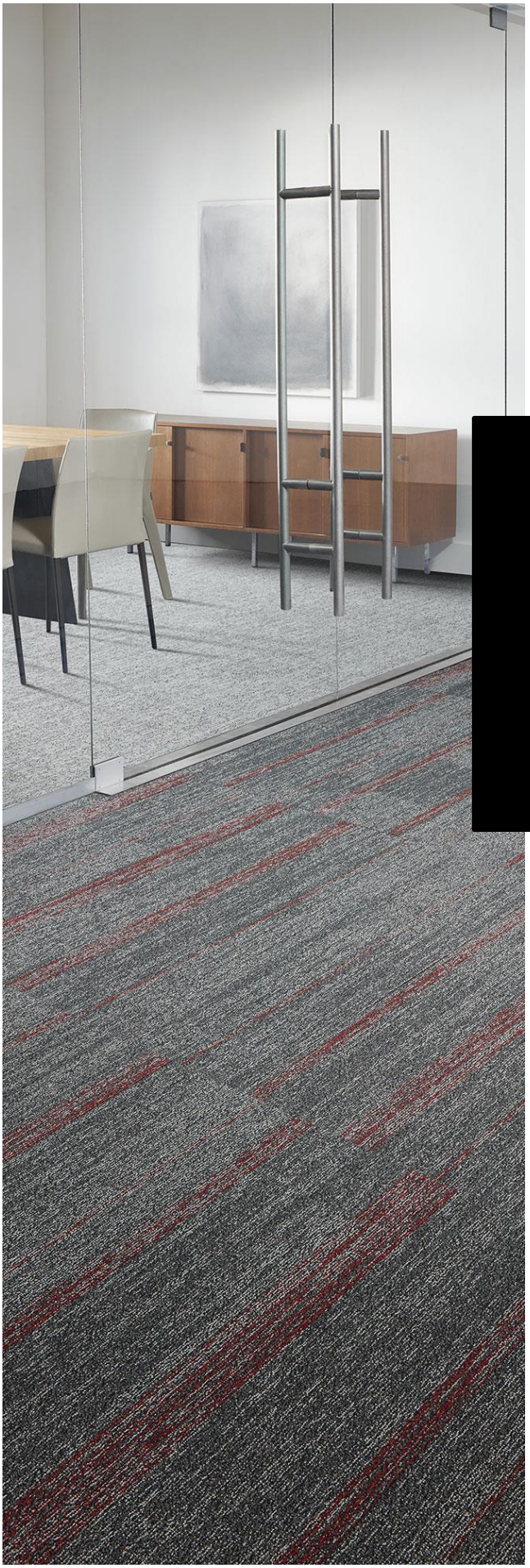

ENVIRONMENTAL PRODUCT DECLARATION

CARPET TILE - WELLBAC® FUNCTION BACKING

Asia – Solution Dyed Recycled Nylon 6

Manufactured using Renewable Energy

WellBAC® Function is Milliken's hardback modular tile. In addition to providing superior underfoot comfort and significantly improving the carpet's wear performance, WellBAC® Function also offers installation, ergonomic, acoustic, safety and environmental benefits.

Milliken has a rich history of delivering innovative flooring solutions from our research center, manufacturing facilities and our creative collective of inspired problem solvers. Milliken's reliable and stylish flooring products offer great design solutions built from unique insights and an exceptional array of technical capabilities.

We believe material health is essential to enable circularity. The use of materials that don't contain harmful chemicals is a critical pathway to end-of-life product recycling. Our carpet products have 100% transparency in materials to 100ppm. Material transparency and a continued focus on improving material health is core to our commitment to the environment. Our carpet, resilient flooring, and entryway tile are recyclable. We will continue to invest in new technology and create flooring products that enable you to make better choices.

For More Information Contact us at:
Millikenfloors.com | 800.824.2246

ENVIRONMENTAL PRODUCT DECLARATION

Milliken

Carpet Tile - WellBAC® Function Backing
Asia - Solution Dyed Recycled Nylon 6

According to ISO 14025
and ISO21930:2017

GENERAL PROGRAM INSTRUCTIONS AND VERSION NUMBER	UL Solutions www.ul.com 333 Pfingsten Rd, Northbrook IL, 60062 www.spot.ul.com
MANUFACTURER NAME AND ADDRESS	Milliken Textile Zhangjiagang Co., Ltd, 19 North Guotai Rd., Zhangjiagang, Jiangsu Provice China 215638
DECLARATION NUMBER	4791117385.117.3
DECLARED PRODUCT & FUNCTIONAL UNIT OR DECLARED UNIT	1 m^2 of Carpet Tile - WellBAC® Function Backing with Solution Dyed Recycled Nylon 6 installed in a building for 75 years
REFERENCE PCR AND VERSION NUMBER	Part A: Life Cycle Assessment Calculation Rules and Report Requirements, (UL Environment, V4.0, 2022) and Part B: Flooring EPD Requirements (UL Environment V2.0, 2018)
DESCRIPTION OF PRODUCT APPLICATION/USE	Carpet flooring for interior use
PRODUCT RSL DESCRIPTION (IF APPL.)	15 Years
MARKETS OF APPLICABILITY	Asia
DATE OF ISSUE	March 4th 2025
PERIOD OF VALIDITY	5 Years
EPD TYPE	Product Specific
EPD SCOPE	Cradle to Grave
YEAR(S) OF REPORTED PRIMARY DATA	2023
LCA SOFTWARE & VERSION NUMBER	Sphera LCA FE 10.9
LCI DATABASE(S) & VERSION NUMBER	MLC Database 2024.2 (formerly GaBi Database)
LCIA METHODOLOGY & VERSION NUMBER	TRACI 2.1, CML 2001-Jan 2016, and IPCC AR5
LCA MODEL VERSION	0.2

The PCR review was conducted by:	UL Solutions PCR Review Panel epd@ul.com
This declaration was independently verified in accordance with ISO 14025: 2006 and ISO 21930: 2017. ☐ INTERNAL ☒ EXTERNAL	Cooper McCollum, UL Solutions
This life cycle assessment was conducted in accordance with ISO 14044 and the reference PCR by:	WAP Sustainability Consulting
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	James Mellentine, Thrive ESG

LIMITATIONS

Exclusions: EPDs do not indicate that any environmental or social performance benchmarks are met, and there may be impacts that they do not encompass. LCAs do not typically address the site-specific environmental impacts of raw material extraction, nor are they meant to assess human health toxicity. EPDs can complement but cannot replace tools and certifications that are designed to address these impacts and/or set performance thresholds – e.g. Type 1 certifications, health assessments and declarations, environmental impact assessments, etc.

Accuracy of Results: EPDs regularly rely on estimations of impacts; the level of accuracy in estimation of effect differs for any particular product line and reported impact.

Comparability: This EPD meets all comparability requirements stated in ISO 21930:2017 and ISO 14025:2006. However, differences in certain assumptions, data quality, and variability between LCA data sets may still exist. As such, caution should be exercised when evaluating EPDs from different manufacturers or programs, as the EPD results may not be entirely comparable. Any EPD comparison must be carried out at the construction works level per ISO 21930:2017 guidelines. The results of this EPD reflect an average performance by the product and its actual impacts may vary on a case-by-case basis. Examples of variations: Different LCA software and background LCI datasets may lead to different results for upstream or downstream of the life cycle stages declared.

1. Product Definition and Information

1.1. Description of Company/Organization

Milliken & Company is an innovation company that has been exploring, discovering, and creating ways to enhance people's lives since 1865. The company is a privately held for-profit corporation. The company is headquartered in Spartanburg, South Carolina, and operates design and manufacturing facilities in the United States, United Kingdom, Australia and China. In 2024, Milliken was recognized as one of the world's most ethical companies by Ethisphere for the eighteenth consecutive year.

