



Environmental Product Declaration

Terroxy Thin-set Epoxy Terrazzo Flooring System



Certified
Environmental
Product Declaration
www.nsf.org

Program Operator	NSF International 789 N. Dixboro, Ann Arbor, MI 48105 www.nsf.org		
PCR identification	<i>PCR for Resinous Floor Coatings NSF International National Center for Sustainability Standards Valid through December 17, 2023</i>		
Manufacturer Name and Manufacturing Address	Terrazzo & Marble Supply Companies 3555 W123rd Street Alsip, IL 60803		
Product Description	Terroxy Thin-set Epoxy Terrazzo Flooring System is a set of resinous floor coatings. Under the reference PCR, Terroxy Thin-set Epoxy Terrazzo Flooring System falls under the following classification: <i>"Mortar, Monolithic Mortars, and Terrazzo: A composite material consisting of marble, silica sand, granite, glass or other suitable aggregate in a binder matrix of Portland cement mortar, epoxy resin, polyester resin, or vinyl ester resin. Typically installed to build thickness greater than 180 mils."</i>		
Product Category	Thin-set Epoxy Terrazzo Flooring		
Declaration Number	EPD10317		
Declared Product and Functional Unit	Terroxy Thin-set Epoxy Terrazzo Flooring System 1 m ² of covered and protected flooring surface for a period of 60 years		
Product's intended Application and Use	Commercial Flooring		
Market Lifetimes Used in Assessment	20 Years for Industrial Application and 30 Years for Commercial Application		
Technical Lifetimes Used in Assessment	30 Years for Industrial Application and 60 Years for Commercial Application		
Markets of Applicability	North America		
Information on where explanatory material can be obtained	https://www.tmsupply.com/technical-information/		
Date of Issue	December 20 th , 2019		
Period of Validity	5 years from date of issue		
EPD Type	Product Specific		
EPD Scope	Cradle to Grave		
Year of reported manufacturer primary data	2018		
LCA Software and Version Number	GaBi V9.2.0.58		
LCI Database and Version Number	GaBi Database Service Pack 39		
Overall Data Quality Score	Good		
LCIA Methodology and Version Number	TRACI 2.1 CML 2001-Jan 2016		
This declaration was independently verified in accordance with ISO 14025:2006. The UL Environment "Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report," v3.1 (February 2018), based on CEN Norm EN 15804 (2012) and ISO 21930:2017, serves as the core PCR, with additional considerations from the USGBC/UL Environment Part A Enhancement (2017) ☐ Internal ☑ External	Jenny Oorbeck joorbeck@nsf.org 		
This life cycle assessment was conducted in accordance with ISO 14044 and the reference PCR by:	WAP Sustainability Consulting		
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	Angela Fisher Aspire Sustainability angela@aspireustainability.com 		
<p>Limitations: <i>In order to support comparative assertions, this EPD meets all comparability requirements stated in ISO 14025:2006. However, differences in certain assumptions, data quality, and variability between LCA data sets may still exist. As such, caution should be exercised when evaluating EPDs from different manufacturers or programs, as the EPD results may not be entirely comparable. Any EPD comparison must be carried out at the construction works level per ISO 21930:2017 guidelines. The results of this EPD reflect an average performance by the product and its actual impacts may vary on a case-to-case basis.</i></p>			

