



MANNINGTON MILLS.

EPD of multiple Luxury Vinyl Tile products, based on several representative products: 2mm, 2.5mm Spacia, 2.5mm Amtico, 2.5mm Divergent, 3mm, 3.2mm, 4mm, and 5mm.

Environmental Product Declaration

Programme: The International EPD® System

Programme operator: EPD International AB

Licensee: EPD North America (www.epdna.com)

EPD registration number: EPD-IES-0020023

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www.environdec.com

In accordance with ISO 14025:2006 and ISO 21930



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Programme and Programme Operator	The International EPD® System EPD International AB Box 210 60 SE-100 31 Stockholm Sweden www.environdec.com info@environdec.com as provided by EPD North America
General Program instructions and Version Number¹	General Programme Instructions for the International EPD® System. Version 4.0. 2021-03-29
EPD Owner The EPD owner has the sole ownership, liability, and responsibility for the EPD.	Mannington 75 Mannington Mills Road Salem, NJ 08079
LCA Practitioner This life cycle assessment was conducted in accordance with ISO 14044 and the reference PCR by the LCA practitioner.	WAP Sustainability Consulting 103 Powell Ct., Suite 200 Brentwood, TN 37027
Declaration Number	EPD-IES-0020023
Declared Product and Functional Unit	Luxury Vinyl Tile 1 m ² of installed flooring and with a building service life of 75 years
Reference PCR and Version Number²	UL Part A: Life Cycle Assessment Calculation Rules and Report Requirements, Version 4.0 UL Part B: Flooring EPD Requirements. UL 10010-7, Version 2.0
Product's intended Application and Use	Commercial Flooring Applications
Product RSL	30 years
Markets of Applicability	North America
Date of Issue	04-18-2025
Period of Validity	5 years from date of issue
EPD Type	Product Specific
Range of Dataset Variability	N/A
EPD Scope	Cradle-to-Grave
Year of reported manufacturer primary data	2023
LCA Software and Version Number	Sphera Managed LCA Content Database 2024.2 (formerly GaBi Database)
LCI Database and Version Number	Sphera LCA for Experts 10.7 (formerly GaBi)
LCIA Methodology and Version Number	TRACI 2.1 CML 2001-Jan 2016 IPCC AR5
Part A PCR review was conducted by:	Lindita Bushi, PhD, Chair Hugues Imbeault-Tétreault, Eng., M.A.Sc. Jack Geibig
The sub-category PCR review was conducted by:	Jack Geibig (Chair) Thomas Gloria, PhD Thaddeus Owen
External and Independent third-party verification of the declaration and data, according to ISO 14025:2008, via:	<input checked="" type="checkbox"/> EPD Verification through an Individual EPD Verification <input type="checkbox"/> EPD Verification through an EPD Process certification <input type="checkbox"/> EPD Verification through an Pre-Verified LCA/EPD Tool
This declaration was independently verified in accordance with ISO 14025: 2006. UL Environment "Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report," v4.0, based on ISO 21930:2017, serves as the core PCR, with additional considerations from the USGBC/UL Environment Part A Enhancement (2017). UL Environment "Part B: Flooring EPD Requirements", v2.0 (2018), serves as the category specific PCR. <input type="checkbox"/> Internal <input checked="" type="checkbox"/> External	 James Mellentine, Thrive ESG
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	James Mellentine, Thrive ESG
The procedure for follow-up of data during EPD validity, as defined by the GPI, involves third party verifier:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<p>¹Not all requirements in the GPI are fulfilled, particularly the requirement, for construction products, to follow EN 15804 for certain aspects of the LCA method.</p> <p>²This EPD is based on a PCR that satisfies procurement rules at the federal, state, and municipal levels which call for EPDs based on the UL Part B PCR. The UL Part B PCR was used to meet regulatory (example: Buy Clean California Act, etc.) and market expectations (example: Building Transparency EC3 comparisons, LEED and existing vendor procurement requirements, product scoring programs, etc.). The EPD should not be used outside of this context.</p> <p>Limitations: Environmental declarations from different programs (ISO 14025) may not be comparable. The declared environmental performance in the EPD shall not be compared with EN 15804-compliant EPDs developed under PCR 2019:14 in the International EPD System. 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 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. The EPD owner has the sole ownership, liability, and responsibility of the EPD.</p>	

Information about EPD Owner

Company Description

Founded in 1915, Mannington continues to pursue its commitment to quality, customer satisfaction and the environment through innovative product design and marketing, state-of-the-art processes, and industry-leading programs. It manufactures and supplies a portfolio of flooring products including residential and commercial sheet vinyl, luxury vinyl, laminate, hardwood floors, carpet, and rubber.

