CROSSFIELD PRODUCTS CORP.

Environmental Product Declaration

Environmental Product Declaration for resinous flooring products produced by Crossfield Products Corp at their Dex-O-Tex facility in Cibolo, Texas

ADMINISTRATIVE INFORMATION

International Certified Environmental Product Declaration

Declared Product:	This Environmental Product Declaration (EPD) covers resinous flooring products produced by Crossfield Products Corp. Declared unit: 1 m2 of covered and protected flooring surface for a period of 60 years.
Declaration Owner:	Crossfield Products Corp.
	1288 Industrial Drive
	Cibolo, Texas
	www.dex-o-tex.com
Program Operator:	Labeling Sustainability
	NA
	Los Angeles, CA 90049
	www.epdregistration.com
Product Category Rule:	ISO 21930:2017 Sustainability in buildings and civil engineering works Core rules for environmental product declarations of construction products and services and PCR for Resinous Floor Coatings.
	PCR Program Operator: NSF International
	PCR review was conducted by: Thomas P. Gloria, Ph. D., Bill Stough, Jack Geibig.
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 ☐ ; External ☐ X
	Third Party Verifier
	Geoffrey Guest, Certified 3rd Party Verifier under the Labeling Sustainability Program (www.labelingsustainability.com), CSA Group (www.csaregistries.ca),
Date of Issue:	20 April 2023
Period of Validity:	5 years; valid until 19 April 2028
EPD Number:	3f77472b-776c-4fae-a590-d45c8bdd2a75

TABLE OF CONTENTS

Administrative Information 1
Study Goal 3
Description Of Product And Scope 3
Resinous Flooring Design Summary 5
Resinous Flooring Design Composition 7
A1 Raw Material Recycled Content And Material Losses 8
System Boundaries 11
Cut-Off Criteria 13
Data Sources And Data Quality Assessment 13
Raw material transport 13
Electricity 13
Process/space heating 13
Fuel required for machinery. 14
Waste generation. 14
Recovered energy 14
Recycled/reused material/components 14
Module A1 material losses 14
Direct A3 emissions accounting. 14
A4 Product transport requirements 14
A5 product installation 14
B product use phase 14
C product end-of-life 15
Data Quality Assessment 15
Environmental Indicators And Inventory Metrics 15
Total Impact Summary 16
Additional Environmental Info 19
References 19
ISO Standards: 19
EN Standards: 19
Other References: 19

COMPANY DESCRIPTION

In the early 1930s, a British chemist named Crossfield developed a formulation for mixing natural rubber and cement (which are not compatible by nature) for ocean ships. In 1938, a group of investors purchased Crossfield's company, and Crossfield Products Corp. was born. When natural rubber was allocated during World War II, Crossfield adopted new synthetic rubber technologies and began using polymer-modified concrete on Navy ships and prominent vessels such as the Queen Mary, the SS America, and Queen Elizabeth. To identify this family of products, the name Dex-O-Tex, a contraction of the term "decks of latex," was coined. Although the marine business was the core business for Dex-O-Tex, it expanded after the 1960s to create a full suite of durable flooring and surfacing systems for various industries and applications. Today, Crossfield Products Corp. is the go-to company for flooring and surfacing solutions offering the most diversified product line of construction coatings. They pride themselves on a long history and expertise in developing state-of-the-art surfacing solutions, precise manufacturing capabilities, and product excellence.

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 Resinous flooring published by NSF International, entitled 'Product Category Rule for Environmental Product declarations PCR for Resinous Floor Coatings'; 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 Crossfield Products Corp 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 Crossfield Products Corp 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 Crossfield Products Corp's license to operate in the community. The intended audience for this LCA report is Crossfield Products Corp'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

Two categories of resinous flooring are covered in this EPD. The first is urethane cement. Urethane cement consists of urethane cement coatings, urethane concrete sealers, and concrete flooring systems that provide optimum flexibility and durability in harsh environments, including warehouses and industrial complexes that house large machinery and deal with high levels of foot traffic and

chemical abuse. In addition, since urethane coatings are glossy and durable, they are also an excellent option for showroom floors and breweries. The next category is terrazzo flooring. In the past, terrazzo was made by mixing small marble rocks with clay and then grinding and polishing the surface until it was smooth, showcasing the decorative design of the marble. Now, terrazzo flooring is available in seamless systems. Small marble chips, colorful stones, and decorative glass pieces are embedded in concrete bases that are polished and buffed to a high shine. In addition to being attractive, the terrazzo flooring options are incredibly durable and can withstand harsh chemicals, moisture, and heavy traffic, making them ideal for a wide range of applications.

To determine the proper market and technical lifetimes, the PCR classifies the product by if it is a thin-mil, self-leveling or broadcast slurry, or mortar / monolithic mortar/terrazzo. Thin-Mil is a resin-rich coating system typically comprised of a primer, body coat(s), and topcoat installed less than 40 mils. Self-leveling or broadcast slurries are a high-build coating system using the addition of fillers and broadcast aggregates (quartz, flake, silica sand) installed in multiple layers to build thickness, typically from 40 to 180 mils. Mortars, monolithic mortars, and terrazzo are composite materials of marble, silica sand, granite, glass, or other suitable aggregates in a binder matrix of Portland cement mortar, epoxy, polyester resin, or vinyl ester resin. They are typically installed to build thicknesses greater than 180 mils.

