



Environmental Product Declaration



Environmental Product Declaration for concrete joint filler products produced by Metzger/McGuire



ADMINISTRATIVE INFORMATION

International Certified Environmental Product Declaration

Declared Product:	This Environmental Product Declaration (EPD) covers concrete joint filler products produced by Metzger/McGuire. Declared unit: 1 kg of Concrete Joint Filler Product
Declaration Owner:	Metzger/McGuire
	P.O. Box 2217
	Concord, New Hampshire
	www.metzgermcguire.com
Program Operator:	Labeling Sustainability
	Address, 11670 W Sunset Blvd.
	City, State, Los Angeles, CA
	http://labelingsustainability.com/
Product Category Rule:	ISO 21930:2017 Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction product and services
	PCR Program Operator: International Organization for Standardization
	PCR review was conducted by: Technical Committee: ISO/TC 59/SC 17 Sustainability in buildings and civil engineering works
Independent LCA Reviewer and EPD Verifier:	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 (www.labelingsustainability.com). CSA Group (www.csaregistries.ca)
Date of Issue:	02 July 2024
Period of Validity:	5 years; valid until 02 July 2029
EPD Number:	031c0ead-4628-4c64-bf67-8b9ga85ab7ce





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COMPANY DESCRIPTION

For more than 50 years, Metzger/McGuire has been the industry leader in concrete joint protection and repair systems. From retail/commercial polished concrete floors to the most demanding distribution/manufacturing industrial floor settings, Metzger/McGuire produces a full line of concrete protection and restoration products to ensure the long-term durability and serviceability of any concrete floor. Our products are backed with 24-hour technical support and field service that is second to none.

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. This level of study is in accordance with EPD Product Category Rule (PCR) for Concrete Joint Filler Product 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 Metzger/McGuire 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 Metzger/McGuire 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 Metzger/McGuire's license to operate in the community. The intended audience for this LCA report is Metzger/McGuire'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

Edge-Pro 80 is a two-part, 100% solids, rapid-setting polyurea polymer liquid system used to fill and protect joints in exposed concrete retail floors and in moderate-duty warehouse concrete floors. Its primary function is to protect joint edges from spilling under material handling vehicle traffic.

Edge-Pro 90 is a two-part, 100% solids, rapid-setting polyurea polymer liquid system used to fill and protect joints in heavy duty industrial concrete floors subjected to frequent and demanding traffic. Its primary function is to protect joint edges from spalling under material handling vehicle traffic.

MM-80P is 100% solids, two component, heavy duty semi-rigid epoxy joint filler designed to fill and protect contraction and construction joints in industrial concrete floors.



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.

CONCRETE JOINT FILLERS PRODUCT DESIGN SUMMARY

The following tables provide a list of the concrete joint filler products considered in this EPD along with key performance parameters.

Table 1: Declared products with All declared products considered in this environmental product declaration.

Prod#	Unique name/ID	Short description	Product type	Unit	bio-carbon content, kg C/FU dry basis	productGroup
1	Edge-Pro 80	Edge-Pro 80 is a two-part, 100% solids, rapid-setting polyurea polymer liquid system.	Polyurea Joint Filler	kg	0.00	Concrete Joint Fillers
2	Edge-Pro 90	Edge-Pro 90 is a two-part, 100% solids, rapid-setting polyurea polymer liquid system.	Polyurea Joint Filler	kg	0.00	Concrete Joint Fillers
3	MM-80P	MM-80P is a 100% solids, two component, heavy duty semi-rigid epoxy joint filler.	Epoxy Joint Filler	kg	0.00	Concrete Joint Fillers

CONCRETE JOINT FILLERS PRODUCT DESIGN COMPOSITION

The following figures provide mass breakdown (kg per functional unit) of the material composition of each concrete joint filler product design considered.

