ENVIRONMENTAL PRODUCT DECLARATION

915FS - Sealants

Certified Environmental Product Declaration
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Program Operator	NSF Certification LLC 789 N. Dixboro, Ann Arbor, MI 48105 www.nsf.org
Manufacturer Name and Address	Bostik, Inc. Conyers Georgia Plant, 150 Parker Road, Conyers, GA 30094
Declaration Number	EPD10971
Declared Product and Functional Unit	915FS manufactured at Conyers, GA 1 kg of sealant
Reference PCR and Version Number	Core PCR: ISO 21930: Sustainability in buildings and civil engineering works - Core rules for environmental product declarations of construction products and services (ISO, 2017) Note - In the absence of an applicable product category PCR, this EPD was informed by the expired PCR: Part B: Building and Construction Sealant EPD Requirements (UL Environment V1.0, 2016)
Product's intended Application and Use	Flooring and Wall Applications
Product RSL	N/A
Markets of Applicability	North America
Date of Issue	07/05/2024
Period of Validity	5 years from date of issue
EPD Type	Product Specific
Range of Dataset Variability	N/A
EPD Scope	Cradle to Gate
Year of reported manufacturer primary data	2019
LCA Software and Version Number	LCA for Experts (formerly known as GaBi) 10.6.1.265
LCI Database and Version Number	LCA for Experts (formerly known as GaBi) Database V2022.1
LCIA Methodology and Version Number	TRACI 2.1 IPCC AR6
The sub-category PCR review was conducted by:	No subcategory PCR is available. ISO 21930 serves as the core PCR for this EPD.

This declaration was independently verified in accordance with ISO 14025: 2006 and ISO 21930:2017 which serves as the core PCR: **☐ Internal ☒ External**	Jack Geibig - EcoForm jgeibig@ecoform.com
This life cycle assessment was conducted in accordance with ISO 14044 and the reference PCR by:	WAP Sustainability Consulting
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	Jack Geibig - EcoForm jgeibig@ecoform.com

Limitations:
Environmental declarations from different programs (ISO 14025) may not be comparable.
EPDs are comparable only if they comply with ISO 21930:2017, include all relevant information modules and are based on equivalent scenarios with respect to the context of construction works.

Description of Company

Bostik is a world-class leader in sealing and bonding technologies. We create smart adhesive solutions for both industries and consumers, covering a broad range of markets such as construction, packaging, automotive, high tech, hygiene products, etc. The adhesive division of the Arkema Group, a specialty materials leader, Bostik benefits from unique research & development capabilities to help build a world that is safer, more sustainable, and adaptive. With over 2 billion USD annual sales and over 6,000 people, Bostik is present in more than 50 countries.

Product Definition and Characteristics

Bostik 915FS is a one-component, smooth fast setting polyurethane sealant/adhesive capable of dynamic joint movement totaling 70% of original joint geometry (±35%). The sealant cures to a tough, flexible rubber when exposed to moisture present in the atmosphere. Bostik 915FS has physical properties that will remain relatively stable over time and in varying weather conditions. Its physical properties are relatively unchanged over a wide temperature range, -40˚F to 150˚F (-40˚C to 66˚C). No substances required to be reported as hazardous are associated with the production of this product.

Product Classification and Description

Table 1: Technical Data for Uncured Properties

TYPICAL CURED PROPERTIES* (AFTER 14 DAYS CURE AT 77˚F AND 50% RH)		
Property	Value	Test Method/Note
Tool/Work Time	70 min.	Bostik Test Method
Skin Time	90 min.	Bostik Test Method
Curing Time @77°F (25°C)	1.5-3 days	Varies with relative humidity
Flow, Sag or Slump	0.3 inch	Bostik Test Method
Staining	None	ASTM C510

