



SEALING AND BONDING
ENVIRONMENTAL PRODUCT
DECLARATION - CRADLE-TO-GATE
Sikaflex[®]-1a



ASTM INTERNATIONAL

BUILDING TRUST



GENERAL INFORMATION

COMPANY

Sika Corporation, Target Market Sealing & Bonding

PRODUCT TYPE

One part polyurethane, elastomeric sealant with adhesive properties

PRODUCT

Sikaflex®-1a

MANUFACTURING SITE

Lyndhurst, NJ 07071

EPD SCOPE

- Cradle-to-Gate

EPD LIMITATIONS

- Environmental declarations from different programs may not be comparable.
- Comparison of the overall environmental performance of sealants using EPD information shall be based on the product's use and impacts at the building level, and therefore EPDs based on the ULE PCR may not be used for comparability purposes.
- Many factors affect the comparability of EPDs. End users should be extremely cautious when comparing or evaluating EPD data of different EPD publishers. Such comparison or evaluation is only possible if all conditions for comparability listed in ISO 14025 (Section 6.7.2) are met.

DECLARED UNIT

1 kg manufactured, Sikaflex®-1a

PRODUCT DESCRIPTION

Sikaflex®-1a is a premium grade, high performance, reactive, 1-component, polyurethane-based elastomeric sealant that meets:

- TT-S-00230C - Federal Specification: Sealing Compound: Elastomeric type, single component (Type II, Class A)
- ASTM C920-14a – Standard Specification for Elastomeric Joint Sealants (Type S, Grade NS, Class 35, use T, NT, O, M, G, I, A)

APPLICATION

Sikaflex®-1a is a solvent free, low emission joint sealant suitable for both exterior and interior applications including construction joints, expansion joints, control joints and window perimeters in the building envelope.

PLACING ON THE MARKET / APPLICATION RULES

For use on projects that require a sealant that meets standard specifications, the prerequisite for placement on the market is to complete testing per ASTM C920 and conform to the requirements established within ASTM C920.

PROPERTIES OF DECLARED PRODUCT AS DELIVERED

See Technical Data below.

MANUFACTURING

The formulated product is generally mixed from its raw materials in a batch process and then filled into packaging containers for shipping. In this process, quality, environmental and any other regulatory standards are observed.

ENVIRONMENT AND HEALTH DURING MANUFACTURING

The production site has an Environmental Management System in place and is certified to ISO 14001. Pollution abatement equipment is installed in the facility.

PRODUCT PROCESSING / INSTALLATION

Sikaflex®-1a is a thermoset resin (filled) and applied using cartridge, foil pack or bulk dispensing applicators. In this process any Health and Safety measures prescribed in the Safety Data Sheet (available on usa.sika.com) and indicated by conditions on the site must be implemented and strictly observed.

PACKAGING

Sikaflex®-1a is packaged in composite cartridge (10oz, 300ml), foil packs (20oz, 600ml), metal pails (4.5 gallons, 17L) and metal drums (50 gallons, 189L).

EXTRAORDINARY EFFECTS

Fire

Cross-linked polyurethane resins do not melt and do not form burning droplets; They will however burn when exposed to a flame.

Water

Polyurethane based, filled and solvent free thermoset resins are chemically inert and are not water soluble. They are commonly used to protect buildings against damaging water infiltration and floodwater damage.

Mechanical Destruction

The mechanical destruction of polyurethane based thermoset resins does not lead to any decomposition products that endanger the environment or health.

FURTHER INFORMATION

Further information can be found in the Product Data Sheet or Safety Data Sheet issued by Sika Corporation. These are available through the website or on request. Useful technical information is also available through the website of professional associations.

ORGANIZATION

Sika Corporation, based in Lyndhurst, NJ, is a leading manufacturer of products and systems for the construction and motor vehicle markets.