Table 2 Material composition - All declared products per 1 kg of Concrete Joint Filler Product

ID	Product Type	Product Components
Edge-Pro 80	Polyurea Joint Filler	<ul style="list-style-type: none"> ○ Methylene Diphenyl Diisocyanate ○ Polyether Polyol ○ Amine Curing Agent ○ Additives
Edge-Pro 90	Polyurea Joint Filler	<ul style="list-style-type: none"> ○ Methylene Diphenyl Diisocyanate ○ Polyether Polyol ○ Amine Curing Agent ○ Additives
MM-80P	Epoxy Joint Filler	<ul style="list-style-type: none"> ○ Epoxy Resin ○ Calcium Carbonate ○ Reactive Diluent ○ Amine Curing Agent ○ Additives



SYSTEM BOUNDARIES

The following figure depicts the cradle-to-grave system boundary considered in this study:

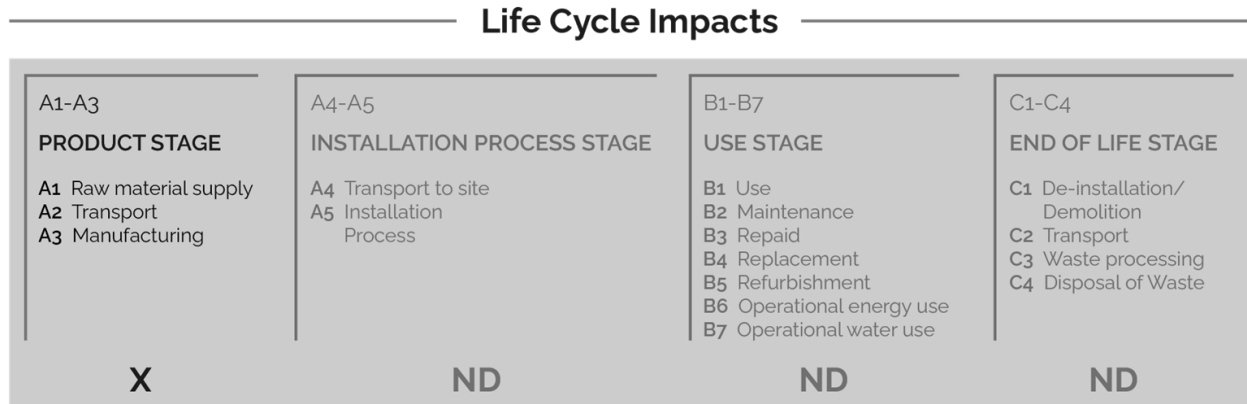


Figure 1: **General life cycle phases for consideration in a construction works system**

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 manufacture the declared products and to operate the facility.

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



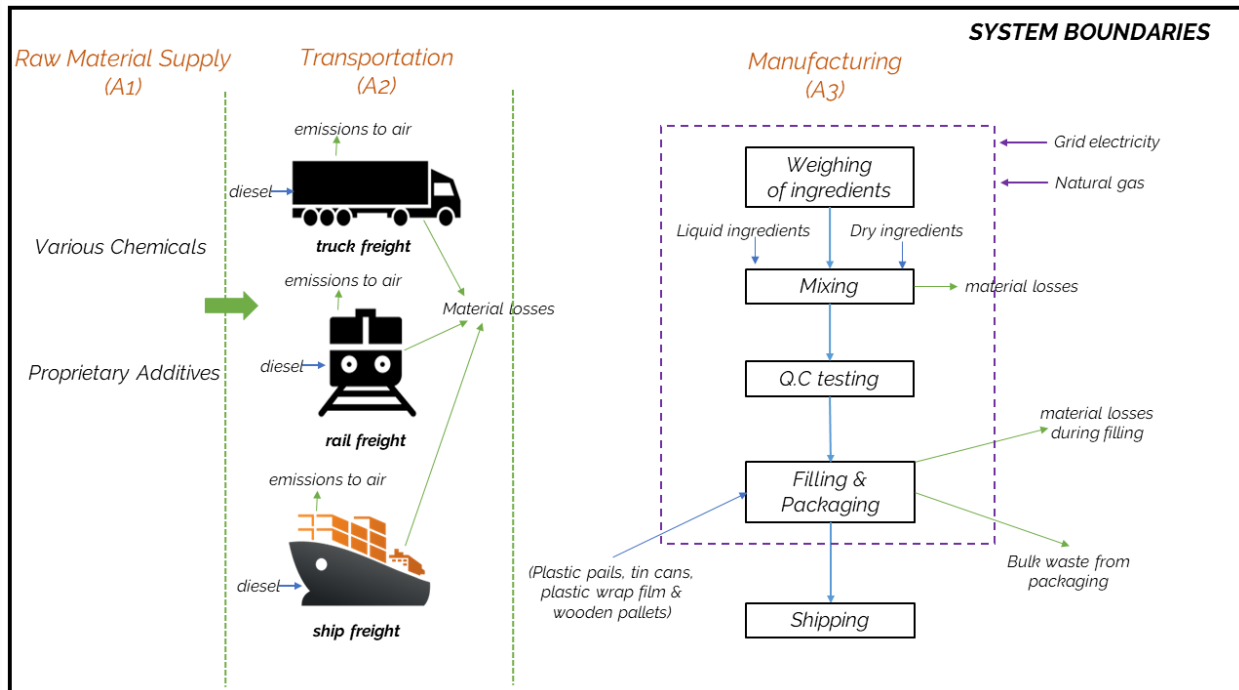


Figure 2: General system inputs considered in the product system and categorized by modules in scope