Company Profile

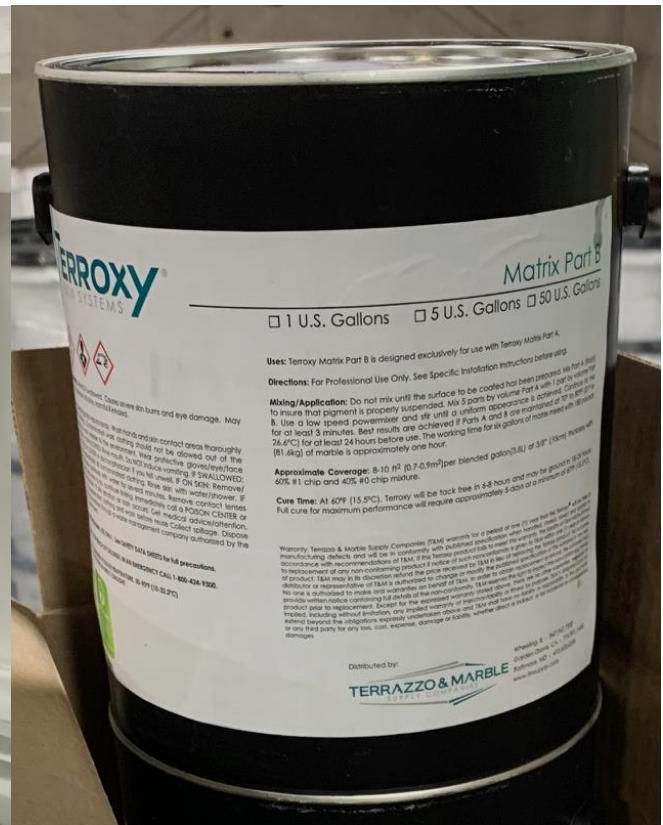
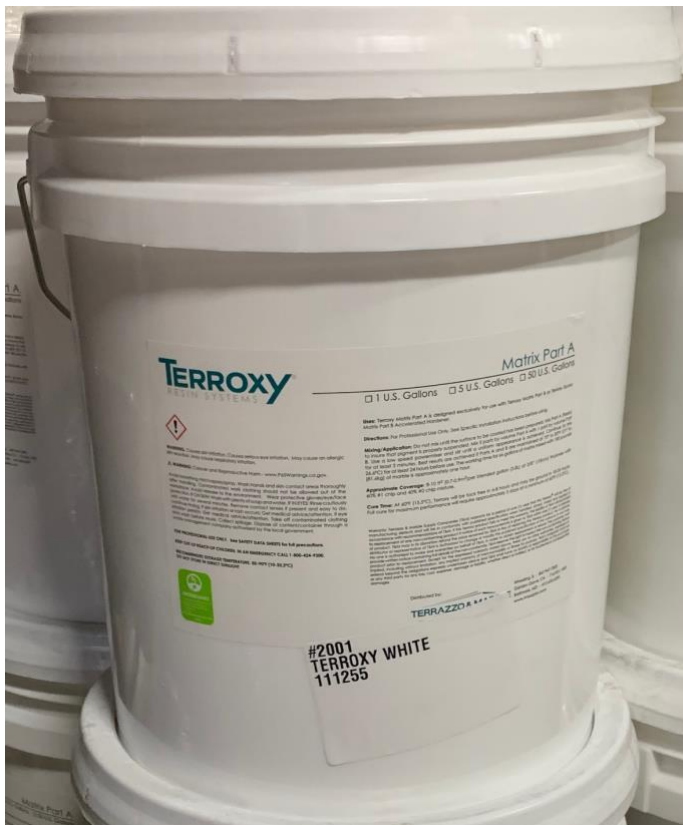
Terrazzo & Marble Supply Companies began over 75 years ago with a simple notion, to provide our customers with the highest quality products and unmatched customer service. It manufactures and supplies a portfolio of products including terrazzo flooring, resinous flooring, natural stones, tiles, quartz, porcelain, and wall finishes. As a 100% employee owned company, our commitment to quality products and service will continue to be a focus as a growing, innovative and trustworthy company.

Product Definition and Characteristics

Terroxy Thin-set Epoxy Terrazzo Flooring System is a set of resinous floor coatings manufactured by T&M in its manufacturing plant in Alsip, IL. The coatings offer outstanding durability, chemical resistance, and bacteria/fungal growth resistance. Under the reference PCR, Terroxy Thin-set Epoxy Terrazzo Flooring System falls under the following classification:

Material	Mass %
Calcium carbonate	70-80%
Epoxy resin	10-15%
Glycidyl Ether	2-3%
Methyl Ester	1-2%
Amine	0-1%
Phenols	0-1%
Other additives	0-1%

“Mortar, Monolithic Mortars, and Terrazzo: A composite material consisting of marble, silica sand, granite, glass or other suitable aggregate in a binder matrix of Portland cement mortar, epoxy resin, polyester resin, or vinyl ester resins.”



The terrazzo flooring system configuration consists of four resinous layers and aggregates. Among the four layers, the primer layer and the matrix layer are necessary while the moisture vapor treatment layer and the iso-crack membrane layer are optional but recommended. The moisture vapor treatment layer is necessary if the concrete slab does not meet the humidity requirement.



System Boundary

This EPD is a cradle-to-grave study.

Table 1: Description of system boundary modules (X = Included in study)

EPD Type	PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY
	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	
Cradle to Grave	Raw material supply	Transport	Manufacturing	Transport from gate to site	Assembly/Install	Use	Maintenance	Repair	Replacement	Refurbishment	Building Operational Energy Use During Product Use	Building Operational Water Use During Product Use	Deconstruction	Transport	Waste processing	Disposal	Reuse, Recovery, Recycling Potential
	X			X	X	X	X	X	X	X	X	X	X	X	X	X	MND

Table 2: System Boundary and Modules

Module Name	Description	Analysis Period	Summary of Included Elements
A1	Product Stage: Raw Material Supply	2018	Raw Material sourcing and processing as defined by secondary data.
A2	Product Stage: Transport	2018	Shipping from supplier to manufacturing site. Fuel use requirements estimated based on product weights and estimated distance.
A3	Product Stage: Manufacturing	2017	Energy, water and material inputs required for manufacturing products from raw materials. Packaging materials and manufacturing waste are included as well.
A4	Construction Process Stage: Transport	2018	Shipping from manufacturing site to project site. Fuel use requirements estimated based on product weights and mapped distance.
A5	Construction Process Stage: Installation	2018	Installation materials, installation waste and packaging material waste.
B1	Use Stage: Use	2018	Use of the product.
B2	Use Stage: Maintenance	2018	Cleaning energy, water, and materials, including refinishing the product.
B3	Use Stage: Repair	2018	Product typically not repaired during use.
B4	Use Stage: Replacement	2018	Total materials and energy required to manufacture a replacement.
B5	Use Stage: Refurbishment	2018	Product typically not refurbished during use.
B6	Operational Energy Use	2018	Operational Energy Use of Building Integrated System During Product Use
B7	Operational Water Use	2018	Operational Water Use of Building Integrated System During Product Use
C1	EOL: Deconstruction	2018	No inputs required for deconstruction.
C2	EOL: Transport	2018	Shipping from project site to waste disposal.
C3	EOL: Waste Processing	2018	Waste processing if incineration as chosen disposal pathway per Part A of the PCR.
C4	EOL: Disposal	2018	Disposal modeled by region as per Part A of the PCR.
D	Benefits beyond system	MND	Credits from energy or material capture.

