ENVIRONMENTAL PRODUCT DECLARATION

ETHYLENE PROPYLENE DIENE MONOMER [EPDM]

SELF-ADHERED MEMBRANE

HOLCIM

GENERAL INFORMATION

This cradle-to-gate with options Environmental Product Declaration covers an EPDM Single Ply Roofing Membrane product produced at the Prescott Plant. The Life Cycle Assessment (LCA) was prepared in conformity with ISO 21930, ISO 14025, ISO 14040, and ISO 14044 and Sub-category PCR: Product Category Rules for Single Ply Roofing Membranes (ASTM International, 2019). This EPD is intended for business-to-business (B-to-B) audiences.

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ISO 21930:2017 Sustainability in Building Construction-Environmental Declaration of Building Products: serves as the core PCR Product Category Rules for Single Ply Roofing Membranes (ASTM International, 2019) serves as the sub-category PCR.

- Sub-category PCR review was conducted by **Thomas P. Gloria, PhD.** (t.gloria@industrial-ecology.com) • Industrial Ecology Consultants
- Independent verification of the declaration, according to ISO 21930:2017 and ISO 14025:2006.: ☐ internal ☑ external
- Third party verifier Thomas P. Gloria, PhD. (t.gloria@industrial-ecology.com) • Industrial Ecology Consultants
- For additional explanatory material Manufacturer Representative: Sherrie MacWilliams (sherrie.macwilliams@holcim.com)
- This LCA EPD was prepared by: Melissa Diaz, Senior LCA and EPD Project Manager • Climate Earth (www.climateearth.com)

PRODUCER

Holcim Solutions and Products US, LLC delivers high-performance solutions that make the entire building envelope more sustainable for customers around the world. We are committed to raising the standards of building solutions by delivering superior quality and innovation while addressing industry needs.

Our offerings cover a comprehensive range of residential and commercial roofing, wall and lining systems, insulation, and waterproofing solutions for a variety of industries from construction to marine and aerospace. Our powerful portfolio of brands includes Elevate, Duro-Last, Malarkey Roofing Products, GenFlex, Gaco, and Enverge. Holcim Solutions and Products US, LLC is a division of the Holcim Group. Visit HolcimBE.com to learn more.

Holcim's Prescott, AR facility is ISO 9000 certified, and manufactures Elevate ethylene propylene diene monomer (EPDM) membrane for use in commercial roofing systems. The facility is 254,000 square feet and opened in 1982.

PRODUCT: RubberGard™ EPDM SA Membrane

With superior durability, flexibility and UV resistance, RubberGard EPDM SA is a versatile roofing solution that withstands the test of time. RubberGard EPDM SA is a non-reinforced roofing membrane that can be mechanically attached, fully adhered or ballasted. RubberGard EPDM SA has a proven service life of 40 years. RubberGard EPDM SA shifts with and absorbs building movement, leading to a more resilient system. Additionally, RubberGard EPDM SA can contribute to LEED® certification. EPDM membranes manufactured at the Prescott facility do not contain hazardous materials.

FIGURE 1
RubberGard EPDM SA

The products covered in this EPD meet the following physical properties:

TABLE 1

Typical Properties (Meets or exceeds ASTM D 4637, Type I)

PROPERTY	TEST METHOD	PERFORMANCE MIN.	TYPICAL PERFORMANCE – 60 MIL
Overall Thickness	D412	0.0504 in (1.372 mm)	0.059 in ()1.499 mm)
Tensile Strength	D 412 (Die C)	1305 psi (9.0 MPa)	1454 psi (10.0 MPa)
Elongation, Ultimate	D 412 (Die C)	300%	622%
Tensile Set	D412 Method A (Die C)	10%	2.18%
Tear Resistance Brittleness Point Ozone Resistance, no cracks	D 624 (Die C) D2137 D1149	159 lbf/in (26.3 kN/m) -49 °F (-45 °C) --	219 lbf/in (38.4 kN/m) -49 °F (-45 °C) Pass
Heat Aging: Tensile Elongation, Ultimate Tear Resistance Linear Dimensional Change	D 573 D 412 (Die C) D 412 D 624 D 1204	-- 1205 psi (8.3 MPa) 200% 125 lbf/in (21.9 kN/m) ± 1.0%	-- 1490 psi (10.3 MPa) 322% 179 lbf/in (31.3 kN/m) -0.32%
Water Absorption	D471	+8%, -2 %	+1.515
Weight	---	---	.47 lb/ft²
Factory Seam Strength	D 816 Method B (Modified	50 lbf/in (8.8 kN/m) or Sheet Failure	Sheet Failure
Weather Resistance: Visual Inspection PRFSE Elongation, Ultimate	--- D 518 D 518 D 412 (Die C)	--- Pass 30% 200%	--- Pass 53% 255%
Air Permeance (Material)	E 2178*	<0.004 ft³/ft² (0.02 L/(s•m²))	Pass

