

## ENVIRONMENTAL PRODUCT DECLARATION

# SOLUTION DYED NYLON 6,6

ES UNDERSCORE BACKING



Milliken™

“At Milliken, sustainability is core to our culture. We believe a healthy enterprise and healthy earth are vitally linked. We care about and respect each other, our customers, and the world we share. While we hold ourselves accountable to the highest ethical standards, we derive our greatest satisfaction from creating innovations that help solve the world’s problems at a human level – adding value to people’s lives, improving health and safety, and making this world sustainable.”

Our products are scrutinized using Life Cycle Analysis before they make it past the drawing board. All Milliken products, globally, are third party certified carbon neutral using the Leonardo Academy’s “Cleaner and Greener” certification.

Four decades of worldwide site-based environmental management systems guarantee that we remain beyond compliance for safety and environmental impacts. All U.S. manufacturing facilities are certified as OSHA VPP STAR and ISO-14001 compliant.

For more information visit  
[www.milliken.com](http://www.milliken.com)

# ENVIRONMENTAL PRODUCT DECLARATION



## Milliken Carpet MTZ

Digital Dye Injected, Nylon Type 6,6, ES Underscore® Backed Carpet Tile

According to ISO 14025

This declaration is an environmental product declaration (EPD) in accordance with ISO 14025. EPDs rely on Life Cycle Assessment (LCA) to provide information on a number of environmental impacts of products over their life cycle. 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, and the level of accuracy in estimation of effect differs for any particular product line and reported impact. Comparability: EPDs are not comparative assertions and are either not comparable or have limited comparability when they cover different life cycle stages, are based on different product category rules or are missing relevant environmental impacts. EPDs from different programs may not be comparable.



PROGRAM OPERATOR	UL Environment
DECLARATION HOLDER	Milliken
DECLARATION NUMBER	4786677553.101.1
DECLARED PRODUCT	Digital Dye Injected Nylon Type 6,6 ES Underscore® Backed Carpet Tile, manufactured by Milliken in Milliken textile(Zhangjiagang) Co., Ltd(MTZ)
REFERENCE PCR	IBU PCR Environmental Product Declarations Harmonised Rules for Textile, Laminate and Resilient Floor Coverings
DATE OF ISSUE	July 23, 2015
PERIOD OF VALIDITY	5 Years
CONTENTS OF THE DECLARATION	<ul style="list-style-type: none"> <li>Product definition and information about building physics</li> <li>Information about basic material and the material's origin</li> <li>Description of the product's manufacture</li> <li>Indication of product processing</li> <li>Information about the in-use conditions</li> <li>Life cycle assessment results</li> <li>Testing results and verifications</li> </ul>
The PCR review was conducted by:	Insitut Bauen und Umwelt e.V
	Accepted by the Advisory board
	Rheinufer 108 53639 Königswinter Germany info@bau-umwelt.com
This declaration was independently verified in accordance with ISO 14025 by Underwriters Laboratories <input type="checkbox"/> INTERNAL <input checked="" type="checkbox"/> EXTERNAL	
	Wade Stout, UL Environment
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	
	Thomas Gloria, Industrial Ecology Consultants





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Product Description

Product Classification and Description

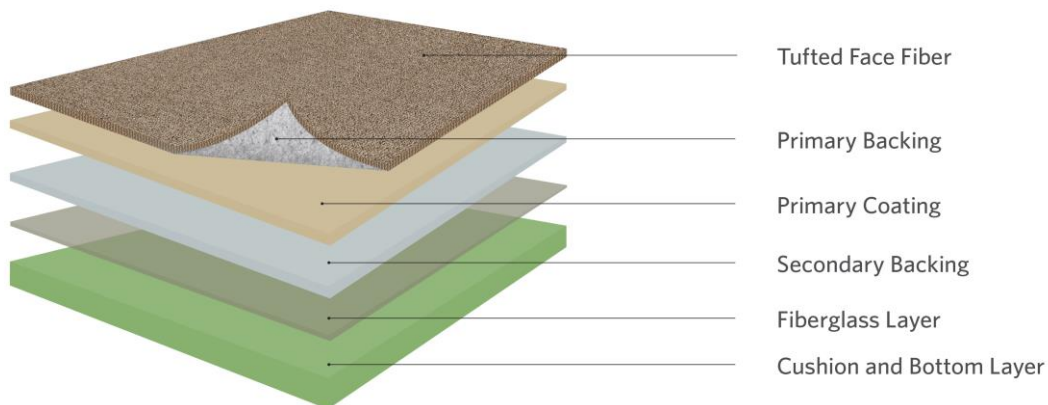
Digital Dye Injected Nylon 6,6 ES Underscore® Backed Carpet Tile is the family of carpet tiles included in this Environmental Product Declaration (EPD). This carpet tile family includes a digital dye injected nylon 6,6 tufted face fiber. Backing includes a thermo plastic adhesive, a polyurethane cushion, and a releasable felt bottom. The weight range of this carpet family is ±11%. This EPD represents an average performance.