Since resinous flooring products may be replaced before they technically fail, the reference service life of the products, as dictated by the PCR, is both an estimated market service life (MSL) and an estimated technical service life (TSL). The values used for both MSL and TSL are in the chart below. The number of replacements needed was calculated by dividing the building service Life (60 years) by the service life (MSL or TSL) and then subtracting the initial application.

Table 1: **The MSL and TSL of each product covered in this EPD based on the product's classifiation.**

Product	Product Classification	Environment	Market Service Life (MSL)	Technical Service Life (TSL)
Tek-Crete SL	mortars, monolithic mortars, and terrazzo:	Industrial	20 Years	30 Years
Tek-Crete SL-Fine	mortars, monolithic mortars, and terrazzo:	Industrial	20 years	30 years
Tek-Crete Skim Coat	self-leveling or broadcast slurries	Industrial	10 years	15 years
Tek-Crete Sealer CP	self-leveling or broadcast slurries	Industrial	10 years	15 years
Cheminert Terrazzo	mortars, monolithic mortars, and terrazzo:	Industrial	20 Years	30 Years
Spectrum Terrazzo	mortars, monolithic mortars, and terrazzo:	Industrial	20 Years	30 Years

Expected lifetimes are based on the PCR given different application settings (commercial or industrial). For example, resinous floor coatings designed specifically for industrial settings rather than commercial environments shall have a lower estimated and technical service life. On the other hand, if the product type is applied indiscriminately between industrial and commercial settings, it shall default to conservative industrial service lifetime values. The table below outlines the primary market for each product.

Table 2: **Number of repaints for each product in this EPD based on its application setting.**

Product	Repaints-MSL	Repaints-TSL
Tek-Crete SL	3	2
Tek-Crete SL-Fine	3	2
Tek-Crete Skim Coat	6	4
Tek-Crete Sealer CP	6	4
Cheminert Terrazzo	3	2
Spectrum Terrazzo	3	2

This LCA assumes the impacts from products manufactured in accordance with the standards outlined in this report. This LCA is a cradle-to-grave study.

RESINOUS FLOORING DESIGN SUMMARY

The following tables provide a list of resinous flooring products considered in this EPD along with key performance parameters.

Urethane Concrete

Table 3: **Declared products with Urethane considered in this environmental product declaration.**

Prod#	Unique name/ID	Short description	Product type	Unit	Density, dry kg/Unit	Density, wet kg/Unit	Thickness(mil)	productGroup
1	Tek-Crete SL (MSL)	Self-leveling urethane mortar	Concrete Flooring	m2	0.49	4.89E-01	187.5	Urethane Concrete
2	Tek-Crete SL (TSL)	Self-leveling urethane mortar	Concrete Flooring	m2	0.49	4.89E-01	187.5	Urethane Concrete
3	Tek-Crete SL-Fine (MSL)	Self-leveling urethane mortar	Concrete Flooring	m2	0.53	5.27E-01	187.5	Urethane Concrete
4	Tek-Crete SL-Fine (TSL)	Self-leveling urethane mortar	Concrete Flooring	m2	0.53	5.27E-01	187.5	Urethane

								Concrete
5	Tek-Crete Skim Coat (MSL)	An aromatic polyurethane resin	Concrete Flooring	m2	0.45	4.51E-01	16.0	Urethane Concrete
6	Tek-Crete Skim Coat (TSL)	An aromatic polyurethane resin	Concrete Flooring	m2	0.45	4.51E-01	16.0	Urethane Concrete
7	Tek-Crete Sealer CP (MSL)	An aliphatic polyurethane resin	Concrete Flooring	m2	0.74	7.44E-01	16.0	Urethane Concrete
8	Tek-Crete Sealer CP (TSL)	An aliphatic polyurethane resin	Concrete Flooring	m2	0.74	7.44E-01	16.0	Urethane Concrete

Terrazzo Flooring

Table 4: **Declared products with Terrazzo Flooring considered in this environmental product declaration.**

Prod#	Unique name/ID	Short description	Product type	Unit	Density, dry kg/Unit	Density, wet kg/Unit	Thickness(mil)	productGroup
9	Cheminert Terrazzo(MSL)	Thin-set epoxy terrazzo flooring	Resinous flooring	m2	2.43	2.43E+00	1400.0	Terrazzo flooring
10	Cheminert Terrazzo(TSL)	Thin-set epoxy terrazzo flooring	Resinous flooring	m2	2.43	2.43E+00	1400.0	Terrazzo flooring
11	Spectrum Terrazzo (MSL)	Decorative thin-set polyacrylate	Resinous flooring	m2	6.56	6.56E+00	375.0	Terrazzo flooring
12	Spectrum Terrazzo (TSL)	Decorative thin-set polyacrylate	Resinous flooring	m2	6.56	6.56E+00	375.0	Terrazzo flooring

RESINOUS FLOORING DESIGN COMPOSITION

The following figures provide mass breakdown (kg per functional unit) of the material composition of each resinous flooring design considered. Please note that the presented breakdown has been randomly altered by +/-10%, and is therefore only an approximation; this manipulation is to ensure confidentiality.