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 Metzger/McGuire, is located at their U.S. facility. All operating data is formulated using the actual data from Metzger/McGuire’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 v3.10 database and a local EPD database in combination with primary data from Metzger/McGuire 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.

No re-used or recycled material for utilization on-site or off-site was reported at this facility.

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

Raw material transport: Metzger/McGuire provided all the raw material data for the reference data from April 2023 to March 2024. Raw material transportation is based on the actual distance from the manufacturer/distributor. The transportation was reported using Metzger/McGuire's primary data which consisted of the actual distance, mode of transport, and location in the city, state, and country.

Electricity: The reported electricity consumption is based on primary information from utility bills for the reporting period. Electricity usage allocation was initially determined by calculating the product percentage of each product type relative to the sales volume. Subsequently, the resulting sales percentage values were then multiplied by the total electricity consumption. Thus, giving a specific value for each product type to the overall electricity consumption.

Process/space heating: The facility incorporates natural gas within its production processes. The reported consumption of natural gas is based on primary information derived from utility bills for the reporting period. The conversion factor used for mmBTU to MJ to represent the natural gas heating values in Mega joules (MJ) was 1 MMBtu equating to 1055.055 MJ.

Fuel required for machinery: No on-site machinery fuel used.

Waste generation: Waste generation values are reported directly from Metzger/McGuire's operational activities. 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. Transportation for waste in the end-of-life modules also uses default distances set by the PCR.

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

Recycled/reused material/components: No recycling is assumed in this cradle to gate study.

Module A1 material losses: Default material losses, 2% were used unless otherwise specified in the PCR.



Direct A3 emissions accounting: Direct emissions were modeled with the best available ecoinvent processes (see LCI list).

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

Input	LCI Activity	Data Source	Geo	Year	Technology	Time	Geography	Reliability	Completeness
Fatty acid, tall oil	kraft paper production/tall oil, crude/RoW/kg	ecoinvent v3.10 in 2024	FL	2024	2	3	2	3	3
Methoxy hydroxy propane	1-propanol production/1-propanol/RoW/kg	ecoinvent v3.10 in 2024	North Rhine-Westphalia	2024	0	3	2	3	3
Methylene-bis-butylaniline	aniline production/aniline/RoW/kg	ecoinvent v3.10 in 2024	Maharashtra	2024	0	3	2	3	3
Silicon dioxide	silica sand production/silica sand/RoW/kg	ecoinvent v3.10 in 2024	Hubei	2024	2	3	2	3	3
Salicylic acid	salicylic acid production/salicylic acid/GLO/kg	ecoinvent v3.10 in 2024	CA	2024	2	3	2	3	3
Bisphenol A epichlorhydrin	bisphenol A epoxy based vinyl ester resin production/bisphenol A epoxy based vinyl ester resin/RoW/kg	ecoinvent v3.10 in 2024	Ohio	2024	2	3	2	3	3
Zeolite	market for zeolite, powder/zeolite, powder/GLO/kg	ecoinvent v3.10 in 2024	KY	2024	2	3	2	3	3
Propane, 1,3-bis(epoxypropoxy)	epoxy resin production, liquid/epoxy resin, liquid/RoW/kg	ecoinvent v3.10 in 2024	Anhui	2024	2	3	2	3	3
Polyether polyol resin	ethylenediamine production/ethylenediamine/RoW/kg	ecoinvent v3.10 in 2024	Gyeonggi-do	2024	1	3	2	3	3
Lime	lime production, milled, loose/lime/RoW/kg	ecoinvent v3.10 in 2024	Gelderland	2024	2	3	2	3	3