Declarations of Technical information and Scenarios

Table 3: Transportation Distance

Input	Type	Distance (miles)	Distance (km)
Raw material supplier to manufacturing facility	Truck	631.92	1016.98
Packaging supplier to manufacturing facility	Rail	131.93	212.32
	Truck	797.98	1284.23
	Ship	930.10	1496.85
Shipping to Distributors	Truck	250	402
Shipping to Point of Sale	Truck	500	804
Shipping to Application Site	Passenger Car	4.97	8
Installation Waste to Landfill	Passenger Car	6.84	11
Packaging Waste to Disposal	Truck	20	32.19
Shipping to EOL (landfill)	Truck	20	32.19

Table 4 : Transportation Types

Vehicle type	Fuel type	Liters of fuel	Capacity utilization	Source
Truck - Trailer, basic enclosed / 45,000 lb payload - 8b	Diesel	38.81 l/100km	67%	GaBi
Truck - Heavy Heavy-duty Diesel Truck / 53,333 lb payload - 8b	Diesel	42 l/100km	67%	GaBi
Truck - Tank, dry bulk / 50,000 lb payload - 8b	Diesel	44.97 l/100km	58%	GaBi
Truck - Tank, liquid or gas / 50,000 lb payload - 8b	Diesel	41.56 l/100km	60%	GaBi

Vehicle type	Fuel type	Liters of fuel	Capacity utilization	Source
Passenger car, average, Euro 3-5, engine size from 1.4l up to >2l	Diesel and gasoline	not provided	n/a	GaBi
Container ship, 5,000 to 200,000 dwt payload capacity, ocean going	Heavy fuel oil	0.23 kg/100 (km*kg)	70%	GaBi
Rail transport cargo - Diesel, average train, gross tonne weight 1,000t / 726t payload capacity	Diesel	1.02E-04 kg/100 (km*kg)	40%	GaBi

Table 5: Installation (A5) Parameters

Parameter	Value	Unit
Unused Coating	8.08E-02	kg
EOL Option Utilized	Landfilled	-
Electricity Consumption	2.5E-01	kWh
VOC Emission	0	kg
Steel Packaging-Recycled	7.72E-02	kg
Steel Packaging-Landfilled	1.23E-01	kg
Steel Packaging-Incinerated	2.52E-02	kg
Plastic Packaging-Recycled	6.67E-02	kg
Plastic Packaging-Landfilled	5.53E-01	kg
Plastic Packaging-Incinerated	1.14E-01	kg

Installation instruction can be found [here](#).

Table 6: Maintenance Stage (B2) Parameters

Parameter	Input per m ²	Source
Cleaning Events over 60 years	220	PCR Section 4.3
Water Per Cleaning Event	3.79 liter	
Cleaner Per Cleaning Event	0.12 liter	
Cleaner Specification	C10-14 Ethoxylated Alcohol (2.5%)	SDS of the cleaner
Cleaner Density	1 kg/liter	Assumption

Table 7: End-of-Life Parameters

Waste Type	Disposal scenario	Weight for 20-yr RSL	Weight for 30-yr RSL	Weight for 60-yr RSL	Unit
Unused product from installation stage	Landfilling	2.37	1.58	0.79	kg
Applied product at the end of reference service life	Landfilling	116.37	77.58	38.79	kg

Additional Environmental Information

Terroxy Terrazzo Flooring System is GreenGuard Gold Certified.



Data Quality Assessment and Disclosure and Explanation of Any Data Gaps

Geographical Coverage

The geographical scope of the manufacturing portion of the life cycle is Alsip, IL. All primary data were collected from the manufacturer. The geographic coverage of primary data is considered excellent.

The geographical scope of the raw material acquisition is USA. Customer distribution, site installation and use portions of the life cycle is North America. Default shipping distance values from the PCR were used in the study. In general, the data is considered good.

Disposal and end-of-life geographic coverage (i.e. site of disposal location) was assumed to be 20 miles from the construction site to a landfill. This data is considered acceptable.

In selecting secondary data (i.e. GaBi Datasets), priority was given to the accuracy and representativeness of the data. Geographic coverage was considered in assessing representativeness. When available and deemed of significant quality, country-specific data was used. However, priority was given to technological relevance and accuracy in selecting secondary data. This often led to the substitution of regional and/or global data for country-specific data. Overall geographic data quality is considered good.