1.2. Product Description

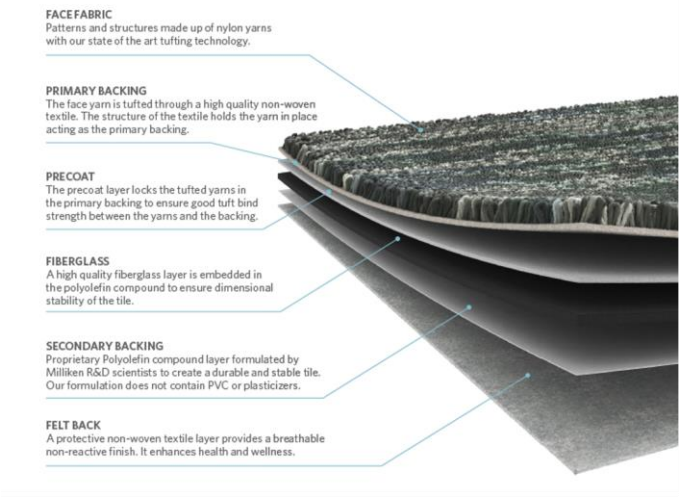

Figure 1. Illustration of Milliken carpet Tile Construction

Product Identification

This EPD represents Milliken's WellBac® Function Backed Carpet Tile manufactured at Milliken Textile Zhangjiagang facility. The face fiber used in the carpet products covered in this EPD is Solution Dyed 100% Recycled nylon 6. Within this product family, there are several collections each of which varies in face weight and design.(See this document to determine which collections are covered under Milliken's EPDs). The product addressed in the body of this EPD is a 16 oz/yd^2 faceweight product of standard construction. Additional results for products in this family with different face weights are presented in Section 8 and embodied carbon values for all possible faceweights are provided in Section 4.3.

A carpet tile's backing is critical to its performance, durability and appearance retention. The right backing will not only ensure the carpet tile remains dimensionally stable and flat on the floor, it can provide acoustic, insulation and sustainability benefits. In addition to providing superior underfoot comfort and significantly improving the carpet's wear performance, WellBAC® Function also offers installation, ergonomic, acoustic, safety and environmental benefits.

Product Specification

The product's performance characteristics are outlined in Table 1, with additional product-specific information found on the product's specification sheet. The product is described using the specifications outlined in Table 2.

Table 1: Carpet Performance Testing

NAME	VALUE	UNIT
Static Electricity (AATCC 134)	≤ 3.5	kV
Flammability (ASTM E 648)	≥0.45 (Class I)	-
Smoke Density (ASTM E 662)	≤450	-
Methenamine Pill Test (CPSC FF-1-70 or ASTM D 2859)	Self-Extinguishing	-

1.3. Application

Milliken & Company's floor coverings are quiet, healthy, and provide a desired aesthetic for any office, hotel, school, home or commercial environment around the world.

1.4. Declaration of Methodological Framework

This LCA is a cradle-to-grave study. A summary of the life cycle stages can be found in Table 18.

The reference service life is outlined in Table 8 and is only applicable if all manufacturing guidelines are followed regarding site-selection and installation, found online.

The cut-off criteria are described in Section 2.4 and allocation procedures are described in Section 2.8. No known flows are deliberately excluded from this EPD.

1.5. Technical Requirements

The following technical data describe the product undergoing the life cycle assessment.

Table 2: Carpet Technical Data

NAME	VALUE	UNIT
Product Form	Carpet tile	-
Type of Manufacturing	Tufted Nylon 6 on coated backing solution dyed	-
Yarn Type	Recycled Nylon 6	-
Primary Backing Type	Polyester	-
Backing	Hardback with felt	-
Product Weight	3.32	kg/m^2
Surface Pile Thickness	1.4-2.6	mm
Surface Pile Weight	0.407-0.678	kg/m^2
CRI Rating	Heavy (>3)	-
Total Thickness	7.1-8.7	mm
*This product family covers a range of face fiber weights. The results presented in this EPD represent an average face weight of 16 oz/yd^2 (0.454 kg/m^2). Scenarios for additional face weights are presented in Section 8.		

1.6. Properties of Declared Product as Delivered

WellBAC® Function backed modular carpet tiles come in sizes of 1mx1m, 50cmx50cm, and 25cmx1m. The tiles are stacked on a wooden pallet and a cardboard wrapping is placed around the stack to protect the product during shipment.

The products declared in this document comply with the following codes or regulations:

- ASTM E 648-17 Radiant Panel
- ASTM E 662-17a Smoke Density
- ASTM D2859 Pill Test
- AATCC 134-2011 GSA Static
- ASTM D5848 Pile weight
- ASTM D5848 Pile Density
- ASTM D6859 Pile Thickness
- ASTM D5793 Stitches
- ASTM D5793 Gauge
- ASTM D7570 AACHEN/ISO 2551 Aachen
- ASTM D1335 Tuft Bind
- AATCC 16.3 Lightfastness

1.7. Material Composition

The materials that make up the flooring product are indicated in Table 3.

Table 3: Material Composition

Component	Material	Mass %
Face fiber*	Recycled Nylon 6	13-20%
Primary backing	Polyester	3-4%
Latex	VAE, Limestone	21-22%
Hotmelt	Calcium Carbonate, Proprietary	53-58%
Backing	Polypropylene, limestone	0-0%
Fiberglass	E-glass	3-3%

The product does not contain hazardous substances per the applicable regional-specific legislation, as indicated in Section 2.8.6 of *Part A: Life Cycle Assessment Calculation Rules and Report Requirements* from UL Environment.

1.8. Manufacturing

WellBAC® Function Backed, Solution Dyed modular tiles are manufactured at Milliken Textile Zhangjiagang facility in China. Tufting is the process of affixing face fiber to a primary backing system. Application of latex backing, hotmelt, polyurethane backing, glass fiber scrim and a felt to the tufted primary backing is called coating. The hotmelt layer is primarily composed of limestone and proprietary materials. The hardback backing is consisting of polypropylene and limestone. Once the carpet is backed, it is cut into tiles. Finally the carpet is packaged for shipping.

This product is made using renewable electricity in the form of Renewable Energy Certificates (RECs). Milliken & Company purchases Green Electricity Certificates (GECs) to cover 100% of the electricity consumed at the Milliken Textile Zhangjiagang facility. For more information related to Milliken's investments in renewable energy, please visit our website.

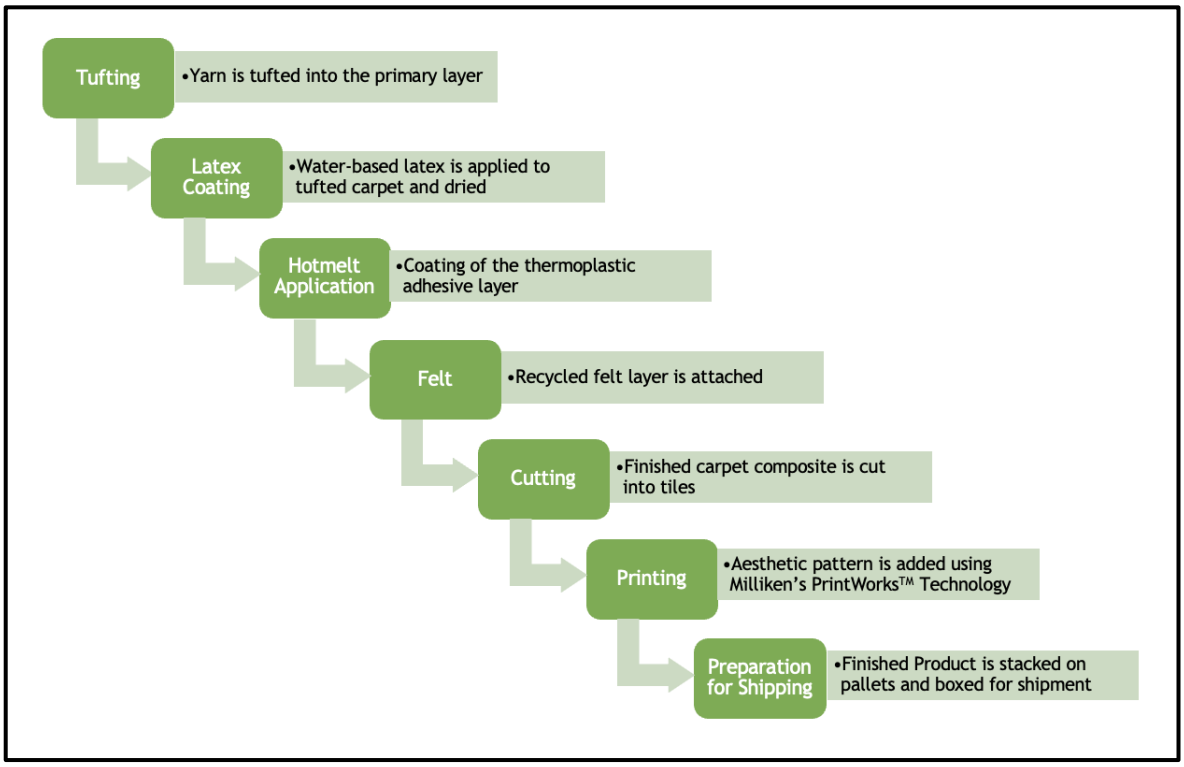

Figure 2. Production process for Milliken Carpet Tile

1.9. Packaging

Packaging utilized in the shipment of the product is described in

Table 4.

