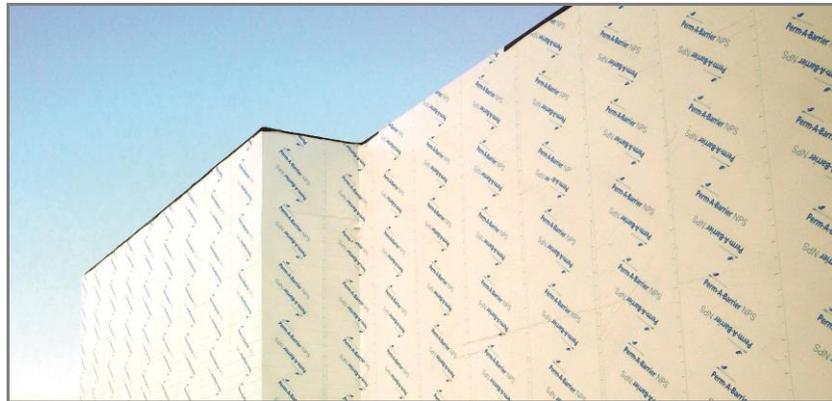


# Environmental Product Declaration

According to ISO 14025 and ISO 21930

## Perm-A-Barrier® Air Barriers

Commissioned by GCP Applied Technologies Inc.



## ASTM International Certified Environmental Product Declaration

This is a Type III environmental product declaration for GCP Applied Technologies' (GCP) Perm-A-Barrier® air barrier products as manufactured at its Chicago, IL facility. This declaration has been prepared in accordance with ISO 14025, ISO 21930, ISO 14040/44, ASTM Product Category Rule (PCR) for Water-resistive and Air Barriers and ASTM General Program Instructions for Type III EPDs.

### Environmental Product Declaration Summary

General Information	
<p><b>Owner of the EPD</b></p>	<div style="text-align: center;">  <p><b>GCP Applied Technologies Inc.</b>                      62 Whittemore Avenue                      Cambridge, Massachusetts 02140 USA                      Link (URL): <a href="https://gcpat.com">https://gcpat.com</a></p> <p>GCP is headquartered in Cambridge, Massachusetts, USA, and has manufacturing, R&amp;D and technical services sites in more than 40 countries on six continents. Sales offices and distributors are present around the world as GCP serves customers in over 110 countries.</p> <p>GCP was formed in February 2016 by the spin-off of W. R. Grace &amp; Co.'s construction products segment and its packaging technologies business.</p> <p>The owner of the declaration is liable for the underlying information and evidence.</p> </div>



General Information			
<b>Corporate and Manufacturing Facility</b>		<b>GCP Applied Technologies Inc., Corporate</b> 62 Whittemore Avenue Cambridge, Massachusetts 02140 USA  <b>Chicago, United States</b> 6051 West 65th Street Bedford Park, Illinois 60638	
<b>Product Name</b>		Perm-A-Barrier® NPL 10 and VPL air barrier products UN CPC 54530	
<b>Product Definition</b>		Air barrier products could either demonstrate air permeance or both air and liquid water permeance properties and may be mechanically fastened building wraps or building paper, fluid applied membranes, self-adhered membranes, cellular plastic or any other material that has been designed to resist air permeance [1].	
<b>Product Category Rule (PCR)</b>		ASTM 2017, ASTM Product Category Rules (PCR) For Preparing an Environmental Product Declaration for: Water-resistant and Air Barriers (UNCPC 54530 AND/OR CSI MASTERFORMAT DIVISION 072600 AND 072700) [1].	
<b>Certification Period</b>		10.23.2017 – 10.23.2022	
<b>Declared Unit</b>		One square meter (1m <sup>2</sup> )	
<b>ASTM Declaration Number</b>		EPD-074	
EPD Information			
<b>Program Operator</b>		ASTM International Environmental Product Declarations 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959 <a href="http://www.astm.org">www.astm.org</a>	
<b>Declaration Holder</b>		GCP Applied Technologies Inc.	
<b>Product group</b> Air barrier products	<b>Date of Issue</b> 10.23.2017	<b>Period of Validity</b> 5 years	<b>Declaration Number</b> EPD-074



