

Environmental
Product
Declaration

In accordance with ISO 14025 and EN 15804 for:

Sto-InnoDrain
from
Sto Scandinavia AB



Programme:	The International EPD® System, www.environdec.com
Programme operator:	EPD International AB
EPD registration number:	S-P-02030
Publication date:	2020-04-17
Valid until:	2025-03-31





Programme information

Programme:	The International EPD® System EPD International AB Box 210 60 SE-100 31 Stockholm Sweden www.environdec.com info@environdec.com
------------	--

Product category rules (PCR): PCR 2012:01 Construction products and construction services (EN15804:A1) and Sub-PCR-I Thermal insulation products (EN 16783)
PCR review was conducted by: International EPD® System info@environdec.com
Independent third-party verification of the declaration and data, according to ISO 14025:2006: <input type="checkbox"/> EPD process certification <input checked="" type="checkbox"/> EPD verification
Third party verifier: Pär Lindman, Miljögiraff AB Approved by: The International EPD® System
Procedure for follow-up of data during EPD validity involves third party verifier: <input type="checkbox"/> Yes <input type="checkbox"/> No

The EPD owner has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804.

Company information

Owner of the EPD:

Sto Scandinavia AB. <https://www.sto.se/>

Description of the organisation:

Sto Scandinavia AB operates in the Nordics as a fully owned subsidiary to Sto SE & Co KGaA, which is listed on the Frankfurt Stock Exchange. The businesses in Norway, Denmark and Finland are conducted as fully owned subsidiaries to Sto Scandinavia AB. The business includes development, production, marketing and sales of products, systems and solutions for facades, concrete, interior and floors.

Product-related or management system-related certifications:

Since 2015, Sto Scandinavia AB, including our Nordic subsidiaries, is certified in accordance with ISO 9001, ISO 14001 and OHSAS 18001.

Name and location of production site:

Sto Scandinavia AB, Gesällgatan 6, 582 77 Linköping.

Product information

Product name:

Sto-InnoDrain

UN CPC code:

369

Product identification:

Insulated sheet of expanded polystyrene according to EN 13163:2012+A2:2016 with a drainage effect.

Geographical scope:

Sweden

LCA information

Declared unit:

Declared unit is 1 m³ of Sto-InnoDrain including packaging. The declared thermal conductivity λ is 0.033 W / (m * K) and density 23.5 kg/m³.

Cut-off rules:

No cut-off criteria have been applied, all used materials including all packaging has been included in the LCA.

Database(s) and LCA software used:

Ecoinvent 3.6, ESU-Services and SimaPro 9.0

Time representativeness:

Plant production data for the complete year of 2018 has been used, together with the latest available Ecoinvent version (3.6) as well as data from ESU-Services updated with new Ecoinvent data.

Frameworks used:

This Life Cycle Assessment study has been performed in accordance with the requirements of EN 15804+A1 and PCR 2012:01 Construction products and Sub-PCR-I Thermal insulation products (EN 16783).

Comparability:

A comparison is only possible if all the datasets to be compared were created according to EN 15804:A1 and the building context and the product-specific performance are taken into account.

Description of system boundaries:

Cradle-to-gate with options have been used, including the following modules of EN 15804:2012+A1:2013: A1, A2, A3 and A4.

LCA practitioners:

Vide Richter, Gunnar Axelsson and Noora Rantanen. AFRY. <https://afry.com/>



Content declaration

Product

Product Description and Intended Use

This EPD describes an insulated sheet of expanded polystyrene according to EN 13163 with a drainage effect. Sto-InnoDrain is a draining insulating disc with excellent energy performance, high safety and great flexibility. The insulating board has several unique properties; it is drainage, diffusion open, pressure equalizing and fire rated.

Sto-InnoDrain is made up of polystyrene grains which are allowed to expand until they comprise 98% of small air bubbles. Polystyrene is then coated with a water repellent coating, gluing together the points of contact. The result is a continuous pore system that both insulates well and drains water well. The insulating board is also treated in a way that makes it difficult to ignite and is self-extinguishing.