Table 4: Packaging

Packaging Type	Material	Amount (kg)	Disposal Pathway
Box	Corrugated Cardboard	0.0759	Landfill, incineration, recycle
Pallet	Wood	0.182	Landfill

1.10. Transportation

In the LCA model underlaying this EPD, it is assumed that all raw materials are distributed by truck. An distance of 800 km was used to model all raw material transportation and in the model as guided by section 3.5 of the UL Part B Flooring PCR. This same assumption was used in modeling distribution to customers.

1.11. Product Installation

While installation equipment is required to install the flooring product, it is not included in the study as these are multi-use tools and the impacts per declared unit are considered negligible. 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.

Except where exceeded or modified by Milliken Carpet Installation Instructions, Milliken recognizes the CRI Carpet Installation Standard 2011 as the minimum acceptable standard for the installation of its carpet products, for more information, visit our website, www.millikencarpet.com.

Subfloor moisture: Milliken warrants that our modular carpet will withstand vapor emission from the slab for the lifetime of the original carpet installation. Technically speaking, we guarantee our carpet tile and adhesive will form a bond that provides tack and resistance to lateral movement while the pressure sensitive adhesive will allow for the removal of the modular carpet allowing for maintenance of the space throughout the life of the carpet.

Adhesive: Milliken modular carpet is designed for installation without permanent adhesives. This allows easy removal and reinstallation. Milliken recommends TractionBack® for all carpet tiles adhesive. If TractionBack® is not available; Milliken recommends Milliken Non-Reactive Standard Adhesive.

Detailed installation instructions are provided online at Milliken Floor Covering's technical documentation webpage.

1.12. Use

The method of maintenance is using a vacuum cleaner to remove dust and debris from carpet with occasional deep cleaning. Vacuuming was assumed to occur five days a week during working weeks. Deep cleaning, which consumes electricity, detergent, and water, was modeled as occurring twice per year.

Table 5: Use Phase Assumptions

Type	Cleanings per Year	Unit
Vacuuming	250	#
Deep Cleaning	2	#

Carpet products are traditionally not repaired or refurbished. If a single carpet tile gets stained or damaged, it can be removed and replaced with a new tile assuming the correct installation method was used per the manufacturer's instructions. Detailed maintenance instructions are provided online at Milliken Floor Covering's technical documentation webpage.

1.13. Reference Service Life and Estimated Building Service Life

The reference service life of the product is 15 years. For a building's estimated service life of 75 years, this means the carpet will be replaced four times, meaning 5 m^2 of tile is needed over the full life of the building. The reference service life assumes the product was installed according to the manufacturer's recommendations.

1.14. Reuse, Recycling, and Energy Recovery

Milliken's modular carpet tiles are 100% recyclable. Keeping unnecessary waste out of landfill is a key part of Milliken's environmental commitment. Milliken's N/XT Life™ Circularity Programme provides reuse, recycling, and non-landfill disposal solutions. This ensures that used carpet is recovered and managed in the most environmentally, socially, and financially responsible way.

1.15. Disposal

Disposal pathways in the EPD are modeled in accordance with disposal routes and waste classification referenced in Sections 2.8.5 and 2.8.6 of *Part A: Life Cycle Assessment Calculation Rules and Report Requirements* from UL Environment. For Asia products not made out of metal, this dictates an End-of-Life scenario of 100% landfilling.

2. Life Cycle Assessment Background Information

2.1. Functional Unit

The functional unit of the flooring product is one (1) m^2 of floor covering, as indicated in Table 6. Values in Table 6 represent carpet tile, installation materials, packaging, and the mass of product loss during installation for 1 m^2 of carpet tile.

Table 6: Functional Unit

NAME	VALUE	UNIT
Functional Unit	1 m^2	
Mass	4.61	kg

2.2. System Boundary

The type of EPD is cradle-to-grave. All LCA modules are included and are summarized in Figure 3 and Table 7.

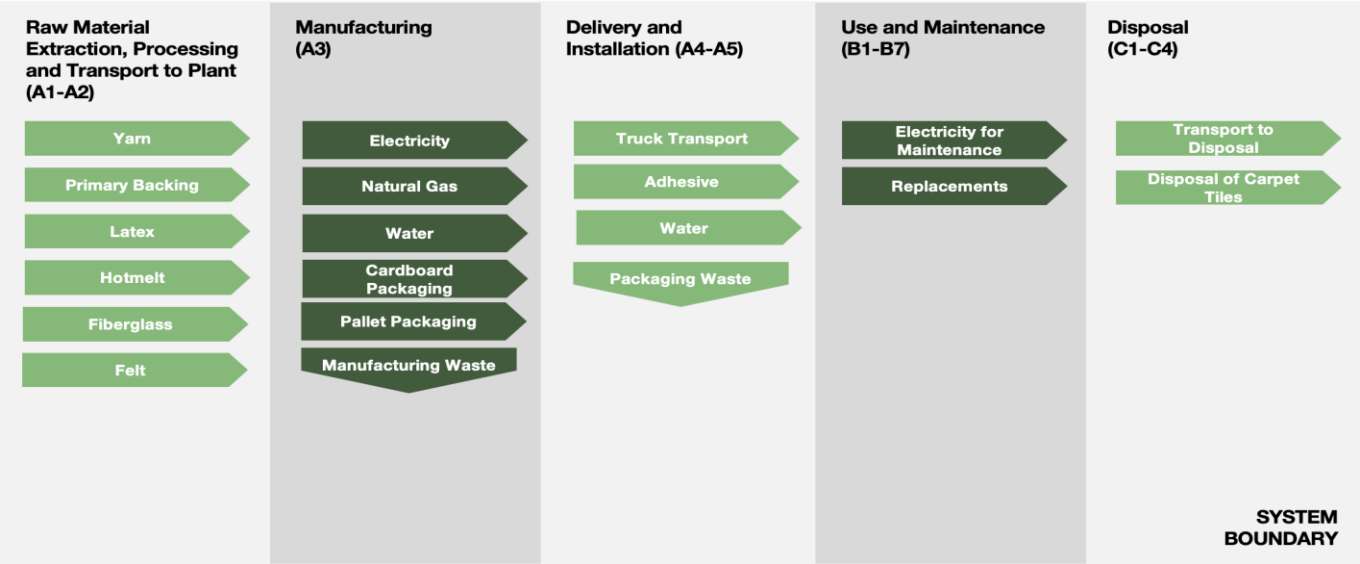

Figure 3. Flows included in the system boundary.

Table 7: System Boundary

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, water and material inputs required for manufacturing products from raw materials. Packaging materials and manufacturing waste are included as well.
A4	Construction Process Stage: Transport	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 adhesives, 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	Materials and energy required to repair the product.
B4	Use Stage: Replacement	2023	Total materials and energy required to manufacture a replacement.
B5	Use Stage: Refurbishment	2023	Materials and energy required to refurbish the product.
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 landfill. Fuel use requirements estimated based on product weight and mapped distance.
C3	EOL: Waste Processing	2023	Waste processing not required. All waste can be processed as is.
C4	EOL: Disposal	2023	Assumes all products are sent to landfill. Landfill impacts modeled based on secondary data.
D	Benefits beyond system	2023	Module not declared

2.3. 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 including all utility usage and production information. For the LCA, the usage information was divided by the production to create an energy and water use per square meter. Another assumption is that the installation tools are used enough times that the per square meter impacts are negligible.

