

# 2.5 mm Luxury Vinyl Tile (LVT)

Biome™, Coalesce™, Duo™, Exchange™, Parallel® USA, Terra™ & Theorem™

ACCORDING TO EN 15804, ISO 14025 AND ISO 21930

## 150+ Years of Excellence

Our founder, Thomas Armstrong, pioneered the principle “Let the buyer have faith,” standing behind his products and giving customers confidence in their purchase. More than a century later, that philosophy is alive and well in Armstrong Flooring.

We are committed to delivering solutions that reduce the environmental impact of the buildings you create. From product design and raw material selection, to production and delivery, we work to demonstrate continuous improvement to remain as strong and vital as our 150-year heritage.

Armstrong Luxury Vinyl Tile captures the essence of earth’s woods, stones, metals and original graphic designs in a wide array of tile and plank sizes. Commercial LVT combines the best of durability, technology, and design. Diamond 10® Technology, provides category-leading scratch, stain, and scuff resistance for floors that look newer, longer.

## Lifecycle Impact Categories

Cradle to grave environmental impacts for 1 m<sup>2</sup> of LVT with Diamond 10® Technology coating flooring assuming a 1-year service life.



**Primary Energy**  
538.7 MJ



**Eutrophication Potential**  
2.09E-03 kg (PO<sub>4</sub>)<sup>3-</sup>-eq.



**Global Warming Potential**  
7.94 kg CO<sub>2</sub>-eq.



**Ozone Depletion Potential**  
1.89E-09 kg R11-eq.



**Acidification Potential**  
0.04 kg SO<sub>2</sub>-eq.



**Photochem Ozone Creation Potential**  
0.43 kg O<sub>3</sub>-eq.

## Flooring Components:

Limestone, Polyvinyl chloride (PVC),  
Diocetyl Terephthalate (DOTP), Zinc Salt,  
Carbon Black, Pigments

Armstrong Flooring

Environmental Product Declaration

Walk On. Walk Strong:



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**Armstrong**Flooring™

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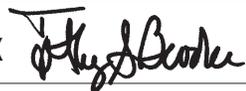
This document is a Type III Environmental Product Declaration by Armstrong Flooring, Inc. that is certified by ASTM as conforming to the requirements of ISO 14025, EN 15804 and ISO 21930. ASTM has assessed that the Life Cycle Assessment (LCA) information fulfills the requirements of ISO 14040 in accordance with the instructions listed in the product category rules cited below. The intent of this document is to further the development of environmentally compatible and sustainable construction methods by providing comprehensive environmental information related to potential impacts in accordance with international standards.

<b>Declaration Number</b>	EPD 207
<b>Program Operator</b>	ASTM International - 100 Barr Harbor Drive, West Conshohocken, PA, 19428, USA www.astm.org
<b>Manufacturer</b>	Armstrong Flooring, Inc. - 2500 Columbia Avenue, Lancaster, PA 17603
<b>Declared Product &amp; Functional Unit</b>	Luxury Vinyl Tile, 1 m <sup>2</sup>
<b>Reference PCR</b>	Part A: PCR for building-related products, 2018 Part B: Flooring EPD Requirements [UL Environment], v2.0 September, 2018
<b>Product Application</b>	Floor covering choice in commercial spaces: • Healthcare • Education • Retail • Hospitality • Office
<b>Product Reference Service Life</b>	30 Years
<b>Markets of Applicability</b>	North America
<b>Date of Issue</b>	May 18, 2021
<b>Date of Validity</b>	5 Years
<b>EPD Type</b>	Product Specific
<b>EPD Scope</b>	Cradle to Grave
<b>Year of Primary Data</b>	2017-2018
<b>LCA Software &amp; Version</b>	GaBi v8.7.1.30
<b>LCI Database(s) &amp; Version</b>	GaBi 2017
<b>LCIA Method</b>	TRACI 2.1

## Verification and Authorization of the Declaration

This declaration and the rules on which this EPD is based have been examined by an independent external verifier in accordance with ISO 14025 and ISO 21930.

