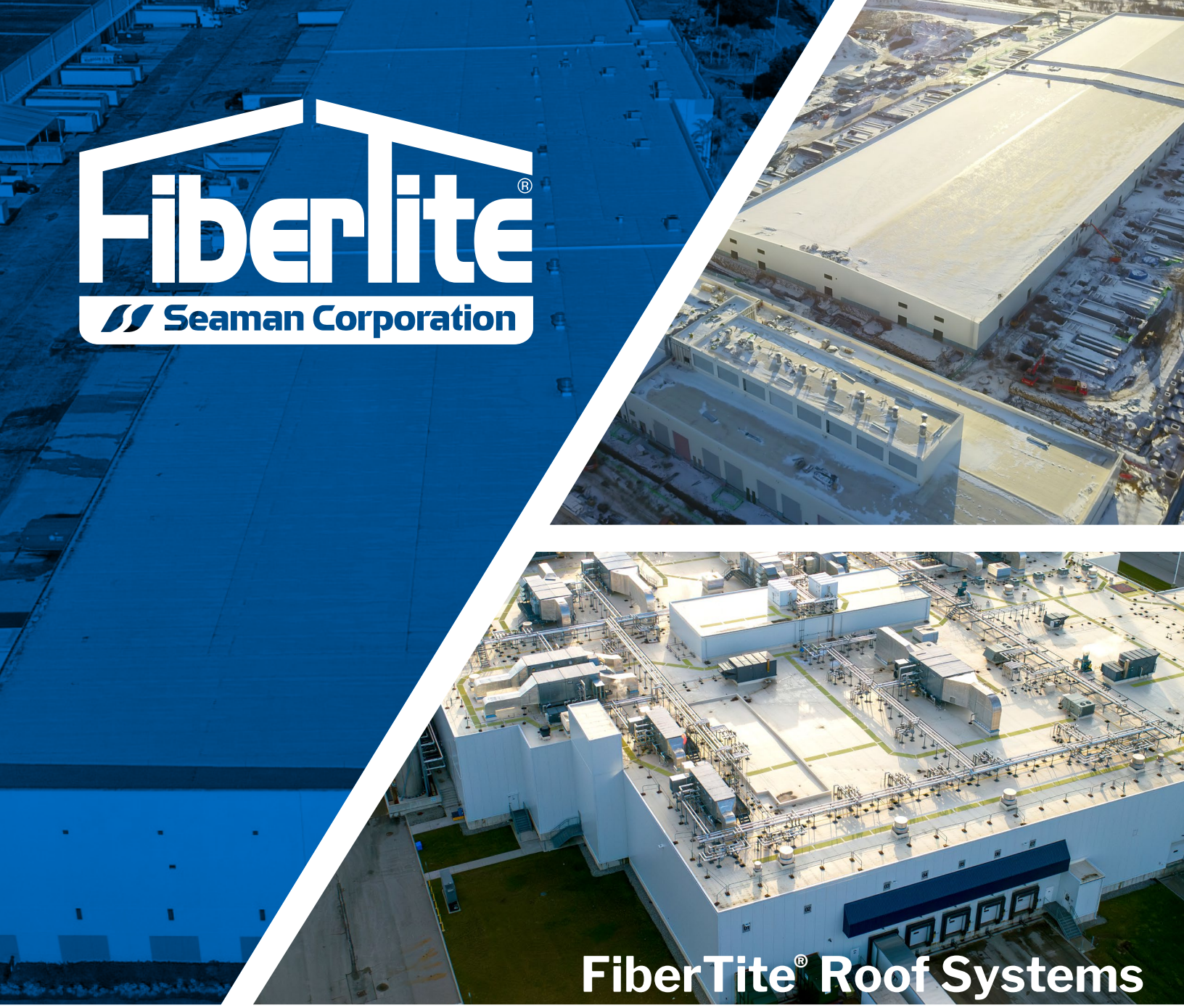

Cradle-to-Grave Environmental Product Declaration

for Seaman Corporation's FiberTite Single-Ply Roofing Membrane

Seaman Corporation

ASTM INTERNATIONAL

ASTM International Certified Environmental Product Declaration

This document is a Type III environmental product declaration (EPD) for Seaman Corporation's FiberTite® polyester reinforced single-ply roofing membranes in 36, 45, 50, and 60-mil nominal thicknesses with and without fleece backing (1), as manufactured at its Wooster, OH and Bristol, TN facilities for the reference year 2021.

This declaration has been prepared in accordance with ISO 14025 (2), ISO 21930 (3), ISO 14040/44 (4), (5), the NSF International's Product Category Rules for Single-Ply Roofing Membranes (6) and ASTM's General Program Instructions for Type III EPD (7).

The intent of this document is to further the development of environmentally compatible and more sustainable construction methods by providing comprehensive environmental information related to the potential impacts of Seaman Corporation's FiberTite roofing membranes in accordance with international standards.

Environmental Product Declaration Summary

General Information	
Owner of the EPD	Seaman Corporation Seaman Corporation 1000 Venture Blvd. Wooster, OH 44691 Link (URL) https://www.seamancorp.com/ Established in 1949, Seaman Corporation is a world leader in innovative, high-performance coated fabrics for many different applications in several markets. Product lines include XR® Geomembrane liners and Shelter-Rite® Architectural Fabrics, Truck Tarps, and Military Fabrics. In 1979, FiberTite® Roof Systems was born from the XR technology and has become a market leader in protecting operational security for critical facilities worldwide. The owner of the declaration is liable for the underlying information and evidence.
Manufacturing Sites	Single-Ply Roofing Membranes Wooster, OH and Bristol, TN 1000 Venture Blvd, Wooster, OH 44691 225 N Industrial Dr, Bristol, TN 37620.
Product Group	Single-Ply Roofing Membranes

Product Name	Seaman Corporation's FiberTite roofing membrane with a finished nominal thickness of 36-mil, 45-mil, 50-mil, and 60-mil with and without fleece backing. 36 mil FiberTite 36 mil FiberTite-FB 45 mil FiberTite-SM 45 mil FiberTite-SM-FB 50 mil FiberTite-XT 50 mil FiberTite-XT-FB 60 mil FiberTite-SM 60 mil FiberTite-SM-FB
Product Definition	Single-ply roofing membranes are defined as thermoplastic or thermoset membranes of compounded synthetic materials manufactured in a factory for use in roofing.
Product Category Rule (PCR)	NSF International, Product Category Rule for Environmental Product Declarations for Single Ply Roofing Membranes, October 2019 (6). ISO 21930:2017 serves as the core PCR (3).
Certification Period	November 21st, 2024 – 5-year validity
Declared Unit	1,000 m^2 of installed FiberTite Roofing Membranes, with a finished nominal thickness of 36, 45, 50, or 60 mils with and with or without fleece backing and a reference service life (RSL) of 40 years over a building estimated service life of 75 years.
ASTM Declaration Number	EPD #822
EPD Information	
Program Operator	ASTM International 100 Barr Harbor Drive, PO Box C700 West Conshohocken, PA 19428-2959, USA https://www.astm.org/products-services/certification/environmental-product-declarations/epd-pcr.html

Declaration Type
This corporate average "Cradle-to-grave" EPD applies to the Seaman Corporation's FiberTite single-ply roofing membrane (all colors) in 36, 45, 50 and 60-mil nominal thicknesses with and without fleece backing. The life cycle stages covered are the production, construction, use, and end-of-life stages, including the optional module D. The declaration is intended for Business-to-Business (B-to-B) and Business-to-Consumer (B-to-C) communication.

Applicable Countries
United States and Canada

Product Applicability
Seaman Corporation's single-ply roof membrane is designed for low-slope roofing applications. It utilizes a unique four-layer technology that sets the performance standard in low-slope and steep slope roofing with a proprietary, proven formula utilizing Elvaloy® Ketone Ethylene Ester (KEE) and provides unmatched puncture, chemical and UV resistance. FiberTite roof membranes can be used in adhered and mechanically fastened systems.

