Environmental Product Declaration

ASTM INTERNATIONAL

According to UL 10010-7

Johnsonite Rubber Tile Collection

Tarkett's Cradle to Cradle Certified Rubber Tile Collections include Solid Color Rubber, Circulinity, Minerality, Mesto Configurations, Color Splash, Prima Olio & Marbelized, Organics, Pentagonals, and Defiant Oil & Grease Resistant Tile.

100% Renewable Energy

Manufactured with 100% renewable energy through Tarkett's renewable energy investment.

Embodied Carbon – 0.08" (2 mm) thickness, cradle to gate (A1-A3) – with Renewable Energy Credits

CO_2 7.55 kg CO2 eq. (per 1 m^2 of tile flooring)

Embodied Carbon – 0.125" (3.17 mm) thickness, cradle to gate (A1-A3) – with Renewable Energy Credits

CO_2 12.6 kg CO2 eq. (per 1 m^2 of tile flooring)

For years, Tarkett has raised the sustainability standards of the flooring industry. It purposefully designs floors with total transparency to create healthier, safer spaces for both people and planet. Committed to changing the game with circular economy and to reducing its carbon footprint, Tarkett has implemented an eco-innovation strategy based on Cradle to Cradle principles, fully aligned with its Tarkett Human-Conscious Design® approach. When Tarkett floors reach their end of life, the company's ReStart® program makes it possible for them to be repurposed or recycled.

Environmental Product Declaration

Johnsonite Rubber Tile Collection

Rubber Tile

EPD Program Operator Name, Logo, Address, and Website	ASTM International – WWW.ASTM.ORG 100 Barr Harbor Dr., West Conshohocken, PA
General Program Instructions and Version Number	ASTM General Program Instructions. V.8.0, April 29, 2020
Manufacturer Name and Address	Tarkett Johnsonite, 16035 Industrial Pkwy, Middlefield, OH 44062
Declaration Number	EPD 448
Declared Product & Functional Unit or Declared Unit	1 m^2 of installed floor covering with an RSL of 35 years over 75 years of building service life
Reference PCR and Version Number	Part B: Flooring EPD Requirements UL 10010-7 v2.0 - 2018
Description of product application/use	Floor covering
Market(s) of applicability	Commercial
Product RSL Description (if Appl.)	35 years
Date of Issue	06/01/2023
Period of Validity	5 years
EPD Type	Product specific
EPD Scope	Cradle to grave (A1-C4)
Year(s) of reported primary data	2020
LCA Software & Version Number	SimaPro v9.4.0.1
LCI Database(s) & Version Number	Ecoinvent v3.8 compiled in November 2021 DATASMART LCI, Long Trail Sustainability, version 2021.1
LCIA Methodology & Version Number	TRACI 2.1
Part A PCR review was conducted by:	Lindita Bushi, PhD, Chair, Athena Sustainable Materials Institute Hugues Imbeault-Tétreault - Groupe AGÉCO Jack Geibig, Ecoform
This declaration was independently verified in accordance with ISO 21930:2017, UL Part A, and ISO 14025: 2006. ☐ INTERNAL ☒ EXTERNAL	Timothy S. Brooke ASTM International
This life cycle assessment was conducted in accordance with ISO 14044 and the reference PCR by:	Cher Xue TrueNorth Collective
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	Lindita Bushi, PhD Athena Sustainable Materials Institute

Limitations

Environmental declarations from different programs (ISO 14025) may not be comparable.

Comparison of the environmental performance of Flooring Products using EPD information shall be based on the product's use and impacts at the building level, and therefore EPDs may not be used for comparability purposes when not considering the building energy use phase as instructed under this PCR.

Full conformance with the PCR for Flooring Products allows EPD comparability only when all stages of a life cycle have been considered. However, variations and deviations are possible". Example of variations: Different LCA software and background LCI datasets may lead to differences results for upstream or downstream of the life cycle stages declared.

Environmental Product Declaration

Johnsonite Rubber Tile Collection

Rubber Tile

Product Definition and Information

1.1. Description of Company/Organization

With a history of 140 years, Tarkett is a worldwide leader in innovative flooring and sports surface solutions, with net sales of €2.8 billion in 2021. Offering a wide range of products including vinyl, linoleum, rubber, carpet, wood, laminate, artificial turf and athletic tracks, the Group serves customers in over 100 countries across the globe. Tarkett has 12,000 employees and 34 industrial sites, and sells 1.3 million square meters of flooring every day, for hospitals, schools, housing, hotels, offices, stores and sports fields.

1.2. Product Description

Product Identification

Rubber flooring has it all. Universally embraced for its practical beauty and a rare balance of function with aesthetics, safety with efficiency, and short term costs with lifetime return. Rubber is naturally slip-resistant and shock-absorbent. Easy to maintain and durable enough to perform for decades, rubber is available in a rich array of colors, patterns and textures.

Product Specification

The rubber tile flooring products are available as tiles or planks. Products have 2 standard thickness, 0.080 inch (2 mm) and 0.125 inch (3.17 mm).

