

A wide-angle photograph of a campus landscape. In the foreground, a calm pond reflects the surrounding greenery and a large, light-colored building in the background. A fountain with multiple jets of water is visible in the middle ground, surrounded by manicured lawns and trees. The sky is clear and blue.

ENVIRONMENTAL **PRODUCT DECLARATION**

BITUTHENE®

POST-APPLIED WATERPROOFING

- **BITUTHENE® 3000**
- **BITUTHENE® 3000HC**
- **BITUTHENE® Low Temperature**
- **BITUTHENE® 4000**
- **BITUTHENE® 8000HC**
- **BITUTHENE® 8000**

GCP is a leading global provider of construction products that include high-performance specialty construction chemicals and building materials.



Program Operator

NSF Certification LLC
789 N. Dixboro, Ann Arbor, MI 48105
www.nsf.org

**General Program Instructions**

NSF Program Operator Rules, February 2015

Manufacturer Name and Address

GCP Applied Technologies Inc.
2325 Lakeview Parkway
Alpharetta GA 30009 USA

Declaration Number

EPD10784

Declared Product and Functional Unit

BITUTHENE® 3000, BITUTHENE® 3000HC, BITUTHENE® LT,
BITUTHENE® 4000, BITUTHENE® 8000HC, BITUTHENE® 8000
Functional Unit: 1 m2 of product

Reference PCR and Version Number

ASTM International Water-Resistive and Air Barriers

Product's intended Application and Use

Waterproofing Systems

Product RSL

Not Applicable

Markets of Applicability

North America

Date of Issue

September 26, 2022

Period of Validity

5 years from date of issue

EPD Type

Product Specific

Intended Audience

Business-to-Business

Range of Dataset Variability

N/A

EPD Scope

Cradle to Gate

Year of reported manufacturer primary data

2020

LCA Software and Version Number

GaBi 10.6.1.35

LCI Database and Version Number

GaBi Database 2022.1

LCIA Methodology and Version Number

TRACI 2.1

The PCR Review was Conducted By:Thomas Gloria, PhD (chair)
Graham Finch
Paul H. Shipp

This declaration was independently verified in accordance with ISO 14025:2006. ISO 21930:2017 serves as the core PCR along with EN 15804 (2012) and UL PCR Part A, v3.1 (2018), with additional considerations from the UL PCR Part B: Insulated Metal Panels Metal Composite Panels and Metal Cladding - Roof and Wall Panels.

 Internal ExternalTony Favilla
afavilla@nsf.org**This Reference Life Cycle Assessment was Conducted in Accordance with ISO 14044 and the Reference PCRs By:**

WAP Sustainability Consulting

This Life Cycle Assessment was Independently Verified in Accordance with ISO 14044 and the Reference PCR By:Jack Geibig
jgeibig@ecoform.com**Limitations:**

Environmental declarations from different programs (ISO 14025) may not be comparable. Comparison of the environmental performance of Products 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. Full conformance with the PCR for Products 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. As this EPD is based on a declared unit, the results cannot be used to compare between products.

1

Product Definition and Information

1.1 DESCRIPTION OF COMPANY

GCP is a leading global provider of construction products that include high-performance specialty construction chemicals and building materials. GCP partners with producers, contractors, designers, and engineers to achieve performance and sustainability goals. The company has a legacy of first to market and award-winning solutions that have been used to build some of the world's most renowned structures. GCP is focused on continuous improvement for its customers, end-users, and the environment.

1.2 PRODUCT DESCRIPTION

BITUTHENE® 3000 and BITUTHENE® Low Temperature Membranes

BITUTHENE® membranes are self-adhesive, rubberized asphalt/polyethylene waterproofing membranes for elevated plaza and parking decks and below grade basements, tunnels, and other subterranean applications. GCP's BITUTHENE® membranes combine a robust, flexible, pre-formed high performance, cross laminated, HDPE carrier film with a tacky, self-adhesive rubberized asphalt compound specifically designed to adhere to cured concrete surfaces. HC membranes indicate formulations specifically made for hot climates.

BITUTHENE® 4000

GCP's BITUTHENE® 4000 system combines a robust, flexible, pre-formed membrane made of a high performance, cross laminated, HDPE carrier film with a tacky, self-adhesive rubberized asphalt compound and BITUTHENE® 4000 surface conditioner. BITUTHENE® 4000 surface conditioner is water-based primer that is specifically formulated to promote adhesion by binding dust and concrete efflorescence to help provide a suitable surface for the BITUTHENE® 4000 waterproofing membrane. For convenience, BITUTHENE® 4000 surface conditioner is packaged inside each roll of BITUTHENE® 4000 membrane.

BITUTHENE® 8000

GCP's BITUTHENE® 8000 membrane combines the proven BITUTHENE® adhesive technology with a unique composite, grey-colored carrier film to provide superior performance, easier installation and protection from methane gas. HC membranes indicate formulations specifically made for hot climates.