This EPD was independently verified by ASTM in accordance with ISO 14025:	Tim Brooke 100 Barr Harbor Drive, PO Box C700 West Conshohocken, PA 19428-2959, USA https://www.astm.org/
Internal:	External: x
EPD Project Report Information	
EPD Project Report	A Cradle-to-Grave Life Cycle Assessment of Seaman Corporation's Single-Ply PVC Roofing Membranes, August 2024 (8).
Prepared by Athena Sustainable Materials Institute	Athena Sustainable Materials Institute 119 Ross Avenue, Suite 100 Ottawa, Ontario, K1Y 0N6, Canada info@athenasmi.org
This EPD project report was independently verified by and in accordance with ISO 14025 and the reference PCR:	Thomas P. Gloria, Ph.D. Industrial Ecology Consultants 35 Bracebridge Rd. Newton, MA 02459-1728
PCR Information	
Program Operator	NSF International
Reference PCR	NSF International, Product Category Rules for Preparing an Environmental Product Declaration for Single Ply Roofing Membranes (6).
Date of Issue	October 2019
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
EPD Explanatory material	Please contact the program operator for any explanatory material regarding this EPD. ASTM International Environmental Product Declarations 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, http://www.astm.org

1 PRODUCT IDENTIFICATION

1.1 PRODUCT DEFINITION

Single-ply roofing membranes are defined as thermoplastic or thermoset membranes of compounded synthetic materials manufactured in a factory for use in roofing (6). This EPD applies to the Seaman Corporation's FiberTite® single-ply roofing membranes (all colors), with a finished nominal thickness of 36, 45, 50 and 60 mils with and without fleece backing, as produced at its manufacturing facilities in Wooster, OH and Bristol, TN.

FiberTite single-ply membranes feature a heavy reinforcing fabric and high percentage of DOW Elvaloy™ Ketone Ethylene Ester (KEE) content. They consist of a unique, four-layer structure which provides exceptional resistance to puncture, ultraviolet radiation, chemicals, and ponding water. These membranes are offered with compliance to the requirements of ASTM D6754, Standard Specification for Ketone Ethylene Ester Based Sheet Roofing.

Seaman Corporation's FiberTite roofing membrane contributes to LEED® credit requirements and is Cool Roof Rating Council-rated and Title 24 compliant. The FiberTite product line offers a membrane for virtually any roofing specification. The membranes weld quickly, cleanly, and consistently. Seaman Corporation's FiberTite roofing membranes can be installed as a mechanically fastened or adhered roofing system.

Table 1 summarizes key technical data for Seaman Corporation's FiberTite single-ply roofing membrane by thickness. Further testing information and results can be found on the FiberTite website (*www.fibertite.com*) (9).

Table 1| *Key technical data of declared thicknesses* (9)

Single-ply roofing membranes	Technical data	Units	Values			
FiberTite KEE Membrane (no fleece backing)	Finished nominal thickness[1]	mil	36	45	50	60
		mm	0.9	1.1	1.3	1.5
	Finished density	kg/m²	1.0	1.4	1.4	1.8
FiberTite KEE Membrane (fleece backed)	Finished nominal thickness[1,2]	mil	36	45	50	60
		mm	0.9	1.1	1.3	1.5
	Finished density	kg/m²	1.2	1.5	1.6	1.9

[1] "Nominal" thickness is defined as the commonly used dimension by which the thickness of a single-ply roofing membrane is sold or marketed. All declared roofing membrane thicknesses are "nominal" values and are subject to normal manufacturing tolerance of +/-10% of the stated value.

[2] Thickness does not include fleece backing

1.2 PRODUCT STANDARDS

The declared Seaman Corporation's FiberTite roofing membranes meet the following standards and requirements:

- ASTM D6754 Standard Specification for Ketone Ethylene Ester (KEE) Based Sheet Roofing (1)
- Cool Roof Rating Council® (select colors)
- FM Approvals
- Miami-Dade County Approval
- California's Building Energy Code (Title 24)
- Texas Department of Insurance.
- Underwriters Laboratory Inc.
- Underwriters Laboratories of Canada
- ICC Evaluation Service
- NEMO etc (certification to ASTM D6754)

2 FUNCTIONAL UNIT

The functional unit is defined as 1,000 m^2 of installed FiberTite Roofing Membranes, with a finished nominal thickness of 36, 45, 50, or 60 mils with and without fleece backing and a reference service life (RSL) of 40 years over a building estimated service life of 75 years.

3 MATERIAL CONTENT

The average material composition by input material (in percent) for Seaman Corporation's FiberTite roofing membrane is provided in **Table 2**.

Table 2| *Average material content for Seaman Corporation's FiberTite roofing membrane*

Material input	Material Content (%)	
	Non-fleece (bareback)	Fleece backed
PVC Resin & KEE co-polymer	52%	48%
Processing aids	15%	14%
Pigments	4%	4%
Fire retardant	11%	10%
Polyester reinforcement	14%	13%
Fleece backing	0%	9%
Others	3%	3%
Total weight (Input)	**100%**	**100%**

4 LIFE CYCLE STAGES

Figure 1 shows the life-cycle stages and information modules that are included within the cradle-to-grave LCA system boundary of this EPD. The boundary is "cradle-to-grave", which consists of the *Production stage* (A1 to A3 modules), *Construction stage* (A4 to A5 modules), *Use stage* (B1 to B7 modules), and *End-of-Life stage* (C1 to C4 modules). Optional supplementary information beyond the system boundary Module D is also included.

Per ISO 21930, 7.1.7. 1 (3), *the information modules A1, A2 and A3 are based on the actual and representative data of the production process of the product. However, as soon as a construction product leaves the factory gate, the assessment shall be based on scenarios and assumptions. The scenarios and assumptions considered depend upon various details, including location, type of transport, method of installation and construction, type of construction works, use, maintenance and repair, end-of-life treatment, and waste handling.*