PRODUCT SPECIFICATIONS

TECHNICAL DATA*1	TEST METHOD	VALUE		
Shelf life	-	10.1 fl. oz. cartridges	12 months	
		20 fl. oz. uni-pac sausages	12 months	
		5 gallon pail	6 months	
		55 gallon drum	6 months	
Storage conditions	-	Store at 40°-95°F (4°-35°C).		
Condition material	-	Condition material to 65°-75°F before using.		
VOC content	-	40 g/L		
Colors	-	White, colonial white, aluminum gray, limestone, black, dark bronze, capitol tan, stone and medium bronze. Special architectural colors on request.		
Application Temperature	-	40° to 100°F. Sealant should be installed when joint is at mid-range of its anticipated movement.		
Service Range	-	-40° to 170°F		
Curing Rate	-	Tack-free time	3 to 6 hours	
		Tack-free to touch	3 hours	
		Final cure	4 to 7 days	
Tear Strength	ASTM D-624	55 lb./in.		
Shore A Hardness	ASTM C-661	21 day	40±5	
Movement Capability	ASTM C-719	+/- 35%		
Tensile Properties (21 days)	ASTM D-412	Tensile Stress	175 psi (1.21 MPa)	
		Elongation at Break	550%	
		Stress at 100%	85 psi (0.59 MPa)	
Adhesion in Peel	ASTM C-794 TT-S-00230C	<u>Substrate</u>	<u>Peel Strength</u>	<u>Adhesion loss</u>
		Concrete	20 lb.	0%
		Aluminum	20 lb.	0%
		Glass	20 lb.	0%
Weathering Resistance	-	Excellent		

*1 Material and curing conditions @ 73°F (23°C) and 50% RH. Results may differ based upon statistical variations depending upon mixing methods and equipment, temperature, application methods, actual site conditions and curing conditions.

LIFE CYCLE ASSESSMENT

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY
Raw Material Supply	Transport	Manufacturing	Transport from gate to site	Assembly / Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational Energy Use	Operational Water Use	De-construction	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	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

(X = Included in LCA; MND = Module not declared)

SYSTEM BOUNDARY

A1-A3	INCLUDED	EXCLUDED
	<ul style="list-style-type: none"> • Extraction and processing of raw materials, including fuels used in product manufacturing; • Transportation of raw materials to the plant; • Manufacturing of the pre-products and product; • Packaging of the product ready for shipment; • Transportation from the manufacturing site to incineration for pre-consumer waste from manufacturing; and • Incineration of pre-consumer waste from production. 	<p>Capital goods & infrastructure, production equipment, delivery vehicles, lab equipment, personnel-related activities and energy and water use related to company management and sales have been excluded in the scope of the study.</p>

LCA CALCULATION RULES

DECLARED UNIT

This EPD refers to the declared unit of 1kg Sikaflex®-1a.

NAME	VALUE	UNIT
Declared unit	1	kg
Density	1,400	kg/m ³
Yield in joint dimensions 12mm x 6mm	9.92	m/kg

ESTIMATES AND ASSUMPTIONS

Some raw materials were valued with a general chemical dataset (conservative approach). The percentage by mass is < 1 %.

CUT-OFF CRITERIA

All raw materials submitted for the formulations and production data were taken into consideration. The manufacturing of the production machines and systems and associated infrastructure used were not included in the LCA. No energy and auxiliary materials (solvents, lubricant oils) needed for the maintenance of the production line were considered.

BACKGROUND DATA

The primary data provided by Sika derive from the plant at Lyndhurst, USA. The background data were taken from the databases of GaBi software version 8.2 and ecoinvent version 3.3. The US Electrical Energy Mix was applied.

DATA QUALITY

To simulate the product stage, data recorded by Sika from the production years 2016 and 2017 were used. All other relevant background datasets were taken from generic data not older than 10 years.

PERIOD UNDER REVIEW

The period under review is the years 2016 (production data) and 2017 (formulation).

ALLOCATION

Mass allocation was applied by dividing the total production data for the production line by the total volume of sealants and adhesives, the only products manufactured in this line.

MATERIAL CONTENT DECLARATION

The average percentage by weight of the raw materials and the mass (kg) of the packaging materials for 1 kg Sikaflex®-1a are provided.