Product Collections

Johnsonite Solid Color Rubber

Offers the industry's largest selection of colors for rubber tiles. The possibilities are endless. The 24" x 24" tiles are available in 15 unique textures, perfect for healthcare, senior living, and education environments. Solid Color Rubber Tile is naturally slip-resistant and offers shock-absorbing comfort under foot.

Johnsonite Circulinity™

Inspired by modern textiles, featuring five interchangeable patterns. They are great individually or grouped together. Each design has distinctive light refraction built into each tile to give it dimension. These 24" x 24" tiles are naturally slip-resistant, shock-absorbing and noise-reducing.

Johnsonite Minerality™ Rubber Tile and Plank

Inspired by the natural grain of wood and stone materials. Available in wood-grain planks for a wood look or strata tiles for a stone look. These sophisticated designs are ideal for healthcare, retail and corporate where the benefits of rubber flooring—slip-resistance, shock-absorbing qualities and natural acoustic properties—are desired and where real stone and wood flooring is impractical or cost prohibitive.

Johnsonite Mesto Configurations™

A tonal study with a soft marbleized visual, can be used together in very subtle gradations to create the effect of layered textural shifts, which are found in geology and other natural formations. With three different tones in each of the 12 color groupings, you can arrange these tiles and planks in a way that reflects the organic color shifts found in nature.

Johnsonite Color Splash

Color Splash Speckled Rubber offers 50 on-trend standard colors, including solid tonal visuals that work alongside multi-colored chipped colorations. Color Splash Speckled Rubber flooring is a great solution for applications where slip-resistance, durability, easy maintenance, and comfort underfoot are important.

Johnsonite Prima Olio & Marbleized

Capture the character of your space with your own marbleized or oil-and-water effect designs. With our custom Prima offerings, expressing your signature style has never been easier.

Johnsonite Organics

With subtle color variations and random patterning, this large-scale, free-flowing aesthetic lends an open, organic feel and updated appearance to any space—plus all the strength and comfort of traditional rubber flooring. While rubber is often reserved as a safe and comfortable solution for education and healthcare spaces, this stylish design is ready to greet guests and customers in the front of the house, from lobbies to conference rooms.

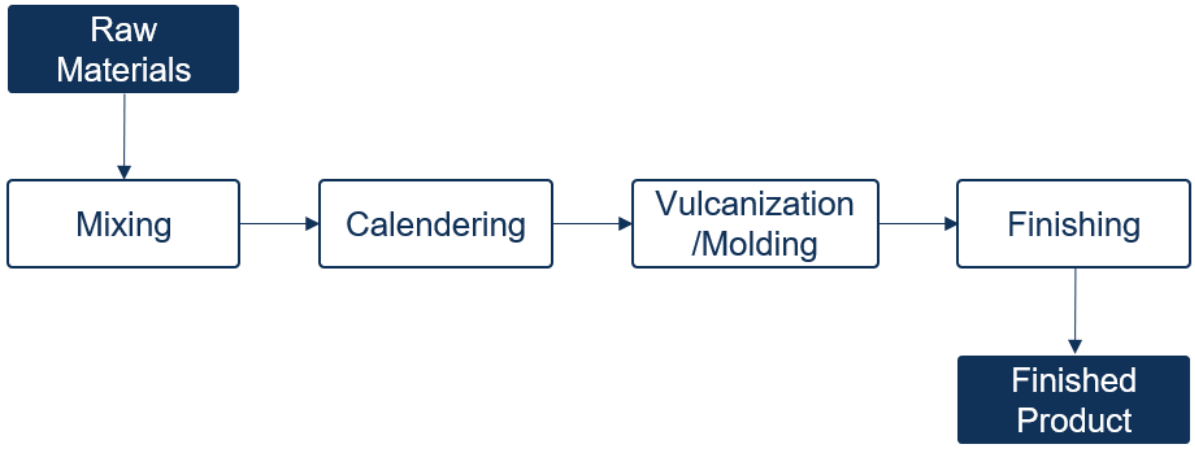
Johnsonite Pentagonals

For more than a century, mathematicians have been trying to solve one of the world's most intriguing geometric puzzles—searching for pentagonal shapes that "tile the plane," or fill a surface without overlapping or leaving gaps. In all this time, only 15 such pentagons have been discovered—and now you can use three of them to create distinctive rubber floor designs. No one knows how many of the novel shapes exist—a mystery that adds wonder and intrigue to these artistic focal points.

Johnsonite Defiant Oil and Grease Resistant Tile

Defiant is specially engineered to resist motor and other petroleum products as well as cooking oils, animal and vegetable fats, saving on maintenance and replacement costs while reducing slip/fall risks. Meets ASTM specifications D 471 for Oil and Grease Resistance. Requires no additional waxing or sealing.

Flow Diagram



Product Average

The product average with 7.21 LBS per square meter of product weight with a thickness of 0.08 inch (2 mm), or 12.06 LBS per square meter with a thickness 0.125 inch (3.17 mm) was based on a production volume weighted average.

1.3. Application

Floor covering.

1.4. Properties of Declared Product as Delivered

Available in 5 standard sizes, 24 in. x 24 in. (61cm x 61cm), 6 in. x 48 in (15.2 cm x 121.9 cm), 12 in. x 24 in. (30.5 cm x 61 cm), 6 in. x 6 in. (15.2 cm x 15.2 cm), or 12 in. x 12 in. (30.5 cm x 30.5 cm).