This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:

X 

Tim Brooke  
Vice President, Certification

**Date**  
May 18, 2021

X 

Tom Gloria  
External Verifier

**Date**  
May 18, 2021

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## 2.0 Product Introduction

### 2.1 Company Description

Armstrong Flooring, Inc. (NYSE: AFI) is a global leader in the design and manufacture of innovative flooring solutions that inspire beauty wherever your life happens. Headquartered in Lancaster, Pennsylvania, Armstrong Flooring is a leading manufacturer of resilient products across North America. The company safely and responsibly operates 8 manufacturing facilities globally, working to provide the highest levels of service, quality and innovation to ensure it remains as strong and vital as its 150-year heritage. Learn more [ArmstrongFlooring.com](http://ArmstrongFlooring.com).

### 2.2 Product Description

Armstrong Flooring Luxury Vinyl Tile captures the essence of earth’s woods, stones, metals and original graphic designs in a wide array of tile and plank sizes. Commercial LVT combines the best of durability, technology, and design for floors that look newer, longer. It features a layered construction consisting of a tough, clear rigid, vinyl wear layer protecting a high-fidelity print layer on a solid vinyl backing. Diamond 10® Technology, provides category-leading scratch, stain, and scuff resistance for floors that look newer, longer.

#### 2.2.1 Brands

Biome™, Coalesce™, Duo™, Exchange™, Parallel® USA, Terra™ & Theorem™

#### 2.2.2 Specifications

Armstrong Flooring Luxury Vinyl Tile meets or exceeds the performance requirements of ASTM F 1700, Standard Specification for Solid Vinyl Floor Tile.

#### 2.2.3 Product Specific EPD

This EPD Is intended to represent product specific life cycle assessment results for the Armstrong Flooring LVT brands in Section 2.2.1.

### 2.3 Application

LVT is a widely used commercial resilient flooring option and is routinely used with great success in healthcare, education, retail, and corporate segments. Properly installed and maintained, LVT provides decades of proven performance across all commercial segments.

### 2.4 Declaration of Methodological Framework

The Life Cycle Assessment (LCA) was performed according to ISO 14040 and followed the PCR instructions. The cradle-to-grave LCA encompasses all relevant life cycle stages and modules including raw material production; transport of raw materials to the production facility; manufacturing of flooring; packaging; transportation to job site; use phase; and end of life including disposal or recycling. Detailed information regarding cut-off and allocation procedures are in sections 2.5 and 2.9.

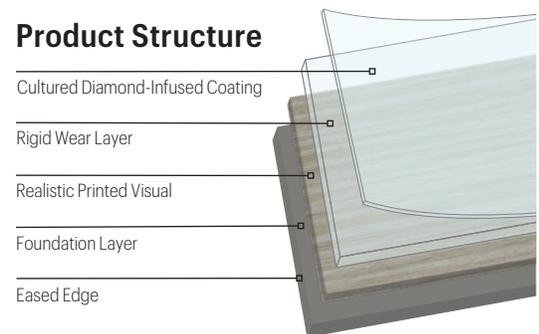
### 2.5 Technical Data

**Table 1: Luxury Vinyl Tile (LVT) Technical Data**

Table 1 below represents all products presented in this EPD. To determine the average weight, the mass of each Luxury Vinyl Tile was used proportionally to determine the overall average value in the chart.

Armstrong LVT with Diamond 10® Technology Coating		Average Value	Unit
Product Thickness		2.5 (0.100")	mm (in.)
Wear Layer Thickness		0.5 (0.020")	mm (in.)
Product Weight		4363	g/m <sup>2</sup>
Product Form	Tile	6 x 36	inches
		6 x 48	
		9 x 48	
		18 x 18	
		18 x 36	

**Figure 1. Example product structure for 2.5 mm LVT with Diamond 10® Technology**



## 2.6 Market Placement / Application Rules

All Armstrong Flooring 2.5 mm LVT meets or exceeds the performance requirements of ASTM F 1700, Standard Specification for Solid Vinyl Floor Tile. It meets the below performance requirements for the following test methods:

Performance	Test Method	Requirement	Performance vs. Requirement
Thickness	ASTM F386	Nominal ±0.005"	Meets
Wear Layer Thickness	ASTM F410	0.020" (0.5 mm) minimum for Commercial Use	Meets
Size	ASTM F2421	± 0.016" per linear foot	Meets
Squareness	ASTM F2421	0.010" maximum	Meets
Residual Indentation	ASTM F1914	Average less than 8%	Meets
Dimensional Stability	Internal	≤ 0.018" per linear ft. MD ≤ 0.012" per lin. ft. AMD	Meets
Chemical Resistance	ASTM F925	No more than slight change in surface dulling, attack or staining	Meets
Resistance to Heat	ASTM F1514	ΔE < 8 avg., max	Meets
Resistance to Light	ASTM F1515	ΔE < 8 avg., max	Meets
Static Load Resistance @ 250	ASTM F970	≤ 0.005"	Meets
Additional Testing			
Static Load Resistance	ASTM F970*	≤ 0.005"	2000 psi
Fire Test Data – Flame Spread	ASTM E648	0.45 W/cm <sup>2</sup> or more Class 1	Meets
Fire Test Data – Smoke Evolution	ASTM E662	450 or less	Meets
Fire Test Data – Canada	CAN/ULC S-102.2	Use dependent	Flame Spread - 5   Smoke Developed - 75
ADA Standards for Accessible Design	Chapter 3, Section 302.1	Floor surfaces shall be stable, firm and slip resistant	Meets
Static Coefficient of Friction**	ASTM D2047/UL 410	≥ 0.5	Meets
Acoustics	ASTM E492 (IIC) ASTM E90 (STC) ASTM E2179 (DELTA IIC)	International Building Code (IIC ≥50) International Building Code (STC ≥50) Sound Transmission Reduction	6" concrete, no ceiling with S-1840 Quiet Comfort Luxury Flooring Underlayment IIC - 53 STC - 51 Delta IIC - 22

\*Testing at loads above 250 psi is outside the scope of the test method. Since testing is conducted on uninstalled flooring, results do not consider the performance of the adhesive, underlayment, or subfloor. These test results are not an indicator of the installed flooring system performance.  
\*\*Using the James Machine as described in D2047 and as directed in UL 410 for floor covering materials (FCM) using a leather foot under dry conditions. The application of site-applied floor sealers, polishes and other types of finishes routinely used to maintain resilient flooring materials will change the walking surface and consequently the SCOF value.