MATERIAL AVERAGE PERCENTAGE BY WEIGHT FOR 1KG		PACKAGING MATERIAL	
RAW MATERIAL INPUT	TOTAL WEIGHT BY [%]		
Filler	47	Composite Cartridge (300 ml units) and plunger [kg]	0.16
Polyurethane Prepolymers	25	Box [kg]	0.04
Plasticizer	20	Wooden Pallet [kg]	0.04
Rest of chemicals	8	Slip sheet [kg]	0.00018
Total weight (Input)	100	Total [kg/kg]	0.23

LIFE CYCLE IMPACTS

RESULTS Sikaflex®-1a	DECLARED UNIT OF 1KG A1-A3
TRACI 2.1	
Global warming potential based on IPCC (2013 AR5), 100 years, excluding biogenic CO2 [kg CO2-Eq.]	3.67E+00
Stratospheric ozone layer depletion air [kg CFC-11-Eq.]	3.53E-09
Acidification potential [kg SO2-Eq.]	1.22E-02
Eutrophication potential [kg N-Eq.]	9.08E-04
Photochemical smog formation potential [kg O3-Eq.]	1.58E-01
Abiotic resource depletion potential - fossil fuels [MJ, LHV]	8.21E+00
TOTAL PRIMARY ENERGY CONSUMPTION	
Renewable primary energy as energy carrier [MJ, LHV]	3.41E+00
Renewable primary energy resources as material utilization [MJ, LHV]	2.24E+00
Total use of renewable primary energy resources [MJ, LHV]	5.65E+00
Non-renewable primary energy as energy carrier [MJ, LHV]	4.85E+01
Non-renewable primary energy as material utilization [MJ, LHV]	2.58E+01
Total use of non-renewable primary energy resources [MJ, LHV]	7.43E+01
Use of secondary material [MJ, LHV]	0.00E+00
Use of renewable secondary fuels [MJ, LHV]	1.34E-06
Use of non-renewable secondary fuels [MJ, LHV]	1.27E-05
Use of net fresh water [m3]	1.67E-02
OUTPUT FLOWS AND WASTE CATEGORIES	
Hazardous waste disposal [kg]	2.81E-05
Non-hazardous waste disposal [kg]	2.10E-01
Radioactive waste disposal [kg]	1.04E-03
Components for reuse [kg]	0.00E+00
Materials for recycling [kg]	0.00E+00
Materials for energy recovery [kg]	0.00E+00
Exported energy [kg]	0.00E+00

INTERPRETATION OF THE RESULTS

Within the scope of this LCA, modules A1-A3, most impacts come from the formulation across almost all TRACI indicators. The contribution of raw materials used in the Sikaflex®-1a formulation is particularly high for Resources, Fossil fuels, at 86%, and Global Warming Potential (68%). The second largest contributor in most cases is the production.

The raw material extraction was also found to account for the highest share of the total Primary energy demand (72%), followed by the manufacturing process (17%) and packaging (11%). The primary energy consumption is predominantly from non-renewable resources at 93%. Moreover, most of the disposed waste is non-hazardous (99.99%).

Considering raw material extraction only, on average the highest contribution to TRACI indicators and primary energy comes from prepolymers and the plasticizers.

ADDITIONAL ENVIRONMENTAL INFORMATION

NAME	SEALANT CATEGORY (PER RULE 1168 CATEGORY)	MEASURED VALUE	CATEGORY LIMIT (PER RULE 1168 CATEGORY) AS OF 1/1/2019	UNIT
VOC Content	All Other Architectural Sealants	40	50	G/L

LEED v4

Sikaflex®-1a has been tested per CDPH Standard Method Version 1.2, 2017 and was found to be compliant with both the Classroom and Private Office Scenarios. See table below for details.

These results coupled with the fact that Sikaflex®-1a meets the SCAQMD Rule 1168 allows Sikaflex®-1a to be counted towards the EQ - Low Emitting Materials credit of LEED v4.

