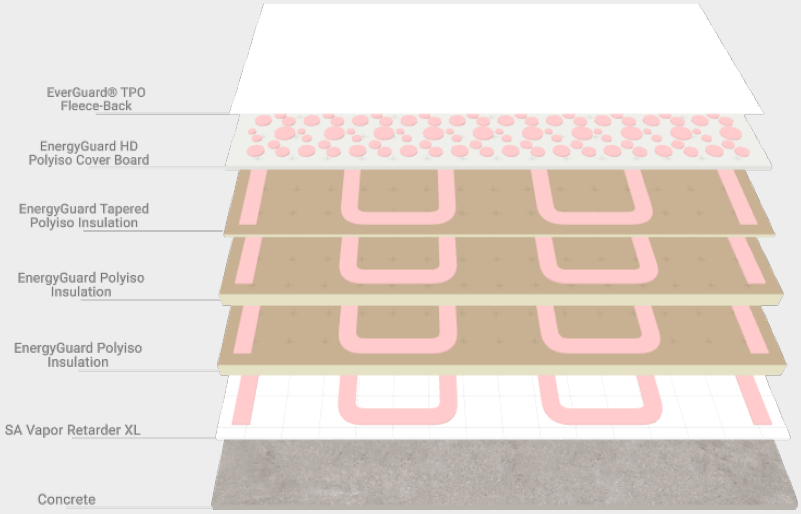
GAF BuildYourRoof

Project

Your Next Project

Prepared By

john.smith@gaf.com



System

New Construction

LAYER	MATERIAL	ATTACHMENT
Deck	Concrete	
Vapor Retarder	SA Vapor Retarder XL	Self Adhered
Bottom Insulation	EnergyGuard™ Polyiso Insulation	OlyBond500® Adhesive Standard Ribbon
Top Insulation	EnergyGuard™ Polyiso Insulation	OlyBond500® Adhesive Standard Ribbon
Tapered Insulation	EnergyGuard™ Tapered Polyiso Insulation	OlyBond500® Adhesive Standard Ribbon
Cover Board	EnergyGuard™ HD Polyiso Cover Board	OlyBond500® Adhesive Standard Ribbon
Membrane	EverGuard® TPO Fleece-Back - 115	OlyBond500® Adhesive Standard Spatter

Note: The images shown are for illustration purposes only and may not be an accurate representation of the products. Images are not drawn to scale. Products depicted are based solely on user inputs and GAF has not verified the accuracy of this information and/or its applicability or suitability for a particular project. GAF expressly disclaims any and all liability arising from any reliance on this information. Always review the appropriate Application and Specification Manual to confirm current requirements, and to obtain additional information that is important for successful roof design and installation. Each roof has unique requirements. It is the sole responsibility of the end user to confirm final product selection with the roofing contractor and/or design professional. This drawing is not intended to replace or supersede contract drawings or plans, or to modify, negate, or alter any requirements specified by the design professional, the general contractor or roofing contractor, local building codes, or others.

GAF BuildYourRoof

Contents

Data Sheets

Environmental Sheets

Safety Sheets

EverGuard® TPO Fleece-back Membrane 100, 115, 135

Description:

Combine performance and value with EverGuard® TPO Fleece-Back Membrane 100, 115, and 135.

Integral polyester fleece backing lets you offer the proven performance of EverGuard® TPO, while increasing durability and reducing labor:

- Provides enhanced puncture resistance against foot traffic, hail, and other impacts*
- Does not require a slip sheet when installed over a variety of existing roof systems
- Guarantees available with coverage up to 30 years for 135†

Installation:

Explore installation options. EverGuard® TPO Fleece-Back Membrane 100, 115, and 135 can be installed with a wide range of applications:

- **Mechanically attached** — quick, cost-effective, and available practically year-round
- **Adhered** — effective with EverGuard® WB 181 Bonding Adhesive (water-based) or hot asphalt for a smooth appearance and excellent wind uplift
- **LRF Adhesive O** — low-rise foam that's low-VOC, ideal for minor surface irregularities, and available in a cartridge or 5-gallon container
- **LRF Adhesive M** — low-rise foam that's similar to LRF-O and can also be used for ISO insulation applications
- **LRF Adhesive XF** — 2- part low-rise foam that's low-VOC, ideal for minor surface irregularities, and can adhere up to 24 squares of Fleece-Back Membrane
- **OlyBond500®** — 2-part low-rise foam that's low-VOC, ideal for minor surface irregularities, and can adhere up to 24 squares of Fleece-Back Membrane

Easy-to-Install Accessories:

Fabricating details on-site can be time-consuming, costly, inconsistent, and even unreliable. EverGuard® TPO prefabricated accessories save you time and labor, deliver consistent performance, and create a uniform aesthetic.

EverGuard® TPO Split Pourable Sealer Pocket

The low-profile design requires less sealant and can be cut down to size to more tightly fit around penetrations.

EverGuard® TPO Vent Boot

One standard size of the molded membrane Vent Boot accommodates 1"– 6" (25.4 mm – 152 mm) pipes and conduits. Vent Boots come with stainless steel clamping rings for the top of the penetration.

EverGuard® TPO Scuppers

Manufactured with TPO-coated metal and unreinforced membrane for use in waterproofing wall scuppers, eliminating unnecessary flashing to waterproof the wall opening.

See our complete line of time-saving prefabricated TPO Accessories

MADE IN THE U.S.A.
WITH DOMESTIC AND IMPORTED MATERIALS.
AMERICAN JOBS IN AMERICAN FACTORIES.

Visit **gaf.com**

For additional information, contact GAF Design Services at **1-877-423-7663** or **designservices@gaf.com**

* GAF warranties and guarantees do not provide coverage against traffic except where GAF walkways are applied, or against hail or other impact. Refer to gaf.com for more information on warranty and guarantee coverage and restrictions. Hail or puncture resistance coverage may be available for purchase for eligible systems. Contact GAF for more information.
† Additional requirements apply. Contact GAF for more information. See applicable guarantee, available at gaf.com, for complete coverage and restrictions.

We protect what matters most™

EverGuard®
TPO
Fleece-back Membrane

100, 115, 135

Physical Properties (ASTM D6878-21) see notes below

Type	ASTM Test Method	ASTM Minimum Values	EverGuard® TPO Fleece-Back Test Values (approx.)		
			100	115	135
TPO Nominal Thickness	ASTM D751	0.039″	0.045″ (1.14 mm)	0.060″ (1.52 mm)	0.080″ (2.03 mm)
Thickness Over Scrim	ASTM D7635	0.015″	15.8 mil (Nominal)	22.1 mil (Nominal)	31.4 mil (Nominal)
Breaking Strength	ASTM D751 Grab Method MD	220 lbf	375 lbf (559 kg/m) x 330 lbf (492 kg/m)	400 lbf (596 kg/m) x 360 lbf (536 kg/m)	440 lbf (656 kg/m) x 390 lbf (581 kg/m)
Elongation At Break	ASTM D 751	15%	30%	30%	30%
Tear Strength	ASTM D 751 (8″ x 8″ Sample)	55 lbf	90 lbf (134 kg/m) x 120 lbf (179 kg/m)	70 lbf (104 kg/m) x 130 lbf (194 kg/m)	100 lbf (149 kg/m) x 180 lbf (268 kg/m)
Brittleness Point	ASTM D2137	-40°F			
Ozone Resistance	ASTM D1149	No cracks @ 7x magnification	No visible deterioration @ 7x magnification	No visible deterioration @ 7x magnification	No visible deterioration @ 7x magnification
Properties After Heat Aging	ASTM D573	≤1.5% Weight change after 8 weeks @ 275°F; No cracks @ 7X magnification	Pass	Pass	Pass
Linear Dimensional Change	ASTM D 1204	±1%	0.2%	0.4%	0.4%
Water Absorption	ASTM D471	±3%	0.7%	0.7%	0.7%
Factory Seam Strength (Membrane Failure)	ASTM D751	66 lbf	115 lbf (171 kg/m)	145 lbf (216 kg/m)	155 lbf (231 kg/m)
Weather Resistance	ASTM G155	10,080 kJ/m² at 340 nm; No cracks @ 7X magnification	>20,000 KJ/(m²•nm) at 340 nm	>25,000 KJ/(m²•nm) at 340 nm	>25,000 KJ/(m²•nm) at 340 nm

Note 1: 100, 115, and 135 TPO fleece-back sheets are composed of 45 mil, 60 mil, and 80 mil TPO membrane, respectively, with an integral fleece backing.
Note 2: Physical properties are based on 45, 60, or 80 mil membranes.
Note 3: Certain data is provided in MD (machine direction) x CMD (cross machine direction) format.
Note 4: Data is based upon typical product performance and is subject to normal manufacturing tolerance and variance.

Additional Physical Properties

Puncture Resistance	FTM 101C Method 2031	Not Established	>350 lb. (159 kg)	>380 lb. (172 kg)	>380 lb. (172 kg)
Permeance	ASTM E2178	Not Established	<0.02 (L/sm²)	<0.02 (L/sm²)	<0.02 (L/sm²)

Guarantee*

EverGuard® TPO Fleece-Back Membrane 100	Up to 20 years
EverGuard® TPO Fleece-Back Membrane 115	Up to 25 years
EverGuard® TPO Fleece-Back Membrane 135	Up to 30 years

* Values stated are approximate and subject to normal manufacturing variation. These values are not guaranteed and are provided solely as a guide. GAF warranties and guarantees do not provide coverage against hail or other impact. See applicable guarantee or warranty, available at gaf.com, for complete coverage and restrictions. Hail or puncture resistance coverage may be available for purchase for eligible systems. Contact GAF for more information.

Sustainability Ratings/Certifications

Cool Roof Rating Council (CRRC)

Type	ASTM Test Method	Color	Product ID#	Initial	Aged
Solar Reflectance	ASTM C1549	White	0676-0027	0.76	0.68
Thermal Emittance	ASTM C1371	White	0676-0027	0.90	0.83
Solar Reflectance Index (SRI)	ASTM E1980	White	0676-0027	94	81

LEED Information (white only)

Manufacturing Location	Mount Vernon, IN	New Columbia, PA	Cedar City, UT

EverGuard® TPO Fleece-back Membrane

100, 115, 135

Applicable Standards/Approvals

CRRC COOL ROOF RATING COUNCIL	CRRC Rated - Can be used to comply with 2022 Title 24, Part 6, Cool Roof Requirements of the California Code of Regulations (white only)	
FM APPROVED	FM Approved (Refer to FM www.RoofNav.com for actual assemblies)	Meets or exceeds the requirements of ASTM D6878
MIAMI-DADE COUNTY APPROVED	Miami-Dade Approved	Meets or exceeds the requirements of the Texas Department of Insurance
CLASSIFIED UL	Classified by UL in accordance with ANSI/UL790, including Class A rated roofing assemblies. Refer to UL Product iQ for specific assemblies.	State of Florida Approved

Product Data

Roll Size	EverGuard® TPO Fleece-back Membrane 100	EverGuard® TPO Fleece-back Membrane 115	EverGuard® TPO Fleece-back Membrane 135
12′ Roll Size	12′ x 100′ (3.66 m x 30.5 m) 1,200 sq. ft. (111.5 sq. m)	12′ x 100′ (3.66 m x 30.5 m) 1,200 sq. ft. (111.5 sq. m)	12′ x 80′ (3.66 m x 24.38 m) 960 sq. ft. (89.2 sq. m)
12′ Roll Weight (Average)	334 lb. (151 kg)	408 lb. (185 kg)	450 lb. (204 kg)
10′ Roll Size	10′ x 100′ (3.05 m x 30.5 m) 1,000 sq. ft. (92.9 sq. m)	10′ x 100′ (3.05 m x 30.5 m) 1,000 sq. ft. (92.9 sq. m	10′ x 80′ (3.05 m x 24.38 m) 800 sq. ft. (74.3 sq. m)
10′ Roll Weight (Average)	278 lb. (126 kg)	340 lb. (154 kg)	375 lb. (170 kg)
8′ Roll Size	8′ x 100′ (2.44 m x 30.5 m) 800 sq. ft. (74.3 sq. m)	8′ x 100′ (2.44 m x 30.5 m) 800 sq. ft. (74.3 sq. m)	8′ x 80′ (2.44 m x 24.38 m) 640 sq. ft. (59.5 sq. m)
8′ Roll Weight (Average)	222 lb. (101 kg)	272 lb. (123 kg)	300 lb. (136 kg)
6′ Roll Size	6′ x 100′ (1.83 m x 30.5 m) 600 sq. ft. (55.7 sq. m)	6′ x 100′ (1.83 m x 30.5 m) 600 sq. ft. (55.7 sq. m)	6′ x 80′ (1.83 m x 24.38 m) 480 sq. ft. (44.6 sq. m)
6′ Roll Weight (Average)	167 lb. (76 kg)	204 lb. (93 kg)	225 lb. (102 kg)
5′ Roll Size	5′ x 100′ (1.52 m x 30.5 m) 500 sq. ft. (46.5 sq. m)	5′ x 100′ (1.52 m x 30.5 m) 500 sq. ft. (46.5 sq. m)	5′ x 80′ (1.52 m x 24.38 m) 400 sq. ft. (37.16 sq. m)
5′ Roll Weight (Average)	139 lb. (63 kg)	170 lb. (77 kg)	188 lb. (85 kg)
Colors	White		
Storage	Store on pallets in a clean, dry area at temperatures below 100°F (38°C).		
Safety Warning	Membrane rolls are heavy. Employ at least two people to position and install.		

Note: Membrane rolls shipped horizontally on pallets, stacked pyramid-style, and banded.

For additional information, contact GAF Design Services at 1-877-423-7663 or designservices@gaf.com

We protect what matters most™

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OLYBOND500®

Insulation Adhesive

Description

OlyBond500® is a two-component, low-rise polyurethane adhesive used to adhere a variety of board stocks to many roof substrates in both new and reroof applications. It can also be used to adhere insulation board to insulation board. OlyBond500® is dispensed in ¾" (19.1 mm) to 1" (25.4 mm) wide beads that spread to several inches while rising ¾" (19.1 mm) to 1" (25.4 mm) above the substrate. Place the board stock into the adhesive and walk into place. A chemical cure takes place, securing the board in approximately 4 to 8 minutes after application, depending on temperature and weather conditions. OlyBond500® uses water, not HCFC, as the blowing agent and therefore is low VOC.

Basic Use

- OlyBond500® is included in many approved roof assemblies listed with UL, FM Approvals, and Miami-Dade County. Refer to UL Product iQ, Miami-Dade County, and FM Approvals at RoofNav.com for actual assemblies.
- Ensure that you have the correct OlyBond500® formulation for the surface and ambient temperature.
  - **Regular -** All Packaging 40°F+ (4.4°C+)
  - **Winter Grade -** Bag In Box/15 Gal (57 L) Drum 25°F - 65°F (13.8°C - 36.1°C)
  - **Winter Grade -** SpotShot 0°F - 65°F (-17.8°C - 36.1°C)
- OlyBond500® is available in both Regular (Bag-in-Box, 15 Gal [57 L] Drums, and SpotShot) and Winter Grade OlyBond500® Spot Shot Bag-in-Box for optimum application at various temperatures.
- Lightweight and portable.
- Allows for easy insulation board installation.
- Compatible with most single-ply and some asphaltic systems.
- Quick cure time.
- On retrofit re-cover projects, the existing roof material must be examined. All wet material must be identified and removed prior to the application of the OlyBond500® adhesive to ensure adequate attachment of existing system.
- See pages 3 – 4 for general application recommendations and requirements.

Packaging

- 10-gallon (37.85 liters) Bag-in-Box sets for use with the PaceCart 2® and PaceCart 3™ (5-gallon [18.93 liters] Part 1; 5-gallon [18.93 liters] Part 2). 30-gallon (57 liters) Drum sets for use with PaceCart 3™ with conversion kit 15 gallon (57 liters) Part 1; 15 gallon (57 liters) Part 2
- 1,500-ml SpotShot cartridge sets for use in specially designed applicators.

Compatibility When Properly Prepared and Evaluated

Roof Decks and Substrates:

- Structural concrete
- Gypsum
- Cementitious wood fiber plank
- Lightweight insulating concrete
- Steel (22 gauge or thicker with approved cross section)
- Plywood (⅝" [15.9 mm] thick min.)
- Smooth surface BUR
- Smooth and granular-surface modified bitumen (See the GAF published application and specifications manual available at gaf.com for proper preparations or contact GAF Technical Support at 1-800-766-3411.)
- Existing sprayed-in-place polyurethane foam
- Base sheets
- Asphaltic and fleece-top vapor barriers

Roof Insulation and Cover Board:

- Expanded polystyrene
- Polyisocyanurate and HD polyisocyanurate (4 ft. x 4 ft. [1.21 m x 1.21 m] boards)
- High-density wood fiber
- Gypsum cover boards
- Perlite
- Certain extruded polystyrene

Any substrate or insulation not listed must be reviewed by GAF. Call us at 800-766-3411.

Codes and Compliance

OlyBond500®

Physical Property	Test Method	Typical Values
Density	ASTM D1622	5.03 lb/cf
Compressive Strength	ASTM D1621	18.02 psi @ 10% deformation
Tensile Strength	ASTM D1623	2.04 psi
Water Absorption	ASTM D2842	2.75%
Closed Cell Content	ASTM D6226	90% min
VOC Content	EPA Method 24	Regular: 11 g/L Winter: 50 g/L
Weight/Gallon		10.32 lb 8.54 lb

Description	Packaging Type	Weight
OlyBond500® Part 1 (Regular & Winter Grade)	Bag-in-Box 5 Gallon (18.9 L)	53 lb. (24.06 kg)
OlyBond500® Part 2 (Regular & Winter Grade)	Bag-in-Box 5 Gallon (18.9 L)	45 lb. (20.43 kg)
OlyBond500® SpotShot Cartridge (Part 1 & Part 2) (Regular & Winter Grade)	(4) 1500 ml Cartridges /Box	19 lb. (8.62 kg)
OlyBond500® Part 1	15 Gallon (56.78 L) Drum	160 lb. (72.64 kg)
OlyBond500® Part 2	15 Gallon (56.78 L) Drum	135 lb. (61.29 kg)
OlyBond® Classic Part A	15 Gallon (56.78 L) Drum	160 lb. (72.64 kg)
OlyBond® Classic Part B	15 Gallon (56.78 L) Drum	135 lb. (61.29 kg)
OlyBond® Classic Part A	55 Gallon (208.2 L) Drum	591 lb. (268.31 kg)
OlyBond® Classic Part B	55 Gallon (208.2 L) Drum	591 lb. (268.31 kg)

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OMG ROOFING PRODUCTS

FM APPROVED

CLASSIFIED cULus

Florida Building Code Approved

MIAMI-DADE COUNTY APPROVED

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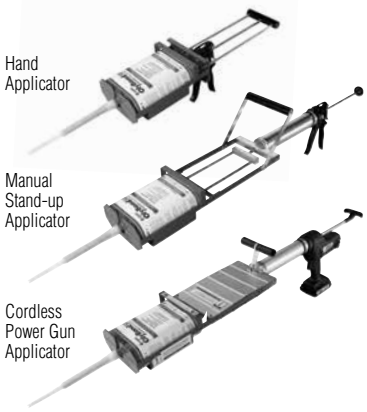
OLYBOND500®
Insulation Adhesive

PaceCart 2® and PaceCart 3™ for OlyBond500®
Patented PaceCart 2® and PaceCart 3™ are the exclusive pieces of application equipment for OlyBond500® using patented Bag-in-Box technology.

- Helps with fast adhesive application
- Designed for large roof projects
- Low installed cost method of application
- Can apply up to 60 squares of insulation per hour using the PaceCart 2® and up to 120 squares of insulation per hour using the PaceCart3™
- Two-component reaction occurs in the disposable mix tips, keeping the gun and hoses clean and free flowing
- 30-ft. (9.14 m) hose allows for easy application around penetrations
- Use OMG PCPreserver™ to keep pumps, hoses, and gun assembly sufficiently lubricated during storage
- Easy to clean and maintain
- Clean, airtight delivery system
- Built-in tool box holds extra mix tips, grease gun, etc.

SpotShot Applicators



Cordless Power Gun Applicator
- All the benefits of the manual stand-up applicator plus a battery-powered mechanical drive system
- Constant pressure provides even and uninterrupted adhesive flow for maximum efficiency
- Easy to operate
- Includes two (2) batteries and a 120-volt charger

Hand Applicator
- Lightweight and easy to use
- Great for repair work or small areas
- Inexpensive

Manual Stand-up Applicator
- Lightweight and portable
- Stand-up application helps reduce worker fatigue as compared with hand applicators

Product Installation
Job Conditions:
- Ensure that you have the correct OlyBond500® formulation for the surface and ambient temperature.
  - **Regular -** All Packaging 40°F+ (4.4°C+)
  - **Winter Grade -** Bag In Box/15 Gal (57 L) Drum 25°F - 65°F (13.8°C - 36.1°C)
  - **Winter Grade -** SpotShot 0°F - 65°F (-17.8°C - 36.1°C)

Roof Deck Criteria
1. OlyBond500® can only be installed on acceptable substrates (i.e., structural concrete, gypsum, cementitous wood fiber plank, lightweight insulating concrete, minimum 22-guage steel, and minimum 5/8" [15.9 mm] plywood) that have been properly prepared. The structure must be sufficient to withstand normal construction load and live loads.
2. Defects in the deck must be repaired prior to re-roof. The application of OlyBond500® should not proceed unless the defects are corrected.
3. It is the responsibility of the roofing contractor to ensure that the existing roof is adequately attached to the building.

Surface Preparation
- **General:** All surfaces must be clean, dry, and free of any debris, dirt, oil, or grease before applying OlyBond500®.
- **Specific Conditions**
  - **Steel** - The bonding surface of steel decks must be dry and free of debris, dirt, grease, and oil. On new steel, the shop coating/mill oil must be removed. The bonding surface must be free of any cleaner before applying OlyBond500®
  - **Existing Smooth Asphaltic Surfaces** - The surface must be dry and free of debris, dirt, grease, and oil.
  - **Existing Polyurethane Foam** - The surface of the polyurethane roof, including the coating, should be removed with a scarifier (minimum inch). The bonding surface should be blown clean before applying OlyBond500®.
  - **Metal** - It is recommended that all non-ferrous metals (aluminum, copper, stainless, etc.) be primed to increase adhesion. Acceptable primers include GAF Epoxy Primer, chlorinated rubber, and wash primer. Contact GAF for further requirements and restrictions.
  - **Concrete** - All concrete surfaces must be fully cured prior to applying OlyBond500®.
  - For detailed GAF substrate preparation requirements, please refer to the appropriate GAF Application and Specifications Manual or contact GAF at 1-800-766-3411.

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OLYBOND500®
Insulation Adhesive

Product Installation

- **Using PaceCart 2® and PaceCart 3™**
  - Install Part 1 and Part 2 components following instructions on Bag-in-Box package or 15 gallon conversion kit.
  - Open flow valves on the dispenser completely and turn machine on. This allows adhesive to be pumped at a 1:1 ratio through the disposable mix tip and onto the substrate in a semi-liquid state.
  - Apply fluid mixture ¾" – 1" (19.1 mm – 25.4 mm) wide wet beads spaced a maximum of 12" (305 mm) on center that spreads in excess of 2" (51 mm) wide while rising to ¾" – 1" (19.1 mm – 25.4 mm).
  - Lay insulation board into place and walk-in to ensure complete adhesion. Curing typically occurs in 4 to 8 minutes depending on temperature and weather conditions.
  - For detailed GAF substrate preparation requirements, please refer to the appropriate GAF Application and Specifications Manual or contact GAF at 1-800-766-3411.
- **Using SpotShot Applicator**
  - Attach the disposable mix tip to the top of the SpotShot tube. Insert the tube into the SpotShot dispensing tool and dispense onto the substrate. Apply fluid mixture in ¾" – 1" (19.1 mm – 25.4 mm) wide wet beads in rows spaced a maximum of 12" (305 mm) on center that spread in excess of 2" (51 mm) wide while rising to ¾" – 1" (19.1 mm – 25.4 mm).
  - Lay insulation board into place and walk-in to ensure complete adhesion. Curing typically occurs in 4 to 8 minutes depending on temperature and weather conditions.
  - For detailed GAF installation requirements, please refer to the appropriate GAF Application and Specifications Manuals or contact GAF at 1-800-766-3411.

Typical Coverge Rates

Coverage rates vary depending on surface roughness and absorption rate of the substrate. Typical coverage rates for OlyBond500® dispensed through the PaceCart® are up to 25 squares per 10-gallon (37.85 liters) Bag-in-Box sets and 75 square per 15-gallon (68.19 L) drum sets. Typical coverage rate for OlyBond500® SpotShot dispensed through applicators is 4 – 6 squares per case (4 sets of 1,500-ml cartridges). See chart below for typical coverage rates on specific substrates.

Application Rates (Bag-in-Box Dispensed from PaceCart 2®)	Typical Coverage* Squares/Gallon
Insulation to Concrete	up to 2.5
Insulation to Insulation	up to 2.5
Insulation to Smooth BUR	up to 1.7
Insulation to Modified Bitumen	up to 1.7
Insulation to Gypsum	up to 1.2
Insulation to Lightweight Concrete	up to 1.7
Insulation to Wood	up to 2.5
Insulation to Cementitious Wood Fiber	up to 1.2
Insulation to Steel	up to 1.2

*All covergae rates are based on 12" (305 mm) on center maximum spacing

Reaction Time

It is important to monitor the speed of the reaction in relation to the temperature (substrate and ambient) at the time of application to ensure a complete reaction. Note the charts below for correct 'Part 2' component selection:

Typical Reaction Time Characteristics

A. 5- and 15-Gallon Bag-in-Box Packaging

Temperature	Part 2 Formula	Tack-Free Time (minutes)	Set-Up Time* (minutes)
25°F to 65°F	W	3-4	10-12
40°F+	R	3-5	10-12

B. 1500 ml SpotShot Cartridges

Temperature	Part 2 Formula	Tack-Free Time (minutes)	Set-Up Time (minutes)
0°F – 65°F	W	3-4	10-12
40°F+	R	3-5	10-12

Important: When applying OlyBond500®, board stock must be placed into the adhesive shortly after it had reached its maximum rise while it is still wet and tacky and before it reaches its tack free state. Do not install boards if adhesive is skinned over.

*Time from adhesive application to insulation board installation

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OLYBOND500®
Insulation Adhesive

Precautions

- **In Case of Fire:** Use water spray, foam, or CO_2. Firefighters should be equipped with self-contained breathing apparatus and turnout gear for protection against PMDI vapors and toxic decomposition products. Avoid water contamination in closed container or confined areas.
- **Do Not Leave Adhesive Exposed or Unprotected.** Polyurethane foam or isocyanurate foam products may present a serious fire hazard if exposed or unprotected. Each person, firm, or corporation engaged in the manufacture, production, application, installation, or use of any of these materials should carefully determine whether there is a potential fire hazard associated with such product in a specific usage and utilize all appropriate precautionary and safety measures as outlined in local, state, and federal regulations. When not in use, keep stored containers closed.

First Aid

In case of contact with eyes, immediately flush eyes with running water for at least 15 minutes. Call a physician immediately. In case of contact with skin, wash affected area with soap and water. Remove all contaminated clothing and shoes and clean before re-use. If swallowed, give large amounts of water to dilute. If vomiting occurs, give more water. Call a physician immediately.

Disposal

Do not discharge into lakes, streams, ponds, or public waters. Spilled material, unused contents, and empty containers should be disposed of in accordance with local, state, and federal regulations.

Patent Notice

The OMG PaceCart® dispensing cart and the Bag-in-Box OlyBond500® Part 1/Part 2 adhesive system, including the adhesive dispensing method, are covered by one or more of U.S. Patent Nos. 6,220,526; 8,113,385; 8,132,693; 8,167,170; 8,342,372; 8,474,658 and 9,327,308; and Canadian Patent No. 2,591,502, Canadian Parent No. 2,821,451 and U.S. Patent Pending.

Limitations

- OlyBond500® is not recommended for use with Polyisocyanurate board stock larger than 4' x 4' (1.21 m x 1.21 m).
- OlyBond500® is not recommended for use during wet weather.
- OlyBond500® cannot be used on dirty or grease-laden surfaces.
- OlyBond500® is not recommended for use on any roof deck that shows signs of deterioration or loss of structural integrity.
- OlyBond500® is not recommended for use after the expiration date. Contact OMG at 800-633-3800 for options and instructions.

Storage and Handling

- Store in a cool, dry location at temperatures between 55°F (12.8°C) and 85°F (29.4°C). Protect from freezing at all times. If properly stored, the shelf life for unopened product is 18 months from the date of manufacture.
- Keep containers closed. Contamination by moisture or basic compounds can cause dangerous pressure build-up in a closed container.
- The minimum product temperature before application should be 72°F (22.2°C). The minimum ambient and surface temperatures should be 40°F (4.4°C) and rising unless the SpotShot winter formulation is being used.

Manufactured by:

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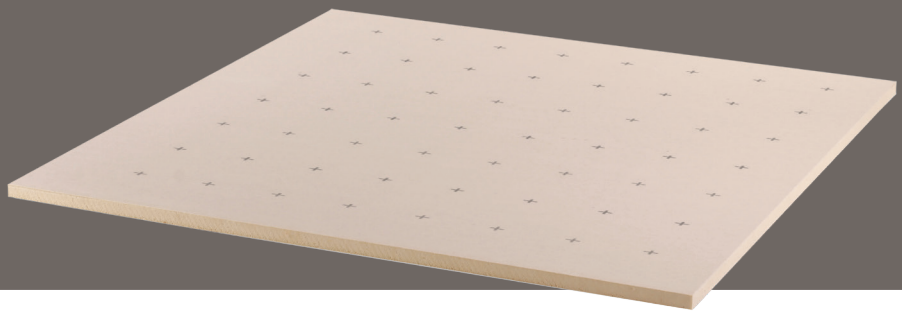
High-Density Polyiso Cover Board >80 psi

EnergyGuard™ RA
HD
Polyiso Cover Board



Description:

EnergyGuard™ RA HD Polyiso Cover Board is a closed-cell high-density polyisocyanurate (polyiso) foam core integrally bonded to inorganic coated glass facers (CGF), designed to be used as a cover board for low-slope roof systems.

