

# Environmental Product Declaration

According to ISO 14025 and ISO 21930

## Bituthene® Waterproofing Membranes

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) Bituthene® waterproofing membrane products, as manufactured at its Mt Pleasant, TN 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>applied technologies</p> </div> <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>



General Information			
<b>Corporate and Waterproofing Manufacturing Facility</b>		<b>GCP Applied Technologies Inc., Corporate</b> 62 Whittemore Avenue Cambridge, Massachusetts 02140 USA  <b>Mt. Pleasant, United States</b> 350 Magnolia Drive Mt. Pleasant, Tennessee 38474	
<b>Product Name</b>		Bituthene® 3000 and Bituthene® Low Temperature UN CPC 54530	
<b>Product Definition</b>		Water-resistive barrier materials - any material that has been determined by testing to resist penetration of liquid water [1].	
<b>Product Category Rule (PCR)</b>		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) [1].	
<b>Certification Period</b>		10.23.2017 – 10.23.2022	
<b>Declared Unit</b>		One square meter (1m <sup>2</sup> ) of waterproofing membrane	
<b>ASTM Declaration Number</b>		EPD-073	
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> Water-resistive & Air barrier products	<b>Date of Issue</b> 10.23.2017	<b>Period of Validity</b> 5 years	<b>Declaration Number</b> EPD-073



EPD Information		
<p><b>Declaration Type</b>                      A “Product Stage” or “Cradle-to-gate” EPD of GCP’s production of waterproofing membrane products. This EPD present the product specific profile for two Bituthene® waterproofing 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>                      Water-resistive barriers are materials applied to the exterior of the building to resist liquid water penetration. Typically, water-resistive barriers are combined with flashing to provide a pathway to direct accumulated liquid water to the exterior [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>	  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>
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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

Water-resistive products can 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 liquid water penetration. Typically water-resistive barriers are combined with flashing to provide a pathway to direct accumulated liquid water to the exterior.

GCP' robust waterproofing product offerings provide reliable solutions for all waterproofing designs and conditions, above and below grade. GCP invented the self-adhered waterproofing membrane more than 50 years ago and have been the leader in this category ever since. Structural and foundation waterproofing, including above- and below-grade waterproofing, is a critically important component of any commercial building structure. GCP offers top quality advanced waterproofing membranes and technologies for virtually all above- and below-grade commercial applications. This EPD covers two GCP Bituthene® waterproofing products produced at its Mt. Pleasant, TN facility as described in Table 1.

**Table 1. GCP's waterproofing membrane products (Bituthene®)**

Brand name	Product description
<p><b>Bituthene® 3000</b></p> <p>GCP product link  <a href="https://GCP.com/construction/en-us/waterproofing/Bituthene-3000-Low-Temperature">https://GCP.com/construction/en-us/waterproofing/Bituthene-3000-Low-Temperature</a></p>	<p>Bituthene® 3000 is a self-adhesive, cold-applied composite membrane comprised of rubberized asphalt and cross laminated, high density polyethylene film. Intended for above and below grade concrete, masonry and wood surfaces, Bituthene 3000 is suitable for installation at temperatures of 40F (5°C) and above.</p>
<p><b>Bituthene® Low Temperature</b></p> <p>GCP product link  <a href="https://GCP.com/construction/en-us/waterproofing/Bituthene-3000-Low-Temperature">https://GCP.com/construction/en-us/waterproofing/Bituthene-3000-Low-Temperature</a></p>	<p>Bituthene® Low Temperature is a self-adhesive, cold-applied composite membranes comprised of rubberized asphalt and cross laminated, high density polyethylene film. Intended for above and below grade concrete, masonry and wood surfaces, Bituthene® Low Temperature can be installed between 25F (-4°C) and 60F (16°C).</p>

## 1.2 PRODUCT STANDARDS

Table 2 lists specifications for water-resistive materials as per ASTM PCR:



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

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

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

Table 3 summarizes key technical data for two GCP Bituthene® waterproofing products. Product data sheets, guide specifications and additional product specific information are available for each of these waterproofing products at [www.gcpat.com](http://www.gcpat.com). Table 4 summarizes the material content data for the manufacture of Bituthene® 3000 and Bituthene® Low Temperature. The coated release paper is removed from the product during installation for Bituthene® 3000 and Bituthene® Low Temperature. Paper fiberboard core, carton, wood pallet and stretch wrap are the materials used for inner and outer packaging of these two waterproofing products.

