

ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804+A2

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-20240204-CBA1-EN
Issue date	03.09.2024
Valid to	02.09.2029

Stiferite CLASS BH average thickness
Stiferite

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General Information

Stiferite

Programme holder

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

Declaration number

EPD-STF-20240204-CBA1-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

03.09.2024

Valid to

02.09.2029



Dipl.-Ing. Hans Peters
(Chairman of Institut Bauen und Umwelt e.V.)



Florian Pronold
(Managing Director Institut Bauen und Umwelt e.V.)

Stiferite CLASS BH average thickness

Owner of the declaration

Stiferite
Viale Navigazione Interna 54
35129 Padova
Italy

Declared product / declared unit

STIFERITE CLASS BH expanded rigid polyurethane foam, covered on the top with bituminized glass tissue bonded to PP and on the bottom with saturated mineral glass tissue, and produced by Stiferite. Stiferite Class BH is produced from 30 mm to 200 mm. The EPD applies to 1 m² of a average 100 mm thick PUR sandwich board, weighted on the square meter produced, i.e. 0,100 m³, with an average density between foam and facing of 42,4 kg/m³.

Scope:

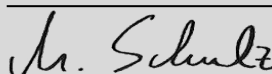
Stiferite produces STIFERITE CLASS BH that is a high performance insulation board manufactured from closed cell expanded rigid polyurethane foam, covered on the top with bituminized glass tissue bonded to PP and on the bottom with saturated mineral glass tissue. The data have been provided by the only Stiferite factory that is located in Padova (Italy) for the year 2023.

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 EN 15804+A2. 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



Matthias Schulz,
(Independent verifier)

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 CLASS BH Average thick panel, made of an insulation component in polyurethane foam using blowing agent Pentane-based, covered on the top with bituminized glass tissue bonded to PP and on the bottom with saturated mineral glass tissue.

Coating with bituminized glass fibre bonded to PP makes the STIFERITE Class BH panel particularly suitable for installations that require high degree of heat resistance. Stiferite CLASS BH has high compressive strength.

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 CLASS BH Average thick 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 BH panel has high compressive strength and is recommended for insulating: roof and floors under bituminous waterproof coverings where high resistance to the torch and high compressive strength are required such as, for example, industrial roofing, flooring and roadways. Waterproof foundation work.

Technical Data

Constructional data

Name	Value	Unit
Gross density	42.4	kg/m ³
Declared Thermal conductivity λ_D acc. to EN 13165	0.0255	W/mK
Compressive strength at 10% of deformation acc. to EN 826	200	kPa
Tensile strength perpendicular to the face acc. to EN 1607	40	kPa
Water absorption by total immersion, $d < 110$ mm acc. to EN 12087	2	%
Water absorption by total immersion, $d > 120$ mm acc. to EN 12087	1	%
Water absorption by partial immersion acc. to EN 1609	0.1	kg/m ²
Water vapour diffusion resistance factor μ acc. to EN 12086	33	
Euroclass reaction to fire acc. to 11925	F	

This provides a thermal resistance $R = 3,92 \text{ m}^2\text{K/W}$.

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.

Product according to the CPR, based on a hEN: performance data of the product in accordance with the declaration of performance with respect to its essential characteristics according to /EN 13165:2012+A1:2015 Thermal insulation products for building- factory made rigid polyurethane foam (PU) products - Specification/ and the CE-marking

Base materials/Ancillary materials

Core material (about 96,4 % of the weight of the declared unit):

Closed-cell Polyiso (PIR) rigid foam made from MDI (55-65 %), polyols (20-30 %), pentane (3-5 %) and additives (4-7 %).

Facing (about 3,62 % of the weight of the declared unit): upper and lower facing consisting of bitumen (25-35 %), PP (1-10 %), urea formaldehyde (5-15 %), and glass fiber (50-60 %).

Additional panels: about 0 % .