Urethane Concrete

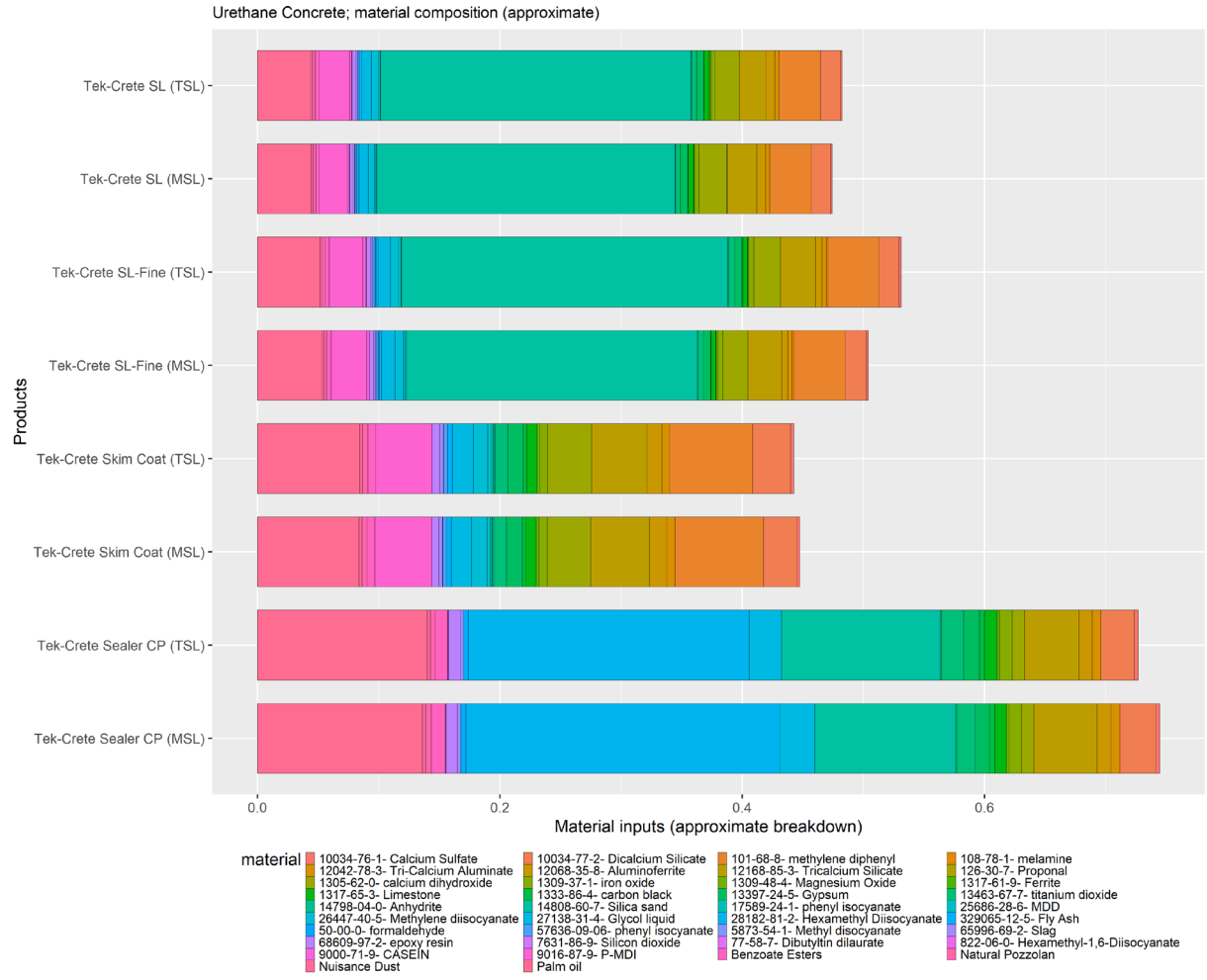

Figure 1: **Approximate material composition - Urethane Concrete per 1 m2 of covered and protected flooring surface for a period of 60 years.. Note: presented breakdown is approximate to ensure confidentiality.Self-Leveling**