**Table 3. Technical data for GCP waterproofing (Bituthene®)**

Brand name	Product type and performance	Selected physical properties
Bituthene® 3000	Waterproofing, self-adhesive	Color: Dark gray-black; Thickness: 1/16 in. (1.5 mm) nominal; Roll size: 3 ft x 66.7 ft; Roll area: 200 ft <sup>2</sup> (18.6 m <sup>2</sup> ); Average roll weight: 37 lb/100 ft <sup>2</sup> ; Water vapor permeance: 0.05 perms maximum (ASTM E96)
Bituthene® Low Temperature	Waterproofing, self-adhesive	Color: Dark gray-black; Thickness: 1/16 in. (1.5 mm) nominal; Roll size: 3 ft x 66.7 ft; Roll area: 200 ft <sup>2</sup> (18.6 m <sup>2</sup> ); Average roll weight: 37 lb/100 ft <sup>2</sup> ; Water vapor permeance: 0.05 perms maximum (ASTM E96)

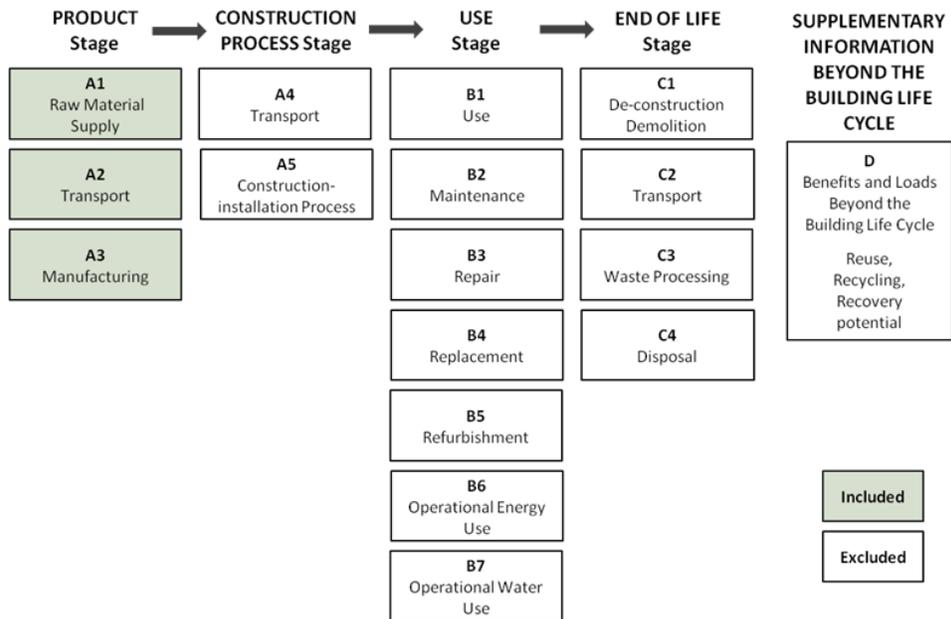
**Table 4. GCP waterproofing - Bituthene® product formulations**

Input material	Bituthene® 3000 (in %)	Bituthene® Low Temperature (in %)
Rubberized asphalt	73%	60%
Polyethylene and proprietary polymers and additives	20%	33%
Release paper	7%	7%
<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.

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.



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



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 5.

**Table 5: Product stage system boundaries – Included and excluded processes**

Product Stage	Included	Excluded
<p><b>A1-A3 Modules</b></p>	<p><b>A1 Product Stage</b> [1]: 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</b> [1]: Transportation: transportation of all input materials and fuels from the supplier to the gate of the manufacturing facility.</p> <p><b>A3 Product Stage</b> [1]: Manufacturing of the waterproofing products, 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 waterproofing products 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.</li> </ul> <p>The A3 module for waterproofing (Mt. Pleasant, TN facility) includes mixing-adhesive, printing-film, coating/lamination, packaging, storage, lighting and heating, ventilation and air conditioning (HVAC), operation of environmental equipment (baghouses and condensers), and on-site transportation (loading and unloading).</p>	<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

Cut-off Rules
<p>No cut-off criteria were applied in the study. All input/output data reported by the GCP waterproofing manufacturing facility were included in the LCI modelling. None of the reported flow data were excluded based on the cut-off criteria.</p>



### Allocation Rules

Allocation rules, as specified in ASTM PCR, section 7.5 were followed [1].

“Mass” was deemed as the most appropriate physical parameter for allocation used for the waterproofing manufacturing system to calculate the input energy flows (electricity and natural gas), 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 for both Bituthene® waterproofing products. Allocation related to transport are based on the mass of transported product.

### Data Quality Requirements

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

**Precision:** GCP’s Mt. Pleasant, TN facility, through measurement and calculation, collected primary input and output data specific to their production of Bituthene® waterproofing products. 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 two Bituthene® 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 waterproofing manufacturing processes were collected at the GCP manufacturing facility in Mt. Pleasant, TN 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 Mt. Pleasant, TN. 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 plants 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 to be 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 6 shows the aggregated product stage total, for both Bituthene® products as manufactured and packaged at the Mt. Pleasant, TN 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 counted and reported under the non-renewable fossil energy (MJ). Figures 2 and 3 present the EPD results for 1 m<sup>2</sup> of Bituthene® 3000 and Bituthene® Low Temperature, by information module on a percent contribution basis, respectively.

