

# Environmental Product Declaration



**Environmental Product Declaration for surface sealant products, spray-applied waterproofing membrane, produced by Elastochem Specialty Chemicals Inc. at their facility in Brantford, ON**



## ADMINISTRATIVE INFORMATION

### International Certified Environmental Product Declaration

<b>Declared Product:</b>	This Environmental Product Declaration (EPD) for spray-applied waterproofing produced by Elastochem Specialty Chemicals Inc. Declared unit: 1 m2 of waterproofing
<b>Declaration Owner:</b>	Elastochem Specialty Chemicals Inc.
	37 Easton Road
	Brantford, ON
	www.elastochem.com
<b>Program Operator:</b>	Labeling Sustainability
	Address, 11670 W Sunset Blvd.
	City, State, Los Angeles, CA
	www.labelinsustainability.com
<b>Product Category Rule:</b>	ISO 21930:2017 Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services and Sub Product Category Rule: Water-Resistive and Air Barriers (UNCPC 5453 and/or CSI MasterFormat. DESIGNATIONS 072500, 072600 and 072700)- Expired September 2022 but no update is available
	PCR Program Operator: AST International
	PCR review was conducted by: Thomas Gloria, Industrial Ecology Consultants (chairperson) Graham Finch, RDH Building Science, Inc. Paul H. Shipp, USG Corporation
<b>Independent LCA Reviewer and EPD Verifier:</b>	This declaration was independently verified in accordance with ISO 14025:2006
	Independent verification of the declaration, according to ISO 14025:2006
	Internal <input type="checkbox"/> ; External <input checked="" type="checkbox"/>
	Third Party Verifier Geoffrey Guest, Certified 3rd Party Verifier under Labeling Sustainability Program ( <a href="http://www.labelingsustainability.com">www.labelingsustainability.com</a> ), CSA Group ( <a href="http://www.csaregistry.ca">www.csaregistry.ca</a> )
<b>Date of Issue:</b>	22 February 2023
<b>Period of Validity:</b>	5 years; valid until 22 February 2028
<b>EPD Number:</b>	eb032047-cfd4-43b4-a4cb-b65237396510



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## COMPANY DESCRIPTION

ELASTOCHEM SPECIALTY CHEMICALS is a family owned and operated Canadian polyurethane manufacturing company located in Ontario Canada. In business for over 35 years and built upon a world-class product portfolio, Elastochem specializes in the manufacturing of outstanding polyurethane and epoxy-based materials for industries including commercial and residential construction, automotive, oil & gas, agriculture and mining and industrial applications.

The largest divisions within the Elastochem portfolio focus on the building envelope with its Insulthane line of Spray Polyurethane Foam and Hygrothane, a leading-edge spray applied waterproofing membrane. In addition to ensuring all products set the bar for quality and performance, Elastochem also engineers their products to be environmentally responsible and are leaders in bringing environmental innovation to the market.

ELASTOCHEM services all of Canada and exports its products to the United States and other countries abroad. ELASTOCHEM SPECIALTY CHEMICALS is a family owned and operated Canadian polyurethane manufacturing company located in Ontario Canada, commonly referred to as a Polyurethane Systems House. Elastochem has been in business for 20 years producing various specialty chemicals and whose focus is on two component polyurethane spray foam (SFP).

## STUDY GOAL

The intended application of this life cycle assessment (LCA) is to comply with the procedures for creating a Type III environmental product declaration (EPD) and publish the EPD for public review on the website, [www.labelingsustainability.com](http://www.labelingsustainability.com). This level of study is in accordance with EPD Product Category Rule (PCR) for surface sealant published by; International Standards Organization (ISO) 14025:2006 Environmental labels and declarations, Type III environmental declarations-Principles and procedures; ISO 14044:2006 Environmental management, Life cycle assessment- Requirements and guidelines; and ISO 14040:2006 Environmental management, Life cycle assessment-Principles and framework. The performance of this study and its subsequent publishing is in alignment with the business-to-business (B2B) communication requirements for the environmental assessment of building products. The study does not intend to support comparative assertions and is intended to be disclosed to the public.

