



**CARLISLE**  
SYNTEC SYSTEMS



**ENVIRONMENTAL PRODUCT DECLARATION**


## ASTM International Certified Environmental Product Declaration

This document is a Type III environmental product declaration (EPD) for Carlisle's Sure-Flex™ Ketone Ethylene Ester High Performance (KEE HP) polyester reinforced single-ply roofing membranes in 50, 60 and 80 mils nominal thicknesses, as manufactured at the Greenville, IL facility for the reference year 2018.

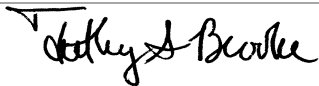

This declaration has been prepared in accordance with ISO 14025 [8], ISO 21930 [3], ISO 14040/44 [4, 5], the NSF International's Product Category Rules for Single-Ply Roofing Membranes [6] and ASTM's General Program Instructions for Type III EPD [7].

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 potential impacts of Carlisle's Sure-Flex™ KEE HP roofing membranes in accordance with international standards.

## Environmental Product Declaration Summary

General Information	
Owner of the EPD	 <b>Carlisle SynTec Systems</b> Carlisle Construction Materials Inc. (CCM) P.O. Box 7000 Carlisle, PA 17013 Link (URL): <a href="http://www.carlislesyntec.com">www.carlislesyntec.com</a>  Carlisle SynTec Systems has been the leader in the commercial single-ply roofing industry for more than 50 years. It continues to lead the roofing industry today by providing its customers with superior roofing systems and services through a select network of manufacturer's representatives, distributors, and applicators.  <i>The owner of the declaration is liable for the underlying information and evidence.</i>
Manufacturing Site	Single-Ply Roofing Membranes Greenville, IL 1825 East U.S. Route 40 Greenville, IL 62246
Product Group	Single-Ply Roofing Membranes
Product Name	Carlisle's Sure-Flex™ KEE HP roofing membrane with a finished nominal thickness of 1.27 mm (50 mils), 1.52 mm (60 mils) and 2.03 mm (80 mils).
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].	
<b>Certification Period</b>		07.02.2021 – 07.02.2026	
<b>Declared Unit</b>		1 m <sup>2</sup> manufactured of Carlisle's Sure-Flex™ KEE HP single-ply roofing membrane	
<b>ASTM Declaration Number</b>		EPD – 236	
<b>EPD Information</b>			
<b>Program Operator</b>		ASTM International 100 Barr Harbor Drive, PO Box C700 West Conshohocken, PA 19428-2959, USA <a href="http://www.astm.org/EPDs.htm">www.astm.org/EPDs.htm</a>	
<b>Declaration Holder</b>		Carlisle SynTec Systems	
<b>Product group</b> Single Ply Roofing Membranes	<b>Date of Issue</b> 07.02.2021	<b>Period of Validity</b> 5 years	<b>Declaration Number</b> EPD-236
<b>Declaration Type</b> This “Cradle-to-gate” EPD applies to the Carlisle's Sure-Flex™ KEE HP roofing membrane (all colors) in 50, 60, and 80 mils nominal thicknesses. Production activities covered include <i>the extraction and upstream production, transport to factory, and manufacturing</i> (modules A1 to A3). The declaration is intended for Business-to-Business (B-to-B) communication.			
<b>Applicable Countries</b> United States and Canada			
<b>Product Applicability</b> Carlisle's Sure-Flex™ KEE HP is an advanced-formula, heat-weldable KEE HP thermoplastic membrane that is designed for long-term weatherability and performance. The declared roofing membranes are designed for low-slope roofing applications. KEE HP roofing membrane can be used in adhered and mechanically fastened systems.			
<b>This EPD was independently verified by ASTM in accordance with ISO 14025:</b>		 Tim Brooke 100 Barr Harbor Drive, PO Box C700 West Conshohocken, PA 19428-2959, USA <a href="http://www.astm.org/EPDs.htm">www.astm.org/EPDs.htm</a>	
<b>Internal</b>	<b>External</b>	Tim Brooke 100 Barr Harbor Drive, PO Box C700 West Conshohocken, PA 19428-2959, USA <a href="http://www.astm.org/EPDs.htm">www.astm.org/EPDs.htm</a>	
	X		
<b>EPD Project Report Information</b>			
<b>EPD Project Report</b>		A Cradle-to-Gate Life Cycle Assessment of Carlisle Construction Materials' Single-Ply Polyester Reinforced PVC and KEE HP Roofing Membranes of Various Thicknesses with and without Fleece Backing, May 2021 [13].	
<b>Prepared by</b>		Lindita Bushi PhD, Mr. Jamie Meil and Mr. Grant Finlayson Athena Sustainable Materials Institute 119 Ross Avenue, Suite 100 Ottawa, Ontario, K1Y 0N6, Canada <a href="mailto:info@athenasmi.org">info@athenasmi.org</a>	
 <b>Athena Sustainable Materials Institute</b>			