Mannington is a leader in vinyl plank, allowing customers to achieve the look of hardwood or tile at a fraction of the cost. Vinyl planks are waterproof, easy to clean and maintain, scratch resistant, and durable. All Mannington hard surface floors are FloorScore® certified which means they are independently tested and meet stringent indoor air quality standards. This certification also qualifies all of our floors for low VOCs.

EPD Owner

Mannington

75 Mannington Mills Road
Salem, NJ 08079

LCA Practitioner

WAP Sustainability Consulting

103 Powell Ct, Suite 200
Brentwood, TN 37027

Product Information

Product Description

Luxury Vinyl Tile (LVT), also called resilient tile or vinyl plank, is primarily composed of polyvinyl chloride, calcium carbonate, plasticizers, stabilizers, and other additives as part of the base or backing layer. On top of the backing layer is the print layer that gives each product its unique design pattern. This is topped off with wear layers that make the product durable and dimensionally stable. See Figure 1 for a breakdown of LVT construction. Most traditional LVT requires adhesive and is glued to the floor during installation. Various thicknesses of LVT are studied in this EPD which include 2.0, 2.5mm, 3.0mm, 3.2mm, 4.0mm, and 5.0mm.

LVT is within CSI MasterFormat section 09 65 19 and UN CPC 36910.

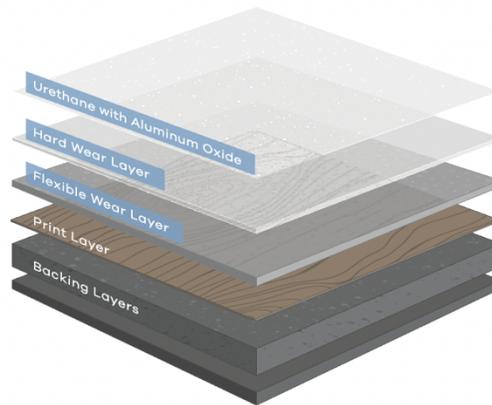


Figure 1: Product Construction

Application

Mannington Mills LVT products are used as interior flooring in healthcare, educational, specialty retail, hospitality interiors, and multi-family residential complexes.



Figure 2: Product Application

Properties of Declared Product as Delivered

Mannington Mills LVT products are usually delivered packaged in a cardboard box to protect the resilient tiles or vinyl planks during transportation to the customer. Multiple boxes are then stacked on a wooden pallet for shipment.

Manufacturing Site

Mannington Commercial LVT products are manufactured in Madison, GA.

Table 1: Technical Data

Vinyl Tile	2 mm	2.5 mm Spacia	2.5 mm Amtico	2.5mm Divergent	3 mm	3.2 mm	4 mm	5 mm
Product thickness (mm)	2	2.5	2.5	2.5	3	3.2	4	5
Wear layer thickness (mm)	0.30	0.51	1.0	0.76	0.51	0.90	0.51	0.50
Product Weight (kg/m ²)	2.54	3.79	3.41	3.55	4.46	4.60	5.84	8.61
Product form	Tile and Plank							

Table 2: Performance Testing

Performance	Test	Requirement	Result
HUD/FHA	N/A	N/A	Passes
Flexibility	ASTM F137	Passes - 1" Mandrel - No Crack/Break	Passes
Dimensional Stability	ASTM F2199	Max 0.020 in/lin ft	Passes
Squareness	ASTM F540	Max 0.010"	Passes
Static Load	ASTM F970 mod.	Residual Indent \leq 0.005"	Passes - 2,000 PSI
Residual Indentation	ASTM F1914	< 8% Avg / 10% Single Value	Passes
Flooring Radiant Panel	ASTM E648	\geq 0.45 watts/cm ²	Passes - Class 1
Smoke Density	ASTM E662	\leq 450	Passes
Slip Resistance	ASTM C1028	\geq 0.5 Leather; 0.6 Rubber	Passes
Acoustic IIC*	ASTM E492	6" Concrete with Drop Ceiling	N/A
Acoustic STC*	ASTM E90	6" Concrete with Drop Ceiling	N/A
Resistance to Light	ASTM F1515	N/A	Passes
Chemical Resistance	ASTM F925	N/A	Passes
Resistance to Heat	ASTM F1514	N/A	Passes