Time Coverage

Primary data were provided by the manufacturer and represent all information for calendar year 2018. Using this data meets the PCR requirements. Time coverage of this data is considered very good.

Data necessary to model cradle-to-gate unit processes was sourced from thinkstep LCI datasets. Time coverage of the GaBi datasets varies from approximately 2010 to present. All datasets rely on at least one 1-year average data. Overall time coverage of the datasets is considered good and meets the requirement of the PCR that the data be updated within a 5-year period with the exception of four datasets due to the unavailability of newer ones.

Technological Coverage

Primary data provided by the manufacturer is specific to the technology that the company uses in manufacturing their product. It is site-specific and considered of good quality. It is worth noting that the energy and water used in manufacturing the product includes overhead energy such as lighting, heating and sanitary use of water. Sub-metering was not available to extract process only energy and water use from the total energy use. Sub-metering would improve the technological coverage of data quality.

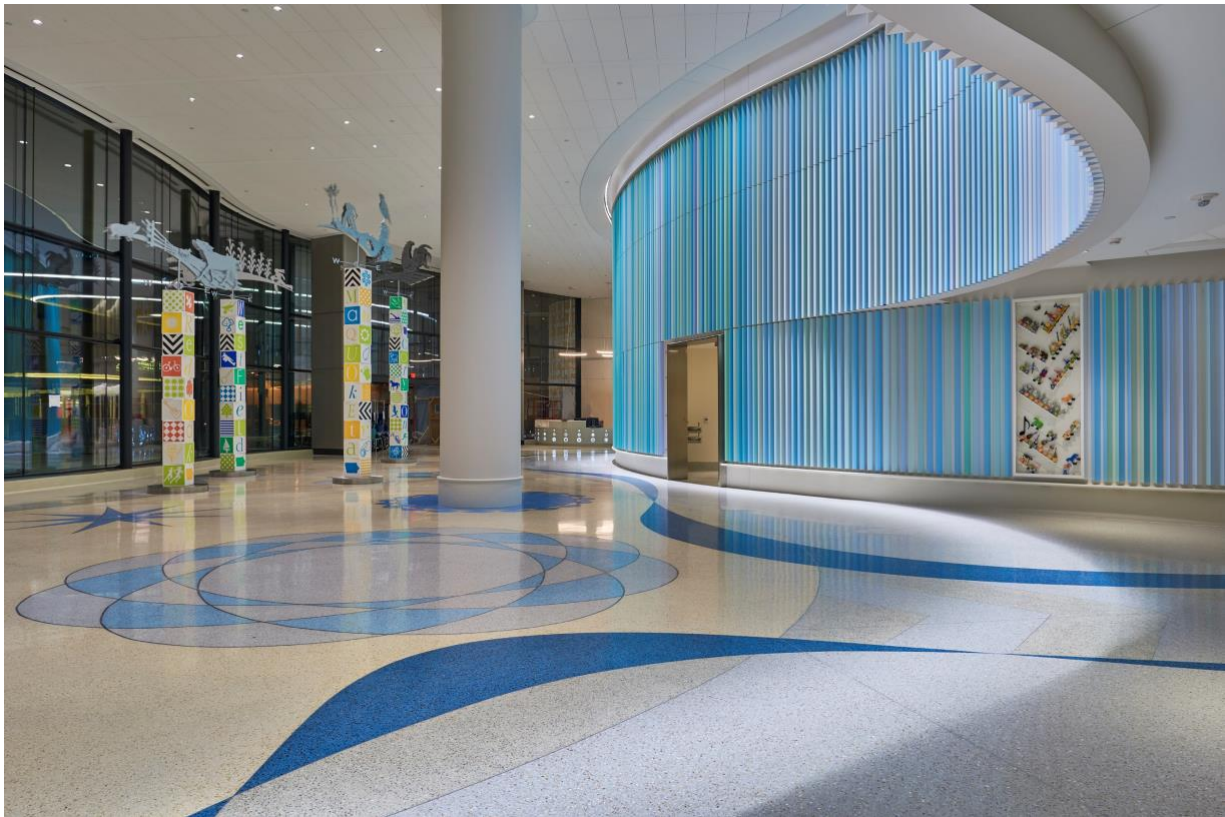
Data necessary to model cradle-to-gate unit processes was sourced from GaBi LCI datasets. Technological coverage of the datasets is considered good relative to the actual supply chain of the manufacturer. While improved life cycle data from suppliers would improve technological coverage, the use of lower quality generic datasets does meet the goal of this LCA.

Secondary Data

Whenever possible, primary data was used for all processes. When primary data did not exist, secondary data for raw material production, generic data was used from the GaBi database.