Fatty acid	fatty acid production, from soybean oil/fatty acid/RoW/kg	ecoinvent v3.10 in 2024	North Rhine-Westphalia	2024	2	3	2	3	3
Polypropylene glycol butylether	dipropylene glycol monomethyl ether production/dipropylene glycol monomethyl ether/RoW/kg	ecoinvent v3.10 in 2024	TX	2024	1	3	2	3	3
Ethylene glycol	ethylene glycol production/ethylene glycol/RoW/kg	ecoinvent v3.10 in 2024	TX	2024	2	3	2	3	3
Octadecanoic acid	stearic acid production/stearic acid/GLO/kg	ecoinvent v3.10 in 2024	MO	2024	2	3	2	3	3
Dibutyltin dilaurate	chemical production, organic/chemical, organic/GLO/kg	ecoinvent v3.10 in 2024	CA	2024	0	3	2	3	3
Methoxyisopropyl acetate	isopropyl acetate production/isopropyl acetate/RoW/kg	ecoinvent v3.10 in 2024	North Rhine-Westphalia	2024	1	3	2	3	3
Wollastotine	chemical production, inorganic/chemical, inorganic/GLO/kg	ecoinvent v3.10 in 2024	NY	2024	0	3	2	3	3
Bisphenol A	bisphenol A production, powder/bisphenol A, powder/RoW/kg	ecoinvent v3.10 in 2024	Jeolla-do	2024	2	3	2	3	3
Ethylene oxide, propylene oxide polymer	ethylene oxide production/ethylene oxide/RoW/kg	ecoinvent v3.10 in 2024	KY	2024	1	3	2	3	3
Diethyltoluenediamine	phenylenediamine production/ortho-phenylene diamine/GLO/kg	ecoinvent v3.10 in 2024	North Brabant	2024	2	3	2	3	3
Phenol, formaldehyde, polymer	phenolic resin production/phenolic resin/RoW/kg	ecoinvent v3.10 in 2024	Ohio	2024	2	3	2	3	3
Polyethylene	polyethylene, high density, granulate, recycled to generic market for high density PE granulate/polyethylene, high density, granulate/RoW/kg	ecoinvent v3.10 in 2024	TN	2024	2	3	2	3	3



Organo clay	clay pit operation/clay/RoW/kg	ecoinvent v3.10 in 2024	North Rhine-Westphalia	2024	2	3	2	3	3
Nonylphenol	phenol production/phenol/RoW/kg	ecoinvent v3.10 in 2024	Taiwan	2024	2	3	2	3	3
Benzyl alcohol	benzyl alcohol production/benzyl alcohol/RoW/kg	ecoinvent v3.10 in 2024	Hubei	2024	2	3	2	3	3
Silica gel	activated silica production/activated silica/GLO/kg	ecoinvent v3.10 in 2024	NY	2024	1	3	2	3	3
O-Cresol glycidyl ether	o-cresol production/o-cresol/RoW/kg	ecoinvent v3.10 in 2024	Ohio	2024	1	3	2	3	3
Aromatic naphtha	naphtha production, petroleum refinery operation/naphtha/RoW/kg	ecoinvent v3.10 in 2024	North Rhine-Westphalia	2024	2	3	2	3	3
Calcium carbonate	calcium carbonate production, precipitated/calcium carbonate, precipitated/RoW/kg	ecoinvent v3.10 in 2024	IL	2024	2	3	2	3	3
Terpene hydrocarbons	C3 hydrocarbon production, mixture, petroleum refinery operation/C3 hydrocarbon mixture/RoW/kg	ecoinvent v3.10 in 2024	IL	2024	1	3	2	3	3
4,4'-Diphenylmethane diisocyanate	methylene diphenyl diisocyanate production/methylene diphenyl diisocyanate/RoW/kg	ecoinvent v3.10 in 2024	TX	2024	2	3	2	3	3

Table 4: LCI inputs assumed for module A2 (i.e. transport of A1 inputs)

