ROOFING
ENVIRONMENTAL PRODUCT DECLARATION CRADLE-TO-GRAVE SARNAFIL S 327

ASTM INTERNATIONAL

Sarnafil®

BUILDING TRUST

GENERAL INFORMATION

COMPANY
Sika Corporation — Roofing

PRODUCT TYPE
Single Ply Roofing Membrane

PRODUCT
Sarnafil S 327 roofing membrane, with a finished thickness of 60 mils, 72 mils or 80 mils.

MANUFACTURING SITE
Canton, MA 02021

EPD SCOPE
- Cradle-to-Grave
- This declaration has been prepared in accordance with ISO 14025 and ISO 21930.

EPD LIMITATIONS
- EPDs from different programs (using different PCR) may not be comparable
- Declarations based on the ASTM SPRM PCR can be used to assist in comparative assertions only with cradle-to-grave assessments with the same product function and functional unit and on the basis of clearly defined scenarios.
- EPDs may enable comparison between products, but do not themselves compare products, as stated in ISO 14025, Sections 4 and 6.7.2. It shall be stated in EPDs created using this PCR that only EPDs prepared from cradle-to-grave life-cycle results, and based on the same function, quantified by the same functional unit, and taking account of replacement based on the product reference service life (RSL) relative to an assumed building service life, can be used to assist purchasers and users in making informed comparisons between products. The basis of a comparison shall include the product application in accordance with ISO 21930, Section 5.5, and clearly defined and justified scenarios for modules A4, A5, B1 to B7 and C1 to C4.
- EPDs based on cradle-to-gate and cradle-to-gate with options information modules shall not be used for comparisons. EPDs based on a declared unit shall not be used for comparisons.

FUNCTIONAL UNIT

1,000 square meters of installed Sarnafil S 327 single-ply roofing membrane, including seams, for a 75- year building service life.

STANDARDS
The three declared Sarnafil S 327 roofing membrane thicknesses (60, 72 and 80 mils) meet the following standards and requirements:

- ASTM D4434
- Title 24 Compliant*
- Cool Roof Rating Council Listed*
- FM Approval
- Miami-Dade County Approval
- Underwriters Laboratory Inc.
- Underwriters Laboratories of Canada
- NSF/ANSI 347 Sustainability Assessment for Single Ply Roof Membranes - Platinum

*White, Tan, Reflective Gray only

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

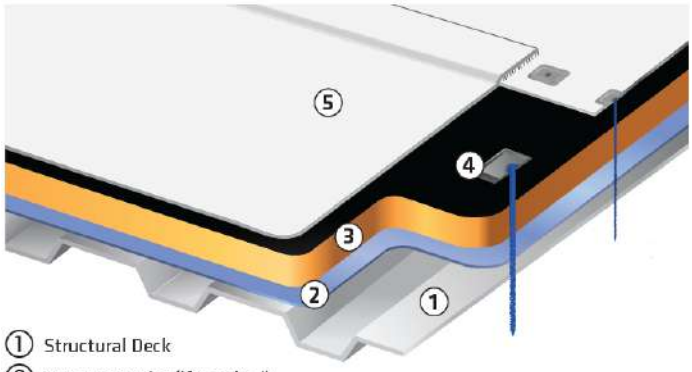
Sika Corporation's roofing division has more than 60 years of experience manufacturing high quality, thermoplastic (PVC), single-ply roofing and waterproofing systems for the non- residential market. Sika is also the first roofing manufacturer to be rated "Platinum" according to NSF/ANSI 347, the leading consensus sustainability standard.

PRODUCT DESCRIPTION AND USE
With a track record of performance of over 60 years, Sarnafil roofing membranes are the products of choice for architects, specifiers and building owners who want the peace of mind that comes with buying from the performance leader.

Sarnafil S 327 roof membrane is a thermoplastic PVC membrane used in mechanically attached systems. Sarnafil S 327 is polyester reinforced, which provides the high breaking and tearing strength needed to prevent excessive elongation and sheet deformation under the stresses produced by the wind uplift of the membrane in this type of system. A unique lacquer coating is applied to the top surface of the membrane which helps to reduce soiling.

Sika's Thickness Guarantee Program for all Sarnafil branded membranes guarantees they meet or exceed the labeled thickness, rather than following industry standards, which allows for membranes to be manufactured up to 10% below advertised thickness.

INSTALLATION
The Sarnafil S 327 membranes are rolled out on a suitable substrate, aligned and mechanically attached with steel fasteners. For the EPD calculations, the total mass of the steel fasteners was calculated using the average of the respective length of fasteners required for a typical roofing system. The resulting average total mass of screws and seam plate is (0.111 kg/m²).



① Structural Deck
② Vapor Retarder (if required)
③ Insulation
④ Insulation Fastener
⑤ Sarnafil S 327 Membrane

USE PHASE

In case of Sarnafil S 327 membranes, it is assumed that neither maintenance, refurbishment nor repair is required for the roofing system. Thus, the use phase only includes replacement. With a reference service life of 35 years, this implies one additional application of 1,000 m^2 of membrane plus overlaps and fixation are required to reach the building service life of 75 years.

