

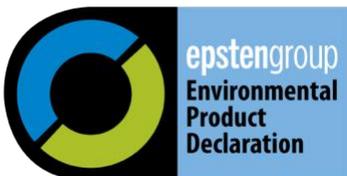
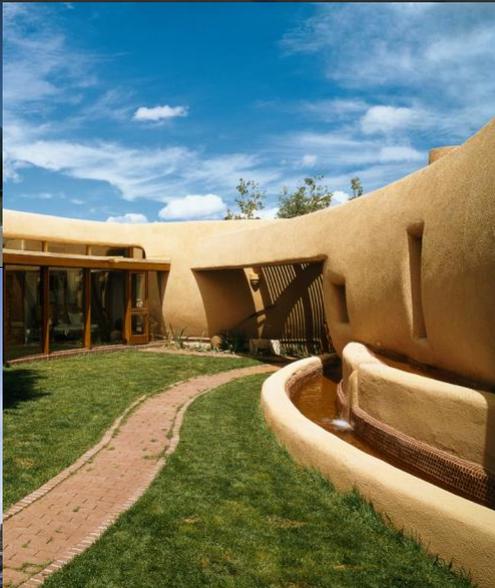


Building with conscience.



**EPD for BTS® Plus**

Sto BTS® Plus is a one-component, polymer-modified, cement based, dry powder material used as an adhesive and base coat in Sto Wall Claddings, including StoTherm ci Classic and StoTherm ci Lotusan Systems.





|   |  |
|---|--|
| <b>PCR Identification</b>   | <b>PCR for Architectural Coatings: NAICS 325510 on the basis of ISO 21930:2007, NSF International, 2017. Valid through June 23, 2022</b>   |
| Compliance to ISO 14040/44, ISO 14025 and ISO 21930   | Yes  |
| Product Category  | Exterior Coating   |
| Manufacturer's name   | Sto Corp.<br>3800 Camp Creek Parkway SW, Building 1400, Suite 120<br>Atlanta, GA 30331<br><a href="http://www.stocorp.com">www.stocorp.com</a>   (800) 221-2397                      |
| EPD program operator  | Epsten Group<br>101 Marietta St. Suite 2600, Atlanta, GA 30303<br><a href="http://www.epstengroup.com">www.epstengroup.com</a>   |
| Declaration Number  | 01-004   |
| Date of Certification   | December 18 <sup>th</sup> , 2019   |
| Period of Validity  | 5 years from date of certification   |
| Functional Unit   | One square meter of covered and protected substrate for 60 years   |
| Market-base life used in assessment   | 10 Years   |
| Design life used in assessment  | N/A  |
| Test method employed for determination of design life   | N/A  |
| Amount of colorant needed   | See table 3  |
| Overall Data Quality Assessment Score   | Good   |
| Site(s) in which the results of the LCA are representative  | STO manufacturing sites in Atlanta, Georgia; and Glendale, Arizona.  |
| Information on where explanatory material can be obtained   | See references at the end of this document.  |
| LCA Software and Version Number   | GaBi 9.2.0.58  |
| LCI Database and Version Number   | GaBi Database Version 8.7, Service Pack 39   |
| This declaration was independently verified in accordance with ISO 14025: 2006 and the reference PCR:<br>PCR for Architectural Coatings: NAICS 325510<br><input type="checkbox"/> Internal <input checked="" type="checkbox"/> External | Kate McFeaters<br><a href="mailto:kmcfeaters@epstengroup.com">kmcfeaters@epstengroup.com</a><br> |
| 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 14040/44 and the reference PCR by:   | Kate McFeaters<br><a href="mailto:kmcfeaters@epstengroup.com">kmcfeaters@epstengroup.com</a><br> |

#### 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

Atlanta Plant

Glendale Plant

## » Performance Features

|                                   |   |                               |                                 |
|-----------------------------------|---|-------------------------------|---------------------------------|
| One-component<br>Polymer Modified | High Polymer/ Cement Ratio<br>Creamy Smooth Consistency | Vapor Permeable<br>High Build | Pre-blended<br>Low Cement Ratio |
|-----------------------------------|---|-------------------------------|---------------------------------|

## » Product Identification

Sto BTS® Plus is offered in 47-lb bags and used as an undercoater. Thus, there are no finish or color base options provided.