ACCEPTANCE CRITERIA AND RESULTS DEMONSTRATING COMPLIANCE OF PRODUCT SAMPLE TO REFERENCED STANDARD:

EXPOSURE SCENARIO ¹	INDIVIDUAL VOCs OF CONCERN ²		FORMALDEHYDE ³		TVOC ⁴
	Criterion	Compliant?	Criterion	Compliant?	Range
School Classroom	≤½ Chronic REL	YES	≤9.0 µg/m ³	YES	≤ 0.5 MG/M ³
Private Office	≤½ Chronic REL	YES	≤9.0 µg/m ³	YES	≤ 0.5 MG/M ³

Product Coverage⁵: Not applicable

1. Exposure scenarios & product quantities for classroom & office are defined in Tables 4-2 - 4-5 (CDPH Std. Mtd. V1.2-2017)
2. Maximum allowable concentrations of individual target VOCs are specified in Table 4-1 (ibid.)
3. Maximum allowable formaldehyde concentration is ≤9 µg/m³, effective Jan 1, 2012; previous limit was ≤16.5 µg/m³ (ibid.)
4. Informative only; predicted TVOC Range in three categories, i.e., ≤0.5 mg/m³, >0.5 - 4.9 mg/m³, and ≥5.0 mg/m³
5. Informative and applicable only to tests of wet-applied products; grams of sample applied per square meter of substrate

EPD VERIFICATION

This EPD was independently verified by ASTM in accordance with ISO 14025. The UL Environment Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project report, based on CEN Norm EN 15804, serves as the core PCR:

Internal <input type="checkbox"/>	External <input checked="" type="checkbox"/>	Lindita Bushi, Ph.D., Senior Research Associate Athena Sustainable Materials Institute 100-119 Ross Avenue Ottawa, Ontario, Canada K1Y0N6 lindita.bushi@athenasmi.org			Signed: <i>Lindita Bushi</i>
Program Operator		Timothy Brooke ASTM International 100 Bar Harbor Drive West Conshohocken, PA 19428 tbrooke@astm.org			Signed: <i>Timothy Brooke</i>
Declaration Holder		Sika Corporation			
Product group		Date of Issue	Period of Validity	Declaration Number	
Sealant		July 1, 2019	5 years	EPD-109	