Content Declaration

Manufacturing

The product is manufactured in Mannington's facility in Madison, GA. The manufacturing process begins with the mixing of raw materials that form the backing layer. Each of the layers are manufactured separately in a similar manner. These layers are then extruded/calendared to form sheets. The different layers are stacked per the construction shown in Figure 1. The layers are then laminated or bonded together under heat and pressure to form a luxury vinyl tile or plank. After manufacturing, the tiles/planks are packaged in cardboard for shipment to the customer. Packaging materials are either recycled, landfilled, or incinerated based on waste classification mentioned in Section 2.8.5- and 2.8.6-Part A of the reference PCR. No substances required to be reported as hazardous are associated with the production of this product, as indicated in Section 2.8.6 of *Part A: Life Cycle Assessment Calculation Rules and Report Requirements* from UL Environment.

Table 3: Product Composition

Material	2 mm	2.5 mm Spacia	2.5 mm Amtico	2.5 mm Divergent	3 mm	3.2 mm	4 mm	5 mm
PVC	36%	25%	58%	34%	34%	54%	36%	23%
Filler	27%	34%	13%	29%	29%	18%	23%	35%
Plasticizer	11%	7%	14%	9%	10%	13%	11%	7%
Stabilizers and Pigments	1%	1%	2%	1%	1%	1%	1%	1%
Regrind: On-site & Post-industrial	22%	30%	7%	24%	23%	10%	26%	31%
Other materials	4%	3%	5%	3%	3%	5%	3%	3%

Table 4: Product Packaging, per m² of installed product

Material	2 mm	2.5 mm Spacia	2.5 mm Amtico	2.5 mm Divergent	3 mm	3.2 mm	4 mm	5 mm
Cardboard (kg)	0.076	0.095	0.095	0.095	0.114	0.122	0.152	0.190
Biogenic material (kg C/m ²)	0.033	0.041	0.041	0.041	0.049	0.052	0.065	0.082

Transportation

It is assumed that all raw materials are delivered to the manufacturing facility via truck and ship, based on global region. Distances were calculated using the supplier location and the location of manufacturing.

The product is distributed from the manufacturing facility in Madison, GA to customers in North America via truck. Distribution distance is based on sales data.

Product Installation

Mannington Mills LVT products should be installed according to manufacturer instructions on the [Mannington Mills website](#).

Installation of Mannington Mills LVT primarily consists of the application of adhesive to the prepared subfloor. A hand trowel and acrylic spread adhesive are required for installation, but manufacturing of these tools is not included in the study as these are multi-use tools and the impacts per functional unit are considered negligible. The recommended coverage rate of the adhesive identified by Mannington Mills is used for this study. All waste generated during installation, including packaging

waste, is disposed of according to the tables found in Section 2.8.5 of Part A: Life Cycle Assessment Calculation Rules and Report Requirements from UL Environment.

Use

The table below shows the parameters for the use phase scenario undergoing study while Table 12 shows the total material and energy inputs required in the study. These inputs were taken from Resilient Floor Coverings Institute's (RFCi) maintenance guidelines indicated in its [industry wide EPD for vinyl tile](#). Excluded from this model is the use of finish and finish remover, as specified by the RFCi industry average EPD for vinyl tile. This is because Mannington Mills products do not require finishes. Vinyl tile products are typically not repaired or refurbished and are only replaced if the product fails or a new look is desired. Detailed maintenance instructions for Mannington Mills LVT are provided on the [Mannington Mills website](#).

Table 5: Maintenance Procedure

Level of Use	Cleaning Process	Cleaning Frequency	Consumption of energy and resources
Commercial/ residential/ industrial	Dust mop	Daily	None
	Damp mop/ neutral cleaner	Weekly	Hot water, neutral detergent
	Spray buff	Monthly	Electricity

Reference Service Life and Estimated Building Service Life

The reference service life (RSL) of Mannington Mills LVT is assumed to be 30 years given that the product is installed as per manufacturer guidelines. A RSL of 30 years is consistent with the average LVT lifetime used in the Resilient Floor Covering Institute LCA and EPD for vinyl tile (RFCi, 2018). After initial installation in a building with an estimated service life (ESL) of 75 years, 1.5 replacements are required.

Reuse, Recycling, and Energy Recovery

Mannington Mills' LVT flooring is typically not reused or recycled and can be disposed of without any special handling requirements and without the threat of contamination as there is no incineration involved at the end-of-life.