2.4. Cut-off Criteria

All known inputs in which data was available were included. Material inputs greater than 1% (based on total mass of the final product) were included within the scope of analysis. Material inputs less than 1% were included if sufficient data was available to warrant inclusion and/or the material input was thought to have significant environmental impact. Cumulative excluded material inputs and environmental impacts are less than 5% based on total weight of the functional unit. The excluded materials include:

- Spot cleaning chemicals are not included due to the infrequency of the activity during use phase
- VOC emissions from adhesive curing were excluded from this model. This was justified based on Milliken's installation instructions explicitly calling for the use of low VOC adhesive.
- No other known flows were excluded in the modeling of this product. Background datasets (from Sphera's Managed LCA Content database) may inherently exclude some flows which were unknown to practitioners creating this model.

2.5. Data Sources

Primary data were collected by facility personnel and from utility bills and was used for all manufacturing processes. When primary data did not exist, secondary data for raw material production was utilized from Sphera's Managed LCA Content (MLC) version 2024.2 (formerly GaBi Database).

2.6. Data Quality

The geographical scope of the manufacturing portion of the life cycle is Milliken Textile Zhangjiagang facility in China. All primary data were collected from the manufacturer. The geographic coverage of primary data is considered excellent. The primary data provided by the manufacturer represent all information for calendar year 2023. Using this data meets the PCR requirements. Time coverage of this data is considered very good. Primary data provided by the manufacturer is specific to the technology that Milliken uses in manufacturing their product. It is site-specific and considered of good quality. It is worth noting that the energy and water used in manufacturing the product includes overhead energy such as lighting, heating and sanitary use of water. Sub-metering would improve the technological coverage of data quality. Data necessary to model cradle-to-gate unit processes was sourced from MLC datasets. Improved life cycle data from suppliers would improve technological coverage.

2.7. Period under Review

The period under review is calendar year 2023.

2.8. Allocation

General principles of allocation were based on ISO 14040/44. Where possible, allocation was avoided. When allocation was necessary it was done on using area. Allocation by area was deemed appropriate for the type of production used at Milliken & Company facilities as consumption of manufacturing inputs and production of waste outputs is more closely tied to the area of carpet produced than it is to the mass produced. Allocation was also prevalent in the secondary MLC datasets used to represent upstream processes. As a default, MLC datasets use a physical mass basis for allocation.

In the manufacturing phase (A1-A3), Green Electricity Certificates (GECs) are used to reduce the impacts associated with electricity used in production. In a given calendar year, the total number of GECs retired is equal to the total electricity consumed at Milliken's MTZ facility.

3. Life Cycle Assessment Scenarios

Table 8. Reference Service Life Table

Name	Value
Product Reference Service Life (RSL)	15 years
Building Estimated Service Life (ESL)	75 Years
Declared product properties (at the gate) and finishes, etc.	See Table 1
Design application parameters	Per recommendation by manufacturer
An assumed quality of work, when installed in accordance with the manufacturer's instructions	Accepted industry standard
Indoor environment (if relevant for indoor applications)	Normal building operating conditions
Use conditions, e.g. frequency of use, mechanical exposure	Normal building operating conditions

Table 9. Transport to the building site (A4)

Name	Value	Unit
Fuel type	Diesel	-
Liters of fuel	38.8	l/100km
Vehicle type	Truck - Trailer, basic enclosed/ 45,000 lb payload	-
Transport distance	800	km
Capacity utilization	0.67	%
Gross density of products transported	370	kg/m^3
Capacity utilization volume factor	0.85	-

Table 10. Installation into the building (A5)

Name	Value	Unit
Adhesive	0.097	kg
Product loss per functional unit	0.066	kg
Waste materials at the construction site before waste processing, generated by product installation	0.324	kg
Output materials resulting from on-site waste processing	0	kg
Biogenic carbon contained in cardboard packaging	0.120	kg CO2
Biogenic carbon contained in wooden pallet	0.288	kg CO2
Direct emissions to ambient air/soil/water	-	kg
VOC content of flooring[1]	<0.5	µg/m3

Table 11. Maintenance (B2)

Name	Value	Unit
Maintenance process information	Manufacturer recommended	-
Vacuuming Maintenance cycle	3750	Number/ RSL
Vacuuming Maintenance cycle	18,750	Number/ ESL
Electricity for vacuuming	0.95	kWh/m^2 floor/yr
Power output of vacuum	1.65	kW
Deep Cleaning Maintenance Cycle	30	Number/ RSL
Deep Cleaning Maintenance Cycle	150	Number/ ESL
Electricity for Deep Cleaning	0.05	kWh/m^2 floor/yr
Power Output of Equipment	1.4	kW
Water for Deep Cleaning	1.9	kg/m2/y
Detergent for Deep Cleaning	0.1	kg/m2/y

Table 12. Repair (B3)

Name	Value	Unit
Repair process information	Product typically not repaired during use	

Table 13. Replacement (B4)

Name	Value	Unit
Replacement cycle	0	Number/ RSL
Replacement cycle	4	Number/ ESL
Energy input, specified by activity, type and amount	0	kWh
Net freshwater consumption specified by water source and fate	0	m^3
Adhesive	0.097	kg/ replacement
Direct emissions to ambient air, soil and water	-	kg
Further assumptions for scenario development, e.g. frequency and time period of use		As appropriate

[1] Milliken Carpet products are certified to GRI Green Label Plus which adheres to the Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources using Environmental Chambers- version 1.2 CA Specification 01350.

Table 14. Refurbishment (B5)

NAME	VALUE	UNIT
Refurbishment process description	Product typically not refurbished during use	

Table 15: Operational Energy Use (B6) and Operational Water

NAME	VALUE	UNIT
Operational Energy/Water Description	Product does not use energy or water	

Table 16: End of life (C1-C4)

NAME		VALUE	UNIT
Assumptions for scenario development		Product is either disposed of with the underlying floor or manually removed via scraping	
Collection process	Collected separately	0	kg
	Collected with mixed construction waste*	4.29	kg
Recovery	Reuse	0	kg
	Recycling	0	kg
	Landfill*	4.29	kg
	Incineration	0	kg
	Incineration with energy recovery	0	kg
	Energy conversion efficiency rate	84-94	%
Disposal	Product or material for final deposition*	4.29	kg
*Includes weight of product and adhesive			

Table 17:Reuse, recovery and/or recycling potentials (D), relevant scenario information

NAME	VALUE	UNIT
Module Not Declared		

4. Life Cycle Assessment Results

Table 18. 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	Building Operational Water Use During	Deconstruction	Transport	Waste processing	Disposal	Reuse, Recovery, Recycling Potential
EPD Type	X			X	X	X	X	X	X	X	X	X	X	X	X	X	MND

Note: Modules B1, B5-B7 and C1 and C3 are included in the scope of this study; however, as illustrated in Section 3, these modules do not have any inputs or outputs in this product system. As such, their environmental impacts are 0.00 and to conserve space, they have been excluded from the results tables presented below.

The product family covered in this EPD is produced using electricity sourced from Green Electricity Certificates (GECs); however, per the PCR guiding this study, results are presented separately including and excluding GECs (i.e., with GEC-sourced electricity and with grid electricity). Results without GECs are reported in Sections 4.1 and 4.2 while results with GECs are reported in Sections 4.3 and 0. The latter most accurately reflect Milliken's current production pathway while the former are presented for compliance with the PCR.

4.1. Life Cycle Impact Assessment Results

Table 19. North American Impact Assessment Results without Renewable Energy

	A1-A3	A4	A5	B2	B4	C2	C4
IPCC AR5 Impacts							
GWPe 100 [kg CO_2 eq]	***4.70E+00***	***2.44E-01***	***4.49E-01***	***6.15E+01***	***2.20E+01***	***2.91E-02***	***7.19E-02***
GWPi 100 [kg CO_2 eq]	***4.19E+00***	***2.54E-01***	***5.14E-01***	***6.15E+01***	***2.02E+01***	***3.03E-02***	***7.16E-02***
TRACI 2.1 Impacts							
ODP [kg CFC-11 eq]	***2.06E-09***	***3.12E-16***	***4.12E-11***	***5.85E-12***	***8.39E-09***	***3.72E-17***	***3.36E-15***
AP [kg SO_2 eq]	***8.38E-03***	***2.39E-03***	***1.53E-03***	***1.79E-01***	***5.18E-02***	***2.85E-04***	***3.63E-04***
EP [kg N eq]	***8.32E-04***	***1.52E-04***	***3.10E-04***	***1.08E-02***	***6.46E-03***	***1.81E-05***	***3.02E-04***
Resources [MJ, LHV]	***9.50E+00***	***4.82E-01***	***4.80E-01***	***1.70E+01***	***4.26E+01***	***5.75E-02***	***1.38E-01***
POCP [kg O_3 eq]	***1.65E-01***	***5.56E-02***	***1.04E-02***	***2.91E+00***	***9.76E-01***	***6.64E-03***	***6.50E-03***

*These impact categories 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.