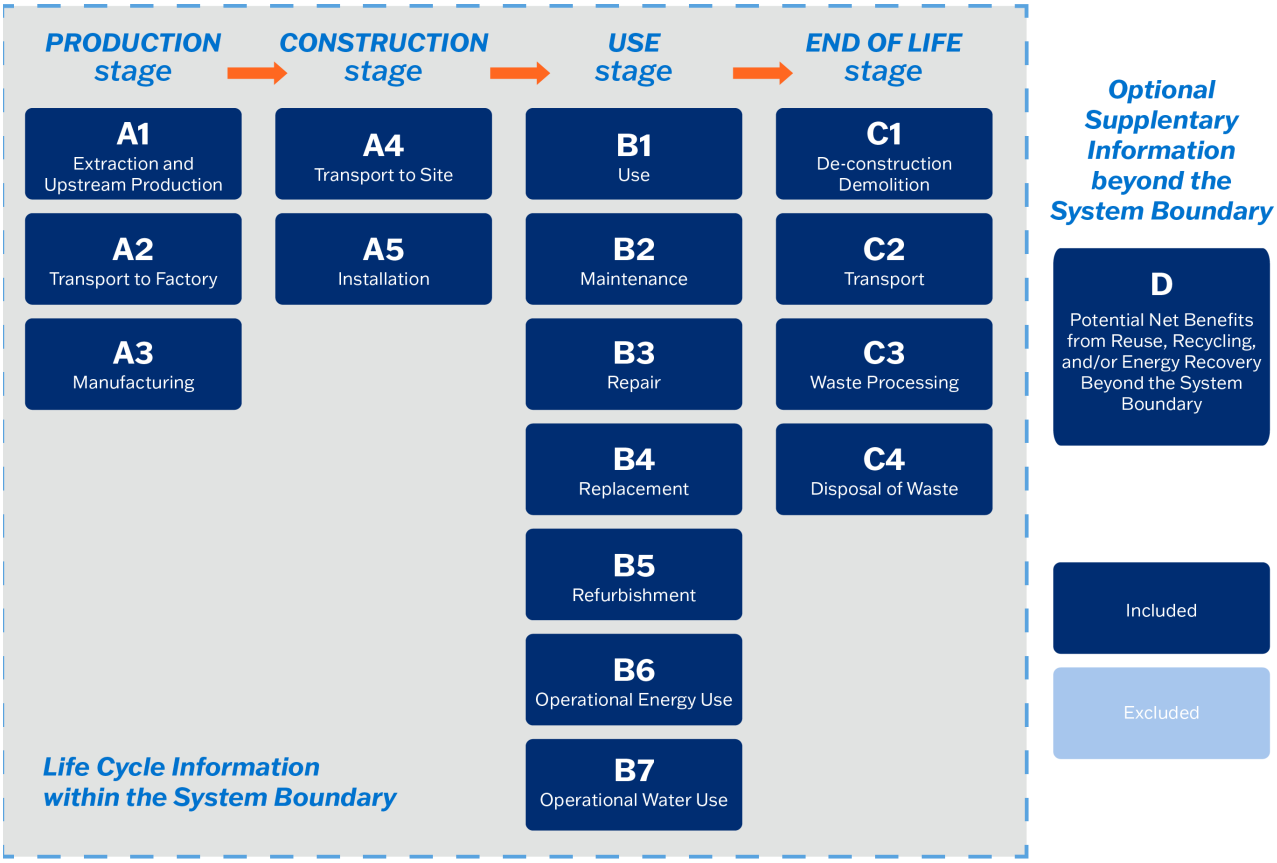

Figure 1 | *Life Cycle Stages and Modules*

The *Production stage* includes the following three information modules A1 to A3: — A1, extraction and upstream production; — A2, transport to factory; and — A3, manufacturing. Figure 2 presents the Production stage system boundary for the declared KEE roofing membrane manufacturing.

The *Construction stage* includes the following two information modules A4 to A5: — A4, transport to the site (**Table 3**); — A5, installation (**Tables 4 and 5**).

For the mechanically fastened installation system, the KEE roofing membranes are rolled out on a suitable substrate (clean, even, solid, on insulation or cover board as required), aligned and fastened with approved fastening systems to the supporting structure according to the manufacturer's specification.

Usually, the fastening is carried out along the membrane overlap (seam area). After installation of the fasteners, seam overlaps are welded for waterproofing. Fasteners may also be placed in the field of the membrane. With mechanical fastening of the roofing membranes, the complete roof build-up (including thermal insulation, vapor control layer, etc.) is secured to the underlying structure.

The *Use stage* includes the following information modules B1 to B7: — B1, use; B2, Maintenance; B3, Repair; B4, Replacement (**Table 6**); B5, Refurbishment; B6, Operational energy use; and B7, Operational water use.

No emissions to air (B1) are released during the use phase of the declared products. No energy (B6) or water use (B7) is required during the service life of the declared products. The burden of use (B1), maintenance (B2), repair (B3), refurbishment (B5), or operational energy use (B6) and water use (B7) modules is assumed null for this EPD. Based on the replacement cycle (0.9), replacement module (B4) is calculated by scaling up A1 to A5 and C1 to C4 results to fulfill the building ESL of 75 years.

The *End-of-Life Stage* includes the following information modules (**Table 7**): — C1, Deconstruction/ Demolition; — C2, Transport to waste processing and/or disposal; — C3, Waste processing of flows resulting in secondary material (post-consumer), materials for reuse (not applicable), or secondary fuels (not applicable); and — C4, Disposal of waste.

Optional supplementary module D provides information about the potential net benefits from post-consumer roof recycling beyond the system boundary of the studied PVC roofing membrane system.

The LCA results associated with module D are reported separately. The net output flow for all PVC roofing membranes for secondary material leaving a product system is calculated by adding all output flows of the secondary material and subtracting any input flows of this secondary material from each information module (A1 to A5, and C1 to C4) thus arriving at the net output flow of secondary material from the PVC roofing membrane system (**Table 8**).

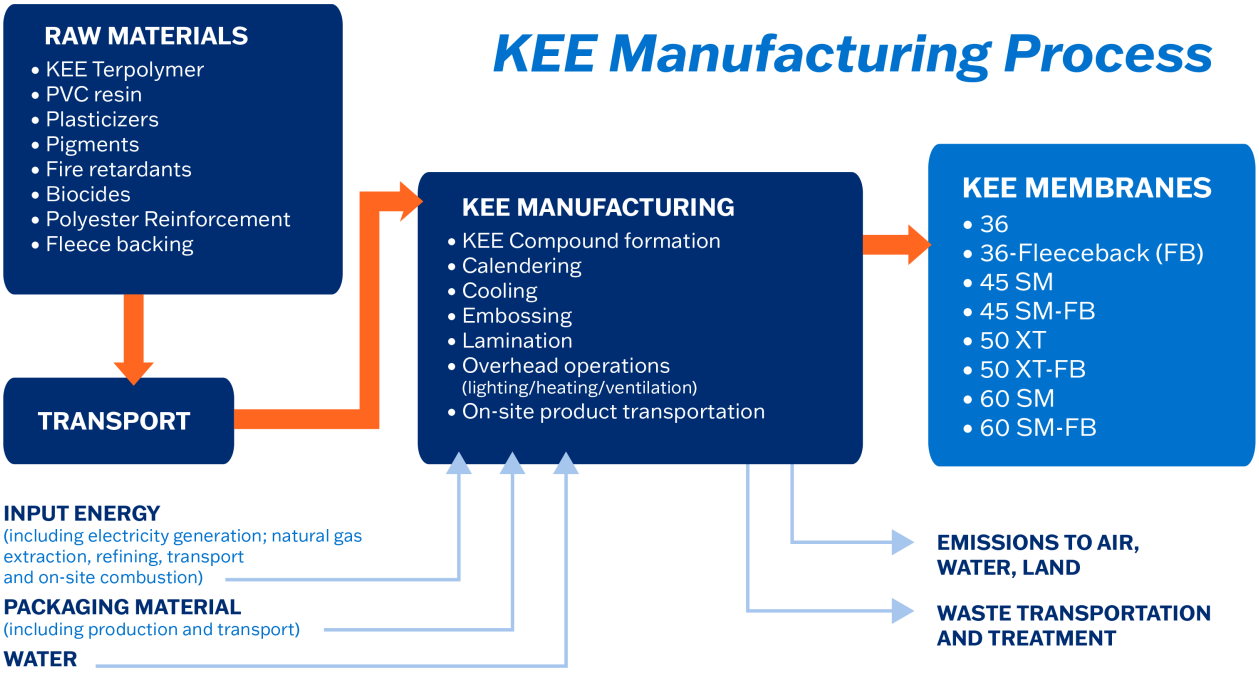

Figure 2 | *Seaman's Corporation's Roofing Membrane System Boundaries*

Table 3 | *A4 Module, Product transport to the building site for Seaman KEE roofing membrane (36, 45, 50 and 60 mils)*

Transport to site (A4)	Units	One-way distance	Comments
Combination truck, diesel, long haul >200 mi	km	1925	Manufacturing site to local distributor
Combination truck, diesel, short-haul <200 mi	km	25[1]	Local distributor to the building site

Note:
[1] *Assumed the same as CFFA Industry Average EPD 126, 2020.*

Table 4 | *A5 Module, Installation systems for Seaman KEE roofing membrane (36, 45, 50 and 60 mils)*

Declared membrane	Installation	Seam welding
40 mils	Mechanically fastened	Hot-air welding
48 mils		
60 mils		
80 mils		

Table 5 | *A5 Module, Installation scenario data for 1,000 m² of installed Seaman KEE roofing membrane (36, 45, 50 and 60 mils)*

Installation (A5)[1]	Units	Quantity
Fasteners (5" type screws and seam plates)[2]	kg	111
Electricity for seam welding	kWh	21
Electricity for securing the screws	kWh	15
Seam area	m²	50
Material loss	m²	10
Waste transport to landfill (including packaging waste)[3] – one way	mi/km	20/32

Notes:

[1] Assumed the same as CFFA Industry Average EPD 126, 2020.

[2] Each fastener is typically used to hold down 7.5 sq. ft. (0.7 m²) of KEE roofing membrane, so a fastener usage of 1.5 fasteners per m² (=10.76/7.5) is used in the LCA. There are 14 screws per pound (5" type). There are 11 seam plates per pound.

Table 6 | *B4 Module, Replacement scenario data for 1,000 m² of installed Seaman KEE roofing membrane (36, 45, 50 and 60 mils)*

Replacement (B4)	Value	Unit
Product Reference Service Life (RSL)	40[1]	years
Building Estimated Service Life (ESL)	75	years
Replacement cycle-ESL	0.9	(ESL/RSL)-1

Note:

[1] RSL of 40 years is based on primary historical data provided by Seaman. Seaman PVC roofing membranes use Elvaloy, a co-polymer that adds flexibility. Since Elvaloy cross-links with the PVC, it does not migrate out over time.