This project report was commissioned to differentiate Elastochem Specialty Chemicals Inc from their competition for the following reasons: generate an advantage for the organization; offer customers information to help them make informed product decisions; improve the environmental performance of Elastochem Specialty Chemicals Inc by continuously measuring, controlling and reducing the environmental impacts of their products; help project facilitators working on Leadership in Energy and Environmental Design (LEED) projects achieve their credit goal; and to strengthen Elastochem Specialty Chemicals Inc's license to operate in the community. The intended audience for this LCA report is Elastochem Specialty Chemicals Inc's employees, their suppliers, project specifiers of their products, architects, and engineers. The EPD report is also available for policy makers, government



officials interested in sustainability, academic professors, and LCA professionals. This LCA report does not include product comparisons from other facilities.

## DESCRIPTION OF PRODUCT AND SCOPE

Hygrothane is a spray applied, two-component polyurea waterproofing system designed to provide long-lasting protection against moisture intrusion. Applied by certified professionals using a high-pressure system, Hygrothane cures rapidly to form a seamless membrane that completely seals and adheres to a variety of substrates, including concrete, metals, wood and more.

Table 1: List of the standards and other product specifications to which Hygrothane complies.

Attribute	Test	Results
<b>Tensile Strength</b>	ASTM D412	697N (MD) 793N (XD) 388% Elongation
<b>Peel Strength</b>	CAN/CGSB 37.58-M86 ASTM C794	1726 N/m
<b>Water Absorption (% Mass)</b>	CAN/CGSB 37.58-M86	0.43%
<b>Low Temp Flex</b>	CAN/CGSB 37.58-M86 ASTM C794	-40°C No Crack
<b>Air Permeance (40mils)</b>	ASTM E2178	0.0004 L/s m <sup>2</sup> @75 Pa
<b>Hydrostatic Pressure</b>	ASTM D5385	Pass 92m (301 ft)
<b>Static Puncture</b>	CAN/CGSB 37-GP-56M	Pass Rating 4
<b>Dynamic Puncture</b>	CAN/CGSB 37-GP-56M	Pass Rating 4
<b>Water Vapour Transmission</b>	ASTM E96 1.27 mm	58 ng/ (Pa-s-m <sup>2</sup> )
<b>Crack Bridging</b>	ASTM C1305 14 Day -20/+40	PASS, No splitting or loss of adhesion
<b>Water Tightness*</b>	CAN/CGSB 37.56-M86	5m No leakage
<b>Plastic Flow (Stability Test @90°C)</b>	CAN/CGSB 37.50-M89	Pass <0.5mm
<b>Lap Peel</b>	ASTM D1876	1680 N/m
<b>Thickness</b>	ASTM D5147	1.27mm (50 mils)
<b>CCMC</b>	Waterproofing membrane for below-grade concrete foundation walls	14144-R
<b>Colour</b>		Black

This LCA assumes the impacts from products manufactured in accordance with the standards outlined in this report. This LCA is a cradle-to-gate study, and therefore, stages extending beyond the plant gate are not included in this LCA. Excluded stages include transportation of the manufactured



material to the construction site; on-site construction processes and components; building (infrastructure) use and maintenance; and "end-of-life" effects.

## SPRAY-APPLIED WATERPROOFING DESIGN SUMMARY

The following table provides a list of the spray-applied waterproofing products considered in this EPD along with key performance parameters.

Table 2: Declared product considered in this environmental product declaration.

Prod#	Unique name/ID	Short description	Product type	Unit	Density, dry and wet kg/Unit	productGroup
1	Hygrothane	Hygrothane is a spray applied, two-component polyurea waterproofing system.	waterproofing	m2	2.19	2.19E+00

## SPRAY-APPLIED WATERPROOFING DESIGN COMPOSITION

The following figure provides breakdown of the material composition of the surface sealant. To protect the proprietary formula percentage of composition as well as the exact names of most substances has been removed. All substances are in descending order.

Prod#	Unique name/ID
1	MDI
2	Tertiary Amine 1
3	Tertiary Amine 2
4	Tertiary Amine 3
5	Tertiary Amine 4
6	Flame Retardant
7	Moisture Scavenger



## A1 RAW MATERIAL RECYCLED CONTENT AND MATERIAL LOSSES

The following table provides a list of the raw material inputs (module A1) across all products considered, their recyclability content and assumed material losses.