Features and Benefits:

- Developed with durable coated glass facers and a high-density polyiso foam core
- R-Value 2.5—highest R-value compared to non-polyiso cover boards of equivalent thickness
- High compressive strength—80 psi (551 kPa) minimum up to 109 psi (751 kPa) maximum
- This product has been validated by UL Environment as resistant to mold growth based on independent testing to UL 2824†
- Lightweight—only 11 lbs (4.9 kg) per 4'x8' (1.22m x 2.44m) board, easy to cut, easy to install
- Ideal for low-slope roofs with high foot traffic, hail events, and metal retrofit applications†

Panel Characteristics:

- Available in 0.5" (12.7mm) thickness, 4' x 4' (1.22m x 1.22m) and 4' x 8' (1.22m x 2.44m) panels

Codes & Compliance:

- Meets the requirements of ASTM C 1289 Type II Class 4 Grade 1 (80 psi - 109 psi max)
- FM Approved—consult RoofNav.com for specific assemblies
- Classified by UL in accordance with ANSI/790; refer to UL Product iQ for specific assemblies
- For additional information, contact GAF at 877-423-7663 or designservices@gaf.com

Sustainability:

- Manufactured using CFC-, HCFC- and HFC-free foam blowing technology with zero ozone depletion potential (ODP) and virtually no (negligible) global warming potential (GWP)
- EnergyGuard™ RA HD Polyiso Cover Board contains 7.4% recycled materials by weight
- Has acheived GREENGUARD GOLD Certification

Thermal Data:

THICKNESS		THERMAL		PCS/PKG
in	mm	R-VALUE[1]	RSI[2]	
0.5	12.7	2.5	0.44	42

[1] Determined by ASTM test method C518 at 75°F mean temperature.

[2] RSI is the metric expression of R-value (m^2•K/W).

†GAF warranties and guarantees do not provide coverage against mold or other biological growth, or hail except where additional puncture resistance coverage is purchased on eligible jobs. Refer to gaf.com for more information on warranty and guarantee coverage and restrictions.

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EnergyGuard™ RA
HD
Polyiso Cover Board

Typical Physical Property Data

PROPERTY	TEST METHOD	ASTM C1289 VALUE
Compressive Strength	ASTM D1621	Grade 1 - min. 80 psi (551 kPa)
Dimensional Stability	ASTM D2126	max. 1% (length & width) max. 4% (thickness)*
Tensile Strength	ASTM C209	min. 2,000 psf (95.8 kPa)
	ASTM D1623	
Water Absorption (% by vol.)	ASTM C209	max 4%
	ASTM D2842	
Water Vapor Permeance	ASTM E96	max. 1.5 perm (85.8 ng/(Pa•s•m²))

*Max. 4% at -40°F and 200°F (-40°C & 93°C) ambient RH. Max. 4% at 158°F (70°C) and 97% RH.

Surface Burning and Service Temperature Data

	TEST METHOD	VALUE
Service Temperature	n/a	-100°F to 250 °F (-73.3°C to 121.1 °C)
Flame Spread Index	ASTM E84 / UL 723	max. 75
Smoke Developed Index	ASTM E84 / UL 723	max. 200

Installation

- EnergyGuard™ RA HD Polyiso Cover Board should be kept dry before, during, and after installation.
- Refer to product packaging and PIMA Technical Bulletin #109 for storage and handling recommendations.
- This product will burn if exposed to an ignition source of sufficient heat and intensity. Do not apply flame directly to EnergyGuard™ RA HD Polyiso Cover Board.
- Typical field fastening requirements can be obtained from GAF membrane system manufacturer or FM Global Property Loss Prevention Data Sheets 1-29.
- Prior to installation, consult your local building codes, contract documents, professional engineer, FM Global, and GAF for additional installation guidelines as well as design enhancements.

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Sloped Polyiso with GRF Facers

EnergyGuard™ RA Tapered Polyiso Insulation

Description:

EnergyGuard™ RA Tapered Polyiso Insulation is a sloped panel made of glass fiber–reinforced (GRF) cellulosic felt facers bonded to a core of polyisocyanurate foam.

Features and Benefits:

- Prevents ponding water when properly installed on a low-slope roof by providing slope via a series of both tapered and flat polyiso fill boards
- Highest R-Value per inch of any rigid board insulation
- Easy to install—lightweight, easy to cut, easy to handle
- Versatile—approved component in single-ply, BUR, modified bitumen, and ballasted systems, with a variety of attachment methods: mechanically attached, fully adhered, loose laid

Panel Characteristics:

- EnergyGuard™ RA Tapered Polyiso Insulation is offered in a variety of slopes to achieve positive drainage as well as long-term thermal resistance (LTTR).
- Available in

  Size: 4ft x 4ft (1.22m x 1.22m) panels

  Thickness: 1/2" - 4.6" (12.7mm - 114.3 mm)

  Slope: with 1/8" (3mm), 1/4" (6mm), and 1/2" (12mm) per foot slope*

* Other slopes available. Order minimums may apply.

Codes & Compliance:

- Meets the requirements of ASTM C1289 Type II, Class 1, Grade 2 (20 psi) and also available in Grade 3 (25 psi)
- Meets the requirements of CAN/ULC-704, Type 2, Class 3 or Type 3, Class 3
- FM Approved—consult RoofNav.com for specific assemblies
- Classified by UL in accordance with ANSI/UL 1256, 790, and 263. Refer to UL Product iQ for specific assemblies
- Miami-Dade County Product Control Approved
- State of Florida Approved
- For additional information, contact GAF at 877-423-7663 or designservices@gaf.com

Sustainability:

- EnergyGuard™ RA Tapered Polyiso Insulation is manufactured using CFC-, HCFC- and HFC-free foam blowing technology with zero ozone depletion potential (ODP) and virtually no (negligible) global warming potential (GWP).
- EnergyGuard™ RA Tapered contains between 52.9% and 27.6% recycled materials by weight

Tapered Design Team:

Our Tapered Design Group specialists are available within your region to assist you in all aspects of preplanning, design, and training. Contact GAF at tdg@GAF.com or 866.207.7123

Our services include:

- Conceptual design assistance
- Quote review and comparison
- Plan and spec review
- Alternate design recommendations
- Job startups, trainings, and presentations

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EnergyGuard™ RA Tapered Polyiso Insulation

ASTM C1289 Type II, Class 1, Grade 2 (20 psi) or Grade 3 (25 psi) • CAN/ULC-704, Type 2, Class 3 or Type 3, Class 3

SLOPE*	LABEL*	THICKNESS			THERMAL RESISTANCE		BRD FT/ PIECE	PCS/ UNIT	BRD FT/ UNIT	SQ FT/ UNIT	WEIGHT (LB/SF)	RECYCLED CONTENT		
		MIN	MAX	AVG	AVG LTTR VALUE	RSI						POST CONSUMER	PRE CONSUMER	TOTAL
1/8"	AA	0.5	1.0	0.75	4.3	0.76	12	64	768	1024	0.211	39.1%	20.0%	59.0%
	A	1.0	1.5	1.25	7.1	1.25	20	38	760	608	0.279	29.6%	18.6%	48.2%
	B	1.5	2.0	1.75	10.0	1.76	28	26	728	416	0.346	23.8%	17.8%	41.6%
	C	2.0	2.5	2.25	12.9	2.27	36	20	720	320	0.414	19.9%	17.3%	37.2%
	D	2.5	3.0	2.75	15.9	2.80	44	16	704	256	0.481	17.1%	16.9%	34.0%
	E	3.0	3.5	3.25	18.9	3.33	52	14	728	224	0.549	15.0%	16.6%	31.6%
	F	3.5	4.0	3.75	22.0	3.87	60	12	720	192	0.616	13.4%	16.3%	29.7%
1/4"	X	0.5	1.5	1.0	5.7	1.00	16	48	768	768	0.245	33.7%	19.2%	52.9%
	Y	1.5	2.5	2.0	11.4	2.01	32	24	768	384	0.380	21.7%	17.5%	39.2%
	Z	2.5	3.5	3.0	17.4	3.06	48	16	768	256	0.515	16.0%	16.7%	32.7%
	ZZ	3.5	4.5	4.0	23.6	4.15	64	10	640	160	0.650	12.7%	16.3%	28.9%
1/4"	G	1.0	2.0	1.5	8.6	1.51	24	32	768	512	0.313	26.4%	18.2%	44.6%
	H	2.0	3.0	2.5	14.4	2.53	40	18	720	288	0.448	18.4%	17.1%	35.5%
	I	3.0	4.0	3.5	20.5	3.61	56	12	672	192	0.583	14.2%	16.5%	30.6%
1/2"	Q	0.5	2.5	1.5	8.6	1.51	24	32	768	512	0.313	26.4%	18.2%	44.6%
	QQ	2.5	4.5	3.5	20.5	3.61	56	12	672	192	0.583	14.2%	16.5%	30.6%
	XX	1.0	3.0	2.0	11.4	2.01	32	22	704	352	0.380	21.7%	17.5%	39.2%

*Full bundles only. Other slopes available. Order minimum may apply.

Typical Physical Property Data

PROPERTY	TEST METHOD	ASTM C1289 VALUE	CAN/ULC-704 VALUE
Compressive Strength	ASTM D1621	Grade 2 - min. 20 psi (138 kPa)	Type 2 - min. 140 kPa (20.3 psi)
		Grade 3 - min. 25 psi (172 kPa)	Type 3 - min. 170 kPa (24.7 psi)
Dimensional Stability	ASTM D2126	max. 2% (length & width) max. 4% (thickness)	max. 2% (length & width)
Tensile Strength	ASTM C209	min. 500 psf (24 kPa)	
	ASTM D1623		Type 2 - 3 min. 35 kPa (731 psf)
Water Absorption (% by vol.)	ASTM C209	max 1.5%	
	ASTM D2842		max. 3.5%
Water Vapor Permeance	ASTM E96	max. 1.5 perm (85.8 ng/(Pa•s•m^2))	
			Class 3 - min. 60 ng/(Pa•s•m^2)(1 perm)

Surface Burning and Service Temperature Data

	TEST METHOD	VALUE
Service Temperature	n/a	-100 to 250 °F (-73.3 to 121.1 °C)
Flame Spread Index	ASTM E84 / UL 723	max. 75*
Smoke Developed Index	ASTM E84 / UL 723	max. 200*

*Foam Core

Installation

- EnergyGuard™ RA Tapered Polyiso Insulation shall be kept dry before, during and after installation.
- Refer to product packaging and PIMA Technical Bulletin #109 for storage and handling recommendations.
- This product will burn if exposed to an ignition source of sufficient heat and intensity. Do not apply flame directly to EnergyGuard™ RA Tapered Polyiso Insulation.
- Typical field fastening requirements can be obtained from GAF membrane system manufacturer or FM Global Property Loss Prevention Data Sheets 1-29.
- Refer to the application specifications in the current GAF Membrane Installation Guide and specifications manual for proper installation procedures.

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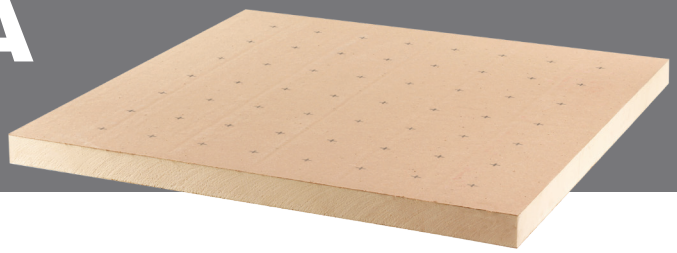
Flat Polyiso with GRF Facers

EnergyGuard™ RA

Polyiso Insulation



Description:

EnergyGuard™ RA Polyiso Insulation board is made of glass fiber-reinforced cellulosic felt (GRF) facers bonded to a core of polyisocyanurate foam.

Features and Benefits:

- Versatile—approved component in single-ply, BUR, and modified bitumen systems, with a variety of attachment methods: mechanically attached, fully adhered, loose laid and ballasted
- Approved for direct application to steel decks
- High insulation value—polyiso insulation has the highest R-value per inch compared to any other type of non-polyiso insulation of equivalent thickness
- Because of its light weight, this material is easy to handle on the jobsite and installs quickly; easy cutting in the field provides the installer with simplified fabricating on the roof deck
- Excellent dimensional stability, high moisture resistance and low water permeability

Panel Characteristics:

- Available in a variety of thicknesses from 1.0" (25.4 mm) to 4.5" (114 mm) to best suit your specifications
- Available in 4' x 4' (1.22m x 1.22m) and 4' x 8' (1.22m x 2.44m) boards

Codes & Compliance:

- Meets the requirements of ASTM C1289 Type II, Class 1, Grade 2 (20 psi) and also available in Grade 3 (25 psi)
- Meets the requirements of CAN/ULC-704, Type 2, Class 3 or Type 3, Class 3
- FM Approved—consult RoofNav.com for specific assemblies
- Classified by UL in accordance with ANSI/UL 1256, 790, and 263; refer to UL Product iQ for specific assemblies
- Miami-Dade County Product Control Approved
- State of Florida Approved
- For additional information, contact GAF at 877-423-7663 or designservices@gaf.com

EnergyGuard™ RA Polyiso Thermal Values:

SIZE*	R-VALUE**	MAX FLUTE SPAN
1.0" (25.4 mm)	5.7	2 5/8" (66.7 mm)
1.2" (30.5 mm)	6.8	2 5/8" (66.7 mm)
1.5" (38.1 mm)	8.6	4 3/8" (111 mm)
2.0" (51 mm)	11.4	4 3/8" (111 mm)
2.3" (58 mm)	13.2	4 3/8" (111 mm)
2.5" (64 mm)	14.4	4 3/8" (111 mm)
2.6" (66 mm)	15.0	4 3/8" (111 mm)
2.8" (71 mm)	16.2	4 3/8" (111 mm)
3.0" (76 mm)	17.4	4 3/8" (111 mm)
3.2" (81 mm)	18.6	4 3/8" (111 mm)
3.5" (89 mm)	20.5	4 3/8" (111 mm)
3.7" (94 mm)	21.7	4 3/8" (111 mm)
4.0" (102 mm)	23.6	4 3/8" (111 mm)
4.3" (109 mm)	25.5	4 3/8" (111 mm)
4.5" (114 mm)	26.8	4 3/8" (111 mm)

* Other thicknesses available upon request.

**Long Term Thermal Resistance Values provide a 15-year time weighted average in accordance with CAN/ULC S770.

For optimal roof performance and to prevent thermal bridging, GAF recommends installing two layers of polyiso with staggered joints.

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EnergyGuard™ RA

Polyiso Insulation

Sustainability

For more information go to **gaf.com/green**

- Manufactured with EPA compliant blowing agents containing no CFCs or HCFCs; has zero ozone depletion potential (ODP) and negligible global warming potential (GWP)
- Potential LEED Credits for Polyiso Use
- Environmental Product Declaration (EPD) (Industry)
- EnergyGuard™ RA contains between 52.9% and 27.6% recycled materials by weight
- Has achieved GreenGuard Gold Certification

Typical Physical Property Data

PROPERTY	TEST METHOD	ASTM C1289 VALUE	CAN/ULC-704 VALUE
Compressive Strength	ASTM D1621	Grade 2 - min. 20 psi (138 kPa)	Type 2 - min. 140 kPa (20.3 psi)
		Grade 3 - min. 25 psi (172 kPa)	Type 3 - min. 170 kPa (24.7 psi)
Dimensional Stability	ASTM D2126	max. 2% (length & width) max. 4% (thickness)	max. 2% (length & width)
Tensile Strength	ASTM C209	min. 500 psf (24 kPa)	
	ASTM D1623		Type 2 - 3 min. 35 kPa (731 psf)
Water Absorption (% by vol.)	ASTM C209	max 1.5%	
	ASTM D2842		max. 3.5%
Water Vapor Permeance	ASTM E96	max. 1.5 perm (85.8 ng/(Pa•s•m^2))	
			Class 3 - min. 60 ng/(Pa•s•m^2)(1 perm)

Surface Burning and Service Temperature Data

	TEST METHOD	VALUE
Service Temperature	n/a	-100 to 250 °F (-73.3 to 121.1 °C)
Flame Spread Index	ASTM E84 / UL 723	max. 75*
Smoke Developed Index	ASTM E84 / UL 723	max. 200*

*Foam Core

Installation

- EnergyGuard™ RA Polyiso Insulation is a non-structural, non load-bearing material. It is not designed for direct traffic usage unless adequately protected.
- EnergyGuard™ RA Polyiso Insulation should be stored protected from the elements. Bundle wrap is not for use as waterproofing for boards. No more insulation should be installed than can be completely covered with roofing on the same day.
- Refer to PIMA Technical Bulletin No.109 Storage and Handling Recommendations for Polyiso Roof Insulation at www.polyiso.org.
- As unprotected polyisocyanurate will burn, fire safety precautions should be observed wherever insulation products are used.
- Direct mopping of modified bitumen roofing or built-up roofing (BUR) to EnergyGuard™ RA Polyiso Insulation is not approved.
- Refer to the application specifications in the current GAF Membrane Installation Guide and specifications manual for proper installation procedures.

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SA Vapor Retarder XL

Self-Adhered Vapor Retarder

Description:

GAF SA Vapor Retarder XL is a self-adhered, vapor-inhibiting membrane designed for use in approved roofing membrane assemblies. It's composed of a tri-laminated woven polyethylene facer combined with an advanced, high-tack adhesive. The under-face is applied with a split silicone release film that is removed during installation. This uniquely durable product exhibiting high-tensile strength can be left exposed for up to 180 days when installed in accordance with published GAF specifications and details.*

Application:

GAF SA Vapor Retarder XL can be applied at temperatures as low as 25°F (-3.9°C) provided that the product has been stored in a heated area to ensure it is between 50°F – 100°F (10°C – 37.7°C) at time of installation. It is recommended that GAF SA Vapor Retarder XL be installed with minimum 3" (76.2 mm) side laps and 3" (76.2 mm) end laps.

Applicable Standards:

ASTM D5147, ASTM E2178, ASTM E96

Product Specifications (approximate†)		
	Standard XL roll	**XL 40 roll**
Thickness	31 mils	41 mils
Roll weight	97 lb.	129 lb.
Rolls size	6 Squares	
Roll length	125 ft.	
Rolls Per Pallet	12 rolls	20 rolls
Roll width	58"	
Shelf life	18 Months from the date of manufacture when stored properly	

Property	MD Value	XMD Value	Test Method
Thickness, mils (mm)	31 (.79)		ASTM D1970
Thickness‡, mils (mm)	41 (1.04)		ASTM D1970
Tensile strength, min. lbf/in (kN/m)	70 (12.3)	70 (12.3)	ASTM D5147
Ultimate elongation @ 73.4°F (23°C), min. %	31	31	ASTM D5147
Tear resistance, min. lbf (N)	95 (423)	110 (489)	ASTM D5147
Static puncture, min. lbf (N)	90 (400)	90 (400)	ASTM E154
Lap adhesion, min. lbf/ft (N/m)	24 (350)	24 (350)	ASTM D1876
Water absorption, min. %	0.01	0.01	ASTM D5147
Peel resistance on steel, min. lbf/in (N/m)	25 (4,378)		ASTM D903
Cold bending, max. °F (°C)	-30 (-34.4)		ASTM D5147
Water vapor permeance, max. perm (ng/Pa.s.m²)	0.03 (1.7)		ASTM E96
Air permeability, max. L/s•m²	0.001		ASTM E2178

Features and Benefits:

- ASTM E108 Class A and FM 4470 Class 1 Fire Ratings directly over steel deck.§
- Designed to be self-sealing.
- Increased adhesion performance provides three times the peel strength compared to self-adhered modified bitumen vapor barriers.
- Use of a primer prior to installation is NOT required.
- Slip-resistant embossed walking surface.
- Extra-large roll size (603 square feet) results in fewer rolls and fewer field seams per job.
- Easy-to-peel, split-release film speeds the application process.
- Standard thickness is 31 mils; also available in 41 mils (contact your local GAF representative for details).
- Direct attachment at curbs and walls on TPO applications (refer to application instructions for approved adhesives).

Applicable Substrates:

GAF SA Vapor Retarder XL is designed to be applied to a variety of properly prepared decks or substrates:

- Steel
- Plywood/OSB
- Gypsum Roof Boards
- Concrete

* Refer to the appropriate application and specifications manual for the system being installed. Available at gaf.com.
† Values stated are approximate and subject to normal manufacturing variation. These values are not guaranteed and are provided solely as a guide.
‡ Thicker/heavier product available by special request only and sold as SA Vapor Retarder XL40.
§ Refer to www.RoofNav.com for actual assemblies.

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For additional information, contact GAF Design Services at **1-877-423-7663** or **designservices@gaf.com**

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Environmental Product Declaration

GAF EverGuard® TPO Fleece-Back Membrane

GAF, a Standard Industries company, is the leading roofing and waterproofing manufacturer in North America. For more than 135 years, GAF has been trusted to protect what matters most for families,communities and business owners with its innovative solutions and focus on customer service. GAF's leadership extends to its commitment to making a positive impact on its communities,industry, and planet. Learn more at www.GAF.com.

The perfect choice if you’re looking to avoid the expense of removing an existing roofing system before installing a new one.

NSF Certified Environmental Product Declaration www.nsf.org

This declaration is an environmental product declaration (EPD) in accordance with ISO 14025 and ISO 21930-2017. EPDs rely on Life Cycle Assessment (LCA) to provide information on a number of environmental impacts of products over their life cycle. Exclusions: EPDs do not indicate that any environmental or social performance benchmarks are met, and there may be impacts that they do not encompass. LCAs do not typically address the site-specific environmental impacts of raw material extraction, nor are they meant to assess human health toxicity. EPDs can complement but cannot replace tools and certifications that are designed to address these impacts and/or set performance thresholds – e.g., Type 1 certifications, health assessments and declarations, environmental impact assessments, etc. Accuracy of Results: EPDs regularly rely on estimations of impacts, and the level of accuracy in estimation of effect differs for any particular product line and reported impact. Comparability: EPDs are not comparative assertions and are either not comparable or have limited comparability when they cover different life cycle stages, are based on different product category rules or are missing relevant environmental impacts. EPDs from different programs may not be comparable.

EPD PROGRAM AND PROGRAM OPERATOR NAME, ADDRESS, LOGO, AND WEBSITE	NSF International, 789 N. Dixboro Rd, Ann Arbor, MI 48105,www.nsf.org
GENERAL PROGRAM INSTRUCTIONS AND VERSION NUMBER	NSF Certification Policies for Environmental Product Declarations (EPD): November 1, 2022
MANUFACTURER NAME AND ADDRESS	GAF 1 Campus Drive Parsippany, NJ 07054
DECLARATION NUMBER	EPD10914
DECLARED PRODUCT & DECLARED UNIT	GAF EverGuard® TPO Fleece-Back Membrane Declared Unit = 1 m²
REFERENCE PCR AND VERSION NUMBER	NSF International: Product Category Rule for Environmental Product Declarations for Single Ply Roofing Membranes, Version 2, Issued 2019 Valid through July 17, 2024
DESCRIPTION OF PRODUCT APPLICATION/USE	Single Ply Roofing Membrane (TPO)
PRODUCT RSL DESCRIPTION	N/A
MARKETS OF APPLICABILITY	Global
DATE OF ISSUE	02/02/2024 - 02/02/2029
PERIOD OF VALIDITY	5 Years
EPD TYPE	Product Specific
DATASET VARIABILITY	N/A
EPD SCOPE	Cradle-to-Gate with options
YEAR(S) OF REPORTED PRIMARY DATA	2021
LCA SOFTWARE & VERSION NUMBER	LCA for Experts v. 10.6 GAF EPD Generator Tool Version 1.0
LCI DATABASE(S) & VERSION NUMBER	Sphera database & USLCI v2.0
LCIA METHODOLOGY & VERSION NUMBER	TRACI 2.1; CML 4.1
The sub-category PCR review was conducted by:	
This declaration was independently verified in accordance with ISO 14025: 2006. ISO 21930:2017, Sustainability in buildings and civil engineering works - Core rules for environmental product declarations of construction products and services, serves as the core PCR, with additional considerations from ISO 21930:2007 and CEN Norm EN 15804 (2012). ☐ INTERNAL ☒ EXTERNAL	Jack Geibig, EcoForm, LLC jgeibig@ecoform.com
This life cycle assessment was conducted in accordance with ISO 14044 and the reference PCR by:	Sustainable Solutions Corporation
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	Jack Geibig, EcoForm, LLC jgeibig@ecoform.com

Environmental declarations from different programs (ISO 14025) may not be comparable.

Comparison of the environmental performance using EPD information shall consider all relevant information modules over the full life cycle of the products within the building.

This PCR allows EPD comparability only when the same functional requirements between products are ensured and the requirements of ISO 21930:2017 §5.5 are met. It should be noted that different LCA software and background LCI datasets may lead to differences results for upstream or downstream of the life cycle stages declared.

General Information

Description of Company/Organization

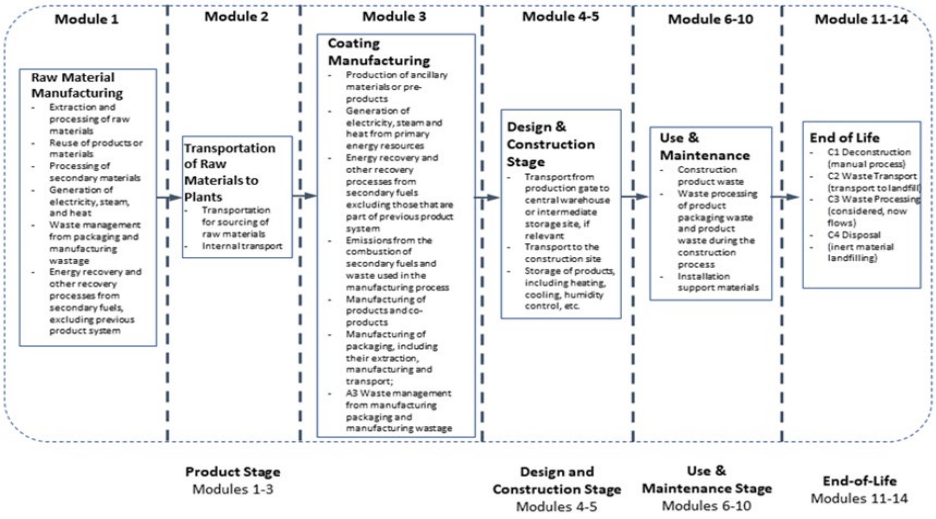
Founded in 1886, GAF is the leading roofing manufacturer in North America. As a member of the Standard Industries family of companies, GAF is part of the largest roofing and waterproofing business in the world. The company's products include a comprehensive portfolio of roofing and waterproofing solutions for residential and commercial properties as well as for civil engineering applications. The full GAF portfolio of solutions is supported by an extensive national network of factory-certified contractors. GAF continues to be the leader in quality and offers comprehensive warranty protection on its products and systems. The company's success is driven by a commitment to empowering its people to deliver advanced quality and purposeful innovation. For more information about GAF, visit www.gaf.com.

Product Description

EverGuard® TPO Fleece-Back membrane is a single-ply roofing product and is designed to be used as an outer roof layer, either in new construction or re-covering applications. It is made of two layers of thermoplastic polyolefin (TPO) bonded to a layer of polyester scrim in the middle. This configuration meets all the inherent properties and performance which TPO is known for, including excellent seam strength, long-term weathering, natural resistance to fungi, energy savings, and more.

The products included in this EPD are:
- EverGuard® TPO Fleece-Back 45-mil Membrane
- EverGuard® TPO Fleece-Back 60-mil Membrane
- EverGuard® TPO Fleece-Back 80-mil Membrane

Flow Diagram



Manufacturer Specific EPD

This product-specific EPD was developed based on the cradle-to-gate with options (modules A1-A5, C1-C4) Life Cycle Assessment. The EPD accounts for raw material extraction and processing, transport, product manufacturing, distribution, installation, and disposal. Manufacturing data were gathered directly from company personnel. For any product group EPDs, an impact assessment was completed for each product. Product grouping was considered appropriate if the individual product impacts differed by no more than ±10% in any impact category. Average product representations were determined by conducting a weighted average of the manufacturing inventory based on total production in the reference year. Product formulations are consistent between different thicknesses of a product group and across various manufacturing sites.

Application

EverGuard® TPO Fleece-Back membrane is a single-ply roofing product and is designed to be used as an outer roof layer, either in new construction or re-covering applications.

Material Composition

The primary product components and/or materials must be indicated as a percentage mass to enable the user of the EPD to understand the composition of the product in delivery status.

The average composition of a EverGuard® TPO Fleece-Back Membrane Single Ply Roofing Membrane (TPO) is as follows:

	Percentage in mass (%)
Material	**Value**
TPO Resin	53-63%
Polyester Scrim	2-10%
UV Weathering Agent	1.5-3.5%
Filler	20-30%
Pigment	1-5%
Fleeceback	5-15%
Total	**100.00%**

***The GAF product modelled in this study contains no substances that are required to be reported as hazardous, nor are any such substances utilized in its production.*

Technical Data

This product-specific EPD was developed based on the cradle-to-gate with options (modules A1-A5, C1-C4) Life Cycle Assessment. The EPD accounts for raw material extraction and processing, transport, product manufacturing, distribution, installation, and disposal. Manufacturing data were gathered directly from company personnel. For any product group EPDs, an impact assessment was completed for each product. Product grouping was considered appropriate if the individual product impacts differed by no more than ±10% in any impact category. Average product representations were determined by conducting a weighted average of the manufacturing inventory based on total production in the reference year. Product formulations are consistent between different thicknesses of a product group and across various manufacturing sites.

Physical Properties	ASTM Test Method	ASTM D6878 Minimum	EverGuard® Typical Test Data*
Breaking Strength	ASTM D751 Grab Method	220 lbf/in. (38.5 kn/m)	400 lbf x 360 lbf (596 x 536 kg/m)
Factory Seam Strength	ASTM D751	66 lbf (98.34 kg/m)	145 lbf (membrane failure) (216 kg/m)
Elongation at Break	ASTM D751	15%	30%
Heat Aging	ASTM D573	90% Retention of Breaking Strength and	100%
Tear Strength	ASTM D751 8" x 8" (203 x 203 mm) Sample	55 lbf (81.95 kg/m)	70 lbf x 130 lbf (104 x 194 kg/m)
Puncture Resistance	FTM 101C Method 2031	Not Established	>380 lb. (172 kg)
Cold Brittleness	ASTM D2137	-40°C	-40°C
Permeance	ASTM E96	Not Established	<0.08 Perms
Dimensional Change	ASTM D1204 @158°F (70°C), 6 hrs.	+/-1%	0.4%
Water Absorption	ASTM D471 @158°F (70°C), 1 week	+/-3.0% (top coating only)	0.7%
Hydrostatic Resistance	ASTM D751 Method D	Not Established	430 psi
Ozone Resistance	ASTM D1149	No cracks @ 7 x magnification	No visible deterioration @ 7 x magnification
Reflectivity (white) Initial/Aged	ASTM C1549 ASTM E903	N/A N/A	0.76/0.68 81.9% Reflectance
Emissivity (white) Initial/Aged	ASTM C1371 ASTM E403	N/A N/A	0.90/0.83
Weather Resistance	ASTM G155/D6878	10,080 KJ/($m^2 \cdot$ nm) at 340 nm	>25,000 KJ/($m^2 \cdot$ nm) at 340 nm
Heat Aging	ASTM D573	≤1.5% Weight change after 8 Weeks @ 275° F	Pass
Thickness Above Scrim	ASTM D7635	0.015"	24.1 mil (Nominal)

*Values stated are approximate and subject to normal manufacturing variation. These values are not guaranteed and are provided solely as a guide.