*** Values given above are not intended to be used in specification preparation purposes.**

Table 2: Technical Data for Cured Properties

TYPICAL CURED PROPERTIES* (AFTER 14 DAYS CURE AT 77˚F AND 50% RH)		
Property	Value	Test Method/Note
Hardness (Shore A)	40-45	ASTM D2240
Tensile Strength @ Break	240 psi	ASTM D412
Adhesion Peel	>25 piw	TT-S-00230C / ASTM C 794
Ozone Resistance	Excellent	Bostik Method
UV Resistance	Good	Bostik Method
Temperature Resistance	-40˚ to 180˚F	Bostik Method
Modulus @ 100% Elongation	65 psi	ASTM D 412
Elongation @ Break	850%	ASTM D 412
Stain and Color Change	None	ASTM C510
Joint Movement Capability	±35%	TT-S-00230C / ASTM C 719
Heat and Aging	Good	ASTM C1246
UV Resistance	Pass	ASTM C 793
*** Values given above are not intended to be used in specification preparation purposes.**		

Life Cycle Stages

Product Stage

Raw material manufacturing

Typical product composition provided by Bostik is summarized in Table 3.

Table 3: Product Composition

Ingredient Category	% of product by mass
Limestone	11.1%
1,2-Benzenedicarboxylic acid, di-C9-11-branched alkyl esters, C10-rich	8.43%
Poly[oxy(methyl-1,2-ethanediyl)],.alpha.,.alpha.',.alpha."-1,2,3-propanetriyltris[.omega.-hydroxy-, polymer with .alpha.-hydro-.omega.-hydroxypoly[oxy(methyl-1,2-ethanediyl)] and 1,1'-methylenebis[isocyanatobenzene]	27.4%
Polyvinyl chloride	25.3%
Sulfonic acids, C10-18-alkane, phenyl esters	17.8%
Propylene carbonate	3.22%
Xylenes (o-, m-, p- isomers)	2.21%
Benzenesulfonyl isocyanate, 4-methyl-	1.01%
Methylenediphenyl diisocyanate	1.01%
Other additives	2.38%

*This product contains no regulated substances.

Transportation of raw materials to plants

The distances were modeled by materials and calculated using a supplier location and location of manufacturing. For materials where supplier data was not provided, a default distance of 250 miles was used per PCR default scenarios.

Sealant manufacturing

The manufacturing process primarily consists of mixing and dispersing raw materials into a homogenous mixture. After that the product is packaged in pails and transported to the customer. A 5% manufacturing waste is assumed, however, all process waste generated is recycled back into the manufacturing process.

Production Installation

Table 4: Sealant Installation Scenario

Name	Value	Unit
Biogenic Carbon in cardboard packaging	0.326	kg CO_2e
Biogenic Carbon in wooden pallet	0.0756	kg CO_2e

Life Cycle Assessment Methodology

This EPD was developed to meet the requirements of ISO 21930 (2017) which was used as the core PCR. Given the absence of a specific product category PCR for sealants, elements of this study were informed by the expired PCR Part B: Building and Construction Sealant EPD Requirements (UL Environment V1.0, 2016). Specifically, the declared unit, system boundaries, and other elements were chosen in alignment with these requirements.

Declared Unit

The declared unit according to the PCR is 1 kg of sealant. This product requires no accessories to meet the requirements of the functional unit.

Table 5: Mass per declared unit

	915FS
Mass per declared unit [kg]	1
Density [kg/m^3]	1,200-1,400

System Boundary

This LCA is a Cradle-to-Gate study. An overview of the system boundary is shown in Figure 1.