Cut-off Criteria

Material inputs greater than 1% (based on total mass of the final product) were included within the scope of analysis. Material inputs less than 1% were included if sufficient data was available to warrant inclusion and/or the material input was thought to have significant environmental impact. Cumulative excluded material inputs and environmental impacts are less than 5% based on total weight of the functional unit. In addition, as per PCR, substances that are characterized as hazardous according to Globally Harmonized System are not cut off. Therefore, there are no known substances, energy resources or environmental impacts excluded.



Life Cycle Assessment Results

The results below represent the impacts of the product system under three reference service life scenarios—20 years, 30 years and 60 years. All results are given per functional unit, which is 1 m² of covered and protected flooring surface over 60 years.

Table 8: Impact Category Key

Acronym	Text	Acronym	Text
ADP-elements	Abiotic depletion potential for non-fossil resources	GWP	Global warming potential
ADP-fossil	Abiotic depletion potential for fossil resources	OPD	Depletion of stratospheric ozone layer
AP	Acidification potential of soil and water	POCP	Photochemical ozone creation potential
EP	Eutrophication potential	Resources	Depletion of non-renewable fossil fuels
LCI Indicators			
PERE	Use of renewable primary energy excluding renewable primary energy resources used as raw materials	PENRT	Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)
PERM	Use of renewable primary energy resources used as raw materials	SM	Use of secondary materials
PERT	Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	RSF	Use of renewable secondary fuels
PENRE	Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	NRSF	Use of non-renewable secondary fuels
PENRM	Use of non-renewable primary energy resources used as raw materials	FW	Net use of fresh water
HWD	Disposed-of hazardous waste	CRU	Components for reuse
NHWD	Disposed-of non-hazardous waste	MFR	Materials for recycling
HLRW	Disposed-of high-level radioactive waste	MER	Materials for energy recovery
ILLRW	Disposed-of intermediate and low-level radioactive waste	EE	Exported energy

Significant data limitations currently exist within the LCI data used to generate waste metrics for Life Cycle Assessments and Environmental Product Declarations. The waste metrics were calculated in a way conformant with the requirements of ISO 21930:2017, but these values represent rough estimates and are for informational purposes only. As such, no decisions regarding actual cradle-grave waste performance between products should be derived from these reported values.



Terroxy Resin Thin-set Terrazzo System--20-yr Service Life

CML Results

Impact Category	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
ADP-elements [kg Sb eq]	6.46E-05	7.94E-07	-5.38E-06	0.00E+00	1.92E-06	0.00E+00	1.20E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.96E-08	0.00E+00	1.15E-06	MND
ADP-fossil fuel [MJ]	6.12E+02	5.74E+01	-2.26E+00	0.00E+00	2.93E+01	0.00E+00	1.33E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.19E+00	0.00E+00	4.34E+01	MND
AP [kg SO ₂ eq]	8.17E-02	8.55E-03	-3.80E-04	0.00E+00	6.67E-03	0.00E+00	1.80E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.59E-04	0.00E+00	1.98E-02	MND
EP [kg Phosphate eq]	1.51E-02	2.57E-03	8.93E-05	0.00E+00	6.12E-03	0.00E+00	3.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.02E-04	0.00E+00	6.30E-03	MND
GWP [kg CO ₂ eq]	3.49E+01	4.24E+00	5.91E-01	0.00E+00	1.51E+00	0.00E+00	7.95E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.55E-01	0.00E+00	2.80E+00	MND
ODP [kg CFC 11 eq]	2.30E-07	4.98E-16	4.24E-09	0.00E+00	3.59E-07	0.00E+00	4.68E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.47E-17	0.00E+00	1.02E-14	MND
POCP [kg Ethene eq]	4.65E-03	-9.74E-04	1.63E-05	0.00E+00	1.31E-03	0.00E+00	7.38E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-1.20E-04	0.00E+00	6.04E-03	MND

TRACI Results

Impact Category	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
AP [kg SO ₂ eq]	9.63E-02	1.13E-02	-2.24E-04	0.00E+00	9.56E-03	0.00E+00	2.15E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.79E-04	0.00E+00	2.22E-02	MND
EP [kg N eq]	1.27E-02	1.40E-03	9.31E-05	0.00E+00	1.04E-02	0.00E+00	2.85E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.46E-05	0.00E+00	5.56E-03	MND
GWP [kg CO ₂ eq]	3.48E+01	4.23E+00	5.92E-01	0.00E+00	1.46E+00	0.00E+00	7.93E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.55E-01	0.00E+00	2.78E+00	MND
ODP [kg CFC 11 eq]	2.30E-07	-3.25E-14	4.58E-09	0.00E+00	3.59E-07	0.00E+00	4.68E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-8.34E-16	0.00E+00	-1.46E-13	MND
Resources [MJ]	7.94E+01	7.70E+00	-6.79E-02	0.00E+00	3.54E+00	0.00E+00	1.74E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.93E-01	0.00E+00	5.59E+00	MND
POCP [kg O ₃ eq]	1.38E+00	2.61E-01	-2.32E-03	0.00E+00	1.20E-01	0.00E+00	3.29E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.07E-02	0.00E+00	2.90E-01	MND