Placing on the Market / Application Rules

The standards that can be applied for EverGuard® TPO Fleece-Back Membrane are:
- ASTM D751
- ASTM D573
- ASTM D2137
- ASTM E96
- ASTM D1204
- ASTM D6878

Properties of Declared Product as Shipped

After manufacturing, the product is prepared for shipment to the customer. The membrane is reeled on a cardboard core and wrapped in plastic film. Additional packaging materials include product labels, a cardboard protective sheet and steel strap. The product is then shipped on wooden pallets to the customer.

Methodological Framework

Declared Unit

The declaration refers to the declared unit of 1 m² as specified in the PCR.

Name	Value			Unit
	45-mil	60-mil	80-mil	
Declared unit	1 m²			
Weight per declared unit	1.41	1.45	2.01	kg
Thickness to achieve Declared Unit	45	60	80	mm

System Boundary

This is a cradle-to-gate with options Environmental Product Declaration intended for Business-to-Business (B2B) purposes. The following life cycle phases were considered:

Product Stage			Construction Process Stage		Use Stage							End-of-Life Stage*				Benefits and Loads Beyond the System Boundaries
Raw material supply	Transport	Manufacturing	Transport from gate to the site	Construction/ installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction /demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	MND

Description of the System Boundary Stages Corresponding to the PCR
(X = Included; MND = Module Not Declared)

*This includes provision of all materials, products and energy, packaging processing and its transport, as well as waste processing up to the end-of waste state or disposal of final residues.

Reference Service Life

The reference service life of GAF EverGuard® TPO Fleece-Back Membrane is not declared due to the exclusion of the use-phase.

Allocation

Co-product allocation was determined on a mass basis.

Cut-off Criteria

Processes whose total contribution to the final result, with respect to their mass and in relation to all considered impact categories, is less than 1% can be neglected. The sum of the neglected processes may not exceed 5% by mass of the considered impact categories. For that a documented assumption is admissible.

For Hazardous Substances the following requirements apply:

- The Life Cycle Inventory (LCI) of hazardous substances will be included, if the inventory is available.
- If the LCI for a hazardous substance is not available, the substance will appear as an input in the LCI of the product.
- If the LCI of a hazardous substance is approximated by modeling another substance, documentation will be provided.

This EPD is in compliance with the cut-off criteria. No processes were neglected or excluded. Capital items for the production processes (machine, buildings, etc.) were not taken into consideration.

Data Sources

Primary data were collected for every process in the product system under the control of GAF. Secondary data from the Sphera (GaBi Content Version 2022.1) and USLCI databases, 2012, were utilized when necessary. These data were evaluated and have temporal, geographic, and technical coverage appropriate to the scope of the product category.

Data Quality

The data sources used are complete and representative of global systems in terms of the geographic and technological coverage and are a recent vintage (i.e., less than ten years old). The data used for primary data are based on direct information sources of the manufacturers. Secondary data sets were used for raw materials extraction and processing, end of life, transportation, and energy production flows. Wherever secondary data is used, the study adopts critically reviewed data for consistency, precision, and reproducibility to limit uncertainty. When a material is not available in the available LCI databases, another chemical which has similar manufacturing and environmental impacts may be used as a proxy, representing the actual chemical.

Important data quality factors include precision (measured, calculated, or estimated), completeness (e.g., unreported emissions or excluded flows), consistency (uniformity of the applied methodology throughout the study), and reproducibility (ability for another researcher reproduce the results based on the methodological information provided). Each dataset has an overall rating from one to four, one being “very good” and four being “poor.” The individual datasets were scored and aggregated to determine the data has an overall average rating of 2.1.

Period Under Review

The period under review is the full calendar year of 2021.

Treatment of Biogenic Carbon

The uptake and release of biogenic carbon throughout the product life cycle follows ISO 21930:2017 Section 7.2.7.

Comparability and Benchmarking

A comparison or an evaluation of EPD data is only possible if all data sets to be compared were created according to ISO 21930 and the building context, respectively the product-specific characteristics of performance, are taken into account. Environmental declarations from different programs may not be comparable. Full conformance with the PCR allows for EPD comparability only when all stages of a product's life cycle have been considered, and the same sub-category PCR, when applicable. Additionally, the functional/declared unit must also be comparable. However, variations and deviations are possible. In order to support comparative assertions, this EPD meets all comparability requirements stated in ISO 14025:2006. However, differences in certain assumptions, data quality, and variability between LCA data sets may still exist. As such, caution should be exercised when evaluating EPDs from different manufacturers as the EPD results may.

Units

The LCA results within this EPD are reported in SI units.

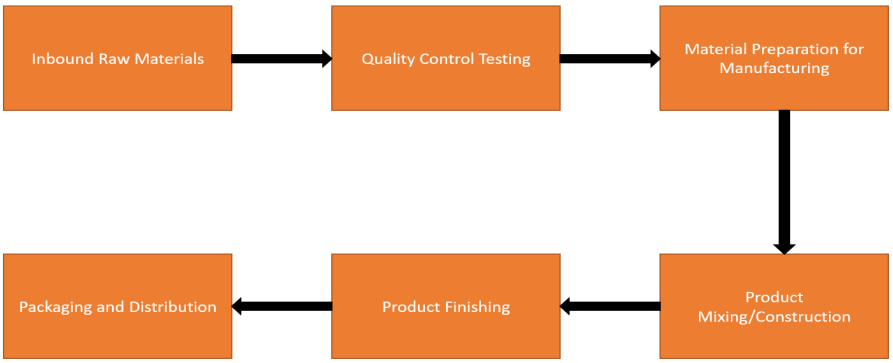
Life Cycle Inventory and Scenarios

Background data

For life cycle modeling of the considered products, the LCA for Experts v. 10.6 Software System for Life Cycle Engineering, developed by Sphera, is used. The Sphera and USLCI databases contain consistent and documented datasets which are documented online. To ensure comparability of results in the LCA, the basic data of the Sphera database were used for energy, transportation, and auxiliary materials.

Manufacturing

Single Ply Roofing Membrane (TPO) is manufactured in Cedar City, Utah; Gainesville, Texas; New Columbia, Pennsylvania; Mt. Vernon, Indiana and begins with the inbound reception of raw materials. The process begins with adding polymers, performance enhancing ingredients, and other option ingredients to a mixer. The inputs are blended, heated, and then extruded onto the top and bottom of a scrim to form laminated layers. The membrane is then cooled by passing through a series of rollers, wound into rolls or cut to size, and packaged for shipment. The table below describes which facility(ies) produce the product of the study. If multiple facilties produced the product, then a weighted average of total production was used to produce an average life cycle inventory from those facilities.



Product Type	Manufacturing location
TPO	Cedar City, UT
	Gainesville, TX
	Mount Vernon, IN
	New Columbia, PA

Packaging

The packaging material is composed primarily of plastic materials. Single ply roofing products are shipped on pallets and wrapped in plastic film.

	Quantity (% By Weight)
Material	**Value**
Cardboard	1.10%
Wood	23.34%
Paper	2.51%
Plastic	73.04%
Total	**100.00%**

Transportation

Transport to Building Site (A4)		
Name	**Value (45-mil / 60-mil / 80-mil)**	**Unit**
Fuel type	Diesel	
Liters of fuel	38	l/100km
Transport distance	970	km
Capacity utilization (including empty runs)	90	%
Gross density of products transported	24 / 24 / 25	kg/m^3
Weight of products transported	-	kg
Volume of products transported	-	m^3
Capacity utilization volume factor	-	-

Product Installation

EverGuard® TPO Fleece-Back Membrane can be installed using various methods, including mechanically attached or adhesive adhered. Acceptable deck types include steel, wood, structural concrete & gypsum, light weighted insulating concrete and cementitious wood fiber. Note: Compliance with model building codes does not always ensure compliance with state or local building codes, which may be amended versions of these model codes. Always check with local building code officials to confirm compliance.

Installation Into the Building (A5)		
Name	**Value (45-mil / 60-mil / 80-mil)**	**Unit**
Auxiliary materials	-	kg
Water consumption	-	m^3
Other resources	-	kg
Electricity consumption	-	kWh
Other energy carriers	0.00	MJ
Product loss per declared unit	-	kg
Waste materials at construction site	0.26	kg
Output substance (recycle)	-	kg
Output substance (landfill)	1.10 / 1.45 / 2.01	kg
Output substance (incineration)	-	kg
Packaging waste (recycle)	0.08	kg
Packaging waste (landfill)	0.14	kg
Packaging waste (incineration)	0.04	kg
Biogenic carbon content of packaging	0.12	kg CO_2eq
Direct emissions to ambient air*, soil, and water	0.12	kg
VOC emissions	-	µg/m3

*CO2 emissions to air from disposal of packaging

Disposal

The product is assumed to be 100% landfilled in the end-of-life disposal, in accordance with the PCR.

End of life (C1-C4)		
Name	**Value (45-mil / 60-mil / 80-mil)**	**Unit**
Collected separately	0.00	kg
Collected as mixed construction waste	1.10 / 1.45 / 2.01	kg
Reuse	0.00	kg
Recycling	0.00	kg
Landfilling	1.10 / 1.45 / 2.01	kg
Incineration with energy recovery	0.00	kg
Energy conversion	-	%
Removals of biogenic carbon	-	kg

LCA Results for the EverGuard® TPO Fleece-Back 45-mil Membrane

LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

Results shown below were calculated using TRACI 2.1 Methodology.

TRACI 2.1 Impact Assessment

Parameter	Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4
GWP	Global warming potential	kg CO_2-Eq.	3.92E+00	1.27E-01	1.18E+00	0.00E+00	2.10E-02	0.00E+00	4.90E-01
ODP	Depletion potential of the stratospheric ozone layer	kg CFC-11 Eq.	0.00E+00	4.81E-12	3.93E-10	0.00E+00	7.96E-13	0.00E+00	1.89E-15
AP	Acidification potential for air emissions	kg SO_2-Eq.	0.00E+00	7.63E-04	9.70E-05	0.00E+00	1.26E-04	0.00E+00	3.57E-03
EP	Eutrophication potential	kg N-Eq.	0.00E+00	4.23E-05	-5.22E-04	0.00E+00	7.01E-06	0.00E+00	1.36E-03
SP	Smog formation potential	kg O_3-Eq.	3.96E+00	2.10E-02	3.21E-02	0.00E+00	3.48E-03	0.00E+00	9.56E-03
FFD	Fossil Fuel Depletion	MJ-surplus	9.86E-12	2.25E-01	2.67E+00	0.00E+00	3.72E-02	0.00E+00	1.13E-01

**All use phase and disposal stages have been considered and only those with non-zero values have been reported*

Results shown below were calculated using CML 2001 - April 2013 Methodology.

CML 4.1 Impact Assessment

Parameter	Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4
GWP	Global warming potential	kg CO_2-Eq.	3.83E+00	1.27E-01	1.19E+00	0.00E+00	2.11E-02	0.00E+00	6.76E-01
ODP	Depletion potential of the stratospheric ozone layer	kg CFC-11 Eq.	5.06E-12	4.80E-12	3.94E-10	0.00E+00	7.95E-13	0.00E+00	1.10E-13
AP	Acidification potential for air emissions	kg SO_2-Eq.	9.06E-03	6.27E-04	1.75E-03	0.00E+00	1.04E-04	0.00E+00	1.33E-03
EP	Eutrophication potential	kg$(PO_4)^3$-Eq.	1.23E-03	1.12E-04	1.33E-04	0.00E+00	1.85E-05	0.00E+00	1.65E-03
POCP	Formation potential of tropospheric ozone photochemical oxidants	kg ethane-Eq.	1.27E-03	7.32E-05	2.84E-04	0.00E+00	1.21E-05	0.00E+00	3.26E-04
ADPE	Abiotic depletion potential for non-fossil resources	kg Sb-Eq.	1.08E-05	5.28E-11	3.23E-06	0.00E+00	8.75E-12	0.00E+00	2.65E-08
ADPF	Abiotic depletion potential for fossil resources	MJ	9.22E+01	1.62E+00	2.15E+01	0.00E+00	2.68E-01	0.00E+00	8.74E-01

**All use phase and disposal stages have been considered and only those with non-zero values have been reported*

Results below contain the resource use throughout the life cycle of the product.

Resource Use

Parameter	Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4
RPR_E	Renewable primary energy as energy carrier	MJ	3.56E+00	0.00E+00	8.34E-01	0.00E+00	0.00E+00	0.00E+00	8.44E-02
RPR_M	Renewable primary energy resources as material utilization	MJ	1.12E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
$NRPR_E$	Nonrenewable primary energy as energy carrier	MJ	6.67E+01	1.64E+00	2.24E+01	0.00E+00	2.71E-01	0.00E+00	8.94E-01
$NRPR_M$	Nonrenewable primary energy as material utilization	MJ	3.01E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SM	Use of secondary material	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	Use of nonrenewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RE	Energy recovered from disposed waste	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	Use of net fresh water	m^3	4.71E-02	0.00E+00	5.28E-03	0.00E+00	0.00E+00	0.00E+00	1.99E-04

**All use phase and disposal stages have been considered and only those with non-zero values have been reported*

Results below contain the output flows and wastes throughout the life cycle of the product.

Output Flows and Waste Categories									
Parameter	**Parameter**	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**
HWD	Hazardous waste disposed	kg	5.00E-06	0.00E+00	9.76E-10	0.00E+00	0.00E+00	0.00E+00	3.33E-11
NHWD	Non-hazardous waste disposed	kg	2.34E-01	0.00E+00	5.29E-02	0.00E+00	0.00E+00	0.00E+00	1.23E+00
HLRW	High-level radioactive waste	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ILLRW	Intermediate- and low-level radioactive waste	kg	1.82E-03	0.00E+00	3.45E-04	0.00E+00	0.00E+00	0.00E+00	7.81E-06
CRU	Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MR	Materials for recycling	kg	4.17E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE	Recovered energy exported from system	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

**All use phase and disposal stages have been considered and only those with non-zero values have been reported*

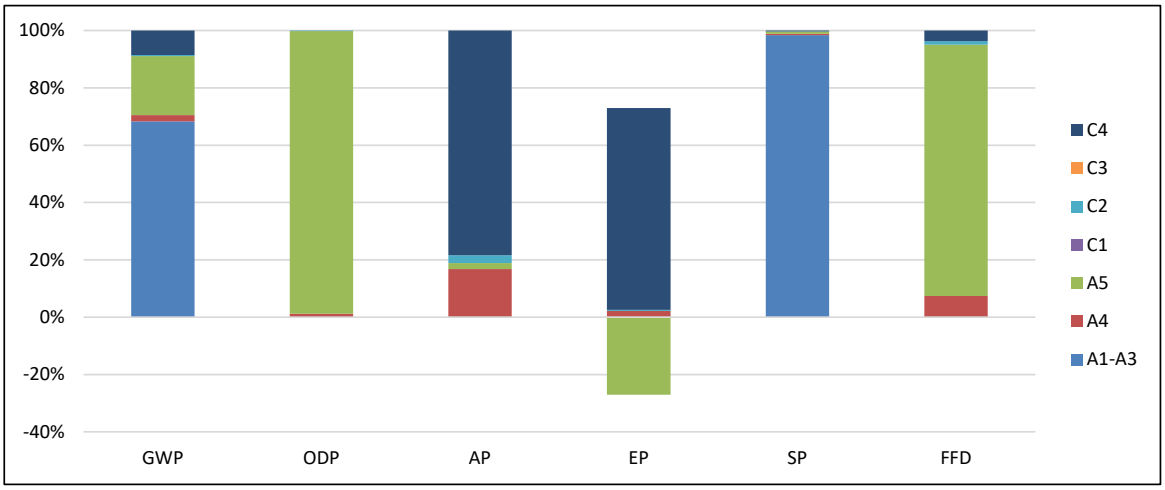
Results below contain direct greenhouse gas emissions and removals throughout the life cycle of the product.

Carbon Emissions and Removals									
Parameter	**Parameter**	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**
BCRP	Biogenic Carbon Removal from Product	kg CO_2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEP	Biogenic Carbon Emissions from Product	kg CO_2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCRK	Biogenic Carbon Removal from Packaging	kg CO_2	1.23E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEK	Biogenic Carbon Emissions from Packaging	kg CO_2	0.00E+00	0.00E+00	1.23E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEW	Biogenic Carbon Emissions from Combustion of Waste from Renewable Sources Used in Production Process	kg CO_2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCE	Calcination Carbon Emissions	kg CO_2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCR	Carbonation Carbon Removal	kg CO_2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CWNR	Carbon Emissions from Combustion of Waste from Non-renewable Sources Used in Production Process	kg CO_2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

**All use phase and disposal stages have been considered and only those with non-zero values have been reported*

LCA Interpretation for the EverGuard® TPO Fleece-Back 45-mil Membrane

The production life cycle stage (A1-A3) dominates the impacts across all impact categories. This is due to the upstream production of materials used in the product, along with natural gas use in the manufacturing of the product. The end-of-life disposal stage (C4) has significant impact in global warming potential, acidification, and eutrophication due to the 100% landfill assumption.



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:
— renewable primary energy resources as energy (fuel), (RPRE);
— renewable primary resources as material, (RPRM);
— non-renewable primary resources as energy (fuel) ,(NRPRE);
— non-renewable primary resources as material (NRPRM);
— secondary materials (SM);
— renewable secondary fuels (RSF);
— non-renewable secondary fuels (NRSF);
— recovered energy (RE);
— abiotic depletion potential for non-fossil mineral resources (ADPelements).
— land use related impacts, for example on biodiversity and/or soil fertility;
— toxicological aspects;
— emissions from land use change [GWP 100 (land-use change)];
— hazardous waste disposed;
— non-hazardous waste disposed;
— high-level radioactive waste;
— intermediate and low-level radioactive waste;
— components for reuse;
— materials for recycling;
— materials for energy recovery; and
— recovered energy exported from the product system.

LCA Results for the EverGuard® TPO Fleece-Back 60-mil Membrane

Results shown below were calculated using TRACI 2.1 Methodology.

TRACI 2.1 Impact Assessment									
Parameter	**Parameter**	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**
GWP	Global warming potential	kg CO_2-Eq.	4.91E+00	1.59E-01	1.18E+00	0.00E+00	2.62E-02	0.00E+00	6.12E-01
ODP	Depletion potential of the stratospheric ozone layer	kg CFC-11 Eq.	0.00E+00	6.00E-12	3.93E-10	0.00E+00	9.93E-13	0.00E+00	2.36E-15
AP	Acidification potential for air emissions	kg SO_2-Eq.	0.00E+00	9.52E-04	9.70E-05	0.00E+00	1.58E-04	0.00E+00	4.45E-03
EP	Eutrophication potential	kg N-Eq.	0.00E+00	5.28E-05	-5.22E-04	0.00E+00	8.73E-06	0.00E+00	1.70E-03
SP	Smog formation potential	kg O_3-Eq.	4.98E+00	2.62E-02	3.21E-02	0.00E+00	4.34E-03	0.00E+00	1.19E-02
FFD	Fossil Fuel Depletion	MJ-surplus	1.22E-11	2.80E-01	2.67E+00	0.00E+00	4.64E-02	0.00E+00	1.41E-01

**All use phase and disposal stages have been considered and only those with non-zero values have been reported*

Results shown below were calculated using CML 2001 - April 2013 Methodology.

CML 4.1 Impact Assessment									
Parameter	**Parameter**	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**
GWP	Global warming potential	kg CO_2-Eq.	4.82E+00	1.59E-01	1.19E+00	0.00E+00	2.63E-02	0.00E+00	8.44E-01
ODP	Depletion potential of the stratospheric ozone layer	kg CFC-11 Eq.	6.20E-12	5.99E-12	3.94E-10	0.00E+00	9.91E-13	0.00E+00	1.38E-13
AP	Acidification potential for air emissions	kg SO_2-Eq.	1.17E-02	7.82E-04	1.75E-03	0.00E+00	1.29E-04	0.00E+00	1.65E-03
EP	Eutrophication potential	kg$(PO_4)^3$-Eq.	1.52E-03	1.39E-04	1.33E-04	0.00E+00	2.31E-05	0.00E+00	2.06E-03
POCP	Formation potential of tropospheric ozone photochemical oxidants	kg ethane-Eq.	1.51E-03	9.14E-05	2.84E-04	0.00E+00	1.51E-05	0.00E+00	4.07E-04
ADPE	Abiotic depletion potential for non-fossil resources	kg Sb-Eq.	1.28E-05	6.59E-11	3.23E-06	0.00E+00	1.09E-11	0.00E+00	3.31E-08
ADPF	Abiotic depletion potential for fossil resources	MJ	1.14E+02	2.02E+00	2.15E+01	0.00E+00	3.35E-01	0.00E+00	1.09E+00

**All use phase and disposal stages have been considered and only those with non-zero values have been reported*

Results below contain the resource use throughout the life cycle of the product.

Resource Use									
Parameter	**Parameter**	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**
RPR_E	Renewable primary energy as energy carrier	MJ	4.03E+00	0.00E+00	8.34E-01	0.00E+00	0.00E+00	0.00E+00	8.68E-02
RPR_M	Renewable primary energy resources as material utilization	MJ	1.12E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
$NRPR_E$	Nonrenewable primary energy as energy carrier	MJ	5.71E+01	1.68E+00	2.24E+01	0.00E+00	2.79E-01	0.00E+00	9.19E-01
$NRPR_M$	Nonrenewable primary energy as material utilization	MJ	4.09E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SM	Use of secondary material	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	Use of nonrenewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RE	Energy recovered from disposed waste	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	Use of net fresh water	m^3	5.77E-02	0.00E+00	5.28E-03	0.00E+00	0.00E+00	0.00E+00	2.05E-04

**All use phase and disposal stages have been considered and only those with non-zero values have been reported*

Results below contain the output flows and wastes throughout the life cycle of the product.

Output Flows and Waste Categories									
Parameter	**Parameter**	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**
HWD	Hazardous waste disposed	kg	6.80E-06	0.00E+00	9.76E-10	0.00E+00	0.00E+00	0.00E+00	4.15E-11
NHWD	Non-hazardous waste disposed	kg	3.16E-01	0.00E+00	5.29E-02	0.00E+00	0.00E+00	0.00E+00	1.53E+00
HLRW	High-level radioactive waste	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ILLRW	Intermediate- and low-level radioactive waste	kg	2.33E-03	0.00E+00	3.45E-04	0.00E+00	0.00E+00	0.00E+00	9.75E-06
CRU	Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MR	Materials for recycling	kg	4.31E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE	Recovered energy exported from system	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

**All use phase and disposal stages have been considered and only those with non-zero values have been reported*

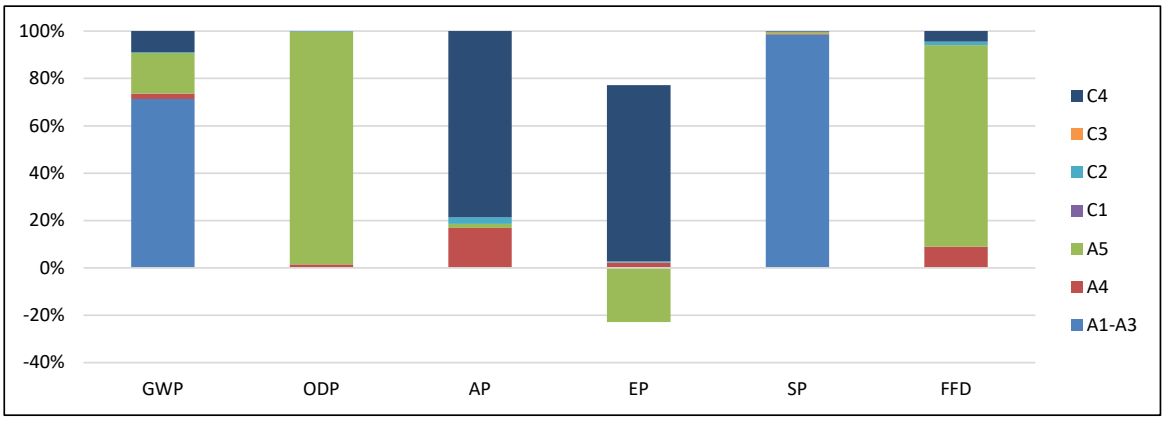
Results below contain direct greenhouse gas emissions and removals throughout the life cycle of the product.

Carbon Emissions and Removals									
Parameter	**Parameter**	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**
BCRP	Biogenic Carbon Removal from Product	kg CO_2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEP	Biogenic Carbon Emissions from Product	kg CO_2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCRK	Biogenic Carbon Removal from Packaging	kg CO_2	1.23E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEK	Biogenic Carbon Emissions from Packaging	kg CO_2	0.00E+00	0.00E+00	1.23E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEW	Biogenic Carbon Emissions from Combustion of Waste from Renewable Sources Used in Production Process	kg CO_2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCE	Calcination Carbon Emissions	kg CO_2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCR	Carbonation Carbon Removal	kg CO_2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CWNR	Carbon Emissions from Combustion of Waste from Non-renewable Sources Used in Production Process	kg CO_2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

**All use phase and disposal stages have been considered and only those with non-zero values have been reported*

LCA Interpretation for the EverGuard® TPO Fleece-Back 60-mil Membrane

The production life cycle stage (A1-A3) dominates the impacts across all impact categories. This is due to the upstream production of materials used in the product, along with natural gas use in the manufacturing of the product. The end-of-life disposal stage (C4) has significant impact in global warming potential, acidification, and eutrophication due to the 100% landfill assumption.



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:
— renewable primary energy resources as energy (fuel), (RPRE);
— renewable primary resources as material, (RPRM);
— non-renewable primary resources as energy (fuel) ,(NRPRE);
— non-renewable primary resources as material (NRPRM);
— secondary materials (SM);
— renewable secondary fuels (RSF);
— non-renewable secondary fuels (NRSF);
— recovered energy (RE);
— abiotic depletion potential for non-fossil mineral resources (ADPelements).
— land use related impacts, for example on biodiversity and/or soil fertility;
— toxicological aspects;
— emissions from land use change [GWP 100 (land-use change)];
— hazardous waste disposed;
— non-hazardous waste disposed;
— high-level radioactive waste;
— intermediate and low-level radioactive waste;
— components for reuse;
— materials for recycling;
— materials for energy recovery; and
— recovered energy exported from the product system.

LCA Results for the EverGuard® TPO Fleece-Back 80-mil Membrane

Results shown below were calculated using TRACI 2.1 Methodology.

TRACI 2.1 Impact Assessment

Parameter	Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4
GWP	Global warming potential	kg CO_2-Eq.	6.50E+00	2.09E-01	1.18E+00	0.00E+00	3.47E-02	0.00E+00	8.07E-01
ODP	Depletion potential of the stratospheric ozone layer	kg CFC-11 Eq.	0.00E+00	7.89E-12	3.93E-10	0.00E+00	1.31E-12	0.00E+00	3.12E-15
AP	Acidification potential for air emissions	kg SO_2-Eq.	0.00E+00	1.25E-03	9.70E-05	0.00E+00	2.08E-04	0.00E+00	5.87E-03
EP	Eutrophication potential	kg N-Eq.	0.00E+00	6.94E-05	-5.22E-04	0.00E+00	1.15E-05	0.00E+00	2.24E-03
SP	Smog formation potential	kg O_3-Eq.	6.64E+00	3.45E-02	3.21E-02	0.00E+00	5.73E-03	0.00E+00	1.57E-02
FFD	Fossil Fuel Depletion	MJ-surplus	1.59E-11	3.69E-01	2.67E+00	0.00E+00	6.13E-02	0.00E+00	1.86E-01

**All use phase and disposal stages have been considered and only those with non-zero values have been reported*

Results shown below were calculated using CML 2001 - April 2013 Methodology.

CML 4.1 Impact Assessment

Parameter	Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4
GWP	Global warming potential	kg CO_2-Eq.	6.43E+00	2.09E-01	1.19E+00	0.00E+00	3.48E-02	0.00E+00	1.11E+00
ODP	Depletion potential of the stratospheric ozone layer	kg CFC-11 Eq.	8.05E-12	7.88E-12	3.94E-10	0.00E+00	1.31E-12	0.00E+00	1.82E-13
AP	Acidification potential for air emissions	kg SO_2-Eq.	1.59E-02	1.03E-03	1.75E-03	0.00E+00	1.71E-04	0.00E+00	2.18E-03
EP	Eutrophication potential	kg$(PO_4)^3$-Eq.	2.01E-03	1.83E-04	1.33E-04	0.00E+00	3.05E-05	0.00E+00	2.72E-03
POCP	Formation potential of tropospheric ozone photochemical oxidants	kg ethane-Eq.	1.92E-03	1.20E-04	2.84E-04	0.00E+00	2.00E-05	0.00E+00	5.36E-04
ADPE	Abiotic depletion potential for non-fossil resources	kg Sb-Eq.	1.60E-05	8.67E-11	3.23E-06	0.00E+00	1.44E-11	0.00E+00	4.36E-08
ADPF	Abiotic depletion potential for fossil resources	MJ	1.50E+02	2.66E+00	2.15E+01	0.00E+00	4.42E-01	0.00E+00	1.44E+00

**All use phase and disposal stages have been considered and only those with non-zero values have been reported*

Results below contain the resource use throughout the life cycle of the product.

Resource Use

Parameter	Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4
RPR_E	Renewable primary energy as energy carrier	MJ	5.76E+00	0.00E+00	8.34E-01	0.00E+00	0.00E+00	0.00E+00	1.20E-01
RPR_M	Renewable primary energy resources as material utilization	MJ	1.12E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
$NRPR_E$	Nonrenewable primary energy as energy carrier	MJ	7.74E+01	2.33E+00	2.24E+01	0.00E+00	3.87E-01	0.00E+00	1.27E+00
$NRPR_M$	Nonrenewable primary energy as material utilization	MJ	5.76E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SM	Use of secondary material	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	Use of nonrenewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RE	Energy recovered from disposed waste	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	Use of net fresh water	m^3	8.09E-02	0.00E+00	5.28E-03	0.00E+00	0.00E+00	0.00E+00	2.84E-04

**All use phase and disposal stages have been considered and only those with non-zero values have been reported*

Results below contain the output flows and wastes throughout the life cycle of the product.