Table 7 | *C1 to C4 Modules, EOL scenario data for 1,000 m² of installed Seaman KEE roofing membrane (36, 45, 50 and 60 mils)*

End-of-life Stage	Flow	Units	Quantity
C1[1]	Electricity	kWh	2.4
	Diesel	MJ	421
C2[1]	Discarded KEE membrane[1]	mi/km	20/32
C3	Secondary material[2]	%	10
C4	Disposal of waste	%	90

Notes:

[1] C1, C2-Assumed the same as CFFA Industry Average EPD 126, 2020.

[2] Secondary material is either recycled back after processing (e.g. pelletization, grinding etc.) to the KEE roofing system or other PVC products (commercial PVC flooring, PVC expansion joint material for the concrete industry).

Table 8 | *Optional Module D, Supplementary data for 1,000 m² of installed Seaman KEE roofing membrane (36, 45, 50 and 60 mils)*

Membrane thickness	Net output flow	Units	Quantity
No fleece backing			
36 mils	Secondary material	kg	152.17
45 mils		kg	203.11
50 mils		kg	208.84
60 mils		kg	260.17
Fleece backed			
36 mils	Secondary material	kg	172.44
45 mils		kg	221.28
50 mils		kg	228.06
60 mils		kg	279.39

Note:
[1] Secondary post-consumer PVC pellets are assumed to be functionally equivalent to primary PVC resin.

5 LIFE CYCLE INVENTORY

5.1 DATA COLLECTION, SOURCES, AND CALCULATIONS

LCI data collection was based on a customized LCI survey. The LCI survey covered the primary data for two facilities for the 2021 reference year (12 consecutive months). Data calculation procedures follow ISO 14044 (5), and NSF PCR for Single Ply Roofing Membranes (6). Per ISO 21930, 7.2.2 (3), when transforming the inputs and outputs of combustible material into inputs and outputs of energy, the net calorific value (lower heating value) of fuels is applied according to scientifically based and accepted values specific to the combustible material.

5.2 DATA QUALITY REQUIREMENTS AND ASSESSMENTS

The LCA project report provides a detailed description of the collected data and the data quality assessment regarding the NSF PCR requirements (6) and ISO 14044 (5). Data quality is assessed based on its representativeness (technology coverage, geographic coverage, time coverage), completeness, consistency, reproducibility, transparency, and uncertainty (**Table 9**).

Table 9| *Data Quality Requirements and Assessments*

Data Quality Requirements	Description
Technology Coverage	Data represents the prevailing technology at Seaman Corporation's plants in Wooster, OH and Bristol, TN. Whenever available, North American typical or average industry LCI datasets were utilized for all upstream and core materials and processes. **Technological representativeness is characterized as "high".**

Data Quality Requirements	Description
Geographic Coverage	The geographic region considered is the U.S. ***Geographical representativeness is characterized as "high".***
Time Coverage	Activity data are representative. - Roofing membrane manufacturing process- primary data collected for the reference year 2021 (12 months) - Inbound/ outbound transportation data- primary data collected for the reference year 2021 (12 months) - Polyester scrim reinforcement production- primary data collected at Wooster, OH plant for the reference year 2021 (12 months) - Fleece backing production- SDS and confidential data provided by Seaman Corporation (2021) - Generic data: the most appropriate LCI datasets were used as found in the US LCI Database, ecoinvent v.3.5 database for US and Global, 2018. US LCI database "dummies" (empty/missing LCI datasets) are substituted with ecoinvent v3.5 LCI datasets. ***Temporal representativeness is characterized as "medium" to "high".***
Completeness	All relevant, specific processes were considered and modelled, including inputs (raw materials, energy, and ancillary materials) and outputs (emissions and production volume). The relevant background materials and processes were taken from the US LCI Database (adjusted for known data placeholders), ecoinvent v 3.5 LCI database for US, and modeled in SimaPro software v.9.5, 2024 (10). The completeness of the cradle-to-grave process chain in terms of process steps is rigorously assessed for all membranes and documented in the project report.
Consistency	To ensure consistency, the input/output LCI modelling of the single-ply roofing membranes used the same LCI modelling structure, which consisted of input raw, secondary, ancillary, and packaging materials, intermediate products, energy flows, water resource inputs, product outputs, co-products, by-products, emissions to air, water and soil, and solid and liquid waste disposal. Crosschecks concerning the plausibility of mass and energy flows were continuously conducted. The LCA team conducted mass and energy balances at the facility level and selected process levels to maintain high consistency.
Reproducibility	Internal reproducibility is possible since the data and the models are stored and available in the *Athena Seaman LCI database* developed in SimaPro v.9.5, 2024 (10). A high level of transparency is provided throughout the critically reviewed LCA project report as the LCI profile is presented for each declared product and major upstream inputs. The supporting LCA project report summarizes key primary (manufacturer-specific) and secondary (generic) LCI data sources.
Transparency	Activity and LCI datasets, including data sources, are transparently disclosed in the project report.

Data Quality Requirements	Description
Uncertainty	A *sensitivity check* was conducted to assess the reliability of the EPD results and conclusions by determining how they are affected by uncertainties in the data or assumptions on the calculation of LCIA and energy indicator results. The LCA background report includes the results of a *sensitivity analysis and Monte Carlo uncertainty analysis of background data sets.*

5.3 ALLOCATION RULES

Both manufacturing facilities produce high-performance fabrics for other uses besides the roofing membranes of interest, and as per the PCR, allocation based on the mass of membrane products produced was necessary. “Mass” based, plant-specific formulations for 1,000 m^2 of single-ply roofing membranes were used to calculate the input raw ancillary materials consumed. “Mass” was used as the physical parameter for allocating flows between the products of interest and other co-products to calculate the input energy flows (electricity, natural gas, propane, etc.), shipping and packaging materials, lubricants, hydraulic fluid, greases, and heating oil, total water consumption, process emissions to air and waste flows. No burden is allocated to the by-product of the declared product system, such as off-spec roofing membranes. In addition, allocation related to transport is based on the mass of transported inputs and outputs.

5.4 CUT OFF RULES

The cut-off criteria were followed as per NSF PCR, Section 7.1.6 (6) and ISO 21930, 7.1.8 (3). All input/output data reported by the Wooster, OH and Bristol, TN manufacturing plants were included in the LCI modelling. None of the reported flow data were excluded based on the cut-off criteria. No substances with hazardous and toxic properties that concern human health and/or the environment were identified in the framework of this EPD. Any plant-specific data gaps for the reference year (e.g., input hydraulic fluids, lubricants, greases, or heated oil) were filled in with plant generic data from 2018. Seaman Corporation confidentially provided Safety Data Sheet (SDSs) for each additive, e.g., processing aid (also referred to as the plasticizer), fire retardant, stabilizer, fleece backing, etc. Any data gaps in the SDS are filled in with proxy and conservative generic LCI datasets, as appropriate.

This EPD excludes the following processes and activities:

- Capital goods and infrastructure, and
- Personnel-related activity (travel, furniture, office operations and supplies).

6 LIFE CYCLE ASSESSMENT RESULTS

Tables 10 to 18 present the “cradle-to-grave” LCA results for 1,000 m^2 of 36, 45, 50, and 60-mil Seaman Corporation’s FiberTite without and with fleece backing roofing membrane, respectively. As per the NSF PCR, the US EPA Tool for the Reduction and Assessment of Chemical and Other

Environmental Impacts (TRACI), version 2.1, 2012 (11) impact categories are used as they provide a North American context for the mandatory category indicators to be included in this EPD. *These are relative expressions only and do not predict category impact endpoints, the exceeding of thresholds, safety margins or risks* [4], [5]. Additional mandatory resource use, waste categories and output flows are also reported per the PCR.[7] *"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:* RPR_E, RPR_M, $NRPR_E$, $NRPR_M$, SM, RSF, NRSF, RE, HWD, NHWD, HLRW, ILLRW, CRU, MR, MER, EE" (6). Note that the environmental burden of modules B1, B2, B3, B5, B6, and B7 is null.