**The ASTM 2178 values listed are for the air permeance of the RubberGard EPDM SA membrane component only. For use of the product as a component in an air barrier assembly, please consult your Holcim Building Systems Advisor (BSA), Code Agency or Authority having Jurisdiction (AHJ) for the acceptable air barrier assembly details.*

TABLE 2

Product Components

MATERIAL	% WEIGHTED AVERAGE COMPOSITION
Inorganic Filler	10.0 - 50.0
EPDM Polymer	20.0 - 35.0
Process Oil & Other Aids	10.0 - 35.0
Carbon Black	0.0 - 35.0
Adhesive	7.0 -12.0
Cure Package & Other Additives	1.0 - 10.0
EPDM Internal Treated Scrap	0.0 - 10.0
Polyester Scrim	0.0 - 5.0

LIFE CYCLE ASSESSMENT

DECLARED UNIT

The declared unit is 1 m^2 of single-ply roofing membrane for a stated product thickness.

SYSTEM BOUNDARY

This EPD is a cradle-to-gate with options EPD, covering the life cycle stages indicated in Table 3. Modules C1 and C3 do not contribute to the end-of-life scenarios considered, so they are declared as zero.

Table 3
Life Cycle Product Stages

PRODUCTION STAGE (MANDATORY)			CONSTRUCTION STAGE		USE STAGE							END-OF-LIFE STAGE			
Extraction and upstream production	Transport to factory	Manufacturing	Transport to site	Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction / Demolition	Transport to waste processing or disposal	Waste processing	Disposal of waste
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
X	X	X	X	X	MND	MND	MND	MND	MND	MND	MND	X	X	X	X

NOTE: MND = module not declared; X = module included.

CUT-OFF

Items excluded from system boundary include:

- production, manufacture and construction of manufacturing capital goods and infrastructure;
- production and manufacture of production equipment, delivery vehicles, and laboratory equipment;
- personnel-related activities (travel, furniture, and office supplies); and
- energy and water use related to company management and sales activities that may be located either within the factory site or at another location.

COMPARISON

Only EPDs prepared from cradle-to-grave life-cycle results, and based on the same function, quantified by the same functional unit, and taking account of replacement based on the product reference service life (RSL) relative to an assumed building service life, can be used to assist purchasers and users in making informed comparisons between products. As this EPD is prepared from cradle-to-gate with options, this document shall not be used for comparison between products per Section 5.5 of the PCR (ASTM International, NSF International, 2024).

ALLOCATION PROCEDURE

Allocation follows the requirements and guidance of ISO 14044:2006, Clause 4.3.4; and ISO 21930:2017 section 7.2. Recycling and recycled content is modeled using the cut-off rule.