1.5. Material Composition

100% Thermoset rubber. No substances required to be reported as hazardous are associated with the production of this product.

1.6. Manufacturing

Rubber tile is a homogenous composition of rubber, additives, and colorants. It is produced in several stages beginning with the mixing of raw materials. After thorough mixing, the resulting compound is calendered, molded, and cut into lengths. The resulting product is stacked and packaged. Electricity, natural gas, water and propane for manufacturing were collected and allocated to the product. The upstream burdens for energy production take into consideration the geographic location of manufacturing. Tarkett has renewable energy investment and all facilities in Ohio use 100% renewable energy (wind).

1.7. Packaging

Carton box with 50% recycled content.

1.8. Transportation

Finished products are assume to be shipped an aveage of 751 km by truck and 118 km by ship to the customer.

1.9. Product Installation

Rubber tile installation primarily involves hand tools for measuring and cutting floor materials. Approximately 4.5% of the total material is assumed to be trimmed and discarded as waste. While some of this waste could be reused, this scrap is modeled as being disposed of in a landfill, and to be conservative, packaging waste is also assumed to be sent to a landfill. Hand trowels are used to spread appropriate adhesive (0.33 kg/sqm) which adheres flooring to the subfloor.

1.10. Health Safety and Environmental Aspects

Rubber tile products are certified in the FloorScore® Indoor Air Quality program and comply with the VOC emissions requirements of the California Department of Public Heath (CDPH) Standard Method for the Testing and Evaluation of the Volatile Organic Chemical Emissions for Indoor Sources Using Environmental Chambers, v1.1, Feb 2010 (also known as the California 01350 Specification). Tarkett's recommended installation instructions should be followed and the appropriate adhedive Material Safety Data Sheets (MSDSs) referenced.

1.11. Product Use

The level of maintenance is dependent on the actual use and desired appearance of the floor. For the purpose of this study, average maintenance is presented on typical installations. This study accounts for three cleaning processes within the use phase: daily dust mop, weekly damp mop, and monthly spray buffing.

1.12. Reference Service Life and Estimated Building Service Life

The service life of rubber flooring will vary depending on the amount of floor traffic and the type and frequency of maintenance. Rubber flooring is assumed to have a reference service life of 35 years with installation losses of 4.5%. To calculate product use and replacement over a 75-year estimated service life of the building, a total of 2.143 m^2 of flooring is needed for the building's lifetime. To compensate for installation losses, an additional 0.1 m^2 of product is needed.

1.13. Disposal

Based on the best available information, a small amount of waste is incinerated. However, for the purpose of this study, 100% of installed product removal waste is disposed of in a landfill. Dump truck transportation to the landfill is estimated with a distance of 32 miles (52 km).

1.14. Reuse, Recycling, and Energy Recovery

No landfill gas is produced from product waste.

Life Cycle Assessment Background Information

2.1. Functional or Declared Unit

For rubber tile flooring products, the declared unit is 1 m^2 of installed floor covering with an RSL of 35 years over 75 years of building service life. All flows to and from the environment within the system boundary are normalized to one pound of product output, which are then be multiplied by the actual product weight per square meter. The reference flow in LBS/m^2 per thickness is identical across all standard sizes mentioned above.

Table 1 Declared Unit

Thickness	Product Weight (LBS/tile) of 24 in. x 24 in.	Calculated Product Weight per declared unit (LBS / m2)
0.080 inch (2 mm)	2.68	7.21
0.125 inch (3.17 mm)	4.48	12.06

2.2. System Boundary

The study uses a cradle-to-grave system boundary. No impacts from the product's use (B1, B3, B5-B7) or from demolition (C1) or waste processing (C3) are included. The use stage modules B1, B3, B5, B6, and B7 are declared as having zero impact as there are no direct emissions from resilient flooring once it is installed nor is any repair or refurbishment requirements expected. The other use stage modules account for cleaning the floor (i.e., maintenance, which consists of dust mopping, damp mopping, and spray buffing), and replacing the floor to match building service life. The life cycle phases considered within system boundaries include:

- Extraction and processing of raw materials (A1)
- Inbound transportation (A2)
- Manufacturing (A3)
- Distribution (A4)
- Installation (A5)
- Maintenance (B2)
- Replacement (B4)
- Transport to disposal (C2)
- Disposal of wall base (C4)

2.3. Limitations

The findings in the study are limited by the inherent uncertainty of creating a representative model through LCA, but efforts were made to reduce uncertainty by examining 100% of the materials that make up the product. With the current availability of data, it is nearly impossible to follow the entire supply chain associated with the product in a company-specific way. Many of the processes within the supply chains are modeled using average industry data with varying amounts of specificity. This makes it difficult to accurately determine how well the unit process data represents the actual factors in the products' life cycle.

2.4. Cut-off Criteria

While the PCR allows for any mass flow to be omitted if it is less than 1%, with cumulative flows not exceeding 5%, this study includes 100% of the material flows and thus follows the cut-off criteria. No known flows are deliberately excluded from this EPD.