Resource Use Results

Impact Category	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
RPR _e [MJ]	5.78E+01	3.13E+00	-2.35E-01	0.00E+00	1.93E+01	0.00E+00	1.21E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.81E-02	0.00E+00	3.39E+00	MND
RPR _m [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
RPR _t [MJ]	5.78E+01	3.13E+00	-2.35E-01	0.00E+00	1.93E+01	0.00E+00	1.21E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.81E-02	0.00E+00	3.39E+00	MND
NRPR _e [MJ]	6.32E+02	5.78E+01	-2.73E+00	0.00E+00	3.09E+01	0.00E+00	1.37E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.20E+00	0.00E+00	4.45E+01	MND
NRPR _m [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
NRPR _t [MJ]	6.32E+02	5.78E+01	-2.73E+00	0.00E+00	3.09E+01	0.00E+00	1.37E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.20E+00	0.00E+00	4.45E+01	MND
SM [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
RSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
NRSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
RE [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
FW [m ³]	2.02E-01	1.66E-02	1.42E-03	0.00E+00	1.89E-02	0.00E+00	4.40E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.64E-04	0.00E+00	5.28E-03	MND

Output Flows and Waste Results

Impact Category	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD [kg]	2.21E-03	2.00E-05	4.55E-06	0.00E+00	9.10E-04	0.00E+00	4.47E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.78E-08	0.00E+00	1.56E-07	MND
NHWD [kg]	7.35E-01	6.70E-03	5.04E-01	0.00E+00	8.32E-01	0.00E+00	2.49E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.29E-05	0.00E+00	6.35E+01	MND
HLRW [kg]	1.01E-05	1.79E-07	-1.92E-07	0.00E+00	7.42E-07	0.00E+00	2.02E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.88E-09	0.00E+00	5.41E-07	MND
ILLRW [kg]	7.90E-03	1.47E-04	-1.83E-04	0.00E+00	6.05E-04	0.00E+00	1.57E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.87E-06	0.00E+00	4.31E-04	MND
CRU [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
MFR [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
MER [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
EE [MJ]	0.00E+00	0.00E+00	1.13E+00	0.00E+00	0.00E+00	0.00E+00	2.25E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND

Terroxy Resin Thin-set Terrazzo System--30-yr Service Life

CML Results

Impact Category	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
ADP-elements [kg Sb eq]	6.46E-05	7.94E-07	-5.38E-06	0.00E+00	1.92E-06	0.00E+00	6.00E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.97E-08	0.00E+00	7.68E-07	MND
ADP-fossil fuel [MJ]	6.12E+02	5.74E+01	-2.27E+00	0.00E+00	2.93E+01	0.00E+00	6.67E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.46E+00	0.00E+00	2.89E+01	MND
AP [kg SO ₂ eq]	8.17E-02	8.55E-03	-3.80E-04	0.00E+00	6.67E-03	0.00E+00	8.99E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.39E-04	0.00E+00	1.32E-02	MND
EP [kg Phosphate eq]	1.51E-02	2.57E-03	8.93E-05	0.00E+00	6.12E-03	0.00E+00	1.78E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.80E-05	0.00E+00	4.20E-03	MND
GWP [kg CO ₂ eq]	3.49E+01	4.24E+00	5.91E-01	0.00E+00	1.51E+00	0.00E+00	3.97E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.03E-01	0.00E+00	1.87E+00	MND
ODP [kg CFC 11 eq]	2.30E-07	4.98E-16	4.24E-09	0.00E+00	3.59E-07	0.00E+00	2.34E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.80E-18	0.00E+00	6.78E-15	MND
POCP [kg Ethene eq]	4.65E-03	-9.74E-04	1.63E-05	0.00E+00	1.31E-03	0.00E+00	3.70E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.02E-05	0.00E+00	4.03E-03	MND

TRACI Results

Impact Category	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
AP [kg SO ₂ eq]	9.63E-02	1.13E-02	-2.24E-04	0.00E+00	9.56E-03	0.00E+00	1.07E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.20E-04	0.00E+00	1.48E-02	MND
EP [kg N eq]	1.27E-02	1.40E-03	9.31E-05	0.00E+00	1.04E-02	0.00E+00	1.42E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.98E-05	0.00E+00	3.70E-03	MND
GWP [kg CO ₂ eq]	3.48E+01	4.23E+00	5.92E-01	0.00E+00	1.46E+00	0.00E+00	3.97E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.03E-01	0.00E+00	1.85E+00	MND
ODP [kg CFC 11 eq]	2.30E-07	-3.25E-14	4.58E-09	0.00E+00	3.59E-07	0.00E+00	2.34E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-5.56E-16	0.00E+00	-9.75E-14	MND
Resources [MJ]	7.94E+01	7.70E+00	-6.79E-02	0.00E+00	3.54E+00	0.00E+00	8.71E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.95E-01	0.00E+00	3.72E+00	MND
POCP [kg O ₃ eq]	1.38E+00	2.61E-01	-2.32E-03	0.00E+00	1.20E-01	0.00E+00	1.64E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.15E-03	0.00E+00	1.94E-01	MND