EPD Information	
<p><b>Declaration Type</b>                      A “Product Stage” or “Cradle-to-gate” EPD of GCP’s production of Perm-A-Barrier® air barrier membrane products. This EPD present the product specific profile for two air barrier membrane products, manufactured by GCP in United States. Product activities covered include the raw material supply, transport and manufacturing (modules A1 to A3). The declaration is intended for Business-to-Business (B-to-B) communication.</p>	
<p><b>Applicable Countries</b>                      Canada, Mexico and the United States of America</p>	
<p><b>Product Applicability and Characteristics</b>                      Air barrier materials are materials that are used anywhere in a building assembly to stop the movement of air into or out of the conditioned space. Air barriers can be either permeable or impermeable to water vapor. Some materials may provide additional properties such as thermal insulation [1].</p>	
<p><b>Content of the Declaration</b>                      The declaration follows Section 11, Content of EPD, ASTM 2017, Product Category Rules For Preparing an Environmental Product Declaration for: Water-resistive and Air Barriers [1].</p>	
<p><b>This EPD was independently verified by ASTM in accordance with ISO 14025:</b></p>	
	
<b>Internal</b>	<b>External</b>
	X
<p>Tim Brooke                      100 Barr Harbor Drive, PO Box C700                      West Conshohocken, PA 19428-2959, USA  <a href="http://www.astm.org/EPDs.htm">www.astm.org/EPDs.htm</a></p>	
EPD Project Report Information	
<p><b>EPD Project Report</b></p>	<p>A Cradle-to-Gate Life Cycle Assessment of Air Barriers and Waterproofing Products Manufactured by GCP Applied Technologies. September 2017.</p>
<p><b>Prepared by</b></p> <div style="display: flex; align-items: center;">  <div> <p><b>Athena</b>                          Sustainable Materials                          Institute</p> </div> </div>	<p>Lindita Bushi Ph.D. and Jamie Meil                      Athena Sustainable Materials Institute                      119 Ross Avenue, Suite 100                      Ottawa, Ontario, K1Y 0N6, Canada  <a href="mailto:info@athenasmi.org">info@athenasmi.org</a></p>
<p><b>This EPD project report was independently verified by in accordance with ISO 14025 and the reference PCR:</b></p>	<p>Thomas P. Gloria, Ph.D.                      Industrial Ecology Consultants                      35 Bracebridge Rd.                      Newton, MA 02459-1728</p>



<b>PCR Information</b>	
<b>Program Operator</b>	ASTM International
<b>Reference PCR</b>	Product Category Rules (PCR) For Preparing an Environmental Product Declaration for: Water-resistive and Air Barriers [1].
<b>Date of Issue</b>	09/2017
<b>PCR review was conducted by:</b>	Thomas P. Gloria, Industrial Ecology Consultants (chairperson) Graham Finch, RDH Building Science, Inc. Paul H. Shipp, USG Corporation



# 1 PRODUCT IDENTIFICATION

## 1.1 PRODUCT DEFINITION

Air barriers products can be mechanically fastened building wraps, self-adhered membranes, fluid-applied materials, non-insulating board stock, and spray polyurethane foam. Any material that has an air permeance that is not greater than 0.02 L/(s·m<sup>2</sup>) at a pressure difference of 75 Pa (0.004 cfm/ft<sup>2</sup> at a pressure difference of 1.56 lb/ft<sup>2</sup>) when tested in accordance with ASTM E 2178 is an air barrier material.

Air barriers are an essential component of a well-performing building envelope. They are the first line of defense in maintaining energy efficiency and improving indoor air quality. As moisture and air seep into a building, its structural integrity begins to deteriorate, resulting in poor building envelope performance. Unexpected air leakage through the building envelope carries moisture, which can promote mold and rust in the building structure, as well as cause higher energy consumption. The best prevention is to design an airtight building envelope, consisting of properly installed, top quality air and moisture barrier materials. GCP offers top quality air barriers and technologies for virtually all commercial applications.

This EPD covers two air barrier products produced at the GCP’s facility located in Chicago, IL as described in Table 1.