1.3 APPLICATION

A waterproofing membrane is a layer of water-tight material that lies on a surface to prevent water leaks or damages. The products assessed here are pre-formed sheet membranes. The objective of waterproofing is to secure a building from all kinds of water damages and prevent further repair work on the structure.

1.4 PRODUCT DESCRIPTION

Table 1: Technical Data by Product

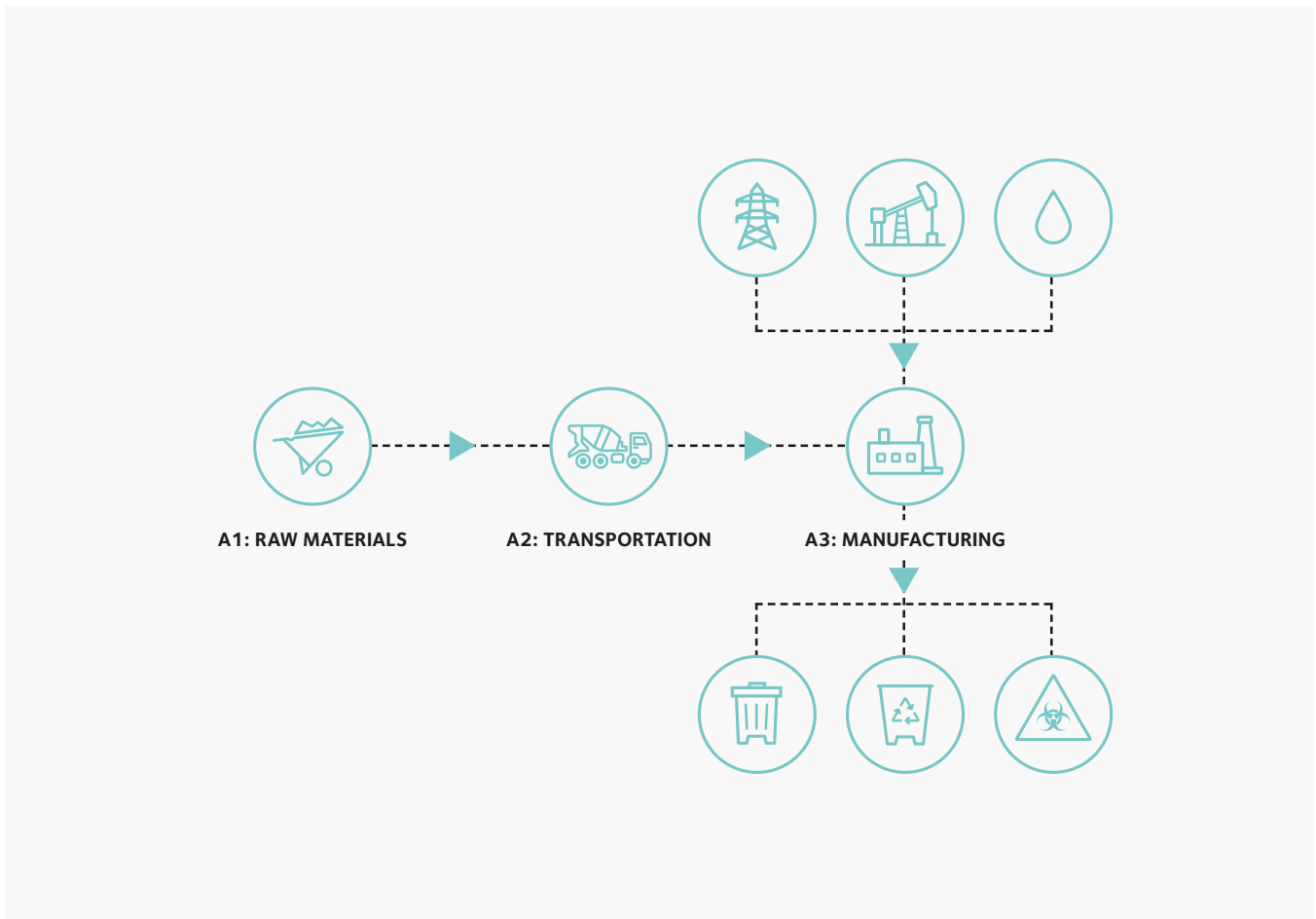
Property	Typical Value BITUTHENE® 3000, BITUTHENE® 3000HC, BITUTHENE® LT	Typical Value BITUTHENE® 4000	Typical Value BITUTHENE® 8000, BITUTHENE® 8000 HT	Test Method
Color	Dark grey-black	Dark grey-black	Dark grey-black	
Thickness	60 mils (1.5 mm) nominal	60 mils (1.5 mm) nominal	60 mils (1.5 mm) nominal	ASTM D3767 - method A
Flexibility, 180° Bend Over 1 in. (25 mm) Mandrel at -25°F (-32°C)	Unaffected	Unaffected	Unaffected	ASTM D1970
Tensile Strength, Membrane, Die C	325 psi (2240 kPa)	325 psi (2240 kPa)	325 psi (2240 kPa)	Minimum ASTM D4121
Tensile Strength, Film	5,000 psi (34.5 MPa) minimum	5,000 psi (34.5 MPa) minimum	5,000 psi (34.5 MPa) minimum	ASTM D8821
Elongation, Ultimate Failure of Rubberized Asphalt	300% minimum	300% minimum	300% minimum	ASTM D4121
Crack Cycling at -25°F (-32°C), 100 Cycles	Unaffected	Unaffected	Unaffected	ASTM C836
Lap Shear	20 lbf (89 N)	20 lbf (89 N)	30 lbf (133 N)	ASTM D10022
Peel Strength	9 lbf/in. (1576 N/m)	11 lbf/in. (1926 N/m)	12 lbf/in. (2100 N/m)	ASTM D903
Puncture Resistance, Membrane	50 lbf (222 N) minimum	50 lbf (222 N) minimum	63 lbf (280 N) minimum	ASTM E154