Resource Use Results

Impact Category	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
RPR _e [MJ]	5.78E+01	3.13E+00	-2.35E-01	0.00E+00	1.93E+01	0.00E+00	6.07E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.54E-02	0.00E+00	2.26E+00	MND
RPR _m [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
RPR _t [MJ]	5.78E+01	3.13E+00	-2.35E-01	0.00E+00	1.93E+01	0.00E+00	6.07E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.54E-02	0.00E+00	2.26E+00	MND
NRPR _e [MJ]	6.32E+02	5.78E+01	-2.73E+00	0.00E+00	3.09E+01	0.00E+00	6.87E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.47E+00	0.00E+00	2.96E+01	MND
NRPR _m [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
NRPR _t [MJ]	6.32E+02	5.78E+01	-2.73E+00	0.00E+00	3.09E+01	0.00E+00	6.87E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.47E+00	0.00E+00	2.96E+01	MND
SM [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
RSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
NRSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
RE [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
FW [m ³]	2.02E-01	1.66E-02	1.42E-03	0.00E+00	1.89E-02	0.00E+00	2.20E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.76E-04	0.00E+00	3.52E-03	MND

Waste

Impact Category	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD [kg]	2.21E-03	2.00E-05	4.56E-06	0.00E+00	9.10E-04	0.00E+00	2.24E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.19E-08	0.00E+00	1.04E-07	MND
NHWD [kg]	7.35E-01	6.70E-03	5.03E-01	0.00E+00	8.32E-01	0.00E+00	1.24E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.53E-05	0.00E+00	4.23E+01	MND
HLRW [kg]	1.01E-05	1.79E-07	-1.92E-07	0.00E+00	7.42E-07	0.00E+00	1.01E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.92E-09	0.00E+00	3.61E-07	MND
ILLRW [kg]	7.90E-03	1.47E-04	-1.82E-04	0.00E+00	6.05E-04	0.00E+00	7.87E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.25E-06	0.00E+00	2.87E-04	MND
CRU [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
MFR [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
MER [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
EE [MJ]	0.00E+00	0.00E+00	1.12E+00	0.00E+00	0.00E+00	0.00E+00	1.12E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND

Terroxy Resin Thin-set Terrazzo System--60-yr Service Life

CML Results

Impact Category	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
ADP-elements [kg Sb eq]	6.46E-05	7.94E-07	-5.38E-06	0.00E+00	1.92E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.86E-09	0.00E+00	3.84E-07	MND
ADP-fossil fuel [MJ]	6.12E+02	5.74E+01	-2.27E+00	0.00E+00	2.93E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.29E-01	0.00E+00	1.45E+01	MND
AP [kg SO ₂ eq]	8.17E-02	8.55E-03	-3.80E-04	0.00E+00	6.67E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.20E-04	0.00E+00	6.60E-03	MND
EP [kg Phosphate eq]	1.51E-02	2.57E-03	8.93E-05	0.00E+00	6.12E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.40E-05	0.00E+00	2.10E-03	MND
GWP [kg CO ₂ eq]	3.49E+01	4.24E+00	5.91E-01	0.00E+00	1.51E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.17E-02	0.00E+00	9.33E-01	MND
ODP [kg CFC 11 eq]	2.30E-07	4.98E-16	4.24E-09	0.00E+00	3.59E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.90E-18	0.00E+00	3.39E-15	MND
POCP [kg Ethene eq]	4.65E-03	-9.74E-04	1.63E-05	0.00E+00	1.31E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-4.01E-05	0.00E+00	2.01E-03	MND

TRACI Results

Impact Category	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
AP [kg SO ₂ eq]	9.63E-02	1.13E-02	-2.24E-04	0.00E+00	9.56E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.60E-04	0.00E+00	7.41E-03	MND
EP [kg N eq]	1.27E-02	1.40E-03	9.31E-05	0.00E+00	1.04E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.49E-05	0.00E+00	1.85E-03	MND
GWP [kg CO ₂ eq]	3.48E+01	4.23E+00	5.92E-01	0.00E+00	1.46E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.16E-02	0.00E+00	9.27E-01	MND
ODP [kg CFC 11 eq]	2.30E-07	-3.25E-14	4.58E-09	0.00E+00	3.59E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-2.78E-16	0.00E+00	-4.87E-14	MND
Resources [MJ]	7.94E+01	7.70E+00	-6.79E-02	0.00E+00	3.54E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.76E-02	0.00E+00	1.86E+00	MND
POCP [kg O ₃ eq]	1.38E+00	2.61E-01	-2.32E-03	0.00E+00	1.20E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.58E-03	0.00E+00	9.68E-02	MND