**Table 1. GCP’s air barrier membrane products (Perm-A-Barrier®)**

Brand name	Product description
<p><b>Perm-A-Barrier® NPL 10</b>                      GCP product link  <a href="https://GCP.com/construction/en-us/air-barriers/Perm-A-Barrier-NPL-10">https://GCP.com/construction/en-us/air-barriers/Perm-A-Barrier-NPL-10</a></p>	<p>Perm-A-Barrier® NPL 10 is a vapor impermeable fluid applied, one component, latex-based membrane that cures to form a resilient, monolithic, fully-bonded elastomeric sheet when applied to construction surfaces. It meets NFPA 285 as part of various wall assemblies. Designed to satisfy the requirements of fire-rated assemblies, Perm-A-Barrier NPL 10 can be included in a wide variety of the National Fire Protection Association (NFPA) 285 compliant wall designs.</p>



Brand name	Product description
<p><b>Perm-A-Barrier® VPL</b>                      GCP product link  <a href="https://GCP.com/construction/en-us/air-barriers/Perm-A-Barrier-VPL">https://GCP.com/construction/en-us/air-barriers/Perm-A-Barrier-VPL</a></p>	<p>Perm-A-Barrier® VPL is a fire-resistive, one component, fluid-applied vapor permeable air barrier membrane that protects building envelope from air leakage and rain penetration, but allow the walls to "breathe". Perm-A-Barrier® VPL has been evaluated to NFPA 285 within various wall assemblies with or without foam plastic insulation.</p>

**1.2 PRODUCT STANDARDS**

Table 2 lists specifications for air barrier materials as per ASTM PCR.

**Table 2. ASTM specifications for water-resistive and air barrier material performances**

Material performances	Test methods
Air Permeance	ASTM E2178
Water Vapor Permeance Water Penetration	ASTM E96 AATCC 127, AC 212, AC38, E2556

**1.3 TECHNICAL DATA, MATERIAL CONTENT, AND PACKAGING**

Table 3 summarizes key technical data for Perm-A-Barrier® NPL 10 and VPL. Product data sheets, guide specifications and additional product specific information are available for each of these air barriers products at <http://www.gcpat.com/>. Table 4 summarizes the material content data for the manufacture of Perm-A-Barrier® NPL 10 and VPL. NPL 10 and VPL are packaged and sold in both 5-gallon pails and 55-gallon drums.



**Table 3. Technical data for GCP air barriers (Perm-A-Barrier®)**

Brand name	Product type and performance	Selected physical properties
Perm-A-Barrier® NPL 10	Air barriers, vapor impermeable	Color: Grey; Density: 9.6 lbs./gal (1.150 kg/L); Dry thickness: 40 mils (1.016 mm); Solids content by volume: 53%; Air permeance: <0.02 L/s·m <sup>2</sup> @ 75 Pa (ASTM E2178); Water vapor transmission: <1 Perms (ASTM E96)
Perm-A-Barrier® VPL	Air barriers, vapor permeable	Color: Green; Density: 11.7 lbs/gal (1.399 kg/L); Dry thickness: 40 mils (1.016 mm); Solids content by volume: 59% (approx.); Air permeance: <0.02 L/s·m <sup>2</sup> @ 75 Pa (ASTM E2178); Water vapor transmission: 15 Perms (ASTM E96)

**Table 4. GCP air barriers - Perm-A-Barrier® product formulations**

Input material	Perm-A-Barrier® NPL 10 (in %)	Perm-A-Barrier® VPL (in %)
Proprietary polymers and compounds	76%	80%
Titanium dioxide	2%	2%
Proprietary additives (including water)	20%	18%
<b>Total</b>	<b>100%</b>	<b>100%</b>

## 2 DECLARED UNIT and LIFE CYCLE STAGES

A declared unit is defined for EPDs covering only the cradle-to-gate life stages. The declared unit is the basic reference flow set by the ASTM PCR for the assessed products [1]. As per the ASTM PCR, a declared unit of one square meter shall be used for sheet wraps/membranes. The declared unit for fluid-applied air barriers shall also be on a one square meter basis. In addition, the coverage rate (in kg/m<sup>2</sup>) for the specified dry product thickness shall be reported (see Table 5).