Disposal

The product is assumed to be 100% landfilled as specified in Sections 2.8.5 and 2.8.6 of Part A: Life Cycle Assessment Calculation Rules and Report Requirements from UL Environment.

Life Cycle Assessment Information

Flow Diagram

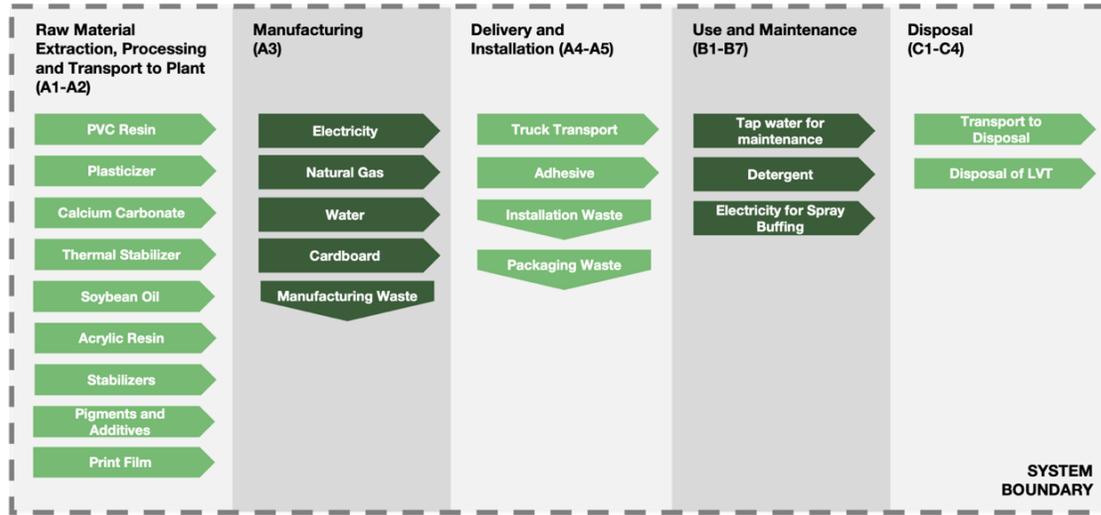


Figure 3: Process Flow Diagram

Declaration of Methodological Framework

The LCA follows an attributional approach.

Functional Unit

The functional unit of the flooring product is one (1) m² of installed flooring. The mass per product and per functional unit for the product including the adhesive are presented in the table below.

Table 6: Functional Unit Details

Product	2 mm	2.5 mm Spacia	2.5 mm Amtico	2.5 mm Divergent	3 mm	3.2 mm	4 mm	5 mm
Product Weight (kg/m²)	2.54E+00	3.79E+00	3.41E+00	3.55E+00	4.46E+00	4.60E+00	5.84E+00	8.61E+00
Functional Unit Weight (kg/m²)	2.86E+00	4.11E+00	3.74E+00	3.88E+00	4.78E+00	4.92E+00	6.17E+00	8.93E+00

System Boundary

This EPD is a Cradle-to-Grave study.

Table 7: System Boundary and Modules

Module Name	Description	Analysis Period	Summary of Included Elements
A1	Product Stage: Raw Material Supply	2023	Raw Material sourcing and processing as defined by secondary data.
A2	Product Stage: Transport	2023	Shipping from supplier to manufacturing site. Fuel use requirements estimated based on product weights and estimated distance.
A3	Product Stage: Manufacturing	2023	Energy and water inputs required for manufacturing products from raw materials. Packaging materials and manufacturing waste are included as well.

Module Name	Description	Analysis Period	Summary of Included Elements
A4	Construction Process Stage: Transport	2023	Shipping from manufacturing site to project site. Fuel use requirements estimated based on product weights and mapped distance.
A5	Construction Process Stage: Installation	2023	Installation materials, installation waste and packaging material waste.
B1	Use Stage: Use	2023	Use of the product.
B2	Use Stage: Maintenance	2023	Cleaning energy, water, and materials, including refinishing the product.
B3	Use Stage: Repair	2023	Product typically not repaired during use.
B4	Use Stage: Replacement	2023	Total materials and energy required to manufacture a replacement.
B5	Use Stage: Refurbishment	2023	Product typically not refurbished during use.
B6	Operational Energy Use	2023	Operational Energy Use of Building Integrated System During Product Use
B7	Operational Water Use	2023	Operational Water Use of Building Integrated System During Product Use
C1	EOL: Deconstruction	2023	No inputs required for deconstruction.
C2	EOL: Transport	2023	Shipping from project site to waste disposal.
C3	EOL: Waste Processing	2023	Waste processing if incineration as chosen disposal pathway per Part A of the PCR.
C4	EOL: Disposal	2023	Disposal modeled by region as per Part A of the PCR.
D	Benefits beyond system	MND	Credits from energy or material capture.

