ENVIRONMENTAL PRODUCT DECLARATION

as per *ISO 14025* and *EN 15804+A2*

Owner of the Declaration	Sto SE & Co. KGaA
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-STO-20230193-IBA1-EN
Issue date	11.08.2023
Valid to	10.08.2028

StoVentec Carrier Board S

Sto SE & Co. KGaA

Institut Bauen und Umwelt e.V.

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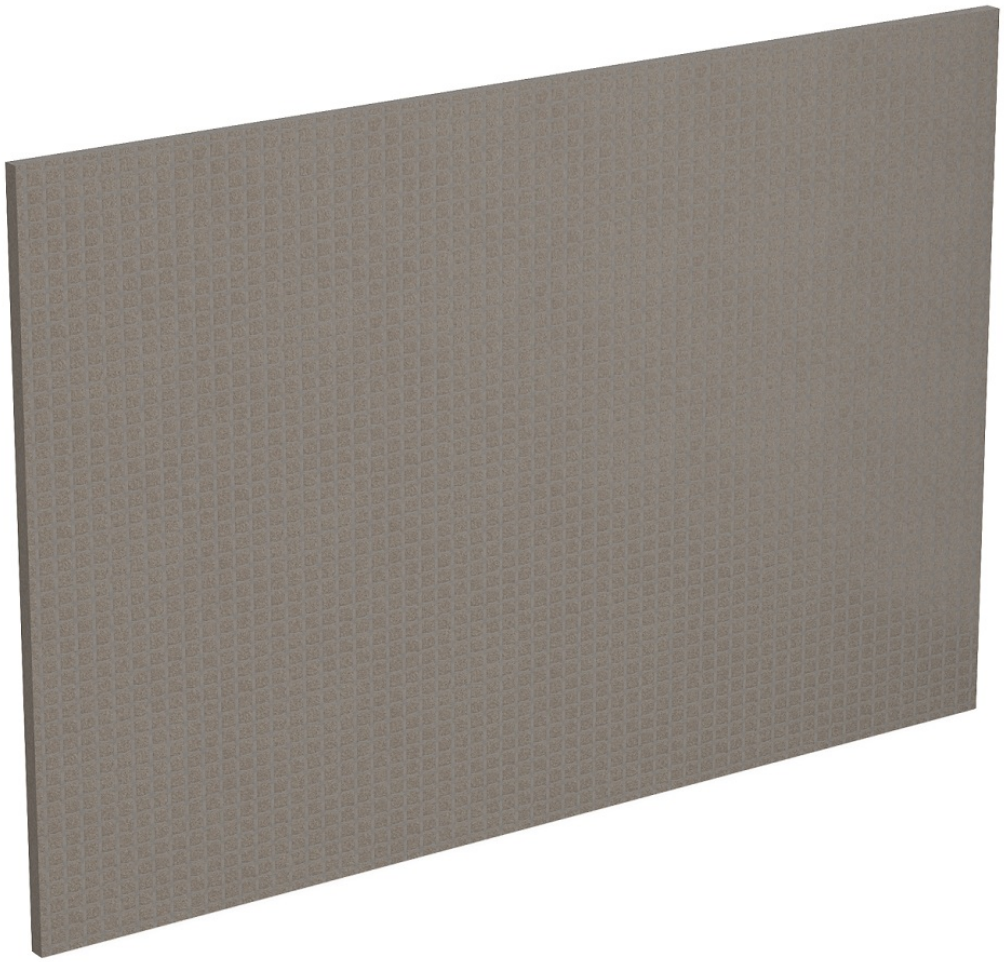

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General Information

Sto SE & Co. KGaA

Programme holder

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

Declaration number

EPD-STO-20230193-IBA1-EN

This declaration is based on the product category rules:

Lightweight boards made of lightweight fillers and reactive resins, 01.08.2021
(PCR checked and approved by the SVR)

Issue date

11.08.2023

Valid to

10.08.2028

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

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

StoVentec Carrier Board S

Owner of the declaration

Sto SE & Co. KGaA
Ehrenbachstr. 1
79780 Stühlingen
Germany

Declared product / declared unit

1 m² carrier board (12 mm) with formulation in the quality (class) A2-s1, d0 in accordance with EN 13501-1 (name: StoVentec Carrier Board S).