The PU board for insulation:

- 1) This product/article/at least one partial article contains substances listed in the candidate list (date: 27.06.2024) exceeding 0.1 percentage by mass: no
- 2) This product/article/at least one partial article doesn't contain other carcinogenic, mutagenic, reprotoxic (CMR) substances in categories 1A or 1B which are not on the candidate list, exceeding 0.1 percentage by mass: no
- 3) 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 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 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 an average thickness of 100 mm, e. g. 0.100 m³. Corresponding conversion factors are listed in the table below

Declared unit

Name	Value	Unit
Declared unit	1	m ²
Gross density	42.4	kg/m ³
Volume	0.100	m ³
Declared thermal conductivity λD	0.0255	W/mK
Layer thickness	0.1	m
Conversion factor to 1 kg	0.236	m ² /kg
Weight of declared unit	4.24	kg/m ²

This provides a thermal resistance R = 3,92 m²K/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. This average EPD covers the following type of insulation panel produced by Stiferite in 2023: Stiferite CLASS BH average thick panel. The representativeness of the data considered for the above Stiferite products was analysed by means of a sensitivity analysis. This analysis showed a limited deviation of the impact of the analysed products from the average results given in this EPD. The difference to the 'worst-case' product (120 mm thickness) for GWP-total is 18 %.

System boundary

LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon

The biogenic carbon content quantifies the amount of biogenic carbon in a construction product leaving the factory gate, and it shall be separately declared for the product and for any accompanying packaging.

If the total mass of biogenic carbon containing materials is less than 5 % of the total mass of the product and accompanying packaging, the declaration of biogenic carbon content may be omitted. The mass of packaging containing biogenic carbon shall always be declared.

Information on describing the biogenic Carbon Content at factory gate

Type of the EPD: cradle to gate - with options. 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 and 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. The background database used is GaBi 2022 database (v. 2022.1)

Name	Value	Unit
Biogenic carbon content in product	-	kg C
Biogenic carbon content in accompanying packaging	0.025	kg C

Note: 1 kg of biogenic carbon is equivalent to 44/12 kg of CO₂.

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

Transport to the building site (A4)

Name	Value	Unit
Truck with a capacity of 17.3 tons	258	km
Ferry with a capacity of 1200-10000 dwt payload capacity	0	km
Ship with a capacity of 27500 dwt payload capacity tons	0	km
Plane with a capacity of 22 ton	0	km

Type and amount of packaging included in module A3

Name	Value	Unit
Cardboard	0.05354	kg
EPS stocks	0.00871	kg
EPS stocks - glue	0.00081	kg
Paper labels	0.00220	kg
PE film	0.01589	kg
PP tape	0.00015	kg
PUR stocks	0	kg
SBR labels	0.00003	kg
Total packaging	0.08133	kg

End of life (C1-C4)

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

C1 – Deconstruction and demolition (0.2 MJ/kg as electrical consumption assumed)

C2: The insulation panel is transported from the building site to a treatment plant by truck and an average distance of 100 km is considered.

C3/C4: Disposal scenarios used is divided in the 2 sub-scenarios:

- 1) Incineration 100% (C3)
- 2) Landfilling 100% (C4/1)

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

- 1) Incineration 100% (D)
- 2) Landfilling 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 Secondary material (SM), Use of renewable secondary fuels (RSF), Use of non renewable secondary fuels (NRSF), Component for re-use (CRU) indicators only the foreground system is considered.

