

ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804+A1

Owner of the Declaration	Stiferite
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-STF-20200242-CBA3-EN
Issue date	18.12.2020
Valid to	17.12.2025

Stiferite Pendenzato Class S average thickness Stiferite

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EPD
VERIFIED



General Information

Stiferite

Programme holder

IBU – Institut Bauen und Umwelt e.V.
Hegelplatz 1
10117 Berlin
Germany

Declaration number

EPD-STF-20200242-CBA3-EN

This declaration is based on the product category rules:

Insulating materials made of foam plastics, 01.08.2021
(PCR checked and approved by the SVR)

Issue date

18.12.2020

Valid to

17.12.2025



Dipl.-Ing. Hans Peters
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Stiferite Pendenzato Class S average thickness

Owner of the declaration

Stiferite
Viale Navigazione Interna 54
35129 Padova
Italy

Declared product / declared unit

STIFERITE Pendenzato CLASS S is a composite panel made by a base side EPS and a top side based on Stiferite CLASS S, expanded rigid polyurethane foam, covered on both sides by saturated glass fibre, and produced by Stiferite. The EPD applies to 1 m² of an average 86 mm thick PUR sandwich board, i.e. 0.086 m³, with an average density between foam and facing of 39.6 kg/m³.

Scope:

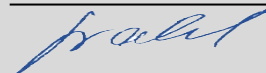
Stiferite produces **STIFERITE Pendenzato CLASS S** that is a high performance composite insulation board manufactured from a top side a closed cell expanded rigid polyurethane foam, covered on both sides by saturated glass fibre, and a bottom side an EPS insulation panel with a slope shape. The data have been provided by the only Stiferite factory that was located in Padova (Italy) for the year 2019. 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.

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The EPD was created according to the specifications of EN 15804+A1. In the following, the standard will be simplified as *EN 15804*.

Verification

The standard EN 15804 serves as the core PCR	
Independent verification of the declaration and data according to ISO 14025:2011	
<input type="checkbox"/>	internally
<input checked="" type="checkbox"/>	externally



Prof. Dr. Birgit Grahl,
(Independent verifier)

Product

Product description/Product definition

STIFERITE's thermo insulation panels are mainly used in the building/construction sector or 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+A2:2016 Thermal insulation products for buildings - Factory made rigid polyurethane foam (PU) products - Specification* for polyurethane insulation board and on the European norm *EN 13163:2012+A2:2016 Thermal insulation for building-factory made expanded polystyrene (EPS) products - Specification* for polystyrene insulation board.

This EPD refers to STIFERITE PENDENZATO CLASS S Average thick panel, made of an insulation component in polyurethane foam using blowing agent Pentane-based, covered on both sides by saturated glass fibre, and on the bottom side of an insulation component in EPS with a slope shape.

The panel is produced in standard dimensions of as request by the customers and straight finish borders. The surface of the panel may be evened off by sandpaper in order to allow installation to uneven surfaces. STIFERITE PENDENZATO CLASS S Average thick panel is produced by a certified company with systems:

ISO 9001, ISO 45001, ISO 14001 in its entire line of products. For the placing on the market of the product in the European Union/European Free Trade Association (EU/EFTA) (with the exception of Switzerland) Regulation (EU) No. 305/2011 (CPR) applies. The product needs a declaration of performance taking into consideration for polyurethane side *EU 13165:2012+A2:2016 Thermal insulation for building-factory made rigid polyurethane foam (PU) products - Specification* and the CE marking, and for EPS side *EN 13163:2012+A2:2016 Thermal insulation for building-factory made expanded polystyrene (EPS) products - Specification* and the CE marking. For the application and use the respective national provisions apply.

Application

The STIFERITE Pendenzato CLASSE S panel is suitable for the insulation of flat roofs under synthetic mantles in-view or weighted down and under bituminous mantles applied cold (not torched).

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	39.6	kg/m ³
Declared Average Thermal conductivity λD acc. to /EN 13165/	PU:0.027, EPS:0.033	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/	< 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/	PU:56, EPS:30- 70	
Euroclass reaction to fire acc. to /EN 11925/	E	

This provides a thermal resistance $R = 3.53 \text{ m}^2 \text{ k/W}$.

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.

Base materials/Ancillary materials

PU insulation panel (about 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%).

PU Facing (about 4,4 % of the weight of the declared unit): upper and lower facing consisting of glass fibre (70-80%) and urea-formaldehyde (20-30%).