Table 10 | *EPD Results (A1-D) – 1,000 m² of Seaman Corporation FiberTite Membrane (36-mil FT)- non-fleece backed*

Impact category and inventory indicators	Unit	A1 to A3	A4	A5	B4	C1	C2	C3	C4	D
GWP 100 [1]	kg CO_2 eq	4,275.50	205.09	522.96	4,595.91	37.66	3.87	0.33	61.16	-268.12
ODP [1]	kg CFC-11 eq	4.9E-04	8.6E-09	4.7E-05	5.0E-04	9.2E-06	1.6E-10	3.5E-08	1.5E-08	-3.9E-05
SFP [1]	kg O_3 eq	296.30	69.50	36.67	373.53	11.38	1.15	0.022	0.0077	-4.42
AP [1]	kg SO_2 eq	24.25	2.69	2.60	27.09	0.37	0.045	0.0013	0.15	-0.90
EP [1]	kg N eq	72.67	0.16	5.55	77.59	0.047	0.0027	0.0023	7.78	-0.54
FFD [1]	MJ surplus, LHV	10,157.57	431.96	764.99	10,300.21	81.68	8.16	0.30	0.025	-933.37
ADPf [2]	MJ, LHV	77,404.81	2,918.28	7,319.18	79,423.49	546.91	55.13	3.68	0.32	-6,564.97
RPRE	MJ, LHV	3,197.78	0	287.14	3,139.47	2.47	0	0.25	0.66	-65.59
RPRM [3]	MJ, LHV	-[5]	-	-	-	-	-	-	-	-
NRPRE	MJ, LHV	64,139.00	2,951.22	6,729.50	68,368.00	555.89	55.76	4.90	1.86	-6,900.31
NRPRM [3]	MJ, LHV	22,613.88	0	1,356.83	20,199.96	0	0	0	0	0
SM [3]	kg	0	0	0	0	0	0	0	0	0
RSF [3]	MJ, LHV	-	-	-	-	-	-	-	-	-
NRSF [3]	MJ, LHV	-	-	-	-	-	-	-	-	-
RE [3]	MJ, LHV	-	-	-	-	-	-	-	-	-
FW [3]	m^3	0.94	0	0.056	0.89	0	0	0	0	0
HWD [3]	kg	8.80	0	0.53	8.40	0	0	0	0	0
NHWD [3]	kg	80.10	0	66.27	1,016.25	0	0	0	982.80	0
HLRW [3 4]	m^3	4.8E-06	0	4.3E-07	4.6E-06	4.2E-09	0	0	2.8E-09	-1.9E-07
ILLRW [3 4]	m^3	7.0E-05	0	8.0E-06	7.1E-05	1.9E-06	0	0	1.3E-06	-2.4E-06
CRU [3]	kg	-	-	-	-	-	-	-	-	-
MR [3]	kg	43.39	0	2.60	139.67	0	0	109.20	0	0
MER [3]	kg	-	-	-	-	-	-	-	-	-
EE [3]	MJ, LHV	-	-	-	-	-	-	-	-	-

Table 11 | *EPD Results (A1-D) – 1,000 m² of Seaman Corporation FiberTite Membrane (45-mil FT-SM)- non-fleece backed*

Impact category and inventory indicators	Unit	A1 to A3	A4	A5	B4	C1	C2	C3	C4	D
GWP 100 [1]	kg CO_2 eq	5,271.79	271.36	586.98	5,629.63	37.66	5.17	0.44	81.74	-357.50
ODP [1]	kg CFC-11 eq	6.8E-04	1.1E-08	5.8E-05	6.8E-04	9.2E-06	2.2E-10	4.7E-08	1.9E-08	-5.3E-05
SFP [1]	kg O_3 eq	399.60	91.96	44.23	493.87	11.38	1.53	0.030	0.0103	-5.90
AP [1]	kg SO_2 eq	32.20	3.55	3.13	35.56	0.37	0.060	0.0018	0.20	-1.20
EP [1]	kg N eq	113.05	0.21	8.01	118.55	0.047	0.0036	0.0031	10.40	-0.71
FFD [1]	MJ surplus, LHV	12,004.72	571.54	884.30	12,198.22	81.68	10.91	0.41	0.033	-1,244.50
ADPf [2]	MJ, LHV	91,597.81	3,861.26	8,228.10	93,881.81	546.91	73.69	4.92	0.43	-8,753.29
RPRE	MJ, LHV	4,419.30	0	360.44	4,305.08	2.47	0	0.34	0.88	-87.45
RPRM [3]	MJ, LHV	-[5]	-	-	-	-	-	-	-	-
NRPRE	MJ, LHV	71,903.82	3,904.85	7,253.38	69,671.76	555.89	74.52	6.55	2.49	-9,200.41
NRPRM [3]	MJ, LHV	30,427.86	0	1,825.67	34,687.76	0	0	0	0	0
SM [3]	kg	0	0	0	0	0	0	0	0	0
RSF [3]	MJ, LHV	-	-	-	-	-	-	-	-	-
NRSF [3]	MJ, LHV	-	-	-	-	-	-	-	-	-
RE [3]	MJ, LHV	-	-	-	-	-	-	-	-	-
FW [3]	m^3	0.94	0	0.057	0.90	0	0	0	0	0
HWD [3]	kg	9.71	0	0.58	9.26	0	0	0	0	0
NHWD [3]	kg	81.27	0	71.56	1,319.74	0	0	0	1,313.55	0
HLRW [3 4]	m^3	5.5E-06	0	4.8E-07	5.4E-06	4.6E-09	0	0	3.0E-09	-2.6E-07
ILLRW [3 4]	m^3	8.2E-05	0	8.7E-06	8.4E-05	1.9E-06	0	0	1.3E-06	-5.1E-07
CRU [3]	kg	-	-	-	-	-	-	-	-	-
MR [3]	kg	56.77	0	3.41	185.51	0	0	145.95	0	0
MER [3]	kg	-	-	-	-	-	-	-	-	-
EE [3]	MJ, LHV	-	-	-	-	-	-	-	-	-

Table 12 | *EPD Results (A1-D) – 1,000 m² of Seaman Corporation FiberTite Membrane (50-mil FT-XT)- non-fleece backed*

Impact category and inventory indicators	Unit	A1 to A3	A4	A5	B4	C1	C2	C3	C4	D
GWP 100 [1]	kg CO_2 eq	5,406.67	278.90	595.56	5,767.78	37.66	5.32	0.45	84.09	-375.37
ODP [1]	kg CFC-11 eq	6.6E-04	1.2E-08	5.7E-05	6.5E-04	9.2E-06	2.2E-10	4.8E-08	2.0E-08	-5.5E-05
SFP [1]	kg O_3 eq	393.36	94.51	44.01	490.39	11.38	1.58	0.030	0.0105	-6.19
AP [1]	kg SO_2 eq	32.82	3.65	3.17	36.25	0.37	0.062	0.0018	0.21	-1.26
EP [1]	kg N eq	104.40	0.22	7.49	110.57	0.047	0.0037	0.0031	10.70	-0.75
FFD [1]	MJ surplus, LHV	13,300.06	587.40	962.98	13,449.42	81.68	11.22	0.42	0.034	-1,306.72
ADPf [2]	MJ, LHV	100,769.19	3,968.42	8,784.86	102,735.63	546.91	75.81	5.06	0.45	-9,190.96
RPRE	MJ, LHV	4,062.30	0	339.02	3,964.53	2.47	0	0.35	0.90	-91.83
RPRM [3]	MJ, LHV	-[5]	-	-	-	-	-	-	-	-
NRPRE	MJ, LHV	81,837.53	4,013.21	7,855.96	79,322.26	555.89	76.67	6.74	2.56	-9,660.43
NRPRM [3]	MJ, LHV	30,061.48	0	1,803.69	34,270.08	0	0	0	0	0
SM [3]	kg	0	0	0	0	0	0	0	0	0
RSF [3]	MJ, LHV	-	-	-	-	-	-	-	-	-
NRSF [3]	MJ, LHV	-	-	-	-	-	-	-	-	-
RE [3]	MJ, LHV	-	-	-	-	-	-	-	-	-
FW [3]	m^3	0.92	0	0.055	0.88	0	0	0	0	0
HWD [3]	kg	7.85	0	0.47	7.49	0	0	0	0	0
NHWD [3]	kg	78.47	0	71.74	1,351.41	0	0	0	1,351.35	0
HLRW [3 4]	m^3	5.7E-06	0	4.9E-07	5.6E-06	4.6E-09	0	0	3.1E-09	-1.3E-08
ILLRW [3 4]	m^3	8.5E-05	0	8.9E-06	8.7E-05	1.9E-06	0	0	1.3E-06	-1.6E-07
CRU [3]	kg	-	-	-	-	-	-	-	-	-
MR [3]	kg	58.63	0	3.52	191.07	0	0	150.15	0	0
MER [3]	kg	-	-	-	-	-	-	-	-	-
EE [3]	MJ, LHV	-	-	-	-	-	-	-	-	-