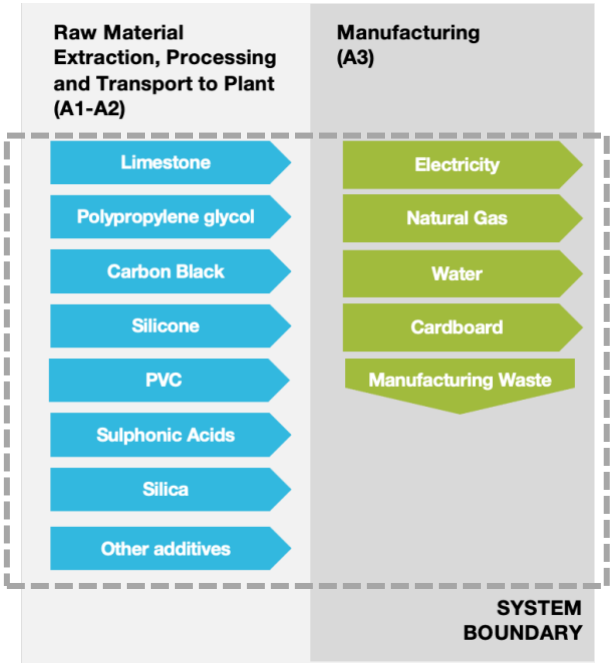

Figure 1: System Boundary

Estimates and Assumptions

All estimates and assumptions are within the requirements of ISO 14040/44. The majority of the estimations are within the primary data. The primary data was collected as annual totals including all utility usage and production information. For the LCA, the usage information was divided by the production volume to create an energy use per declared unit. Other assumptions are listed below:

- Some minor additives have been excluded (1.8%). The product contains no hazardous ingredients. They were excluded since they were at very low percentages in the formulation and appropriate proxies were not identified. The exclusion of these materials has no major impacts on the overall results. However, to account for this difference, the inputs were scaled up to fill in the missing additives to total the composition to 100%.
- Availability of geographically more accurate datasets would have improved the accuracy of the study.
- Only known and quantifiable environmental impacts are considered.
- Due to the assumptions and value choices listed above, these do not reflect real-life scenarios and hence they cannot assess actual and exact impacts, but only potential environmental impacts.

Data Sources

Primary data was collected by facility personnel and from utility bills and was used for all manufacturing processes. Whenever available, supplier data was used for raw materials used in the production processes. When primary data did not exist, secondary data for raw material production was utilized from LCA for Experts (formerly known as GaBi) Version 10.6.1.35, Database V2021.2.

Data Quality Assessment

The overall data quality is considered good.

Geographical Coverage

The geographical scope of the manufacturing portion of the life cycle is Conyers, GA USA. All primary data were collected from the manufacturer. The geographic coverage of primary data is considered excellent.

The geographical scope of the raw material acquisition is the United States. Customer distribution, site installation, and use portions of the life cycle is mostly the United States.

In selecting secondary data (i.e. LCA for Experts (formerly known as GaBi) Datasets), priority was given to the accuracy and representativeness of the data. When available and deemed of significant quality, country-specific data were used. However, priority was given to technological relevance and accuracy in selecting secondary data. This often led to the substitution of regional and/or global data for country-specific data. Overall geographic data quality is considered good.

Time Coverage

Primary data were provided by the manufacturer and represent all information for calendar year 2019. The project commenced in 2021. Due to deviation from business-as-usual manufacturing in 2020, attributed to the COVID-19 pandemic, utility data from 2019 were used. Using these data meets the PCR requirements. Time coverage of these primary data is considered good.

Data necessary to model cradle-to-gate unit processes were sourced from Sphera LCA for Experts (formerly known as GaBi) LCI datasets. Time coverage of the LCA for Experts (formerly known as GaBi) datasets varies from approximately 2010 to present. All datasets rely on at least one 1-year average data. Overall time coverage of the datasets is considered good and meets the requirement of the PCR that all data be updated within a 10- year period.

Technological Coverage

Primary data provided by the manufacturer is specific to the technology the company uses in manufacturing their product. It is site-specific and considered of good quality. It is worth noting that the energy used in manufacturing the product includes overhead energy such as lighting, heating and sanitary use of water. Sub-metering was not available to extract process-only energy use from the total energy use. Sub-metering would improve the technological coverage of data quality.
Data necessary to model cradle-to-gate unit processes was sourced from LCA for Experts (formerly known as GaBi) LCI datasets. Technological coverage of the datasets is considered good relative to the actual supply chain of the manufacturer. While improved life cycle data from suppliers would improve technological coverage, the use of lower-quality generic datasets does meet the goal of this LCA.