Scope:

This EPD relates to carrier boards made of lightweight filler material (expanded glass or perlite granulate) and reactive resins with formulations in the qualities (classes) B1 in accordance with DIN 4102-1 and A2-s1, d0 in accordance with EN 13501-1. These are produced by Verotec GmbH, Hanns-Martin-Schleyer-Straße 1, 89415 Lauingen, Germany. This is an environmental product declaration for a specific product named StoVentec Carrier Board S (made of expanded glass granulate) in the quality (class) A2-s1,d0 in accordance with EN 13501-1, while the following board types (formulations) and their environmental effects are described in the annex.
Formulation in quality (class) A2-s1,d0 in accordance with EN 13501-1 - made of expanded glass granulate:

- StoVentec Carrier Board A (12 mm)
- StoPanel Plus (12 mm)
- StoPanel Plus (20 mm)
- StoPrefa Render Carrier Board (12 mm)

Formulation in quality (class) B1 in accordance with DIN 4102-1 - made of expanded glass granulate:

- StoVentec Carrier Board (12 mm)
- Sto-Render Carrier Board (20 mm)
- StoPrefa Shutter Board (20 mm)

Formulation in quality (class) A2-s1,d0 in accordance with EN 13501-1 - made of expanded perlite granulate:

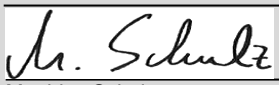
- Verolith Carrier Board (15 mm)

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
☐ internally ☒ externally



Matthias Schulz,
(Independent verifier)

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Product

Product description/Product definition

Pressed carrier boards made of lightweight fillers (expanded glass or perlite granulate) and reactive resins with glass fibre mesh reinforcement on both sides. The expanded glass granulate is made of recycled glass while the perlite granulate is a natural material of volcanic origin. The declared product is named "StoVentec Carrier Board S" and is based on expanded glass granulate with reactive resins in the quality (class) A2-s1,d0 in accordance with *EN 13501-1*.
The following technical data and calculations refer to the declared product.

Placing on the market/appliaction rules

The relevant national regulations at the site of use apply when using this product. In Germany, for example, these are the building regulations that apply within the individual federal states and the technical provisions based on these regulations. 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 federal states and the corresponding national specifications.

Application

The carrier boards are suitable for use in rainscreen cladding systems or for ceiling claddings in outdoor areas. They can also be used in combination with external wall insulation systems and in interiors.

Technical Data

Constructional data

Name	Value	Unit
Gross density TIAP 120 (Sto internal)	ca. 500	kg/m^3
Thermal conductivity DIN 52612	0.12	W/(mK)
Modulus of elasticity EN ISO 178	1800 – 2000	N/mm²
Thermal expansion TIAP 650 (Sto-intern)	0,000011	1/K
Water vapour diffusion-equivalent air layer thickness EN ISO 7783-2	15	µ

Other constructional data are not relevant.

Product performance values in relation to its characteristics according to the relevant technical regulations (no CE marking).

Base materials/Ancillary materials

Name	Value	Unit
Expanded glass granulate	< 85	Mass [%]
Filling materials	< 20	Mass [%]
Propellant and hydrophobic agents	< 1	Mass [%]
Reactive polymer resin	< 10	Mass [%]
Hardener	< 2	Mass [%]
Glass fibre mesh	< 7	Mass [%]

1. This products contains substances listed in the candidate list (17 January 2023) exceeding 0.1 percentage by mass: **no**
2. This product contains other 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**
4. This product contains fire retardants: **yes / aluminium hydroxide**

Reference service life

According to the Bewertungssystem Nachhaltiges Bauen (*BNB*) Sustainable Building assessment system of 7 July 2011, the carrier board approximately corresponds to Code Nr. 335.915 (*BNB*), wall coverings (systems): plastic, multi-layer lightweight construction boards with a service life of 40 years. The board structure of recycled glass and reactive resin is extremely stable in its coated state. The reference service life could therefore be synonymous with the service life of the structure/building element.

LCA: Calculation rules

Declared Unit

The declaration refers to 1m² StoVentec Carrier Board S of thickness 12mm.

