



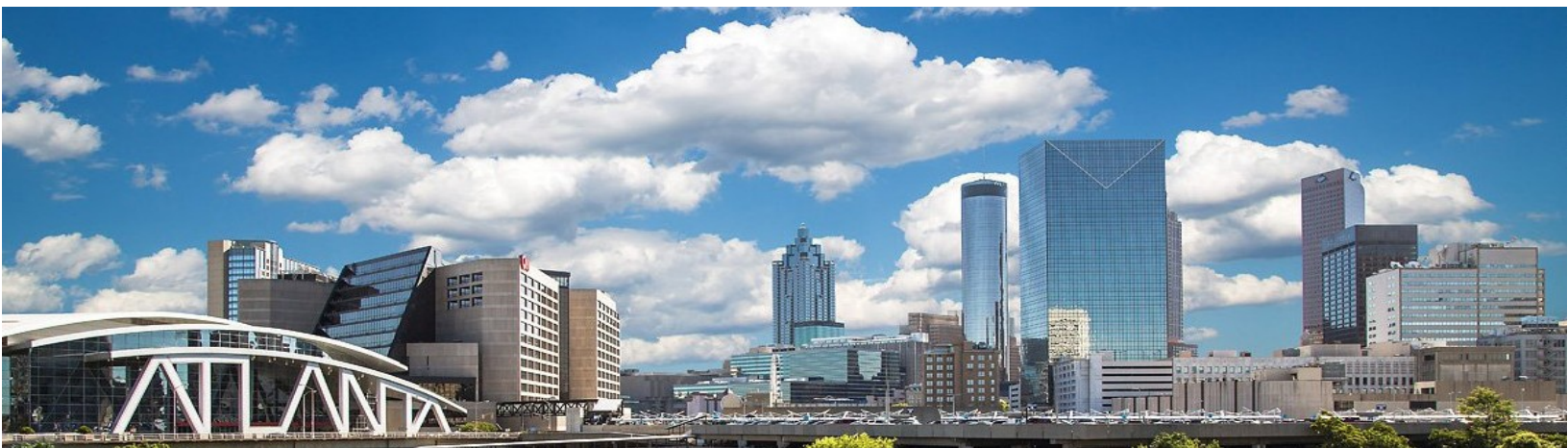
Building with conscience.





EPD for Sto TurboStick®

Sto TurboStick®
Sto TurboStick® is a ready-to-use, single component polyurethane foam adhesive for installing Sto insulation boards in StoTherm® exterior wall claddings. Compared to cementitious adhesives, Sto TurboStick delivers unparalleled convenience and installation speeds.





Manufacturer Name	Sto Corp. 3800 Camp Creek Parkway SW, Building 1400, Suite 120, Atlanta, GA 30331 www.stocorp.com (800) 221-2397
EPD Program Operator	Epsten Group 101 Marietta St. Suite 2600, Atlanta, GA 30303 www.epstengroup.com
Compliance to ISO21930:2017	Yes
Product Name	Sto TurboStick®
Product's Intended Application and Use	Foam adhesive for securing insulation boards
Declaration Number	01-008
Date of Certification	December 18 th , 2019
Period of Validity	5 years from date of certification
Functional Unit	One square meter of covered substrate for 60 years
Reference Service Life used in assessment	10 Years
Overall Data Quality Assessment Score	Good
Manufacturing Location	Wilmington, IL, USA
LCA Software and Version Number	GaBi 9.2.0.58
LCI Database and Version Number	GaBi Database, Service Pack 39
ISO 21930: 2017 serves as the core PCR Independent verification of the declaration and data, according to ISO 21930:2017 and ISO 14025:2006 <input type="checkbox"/> Internal <input checked="" type="checkbox"/> External	Kate McFeaters kmcfeaters@epstengroup.com 
This life cycle assessment was conducted in accordance with ISO 14044 and the reference PCR by:	WAP Sustainability Consulting, LLC
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	Kate McFeaters kmcfeaters@epstengroup.com 

Comparability

In order to support comparative assertions, this EPD meets all comparability requirements stated in ISO 14025:2006. However, differences in certain assumptions, data quality, and variability between LCA data sets may still exist. As such, caution should be exercised when evaluating EPDs from different manufacturers, as the EPD results may not be entirely comparable. Any EPD comparison must be carried out at the building level per ISO 21930 guidelines. The results of this EPD reflect an average performance by the product and its actual impacts may vary on a case-to-case basis.