The reference service life of 35 years of Sarnafil S 327 roofing membrane has been reviewed by the Athena Sustainable Materials Institute based on Sika's product performance data from various sites across North America and a thorough review of various research and certification documents. This reflects the high resistance to weathering and aging of the product when properly installed and used.

END OF LIFE

Sarnafil S 327 roofing membranes are recycled back into new Sika membranes at the end of the use stage. As the membrane is mechanically fixed, it can easily be separated from the remaining components. Within Sika's Roof Recycling Program introduced in 2008, the company will accept a building owner's existing PVC roofing membrane for recycling with the purchase of a new Sika roofing system. Sika will also take back the newly installed PVC roofing system for recycling at the end of its service life.

Thanks to Sika's Roof Recycling Program, over 90 million pounds of vinyl roofing membranes have been diverted from landfills to date. Based on Sika's established program, a 100% recycling scenario was deemed appropriate for the EPD. Input data on the recycling process was obtained from the contracted external processing company.

PRODUCT SPECIFICATIONS

TECHNICAL DATA	UNITS	ASTM TEST METHOD	ASTM D4434 TYPE III REQUIREMENT	VALUE/TEST RESULTS		
				60 MILS	72 MILS	80 MILS
Weight	[kg/m^2]	–	–	2.0	2.4	2.6
Total Recycled Content (both pre— and post—consumer)[1]	[%]	–	–	10		
Reinforcing Material	–	–	–	Polyester		
Overall Thickness	[mil]	D751	45	60	72	80
Reflectivity	[%]	ASTM C1549	–	0.84[2] - 0.76[3]		
Emissivity	[%]	ASTM C1371	–	0.86[2] - 0.85[3]		
Solar Reflective Index (white)	–	–	–	105[2] - 93[3]		
Breaking Strength (M.D.), min.	[lbf/in] (KN/m)	D751	200 (35)	305	315	325
Elongation at Break, min.	–	D751	–			
Machine Direction	[%]		15	28.5	29	29.5
Cross Direction	[%]		15	29.5	30	30.5
Seam Strength, min., (% of original)[4]	[%]	D751	75	Pass		
Retention of Properties After Heat Aging	[%]	D3045	–	–		
Tensile Strength, min., (% of original)	[%]	D751	90	Pass		
Elongation, min., (% of original)	[%]	D751	90	Pass		
Tearing Strength (C.D.), min	[lbf] (N)	D1004	45 (200)	48	48.5	49
Low Temperature Bend, -40 °F (-40 °C)	–	D2136	Pass	Pass		
Accelerated Weathering Test (Fluorescent Light, UV exposure)	–	G154	5,000 hours	10,000 hours		
Cracking (7x magnification)		None	None	None		
Discoloration (by observation)		Negligible	Negligible	Negligible		
Crazing (7x magnification)		None	None	None		
Linear Dimensional Change (C.D.), %	[%]	D1204	0.5 max.	-0.12	-0.13	-0.14
Weight Change After Immersion in Water, %	[%]	D570	±3.0 max.	2	1.8	1.8
Static Puncture Resistance	[lbf] (kg)	D5602	33	Pass		
Dynamic Puncture Resistance	[ft-lbf] (J)	D5635	14.7	Pass		

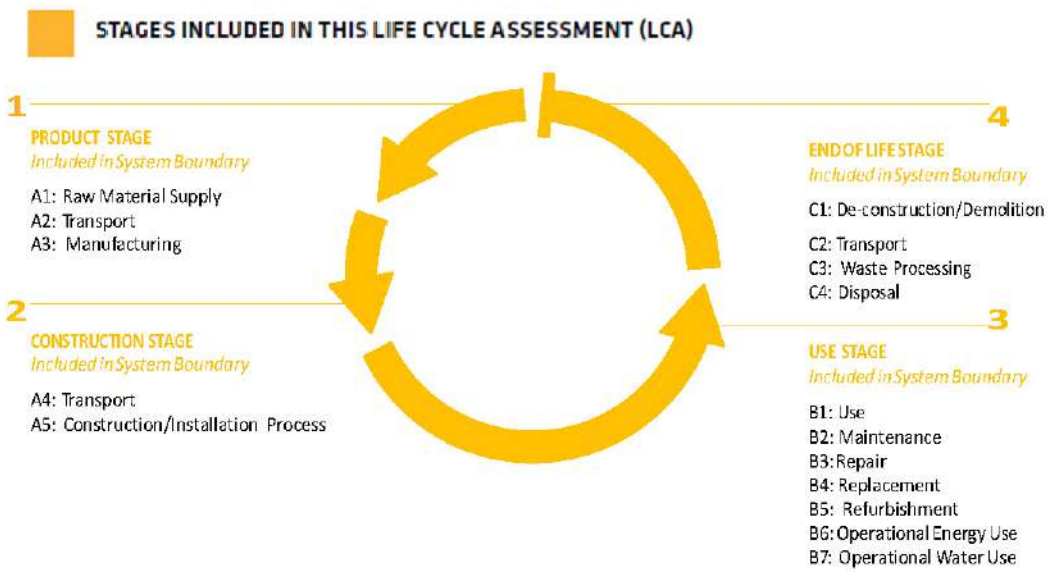
[1] Pre-consumer material: roofing membrane trimmings from Sika's manufacturing process and market supplied post-industrial PVC scrap material. Post-consumer material: Sika Sarnafil and other PVC roofing material at the end of its service life (total average recycled content: minimum 10%)