Resistance to Hydrostatic Head	230 ft (70m) of water	230 ft (70m) of water	230 ft (70m) of water	ASTM D5385
Water Vapor Permeance	<0.1 perms	<0.1 perms	<0.03 perms	ASTM E96, section 12 - water method
Water Absorption	<0.1%	<0.1%	<0.05%	ASTM D570

1.5 DECLARATION OF METHODOLOGICAL FRAMEWORK

This EPD is considered a Cradle-to-Gate study. A summary of the life cycle stages included in this EPD is presented in 2.2. No known flows are deliberately excluded from this EPD. Third party verified ISO 14040/44 secondary LCI data sets contribute more than 67% of total impacts in all impact categories required by the PCR.

1.6 PROCESS FLOW DIAGRAM



1.7 MANUFACTURING

Raw materials are sourced from the suppliers within North America and are transported to the manufacturing facility at Mt. Pleasant, TN by a combination of truck and train transportation.

1.8 MATERIAL COMPOSITION

Table 2: Material Composition per declared unit of 1m² of product for installation

Materials	BITUTHENE® 3000	BITUTHENE® 3000HC	BITUTHENE® 4000	BITUTHENE® LT	BITUTHENE® 8000HC	BITUTHENE® 8000
Bitumen	53.3%	55.8%	38.7%	37.9%	55.7%	38.6%
Lubricants	14.7%	14.7%	24.7%	27.0%	13.3%	24.7%
SBR	12.0%	12.0%	16.6%	15.2%	11.2%	16.5%
Other Materials	20.0%	20.0%	20.0%	19.9%	19.8%	20.2%

This product contains no regulated substances.

1.9 PACKAGING

Table 3: Packaging requirements per functional unit of 1 m² of product for installation

	BITUTHENE® 3000	BITUTHENE® 3000HC	BITUTHENE® 4000	BITUTHENE® LT	BITUTHENE® 8000HC	BITUTHENE® 8000	UNIT
Pallet	0.0432	0.0573	0.0573	0.0432	0.0573	0.0573	kg/m ²
Carton	0.0163	0.0165	0.0165	0.0163	0.0165	0.0165	kg/m ²
Plastic	0.0010	0.0015	0.0015	0.0010	0.0015	0.0015	kg/m ²

2

Life Cycle Assessment Background Information

2.1 DECLARED UNIT

The declared unit according to the PCR is 1 m² of product for installation.

Table 4: Declared Unit

	BITUTHENE® 3000	BITUTHENE® 3000HC	BITUTHENE® 4000	BITUTHENE® LT	BITUTHENE® 8000HC	BITUTHENE® 8000
Declared Unit	1m2	1m2	1m2	1m2	1m2	1m2
Weight (kg)	1.85	1.82	1.80	1.84	1.82	1.81

2.2 SYSTEM BOUNDARY

This EPD is considered a Cradle-to-Gate study. A summary of the life cycle modules included in this EPD is presented in Table 3. Modules A4-A5, B1-B4 and C1-C4 were not declared. Infrastructure flows have been excluded.

Table 5: Summary of Included Life-Cycle Modules

Module	Description
A1	Product Stage: Raw Material Supply
A2	Product Stage: Transport
A3	Product Stage: Manufacturing

2.3 ESTIMATES AND ASSUMPTIONS

All estimates and assumptions are within the requirements of ISO 14040/44. Most of the estimations are within the primary data. The primary data was collected as annual totals including all material inputs, utility usage and production information. For the LCA, the total utility usage information was divided by the annual input of all materials and then allocated to the product based on its material composition.