Input	LCI Activity	Data Source	Geo	Year	Technology	Time	Geography	Reliability	Completeness
2-Ethylhexyl glycidyl ether-freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO4/transport, freight, lorry 7.5-16	ecoinvent v3.10 in 2024	RER	2024	2	3	1	3	3



	metric ton, EURO4/RER/tkm								
4,4'- Diphenylmet hane diisocyanate - freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO4/transport, freight, lorry 7.5-16 metric ton, EURO4/RER/tkm	ecoinvent v3.10 in 2024	RER	2024	2	3	1	3	3
Aromatic naphtha- freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO4/transport, freight, lorry 7.5-16 metric ton, EURO4/RER/tkm	ecoinvent v3.10 in 2024	RER	2024	2	3	1	3	3
Benzyl alcohol- freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO4/transport, freight, lorry 7.5-16 metric ton, EURO4/RER/tkm	ecoinvent v3.10 in 2024	RER	2024	2	3	1	3	3
Bisphenol A- freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO4/transport, freight, lorry 7.5-16 metric ton, EURO4/RER/tkm	ecoinvent v3.10 in 2024	RER	2024	2	3	1	3	3
Bisphenol A epicholorhy drin- freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO4/transport, freight, lorry 7.5-16 metric ton, EURO4/RER/tkm	ecoinvent v3.10 in 2024	RER	2024	2	3	1	3	3
Bisphenol A epoxy resin- freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO4/transport, freight, lorry 7.5-16 metric ton, EURO4/RER/tkm	ecoinvent v3.10 in 2024	RER	2024	2	3	1	3	3
Bulk waste- freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO4/transport, freight, lorry 7.5-16 metric ton, EURO4/RER/tkm	ecoinvent v3.10 in 2024	RER	2024	2	3	1	3	3



Calcium carbonate- freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO4/transport, freight, lorry 7.5-16 metric ton, EURO4/RER/tkm	ecoinvent v3.10 in 2024	RER	2024		2	3	1	3	3
Can- freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO4/transport, freight, lorry 7.5-16 metric ton, EURO4/RER/tkm	ecoinvent v3.10 in 2024	RER	2024		2	3	1	3	3
D-limonene- freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO4/transport, freight, lorry 7.5-16 metric ton, EURO4/RER/tkm	ecoinvent v3.10 in 2024	RER	2024		2	3	1	3	3
Dibutyltin dilaurate- freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO4/transport, freight, lorry 7.5-16 metric ton, EURO4/RER/tkm	ecoinvent v3.10 in 2024	RER	2024		2	3	1	3	3
Diethylene triamine- freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO4/transport, freight, lorry 7.5-16 metric ton, EURO4/RER/tkm	ecoinvent v3.10 in 2024	RER	2024		2	3	1	3	3
Diethyltolue nediamine- freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO4/transport, freight, lorry 7.5-16 metric ton, EURO4/RER/tkm	ecoinvent v3.10 in 2024	RER	2024		2	3	1	3	3
Diphenylmet hane Diosocynate - freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO4/transport, freight, lorry 7.5-16 metric ton, EURO4/RER/tkm	ecoinvent v3.10 in 2024	RER	2024		2	3	1	3	3



Ethylene glycol-freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO4/transport, freight, lorry 7.5-16 metric ton, EURO4/RER/tkm	ecoinvent v3.10 in 2024	RER	2024	2	3	1	3	3
Ethylene oxide, propylene oxide polymer-freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO4/transport, freight, lorry 7.5-16 metric ton, EURO4/RER/tkm	ecoinvent v3.10 in 2024	RER	2024	2	3	1	3	3
Ethylenedia mine propylene oxide ether-freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO4/transport, freight, lorry 7.5-16 metric ton, EURO4/RER/tkm	ecoinvent v3.10 in 2024	RER	2024	2	3	1	3	3
Fatty acid, tall oil-freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO4/transport, freight, lorry 7.5-16 metric ton, EURO4/RER/tkm	ecoinvent v3.10 in 2024	RER	2024	2	3	1	3	3
Fatty acid-freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO4/transport, freight, lorry 7.5-16 metric ton, EURO4/RER/tkm	ecoinvent v3.10 in 2024	RER	2024	2	3	1	3	3
Lime- freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO4/transport, freight, lorry 7.5-16 metric ton, EURO4/RER/tkm	ecoinvent v3.10 in 2024	RER	2024	2	3	1	3	3
Liquid waste-freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO4/transport, freight, lorry 7.5-16 metric ton, EURO4/RER/tkm	ecoinvent v3.10 in 2024	RER	2024	2	3	1	3	3