Table 13 | *EPD Results (A1-D) – 1,000 m² of Seaman Corporation FiberTite Membrane (60-mil FT-SM)- non-fleece backed*

Impact category and inventory indicators	Unit	A1 to A3	A4	A5	B4	C1	C2	C3	C4	D
GWP 100 [1]	kg CO_2 eq	6,678.76	347.10	676.36	7,066.55	37.66	6.62	0.56	104.68	-464.74
ODP [1]	kg CFC-11 eq	9.1E-04	1.5E-08	7.2E-05	9.0E-04	9.2E-06	2.8E-10	6.0E-08	2.5E-08	-6.8E-05
SFP [1]	kg O_3 eq	513.95	117.63	52.67	627.88	11.38	1.96	0.038	0.0131	-7.67
AP [1]	kg SO_2 eq	41.95	4.54	3.78	45.88	0.37	0.077	0.0022	0.26	-1.56
EP [1]	kg N eq	152.56	0.27	10.41	158.95	0.047	0.0046	0.0039	13.31	-0.93
FFD [1]	MJ surplus, LHV	15,251.78	731.04	1,089.05	15,451.28	81.68	13.97	0.52	0.043	-1,617.85
ADPf [2]	MJ, LHV	115,723.22	4,938.88	9,742.67	117,947.61	546.91	94.36	6.30	0.56	-11,379.28
RPRE	MJ, LHV	5,653.78	0	434.51	5,483.08	2.47	0	0.44	1.13	-113.69
RPRM [3]	MJ, LHV	-[5]	-	-	-	-	-	-	-	-
NRPRE	MJ, LHV	90,062.23	4,994.63	8,410.69	86,530.93	555.89	95.43	8.39	3.19	-11,960.53
NRPRM [3]	MJ, LHV	38,636.93	0	2,318.22	44,046.10	0	0	0	0	0
SM [3]	kg	0	0	0	0	0	0	0	0	0
RSF [3]	MJ, LHV	-	-	-	-	-	-	-	-	-
NRSF [3]	MJ, LHV	-	-	-	-	-	-	-	-	-
RE [3]	MJ, LHV	-	-	-	-	-	-	-	-	-
FW [3]	m^3	1.22	0	0.073	1.16	0	0	0	0	0
HWD [3]	kg	13.52	0	0.81	12.90	0	0	0	0	0
NHWD [3]	kg	103.86	0	89.35	1,687.77	0	0	0	1,682.10	0
HLRW [3 4]	m^3	6.6E-06	0	5.5E-07	6.5E-06	4.9E-09	0	0	3.3E-09	-3.4E-07
ILLRW [3 4]	m^3	1.0E-04	0	9.9E-06	1.0E-04	1.9E-06	0	0	1.3E-06	-4.1E-06
CRU [3]	kg	-	-	-	-	-	-	-	-	-
MR [3]	kg	71.97	0	4.32	236.87	0	0	186.90	0	0
MER [3]	kg	-	-	-	-	-	-	-	-	-
EE [3]	MJ, LHV	-	-	-	-	-	-	-	-	-

Table 14 | *EPD Results (A1-D) – 1,000 m² of Seaman Corporation FiberTite Membrane (36-mil FT-FB) – fleece-backed*

Impact category and inventory indicators	Unit	A1 to A3	A4	A5	B4	C1	C2	C3	C4	D
GWP 100 [1]	kg CO_2 eq	5,548.49	234.35	601.36	5,846.41	37.66	4.39	0.37	69.39	-303.87
ODP [1]	kg CFC-11 eq	6.1E-04	9.8E-09	5.4E-05	6.0E-04	9.2E-06	1.8E-10	3.9E-08	1.6E-08	-4.5E-05
SFP [1]	kg O_3 eq	339.07	79.42	39.88	423.97	11.38	1.30	0.025	0.0087	-5.01
AP [1]	kg SO_2 eq	28.94	3.07	2.91	31.96	0.37	0.051	0.0015	0.17	-1.02
EP [1]	kg N eq	76.49	0.18	5.79	82.21	0.047	0.0031	0.0026	8.83	-0.61
FFD [1]	MJ surplus, LHV	12,860.43	493.58	931.23	12,938.90	81.68	9.26	0.35	0.028	-1,057.82
ADPf [2]	MJ, LHV	97,541.58	3,334.57	8,554.91	99,040.56	546.91	62.56	4.18	0.37	-7,440.30
RPRE	MJ, LHV	3,995.98	0	335.03	3,901.07	2.47	0	0.29	0.75	-74.33
RPRM [3]	MJ, LHV	-[5]	-	-	-	-	-	-	-	-
NRPRE	MJ, LHV	87,089.66	3,372.21	8,134.38	85,019.84	555.89	63.26	5.56	2.11	-7,820.35
NRPRM [3]	MJ, LHV	23,015.73	0	1,380.94	26,237.93	0	0	0	0	0
SM [3]	kg	0	0	0	0	0	0	0	0	0
RSF [3]	MJ, LHV	-	-	-	-	-	-	-	-	-
NRSF [3]	MJ, LHV	-	-	-	-	-	-	-	-	-
RE [3]	MJ, LHV	-	-	-	-	-	-	-	-	-
FW [3]	m^3	1.30	0	0.078	1.24	0	0	0	0	0
HWD [3]	kg	53.20	0	3.19	50.75	0	0	0	0	0
NHWD [3]	kg	135.60	0	87.14	1,204.06	0	0	0	1,115.10	0
HLRW [3 4]	m^3	6.4E-06	0	5.3E-07	6.3E-06	4.4E-09	0	0	2.9E-09	-2.2E-07
ILLRW [3 4]	m^3	9.2E-05	0	9.3E-06	9.4E-05	1.9E-06	0	0	1.3E-06	-2.7E-06
CRU [3]	kg	-	-	-	-	-	-	-	-	-
MR [3]	kg	48.75	0	2.92	158.01	0	0	123.90	0	0
MER [3]	kg	-	-	-	-	-	-	-	-	-
EE [3]	MJ, LHV	-	-	-	-	-	-	-	-	-

Table 15 | *EPD Results (A1-D) – 1,000 m² of Seaman Corporation FiberTite Membrane (45-mil FT-SM-FB) – fleece-backed*