2.4 CUTOFF CRITERIA

Material inputs greater than 1% (based on total mass of the final product) were included within the scope of analysis. Material inputs less than 1% were included if sufficient data was available to warrant inclusion and/or the material input was thought to have significant environmental impact. Cumulative excluded material inputs and environmental impacts are less than 5% based on total weight of the functional unit. No known flows are deliberately excluded from this EPD.

2.5 DATA SOURCES

Primary data were collected by GCP associates for onsite energy, water, and waste during manufacturing. Whenever available, supplier data were used for raw materials used in the production process. When primary data did not exist, secondary data for raw material production were used from GaBi Database 2022.1. All calculation procedures adhere to ISO 14044.

2.6 DATA QUALITY

The geographical scope of the manufacturing portion of the life cycle is Mt Pleasant, TN. All primary data were collected from the manufacturer. The geographic coverage of primary data is considered excellent. Primary data were provided by the manufacturer and represent all information for calendar year 2020. Secondary data meets the requirement of the PCR that all data be updated within a 10- year period. Primary data provided by the manufacturer is specific to the technology that the company uses in manufacturing their product. It is site-specific and considered of good quality. Data used to allocate energy and water on a per unit of product produced includes overhead energy such as lighting, heating, and sanitary use of water. Sub-metering was not available to extract process only energy and water use from the total energy use. Sub-metering would improve the technological coverage of data quality.

2.7 PERIOD UNDER REVIEW

The period under review is calendar year 2020.

2.8 ALLOCATION

General principles of allocation were based on ISO 14040/44. The manufacturing processes at GCP, studied in this LCA, produces different types of construction products that are similar in product specifications. A mass-based allocation method was adopted for this study. The manufacturing inputs and wastes were allocated on a mass basis to the product. As a default, secondary GaBi datasets use a physical mass basis for allocation. Throughout the study recycled materials were accounted for via the cut-off method.

3

Life Cycle Assessment Results

All results are given per functional unit, which is 1 m² of applied waterproofing or air-barrier. Environmental impacts were calculated using the GaBi software platform. Impact results have been calculated using IPCC AR5 and TRACI 2.1 characterization factors. LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks. 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. 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.

Table 6: Description of the System Boundary Modules

	PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY
	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
	Raw Material Supply	Transport	Manufacturing	Transport From Gate to Site	Assembly/Install	Use	Maintenance	Repair	Replacement	Refurbishment	Building Operational Energy Use During Product Use	Building Operational Water Use During Product Use	Deconstruction	Transport	Waste Processing	Disposal	Reuse, Recovery, Recycling Potential
CRADLE TO GRAVE	X			MND		MND							MND				MND

Table 7: LCIA Indicators

Abbreviation	Parameter	Unit
IPCC AR 5		
GWP	Global warming potential (100 years, excludes biogenic CO ₂)	kg CO ₂ eq
TRACI 2.1		
AP	Acidification potential of soil and water	kg SO ₂ eq

EP	Eutrophication potential	kg N eq
GWP	Global warming potential (100 years, excludes biogenic CO ₂)	kg CO ₂ eq
ODP	Depletion of stratospheric ozone layer	kg CFC 11 eq
SFP	Smog formation potential	kg O ₃ eq

In addition to the environmental parameters described in the previous section, the following resource use and waste categories are also disclosed.

Table 8: Resource Use, Waste, and Output Flow Indicators (ISO 21930:2017)

Abbreviation	Parameter	Unit
Resource Use Parameters		
RPR_E	Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ, net calorific value (LHV)
RPR_M	Use of renewable primary energy resources used as raw materials	MJ, net calorific value
NRPR_E	Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ, net calorific value
NRPR_M	Use of non-renewable primary energy resources used as raw materials	MJ, net calorific value
SM	Use of secondary materials	kg
RSF	Use of renewable secondary fuels	MJ, net calorific value
NRSF	Use of non-renewable secondary fuels	MJ, net calorific value
RE	Recovered energy	MJ, net calorific value
FW	Net use of fresh water	m ³

Waste Parameters and Output Flows		
HWD	Disposed-of-hazardous waste	kg
NHWD	Disposed-of non-hazardous waste	kg
HLRW	High-level radioactive waste, conditioned, to final repository	kg
ILLRW	Intermediate- and low-level radioactive waste, conditioned, to final repository	kg
CRU	Components for reuse	kg
MR	Materials for recycling	kg
MER	Materials for energy recovery	kg
EEE	Exported electrical energy	MJ
EET	Exported thermal energy	MJ

In order to align with the PCR, which references ISO 21930:2007, primary energy consumption results also need to be reported for the higher heating value (HHV) / gross calorific value, as well as material resource consumption.