Completeness

The data included is considered complete. No known flows above 1% were excluded and the sum of all excluded flows totals less than 5%.

Period under Review

The period under review is calendar year 2019.

Allocation

General principles of allocation were based on ISO 14040/44. There are no products other than the product under study that are produced as part of the manufacturing processes. Since there are no co-products, no allocation based on co-products is required. To derive per-unit values for manufacturing inputs, allocation based on total production by mass was adopted.

Cut-off Criteria

Material and energy inputs greater than 1% (based on total mass of the final product) were included within the scope of analysis. In cases of insufficient input data or data gaps for a unit process, the cut-off criteria are 1% of energy usage, 1% of total mass input of the unit process and 1% of environmental impacts as stated in ISO 21930. Cumulative excluded material inputs and environmental impacts are less than 5% based on total weight of the declared unit.
The list of excluded materials and energy inputs include:

- Some minor additives have been excluded (1.8%). The exclusion of these materials has no major impacts on the overall results. However, to account for this difference, the inputs were scaled up to fill in the missing additives to total the composition to 100%.
- As the tools used during the installation of the product are multi-use tools and can be reused after each installation, the per-declared unit impacts are considered negligible and therefore are not included.
- Some material inputs may have been excluded within the LCA for Experts (formerly known as GaBi) datasets used for this project. All LCA for Experts (formerly known as GaBi) datasets have been critically reviewed and conform to the exclusion requirement of ISO 21930.

There are no substances with hazardous and toxic properties that can be of concern for human health and/ or the environment in the products included in this study.

Comparability

This study was not completed with the intent that comparative assertion with external objects or public disclosures (i.e., comparative marketing claims) would be made.

Life Cycle Assessment Results

Table 6: Description of the system boundary modules

	PRODUCT STAGE			CONSTRUCT-ION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY
	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
	Raw material supply	Transport	Manufacturing	Transport from gate to site	Assembly/Install	Use	Maintenance	Repair	Replacement	Refurbishment	Building Operational Energy Use During	Building Operational Water Use During	Deconstruction	Transport	Waste processing	Disposal	Reuse, Recovery, Recycling Potential
Cradle to Gate	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Note: Comparisons cannot be made between product-specific or industry average EPDs at the design stage of a project, before a building has been specified. Comparisons may be made between product-specific or industry average EPDs at the time of product purchase when product performance and specifications have been established and serve as a functional unit for comparison. Environmental impact results shall be converted to a functional unit basis before any comparison is attempted. Any comparison of EPDs shall be subject to the requirements of ISO 21930. EPDs are not comparative assertions and are either not comparable or have limited comparability when they have different system boundaries, are based on different product category rules or are missing relevant environmental impacts. Such comparison can be inaccurate and could lead to erroneous selection of materials or products which are higher impact, at least in some impact categories.

Life Cycle Impact Assessment Results

Table 7: LCIA results for 915FS, per declared unit

Impact Category	A1-A3	A4-D
TRACI LCIA Impacts (North America), CML and IPCC AR6		
AP [kg SO_2 eq]	7.75E-03	ND
EP [kg N eq]	8.45E-04	ND
IPCC AR6 GWP [kg CO_2 eq]	3.80E+00	ND
ODP [kg CFC 11 eq]	4.80E-11	ND
ADP-fossil fuel [MJ] (CML)	6.00E+01	ND
SFP [kg O_3 eq]	1.56E-01	ND
Carbon Emissions and Uptake		
BCRP [kg CO_2]	0.00E+00	ND
BCEP [kg CO_2]	0.00E+00	ND
BCRK [kg CO_2]	4.02E-01	ND
BCEK [kg CO_2]	0.00E+00	ND
BCEW [kg CO_2]	0.00E+00	ND
CCE [kg CO_2]	0.00E+00	ND
CCR [kg CO_2]	0.00E+00	ND
CWNR [kg CO_2]	0.00E+00	ND

Table 8: Resource use, waste, and output flow results for 915FS, per declared unit

