ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804

Owner of the Declaration	Stiferite SPA
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-STF-20170043-CBA1-EN
ECO EPD Ref. No.	ECO-00000533
Issue date	01/06/2017
Valid to	31/05/2022

STIFERITE GTE average thick panel

Stiferite SPA

Institut Bauen und Umwelt e.V.

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

ECO PLATFORM EPD EN 15804 VERIFIED

General Information

Stiferite SPA

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

Declaration number
EPD-STF-20170043-CBA1-EN

This Declaration is based on the Product Category Rules:
Insulating materials made of foam plastics, 12.2016
(PCR tested and approved by the SVR)

Issue date
01/06/2017

Valid to
31/05/2022

Prof. Dr.-Ing. Horst J. Bossenmayer
(President of Institut Bauen und Umwelt e.V.)

Dr. Burkhart Lehmann
(Managing Director IBU)

STIFERITE GTE insulation panel

Owner of the Declaration
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Viale Navigazione Interna 54

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Declared product / Declared unit
STIFERITE GTE expanded rigid polyurethane foam, covered on both sides by multi-layer aluminium gas-tight facer, and produced by Stiferite. The EPD applies to 1 m2 of an average 59 mm thickness PUR sandwich board, i.e. 0.059 m3, with an average density between foam and facing of 35 kg/m3.

Scope:
Stiferite SPA produces STIFERITE GTE that is a high-performance insulation board manufactured from closed cell expanded rigid polyurethane foam, covered on both sides by multi-layer aluminium gas-tight facers.The data have been provided by the only Stiferite factory that were located in Padova (Italy) for the year 2015.

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

Prof. Dr. Birgit Grahl
(Independent verifier appointed by SVR)

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 excellent 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 GTE average thickness panel, made of an insulation component in polyurethane foam using blowing agent Pentane-based, covered on both sides by multi-layer gas-tight aluminium facers.
The gas-tight properties of the facing allow the highest thermal insulation to be achieved and maintained over time.
The panel is produced in standard dimensions of 600 x 1200 mm and straight finish edges.
On request and for minimum quantities, the panels may be produced in various dimensions, and the edges 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 GTE panel is produced by a certified company with systems: /ISO 9001/, /OHSAS 18001/, /ISO 14001/ in its entire line of products.

Product according to the CPR based on a hEN/:13165:2012+A1:2015 For the placing on the market of the product in the EU/EFTA (with the exception of Switzerland) the 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 GTE panel is recommended in flat roof: cold-applied waterproof synthetic or bituminous under-roofing, inverted roof; pitched roofs; ventilated, under sheet-metal; walls: in cavity, application from the inside behind infill elements, ventilated facades; floors and lofts: ground-supported and intermediate landing, radiant floors, industrial floors.

Technical Data
The data given 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	35	kg/m³
Declared Thermal conductivity λD acc. to /EN 13165/	0.023	W/mK
Compressive strength at 10% deformation acc. to /EN 826/	> 150	kPa
Tensile strength perpendicular to the face acc. to /EN 1607/	> 35	kPa
Water absorption by total immersion acc. to /EN 12087/	< 1	Vol.-%
Water absorption by partial immersion acc. to /EN 1609/	< 0.1	kg/m²
Water vapour diffusion resistance factor μ acc. to /EN 12086/	89900	
Euroclass reaction to fire acc. to /EN 11925/	E	

This provides a thermal resistance R = 2.57 m² k/W.

Base materials / Ancillary materials
Core material (about 88.9% 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 11.1% of the weight of the declared unit): multi-layer gas-tight aluminium facer consisting of kraft paper (40-50%), aluminium (5-15%), PET (10-16 %), PE (10-20%), glue (1-3%), lacquer (0.5-2%) and reinforcemant (10-15%).

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 2.4.2.8 of the /PANGPP 2016/:

- 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 product weight is 2.16 % (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 a thickness of 59 mm, e. g. 0.059 m³.
Corresponding conversion factors are listed in the table below.

Declared unit

Name	Value	Unit
Declared unit	1	m²
Gross density	35	kg/m³
Volume	0.059	m³
Declared thermal conductivity λD	0.023	W/mK
Conversion factor to 1 kg	0.484	m²/kg
Weight of declared unit	2.07	kg/m²

The LCI data used in this report refer to an average product having an average thickness (material in the recipes of different thickness 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.