Table 20. EU Impact Assessment Results without Renewable Energy

	A1-A3	A4	A5	B2	B4	C2	C4
CML 2001 (v4.2) Impacts							
GWP 100 [kg CO2 eq]	4.02E+00	2.49E-01	4.47E-01	6.01E+01	1.93E+01	2.98E-02	6.92E-02
ODP [kg CFC-11 eq]	2.01E-09	1.84E-14	4.06E-11	3.46E-10	8.20E-09	2.20E-15	1.99E-13
AP [kg SO2 eq]	7.40E-03	1.72E-03	8.53E-04	1.73E-01	4.21E-02	2.06E-04	3.42E-04
EP [kg PO4-3 eq]	1.18E-03	4.40E-04	4.62E-04	1.80E-02	1.01E-02	5.25E-05	3.89E-04
POCP [kg ethene eq]	6.99E-04	-7.98E-04	1.65E-04	2.10E-02	-1.10E-05	-9.53E-05	2.68E-05
ADPelement [kg Sb-eq]	1.60E-06	4.10E-09	1.20E-07	4.57E-06	7.00E-06	4.90E-10	2.26E-08
ADPfossil [MJ, LHV]	7.67E+01	3.37E+00	3.59E+00	6.17E+02	3.40E+02	4.02E-01	1.03E+00

4.2. Life Cycle Inventory Results without Renewable Energy

Table 21. Resource Use without Renewable Energy

PARAMETER	A1-A3	A4	A5	B2	B4	C2	C4
RPRE [MJ, LHV]	1.49E+01	1.62E-02	7.60E-01	1.86E+02	6.31E+01	1.94E-03	1.32E-01
RPRM [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RPRT [MJ,LHV]	1.49E+01	1.62E-02	7.60E-01	1.86E+02	6.31E+01	1.94E-03	1.32E-01
NRPRE [MJ, LHV]	3.72E+01	3.37E+00	2.86E+00	6.62E+02	1.80E+02	4.02E-01	1.06E+00
NRPRM [MJ, LHV]	4.76E+01	0.00E+00	9.52E-01	0.00E+00	1.94E+02	0.00E+00	0.00E+00
NRPRT [MJ, LHV]	8.48E+01	3.37E+00	3.81E+00	6.62E+02	3.74E+02	4.02E-01	1.06E+00
SM [kg]	9.95E-01	0.00E+00	1.99E-02	0.00E+00	4.06E+00	0.00E+00	0.00E+00
RSF [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RE [MJ, LHV]	5.27E-02	2.16E-03	1.97E-03	6.45E-01	2.32E-01	2.58E-04	8.55E-04
FW [m3]	5.73E-02	2.86E-05	1.55E-03	4.67E-01	2.36E-01	3.41E-06	1.37E-04

Table 22. Output Flows and Waste Categories

PARAMETER	A1-A3	A4	A5	B2	B4	C2	C4
HWD [kg]	1.61E-05	6.71E-11	8.96E-07	3.97E-07	6.79E-05	8.01E-12	2.62E-10
NHWD [kg]	2.17E-01	1.36E-04	2.47E-01	5.11E-01	1.48E+01	1.62E-05	3.24E+00
HLRW [kg] or [m3]	3.07E-06	1.59E-09	8.33E-08	1.89E-05	1.27E-05	1.90E-10	1.26E-08
ILLRW [kg] or [m3]	2.86E-03	1.34E-06	8.00E-05	1.57E-02	1.18E-02	1.60E-07	1.13E-05
CRU [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MR [kg]	1.42E-01	0.00E+00	6.24E-03	0.00E+00	1.27E+00	0.00E+00	1.71E-01
MER [kg]	1.23E-01	0.00E+00	2.46E-03	0.00E+00	5.01E-01	0.00E+00	0.00E+00
EE [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EET [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 23. Carbon Emissions and Removals

PARAMETER	A1-A3	A4	A5	B2	B4	C2	C4
BCRP [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEP [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCRK [kg CO_2]	4.07E-01	0.00E+00	0.00E+00	0.00E+00	1.63E+00	0.00E+00	0.00E+00
BCEK [kg CO_2]	0.00E+00	0.00E+00	4.07E-01	0.00E+00	1.63E+00	0.00E+00	0.00E+00
BCEW [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCE [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCR [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CWNR [kg CO_2]	4.37E-01	0.00E+00	0.00E+00	0.00E+00	1.75E+00	0.00E+00	0.00E+00

4.3. Life Cycle Impact Assessment Results with Renewable Energy

Table 24. North American Impact Assessment Results with Renewable Energy

	A1-A3	A4	A5	B2	B4	C2	C4
IPCC AR5 Impacts							
GWPe 100 [kg CO_2 eq]	3.96E+00	2.44E-01	4.34E-01	6.15E+01	1.89E+01	2.91E-02	7.19E-02
GWPi 100 [kg CO_2 eq]	3.45E+00	2.54E-01	4.99E-01	6.15E+01	1.72E+01	3.03E-02	7.16E-02
TRACI 2.1 Impacts							
ODP [kg CFC-11 eq]	2.06E-09	3.12E-16	4.12E-11	5.85E-12	8.40E-09	3.72E-17	3.36E-15
AP [kg SO_2 eq]	6.21E-03	2.39E-03	1.49E-03	1.79E-01	4.30E-02	2.85E-04	3.63E-04
EP [kg N eq]	7.21E-04	1.52E-04	3.08E-04	1.08E-02	6.00E-03	1.81E-05	3.02E-04
Resources [MJ, LHV]	9.35E+00	4.82E-01	4.77E-01	1.70E+01	4.20E+01	5.75E-02	1.38E-01
POCP [kg O_3 eq]	1.29E-01	5.56E-02	9.69E-03	2.91E+00	8.32E-01	6.64E-03	6.50E-03

*These impact categories 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.

Table 25. EU Impact Assessment Results with Renewable Energy

	A1-A3	A4	A5	B2	B4	C2	C4
CML 2001 (v4.2) Impacts							
GWP 100 [kg CO2 eq]	3.29E+00	2.49E-01	4.33E-01	6.01E+01	1.63E+01	2.98E-02	6.92E-02
ODP [kg CFC-11 eq]	2.13E-09	1.84E-14	4.30E-11	3.46E-10	8.68E-09	2.20E-15	1.99E-13
AP [kg SO2 eq]	5.29E-03	1.72E-03	8.11E-04	1.73E-01	3.35E-02	2.06E-04	3.42E-04
EP [kg PO4-3 eq]	9.76E-04	4.40E-04	4.58E-04	1.80E-02	9.26E-03	5.25E-05	3.89E-04
POCP [kg ethene eq]	4.47E-04	-7.98E-04	1.60E-04	2.10E-02	-1.04E-03	-9.53E-05	2.68E-05
ADPelement [kg Sb-eq]	1.96E-06	4.10E-09	1.27E-07	4.57E-06	8.46E-06	4.90E-10	2.26E-08
ADPfossil [MJ, LHV]	6.95E+01	3.37E+00	3.44E+00	6.17E+02	3.11E+02	4.02E-01	1.03E+00