Table 9: Additional indicator results (ISO 21930:2007)

Parameter	Unit
Total Primary Energy Consumption	
Nonrenewable Fossil	MJ, gross calorific value (HHV)
Nonrenewable Nuclear	MJ, gross calorific value (HHV)
Renewable (Solar, Wind, Hydro, Geo)	MJ, gross calorific value (HHV)
Renewable (Biomass)	MJ, gross calorific value (HHV)

Material Resources Consumption

Nonrenewable Material Resources	kg
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Renewable Material Resources	kg
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3.1 RESULTS (ISO 21930:2017)

Table 10: LCIA and indicator results for BITUTHENE® 3000 and 3000HC, per 1 m²

Impact Category	BITUTHENE® 3000	BITUTHENE® 3000	BITUTHENE® 3000	BITUTHENE® 3000	BITUTHENE® 3000HC	BITUTHENE® 3000HC	BITUTHENE® 3000HC	BITUTHENE® 3000HC
	A1	A2	A3	A1-A3	A1	A2	A3	A1-A3
IPCC AR5								
GWP [kg CO2 eq]	2.05E+00	8.59E-02	5.08E-02	2.19E+00	1.94E+00	8.20E-02	6.06E-02	2.08E+00
TRACI								
AP [kg SO2 eq]	3.29E-03	1.62E-04	1.49E-04	3.60E-03	3.17E-03	1.52E-04	1.62E-04	3.48E-03
EP [kg N eq]	3.71E-04	2.03E-05	3.63E-05	4.27E-04	3.61E-04	1.92E-05	3.79E-05	4.18E-04
GWP [kg CO2 eq]	1.94E+00	8.47E-02	4.94E-02	2.07E+00	1.83E+00	8.09E-02	5.90E-02	1.97E+00
ODP [kg CFC 11 eq]	2.91E-12	1.61E-16	1.52E-14	2.92E-12	2.95E-12	1.54E-16	1.69E-14	2.97E-12
SFP [kg O3 eq]	7.83E-02	4.14E-03	2.21E-03	8.46E-02	7.54E-02	3.86E-03	2.51E-03	8.18E-02
Resource Use Indicators								
RPRE [MJ]	2.41E+00	4.66E-02	5.47E-01	3.01E+00	2.35E+00	4.45E-02	6.76E-01	3.07E+00
RPRM [MJ]	5.52E+00	0.00E+00	7.27E-01	6.24E+00	5.61E+00	0.00E+00	8.77E-01	6.49E+00
NRPRE [MJ]	3.69E+01	1.20E+00	7.21E-01	3.88E+01	3.52E+01	1.14E+00	8.71E-01	3.72E+01
NRPRM [MJ]	5.79E+01	0.00E+00	4.45E-02	5.80E+01	5.70E+01	0.00E+00	6.47E-02	5.70E+01
SM [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 [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 [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 [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 [m3]	9.01E-03	1.67E-04	3.09E-04	9.48E-03	8.53E-03	1.60E-04	3.57E-04	9.05E-03
Output Flows and Waste Categories								
HWD [kg]	4.79E-08	4.98E-12	5.05E-10	4.84E-08	4.86E-08	4.75E-12	5.33E-10	4.91E-08
NHWD [kg]	2.36E-02	1.03E-04	4.14E-03	2.78E-02	2.26E-02	9.83E-05	4.28E-03	2.70E-02
HLRW [kg]	7.36E-07	3.93E-09	2.45E-08	7.65E-07	7.00E-07	3.76E-09	2.93E-08	7.33E-07
ILLRW [kg]	6.38E-04	3.31E-06	2.16E-05	6.63E-04	6.08E-04	3.17E-06	2.59E-05	6.37E-04
CRU [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 [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
MER [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
EEE [MJ]	0.00E+00	0.00E+00	1.83E-07	1.83E-07	0.00E+00	0.00E+00	1.81E-07	1.81E-07
EET [MJ]	0.00E+00	0.00E+00	8.63E-08	8.63E-08	0.00E+00	0.00E+00	8.50E-08	8.50E-08