This EPD includes a broad range of face fiber colors and patterns all with Nylon 6,6 yarn and similar backing. The variation within this product group is in the face yarn style.

Layer	Component	Material	Weight (oz. / yd <sup>2</sup> )	Weight (kg / m <sup>2</sup> )
Tufted Face Fiber	Yarn	Digital dye injected Nylon 6,6	20.0	0.70
Primary Backing	Non-woven Layer	Non-woven polypropylene and post-industrial recycled PET	4.9	0.13
Primary Coating	Latex	Styrene butadiene	14.0	0.36
Secondary Backing	Adhesive	Thermo plastic adhesive with 28 oz / yd <sup>2</sup> post-industrial Celceram®	42.0	1.40
Fiberglass Layer	Stabilization Layer	Non-woven fiberglass mat with acrylic binder	2.0	0.07
Cushion Bottom Layer	Cushion	Polyurethane layer (15oz/sy) with a blended polypropylene/PET felt (4oz/sy)	19	0.64

Table 1: Product Construction details

Figure 1: Product Construction image





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Range of Applications

Milliken ES Underscore® Cushion Back Carpet Tile is intended for heavy or severe traffic use in commercial buildings using test method ASTM D5252 and ASTM D7330.

Name	Value	Unit
Type of manufacture	Tufted loop, tufted cut and loop, tufted tip sheared or tufted cut pile	-
Yarn type	Nylon 6.6	-
Pile fibre composition	100	%
Total thickness	6.9 – 10.7	mm
Total carpet weight	3021 – 4205	g/m <sup>2</sup>
Surface pile weight	336 – 1120	g/m <sup>2</sup>
Secondary backing	136	g/m <sup>2</sup>

Table 2: Constructional Data

Product Standards and Approvals

Fire/ Static

Radiant Panel:	ASTM-E-648	>= 0.45 (Class 1)
Smoke Density:	ASTM-E-662	<= 450
Methenamine Pill Test:	ASTM-D-2859	Self-Extinguishing
Static Electricity:	AATCC-134	<= 3.5KW, Permanent Conductive Fibers

Appearance

Atmospheric Fading	AATCC 129 & 164	>= 4.5
Light Fastness:	AATCC 16 E	>= 4.0 at 80 hrs.
Crocking:	AATCC 165	>= 4.0 wet or dry
Dimensional Stability:	DIN Std 54318/ ASTM 7570/ISO 2551	<= 0.2%

Installed Water Resistance

Milliken warrants that the modular carpet will resist moisture penetration during the lifetime of the modular carpet. This warranty does not include moisture penetration at the seams of modular carpet.

Mechanical Resistance

This family of carpets is designed for commercial buildings similar to CRI Test Method 101 (Assessment of Carpet Surface Appearance Change). All of Milliken carpet on ES Backing has either a Heavy or Severe Use Rating.





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Accreditations

- ISO 14001 Environmental Management System
- ISO 9001 Quality Management System
- OSHA VPP STAR Certified
- Carpet and Rug Institute (CRI) Green Label Plus Certification



Delivery Status

Delivery Status	
Type of construction	Tufted textured loop, tufted cut and loop, tufted tip sheared, or tufted cut pile
Pile fiber	Digital dyed injected nylon 6,6
Primary backing	Polypropylene and post-industrial polyethylene terephthalate with styrene butadiene latex
Secondary backing	Polyurethane, Celceram®, asphalt, fiberglass
Face fiber weight	20oz/sy or 0.70 kg/m <sup>2</sup>
Total carpet weight	101.9oz/sy or 3.55 kg/m <sup>2</sup>