MANUFACTURING

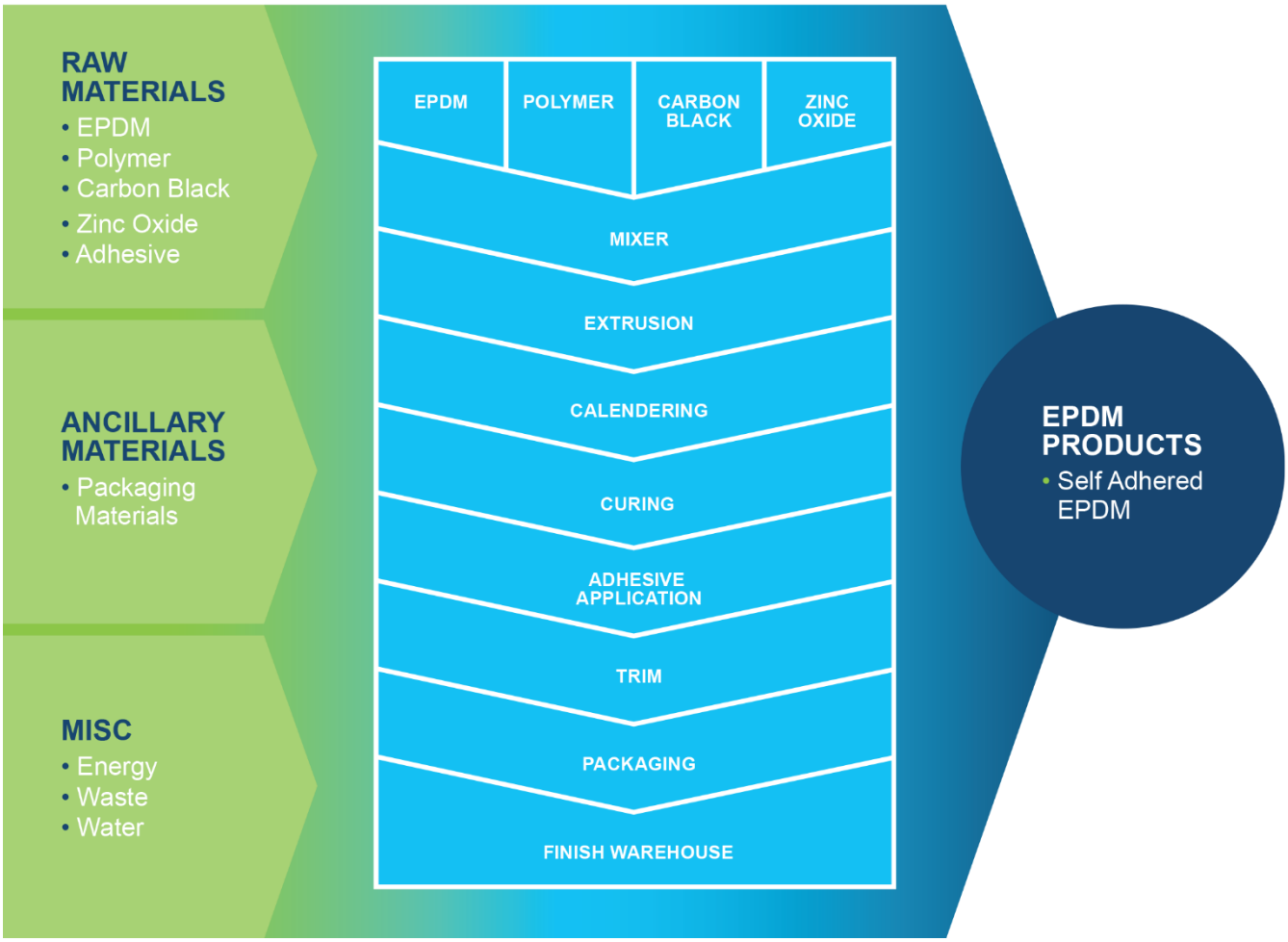
A1-A3, Production Stage

EPDM Self Adhered Roof Membrane Manufacturing

The main material input into the manufacturing process is EPDM along with various additives, which aid in the manufacturing process (e.g., accelerators) and which enhance the membrane's performance (e.g., fire retardants and pigments). The manufacturing process begins with mixing raw materials together in large batches to create uncured rubber that is slabbed off onto pallets for quality control testing. Once the uncured rubber has passed the quality control, it is extruded into a top and bottom layer and then calendared

together. The sheet is dusted with mica to keep the material from sticking to itself though the vulcanization process. The vulcanization process uses heat (steam) and pressure to cure the rubber. Once vulcanized, the membrane is rolled onto a large metal spindle called a master roll. The master rolls are transferred to another facility for adhesive to be applied to the membrane backing. After the adhesive application, the membrane is trimmed and cut to size. The final product is rolled onto a cardboard core, wrapped in plastic and labeled.

FIGURE 2
Process Flow Diagram of EPDM



A4, TRANSPORTATION

An average truck and transport distance from the plant to the construction site is assumed.

A5, INSTALLATION

The installation scenario includes the energy and ancillary materials typically consumed to mechanically install EPDM self-adhered membranes on a standard-shaped roof of 20,000 square feet, with a total EPDM membrane weight of 8,200 lb.

B1 – B7 USE STAGE

Use stage information modules have been omitted from this LCA study.