<b>This EPD project report was independently verified by and in accordance with ISO 14025 and the reference PCR:</b>	Thomas P. Gloria, Ph.D. Industrial Ecology Consultants 35 Bracebridge Rd. Newton, MA 02459-1728
<b>PCR Information</b>	
<b>Program Operator</b>	NSF International
<b>Reference PCR</b>	NSF International, Product Category Rules for Preparing an Environmental Product Declaration for Single Ply Roofing Membranes [6].
<b>Date of Issue</b>	October 2019
<b>PCR review was conducted by:</b>	Thomas P. Gloria, PhD (Chair), Industrial Ecology Consultants <a href="mailto:t.gloria@industrial-ecology.com">t.gloria@industrial-ecology.com</a> Mr. Jack Geibig, EcoForm Mr. Bill Stough, Sustainable Research Group
<b>EPD Explanatory material</b>	For any explanatory material, regarding this EPD, please contact the program operator.  ASTM International Environmental Product Declarations 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, <a href="http://www.astm.org">http://www.astm.org</a>

# 1 PRODUCT IDENTIFICATION

## 1.1 PRODUCT DEFINITION

This EPD applies to the Carlisle's Sure-Flex™ single-ply KEE HP Roofing Membrane (all colors), with a finished nominal thickness of 50, 60 and 80 mils, as produced at its Greenville, IL plant.

Carlisle's Sure-Flex™ KEE HP membrane is manufactured using DuPont® Elvaloy® KEE HP resin modifier. KEE HP enhances the performance of PVC compounds by providing outstanding thermal stability and flexibility while extending the low- and high-temperature performance limits of standard KEE. The addition of Elvaloy KEE HP, a non-volatile resin modifier, provides enhanced heat and chemical resistance. The physical properties of the membrane are enhanced by a polyester fabric that is encapsulated by thick KEE HP-based top and bottom plies. The smooth surface of the KEE HP membrane allows a total surface fusion weld over a wide temperature range, creating a consistent, watertight, one-piece roof assembly.

Carlisle's Sure-Flex™ KEE HP contributes to LEED® credit requirements and is Cool Roof Rating Council (CRRC)-rated and Title 24 compliant. The Sure-Flex™ product line is one of the broadest in the industry, offering a KEE HP membrane for virtually any low-slope roofing specification. The membranes weld quickly, cleanly, and consistently. Carlisle's Sure-Flex™ KEE HP roofing membranes can be either installed as a mechanically fastened or adhered roofing system.

Table 1 summarizes key technical data for Carlisle Sure-Flex™ single-ply KEE HP roofing membrane by thickness. Carlisle's Sure-Flex™ KEE HP is classified as Type III and/or Type IV and meets or exceeds the requirements of ASTM D4434 [1]. Further testing information and results can be found on the Carlisle SynTec Systems's website ([www.carlislesyntec.com](http://www.carlislesyntec.com)).

**Table 1. Key technical data of declared thicknesses**

Technical data	Units	Values		
Finished nominal thickness	mil	50	60	80
	mm	1.27	1.52	2.03
Finished density	kg/m <sup>2</sup>	1.6	1.9	2.6
Color	n/a	white, gray, light gray, and tan		

## 1.2 PRODUCT STANDARDS

The Carlisle Sure-Flex™ KEE HP roofing membrane, with a finished nominal thickness of 50, 60 and 80 mils meet the following standards and requirements,

- ASTM D4434 Type IV Standard Specification for Poly (Vinyl Chloride) Sheet Roofing
- Cool Roof Rating Council®
- FM Approvals
- Miami-Dade County Approval
- California's Building Energy Code (Title 24) Compliant
- Underwriters Laboratory Inc.