[2] New Membrane

[3] 3 year aged membrane

[4] Failure occurs through membrane rupture not seam failure

LIFE CYCLE STAGES



SYSTEM BOUNDARY

INCLUDED	
A1-A3	• Extraction and processing of raw materials, including fuels used in product manufacturing; • Transportation of raw materials including empty backhauls; • Manufacturing of the product; • Packaging of the product ready for shipment; • Transportation from the manufacturing site to recycling/reuse for pre-consumer waste and unutilized byproducts from manufacturing, including empty backhauls; and • Recycling/reuse of pre-consumer waste and by-products of production.
A4-A5	• Transportation of product from manufacturing site to building site, including empty backhauls; • Installation on the building site including steel fasteners (0.111 kg/m^2) for a mechanically attached application; and • Disposal (landfill) of waste produced on the building site.
B1-B7	• Reference service life of the building is assumed to be 75 years according to the PCR and the number of replacements of the building product are declared accordingly (note that an assumed 75-year reference service life for the building is the accepted time period for the purpose of comparative analysis); • Any replacement of the building product (B4) required to attain the reference service life of the building based on a verifiable product performance history; • As the product reference service life (35 years) is less than the assumed building service life (75 years), the aggregated product stage, construction process stage and end of life stage impacts (modules A1 – A5 and C1 – C4) associated with the number of roof replacements (1.1) necessary to equal the service life of the building are included; • The combined impacts of the original product and any roof replacements are determined by dividing the building service life (75 years) by the service life of the product, and the impacts are multiplied by the result. In this case, the impacts are multiplied by 1.1, thus normalizing the roof replacements during the assumed 75-year building service life. • It is assumed that no use inputs/outputs (B1), maintenance (B2), repair (B3), refurbishment (B5) or operational water (B6) and energy (B7) use is required for the roofing system.
C1-C4	• Dismantling/demolition of the roof system (assumed to be carried out manually using hand tools); • Average transport from building site to recycling (membrane)/landfill (fasteners), including empty backhauls; and • Recycling/landfilling processes.
D	• Potential net benefits from reuse, recycling, and/or energy recovery beyond the system boundary.

NOT INCLUDED	
ALL MODULES	• 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.

MATERIAL CONTENT DECLARATION

The material average percentage by weight for 1,000 m^2 for the Sarnafil S 327 60, 72 and 80 mils is provided.

MATERIAL AVERAGE PERCENTAGE BY WEIGHT FOR 1,000 M^2: SARNAFIL S 327 60, 72 AND 80 MILS		PACKAGING MATERIAL	DECLARED PRODUCT [MILS]		
RAW MATERIAL INPUT	**TOTAL WEIGHT BY [%]**		**60**	**72**	**80**
PVC resin new material	42	Cardboard Core [kg]	0.05	0.05	0.05
PVC resin recycled content	13	Wooden pallet [kg]	0.08	0.08	0.08
Plasticizer	27	PE Film [kg]	0.003	0.003	0.003
Polyester fabric (scrim reinforcement)	4				
Rest of chemicals	14				
Total weight (Input)	**100**	**Total [kg/m^2]**	**0.13**	**0.13**	**0.13**

LIFE CYCLE IMPACTS

The results displayed below apply to Sarnafil S 327 with a thickness of 60 mils, 72 mils and 80 mils.

RESULTS SARNAFIL S 327 [60 MILS]	FUNCTIONAL UNIT OF 1,000 M^2 INSTALLED MEMBRANE					
CATEGORY INDICATOR	**TOTAL**	**PRODUCT STAGE**	**CONSTRUCTION PROCESS STAGE**	**USE STAGE**	**END-OF-LIFE STAGE**	**BENEFITS BEYOND SYSTEM BOUNDARIES**
		A1-A3	**A4-A5**	**B4**	**C1-C4**	**D**
GWP100, excl biogenic carbon [kg CO2 eq.]	1.93E+04	7.19E+03	1.49E+03	1.03E+04	3.34E+02	-4.63E+03
AP [kg SO2 eq.]	8.26E+01	2.94E+01	6.78E+00	4.41E+01	2.34E+00	-1.02E+01
EP [kg N eq.]	1.01E+01	3.25E+00	1.11E+00	5.41E+00	3.82E-01	-1.88E+00
ODP [kg CFC 11 eq.]	1.00E-03	2.52E-04	1.47E-04	5.34E-04	6.83E-05	-1.84E-04
ADP_{fossil} [MJ surplus energy]	3.59E+05	1.42E+05	2.07E+04	1.91E+05	4.95E+03	-1.02E+05
POCP [kg O3 eq.]	1.21E+03	3.64E+02	1.33E+02	6.43E+02	6.60E+01	-2.71E+02
USE OF PRIMARY RESOURCES						
RPR_E [MJ]	7.85E+04	3.36E+04	3.02E+03	4.19E+04	5.65E+01	-4.61E+03
RPR_M [MJ] [1]	-	-	-	-	-	-
$NRPR_E$ [MJ]	2.84E+05	1.09E+05	1.90E+04	1.52E+05	5.01E+03	-7.75E+04
$NRPR_M$ [MJ] [1]	8.93E+04	3.92E+04	2.50E+03	4.76E+04	0	-3.24E+04
USE OF SECONDARY RESOURCES						
SM [kg] [1]	2.16E+02	9.48E+01	6.05E+00	1.15E+02	0	0
RSF [MJ] [1]	-	-	-	-	-	-
NRSF [MJ] [1]	-	-	-	-	-	-
RE [MJ] [1]	-	-	-	-	-	-
USE OF FRESHWATER						
FW [l]	3.71E+05	1.59E+05	1.34E+04	1.98E+05	4.64E+02	-2.78E+04
WASTE CATEGORIES AND OUTPUT FLOWS						
HWD [kg] [1]	-	-	-	-	-	-
NHWD [kg] [1]	5.38E+02	4.28E+01	1.60E+02	2.25E+02	1.10E+02	0