Software

Sphera LCA for Experts 2024.2.

Estimates and Assumptions

All estimates and assumptions are within the requirements of ISO 14040/44. The majority of the estimations are within the primary data. The primary data was collected as annual totals for utilities usage and production volume. For the LCA, the utility usage information was divided by the production to find a utility consumption per square meter. Infrastructure and capital goods are excluded from this LCA in alignment with GPI 5.0. Another assumption is that the installation tools are used enough times that the per square meter impacts are negligible.

Cut-Off Criteria

A cut-off rule of 1% has been applied to this assessment, meaning the included inventory data must account for greater than 99% of the total material and energy inputs into the system. Furthermore, greater than 99% of the environmental impacts from the product system must be accounted for in the assessment. No known material or manufacturing inputs or outputs are deliberately excluded from this EPD. Cumulative excluded inputs within the life cycle account for less than 1% of the total mass inputs, energy inputs, and environmental impacts.

Data Sources

Primary data were collected by facility personnel and from utility bills and was used for all manufacturing processes. Supplier data was used for raw materials used in the production process; when primary data did not exist, secondary data for raw material production was utilized from Sphera Managed LCA Content Database 2024.2.

Data Quality

The geographical scope of the manufacturing portion of all life cycle modules is North America, specifically Madison, Georgia. All primary data were collected from the manufacturer. The geographic coverage of primary data is considered good. The primary data provided by the manufacturer represent all information for calendar year 2023. Time coverage of this data is considered good. Primary data provided by the manufacturer is specific to the technology used in manufacturing their product. It is site-specific and considered of good quality. Data necessary to model cradle-to-gate unit processes was sourced from Sphera Managed LCA Content LCI datasets. Improved life cycle data from suppliers would improve technological coverage.

Table 8: Declaration of sources and share of primary data

Process	Source type	Source	Reference year	Data category	Share of primary data, of GWP GHG results for A1-A3 ¹
PVC	Database	Sphera LCA for experts 2024.2	2023	Secondary Data	0%
Plasticizer	Database	Sphera LCA for experts 2024.2	2023	Secondary Data	0%
Generation of electricity used in manufacturing product	Database	Sphera LCA for experts 2024.2	2023	Primary Data	14-22%
Generation and use of natural gas in manufacturing	Database	Sphera LCA for experts 2024.2	2023	Primary Data	5-9%
Transportation	Database	Sphera LCA for experts 2024.2	2023	Primary Data	2-3%
Other processes	Database	Sphera LCA for experts 2024.2	2023	Secondary data	0%
Total share of primary data, of GWP-GHG results for A1-A3					21-34%
¹ The share of primary data is calculated based on GWP-GHG results. It is a simplified indicator for data quality that do not capture all relevant aspects of data quality. The indicator is not comparable across product categories.					

Period Under Review

The period under review is calendar year 2023.

Allocation

General principles of allocation were based on ISO 14040/44. To derive a per-unit value for manufacturing electricity, allocation based on total production by mass was adopted. As a default, secondary Sphera Managed LCA Content datasets use a physical basis for allocation.

Of relevance to the defined system boundary is the method in which recycled materials were handled. Throughout the study recycled materials were accounted for via the cut-off method. Under this method, impacts and benefits associated with the previous life of a raw material from recycled stock are excluded from the system boundary. Additionally, impacts and benefits associated with secondary functions of materials at end of life are also excluded (i.e., production into a third life or energy generation from the incineration plant). The study does include the impacts associated with reprocessing and preparation of recycled materials that are part of the bill of materials of the products under study.

Comparability and Benchmarking

The user of the EPD should take care when comparing EPDs from different companies. Assumptions, data sources, and assessment tools may all impact the uncertainty of the final results and make comparisons misleading. Without understanding the specific variability, the user is therefore, not encouraged to compare EPDs. Even for similar products, differences in use and end-of-life stage assumptions, and data quality may produce incomparable results. 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 Building-Related 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.