Table 3: Module A1 raw material inputs, the recyclability content and assumed material losses (dry basis)

product.name	mix.category	primary.content	Recycled.content	material.losses
Steel Drums	steel, low-alloyed	31%	0%	0%
Pallets	EUR-flat pallet	100%	0%	0%
Plastic Wrap (HPDE)	extrusion, plastic film	100%	0%	0%
Tertiary Amine 2	Proprietary	100%	0%	2%
Tertiary Amine 4	Proprietary	100%	0%	2%
Polyester Polyol 1	Proprietary	100%	0%	2%
Tertiary Amine 1	Proprietary	100%	0%	2%
chemical, organic	chemical, organic	100%	0%	2%
carbon black	Proprietary	100%	0%	2%
Moisture Scavenger 1	Proprietary	100%	0%	2%
Side A	MDI	100%	0%	2%

## SYSTEM BOUNDARIES

In the following figure, the cradle-to-gate system boundary is considered A1 to A3 only.

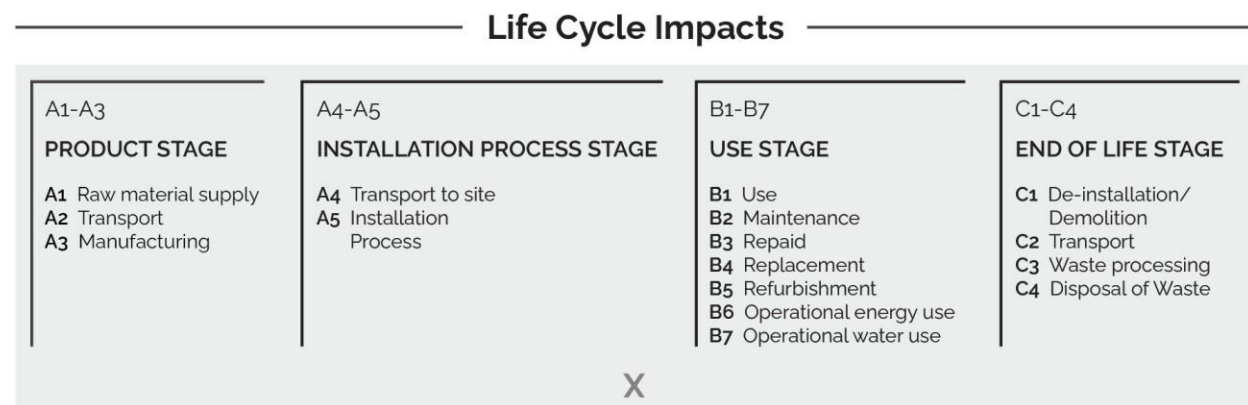


Figure 2: General life cycle phases for consideration in a construction works system

This is a Cradle-to-gate life cycle assessment and the following life cycle stages are included in the study:

- A1: Raw material supply (upstream processes) - Extraction, handling, and processing of the materials used in manufacturing the declared products in this LCA.
- A2: Transportation - Transportation of A1 materials from the supplier to the "gate" of the manufacturing facility (i.e. A3).
- A3: Manufacturing (core processes)- The energy and other utility inputs used to store, move, and manufacturer the declared products and to operate the facility.

According to the PCR, the following figure illustrates the general activities and input requirements for producing surface sealant products and is not necessarily exhaustive.



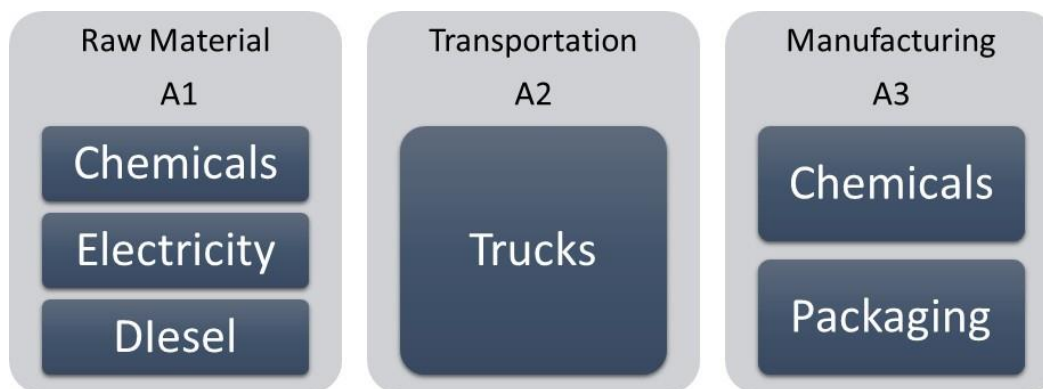


Figure 3: General system inputs considered in the product system and categorized by modules in scope