Table 1: BTS® Plus Identification

| Product Name  | Product Number | Base Type | Finish Type |
|---------------|----------------|-----------|-------------|
| Sto BTS® Plus | 80130          | n/a       | n/a         |



## » Product Description

Sto BTS® Plus is a one-component, polymer-modified, cement based, dry powder material used as an adhesive, skim coat and base coat in Sto Wall Claddings, including StoTherm ci Classic and StoTherm ci Lotusan Systems. According to the classification scheme developed by American Coating Association (ACA), BTS® Plus is treated in the study as an undercoater and as per PCR, it should only utilize the market-based lifetime (10 years for exterior undercoater).

## » Material Composition

The material compositions of BTS® Plus are listed below:

Table 2: Material composition for BTS® Plus

| Ingredient | BTS® Plus |
|------------|-----------|
| Additives  | 0-1%      |
| Cement     | 40-45%    |
| Colorant   | 0-1%      |
| Polymer    | 2-3%      |
| Silica     | 54-55%    |
| Silicate   | 0-1%      |

## » Components related to Life Cycle Assessment

The functional unit for the LCA study was covering and protecting 1 square meter (m<sup>2</sup>) 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 the PCR. The market-based lifetime is 10 years. By default, BTS® Plus has a 5-year warranty. In case it is applied on Sto’s wall systems, the warranty is extended to 10 years. The reference flow required for one functional unit is provided in Table 3.

Table 3: Market-based lifetime and reference flow

|   | Functional Unit [1 m <sup>2</sup> ] | Reference Flow [kg]              | Tint needed* [kg] |
|---|-------------------------------------|----------------------------------|-------------------|
| Lifespan                                |                                     |                                  |                   |
|   |                                     | Market-based Lifetime [10 years] |                   |
| BTS® Plus – Adhesive over Rough Masonry | 1                                   | 40.39                            | N/A               |
| BTS® Plus – Average                     |                                     | 14.12                            | N/A               |