Table 3: Delivery Status

Material Content

Material Content of the Product

Material Content of Product					
Layers	Component	Material	Availability	Percent of total carpet mass, %	Origin
Face fiber	Yarn	Nylon 6,6	Fossil resource, limited	19%	US
Primary layer	Nonwoven layer	Polypropylene	Fossil resource, limited	3%	US
		Polyethylene terephthalate	Post-industrial recycled source, abundant	1%	US
Primary coating	Latex	Styrene butadiene latex	Fossil resource, limited	6%	US
		Calcium carbonate	Mineral ore, abundant	6%	US
Thermo plastic adhesive	Adhesive	Polypropylene/wax with Celceram® filler	Fossil resource with post-industrial filler, limited/abundant	37%	US
Secondary layer	Cushion	Polyurethane	Fossil resource, limited	23%	US
	Felt back	Polypropylene/poly-ethylene terephthalate	Fossil resource, limited	5%	US

Table 4: Product Content





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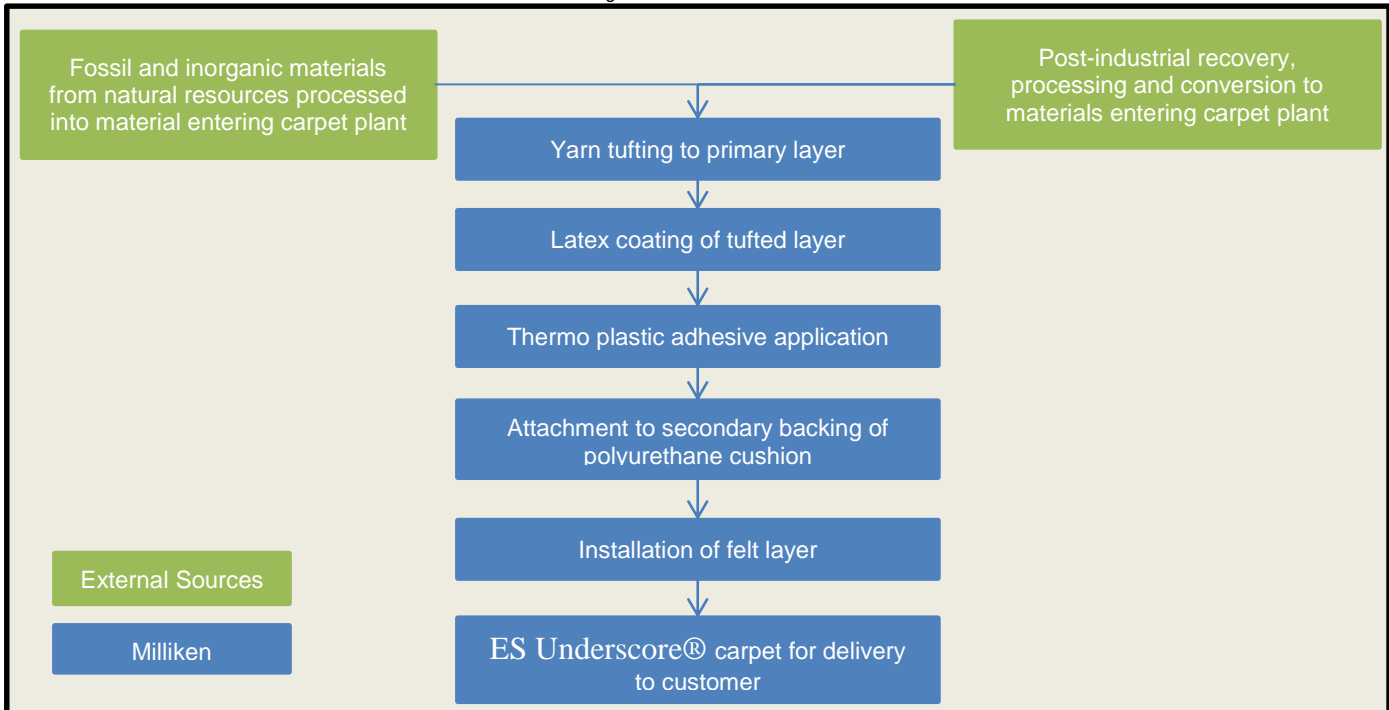
Production of Main Materials