HLRW [kg] [1, 3]	6.83E-03	2.88E-03	3.11E-04	3.64E-03	7.11E-07	-2.31E-03
ILLRW [kg] [1, 4]	5.50E+00	2.31E+00	2.59E-01	2.93E+00	6.24E-04	-1.92E+00
CRU [kg] [1]	-	-	-	-	-	-
MR [kg] [1]	2.00E+03	0	0	0	2.00E+03	0
MER [kg] [1]	4.86E+01	2.27E+01	1.45E+00	2.44E+01	0	0
EE [MJ] [1]	2.28E+01	1.07E+01	6.82E-01	1.15E+01	0	0

GWP100 = Global warming potential (100 years); AP = Acidification potential; EP = Eutrophication potential; ODP = Ozone depletion potential; ADP_{fossil} = Abiotic depletion potential; POCP = Photochemical ozone creation potential; RPR_E = Renewable primary energy resources as energy (fuel); RPR_M = Renewable primary resources as material; $NRPR_E$ = Non-renewable primary resources as energy (fuel); $NRPR_M$ = Non-renewable primary resources as material; SM = Secondary materials; RSF = Renewable secondary fuels; NRSF = Non-renewable secondary fuels; RE = Recovered energy; FW = Freshwater; HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; HLRW = High-level radioactive waste; ILLRW = Intermediate and low-level radioactive waste; CRU = Components for re-use; MR = Materials for recycling; MER = Materials for energy recovery; EE = Recovered energy exported from the product system

RESULTS SARNAFIL S 327 [72 MILS]	**FUNCTIONAL UNIT OF 1,000 M^2 INSTALLED MEMBRANE**					
CATEGORY INDICATOR	**TOTAL**	**PRODUCT STAGE**	**CONSTRUCTION PROCESS STAGE**	**USE STAGE**	**END-OF-LIFE STAGE**	**BENEFITS BEYOND SYSTEM BOUNDARIES**
		A1-A3	**A4-A5**	**B4**	**C1-C4**	**D**
GWP100, excl biogenic carbon [kg CO2 eq.]	2.27E+04	8.54E+03	1.66E+03	1.21E+04	3.93E+02	-5.55E+03
AP [kg SO2 eq.]	9.77E+01	3.52E+01	7.62E+00	5.21E+01	2.71E+00	-1.23E+01
EP [kg N eq.]	1.13E+01	3.61E+00	1.22E+00	6.04E+00	4.52E-01	-2.26E+00
ODP [kg CFC 11 eq.]	1.16E-03	2.92E-04	1.68E-04	6.20E-04	8.22E-05	-2.21E-04
ADP_{fossil} [MJ surplus energy]	4.26E+05	1.69E+05	2.36E+04	2.27E+05	5.83E+03	-1.22E+05
POCP [kg O3 eq.]	1.40E+03	4.27E+02	1.50E+02	7.46E+02	7.59E+01	-3.24E+02
USE OF PRIMARY RESOURCES						
RPR_E [MJ]	8.13E+04	3.48E+04	3.11E+03	4.34E+04	6.66E+01	-5.51E+03
RPR_M [MJ] [1]	-	-	-	-	-	-
$NRPR_E$ [MJ]	3.36E+05	1.29E+05	2.15E+04	1.79E+05	5.90E+03	-9.28E+04
$NRPR_M$ [MJ [1]	1.08E+05	4.74E+04	3.02E+03	5.76E+04	0	-3.89E+04
USE OF SECONDARY RESOURCES						
SM [kg] [1]	2.63E+02	1.15E+02	7.37E+00	1.40E+02	0	0
RSF [MJ] [1]	-	-	-	-	-	-
NRSF [MJ] [1]	-	-	-	-	-	-
RE [MJ] [1]	-	-	-	-	-	-
USE OF FRESHWATER						
FW [l]	4.46E+05	1.92E+05	1.56E+04	2.38E+05	5.62E+02	-2.73E+04
WASTE CATEGORIES AND OUTPUT FLOWS						
HWD [kg] [1]	-	-	-	-	-	-
NHWD [kg] [1]	5.88E+02	6.18E+01	1.66E+02	2.51E+02	1.10E+02	0
HLRW [kg] [1, 3]	7.99E-03	3.38E-03	3.43E-04	4.26E-03	7.11E-07	-2.26E-03
ILLRW [kg] [1, 4]	6.45E+00	2.72E+00	2.85E-01	3.44E+00	6.24E-04	-1.88E+00
CRU [kg] [1]	-	-	-	-	-	-
MR [kg] [1]	2.40E+03	0	0	0	2.40E+03	0
MER [kg] [1]	2.49E+04	9.42E+03	1.76E+03	1.33E+04	4.31E+02	-6.26E+03
EE [MJ] [1]	1.07E+02	3.90E+01	8.15E+00	5.72E+01	2.94E+00	-1.38E+01