Table 11: LCIA and indicator results for BITUTHENE® Low Temp and 4000, per 1 m²

Impact Category	BITUTHENE® Low Temp	BITUTHENE® Low Temp	BITUTHENE® Low Temp	BITUTHENE® Low Temp	BITUTHENE® 4000	BITUTHENE® 4000	BITUTHENE® 4000	BITUTHENE® 4000
	A1	A2	A3	A1-A3	A1	A2	A3	A1-A3
IPCC AR5								
GWP [kg CO2 eq]	2.37E+00	9.80E-02	5.08E-02	2.52E+00	2.35E+00	1.01E-01	6.06E-02	2.51E+00
TRACI								
AP [kg SO2 eq]	3.59E-03	2.07E-04	1.49E-04	3.95E-03	3.58E-03	2.05E-04	1.62E-04	3.94E-03
EP [kg N eq]	4.06E-04	2.45E-05	3.63E-05	4.67E-04	4.06E-04	2.47E-05	3.79E-05	4.69E-04
GWP [kg CO2 eq]	2.25E+00	9.66E-02	4.94E-02	2.40E+00	2.23E+00	9.94E-02	5.89E-02	2.39E+00
ODP [kg CFC 11 eq]	2.91E-12	1.84E-16	1.52E-14	2.92E-12	2.96E-12	1.89E-16	1.69E-14	2.97E-12
SFP [kg O3 eq]	8.53E-02	5.54E-03	2.21E-03	9.31E-02	8.53E-02	5.41E-03	2.51E-03	9.33E-02
Resource Use Indicators								
RPRE [MJ]	2.57E+00	5.31E-02	5.47E-01	3.17E+00	2.55E+00	5.47E-02	6.76E-01	3.28E+00
RPRM [MJ]	5.52E+00	0.00E+00	7.27E-01	6.24E+00	5.61E+00	0.00E+00	8.77E-01	6.49E+00
NRPRE [MJ]	4.03E+01	1.37E+00	7.21E-01	4.23E+01	3.97E+01	1.41E+00	8.70E-01	4.20E+01
NRPRM [MJ]	5.77E+01	0.00E+00	4.45E-02	5.77E+01	5.68E+01	0.00E+00	6.47E-02	5.68E+01
SM [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 [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 [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 [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 [m3]	9.91E-03	1.91E-04	3.09E-04	1.04E-02	9.89E-03	1.96E-04	3.57E-04	1.04E-02
Output Flows and Waste Categories								
HWD [kg]	4.82E-08	5.68E-12	5.05E-10	4.87E-08	4.90E-08	5.84E-12	5.33E-10	4.96E-08
NHWD [kg]	2.64E-02	1.17E-04	4.14E-03	3.07E-02	2.72E-02	1.21E-04	4.28E-03	3.16E-02
HLRW [kg]	8.11E-07	4.49E-09	2.45E-08	8.40E-07	7.91E-07	4.62E-09	2.93E-08	8.25E-07
ILLRW [kg]	7.00E-04	3.78E-06	2.16E-05	7.25E-04	6.84E-04	3.89E-06	2.59E-05	7.13E-04
CRU [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 [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
MER [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
EEE [MJ]	0.00E+00	0.00E+00	1.82E-07	1.82E-07	0.00E+00	0.00E+00	1.79E-07	1.79E-07
EET [MJ]	0.00E+00	0.00E+00	8.57E-08	8.57E-08	0.00E+00	0.00E+00	8.42E-08	8.42E-08

Table 12: LCIA and indicator results for BITUTHENE® 8000HC and 8000, per 1 m²

Impact Category	BITUTHENE® 8000HC	BITUTHENE® 8000HC	BITUTHENE® 8000HC	BITUTHENE® 8000HC	BITUTHENE® 8000	BITUTHENE® 8000	BITUTHENE® 8000	BITUTHENE® 8000
	A1	A2	A3	A1-A3	A1	A2	A3	A1-A3
IPCC AR5								
GWP [kg CO2 eq]	1.94E+00	8.20E-02	6.06E-02	2.08E+00	2.35E+00	1.01E-01	6.06E-02	2.51E+00
TRACI								
AP [kg SO2 eq]	3.17E-03	1.52E-04	1.62E-04	3.48E-03	3.58E-03	2.05E-04	1.62E-04	3.94E-03
EP [kg N eq]	3.61E-04	1.92E-05	3.79E-05	4.18E-04	4.06E-04	2.47E-05	3.79E-05	4.69E-04
GWP [kg CO2 eq]	1.83E+00	8.09E-02	5.90E-02	1.97E+00	2.23E+00	9.94E-02	5.89E-02	2.39E+00
ODP [kg CFC 11 eq]	2.95E-12	1.54E-16	1.69E-14	2.97E-12	2.96E-12	1.89E-16	1.69E-14	2.97E-12
SFP [kg O3 eq]	7.54E-02	3.86E-03	2.51E-03	8.18E-02	8.53E-02	5.41E-03	2.51E-03	9.33E-02
Resource Use Indicators								
RPRE [MJ]	2.35E+00	4.45E-02	6.76E-01	3.07E+00	2.55E+00	5.47E-02	6.76E-01	3.28E+00
RPRM [MJ]	5.61E+00	0.00E+00	8.77E-01	6.49E+00	5.61E+00	0.00E+00	8.77E-01	6.49E+00
NRPRE [MJ]	3.52E+01	1.14E+00	8.71E-01	3.72E+01	3.97E+01	1.41E+00	8.70E-01	4.20E+01
NRPRM [MJ]	5.70E+01	0.00E+00	6.47E-02	5.70E+01	5.68E+01	0.00E+00	6.47E-02	5.68E+01
SM [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 [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 [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 [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 [m3]	8.53E-03	1.60E-04	3.57E-04	9.05E-03	9.89E-03	1.96E-04	3.57E-04	1.04E-02
Output Flows and Waste Categories								
HWD [kg]	4.86E-08	4.75E-12	5.33E-10	4.91E-08	4.90E-08	5.84E-12	5.33E-10	4.96E-08
NHWD [kg]	2.26E-02	9.83E-05	4.28E-03	2.70E-02	2.72E-02	1.21E-04	4.28E-03	3.16E-02
HLRW [kg]	7.00E-07	3.76E-09	2.93E-08	7.33E-07	7.91E-07	4.62E-09	2.93E-08	8.25E-07
ILLRW [kg]	6.08E-04	3.17E-06	2.59E-05	6.37E-04	6.84E-04	3.89E-06	2.59E-05	7.13E-04
CRU [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 [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
MER [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
EEE [MJ]	0.00E+00	0.00E+00	1.81E-07	1.81E-07	0.00E+00	0.00E+00	1.79E-07	1.79E-07
EET [MJ]	0.00E+00	0.00E+00	8.50E-08	8.50E-08	0.00E+00	0.00E+00	8.42E-08	8.42E-08

