1	D/2
PERE	[MJ]	8.36E+0	IND	2.01E-1	IND	IND	IND	4.80E-1	IND	IND	IND
PERM	[MJ]	1.12E-2	IND	-1.12E-2	IND	IND	IND	0.00E+0	IND	IND	IND
PERT	[MJ]	8.37E+0	3.12E-2	1.90E-1	8.91E-3	0.00E+0	0.00E+0	4.80E-1	3.75E-1	-1.12E+1	-1.53E-1
PENRE	[MJ]	7.79E+1	IND	2.40E+0	IND	IND	IND	8.99E+1	IND	IND	IND
PENRM	[MJ]	8.94E+1	IND	-2.19E+0	IND	IND	IND	-8.72E+1	IND	IND	IND
PENRT	[MJ]	1.67E+2	6.89E-1	2.07E-1	1.55E-1	0.00E+0	0.00E+0	2.73E+0	1.69E+0	-4.96E+1	-1.62E+0
SM	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
RSF	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
NRSF	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
FW	[m ³]	4.79E-2	7.69E-5	1.15E-3	2.20E-5	0.00E+0	0.00E+0	1.25E-2	5.95E-4	-1.73E-2	-2.46E-4

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 – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A1: 1 m² Class SK insulation panel

Parameter	Unit	A1-A3	A4	A5	C2	C3/1	C3/2	C4/1	C4/2	D/1	D/2
HWD	[kg]	1.29E-5	4.02E-8	2.60E-7	1.16E-8	0.00E+0	0.00E+0	3.37E-9	1.30E-8	-2.77E-8	-1.38E-9
NHWD	[kg]	1.31E-1	4.70E-5	6.97E-2	1.34E-5	0.00E+0	0.00E+0	9.06E-2	2.43E+0	-2.52E-2	-3.68E-4
RWD	[kg]	3.63E-3	1.34E-6	8.48E-5	3.32E-7	0.00E+0	0.00E+0	2.45E-4	1.74E-4	-6.00E-3	-5.23E-5
CRU	[kg]	2.55E-3	0.00E+0	5.10E-5	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
MFR	[kg]	0.00E+0	0.00E+0	1.95E-2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
MER	[kg]	0.00E+0	0.00E+0	2.18E-2	0.00E+0	0.00E+0	0.00E+0	2.43E+0	0.00E+0	0.00E+0	0.00E+0
EEE	[MJ]	0.00E+0	0.00E+0	1.05E-1	0.00E+0	0.00E+0	0.00E+0	1.74E+1	0.00E+0	0.00E+0	0.00E+0
EET	[MJ]	0.00E+0	0.00E+0	2.42E-1	0.00E+0	0.00E+0	0.00E+0	7.57E+0	0.00E+0	0.00E+0	0.00E+0

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

Standards

EN 15804

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ISO 14025

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Further References

Title of the software/database

Title of the software/database. Addition to the title, version. Place: Publisher, Date of publication [Access on access date].

IBU 2016

Institut Bauen und Umwelt e.V.: General Programme Instructions for the Preparation of EPDs at the Institut Bauen und Umwelt e.V. Version 1., Berlin: Institut Bauen und Umwelt e.V., 2016.
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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 12.2016
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ISO 9001

ISO 9001:2015 Quality management

OHSAS 18001

OHSAS 18001: 2007
Occupational Health and Safety Zone

ISO 14001

ISO 14001: 2015 Environmental management systems

ETAG 004: 2013

ETAG 004: 2013 External Thermal Insulation Composite Systems with rendering

REACH

REACH Registration, Evaluation, Authorization and Restriction of Chemical, 2007

EN 13165+A1:2015

EN 13165:2012+A1:2015 Thermal insulation products for buildings -
Factory made rigid polyurethane foam (PU) products - Specification

EN 826

EN 826:2013 Determination of Compression Behavior of Thermal Insulation Products

EN 1607

EN 1607:2013 Thermal insulating products for building applications. Determination of tensile strength perpendicular to faces

EN 12087

EN 12087:2013
Thermal insulating products for building applications. Determination of long term water absorption by immersion.

EN 1609

EN 1609:2013
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EN 11925

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Reaction to fire tests. Ignitability of products subjected to direct impingement of flame. Single-flame source test.

PANGPP 2016

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GaBi 7 2016

GaBi 7: Documentation of GaBi 7: Software-System and Database for Life Cycle Engineering. Copyright, TM. Stuttgart, Leinfelden-Echterdingen, 1992-2016
<http://www.gabi-software.com>

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