## 2.7 Material Composition

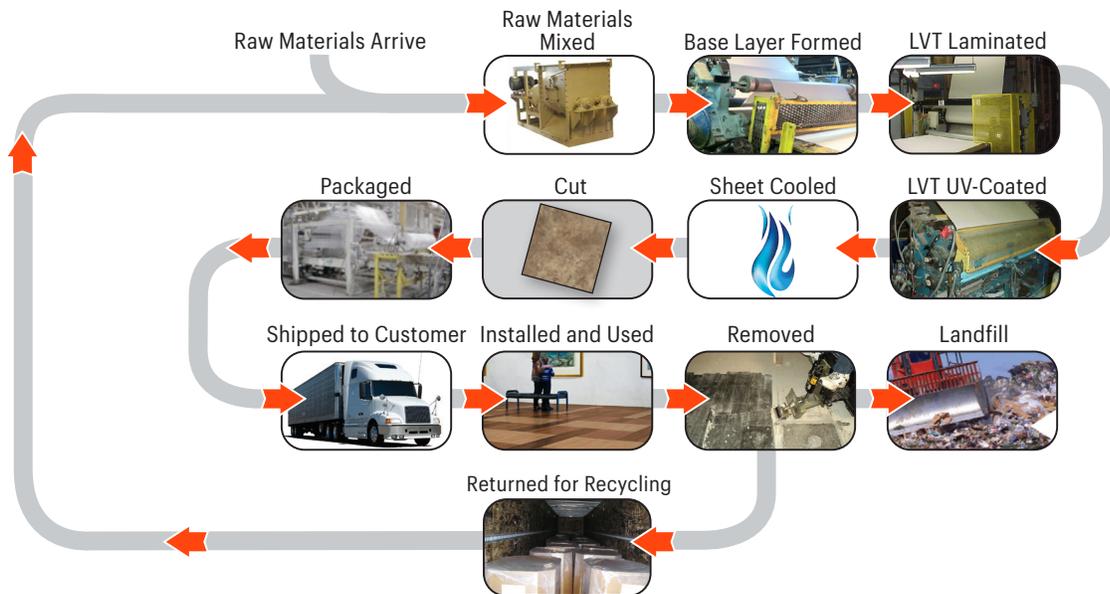
Table 3: Material Composition for LVT

Material Content	Function	Casrn	Quantity (% by weight) 2.5 mm LVT	Availability	
Limestone Flour	Filler	1317-65-3	65-70%	Abundant Mineral	Non-Renewable
Polyvinyl chloride (PVC)	Binder/Film	9002-86-2	10-15%	Fossil Limited	Non-Renewable
		9003-22-9			
Diocetyl Terephthalate (DOTP)	Plasticizer	6422-86-2	5-10%	Fossil Limited	Non-Renewable
Zinc Salt	Stabilizers	6865-35-6	0.1-1%	Abundant Mineral	Non-Renewable
Carbon Black	Black Pigment	1333-86-4	0.1-1%	Abundant Mineral	Non-Renewable
Pigments	Colorants	Various	0.1-0.5%	Abundant Mineral	Non-Renewable

## 2.8 Manufacturing

Armstrong LVT is floor tile and planks used in residential and commercial flooring applications and is comprised mostly of limestone in a vinyl binder matrix. The manufacturing process involves the hot mixing of the raw materials milled and calendered into a hot sheet which is then laminated with different layers by a hot press machine. The sheet is coated and then slowly cooled or annealed to make it stronger, before being cut into tiles.

**Figure 2: Process for Armstrong Flooring LVT**



## 2.9 Packaging

Armstrong Flooring LVT is packaged in a recyclable corrugated box and placed on a wooden pallet for shipping.

## 2.10 Installation

Armstrong Flooring LVT must be installed in strict accordance with the Armstrong Flooring Guaranteed Installation Systems manual, F-5061. This comprehensive guide to Armstrong flooring installation provides all the information needed to properly install Armstrong Flooring LVT to ensure it will look great and perform exactly as it should. Visit [armstrongflooring.com/commercial](http://armstrongflooring.com/commercial) for more information.

## 2.11 Use Conditions

Recommended maintenance practices are provided in the installation guide and are required as part of the warranty. Warranty details can be found at [armstrongflooring.com/commercial](http://armstrongflooring.com/commercial). For Armstrong Flooring LVT, the recommended maintenance is representative of medium intensity maintenance, as shown in Table 6. Because maintenance procedures often vary depending on the building owner's maintenance practices, level of use, and traffic conditions, Table 6 provides low, medium and high maintenance scenarios. The low intensity maintenance scenario results in lower environmental impacts. For example, less scrubbing means less water consumption and a lower eutrophication potential.

## 2.12 Reference Service Life & Estimated Building Service Life

Per the PCR, this product has a 30 year reference service life and is intended for a building with a 75-year estimated service life.

## 2.13 Reuse, Recycling & Energy Recovery

Armstrong Flooring LVT can be recycled through the On&On® Recycling Program provided it meet program requirements. See [www.armstrongflooring.com/reclaim](http://www.armstrongflooring.com/reclaim)



### 3.3 Product for Use Phase (Module B1-B7)

For this study, it was assumed that LVT would last 30 years and therefore would need to be replaced 1.5 times over the building’s useful life if properly installed and maintained. The useful life indicated in the PCR for flooring is 75 years. Recommended maintenance practices are provided in the Armstrong Flooring Installation Guide and required as part of the warranty. For LVT, the recommended maintenance is representative of medium intensity maintenance, as shown in Table 6. Because maintenance procedures often vary depending on the building owner’s maintenance practices, level of use, and traffic conditions, Table 6 provides low, medium and high maintenance scenarios. The low intensity maintenance scenario results in lower environmental impacts. For example, less scrubbing means less water consumption and a lower eutrophication potential.