» Company

We believe in ‘**Building with conscience**’.

That means ensuring that all building products are not only safe, effective and easy to install, but also environmentally responsible and sustainable. We know you’re always looking for the smartest and newest technology to create energy efficient buildings with superior aesthetics.

That’s exactly what our products help you achieve. Products like our wall systems, coatings and finishes are consistent favorites among design professionals, contractors and property owners alike. Whatever your needs or vision may be, we offer products for every type of building project; whether it’s new construction, restoration or panelization, commercial or residential work.

An architect or specifier focuses on aesthetics and feasibility, a contractor needs products that are easy to work with, and a building owner requires high value and low costs on properties. Sto understands these unique needs, and delivers the smart, innovative materials and solutions that make this all possible. That’s why Sto remains the innovative leader in integrated exterior wall systems.

When you combine that commitment to product support and innovation with value-added offerings like consultative design and color services through Sto Studio or training in proper application techniques through the Sto Institute, you get an integrated exterior wall system solution unmatched in the industry.

» Manufacturing Sites Covered in this EPD

Manufacturing location is Wilmington, IL, USA.

» Product Identification

Sto TurboStick® is offered in a 31-lb gross weight pressurized cylinder. Sto TurboStick® is a ready-to-use, single component polyurethane foam adhesive for securing Sto EPS Insulation Boards in StoTherm exterior wall claddings.

Table 1: List of TurboStick® Products

Product Name	Product Number
Sto TurboStick®	81181



» Product Description

The leader in innovation, Sto offers an entirely new PU-foam adhesive system that outperforms traditional adhesives across the board. Sto TurboStick® requires no mixing, goes on easier, cures in just one hour, and can even be used for other applications, such as filling voids between insulation boards. It is also lightweight, so it requires no heavy lifting to get it up the scaffolding like cementitious adhesives.

- Ready-to-apply: Go straight to the wall as there is no mixing required compared to traditional cementitious adhesives;
- Cures in one hour: Rasp, cut joints and apply basecoat and mesh the same day instead of waiting until the following day;
- Small packaging: Easier to handle the material on scaffolding. Requires less space on the ground for staging compared to bag material; and
- Lightweight: The product weighs significantly less than a bag of basecoat. In addition, its compact size makes it easier to carry and handle, for example on scaffolding.

» **Performance Features**

Convenient and Ready-to-Use	Pre-pressurized Container	Minimal preparation time
Compact and Lightweight	Fast	VOC Compliant
High coverage rate		

» **Technical Details**

Table 2: Technical Data*

Performance	Test Method	Test Criteria	Result
Surface Burning	ASTM E-84-10	Flame Spread: ≤25	Flame Spread: 10
	(UL 723, UBC 8-1, NFPA 255)	Smoke Developed: ≤450	Smoke Developed: 5
Tensile Strength	ASTM C-297	Greater than 15 psi	> 15 psi; cohesive failure of EPS insulation board
VOC (g/L)	This product contains no VOC's. Complies with US EPA (40 CFR 59) VOC emission standards for architectural coatings.		

*Results are based on lab testing under controlled conditions. Results can vary between labs or from field tests.