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE OR INDICATOR 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	MND	MND	MND	MNR	MNR	MNR	MND	MND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 m2 Stiferite CLASS BH average thickness

Parameter	Unit	A1-A3	A4	C1	C2	C3	C3/1	C4	C4/1	D	D/1
GWP-total	kg CO ₂ eq	1.19E+01	9.45E-02	9.69E-02	2.57E-02	9.1E+00	0	0	9.38E-02	-4.32E+00	0
GWP-fossil	kg CO ₂ eq	1.22E+01	9.36E-02	9.69E-02	2.54E-02	9.1E+00	0	0	9.35E-02	-4.31E+00	0
GWP-biogenic	kg CO ₂ eq	-2.26E-01	3.04E-04	5.72E-05	8.24E-05	6.42E-04	0	0	2.08E-04	-3.88E-03	0
GWP-luluc	kg CO ₂ eq	6.08E-03	6.31E-04	6.28E-06	1.71E-04	2.44E-05	0	0	1.19E-04	-2.33E-04	0
ODP	kg CFC11 eq	1.65E-11	9.2E-15	9.57E-13	2.49E-15	7.59E-13	0	0	1.86E-13	-3.16E-11	0
AP	mol H ⁺ eq	1.98E-02	3.32E-04	1.42E-04	8.48E-05	5.38E-03	0	0	4.89E-04	-5.33E-03	0
EP-freshwater	kg P eq	3.96E-05	3.35E-07	4.35E-08	9.06E-08	2.17E-07	0	0	4.7E-07	-1.5E-06	0
EP-marine	kg N eq	5.87E-03	1.53E-04	3.89E-05	3.88E-05	2.6E-03	0	0	1.32E-04	-1.55E-03	0
EP-terrestrial	mol N eq	5.95E-02	1.71E-03	4.16E-04	4.34E-04	2.99E-02	0	0	1.45E-03	-1.67E-02	0
POCP	kg NMVOC eq	3.43E-02	2.99E-04	1.1E-04	7.61E-05	6.67E-03	0	0	3.95E-04	-4.42E-03	0
ADPE	kg Sb eq	3.24E-06	9.44E-09	1.15E-08	2.56E-09	2.05E-08	0	0	7.53E-09	-4.33E-07	0
ADPF	MJ	3.04E+02	1.23E+00	2.05E+00	3.33E-01	2.59E+00	0	0	9.3E-01	-8.57E+01	0
WDP	m ³ world eq deprived	2.29E+00	1.05E-03	7.23E-03	2.84E-04	9.02E-01	0	0	7.07E-03	-2.42E-01	0

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; WDP = Water (user) deprivation potential)

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 m2 Stiferite CLASS BH average thickness

Parameter	Unit	A1-A3	A4	C1	C2	C3	C3/1	C4	C4/1	D	D/1
PERE	MJ	1.55E+01	8.52E-02	2.97E-01	2.31E-02	4.5E-01	0	0	1.42E-01	-9.87E+00	0
PERM	MJ	9.72E-01	ND	ND	ND	ND	0	0	ND	ND	0
PERT	MJ	1.65E+01	8.52E-02	2.97E-01	2.31E-02	4.5E-01	0	0	1.42E-01	-9.87E+00	0
PENRE	MJ	1.91E+02	1.23E+00	2.05E+00	3.34E-01	1.15E+02	0	0	1.13E+02	-8.57E+01	0
PENRM	MJ	1.14E+02	ND	ND	ND	-1.12E+02	0	0	-1.12E+02	ND	0
PENRT	MJ	3.05E+02	1.23E+00	2.05E+00	3.34E-01	2.59E+00	0	0	9.31E-01	-8.57E+01	0
SM	kg	4.56E-01	ND	ND	ND	ND	0	0	ND	ND	0
RSF	MJ	ND	ND	ND	ND	ND	0	0	ND	ND	0
NRSF	MJ	ND	ND	ND	ND	ND	0	0	ND	ND	0
FW	m ³	7.68E-02	9.85E-05	4.5E-04	2.67E-05	2.12E-02	0	0	2.22E-04	-1.5E-02	0

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+A2: 1 m2 Stiferite CLASS BH average thickness