2.5. Data Sources

The quality of the results of an LCA study is directly dependent on the quality of input data used in the inventory for modeling. In this study, data was collected from multiple sources and primary data was used when available. Data on material composition and manufacturing are primary data from Tarkett and are based on year 2020. All upstream and downstream activities are included using a combination of primary and secondary data. While the majority of inventory data are sourced from primary resources, representative proxies are used to close gaps in the absence of primary data.

2.6. Data Quality

Primary and secondary data are represented ecoinvent v3.8 and DATASMART LCI Package (Long Trail Sustainability, 2021)). Ecoinvent v3.8 is used as the main database for background data. This version is published in 2021. Ecoinvent is widely used in research and industry to support life cycle assessment practices. Each version of this database goes through thorough review process and documentation of precision and completeness is available by the provider.

2.7. Period under Review

Primary data collected from Tarkett are based on averaged 2020 annual data for production details (energy, water, and emissions). Raw material inputs were based on standard product weight and formulation.

2.8. Allocation

Given that raw materials are key contributors to environmental performance, mass-based allocation of plant utility consumption, resource use and waste generation was applied for facilities that produced more than one flooring product. Raw material inputs are allocated to 1 pound of product output based on formula.

Life Cycle Assessment Results

The system boundaries are split into modules that include provision of all relevant materials, products, and energy. The modules included in the study are the extraction and processing of raw materials (A1), inbound transportation (A2), manufacturing (A3), transport from gate to site (A4), assembly/installation (A5), maintenance (B2), replacement (B4), transport to disposal (C2), and disposal of rubber tile (C4). The maintenance (B2) and replacement (B4) modules account for cleaning the floor (i.e., maintenance, which consists of dust mopping, damp mopping, and spray buffing), and replacing the floor to match building service life.The use stage modules B1, B3, B5, B6, and B7 are declared as having zero impact as there are no direct emissions from resilient flooring once it is installed nor is any repair or refurbishment requirements expected. The optional module D, for reporting benefits and loads beyond the system boundary has also been excluded. A summary of the system boundaries by module is provided below in Table 2. Modules with an ‘X’ are included in the study and those with an ‘MND’ are Module Not Declared.

Table 2. Description of the system boundary modules

	Product Stage			Construct-Ion Process Stage		Use Stage							End Of Life Stage				Benefits and Loads Beyond the System Boundary
	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
	Raw Material Supply	Transport	Manufacturing	Transport From Gate to Site	Assembly/Install	Use	Maintenance	Repair	Replacement	Refurbishment	Building Operational Energy Use During Product Use	Building Operational Water Use During Product Use	Deconstruction	Transport	Waste Processing	Disposal	Reuse, Recovery, Recycling Potential
EPD	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	MND

3.1 Life Cycle Impact Assessment Results – With Renewable Energy Credits

Table 3. North American Impact Assessment Results for Johnsonite Rubber Tile Collection – 0.080 inch (2mm) – with RECs

TRACI v2.1	A1	A2	A3	A4	A5	B2	B4	C2	C4
Global Warming Potential (GWP 100) kg CO2 eq	5.78E+00	8.14E-01	9.62E-01	4.27E-01	8.74E-01	9.04E+00	1.02E+01	1.80E-02	3.37E-02
Ozone Depletion Potential (ODP) kg CFC-11 eq	2.00E-07	1.92E-07	1.20E-07	1.01E-07	1.04E-07	2.69E-07	8.37E-07	4.27E-09	1.11E-08
Smog Formation Potential (SFP) kg O3 eq	1.20E+00	1.56E-01	4.11E-02	7.24E-02	9.46E-02	4.36E-01	1.80E+00	2.99E-03	6.29E-03
Acidification (AP) kg SO2 eq	5.36E-02	6.28E-03	2.05E-03	2.72E-03	4.96E-03	3.47E-02	7.99E-02	1.11E-04	2.58E-04
Eutrophication Potential (EP) kg N eq	7.52E-03	9.92E-04	6.79E-04	5.14E-04	1.95E-03	2.24E-02	1.35E-02	2.16E-05	1.09E-04
Abiotic Resource Depletion Potential of Non-renewable energy resources (ADPfossil) MJ, LHV	1.79E+01	1.71E+00	2.30E+00	9.05E-01	2.16E+00	2.67E+01	2.87E+01	3.81E-02	1.12E-01

Table 4. North American Impact Assessment Results for Johnsonite Rubber Tile Collection – 0.125 inch (3.17 mm) – with RECs

TRACI v2.1	A1	A2	A3	A4	A5	B2	B4	C2	C4
Global Warming Potential (GWP 100) kg CO2 eq	9.64E+00	1.36E+00	1.61E+00	7.13E-01	1.12E+00	9.04E+00	1.66E+01	3.00E-02	5.64E-02
Ozone Depletion Potential (ODP) kg CFC-11 eq	3.32E-07	3.21E-07	2.00E-07	1.69E-07	1.24E-07	2.69E-07	1.34E-06	7.13E-09	1.85E-08
Smog Formation Potential (SFP) kg O3 eq	2.01E+00	2.60E-01	6.87E-02	1.21E-01	1.40E-01	4.36E-01	2.99E+00	5.01E-03	1.05E-02
Acidification (AP) kg SO2 eq	8.95E-02	1.05E-02	3.43E-03	4.54E-03	6.95E-03	3.47E-02	1.32E-01	1.86E-04	4.32E-04
Eutrophication Potential (EP) kg N eq	1.25E-02	1.66E-03	1.14E-03	8.57E-04	2.25E-03	2.24E-02	2.13E-02	3.61E-05	1.82E-04
Abiotic Resource Depletion Potential of Non-renewable energy resources (ADPfossil) MJ, LHV	2.99E+01	2.87E+00	3.84E+00	1.51E+00	2.86E+00	2.67E+01	4.71E+01	6.37E-02	1.87E-01