- Underwriters Laboratories of Canada

## 2 DECLARED UNIT

The declared product is 1 m<sup>2</sup> of Carlisle's Sure-Flex™ single-ply KEE HP Roofing membrane, with a finished nominal thickness of 50, 60 or 80 mils.

## 3 MATERIAL CONTENT

The average material composition by input material (in %) for 1m<sup>2</sup> for the Carlisle Sure-Flex™ KEE HP is provided in Table 2.

**Table 2. Average material content for 1 m<sup>2</sup> Carlisle Sure-Flex™ KEE HP Membrane**

Material input	Material Content (in %)
PVC Resin	49
Plasticizers	31
Pigments	7
Fire retardant	2
Stabilizers	2
Fillers	2
Processing aids, oils, and lubricants	2
Biocide	<1
Polyester reinforcement	5
<b>Total weight (Input)</b>	<b>100</b>

## 4 LIFE CYCLE STAGES

Figure 1 shows the life-cycle stages and information modules that are included within the cradle-to-gate LCA system boundary of this EPD. The boundary is "cradle-to-gate", which includes the *Production stage* (A1 to A3 modules). *Construction, Use, and End-of-Life stages* - are excluded from the system boundary. The *Production stage* system boundary is shown in Figure 2. Per ISO 21930, 7.1.7.2.1 [3], the system boundary with nature (natural environment) includes those technical processes that provide the material and energy inputs into the system and the subsequent manufacturing and transport processes up to the to the factory gate, as well as the processing of any waste arising from those processes.

Production stage			Construction stage		Use stage							End-of-life stage			
Extraction and upstream production	Transport to factory	Manufacturing	Transport to site	Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational Energy Use	Operational Water Use	De-Construction/ Demolition	Transport to waste processing or disposal	Waste processing	Disposal of waste
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
X			MND												
X- module is included in system boundary; MND- module is not declared (excluded from system boundary)															