3.2 ADDITIONAL RESULTS (ISO 21930:2007)

Table 13: Additional indicator results for BITUTHENE® 3000 and 3000HC, per 1 m²

	BITUTHENE® 3000	BITUTHENE® 3000	BITUTHENE® 3000	BITUTHENE® 3000	BITUTHENE® 3000HC	BITUTHENE® 3000HC	BITUTHENE® 3000HC	BITUTHENE® 3000HC
	A1	A2	A3	A1-A3	A1	A2	A3	A1-A3
Total Primary Energy Consumption [MJ (HHV)]								
Nonrenewable Fossil	1.01E+02	1.28E+00	7.78E-01	1.03E+02	9.81E+01	1.22E+00	9.53E-01	1.00E+02
Nonrenewable Nuclear	1.63E+00	8.45E-03	5.47E-02	1.69E+00	1.55E+00	8.08E-03	6.57E-02	1.63E+00
Renewable (Solar, Wind, Hydro, Geo)	7.93E+00	4.66E-02	1.27E+00	9.25E+00	7.96E+00	4.45E-02	1.55E+00	9.56E+00
Renewable (Biomass)	5.73E-09	3.88E-10	2.02E-09	8.13E-09	5.75E-09	3.70E-10	2.66E-09	8.78E-09
Material Resources Consumption (kg)								
Nonrenewable Material Resources	2.11E+00	9.22E-03	1.17E-01	2.24E+00	2.00E+00	8.81E-03	1.46E-01	2.15E+00
Renewable Material Resources	6.29E-01	1.57E-02	7.01E-02	7.15E-01	6.38E-01	1.55E-02	7.52E-02	7.29E-01

Table 14: Additional indicator results for BITUTHENE® Low Temp and 4000, per 1 m²