GWP100 = Global warming potential (100 years); AP = Acidification potential; EP = Eutrophication potential; ODP = Ozone depletion potential; ADP_{fossil} = Abiotic depletion potential; POCP = Photochemical ozone creation potential; RPR_E = Renewable primary energy resources as energy (fuel); RPR_M = Renewable primary resources as material; $NRPR_E$ = Non-renewable primary resources as energy (fuel); $NRPR_M$ = Non-renewable primary resources as material; SM = Secondary materials; RSF = Renewable secondary fuels; NRSF = Non-renewable secondary fuels; RE = Recovered energy; FW = Freshwater; HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; HLRW = High-level radioactive waste; ILLRW = Intermediate and low-level radioactive waste; CRU = Components for re-use; MR = Materials for recycling; MER = Materials for energy recovery; EE = Recovered energy exported from the product system

RESULTS SARNAFIL S 327 [80 MILS]	**FUNCTIONAL UNIT OF 1,000 M^2 INSTALLED MEMBRANE**					
CATEGORY INDICATOR	**TOTAL**	**PRODUCT STAGE**	**CONSTRUCTION PROCESS STAGE**	**USE STAGE**	**END-OF-LIFE STAGE**	**BENEFITS BEYOND SYSTEM BOUNDARIES**
		A1-A3	**A4-A5**	**B4**	**C1-C4**	**D**
GWP100, excl biogenic carbon [kg CO2 eq.]	2.49E+04	9.42E+03	1.76E+03	1.33E+04	4.31E+02	-6.26E+03
AP [kg SO2 eq.]	1.07E+02	3.90E+01	8.15E+00	5.72E+01	2.94E+00	-1.38E+01
EP [kg N eq.]	1.21E+01	3.86E+00	1.29E+00	6.46E+00	4.98E-01	-2.55E+00
ODP [kg CFC 11 eq.]	1.27E-03	3.20E-04	1.80E-04	6.76E-04	9.11E-05	-2.50E-04
ADP_{fossil} [MJ surplus energy]	4.68E+05	1.86E+05	2.54E+04	2.49E+05	6.40E+03	-1.37E+05
POCP [kg O3 eq.]	1.53E+03	4.70E+02	1.60E+02	8.14E+02	8.23E+01	-3.66E+02
USE OF PRIMARY RESOURCES						
RPR_E [MJ]	8.31E+04	3.56E+04	3.16E+03	4.43E+04	7.31E+01	-6.21E+03
RPR_M [MJ] [1]	-	-	-	-	-	-
$NRPR_E$ [MJ]	3.67E+05	1.42E+05	2.29E+04	1.96E+05	6.47E+03	-1.05E+05
$NRPR_M$ [MJ [1]	1.21E+05	5.33E+04	3.40E+03	6.47E+04	0	-4.37E+04
USE OF SECONDARY RESOURCES						
SM [kg] [1]	2.94E+02	1.29E+02	8.23E+00	1.57E+02	0	0
RSF [MJ] [1]	-	-	-	-	-	-
NRSF [MJ] [1]	-	-	-	-	-	-
RE [MJ] [1]	-	-	-	-	-	-
USE OF FRESHWATER						
FW [l]	4.94E+05	2.13E+05	1.70E+04	2.64E+05	6.25E+02	-3.75E+04
WASTE CATEGORIES AND OUTPUT FLOWS						
HWD [kg] [1]	-	-	-	-	-	-
NHWD [kg] [1]	6.24E+02	7.58E+01	1.69E+02	2.69E+02	1.10E+02	0
HLRW [kg] [1, 3]	8.73E-03	3.71E-03	3.64E-04	4.66E-03	7.11E-07	-3.10E-03
ILLRW [kg] [1, 4]	7.06E+00	2.99E+00	3.02E-01	3.76E+00	6.24E-04	-2.59E+00
CRU [kg] [1]	-	-	-	-	-	-
MR [kg] [1]	2.70E+03	0	0	0	2.70E+03	0
MER [kg] [1]	6.55E+01	3.06E+01	1.96E+00	3.29E+01	0	0
EE [MJ] [1]	3.08E+01	1.44E+01	9.19E-01	1.55E+01	0	0