3.2 Life Cycle Inventory Results– With Renewable Energy Credits

Table 5. Resource Use for Johnsonite Rubber Tile Collection – 0.080 inch (2 mm) – with RECs

Parameter	A1	A2	A3	A4	A5	B2	B4	C2	C4
Renewable primary energy as energy carrier (RPRE) MJ, LHV	4.35E+00	1.35E-01	1.38E+01	7.32E-02	1.25E+00	7.93E+00	2.24E+01	3.09E-03	1.37E-02
Renewable primary energy as material utilization (RPRM) MJ, LHV	x	x	x	x	x	x	x	x	x
Total use of renewable primary energy resources (RPRT) MJ	4.35E+00	1.35E-01	1.38E+01	7.32E-02	1.25E+00	7.93E+00	2.24E+01	3.09E-03	1.37E-02
Non-renewable primary energy as energy carrier (NRPRE) MJ	7.62E+01	1.21E+01	1.49E+01	6.41E+00	1.45E+01	1.24E+02	1.43E+02	2.70E-01	8.09E-01
Non-renewable primary energy as material utilization (NRPRM) MJ	5.21E+01	x	x	x	2.34E+00	9.40E+01	6.22E+01	x	x
Total use of non-renewable primary energy resources (NRPRT) MJ	1.28E+02	1.21E+01	1.49E+01	6.41E+00	1.68E+01	2.18E+02	2.05E+02	2.70E-01	8.09E-01
Use of secondary materials (SM) kg	x	x	x	x	x	x	x	x	x
Renewable secondary fuels (RSF) MJ	x	x	x	x	x	x	x	x	x
Use of non-renewable secondary fuels (NRSF) MJ	x	x	x	x	x	x	x	x	x
Recovered energy (RE) MJ	x	x	x	x	x	x	x	x	x
Use of net fresh water (FW) m^3	3.29E-02	1.30E-03	8.78E-03	7.09E-04	8.64E-03	3.24E-01	6.08E-02	2.99E-05	8.55E-04

Table 6. Resource Use for Johnsonite Rubber Tile Collection – 0.125 inch (3.17 mm) – with RECs

Parameter	A1	A2	A3	A4	A5	B2	B4	C2	C4
Renewable primary energy as energy carrier (RPRE) MJ, LHV	7.13E+00	2.26E-01	2.31E+01	1.22E-01	1.80E+00	7.93E+00	3.70E+01	5.17E-03	2.29E-02
Renewable primary energy as material utilization (RPRM) MJ, LHV	x	x	x	x	x	x	x	x	x
Total use of renewable primary energy resources (RPRT) MJ	7.13E+00	2.26E-01	2.31E+01	1.22E-01	1.80E+00	7.93E+00	3.70E+01	5.17E-03	2.29E-02
Non-renewable primary energy as energy carrier (NRPRE) MJ	1.27E+02	2.03E+01	2.48E+01	1.07E+01	1.79E+01	1.24E+02	2.32E+02	4.52E-01	1.35E+00
Non-renewable primary energy as material utilization (NRPRM) MJ	8.71E+01	x	x	x	3.92E+00	9.40E+01	1.04E+02	x	x
Total use of non-renewable primary energy resources (NRPRT) MJ	2.14E+02	2.03E+01	2.48E+01	1.07E+01	2.18E+01	2.18E+02	3.36E+02	4.52E-01	1.35E+00
Use of secondary materials (SM) kg	x	x	x	x	x	x	x	x	x
Renewable secondary fuels (RSF) MJ	x	x	x	x	x	x	x	x	x
Use of non-renewable secondary fuels (NRSF) MJ	x	x	x	x	x	x	x	x	x
Recovered energy (RE) MJ	x	x	x	x	x	x	x	x	x
Use of net fresh water (FW) m^3	5.48E-02	2.18E-03	1.47E-02	1.18E-03	9.99E-03	3.24E-01	9.64E-02	5.01E-05	1.43E-03

Table 7. Output Flows and Waste Categories for Johnsonite Rubber Tile Collection – 0.080 inch (2 mm) – with RECs