Comparison of the environmental performance of construction works and construction products using EPD information shall be based on the product's use and impacts at the construction works level. In general, EPDs may not be used for comparability purposes when not considered in a construction works context. Given this PCR ensures products meet the same functional requirements, comparability is permissible provided the information given for such comparison is transparent and the limitations of comparability explained.

Table 9: Life Cycle Stages Included in the Study

Module	Production			Construction		Use							End of Life				Benefits & Loads Beyond System Boundary
	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	
Module Description	Raw Material Supply	Transport	Manufacturing	Transport to Site	Assembly/Install	Use	Maintenance	Repair	Replacement	Refurbishment	Operational Energy Use	Operational Water Use	Deconstruction	Transport	Waste Processing	Disposal	Reuse, Recovery, Recycling Potential
Modules Declared	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	MND
Geography	United States																

X = Module Included in LCA Report, MND = Module not Declared

Table 10: Transportation to Building Site (A4)

	2 mm	2.5 mm Spacia	2.5 mm Amtico	2.5 mm Divergent	3 mm	3.2 mm	4 mm	5 mm
Weight of Products Transported (kg)	2.62E+00	3.88E+00	3.51E+00	3.59E+00	4.57E+00	4.72E+00	6.00E+00	8.80E+00
Transport by Truck								
Vehicle Type	Heavy Heavy-duty Diesel Truck / 53,333 lb payload - 8b							
Fuel Efficiency [L/100km]	42							
Fuel Type	Diesel							
Distance [mil]	955							
Capacity Utilization [%]	68%							
Capacity Utilization Volume Factor	1							
Transport by Ship								
Vehicle Type	Bulk commodity carrier, 1,000 to 250,000 dwt payload capacity, deep sea							
Fuel Efficiency [L/100km]	15.134							
Fuel Type	Heavy fuel oil							
Distance [mil]	5768							
Capacity Utilization [%]	53%							
Capacity Utilization Volume Factor	1							

Table 11: Reference Service Life

	Value
RSL [years]	30
Declared product properties (at gate) and finishes, etc.	See Table 1 for technical details
An assumed quality of work, when installed in accordance with the manufacturer's instructions	Per industry standards
Indoor environment	Can be installed in any typical indoor environment, assuming manufacturer's installation instructions and recommendations are followed.
Maintenance	See Use section above for maintenance instructions.

Table 12: Installation at building site (A5)

	2 mm	2.5 mm Spacia	2.5 mm Amtico	2.5 mm Divergent	3 mm	3.2 mm	4 mm	5 mm
Adhesive [kg/m²]*	3.00E-01							
Product Loss During Installation	5%							
Packaging Waste to Landfill [kg]	1.52E-02	1.90E-02	1.90E-02	1.90E-02	2.28E-02	2.43E-02	3.04E-02	3.80E-02
Packaging Waste to Incineration [kg]	3.80E-03	4.75E-03	4.75E-03	4.75E-03	5.70E-03	6.08E-03	7.60E-03	9.50E-03
Packaging Waste to Recycling [kg]	5.17E-02	6.46E-02	6.46E-02	6.46E-02	7.75E-02	8.27E-02	1.03E-01	1.29E-01
Biogenic Carbon Contained in Packaging [kg CO₂eq.]	1.20E-01	1.50E-01	1.50E-01	1.50E-01	1.80E-01	1.92E-01	2.40E-01	3.00E-01
Total Volatile Organic Compounds (TVOC) [mg/m³]	≤ 0.5							

No freshwater, electricity, or fuels are used in installation.

	2 mm	2.5 mm Spacia	2.5 mm Amtico	2.5 mm Divergent	3 mm	3.2 mm	4 mm	5 mm
<i>*Emissions from the adhesive during installation were considered for this assessment. However, no emissions were modeled due to the manufacturer-recommended adhesives having low- to no-VOC content.</i>								

Table 13: Maintenance (B2)

Name	Value	Unit
Maintenance process information	Industry wide EPD by RFCi	-
Maintenance cycle	1,560 (weekly)	Cycles/ RSL
Maintenance cycle	3,900 (weekly)	Cycles/ ESL
Net freshwater consumption	0.435	m ³ / ESL
Detergent	119	mL / m ² / year
Finish	0.12	L / m ² / year
Finish Remover	0	L / m ² / year
Electricity	0.022	kWh/ m ² / year
Water	5.8	L / m ² / year

No waste or direct emissions occur during regular maintenance.