Terrazzo Flooring

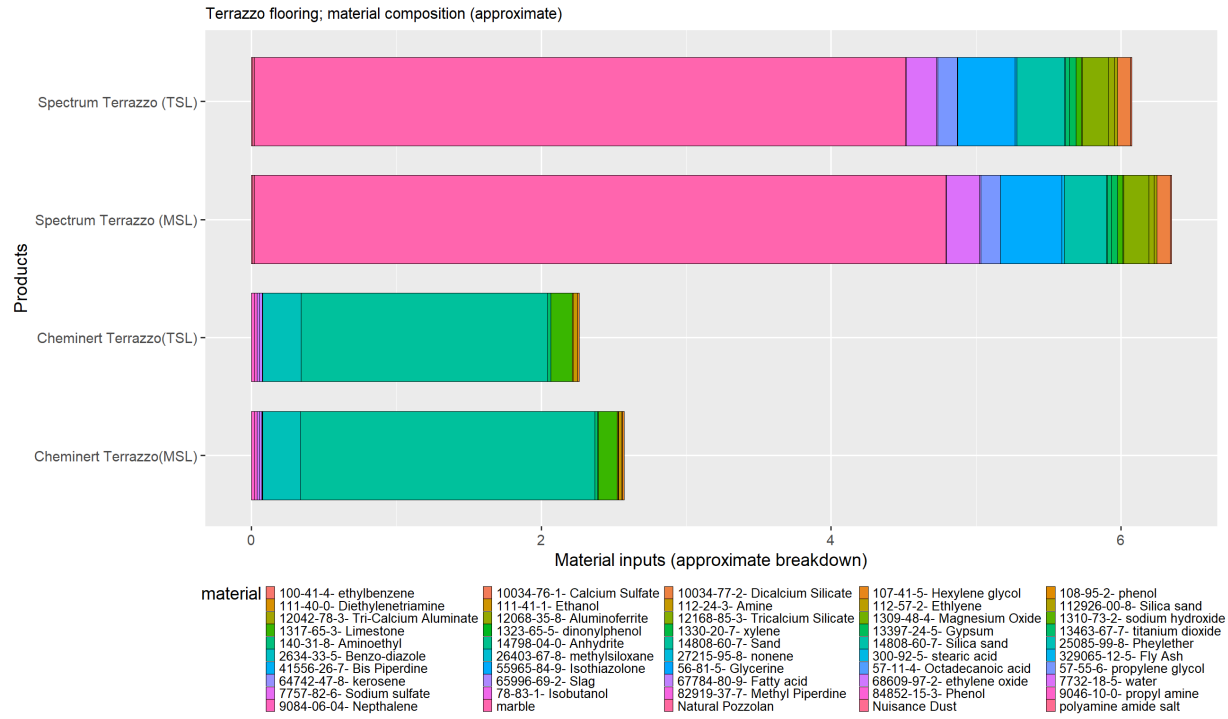

Figure 2: **Approximate material composition - Terrazzo flooring per 1 m2 of covered and protected flooring surface for a period of 60 years.. Note: presented breakdown is approximate to ensure confidentiality.Broadcast Slurry**

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

product.name	mix.category	primary.content	post.industrial. content	post.consumer. content	material. losses
P-MDI	methylene diphenyl diisocyanate	100%	0%	0%	2%
methylene diphenyl	methylene diphenyl diisocyanate	100%	0%	0%	2%
Methylene diisocyanate	methylene diphenyl diisocyanate	100%	0%	0%	2%
phenyl isocyanate	phenyl isocyanate	100%	0%	0%	2%
MDD	methylene diphenyl diisocyanate	100%	0%	0%	2%
Methyl disocyanate	methylene diphenyl diisocyanate	100%	0%	0%	2%

phenyl isocyanate	phenyl isocyanate	100%	0%	0%	2%
Proponal	1-propanol	100%	0%	0%	2%
Silicon dioxide	silica sand	100%	0%	0%	2%
calcium dihydroxide	lime, hydrated, packed	100%	0%	0%	2%
Ferrite	ferrite	100%	0%	0%	2%
CASEIN	whey	100%	0%	0%	2%
Tricalcium Silicate	sodium silicate, solid	100%	0%	0%	2%
Dicalcium Silicate	silica sand	100%	0%	0%	2%
Aluminoferrite	ferrite	100%	0%	0%	2%
Gypsum	gypsum, mineral	100%	0%	0%	2%
Tri-Calcium Aluminate	calcium ammonium nitrate	100%	0%	0%	2%
Limestone	limestone, unprocessed	100%	0%	0%	2%
Fly Ash	fly ash and scrubber sludge	100%	0%	0%	2%
Natural Pozzolan	limestone, unprocessed	100%	0%	0%	2%
Slag	blast furnace slag	0%	0%	100%	2%
Calcium Sulfate	gypsum, mineral	100%	0%	0%	2%
Anhydrite	anhydrite	100%	0%	0%	2%
Magnesium Oxide	magnesium oxide	100%	0%	0%	2%
Nuisance Dust	silica sand	100%	0%	0%	2%
Silica sand	silica sand	100%	0%	0%	2%
Palm oil	palm oil, crude	100%	0%	0%	2%
Glycol liquid	propylene glycol, liquid	100%	0%	0%	2%
epoxy resin	epoxy resin, liquid	100%	0%	0%	2%
Benzoate Esters	benzoic acid	100%	0%	0%	2%
iron oxide	iron ore concentrate	100%	0%	0%	2%
melamine	melamine	100%	0%	0%	2%
formaldehyde	urea formaldehyde resin	100%	0%	0%	2%
carbon black	carbon black	100%	0%	0%	2%
titanium dioxide	titanium dioxide	100%	0%	0%	2%
Hexamethyl Diisocyanate	toluene diisocyanate	100%	0%	0%	2%
Hexamethyl-1,6-Diisocyanate	toluene diisocyanate	100%	0%	0%	2%