GWP100 = Global warming potential (100 years); AP = Acidification potential; EP = Eutrophication potential; ODP = Ozone depletion potential; ADP_{fossil} = Abiotic depletion potential; POCP = Photochemical ozone creation potential; RPR_E = Renewable primary energy resources as energy (fuel); RPR_M = Renewable primary resources as material; $NRPR_E$ = Non-renewable primary resources as energy (fuel); $NRPR_M$ = Non-renewable primary resources as material; SM = Secondary materials; RSF = Renewable secondary fuels; NRSF = Non-renewable secondary fuels; RE = Recovered energy; FW = Freshwater; HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; HLRW = High-level radioactive waste; ILLRW = Intermediate and low-level radioactive waste; CRU = Components for re-use; MR = Materials for recycling; MER = Materials for energy recovery; EE = Recovered energy exported from the product system

NOTES ON LCA RESULTS FOR SARNAFIL S 327 60 MILS, 72 MILS, AND 80 MILS:

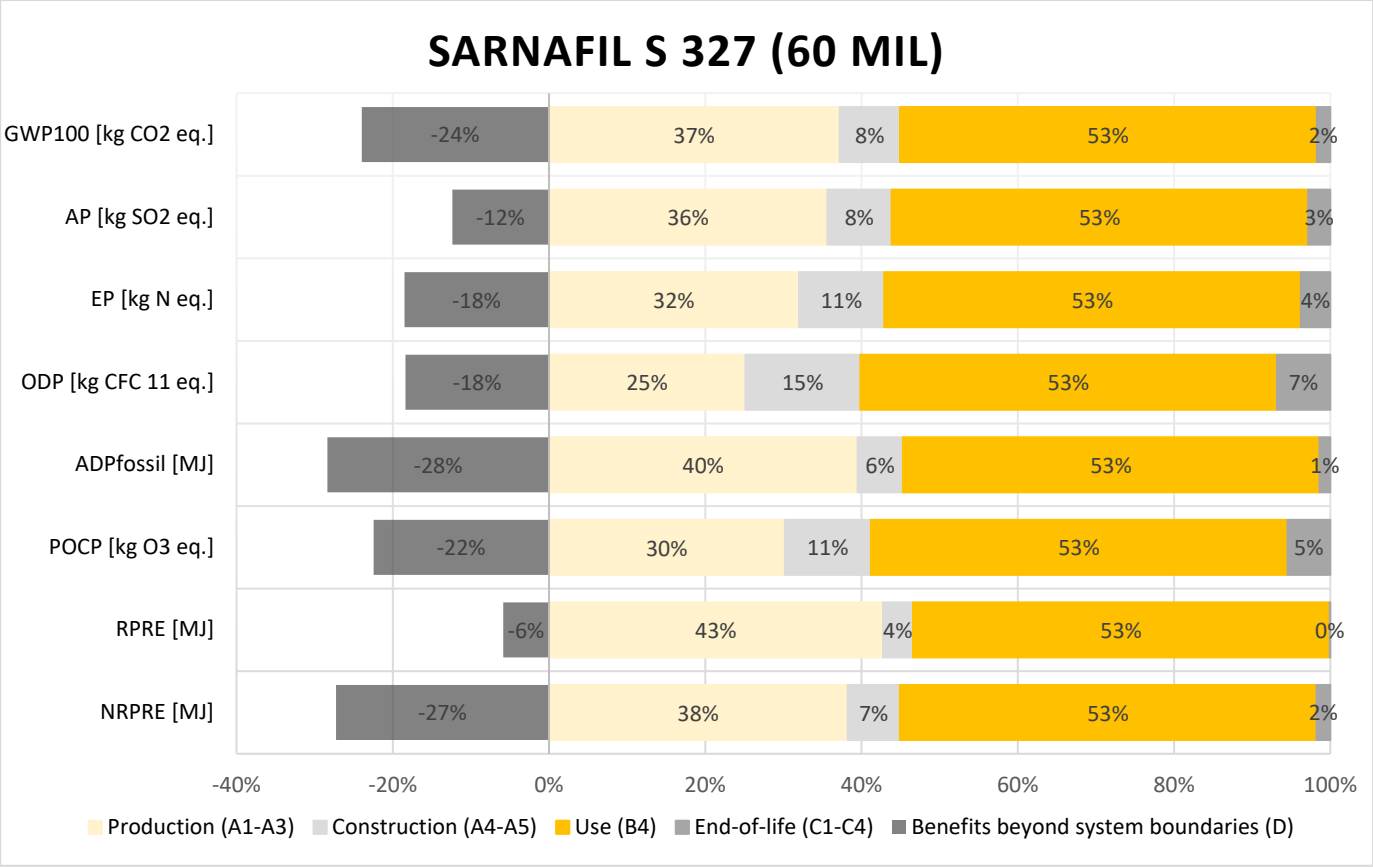
1. Calculated as per ACLCA ISO 21930 Guidance, respective sections 6.2 to 10.8.
2. "-" N/A for this product system "Not all LCA datasets for upstream materials includes these impact categories and thus results may be incomplete. Use caution when interpreting data in these categories" (NSF PCR for Single Ply Roofing Membrane, October 2019).
3. It should be noted that the foreground system (Sarnafil G 410 manufacturing process) does not generate any HLRW. High-level radioactive waste, e.g., when generated by electricity production, consists mostly of spent fuel from reactors." (ISO 21930:2017, clause 7.2.14).
4. It should be noted that the foreground system (Sarnafil G 410 manufacturing process) does not generate any ILLRW. Low- and intermediate-level radioactive wastes, e.g., when generated by electricity production,arise mainly from routine facility maintenance and operations (ISO 21930:2017, clause 7.2.14).
5. 'Emerging LCA impact categories and inventory items are still under development and can have high levels of uncertainty that preclude international acceptance pending further development. Use caution when interpreting data in these categories: RPRE, RPRM, NRPRE, NRPRM, SM, RSF, NRSF, RE, HWD, NHWD, HLRW, ILLRW, CRU, MR,MER, EE" (NSF PCR for Single Ply Roofing Membrane, October 2019).
6. Biogenic C-content of packaging fall below the cut-off criteria (NSF PCR, Section 7.1.6 and ISO 21930, 7.1.8), and is therefore excluded. It should be noted that GWP based in biogenic C-content of packaging is not included in the quantification of GWP 100.