Impact category and inventory indicators	Unit	A1 to A3	A4	A5	B4	C1	C2	C3	C4	D
GWP 100 [1]	kg CO_2 eq	6,534.87	298.83	664.68	6,868.40	37.66	5.65	0.48	89.39	-393.24
ODP [1]	kg CFC-11 eq	8.0E-04	1.3E-08	6.5E-05	7.8E-04	9.2E-06	2.4E-10	5.1E-08	2.1E-08	-5.8E-05
SFP [1]	kg O_3 eq	443.64	101.27	47.48	544.94	11.38	1.68	0.032	0.0112	-6.49
AP [1]	kg SO_2 eq	36.92	3.91	3.44	40.43	0.37	0.066	0.0019	0.22	-1.32
EP [1]	kg N eq	117.22	0.24	8.27	123.43	0.047	0.0039	0.0033	11.37	-0.79
FFD [1]	MJ surplus, LHV	14,685.20	629.38	1,048.99	14,811.89	81.68	11.93	0.45	0.036	-1,368.95
ADPf [2]	MJ, LHV	111,552.20	4,252.02	9,451.42	113,300.08	546.91	80.58	5.38	0.47	-9,628.62
RPRE	MJ, LHV	5,229.74	0	409.06	5,078.34	2.47	0	0.37	0.96	-96.20
RPRM [3]	MJ, LHV	-[5]	-	-	-	-	-	-	-	-
NRPRE	MJ, LHV	94,585.30	4,300.01	8,640.62	91,615.19	555.89	81.49	7.16	2.72	-10,120.45
NRPRM [3]	MJ, LHV	30,863.86	0	1,851.83	35,184.81	0	0	0	0	0
SM [3]	kg	0	0	0	0	0	0	0	0	0
RSF [3]	MJ, LHV	-	-	-	-	-	-	-	-	-
NRSF [3]	MJ, LHV	-	-	-	-	-	-	-	-	-
RE [3]	MJ, LHV	-	-	-	-	-	-	-	-	-
FW [3]	m^3	1.30	0	0.078	1.24	0	0	0	0	0
HWD [3]	kg	53.20	0	3.19	50.75	0	0	0	0	0
NHWD [3]	kg	135.90	0	92.78	1,498.58	0	0	0	1,436.40	0
HLRW [3 4]	m^3	7.1E-06	0	5.7E-07	6.9E-06	4.7E-09	0	0	3.1E-09	-2.8E-07
ILLRW [3 4]	m^3	1.0E-04	0	1.0E-05	1.1E-04	1.9E-06	0	0	1.3E-06	-3.5E-06
CRU [3]	kg	-	-	-	-	-	-	-	-	-
MR [3]	kg	62.11	0	3.73	202.89	0	0	159.60	0	0
MER [3]	kg	-	-	-	-	-	-	-	-	-
EE [3]	MJ, LHV	-	-	-	-	-	-	-	-	-

Table 16 | *EPD Results (A1-D) – 1,000 m² of Seaman Corporation FiberTite Membrane (50-mil FT-XT-FB) – fleece-backed*

Impact category and inventory indicators	Unit	A1 to A3	A4	A5	B4	C1	C2	C3	C4	D
GWP 100 [1]	kg CO_2 eq	6,687.81	306.37	674.34	7,023.78	37.66	5.80	0.49	91.74	-411.12
ODP [1]	kg CFC-11 eq	7.7E-04	1.3E-08	6.4E-05	7.6E-04	9.2E-06	2.4E-10	5.2E-08	2.2E-08	-6.0E-05
SFP [1]	kg O_3 eq	438.04	103.82	47.30	542.07	11.38	1.72	0.033	0.0115	-6.78
AP [1]	kg SO_2 eq	37.61	4.01	3.49	41.19	0.37	0.067	0.0020	0.23	-1.38
EP [1]	kg N eq	108.46	0.24	7.74	115.35	0.047	0.0040	0.0034	11.67	-0.82
FFD [1]	MJ surplus, LHV	16,000.33	645.25	1,128.86	16,081.97	81.68	12.24	0.46	0.037	-1,431.17
ADPf [2]	MJ, LHV	120,891.21	4,359.29	10,018.25	122,313.93	546.91	82.70	5.52	0.49	-10,066.29
RPRE	MJ, LHV	4,435.40	0	361.40	4,320.57	2.47	0	0.38	0.99	-100.57
RPRM [3]	MJ, LHV	-[5]	-	-	-	-	-	-	-	-
NRPRE	MJ, LHV	104,780.46	4,408.49	9,258.89	101,511.38	555.89	83.64	7.35	2.79	-10,580.47
NRPRM [3]	MJ, LHV	30,518.20	0	1,831.09	34,790.75	0	0	0	0	0
SM [3]	kg	0	0	0	0	0	0	0	0	0
RSF [3]	MJ, LHV	-	-	-	-	-	-	-	-	-
NRSF [3]	MJ, LHV	-	-	-	-	-	-	-	-	-
RE [3]	MJ, LHV	-	-	-	-	-	-	-	-	-
FW [3]	m^3	1.40	0	0.084	1.34	0	0	0	0	0
HWD [3]	kg	53.40	0	3.20	50.94	0	0	0	0	0
NHWD [3]	kg	136.50	0	93.22	1,533.53	0	0	0	1,474.20	0
HLRW [3 4]	m^3	7.4E-06	0	5.9E-07	7.2E-06	4.7E-09	0	0	3.1E-09	-3.0E-07
ILLRW [3 4]	m^3	1.1E-04	0	1.0E-05	1.1E-04	1.9E-06	0	0	1.3E-06	-3.6E-06
CRU [3]	kg	-	-	-	-	-	-	-	-	-
MR [3]	kg	63.88	0	3.83	208.36	0	0	163.80	0	0
MER [3]	kg	-	-	-	-	-	-	-	-	-
EE [3]	MJ, LHV	-	-	-	-	-	-	-	-	-

Table 17 | *EPD Results (A1-D) – 1,000 m² of Seaman Corporation FiberTite Membrane (60-mil FT-SM-FB) – fleece-backed*

Impact category and inventory indicators	Unit	A1 to A3	A4	A5	B4	C1	C2	C3	C4	D
GWP 100 [1]	kg CO_2 eq	7,648.97	372.33	736.22	8,023.69	37.66	7.11	0.60	112.32	-500.49
ODP [1]	kg CFC-11 eq	9.9E-04	1.6E-08	7.7E-05	9.7E-04	9.2E-06	3.0E-10	6.4E-08	2.7E-08	-7.4E-05
SFP [1]	kg O_3 eq	552.30	126.18	55.50	672.78	11.38	2.11	0.041	0.0141	-8.25
AP [1]	kg SO_2 eq	46.02	4.87	4.04	50.10	0.37	0.083	0.0024	0.28	-1.67
EP [1]	kg N eq	155.47	0.29	10.60	162.63	0.047	0.0049	0.0042	14.29	-1.00
FFD [1]	MJ surplus, LHV	17,383.10	784.19	1,220.23	17,536.32	81.68	14.99	0.56	0.046	-1,742.30
ADPf [2]	MJ, LHV	131,675.38	5,297.93	10,722.13	133,515.86	546.91	101.26	6.76	0.60	-12,254.61
RPRE	MJ, LHV	6,325.32	0	474.80	6,123.84	2.47	0	0.47	1.21	-122.43
RPRM [3]	MJ, LHV	-5)	-	-	-	-	-	-	-	-
NRPRE	MJ, LHV	108,237.90	5,357.72	9,523.81	104,183.99	555.89	102.40	9.00	3.42	-12,880.57
NRPRM [3]	MJ, LHV	38,855.62	0	2,331.34	44,295.40	0	0	0	0	0
SM [3]	kg	0	0	0	0	0	0	0	0	0
RSF [3]	MJ, LHV	-	-	-	-	-	-	-	-	-
NRSF [3]	MJ, LHV	-	-	-	-	-	-	-	-	-
RE [3]	MJ, LHV	-	-	-	-	-	-	-	-	-
FW [3]	m^3	1.30	0	0.078	1.24	0	0	0	0	0
HWD [3]	kg	52.80	0	3.17	50.37	0	0	0	0	0
NHWD [3]	kg	134.90	0	96.62	1,832.83	0	0	0	1,804.95	0
HLRW [3 4]	m^3	7.9E-06	0	6.2E-07	7.7E-06	5.0E-09	0	0	3.4E-09	-3.6E-07
ILLRW [3 4]	m^3	1.2E-04	0	1.1E-05	1.2E-04	1.9E-06	0	0	1.3E-06	-4.4E-06
CRU [3]	kg	-	-	-	-	-	-	-	-	-
MR [3]	kg	77.19	0	4.63	254.13	0	0	200.55	0	0
MER [3]	kg	-	-	-	-	-	-	-	-	-
EE [3]	MJ, LHV	-	-	-	-	-	-	-	-	-

Notes:

[1] Calculated as per U.S EPA TRACI 2.1, v1.05, SimaPro v.9.5.0.2 GWP-100 (10), excludes biogenic CO_2 removals and emissions associated with biobased products, including bio-based packaging. There is no biogenic content in the declared products. CO_2 emissions from calcination and carbonation do not apply to the declared products; 100-year time horizon GWP factors are provided by the IPCC 2013 Fifth Assessment Report (AR5), TRACI 2.1, v1.05 (11). FFD is required in LEED V4.1 MR Credit: Building Product Disclosure and Optimization – Environmental Product Declarations (12).