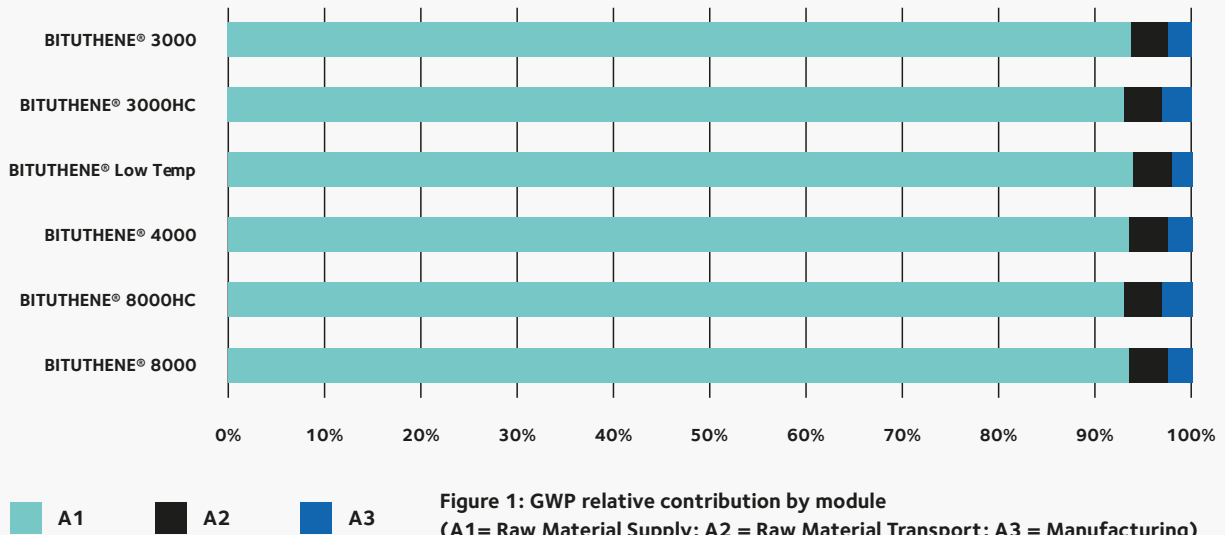
	BITUTHENE® Low Temp	BITUTHENE® Low Temp	BITUTHENE® Low Temp	BITUTHENE® Low Temp	BITUTHENE® 4000	BITUTHENE® 4000	BITUTHENE® 4000	BITUTHENE® 4000
	A1	A2	A3	A1-A3	A1	A2	A3	A1-A3
Total Primary Energy Consumption [MJ (HHV)]								
Nonrenewable Fossil	1.04E+02	1.46E+00	7.78E-01	1.06E+02	1.03E+02	1.50E+00	9.52E-01	1.05E+02
Nonrenewable Nuclear	1.79E+00	9.65E-03	5.47E-02	1.85E+00	1.75E+00	9.93E-03	6.56E-02	1.82E+00
Renewable (Solar, Wind, Hydro, Geo)	8.09E+00	5.31E-02	1.27E+00	9.41E+00	8.16E+00	5.47E-02	1.55E+00	9.76E+00
Renewable (Biomass)	5.56E-09	4.43E-10	2.02E-09	8.02E-09	5.48E-09	4.55E-10	2.66E-09	8.59E-09
Material Resources Consumption (kg)								
Nonrenewable Material Resources	2.42E+00	1.05E-02	1.17E-01	2.55E+00	2.45E+00	1.08E-02	1.46E-01	2.61E+00
Renewable Material Resources	6.32E-01	1.61E-02	7.01E-02	7.19E-01	6.42E-01	1.60E-02	7.52E-02	7.33E-01

Table 15: Additional indicator results for BITUTHENE® 8000HC and 8000, per 1 m²

	BITUTHENE® 8000HC	BITUTHENE® 8000HC	BITUTHENE® 8000HC	BITUTHENE® 8000HC	BITUTHENE® 8000	BITUTHENE® 8000	BITUTHENE® 8000	BITUTHENE® 8000
	A1	A2	A3	A1-A3	A1	A2	A3	A1-A3
Total Primary Energy Consumption [MJ (HHV)]								
Nonrenewable Fossil	9.81E+01	1.22E+00	9.53E-01	1.00E+02	1.03E+02	1.50E+00	9.52E-01	1.05E+02
Nonrenewable Nuclear	1.55E+00	8.08E-03	6.57E-02	1.63E+00	1.75E+00	9.93E-03	6.56E-02	1.82E+00
Renewable (Solar, Wind, Hydro, Geo)	7.96E+00	4.45E-02	1.55E+00	9.56E+00	8.16E+00	5.47E-02	1.55E+00	9.76E+00
Renewable (Biomass)	5.75E-09	3.70E-10	2.66E-09	8.78E-09	5.48E-09	4.55E-10	2.66E-09	8.59E-09
Material Resources Consumption (kg)								
Nonrenewable Material Resources	2.42E+00	1.05E-02	1.17E-01	2.55E+00	2.45E+00	1.08E-02	1.46E-01	2.61E+00
Renewable Material Resources	6.32E-01	1.61E-02	7.01E-02	7.19E-01	6.42E-01	1.60E-02	7.52E-02	7.33E-01

4 Life Cycle Assessment Interpretation

For the selected BITUTHENE® waterproofing systems, the primary contributors to the cradle-to-gate GWP impacts are the raw materials found in module A1. For all products under consideration, the primary contributors are bitumen and SBR with a combined contribution between 50-60% of module A1 GWP impacts for most of the products.



5

Life Cycle Assessment Interpretation

1. IPCC. (2013). Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge, United Kingdom and New York, NY, USA: Cambridge University Press.
2. ISO 14044: 2006 Environmental Management – Life cycle assessment – Requirements and Guidelines.
3. ISO 14044: 2006/ Amd 1:2017 Environmental Management – Life cycle assessment – Requirements and Guidelines – Amendment 1.
4. ISO 14025:2006 Environmental labels and declarations – Type III environmental declarations – Principles and Procedures.
5. ISO 21930:2007 Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services.
6. ISO 21930:2017 Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services.
7. TRACI: The Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts. Version 2.1 – User Guide - <https://nepis.epa.gov/Adobe/PDF/P100HN53.pdf>.
8. ASTM International PCR: Water-Resistive and Air Barriers (UNCPC 54530 and/or CSI MasterFormat DESIGNATIONS 072500, 072600 and 072700)