Description	Primary Materials	Production
Face Fabric	Nylon 6,6	Synthetic fiber material which is a copolymer of hexamethylene diamine and adipic acid, this synthetic material is extruded into fiber and twisted into bundles of fibers to form yarns.
Primary Backing/Substrate	Polyethylene terephthalate	Also known as Polyester, this is a synthetic fiber made of a copolymer of ethylene and terephthalic acid. The recycled fiber is often extruded from post-consumer plastic bottles. This fiber is made into a fabric form and might be woven, spun bonded, or needle punched.
Primary Backing/Substrate	Recycled polyethylene terephthalate	Post-industrial collection and processing for use in extrusion of fibers
Adhesive	Styrene butadiene latex	Copolymer of styrene and 1,3 butadiene
Primary and Backing Adhesive	Polypropylene	Adhesive component or synthetic fiber material made of a polymer from propylene monomer supplied from a refinery, this material is made into a fabric form and might be woven, spun bonded, or needle punched
Fiberglass	Silica	Mineral resource produced by fusion of sand and other silicate fillers.
Backing Component	Calcium carbonate	Mined and prepared for use directly from limestone deposits
Backing Component	Celceram®	Post-industrial recovery from coal-fired power plants. This material is an EPA Environmental Preferred Product.
Cushion Layer	Polyurethane	Copolymer of polyol and isocyanate
Releasable Secondary Backing	Felt	Non-woven polypropylene and polyethylene terephthalate fabric made using needle punch technology.

Table 5: Production of main materials details

Production of the Floor Covering

Figure 2: Production Process





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## Health, Safety, and Environmental Aspects during Production

- ISO 14001 Certified
- Milliken Safety Way™ Compliant

Milliken has recycling programs set up for all recyclable waste streams and zero waste is sent to the landfill during our manufacturing process. The waste that cannot be recycled is used to make energy in certified Energy from Waste facilities. These certified facilities help reduce greenhouse gas emissions that would otherwise be created by landfills.

We minimize waste in our processes everywhere possible. We have reduced packaging waste by minimizing the amount of carpet we ship in individual boxes. We are able to reduce our manufacturing waste by monitoring our waste streams using six sigma statistical process control methodologies.

## Delivery and Installation of the Floor Covering

### Delivery

Ocean freight and truck transport of the carpet is the dominant means of delivery. For the life cycle inventory, a truck is used with 50% utilization of payload.

### Installation

Except where exceed 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](http://www.millikencarpet.com).

**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 Modular Carpet Adhesive 100V and Milliken Modular Carpet Spray Adhesive.

### Health, Safety and Environmental Aspects during Installation

As a first preference, Milliken strongly recommends the use of a Milliken Certified installation Contractor to install our products. As an alternative source, Floor Covering Installation Board (FCIB) certified contractors as well as companies that document they employ installers certified at the C-2 level or higher by the International Certified Floor Covering Installers Associations (CFI) are also recognized as viable sources of quality installations.

### Installation Waste

Excess carpet from installation is preferred to be recycled through Milliken Landfill Diversion Program. This program is accessed from our website. ([www.millikencarpet.com/LandfillDiversion](http://www.millikencarpet.com/LandfillDiversion)).

### Packaging

Carpet tiles are in industrial cardboard boxes. Cardboard can be recycled at high rates and so no life cycle inventory values are used herein as the credit for this goes to the recycled product, as standard life cycle practice.



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## Use Stage

This is built to serve as a viable floor covering for the warranty life of the lifetime of the carpet. "Lifetime" is defined as the period of time that the original purchaser of the carpet chooses to keep the carpet on the floor at the original installation site. To include the use phase, one year of service life is used. The user may scale up the service life to meet their requirements.

## Cleaning and Maintenance

The maintenance of carpet is evaluated for commercial buildings in which three representative use intensity segments of the building are established; low, medium, and high.

1. Low Use – individual offices and low traffic corridors, etc.
2. Medium Use – conference rooms, secondary corridors and
3. High Use - entry areas, lobbies, elevator cabs and high traffic corridors

Cleaning is more frequent in areas with greater use. The cleaning includes both routine vacuuming and deep cleaning with different annual frequencies assigned to both. Deep cleaning is less frequent and more intense. The use of chemicals/water and the energies for vacuuming and deep cleaning were developed from the typical equipment used. This was done for a) hot water extraction (HWE) cleaning and b) low moisture encapsulation (LM).

## Prevention of Structural Damage

Milliken recognizes the CRI Carpet Installation Standard 2011 as the minimum acceptable standard for the installation of its carpet products. Milliken flooring products should not be installed until any and all structural damage has been adequately repaired and determined to be code compliant.

For more information on floor preparation and installation instruction, visit our website, [www.millikencarpet.com](http://www.millikencarpet.com).