Table 14: End-of-Life Scenario Details (C1-C4)

	2 mm	2.5 mm Spacia	2.5 mm Amtico	2.5 mm Divergent	3 mm	3.2 mm	4 mm	5 mm
Collected as mixed construction waste [kg]	2.86E+00	4.11E+00	3.74E+00	3.88E+00	4.78E+00	4.92E+00	6.17E+00	8.93E+00
Waste to Landfill [kg]	2.86E+00	4.11E+00	3.74E+00	3.88E+00	4.78E+00	4.92E+00	6.17E+00	8.93E+00
Distance to Landfill [km]	161							

Environmental Performance

All results are given per functional unit, which is 1 m² of installed flooring over an estimated building life of 75 years. The results of the end-of-life stage (module C) should be considered when using the results of the production stage. Environmental Impacts were calculated using the Sphera LCA for Experts software platform. Impact results have been calculated using IPCC AR6, CML 2001-Aug 2016, and TRACI 2.1, characterization factors. LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks. The Impact Category Key tables give definitions of relevant acronyms.

The LCIA impact categories referenced below are globally deemed mature enough to be included in Type III environmental declarations. Other categories are being developed and defined and LCA should continue making advances in their development. However, the EPD users shall not use additional measures for comparative purposes.

Life Cycle Assessment Interpretation

For global warming impacts, the replacements stage (B4) is the greatest contributor. This follows the fact that with a reference service life of 30 years, there are 2.5 replacements that need to occur during the 75 years of building operation, apart from the initial product installation. This includes raw material extraction, manufacturing, distribution, install and end of life (for replaced product) for every replacement.

If the impacts from maintenance are set aside to observe impacts from other phases, the product stage (A1-A3) is the greatest contributor to the global warming impacts. Within the product stage, raw material extraction drives impact, specifically PVC. This is a fossil-based material, which makes up the majority of the product based on weight, explaining its presence as top contributors within the product stage.

Trends for all other TRACI impact categories follow the trends of global warming, where replacements and raw materials contribute the most to life cycle impacts.

Additional Environmental Information

Mandatory Environmental Information

No substances required to be reported as hazardous per the EPA's Resource Conservation and Recovery Act (US EPA, 2023) were identified during the LCA associated with the production of this product.

Environmental and Health During Manufacturing

Mannington's LVT product is produced in a facility that is ISO 9001 and ISO 14001 certified. More information on Mannington Mills' sustainability programs, sustainability resources, and sustainability certifications can be found at Mannington Mills' sustainability website at <https://www.manningtoncommercial.com/sustainability/>.

Environment and Health During Installation

All recommended personal protective equipment (PPE) should be utilized during installation, as indicated on the SDS and installation guidelines, found online at <https://www.manningtoncommercial.com/resources/technical/>.

Extraordinary Effects

Fire

Mannington Mills LVT flooring has received a Class I critical radiant flux, $> 0.45 \text{ W/cm}^2$, ASTM E648.

Water

There are no environmental impacts associated with the product being flooded.

Mechanical Destruction

Should the product become flooded, the water should be removed through means of extraction and drying, and the product should behave as originally intended. There are no environmental impacts associated with the product being flooded.

Environmental Activities and Certifications

Mannington Mills LVT has the following environmental certifications. These certifications can be accessed with the links below:

- [Material Ingredient Disclosure via Health Product Declaration \(HPD\)](#)
- [VOCs vis FloorScore® \(CDPH v1.2-2017\)](#)

Abbreviations

Table 31: Impact Category Key – LCIA Indicators

Abbreviation	Parameter	Unit
IPCC AR6		
GWPe	Global warming potential (100 years, excludes biogenic CO ₂)	kg CO ₂ eq
GWPI	Global warming potential (100 years, includes biogenic CO ₂)	kg CO ₂ eq
CML 2001-Aug 2016		
GWPe	Global warming potential (100 years, excludes biogenic CO ₂)	kg CO ₂ eq
GWPI	Global warming potential (100 years, includes biogenic CO ₂)	kg CO ₂ eq
ODP	Ozone Layer Depletion Potential	kg R11 eq
AP	Acidification potential of soil and water	kg SO ₂ eq
EP	Eutrophication potential	kg Phosphate eq
POCP	Photochemical ozone creation potential	kg Ethene eq
ADPE	Abiotic depletion potential for non-fossil resources	kg Sb eq
ADPF	Abiotic depletion potential for fossil resources	MJ, net calorific value
TRACI 2.1		
AP	Acidification potential of soil and water	kg SO ₂ eq
EP	Eutrophication potential	kg N eq
GWPe	Global warming potential (100 years, excludes biogenic CO ₂)	kg CO ₂ eq
GWPI	Global warming potential (100 years, includes biogenic CO ₂)	kg CO ₂ eq
ODP	Depletion of stratospheric ozone layer	kg CFC 11 eq
Resources	Depletion of non-renewable fossil fuels	MJ, surplus energy
SFP	Smog formation potential	kg O ₃ eq