[2] Calculated as per CML-IA Baseline v3.05, SimaPro v.9.5.0.2 (10). ADP_f is also required in LEED v4.0/v4.1 MR2 Credit: Building Product Disclosure and Optimization – Environmental Product Declarations (13), (12).

[3] Calculated as per ACLCA ISO 21930 Guidance (14), respective sections 6.2 to 10.8.

[4] It should be noted that the foreground system (Seaman Corporation roofing membrane manufacturing process) does not generate any HLRW or ILLRW. High, intermediate or low-level radioactive waste is generated by electricity production (spent fuel from reactors, routine facility maintenance and operations)" (ISO 21930:2017, clause 7.2.14). High-level radioactive waste, e.g., when generated by electricity production, consists mainly of spent fuel from reactors." (ISO 21930:2017, clause 7.2.14).

[5] "-"N/A for this product system. *"Not all LCA datasets for upstream materials include these impact categories, and thus results may be incomplete. Use caution when interpreting data in these categories"* (6).

[6] The environmental burden of modules B1, B2, B3, B5, B6, and B7 is null.

[7] The following abbreviations are used for impact category and inventory indicators:

| Global warming potential \| GWP-100
| Ozone depletion potential \| ODP
| Smog formation potential \| SFP
| Acidification potential \| AP
| Eutrophication potential \| EP
| Fossil fuel depletion \| FFD
| Abiotic depletion potential, fossil \| ADPf
| Renewable primary resources used as an energy carrier (fuel) \| RPR_E
| Renewable primary resources with energy content used as material \| RPR_M
| Non-renewable primary resources used as an energy carrier (fuel) \| $NRPR_E$
| Non-renewable primary resources with energy content used as material \| $NRPR_M$
| Secondary materials \| SM
| Renewable secondary fuels \| RSF
| Non-renewable secondary fuels \| NRSF
| Recovered energy \| RE
| Consumption of freshwater \| FW
| Hazardous waste disposed \| HWD
| Non-hazardous waste disposed \| NHWD
| High-level radioactive waste, conditioned, to the final repository \| HLRW
| Intermediate- and low-level radioactive waste, conditioned, to the final repository \| ILLRW
| Components for re-use \| CRU
| Materials for recycling \| MR
| Materials for energy recovery \| MER
| Recovered energy exported from the product system \| EE

7 INTERPRETATION

The Seaman Corporation's FiberTite® EPD results represent a "cradle-to-grave" environmental profile per 1,000 m^2 for each declared single-ply roofing membrane thickness as manufactured at its Wooster, OH and Bristol, TN plants for the reference year 2021.

For each declared membrane thickness, the *Use stage* (B4) dominates the LCIA and energy indicator results - ranging from around 49% of the total potential impacts. It should be noted that the environmental burden of modules B1, B2, B3, B5, B6, and B7 is null.

The Production stage (A1 to A3) is the second largest contributor to the LCIA and energy indicator results – contributing to roughly 46% of the total potential impacts. Except for SFP (around 12%), the *Construction stage* (A4 to A5) accounted for less than 10% of the total potential impacts. *The End-of-life stage* (C1 to C4) was generally found to be a minor contributor to the declared product potential impacts; however, it did account for around 5% of the eutrophication potential because of waste disposal. *The net benefits of recycling* (*Module D*) are less than 5% across all LCIA and energy indicator results.

Regarding the Production stage (A1 to A3), *module A1 Extraction and upstream production* contribute the largest share of the LCIA category indicator results – accounting for between 73% and 98% of the Production stage (A1 to A3) potential environmental burdens. *Module A3* Manufacturing is the second largest contributor (<20%) to membrane manufacture's overall potential environmental impacts. Approximately 95% of the total primary energy is derived from *non-renewable primary energy resources* ($NRPR_E$) for all membrane types. *Module A2* transportation significantly contributes to the smog formation potential but otherwise contributes less than 10% to the other environmental indicator metrics.

8 ADDITIONAL ENVIRONMENTAL INFORMATION

- Selected FiberTite roofing membranes comply with efficiency programs requiring the use of a highly reflective roof like California Title 24, U.S. Green Building Council's (USBGC) Leadership in Energy and Environmental Design (LEED) rating system, the International Green Construction Code (IgCC), IECC, and Green Building Institute's Green Globes.
- FiberTite Roof Systems, when designed and installed properly, can help increase energy efficiency, especially the building's peak energy demand.

9 DECLARATION TYPE

This "Cradle-to-grave" EPD applies to Seaman Corporation's FiberTite roofing membranes (all colors) of 36, 45, 50, and 60-mil nominal thicknesses with and without fleece backing. The life cycle stages covered are the production, construction, use, and end-of-life stages, including the optional module D. The declaration is intended for use in Business-to-Business (B-to-B) and Business -to-Consumer communication.

The three declared thicknesses (36, 45, 50, and 60-mil with and without fleece backing) of FiberTite roofing membrane fall under the description:
- A product-specific EPD, from multiple manufacturer's plants.

10 EPD COMPARABILITY LIMITATION STATEMENT

- *Only EPDs prepared from cradle-to-grave life cycle results and based on the same function, RSL, quantified by the same functional unit, and meeting all the conditions for comparability listed in ISO 14025:2006 and ISO 21930:2017 can be used to make comparisons between products.*

- Declarations based on the NSF Product category rules are not comparative assertions; no claim of environmental superiority may be inferred or implied.

11 REFERENCES

1| ASTM D6754 Standard Specification for Ketone Ethylene Ester (KEE) Based Sheet Roofing.

2| ISO 14025:2006 Environmental labeling and declarations - Type III environmental declarations - Principles and procedures.

3| ISO 21930:2017 Sustainability in buildings and civil engineering works - Core rules for environmental product declarations of construction products and services.

4| ISO 14040/Amd1:2020 Environmental Management – Life Cycle Assessment – Principles and Framework, International Organization for Standardization, 2006.

5| ISO 14044/Amd1:2017/Amd2:2020 Environmental Management – Life Cycle Assessment – Requirements and guidelines, International Organization for Standardization, 2006.

6| NSF International, Product Category Rule Environmental Product Declarations, PCR for Single Ply Roofing Membrane, October 2019.

7| ASTM Program Operator for Product Category Rules (PCRs) and Environmental Product Declarations (EPDs), General Program Instructions, 04/29/20.

8| Athena Sustainable Materials Institute, A Cradle-to-Grave Life Cycle Assessment of Seaman Corporation's Single-Ply Polyester Reinforced Roofing Membranes, August 2024.

9| 2022, Seaman Corporation. FiberTite Product Data Sheets & Application Guides, *https://www.fibertite.com/document-library/product-data-sheets* *https://www.fibertite.com/product-overview*

10| PRé 2021.SimaPro LCA Software v 9.5.0.2, 2024, https://simapro.com/.

11| Bare, J., TRACI 2.0: The Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts 2.0. Clean Technologies and Environmental Policy 2011, 13, (5), *https://link.springer.com/article/10.1007/s10098-010-0338-9#page-1*

12| LEED v4.1, MRc2: Building product disclosure and optimization, Environmental Product Declarations,. *https://leeduser.buildinggreen.com/credit/NC-v4.1/MRc2#tab-credit-language*

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14| ACLCA 2019, Guidance to Calculating Non-LCIA Inventory Metrics in Accordance with ISO 21930:2017. The American Centre for Life Cycle Assessment. May, 2019.

15| ANSI/NSF 347 Sustainability Assessment for Single Ply Roofing Membranes.

Seaman Corporation's FiberTite® roof membranes are widely regarded as the premium waterproofing layer for commercial roof systems and building assets worldwide. Our roofs are engineered to deliver industry-leading protection against fire, punctures, tears, chemicals, allowing it withstand hazards of wind, hail, and ponding water. With more than 4 decades of proven performance, these products are utilized by some of the largest corporations, serving critical facilities and segments, across the Americas, Europe, Asias, and Oceania.

FiberTite Roof Systems
FiberTite.com
800.927.8578

Seaman Corporation