DECLARATION TYPE A "Cradle-to-Gate" EPD for 1 kg Sikaflex®-1a sealant. The modules included are A1 -A3. The declaration is intended for use in Business to Business (B2B) communication.	PRODUCT APPLICABILITY AND CHARACTERISTICS The declared Sikaflex®-1a one part polyurethane, elastomeric sealant with adhesive properties is designed for all types of joints (vertical and horizontal) where maximum depth of sealant will not exceed ½ in moving joints.	CONTENT OF THE DECLARATION This declaration follows the content requirements of UL Environment "Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report" (July 2014) and "Part B: Product Category Rules for Building and Construction Sealant EPD Requirements" (September 2016).
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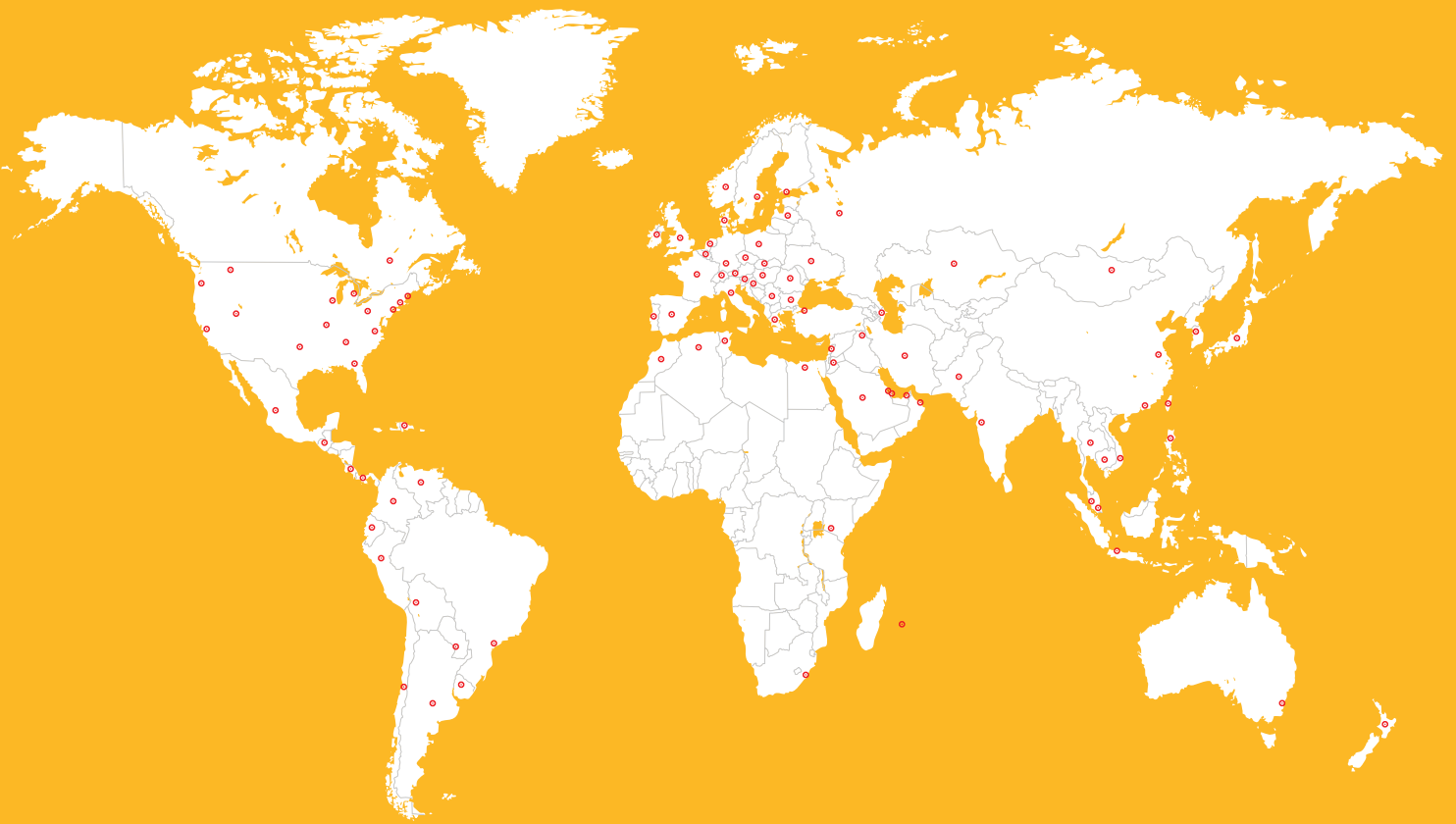
EPD PROJECT REPORT INFORMATION

EPD PROJECT REPORT	A "Cradle-to-Gate" Life Cycle Assessment for Sikaflex®-1a
LCA AND EPD PREPARED BY:	Corporate Product Sustainability Sika Technology AG Tüffenwies 16 8050 Zurich Switzerland product.sustainability@ch.sika.com

PCR INFORMATION

PROGRAM OPERATOR	UL Environment
REFERENCE PCR PART A	PCR Part A: UL Environment and Institute of Construction and Environment e.V., Königswinter (pub.): Product Category Rules for Construction Products from the range of Environmental Product Declarations of Institute Bauen und Umwelt (IBU), "Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report", v1.3, July 2014
REFERENCE PCR PART B	PCR Part B: UL Environment and Institute of Construction and Environment e.V., Königswinter (pub.): Product Category Rules Guidance for Building-Related Products and Services, "Part B: Building and Construction Sealant EPD Requirements", v1.0, September 2016

GLOBAL BUT LOCAL PARTNERSHIP



WHO WE ARE

Sika AG, located in Baar, Switzerland, is a specialty chemicals company with a leading position in the development and production of systems and products for bonding, sealing, damping, reinforcing and protecting in the building sector and the motor vehicle industry.

The corporation has subsidiaries in 84 countries, employs 16,000 people worldwide, and has more than 160 manufacturing facilities around the globe.

Our most current General Sales Conditions shall apply.
Please consult the Product Data Sheet prior to any use and processing.

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