## Health Aspects During Usage

Conforms to CRI Green Label Plus indoor air quality testing program.

<http://www.carpet-rug.org/commercialcustomers/green-building-and-the-environment/green-label-plus/carpet-and-adhesive>

## End-of-Life

### Recycling or Reuse

Landfill Diversion Program: The ES Underscore® families of carpets are designed to achieve Milliken's commitment to enhance recycle and reuse. After removal from a commercial building, the carpet should be entered into the Milliken Landfill Diversion program ([www.millikencarpet.com/LandfillDiversion](http://www.millikencarpet.com/LandfillDiversion)). If landfill diversion is not a feasible option, then disposal in municipal landfill should follow local regulations. Similar regulations governing incineration facilities should be followed if this technology is selected.

### Disposal

Milliken recommends the use of our Landfill Diversion Program as the proper disposal method for all carpet products.







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**Life Cycle Assessment**

The following environmental data are the result of an ISO14040 compliant cradle-to-grave life cycle assessment (LCA). As is required for public disclosure, the LCA was peer reviewed by external third parties.

**Description of the Declared or Functional Unit**

To serve as an effective unit for users of the ES Underscore® Cushion Back carpet tile, the basis of the life cycle information is one square meter of carpet in a commercial building. To include the use phase, one year of reference service life(RSL) is used. The user may scale up the service life to meet their requirements.

Name	Value	Unit
Declare Unit	1	m <sup>2</sup>
Conversion factor to 1 kg (Comfort Plus)	3.85	kg/m <sup>2</sup>
Conversion factor to 1 kg (Underscore)	3.31	kg/m <sup>2</sup>

Table 6: Declared unit conversion

**Cut-off Criteria**

Excluded materials met the following criteria:

- Less than 1% of total mass of the final product
- Less than 1% of total energy flows
- Total excluded materials must not exceed 5% of final product.

Materials that fell below the stated 1% thresholds were also evaluated to ensure they did not contribute disproportionately high environmental impacts.

**Allocation**

Background data used in the LCA model may contain some allocation. Gate-to-gate Primary manufacturing data for Milliken carpet production was not allocated.

Assumptions include:

1. Energy and material inputs imbedded in GaBi datasets are assumed to be representative of Milliken & Company/MTZ suppliers.
2. All carpet at End of life is assumed to be disposed of in landfill.
3. Where Chinese specific data was not available best available geographical substitution was used. Model assumes that best available geographical substitution is an appropriate substitution.

**Background Data**

The LCA was modeled using the GaBi 6 software platform. Life cycle inventory background data was typically sourced from PE International datasets, although some data from Plastics Europe and the USLCI databases were utilized when the PE datasets were either not available or less representative of actual conditions.





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Data Quality

Time Related Coverage: All gate-to-gate manufacturing data was sourced from Milliken’s most recent fiscal year. The time coverage of background data is adopted from the specific datasets utilized in the model. No background data is more than 10 years old.

Geographical Coverage: All gate-to-gate manufacturing data are specific to Milliken locations within the US and/or China. For background data, domestic data was preferred. In absence of domestic specific data required some international data was utilized.

Technology coverage: Gate-to-gate data represents Milliken specific processes and technologies. Technological coverage related to cradle-to-gate processes is specific to the GaBi datasets. These datasets were evaluated and found to be representative of the technology used within Milliken’s supply chain.

System Boundaries

The LCA of 1 m<sup>2</sup> of Milliken carpet includes:

In Table 7 "Description of the system boundary", all declared modules shall be indicated with an "X"; all modules that are not declared shall be indicated with "MND".

Modules A1-A3 have been aggregated as allowed in section 6.2 of EN15804. These modules include the energy supply and production of the basic material, processing of secondary material, transport of the material to the manufacturing site, manufacturing wastewater treatment, packaging material and waste processing up to the landfill.

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE NOT DECLARED)																	
PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARYS	
Raw material supply	Transport	Manufacturing	Transport from the gate to the	Assembly	Use	Maintenance	Repair	Replacement <sup>1)</sup>	Refurbishment <sup>1)</sup>	Operational energy use	Operational water use	De-construction	demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7		C1	C2	C3	C4	D
X	X	X	X	X	MND	X	MND	MND	MND	MND	MND		MND	X	MND	X	

Table 7: Description of the system boundary

Notes on use stage

Carpet manufactured by Milliken carries a limited lifetime warranty. While the actual life time of the carpet is related to several factors, including changing style preference and building traffic, Milliken has adopted a 15-year service life in the LCA model. Results are presented for a single year of use.