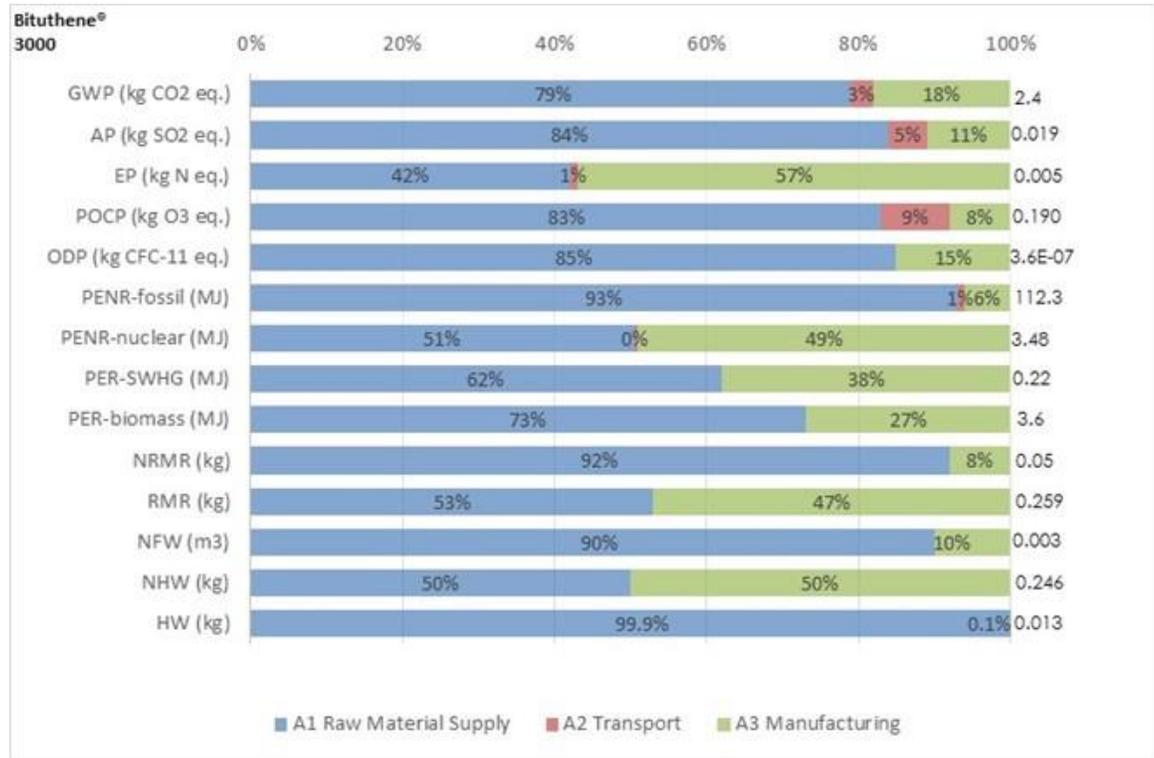
**Table 6: Product stage EPD results for 1 m<sup>2</sup> GCP Bituthene®**

Category Indicator	Unit	Bituthene® 3000	Bituthene® Low Temperature
Global warming potential, GWP	kg CO <sub>2</sub> equiv.	2.4	2.5
Acidification potential, AP	kg SO <sub>2</sub> equiv.	1.88E-02	1.93E-02
Eutrophication potential, EP	kg N equiv.	5.02E-03	5.30E-03
Smog creation potential, POCP	kg O <sub>3</sub> equiv.	1.90E-01	1.87E-01
Ozone depletion potential, ODP	kg CFC-11 equiv.	3.6E-07	5.5E-07
<b>Total primary energy consumption</b>			
Non-renewable, fossil, PENR-fossil	MJ, HHV	112.3	114.8
Non-renewable, nuclear, PENR-nuclear	MJ, HHV	3.48	3.52
Renewable, solar, wind, hydroelectric, and geothermal, PER-SWHG	MJ, HHV	0.22	0.23
Renewable, biomass, PER-biomass	MJ, HHV	3.579	3.582
<b>Material resources consumption</b>			
Non-renewable materials, NRMR	kg	4.98E-02	5.00E-02
Renewable materials, RMR	kg	2.59E-01	2.60E-01