Impact Category	A1-A3	A4-D
Resource Use Indicators		
RPR_E [MJ]	6.39E+00	ND
RPR_M [MJ]	4.60E+00	ND
RPR_T [MJ]	1.10E+01	ND
$NRPR_E$ [MJ]	8.15E+01	ND
$NRPR_M$ [MJ]	1.56E+01	ND
$NRPR_T$ [MJ]	9.71E+01	ND
SM [kg]	5.00E-02	ND
RSF [MJ]	0.00E+00	ND
NRSF [MJ]	0.00E+00	ND
RE [MJ]	0.00E+00	ND
FW [m^3]	2.35E-02	ND
Output Flows and Waste Categories		
HWD [kg]	2.91E-07	ND
NHWD [kg]	1.08E-01	ND
HLRW [kg]	2.00E-06	ND
ILLRW [kg]	1.73E-03	ND
CRU [kg]	0.00E+00	ND
MR [kg]	6.00E-04	ND
MER [kg]	0.00E+00	ND
EEE [MJ]	0.00E+00	ND
EET [MJ]	0.00E+00	ND

LCA Interpretation

Within the A1-A3 stage, most impacts across all products are from the extraction and processing of raw materials.
In the sourcing and extraction stage, the largest contributors to the impacts in terms of raw materials are polymers (51%), packaging (16%), and glycol (7%). Within manufacturing, electricity contributes to 6.6% of overall GWP impacts while thermal energy from natural gas contributes to 1.3%.

Additional Environmental Information

915FS has a Health Product Declaration (HPD) which can be found at https://www.hpd-collaborative.org/hpd-public-repository/.

915FS has VOC Emission compliance testing for the following standards and codes:

- USGBC LEED Version 4/4.1, BD&C, ID&C, Residential BD&C Multifamily
- The WELL Building Standard, WELL v2, Feature X06
- ANSI/GBI 01-2019 Green Globes Assessment Protocol

These products also have FloorScore certificates that can be found here: https://www.scsglobalservices.com/certified-green-products-guide?q=bostik&program=301.

More information on Bostik's products can be found on their website.

Supporting Documentation

The full text of the acronyms are found in Table 9.

Table 9: Acronym Key

Acronym	Text	Acronym	Text
LCA Indicators			
ADP-elements	Abiotic depletion potential for non-fossil resources	**GWP**	Global warming potential
ADP-fossil	Abiotic depletion potential for fossil resources	**OPD**	Depletion of stratospheric ozone layer
AP	Acidification potential of soil and water	**POCP**	Photochemical ozone creation potential
EP	Eutrophication potential	**Resources**	Depletion of non-renewable fossil fuels
LCI Indicators			
RPR_E	Use of renewable primary energy excluding renewable primary energy resources used as raw materials	**RPR_M**	Use of renewable primary energy resources used as raw materials
$NRPR_E$	Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	**$NRPR_M$**	Use of non-renewable primary energy resources used as raw materials
SM	Use of secondary materials	**FW**	Net use of fresh water
RSF	Use of renewable secondary fuels	**NRSF**	Use of non-renewable secondary fuels
HWD	Disposed-of-hazardous waste	**MR**	Materials for recycling
NHWD	Disposed-of non-hazardous waste	**MER**	Materials for energy recovery
HLRW	High-level radioactive waste, conditioned, to final repository	**ILLRW**	Intermediate- and low-level radioactive waste, conditioned, to final repository
CRU	Components for reuse	**EE**	Exported energy
RE	Recovered Energy		
Biogenic Carbon Indicators			
BCRP	Biogenic Carbon Removal from Product	**BCEW**	Biogenic Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes
BCEP	Biogenic Carbon Emission from Product	**CCE**	Calcination Carbon Emissions
BCRK	Biogenic Carbon Removal from Packaging	**CCR**	Carbonation Carbon Removals
BCEK	Biogenic Carbon Emission from Packaging	**CWNR**	Carbon Emissions from Combustion of Waste from Non- Renewable Sources used in Production Processes

References

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