C1 – C4 END-OF-LIFE STAGE

At the end of building service life and during roof replacement, the EPDM roofing membranes may be reused, recovered and repurposed, or disposed. This study does not take reuse and recovery into account, and it is assumed that insulation is manually removed when the building is decommissioned and disposed in a landfill, for which an average distance and specific end of life LCI is applied. Therefore, it is assumed zero impacts from demolition and waste processing.

LIFE CYCLE ASSESSMENT RESULTS

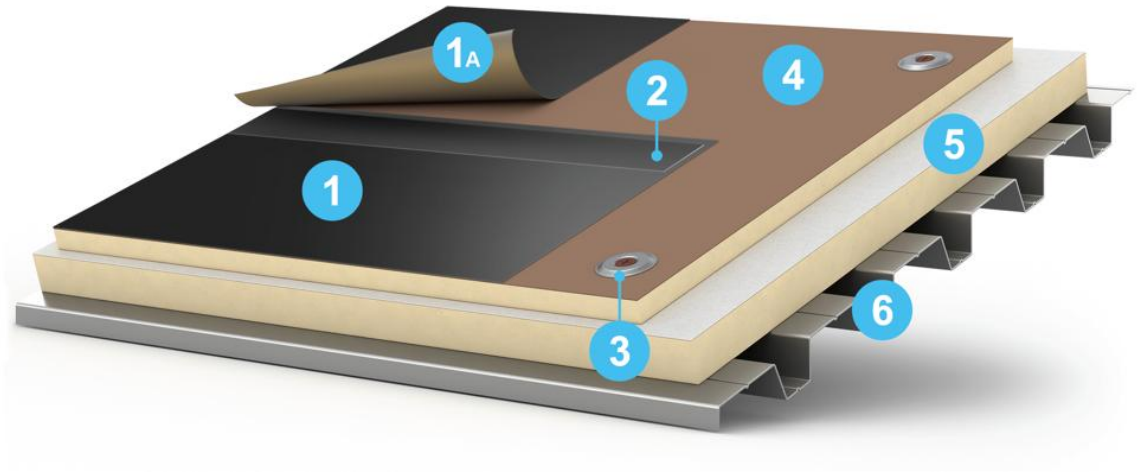
TABLE 4: **RubberGard™ EPDM Single Ply Roofing Membrane**, Self Adhered Products, per 1 m^2