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Results of the Assessment

In the multi stage system for the life cycle of the family of ES Underscore® tile carpets, the natural resource energy is given in Table 8.

	Value	Unit
Liters of fuel	20.6	l/100 km
Transport distance	18911.76	km
Capacity utilization (including empty runs)	100	%
Gross density of products transported	3.31	kg/m <sup>3</sup>
Capacity utilization volume factor	100	%

Table 8: Transport to the construction site (A4)

LCA Scenarios and Additional Technical Information

The following technical information in Table 9 and Table 10, is a basis for the declared modules.

Name	Value	Unit
Auxiliary	0.1	Kg/m <sup>2</sup>
Water consumption	0	m <sup>3</sup> /m <sup>2</sup>
Electricity consumption	0	kWh/m <sup>2</sup>
Other energy carriers	0	MJ/m <sup>2</sup>
Material loss	0.05	m <sup>2</sup> /m <sup>2</sup>
Output substances following waste treatment on site	0.05	Kg/m <sup>2</sup>
Dust in the air	0	Kg/m <sup>2</sup>

Table 9: Installation in the building (A5)

Name	Value	Unit
Information on maintenance		-
Maintenance cycle (Vacuum)	208	Per Year
Maintenance Cycle (Extraction Cleaning)	1.5	Per Year
Water consumption	0.003	m <sup>3</sup> /m <sup>2</sup>
Auxiliary	0.06	Kg/m <sup>2</sup>
Electricity consumption	0.312	KWh/yr
Other energy carriers	0	MJ/m <sup>2</sup>
Material loss	0	Kg/m <sup>2</sup>

Table 10: Maintenance (B2)





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Name	Value	Unit
Reference Service Life	1 year	a

Table 11: Reference Service Life

Life Cycle Inventory Analysis

Results are uniformly provided in units of natural resource energy (MJ/m<sup>2</sup> carpet). The natural resource energy is calculated from the process energy of each manufacturing plant by first including the high heat value (HHV) of fuel combusted per unit of energy transferred to the process (efficiency) plus secondly the energy used to deliver fuel to the point of use in the energy production plant (often known as pre-combustion or delivered energy).

Life Cycle Impact Assessment

Translating the life cycle inventory data into life cycle impact categories provides additional information for the family of ES Underscore® carpet tiles. As found with the life cycle inventory, the substantial majority of these environmental impacts are attributable to the supply chain and manufacturing of these carpets.

The following tables 12, 13 and 14 represents the LCIA results from 1m<sup>2</sup> of product.

Table 12: Life cycle impact category results for Digital Dye Injected Nylon 6,6 ES Underscore® Cushion Back Carpet Tile, 20oz

Results of the LCA – Environmental Impact - Medium Weight Product (20oz)									
	Impact category	Units	Total	Product Stage (A1-A3)	Construction Stage (A4)	Installation (A5)	Maintenance (B2)	End of Life Stage (C2)	End of Life Stage (C4)
ADPE	Abiotic depletion potential for non-fossil resources	kg Sb Eq.	2.45E-05	2.43E-05	1.48E-07	0.00E+00	8.79E-09	7.36E-10	5.85E-08
ADPF	Abiotic depletion potential for fossil resources	MJ	3.42E+02	3.17E+02	1.89E+01	0.00E+00	3.12E+00	2.80E-01	2.28E+00
AP	Acidification potential of land and water	kg SO <sub>2</sub> -Eq.	7.11E-02	4.01E-02	2.62E-02	0.00E+00	2.07E-03	1.26E-04	2.60E-03
EP	Eutrophication Potential	Kg (PO <sub>4</sub> ) <sub>3</sub> -Eq.	1.17E-02	7.09E-03	3.09E-03	0.00E+00	2.41E-04	2.95E-05	1.22E-03
GWP	Global Warming Potential	Kg CO <sub>2</sub> -Eq.	2.27E+01	2.08E+01	1.46E+00	0.00E+00	3.01E-01	2.02E-02	1.49E-01
ODP	Depletion potential of the Stratospheric Ozone Layer	Kg CFC11-Eq.	1.32E-08	1.32E-08	7.78E-12	0.00E+00	2.10E-13	2.08E-15	3.12E-12
POCP	Formation potential of Tropospheric Ozone Photochemical Oxidants	Kg Ethene Eq.	8.79E-03	6.50E-03	9.09E-04	0.00E+00	1.65E-04	-5.16E-05	1.27E-03