4.4. Life Cycle Inventory Results with Renewable Energy

Table 26. Resource Use with Renewable Energy

PARAMETER	A1-A3	A4	A5	B2	B4	C2	C4
RPRE [MJ, LHV]	3.24E+01	1.62E-02	1.11E+00	1.86E+02	1.34E+02	1.94E-03	1.32E-01
RPRM [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RPRT [MJ,LHV]	3.24E+01	1.62E-02	1.11E+00	1.86E+02	1.34E+02	1.94E-03	1.32E-01
NRPRE [MJ, LHV]	2.94E+01	3.37E+00	2.71E+00	6.62E+02	1.48E+02	4.02E-01	1.06E+00
NRPRM [MJ, LHV]	4.76E+01	0.00E+00	9.52E-01	0.00E+00	1.94E+02	0.00E+00	0.00E+00
NRPRT [MJ, LHV]	7.70E+01	3.37E+00	3.66E+00	6.62E+02	3.42E+02	4.02E-01	1.06E+00
SM [kg]	9.95E-01	0.00E+00	1.99E-02	0.00E+00	4.06E+00	0.00E+00	0.00E+00
RSF [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RE [MJ, LHV]	4.60E-02	2.16E-03	1.84E-03	6.45E-01	2.05E-01	2.58E-04	8.55E-04
FW [m3]	5.17E-02	2.86E-05	1.44E-03	4.67E-01	2.13E-01	3.41E-06	1.37E-04

Table 27. Output Flows and Waste Categories

PARAMETER	A1-A3	A4	A5	B2	B4	C2	C4
HWD [kg]	1.61E-05	6.71E-11	8.96E-07	3.97E-07	6.79E-05	8.01E-12	2.62E-10
NHWD [kg]	2.24E-01	1.36E-04	2.47E-01	5.11E-01	1.48E+01	1.62E-05	3.24E+00
HLRW [kg] or [m3]	2.84E-06	1.59E-09	7.87E-08	1.89E-05	1.17E-05	1.90E-10	1.26E-08
ILLRW [kg] or [m3]	2.67E-03	1.34E-06	7.62E-05	1.57E-02	1.10E-02	1.60E-07	1.13E-05
CRU [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MR [kg]	1.42E-01	0.00E+00	6.24E-03	0.00E+00	1.27E+00	0.00E+00	1.71E-01
MER [kg]	1.23E-01	0.00E+00	2.46E-03	0.00E+00	5.01E-01	0.00E+00	0.00E+00
EE [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EET [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 28. Carbon Emissions and Removals

PARAMETER	A1-A3	A4	A5	B2	B4	C2	C4
BCRP [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEP [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCRK [kg CO_2]	4.07E-01	0.00E+00	0.00E+00	0.00E+00	1.63E+00	0.00E+00	0.00E+00
BCEK [kg CO_2]	0.00E+00	0.00E+00	4.07E-01	0.00E+00	1.63E+00	0.00E+00	0.00E+00
BCEW [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCE [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCR [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CWNR [kg CO_2]	4.37E-01	0.00E+00	0.00E+00	0.00E+00	1.75E+00	0.00E+00	0.00E+00

4.5. Global Warming Potential (GWP) stage A1-A3 for additional product yarn weights and M/PACT™

Today, all Milliken carpet, resilient flooring and entryway carpet tile products are part of M/PACT™, our carbon offset programme. These products offset their raw materials and manufacturing carbon footprint (cradle-to-gate, including biogenic carbon) using third-party Verified Carbon Standard Credits that support renewable energy and carbon reduction technologies to help fight climate change.

Milliken Flooring can produce the reference product with a variety of different yarn weights. Table 29 and Table 30 show the embodied carbon values for the different variations of this product (e.g. the embodied carbon of the reference product with different face weights as produced by Milliken Flooring). Embodied carbon in this EPD refers to A1-A3 (cradle-to-gate) GWP impacts. This value reflects the GWP associated with upstream material extraction and processing, material transportation to Milliken Flooring facilities, and the Milliken Flooring production process. Embodied carbon is presented both including and excluding biogenic carbon.

Table 29: Embodied Carbon with Face Weights without Renewable Energy

Yarn Weight (oz/yd2)	Yarn Weight (g/m2)	Embodied Carbon (kg/m2 co2e Excluding biogenic carbon)	Embodied Carbon (kg/m2 co2e Including biogenic carbon)	GWP After M/PACT™ carbon offset programme (kg/m2 co2e)
12	407	4.5	4.0	0.00
13	441	4.5	4.0	0.00
14	475	4.6	4.1	0.00
15	509	4.6	4.1	0.00
16	542	4.7	4.2	0.00
17	576	4.8	4.3	0.00
18	610	4.8	4.3	0.00
19	644	4.9	4.4	0.00
20	678	4.9	4.4	0.00

Table 30. Embodied Carbon with Face Weights with Renewable Energy

Yarn Weight (oz/yd2)	Yarn Weight (g/m2)	Embodied Carbon (kg/m2 co2e Excluding biogenic carbon)	Embodied Carbon (kg/m2 co2e Including biogenic carbon)	GWP After M/PACT™ carbon offset programme (kg/m2 co2e)
12	407	3.7	3.2	0.00
13	441	3.8	3.3	0.00
14	475	3.8	3.3	0.00
15	509	3.9	3.4	0.00
16	542	4.0	3.4	0.00
17	576	4.0	3.5	0.00
18	610	4.1	3.6	0.00
19	644	4.1	3.6	0.00
20	678	4.2	3.7	0.00

5. LCA Interpretation

Overall for Milliken's Solution Dyed Recycled Nylon 6 Yarn carpet on Wellbac® Function backing, the majority of cradle-to-grave impacts come from the B4 lifecycle module which covers the replacement of Milliken Flooring products over the ESL of an average building. The second largest contributor to most impact categories is the B2 lifecycle module which encompasses maintenance of the product over the ESL of the building in which it is installed.

In the manufacturing stage (A3) electricity consumption is the single largest contributor to global warming potential (GWP) impacts with natural gas consumption as the second largest contributor. Within the materials used in this product, yarn and latex contribute the most to GWP impacts. While most impact categories follow similar trends, A1-A3 eutrophication potential (EP) impacts are slightly different with manufacturing waste accounting for the majority of impact.

6. Additional Environmental Information

6.1. Environment and Health During Manufacturing

Information on Milliken's sustainability programs, "No Carpet to Landfill" pledge and other sustainability resources can be found at Milliken Floor Covering's sustainability website.

6.2. 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.

6.3. Extraordinary Effects

Fire

The product's fire performance can be found in the technical specifications found in Table 1.

Water

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.

Mechanical Destruction

If the product is mechanically destroyed, it should be disposed of using standard procedures and replaced in a timely manner.

6.4. Environmental Activities and Certifications

Milliken has published third-party verified Red List Free Declare labels for all Milliken Carpet products. Additionally, Milliken Carpet products globally are Cradle to Cradle Certified® Silver. All environmental certifications can be found on Milliken Floor Covering's sustainability website. Select certifications are also presented on mindful Materials. Milliken & Company is the first flooring company and one of the first 50 companies in the world to have our net-zero targets verified by Science Based Targets initiative (SBTi).

7. Supporting Documentation

The full text of the acronyms found in Section 4.1 are found in Table 31.

Table 31. Acronym Key

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

8. Appendix

To adhere to Sections 2.5.2 Part A: Life Cycle Assessment Calculation Rules and Report Requirements from UL Environment,additional results for face weights of 26 and 36oz/yd^2 are provided in the following appendix. These additional results ensure all values in Section 4 differ by no more than +/-10% from at least one of the full results tables in this EPD.