Resource Use Results

Impact Category	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
RPR _e [MJ]	5.78E+01	3.13E+00	-2.35E-01	0.00E+00	1.93E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.27E-02	0.00E+00	1.13E+00	MND
RPR _m [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
RPR _t [MJ]	5.78E+01	3.13E+00	-2.35E-01	0.00E+00	1.93E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.27E-02	0.00E+00	1.13E+00	MND
NRPR _e [MJ]	6.32E+02	5.78E+01	-2.73E+00	0.00E+00	3.09E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E-01	0.00E+00	1.48E+01	MND
NRPR _m [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
NRPR _t [MJ]	6.32E+02	5.78E+01	-2.73E+00	0.00E+00	3.09E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E-01	0.00E+00	1.48E+01	MND
SM [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
RSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
NRSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
RE [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
FW [m³]	2.02E-01	1.66E-02	1.42E-03	0.00E+00	1.89E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.80E-05	0.00E+00	1.76E-03	MND

Waste

Impact Category	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD [kg]	2.21E-03	2.00E-05	4.56E-06	0.00E+00	9.10E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.95E-09	0.00E+00	5.19E-08	MND
NHWD [kg]	7.35E-01	6.70E-03	5.03E-01	0.00E+00	8.32E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.76E-05	0.00E+00	2.12E+01	MND
HLRW [kg]	1.01E-05	1.79E-07	-1.92E-07	0.00E+00	7.42E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.96E-09	0.00E+00	1.80E-07	MND
ILLRW [kg]	7.90E-03	1.47E-04	-1.82E-04	0.00E+00	6.05E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.62E-06	0.00E+00	1.44E-04	MND
CRU [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
MFR [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
MER [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
EE [MJ]	0.00E+00	0.00E+00	1.12E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND

Biogenic Carbon Uptakes and Emissions

Table 9: Carbon Uptakes and Emission Indicators

	Description
BCRP [kg CO2e]	Biogenic Carbon Removal from Product
BCEP [kg CO2e]	Biogenic Carbon Emission from Product
BCRK [kg CO2e]	Biogenic Carbon Removal from Packaging
BCEK [kg CO2e]	Biogenic Carbon Emission from Packaging
BCEW [kg CO2e]	Biogenic Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes—Not applicable
CCE [kg CO2e]	Calcination Carbon Emissions –Not applicable
CCR [kg CO2e]	Carbonation Carbon Removals –Not applicable
CWNR [kg CO2e]	Carbon Emissions from Combustion of Waste from Non-Renewable Sources used in Production Processes –Not applicable

Product	Indicator	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Terroxy Resin Thin-set Terrazzo System-20-yr Service Life	BCRP	3.80E+00	0.00E+00	7.75E-03	0.00E+00	0.00E+00	0.00E+00	7.62E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.84E-01	MND
	BCEP	2.32E+00	0.00E+00	4.74E-03	0.00E+00	0.00E+00	0.00E+00	4.66E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.32E-01	MND
	BCRK	9.00E-03	0.00E+00	1.82E-03	0.00E+00	0.00E+00	0.00E+00	2.16E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
	BCEK	9.63E-03	0.00E+00	1.32E-03	0.00E+00	0.00E+00	0.00E+00	2.19E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
Terroxy Resin Thin-set Terrazzo System-30-yr Service Life	BCRP	3.80E+00	0.00E+00	7.75E-03	0.00E+00	0.00E+00	0.00E+00	3.81E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.23E-01	MND
	BCEP	2.32E+00	0.00E+00	4.74E-03	0.00E+00	0.00E+00	0.00E+00	2.33E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.77E-02	MND
	BCRK	9.00E-03	0.00E+00	1.82E-03	0.00E+00	0.00E+00	0.00E+00	1.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
	BCEK	9.63E-03	0.00E+00	1.32E-03	0.00E+00	0.00E+00	0.00E+00	1.09E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
Terroxy Resin Thin-set Terrazzo System-60-yr Service Life	BCRP	3.80E+00	0.00E+00	7.75E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.13E-02	MND
	BCEP	2.32E+00	0.00E+00	4.74E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.38E-02	MND
	BCRK	9.00E-03	0.00E+00	1.82E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND
	BCEK	9.63E-03	0.00E+00	1.32E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND

Interpretation

Overall, the raw material extraction (A1) is the largest impact contributor in one single 60-year reference service life of the product system in study. Despite the high mass percentage of aggregates in the whole flooring system, the major impacts come from the resins and other fossil-based compounds. This is not unexpected considering the substantial resources needed to produce raw materials of this type and that resins and other fossil-based compounds together represent over 60% of the non-aggregate ingredients. On the other hand, the impacts from the manufacturing stage (A3) across all the indicators is negligible. This points out that formulation optimization is a focal area where the manufacturer may be able to effectively reduce its product environmental impact.

Besides raw material extraction, the two transportation stages (A2 and A4) are also worth attention. The high mass of aggregates in the product system leads to a heavier footprint in transportation than those light weighted products. Improving the supplier diversity of aggregates may be helpful to reduce the transportation distance of aggregates. Finally, from a broader standpoint, improving the product system's performance and durability can be an effective measure. In the assessment, the reference flows across three reference service life scenarios ranges from 42 kg to 123 kg. A longer reference service life of the product system leads to better environmental performance across all impact categories over the whole life span of a building.

Reference

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