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Results of the LCA – Resource Use -Medium Weight Product (20oz)									
	Impact category	Units	Total	Product Stage (A1-A3)	Construction Stage (A4)	Installation (A5)	Maintenance (B2)	End of Life Stage (C2)	End of Life Stage (C4)
PERE	Renewable primary energy as energy carrier	MJ	1.45E+01	1.40E+01	6.44E-02	0.00E+00	2.92E-01	5.13E-04	1.09E-01
PERM	Renewable primary resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	Total use of renewable primary energy resources	MJ	1.45E+01	1.40E+01	6.44E-02	0.00E+00	2.92E-01	5.13E-04	1.09E-01
PENRE	Non-renewable primary energy as energy carrier	MJ	3.60E+02	3.35E+02	1.90E+01	0.00E+00	3.19E+00	2.80E-01	2.36E+00
PENRM	Non-renewable primary energy as material utilization	MJ	1.78E-04	1.78E-04	2.77E-12	0.00E+00	9.43E-13	1.92E-15	5.63E-12
PENRT	Total use of non-renewable primary energy resources	MJ	3.60E+02	3.35E+02	1.90E+01	0.00E+00	3.19E+00	2.80E-01	2.36E+00
SM	Use of secondary material	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	Use of non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	Use of net fresh water	MJ	4.86E+00	4.56E+00	3.41E-02	0.00E+00	1.94E-01	4.01E-04	7.08E-02

Table 13: Results of the LCA-Resource use

Results of the LCA – Output Flows and Waste Categories - Medium Weight Product (20oz)									
	Impact category	Units	Total	Product Stage (A1-A3)	Construction Stage (A4)	Installation (A5)	Maintenance (B2)	End of Life Stage (C2)	End of Life Stage (C4)
HWD	Hazardous waste disposed	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NHWD	Non-hazardous waste disposed	Kg	1.63E+01	1.25E+01	1.32E-01	0.00E+00	2.27E-01	4.62E-04	3.47E+00
RWD	Radioactive waste disposed	Kg	7.49E-03	7.41E-03	2.81E-05	0.00E+00	2.47E-05	5.22E-08	2.93E-05
CRI	Components for reuse	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	Materials for recycling	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	Materials for energy recovery	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE	Exported electrical Energy	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EET	Exported Thermal Energy	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 14: Results of the LCA – Output Flows and Waste Categories





## Milliken Carpet MTZ

Digital Dye Injected, Nylon Type 6,6, ES Underscore® Backed Carpet Tile

According to ISO 14025

## Interpretation

The use of energy in the supply chain and the carpet manufacturing plant to produce the ES Underscore® family of floor coverings is the dominant contributor to the life cycle energy and impacts. Generally, the supply chain and manufacture phase comprise about 98% of the environmental footprint of these carpets. The use phase is the second largest impact stage and is evaluated for a one year period, since the actual frequency of replacement is unknown. Because of the polymeric nature of the carpet composition, the end-of-life impact is negligible, except for the consumption of landfill volume. As recycling of carpet grows (based on the Milliken Landfill Diversion Program), the contribution to landfill volume will decrease even further.

The information in the EPD is provided to demonstrate that Milliken has a commitment to understand the complete life cycle of the ES Underscore® family of products for our customers. That understanding is the mechanism by which Milliken will continue to improve the sustainability of these products for our customers.

## Additional Information, Evidence, and Test Results

- Carbon Neutral Certified – Leonardo Academy
- Carpet and Rug Institute (CRI) Green Label Plus & Green Label Certified

## References

ISO 14025 Environmental labels and declarations-Type III Environmental Declarations –Principals and Procedures

ISO 14040 Life Cycle Assessment- Principles and Framework

ISO 14044 Life Cycle Assessment- Requirements and Guidelines

ISO 21930 Sustainability in Building Construction-Environmental Declaration of Building Products

This study and the results were directed by the ISO14044, EN15804 and the PCR Guidance-Texts for Building-Related Products, Part A: Calculation Rules for the LCA and Requirements Project Report, Part B: Requirements on the EPD for Floor Coverings and Services from the Institute Construction and Environment e.V (IBU) .

This study represents a full cradle to grave study as defined by EN15804 and is a declaration of a specific product from a manufacturer's plant.