polyamine amide salt	sodium amide	100%	0%	0%	2%
xylene	xylene	100%	0%	0%	2%
ethylbenzene	ethyl benzene	100%	0%	0%	2%
Isobutanol	isobutanol	100%	0%	0%	2%
Bis Piperdine	piperidine	100%	0%	0%	2%
Methyl Piperdine	piperidine	100%	0%	0%	2%
methylsiloxane	silicone product	100%	0%	0%	2%
ethylene oxide	ethylene oxide	100%	0%	0%	2%
Pheylether	diphenylether-compound	100%	0%	0%	2%
Silica sand	silica sand	100%	0%	0%	2%
Glycerine	glycerine	100%	0%	0%	2%
Hexylene glycol	propylene glycol, liquid	100%	0%	0%	2%
Fatty acid	fatty acid methyl ester	100%	0%	0%	2%
Amine	triethyl amine	100%	0%	0%	2%
propyl amine	propyl amine	100%	0%	0%	2%
Phenol	phenol	100%	0%	0%	2%
Ethanol	diethanolamine	100%	0%	0%	2%
Aminoethyl	piperidine	100%	0%	0%	2%
inonylphenol	phenol	100%	0%	0%	2%
Diethylenetriamine	ethylenediamine	100%	0%	0%	2%
Ethlyene	ethylenediamine	100%	0%	0%	2%
phenol	phenol	100%	0%	0%	2%
nonene	n-olefins	100%	0%	0%	2%
Dibutyltin dilaurate	fatty acid	100%	0%	0%	2%
Nepthalene	naphthalene sulfonic acid	100%	0%	0%	2%
Sodium sulfate	sodium sulfate, anhydrite	100%	0%	0%	2%
propylene glycol	propylene glycol, liquid	100%	0%	0%	2%
Benzo-diazole	benzo[thia]diazole-compound	100%	0%	0%	2%
sodium hydroxide	sodium hydroxide, without water, in 50% solution state	100%	0%	0%	2%
kerosene	kerosene	100%	0%	0%	2%
stearic acid	stearic acid	100%	0%	0%	2%
Octadecanoic acid	stearic acid	100%	0%	0%	2%
Isothiazolone	benzo[thia]diazole-compound	100%	0%	0%	2%

Propane burned	propane, burned in building machine	100%	0%	0%	2%
HDPE for Pail	polyethylene, high density, granulate	100%	0%	0%	2%
Kraft Paper	kraft paper	100%	0%	0%	2%
Tin Processing	tin	100%	0%	0%	0%
HDPE Processing	extrusion of plastic sheets and thermoforming, inline	100%	0%	0%	0%
Pallet	EUR-flat pallet	75%	0%	25%	0%
Plastic wrap	packaging film, low density polyethylene	100%	0%	0%	1%
Sand	sand	100%	0%	0%	2%

SYSTEM BOUNDARIES

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

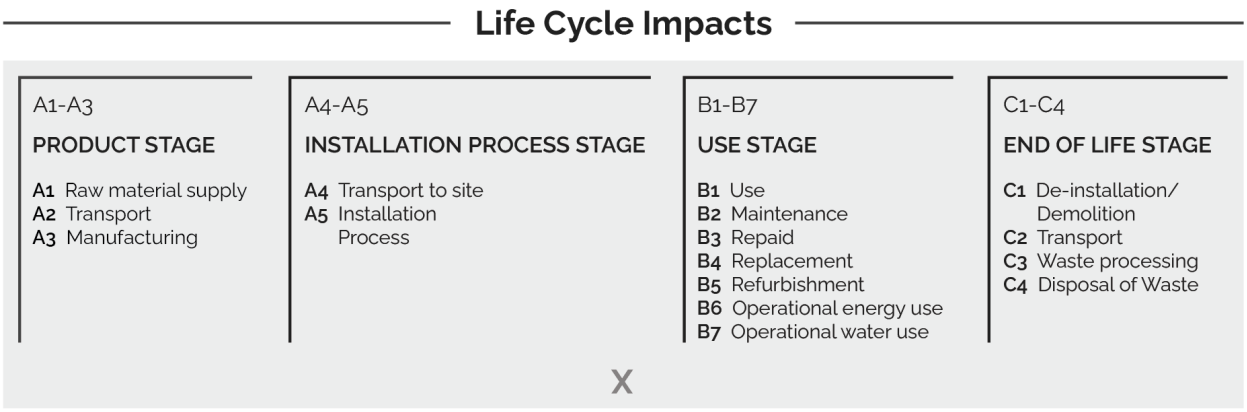

Figure 3: **General life cycle phases for consideration in a construction works system**

This is a Cradle-to-grave 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.
- A4: Product plant gate-to-site of use logistics
- A5: Product at-site installation requirements
- B: Product use phase requirements and direct emissions (if applicable)

- C: Product end-of-life requirements

As according to the PCR, the following figure illustrates the general activities and input requirements for producing ready mix concrete products and is not necessarily exhaustive.