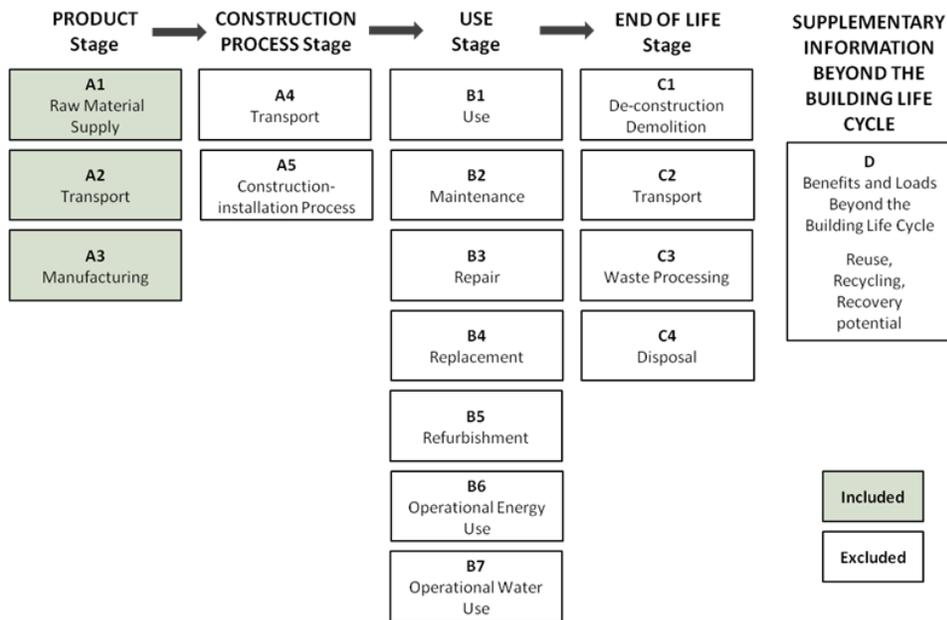
As illustrated in Figure 1, the system boundary of construction products is typically characterized by the temporal flow of its life cycle – i.e. Product, Construction Process, Use, and End of Life stages. The various processes that occur at each stage are classified and grouped in information modules (or simply "modules"), labeled with alpha-numeric designations "A1" through "C4". A declared unit is defined for EPDs covering “cradle-to-gate”, or the production stage (shown infilled green in Figure 1), which consists of three modules: A1 Raw Material Supply; A2 Transport (to the manufacturer); and A3 Core



Manufacturing. This EPD focuses on the product stage only. Included and excluded product stage processes are listed in Table 6.

**Table 5. GCP air barriers - Declared Unit**

Air barriers		Declared unit	Coverage rate, CR (kg/m <sup>2</sup> )
Perm-A-Barrier®	NPL 10	1 m <sup>2</sup>	Perm-A-Barrier® NPL 10 membrane is typically applied at a minimum thickness of 70 mils wet. The theoretical coverage rate (not including waste) at a thickness of 70 mils is approximately 23 ft <sup>2</sup> /gal (0.5645 m <sup>2</sup> /L) to attain a 40-mil dry thickness. Specific density = 1.15kg/L  Coverage rate (kg/m <sup>2</sup> ) = (1.150 kg/L)/(0.5645 m <sup>2</sup> /L) = <b>2.038 kg/m<sup>2</sup></b>  Source: <a href="https://GCP.com/construction/en-us/Documents/GCP0083_PAB-130-1016_PAB-NPL-10_DS_HiRes.pdf">https://GCP.com/construction/en-us/Documents/GCP0083_PAB-130-1016_PAB-NPL-10_DS_HiRes.pdf</a>
	VPL	1 m <sup>2</sup>	Perm-A-Barrier® VPL membrane is typically applied at a minimum thickness of 68 mils wet. The theoretical coverage rate (not including waste) at a thickness of 68 mils is approximately 23.6 ft <sup>2</sup> /gal (0.5792 m <sup>2</sup> /L) to attain a 40-mil dry thickness. Specific density = 1.399 kg/L  Coverage rate (kg/m <sup>2</sup> ) = (1.399 kg/L)/(0.5792 m <sup>2</sup> /L) = <b>2.417 kg/m<sup>2</sup></b>  Source: <a href="https://GCP.com/construction/en-us/Documents/GCP0083_PAB-121-0317_PAB-VPL_DS_FINAL.PDF">https://GCP.com/construction/en-us/Documents/GCP0083_PAB-121-0317_PAB-VPL_DS_FINAL.PDF</a>