## » 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 the PCR.

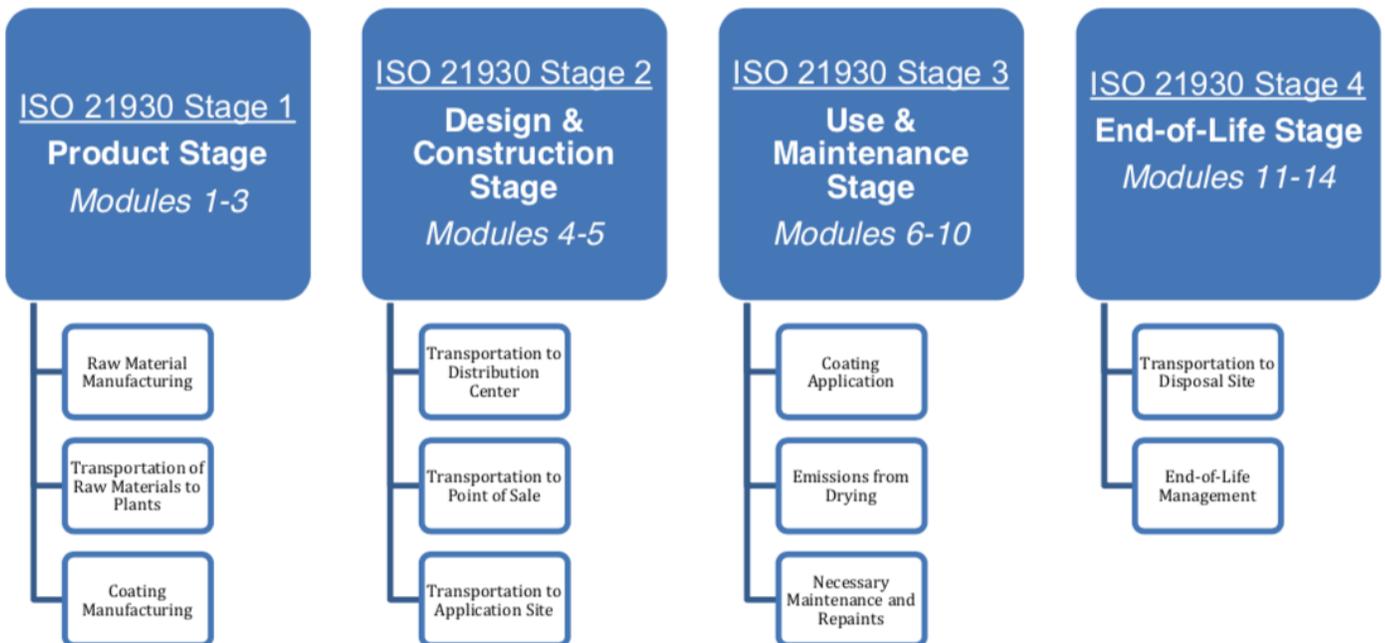


Figure 1: Life stages for the cradle-to-grave LCA

## » 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 Sto's facilities in Atlanta, GA, and Glendale, AZ for the 2018 reference year. When primary data did not exist, secondary data were obtained from the Gabi V8.7 Database Service Pack 39. Overall, both primary and secondary data are considered good 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 were made in accordance with the PCR and include the transportation distances, the disposal of packaging material and the product at its end of life and 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.

## » Product Stage

BTS® Plus is a dry-powder product. It is manufactured in both the Atlanta, GA and Glendale, AZ facilities. The facility in Atlanta also supplies BTS® concentrate to Glendale facility, based on which BTS® Plus is produced. BTS® Plus is packaged in a paper bag at 47 pounds (21.3 kgs) per bag. This stage includes an aggregation of raw material extraction, supplier processing, delivery, manufacturing and packaging by Sto.

## » Design and Construction Stage

The design and construction process stage starts with the packaged product leaving the production site and ends with being delivered to the application site.

During this stage, the finished product is moved from a shipping dock for distribution. The end gate is the application site after the purchaser acquires the finished product and transports it to the application site.

## » Use and Maintenance Stage

The use stage begins when the user prepares the product before applying it to a substrate and ends with any leftover coating and discarded packaging entering the end-of-life stage. Detailed application instructions are provided online. The application procedure includes mixing and applying. In the mixing process, BTS® Plus requires the addition of water at an average rate of 5.45 kg of water per 21.3-kg bag. As recommended, an electric drill/mixer and a spray pump are assumed to be used for mixing and application. The equipment is not included in the study as these are multi-use tools and the impacts per declared unit is considered negligible, but electricity to power application tools has been included.

As prescribed in the PCR, 10% of the wet mass of BTS® Plus is assumed to be unused and properly disposed of.

## » End-of-Life Stage

Table 4: End-of-life Disposal Scenarios

| Waste Flow            | Recycling | Incineration | Landfilling |
|-----------------------|-----------|--------------|-------------|
| Paper Packaging       | 66.6%     | 6.01%        | 27.39%      |
| Unused Product        | 0%        | 0%           | 100%        |
| Post-Consumer Product | 0%        | 0%           | 100%        |

In this stage, the disposal of installation waste, packaging waste and product waste at its end of life is included. The disposal pathway of each waste stream is modeled based on the recommendation of PCR and US EPA's latest waste management fact sheet.