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

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	0.0413	kg
VOC in the air Pentane	1.27E-06	kg

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)
2) Landfilling 100% (D2)

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)

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: 1 m² GTE average thickness 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.]	5.77E+0	4.35E-2	1.75E-1	9.54E-3	0.00E+0	0.00E+0	4.45E+0	2.11E-1	-2.45E+0	-5.80E-2
ODP	[kg CFC11-Eq.]	9.09E-6	2.75E-13	1.82E-7	6.89E-14	0.00E+0	0.00E+0	5.29E-11	3.87E-11	-1.35E-9	-1.30E-11
AP	[kg SO_2-Eq.]	1.39E-2	3.93E-4	3.25E-4	2.38E-5	0.00E+0	0.00E+0	1.84E-3	3.80E-4	-5.62E-3	-9.86E-5
EP	[kg $(PO_4)^{3-}$-Eq.]	1.90E-3	5.13E-5	4.67E-5	5.53E-6	0.00E+0	0.00E+0	4.39E-4	9.27E-5	-5.23E-4	-1.06E-5
POCP	[kg ethene-Eq.]	3.70E-3	-4.68E-6	7.78E-5	-6.57E-6	0.00E+0	0.00E+0	1.25E-4	5.96E-5	-4.50E-4	-1.24E-5
ADPE	[kg Sb-Eq.]	1.57E-5	2.74E-9	3.22E-7	7.13E-10	0.00E+0	0.00E+0	5.84E-8	3.15E-8	-6.43E-7	-1.59E-8
ADPF	[MJ]	1.34E+2	5.83E-1	2.83E+0	1.31E-1	0.00E+0	0.00E+0	1.68E+0	1.16E+0	-3.00E+1	-1.27E+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 - RESOURCE USE: 1 m² GTE average thickness panel

Parameter	Unit	A1-A3	A4	A5	C2	C3/1	C3/2	C4/1	C4/2	D/1	D/2
PERE	[MJ]	1.32E+1	IND	2.94E-1	IND	IND	IND	3.91E-1	IND	IND	IND
PERM	[MJ]	1.75E-2	IND	-1.10E-2	IND	IND	IND	0.00E+0	IND	IND	IND
PERT	[MJ]	1.32E+1	2.65E-2	2.83E-1	7.57E-3	0.00E+0	0.00E+0	3.91E-1	3.20E-1	-9.34E+0	-1.56E-1
PENRE	[MJ]	6.79E+1	IND	1.99E+0	IND	IND	IND	7.44E+1	IND	IND	IND
PENRM	[MJ]	7.41E+1	IND	-1.82E+0	IND	IND	IND	-7.22E+1	IND	IND	IND
PENRT	[MJ]	1.42E+2	5.85E-1	1.75E-1	1.32E-1	0.00E+0	0.00E+0	2.19E+0	1.53E+0	-4.26E+1	-1.42E+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]	4.20E-2	6.53E-5	9.99E-4	1.87E-5	0.00E+0	0.00E+0	1.08E-2	5.02E-4	-1.44E-2	-2.44E-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 – OUTPUT FLOWS AND WASTE CATEGORIES: 1 m² GTE average thickness panel

Parameter	Unit	A1-A3	A4	A5	C2	C3/1	C3/2	C4/1	C4/2	D/1	D/2
HWD	[kg]	1.09E-5	3.41E-8	2.20E-7	9.88E-9	0.00E+0	0.00E+0	2.07E-9	1.10E-8	-2.34E-8	-1.30E-9
NHWD	[kg]	1.58E-1	3.99E-5	5.93E-2	1.14E-5	0.00E+0	0.00E+0	3.62E-2	2.04E+0	-2.11E-2	-3.62E-4
RWD	[kg]	3.13E-3	1.13E-6	7.29E-5	2.82E-7	0.00E+0	0.00E+0	2.02E-4	1.49E-4	-5.01E-3	-5.80E-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	1.63E-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	1.81E-2	0.00E+0	0.00E+0	0.00E+0	2.07E+0	0.00E+0	0.00E+0	0.00E+0
EEE	[MJ]	0.00E+0	0.00E+0	8.82E-2	0.00E+0	0.00E+0	0.00E+0	1.45E+1	4.35E-2	0.00E+0	0.00E+0
EET	[MJ]	0.00E+0	0.00E+0	2.01E-1	0.00E+0	0.00E+0	0.00E+0	7.24E+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; EEE = Exported thermal energy

References

IBU PCR Part A:2014-20-08 V1.4
Product Category Rules for Building-Related Products and Services.
Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Background Report.

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
https://epd-online.com

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

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:
Thermal insulating products for building applications. Determination of short term water absorption by partial immersion.

EN 12086
EN 12086: 2013
Thermal insulating products for building applications. Determination of water vapour transmission properties.

EN 11925
EN 11925:2010
Reaction to fire tests. Ignitability of products subjected to direct impingement of flame. Single-flame source test.

PANGPP 2016
Piano d' Azione Nazionale sul *Green Public Procurement* (PANGPP) – Gazzetta Ufficiale della Repubblica Italiana, Serie Generale n.16, 21-01-2016, http://www.minambiente.it/sites/default/files/archivio/allegati/GPP/GPP_CAM_Edilizia.pdf

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

Institut Bauen und Umwelt
Institut Bauen und Umwelt e.V., Berlin(pub.): Generation of Environmental Product Declarations (EPDs);
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

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