**Table 6: Estimated Maintenance Intensity & Assumptions**

Maintenance Schedule	Number of Times Performed in 1 Year (365 Days)			Additional Resource Consumption
	Low	Medium	High	
Sweep /Dry Mop	260	260	260	None
Damp Mop	26	52	104	Water, pre-diluted cleaner
Scrubbing/Spray Buff	6	12	24	Floor finish, electricity

### 3.4 Units

The PCR require SI units for all LCA results.

### 3.5 Estimations and Assumptions

#### Transportation

Per the PCR (UL, 2018) a distance of 800 km (497 miles) by diesel-powered truck is used to represent the distribution of product to the installation site. For products manufactured outside of the United States, inbound transportation by cargo ship is also included. Additionally, transportation is assumed to be 161 km (100 miles) by diesel-powered truck for the following:

- Product to Building site
- Installation waste to disposal
- Deconstructed product to end of life destination

### 3.6 Cut-off Rules

Cut-off rules are consistent with PCR (UL, 2018). No known flows were deliberately excluded.

### 3.7 Data Sources

All gate-to-gate, primary foreground data was collected for the flooring manufacturing process. This foreground data was from annual production for the year of 2017. Relevant background data was taken from the database provided in the GaBi 8.7.1.30 software system for life cycle engineering. No data set was over 10 years old. The GaBi database provides the life cycle inventory data for the raw and process materials obtained from the background system.

### 3.8 Data Quality

A variety of tests and checks were performed throughout the project to ensure high quality of the completed LCA. Checks included data verification and triangulation against several sources including published LCA studies. Overall, the data quality is considered to be good to high quality.

**Temporal:** All of the primary data is taken from 12 months of continuous operation in the 2017 calendar year. All secondary data were obtained from the GaBi 2018 databases.

**Geographical:** All primary and secondary data were collected specific to the countries or regions under study. Where country-specific or region-specific data were unavailable, proxy data were used. Geographical representativeness is considered to be high.

**Technological:** All primary and secondary data were modeled to be specific to the technologies or technology mixes under study. Where technology-specific data were unavailable, proxy data were used. Technological representativeness is considered to be high.

### 3.9 Period under review

Primary data was collected during 2018. This analysis is intended to represent production in 2017.

### 3.10 Allocation

No co-product or multi-input process allocation occurs in the product system. For reuse, recycling, and recovery allocation, the cut-off allocation approach is adopted in the case of any recycled content, which is assumed to enter the system burden-free. Only environmental impacts from the point of recovery and forward (e.g., collection, sorting, processing, etc.) are considered. With the exception of bio-based packaging waste, product and packaging waste is modeled as being disposed in a landfill rather than incinerated or recycled. Plastic and other construction waste is assumed to be inert in landfills so no system expansion or allocation is necessary as landfill gas is not produced. In the case of biobased packaging waste disposed during installation, landfill gas from the decomposition of this waste is assumed to be collected and used to produce electricity. It is assumed that this recovered energy offsets energy produced by the U.S. average grid.

### 3.11 Comparability and Benchmarking

As shown in Table 16, this EPD compares 2.5 mm LVT with Diamond 10<sup>®</sup> Technology to 3.2 mm Natural Creations with Diamond 10<sup>®</sup> Technology. Both products are manufactured in Lancaster, PA. These results are comparable and acceptable according to the PCR and ISO standards, because background datasets, modeling assumptions, and time periods are the same.

### Life Cycle Assessment Scenarios

The following information is required by the PCR to be documented.

**Table 7: Transportation to the Building Site (A4)**

Name	Value	Unit
Fuel Type	Diesel	-
Liters of Fuel	35	L/100km
Vehicle Type	Truck (trailer)	-
Transportation Distance	800	km
Capacity Utilization (including Empty Runs, Mass Based)	78	%
Gross Density of Products Transported	2.1	kg/m <sup>2</sup>
Capacity Utilization Volume Factor	1	-

**Table 8: Installation into the building (A5)**

Name	Value	Unit
Ancillary Materials	0.37	kg
Electricity Consumption	0.02	MJ
Waste Materials at the Construction Site	0.26	kg