» **Material Composition**

The material composition of TurboStick® is listed below:

Table 3: Material composition of TurboStick®

	TurboStick®
Polymethylenepolyphenyl polyisocyanate, polypropyleneglycol copolymer	30-60%
1,1,1,2-Tetrafluoroethane	10-30%
Diphenylmethane Diisocyanate, isomers and homologues	10-30%
4,4'-Diphenylmethane diisocyanate	7-13%
N,N'-Dimorpholinodiethylether	1-5%

» **Components related to Life Cycle Assessment**

The functional unit for the EPD was covering 1 square meter (m²) of substrate for a period of 60 years—the assumed lifetime of a building. The reference flow required for the functional unit is calculated based on the product lifespan scenarios prescribed in ISO 21930:2017. The reference service life of the product is 10 years which is the warranty of Sto's wall system. The reference flow required for one functional unit is provided in Table 4.

Table 4: Reference flow and Functional Unit

Product	Functional Unit [1 m ²]	Reference Flow [kg]
TurboStick®	1	0.81

» Scope and Boundaries of the Life Cycle Assessment

The LCA was performed in accordance with ISO 14040 standards. The study is a cradle-to-grave LCA and includes the following life stages as prescribed in ISO 21930:2017.

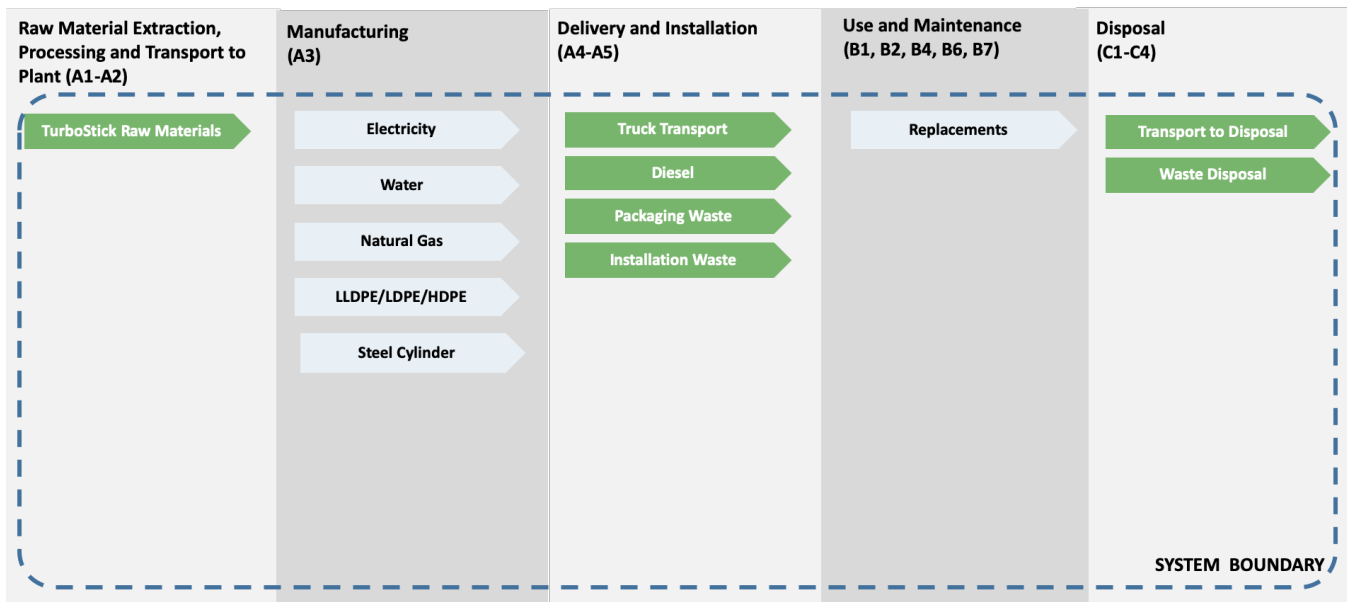


Figure 1: Life stages for the cradle-to-grave LCA

» Cut-off Criteria

Material inputs greater than 1% (based on total mass of the final product) were included within the scope of analysis. Material inputs less than 1% were included if sufficient data was available to warrant inclusion and/or the material input was thought to have significant environmental impact. Cumulative excluded material inputs and environmental impacts are less than 5% based on total weight of the functional unit.