## » Life Cycle Assessment Results

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

Table 5: LCIA impact category and LCI Indicator keys

| Abbreviation                             | Parameter   | Unit                          |
|--|---|-------------------------------|
| <b>TRACI 2.1</b>                         |   |                               |
| AP                                       | Acidification potential of soil and water                   | kg SO <sub>2</sub> eq         |
| EP                                       | Eutrophication potential                                    | kg N eq                       |
| GWP                                      | Global warming potential including biogenic carbon emission | kg CO <sub>2</sub> eq         |
| ODP                                      | Depletion of stratospheric ozone layer                      | kg CFC 11 eq                  |
| POCP                                     | Photochemical ozone creation potential                      | kg O <sub>3</sub> eq          |
| <b>Resource Use Parameters</b>           |   |                               |
| RPR                                      | Use of renewable primary energy                             | MJ, net calorific value (LHV) |
| RMR                                      | Use of renewable Material Resources                         | kg                            |
| NRER                                     | Depletion of Non-Renewable Energy Resources                 | MJ, net calorific value       |
| NRMR                                     | Depletion of Non-Renewable Material Resources               | kg                            |
| FW                                       | Consumption of Freshwater                                   | m <sup>3</sup>                |
| <b>Waste Parameters</b>                  |   |                               |
| HWD                                      | Disposed-of-hazardous waste                                 | kg                            |
| NHWD                                     | Disposed-of non-hazardous waste                             | kg                            |
| <b>Biogenic Carbon Parameter</b>         |   |                               |
| BC                                       | Biogenic Carbon   | kg CO <sub>2</sub> eq         |
| <b>Energy Differentiation Parameters</b> |   |                               |
| HWP                                      | Hydro/wind Power  | MJ, net calorific value (LHV) |
| FE                                       | Fossil Energy   | MJ, net calorific value (LHV) |
| BE                                       | Bio-energy  | MJ, net calorific value (LHV) |
| NE                                       | Nuclear Energy  | MJ, net calorific value (LHV) |
| OE                                       | Other Energy  | MJ, net calorific value (LHV) |

» BTS® Plus – Adhesive over Rough Masonry

|                       | Indicator                   | 1. Product Stage | 2. Design & Construction Stage | 3. Use & Maintenance Stage | 4. End-of-Life Stage |
|-----------------------|-----------------------------|------------------|--------------------------------|----------------------------|----------------------|
| Market-based lifetime | AP [kg SO <sub>2</sub> eq]  | 8.90E-02         | 1.56E-02                       | 6.73E-04                   | 1.07E-02             |
|                       | EP [kg N eq]                | 9.00E-03         | 1.27E-03                       | 3.03E-05                   | 1.52E-03             |
|                       | GWP [kg CO <sub>2</sub> eq] | 3.86E+01         | 3.04E+00                       | 2.42E-01                   | 1.94E+00             |
|                       | ODP [kg CFC 11 eq]          | 3.82E-12         | 2.89E-16                       | 8.03E-16                   | 6.57E-15             |
|                       | POCP [kg O <sub>3</sub> eq] | 1.61E+00         | 3.57E-01                       | 5.67E-03                   | 1.79E-01             |
|                       | RPRE [MJ]                   | 4.35E+01         | 1.33E+00                       | 5.23E-01                   | 2.22E+00             |
|                       | NRPRE [MJ]                  | 4.64E+02         | 4.30E+01                       | 3.85E+00                   | 2.99E+01             |
|                       | FW [m3]                     | 1.09E-01         | 5.13E-03                       | 1.18E-02                   | 3.47E-03             |
|                       | RMR [kg]                    | 2.05E-01         | 0.00E+00                       | 0.00E+00                   | 0.00E+00             |
|                       | NRMR [kg]                   | 4.04E+01         | 0.00E+00                       | 0.00E+00                   | 0.00E+00             |
|                       | HWD [kg]                    | 7.01E-07         | 3.49E-07                       | 1.73E-09                   | 1.11E-07             |
|                       | NHWD [kg]                   | 4.33E+00         | 1.62E-03                       | 3.30E-03                   | 4.09E+01             |
|                       | BC [kg CO <sub>2</sub> eq]  |                  |                                | 4.21E+00                   |                      |
|                       | HWP [MJ]                    |                  |                                | 2.67E+00                   |                      |
|                       | FE [MJ]                     |                  |                                | 3.97E+01                   |                      |
|                       | BE [MJ]                     |                  |                                | 1.29E+00                   |                      |
|                       | NE [MJ]                     |                  |                                | 1.04E+01                   |                      |
|                       | OE [MJ]                     |                  |                                | 1.04E+00                   |                      |