**Table 9: Reference Service Life**

Name	Value	Unit
Reference Service Life	30	years

**Table 10: Maintenance (B2)**

Name	Value	Unit
Maintenance Process Information (Cite Source)	AFI Maintenance Guide	
Maintenance Cycle (Reference Service Life)	1560 (weekly)	Cycles/RSL
Maintenance Cycle (Estimated Service Life)	3,900 (weekly)	Cycles/ESL
Net Freshwater Consumption: Municipal Water to POTW	0.11	kg/ESL
Ancillary Materials (Pre-diluted Cleaner)	306.7	L/ESL
Energy Input for Spray Buffing	5.67	kWh/ESL

**Table 11: Replacement (B4)**

Name	Value	Unit
Reference Service Life	30	Years
Replacement Cycle	1.5	–
Ancillary Materials (Adhesive)	0.56	kg
Electricity Consumption	0.03	MJ
Waste Materials at the Construction Site	0.39	kg

**Table 12: End of Life (C1-C4)**

Name	Description	Value	Unit
Collection Process	Collect Separately	3.3	kg
Disposal	Product or Materials for Final Disposition	3.3	kg

## 4.0 Life Cycle Assessment Results

The results in this EPD represent product specific results for one square meter of Armstrong Flooring products. Caution should be used when trying to compare the results presented in this EPD to other products.

### 4.1 Life Cycle Assessment Impact Results

Results for the life cycle assessment are presented in the tables below. The Product Category Rules for Flooring require impacts be calculated for a building life of 75 years. This means that during a 75 year time frame, the floor is manufactured, installed, maintained, and replaced multiple times depending upon the floor’s reference service life. The estimated reference service life for Luxury Vinyl Tile is provided in Table 9. The total 75-year impacts are calculated by adding the values from all of the modules plus 74 times the impact in module B2. Additional, impacts for a 1-year service life including disposal are shown in the tables below.

**Table 13: Impact Assessment Results for 1 m<sup>2</sup> of 2.5 mm LVT made in Lancaster, PA**

Biome™, Coalesce™, Duo™, Exchange™, Parallel® USA, Terra™ & Theorem™	TRACI 2.1 Impact Category	Global Warming Air, incl. biogenic carbon	Ozone Depletion Air	Acidification	Eutrophication	Smog Air	Resources, Fossil fuels
	Units	kg CO2 eq.	kg CFC 11 eq.	kg SO2 eq.	kg N eq.	kg O3 eq.	MJ
Production	A1-A3	6.88	1.64E-10	0.03	1.74E-03	0.33	14.41
Transport	A4	4.63E-01	-2.50E-15	2.23E-03	1.85E-04	0.05	0.88
Install	A5	0.26	1.73E-09	2.95E-03	5.25E-05	0.01	1.22
Maintain	B2	4.72E-02	1.60E-15	9.76E-05	2.95E-05	1.55E-03	0.07
Replace	B4	11.906	2.84E-09	5.73E-02	3.13E-03	0.64	25.70
Transport	C2	0.095	-5.09E-16	4.55E-04	3.76E-05	0.01	0.18
Disposal	C4	0.188	-5.09E-16	8.47E-04	4.32E-05	0.02	3.70E-01
Recycling	D	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00
<b>Total</b>	<b>1 Year</b>	7.94	1.89E-09	0.04	2.09E-03	0.43	17.13
<b>Total</b>	<b>75 Years</b>	23.338	4.73E-09	0.103	0.007	1.181	48.025

## 4.2. Life Cycle Inventory Results

Tables 15 and 16 provide life cycle inventory results for products included in this EPD. Inventory data are not included for non-renewable primary energy resources used as raw materials, use of secondary materials (SM), use of renewable secondary fuels (RSF), or use of non-renewable secondary fuels (NRSF) as values for these inventory categories are zero.