Sto-InnoDrain can be used as a part of the system StoTherm Vario D - a drainage facade insulation system that in combination with StoGuard becomes two-stage sealed. StoTherm Vario D is the ideal solution for those who want a compact facade system and who want to use a light insulating material with good insulating value, good drainage capacity and documented fire safety.

Sto-InnoDrain is a façade insulation board intended for outdoor use, as insulation board in StoTherm Vario D or as insulation board in other StoTherm systems exposed for moisture. The board should be glued or plugged and glued..

Technical Data

Constructional data for Sto-InnoDrain can be found in the table below.

Name	Value	Unit
Thermal conductivity	0.033	W/(mK)
Density (EN1602)	23.5	kg/m ³
Bending strength (EN 12089)	100	kPa
Tensile strength perpendicular to faces (EN 1607)	≥ 80	kPa
Water vapour transmission properties (EN 12086)	20-50	μ
Short-term water absorption (EN 1609)	< 1	kg/m ²
Reaction to fire (EN 13501-1)	E	Class

Base materials

As an expanded polystyrene sheet, the product consists mainly of polystyrene, additional materials are used to create the characteristics of the product. No material is classified in the "Candidate List of Substances of Very High Concern for Authorization" from the European Chemicals Agency. The composition is given in the table below. The flame retardant is halogen-free.

Materials / chemical substances	%	Environmental / hazardous properties
Polystyrene	>65	Not classified
Binding Agent	10-25	Not classified
Flame Retardant	10-25	Not classified
Graphite	3.5-5	Not classified

Delivery

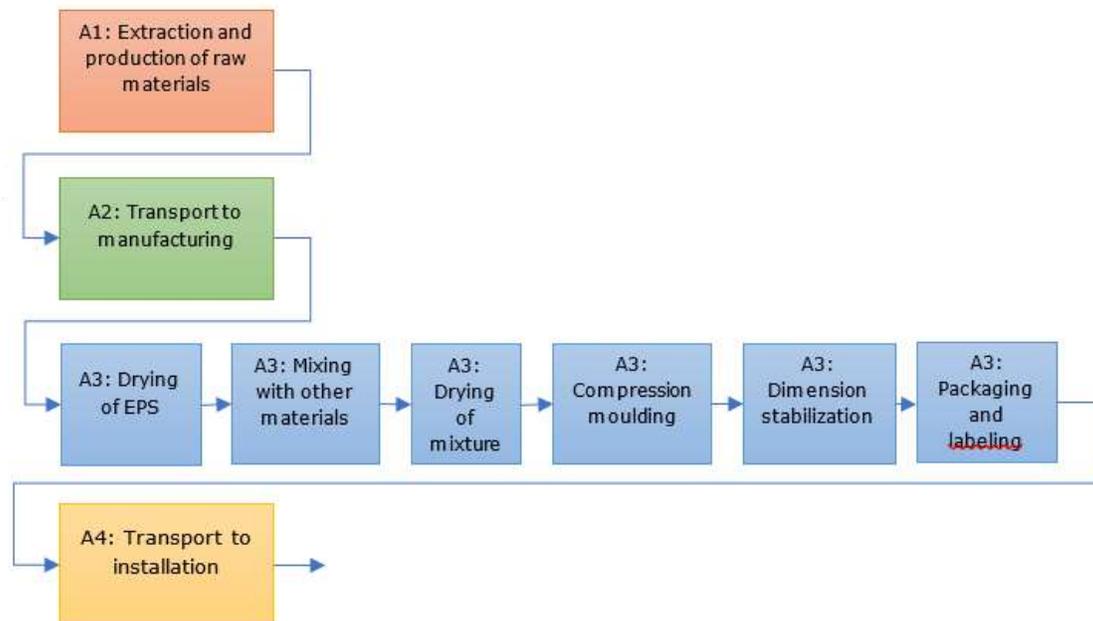
Sto-InnoDrain is normally transported by truck. The product area is 120x60 cm, while the thickness is 4 to 20 cm. While truck size and transport distance vary depending on order size, A4 has been calculated with the assumptions presented in the table below. Distance to central warehouse or storage is zero as the product is stored at the production site. Fuel consumption is calculated as l/km per declared unit. Product losses during transportation are assumed to be insignificant.