Output Flows and Waste Categories									
Parameter	**Parameter**	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**
HWD	Hazardous waste disposed	kg	9.59E-06	0.00E+00	9.76E-10	0.00E+00	0.00E+00	0.00E+00	5.47E-11
NHWD	Non-hazardous waste disposed	kg	4.40E-01	0.00E+00	5.29E-02	0.00E+00	0.00E+00	0.00E+00	2.02E+00
HLRW	High-level radioactive waste	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ILLRW	Intermediate- and low-level radioactive waste	kg	3.15E-03	0.00E+00	3.45E-04	0.00E+00	0.00E+00	0.00E+00	1.29E-05
CRU	Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MR	Materials for recycling	kg	5.96E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE	Recovered energy exported from system	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

**All use phase and disposal stages have been considered and only those with non-zero values have been reported*

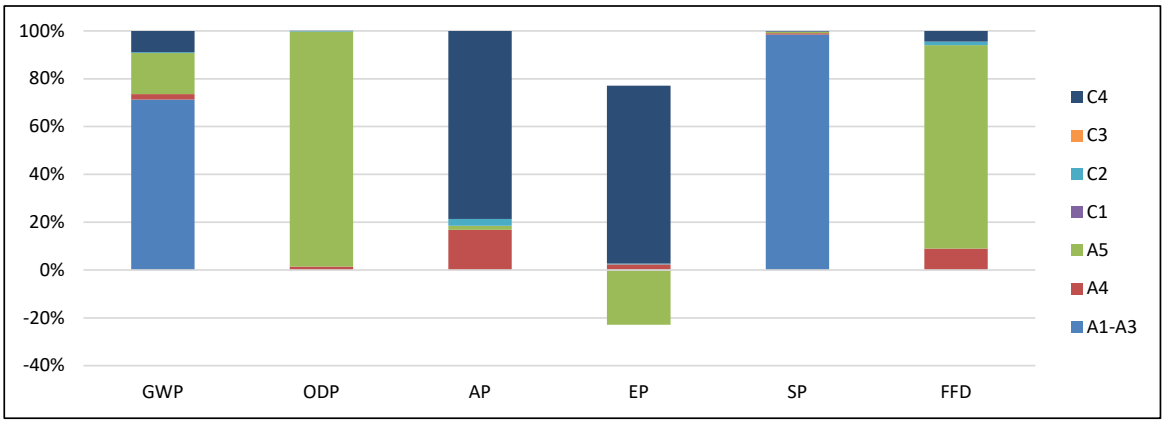
Results below contain direct greenhouse gas emissions and removals throughout the life cycle of the product.

Carbon Emissions and Removals									
Parameter	**Parameter**	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**
BCRP	Biogenic Carbon Removal from Product	kg CO_2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEP	Biogenic Carbon Emissions from Product	kg CO_2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCRK	Biogenic Carbon Removal from Packaging	kg CO_2	1.23E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEK	Biogenic Carbon Emissions from Packaging	kg CO_2	0.00E+00	0.00E+00	1.23E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEW	Biogenic Carbon Emissions from Combustion of Waste from Renewable Sources Used in Production Process	kg CO_2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCE	Calcination Carbon Emissions	kg CO_2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCR	Carbonation Carbon Removal	kg CO_2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CWNR	Carbon Emissions from Combustion of Waste from Non-renewable Sources Used in Production Process	kg CO_2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

**All use phase and disposal stages have been considered and only those with non-zero values have been reported*

LCA Interpretation for the EverGuard® TPO Fleece-Back 80-mil Membrane

The production life cycle stage (A1-A3) dominates the impacts across all impact categories. This is due to the upstream production of materials used in the product, along with natural gas use in the manufacturing of the product. The end-of-life disposal stage (C4) has significant impact in global warming potential, acidification, and eutrophication due to the 100% landfill assumption.



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:
— renewable primary energy resources as energy (fuel), (RPRE);
— renewable primary resources as material, (RPRM);
— non-renewable primary resources as energy (fuel) ,(NRPRE);
— non-renewable primary resources as material (NRPRM);
— secondary materials (SM);
— renewable secondary fuels (RSF);
— non-renewable secondary fuels (NRSF);
— recovered energy (RE);
— abiotic depletion potential for non-fossil mineral resources (ADPelements).
— land use related impacts, for example on biodiversity and/or soil fertility;
— toxicological aspects;
— emissions from land use change [GWP 100 (land-use change)];
— hazardous waste disposed;
— non-hazardous waste disposed;
— high-level radioactive waste;
— intermediate and low-level radioactive waste;
— components for reuse;
— materials for recycling;
— materials for energy recovery; and
— recovered energy exported from the product system.

Additional Environmental Information

Environmental and Health During Manufacturing

During the manufacturing of EverGuard® TPO Fleece-Back Membrane, all legal regulations regarding emissions to air, wastewater discharge, solid waste disposal and noise emissions are followed.

Environmental and Health During Installation

There is no harmful emissive potential. No damage to health or impairment is expected under normal use corresponding to the intended use of the product.

Extraordinary Effects

Fire
Resistance by the roofing system to fire applied to the exterior roof surface is important. Typically, a UL Class B or C rating is required by building code. Also, depending on the use and size of the building and the construction type, fire resistance to fire originating from within the building may be required. This is normally expressed in the form of hourly ratings, and usually requires the use of a specialized roof assembly. Refer to current EverGuard® listings in the appropriate UL directory to verify roof assembly requirements for specific fire ratings.

Water
No environmental impacts are expected due to water exposure of properly installed EverGuard® TPO Fleece-Back Membrane.

Mechanical Destruction
EverGuard® TPO Fleece-Back Membrane has excellent mechanical strength. The breaking strength and elongation at break performance are measured by ASTM D751.

Delayed Emissions

Global warming potential is calculated using the TRACI 2.1 and CML 4.1 impact assessment methodologies. Delayed emissions are not considered.

Environmental Activities and Certifications

N/A

Further Information

GAF
1 Campus Drive
Parsippany, NJ 07054

References

- PCR — NSF International: Product Category Rule for Environmental Product Declarations for Single Ply Roofing Membranes, Version 2, Issued 2019
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- ISO 14044 — ISO 14044:2006-10, Environmental management — Life cycle assessment — Requirements and guidelines.
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- EN 15804 — EN 15804:2012-04: Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction product
- NSF International — NSF Program Operator Rules, NSF International – National Center for Sustainability Standards, 2015
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- Characterization Method — WMO. 1999. Scientific Assessment of Ozone Depletion: 1998, World Meteorological Organization Global Ozone Research and Monitoring Project - Report No. 44, WMO, Geneva.

Contact Information

Study Commissioner

GAF
Aly Perez
Product Sustainability Specialist
1 Campus Drive
Parsippany, NJ 07054
alyson.perez@gaf.com

LCA Practitioner

Sustainable Solutions Corporation
155 Railroad Plaza, Suite 203
Royersford, PA 19468 USA
(+1) 610 569-1047
info@sustainablesolutionscorporation.com
www.sustainablesolutionscorporation.com

Environmental Product Declaration

EnergyGuard™ HD Polyiso Cover Board and EnergyGuard™ HD Barrier Polyiso Cover Board

GAF, a Standard Industries company, is the leading roofing and waterproofing manufacturer in North America. For more than 135 years, GAF has been trusted to protect what matters most for families, communities and business owners with its innovative solutions and focus on customer service. GAF's leadership extends to its commitment to making a positive impact on its communities, industry, and planet. Learn more at www.GAF.com.

NSF Certified Environmental Product Declaration www.nsf.org

This declaration is an environmental product declaration (EPD) in accordance with ISO 14025 and ISO 21930-2017. EPDs rely on Life Cycle Assessment (LCA) to provide information on a number of environmental impacts of products over their life cycle. Exclusions: EPDs do not indicate that any environmental or social performance benchmarks are met, and there may be impacts that they do not encompass. LCAs do not typically address the site-specific environmental impacts of raw material extraction, nor are they meant to assess human health toxicity. EPDs can complement but cannot replace tools and certifications that are designed to address these impacts and/or set performance thresholds – e.g., Type 1 certifications, health assessments and declarations, environmental impact assessments, etc. Accuracy of Results: EPDs regularly rely on estimations of impacts, and the level of accuracy in estimation of effect differs for any particular product line and reported impact. Comparability: EPDs are not comparative assertions and are either not comparable or have limited comparability when they cover different life cycle stages, are based on different product category rules or are missing relevant environmental impacts. EPDs from different programs may not be comparable.

EPD PROGRAM AND PROGRAM OPERATOR NAME, ADDRESS, LOGO, AND WEBSITE	NSF International, 789 N. Dixboro Rd, Ann Arbor, MI 48105,www.nsf.org
GENERAL PROGRAM INSTRUCTIONS AND VERSION NUMBER	NSF Certification Policies for Environmental Product Declarations (EPD): November 1, 2022
MANUFACTURER NAME AND ADDRESS	GAF 1 Campus Drive Parsippany, NJ 07054
DECLARATION NUMBER	EPD10899
DECLARED PRODUCT & FUNCTIONAL UNIT OF DECLARED UNIT	EnergyGuard™ HD Polyiso Cover Board and EnergyGuard™ HD Barrier Polyiso Cover Board Functional Unit = 1 m² of installed insulation material with a thickness that gives an average thermal resistance RSI = 1 m²K/W with a building service life of 75 years over a 75 year building lifetime
REFERENCE PCR AND VERSION NUMBER	UL Part B v2.0: Building Envelope Thermal Insulation EPD Requirements Valid through April 11, 2024.
DESCRIPTION OF PRODUCT APPLICATION/USE	Thermal Insulation for Roofing Applications
PRODUCT RSL DESCRIPTION	40 Years
MARKETS OF APPLICABILITY	Global
DATE OF ISSUE	12/08/2023 - 12/08/2028
PERIOD OF VALIDITY	5 Years
EPD TYPE	Product Specific
DATASET VARIABILITY	N/A
EPD SCOPE	Cradle-to-Grave
YEAR(S) OF REPORTED PRIMARY DATA	2021
LCA SOFTWARE & VERSION NUMBER	LCA for Experts v. 10.6 GAF EPD Generator Tool Version 1.0
LCI DATABASE(S) & VERSION NUMBER	Sphera database & USLCI v2.0
LCIA METHODOLOGY & VERSION NUMBER	TRACI 2.1; CML 4.1
The sub-category PCR review was conducted by:	
This declaration was independently verified in accordance with ISO 14025: 2006. The UL Environment "Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report," v3.2 (Dec 2018), based on ISO 21930:2017, serves as the core PCR, with additional considerations from the USGBC/UL Environment Part A Enhancement (2017) ☐ INTERNAL ☒ EXTERNAL	Jack Geibig, EcoForm, LLC jgeibig@ecoform.com
This life cycle assessment was conducted in accordance with ISO 14044 and the reference PCR by:	Sustainable Solutions Corporation
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	Jack Geibig, EcoForm, LLC jgeibig@ecoform.com

Environmental declarations from different programs (ISO 14025) may not be comparable. Comparison of the environmental performance using EPD information shall consider all relevant information modules over the fulllife cycle of the products within the building. Comparison of the environmental performance of Building Envelope Thermal Insulation using EPD information shall be based on the product's use and impacts at the building level, and therefore EPDs may not be used for comparability purposes when not considering the building energy use phase as instructed under this PCR. This PCR allows EPD comparability only when the same functional requirements between products are ensured and the requirements of ISO 21930:2017 §5.5 are met. It should be noted that different LCA software and background LCI datasets may lead to differences results for upstream or downstream of the life cycle stages declared. Full conformance with the PCR for Building Envelope Thermal Insulation allows EPD comparability only when all stages of a life cycle have been considered. However, variations and deviations are possible. Example of variations: Different LCA software and background LCI datasets may lead to differences results for upstream or downstream of the life cycle stages declared.

Environmental Product Declaration

EnergyGuard™ HD Polyiso Cover Board and
EnergyGuard™ HD Barrier Polyiso Cover Board

Board Insulation (PolyIso)

According to
ISO 14025, ISO 14044,
and ISO 21930:2017

General Information

Description of Company/Organization

Founded in 1886, GAF is the leading roofing manufacturer in North America. As a member of the Standard Industries family of companies, GAF is part of the largest roofing and waterproofing business in the world. The company's products include a comprehensive portfolio of roofing and waterproofing solutions for residential and commercial properties as well as for civil engineering applications. The full GAF portfolio of solutions is supported by an extensive national network of factory-certified contractors. GAF continues to be the leader in quality and offers comprehensive warranty protection on its products and systems. The company's success is driven by a commitment to empowering its people to deliver advanced quality and purposeful innovation. For more information about GAF, visit www.gaf.com.

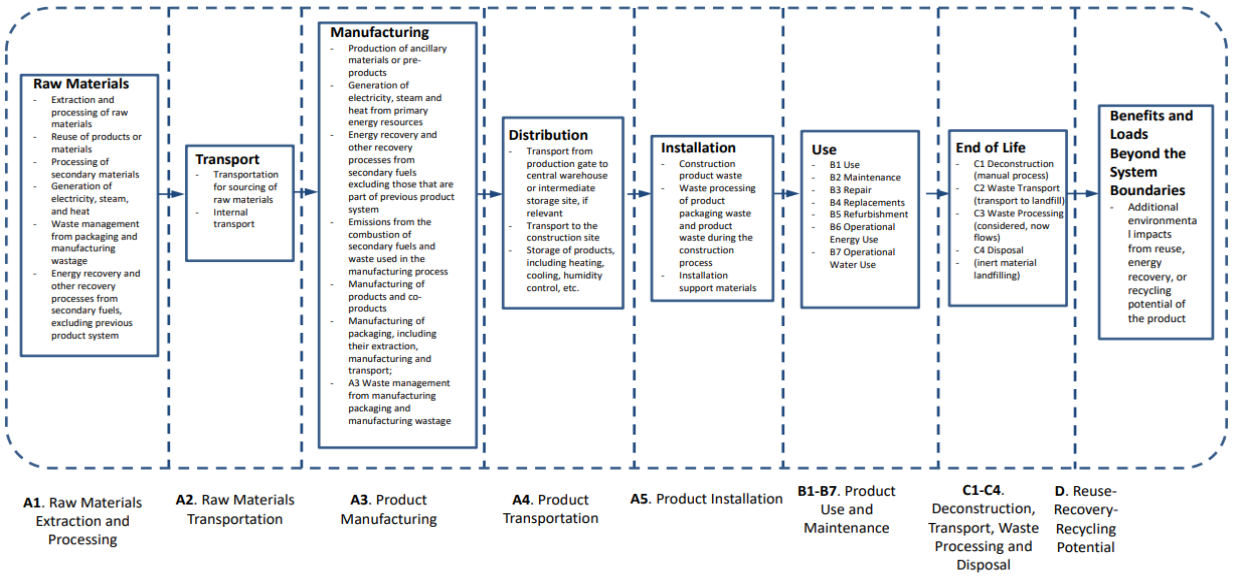
Product Description

Product Name: EnergyGuard™ HD Polyiso Cover Board
Product Characteristic: EnergyGuard™ HD Polyiso Cover Board has an R-value of 2.5 and weighs less than gypsum cover boards. It has an 80 psi minimum compressive strength and a durable coated glass facer which provides moisture and mold resistance pursuant to ASTM D3273.

Additional features include:
- Easy to Handle: Light weight (HD = 11 lb. per 4' x 8' board) and easy to cut and install
- Excellent Performance: Highest R-value cover board at 2.5 (tested in accordance with ASTM C518)
- Versatile: Ideal for low-slope roofs with high foot traffic, hail events and metal retrofit applications

The products included in this EPD are:
- EnergyGuard™ HD Polyiso Cover Board
- EnergyGuard™ HD Barrier Polyiso Cover Board

Flow Diagram



Manufacturer Specific EPD

This product-specific EPD was developed based on the cradle-to-grave (modules A1-C4) Life Cycle Assessment. The EPD accounts for raw material extraction and processing, transport, product manufacturing, distribution, installation, use, and disposal. Manufacturing data were gathered directly from company personnel. For any product group EPDs, an impact assessment was completed for each product. Product grouping was considered appropriate if the individual product impacts differed by no more than ±10% in any impact category.
Additionally, one insulation product can vary by its insulation rating. This EPD reports the environmental impacts of multiple different thickness(s) by using "scaling factor" tables. These tables provide an equation to be able to calculate the emissions for any thickness(s) of this product. The impacts will scale linearly by their thickness(s).

Application

Product Applications: Cover Board for Roofing Applications

Material Composition

The primary product components and/or materials must be indicated as a percentage mass to enable the user of the EPD to understand the composition of the product in delivery status.

The average composition of EnergyGuard™ HD Polyiso Cover Board and EnergyGuard™ HD Barrier Polyiso Cover Board is as follows:

	Percentage in mass (%)
Material	**Value**
Polyol, MDI, and Flame Retardant A or B	54-65%
Blowing Agent	0.9-2.6%
Water	0.1-0.3%
Catalyst	0.5-1.4%
Surfactant	0.2-0.5%
Coated Glass Facer	33-41%
Total	**100.00%**
**The GAF product modelled in this study contains no substances that are required to be reported as hazardous, nor are any such substances utilized in its production.*	

Placing on the Market / Application Rules

The standards and criteria that can be applied for EnergyGuard™ HD Polyiso Cover Board are:
- Meets the requirements of ASTM C1289, Type II, Class 4, Grade 1
- FM Approved, including as a component of a Class 1-SH hail rated assembly
- Classified by UL in accordance with ANSI/UL 790 and 1256
- UL Evaluation Report ER1306-03
- Miami Dade County Product Control Approved
- State of Florida Approved

The standards and criteria that can be applied for EnergyGuard™ HD Barrier Polyiso Cover Board are:
- Meets the requirements of ASTM C1289, Type II, Class 4, Grade 1
- Classified by UL in accordance with ANSI/UL 790 and 1256
- FM Approved, including as a component of a Class 1-SH hail rated assembly
- UL Evaluation Report ER1306-03
- Achieves ANSI/IL 790 Class A roofing fire resistance rating over combustible deck with a 1/2" thickness

Properties of Declared Product as Shipped

After manufacturing, the product is packaged for shipment to the customer. Packaging includes a plastic film that wraps around the entire product. This may be recyclable in some markets, but for the purposes of this EPD it is assumed to be landfilled. Product is available in 4' x 4' (1.22 m x 1.22 m) and 4' x 8' (1.22 m x 2.44 m) boards. Available in 0.5" (12.7 mm) thickness.

Methodological Framework

Functional Unit

The declaration refers to the functional unit of 1 m² of installed insulation material with a thickness that gives an average thermal resistance RSI = 1 m²K/W with a building service life of 75 years as specified in the PCR.

Name	Value	Unit
Functional unit	1 m² of installed insulation material with a thickness that gives an average thermal resistance RSI = 1 m²K/W with a building service life of 75 years	
Mass	4.30	kg
Thickness to achieve functional unit	0.029	m
Thickness to achieve functional unit	1.136	inches
R-values is determined in accordance with ASTM C1303		

System Boundary

This is a cradle-to-grave Environmental Product Declaration. The following life cycle phases were considered:

Product Stage			Construction Process Stage		Use Stage							End-of-Life Stage*				Benefits and Loads Beyond the System Boundaries
Raw material supply	Transport	Manufacturing	Transport from gate to the site	Construction/ installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction /demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	MND

Description of the System Boundary Stages Corresponding to the PCR
(X = Included; MND = Module Not Declared)

*This includes provision of all materials, products and energy, packaging processing and its transport, as well as waste processing up to the end-of waste state or disposal of final residues.

Reference Service Life

The use phase follows the installation of polyiso roof insulation boards. In a roofing system, the insulation is located on top of a roof deck and below the roof membrane. The roof membrane when installed properly and adequately maintained, protects the insulation from the environmental elements and weather during its use. Therefore, it is expected that polyiso will not sustain damage that affects its performance and function, and does not require maintenance. As defined in the governing PCR, the Building Estimated Service Life (ESL) is 75 years. The necessary steps for providing weather protection are specified by manufacturer installation instructions and are mandated by model building codes. The roof membrane's useful life span is influenced by many variables including roof system design, quality of the installation, type and durability of the membrane, roof system component configuration and maintenance as well as weather conditions and events. However, the real world reroofing scenarios, building owner tendencies, and the expected service life of roof membranes all indicate that reroofing activity will take place during the 75-year building ESL.

Reroofing activity may initially occur at 15-30 years after the installation of the original system and driven by recurring roof leaks that cannot be remedied by patch repairs of the membrane. When reroofing is required, options are available to address the need for a new roof membrane without the need to replace the insulation. The model building codes describe a "Roof Recover" as an acceptable reroofing practice, which occurs when a new roof covering is installed on top of the existing roof system without disturbing or removing the existing roof covering or the insulation below. Roof Recover, as defined by industry practices, involves visual examination and appropriate testing to ensure that all roof components, including insulation, have not sustained damage or deterioration. This approach allows the insulation to be reused instead of being disposed of into a landfill. The Roof Recover approach is a common practice in the roofing industry, it is permitted by model building codes, and allows the service life of a roof system to be extended (without the need to replace the insulation). Although the Roof Recover approach is a common practice, it is often not captured in reroofing studies available in the public domain, which typically contemplate a full roof replacement. Pertinent to this declaration, we recognize a 20-year life span for the original installation of the membrane followed by a Roof Recover, which extends the life of the original roof system to 40 years. This practice establishes a 40-year RSL for polyiso roof insulation boards with a Roof Recover. The model building codes allow a roof to be recovered only once. Where two roof membranes are installed on an existing roof, a reroofing process referred to as a "Roof Replacement" is required. This process involves the removal of all roof components down to the roof deck. This study conservatively assumes all insulation is disposed in the landfill during a Roof Replacement. Therefore, the polyiso roof insulation boards' cradle-to-grave assessment incorporates all life cycle stage environmental impacts connected with the original building construction, a Roof Recover operation at 20-years, as well as the building's Roof Replacement operation at 40-years. This translates to 1.9 replacement cycles during the 75-year building ESL (75-year ESL/40-year RSL = 1.9 replacement cycles).

Allocation

Allocation was determined on a mass basis. Since multiple facilities produced these products, a weighted average by production mass was used to determine manufacturing inputs. When facilities manufacture additional product types, facility allocation is done based on mass of production. No co-products are produced, so no co-product allocation was performed.

Cut-off Criteria

Processes whose total contribution to the final result, with respect to their mass and in relation to all considered impact categories, is less than 1% can be neglected. The sum of the neglected processes may not exceed 5% by mass of the considered impact categories. For that a documented assumption is admissible.

For Hazardous Substances the following requirements apply:

- The Life Cycle Inventory (LCI) of hazardous substances will be included, if the inventory is available.
- If the LCI for a hazardous substance is not available, the substance will appear as an input in the LCI of the product.
- If the LCI of a hazardous substance is approximated by modeling another substance, documentation will be provided.

This EPD is in compliance with the cut-off criteria. No processes were neglected or excluded. Capital items for the production processes (machine, buildings, etc.) were not taken into consideration.

Data Sources

Primary data were collected for every process in the product system under the control of GAF. Secondary data from the Sphera and USLCI databases were utilized when necessary. These data were evaluated and have temporal, geographic, and technical coverage appropriate to the scope of the product category.

Data Quality

The data sources used are complete and representative of global systems in terms of the geographic and technological coverage and are a recent vintage (i.e., less than ten years old). The data used for primary data are based on direct information sources of the manufacturers. Secondary data sets were used for raw materials extraction and processing, end of life, transportation, and energy production flows. Wherever secondary data is used, the study adopts critically reviewed data for consistency, precision, and reproducibility to limit uncertainty. When a material is not available in the available LCI databases, another chemical which has similar manufacturing and environmental impacts may be used as a proxy, representing the actual chemical. Please see Appendix A in the LCA report for the full breakdown of the data sources.

Important data quality factors include precision (measured, calculated, or estimated), completeness (e.g., unreported emissions or excluded flows), consistency (uniformity of the applied methodology throughout the study), and reproducibility (ability for another researcher reproduce the results based on the methodological information provided). Each dataset has an overall rating from one to four, one being “very good” and four being “poor.” The individual datasets were scored and aggregated to determine the data has an overall average rating of 2.1, which is considered good.

Period Under Review

The period under review is the full calendar year of 2021.

Treatment of Biogenic Carbon

The uptake and release of biogenic carbon throughout the product life cycle follows ISO 21930:2017 Section 7.2.7.

Comparability and Benchmarking

A comparison or an evaluation of EPD data is only possible if all data sets to be compared were created according to ISO 21930 and the building context, respectively the product-specific characteristics of performance, are taken into account. Environmental declarations from different programs may not be comparable. When comparing EPDs created using this PCR, variations and deviations are possible. Example of variations: Different LCA software and background LCI datasets may lead to different results for upstream or downstream of the life cycle stages declared. In order to support comparative assertions, this EPD meets all comparability requirements stated in ISO 14025:2006. However, differences in certain assumptions, data quality, and variability between LCA data sets may still exist. As such, caution should be exercised when evaluating EPDs from different manufacturers as the EPD results may. These six impact categories are globally deemed mature enough to be included in Type III environmental declarations. Other categories are being developed and defined and LCA should continue making advances in their development, however the EPD users shall not use additional measures for comparative purposes. Third party verified ISO 14040/44 secondary LCI data sets contribute more than 67% of total impact (either at the unit process level or in aggregate) to any of the required impact categories identified by the applicable PCR.

Units

The LCA results within this EPD are reported in SI units.

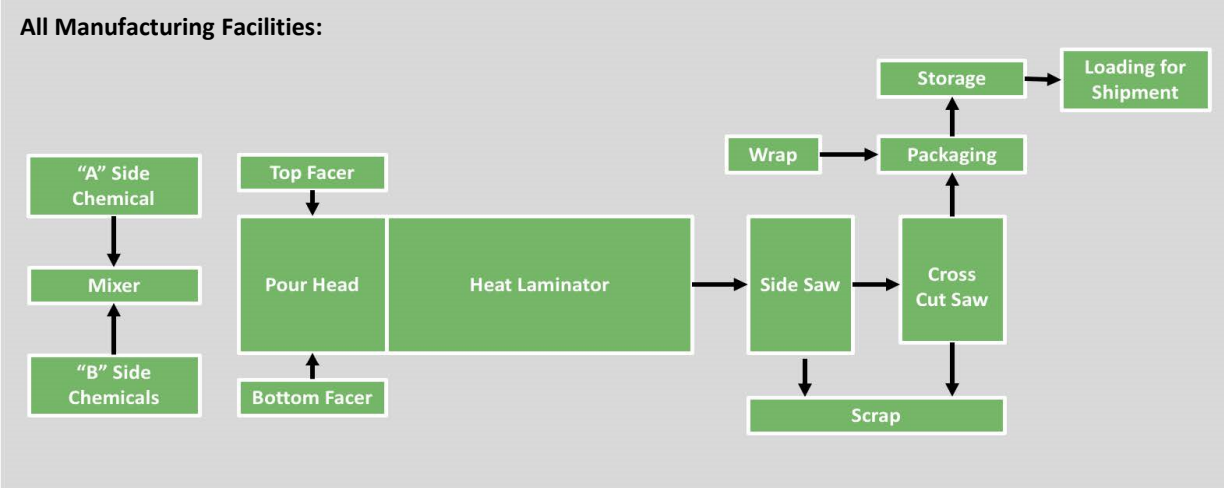
Additional Environmental Information

Background data

For life cycle modeling of the considered products, the GaBi v10.6 Software System for Life Cycle Engineering, developed by Sphera, is used. The Sphera and USLCI databases contain consistent and documented datasets which are documented online. To ensure comparability of results in the LCA, the basic data of the Sphera database were used for energy, transportation, and auxiliary materials. LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks" immediately prior to the results.

Manufacturing

Polyiso board insulation is manufactured in Cedar City, Utah; Gainesville, Texas; New Columbia, Pennsylvania; Statesboro, Georgia and begins with the inbound reception of raw materials. The process begins with adding the chemicals for the two side mixtures to a mixer. The mixtures are mixed and then poured onto the top and bottom facers separately. The facers with applied mixtures are sent through a heat laminator where they are cured into a solid piece of board insulation. The board exits the laminator and is sent to a set of saws to refine the dimensions. Once the board dimensions have been refined, the board is sent to packaging where it is palletized on boards made from the scrap material from the saw processes, shrink wrapped, and sent to storage before ultimately being sent out for final distribution.



Packaging

The packaging material is composed primarily of plastic materials. Board insulation products are shipped on pallets made of repurposed board insulation and wrapped in plastic film.

	Quantity (% By Weight)
Material	**Value**
Cardboard	0.00%
Wood	0.00%
Paper	0.00%
Plastic	100.00%
Total	**100.00%**

Transportation

Transport to Building Site (A4)		
Name	**Value**	**Unit**
Fuel type	Diesel	
Liters of fuel	38	l/100km
Vehicle Type	Truck	
Transport distance	734	km
Capacity utilization (including empty runs)	90	%
Gross density of products transported	149	kg/m^3
Weight of products transported	-	kg
Volume of products transported	-	m^3
Capacity utilization volume factor	-	-

Product Installation

Detailed installation instructions are provided online along with the type of fasteners required for each product. Installation equipment is required though not included in the study as these are multi-use tools and the impacts per declared unit is considered negligible. Note: Compliance with model building codes does not always ensure compliance with state or local building codes, which may be amended versions of these model codes. Always check with local building code officials to confirm compliance.

Installation into the building (A5)		
Name	**Value**	**Unit**
Auxiliary materials	-	kg
Water consumption	-	m^3
Other resources	-	kg
Electricity consumption	-	kWh
Other energy carriers	-	MJ
Product loss per functional unit	-	kg
Waste materials at construction site	-	kg
Output substance (recycle)	-	kg
Output substance (landfill)	4.30	kg
Output substance (incineration)	-	kg
Packaging waste (recycle)	0.00	kg
Packaging waste (landfill)	0.43	kg
Packaging waste (incineration)	0.00	kg
Direct emissions to ambient air*, soil, and water	0	kg CO_2
VOC emissions	-	kg

*CO2 emissions to air from disposal of packaging

Reference Service Life		
Name	**Value**	**Unit**
Reference Service Life	40	years
Estimated Building Service Life	75	years
Number of Replacements	0.9	number

Product Use

No cleaning, maintenance (B2), repair (B3) or refurbishment (B5) activities are required. In addition, the product consumes no water or electricity during its use (B6-B7).

Use (B4)		
Name	**Value**	**Unit**
Replacement Cycle	0.0	Number/RSL
Replacement Cycle	0.9	Number/ESL
Further assumptions for scenario development, e.g. frequency and time period of use	Assumes reroofing every 20 years with a maximum of 1 reroof before replacement	-

Disposal

The packaging waste is assumed to be 100% landfilled in the end-of-life disposal, in accordance with the PCR. Product waste at the end-of-life can de disposed where appropriate, but is assumed to be landfilled based on common practice of these materials. The product and its packaging contain no biogenic content.

End of life (C1-C4)		
Name	**Value**	**Unit**
Collected separately	0.00	kg
Collected as mixed construction waste	4.30	kg
Reuse	0.00	kg
Recycling	0.00	kg
Landfilling	4.30	kg
Incineration with energy recovery	0.00	kg
Energy conversion	-	%

Re-use Phase

Re-use of the product is not common due to the nature of installation of the product into the building envelope.

LCA Results for 1.136" Board

LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

To determine the environmental impacts for insulation products with varying insulation ratings, refer to the section below titled "Scaling Factors for Varying Thicknesses".

Results shown below were calculated using TRACI 2.1 Methodology.