**Figure 1 Life Cycle Modules Included and Excluded from the System Boundary**



**Table 6: Product stage system boundaries – Included and excluded processes**

Product Stage	Included	Excluded
<p><b>A1-A3 Modules</b></p>	<p><b>A1 Product Stage [1]:</b> Raw material supply (upstream processes): extraction, handling, and processing of the raw materials as well as the intermediate component products and fuels used in the production of the products of interest.</p> <p><b>A2 Product Stage [1]:</b> Transportation: transportation of all input materials and fuels from the supplier to the gate of the manufacturing facility.</p> <p><b>A3 Product Stage [1]:</b> Manufacturing of the air barriers, including all energy and materials required and all emissions and wastes produced. This includes:</p> <ul style="list-style-type: none"> <li>- Packaging, including transportation and waste disposal, to make air barriers ready for shipment;</li> <li>- Average transportation from manufacturing site to landfill/incineration/waste treatment facilities for on-site wastes, including empty backhauls and the waste disposal process. The A3 module includes mixing, powder addition station, vacuum system, liquid addition station, packaging, storage, lighting and heating, ventilation and air conditioning (HVAC), operation of environmental equipment (baghouses, cartridge filters and condensers), and on-site transportation (loading and unloading).</li> </ul>	<ul style="list-style-type: none"> <li>-Production, manufacture, and construction of manufacturing capital goods and infrastructure;</li> <li>-Production and manufacture of production equipment, delivery vehicles, and laboratory equipment;</li> <li>-Personnel-related activities (travel, furniture, and office supplies); and</li> <li>- Energy and water use related to company management and sales activities.</li> </ul>

### 3 CUT-OFF RULES, ALLOCATION RULES AND DATA QUALITY REQUIREMENTS

<p><b>Cut-off Rules</b></p>
<p>No cut-off criteria were applied in the study. All input/output data reported by the two GCP manufacturing facilities were included in the LCI modelling. None of the reported flow data were excluded based on the cut-off criteria.</p>
<p><b>Allocation Rules</b></p>
<p>Allocation rules, as specified in ASTM PCR for SFRM, section 7.5 were followed [1]. “Mass” was deemed as the most appropriate physical parameter for allocation used for the air barriers manufacturing system to calculate the input energy flows (electricity, natural gas and propane), emissions to air and water and waste flows per selected products. Plant product formulations including ancillary and packaging data were combined with allocated “gate to gate” manufacturing data to calculate the cradle to gate LCA profiles. Allocation related to transport are based on the mass of transported product.</p>

### Data Quality Requirements

Data quality requirements, as specified in ASTM PCR, section 7.1, were observed [1].

**Precision:** GCP's Chicago, IL facility, through measurement and calculation, collected primary input and output data specific to the production of Perm-A-Barrier® NPL 10 and VPL. For accuracy, the LCA team individually validated all facility specific gate-to-gate input and output data.

**Completeness:** All relevant, specific processes, including inputs (raw materials, energy and ancillary materials), outputs (emissions and production volume) and GCP product formulations were considered.

**Consistency:** System boundaries, allocation and cut-off rules have been uniformly applied across the product stage modules (A1 to A3). The study predominantly relies on two secondary data sources (US LCI and ecoinvent 3.2 databases); ecoinvent LCI datasets were adjusted uniformly for the North American geography (electricity grid, fuel combustion). SimaPro LCA software v.8.3, February 2017 is used to model the cradle-to gate LCA profiles of the eight selected air barriers and waterproofing products. Crosschecks concerning the plausibility of mass and energy flows were continuously conducted.

**Uncertainty:** Uncertainty associated with the LCA model and results is considered "low" given the high representativeness of primary data collected for major input materials (A1), transport (A2) and manufacturing (A3).

**Representativeness:** The representativeness of the data is summarized as follows.

- **Temporal** representativeness is characterized as "high".

Primary data for air barriers manufacturing processes were collected at GCP's Chicago, IL manufacturing facility for the reference year 2015 (12 months). All secondary data are sourced from either the US LCI database, adjusted or ecoinvent v.3.2 database for US and global, 2016. All significant LCI data sources, those that exercise a considerable influence over the calculated results, are less than 10 years old.

- **Geographical** representativeness is characterized as "high".

Geographical coverage of core manufacturing processes is specific to the GCP's facility operating in Chicago, IL. All energy profiles reflect regional-specific conditions for foreground processes, and U.S. averages for other inputs. Some chemical and process data are based on European sources. Where possible LCI these datasets were adjusted to reflect U.S. system boundaries.

- **Technological** representativeness is characterized as "high".

Core manufacturing process technology is derived from very recent annual data covering the specific plant at which the products are manufactured. Background data are deemed to be reflective of typical or average technologies used. Some background material and process data are European but deemed similar to technologies used in North America.