Parameter	Value	Unit
Vehicle type	Truck	-
Vehicle load capacity	23 000 kg	kg or m3
Fuel type and consumption	Diesel 0,00104	l/km
Distance to central warehouse or storage	0	km
Distance to construction site	200	km
Capacity utilisation (including empty returns)	60	%
Bulk density of transported products	23	kg/m3
Volume Capacity Utilisation factor	1	-

Manufacturing

Sto-InnoDrain production utilized only primary materials and primary fuels. The production of Sto-InnoDrain starts with the extraction of raw materials of polystyrene, flame retardant and additional raw materials. Materials are transported to the site by 16-32 tons truck. At Sto's production site, the expanded EPS will firstly be dried, before mixing with the additional materials. The mixture is thereafter dried and moulded under compression. After the stabilization phase, the products are ready for packaging and labelling.

An overview of the manufacturing process of Sto-InnoDrain can be seen in the following flow chart. The system boundaries of Life Cycle calculation include all presented items in the flow chart.





Environment and health during manufacturing

No further health protection measures, beyond regulated measures are necessary during any of the manufacturing steps for Sto-InnoDrain. EPS insulation has a long history of use and no negative health effects are known. No ozone depleting substances are used during production.

Product installation

There are no special instructions regarding personal and environmental protection during product handling and installation. Sto Scandinavia AB provides installation guidance if necessary and such guidance is also available in the Sto-InnoDrain technical fact sheet and safety data sheet.

Packaging

Raw materials bought are packaged in cardboard and paper bags. When delivered to customers, Sto-InnoDrain is packaged in a LDPE plastic film, consisting 51 % of renewable LDPE.

Use

Using insulation material has a positive effect on energy efficiency of buildings. A quantification of these effects are however only possible within the context of specific construction projects. No harmful substances are emitted during use phase.

Reference service life

No reference service life is provided in this EPD. However, if applied correctly applied the lifetime of EPS insulation is equal to building life time without requiring maintenance.

Extraordinary effects

Sto-Innodrain is classified as fireclass E according to EN 13501-1. Sto-InnoDrain is designed to handle moist conditions.

Disposal

Disposal should follow applicable regulations. Sto Scandinavia AB also has the possibility to recycle Sto-InnoDrain sheets that are returned back to them but who are not in quality for reuse. At the factory site, a machine breaks down the returned insulating boards and the resulting material is dosed in with virgin raw material when producing new boards.

Further information

Further information is provided at <https://www.sto.se/>.



Environmental performance

The following tables display the LCA-study results according to EN 15804:A1 for 1 m³ Sto-InnoDrain. The modules A1, A2, A3 and A4 have been included in this study and are presented in the picture below. All life cycle stages according to EN 15804:A1 are presented below and the modules A1, A2 and A3 are mandatory to declare.

Product stage			Construction process stage		Use stage								End of life stage				Resource recovery stage
Raw materials	Transport	Manufacturing	Transport	Construction installation	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														

The environmental impacts are presented in the table below, while use of resources, waste production and output flows are presented in the next page. This study was made according to the instructed methods and impact categories from EN15804. Only inventory values and midpoint impacts are presented, without any normalisation or weighing.

Potential environmental impact

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4
Global warming potential (GWP)	kg CO ₂ eq.	7.55E+01	6.11E+00	4.47E+00	8.60E+01	1.24E+00
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC 11 eq.	2.36E-06	1.13E-06	4.73E-08	3.53E-06	2.29E-07
Acidification potential (AP)	kg SO ₂ eq.	2.44E-01	1.48E-02	2.88E-03	2.61E-01	2.99E-03
Eutrophication potential (EP)	kg PO ₄ ³⁻ eq.	3.86E-02	3.27E-03	1.11E-03	4.30E-02	6.64E-04
Formation potential of tropospheric ozone (POCP)	kg C ₂ H ₄ eq.	1.52E-02	9.28E-04	2.39E-04	1.64E-02	1.88E-04
Abiotic depletion potential – Elements	kg Sb eq.	1.98E-04	1.87E-05	2.19E-06	2.19E-04	3.78E-06
Abiotic depletion potential – Fossil resources	MJ. net calorific value	1.69E+03	9.26E+01	5.18E+00	1.79E+03	1.88E+01
Water scarcity potential	m ³ eq.	5.99E+01	4.80E-01	1.87E+01	7.91E+01	9.73E-02