INTERPRETATION OF THE RESULTS

A dominance analysis for the impact categories is shown graphically per module, in the figures below. The thickness of 60 mil was chosen for dominance analysis, but also apply for other thicknesses. For the dominant modules, the main contributors are indicated and discussed.

The results of the Cradle-to-Grave assessment of Sarnafil S 327 show that most impacts come from the Production Stage (A1-A3) and Use Stage (B4). Taking a closer look into (A1-A3), more than 74% of the impacts come from the raw materials, except for EP, where 52% are attributed to the raw materials and 42% results from packaging. The production of the membrane accounts for 16% of the GWP exc. biogenic indicator. The main inputs from stage B4 are associated with the additional membrane for replacement.

Impact assessment and energy indicator results by stage – 1m² of 60 mil Sarnafil S 327 - % basis



ADDITIONAL ENVIRONMENTAL INFORMATION

- Sarnafil roofing membranes were the first products to achieve Platinum certification to the NSF/ANSI 347 Sustainability Assessment for Single Ply Roofing Membranes.
- The Sarnafil EnergySmart® membrane has a highly reflective, lacquer-coated surface that can reduce cooling and overall energy consumption in conditioned buildings. Sarnafil roof membranes exceed the cool roof requirements of California's Building Energy Code (Title 24), LEED® and Green Globes®.
- Sika's Roof Recycling Program has diverted more than 90 million pounds of pre-consumer and post-consumer vinyl membrane from landfill, recycling it back into roofing and waterproofing membrane products.
- Sarnafil 5-foot and 10-foot membranes have been validated by UL Environment to contain an average of 10% recycled content.
- Sarnafil roof membranes help building owners achieve LEED and Green Globes certification.
- The reference service life of 35 years was reviewed by the Athena Sustainable Materials Institute, based on the results of various field surveys.
- Sarnafil roofing membranes were the first products in the industry to conduct a Cradle-to-Grave analysis.

EPD VERIFICATION

This EPD was independently verified by ASTM in accordance with ISO 21930 and ISO 14025:

Internal ☐	**External** ☒	Lindita Bushi, Ph.D., Senior Research Associate Athena Sustainable Materials Institute 100-119 Ross Avenue Ottawa, Ontario, Canada K1Y0N6 lindita.bushi@athenasmi.org	**Signed:** Lindita Bushi
Program Operator		Timothy Brooke ASTM International 100 Bar Harbor Drive West Conshohocken, PA 19428 tbrooke@astm.org	**Signed:**

Declaration Holder	Sika Corporation		
Product group	**Date of Issue**	**Period of Validity**	**Declaration Number**
Single Ply Roofing Membranes	07/14/2023	5 years	EPD 543

DECLARATION TYPE

A "Cradle-to-Grave" EPD for three selected thicknesses of the Sarnafil S 327 roofing membrane (60, 72 and 80 mils).

The modules included are A1 -A3, A4-A5, B1-B7 and C1-C4. The declaration is intended for use in Business to Business (B2B) communication.

PRODUCT APPLICABILITY AND CHARACTERISTICS

The declared Sarnafil S 327 roofing membrane thicknesses (60, 72 and 80 mils) are designed for low-slope and steep slope roofing applications. The membranes include an internal polyester reinforcement to provide the tear resistance required for mechanically-fastened roof systems.

CONTENT OF THE DECLARATION

This declaration follows Section 9, Content of NSF International Product Category Rules for Preparing an Environmental Product Declaration for Single-Ply Roofing Membranes, version 2, 2019.