**Table 14: Resources Use for 1 m<sup>2</sup> of 2.5 mm LVT made in Lancaster, PA**

Biome™, Coalesce™, Duo™, Exchange™, Parallel® USA, Terra™ & Theorem™	Resource Use Parameters	Total use of renewable primary energy resources	Renewable primary energy used as energy carrier	Total use of non-renewable primary energy resources	Non-renewable primary energy used as energy carrier	Use of net fresh water resources (FW)
	Units	[MJ, LHV]	[MJ, LHV]	[MJ, LHV]	[MJ, LHV]	[m <sup>3</sup> ]
Production	A1-A3	7.51	7.51	150.32	150.32	0.08
Transport	A4	0.20	0.20	7.10	7.10	9.22E-04
Install	A5	0.05	0.05	9.68	9.68	9.24E-04
Maintain	B2	0.10	0.10	0.90	0.90	-1.44E-03
Replace	B4	12.13	12.13	256.79	256.79	-1.44E-03
Transport	C2	0.04	0.04	1.44	1.44	0.21
Disposal	C4	0.22	0.22	3.19	3.19	1.87E-04
Recycling	D	0.00	0.00	0.00	0.00	4.08E-04
<b>Total</b>	<b>1 Year</b>	8.93	8.93	186.53	186.53	0.05
<b>Total</b>	<b>75 Years</b>	28.44	28.44	510.25	510.25	0.40

**Table 15: Outflows and Waste Categories for 1 m<sup>2</sup> of 2.5 mm LVT made in Lancaster, PA**

2.5 mm LVT Made in Lancaster, PA	Outflows and Waste Categories	Harardous Waste Disposed (HWD)	Non-Harardous Waste Disposed (NHWD)	High Level Radioactive Waste Disposed (HLRW)	Intermediate Low Level Radioactive Waste (ILLRW)	Exported Energy, Electrical	Exported Energy, Thermal
Production	A1-A3	3.07E-04	1.99E-01	-1.42E-06	-1.14E-03	0	0
Transport	A4	5.35E-08	2.49E-04	-1.77E-08	-1.43E-05	0	0
Install	A5	4.68E-09	3.51E-01	-1.09E-08	-8.77E-06	1.08E-04	5.08E-05
Maintain	B2	8.26E-10	1.73E-03	-6.60E-08	-5.38E-05	0	0
Replace	B4	3.07E-04	6.87E+00	-1.51E-06	-1.21E-03	1.08E-04	5.08E-05
Transport	C2	1.09E-08	5.06E-05	-3.59E-09	-2.91E-06	0	0
Disposal	C4	1.03E-08	4.22E+00	-3.59E-08	-2.80E-05	0	0
Recycling	D	0	0	0	0	0	0
<b>Total</b>	<b>1 Year</b>	3.07E-04	4.77E+00	-1.56E-06	-1.25E-03	1.08E-04	5.08E-05
<b>Total</b>	<b>75 Years</b>	6.14E-04	1.16E+01	-3.07E-06	-2.46E-03	2.16E-04	1.02E-04

Table 16 demonstrates a significant reduction in environmental impacts when comparing 2.5 mm to 3.2 mm LVT with Diamond 10<sup>®</sup> Technology in modules A1-A3. These modules include the extraction, manufacture, and transportation of raw material and flooring production.

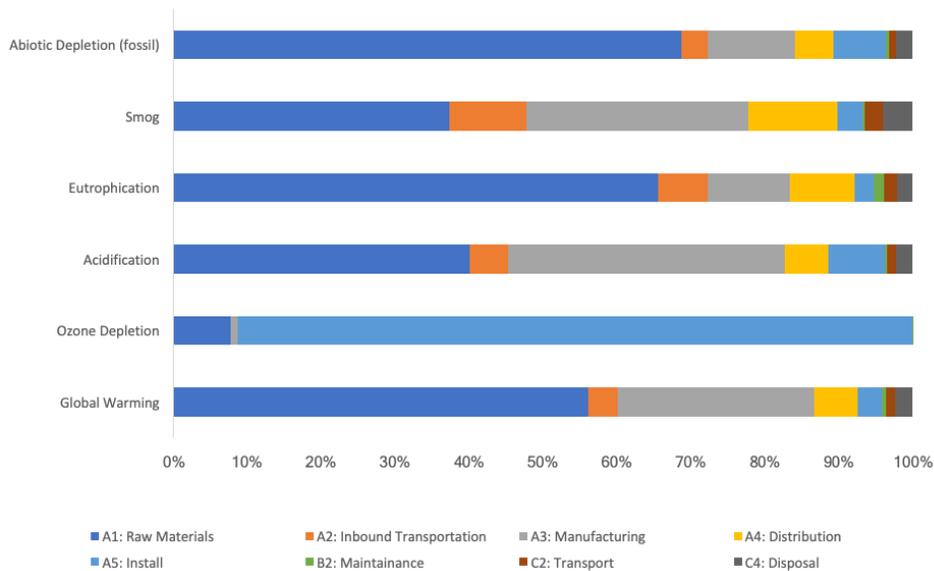
**Table 16. Comparison between 2.5 mm LVT and 3.2 mm LVT with Diamond 10<sup>®</sup> Technology**