MDI- freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO4/transport, freight, lorry 7.5-16 metric ton, EURO4/RER/tkm	ecoinvent v3.10 in 2024	RER	2024		2	3	1	3	3
Methoxy hydroxy propane- freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO4/transport, freight, lorry 7.5-16 metric ton, EURO4/RER/tkm	ecoinvent v3.10 in 2024	RER	2024		2	3	1	3	3
Methoxyisopropyl acetate- freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO4/transport, freight, lorry 7.5-16 metric ton, EURO4/RER/tkm	ecoinvent v3.10 in 2024	RER	2024		2	3	1	3	3
Methylene-bis-butylaniline- freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO4/transport, freight, lorry 7.5-16 metric ton, EURO4/RER/tkm	ecoinvent v3.10 in 2024	RER	2024		2	3	1	3	3
Nonylphenol - freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO4/transport, freight, lorry 7.5-16 metric ton, EURO4/RER/tkm	ecoinvent v3.10 in 2024	RER	2024		2	3	1	3	3
O-Cresol glycidyl ether- freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO4/transport, freight, lorry 7.5-16 metric ton, EURO4/RER/tkm	ecoinvent v3.10 in 2024	RER	2024		2	3	1	3	3
Octadecanoic acid- freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO4/transport, freight, lorry 7.5-16 metric ton, EURO4/RER/tkm	ecoinvent v3.10 in 2024	RER	2024		2	3	1	3	3



Organo clay- freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO4/transport, freight, lorry 7.5-16 metric ton, EURO4/RER/tkm	ecoinvent v3.10 in 2024	RER	2024		2	3	1	3	3
Phenol, formaldehyd e, polymer- freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO4/transport, freight, lorry 7.5-16 metric ton, EURO4/RER/tkm	ecoinvent v3.10 in 2024	RER	2024		2	3	1	3	3
Plastic film- freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO4/transport, freight, lorry 7.5-16 metric ton, EURO4/RER/tkm	ecoinvent v3.10 in 2024	RER	2024		2	3	1	3	3
Plastic granules- freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO4/transport, freight, lorry 7.5-16 metric ton, EURO4/RER/tkm	ecoinvent v3.10 in 2024	RER	2024		2	3	1	3	3
Polyether polyol resin- freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO4/transport, freight, lorry 7.5-16 metric ton, EURO4/RER/tkm	ecoinvent v3.10 in 2024	RER	2024		2	3	1	3	3
Polyethylen e- freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO4/transport, freight, lorry 7.5-16 metric ton, EURO4/RER/tkm	ecoinvent v3.10 in 2024	RER	2024		2	3	1	3	3
Polypropyle ne glycol butylether- freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO4/transport, freight, lorry 7.5-16 metric ton, EURO4/RER/tkm	ecoinvent v3.10 in 2024	RER	2024		2	3	1	3	3



Quartz- freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO4/transport, freight, lorry 7.5-16 metric ton, EURO4/RER/tkm	ecoinvent v3.10 in 2024	RER	2024		2	3	1	3	3
Salicylic acid- freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO4/transport, freight, lorry 7.5-16 metric ton, EURO4/RER/tkm	ecoinvent v3.10 in 2024	RER	2024		2	3	1	3	3
Silica gel- freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO4/transport, freight, lorry 7.5-16 metric ton, EURO4/RER/tkm	ecoinvent v3.10 in 2024	RER	2024		2	3	1	3	3
Silicon dioxide- freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO4/transport, freight, lorry 7.5-16 metric ton, EURO4/RER/tkm	ecoinvent v3.10 in 2024	RER	2024		2	3	1	3	3
Terpene hydrocarbon s- freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO4/transport, freight, lorry 7.5-16 metric ton, EURO4/RER/tkm	ecoinvent v3.10 in 2024	RER	2024		2	3	1	3	3
Tetraethylen e pentamine- freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO4/transport, freight, lorry 7.5-16 metric ton, EURO4/RER/tkm	ecoinvent v3.10 in 2024	RER	2024		2	3	1	3	3
Trade Secret- freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO4/transport, freight, lorry 7.5-16 metric ton, EURO4/RER/tkm	ecoinvent v3.10 in 2024	RER	2024		2	3	1	3	3



Triethylene tetramine- freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO4/transport, freight, lorry 7.5-16 metric ton, EURO4/RER/tkm	ecoinvent v3.10 in 2024	RER	2024		2	3	1	3	3
Wollastotite - freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO4/transport, freight, lorry 7.5-16 metric ton, EURO4/RER/tkm	ecoinvent v3.10 in 2024	RER	2024		2	3	1	3	3
Zeolite- freight transport via Truck	market for transport, freight, lorry 7.5-16 metric ton, EURO4/transport, freight, lorry 7.5-16 metric ton, EURO4/RER/tkm	ecoinvent v3.10 in 2024	RER	2024		2	3	1	3	3