Table 32: Impact Category Key – Biogenic Carbon Indicators

Abbreviation	Parameter	Unit
BCRP	Biogenic Carbon Removal from Product	[kg CO ₂]
BCEP	Biogenic Carbon Emission from Product	[kg CO ₂]
BCRK	Biogenic Carbon Removal from Packaging	[kg CO ₂]
BCEK	Biogenic Carbon Emission from Packaging	[kg CO ₂]
BCEW	Biogenic Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes	[kg CO ₂]
CCE	Calcination Carbon Emissions	[kg CO ₂]
CCR	Carbonation Carbon Removals	[kg CO ₂]
CWNR	Carbon Emissions from Combustion of Waste from Non- Renewable Sources used in Production Processes	[kg CO ₂]

Table 33: Impact Category Key – Resource Use, Waste, and Output Flow Indicators

Abbreviation	Parameter	Unit
Resource Use Parameters		
RPR _E	Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ, net calorific value (LHV)
RPR _M	Use of renewable primary energy resources used as raw materials	MJ, net calorific value
NRPR _E	Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ, net calorific value
NRPR _M	Use of non-renewable primary energy resources used as raw materials	MJ, net calorific value
SM	Use of secondary materials	kg
RSF	Use of renewable secondary fuels	MJ, net calorific value
NRSF	Use of non-renewable secondary fuels	MJ, net calorific value
RE	Recovered energy	MJ, net calorific value
FW	Net use of fresh water	m ³
Waste Parameters and Output Flows		
HWD	Disposed-of-hazardous waste	kg
NHWD	Disposed-of non-hazardous waste	kg
HLRW	High-level radioactive waste, conditioned, to final repository	kg
ILLRW	Intermediate- and low-level radioactive waste, conditioned, to final repository	kg
CRU	Components for reuse	kg
MR	Materials for recycling	kg
MER	Materials for energy recovery	Kg
EEE	Exported electrical energy	MJ
EET	Exported thermal energy	MJ

References

- CML - Department of Industrial Ecology. (2016, September 05). *CML-IA Characterisation Factors*. Retrieved from <https://www.universiteitleiden.nl/en/research/research-output/science/cml-ia-characterisation-factors>
- International EPD System. (2021). *General Programme Instructions of the International EPD System. Version 4.0*.
- IPCC. (2013). *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge, United Kingdom and New York, NY, USA: Cambridge University Press.
- ISO. (2006 a). *ISO 14025: Environmental labels and declarations - Type III environmental declarations - Principles and procedures*. Geneva: International Organization for Standardization.
- ISO. (2006 b). *ISO 14040/Amd 1:2020: Environmental management - Life cycle assessment - Principles and framework*. Geneva: International Organization for Standardization.
- ISO. (2006 c). *ISO 14044/Amd 1:2017/Amd 2:2020: Environmental Management - Life cycle assessment - Requirements and Guidelines*. Geneva: International Organization for Standardization.
- ISO. (2017). *ISO 21930: Sustainability in buildings and civil engineering works - Core rules for environmental product declarations of construction products and services*. Geneva: International Organization for Standardization.
- RFCi. (2018). *Industry-Wide EPD: Vinyl Tile*. Resilient Floor Coverings Institute.
- UL Environment. (2018). *Part B: Flooring EPD Requirements, UL 10010-7, Version 2.0*.
- UL Environment. (2022). *Part A: Life Cycle Assessment Calculation Rules and Report Requirements, UL 10010, V4.0*.
- US EPA. (2012). *TRACI: The Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts. Version 2.1 - User Guide*. Retrieved from <https://nepis.epa.gov/Adobe/PDF/P100HN53.pdf>
- US EPA. (2023). *Resource Conservation and Recovery Act, Subtitle C*. US EPA.
- WAP Sustainability Consulting. (2024). *Life Cycle Assessment for Mannington Luxury Vinyl Tile*.