IMPACT ASSESSMENT UNIT	PRODUCTION (A1-A3)	TRANSPORT (A4)	INSTALLATION (A5)	TRANSPORT TO DISPOSAL OF WASTE (C2)	DISPOSAL OF WASTE (C4)
Global warming potential (GWP)[1]; kg CO_2 eq					
EPDM 60 mils	3.91	0.26	0.38	6.56E-03	5.17E-03
Depletion potential of the stratospheric ozone layer (ODP); kg CFC-11 eq					
EPDM 60 mils	1.43E-06	1.07E-11	2.81E-08	1.31E-09	8.80E-10
Eutrophication potential (EP); kg N eq					
EPDM 60 mils	2.75E-03	2.03E-04	1.72E-03	4.23E-06	5.12E-06
Acidification potential of soil and water sources (AP); kg SO_2 eq					
EPDM 60 mils	2.07E-02	3.36E-03	8.64E-04	4.12E-05	4.98E-05
Formation potential of tropospheric ozone (POCP); kg O_3 eq					
EPDM 60 mils	0.40	8.65E-02	1.11E-02	1.27E-03	1.50E-03
Resource Use					
Abiotic depletion potential for non-fossil mineral resources ($ADP_{elements}$); kg Sb eq					
EPDM 60 mils	4.41E-05	0.00	1.77E-06	7.47E-12	7.85E-12
Abiotic depletion potential for fossil resources (ADP_{fossil}); MJ, NCV					
EPDM 60 mils	107	3.62	4.15	8.73E-02	7.17E-02
Renewable primary energy resources as energy (fuel) (RPRE)[2]; MJ, NCV					
EPDM 60 mils	1.35	0.00	0.15	1.36E-04	1.49E-04
Renewable primary resources as material (RPRM)[2]; MJ, NCV					
EPDM 60 mils	0.00	0.00	0.00	0.00	0.00
Non-renewable primary resources as energy (fuel) (NRPRE)[2]; MJ, NCV					
EPDM 60 mils	111	3.62	4.28	8.78E-02	7.23E-02
Non-renewable primary resources as material (NRPRM)[2]; MJ, NCV					
EPDM 60 mils	0.00	0.00	0.00	0.00	0.00
Consumption of fresh water (FW)[2]; m^3					
EPDM 60 mils	7.49E-02	0.00	3.10E-03	1.47E-05	1.25E-05
Secondary Material, Fuel and Recovered Energy					
Secondary Materials (SM)[2]; kg					
EPDM 60 mils	0.00	0.00	0.00	0.00	0.00
Renewable secondary fuels (RSF)[2]; MJ, NCV					
EPDM 60 mils	0.00	0.00	0.00	0.00	0.00
Non-renewable secondary fuels (NRSF)[2]; MJ, NCV					
EPDM 60 mils	0.00	0.00	0.00	0.00	0.00
Recovered energy (RE)[2]; MJ, NCV					
EPDM 60 mils	0.00	0.00	0.00	0.00	0.00
Waste & Output Flows					
Hazardous waste disposed (HW)[2]; kg					
EPDM 60 mils	1.80E-06	0.00	0.00	0.00	0.00
Non-hazardous waste disposed (NHWD)[2]; kg					
EPDM 60 mils	4.06E-03	0.00	0.00	0.00	0.00
High-level radioactive waste (HLRW)[2]; kg					
EPDM 60 mils	1.72E-09	0.00	8.61E-11	2.96E-13	3.23E-13
Intermediate and low-level radioactive waste (ILLRW)[2]; kg					
EPDM 60 mils	8.30E-09	0.00	1.22E-09	1.43E-12	1.56E-12
Components for reuse (CRU)[2]; kg					
EPDM 60 mils	0.00	0.00	0.00	0.00	0.00
Materials for recycling (MR)[2]; kg					
EPDM 60 mils	1.23E-03	0.00	0.00	0.00	0.00
Materials for energy recovery (MER)[2]; kg					
EPDM 60 mils	0.00	0.00	0.00	0.00	0.00
Recovered energy exported from the product system (EE)[2]; MJ, NCV					
EPDM 60 mils	0.00	0.00	0.00	0.00	0.00

** 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. The following optional indicators are not reported and also have high levels of uncertainty: Land use related impacts, toxicological aspects, and emissions from land use change*
***Only EPDs prepared from cradle-to-grave life-cycle results and based on the same function, quantified by the same functional unit, and taking account of replacement based on the product reference service life (RSL) relative to an assumed building service life, can be used to assist purchasers and users in making informed comparisons between products.*

[1] GWP 100; 100-year time horizon GWP factors are provided by the IPCC 2013 Fifth Assessment Report (AR5). CO_2 from biogenic secondary fuels used in kiln are climate-neutral (CO_2 sink = CO_2 emissions), ISO 21930, 7.2.7.
[2] Calculated per ACLCA ISO 21930 Guidance.

ADDITIONAL ENVIRONMENTAL INFORMATION



EPDM SA Roof System

1. **Elevate RubberGard™ EPDM SA with Secure Bond Technology**
    - Secure Bond adhesive is factory-applied to the underside of the membrane (1A). It contains no solvents and VOCs and is odorless, making it perfect for installation on buildings that must remain operational during the roof installation.
    - Because the adhesive is factory-applied, buckets of adhesive for this part of the installation are eliminated preventing waste from going to landfill.
2. **QuickSeam™ Splice Tape**
3. **Elevate Metal Plates and Fasteners**
4. **ISOGARD HD Cover Board** (optional) – **Mechanically Attached or Adhered**
5. **ISOGARD GL or ISOGARD CG Insulation – Mechanically Attached or Adhered**
    - All Elevate polyisocyanurate insulations use EPA accepted blowing agents. Elevate ISOGARD HD Cover Board with ISOGARD foam technology and ISOGARD GL and ISOGARD CG insulation incorporates a HCFC-free blowing agent that does not contribute to the depletion of the ozone layer (ODP-free).
    - The thermal performance of ISOGARD polyiso insulation is up to 40% better than that of major competitors when tested by an independent third party in cold temperature 40°F (4°C) applications according to ASTM C1289 standards. The increased R-value per inch means better thermal performance from the same roofing systems using the same amount of insulation compared to leading competitive products on the market today.
6. **Steel Deck**

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