EPS insulation panels: about 23,6 % The PU board for insulation:

- This product/article/at least one partial article contains substances listed in the candidate list (date: 17.11.2020) exceeding 0.1 percentage by mass: no
- This product/article/at least one partial article doesn't contain other CMR substances in categories 1A or 1B which are not on the candidate list, exceeding 0.1 percentage by mass: no
- Biocide products were added to this construction product or it has been treated with biocide products (this then concerns a treated product as defined by the (EU) Ordinance on Biocide Products No. 528/2012): no

Additional declaration according to quoted law: The product is compliant with all requirements indicated at Additional declaration according to quoted law: The product is compliant with all requirements indicated in chapter 2.5.7 'Isolanti termici ed acustici' of the n.256 D.L. of the 23th June 2022 (CAM EDILIZIA):

- Any blowing agent with Ozone depletion potential >0 is not used in production
- Any substances of Very High Concern-SVHC in concentration of more than 0,1 %w are not used in production (REACH n. 1907/2006). Any specific authorizations for use are reserved provided for by the same Regulation for the substances included in Annex XIV and specifications restrictions set out in Annex XVII of the Regulation.
- 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 EPS insulation weight is more than 15% and 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, *Clima 2019*.

LCA: Calculation rules

Declared Unit

The declared unit is 1 m² with an average thickness of 86 mm, e. g. 0.086 m³. Corresponding conversion factors are listed in the table below.

Declared unit

Name	Value	Unit
Declared unit	1	m ²
Gross density	39.6	kg/m ³
Volume	0.086	m ³
Grammage	34	kg/m ²
Declared average thermal conductivity λD	PU:0.027, EPS:0.033	W/mK
Layer thickness	0.086	m
Conversion factor to 1 kg	3.4	kg/m ²
Weight of declared unit	3.4	kg/m ²

This provides a thermal resistance R = 3.53 m² /W.

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.

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

Geographic Representativeness

Land or region, in which the declared product system is manufactured, used or handled at the end of the product's lifespan: Italy

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 9 2020* 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	270	km
Ferry with a capacity of 1200-10000 dwt payload capacity	124	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	0.0681	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 into the 2 sub-scenarios:

1) Incineration 100% (C4/1)

2) Landfilling 100% (C4/2)

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

1) Incineration 100% (D1)

2) Landfilling 100% (D2)

Reuse, recovery and/or recycling potentials (D), relevant scenario information

Name	Value	Unit
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Module D includes credits from recycling materials of insulation panels and packaging, energy credits from thermal recovery of the packaging. The results are declared for the same 3 different scenarios described above.

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 PENDENZATO CLASS S 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	9.27E+00	6.4E-02	2.38E-01	1.6E-02	0	0	7.26E+00	2.71E-01	-3.46E+00	-4.42E-02
ODP	kg CFC11 eq	1.21E-05	1.41E-17	2.41E-07	3.97E-18	0	0	4.21E-15	2.89E-15	-6.76E-14	-6.24E-16
AP	kg SO ₂ eq	2E-02	5.82E-04	4.43E-04	3.51E-05	0	0	2.85E-03	6.35E-04	-5.4E-03	-5.47E-05
EP	kg PO ₄ ³ eq	2.84E-03	7.8E-05	6.67E-05	8.52E-06	0	0	6.32E-04	1.97E-04	-6.42E-04	-7.35E-06
POCP	kg Ethen eq	3.89E-03	-1.1E-05	8.03E-05	-1.13E-05	0	0	1.72E-04	5.01E-05	-4.44E-04	-6.38E-06
ADPE	kg Sb eq	2.94E-05	4.9E-09	5.95E-07	1.47E-09	0	0	2.37E-07	9.47E-08	-8.17E-07	-1.02E-08
ADPF	MJ	2.26E+02	8.5E-01	4.69E+00	2.16E-01	0	0	3.22E+00	2.35E+00	-4.6E+01	-1.06E+00

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 PENDENZATO CLASS S average thickness panel