Declared unit

Name	Value	Unit
Declared unit	1	m^2
Gross density	535	kg/m^3
Grammage	6.42	kg/m^2
Layer thickness	0.012	m

System boundary

Type of EPD: Cradle to gate with options, modules C1-C4 and module D (A1-A3 + C + D and additional modules: A4, A5). The LCA considers the following modules of the life cycle:

Production Stage (A1-A3): The Product stage includes:
· A1 Raw material supply and processing,
· A2 Transport of raw materials to the manufacturer,
· A3 Production of StoVentec Carrier Board S in the factory, (incl. energy provision, water provision, disposal of production waste, production of packaging materials)

Construction stage (A4-A5): The construction process stage includes:
· A4 transport to the construction site 100km by truck,
· A5 installation of the product with machine and treatment of the packaging materials in waste incineration units after installation of the product

End-of-life stage (C1-C4): The end-of-life stage includes:
· C1 de-construction with machine
· C2 transport to waste processing; 50 km with truck
Transport distance can be adjusted at building level if necessary (e.g., for 100 km actual transport distance: multiply LCA values by factor 2).
· C4 disposal of the product in a landfill for inert matter

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Benefits and loads beyond the System Boundary (D): Module D includes:
Energy recovery potentialsfrom the thermal treatment of the pallets, paper and plastic waste from packaging

Geographic Representativeness
Land or region, in which the declared product system is manufactured, used or handled at the end of the product´s lifespan: Europe

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 data comes from the GaBi database *GaBi software Version CUP2022.2*

LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon

Information on describing the biogenic Carbon Content at factory gate

Name	Value	Unit
Biogenic carbon content in product	-	kg C
Biogenic carbon content in accompanying packaging	0.026	kg C

Transportfrom the gate to the site (A4)

Name	Value	Unit
Transport distance	100	km

Installation into the building (A5)
Module A5 includes the installation of the product with a machine and the treatment and disposal of packaging material. Benefits for potential avoided burdens due to energy substitution of electricity and thermal energy generation are declared in module D and affect only the rate of primary material (no secondary materials)
No credit for paper has been taken as waste paper has been used.

Name	Value	Unit
wooden pallets	0.047	kg
Paper	0.018	kg
polyethylene	0.002	kg
Diesel consumption	0.01	l/10 kg

End of the life cycle (C1-C4)

Deconstruction (C1)
The product dismantling from the building is done with a machine

Transport to EoL treatment (C2)
Transport to waste treatment: 50 km by truck

Disposal (C4)
landfilling (EU)

Name	Value	Unit
Landfilling	6.42	kg

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

Name	Value	Unit
For energy recovery (packaging)	0.049	kg

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LCA: Results

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; ND = 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	X	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 StoVentec Carrier Board S (12mm)

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	kg CO_2 eq	9.36E+00	4.18E-02	1.24E-01	3.31E-02	2.09E-02	0	9.77E-02	-2.96E-02
GWP-fossil	kg CO_2 eq	9.34E+00	4.18E-02	3.76E-02	3.16E-02	2.09E-02	0	9.74E-02	-2.95E-02
GWP-biogenic	kg CO_2 eq	1.89E-02	0	8.64E-02	1.48E-03	0	0	0	-1.51E-04
GWP-luluc	kg CO_2 eq	1.57E-03	6.81E-07	7.43E-07	5.23E-07	3.4E-07	0	2.8E-04	-3.24E-06
ODP	kg CFC11 eq	3.45E-11	6.35E-15	1.22E-14	4.88E-15	3.17E-15	0	3.61E-16	-2E-13
AP	mol H^+ eq	2.11E-02	3.18E-05	1.86E-04	1.74E-04	1.59E-05	0	6.99E-04	-3.88E-05
EP-freshwater	kg P eq	2.11E-05	8.68E-09	8.43E-09	6.67E-09	4.34E-09	0	1.67E-07	-4.06E-08
EP-marine	kg N eq	6.64E-03	1.06E-05	9.08E-05	8.67E-05	5.31E-06	0	1.8E-04	-1.05E-05
EP-terrestrial	mol N eq	7.65E-02	1.18E-04	1.01E-03	9.49E-04	5.91E-05	0	1.98E-03	-1.13E-04
POCP	kg NMVOC eq	1.83E-02	3.01E-05	2.43E-04	2.32E-04	1.51E-05	0	5.45E-04	-2.95E-05
ADPE	kg Sb eq	2.5E-06	2.33E-09	1.97E-09	1.79E-09	1.16E-09	0	8.74E-09	-4.45E-09
ADPF	MJ	1.45E+02	5.86E-01	4.7E-01	4.5E-01	2.93E-01	0	1.28E+00	-5.02E-01
WDP	m^3 world eq deprived	1.28E-01	4.8E-05	9.38E-03	3.69E-05	2.4E-05	0	1.02E-02	-3.14E-03