Figure 1 Life Cycle Stages and Modules

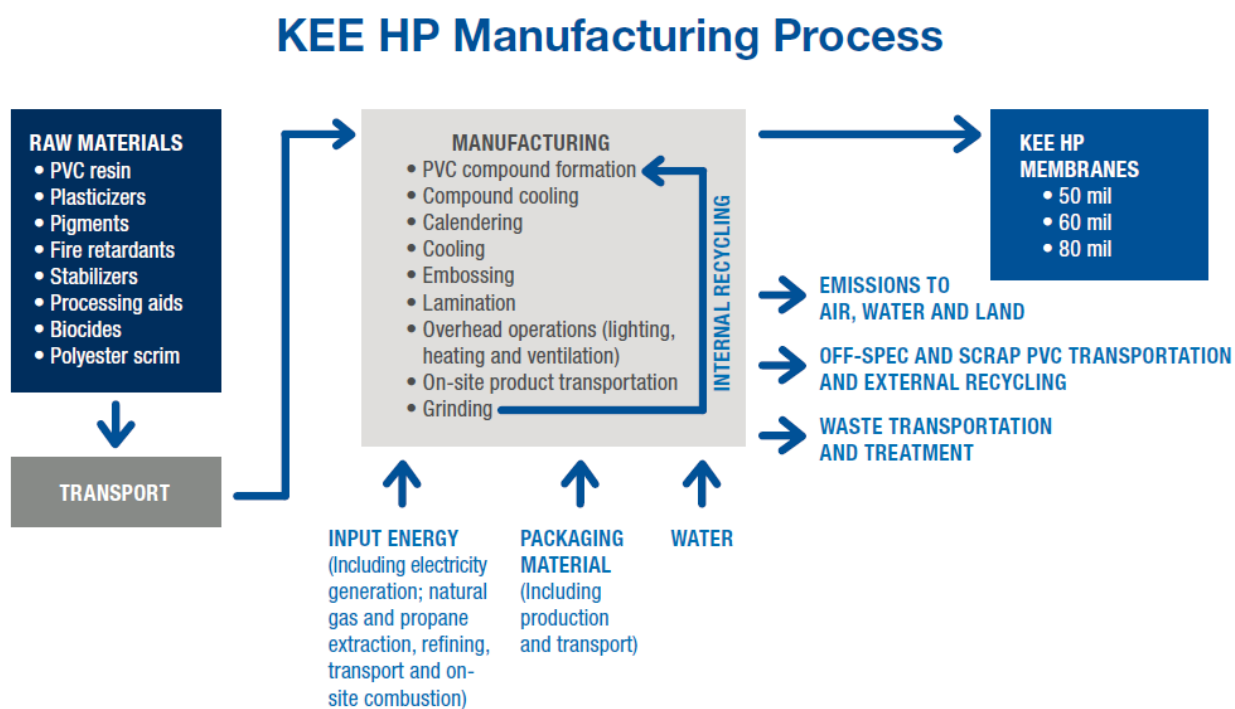


Figure 2 Carlisle Sure-Flex™ KEE HP Membrane System Boundaries

## 5 LIFE CYCLE INVENTORY

### 5.1 DATA COLLECTION, SOURCES, AND CALCULATIONS

LCI data collection was based on one customized LCI survey. The LCI survey covered the primary data for the facility for the 2018 reference year. Source of data is specified as: Direct, based on measurements or purchasing/selling records of the surveyed facility; Indirect, based on calculations made by the personnel of the surveyed facility; and Estimated, based on the industry average data and/or expert judgment. 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

A detailed description of collected data and the data quality assessment regarding the NSF PCR requirements [6] and ISO 14044 [5] is provided in the LCA project report. Data quality is assessed based on its representativeness (technology coverage, geographic coverage, time coverage), completeness, consistency, reproducibility, transparency, and uncertainty (Table 3).

**Table 3. Data Quality Requirements and Assessments**

<b>Data Quality Requirements</b>	<b>Description</b>
<b>Technology Coverage</b>	Data represents the prevailing technology at the Grenville, IL facility. Whenever available, for all upstream and core material and processes, North American typical or average industry LCI datasets were utilized. <i>Technological representativeness is characterized as "high".</i>
<b>Geographic Coverage</b>	The geographic region considered is the U.S. <i>Geographical representativeness is characterized as "high".</i>
<b>Time Coverage</b>	Activity data are representative. - Roofing membrane manufacturing process - primary data collected for reference year 2018 (12 months) - In-bound/ out-bound transportation data- primary data collected for reference year 2018 (12 months) - Polyester scrim reinforcement production- U.S. industry data for the reference year 2010 (12 months) - 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. <i>Temporal representativeness is characterized as "medium" to "high".</i>



Data Quality Requirements	Description
<b>Completeness</b>	All relevant, specific processes, including inputs (raw materials, energy and ancillary materials) and outputs (emissions and production volume) were considered and modeled. 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.9.1.1.1, 2021. The completeness of the cradle-to-gate process chain in terms of process steps is rigorously assessed for all membranes and documented in project report.
<b>Consistency</b>	To ensure consistency, the input/output LCI modeling of the KEE HP single-ply roofing membranes used the same LCI modeling 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 a high level of consistency.
<b>Reproducibility</b>	Internal reproducibility is possible since the data and the models are stored and available in <i>Athena CCM LCI database</i> developed in SimaPro, 2021. A high level of transparency is provided throughout the report as the LCI profile is presented for each of the declared products as well as major upstream inputs. Key primary (manufacturer specific) and secondary (generic) LCI data sources are summarized in the supporting LCA project report.
<b>Transparency</b>	Activity and LCI datasets are transparently disclosed in the project report, including data sources.
<b>Uncertainty</b>	A <i>sensitivity check</i> 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 calculation of LCIA and energy indicator results. The sensitivity check includes the results of a <i>sensitivity analysis</i> and <i>Monte Carlo uncertainty analysis of background data sets</i> .