Parameter	Unit	A1-A3	A4	C1	C2	C3	C3/1	C4	C4/1	D	D/1
HWD	kg	8.38E-08	6.53E-12	1.47E-10	1.77E-12	3.5E-10	0	0	5.81E-11	-8.11E-09	0
NHWD	kg	2.97E-01	2.01E-04	4.36E-04	5.45E-05	1.27E-01	0	0	4.22E+00	-1.9E-02	0

RWD	kg	3.58E-03	2.29E-06	3.41E-04	6.21E-07	1.11E-04	0	0	1.14E-05	-1.13E-02	0
CRU	kg	ND	ND	ND	ND	ND	0	0	ND	ND	0
MFR	kg	ND	ND	ND	ND	ND	0	0	ND	ND	0
MER	kg	ND	ND	ND	ND	ND	0	0	ND	ND	0
EEE	MJ	ND	ND	ND	ND	2.79E+01	0	0	ND	ND	0
EET	MJ	ND	ND	ND	ND	1.58E+01	0	0	ND	ND	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

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional:

1 m2 Stiferite CLASS BH average thickness

Parameter	Unit	A1-A3	A4	C1	C2	C3	C3/1	C4	C4/1	D	D/1
PM	Disease incidence	1.54E-07	1.93E-09	1.27E-09	4.85E-10	1.55E-08	0	0	5.68E-09	-4.72E-08	0
IR	kBq U235 eq	4.14E-01	3.46E-04	5E-02	9.37E-05	1.75E-02	0	0	1.26E-03	-1.65E+00	0
ETP-fw	CTUe	1.23E+02	8.72E-01	6.29E-01	2.36E-01	8.94E-01	0	0	1.48E+01	-2.09E+01	0
HTP-c	CTUh	8.7E-09	1.8E-11	1.16E-11	4.87E-12	6.31E-10	0	0	6.39E-10	-5.19E-10	0
HTP-nc	CTUh	6.24E-07	1.12E-09	5.89E-10	2.98E-10	6.95E-08	0	0	7.49E-08	-2.51E-08	0
SQP	SQP	3.34E+01	5.21E-01	1.89E-01	1.41E-01	5.28E-01	0	0	1.85E-01	-6.27E+00	0

PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index

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.

This EPD was created using a software tool.

References

Standards

EN 15804

EN 15804:2012+A2:2019+AC:2021, Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products.

ISO 14025

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

Further References

IBU 2021

Institut Bauen und Umwelt e.V.: General Instructions for the EPD programme of Institut Bauen und Umwelt e.V., Version 2.0, Berlin: Institut Bauen und Umwelt e.V., 2021
www.ibu-epd.com

IBU 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 according to EN 15804+A2:2019; V1.2, 11/2021

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 01/08/2021
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

EN 13165:2012 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 2022

Piano d' Azione Nazionale sul *Green Public Procurement* (PANGPP) – Decreto Ministeriale n. 256 del 23-06-2022 Gazzetta Ufficiale della Repubblica Italiana, Serie Generale n.183 del 06-08-2022 <https://www.mite.gov.it/notizie/novita-sui-criteri-minini-ambientali-cam>

GaBi 8 2022

GaBi 2022 GaBi 10 and DB 2022.1: Documentation of GaBi 10: Software- System and Database for Life Cycle Engineering. Copyright, TM. Stuttgart, Leinfelden-Echterdingen, 1992-2022 <http://www.gabi-software.com>
STIFERITE LCA tool background report v 2.3 (03-06-2022)



Publisher

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

+49 (0)30 3087748- 0
info@ibu-epd.com
www.ibu-epd.com



Programme holder

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

+49 (0)30 3087748- 0
info@ibu-epd.com
www.ibu-epd.com



Author of the Life Cycle Assessment

thinkstep Italy
Via Bovini 43
48123 Ravenna
Italy

+39 0544 467132
info@thinkstep.com
www.thinkstep.com



Owner of the Declaration

Stiferite
Viale Navigazione Interna 54
35129 Padova
Italy

+39 049 8997911
info@stiferite.com
www.stiferite.com