## 4 LIFE CYCLE ASSESSMENT RESULTS

This section summarizes the results of the life cycle impact assessment (LCIA) and cumulative inventory metrics based on the cradle-to-gate life cycle inventory inputs and outputs analysis. As per the ASTM PCR, Section 8, US EPA's Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts (TRACI, version 2.1) impact categories are used as they provide a North American context for the mandatory category indicators to be included in this EPD. These are relative expressions only and do not predict category impact end-points, the exceeding of thresholds, safety margins or risks. Total primary and sub-set energy consumption was compiled using a cumulative energy demand model. Material resource consumption and generated waste reflect cumulative life cycle inventory flow information. Table 7 shows the aggregated product stage total, for each Perm-A-Barrier® product as manufactured and packaged at the Chicago, IL plant. It should be noted that non-renewable energy flows (for example, crude oil) used as feedstock to produce materials (for example, bitumen, plastic) are accounted for and reported under the non-renewable fossil energy (MJ). Figures 2 and 3 present the EPD results for 1 m<sup>2</sup> of Perm-A-Barrier® NPL 10 and Perm-A-Barrier® VPL, by information module on a percent contribution basis, respectively.

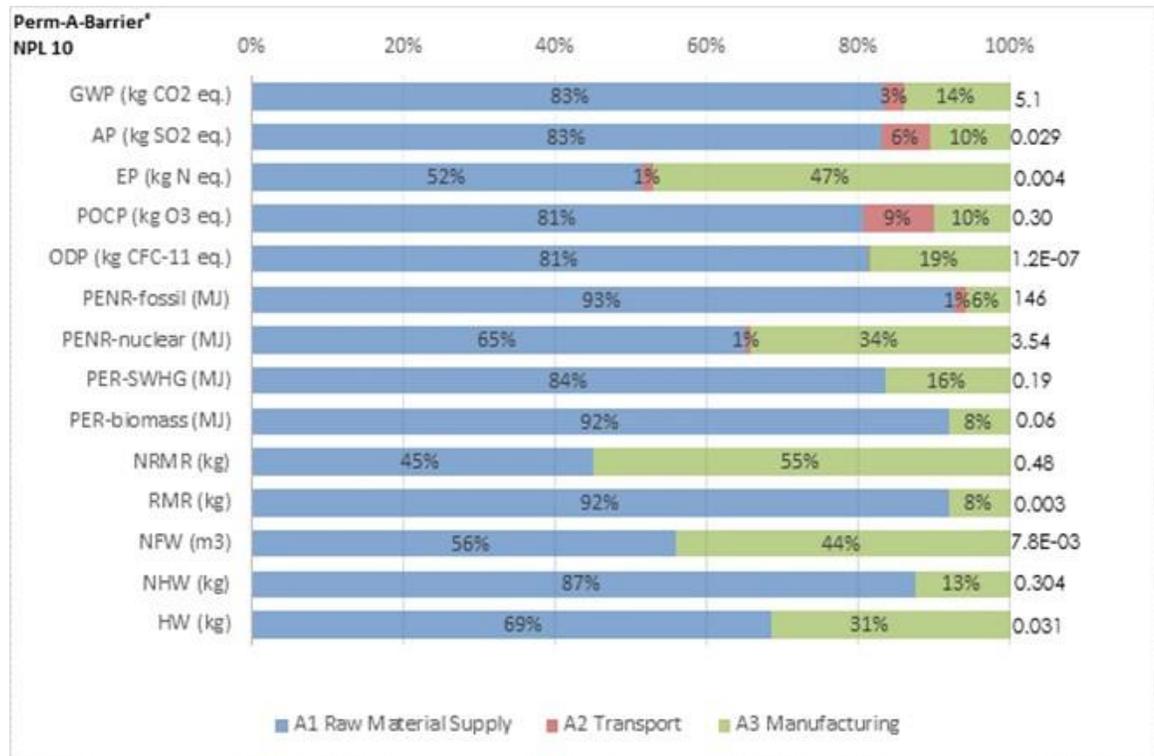
**Table 7: Product stage EPD results for 1 m<sup>2</sup> GCP Perm-A-Barrier®**