### 5.3 ALLOCATION RULES

The Greenville, IL single-ply roof membrane manufacturing facility produces other co-products besides selected membranes and as such and as per the PCR, allocation based on the mass of membrane products was necessary. “Mass” based, plant specific formulation for 1m<sup>2</sup> of KEE HP roofing membranes were used to calculate the input raw the 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 KEE HP 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 as per NSF PCR, Section 7.1.6 [6] and ISO 21930, 7.1.8 [3] were followed. All input/output data reported by the Greenville, IL manufacturing plant were included in the LCI modelling. None of the reported flow data were excluded based on the cut-off criteria. Any plant specific data gaps for the reference year (e.g., input hydraulic fluids, lubricants, greases, or heated oil) were filled in with industry average data. Material Safety Data Sheet (MSDSs) were confidentially provided by CCM for each additive e.g., plasticizer, fire retardant, stabilizer, fleece backing, etc. Any data gaps in the MSDS are filled in with proxy and conservative generic LCI datasets, as appropriate.

This EPD excludes the following processes:

- Capital goods and infrastructure
- Human activity and personnel related activity (travel, furniture, office operations and supplies)
- Energy and water use related to company management and sales activities that may be located either within the factory site or at another location.

## 6 LIFE CYCLE ASSESSMENT RESULTS

Table 4 details the “cradle-to-gate” LCA results for 1 m<sup>2</sup> of 50, 60 and 80 mils Carlisle Sure-Flex™ KEE HP membrane on an absolute basis.

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 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 as per the PCR.

**Table 4. EPD results for 1 m<sup>2</sup> of 50, 60 and 80 mils Carlisle Sure-Flex™ KEE HP Membrane - Production Stage (A1-A3)**

Impact category and inventory indicators	Unit	Carlisle Sure-Flex™ KEE HP membranes Production stage (A1 to A3)		
		50 mils	60 mils	80 mils
Global warming potential, GWP 100 <sup>1)</sup>	kg CO <sub>2</sub> eq	5.5	6.6	8.8
Ozone depletion potential, ODP <sup>1)</sup>	kg CFC-11 eq	8.7E-07	1.1E-06	1.5E-06
Smog formation potential, SFP <sup>1)</sup>	kg O <sub>3</sub> eq	0.33	0.40	0.55
Acidification potential, AP <sup>1)</sup>	kg SO <sub>2</sub> eq	0.035	0.042	0.058
Eutrophication potential, EP <sup>1)</sup>	kg N eq	0.084	0.102	0.140
Fossil fuel depletion, FFD <sup>1)</sup>	MJ surplus	13.1	15.9	21.4
Abiotic depletion potential, fossil ADPf <sup>2)</sup>	MJ LHV	98.3	119.0	159.9

Impact category and inventory indicators	Unit	Carlisle Sure-Flex™ KEE HP membranes Production stage (A1 to A3)		
		50 mils	60 mils	80 mils
Renewable primary resources used as an energy carrier (fuel), RPR <sub>E</sub>	MJ LHV	3.8	4.6	6.2
Renewable primary resources with energy content used as material, RPR <sub>M</sub> <sup>3)</sup>	MJ LHV	-	-	-
Non-renewable primary resources used as an energy carrier (fuel), NRPR <sub>E</sub>	MJ LHV	68.7	82.5	109.9
Non-renewable primary resources with energy content used as material, NRPR <sub>M</sub> <sup>3)</sup>	MJ LHV	39.8	48.6	66.1
Secondary materials, SM <sup>3)</sup>	kg	0	0	0
Renewable secondary fuels, RSF <sup>3)</sup>	MJ LHV	-	-	-
Non-renewable secondary fuels, NRSF <sup>3)</sup>	MJ LHV	-	-	-
Recovered energy, RE <sup>3)</sup>	MJ LHV	-	-	-
Consumption of freshwater, FW <sup>3)</sup>	m <sup>3</sup>	2.0E-05	2.4E-05	3.3E-05
Hazardous waste disposed, HWD <sup>3)</sup>	kg	0	0	0
Non-hazardous waste disposed, NHWD <sup>3)</sup>	kg	0.0058	0.0071	0.0096
High-level radioactive waste, conditioned, to final repository, HLRW <sup>3) 4)</sup>	m <sup>3</sup>	5.3E-09	6.4E-09	8.4E-09
Intermediate- and low-level radioactive waste, conditioned, to final repository, ILLRW <sup>3) 5)</sup>	m <sup>3</sup>	8.4E-08	1.0E-07	1.3E-07
Components for re-use, CRU <sup>3)</sup>	kg	-	-	-
Materials for recycling, MR <sup>3)</sup>	kg	0.127	0.156	0.211
Materials for energy recovery, MER <sup>3)</sup>	kg	-	-	-
Recovered energy exported from the product system, EE <sup>3)</sup>	MJ LHV	-	-	-