Parameter	A1	A2	A3	A4	A5	B2	B4	C2	C4
Hazardous waste disposed (HWD) kg	x	x	x	x	x	x	x	x	x
Non-hazardous waste disposed (NHWD) kg	x	x	x	x	1.63E-01	x	3.92E+00	x	3.27E+00
High Level Radioactive waste disposed (HRWD) kg	x	x	x	x	x	x	x	x	x
Low and Intermediate Level Radioactive waste disposed (LRWD) kg	x	x	x	x	x	x	x	x	x
Components for re-use (CRU) kg	x	x	2.87E-01	x	1.29E-02	x	3.42E-01	x	x
Materials for recycling (MR) kg	x	x	x	x	x	x	x	x	x
Materials for energy recovery (MER) kg	x	x	2.21E-01	x	9.96E-03	x	2.64E-01	x	x
Exported electrical energy (EE, electrical) MJ, LHV	x	x	x	x	x	x	x	x	x
Exported thermal energy (EE, thermal) MJ, LHV	x	x	x	x	x	x	x	x	x

Table 8. Output Flows and Waste Categories for Johnsonite Rubber Tile Collection – 0.125 inch (3.17 mm) – with RECs

Parameter	A1	A2	A3	A4	A5	B2	B4	C2	C4
Hazardous waste disposed (HWD) kg	x	x	x	x	x	x	x	x	x
Non-hazardous waste disposed (NHWD) kg	x	x	x	x	2.61E-01	x	6.55E+00	x	5.47E+00
High Level Radioactive waste disposed (HRWD) kg	x	x	x	x	x	x	x	x	x
Low and Intermediate Level Radioactive waste disposed (LRWD) kg	x	x	x	x	x	x	x	x	x
Components for re-use (CRU) kg	x	x	4.79E-01	x	2.16E-02	x	5.72E-01	x	x
Materials for recycling (MR) kg	x	x	x	x	x	x	x	x	x
Materials for energy recovery (MER) kg	x	x	3.70E-01	x	1.67E-02	x	4.42E-01	x	x
Exported electrical energy (EE, electrical) MJ, LHV	x	x	x	x	x	x	x	x	x
Exported thermal energy (EE, thermal) MJ, LHV	x	x	x	x	x	x	x	x	x

Table 9. Carbon Emissions and Removals – Johnsonite Traditional Rubber Tile – 0.080 inch (2 mm) – with RECs

Parameter	A1	A2	A3	A4	A5	B2	B4	C2	C4
Biogenic Carbon Removal from Product (BCRP) kg CO2	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
Biogenic Carbon Emission from Product (BCEP) kg CO2	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
Biogenic Carbon Removal from Packaging (BCRK) kg CO2	-1.37E-02	0.00E+00	0.00E+00	-5.16E-03	0.00E+00	-1.21E-03	0.00E+00	-7.28E-03	0.00E+00
Biogenic Carbon Emission from Packaging (BCEK) kg CO2	3.42E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.60E-03	0.00E+00	1.82E-03	0.00E+00

Table 10. Carbon Emissions and Removals – Johnsonite Traditional Rubber Tile – 0.125 inch (3.17 mm) – with RECs

Parameter	A1	A2	A3	A4	A5	B2	B4	C2	C4
Biogenic Carbon Removal from Product (BCRP) kg CO2	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
Biogenic Carbon Emission from Product (BCEP) kg CO2	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
Biogenic Carbon Removal from Packaging (BCRK) kg CO2	-1.37E-02	0.00E+00	0.00E+00	-5.16E-03	0.00E+00	-1.21E-03	0.00E+00	-7.28E-03	0.00E+00
Biogenic Carbon Emission from Packaging (BCEK) kg CO2	3.42E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.60E-03	0.00E+00	1.82E-03	0.00E+00

3.3 Life Cycle Impact Assessment Results – Without Renewable Energy Credits

Table 11. North American Impact Assessment Results for Johnsonite Rubber Tile Collection – 0.080 inch (2mm) – without RECs

TRACI v2.1	A1	A2	A3	A4	A5	B2	B4	C2	C4
Global Warming Potential (GWP 100) kg CO2 eq	5.78E+00	8.14E-01	3.74E+00	4.27E-01	9.99E-01	9.04E+00	1.35E+01	1.80E-02	3.37E-02
Ozone Depletion Potential (ODP) kg CFC-11 eq	2.00E-07	1.92E-07	2.09E-07	1.01E-07	1.08E-07	2.69E-07	9.43E-07	4.27E-09	1.11E-08
Smog Formation Potential (SFP) kg O3 eq	1.20E+00	1.56E-01	1.48E-01	7.24E-02	9.94E-02	4.36E-01	1.93E+00	2.99E-03	6.29E-03
Acidification (AP) kg SO2 eq	5.36E-02	6.28E-03	1.45E-02	2.72E-03	5.52E-03	3.47E-02	9.49E-02	1.11E-04	2.58E-04
Eutrophication Potential (EP) kg N eq	7.52E-03	9.92E-04	7.09E-03	5.14E-04	2.24E-03	2.24E-02	2.11E-02	2.16E-05	1.09E-04
Abiotic Resource Depletion Potential of Non-renewable energy resources (ADPfossil) MJ, LHV	1.79E+01	1.71E+00	5.36E+00	9.05E-01	2.30E+00	2.67E+01	3.24E+01	3.81E-02	1.12E-01

Table 12. North American Impact Assessment Results for Johnsonite Rubber Tile Collection – 0.125 inch (3.17 mm) – without RECs