TRACI 2.1 Impact Assessment										
Parameter	**Parameter**	**Unit**	**A1-A3**	**A4**	**A5**	**B4**	**C1**	**C2**	**C3**	**C4**
GWP	Global warming potential	kg CO_2-Eq.	8.88E+00	2.93E-01	3.80E-01	1.00E+01	0.00E+00	6.42E-02	0.00E+00	1.50E+00
ODP	Depletion potential of the stratospheric ozone layer	kg CFC-11 Eq.	1.32E-07	1.11E-11	2.14E-15	1.19E-07	0.00E+00	2.43E-12	0.00E+00	5.77E-15
AP	Acidification potential for air emissions	kg SO_2-Eq.	4.10E-02	1.76E-03	2.14E-04	4.88E-02	0.00E+00	3.86E-04	0.00E+00	1.09E-02
EP	Eutrophication potential	kg N-Eq.	1.74E-03	9.75E-05	1.74E-04	5.58E-03	0.00E+00	2.13E-05	0.00E+00	4.16E-03
SP	Smog formation potential	kg O_3-Eq.	3.82E-01	4.85E-02	2.78E-03	4.26E-01	0.00E+00	1.06E-02	0.00E+00	2.92E-02
FFD	Fossil Fuel Depletion	MJ-surplus	2.26E+01	5.18E-01	6.26E-02	2.13E+01	0.00E+00	1.13E-01	0.00E+00	3.45E-01

**All use phase and disposal stages have been considered and only those with non-zero values have been reported*

Results shown below were calculated using CML 2001 - April 2013 Methodology.

CML 4.1 Impact Assessment										
Paramet	**Parameter**	**Unit**	**A1-A3**	**A4**	**A5**	**B4**	**C1**	**C2**	**C3**	**C4**
GWP	Global warming potential	kg CO_2-Eq.	8.94E+00	2.94E-01	3.80E-01	1.06E+01	0.00E+00	6.44E-02	0.00E+00	2.06E+00
ODP	Depletion potential of the stratospheric ozone layer	kg CFC-11 Eq.	1.20E-07	1.11E-11	1.25E-13	1.08E-07	0.00E+00	2.42E-12	0.00E+00	3.37E-13
AP	Acidification potential for air emissions	kg SO_2-Eq.	4.23E-02	1.45E-03	1.89E-04	4.35E-02	0.00E+00	3.16E-04	0.00E+00	4.05E-03
EP	Eutrophication potential	kg$(PO_4)^3$-Eq.	2.94E-03	2.58E-04	1.80E-04	7.63E-03	0.00E+00	5.64E-05	0.00E+00	5.04E-03
POCP	Formation potential of tropospheric ozone photochemical oxidants	kg ethane-Eq.	3.43E-03	1.69E-04	4.10E-06	4.17E-03	0.00E+00	3.70E-05	0.00E+00	9.94E-04
ADPE	Abiotic depletion potential for non-fossil resources	kg Sb-Eq.	2.14E-04	1.22E-10	3.14E-08	1.93E-04	0.00E+00	2.67E-11	0.00E+00	8.09E-08
ADPF	Abiotic depletion potential for fossil resources	MJ	1.73E+02	3.74E+00	5.22E-01	1.63E+02	0.00E+00	8.18E-01	0.00E+00	2.67E+00

**All use phase and disposal stages have been considered and only those with non-zero values have been reported*

Results below contain the resource use throughout the life cycle of the product.

Resource Use										
Parameter	**Parameter**	**Unit**	**A1-A3**	**A4**	**A5**	**B4**	**C1**	**C2**	**C3**	**C4**
RPR_E	Renewable primary energy as energy carrier	MJ	1.05E+01	0.00E+00	7.22E-02	9.72E+00	0.00E+00	0.00E+00	0.00E+00	2.57E-01
RPR_M	Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
$NRPR_E$	Nonrenewable primary energy as energy carrier	MJ	3.15E+01	3.78E+00	5.44E-01	3.54E+01	0.00E+00	8.26E-01	0.00E+00	2.73E+00
$NRPR_M$	Nonrenewable primary energy as material utilization	MJ	3.01E+01	0.00E+00	0.00E+00	2.71E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SM	Use of secondary material	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	Use of nonrenewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RE	Energy recovered from disposed waste	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	Use of net fresh water	m^3	5.71E-02	0.00E+00	8.54E-04	5.27E-02	0.00E+00	0.00E+00	0.00E+00	6.08E-04

**All use phase and disposal stages have been considered and only those with non-zero values have been reported*

Results below contain the output flows and wastes throughout the life cycle of the product.

Output Flows and Waste Categories										
Parameter	**Parameter**	**Unit**	**A1-A3**	**A4**	**A5**	**B4**	**C1**	**C2**	**C3**	**C4**
HWD	Hazardous waste disposed	kg	1.47E-06	0.00E+00	2.64E-11	1.33E-06	0.00E+00	0.00E+00	0.00E+00	1.02E-10
NHWD	Non-hazardous waste disposed	kg	6.07E-01	0.00E+00	6.74E-01	4.52E+00	0.00E+00	0.00E+00	0.00E+00	3.74E+00
HLRW	High-level radioactive waste	kg or m^3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ILLRW	Intermediate- and low-level radioactive waste	kg or m^3	3.39E-03	0.00E+00	9.06E-06	3.08E-03	0.00E+00	0.00E+00	0.00E+00	2.38E-05
CRU	Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MR	Materials for recycling	kg	5.72E-02	0.00E+00	0.00E+00	5.15E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE	Recovered energy exported from system	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

**All use phase and disposal stages have been considered and only those with non-zero values have been reported*

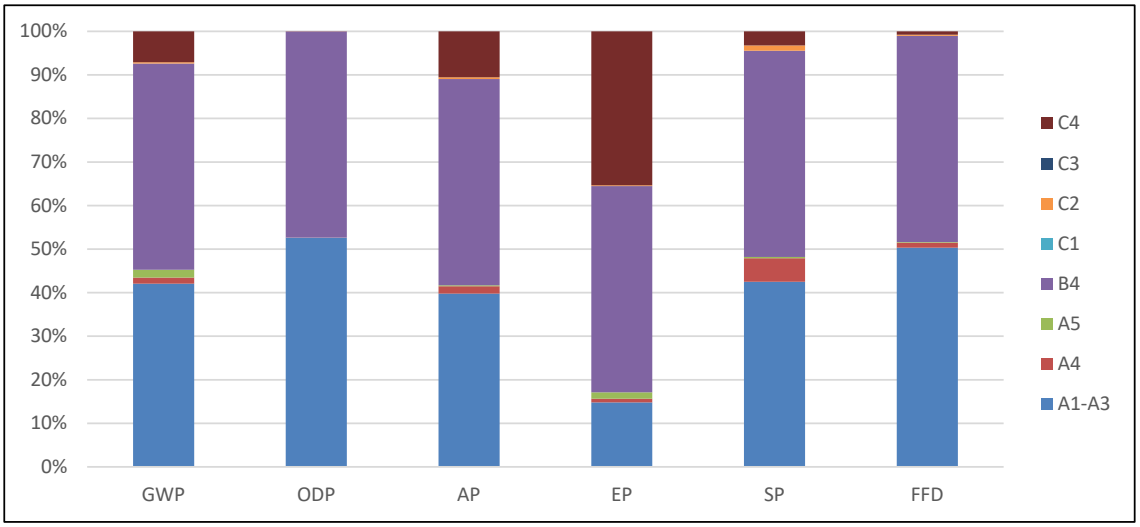
Results below contain direct greenhouse gas emissions and removals throughout the life cycle of the product.

Carbon Emissions and Removals										
Parameter	**Parameter**	**Unit**	**A1-A3**	**A4**	**A5**	**B4**	**C1**	**C2**	**C3**	**C4**
BCRP	Biogenic Carbon Removal from Product	kg CO_2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEP	Biogenic Carbon Emissions from Product	kg CO_2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCRK	Biogenic Carbon Removal from Packaging	kg CO_2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEK	Biogenic Carbon Emissions from Packaging	kg CO_2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEW	Biogenic Carbon Emissions from Combustion of Waste from Renewable Sources Used in Production Process	kg CO_2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCE	Calcination Carbon Emissions	kg CO_2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCR	Carbonation Carbon Removal	kg CO_2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CWNR	Carbon Emissions from Combustion of Waste from Non-renewable Sources Used in Production Process	kg CO_2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

**All use phase and disposal stages have been considered and only those with non-zero values have been reported*

LCA Interpretation

The replacements stage, B4, incorporates all impacts times 0.9 of the other stages. It therefore is the singularly most impactful stage. However, for 1 lifetime, the production life cycle stage (A1-A3) dominates the impacts across all impact categories. This is due to the upstream production of materials used in the product, along with natural gas use in the manufacturing of the product. The end-of-life disposal stage (C4) has significant impact in global warming potential, acidification, and eutrophication due to the 100% landfill assumption.



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:
— renewable primary energy resources as energy (fuel), (RPRE);
— renewable primary resources as material, (RPRM);
— non-renewable primary resources as energy (fuel) ,(NRPRE);
— non-renewable primary resources as material (NRPRM);
— secondary materials (SM);
— renewable secondary fuels (RSF);
— non-renewable secondary fuels (NRSF);
— recovered energy (RE);
— abiotic depletion potential for non-fossil mineral resources (ADPelements).
— land use related impacts, for example on biodiversity and/or soil fertility;
— toxicological aspects;
— emissions from land use change [GWP 100 (land-use change)];
— hazardous waste disposed;
— non-hazardous waste disposed;
— high-level radioactive waste;
— intermediate and low-level radioactive waste;
— components for reuse;
— materials for recycling;
— materials for energy recovery; and
— recovered energy exported from the product system.

Scaling Factors for Varying Thicknesses

To determine the environmental impacts for insulation products with varying insulation ratings, use the following equation:
Impact per meter = x + n*y, where
*x is the impact from the static facer
*n is the thickness ratio of the desired product to the baseline product (results shown above)
*y is the impact of foam for 1 additional m2K/W ("For Varying Foam Thickness")

Example: A1-A3 GWP Impact (0.5" Board) = 4.03E+00 + (0.5"/1.136") * 4.86E+00
A1-A3 GWP Impact (0.5" Board) = 4.03E+00 + 0.44 * 4.86E+00
A1-A3 GWP Impact (0.5" Board) = 6.17 kg CO2-Eq.

Scaling Factors Table - Static Facer Impacts

Parameter	Parameter	Unit	A1-A3	A4	A5	B4	C1	C2	C3	C4
GWP	Global warming potential	kg CO_2-Eq.	x	x	x	x	x	x	x	x
ODP	Depletion potential of the stratospheric ozone layer	kg CFC-11 Eq.	x	x	x	x	x	x	x	x
AP	Acidification potential for air emissions	kg SO_2-Eq.	x	x	x	x	x	x	x	x
EP	Eutrophication potential	kg N-Eq.	x	x	x	x	x	x	x	x
SP	Smog formation potential	kg O_3-Eq.	x	x	x	x	x	x	x	x
FFD	Fossil Fuel Depletion	MJ-surplus	x	x	x	x	x	x	x	x

Scaling Factors Table - For Varying Foam Thickness

Parameter	Parameter	Unit	A1-A3	A4	A5	B4	C1	C2	C3	C4
GWP	Global warming potential	kg CO_2-Eq.	y	y	y	y	y	y	y	y
ODP	Depletion potential of the stratospheric ozone layer	kg CFC-11 Eq.	y	y	y	y	y	y	y	y
AP	Acidification potential for air emissions	kg SO_2-Eq.	y	y	y	y	y	y	y	y
EP	Eutrophication potential	kg N-Eq.	y	y	y	y	y	y	y	y
SP	Smog formation potential	kg O_3-Eq.	y	y	y	y	y	y	y	y
FFD	Fossil Fuel Depletion	MJ-surplus	y	y	y	y	y	y	y	y

Results shown below were calculated using TRACI 2.1 Methodology.

TRACI 2.1 Impact Assessment - x values

Parameter	Parameter	Unit	A1-A3	A4	A5	B4	C1	C2	C3	C4
GWP	Global warming potential	kg CO_2-Eq.	4.03E+00	1.51E-01	1.90E-01	4.65E+00	0.00E+00	3.31E-02	0.00E+00	7.72E-01
ODP	Depletion potential of the stratospheric ozone layer	kg CFC-11 Eq.	8.52E-13	5.72E-12	1.07E-15	7.04E-12	0.00E+00	1.25E-12	0.00E+00	2.98E-15
AP	Acidification potential for air emissions	kg SO_2-Eq.	2.44E-02	9.08E-04	1.07E-04	2.81E-02	0.00E+00	1.99E-04	0.00E+00	5.61E-03
EP	Eutrophication potential	kg N-Eq.	6.61E-04	5.03E-05	8.70E-05	2.66E-03	0.00E+00	1.10E-05	0.00E+00	2.15E-03
SP	Smog formation potential	kg O_3-Eq.	1.71E-01	2.50E-02	1.39E-03	1.96E-01	0.00E+00	5.47E-03	0.00E+00	1.51E-02
FFD	Fossil Fuel Depletion	MJ-surplus	6.64E+00	2.67E-01	3.13E-02	6.46E+00	0.00E+00	5.85E-02	0.00E+00	1.78E-01

**All use phase and disposal stages have been considered and only those with non-zero values have been reported*

Results shown below were calculated using TRACI 2.1 Methodology.

TRACI 2.1 Impact Assessment - y values										
Parameter	**Parameter**	**Unit**	**A1-A3**	**A4**	**A5**	**B4**	**C1**	**C2**	**C3**	**C4**
GWP	Global warming potential	kg CO_2-Eq.	4.86E+00	1.42E-01	1.90E-01	5.35E+00	0.00E+00	3.11E-02	0.00E+00	7.23E-01
ODP	Depletion potential of the stratospheric ozone layer	kg CFC-11 Eq.	1.32E-07	5.37E-12	1.07E-15	1.19E-07	0.00E+00	1.18E-12	0.00E+00	2.79E-15
AP	Acidification potential for air emissions	kg SO_2-Eq.	1.65E-02	8.52E-04	1.07E-04	2.06E-02	0.00E+00	1.87E-04	0.00E+00	5.26E-03
EP	Eutrophication potential	kg N-Eq.	1.08E-03	4.72E-05	8.70E-05	2.91E-03	0.00E+00	1.03E-05	0.00E+00	2.01E-03
SP	Smog formation potential	kg O_3-Eq.	2.12E-01	2.35E-02	1.39E-03	2.30E-01	0.00E+00	5.14E-03	0.00E+00	1.41E-02
FFD	Fossil Fuel Depletion	MJ-surplus	1.60E+01	2.51E-01	3.13E-02	1.48E+01	0.00E+00	5.49E-02	0.00E+00	1.67E-01

**All use phase and disposal stages have been considered and only those with non-zero values have been reported*

Results shown below were calculated using CML 2001 - April 2013 Methodology.

CML 4.1 Impact Assessment - x values										
Parameter	**Parameter**	**Unit**	**A1-A3**	**A4**	**A5**	**B4**	**C1**	**C2**	**C3**	**C4**
GWP	Global warming potential	kg CO_2-Eq.	4.07E+00	1.52E-01	1.90E-01	4.95E+00	0.00E+00	3.32E-02	0.00E+00	1.06E+00
ODP	Depletion potential of the stratospheric ozone layer	kg CFC-11 Eq.	8.84E-12	5.71E-12	6.23E-14	1.44E-11	0.00E+00	1.25E-12	0.00E+00	1.74E-13
AP	Acidification potential for air emissions	kg SO_2-Eq.	2.60E-02	7.46E-04	9.44E-05	2.62E-02	0.00E+00	1.63E-04	0.00E+00	2.09E-03
EP	Eutrophication potential	kg$(PO_4)^3$-Eq.	1.36E-03	1.33E-04	9.02E-05	3.79E-03	0.00E+00	2.91E-05	0.00E+00	2.60E-03
POCP	Formation potential of tropospheric ozone photochemical oxidants	kg ethane-Eq.	1.43E-03	8.71E-05	2.05E-06	1.85E-03	0.00E+00	1.91E-05	0.00E+00	5.13E-04
ADPE	Abiotic depletion potential for non-fossil resources	kg Sb-Eq.	2.04E-04	6.28E-11	1.57E-08	1.84E-04	0.00E+00	1.38E-11	0.00E+00	4.18E-08
ADPF	Abiotic depletion potential for fossil resources	MJ	5.48E+01	1.93E+00	2.61E-01	5.29E+01	0.00E+00	4.22E-01	0.00E+00	1.38E+00

**All use phase and disposal stages have been considered and only those with non-zero values have been reported*

Results shown below were calculated using CML 2001 - April 2013 Methodology.

CML 4.1 Impact Assessment - y values										
Parameter	Parameter	Unit	A1-A3	A4	A5	B4	C1	C2	C3	C4
GWP	Global warming potential	kg CO_2-Eq.	4.88E+00	1.42E-01	1.90E-01	5.61E+00	0.00E+00	3.12E-02	0.00E+00	9.97E-01
ODP	Depletion potential of the stratospheric ozone layer	kg CFC-11 Eq.	1.20E-07	5.36E-12	6.23E-14	1.08E-07	0.00E+00	1.17E-12	0.00E+00	1.63E-13
AP	Acidification potential for air emissions	kg SO_2-Eq.	1.64E-02	7.00E-04	9.44E-05	1.73E-02	0.00E+00	1.53E-04	0.00E+00	1.96E-03
EP	Eutrophication potential	kg$(PO_4)^3$-Eq.	1.58E-03	1.25E-04	9.02E-05	3.83E-03	0.00E+00	2.73E-05	0.00E+00	2.44E-03
POCP	Formation potential of tropospheric ozone photochemical oxidants	kg ethane-Eq.	2.00E-03	8.18E-05	2.05E-06	2.32E-03	0.00E+00	1.79E-05	0.00E+00	4.81E-04
ADPE	Abiotic depletion potential for non-fossil resources	kg Sb-Eq.	1.03E-05	5.90E-11	1.57E-08	9.31E-06	0.00E+00	1.29E-11	0.00E+00	3.91E-08
ADPF	Abiotic depletion potential for fossil resources	MJ	1.18E+02	1.81E+00	2.61E-01	1.10E+02	0.00E+00	3.96E-01	0.00E+00	1.29E+00

**All use phase and disposal stages have been considered and only those with non-zero values have been reported*

Results below contain the resource use throughout the life cycle of the product.

Resource Use - x values										
Parameter	Parameter	Unit	A1-A3	A4	A5	B4	C1	C2	C3	C4
RPR_E	Renewable primary energy as energy carrier	MJ	6.74E+00	0.00E+00	3.61E-02	6.22E+00	0.00E+00	0.00E+00	0.00E+00	1.33E-01
RPR_M	Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
$NRPR_E$	Nonrenewable primary energy as energy carrier	MJ	4.65E+01	1.95E+00	2.72E-01	4.55E+01	0.00E+00	4.26E-01	0.00E+00	1.41E+00
$NRPR_M$	Nonrenewable primary energy as material utilization	MJ	1.50E+01	0.00E+00	0.00E+00	1.35E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SM	Use of secondary material	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	Use of nonrenewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RE	Energy recovered from disposed waste	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	Use of net fresh water	m^3	2.03E-02	0.00E+00	4.27E-04	1.90E-02	0.00E+00	0.00E+00	0.00E+00	3.14E-04

**All use phase and disposal stages have been considered and only those with non-zero values have been reported*

Results below contain the resource use throughout the life cycle of the product.

Resource Use - y values										
Parameter	**Parameter**	**Unit**	**A1-A3**	**A4**	**A5**	**B4**	**C1**	**C2**	**C3**	**C4**
RPR_E	Renewable primary energy as energy carrier	MJ	3.73E+00	0.00E+00	3.61E-02	3.50E+00	0.00E+00	0.00E+00	0.00E+00	1.24E-01
RPR_M	Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
$NRPR_E$	Nonrenewable primary energy as energy carrier	MJ	-1.50E+01	1.83E+00	2.72E-01	-1.01E+01	0.00E+00	4.00E-01	0.00E+00	1.32E+00
$NRPR_M$	Nonrenewable primary energy as material utilization	MJ	1.50E+01	0.00E+00	0.00E+00	1.35E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SM	Use of secondary material	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	Use of nonrenewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RE	Energy recovered from disposed waste	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	Use of net fresh water	m^3	3.68E-02	0.00E+00	4.27E-04	3.37E-02	0.00E+00	0.00E+00	0.00E+00	2.94E-04

**All use phase and disposal stages have been considered and only those with non-zero values have been reported*

Results below contain the output flows and wastes throughout the life cycle of the product.

Output Flows and Waste Categories - x values										
Parameter	**Parameter**	**Unit**	**A1-A3**	**A4**	**A5**	**B4**	**C1**	**C2**	**C3**	**C4**
HWD	Hazardous waste disposed	kg	3.66E-09	0.00E+00	1.32E-11	3.35E-09	0.00E+00	0.00E+00	0.00E+00	5.24E-11
NHWD	Non-hazardous waste disposed	kg	5.23E-01	0.00E+00	3.37E-01	2.51E+00	0.00E+00	0.00E+00	0.00E+00	1.93E+00
HLRW	High-level radioactive waste	kg or m^3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ILLRW	Intermediate- and low-level radioactive waste	kg or m^3	2.63E-03	0.00E+00	4.53E-06	2.38E-03	0.00E+00	0.00E+00	0.00E+00	1.23E-05
CRU	Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MR	Materials for recycling	kg	2.86E-02	0.00E+00	0.00E+00	2.57E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE	Recovered energy exported from system	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

**All use phase and disposal stages have been considered and only those with non-zero values have been reported*

Results below contain the output flows and wastes throughout the life cycle of the product.

Output Flows and Waste Categories - y values										
Parameter	**Parameter**	**Unit**	**A1-A3**	**A4**	**A5**	**B4**	**C1**	**C2**	**C3**	**C4**
HWD	Hazardous waste disposed	kg	1.47E-06	0.00E+00	1.32E-11	1.32E-06	0.00E+00	0.00E+00	0.00E+00	4.91E-11
NHWD	Non-hazardous waste disposed	kg	8.37E-02	0.00E+00	3.37E-01	2.01E+00	0.00E+00	0.00E+00	0.00E+00	1.81E+00
HLRW	High-level radioactive waste	kg or m^3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ILLRW	Intermediate- and low-level radioactive waste	kg or m^3	7.63E-04	0.00E+00	4.53E-06	7.01E-04	0.00E+00	0.00E+00	0.00E+00	1.15E-05
CRU	Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MR	Materials for recycling	kg	2.86E-02	0.00E+00	0.00E+00	2.57E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE	Recovered energy exported from system	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

**All use phase and disposal stages have been considered and only those with non-zero values have been reported*

Additional Environmental Information

Environmental and Health During Manufacturing

During the manufacturing of EnergyGuard™ HD and HD Barrier Polyiso Cover Board, there is no harmful emissive potential. No damage to health or impairment is expected under normal use corresponding to the intended use of the product.

Environmental and Health During Installation

There is no harmful emissive potential. No damage to health or impairment is expected under normal use corresponding to the intended use of the product.

Extraordinary Effects

Fire
As unprotected polyisocyanurate will burn, fire safety precautions should be observed wherever insulation products are used.

Water
There are no extraordinary effects on the environment due to the application of water on the product. EnergyGuard™ HD and HD Barrier Polyiso Cover Board meets the requirements of D3272 for resistance to mold growth.

Mechanical Destruction
EnergyGuard™ HD and HD Barrier Polyiso Cover Board is a non-structural, non load-bearing material.

Delayed Emissions

Global warming potential is calculated using the TRACI 2.1 and CML 4.1 impact assessment methodologies. Delayed emissions are

Environmental Activities and Certifications

N/A

Further Information

GAF
1 Campus Drive
Parsippany, NJ 07054

References

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Contact Information

Study Commissioner

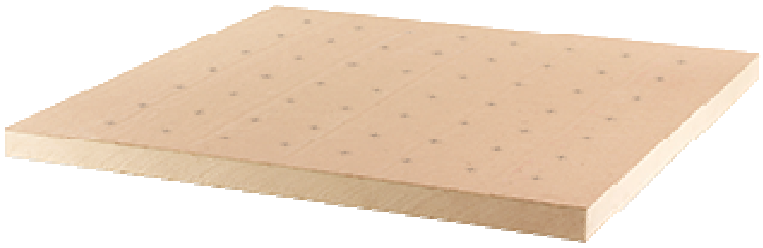
GAF
Aly Perez
Product Sustainability Specialist
1 Campus Drive
Parsippany, NJ 07054
alyson.perez@gaf.com

LCA Practitioner

Sustainable Solutions Corporation
155 Railroad Plaza, Suite 203
Royersford, PA 19468 USA
(+1) 610 569-1047
info@sustainablesolutionscorporation.com
www.sustainablesolutionscorporation.com

Environmental Product Declaration

EnergyGuard™ Polyiso Insulation



GAF, a Standard Industries company, is the leading roofing and waterproofing manufacturer in North America. For more than 135 years, GAF has been trusted to protect what matters most for families, communities and business owners with its innovative solutions and focus on customer service. GAF's leadership extends to its commitment to making a positive impact on its communities, industry, and planet. Learn more at www.GAF.com.

NSF Certified Environmental Product Declaration www.nsf.org

This declaration is an environmental product declaration (EPD) in accordance with ISO 14025 and ISO 21930-2017. EPDs rely on Life Cycle Assessment (LCA) to provide information on a number of environmental impacts of products over their life cycle. Exclusions: EPDs do not indicate that any environmental or social performance benchmarks are met, and there may be impacts that they do not encompass. LCAs do not typically address the site-specific environmental impacts of raw material extraction, nor are they meant to assess human health toxicity. EPDs can complement but cannot replace tools and certifications that are designed to address these impacts and/or set performance thresholds – e.g., Type 1 certifications, health assessments and declarations, environmental impact assessments, etc. Accuracy of Results: EPDs regularly rely on estimations of impacts, and the level of accuracy in estimation of effect differs for any particular product line and reported impact. Comparability: EPDs are not comparative assertions and are either not comparable or have limited comparability when they cover different life cycle stages, are based on different product category rules or are missing relevant environmental impacts. EPDs from different programs may not be comparable.

EPD PROGRAM AND PROGRAM OPERATOR NAME, ADDRESS, LOGO, AND WEBSITE	NSF International, 789 N. Dixboro Rd, Ann Arbor, MI 48105,www.nsf.org
GENERAL PROGRAM INSTRUCTIONS AND VERSION NUMBER	NSF Certification Policies for Environmental Product Declarations (EPD): November 1, 2022
MANUFACTURER NAME AND ADDRESS	GAF 1 Campus Drive Parsippany, NJ 07054
DECLARATION NUMBER	EPD10897
DECLARED PRODUCT & FUNCTIONAL UNIT OF DECLARED UNIT	EnergyGuard™ Polyiso Insulation Functional Unit = 1 m² of installed insulation material with a thickness that gives an average thermal resistance RSI = 1 m²K/W with a building service life of 75 years over a 75 year building lifetime
REFERENCE PCR AND VERSION NUMBER	UL Part B v2.0: Building Envelope Thermal Insulation EPD Requirements Valid through November 15, 2021.
DESCRIPTION OF PRODUCT APPLICATION/USE	Thermal Insulation for Roofing Applications
PRODUCT RSL DESCRIPTION	40 Years
MARKETS OF APPLICABILITY	Global
DATE OF ISSUE	12/08/2023 - 12/08/2028
PERIOD OF VALIDITY	5 Years
EPD TYPE	Product Specific
DATASET VARIABILITY	N/A
EPD SCOPE	Cradle-to-Grave
YEAR(S) OF REPORTED PRIMARY DATA	2021
LCA SOFTWARE & VERSION NUMBER	LCA for Experts v. 10.6 GAF EPD Generator Tool Version 1.0
LCI DATABASE(S) & VERSION NUMBER	Sphera database & USLCI v2.0
LCIA METHODOLOGY & VERSION NUMBER	TRACI 2.1; CML 4.1
The sub-category PCR review was conducted by:	
This declaration was independently verified in accordance with ISO 14025: 2006. The UL Environment "Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report," v3.2 (Dec 2018), based on ISO 21930:2017, serves as the core PCR, with additional considerations from the USGBC/UL Environment Part A Enhancement (2017) ☐ INTERNAL ☒ EXTERNAL	Jack Geibig, EcoForm, LLC jgeibig@ecoform.com
This life cycle assessment was conducted in accordance with ISO 14044 and the reference PCR by:	Sustainable Solutions Corporation
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	Jack Geibig, EcoForm, LLC jgeibig@ecoform.com

Environmental declarations from different programs (ISO 14025) may not be comparable. Comparison of the environmental performance using EPD information shall consider all relevant information modules over the fulllife cycle of the products within the building. Comparison of the environmental performance of Building Envelope Thermal Insulation using EPD information shall be based on the product's use and impacts at the building level, and therefore EPDs may not be used for comparability purposes when not considering the building energy use phase as instructed under this PCR. This PCR allows EPD comparability only when the same functional requirements between products are ensured and the requirements of ISO 21930:2017 §5.5 are met. It should be noted that different LCA software and background LCI datasets may lead to differences results for upstream or downstream of the life cycle stages declared. Full conformance with the PCR for Building Envelope Thermal Insulation allows EPD comparability only when all stages of a life cycle have been considered. However, variations and deviations are possible. Example of variations: Different LCA software and background LCI datasets may lead to differences results for upstream or downstream of the life cycle stages declared.