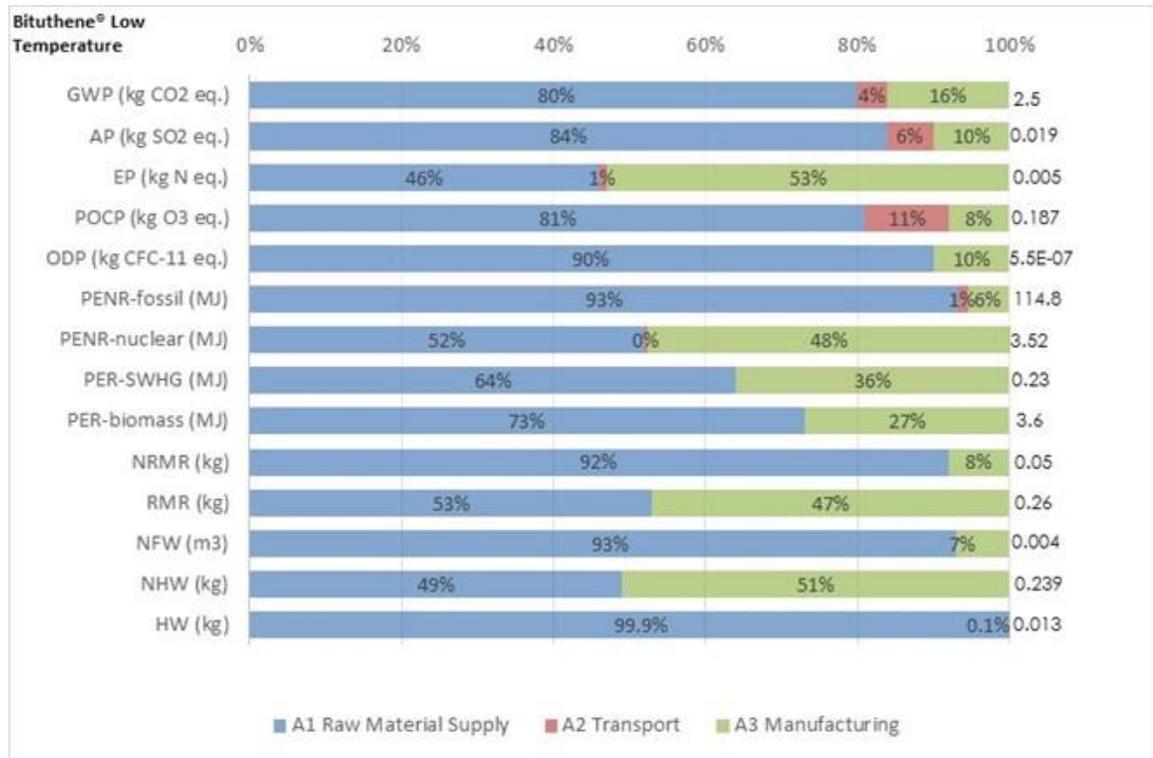
Category Indicator	Unit	Bituthene® 3000	Bituthene® Low Temperature
Net fresh water consumption, NFW	m <sup>3</sup>	2.9E-03	4.0E-03
<b>Waste generated</b>			
Non-hazardous waste, NHW	kg	2.46E-01	2.39E-01
Hazardous waste, HW	kg	1.28E-02	1.34E-02

**Figure 2 Product Stage EPD Results for 1 m<sup>2</sup> GCP Bituthene® 3000 by Information Module-% Basis**





**Figure 3 Product Stage EPD Results for 1 m<sup>2</sup> GCP Bituthene® Low Temperature by Information Module- % Basis**



## 5 INTERPRETATION

The EPD results represent a “cradle-to-gate” EPD per 1m<sup>2</sup> of Bituthene® 3000 and Bituthene® Low Temperature as manufactured at the GCP manufacturing facility in Mt Pleasant, TN during the reference year 2015.

**Bituthene® 3000 and Bituthene® Low Temperature** – the product line demonstrate similar LCA outcomes both in order of magnitude as well as percent contribution across the three activity stages. Raw material supply (A1) accounts for most of the impact results, resource consumption and waste flows – typically ranging between 50% to over 90%. Core manufacturing impacts are significant for global warming potential (18%), eutrophication potential (57%), renewable material resource use (47%) and non-hazardous waste generation (50%). A2 transportation accounts for 9% of the smog potential, but otherwise is a minor contributor to the overall cradle-to-gate effects.

## 6 ADDITIONAL AND ENVIRONMENTAL INFORMATION

Low temperature baghouses and condensers are installed at GCP's Mt. Pleasant, TN plant to control various process emissions.

## 7 DECLARATION TYPE

GCP EPD for water-resistive and 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 Bituthene® waterproofing 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 project 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, Waterproofing (<https://gcpat.com/construction/en-us/waterproofing>)
10. Athena Institute 2017. A Cradle-to-Gate Life Cycle Assessment of Air Barriers and Waterproofing Products Manufactured by GCP Applied Technologies. September 2017.