Category Indicator	Unit	Perm-A-Barrier® NPL 10 (CR= 2.038 kg/m <sup>2</sup> )	Perm-A-Barrier® VPL (CR= 2.417 kg/m <sup>2</sup> )
Global warming potential, GWP	kg CO <sub>2</sub> equiv.	5.1	3.8
Acidification potential, AP	kg SO <sub>2</sub> equiv.	2.9E-02	2.3E-02
Eutrophication potential, EP	kg N equiv.	4.0E-03	1.3E-02
Smog creation potential, POCP	kg O <sub>3</sub> equiv.	3.0E-01	2.2E-01
Ozone depletion potential, ODP	kg CFC-11 equiv.	1.2E-07	5.1E-07
<b>Total primary energy consumption</b>			
Non-renewable, fossil, PENR-fossil	MJ, HHV	145.6	56.5
Non-renewable, nuclear, PENR-nuclear	MJ, HHV	3.5	6.1
Renewable, solar, wind, hydroelectric, and geothermal, PER-SWHG	MJ, HHV	0.19	1.14
Renewable, biomass, PER-biomass	MJ, HHV	0.06	1.93
<b>Material resources consumption</b>			
Non-renewable materials, NRMR	kg	4.8E-01	5.5E+00
Renewable materials, RMR	kg	3.2E-03	1.1E-01

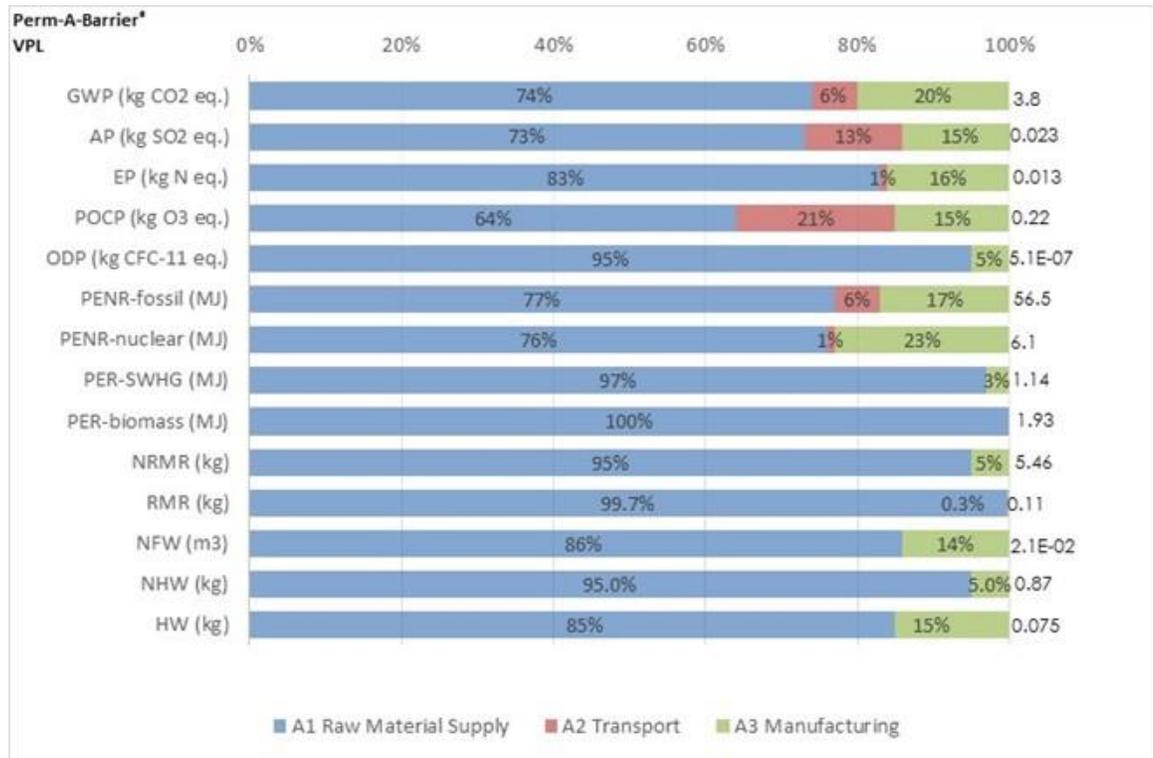


Category Indicator	Unit	Perm-A-Barrier® NPL 10 (CR= 2.038 kg/m <sup>2</sup> )	Perm-A-Barrier® VPL (CR= 2.417 kg/m <sup>2</sup> )
Net fresh water consumption, NFW	m <sup>3</sup>	7.8E-03	2.1E-02
<b>Waste generated</b>			
Non-hazardous waste, NHW	kg	3.0E-01	8.7E-01
Hazardous waste, HW	kg	3.1E-02	7.5E-02

**Figure 2 Product Stage EPD Results for 1 m<sup>2</sup> GCP Perm-A-Barrier® NPL 10 by Information Module- % Basis**



**Figure 3 Product Stage EPD Results for 1 m<sup>2</sup> GCP Perm-A-Barrier® VPL by Information Module- % Basis**



## 5 INTERPRETATION

The EPD results represent a “cradle-to-gate” EPD per 1m<sup>2</sup> of Perm-A-Barrier® NPL 10 and Perm-A-Barrier® VPL as manufactured at GCP’s Chicago, IL manufacturing facility during the reference year 2015.