8.1 Additional Results without Renewable Energy

Milliken Function Backing PrintWorks™ Technology Nylon 6: 26 oz Face Weight Results without Renewable Energy

Table 32: North American Impact Assessment Results per 1 m2 of installed flooring

	A1-A3	A4	A5	B2	B4	C2	C4
IPCC AR5 Impacts							
GWPe 100 [kg CO_2 eq]	5.29E+00	2.67E-01	4.62E-01	6.15E+01	2.45E+01	3.20E-02	7.90E-02
GWPi 100 [kg CO_2 eq]	4.78E+00	2.78E-01	5.27E-01	6.15E+01	2.28E+01	3.33E-02	7.87E-02
TRACI 2.1 Impacts							
ODP [kg CFC-11 eq]	2.05E-09	3.42E-16	4.10E-11	5.85E-12	8.37E-09	4.09E-17	3.69E-15
AP [kg SO_2 eq]	9.29E-03	2.62E-03	1.56E-03	1.79E-01	5.67E-02	3.14E-04	3.99E-04
EP [kg N eq]	9.11E-04	1.66E-04	3.13E-04	1.08E-02	7.08E-03	1.99E-05	3.60E-04
Resources [MJ, LHV]	1.02E+01	5.28E-01	4.95E-01	1.70E+01	4.56E+01	6.33E-02	1.51E-01
POCP [kg O_3 eq]	1.80E-01	6.09E-02	1.08E-02	2.91E+00	1.07E+00	7.30E-03	7.14E-03

Table 33: Resource Use per 1 m2 of installed flooring

Parameter	A1-A3	A4	A5	B2	B4	C2	C4
RPRE [MJ, LHV]	1.76E+01	1.78E-02	8.16E-01	1.86E+02	7.44E+01	2.13E-03	1.45E-01
RPRM [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RPRT [MJ,LHV]	1.76E+01	1.78E-02	8.16E-01	1.86E+02	7.44E+01	2.13E-03	1.45E-01
NRPRE [MJ, LHV]	3.51E+01	3.69E+00	2.83E+00	6.62E+02	1.73E+02	4.42E-01	1.17E+00
NRPRM [MJ, LHV]	5.86E+01	0.00E+00	1.17E+00	0.00E+00	2.39E+02	0.00E+00	0.00E+00
NRPRT [MJ, LHV]	9.36E+01	3.69E+00	4.00E+00	6.62E+02	4.12E+02	4.42E-01	1.17E+00
SM [kg]	1.34E+00	0.00E+00	2.68E-02	0.00E+00	5.46E+00	0.00E+00	0.00E+00
RSF [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RE [MJ, LHV]	6.06E-02	2.36E-03	2.14E-03	6.45E-01	2.66E-01	2.83E-04	9.79E-04
FW [m3]	6.11E-02	3.13E-05	1.63E-03	4.67E-01	2.52E-01	3.75E-06	1.51E-04

Table 34: Output Flows and Waste Categories per 1 m2 of installed flooring

PARAMETER	A1-A3	A4	A5	B2	B4	C2	C4
HWD [kg]	1.61E-05	7.34E-11	8.96E-07	3.97E-07	6.79E-05	8.80E-12	2.89E-10
NHWD [kg]	2.91E-01	1.49E-04	2.55E-01	5.11E-01	1.64E+01	1.79E-05	3.56E+00
HLRW [kg] or [m3]	4.02E-06	1.74E-09	1.02E-07	1.89E-05	1.65E-05	2.09E-10	1.39E-08
ILLRW [kg] or [m3]	3.73E-03	1.47E-06	9.75E-05	1.57E-02	1.54E-02	1.76E-07	1.24E-05
CRU [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MR [kg]	1.41E-01	0.00E+00	6.58E-03	0.00E+00	1.34E+00	0.00E+00	1.88E-01
MER [kg]	1.23E-01	0.00E+00	2.46E-03	0.00E+00	5.01E-01	0.00E+00	0.00E+00
EE [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EET [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 35: Carbon emissions and removals per 1 m2 of installed flooring

PARAMETER	A1-A3	A4	A5	B2	B4	C2	C4
BCRP [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEP [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCRK [kg CO_2]	4.07E-01	0.00E+00	0.00E+00	0.00E+00	1.63E+00	0.00E+00	0.00E+00
BCEK [kg CO_2]	0.00E+00	0.00E+00	4.07E-01	0.00E+00	1.63E+00	0.00E+00	0.00E+00
BCEW [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCE [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCR [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CWNR [kg CO_2]	4.37E-01	0.00E+00	0.00E+00	0.00E+00	1.75E+00	0.00E+00	0.00E+00

Milliken Function Backing PrintWorks™ Technology Nylon 6: 36 oz Face Weight Results without Renewable Energy

Table 36: North American Impact Assessment Results per 1 m2 of installed flooring

	A1-A3	A4	A5	B2	B4	C2	C4
IPCC AR5 Impacts							
GWPe 100 [kg CO_2 eq]	5.88E+00	2.90E-01	3.48E-01	6.15E+01	0.00E+00	3.49E-02	8.62E-02
GWPi 100 [kg CO_2 eq]	5.37E+00	3.02E-01	4.23E-01	6.15E+01	0.00E+00	3.64E-02	8.58E-02
TRACI 2.1 Impacts							
ODP [kg CFC-11 eq]	2.05E-09	3.71E-16	7.86E-15	5.85E-12	0.00E+00	4.46E-17	4.03E-15
AP [kg SO_2 eq]	1.02E-02	2.84E-03	1.30E-03	1.79E-01	0.00E+00	3.42E-04	4.35E-04
EP [kg N eq]	9.89E-04	1.80E-04	2.84E-04	1.08E-02	0.00E+00	2.17E-05	4.17E-04
Resources [MJ, LHV]	1.08E+01	5.74E-01	2.77E-01	1.70E+01	0.00E+00	6.90E-02	1.65E-01
POCP [kg O_3 eq]	1.96E-01	6.62E-02	5.73E-03	2.91E+00	0.00E+00	7.96E-03	7.79E-03

Table 37: Resource Use per 1 m2 of installed flooring

Parameter	A1-A3	A4	A5	B2	B4	C2	C4
RPRE [MJ, LHV]	2.04E+01	1.93E-02	4.60E-01	1.86E+02	0.00E+00	2.32E-03	1.58E-01
RPRM [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RPRT [MJ,LHV]	2.04E+01	1.93E-02	4.60E-01	1.86E+02	0.00E+00	2.32E-03	1.58E-01
NRPRE [MJ, LHV]	3.30E+01	4.01E+00	2.02E+00	6.62E+02	0.00E+00	4.82E-01	1.27E+00
NRPRM [MJ, LHV]	6.95E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRPRT [MJ, LHV]	1.02E+02	4.01E+00	2.02E+00	6.62E+02	0.00E+00	4.82E-01	1.27E+00
SM [kg]	1.68E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RE [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW [m3]	6.48E-02	3.40E-05	4.01E-04	4.67E-01	0.00E+00	4.08E-06	1.65E-04

Table 38: Output Flows and Waste Categories per 1 m2 of installed flooring

PARAMETER	A1-A3	A4	A5	B2	B4	C2	C4
HWD [kg]	1.61E-05	7.98E-11	5.75E-07	3.97E-07	0.00E+00	9.60E-12	3.15E-10
NHWD [kg]	3.64E-01	1.62E-04	1.78E-01	5.11E-01	0.00E+00	1.95E-05	3.88E+00
HLRW [kg] or [m3]	4.97E-06	1.90E-09	2.17E-08	1.89E-05	0.00E+00	2.28E-10	1.51E-08
ILLRW [kg] or [m3]	4.60E-03	1.59E-06	2.26E-05	1.57E-02	0.00E+00	1.92E-07	1.35E-05
CRU [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MR [kg]	1.41E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.05E-01
MER [kg]	1.23E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EET [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 39: Carbon emissions and removals per 1 m2 of installed flooring

PARAMETER	A1-A3	A4	A5	B2	B4	C2	C4
BCRP [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEP [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCRK [kg CO_2]	4.07E-01	0.00E+00	0.00E+00	0.00E+00	1.63E+00	0.00E+00	0.00E+00
BCEK [kg CO_2]	0.00E+00	0.00E+00	4.07E-01	0.00E+00	1.63E+00	0.00E+00	0.00E+00
BCEW [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCE [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCR [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CWNR [kg CO_2]	4.37E-01	0.00E+00	0.00E+00	0.00E+00	1.75E+00	0.00E+00	0.00E+00

8.2 Additional Results with Renewable Energy

Milliken Function Backing PrintWorks™ Technology Nylon 6: 26 oz Face Weight Results with Renewable Energy

Table 40: North American Impact Assessment Results per 1 m2 of installed flooring

	A1-A3	A4	A5	B2	B4	C2	C4
IPCC AR5 Impacts							
GWPe 100 [kg CO_2 eq]	4.55E+00	2.67E-01	4.47E-01	6.15E+01	2.15E+01	3.20E-02	7.90E-02
GWPi 100 [kg CO_2 eq]	4.04E+00	2.78E-01	5.12E-01	6.15E+01	1.98E+01	3.33E-02	7.87E-02
TRACI 2.1 Impacts							
ODP [kg CFC-11 eq]	2.05E-09	3.42E-16	4.11E-11	5.85E-12	8.38E-09	4.09E-17	3.69E-15
AP [kg SO_2 eq]	7.12E-03	2.62E-03	1.51E-03	1.79E-01	4.78E-02	3.14E-04	3.99E-04
EP [kg N eq]	7.99E-04	1.66E-04	3.11E-04	1.08E-02	6.62E-03	1.99E-05	3.60E-04
Resources [MJ, LHV]	1.00E+01	5.28E-01	4.92E-01	1.70E+01	4.50E+01	6.33E-02	1.51E-01
POCP [kg O_3 eq]	1.45E-01	6.09E-02	1.01E-02	2.91E+00	9.21E-01	7.30E-03	7.14E-03