Parameter	Unit	A1-A3	A4	A5	C2	C3/1	C3/2	C4/1	C4/2	D/1	D/2
PERE	MJ	1.1E+01	IND	2.5E-01	IND	IND	IND	1.03E+00	IND	IND	IND
PERM	MJ	0	IND	0	IND	IND	IND	0	IND	IND	IND
PERT	MJ	1.1E+01	3.88E-02	2.5E-01	1.25E-02	0	0	1.03E+00	7.68E-01	-1.79E+01	-1.36E-01
PENRE	MJ	1.09E+02	IND	1.92E+00	IND	IND	IND	1.31E+02	IND	IND	IND
PENRM	MJ	1.29E+02	IND	-1.72E+00	IND	IND	IND	-1.27E+02	IND	IND	IND
PENRT	MJ	2.37E+02	8.54E-01	1.95E-01	2.17E-01	0	0	4E+00	2.92E+00	-6.14E+01	-1.14E+00
SM	kg	0	0	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0
FW	m ³	6.07E-02	4.57E-05	1.35E-03	1.46E-05	0	0	1.77E-02	8.89E-04	-2.08E-02	-1.87E-04

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 PENDENZATO CLASS S average thickness panel

Parameter	Unit	A1-A3	A4	A5	C2	C3/1	C3/2	C4/1	C4/2	D/1	D/2
HWD	kg	6.25E-04	3.07E-08	1.25E-05	1E-08	0	0	5.58E-09	1.22E-08	-2.43E-08	-3.77E-10
NHWD	kg	1.78E-01	1.25E-04	8.79E-02	3.44E-05	0	0	3.99E-01	3.39E+00	-3.21E-02	-3.58E-04
RWD	kg	4.43E-03	1.43E-06	9.95E-05	4.01E-07	0	0	3.1E-04	2.26E-04	-6.12E-03	-3.47E-05
CRU	kg	0	0	0	0	0	0	0	0	0	0
MFR	kg	0	0	1.37E-02	0	0	0	0	0	0	0
MER	kg	0	0	1.56E-02	0	0	0	3.4E+00	0	0	0
EEE	MJ	0	0	8.65E-02	0	0	0	2.04E+01	0	0	0
EET	MJ	0	0	1.56E-01	0	0	0	1.59E+01	0	0	0

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

Disclaimer 1 – for the indicator 'Potential Human exposure efficiency relative to U235'. This impact category deals mainly with the eventual impact of low-dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure or radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, radon and from some construction materials is also not measured by this indicator.

Disclaimer 2 – for the indicators 'abiotic depletion potential for non-fossil resources', 'abiotic depletion potential for fossil resources', 'water (user) deprivation potential, deprivation-weighted water consumption', 'potential comparative toxic unit for ecosystems', 'potential comparative toxic unit for humans – cancerogenic', 'Potential comparative toxic unit for humans - not cancerogenic', 'potential soil quality index'. The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high as there is limited experience with the indicator.

References

Standards

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 14025

DIN EN ISO 14025:2011-10, Environmental labels and declarations — Type III environmental declarations — Principles and procedures.

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.
www.ibu-epd.com

EN 13165

EN 13165:2012+A2:2016 Thermal insulation products for buildings - Factory made rigid polyurethane foam (PU) products - Specification

EN 13163

EN 13163:2012+A2:2016 Thermal insulation for building-factory made expanded polystyrene (EPS) 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.

ISO 9001

ISO 9001:2015 Quality management

ISO 14001

ISO 14001: 2015 Environmental management systems

ISO 45001

ISO 45001: 2018 Occupational health and safety management systems

Further References

BNB

Bewertungssystem Nachhaltiges Bauen (en: assessment system sustainable building)
<https://www.bbsr.bund.de/BBSR/EN/RP/FutureBuilding/2SustainableBuilding/391866¬First=true&docId=390900>

Candidate List

<https://echa.europa.eu/it/candidate-list-table> (date 17.11.2020)

Clima 2019

Clima 2019 Paper Polyurethane 'Environmental Impacts for a Polyurethane Panel' E. Guolo, F. Cappelletti, P. Romagnoni, F. Raggiotto

GaBi 9 2020

GaBi 9: Documentation of GaBi 9: Software-System and Database for Life Cycle Engineering. Copyright, TM. Stuttgart, Leinfelden-Echterdingen, 1992-2020
<http://www.gabi-software.com>

PANGPP 2017

Piano d' Azione Nazionale sul *Green Public Procurement* (PANGPP) – Gazzetta Ufficiale della Repubblica Italiana, Serie Generale n.17, 11-10-2017,
http://www.minambiente.it/sites/default/files/archivio/allegati/GPP/GPP_

PCR Part A

Product Category Rules for Building-Related Products and Services. Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Background Report. Version 06.2017

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 06.2017
<https://epd-online.com>

REACH

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



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