In addition, as according to the relevant PCR, the following requirements are excluded from this study:

- Production, manufacture and construction of A3 building/capital goods and infrastructure;
- Production and manufacture of steel production equipment, steel delivery vehicles, earth-moving equipment, and laboratory equipment;
- Personnel-related activities (travel, furniture, office supplies);
- Energy use related to company management and sales activities.

For this LCA the manufacturing plant, owned and operated by Elastochem Specialty Chemicals Inc, is located at their Elastochem Chemicals facility in Ontario. All operating data is formulated using the actual data from Elastochem Specialty Chemicals Inc's plant at the above location, including water, energy consumption and waste generation. All inputs for this system boundary are calculated for the plant.

This life cycle inventory was organized in a spreadsheet and was then input into an RStudio environment where pre-calculated LCIA results for relevant products/activities stemming from the ecoinvent v3.8 database and a local EPD database in combination with primary data from Elastochem Specialty Chemicals Inc were utilized. Explanations of the contribution of each data source to this study are outlined in the section 'Data Sources and Quality'. Further LCI details for each declared product are provided in the sections 'Detailed LCI tables' and 'Transport tables' of the detailed LCA report. A parameter uncertainty analysis was also performed where key statistical results (e.g. min/mean/max etc.) are provided in the detailed LCA report.

No known flows are deliberately excluded from this EPD.

## CUT-OFF CRITERIA

ISO 14044:2006 and the focus PCR requires the LCA model to contain a minimum of 95% of the total inflows (mass and energy) to the upstream and core modules be included in this study. The cut-off criteria were applied to all other processes unless otherwise noted above as follows. A 1% cut-off is considered for all renewable and non-renewable primary energy consumption and the total mass of inputs within a unit process where the total of the neglected inputs does not exceed 5%.



## DATA SOURCES AND DATA QUALITY ASSESSMENT

No recovered on-site energy occurs at this facility.

Table 4: Reused or recycled components/materials at the A3 facility site

Component/material for re-use/recycling	Value	Units	Re-used/recycled on-site or off-site
Plastic packaging	23.11145	kg	Off-site
Plastic	694.45465	kg	Off-site
Steel components	6,444.53916	kg	Off-site

The following statements explain how the above facility requirements/generation were derived:

**Raw material transport:** Elastochem Specialty Chemicals provided all raw material data for the reference year 2021. This includes a complete chemical inventory of the products covered in this study to 100 ppm. The transportation was reported using primary Elastochem data and consisted of the distance, mode of transport, and location data in the city, state, and country.

**Electricity:** Elastochem Specialty Chemicals uses the national grid of their region. Therefore, all primary data was gathered from utility bills and reported using kWh. The products covered in this EPD consist of 1% of the overall product volume sold (i.e., mass basis); therefore, all electricity was allocated based on that 1% figure.

**Process/space heating:** Elastochem Specialty Chemicals uses natural gas as supplied to their region. Therefore, all primary data was gathered from utility bills and reported using megajoules (MJ). The products covered in this EPD consist of 1% of the overall product volume; therefore, all electricity was allocated based on that 1% figure.

**Fuel required for machinery:** Elastochem Specialty Chemicals uses propane to move materials at their facility. Primary data was gathered from the vendor bills for the propane tanks and reported in liters. The products covered in this EPD consist of 1% of the overall product volume; therefore, all electricity was allocated based on that figure. The propane was reported in gallons and converted to kilograms using the formula: 2.21 kg = 1 gallon of propane.

**Waste generation:** All waste for A3 was calculated using primary information from Elastochem vendor bills. No conversion was necessary because they reported their waste in tons. Transportation defaults were used because the driver's route and ultimate final destination are unknown. Therefore, the exact mileage could not be confirmed by the waste hauler. No hazardous waste is associated with this product.