Table 41: Resource Use per 1 m2 of installed flooring

Parameter	A1-A3	A4	A5	B2	B4	C2	C4
RPRE [MJ, LHV]	3.51E+01	1.78E-02	1.17E+00	1.86E+02	1.46E+02	2.13E-03	1.45E-01
RPRM [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RPRT [MJ,LHV]	3.51E+01	1.78E-02	1.17E+00	1.86E+02	1.46E+02	2.13E-03	1.45E-01
NRPRE [MJ, LHV]	2.73E+01	3.69E+00	2.67E+00	6.62E+02	1.41E+02	4.42E-01	1.17E+00
NRPRM [MJ, LHV]	5.86E+01	0.00E+00	1.17E+00	0.00E+00	2.39E+02	0.00E+00	0.00E+00
NRPRT [MJ, LHV]	8.59E+01	3.69E+00	3.84E+00	6.62E+02	3.80E+02	4.42E-01	1.17E+00
SM [kg]	1.34E+00	0.00E+00	2.68E-02	0.00E+00	5.46E+00	0.00E+00	0.00E+00
RSF [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RE [MJ, LHV]	5.39E-02	2.36E-03	2.00E-03	6.45E-01	2.38E-01	2.83E-04	9.79E-04
FW [m3]	5.54E-02	3.13E-05	1.51E-03	4.67E-01	2.29E-01	3.75E-06	1.51E-04

Table 42: Output Flows and Waste Categories per 1 m2 of installed flooring

PARAMETER	A1-A3	A4	A5	B2	B4	C2	C4
HWD [kg]	1.61E-05	7.34E-11	8.96E-07	3.97E-07	6.79E-05	8.80E-12	2.89E-10
NHWD [kg]	2.97E-01	1.49E-04	2.55E-01	5.11E-01	1.64E+01	1.79E-05	3.56E+00
HLRW [kg] or [m3]	3.79E-06	1.74E-09	9.78E-08	1.89E-05	1.56E-05	2.09E-10	1.39E-08
ILLRW [kg] or [m3]	3.54E-03	1.47E-06	9.37E-05	1.57E-02	1.46E-02	1.76E-07	1.24E-05
CRU [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MR [kg]	1.41E-01	0.00E+00	6.58E-03	0.00E+00	1.34E+00	0.00E+00	1.88E-01
MER [kg]	1.23E-01	0.00E+00	2.46E-03	0.00E+00	5.01E-01	0.00E+00	0.00E+00
EE [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EET [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 43: Carbon emissions and removals per 1 m2 of installed flooring

PARAMETER	A1-A3	A4	A5	B2	B4	C2	C4
BCRP [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEP [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCRK [kg CO_2]	4.07E-01	0.00E+00	0.00E+00	0.00E+00	1.63E+00	0.00E+00	0.00E+00
BCEK [kg CO_2]	0.00E+00	0.00E+00	4.07E-01	0.00E+00	1.63E+00	0.00E+00	0.00E+00
BCEW [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCE [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCR [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CWNR [kg CO_2]	4.37E-01	0.00E+00	0.00E+00	0.00E+00	1.75E+00	0.00E+00	0.00E+00

Milliken Function Backing PrintWorks™ Technology Nylon 6: 36 oz Face Weight Results with Renewable Energy

Table 44: North American Impact Assessment Results per 1 m2 of installed flooring

	A1-A3	A4	A5	B2	B4	C2	C4
IPCC AR5 Impacts							
GWPe 100 [kg CO_2 eq]	5.14E+00	2.90E-01	3.48E-01	6.15E+01	0.00E+00	3.49E-02	8.62E-02
GWPi 100 [kg CO_2 eq]	4.63E+00	3.02E-01	4.23E-01	6.15E+01	0.00E+00	3.64E-02	8.58E-02
TRACI 2.1 Impacts							
ODP [kg CFC-11 eq]	2.05E-09	3.71E-16	7.86E-15	5.85E-12	0.00E+00	4.46E-17	4.03E-15
AP [kg SO_2 eq]	8.02E-03	2.84E-03	1.30E-03	1.79E-01	0.00E+00	3.42E-04	4.35E-04
EP [kg N eq]	8.78E-04	1.80E-04	2.84E-04	1.08E-02	0.00E+00	2.17E-05	4.17E-04
Resources [MJ, LHV]	1.07E+01	5.74E-01	2.77E-01	1.70E+01	0.00E+00	6.90E-02	1.65E-01
POCP [kg O_3 eq]	1.60E-01	6.62E-02	5.73E-03	2.91E+00	0.00E+00	7.96E-03	7.79E-03

Table 45: Resource Use per 1 m2 of installed flooring

Parameter	A1-A3	A4	A5	B2	B4	C2	C4
RPRE [MJ, LHV]	3.79E+01	1.93E-02	4.60E-01	1.86E+02	0.00E+00	2.32E-03	1.58E-01
RPRM [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RPRT [MJ,LHV]	3.79E+01	1.93E-02	4.60E-01	1.86E+02	0.00E+00	2.32E-03	1.58E-01
NRPRE [MJ, LHV]	2.52E+01	4.01E+00	2.02E+00	6.62E+02	0.00E+00	4.82E-01	1.27E+00
NRPRM [MJ, LHV]	6.95E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRPRT [MJ, LHV]	9.47E+01	4.01E+00	2.02E+00	6.62E+02	0.00E+00	4.82E-01	1.27E+00
SM [kg]	1.68E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RE [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW [m3]	5.92E-02	3.40E-05	4.01E-04	4.67E-01	0.00E+00	4.08E-06	1.65E-04

Table 46: Output Flows and Waste Categories per 1 m2 of installed flooring

Parameter	A1-A3	A4	A5	B2	B4	C2	C4
HWD [kg]	1.61E-05	7.98E-11	5.75E-07	3.97E-07	0.00E+00	9.60E-12	3.15E-10
NHWD [kg]	3.71E-01	1.62E-04	1.78E-01	5.11E-01	0.00E+00	1.95E-05	3.88E+00
HLRW [kg] or [m3]	4.74E-06	1.90E-09	2.17E-08	1.89E-05	0.00E+00	2.28E-10	1.51E-08
ILLRW [kg] or [m3]	4.41E-03	1.59E-06	2.26E-05	1.57E-02	0.00E+00	1.92E-07	1.35E-05
CRU [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MR [kg]	1.41E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.05E-01
MER [kg]	1.23E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EET [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 47: Carbon emissions and removals per 1 m2 of installed flooring

Parameter	A1-A3	A4	A5	B2	B4	C2	C4
BCRP [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEP [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCRK [kg CO_2]	4.07E-01	0.00E+00	0.00E+00	0.00E+00	1.63E+00	0.00E+00	0.00E+00
BCEK [kg CO_2]	0.00E+00	0.00E+00	4.07E-01	0.00E+00	1.63E+00	0.00E+00	0.00E+00
BCEW [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCE [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCR [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CWNR [kg CO_2]	4.37E-01	0.00E+00	0.00E+00	0.00E+00	1.75E+00	0.00E+00	0.00E+00

9. References

1. Life Cycle Assessment, LCA Report for Milliken & Company. WAP Sustainability Consulting. December 2024
2. Product Category Rule (PCR) for Building-Related Products and Services, Part A: Life Cycle Assessment Calculation Rules and Report Requirements UL 10010. Version 4.0, March, 2022.
3. Part B: Flooring EPD Requirements. UL Environment V2.0, 2018.
4. ISO 14044: 2006 Environmental Management – Life cycle assessment – Requirements and Guidelines.
5. ISO 14025:2006 Environmental labels and declarations – Type III environmental declarations – Principles and Procedures.
6. ISO 21930:2017 Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services.