TRACI 2.1 Impact Category	Units	3.2 mm LVT	2.5 mm LVT	% reduction	3.2 mm LVT	2.5 mm LVT	3.2 mm LVT	2.5 mm LVT
		A1-A3	A1-A3		1-Year Service Life	1-Year Service Life	75-Year Service Life	75-Year Service Life
Global Warming	kg CO2 eq.	9.04	6.88	-31%	10.33	7.94	29.83	23.34
Ozone Depletion	kg CFC 11 eq.	2.32E-10	1.64E-10	-42%	2.35E-09	1.89E-09	5.87E-09	4.73E-09
Acidification	kg SO2 eq.	0.04	0.03	-22%	0.05	0.04	0.12	0.10
Eutrophication	kg N eq.	1.92E-03	1.74E-03	-11%	2.35E-03	2.09E-03	0.01	7.40E-03
Smog	kg O3 eq.	0.44	0.33	-31%	0.55	0.43	1.50	1.18
Abiotic Depletion (fossil)	MJ	19.19	14.41	-33%	22.51	17.13	62.18	48.03

## 5.0 LCA Interpretation

Under the 75-year building service life assumption, product manufacturing (A1-A3) and recommended maintenance (B2) are the largest contributors to most impacts categories considered. The production of raw materials as shown in Figure 3, represents a substantial fraction of potential impact, even over the life of a building. The potential impact of floor maintenance adds up over time and are relevant contributors to the life cycle. Transportation of the flooring product from the manufacturing facility to the installation site (A4) is a relatively minor contributor to all impact categories. Replacement (B4) is a key contributor, because it represents the production, installation and disposal of replacement products needed to satisfy the 75-year building service. The PCR assumes that all flooring product have the same durability, however more durable products will have lower impact.

**Figure 3. One-Year Life Cycle Impacts for Armstrong Flooring LVT with Diamond 10® Technology**



## 6.0 Additional Environmental Information

### 6.1 Environment and Health During Manufacturing

All Armstrong Flooring manufacturing plants maintain an Environmental Management System (EMS) in accordance with ISO 14001 which includes continuous environmental performance targets. Manufacturing plants located outside of the United States including plants in China and Australia are third party certified to ISO 14001 and ISO 9001.

Additionally, Armstrong has a robust internal Quality Assurance process that is based on industry-accepted best practices and is led by a team of quality professionals who have been certified by the American Society for Quality. The process involves several hundred different measures made throughout the manufacturing processes.

### 6.2 Environment and Health During Installation and Use.

All Armstrong flooring products are tested and certified by FloorScore® to comply with the requirements of the California Department of Public Health Standard for the Testing and Evaluation of VOC emissions (CDPH v1.2).

## 7.0 References

Armstrong Flooring (2018), Guaranteed Installation Systems (F5061) manual.

CDPH. (2017) Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers – v1.2.

ISO. (2006) 14025: Environmental labels and declarations – Type III – environmental declarations – Principles and procedures.

ISO 14040:2006/Amd 1:2017: Environmental management – Life cycle assessment – Principles and framework.

ISO 14044:2006/Amd 2:2020: Environmental management – Life cycle assessment – Requirements and guidelines.

ISO. (2015) 9001 Quality Management Systems – Requirements.

ISO. (2017) 21930: Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services

European Standards. (2013) EN 15804+A1 Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products.

UL (2018) Product Category Rules for Building-Related products and Services in North America – Part A, v 3.2.

UL (2018) Product Category Rules for Building-Related Products and Service, Part B: Flooring EPD Requirements, v 2.0.

US EPA. (2012). Tool for the reduction and assessment of Chemical and other Environmental Impacts (TRACI) v 2.1.