**Notes:**

<sup>1)</sup> Calculated as per U.S EPA TRACI 2.1, v1.05, SimaPro v 9.1.1.1 GWP-100, excludes biogenic CO<sub>2</sub> removals and emissions associated with any biobased products; 100-year time horizon GWP factors are provided by the IPCC 2013 Fifth Assessment Report (AR5), TRACI 2.1, v1.05 [10]. FPD is required in LEED V4.1 MR Credit: Building Product Disclosure and Optimization – Environmental Product Declarations [11].

<sup>2)</sup> Calculated as per CML-IA Baseline V3.05, SimaPro v 9.1.1.1. ADP<sub>f</sub> is also required in LEED V4.1 MR Credit: Building Product Disclosure and Optimization – Environmental Product Declarations [11].

<sup>3)</sup> Calculated as per ACLCA ISO 21930 Guidance [12], respective sections 6.2 to 10.8.

<sup>4)</sup> It should be noted that the foreground system (CCM roofing membrane 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).

<sup>5)</sup> It should be noted that the foreground system (CCM roofing membrane 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).

<sup>6)</sup> “-“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].

## Carlisle Sure-Flex™ single-ply KEE HP roofing membrane

<sup>7)</sup> “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<sub>E</sub>, RPR<sub>M</sub>, NRPR<sub>E</sub>, NRPR<sub>M</sub>, SM, RSF, NRSF, RE, HWD, NHWD, HLRW, ILLRW, CRU, MR, MER, EE” [6].

<sup>8)</sup> Biogenic C-content of packaging fall below the cut-off criteria (NSF PCR, Section 7.1.6 [6] and ISO 21930, 7.1.8 [3]), and is therefore excluded. It should be noted that GWP based on biogenic C-content of packaging is not included in the quantification of GWP 100.

## 7 INTERPRETATION

The Carlisle’s Sure-Flex™ EPD results represent a “cradle-to-gate” environmental profile per 1 m<sup>2</sup> for each declared KEE HP roofing membrane thickness as manufactured at the Greenville, IL plant for the reference year 2018.

*Module A1 Extraction and upstream material* input production contributes the largest share of the LCIA category and energy indicator results – accounting for between 79% (smog) and 97% (eutrophication) of the potential environmental burdens. *Module A2 Transportation* contributed 16% of the smog related emissions, but was otherwise, a minor contributor (<6%) to the overall impact of membrane manufacture. *Module A3 Manufacturing* is the second largest contributor (<17%) to the overall potential environmental impacts of the membrane manufacture.

## 8 ADDITIONAL ENVIRONMENTAL INFORMATION

- The Carlisle KEE HP roofing membranes meet the requirements of LEED®, Green Globes™ and exceed the cool roof requirements of ENERGYSTAR®, and California’s Building Energy Code (Title 24).
- Carlisle diverts all pre-consumer off-specs vinyl membrane from landfill, by recycling it back into their KEE HP roofing membrane products or shipping it to external KEE HP recyclers.
- Carlisle KEE HP roofing membranes surpass the requirements and are certified with SECO, Intron and BBA with routine audits to maintain certification which validates plant processes and product characteristics.
- Carlisle KEE HP roofing membranes help building owners achieve LEED and Green Globes certification.
- No substances of high concern were identified in the framework of this EPD.

## 9 DECLARATION TYPE

This “Cradle-to-gate” EPD applies to the Carlisle’s Sure-Flex™ KEE HP roofing membrane (all colors) 50, 60, and 80 mils nominal thicknesses. Production activities covered include *the extraction and upstream production, transport to factory, manufacturing* (modules A1 to A3). The declaration is intended for Business-to-Business (B-to-B) communication.

The three declared thicknesses (50, 60 and 80 mils), Carlisle Sure-Flex™ KEE HP roofing membrane fall under the description:

- *A product-specific EPD, from a manufacturer’s plant.*

## 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 comparison between products.*
- Declarations based on the NSF Product category rules are not comparative assertions; that is, no claim of environmental superiority may be inferred or implied.