**Recovered energy:** No on-site energy is recovered on site.

**Recycled/reused material/components:** Elastochem buys new barrels and totes for its products. A new barrel consists of 19.1 kg of steel. A tote is made of HPDE and steel. It weighs 58 kg, 90% of that weight being the HPDE and the remaining 10% steel.

**Module A1 material losses:** Default material losses, 2%, were used.



**Direct A3 emissions accounting:** NA

The following tables depict a list of assumed life cycle inventory utilized in the LCA modeling to generate the impact results across the life cycle modules in scope. An assessment of the quality of each LCI activities utilized from various sources is also provided.

Table 5: LCI inputs assumed for module A1 (i.e. raw material supply)

Input	LCI.activity	Data.source	Geo	Year	Technology	Time	Geography	Reliability	Completeness
<b>Proprietary</b>	Proprietary	ecoinvent v3.8	Ontario	v3.8 in 2021	2	3	2	3	3
<b>Tertiary Amine 2</b>	Proprietary	ecoinvent v3.8	Kansas	v3.8 in 2021	2	3	2	3	3
<b>Steel Drums</b>	steel production, electric, low-alloyed/steel, low-alloyed/RoW/kg	ecoinvent v3.8	Multiple Regions	v3.8 in 2021	1	3	1	3	3
<b>Tertiary Amine 1</b>	Proprietary	ecoinvent v3.8	Kansas	v3.8 in 2021	2	3	2	3	3
<b>Tertiary Amine 4</b>	Proprietary	ecoinvent v3.8	Kansas	v3.8 in 2021	2	3	2	3	3
<b>Plastic Wrap (HPDE)</b>	extrusion, plastic film/extrusion, plastic film/RoW/kg	ecoinvent v3.8	Multiple Regions	v3.8 in 2021	1	3	1	3	3
<b>Polyester Polyol 1</b>	Proprietary	ecoinvent v3.8	Texas	v3.8 in 2021	2	3	2	3	3
<b>chemical, organic</b>	market for chemical, organic/chemical, organic/GLO/kg	ecoinvent v3.8	Multiple Regions	v3.8 in 2021	2	3	2	3	3
<b>Pallets</b>	EUR-flat pallet production/EUR-flat pallet/RoW/unit	ecoinvent v3.8	Multiple Regions	v3.8 in 2021	1	3	1	3	3
<b>Moisture Scavenger 1</b>	Proprietary	ecoinvent v3.8	Kansas	v3.8 in 2021	2	3	2	3	3
<b>Other Proprietary Ingredients</b>	Proprietary	ecoinvent v3.8	Multiple Regions	v3.8 in 2021	1	3	1	3	3
<b>Side A</b>	MDI/RER	ecoinvent v3.8	Multiple Regions	v3.8 in 2021	1	3	1	3	3



Table 6: LCI inputs assumed for module A3

Input	LCI.activity	Data.source	Geo	Year	Technology	Time	Geography	Reliability	Completeness
<b>Bulk Waste</b>	process-specific burdens, inert material landfill/process-specific burdens, inert material landfill/RoW/kg	ecoinvent v3.8	Ontario	v3.8 in 2021	2	3	2	3	3
<b>Electricity</b>	market for electricity, medium voltage/electricity, medium voltage/CA-ON/kWh	ecoinvent v3.8	Ontario	v3.8 in 2021	2	3	2	3	3
<b>Natural Gas</b>	heat production, natural gas, at boiler modulating >100kW/heat, district or industrial, natural gas/CA-QC/MJ	ecoinvent v3.8	Ontario	v3.8 in 2021	2	3	2	3	3
<b>Regulated Waste</b>	treatment of hazardous waste, hazardous waste incineration/hazardous waste, for incineration/RoW/kg	ecoinvent v3.8	Multiple Regions	v3.8 in 2021	1	3	1	3	3

## DATA QUALITY ASSESSMENT

Data quality/variability requirements, as specified in the PCR, are applied. This section describes the achieved data quality relative to the ISO 14044:2006 requirements. Data quality is judged based on its precision (measured, calculated or estimated), completeness (e.g., unreported emissions), consistency (degree of uniformity of the methodology applied within a study serving as a data source) and representativeness (geographical, temporal, and technological).