Use of resources

PARAMETER		UNIT	A1	A2	A3	TOTAL A1-A3	A4
Primary energy resources – Renewable	Use as energy carrier	MJ. net calorific value	9.26E+00	8.57E-01	3.26E+02	3.36E+02	1.74E-01
	Used as raw materials	MJ. net calorific value	8.01E+00	3.00E-03	0.00E+00	8.01E+00	1.00E-03
	TOTAL	MJ. net calorific value	1.73E+01	8.60E-01	3.26E+02	3.44E+02	1.74E-01
Primary energy resources – Non-renewable	Use as energy carrier	MJ. net calorific value	1.55E+02	9.17E+01	6.64E+00	2.53E+02	1.86E+01
	Used as raw materials	MJ. net calorific value	1.61E+03	2.12E+00	8.10E-02	1.62E+03	4.30E-01
	TOTAL	MJ. net calorific value	1.77E+03	9.38E+01	6.72E+00	1.87E+03	1.90E+01
Secondary material	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Renewable secondary fuels	MJ. net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Non-renewable secondary fuels	MJ. net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Net use of fresh water	m ³	6.82E-01	1.61E-02	4.34E-01	4.34E-01	3.30E-03	

Waste production

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4
Hazardous waste disposed	kg	0.00E+00	0.00E+00	2.94E-01	2.94E-01	0.00E+00
Non-hazardous waste disposed	kg	2.82E-01	0.00E+00	1.10E-02	2.93E-01	0.00E+00
Radioactive waste disposed	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Output flows

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4
Components for reuse	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Material for recycling	kg	2.82E-01	0.00E+00	0.00E+00	2.82E-01	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	1.06E-01	1.06E-01	0.00E+00
Exported energy. electricity	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy. thermal	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00



Interpretation and conclusions

The production of raw materials, life cycle stage A1, dominates in all environmental impact categories. Transports to Sto Scandinavia (A2) is the second largest contributor for all environmental impact categories, except water scarcity where manufacturing (A3) is second largest.

Looking at the single processes and materials driving the environmental impact, the raw material production of expandable polystyrene dominates all environmental impact categories, except “abiotic depletion, elements” where mining processes are contributing the most. Transport by truck (A2+A4) is the second biggest process that contributes to global warming, while electricity use at the production site in Sweden has an impact on global warming and water scarcity.

The electricity used in this study is from Ecoinvent 3.6 database and the reference year is 2012. The initial data is as accurate as it can be for this LCA study. No allocation was done and the reference data corresponded full year of 2018 that was the newest data available for the study.

For future developments, the production process of polystyrene should be optimized. The utilized raw materials should be delivered as close to the factory as possible and trucks should be fully loaded.



References

General Programme Instructions of the International EPD® System. Version 3.0.

Wernet, G., Bauer, C., Steubing, B., Reinhard, J., Moreno-Ruiz, E., and Weidema, B., 2016. The ecoinvent database version 3 (part I): overview and methodology. *The International Journal of Life Cycle Assessment*, [online] 21(9), pp.1218–1230. Available at: [<http://link.springer.com/10.1007/s11367-016-1087-8>]~2019-12-05

Jungbluth, N. (2012). ESU-Services. LCI of Expanded Graphite.

PCR references

PCR 2012:01 Construction products and construction services with Sub-PCR-I Thermal insulation products

EN 15804:2012+A1:2013 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products

EN 16783:2017 Thermal insulation products - Product category rules (PCR) for factory made and in-situ formed products for preparing environmental product declarations