General Information

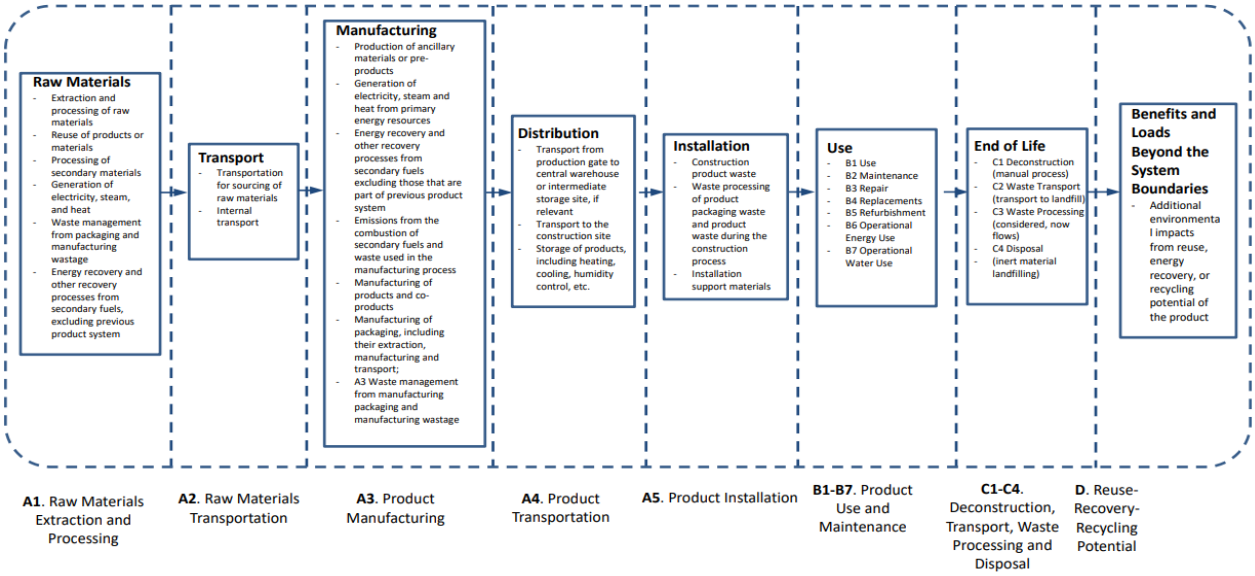
Description of Company/Organization

Founded in 1886, GAF is the leading roofing manufacturer in North America. As a member of the Standard Industries family of companies, GAF is part of the largest roofing and waterproofing business in the world. The company's products include a comprehensive portfolio of roofing and waterproofing solutions for residential and commercial properties as well as for civil engineering applications. The full GAF portfolio of solutions is supported by an extensive national network of factory-certified contractors. GAF continues to be the leader in quality and offers comprehensive warranty protection on its products and systems. The company's success is driven by a commitment to empowering its people to deliver advanced quality and purposeful innovation. For more information about GAF, visit www.gaf.com.

Product Description

Product Name: EnergyGuard™ Polyiso Insulation
Product Characteristic: EnergyGuard™ delivers high thermal value, moisture resistance, and dimensional stability to virtually all low-slope roofing systems.
Additional features include:
- ENERGY EFFICIENT: Highest R value per inch compared to any other type of non polyiso insulation of equivalent thickness.
- VERSATILE: Approved component in single ply, BUR, and modified bitumen systems with a variety of attachment methods MA, FA Loose laid and ballasted
- EASY TO INSTALL: Lightweight and easy to cut in the field, making handling and installation easier and more efficient.

Flow Diagram



Manufacturer Specific EPD

This product-specific EPD was developed based on the cradle-to-grave (modules A1-C4) Life Cycle Assessment. The EPD accounts for raw material extraction and processing, transport, product manufacturing, distribution, installation, use, and disposal. Manufacturing data were gathered directly from company personnel. For any product group EPDs, an impact assessment was completed for each product. Product grouping was considered appropriate if the individual product impacts differed by no more than ±10% in any impact category.
Additionally, one insulation product can vary by its insulation rating. This EPD reports the environmental impacts of multiple different thickness(s) by using "scaling factor" tables. These tables provide an equation to be able to calculate the emissions for any thickness(s) of this product. The impacts will scale linearly by their thickness(s).

Application

Product Applications: Thermal Insulation for Roofing Applications

Material Composition

The primary product components and/or materials must be indicated as a percentage mass to enable the user of the EPD to understand the composition of the product in delivery status.

The average composition of a EnergyGuard™ Polyiso Insulation is as follows:

	Percentage in mass (%)
Material	**Value**
Polyol, MDI, and Flame Retardant A or B	75-80%
Blowing Agent	4.2-6.0%
Water	0.1-0.3%
Catalyst	0.6-1.9%
Surfactant	0.4-0.5%
Paper Facer	13-16%
Total	**100.00%**
**The GAF product modelled in this study contains no substances that are required to be reported as hazardous, nor are any such substances utilized in its production.*	

Placing on the Market / Application Rules

The standards and criteria that can be applied for EnergyGuard™ Polyiso Insulation are:
- Meets the requirements of ASTM C1289 Type II, Class 1, Grade 2 (20 psi) and also available in Grade 3 (25 psi)
- FM 4450 / 4470
- UL listed to ANSI / UL 790, UL 263, UL 1256
- UL Evaluation Report UL ER1306-03
- Miami-Dade County Approved
- State of Florida Approved

Properties of Declared Product as Shipped

After manufacturing, the product is packaged for shipment to the customer. Packaging includes a plastic film that wraps around the entire product. This may be recyclable in some markets, but for the purposes of this EPD it is assumed to be landfilled. Product is available in 4' x 4' (1.22 m x 1.22 m) and 4' x 8' (1.22 m x 2.44 m) boards. Available in a variety of thicknesses from 1.0" (25.4 mm) to 4.6" (116 mm).

Methodological Framework

Functional Unit

The declaration refers to the functional unit of 1 m² of installed insulation material with a thickness that gives an average thermal resistance RSI = 1 m²K/W with a building service life of 75 years as specified in the PCR.

Name	Value	Unit
Funtional unit	1 m² of installed insulation material with a thickness that gives an average thermal resistance RSI = 1 m²K/W with a building service life of 75 years	
Mass	1.27	kg
Thickness to achieve functional unit	0.0253	m
Thickness to achieve functional unit	0.996	inches
R-values is determined in accordance with ASTM C1303		

System Boundary

This is a cradle-to-grave Environmental Product Declaration. The following life cycle phases were considered:

Product Stage			Construction Process Stage		Use Stage							End-of-Life Stage*				Benefits and Loads Beyond the System Boundaries
Raw material supply	Transport	Manufacturing	Transport from gate to the site	Construction/ installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction /demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	MND

Description of the System Boundary Stages Corresponding to the PCR

(X = Included; MND = Module Not Declared)

*This includes provision of all materials, products and energy, packaging processing and its transport, as well as waste processing up to the end-of waste state or disposal of final residues.

Reference Service Life

The use phase follows the installation of polyiso roof insulation boards. In a roofing system, the insulation is located on top of a roof deck and below the roof membrane. The roof membrane when installed properly and adequately maintained, protects the insulation from the environmental elements and weather during its use. Therefore, it is expected that polyiso will not sustain damage that affects its performance and function, and does not require maintenance. As defined in the governing PCR, the Building Estimated Service Life (ESL) is 75 years. The necessary steps for providing weather protection are specified by manufacturer installation instructions and are mandated by model building codes. The roof membrane's useful life span is influenced by many variables including roof system design, quality of the installation, type and durability of the membrane, roof system component configuration and maintenance as well as weather conditions and events. However, the real world reroofing scenarios, building owner tendencies, and the expected service life of roof membranes all indicate that reroofing activity will take place during the 75-year building ESL.

Reroofing activity may initially occur at 15-30 years after the installation of the original system and driven by recurring roof leaks that cannot be remedied by patch repairs of the membrane. When reroofing is required, options are available to address the need for a new roof membrane without the need to replace the insulation. The model building codes describe a "Roof Recover" as an acceptable reroofing practice, which occurs when a new roof covering is installed on top of the existing roof system without disturbing or removing the existing roof covering or the insulation below. Roof Recover, as defined by industry practices, involves visual examination and appropriate testing to ensure that all roof components, including insulation, have not sustained damage or deterioration. This approach allows the insulation to be reused instead of being disposed of into a landfill. The Roof Recover approach is a common practice in the roofing industry, it is permitted by model building codes, and allows the service life of a roof system to be extended (without the need to replace the insulation). Although the Roof Recover approach is a common practice, it is often not captured in reroofing studies available in the public domain, which typically contemplate a full roof replacement. Pertinent to this declaration, we recognize a 20-year life span for the original installation of the membrane followed by a Roof Recover, which extends the life of the original roof system to 40 years. This practice establishes a 40-year RSL for polyiso roof insulation boards with a Roof Recover. The model building codes allow a roof to be recovered only once. Where two roof membranes are installed on an existing roof, a reroofing process referred to as a "Roof Replacement" is required. This process involves the removal of all roof components down to the roof deck. This study conservatively assumes all insulation is disposed in the landfill during a Roof Replacement. Therefore, the polyiso roof insulation boards' cradle-to-grave assessment incorporates all life cycle stage environmental impacts connected with the original building construction, a Roof Recover operation at 20-years, as well as the building's Roof Replacement operation at 40-years. This translates to 1.9 replacement cycles during the 75-year building ESL (75-year ESL/40-year RSL = 1.9 replacement cycles).

Allocation

Allocation was determined on a mass basis. Since multiple facilities produced these products, a weighted average by production mass was used to determine manufacturing inputs. When facilities manufacture additional product types, facility allocation is done based on mass of production. No co-products are produced, so no co-product allocation was performed.

Cut-off Criteria

Processes whose total contribution to the final result, with respect to their mass and in relation to all considered impact categories, is less than 1% can be neglected. The sum of the neglected processes may not exceed 5% by mass of the considered impact categories. For that a documented assumption is admissible.

For Hazardous Substances the following requirements apply:

- The Life Cycle Inventory (LCI) of hazardous substances will be included, if the inventory is available.
- If the LCI for a hazardous substance is not available, the substance will appear as an input in the LCI of the product.
- If the LCI of a hazardous substance is approximated by modeling another substance, documentation will be provided.

This EPD is in compliance with the cut-off criteria. No processes were neglected or excluded. Capital items for the production processes (machine, buildings, etc.) were not taken into consideration.

Data Sources

Primary data were collected for every process in the product system under the control of GAF. Secondary data from the Sphera and USLCI databases were utilized when necessary. These data were evaluated and have temporal, geographic, and technical coverage appropriate to the scope of the product category.

Data Quality

The data sources used are complete and representative of global systems in terms of the geographic and technological coverage and are a recent vintage (i.e., less than ten years old). The data used for primary data are based on direct information sources of the manufacturers. Secondary data sets were used for raw materials extraction and processing, end of life, transportation, and energy production flows. Wherever secondary data is used, the study adopts critically reviewed data for consistency, precision, and reproducibility to limit uncertainty. When a material is not available in the available LCI databases, another chemical which has similar manufacturing and environmental impacts may be used as a proxy, representing the actual chemical. Please see Appendix A in the LCA report for the full breakdown of the data sources.

Important data quality factors include precision (measured, calculated, or estimated), completeness (e.g., unreported emissions or excluded flows), consistency (uniformity of the applied methodology throughout the study), and reproducibility (ability for another researcher reproduce the results based on the methodological information provided). Each dataset has an overall rating from one to four, one being “very good” and four being “poor.” The individual datasets were scored and aggregated to determine the data has an overall average rating of 2.1, which is considered good.

Period Under Review

The period under review is the full calendar year of 2021.

Treatment of Biogenic Carbon

The uptake and release of biogenic carbon throughout the product life cycle follows ISO 21930:2017 Section 7.2.7.

Comparability and Benchmarking

A comparison or an evaluation of EPD data is only possible if all data sets to be compared were created according to ISO 21930 and the building context, respectively the product-specific characteristics of performance, are taken into account. Environmental declarations from different programs may not be comparable. When comparing EPDs created using this PCR, variations and deviations are possible. Example of variations: Different LCA software and background LCI datasets may lead to different results for upstream or downstream of the life cycle stages declared. In order to support comparative assertions, this EPD meets all comparability requirements stated in ISO 14025:2006. However, differences in certain assumptions, data quality, and variability between LCA data sets may still exist. As such, caution should be exercised when evaluating EPDs from different manufacturers as the EPD results may. These six impact categories are globally deemed mature enough to be included in Type III environmental declarations. Other categories are being developed and defined and LCA should continue making advances in their development, however the EPD users shall not use additional measures for comparative purposes. Third party verified ISO 14040/44 secondary LCI data sets contribute more than 67% of total impact (either at the unit process level or in aggregate) to any of the required impact categories identified by the applicable PCR.

Units

The LCA results within this EPD are reported in SI units.

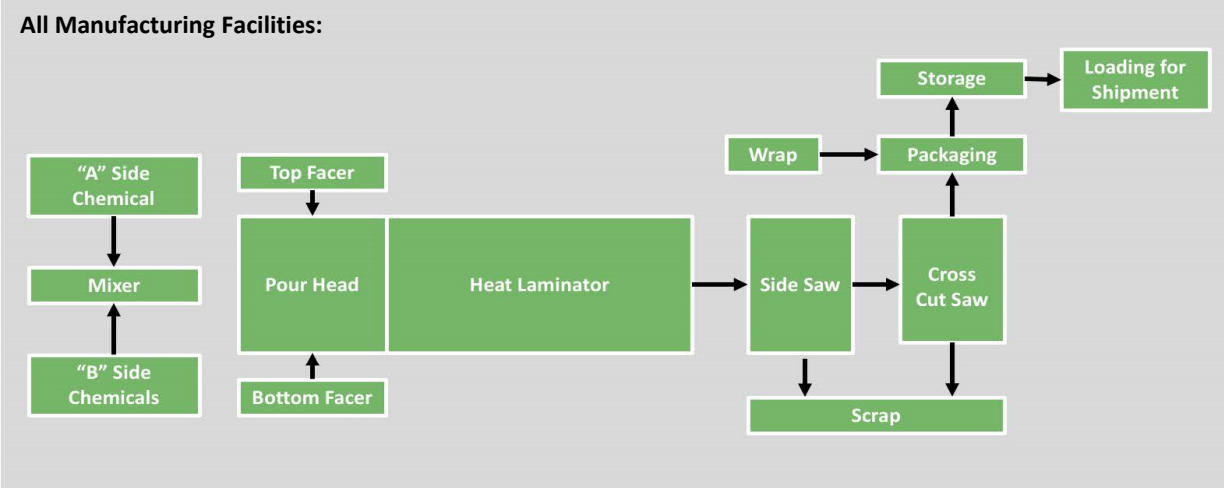
Additional Environmental Information

Background data

For life cycle modeling of the considered products, the GaBi v10.6 Software System for Life Cycle Engineering, developed by Sphera, is used. The Sphera and USLCI databases contain consistent and documented datasets which are documented online. To ensure comparability of results in the LCA, the basic data of the Sphera database were used for energy, transportation, and auxiliary materials.

Manufacturing

Polyiso board insulation is manufactured in Cedar City, Utah; Gainesville, Texas; New Columbia, Pennsylvania; Statesboro, Georgia and begins with the inbound reception of raw materials. The process begins with adding the chemicals for the two side mixtures to a mixer. The mixtures are mixes and then poured onto the top and bottom facers separately. The facers with applied mixtures are sent through a heat laminator where they are cured into a solid piece of board insulation. The board exits the laminator and is sent to a set of saws to refine the dimensions. Once the board dimensions have been refined, the board is sent to packaging where it is palletized on boards made from the scrap material from the saw processes, shrink wrapped, and sent to storage before ultimately being sent out for final distribution.



Packaging

The packaging material is composed primarily of plastic materials. Board insulation products are shipped on pallets made of repurposed board insulation and wrapped in plastic film.

	Quantity (% By Weight)
Material	**Value**
Cardboard	0.00%
Wood	0.00%
Paper	0.00%
Plastic	100%
Total	**100%**

Transportation

Transport to Building Site (A4)		
Name	**Value**	**Unit**
Fuel type	Diesel	
Liters of fuel	38	l/100km
Vehicle Type	Truck	
Transport distance	734	km
Capacity utilization (including empty runs)	90	%
Gross density of products transported	50	kg/m^3
Weight of products transported	-	kg
Volume of products transported	-	m^3
Capacity utilization volume factor	-	-

Product Installation

Detailed installation instructions are provided online along with the type of fasteners or adhesive required for each product. Installation equipment is required though not included in the study as these are multi-use tools and the impacts per declared unit is considered negligible. Note: Compliance with model building codes does not always ensure compliance with state or local building codes, which may be amended versions of these model codes. Always check with local building code officials to confirm compliance. At the end-of-life, some of the packaging was sent to incineration and recycling along with landfill.

Installation into the building (A5)		
Name	**Value**	**Unit**
Auxiliary materials	-	kg
Water consumption	-	m^3
Other resources	-	kg
Electricity consumption	-	kWh
Other energy carriers	-	MJ
Product loss per functional unit	-	kg
Waste materials at construction site	-	kg
Output substance (recycle)	-	kg
Output substance (landfill)	1.27	kg
Output substance (incineration)	-	kg
Packaging waste (recycle)	0.00	kg
Packaging waste (landfill)	0.19	kg
Packaging waste (incineration)	0.00	kg
Direct emissions to ambient air*, soil, and water	0	kg CO_2
VOC emissions	-	kg

*CO2 emissions to air from disposal of packaging

Reference Service Life		
Name	**Value**	**Unit**
Reference Service Life	40	years
Estimated Building Service Life	75	years
Number of Replacements	0.9	number

Product Use

No cleaning, maintenance (B2), repair (B3) or refurbishment (B5) activities are required. In addition, the product consumes no water or electricity during its use (B6-B7).

Use (B4)		
Name	**Value**	**Unit**
Replacement Cycle	0.0	Number/RSL
Replacement Cycle	0.9	Number/ESL
Further assumptions for scenario development, e.g. frequency and time period of use	Assumes reroofing every 20 years with a maximum of 1 reroof before replacement	-

Disposal

The packaging waste is assumed to be 100% landfilled in the end-of-life disposal, in accordance with the PCR. Product waste at the end-of-life can de disposed where appropriate, but is assumed to be landfilled based on common practice of these materials. The product and its packaging contain no biogenic content.

End of life (C1-C4)		
Name	**Value**	**Unit**
Collected separately	0.00	kg
Collected as mixed construction waste	1.27	kg
Reuse	0.00	kg
Recycling	0.00	kg
Landfilling	1.27	kg
Incineration with energy recovery	0.00	kg
Energy conversion	-	%

Re-use Phase

Re-use of the product is not common due to the nature of installation of the product into the building envelope.

LCA Results for 0.996" Board

LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

To determine the environmental impacts for insulation products with varying insulation ratings, refer to the section below titled "Scaling Factors for Varying Thicknesses".

Results shown below were calculated using TRACI 2.1 Methodology.

TRACI 2.1 Impact Assessment										
Parameter	**Parameter**	**Unit**	**A1-A3**	**A4**	**A5**	**B4**	**C1**	**C2**	**C3**	**C4**
GWP	Global warming potential	kg CO_2-Eq.	1.85E+00	8.64E-02	1.66E-01	2.31E+00	0.00E+00	1.90E-02	0.00E+00	4.41E-01
ODP	Depletion potential of the stratospheric ozone layer	kg CFC-11 Eq.	4.68E-08	3.27E-12	9.38E-16	4.21E-08	0.00E+00	7.17E-13	0.00E+00	1.70E-15
AP	Acidification potential for air emissions	kg SO_2-Eq.	6.13E-03	5.19E-04	9.36E-05	9.06E-03	0.00E+00	1.14E-04	0.00E+00	3.21E-03
EP	Eutrophication potential	kg N-Eq.	4.21E-04	2.87E-05	7.62E-05	1.58E-03	0.00E+00	6.31E-06	0.00E+00	1.23E-03
SP	Smog formation potential	kg O_3-Eq.	7.97E-02	1.43E-02	1.22E-03	9.62E-02	0.00E+00	3.13E-03	0.00E+00	8.61E-03
FFD	Fossil Fuel Depletion	MJ-surplus	6.15E+00	1.53E-01	2.74E-02	5.82E+00	0.00E+00	3.35E-02	0.00E+00	1.02E-01

**All use phase and disposal stages have been considered and only those with non-zero values have been reported*

Results shown below were calculated using CML 2001 - April 2013 Methodology.

CML 4.1 Impact Assessment										
Paramete	**Parameter**	**Unit**	**A1-A3**	**A4**	**A5**	**B4**	**C1**	**C2**	**C3**	**C4**
GWP	Global warming potential	kg CO_2-Eq.	1.84E+00	8.67E-02	1.67E-01	2.45E+00	0.00E+00	1.90E-02	0.00E+00	6.08E-01
ODP	Depletion potential of the stratospheric ozone layer	kg CFC-11 Eq.	4.28E-08	3.26E-12	5.46E-14	3.85E-08	0.00E+00	7.15E-13	0.00E+00	9.93E-14
AP	Acidification potential for air emissions	kg SO_2-Eq.	6.02E-03	4.26E-04	8.28E-05	7.03E-03	0.00E+00	9.34E-05	0.00E+00	1.19E-03
EP	Eutrophication potential	kg$(PO_4)^3$-Eq.	6.10E-04	7.60E-05	7.92E-05	2.04E-03	0.00E+00	1.67E-05	0.00E+00	1.49E-03
POCP	Formation potential of tropospheric ozone photochemical oxidants	kg ethane-Eq.	7.39E-04	4.98E-05	1.80E-06	9.85E-04	0.00E+00	1.09E-05	0.00E+00	2.93E-04
ADPE	Abiotic depletion potential for non-fossil resources	kg Sb-Eq.	3.70E-06	3.60E-11	1.38E-08	3.36E-06	0.00E+00	7.88E-12	0.00E+00	2.38E-08
ADPF	Abiotic depletion potential for fossil resources	MJ	4.56E+01	1.10E+00	2.28E-01	4.31E+01	0.00E+00	2.42E-01	0.00E+00	7.86E-01

**All use phase and disposal stages have been considered and only those with non-zero values have been reported*

Results below contain the resource use throughout the life cycle of the product.

Resource Use										
Parameter	**Parameter**	**Unit**	**A1-A3**	**A4**	**A5**	**B4**	**C1**	**C2**	**C3**	**C4**
RPR_E	Renewable primary energy as energy carrier	MJ	1.93E+00	0.00E+00	3.16E-02	1.83E+00	0.00E+00	0.00E+00	0.00E+00	7.60E-02
RPR_M	Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
$NRPR_E$	Nonrenewable primary energy as energy carrier	MJ	-9.43E+00	1.11E+00	2.38E-01	-6.33E+00	0.00E+00	2.43E-01	0.00E+00	8.04E-01
$NRPR_M$	Nonrenewable primary energy as material utilization	MJ	1.08E+01	0.00E+00	0.00E+00	9.68E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SM	Use of secondary material	kg	9.57E-01	0.00E+00	0.00E+00	8.61E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	Use of nonrenewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RE	Energy recovered from disposed waste	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	Use of net fresh water	m^3	1.39E-02	0.00E+00	3.74E-04	1.30E-02	0.00E+00	0.00E+00	0.00E+00	1.80E-04

**All use phase and disposal stages have been considered and only those with non-zero values have been reported*

Results below contain the output flows and wastes throughout the life cycle of the product.

Output Flows and Waste Categories										
Parameter	**Parameter**	**Unit**	**A1-A3**	**A4**	**A5**	**B4**	**C1**	**C2**	**C3**	**C4**
HWD	Hazardous waste disposed	kg	9.01E-07	0.00E+00	1.16E-11	8.11E-07	0.00E+00	0.00E+00	0.00E+00	3.00E-11
NHWD	Non-hazardous waste disposed	kg	4.42E-02	0.00E+00	2.96E-01	1.30E+00	0.00E+00	0.00E+00	0.00E+00	1.11E+00
HLRW	High-level radioactive waste	kg or m^3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ILLRW	Intermediate- and low-level radioactive waste	kg or m^3	3.32E-04	0.00E+00	3.98E-06	3.09E-04	0.00E+00	0.00E+00	0.00E+00	7.03E-06
CRU	Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MR	Materials for recycling	kg	1.69E-02	0.00E+00	0.00E+00	1.52E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE	Recovered energy exported from system	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

**All use phase and disposal stages have been considered and only those with non-zero values have been reported*

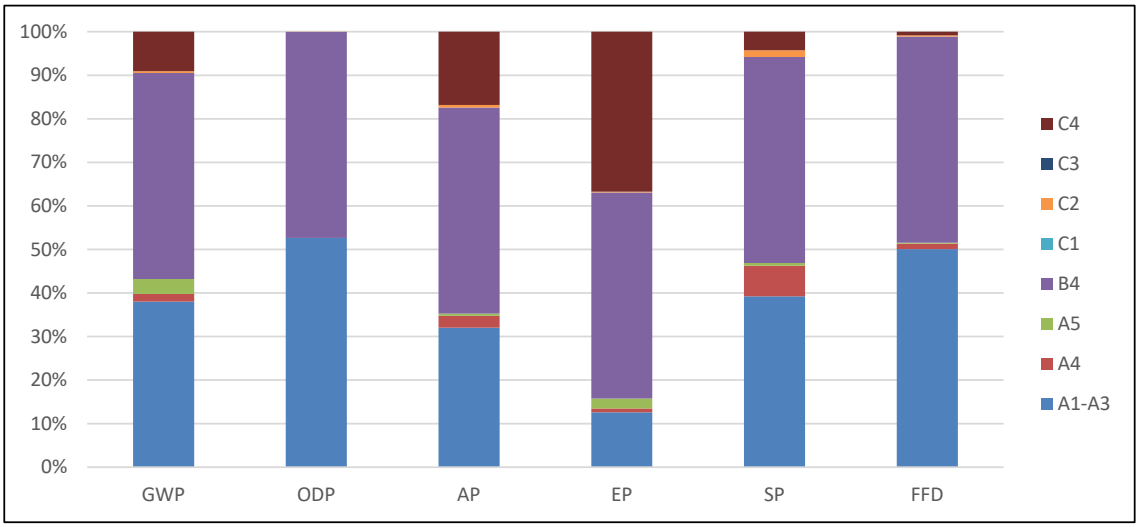
Results below contain direct greenhouse gas emissions and removals throughout the life cycle of the product.

Carbon Emissions and Removals										
Parameter	**Parameter**	**Unit**	**A1-A3**	**A4**	**A5**	**B4**	**C1**	**C2**	**C3**	**C4**
BCRP	Biogenic Carbon Removal from Product	kg CO_2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEP	Biogenic Carbon Emissions from Product	kg CO_2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCRK	Biogenic Carbon Removal from Packaging	kg CO_2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEK	Biogenic Carbon Emissions from Packaging	kg CO_2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEW	Biogenic Carbon Emissions from Combustion of Waste from Renewable Sources Used in Production Process	kg CO_2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCE	Calcination Carbon Emissions	kg CO_2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCR	Carbonation Carbon Removal	kg CO_2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CWNR	Carbon Emissions from Combustion of Waste from Non-renewable Sources Used in Production Process	kg CO_2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

**All use phase and disposal stages have been considered and only those with non-zero values have been reported*

LCA Interpretation

The replacements stage, B4, incorporates all impacts times 0.9 of the other stages. It therefore is the singularly most impactful stage. However, for 1 lifetime, the production life cycle stage (A1-A3) dominates the impacts across all impact categories. This is due to the upstream production of materials used in the product, along with natural gas use in the manufacturing of the product. The end-of-life disposal stage (C4) has significant impact in global warming potential, acidification, and eutrophication due to the 100% landfill assumption.



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:
— renewable primary energy resources as energy (fuel), (RPRE);
— renewable primary resources as material, (RPRM);
— non-renewable primary resources as energy (fuel) ,(NRPRE);
— non-renewable primary resources as material (NRPRM);
— secondary materials (SM);
— renewable secondary fuels (RSF);
— non-renewable secondary fuels (NRSF);
— recovered energy (RE);
— abiotic depletion potential for non-fossil mineral resources (ADPelements).
— land use related impacts, for example on biodiversity and/or soil fertility;
— toxicological aspects;
— emissions from land use change [GWP 100 (land-use change)];
— hazardous waste disposed;
— non-hazardous waste disposed;
— high-level radioactive waste;
— intermediate and low-level radioactive waste;
— components for reuse;
— materials for recycling;
— materials for energy recovery; and
— recovered energy exported from the product system.

Scaling Factors for Varying Thicknesses

To determine the environmental impacts for insulation products with varying insulation ratings, use the following equation:
Impact per meter = x + n*y, where
*x is the impact from the static facer
*n is the thickness ratio of the desired product to the baseline product (results shown above)
*y is the impact of foam for 1 additional m2K/W ("For Varying Foam Thickness")

Example: A1-A3 GWP Impact (2" Board) = 9.38E-02 + (2"/0.996") * 1.76E+00
A1-A3 GWP Impact (2" Board) = 9.38E-02 + 2.01 * 1.76E+00
A1-A3 GWP Impact (2" Board) = 3.63 kg CO2-Eq.

Scaling Factors Table - Static Facer Impacts

Parameter	Parameter	Unit	A1-A3	A4	A5	B4	C1	C2	C3	C4
GWP	Global warming potential	kg CO_2-Eq.	x	x	x	x	x	x	x	x
ODP	Depletion potential of the stratospheric ozone layer	kg CFC-11 Eq.	x	x	x	x	x	x	x	x
AP	Acidification potential for air emissions	kg SO_2-Eq.	x	x	x	x	x	x	x	x
EP	Eutrophication potential	kg N-Eq.	x	x	x	x	x	x	x	x
SP	Smog formation potential	kg O_3-Eq.	x	x	x	x	x	x	x	x
FFD	Fossil Fuel Depletion	MJ-surplus	x	x	x	x	x	x	x	x

Scaling Factors Table - For Varying Foam Thickness

Parameter	Parameter	Unit	A1-A3	A4	A5	B4	C1	C2	C3	C4
GWP	Global warming potential	kg CO_2-Eq.	y	y	y	y	y	y	y	y
ODP	Depletion potential of the stratospheric ozone layer	kg CFC-11 Eq.	y	y	y	y	y	y	y	y
AP	Acidification potential for air emissions	kg SO_2-Eq.	y	y	y	y	y	y	y	y
EP	Eutrophication potential	kg N-Eq.	y	y	y	y	y	y	y	y
SP	Smog formation potential	kg O_3-Eq.	y	y	y	y	y	y	y	y
FFD	Fossil Fuel Depletion	MJ-surplus	y	y	y	y	y	y	y	y

Results shown below were calculated using TRACI 2.1 Methodology.

TRACI 2.1 Impact Assessment - x values

Parameter	Parameter	Unit	A1-A3	A4	A5	B4	C1	C2	C3	C4
GWP	Global warming potential	kg CO_2-Eq.	9.38E-02	3.31E-02	8.31E-02	3.48E-01	0.00E+00	7.26E-03	0.00E+00	1.69E-01
ODP	Depletion potential of the stratospheric ozone layer	kg CFC-11 Eq.	3.40E-13	1.25E-12	4.69E-16	1.68E-12	0.00E+00	2.75E-13	0.00E+00	6.53E-16
AP	Acidification potential for air emissions	kg SO_2-Eq.	1.70E-04	1.99E-04	4.68E-05	1.52E-03	0.00E+00	4.36E-05	0.00E+00	1.23E-03
EP	Eutrophication potential	kg N-Eq.	3.00E-05	1.10E-05	3.81E-05	4.96E-04	0.00E+00	2.42E-06	0.00E+00	4.70E-04
SP	Smog formation potential	kg O_3-Eq.	2.91E-03	5.47E-03	6.10E-04	1.21E-02	0.00E+00	1.20E-03	0.00E+00	3.30E-03
FFD	Fossil Fuel Depletion	MJ-surplus	1.30E-01	5.85E-02	1.37E-02	2.29E-01	0.00E+00	1.28E-02	0.00E+00	3.90E-02

**All use phase and disposal stages have been considered and only those with non-zero values have been reported*

Results shown below were calculated using TRACI 2.1 Methodology.