Table 5: LCI inputs assumed for module A3

Input	LCI Activity	Data Source	Geo	Year	Technology	Time	Geography	Reliability	Completeness	
Bulk waste	process-specific burdens, residual material landfill/process-specific burdens, residual material landfill/RoW/kg	ecoinvent v3.10 in 2024	Wisconsin	2024		2	3	2	3	3
Can	market for steel, low-alloyed/steel, low-alloyed/GLO/kg	ecoinvent v3.10 in 2024	Wisconsin	2024	1	3	2	3	3	
Electricity	market for electricity, medium voltage/electricity, medium voltage/US-MRO/kWh	ecoinvent v3.10 in 2024	Multiple states	2024		2	3	2	3	3
Liquid waste	treatment of waste mineral oil, hazardous waste incineration/waste mineral oil/RoW/kg	ecoinvent v3.10 in 2024	Wisconsin	2024		1	3	2	3	3



Natural gas	market for heat, district or industrial, natural gas/heat, district or industrial, natural gas/RoW/MJ	ecoinvent v3.10 in 2024	Multiple states	2024	2	3	2	3	3
Pallets	EUR-flat pallet production/EUR-flat pallet/RoW/unit	ecoinvent v3.10 in 2024	Wisconsin	2024	2	3	2	3	3
Plastic film	market for extrusion, plastic film/extrusion, plastic film/GLO/kg	ecoinvent v3.10 in 2024	Wisconsin	2024	2	3	2	3	3
Plastic granules	market for polyethylene, high density, granulate, recycled/polyethylene, high density, granulate, recycled/RoW/kg	ecoinvent v3.10 in 2024	Wisconsin	2024	2	3	2	3	3
Plastic pail	injection moulding/injection moulding/RoW/kg	ecoinvent v3.10 in 2024	Wisconsin	2024	2	3	2	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 v3.10 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 Concrete Joint Filler Product materials, emissions to air, water and soil, and waste recycling and treatment. The same background LCI datasets from the ecoinvent v3.10 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 Concrete Joint Filler Product 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 Concrete Joint Filler 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 2023-04-01 to 2024-03-31.
- Upstream (background) LCI data was either the PCR specified default (if applicable) or more appropriate LCI datasets as found in the country-adjusted ecoinvent v3.10 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 6: Life cycle impact categories and life cycle inventory metrics

ID	LCIA.indicators	Abbreviations	Units
1	Climate change: global warming potential (GWP100)	GWP100	kg CO2-eq
2	Ozone depletion: ozone depletion potential (ODP)	ODP	kg CFC-11-eq
3	Acidification: acidification potential (AP)	AP	kg SO2-eq
4	Eutrophication: eutrophication potential	EP	kg N-eq



5	Smog formation potential	SFP	kg O ₃ -eq
6	Energy resources: non-renewable: abiotic depletion potential (ADP): fossil fuels	ADPfossil	MJ
Inventory metrics			
7	Inventory indicators ISO21930: Cumulative Energy Demand - renewable energy resources	RPRE	MJ
8	Inventory indicators ISO21930: Renewable primary resources with energy content used as material (i.e., PERM)	PRM	MJ
9	Inventory indicators ISO21930: Cumulative Energy Demand - non-renewable energy resources	NRPRE	MJ
10	Inventory indicators ISO21930: Non-renewable primary resources with energy content used as material (i.e., PENRM)	NRPRM	kg
11	Inventory indicators ISO21930: use of secondary material	SM	MJ
12	Inventory indicators ISO21930: use of renewable secondary fuels	RSF	MJ
13	Inventory indicators ISO21930: recovered energy	RE	MJ
14	Inventory indicators ISO21930: use of net fresh water	FW	m ³
15	Inventory indicators ISO21930: hazardous waste disposed	HWD	kg
16	Inventory indicators ISO21930: non-hazardous waste disposed	NHWD	kg
17	Inventory indicators ISO21930: high-level radioactive waste disposed	HLRW	kg
18	Inventory indicators ISO21930: intermediate and low-level radioactive waste disposed	ILLRW	kg
19	Inventory indicators ISO21930: materials for recycling	MR	kg
20	Inventory indicators ISO21930: materials for energy recovery	MER	kg
21	Inventory indicators ISO21930: exported energy - electricity	EEel	MJ
22	Inventory indicators ISO21930: exported energy - heat	EEheat	MJ