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 StoVentec Carrier Board S (12mm)

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	1.62E+01	3.4E-03	1.03E+00	2.61E-03	1.7E-03	0	1.67E-01	-1.38E-01
PERM	MJ	1.02E+00	0	-1.02E+00	0	0	0	0	0
PERT	MJ	1.73E+01	3.4E-03	7.19E-03	2.61E-03	1.7E-03	0	1.67E-01	-1.38E-01
PENRE	MJ	1.25E+02	5.86E-01	5.58E-01	4.51E-01	2.93E-01	0	2.11E+01	-5.02E-01
PENRM	MJ	1.99E+01	0	-8.83E-02	0	0	0	-1.98E+01	0
PENRT	MJ	1.45E+02	5.86E-01	4.7E-01	4.51E-01	2.93E-01	0	1.28E+00	-5.02E-01
SM	kg	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0
FW	m^3	2.13E-02	2.89E-06	2.22E-04	2.22E-06	1.44E-06	0	3.22E-04	-1.33E-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+A2: 1 m² StoVentec Carrier Board S (12mm)

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	kg	2.21E-08	1.96E-12	3.37E-12	1.5E-12	9.78E-13	0	1.95E-08	-6.79E-11
NHWD	kg	7.95E-01	7.06E-05	1.1E-03	5.42E-05	3.53E-05	0	6.43E+00	-2.54E-04
RWD	kg	3.47E-03	5.21E-07	1.52E-06	4E-07	2.6E-07	0	1.45E-05	-3.95E-05
CRU	kg	0	0	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	0	0	0
MER	kg	0	0	0	0	0	0	0	0
EEE	MJ	0	0	1.33E-01	0	0	0	0	0
EET	MJ	0	0	2.38E-01	0	0	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

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional: 1 m² StoVentec Carrier Board S (12mm)

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	Disease incidence	1.8E-07	1.78E-10	3.64E-09	3.57E-09	8.88E-11	0	8.65E-09	-3.21E-10
IR	kBq U235 eq	3.25E-01	4.66E-05	2.18E-04	3.59E-05	2.33E-05	0	1.49E-03	-6.69E-03
ETP-fw	CTUe	1.33E+02	4.66E-01	3.67E-01	3.58E-01	2.33E-01	0	7.3E-01	-1.1E-01
HTP-c	CTUh	2.82E-09	8.74E-12	7.32E-12	6.72E-12	4.37E-12	0	1.08E-10	-5.06E-12
HTP-nc	CTUh	2.32E-07	3.76E-10	3.95E-10	3.69E-10	1.88E-10	0	1.19E-08	-1.96E-10
SQP	SQP	2.55E+01	2.55E-03	7.67E-03	1.96E-03	1.27E-03	0	2.66E-01	-8.95E-02

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.

References

Standards

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DIN 4102
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DIN 52612
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DIN EN 13501-1
DIN EN 13501-1 Fire classification of construction products and building elements – Part 1: Classification using data from reaction to fire tests; German version EN 13501-1:2007+A1:2009,2010-01

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Further Refererences

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European Waste Catalogue (EWC); Regulation (EC) No. 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006

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GaBi ts software
Sphera Solutions GmbH GaBi Software System and Database for Life Cycle Engineering CUP Version: 2022.2 University of Stuttgart Leinfelden Echterdingen

IBU 2021
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Bund/Länder-Arbeitsgemeinschaft Abfall (Federal/State Working Group for Waste; LAGA) 33 https://www.umwelt-online.de/recht/abfall/laga/m33_ges.htm, September 2017

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PCR Part B
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