» Data Quality

The overall data quality level was determined to be good. Primary data was collected from the manufacturing facility in Illinois, USA for the 2018 reference year. When primary data did not exist, secondary data were obtained from the Gabi V9.2.0.58 Database Service Pack 39. Overall, both primary and secondary data are considered acceptable quality in terms of geographic, temporal and technological coverage.

» Estimates and Assumption

Assumptions were made to represent the cradle-to-grave environmental performance of Sto's products. These assumptions include up stream and downstream transportation distances, the disposal of packaging material, the method in which the product is disposed of at its end of life and relevant use phase assumptions.

» Allocation

General principles of allocation were based on ISO 14040/44. Where possible, allocation was avoided. When allocation was necessary it was done on a physical mass basis. To derive a per unit value for manufacturing inputs such as electricity, water, and natural gas, a series of allocation calculations were adopted. The facility level of utility data was allocated based on production values of different types of products in the same manufacturing facility. Then the data is further allocated among products of different specifications based on the mass because it is believed the energy consumption and water consumption correlated better on a mass basis.

» Production Stage (A1-A3)

TurboStick® is manufactured in Illinois, US. All the raw materials are supplied from the US. The product is a mixture of four types of substances: polyols, isocyanates, catalysts, and blowing agent, filled and shipped in a steel cylinder.

» Transport to Construction Site (A4)

The product is assumed to be shipped from the manufacturing facility to distribution facilities in the US via truck. From the distribution facilities, the product is shipped to construction sites. Table 5 gives the transportation details including the distances and the truck dataset used in the model. Transport distances are calculated based on the locations of the manufacturing facility, the distribution facilities, and customers' zip codes retrieved from the sales records.

Table 5: Transport Details

Name	Details	Unit
Type of transport	Truck	-
Fuel type	Diesel	-
Liters of fuel	39.0625	l/100km
Vehicle type	Heavy duty diesel truck/ 45,000 lb payload	-
Transport distance from the manufacturing facility to distribution facilities	1437.95	km
Transport distance from the distribution facilities to construction sites	880.69	km

» Installation (A5)

TurboStick® can be applied directly from the cylinder through a dispensing pistol without any additional steps due to which no specific installation materials are required. The reference flow is calculated on the basis of the coverage rates on TurboStick®'s product data sheets and a 10% installation waste was considered to account for the possibility of some unused amount left in the product containers. The disposal of the pressure cylinder modeled to be landfilled as it is a standard practice to deal with pressure cylinder potentially containing unused adhesive polymer, while the installation waste disposal is modeled in accordance with EPA's Advancing Sustainable Materials Management: 2015 Fact Sheet. For TurboStick® which uses HFC-134a as the blowing agent, HFC-134a is modeled as the VOC emission flow. As the tools (dispensing pistol) used during the installation of the product are multi-use tools and can be reused after each installation, the per-functional unit impacts are considered negligible and therefore are not included. Detailed installation instructions are provided online. Packaging waste is generated and disposed of in this stage.

Table 6: Installation (A5)

Name	Value	Unit
Product loss per functional unit	8.09E-02	kg/ ESL
Waste materials at the construction site before waste processing, generated by product installation	0.362	kg/ ESL
Steel waste, packaging	0.281	kg/ ESL
VOC Emissions	0.154	Kg/ESL

» **Use Stage (B1-B5 & B6-B7)**

Since the product is installed as part of the wall assembly, there are no use phase inputs required to maintain the product. The RSL of the product is 10 years, so five replacements are required to cover the estimated service life (ESL). The product requires no maintenance once installed. It is assumed that the product requires no repairs or refurbishments if it is properly applied. Besides the emissions to the air disclosed in the above table, there are no other emissions to air, soil or water, including those of any regulated substances.