**Precision:** Through measurement and calculation, the manufacturers collected and provided primary data on their annual production. For accuracy, the LCA practitioner and 3rd Party Verifier validated the plant gate-to-gate data.

**Completeness:** All relevant specific processes, including inputs (raw materials, energy and ancillary materials) and outputs (emissions and production volume) were considered and modeled to represent the specified and declared products. The majority of relevant background materials and processes were taken from ecoinvent v3.8 LCI datasets where relatively recent region-specific electricity inputs were utilized. The most relevant EPDs requiring key A1 inputs were also utilized where readily available.



**Consistency:** To ensure consistency, the same modeling structure across the respective product systems was utilized for all inputs, which consisted of raw material inputs and ancillary material, energy flows, water resource inputs, product and co-products outputs, returned and recovered Spray foam insulation materials, emissions to air, water and soil, and waste recycling and treatment. The same background LCI datasets from the ecoinvent v3.8 database were used across all product systems. Crosschecks concerning the plausibility of mass and energy flows were continuously conducted. The LCA team conducted mass and energy balances at the plant and selected process level to maintain a high level of consistency.

**Reproducibility:** Internal reproducibility is possible since the data and the models are stored and available in a machine-readable project file for all foreground and background processes, and in Labeling Sustainability's proprietary Spray foam insulation LCA calculator\* for all production facility and product-specific calculations. A considerable level of transparency is provided throughout the detailed LCA report as the specifications and material quantity make-up for the declared products are presented and key primary and secondary LCI data sources are summarized. The provision of more detailed publicly accessible data to allow full external reproducibility was not possible due to reasons of confidentiality.

\*Labeling Sustainability has developed a proprietary tool that allows the calculation of PCR-compliant LCA results for Spray foam insulation product designs. The tool auto-calculates results by scaling base-unit technosphere inputs (i.e. 1 kg sand, 1 kWh electricity, etc.) to replicate the reference flow conversions that take place in any typical LCA software like openLCA or SimaPro. The tool was tested against several LCAs performed in openLCA and the tool generated identical results to those realized in openLCA across every impact category and inventory metric (where comparisons could be readily made).

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

- Time related coverage of the manufacturing processes' primary collected data from 2021-01-01 to 2021-12-31.
- Upstream (background) LCI data was either the PCR specified default (if applicable) or more appropriate LCI datasets as found in the country-adjusted ecoinvent ecoinvent v3.8 database.
- Geographical coverage for inputs required by the A3 facility(ies) is representative of its region of focus; other upstream and background processes are based on US, North American, or global average data and adjusted to regional electricity mixes when relevant.
- Technological coverage is typical or average and specific to the participating facilities for all primary data.

## ENVIRONMENTAL INDICATORS AND INVENTORY METRICS

Per the PCR, this EPD supports the life cycle impact assessment indicators and inventory metrics as listed in the tables below. As specified in the PCR, the most recent US EPA Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts (TRACI), impact categories were utilized as they provide a North American context for the mandatory category indicators to be included in the EPD. Additionally, the PCR requires a set of inventory metrics to be reported with the LCIA indicators (see tables below).



Table 7: Life cycle impact categories and life cycle inventory metrics

ID	LCIA.indicators	Abbreviations	Units
1	Environmental impact: acidification	AP	moles of H <sup>+</sup> -Eq
2	Environmental impact: eutrophication	EP	kg N
3	Environmental impact: global warming	GWP	kg CO <sub>2</sub> -Eq
4	Environmental impact: ozone depletion	ODP	kg CFC-11-Eq
5	Environmental impact: photochemical oxidation	PCOP	kg NO <sub>x</sub> -Eq
6	Material resources: metals/minerals: abiotic depletion potential (ADP): elements (ultimate reserves)	ADPe	kg Sb-Eq
7	Energy resources: non-renewable: abiotic depletion potential (ADP): fossil fuels	ADPf	MJ, net calorific value
<b>Inventory metrics</b>			
8	Total primary energy	TPE	MJ-Eq
9	Renewable energy	RE	MJ-Eq
10	Non-renewable energy	NRE	MJ-Eq
11	Non-Renewable Resources	NRR	kg
12	Renewable Resources	RR	m <sup>3</sup>
13	Water depletion: WDP	WDP	m <sup>3</sup>
14	Land filling: bulk waste	LFW	kg waste
15	Land filling: hazardous waste	LFHW	kg waste

It should be noted that 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 any of the following categories.