TRACI v2.1	A1	A2	A3	A4	A5	B2	B4	C2	C4
Global Warming Potential (GWP 100) kg CO2 eq	9.64E+00	1.36E+00	6.26E+00	7.13E-01	1.33E+00	9.04E+00	2.22E+01	3.00E-02	5.64E-02
Ozone Depletion Potential (ODP) kg CFC-11 eq	3.32E-07	3.21E-07	3.49E-07	1.69E-07	1.31E-07	2.69E-07	1.52E-06	7.13E-09	1.85E-08
Smog Formation Potential (SFP) kg O3 eq	2.01E+00	2.60E-01	2.47E-01	1.21E-01	1.48E-01	4.36E-01	3.21E+00	5.01E-03	1.05E-02
Acidification (AP) kg SO2 eq	8.95E-02	1.05E-02	2.43E-02	4.54E-03	7.89E-03	3.47E-02	1.57E-01	1.86E-04	4.32E-04
Eutrophication Potential (EP) kg N eq	1.25E-02	1.66E-03	1.19E-02	8.57E-04	2.73E-03	2.24E-02	3.41E-02	3.61E-05	1.82E-04
Abiotic Resource Depletion Potential of Non-renewable energy resources (ADPfossil) MJ, LHV	2.99E+01	2.87E+00	8.97E+00	1.51E+00	3.09E+00	2.67E+01	5.33E+01	6.37E-02	1.87E-01

3.4 Life Cycle Inventory Results– Without Renewable Energy Credits

Table 13. Resource Use for Johnsonite Rubber Tile Collection – 0.080 inch (2 mm) – without RECs

Parameter	A1	A2	A3	A4	A5	B2	B4	C2	C4
Renewable primary energy as energy carrier (RPRE) MJ, LHV	4.35E+00	1.35E-01	7.33E-01	7.32E-02	6.60E-01	7.93E+00	6.82E+00	3.09E-03	1.37E-02
Renewable primary energy as material utilization (RPRM) MJ, LHV	x	x	x	x	x	x	x	x	x
Total use of renewable primary energy resources (RPRT) MJ	4.35E+00	1.35E-01	7.33E-01	7.32E-02	6.60E-01	7.93E+00	6.82E+00	3.09E-03	1.37E-02
Non-renewable primary energy as energy carrier (NRPRE) MJ	7.62E+01	1.21E+01	5.60E+01	6.41E+00	1.63E+01	1.24E+02	1.92E+02	2.70E-01	8.09E-01
Non-renewable primary energy as material utilization (NRPRM) MJ	5.21E+01	x	x	x	2.34E+00	9.40E+01	6.22E+01	x	x
Total use of non-renewable primary energy resources (NRPRT) MJ	1.28E+02	1.21E+01	5.60E+01	6.41E+00	1.87E+01	2.18E+02	2.54E+02	2.70E-01	8.09E-01
Use of secondary materials (SM) kg	x	x	x	x	x	x	x	x	x
Renewable secondary fuels (RSF) MJ	x	x	x	x	x	x	x	x	x
Use of non-renewable secondary fuels (NRSF) MJ	x	x	x	x	x	x	x	x	x
Recovered energy (RE) MJ	x	x	x	x	x	x	x	x	x
Use of net fresh water (FW) m^3	3.29E-02	1.30E-03	7.18E-02	7.09E-04	1.15E-02	3.24E-01	1.36E-01	2.99E-05	8.55E-04

Table 14. Resource Use for Johnsonite Rubber Tile Collection – 0.125 inch (3.17 mm) – without RECs

Parameter	A1	A2	A3	A4	A5	B2	B4	C2	C4
Renewable primary energy as energy carrier (RPRE) MJ, LHV	7.13E+00	2.26E-01	1.23E+00	1.22E-01	8.15E-01	7.93E+00	1.09E+01	5.17E-03	2.29E-02
Renewable primary energy as material utilization (RPRM) MJ, LHV	x	x	x	x	x	x	x	x	x
Total use of renewable primary energy resources (RPRT) MJ	7.13E+00	2.26E-01	1.23E+00	1.22E-01	8.15E-01	7.93E+00	1.09E+01	5.17E-03	2.29E-02
Non-renewable primary energy as energy carrier (NRPRE) MJ	1.27E+02	2.03E+01	9.37E+01	1.07E+01	2.10E+01	1.24E+02	3.14E+02	4.52E-01	1.35E+00
Non-renewable primary energy as material utilization (NRPRM) MJ	8.71E+01	x	x	x	3.92E+00	9.40E+01	1.04E+02	x	x
Total use of non-renewable primary energy resources (NRPRT) MJ	2.14E+02	2.03E+01	9.37E+01	1.07E+01	2.49E+01	2.18E+02	4.18E+02	4.52E-01	1.35E+00
Use of secondary materials (SM) kg	x	x	x	x	x	x	x	x	x
Renewable secondary fuels (RSF) MJ	x	x	x	x	x	x	x	x	x
Use of non-renewable secondary fuels (NRSF) MJ	x	x	x	x	x	x	x	x	x
Recovered energy (RE) MJ	x	x	x	x	x	x	x	x	x
Use of net fresh water (FW) m^3	5.48E-02	2.18E-03	1.20E-01	1.18E-03	1.47E-02	3.24E-01	2.22E-01	5.01E-05	1.43E-03