## 11 REFERENCES

1. ASTM D4434/ D4434M – 15 Standard Specification for Poly(Vinyl Chloride) Sheet Roofing.
2. ASTM D6754/ D6754M – 15 Standard Specification for Ketone Ethylene Ester Based Sheet Roofing.
3. ISO 21930:2017 Sustainability in buildings and civil engineering works - Core rules for environmental product declarations of construction products and services.
4. ISO 14040:2006/Amd 1:2020 Environmental management - Life cycle assessment - Principles and framework.
5. ISO 14044:2006/Amd1:2017/Amd2:2020 Environmental management - Life cycle assessment - Requirements and guidelines.
6. NSF International, Product Category Rule Environmental Product Declarations, PCR for Single Ply Roofing Membrane, October 2019.  
<https://www.spri.org/wpfb-file/pcr-single-ply-roofing-membrane-2019-pdf/>, accessed 04-2021.
7. ASTM Program Operator for Product Category Rules (PCRs) and Environmental Product Declarations (EPDs), General Program Instructions, 04/29/20.



8. ISO 14025:2006 Environmental labeling and declarations - Type III environmental declarations - Principles and procedures.
9. ISO 14021:2016 Environmental labels and declarations -- Self-declared environmental claims (Type II environmental labelling).
10. PRé 2019.SimaPro LCA Software v9.1.1.1, 2021.  
<https://simapro.com/>, accessed 04-2021.
11. ACLCA 2019, Guidance to Calculating Non-LCIA Inventory Metrics in Accordance with ISO 21930:2017. The American Centre for Life Cycle Assessment. May, 2019.  
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12. LEED v4.1 July 2019, Building Design and Construction Guide (BD+C), Getting started guide for beta participant, MR Credit: Building Product Disclosure and Optimization – Environmental Product Declarations, Option 2 Multi-attribute optimization (1 point), pg.170.  
<https://leeduser.buildinggreen.com/credit/NC-v4.1/MRc2#tab-credit-language>, accessed 04-2021.
13. Athena Sustainable Materials Institute, *A Cradle-to-Gate Life Cycle Assessment of Carlisle Construction Materials' Single-Ply Polyester Reinforced PVC and KEE HP Roofing Membranes of Various Thicknesses with and without Fleece Backing*, May 2021 (73 pages).
14. ANSI NSF 347 Sustainability Assessment for Single Ply Roofing Membranes.

## EXPERIENCE THE CARLISLE DIFFERENCE

### CARLISLE SYNTEC SYSTEMS: SETTING THE STANDARD FOR EXCELLENCE

Carlisle SynTec Systems, the flagship division of Carlisle Construction Materials, LLC (CCM), is the largest supplier of commercial roofing products in the world. Carlisle produces high-performance EPDM, TPO, PVC, and FleeceBACK® single-ply roofing membranes, a full line of polyiso and expanded polystyrene insulation, and a wide variety of solvent-based and low-VOC adhesives. With more than 55 years of manufacturing experience and billions of square feet of roofing materials sold, Carlisle continues to lead the industry by providing the best products, services, and warranty options available today.

## U.S. Locations



- |                            |  |                      |                      |                      |
|----------------------------|--|----------------------|----------------------|----------------------|
| ① EPS & Polyiso Insulation | ⑤ TPO, PVC, EPDM, EPS & Polyiso Insulation | ⑨ TPO                | ⑭ EPS Insulation     | ⑲ Metal Products     |
| ② EPS Insulation           | ⑥ Metal Products                           | ⑩ Polyiso Insulation | ⑮ Polyiso Insulation | ⑳ Polyiso Insulation |
| ③ EPS Insulation           | ⑦ EPS Insulation                           | ⑪ EPS Insulation     | ⑯ Metal Products     | ㉑ Polyiso Insulation |
| ④ EPS & Polyiso Insulation | ⑧ Polyiso Insulation                       | ⑫ Metal Products     | ⑰ EPDM, TPO & PVC    | ㉒ EPS Insulation     |
|                            |  | ⑬ EPDM, TPO & PVC    | ⑱ Polyiso Insulation |                      |