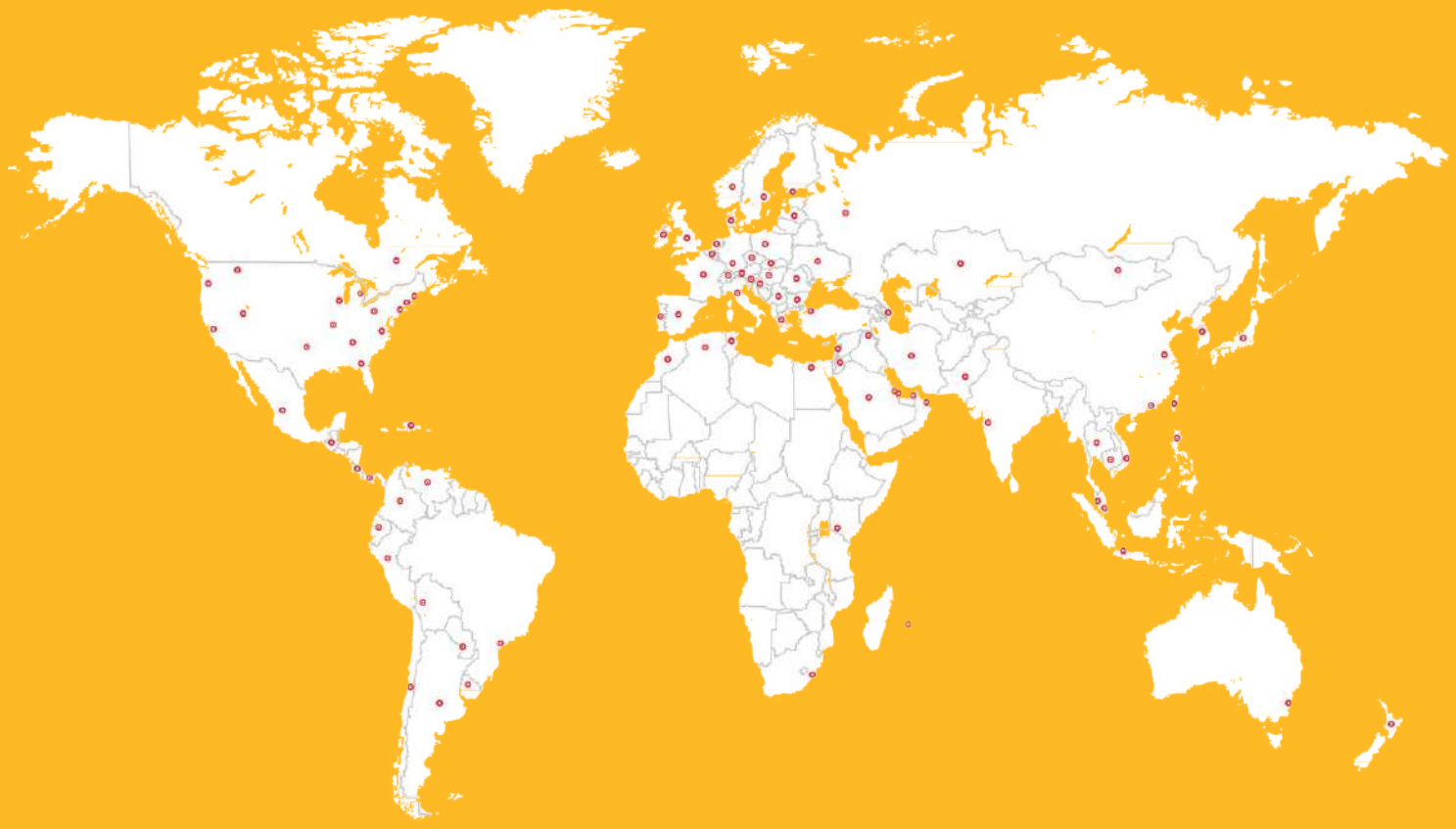
EPD PROJECT REPORT INFORMATION

EPD PROJECT REPORT	A "Cradle-to-Grave" Life Cycle Assessment for three thicknesses of Sarnafil S 327 (60, 72 and 80 mils), June 2023
LCA AND EPD PREPARED BY:	Global Product Sustainability Sika Services AG Tüffenwies 16 8048 Zürich Switzerland product.sustainability@ch.sika.com

PCR INFORMATION

PROGRAM OPERATOR	NSF International
REFERENCE PCR	NSF International, Product Category Rule for Environmental Product Declarations, PCR for Single Ply Roofing Membranes October 2019.
DATE OF ISSUE	10/11/2019, version 2
PCR REVIEW WAS CONDUCTED BY:	Thomas P. Gloria, PhD (Chair), Industrial Ecology Consultants, t.gloria@industrial-ecology.com Mr. Jack Geibig, EcoForm Mr. Bill Stough, Sustainable Research Group

GLOBAL BUT LOCAL PARTNERSHIP



BUILDING TRUST, EVERY DAY

With over 100 years of experience, Sika is a worldwide innovation and sustainability leader in the development and production of systems and products for construction, as well as the marine, automotive, and renewable energy manufacturing industries. Sika has offices in over 100 countries with over 300 manufacturing facilities and more than 27,000 employees worldwide. With annual sales of 9.5+ billion dollars in 2021, our commitment to quality, innovation, and the environment as well as putting our customer's needs first, encompasses why Sika is a global leader in our industries. Sika, Building Trust.

SIKA CORPORATION • ROOFING

100 Dan Road • Canton, MA 02021 • USA

East Tel: 888-552-9769 West Tel:

888-509-3350 Fax: 781-828-5365

usa.sika.com/sarnafil

webmaster.sarnafil@us.sika.com

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