Table 15. Output Flows and Waste Categories for Johnsonite Rubber Tile Collection – 0.080 inch (2 mm) – without RECs

Parameter	A1	A2	A3	A4	A5	B2	B4	C2	C4
Hazardous waste disposed (HWD) kg	x	x	x	x	x	x	x	x	x
Non-hazardous waste disposed (NHWD) kg	x	x	x	x	1.63E-01	x	3.92E+00	x	3.27E+00
High Level Radioactive waste disposed (HRWD) kg	x	x	x	x	x	x	x	x	x
Low and Intermediate Level Radioactive waste disposed (LRWD) kg	x	x	x	x	x	x	x	x	x
Components for re-use (CRU) kg	x	x	2.87E-01	x	1.29E-02	x	3.42E-01	x	x
Materials for recycling (MR) kg	x	x	x	x	x	x	x	x	x
Materials for energy recovery (MER) kg	x	x	2.21E-01	x	9.96E-03	x	2.64E-01	x	x
Exported electrical energy (EE, electrical) MJ, LHV	x	x	x	x	x	x	x	x	x
Exported thermal energy (EE, thermal) MJ, LHV	x	x	x	x	x	x	x	x	x

Table 16. Output Flows and Waste Categories for Johnsonite Rubber Tile Collection – 0.125 inch (3.17 mm) – without RECs

Parameter	A1	A2	A3	A4	A5	B2	B4	C2	C4
Hazardous waste disposed (HWD) kg	x	x	x	x	x	x	x	x	x
Non-hazardous waste disposed (NHWD) kg	x	x	x	x	2.61E-01	x	6.55E+00	x	5.47E+00
High Level Radioactive waste disposed (HRWD) kg	x	x	x	x	x	x	x	x	x
Low and Intermediate Level Radioactive waste disposed (LRWD) kg	x	x	x	x	x	x	x	x	x
Components for re-use (CRU) kg	x	x	4.79E-01	x	2.16E-02	x	5.72E-01	x	x
Materials for recycling (MR) kg	x	x	x	x	x	x	x	x	x
Materials for energy recovery (MER) kg	x	x	3.70E-01	x	1.67E-02	x	4.42E-01	x	x
Exported electrical energy (EE, electrical) MJ, LHV	x	x	x	x	x	x	x	x	x
Exported thermal energy (EE, thermal) MJ, LHV	x	x	x	x	x	x	x	x	x

Table 17. Carbon Emissions and Removals – Johnsonite Traditional Rubber Tile – 0.080 inch (2 mm) – without RECs

Parameter	A1	A2	A3	A4	A5	B2	B4	C2	C4
Biogenic Carbon Removal from Product (BCRP) kg CO2	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
Biogenic Carbon Emission from Product (BCEP) kg CO2	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
Biogenic Carbon Removal from Packaging (BCRK) kg CO2	-1.37E-02	0.00E+00	0.00E+00	-5.16E-03	0.00E+00	-1.21E-03	0.00E+00	-7.28E-03	0.00E+00
Biogenic Carbon Emission from Packaging (BCEK) kg CO2	3.42E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.60E-03	0.00E+00	1.82E-03	0.00E+00

Table 18. Carbon Emissions and Removals – Johnsonite Traditional Rubber Tile – 0.125 inch (3.17 mm) – without RECs

Parameter	A1	A2	A3	A4	A5	B2	B4	C2	C4
Biogenic Carbon Removal from Product (BCRP) kg CO2	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
Biogenic Carbon Emission from Product (BCEP) kg CO2	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
Biogenic Carbon Removal from Packaging (BCRK) kg CO2	-1.37E-02	0.00E+00	0.00E+00	-5.16E-03	0.00E+00	-1.21E-03	0.00E+00	-7.28E-03	0.00E+00
Biogenic Carbon Emission from Packaging (BCEK) kg CO2	3.42E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.60E-03	0.00E+00	1.82E-03	0.00E+00

LCA Interpretation

The cradle-to-grave impacts with Renewable Energy Credits are dominated by B4, replacement during use stage from 28% to 47%, followed by B2, maintenance (11% to 47%), and A1, raw material (11% to 32%).

The cradle-to-grave impacts without Renewable Energy Credits are dominated by B4, replacement during use stage from 34% to 48%, followed by B2, maintenance (11% to 36%), and A1, raw material (10% to 30%).

Additional Information

5.1 Accreditations

- ISO 14001 Environmental Management System
- ISO 9001 Quality Management System
- ISO 45001 Occupational Health and Safety System

5.2 Applicable Product Standards

- ASTM F1344, Revision 21A, October 1, 2021 - Standard Specification for Rubber Floor Tile
- CSI MasterFormat Code: 09 65 19 Resilient Tile Flooring

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Tarkett

30000 Aurora Rd

Solon, OH

44139 United States

Phone : 1-800-899-8916

www.tarkett.com

TrueNorth Collective

4537 Winnequah Rd,

Monona, Wisconsin

53716 United States

Phone : 1 608-616-5024

info@truenorthcollective.net

www.truenorthcollective.net