» BTS® Plus – Average Substrate

|                       | Indicator                   | 1. Product Stage | 2. Design & Construction Stage | 3. Use & Maintenance Stage | 4. End-of-Life Stage |
|-----------------------|-----------------------------|------------------|--------------------------------|----------------------------|----------------------|
| Market-based lifetime | AP [kg SO <sub>2</sub> eq]  | 3.11E-02         | 5.46E-03                       | 2.35E-04                   | 3.73E-03             |
|                       | EP [kg N eq]                | 3.15E-03         | 4.45E-04                       | 1.06E-05                   | 5.30E-04             |
|                       | GWP [kg CO <sub>2</sub> eq] | 1.35E+01         | 1.06E+00                       | 8.44E-02                   | 6.78E-01             |
|                       | ODP [kg CFC 11 eq]          | 1.34E-12         | 1.01E-16                       | 2.81E-16                   | 2.30E-15             |
|                       | POCP [kg O <sub>3</sub> eq] | 5.62E-01         | 1.25E-01                       | 1.98E-03                   | 6.26E-02             |
|                       | RPRE [MJ]                   | 1.52E+01         | 4.66E-01                       | 1.83E-01                   | 7.74E-01             |
|                       | NRPRE [MJ]                  | 1.62E+02         | 1.51E+01                       | 1.35E+00                   | 1.04E+01             |
|                       | FW [m <sup>3</sup> ]        | 3.82E-02         | 1.79E-03                       | 4.12E-03                   | 1.21E-03             |
|                       | RMR [kg]                    | 7.16E-02         | 0.00E+00                       | 0.00E+00                   | 0.00E+00             |
|                       | NRMR [kg]                   | 1.41E+01         | 0.00E+00                       | 0.00E+00                   | 0.00E+00             |
|                       | HWD [kg]                    | 2.45E-07         | 1.22E-07                       | 6.07E-10                   | 3.88E-08             |
|                       | NHWD [kg]                   | 1.51E+00         | 5.68E-04                       | 1.15E-03                   | 1.43E+01             |
|                       | BC [kg CO <sub>2</sub> eq]  |                  |                                | 1.47E+00                   |                      |
|                       | HWP [MJ]                    |                  |                                | 9.34E-01                   |                      |
|                       | FE [MJ]                     |                  |                                | 1.39E+01                   |                      |
|                       | BE [MJ]                     |                  |                                | 4.51E-01                   |                      |
|                       | NE [MJ]                     |                  |                                | 3.64E+00                   |                      |
|                       | OE [MJ]                     |                  |                                | 3.65E-01                   |                      |

## » Interpretation

Overall, the Product Stage is the major contributor to many impact categories including GWP. This is understandable as cement is a major ingredient of BTS® Plus and it is an energy-intensive material.

## » Reference

- Life Cycle Assessment, LCA report for Sto Corp. WAP Sustainability, September 2019
- PCR for Architectural Coatings: NAICS 325510. NSF International, 2017
- 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.
- Advancing Sustainable Materials Management: 2015 Fact Sheet. US EPA. Available at [https://www.epa.gov/sites/production/files/2018-07/documents/2015\\_smm\\_msw\\_factsheet\\_07242018\\_fnl\\_508\\_002.pdf](https://www.epa.gov/sites/production/files/2018-07/documents/2015_smm_msw_factsheet_07242018_fnl_508_002.pdf)
- Product Bulletin – Sto BTS® Plus. Sto Corp. Available at [https://www.stocorp.com/wp-content/content/Products\\_TechService/Base%20Coats%20and%20Adhesives/Product%20Bulletins/PB\\_80727\\_Sto\\_BTS\\_Plus\\_EN.pdf](https://www.stocorp.com/wp-content/content/Products_TechService/Base%20Coats%20and%20Adhesives/Product%20Bulletins/PB_80727_Sto_BTS_Plus_EN.pdf)