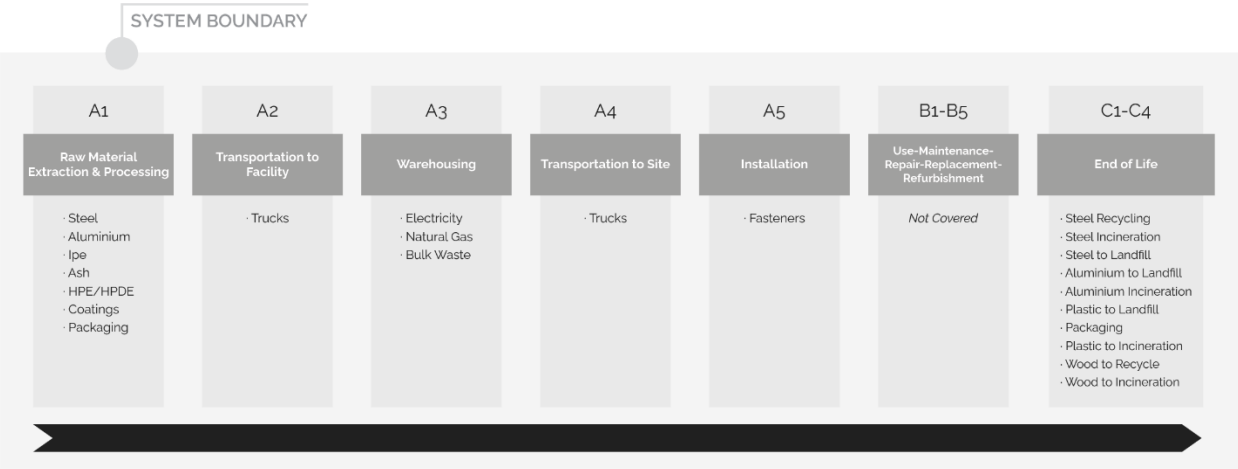

Figure 4: **General system inputs considered in the product system and categorized by modules in scope**

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 Crossfield Products Corp, is located at their Dex-O-Tex-TX facility in Texas. All operating data is formulated using the actual data from Crossfield Products Corp'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 Crossfield Products Corp 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 6: **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
Pallets	386.2691	kg	Off-site
kraft paper	407.3501	kg	Off-site
Plastic flim	473.1648	kg	Off-site

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

Raw material transport: Raw material transport is based on the actual distance from the manufacturer. All distances are calculated based on Crossfield primary data. Materials arrive at the Crossfield facility by tanker truck or freight truck. Only one product originates at a manufacturer outside the United States in England and travels by truck/boat/truck.

The PCR states, "Instances will likely occur where products are made at multiple manufacturing locations or travel to different distribution or retail centers. For situations such as this, a weighted average of production volume at each facility and/or site shall be utilized for calculation purposes." but this EPD only covers exact calculations related to the Dex-O-Tex facility. However, the PCR allows for an average, the industry norm for EPDs in leaning towards facility-specific EPD. Since an EPD is valid for five years, the decision was made to make all Dex-O-Tex EPDs facility specific; therefore, all transportation requirements are for the Texas facility only.

Electricity: Primary electricity consumption was calculated for the Crossfield/Dex-O-Tex facility from electricity bills. Crossfield's fiscal year starts in June; twelve consecutive months were used, from June 2021 through May 2022. Crossfield's utility providers' monthly usage was in kilowatt-hours (kWh), so no conversions were performed. To calculate the amount of utility allotted to each product, the total used was multiplied by the percentage of sales by dollar amount and then divided by the number of each product manufactured.

Process/space heating: Natural gas usage was calculated by using Dex-O-Tex's utility bills for the fiscal year from June 2021 to May 2022.

Fuel required for machinery: On-site machinery for moving materials uses propane and was recorded in this study under Module A3.The conversion factor used for m3 to MJ to represent the burning of the natural gas was 1 m3 of natural gas= 38.3 MJ of energy.

Waste generation: All Waste was calculated using primary information from Dex-O-Tex utility bills. Transportation defaults were used because the driver's route and ultimate final destination are unknown. Therefore, the waste hauler could not confirm the exact mileage. The types of Waste included are as follows 1). Recycling: cardboard boxes, paper bags, plastic bagging, or pails; 2). Bulk Waste: trash bins from standard Waste streams from the warehouse, food, drinks, single-use plastics, and samples such as 2" x 4" tiles with cured material on top; 3). Hazardous/Regulated Waste: expired resins and products in pails/drums/ cans. Regulated waste is picked up on an "as needed" basis.