**Perm-A-Barrier® NPL 10** – Apart from eutrophication potential, a large portion of the life cycle impact indicator results are a function of the upstream raw materials (A1) used in the manufacture of the product. Core manufacturing accounts for between 10% and 20% of the category indicator impacts (excluding eutrophication) and transportation (A2) accounts for less than 10% of the product stage impact. A similar pattern is noted for primary energy consumption which is again dominated by A1 raw material supply, followed by core manufacturing and then transportation. Net fresh water use is minor and equally a function of A1 and A3 activity stages, while waste flows are more a function of upstream materials; especially hazardous waste.

**Perm-A-Barrier® VPL** – Across the three production stage information modules, module A1 raw material supply contributes the largest share of the impact category results –



accounting for between 95% (ozone depletion) and about 74% (global warming potential) of the impact burden. The upstream raw material supply (A1) also accounts for the largest share of energy use (77). Raw material transportation (A2) proves to be a minor contributor to the products overall burden. Net fresh water consumption is small and largely a function of raw material supply (A1). Similarly, A1 is responsible for a large proportion of the waste flows.

## 6 ADDITIONAL AND ENVIRONMENTAL INFORMATION

Low temperature baghouses, cartridge filters and condensers are installed at GCP's Chicago, IL plant to control various process emissions.

## 7 DECLARATION TYPE

GCP EPD for air barrier products is categorized as follows:

*- A company specific product EPD(s), as produced at the manufacturer's plant.*

This declaration presents a GCP company specific EPD for two air barriers products. Product activities covered include the raw material supply, transport and core manufacturing (modules A1 to A3). The declaration is intended for Business-to-Business (B-to-B) communication.

## 8 DISCLAIMERS

This EPD does not report all the environmental impacts caused by the life cycle of GCP's products. For example, the PCR does not include impact categories for human health impacts and thus particulate emissions that might impact human and/or ecosystem health are excluded. To assess the local impacts of product manufacturing on human health, land use and local ecology, additional analysis is required.

This EPD reports the results in order to benchmark the manufacture of GCP's products. No environmental claim regarding the superiority or equivalence of GCP's products relative to a competing product that performs the same function is implied. EPDs from different programs and/or based on a different PCR may not be comparable.

## 9 EPD Explanatory Material

For any explanatory material regarding this EPD, please contact the program operator.

ASTM International  
Environmental Product Declarations  
100 Barr Harbor Drive,  
West Conshohocken,  
PA 19428-2959, <http://www.astm.org>

## 10 REFERENCES

1. ASTM 2017. ASTM Product Category Rules (PCR) For Preparing an Environmental Product Declaration for: Water-resistive and Air Barriers (UNCPC 54530 AND/OR CSI MASTERFORMAT DIVISION 072600 AND 072700).  
[https://www.astm.org/CERTIFICATION/DOCS/368.PCR for Water-Resistive Air Barrier PCR final.pdf](https://www.astm.org/CERTIFICATION/DOCS/368.PCR%20for%20Water-Resistive%20Air%20Barrier%20PCR%20final.pdf)
2. ASTM Program Operator for Product Category Rules (PCRs) and Environmental Product Declarations (EPDs), General Program Instructions v.7, 06/14/16.
3. ISO 21930: 2007 Building construction – Sustainability in building construction – Environmental declaration of building products.
4. ISO 14025: 2006 Environmental labeling and declarations - Type III environmental declarations - Principles and procedures.
5. ISO 14044: 2006 Environmental management - Life cycle assessment - Requirements and guidelines.
6. ISO 14040: 2006 Environmental management - Life cycle assessment - Principles and framework.
7. ISO 14021:1999 Environmental labels and declarations - Self-declared environmental claims (Type II environmental labelling)
8. EN 15804:2012 Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products.
9. GCP Applied Technologies 2017 Construction Products, Air Barriers (<https://gcpat.com/construction/en-us/air-barriers>)
10. Athena Institute 2017. A Cradle-to-Gate Life Cycle Assessment of Air Barriers and Waterproofing Products Manufactured by GCP Applied Technologies. September 2017.