- Renewable primary energy resources as energy (fuel);
- Renewable primary resources as material;
- Non-renewable primary resources as energy (fuel);
- Non-renewable primary resources as material;
- Secondary Materials;
- Renewable secondary fuels;
- Non-renewable secondary fuels;
- Recovered energy;
- Abiotic depletion potential for non-fossil mineral resources.
- Land use related impacts, for example on biodiversity and/or soil fertility;
- Toxicological aspects;
- Emissions from land use change [GWP 100 (land-use change)];
- Hazardous waste disposed;
- Non-hazardous waste disposed;
- High-level radioactive waste;
- Intermediate and low-level radioactive waste;
- Components for reuse;
- Materials for recycling;
- Materials for energy recovery;



- Recovered energy exported from the product system.

## TOTAL IMPACT SUMMARY

The following table reports the total LCA results for each product produced at the given surface sealant facility on a per 1 m<sup>2</sup> of waterproofing basis.

Table 8: Total life cycle (across modules in scope) impact results for the declared product, assuming the geometric mean point values on a per 1 m<sup>2</sup> of waterproofing

a) Midpoint Impact Categories:

Indicator/LCI Metric	AP	EP	GWP	ODP	PCOP	ADPe	ADPf
Unit	moles of H <sup>+</sup> -Eq	kg N	kg CO <sub>2</sub> -Eq	kg CFC-11-Eq	kg NO <sub>x</sub> -Eq	kg Sb-Eq	MJ, net calorific value
Hygrothane	2.03E+00	4.03E-03	7.45E+00	9.13E-07	2.31E-02	8.70E-05	1.61E+02

b) Inventory Metrics:

Indicator/LCI Metric	TPE	RE	NRE	NRR	RR	WDP	LFW	LFHW
Unit	MJ-Eq	MJ-Eq	MJ-Eq	kg	m <sup>3</sup>	m <sup>3</sup>	kg waste	kg waste
Hygrothane	2.03E+02	3.40E+01	1.70E+02	4.49E+00	3.98E-04	1.72E-01	1.40E+00	1.22E-04

## ADDITIONAL ENVIRONMENTAL INFO

No regulated substances of very high concern are utilized on site.



## REFERENCES

### ISO Standards:

- ISO 6707-1: 2014 Buildings and Civil Engineering Works - Vocabulary - Part 1: General Terms
- ISO 14021:1999 Environmental Labels and Declarations - Self-declared Environmental Claims (Type II Environmental Labeling)
- ISO 14025:2006 Environmental Labels and Declarations - Type III Environmental Declarations - Principles and Procedures
- ISO 14040:2006 Environmental Management - Life Cycle Assessment - Principles and Framework
- ISO 14044:2006 Environmental Management - Life Cycle Assessment - Requirements and Guidelines
- ISO 14067:2018 Greenhouse Gases – Carbon Footprint of Products – Requirements and Guidelines for Quantification
- ISO 14050:2009 Environmental Management - Vocabulary
- ISO 21930:2017 Sustainability in Building Construction - Environmental Declaration of Building Products

### EN Standards:

- EN 16757 Sustainability of construction works - Environmental product declarations – Product Category Rules for concrete and concrete elements
- EN 15804 Sustainability of construction works - Environmental product declarations -Core rules for the product category of construction products

### Other References:

- USGBC LEED v4 for Building Design and Construction, 11 Jan 2019 available at <https://www.usgbc.org/resources/pcr-committee-process-resources-part-b>
- USGBC PCR Committee Process & Resources: Part B, USGBC, 7 July 2017 available at <https://www.usgbc.org/resources/pcr-committee-process-resources-part-b>.
- US EPA (2020) Advancing Sustainable Materials Management: 2018 Fact Sheet, [https://www.epa.gov/sites/production/files/2021-01/documents/2018\\_ff\\_fact\\_sheet\\_dec\\_2020\\_fnl\\_508.pdf](https://www.epa.gov/sites/production/files/2021-01/documents/2018_ff_fact_sheet_dec_2020_fnl_508.pdf)