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

Recycled/reused material/components: According to the Advancing Sustainable Materials Management: 2018 Fact Sheet (US EPA), only 4% of the total plastic packaging is recycled in the USA. Similarly, 4.47% of Plastic waste from pallets were assumed to be recycled off-site at the end of their service life. These numbers are in alignment with the PCR for Resinous Floor Coverings. The PCR also states the transportation distance to the disposal point is 11 km plus the default value in the WARRM Model which is 20 miles (32 km). A total value of 43 km was used per the PCR.

Module A1 material losses: Default material losses were used unless otherwise specified in the PCR. For instance, per the PCR, "It shall be assumed that there is a loss of 2% of the wet mass of the coating remains unused and is properly disposed as solid waste. This value was determined via industry consensus during the PCR development process and represents a conservative estimate."

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

A4 Product transport requirements: The average customer or project was calculated based on Dex-O-Tex records for shipping. On average, the customer for the Texas factory was within 100 miles or (160.9 km) from the factory. In addition, 25% of the orders were picked up by the project installer and not shipped. Dex-O-Tex sells direct to installers and therefore no distribution was calculated as part of this module per the PCR guidelines.

A5 product installation: In accordance with the requirements of ISO 21930:2017, the impact from the activities normally considered in Module A1-A3 (production stage) and in Module A4 (transport to site) for the mass of product wasted during application are included in the Module A5 and not Modules A1 to A4. Additionally, waste processing of the packaging system shall also be accounted in module A5.

B product use phase: Maintenance is thoroughly explained in the PCR for Resinous Floor Coverings. Per the PCR, "It shall be assumed that a cleaning event (1 gallon of mop water with an added ½ cup of cleaning solution) can accommodate 100 m2. Therefore, to satisfy the 60-year time frame functional unit, a total of 21,840 cleaning events will take place, corresponding to 218.4 events for the smaller surface area considered by the functional unit (1 m2 vs. 100 m2). Another 1.6 cleaning events shall also be added to account for any spot cleaning events that may occur. The total impact of these 220 cleaning events shall be reported." This means that 886 liters of tap water are used per m2 of the installed floor.

The process "market for cleaning consumables, without water, in 13.6% solution state, Global" was used to represent a cleaning solution for the floors in use. This is the best available Ecoinvent process. The formula assumes a product density of 100 fl oz. per 2.5 L cleaner. The market process was used due to the level of uncertainty as to where the origin of the cleaner is and how many levels of warehousing and distribution are present.

C product end-of-life: Per the PCR, the following guidelines were followed. "In the United States, the 2012 EPA Waste Reduction Model (WARM model) gives an average transport end of life distance as 32 km. This value shall be used for manufacturing facilities located in the US when primary data or other representative data are not available, and waste transports are not included in the secondary dataset."

DATA QUALITY ASSESSMENT

Data quality/variability requirements, as specified in the PCR, are applied. Data Quality assessments were conducted for every process used as defined in Table 5. All data met the requirements of the PCR, ISO 14040/14044 and ISO 14025.

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).

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+-Eq
2	environmental impact: eutrophication	EP	kg N
3	environmental impact: global warming	GWP	kg CO2-Eq
4	environmental impact: ozone depletion	ODP	kg CFC-11-Eq
5	environmental impact: photochemical oxidation	PCOP	kg NOx-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
Inventory metrics			
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	m3

13	Water depletion: WDP	WDP	m3
14	Land filling: bulk waste	LFW	kg waste
15	Land filling: hazardous waste	LFHW	kg waste

A summary description of each of the impact categories and inventory metrics is provided in the following table:

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 resinous flooring facility on a per 1 m2 of covered and protected flooring surface for a period of 60 years.

Urethane Concrete

Table 8: **Total life cycle (across modules in scope) impact results for Urethane Concrete assuming the geometric mean point values on a per 1 m2 of covered and protected flooring surface for a period of 60 years basis.**

a) Midpoint Impact Categories:

Indicator/LCI Metric	AP	EP	GWP	ODP	PCOP	ADPe	ADPf
Unit	moles of H+-Eq	kg N	kg CO2-Eq	kg CFC-11-Eq	kg NOx-Eq	kg Sb-Eq	MJ, net calorific value
Minimum	0.814	0.00254	3.78	4.79e-07	0.00979	4.38e-05	58.6
Maximum	2.96	0.0111	12.2	1.1e-06	0.0292	0.000246	180
Mean	1.7	0.00592	7.16	6.62e-07	0.0183	0.000114	111
Median	1.58	0.00524	6.57	5.9e-07	0.0172	8.84e-05	103
Tek-Crete SL (MSL)	0.981	0.00303	4.44	5.23e-07	0.0114	5.18e-05	73.9
Tek-Crete SL (TSL)	0.814	0.00254	3.78	4.79e-07	0.00979	4.38e-05	58.6
Tek-Crete SL-Fine (MSL)	1.2	0.00381	5.4	6.37e-07	0.0136	6.58e-05	84.4
Tek-Crete SL-Fine (TSL)	0.951	0.00322	4.18	5.52e-07	0.0123	5.75e-05	68.9
Tek-Crete Skim Coat (MSL)	2.5	0.00844	10.1	1.1e-06	0.0292	0.00013	158
Tek-Crete Skim Coat (TSL)	1.95	0.00667	7.74	8.39e-07	0.0217	0.000111	121
Tek-Crete Sealer CP (MSL)	2.96	0.0111	12.2	6.28e-07	0.0279	0.000246	180
Tek-Crete Sealer CP (TSL)	2.28	0.00854	9.43	5.4e-07	0.0209	0.000203	144

b) Inventory Metrics:

Indicator/LCI Metric	TPE	RE	NRE	NRR	RR	WDP	LFW	LFHW
Unit	MJ-Eq	MJ-Eq	MJ-Eq	kg	m3	m3	kg waste	kg waste
Minimum	35.8	4.74	30.9	0.904	4.49e-05	0.0351	2.81	7.63e-05
Maximum	65.6	13	52.3	1.38	0.000147	0.0773	7.83	0.000154
Mean	49.6	8.18	41.4	1.17	8.64e-05	0.0522	4.56	0.000107
Median	48.6	7.48	41	1.2	7.7e-05	0.0483	4.04	9.94e-05
Tek-Crete SL (MSL)	35.8	4.74	31.2	0.906	4.5e-05	0.0368	3.55	9.36e-05
Tek-Crete SL (TSL)	35.9	4.75	30.9	0.904	4.49e-05	0.0351	2.81	7.63e-05
Tek-Crete SL-Fine (MSL)	42.3	6.28	36	1.05	8.91e-05	0.0418	3.9	0.000104
Tek-Crete SL-Fine (TSL)	42.2	6.3	35.9	1.05	8.93e-05	0.0389	2.99	8.97e-05
Tek-Crete Skim Coat (MSL)	55.1	8.76	46.1	1.38	6.5e-05	0.0607	5.41	0.000154

Tek-Crete Skim Coat (TSL)	55	8.67	46.3	1.38	6.5e-05	0.0548	4.17	0.000123
Tek-Crete Sealer CP (MSL)	65.6	13	52.3	1.35	0.000147	0.0773	7.83	0.000117
Tek-Crete Sealer CP (TSL)	65.1	12.9	52.2	1.34	0.000146	0.0723	5.83	9.47e-05

Terrazzo Flooring

Table 9: **Total life cycle (across modules in scope) impact results for Terrazzo Florring, assuming the geometric mean point values on a per 1 m2 of covered and protected flooring surface for a period of 60 years basis.**

a) Midpoint Impact Categories:

Indicator/LCI Metric	**AP**	**EP**	**GWP**	**ODP**	**PCOP**	**ADPe**	**ADPf**
Unit	**moles of H+-Eq**	**kg N**	**kg CO2-Eq**	**kg CFC-11-Eq**	**kg NOx-Eq**	**kg Sb-Eq**	**MJ, net calorific value**
Minimum	7.47	0.0201	9.82	1.47e-06	0.058	0.00032	143
Maximum	10.4	0.0332	22.4	3.02e-05	0.108	0.000375	331
Mean	8.72	0.0264	15.2	1.48e-05	0.0818	0.000348	225
Median	8.51	0.026	14.2	1.38e-05	0.0805	0.000348	213
Cheminert Terrazzo(MSL)	8.68	0.0246	10.7	1.75e-06	0.108	0.000375	155
Cheminert Terrazzo(TSL)	7.47	0.0201	9.82	1.47e-06	0.0934	0.00032	143
Spectrum Terrazzo (MSL)	10.4	0.0332	22.4	3.02e-05	0.0676	0.000375	331
Spectrum Terrazzo (TSL)	8.34	0.0275	17.7	2.58e-05	0.058	0.000321	271

b) Inventory Metrics:

Indicator/LCI Metric	**TPE**	**RE**	**NRE**	**NRR**	**RR**	**WDP**	**LFW**	**LFHW**
Unit	**MJ-Eq**	**MJ-Eq**	**MJ-Eq**	**kg**	**m3**	**m3**	**kg waste**	**kg waste**
Minimum	98.7	6.33	92.3	2.84	0.000141	0.0703	10.6	0.000186
Maximum	146	8.24	137	4.33	0.000233	0.078	32.8	0.000405
Mean	122	7.28	115	3.58	0.000186	0.0733	20.4	0.000281
Median	122	7.28	115	3.57	0.000186	0.0724	19.2	0.000266
Cheminert Terrazzo(MSL)	99.3	6.34	93	2.85	0.000141	0.078	13.5	0.000203
Cheminert Terrazzo(TSL)	98.7	6.33	92.3	2.84	0.000142	0.0722	10.6	0.000186

Spectrum Terrazzo (MSL)	146	8.24	137	4.33	0.00023	0.0727	32.8	0.000405
Spectrum Terrazzo (TSL)	145	8.22	137	4.29	0.000233	0.0703	24.8	0.00033

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:

- NSF International (2018). Product Category Rule for Environmental Product Declarations PCR for Resinous Floor Coatings
- 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