Table 7: Replacement (B4)

Name	Value	Unit
Reference Service Life (RSL)	10	Years
Estimated Service Life (ESL)	60	Years
Replacement cycle	5	(ESL/RSL)-1
Declared product properties	As per Product Identification section	-
Design application parameters	As per technical details in Table 2	-
An assumed quality of work, when installed in accordance with the manufacturer's instructions	Industry Standard	-

» **End-of-Life Stage (C1-C4)**

In this stage, the product is transported to the waste disposal facility and processed. Due to the fact that TurboStick® is applied as part of a wall system including the external coating/finish and are not able to be dismantled based on their material type, it is reasonable to assume that the products at their end-of-life stage are landfilled.

Table 8: End-of-Life Parameters

	TurboStick®	Unit
Collected with mixed construction waste	0.574	kg/ESL
Landfilling	100	%
Product for final deposition	0.574	kg/ESL

» Life Cycle Assessment Results

As prescribed by ISO 21930:2017, TRACI 2.1 impact characterization methodology and IPCC 5th assessment report are adopted to calculate the environment impacts. Table 9 provides the acronym key of the impact indicators declared in this EPD.

Table 9: LCIA impact category and LCI Indicator keys

Abbreviation	Parameter	Unit
TRACI 2.1		
AP	Acidification potential of soil and water	kg SO ₂ eq
EP	Eutrophication potential	kg N eq
GWP	Global warming potential including biogenic carbon emission	kg CO ₂ eq
ODP	Depletion of stratospheric ozone layer	kg CFC 11 eq
POCP	Photochemical ozone creation potential	kg O ₃ eq
ADP-Fossil Fuel	Abiotic depletion potential for fossil resources (An indicator derived from CML 2001-Jan 2016)	MJ, net calorific value
Resource Use Parameters		
RPR _E	Renewable primary energy as energy carrier	MJ, net calorific value
RPR _M	Renewable primary energy resources as material utilization	MJ, net calorific value
NRPR _E	Non-renewable primary energy as energy carrier	MJ, net calorific value
NRPR _M	Non-renewable primary energy as material utilization	MJ, net calorific value
SM	Use of secondary material	kg
RSF	Use of renewable secondary fuels	MJ, net calorific value
NRSF	Use of non-renewable secondary fuels	MJ, net calorific value
RE	Recovered energy	MJ, net calorific value
FW	Use of fresh water	m ³
Waste Parameters		
HWD	Disposed-of-hazardous waste	kg
NHWD	Disposed-of non-hazardous waste	kg
HLRW	High-level radioactive waste disposed	kg
ILLRW	Intermediate and low-level radioactive waste disposed	kg
Carbon Removal and Emission Parameter		
BCRP	Biogenic Carbon Removal from Product	kg CO ₂ eq
BCEP	Biogenic Carbon Emission from Product	kg CO ₂ eq
BCRK	Biogenic Carbon Removal from Packaging	kg CO ₂ eq
BCEK	Biogenic Carbon Emission from Packaging	kg CO ₂ eq
BCEW	Biogenic Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes	kg CO ₂ eq
CCE	Calcination Carbon Emissions	kg CO ₂ eq
CCR	Carbonation Carbon Removals	kg CO ₂ eq
CWNR	Carbon Emissions from Combustion of Waste from Non- Renewable Sources used in Production Processes	kg CO ₂ eq

» Sto TurboStick® -- Results

TRACI Results and ADP-Fossil

Impact Category	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
AP [kg SO ₂ eq]	2.54E-03	1.60E-04	2.43E-05	0.00E+00	0.00E+00	0.00E+00	1.37E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.44E-07	0.00E+00	1.98E-05	MND
EP [kg N eq]	1.89E-04	1.32E-05	5.09E-06	0.00E+00	0.00E+00	0.00E+00	1.04E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.88E-08	0.00E+00	1.01E-06	MND
GWP [kg CO ₂ eq]	1.23E+00	3.34E-02	3.30E+01	0.00E+00	0.00E+00	0.00E+00	1.71E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.35E-04	0.00E+00	4.31E-03	MND
ODP [kg CFC 11 eq]	1.30E-08	-1.80E-16	-1.58E-16	0.00E+00	0.00E+00	0.00E+00	6.48E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-1.27E-18	0.00E+00	-2.27E-16	MND
POCP [kg O ₃ eq]	3.82E-02	3.66E-03	3.23E-04	0.00E+00	0.00E+00	0.00E+00	2.13E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.67E-05	0.00E+00	3.97E-04	MND
ADP-fossil fuel [MJ]	1.72E+01	4.71E-01	5.24E-02	0.00E+00	0.00E+00	0.00E+00	8.88E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.33E-03	0.00E+00	6.72E-02	MND