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

Interpretation

The life cycle analysis of various Semi-Rigid Concrete Joint Fillers and Concrete Joint Filler Products reveals that chemicals and epoxy resin in the production stage (Module A1) have a significant impact on the environment which is around 56% of overall kg CO₂ eq. Additionally, the freight transport of additives via truck in Module A2 also contributes substantially up to 4% kg of CO₂ eq to the total environmental impact. To mitigate these environmental hotspots, it is essential to reduce the impact of additives in production and transportation. This can be achieved by:

- Seeking alternative materials with lower environmental impacts.
- Optimizing production processes to minimize waste and emissions.
- Enhance supply chain efficiency to reduce fuel consumption and emissions.

For specific products, such as Edge Pro 80, Edge Pro 90, and MM 80P, the focus should be on the major contributing chemical additives. Strategies should consider the use of more sustainable additives in their production and use to minimize environmental impacts.

The following table reports the total LCA results for each product produced at the given concrete joint filler product facility on a per 1 kg of Concrete Joint Filler Product basis.

Table 7: **Total life cycle (across modules in scope) impact results for All declared products, assuming the geometric mean point values on a per 1 kg of Concrete Joint Filler Product basis**

a) Midpoint Impact Categories:

Indicator/LCI Metric	GWP100	ODP	AP	EP	SFP	ADP _{fossil}
Unit	kg CO ₂ -eq	kg CFC-11-eq	kg SO ₂ -eq	kg N-eq	kg O ₃ -eq	MJ
Minimum	3.2	8.12E-08	0.0122	0.0196	0.173	58.5
Maximum	7.18	1.76E-07	0.0299	0.0872	0.353	107
Mean	5.787	1.43E-07	0.024	0.062	0.291	89.8
Median	6.98	1.72E-07	0.0293	0.0806	0.346	104
Edge-Pro 80	7.18	1.76e-07	0.0299	0.0872	0.353	107
Edge-Pro 90	6.98	1.72e-07	0.0293	0.0806	0.346	104
MM-80P	3.2	8.12e-08	0.0122	0.0196	0.173	58.5



b) Resource Inventory Metrics:

Indicator/LCI Metric	RPRE	PRM	NRPRE	NRPRM	SM	RSF	RE	FW
Unit	MJ	MJ	MJ	kg	MJ	MJ	MJ	m3
Minimum	4.96	0.00288	4.96	15	0.0391	0.000505	0.0389	0.0204
Maximum	5.35	6.24	5.34	24.1	0.197	6.00E-04	0.0557	0.0579
Mean	5.123	2.08192	5.123	20.86	0.113	0.001	0.049	0.045
Median	5.06	0.00288	5.07	23.5	0.102	0.000591	0.053	0.056
Edge-Pro 80	5.06	0.00288	5.07	24.1	0.197	6e-04	0.0557	0.0579
Edge-Pro 90	4.96	0.00288	4.96	23.5	0.102	0.000591	0.053	0.056
MM-80P	5.35	6.24	5.34	15	0.0391	0.000505	0.0389	0.0204

c) Waste/output Inventory Metrics:

Indicator/LCI Metric	HWD	NHWD	HLRW	ILLRW	MR	MER	EEel	EEheat
Unit	kg	kg	kg	kg	kg	kg	MJ	MJ
Minimum	0.2	4.32	9.58E-06	2.44E-05	0.000729	6.21E-06	0.0149	0.0242
Maximum	0.686	11.7	2.41E-05	5.56E-05	0.00182	9.12E-06	0.0282	0.028
Mean	0.484	9.17	1.91E-05	4.47E-05	0.001	8.03E-06	0.023	0.026
Median	0.567	11.5	2.36E-05	5.42E-05	0.00179	8.75E-06	0.0271	0.0264
Edge-Pro 80	0.686	11.7	2.41e-05	5.56e-05	0.00182	9.12e-06	0.0282	0.028
Edge-Pro 90	0.567	11.5	2.36e-05	5.42e-05	0.00179	8.75e-06	0.0271	0.0264
MM-80P	0.2	4.32	9.58e-06	2.44e-05	0.000729	6.21e-06	0.0149	0.0242

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