TRACI 2.1 Impact Assessment - y values										
Parameter	**Parameter**	**Unit**	**A1-A3**	**A4**	**A5**	**B4**	**C1**	**C2**	**C3**	**C4**
GWP	Global warming potential	kg CO_2-Eq.	1.76E+00	5.33E-02	8.31E-02	1.96E+00	0.00E+00	1.17E-02	0.00E+00	2.72E-01
ODP	Depletion potential of the stratospheric ozone layer	kg CFC-11 Eq.	4.68E-08	2.02E-12	4.69E-16	4.21E-08	0.00E+00	4.42E-13	0.00E+00	1.05E-15
AP	Acidification potential for air emissions	kg SO_2-Eq.	5.96E-03	3.20E-04	4.68E-05	7.53E-03	0.00E+00	7.02E-05	0.00E+00	1.98E-03
EP	Eutrophication potential	kg N-Eq.	3.91E-04	1.77E-05	3.81E-05	1.09E-03	0.00E+00	3.89E-06	0.00E+00	7.57E-04
SP	Smog formation potential	kg O_3-Eq.	7.68E-02	8.82E-03	6.10E-04	8.41E-02	0.00E+00	1.93E-03	0.00E+00	5.31E-03
FFD	Fossil Fuel Depletion	MJ-surplus	6.02E+00	9.43E-02	1.37E-02	5.59E+00	0.00E+00	2.07E-02	0.00E+00	6.28E-02

**All use phase and disposal stages have been considered and only those with non-zero values have been reported*

Results shown below were calculated using CML 2001 - April 2013 Methodology.

CML 4.1 Impact Assessment - x values										
Paramet	**Parameter**	**Unit**	**A1-A3**	**A4**	**A5**	**B4**	**C1**	**C2**	**C3**	**C4**
GWP	Global warming potential	kg CO_2-Eq.	8.10E-02	3.32E-02	8.33E-02	3.94E-01	0.00E+00	7.28E-03	0.00E+00	2.33E-01
ODP	Depletion potential of the stratospheric ozone layer	kg CFC-11 Eq.	5.43E-13	1.25E-12	2.73E-14	1.92E-12	0.00E+00	2.74E-13	0.00E+00	3.80E-14
AP	Acidification potential for air emissions	kg SO_2-Eq.	1.32E-04	1.63E-04	4.14E-05	7.46E-04	0.00E+00	3.58E-05	0.00E+00	4.57E-04
EP	Eutrophication potential	kg$(PO_4)^3$-Eq.	3.77E-05	2.91E-05	3.96E-05	6.14E-04	0.00E+00	6.38E-06	0.00E+00	5.69E-04
POCP	Formation potential of tropospheric ozone photochemical oxidants	kg ethane-Eq.	1.58E-05	1.91E-05	9.01E-07	1.37E-04	0.00E+00	4.18E-06	0.00E+00	1.12E-04
ADPE	Abiotic depletion potential for non-fossil resources	kg Sb-Eq.	2.46E-08	1.38E-11	6.88E-09	3.65E-08	0.00E+00	3.02E-12	0.00E+00	9.14E-09
ADPF	Abiotic depletion potential for fossil resources	MJ	1.18E+00	4.22E-01	1.14E-01	1.89E+00	0.00E+00	9.26E-02	0.00E+00	3.01E-01

**All use phase and disposal stages have been considered and only those with non-zero values have been reported*

Results shown below were calculated using CML 2001 - April 2013 Methodology.

CML 4.1 Impact Assessment - y values										
Paramet	**Parameter**	**Unit**	**A1-A3**	**A4**	**A5**	**B4**	**C1**	**C2**	**C3**	**C4**
GWP	Global warming potential	kg CO_2-Eq.	1.76E+00	5.35E-02	8.33E-02	2.06E+00	0.00E+00	1.17E-02	0.00E+00	3.75E-01
ODP	Depletion potential of the stratospheric ozone layer	kg CFC-11 Eq.	4.28E-08	2.01E-12	2.73E-14	3.85E-08	0.00E+00	4.41E-13	0.00E+00	6.13E-14
AP	Acidification potential for air emissions	kg SO_2-Eq.	5.88E-03	2.63E-04	4.14E-05	6.28E-03	0.00E+00	5.76E-05	0.00E+00	7.36E-04
EP	Eutrophication potential	kg$(PO_4)^3$-Eq.	5.72E-04	4.69E-05	3.96E-05	1.43E-03	0.00E+00	1.03E-05	0.00E+00	9.17E-04
POCP	Formation potential of tropospheric ozone photochemical oxidants	kg ethane-Eq.	7.23E-04	3.07E-05	9.01E-07	8.48E-04	0.00E+00	6.73E-06	0.00E+00	1.81E-04
ADPE	Abiotic depletion potential for non-fossil resources	kg Sb-Eq.	3.68E-06	2.22E-11	6.88E-09	3.33E-06	0.00E+00	4.86E-12	0.00E+00	1.47E-08
ADPF	Abiotic depletion potential for fossil resources	MJ	4.44E+01	6.80E-01	1.14E-01	4.12E+01	0.00E+00	1.49E-01	0.00E+00	4.85E-01

**All use phase and disposal stages have been considered and only those with non-zero values have been reported*

Results below contain the resource use throughout the life cycle of the product.

Resource Use - x values										
Parameter	**Parameter**	**Unit**	**A1-A3**	**A4**	**A5**	**B4**	**C1**	**C2**	**C3**	**C4**
RPR_E	Renewable primary energy as energy carrier	MJ	5.76E-01	0.00E+00	1.58E-02	5.59E-01	0.00E+00	0.00E+00	0.00E+00	2.91E-02
RPR_M	Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
$NRPR_E$	Nonrenewable primary energy as energy carrier	MJ	-4.05E+00	4.26E-01	1.19E-01	-2.80E+00	0.00E+00	9.34E-02	0.00E+00	3.08E-01
$NRPR_M$	Nonrenewable primary energy as material utilization	MJ	5.38E+00	0.00E+00	0.00E+00	4.84E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SM	Use of secondary material	kg	4.78E-01	0.00E+00	0.00E+00	4.31E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	Use of nonrenewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RE	Energy recovered from disposed waste	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	Use of net fresh water	m^3	6.61E-04	0.00E+00	1.87E-04	8.25E-04	0.00E+00	0.00E+00	0.00E+00	6.88E-05

**All use phase and disposal stages have been considered and only those with non-zero values have been reported*

Results below contain the resource use throughout the life cycle of the product.

Resource Use - y values										
Parameter	**Parameter**	**Unit**	**A1-A3**	**A4**	**A5**	**B4**	**C1**	**C2**	**C3**	**C4**
RPR_E	Renewable primary energy as energy carrier	MJ	1.35E+00	0.00E+00	1.58E-02	1.27E+00	0.00E+00	0.00E+00	0.00E+00	4.69E-02
RPR_M	Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
$NRPR_E$	Nonrenewable primary energy as energy carrier	MJ	-5.38E+00	6.86E-01	1.19E-01	-3.53E+00	0.00E+00	1.50E-01	0.00E+00	4.96E-01
$NRPR_M$	Nonrenewable primary energy as material utilization	MJ	5.38E+00	0.00E+00	0.00E+00	4.84E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SM	Use of secondary material	kg	4.78E-01	0.00E+00	0.00E+00	4.31E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	Use of nonrenewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RE	Energy recovered from disposed waste	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	Use of net fresh water	m^3	1.32E-02	0.00E+00	1.87E-04	1.21E-02	0.00E+00	0.00E+00	0.00E+00	1.11E-04

**All use phase and disposal stages have been considered and only those with non-zero values have been reported*

Results below contain the output flows and wastes throughout the life cycle of the product.

Output Flows and Waste Categories - x values										
Parameter	**Parameter**	**Unit**	**A1-A3**	**A4**	**A5**	**B4**	**C1**	**C2**	**C3**	**C4**
HWD	Hazardous waste disposed	kg	2.27E-09	0.00E+00	5.78E-12	2.06E-09	0.00E+00	0.00E+00	0.00E+00	1.15E-11
NHWD	Non-hazardous waste	kg	1.31E-02	0.00E+00	1.48E-01	5.26E-01	0.00E+00	0.00E+00	0.00E+00	4.23E-01
HLRW	High-level radioactive waste	kg or m^3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ILLRW	Intermediate- and low-level radioactive waste	kg or m^3	5.98E-05	0.00E+00	1.99E-06	5.80E-05	0.00E+00	0.00E+00	0.00E+00	2.69E-06
CRU	Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MR	Materials for recycling	kg	8.46E-03	0.00E+00	0.00E+00	7.61E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE	Recovered energy exported from system	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

**All use phase and disposal stages have been considered and only those with non-zero values have been reported*

Results below contain the output flows and wastes throughout the life cycle of the product.

Output Flows and Waste Categories - y values										
Parameter	**Parameter**	**Unit**	**A1-A3**	**A4**	**A5**	**B4**	**C1**	**C2**	**C3**	**C4**
HWD	Hazardous waste disposed	kg	8.99E-07	0.00E+00	5.78E-12	8.09E-07	0.00E+00	0.00E+00	0.00E+00	1.85E-11
NHWD	Non-hazardous waste disposed	kg	3.11E-02	0.00E+00	1.48E-01	7.75E-01	0.00E+00	0.00E+00	0.00E+00	6.82E-01
HLRW	High-level radioactive waste	kg or m^3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ILLRW	Intermediate- and low-level radioactive waste	kg or m^3	2.73E-04	0.00E+00	1.99E-06	2.51E-04	0.00E+00	0.00E+00	0.00E+00	4.34E-06
CRU	Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MR	Materials for recycling	kg	8.46E-03	0.00E+00	0.00E+00	7.61E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE	Recovered energy exported from system	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

**All use phase and disposal stages have been considered and only those with non-zero values have been reported*

Additional Environmental Information

Environmental and Health During Manufacturing

During the manufacturing of EnergyGuard™ Polyiso Insulation, all legal regulations regarding emissions to air, wastewater discharge, solid waste disposal and noise emissions are followed.

Environmental and Health During Installation

There is no harmful emissive potential. No damage to health or impairment is expected under normal use corresponding to the intended use of the product.

Extraordinary Effects

Fire
UL Class A over Combustible Decks, with a cover board. As unprotected polyisocyanurate will burn, fire safety precautions should be observed wherever insulation products are used.

Water
There are no extraordinary effects on the environment due to the application of water on the product.

Mechanical Destruction
EnergyGuard™ Polyiso Insulation is a non-structural, non load-bearing material. It is not designed for direct traffic usage unless adequately protected.

Delayed Emissions

Global warming potential is calculated using the TRACI 2.1 and CML 4.1 impact assessment methodologies. Delayed emissions are not considered.

Environmental Activities and Certifications

N/A

Further Information

GAF
1 Campus Drive
Parsippany, NJ 07054

References

- PCR Part A — UL Environment: Product Category Rules for Building-Related Products and Services in North America, Part A: Life Cycle Assessment Calculation Rules and Report Requirements, v.3.2, December 2018.
- PCR Part B — UL Environment: Product Category Rules Part B: Building Envelope Thermal Insulation EPD Requirements, v2.0, April 2018.
- LCA for Experts — thinkstep.one. LCA for Experts (v.10.6).
- ISO 14025 — ISO 14025:2011-10, Environmental labels and declarations — Type III environmental declarations — Principles and procedures.
- ISO 14040 — ISO 14040:2009-11, Environmental management — Life cycle assessment — Principles and framework.
- ISO 14044 — ISO 14044:2006-10, Environmental management — Life cycle assessment — Requirements and guidelines.
- ISO 21930: 2017 — ISO 21930:2017, Sustainability in buildings and civil engineering works - Core rules for environmental product declarations of construction products and services.
- NSF International — NSF Program Operator Rules, NSF International – National Center for Sustainability Standards, 2015
- Characterization Method — IPPC. 2014. Climate Change 2013. The Physical Science Basis. Cambridge University Press. (http://www.ipcc.ch/report/ar5/wg1/).
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Contact Information

Study Commissioner

GAF
Aly Perez
Product Sustainability Specialist
1 Campus Drive
Parsippany, NJ 07054
alyson.perez@gaf.com

LCA Practitioner

Sustainable Solutions Corporation
155 Railroad Plaza, Suite 203
Royersford, PA 19468 USA
(+1) 610 569-1047
info@sustainablesolutionscorporation.com
www.sustainablesolutionscorporation.com

GAF
Safety Data Sheet
SDS # 2001
SDS Date: February 2024

SECTION 1: PRODUCT AND COMPANY INFORMATION

PRODUCT NAME:	EverGuard® TPO (All Thicknesses) TPO FB Membranes and Accessories (UN Detailing Membrane) Coated Metal Membrane Pre-Formed Corners & Vent Boots Split Pourable Sealer Pocket Flashing Strips UN T-Patches EverGuard® TPO Coated Drain.
MANUFACTURER:	GAF
ADDRESS:	1 Campus Drive, Parsippany, NJ 07054
24-HOUR EMERGENCY PHONE (CHEMTREC):	800 – 424 – 9300
INFORMATION ONLY:	877 – GAF – ROOF
PREPARED BY:	Corporate EHS

SECTION 2: HAZARDS IDENTIFICATION

As defined in the OSHA Hazard Communication Standard, 29 CFR 1910.1200, the products listed below are considered articles and do not require an SDS. In addition, articles are not included in the scope of the Globally Harmonization System (GHS). As such, the GHS labeling elements are not included on this SDS. All components listed for this product are bound within the product. When handled as intended and under normal conditions of use, there is no evidence that any of the ingredients are released in amounts that pose a significant health risk. Although these products are not subject to the OSHA Standard or GHS labeling elements, GAF would like to disclose as much health and safety information as possible to ensure that this product is handled and used properly. This SDS contains valuable information critical to the safe handling and proper use of the product. This SDS should be retained and be made available for employees and other users of this product. In addition, the recommendations for handling and use of these products should be included in worker training programs.

PRIMARY ROUTE OF EXPOSURE:	None.

SIGNS & SYMPTOMS OF EXPOSURE

EYES:	Vapor from this product during heat welding may irritate eyes.
SKIN:	Exposure to hot surfaces during heat welding may cause thermal burns.
INGESTION:	Not applicable.

INHALATION: Inhalation of vapor from this product during heat welding may cause respiratory tract irritation.

ACUTE HEALTH HAZARDS: See above.

CHRONIC HEALTH HAZARDS: None known.

CARCINOGENICITY: Not applicable.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

			OCCUPATIONAL EXPOSURE LIMITS		
CHEMICAL NAME	**CAS #**	**% (BY WT)**	**OSHA**	**ACGIH**	**OTHER**
Trade Secret	-	100	NE	NE	NE

NE= Not Established

SECTION 4: FIRST AID MEASURES

FIRST AID PROCEDURES

EYES: No known effect on eye contact, rinse with water if irritation occurs.

SKIN: No known effect on skin contact; rinse with water if irritation occurs.

INHALATION: Allow the victim to rest in a well ventilated area. Seek medical attention if necessary.

INGESTION: Do not ingest. Contact poison control and seek medical attention immediately.

NOTES TO PHYSICIANS OR FIRST AID PROVIDERS: Treat symptomatically and supportively.

SECTION 5: FIRE FIGHTING PROCEDURES

SUITABLE EXTINGUISHING MEDIA: Dry chemical, carbon dioxide, water spray or foam.

HAZARDOUS COMBUSTION PRODUCTS: Toxic gases or vapors, such as carbon monoxide and other organic compounds may be released in a fire.

RECOMMENDED FIRE FIGHTING PROCEDURES: Small Fire: Use Dry Chemical, carbon dioxide, water spray or foam.

Large Fire: Use water spray, fog or foam. DO NOT use water jet. All fires produce toxic gases. Fire fighters should use self-contained breathing apparatus and full protective gear.

UNUSUAL FIRE & EXPLOSION HAZARDS: Flammable when exposed to external ignition sources such as sparks, heat, and open flames.

SECTION 6: ACCIDENTAL RELEASE MEASURES

ACCIDENTAL RELEASE MEASURES: Use appropriate tools to put the spilled solid in a waste disposal container.

Dispose in accordance with all applicable regulations.

SECTION 7: HANDLING AND STORAGE

HANDLING AND STORAGE: Keep the product dry. Store in a cool, well ventilated area.

OTHER PRECAUTIONS: Keep away from sources of ignition.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS / VENTILATION: This product is combustible. Use adequate ventilation when heat welding this product.

RESPIRATORY PROTECTION: A respiratory protection program that meets OSHA 1910.134, ANSI Z88.2 requirements must be followed whenever workplace conditions warrant use of a respirator.

EYE PROTECTION: Use safety glasses when appropriate.

SKIN PROTECTION: Use impervious gloves and clothing when appropriate.

OTHER PROTECTIVE EQUIPMENT: Work shoes.

WORK HYGIENIC PRACTICES: Use proper protective equipment at all times and wash after handling material.

EXPOSURE GUIDELINES: Not applicable.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE & ODOR:	Solid plastic sheet with characteristic odor. May be colored.		
FLASH POINT:	>301 °C (573.8 °F)	**LOWER EXPLOSIVE LIMIT:**	No Data
METHOD USED:	Closed Cup	**UPPER EXPLOSIVE LIMIT:**	No Data
EVAPORATION RATE:	No Data	**BOILING POINT:**	No Data
pH (undiluted product):	No Data	**MELTING POINT:**	175 °C (350 °F)
SOLUBILITY IN WATER:	Insoluble in water (cold/hot)	**SPECIFIC GRAVITY:**	1.35 (Water = 1)
VAPOR DENSITY:	No Data	**PERCENT VOLATILE:**	No Data
VAPOR PRESSURE:	No Data	**MOLECULAR WEIGHT:**	No Data

VOC (LBS/GAL):	Not Applicable		

SECTION 10: STABILITY AND REACTIVITY

THERMAL STABILITY: **STABLE X** **UNSTABLE ☐**

CONDITIONS TO AVOID (STABILITY): None known.

INCOMPATIBILITY (MATERIAL TO AVOID): None known.

HAZARDOUS DECOMPOSITION OR BY-PRODUCTS: Gases or vapors such as carbon monoxide, carbon dioxide, or oxides of nitrogen, and other organic compounds may be released in a fire.

HAZARDOUS POLYMERIZATION: Will not occur

SECTION 11: TOXICOLOGICAL INFORMATION

Information on Likely Routes of Exposure

Inhalation Unlikely under normal conditions
Skin Contact Unlikely under normal conditions
Eye Contact Unlikely under normal conditions
Ingestion Unlikely under normal conditions.

Acute and Chronic Toxicity No data available
Immediate Effects No immediate effects known.
Delayed Effects No delayed effects known.

Irritation/Corrosivity Data May cause skin irritation with repeated contact. No other effects known.

SECTION 12: ECOLOGICAL INFORMATION

Ecotoxicity No data available
Component Analysis - Aquatic Toxicity No data available
Persistence and Degradability No information available for the product.
Bioaccumulative Potential No information available for the product.
Mobility No information available for the product.

SECTION 13: DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD: Comply with federal, state and local regulations for disposal.

SECTION 14: TRANSPORTATION INFORMATION

DOT

Not regulated as dangerous goods.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

SECTION 15: REGULATORY INFORMATION

U.S. FEDERAL REGULATIONS

TSCA: Not applicable.

CERCLA: Not applicable.

SARA

311/312 HAZARD CATEGORIES: Not applicable.

313 REPORTABLE INGREDIENTS: Not applicable.

CALIFORNIA PROPOSITION 65: Not applicable.

SECTION 16: OTHER INFORMATION

ADDITIONAL COMMENTS: None.

DATE OF PREVIOUS SDS: May 2023

CHANGES SINCE PREVIOUS SDS: Revised Section 4.

This information relates to the specific material designated and may not be valid for such material used in combination with any other materials or in any process. Such information is to the best of our knowledge and belief accurate and reliable as of the date compiled. However, no representation, warranty or guarantee, expressed or implied, is made as to its accuracy, reliability, or completeness. It is the user's responsibility to satisfy himself as to the suitability and completeness of such information for his particular use. We do not accept liability for any loss or damage that may occur from the use of this information. Nothing herein shall be construed as a recommendation for uses which infringe valid patents or as extending a license of valid patents.

SAFETY DATA SHEET

Rev. 4, 8/26/2022

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: OlyBond 500 Part 1

Supplier: GAF.
1 Campus Drive
Parsippany, NJ 07054
USA
Phone: 1-877-GAF-ROOF

24-hour Emergency Response Number:
Chemtrec: 800-424-9300

Product Use(s): One component of a two-component polyurethane system

2. HAZARDS IDENTIFICATION

Classifications: Acute Toxicity, Inhalation: Hazard Category 4
Respiratory Sensitization: Hazard Category 1
Skin Sensitization: Hazard Category 1
Skin Irritation: Hazard Category 2
Eye Irritation: Hazard Category 2B
Specific Target Organ Toxicity, Single Exposure: Hazard Category 3
Specific Target Organ Toxicity, Repeated Exposure: Hazard Category 2

Symbols:

Signal Word: Danger

Hazard Statements:
May be harmful if inhaled.
May cause allergy or asthma symptoms or breathing difficulties if inhaled.
May cause respiratory irritation.
May cause an allergic skin reaction.
Causes eye and skin irritation.
May cause damage to the respiratory system and/or skin through prolonged or repeated exposure.

Precautionary Statements:
Do not breathe mist, spray, or vapors.
Use only outdoors or in a well-ventilated area.
In case of inadequate ventilation wear proper respiratory protection.
Wear protective gloves and eye/face protection.
Wash hands and forearms thoroughly after handling.
Contaminated work clothing must not be allowed out of the workplace.

IF INHALED: If breathing is difficult, remove person to fresh air and keep comfortable for breathing. If experiencing respiratory symptoms or if you feel unwell, call a doctor or Poison Control Center.

IF ON SKIN: Wash with plenty of soap/ water. Take off contaminated clothing and wash before reuse. Contaminated work clothing must not be allowed out of the workplace. If skin irritation or rash occurs, get medical advice/attention.

2. HAZARDS IDENTIFICATION (continued)

Precautionary Statements: (continued)

IF IN EYES: Rinse cautiously with water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists, get medical advice/attention.

Store locked up in a well-ventilated place. Keep container tightly closed. Dispose of contents/container in accordance with applicable regulations.

EMERGENCY OVERVIEW

Overexposure to components of this product by inhalation may cause respiratory irritation, asthma-like symptoms, and/or respiratory sensitization.

Skin contact may cause irritation and/or allergy-like symptoms, and eye contact may cause severe irritation. Avoid skin and eye contact, using proper personal protective equipment as needed. See Section #7 for recommendations on proper handling and work practices, and Section #8 for recommendations on personal protective equipment.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Ingredient	CAS Number	Percentage	Impurities
Diphenylmethane Diisocyanate Isomers& Homologues	9016-87-9	100	None known
4,4'-Methylene Bisphenyl Isocyanate	101-68-8	30-50 (part of 9016-87-9)	None known

4. FIRST AID MEASURES

Eyes: Hold eyes open and flush with lukewarm water for at least 15 minutes. Seek immediate medical assistance.

Skin: Remove contaminated clothing. Wash affected areas with soap and water for at least five minutes. If irritation persists or a rash occurs, seek medical attention. Launder or dry-clean clothing before reuse.

Ingestion: DO NOT induce vomiting. If the subject is conscious, wash mouth and give 2 or more cups of milk or water. Seek immediate medical assistance. Do not attempt to give anything by mouth to an unconscious or convulsive person.

Inhalation: If signs and symptoms of respiratory toxicity are observed, remove subject from area and seek immediate medical attention. Keep the subject warm and at rest. If necessary, administer oxygen or perform artificial respiration if necessary and qualified personnel are available to do so.

Guidance for Physician or Poison Control Center: Inhalation exposure can irritate the respiratory tract and induce respiratory sensitization. Treatment of acute irritation and bronchial constriction should be done according to symptoms. Eye contact can cause moderate to severe irritation. Skin contact can cause moderate irritation, and may elicit an allergic response among susceptible individuals. Treat eye and skin irritation or injury according to symptoms. Extended medical treatment may be necessary for individuals exhibiting respiratory sensitization and/or skin disorders.

5. FIREFIGHTING MEASURES

Extinguishing Media:	Water spray, carbon dioxide, dry chemical or chemical foam. DO NOT use water jet.
Fire and Explosion Hazards:	The container may burst if exposed to elevated temperatures, spilling the contents. Material reacts slowly with water, releasing carbon dioxide which can cause pressure buildup and rupture of closed containers. If present in a fire or explosion, potential decomposition byproducts include carbon monoxide, oxides of nitrogen, isocyanates, hydrogen cyanide, hydrogen fluoride, and carbonyl halides
Firefighting Instructions:	If fighting a fire in which this product is present, wear a self-contained breathing apparatus with full-facepiece operated in pressure-demand or other positive pressure mode.

6. ACCIDENTAL RELEASE MEASURES

Methods and Materials:	Absorb spilled material with a sorbent such as sawdust or calcium silicate hydrate. When absorbed, transfer to an impervious container. Neutralize with solution of 8-10% sodium carbonate and 2% liquid detergent in water (10:1 ratio of solution to product). Do not seal container, as CO_2 will be released. Neutralize in a well-ventilated area for at least 48 hours before sealing containers for disposal.
Personal Precautions:	Avoid contact with skin, eyes, and mucous membranes. Wear appropriate personal protective equipment (see Section #8) during cleanup and decontamination. Restrict unauthorized personnel during cleanup and disposal operations.
Environmental Precautions:	Prevent spills from entering sewers or contaminating soil.

7. HANDING AND STORAGE

Handling Precautions:	Containers should be kept tightly closed to prevent contact with moisture and other chemicals. Do not reuse empty containers for any purpose. When handling the product, avoid contact with eyes, skin, and clothing, using protective equipment as needed. Do not use this product around children, and secure it away from children.
Work and Hygiene Practices:	To prevent ingestion or contact following use of the product, wash hands and face before eating, drinking, applying cosmetics, or using tobacco. Remove contaminated clothing and protective equipment before entering eating/drinking areas.
Storage Precautions:	Keep containers tightly sealed during storage. Store in a dry, well-ventilated area away from sources of ignition and incompatible materials (see Section #10). Recommended temperature range for storage is 55-85°F. (12.8-29.4°C.).

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Ingredients Exposure Limits:

Ingredient	OSHA PEL	ACGIH TLV
Diphenylmethane Diisocyanate Isomers & Homolouges	None	None
4,4'-Methylene Bisphenyl Isocyanate	0.02 ppm "C"	0.005 ppm TWA

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION (continued)

Ingredients Biological Limits:

Ingredient	Biological Limit(s)
Diphenylmethane Diisocyanate Isomers & Homolouges	No ACGIH BEIs or other biological limits
4,4'-Methylene Bisphenyl Isocyanate	No ACGIH BEIs or other biological limits

Engineering Controls: Use appropriate ventilation (dilution or local exhaust) whenever natural ventilation is restricted or inadequate to maintain concentrations of all components within their applicable standards.

Eye/Face Protection: Wear eye protection adequate to prevent eye contact with the product. Plastic-frame spectacles with side shields, chemical goggles, or a face shield are recommended. Do not wear contact lenses when working with this product.

Skin Protection: Wear protective gloves and clothing to prevent skin irritation or injury from contact with the product. Glove materials known to be effective against permeation by isocyanates include butyl rubber, nitrile rubber, and polychloroprene.

Respiratory Protection: If an exposure level to a component exceeds an applicable standard, use a NIOSH-approved respirator of a class and configuration effective for protection from the component(s) generated. Where exposures exceed the OSHA *Permissible Exposure Limit* (*PEL*), an airline respirator or self-contained breathing apparatus (SCBA) is recommended. Consult OSHA regulations (29CFR1910.134) and/or American National Standard Z88.2 (ANSI, New York, NY 10036, USA) for guidance.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: dark brown liquid
Odor: aromatic
Odor threshold: not determined
pH: not applicable
Melting point: not determined.
Freezing point: not determined
Boiling point: ≥200°F./93°C.
Boiling range: not determined
Flash Point: approx. 484°F./220°C.
Autoignition Point: not determined
Flammability Class: IIIB
Lower Explosive Limit: not determined
Upper Explosive Limit: not determined
Vapor pressure: not determined
Vapor density: not determined
Evaporation Rate: not determined
VOCs (per EPA Method 24): 11.00 grams/liter
Relative density (H2O): approx. 1.22
Solubility (H2O): reactive
Oil-water partition coefficient: not determined
Decomposition temperature: not determined
Viscosity: 150-350 cps

10. STABILITY AND REACTIVITY

Stability:	Stable
Reactivity:	May react with water and incompatible materials
Hazardous Polymerization:	May occur at temperatures >392°F./200°C.
Risk of Dangerous Reactions:	None reasonably foreseeable
Incompatible Materials:	Water, alcohols, acids, alkalis, and amines
Potential Decomposition Byproducts:	Carbon monoxide, carbon dioxide, nitrogen oxides, isocyanates, and hydrogen cyanide

11. TOXICOLOGICAL INFORMATION

Ingredients Toxicology Data	LD_{50} Oral	LD_{50} Dermal	LC_{50}
Diphenylmethane Diisocyanate Isomers & Homolouges	>10,000 mg/kg (rat)	>9400 mg/kg (rabbit)	0.49 mg/l 4 hour (rat)
4,4'-Methylene Bisphenyl Isocyanate	>10,000 mg/kg (rat)	>9400 mg/kg (rabbit)	2.24 mg/m³ for 1 hour (rat)

Primary Route(s) of Entry:	Inhalation; ingestion
Eye Hazards:	This product may cause eye irritation.
Skin Hazards:	This product may cause mild to moderate skin irritation and has the potential to cause skin sensitization among susceptible individuals.
Ingestion Hazards:	The product is nontoxic by ingestion, but ingestion may cause nausea, vomiting, and/or gastrointestinal irritation.
Inhalation Hazards:	Inhalation of toxicologically-significant quantities of ingredients is unlikely when the product is used in a well-ventilated area and in accordance with instructions.
Symptoms Related to Overexposure:	Inhalation overexposure to isocyanates may cause respiratory irritation, breathing difficulties, and asthma-like symptoms.
Delayed Effects from Long Term Overexposure:	Long-term inhalation overexposure to this product may result in respiratory sensitization, which may be irreversible.
Carcinogenicity:	A single inhalation study exposing rats to aerosolized polymeric 4,4'-Methylene Bisphenyl Isocyanate identified a single malignant pulmonary tumor among 60 animals exposed at the highest exposure level. Observations of pulmonary fibrosis and other pathological anomalies in the test animals precluded definitive determination as to the cause(s) of the tumor. Epidemiological studies of humans occupationally exposed to the isocyanates in this product have found no strong association or consistent pattern with respect to carcinogenicity.
Germ Cell Mutagenicity:	No ingredients have been determined to be germ cell mutagens.
Reproductive Toxicity:	No ingredients have been determined to be damaging to fertility or to the unborn child.