Resource Use

Impact Category	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
RPR _E [MJ]	5.53E-01	1.47E-02	3.60E-03	0.00E+00	0.00E+00	0.00E+00	2.88E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.04E-04	0.00E+00	5.26E-03	MND
RPR _M [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
NRPR _E [MJ]	1.80E+01	4.74E-01	5.36E-02	0.00E+00	0.00E+00	0.00E+00	9.28E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.35E-03	0.00E+00	6.89E-02	MND
NRPR _M [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
SM [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
RSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
NRSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
RE [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
FW [m ³]	4.94E-03	5.68E-05	1.54E-05	0.00E+00	0.00E+00	0.00E+00	2.51E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.01E-07	0.00E+00	8.18E-06	MND

Waste

Impact Category	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD [kg]	2.25E-07	3.84E-09	2.24E-10	0.00E+00	0.00E+00	0.00E+00	1.14E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.71E-11	0.00E+00	2.42E-10	MND
NHWD [kg]	5.21E-02	1.79E-05	6.09E-02	0.00E+00	0.00E+00	0.00E+00	1.06E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.26E-07	0.00E+00	9.86E-02	MND
HLRW [kg]	3.60E-07	1.27E-09	5.93E-10	0.00E+00	0.00E+00	0.00E+00	1.82E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.94E-12	0.00E+00	8.39E-10	MND
ILLRW [kg]	3.00E-04	1.05E-06	4.74E-07	0.00E+00	0.00E+00	0.00E+00	1.51E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.41E-09	0.00E+00	6.67E-07	MND

Carbon Removal and Emission

Indicator	TurboStick®
BCRP [kg CO2 eq]	1.16E-02
BCEP [kg CO2 eq]	1.70E-02
BCRK [kg CO2 eq]	1.38E-03
BCEK [kg CO2 eq]	1.41E-03
BCEW [kg CO2 eq]	0.00E+00
CCE [kg CO2 eq]	0.00E+00
CCR [kg CO2 eq]	0.00E+00
CWNR [kg CO2 eq]	0.00E+00

» Interpretation

In one reference service life of the product, the production stage, which includes the raw material extraction, transportation from suppliers and manufacturing, is the highest contributor to all impact indicators with the exception of GWP. The GWP impacts from the installation stage are dominant because of the remarkably high GWP intensity of the blowing agent. From the perspective of a whole building lifespan, the vast majority of the impacts are derived from the number of replacements needed. This is directly related to the impacts associated with the manufacture of new products that are used to replace the original. Improving the relatively short lifespan of the products is essential to reducing the overall impact of the product.

» Reference

- Life Cycle Assessment, LCA report for Sto Corp. WAP Sustainability, October 2019
- ISO14044:2006 Environmental Management–Life cycle assessment–Requirements and Guidelines.
- ISO 14025:2006 Environmental labels and declarations – Type III environmental declarations – Principles and Procedures.
- ISO 21930:2007 Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services.
- Sto Studio. Sto Corp, 2019. Available at <https://www.stocorp.com/sto-studio-us/>
- Product Bulletin – Sto TurboStick. Sto Corp. Available at https://www.stocorp.com/wp-content/content/Products_Tech-Service/Base%20Coats%20and%20Adhesives/Product%20Bulletins/PB_81181_Sto_Turbostick_EN.pdf