11. TOXICOLOGICAL INFORMATION (continued)

Acute Toxicity Estimates:	LD_{50} (oral): >10,000 mg/kg LD_{50} (dermal): >94,000 mg/kg:

12. ECOLOGICAL INFORMATION

Diphenylmethane Diisocyanate, Isomers and Homologues:	Aquatic Toxicity to Fish: LC_{50} >1,000 mg/l. for 96 h. (zebra fish) Aquatic Toxicity to Invertebrates: EC_{50} >1,000 mg/l. for 24 h. (daphnia) Aquatic Toxicity to Plants: EC_{50} >1,640 mg/l. for 72 h. (algae) Aquatic Toxicity to Microorganisms: EC_{50} >100 mg/l. for 3 h. (bacteria) Toxicity to Terrestrial Organisms: NOEC=1,000 mg/kg for 14 d. (worms) No data available for Persistence and Degradability, Bioaccumulation Potential, or Mobility in Soil.
Polymeric Isocyanates:	No data available for Aquatic Toxicity to Fish, Invertebrates, Plants, or Microorganisms, Toxicity to Terrestrial Organisms, Persistence and Degradability, Bioaccumulation Potential, or Mobility in Soil.
Ozone Depletion Potential:	This product neither contains nor is manufactured with any ingredients known to deplete the ozone layer.

13. DISPOSAL CONSIDERATIONS

Do not discharge waste product into sanitary or storm sewers or allow it to contaminate soil. Empty containers should be decontaminated prior to disposal. Consult applicable Federal, State/Provincial, and local regulations.

14. TRANSPORTATION INFORMATION

Transport of the product is not regulated by USDOT, TDG (Canada), IATA, or IMO.

15. REGULATORY INFORMATION

United States Regulatory Information

TSCA Information:	All ingredients of this product are listed in the TSCA Registry.
SARA Hazard Classes:	Acute Health Hazard, Chronic Health Hazard, Reactivity Hazard
EPCRA Section 313 Notification:	This product contains these ingredients in concentrations ≥1% (for carcinogens ≥0.1%) regulated under Section 313 of the *Emergency Planning and Community Right-To-Know Act* of 1986 or 40 CFR 372: 1. 4,4'-Methylene Bisphenyl Isocyanate (CASRN 101-68-8) 2. Polymeric Isocyanantes (CASRN 9016-87-9)
CERCLA Information:	Under requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 4,4'-Methylene Bisphenyl Isocyanate (CASRN 101-68-8) has a Reportable Quantity of 5,000 lbs. Any spill or release above this RQ must be reported to the National Response Center (800-424-8802).

Canadian Regulatory Information

This product has been classified in accordance with Canada's *Hazardous Products Regulations* (SOR/DORS/2015-15).

16. OTHER INFORMATION

	Health	Flammability	Physical Hazard	PPE
Hazardous Materials Information System (HMIS III) Ratings (Legend):	2* (moderate hazard)	1 (slight hazard)	0 (minimal hazard)	See Note

Note regarding PPE: GAF recommends use of protective eyewear and skin protection (Personal Protection Index "B") as standard PPE for the anticipated conditions of use of this product. However, HMIS recommends that its ratings be used only in conjunction with a fully implemented HMIS program, and that specific PPE codes should be created by the user, who is familiar with the actual conditions under which the product is used. We cannot anticipate every condition of the product's use, and it is the user's responsibility to evaluate the hazards pertinent to its specific operations, and to determine the specific PPE required.

	Health	Flammability	Reactivity
National Fire Protection Association (NFPA) Ratings:	2	2	0

Revision Information: Date of Prior SDS: 10/25/2016

DISCLAIMER

This information relates to the specific material designated and may not be valid for such material used i+n combination with any other materials or in any process. Such information is to the best of our knowledge and belief accurate and reliable as of the date compiled. However, no representation, warranty or guarantee, expressed or implied, is made as to its accuracy, reliability, or completeness. It is the user’s responsibility to satisfy himself as to the suitability and completeness of such information for his particular use. We do not accept liability for any loss or damage that may occur from the use of this information. Nothing herein shall be construed as a recommendation for uses which infringe valid patents or as extending a license of valid patents.

SAFETY DATA SHEET 2171

Rev. 2, 8/26/2022

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: OlyBond 500 Part 2

Supplier: GAF
1 Campus Drive
Parsippany, NJ 07954
USA
Phone: 1-877-GAF-ROOF

24-hour Emergency Response Number:
Chemtrec: 800-424-9300

Product Use(s): One component of a two-component polyurethane system

2. HAZARDS IDENTIFICATION

Classifications: Not classified as hazardous.

Symbols: None

Signal Word: None

Hazard Statements: None

Precautionary Statements: None

EMERGENCY OVERVIEW

Eye contact with this product may cause mild irritation. There are no known serious health effects from inhalation or skin contact. See Section #7 for recommendations on proper handling and work practices, and Section #8 for recommendations on personal protective equipment.

This product is formulated to be mixed with another component (OlyBond500 Winter Part 1) that, if handled improperly, may cause potentially serious health effects such as respiratory irritation, asthma-like symptoms, and/or respiratory sensitization. Do not handle or mix the two components together until you have read and understood that information in the Safety Data Sheets for both components.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Ingredient	CAS Number	Percentage	Impurities
Diethylene Glycol	111-46-6	<10	None known

4. FIRST AID MEASURES

Eyes:	Hold eyes open and flush with lukewarm water for at least 15 minutes. Seek immediate medical assistance.
Skin:	Remove contaminated clothing. Wash affected areas with soap and water for at least five minutes. If irritation occurs or persists, seek medical attention. Launder or dry-clean clothing before reuse.
Ingestion:	DO NOT induce vomiting. If the subject is conscious, wash mouth and give 2 or more cups of milk or water. Seek immediate medical assistance. Do not attempt to give anything by mouth to an unconscious or convulsive person.
Inhalation:	If signs and symptoms of respiratory toxicity are observed, remove subject from area and seek immediate medical attention. Keep the subject warm and at rest. If necessary, administer oxygen or perform artificial respiration if necessary and qualified personnel are available to do so.
Guidance for Physician or Poison Control Center:	This product is not acutely toxic by ingestion or inhalation. Eye contact can cause mild irritation. Skin contact can cause mild irritation. Ingestion is unlikely to occur in industrial use, but if ingestion occurs it may cause nausea, vomiting, and gastrointestinal irritation.

5. FIREFIGHTING MEASURES

Extinguishing Media:	Water spray, carbon dioxide, dry chemical or chemical foam. DO NOT use water jet.
Fire and Explosion Hazards:	This product may ignite if exposed to sources of ignition at temperatures above its flash point. If present in a fire or explosion, potential thermal decomposition byproducts include carbon monoxide, smoke, and irritant decomposition byproducts.
Firefighting Instructions:	If fighting a fire in which this product is present, wear a self-contained breathing apparatus with full-facepiece operated in pressure-demand or other positive pressure mode.

6. ACCIDENTAL RELEASE MEASURES

Methods and Materials:	Absorb spilled material with a sorbent such as sawdust, vermiculite, or calcium silicate hydrate. When absorbed, transfer to an impervious container.
Personal Precautions:	Avoid contact with skin, eyes, and mucous membranes. Wear appropriate personal protective equipment (see Section #8) during cleanup and decontamination.
Environmental Precautions:	Prevent spills from entering sewers or contaminating soil.

7. HANDING AND STORAGE

Handling Precautions:	Containers should be kept tightly closed to prevent contact with moisture and other chemicals. Do not reuse empty containers for any purpose. When handling the product, avoid contact with eyes, skin, and clothing, using protective equipment as needed. Do not use this product around children, and secure it away from children.
Work and Hygiene Practices:	To prevent ingestion or contact following use of the product, wash hands and face before eating, drinking, applying cosmetics, or using tobacco. Remove contaminated clothing and protective equipment before entering eating/drinking areas.
Storage Precautions:	Store containers tightly sealed in a dry, well-ventilated, area away from incompatible materials (see Section #10). Recommended temperature range for storage is 55-85°F. (12.8-29.4°C.).

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Ingredients Exposure Limits:

Ingredient	OSHA PEL	ACGIH TLV
Diethylene Glycol	None	None

Ingredients Biological Limits:

Ingredient	Biological Limit(s)
Diethylene Glycol	No ACGIH BEIs or other biological limits

Engineering Controls:	Use appropriate ventilation (dilution or local exhaust) whenever this product is used in conjunction with OlyBond 500 Spot Shot Part 1 in conditions where natural ventilation is restricted.
Eye/Face Protection:	Wear eye protection adequate to prevent eye contact with the product. Plastic-frame spectacles with side shields, chemical goggles, or a face shield are recommended. Do not wear contact lenses when working with this product.
Skin Protection:	Wear protective gloves and clothing to prevent skin irritation or injury from contact with the product. Glove materials known to be effective against permeation by this product include butyl rubber, nitrile rubber, and polyvinyl alcohol.
Respiratory Protection:	If an exposure level to a component exceeds an applicable standard, use a NIOSH-approved respirator of a class and configuration effective for protection from the component(s) generated. Consult OSHA regulations (29CFR1910.134) and/or American National Standard Z88.2 (ANSI, New York, NY 10036, USA) for guidance.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: red viscous liquid
Odor: mildly sweet
Odor threshold: not determined
pH: not determined
Melting point: not determined
Freezing point: not determined
Boiling point: not determined

9. PHYSICAL AND CHEMICAL PROPERTIES (continued)

Boiling range: not determined
Flash Point: approx. 375°F./191°C.
Autoignition Point: not determined
Flammability Class: IIIB
Lower Explosive Limit: not determined
Upper Explosive Limit: not determined
Vapor pressure: not determined
Vapor density: not determined
Evaporation Rate: not determined
VOCs (per EPA Method 24): 11.00 grams/liter
Relative density (H_2O): approx. 1.02
Solubility (H_2O): partial
Oil-water partition coefficient: not determined
Decomposition temperature: not determined
Viscosity: 390-530 cps

10. STABILITY AND REACTIVITY

Stability:	Stable
Reactivity:	Polymerizes with isocyanate-containing substances
Hazardous Polymerization:	Will not occur
Risk of Dangerous Reactions:	None reasonably foreseeable
Incompatible Materials:	Oxidizing agents
Potential Decomposition Byproducts:	Carbon monoxide, carbon dioxide, smoke, and irritant decomposition byproducts

11. TOXICOLOGICAL INFORMATION

Ingredients Toxicology Data	LD_{50} Oral	LD_{50} Dermal	LC_{50}
Diethylene Glycol	16,500 mg/kg (rat)	13,330 mg/kg (hamster)	>4.6 mg/L/4h rat

Primary Route(s) of Entry:	Inhalation; ingestion
Eye Hazards:	This product may cause mild eye irritation.
Skin Hazards:	This product may cause mild skin irritation. Irritation may be more pronounced on abraded skin.
Ingestion Hazards:	The product is not classified as toxic by ingestion, but ingestion may cause nausea, vomiting, and/or gastrointestinal irritation.
Inhalation Hazards:	Inhalation of toxicologically-significant quantities of ingredients is unlikely when the product is used in a well-ventilated area and in accordance with instructions.
Symptoms Related to Overexposure:	Inhalation overexposure may cause respiratory irritation.
Delayed Effects from Long Term Overexposure:	Long-term chronic ingestion may damage the kidneys and the gastrointestinal system.

11. TOXICOLOGICAL INFORMATION (continued)

Carcinogenicity:	No ingredients are classified as potential or confirmed human carcinogens by OSHA, NTP, or IARC.
Germ Cell Mutagenicity:	No ingredients have been determined to be germ cell mutagens.
Reproductive Toxicity:	No ingredients have been determined to be damaging to fertility or to the unborn child.
Acute Toxicity Estimates:	LD_{50} (oral): >2,000 mg/kg LD_{50} (dermal): >2,000 mg/kg LC_{50}: no data available

12. ECOLOGICAL INFORMATION

Diethylene Glycol:	Diethylene Glycol: Aquatic Toxicity to Fish: LC50 = >100 mg/l. for 96 h. (fathead minnows) Aquatic Toxicity to Invertebrates: EC50 = >10,000 mg/l. for 48 h. (daphnia) Readily biodegradable.
Ozone Depletion Potential:	This product neither contains nor is manufactured with any ingredients known to deplete the ozone layer.

13. DISPOSAL CONSIDERATIONS

Do not discharge waste product into sanitary or storm sewers or allow it to contaminate soil. Empty containers should be decontaminated prior to disposal. Consult applicable Federal, State/Provincial, and local regulations.

14. TRANSPORTATION INFORMATION

Transport of the product is not regulated by USDOT, TDG (Canada), IATA, or IMO.

15. REGULATORY INFORMATION

United States Regulatory Information

TSCA Information:	All ingredients of this product are listed in the TSCA Registry.
SARA Hazard Classes:	Refer to Section 2 for the OSHA Hazard Classification
EPCRA Section 313 Notification:	This product contains no ingredients in concentrations ≥1% (≥0.1% for carcinogens) regulated under Section 313 of the *Emergency Planning and Community Right-To-Know Act* of 1986 or 40 CFR 372.

Canadian Regulatory Information

All ingredients in this product are listed in the Domestic Substances List (DSL)

This product has been classified in accordance with Canada's *Hazardous Products Regulations* (SOR/DORS/2015-15).

16. OTHER INFORMATION

	Health	Flammability	Physical Hazard	PPE
Hazardous Materials Information System (HMIS III) Ratings (Legend):	1 (slight hazard)	1 (slight hazard)	0 (minimal hazard)	See Note

16. OTHER INFORMATION (continued)

Note regarding PPE: GAF recommends use of protective eyewear and skin protection (Personal Protection Index "B") as standard PPE for the anticipated conditions of use of this product. However, HMIS recommends that its ratings be used only in conjunction with a fully implemented HMIS program, and that specific PPE codes should be created by the user, who is familiar with the actual conditions under which the product is used. We cannot anticipate every condition of the product's use, and it is the user's responsibility to evaluate the hazards pertinent to its specific operations, and to determine the specific PPE required.

	Health	Flammability	Reactivity
National Fire Protection Association (NFPA) Ratings:	1	1	0

Revision Information: Date of Prior SDS: 3/5/2018

DISCLAIMER

This information relates to the specific material designated and may not be valid for such material used in combination with any other materials or in any process. Such information is to the best of our knowledge and belief accurate and reliable as of the date compiled. However, no representation, warranty or guarantee, expressed or implied, is made as to its accuracy, reliability, or completeness. It is the user’s responsibility to satisfy himself as to the suitability and completeness of such information for his particular use. We do not accept liability for any loss or damage that may occur from the use of this information. Nothing herein shall be construed as a recommendation for uses which infringe valid patents or as extending a license of valid patents.

GAF
Safety Data Sheet
SDS # 1088
SDS Date: November 2022

SECTION 1: PRODUCT AND COMPANY INFORMATION

PRODUCT NAME:	EnergyGuard™ Tapered Polyiso Insulation EnergyGuard™ Polyiso Insulation EnergyGuard™ HD Plus Coverboard EnergyGuard™ HD Coverboard EnergyGuard™ Ultra Polyiso Insulation EnergyGuard™ Ultra Tapered Polyiso Insulation
CHEMICAL NAME:	Polyisocyanurate
MANUFACTURER:	GAF
ADDRESS:	1 Campus Drive, Parsippany, NJ 07054
24-HOUR EMERGENCY PHONE (CHEMTREC):	800 – 424 – 9300
INFORMATION ONLY:	877 – GAF– ROOF
APPROVED BY:	Corporate EHS

SECTION 2: HAZARDS IDENTIFICATION

As defined in the OSHA Hazard Communication Standard, 29 CFR 1910.1200, the products listed below are considered articles and do not require an SDS. In addition, articles are not included in the scope of the Globally Harmonization System (GHS). As such, the GHS labeling elements are not included on this SDS. All components listed for this product are bound within the product. When handled as intended and under normal conditions of use, there is no evidence that any of the ingredients are released in amounts that pose a significant health risk. Although these products are not subject to the OSHA Standard or GHS labeling elements, GAF would like to disclose as much health and safety information as possible to ensure that this product is handled and used properly. This SDS contains valuable information critical to the safe handling and proper use of the product. This SDS should be retained and be made available for employees and other users of this product. In addition, the recommendations for handling and use of these products should be included in worker training programs.

ADDITIONAL HAZARD IDENTIFICATION INFORMATION:

PRIMARY ROUTE OF EXPOSURE: Inhalation, Skin Contact.

SIGNS & SYMPTOMS OF EXPOSURE

EYES: May cause irritation to the eyes.

SKIN: May cause irritation to the skin.

INGESTION: Not applicable.

INHALATION: Exposure to dust may cause irritation. Processes such as cutting, grinding, crushing, or impact may result in generation of excessive amounts of airborne dusts in the workplace. Nuisance dust may affect the lungs but reactions are typically reversible.

ACUTE HEALTH HAZARDS: None known.

CHRONIC HEALTH HAZARDS: No data available.

CARCINOGENICITY: Not applicable.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

			OCCUPATIONAL EXPOSURE LIMITS		
CHEMICAL NAME	**CAS #**	**%**	**OSHA**	**ACGIH**	**OTHER**
Isopentane	78-78-4	4.5 - 9.9	1000 ppm	600 ppm	REL: 120 ppm
n-Pentane	109-66-0	<0.1 - 5.5	1000 ppm	600 ppm	REL: 120 ppm
Tris (monochloropropyl) Phosphate	13674-84-5	<1 - 8	NE	NE	NE
Fibrous Glass	None	<25	NE	1 f/cc	REL: 3 f/cc

NE = Not Established

Balance of other ingredients are non-hazardous or less than 1% in concentration (or 0.1% for carcinogens, reproductive toxins, or respiratory sensitizers).

SECTION 4: FIRST AID MEASURES

FIRST AID PROCEDURES

EYES:	Hold eyelids open and wash with gentle stream of water for at least 15 minutes preferably at eyewash fountain.
SKIN:	Wash affected area thoroughly with soap and water.
INHALATION:	Remove to fresh uncontaminated air.
INGESTION:	Rinse mouth. Do not give anything by mouth to an unconscious person. Consult medical personnel.
NOTES TO PHYSICIANS OR FIRST AID PROVIDERS:	No information available

SECTION 5: FIRE FIGHTING PROCEDURES

SUITABLE EXTINGUISHING MEDIA:	Water spray, alcohol foam, carbon Dioxide, or dry chemical.
HAZARDOUS COMBUSTION PRODUCTS:	Carbon dioxide and carbon monoxide, phosphorus oxides, and phosphoric acid.
RECOMMENDED FIRE FIGHTING PROCEDURES:	Wear impermeable protective clothing and self-contained breathing apparatus. Toxic fumes and vapors may be evolved.
UNUSUAL FIRE & EXPLOSION HAZARDS:	Emits dense, black smoke when burned. Certain operations such as grinding or cutting may lead to a buildup of dust suspended in air which can cause a dust explosion if ignited. Isopentane and n-pentane, highly flammable materials, may be present within this product. Provide adequate ventilation and appropriate dust handling systems.

SECTION 6: ACCIDENTAL RELEASE MEASURES

ACCIDENTAL RELEASE MEASURES:	Use only in well ventilated areas. Wear appropriate personal protective equipment. Pick up large pieces. Sweep and scoop up material and put into a suitable container for disposal as a non-hazardous waste.

SECTION 7: HANDLING AND STORAGE

HANDLING AND STORAGE:	Use only in a well-ventilated area. Wear appropriate personal protective equipment. Protect against dust that may be generated by altering or applying this product. Minimize dust generation and accumulation. Routine housekeeping should

be carried out to ensure that dusts do not accumulate on surfaces. Wash thoroughly with soap and water after handling and before eating, drinking or using tobacco products.

OTHER PRECAUTIONS: None.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS / VENTILATION: Use local mechanical ventilation.

RESPIRATORY PROTECTION: Respiratory protection may be needed when mechanically manipulating this product (sawing, cutting, etc.). If respiratory protection is selected, a NIOSH-approved dust mask or respirator should be worn.

EYE PROTECTION: Safety glasses with side shields

SKIN PROTECTION: Cotton or leather gloves are recommended when handling.

OTHER PROTECTIVE EQUIPMENT: Wear long sleeves and/or protective coveralls if determined to be needed by the end-user.

WORK HYGIENIC PRACTICES: Wash exposed skin prior to eating, drinking or smoking and at the end of each shift.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE & ODOR:	White rigid cellular sheets/odorless.		
FLASH POINT:	No Data	**LOWER EXPLOSIVE LIMIT:**	No Data
METHOD USED:	No Data	**UPPER EXPLOSIVE LIMIT:**	No Data
EVAPORATION RATE:	No Data	**BOILING POINT:**	No Data
pH (undiluted product):	No Data	**MELTING POINT:**	No Data
SOLUBILITY IN WATER:	No Data	**SPECIFIC GRAVITY:**	No Data
VAPOR DENSITY:	No Data	**PERCENT VOLATILE:**	No Data
VAPOR PRESSURE:	No Data	**MOLECULAR WEIGHT:**	No Data
VOC WITH WATER (LBS/GAL):	No Data	**WITHOUT WATER (LBS/GAL):**	No Data

SECTION 10: STABILITY AND REACTIVITY

THERMAL STABILITY:	**STABLE X**	**UNSTABLE ☐**
CONDITIONS TO AVOID (STABILITY):	None known.	
INCOMPATIBILITY (MATERIAL TO AVOID):	None known.	
HAZARDOUS DECOMPOSITION OR BY-PRODUCTS:	Carbon dioxide and carbon monoxide	
HAZARDOUS POLYMERIZATION:	Will not occur.	

SECTION 11: TOXICOLOGICAL INFORMATION

TOXICOLOGICAL INFORMATION:

Pentane (0.05% TO 5.5%) 109-66-0
Acute Toxicity: Ingestion/Oral-Rat LD50 • >2000 mg/kg; Inhalation-Rat LC50 • 364 g/m³ 4 Hour(s)

Isopentane (4.5% TO 9.9%) 78-78-4
Acute Toxicity: Inhalation-Rat LC50 • 280000 mg/m³ 4 Hour(s)

Route(s) of entry/exposure - Inhalation, Skin, Eye, Ingestion
Medical Conditions Aggravated by Exposure - Disorders of the lungs.

Potential Health Effects
Inhalation
Acute (Immediate) - Exposure to dust may cause irritation. Processes such as cutting, grinding, crushing, or impact may result in generation of excessive amounts of airborne dusts in the workplace. Nuisance dust may affect the lungs but reactions are typically reversible.
Chronic (Delayed) - No data available

Skin
Acute (Immediate) - Exposure to dust may cause mechanical irritation.
Chronic (Delayed) - No data available.

Eye
Acute (Immediate) - Exposure to dust may cause mechanical irritation. Excessive concentrations of nuisance dust in the workplace may reduce visibility and may cause unpleasant deposits in eyes.
Chronic (Delayed) - No data available.

Ingestion
Acute (Immediate) - Excessive concentrations of nuisance dust in the workplace may cause mechanical irritation to mucous membranes.
Chronic (Delayed) - No data available.

SECTION 12: ECOLOGICAL INFORMATION

ECOLOGICAL INFORMATION: No information available.

SECTION 13: DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD: Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

SECTION 14: TRANSPORTATION INFORMATION

DOT
Not regulated as dangerous goods.

IATA
Not regulated as dangerous goods.

IMDG
Not regulated as dangerous goods.

SECTION 15: REGULATORY INFORMATION

U.S. FEDERAL REGULATIONS

TSCA:	This product and its components are listed on the TSCA 8(b) inventory.
CERCLA:	Not applicable.
SARA	Not applicable.
311 / 312 HAZARD CATEGORIES:	Not applicable.
313 REPORTABLE INGREDIENTS:	Not applicable.

SECTION 16: OTHER INFORMATION

ADDITIONAL COMMENTS:	None.
DATE OF PREVIOUS SDS:	March 2018
CHANGES SINCE PREVIOUS SDS:	Updated Section 1

This information relates to the specific material designated and may not be valid for such material used in combination with any other materials or in any process. Such information is to the best of our

knowledge and belief accurate and reliable as of the date compiled. However, no representation, warranty or guarantee, expressed or implied, is made as to its accuracy, reliability, or completeness. It is the user's responsibility to satisfy himself as to the suitability and completeness of such information for his particular use. We do not accept liability for any loss or damage that may occur from the use of this information. Nothing herein shall be construed as a recommendation for uses which infringe valid patents or as extending a license of valid patents.

GAF
Safety Data Sheet
SDS # 4042
SDS Date: May 2024

SECTION 1: PRODUCT AND COMPANY INFORMATION

PRODUCT NAME:	GAF SA Vapor Retarder XL GAF SA Vapor Retarder XL40
MANUFACTURER:	GAF
ADDRESS:	1 Campus Drive, Parsippany, NJ 07054
24 HOUR EMERGENCY PHONE: (CHEMTREC)	800–424–9300
INFORMATION ONLY:	877-GAF-ROOF
APPROVED BY:	Corporate EHS

SECTION 2: HAZARDS IDENTIFICATION

As defined in the OSHA Hazard Communication Standard, 29 CFR 1910.1200, the products listed below are considered articles and do not require an SDS. In addition, articles are not included in the scope of the Globally Harmonization System (GHS). As such, the GHS labeling elements are not included on this SDS. All components listed for this product are bound within the product. When handled as intended and under normal conditions of use, there is no evidence that any of the ingredients are released in amounts that pose a significant health risk. Although these products are not subject to the OSHA Standard or GHS labeling elements, GAF would like to disclose as much health and safety information as possible to ensure that this product is handled and used properly. This SDS contains valuable information critical to the safe handling and proper use of the product. This SDS should be retained and be made available for employees and other users of this product. In addition, the recommendations for handling and use of these products should be included in worker training programs.

ADDITIONAL HAZARD IDENTIFICATION INFORMATION:

PRIMARY ROUTE OF EXPOSURE: Skin Contact

SIGNS & SYMPTONS OF EXPOSURE

EYES:	Not an expected exposure route.
SKIN:	May cause minor irritation to the skin.
INGESTION:	Not an expected exposure route.
INHALATION:	Not an expected exposure route.
ACUTE HEALTH HAZARDS:	See above.
CHRONIC HEALTH HAZARDS:	None known.
CARCINOGENICITY:	None known.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

			OCCUPATIONAL EXPOSURE LIMITS		
CHEMICAL NAME	**CAS #**	**% (BY WT)**	**OSHA**	**ACGIH**	**OTHER**
Synthetic Butyl compounds	Proprietary	70-90	NE	NE	NE
Polypropylene	9003-07-0	1-10	NE	NE	NE
Polyethylene	9002-88-4	5-30	NE	NE	NE

NE = Not Established

SECTION 4: FIRST AID MEASURES

FIRST AID PROCEDURES

EYES: If material comes into contact with the eyes, flush eyes with water.

SKIN: For minor burns due to molten plastic, use running cold water

INHALATION: Remove to fresh uncontaminated air.

INGESTION: If swallowed, contact a physician.

NOTES TO PHYSICIANS OR FIRST AID PROVIDERS: None known

SECTION 5: FIRE FIGHTING PROCEDURES

SUITABLE EXTINGUISHING MEDIA: Water, Dry Chemical, CO2, Foam

HAZARDOUS COMBUSTION PRODUCTS: Carbon monoxide, carbon dioxide, acrylates and unidentified organic compounds.

RECOMMENDED FIRE FIGHTING PROCEDURES: Molten polypropylene tends to flow or drip, respiratory and eye protection required for firefighting personnel. Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

UNUSUAL FIRE & EXPLOSION HAZARDS: None known.

SECTION 6: ACCIDENTAL RELEASE MEASURES

ACCIDENTAL RELEASE MEASURES: Clean up material and properly dispose of material.

SECTION 7: HANDLING AND STORAGE

HANDLING AND STORAGE: Store material in accordance with instructions on the product packaging, if any. Material should be kept clean, dry, and in original packaging. Keep this product away from heat, sparks, ignition sources, and open flames in accordance with applicable laws and regulations.

OTHER PRECAUTIONS: None known.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS / VENTILATION: Not required under normal conditions.

RESPIRATORY PROTECTION: Not required under normal use circumstances.

EYE PROTECTION: None required; safety glasses with side shields can be worn.

SKIN PROTECTION: None required; cotton or leather gloves can be used when handling.

OTHER PROTECTIVE EQUIPMENT: None.

WORK HYGIENIC PRACTICES: Avoid generating dusts. Wash exposed skin prior to eating, drinking or smoking and at the end of each shift.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE & ODOR:	Dark gray rolled material; no appreciable odor		
FLASH POINT:	No Data	**LOWER EXPLOSIVE LIMIT:**	No Data
METHOD USED:	No Data	**UPPER EXPLOSIVE LIMIT:**	No Data
EVAPORATION RATE:	No Data	**BOILING POINT:**	No Data
pH (undiluted product):	No Data	**MELTING POINT:**	>235°F
SOLUBILITY IN WATER:	Insoluble	**SPECIFIC GRAVITY:**	No Data

VAPOR DENSITY:	No Data	**PERCENT VOLATILE:**	No Data
VAPOR PRESSURE:	No Data	**MOLECULAR WEIGHT:**	No Data
VOC WITH WATER (LBS/GAL):	No Data	**WITHOUT WATER (LBS/GAL):**	No Data

SECTION 10: STABILITY AND REACTIVITY

THERMAL STABILITY: **STABLE X** **UNSTABLE** ☐

CONDITIONS TO AVOID (STABILITY): The nature and quantity of by-products formed upon combustion will vary under various conditions: temperature, available oxygen, the presence of other materials, and the nature of combustion (flame or carbonization).

INCOMPATIBILITY (MATERIAL TO AVOID): None known.

HAZARDOUS DECOMPOSITION OR BY-PRODUCTS: Carbon monoxide, Carbon dioxide.

HAZARDOUS POLYMERIZATION: Will not occur.

SECTION 11: TOXICOLOGICAL INFORMATION

TOXICOLOGICAL INFORMATION: No information available.

SECTION 12: ECOLOGICAL INFORMATION

ECOLOGICAL INFORMATION: No information available.

SECTION 13: DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD: Comply with federal, state and local regulations for disposal.

SECTION 14: TRANSPORTATION INFORMATION

DOT
Not regulated as dangerous goods.

IATA
Not regulated as dangerous goods.

IMDG
Not regulated as dangerous goods.

SECTION 15: REGULATORY INFORMATION

U.S. FEDERAL REGULATIONS

TSCA:	This product and its components are not listed on the TSCA 8(b) inventory.
CERCLA:	None.
SARA	
311/312 HAZARD CATEGORIES:	None.
313 REPORTABLE INGREDIENTS:	None.
CALIFORNIA PROPOSITION 65:	None.

SECTION 16: OTHER INFORMATION

ADDITIONAL COMMENTS:	None.
DATE OF PREVIOUS SDS:	Not applicable.
CHANGES SINCE PREVIOUS SDS:	New product.

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