

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 worlds’ 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 Americas  
Solution Dyed Nylon 6,6  
ES Underscore® Backing

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	13CA02639.107.1	
DECLARED PRODUCT	Solution Dyed Nylon 6,6 with Milliken ES Underscore® Backing	
REFERENCE PCR	NSF PCR for Flooring (Carpet, Resilient, Laminate, Ceramic, and Wood)	
DATE OF ISSUE	January 28, 2014	
PERIOD OF VALIDITY	5 Years	
CONTENTS OF THE DECLARATION	Product definition and information about building physics Information about basic material and the material's origin Description of the product's manufacture Indication of product processing Information about the in-use conditions Life cycle assessment results Testing results and verifications	
The PCR review was conducted by:		NSF International
		Accepted by PCR Review Panel
		ncss@nsf.org
This declaration was independently verified in accordance with ISO 14025 by Underwriters Laboratories: <input type="checkbox"/> INTERNAL <input checked="" type="checkbox"/> EXTERNAL		 Wade Stout, ULE EPM
		 Thomas Gloria, Life-Cycle Services, LLC
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:		





Milliken Carpet Americas

Solution Dyed Nylon 6,6 ES Underscore® Backing

According to ISO 14025

## Product Definition

### Product Classification & Description

The ES Underscore® Cushion Back Carpet Tile is the family of carpet tiles included in this Environmental Product Declaration (EPD). This tufted carpet tile family is constructed Solution Dyed Nylon 6,6 face fiber, laminated with a hotmelt coating, and polyurethane cushion, and 100% post-industrial recycled felt bottom. The weight range of this carpet family is  $\pm 11\%$ . This EPD represents an average performance, and if the EPD declares an average performance for a number of products, information on the deviations of the products' performance with respect to the average will be stated. An Appendix is included on the last page of this EPD for various face weight products and their corresponding Environmental Impacts.

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

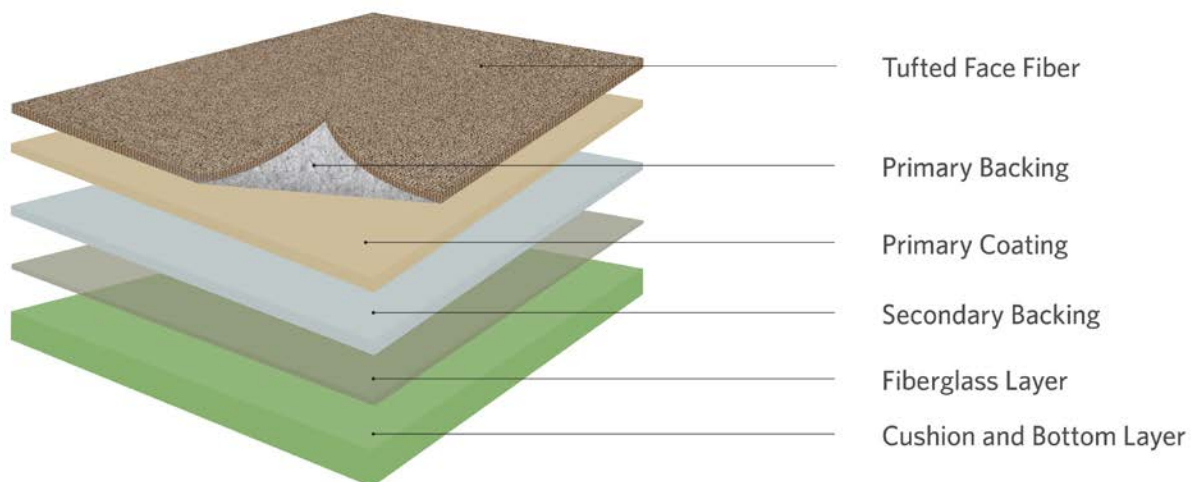
Layer	Component	Material	Weight (oz. / yd <sup>2</sup> )	Weight (kg / m <sup>2</sup> )
Tufted Face Fiber	Yarn	Solution Dyed Nylon 6,6 fibers	20.0	0.70
Primary Backing	Non-woven Layer	Non-woven polypropylene and post-industrial recycled PET	4.9	0.13
Primary Coating	Latex	Styrene butadiene	14.0	0.36
Secondary Backing	Adhesive	Hotmelt 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 (15 oz/sy) with a blended polypropylene/PET felt (4 oz/sy)	19	0.64



Milliken Carpet Americas

Solution Dyed Nylon 6,6 ES Underscore® Backing

According to ISO 14025





Milliken Carpet Americas

Solution Dyed Nylon 6,6 ES Underscore® Backing

According to ISO 14025

## Range of Applications

Milliken's Aquafil Econyl® Solution Dyed Nylon 6,6 ES Underscore® Cushion Back Carpet Tile is intended for heavy or severe traffic use in commercial buildings using test methods ASTM D5252 and ASTM D7330.

## Product Standards and Approvals

### Fire/ Static

Radiant Panel:	ASTM-E-648	$\geq 0.45$ (Class 1)
Smoke Density:	ASTM-E-662	$\leq 450$
Methenamine Pill Test:	ASTM-D-2859	Self-Extinguishing
Static Electricity:	AATCC-134	$\leq 3.5\text{KW}$ , Permanent Conductive Fibers

### Appearance

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

### 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.

## Accreditations

- ISO 14001 Environmental Management System
- ISO 9001 Quality Management System
- OSHA VPP STAR Certified
- Cleaner and Greener® Certified manufacturer
- Carpet and Rug Institute (CRI) Green Label Plus Certification
- Gold and Platinum NSF 140 Sustainability Assessment for Carpet







Milliken Carpet Americas

Solution Dyed Nylon 6,6 ES Underscore® Backing

According to ISO 14025

## Delivery Status

Delivery Status	
Type of construction	Tufted textured loop, tufted cut and loop, tufted tip sheared, or tufted cut pile
Pile fiber	Solution Dyed Nylon 6,6
Primary backing	Polypropylene and post-industrial polyethylene terephthalate with styrene butadiene latex
Secondary backing	Polyurethane, Celceram®, asphalt, fiberglass
Face fiber weight	20 oz/sy or 0.68 kg/m <sup>2</sup>
Total carpet weight	101.9 oz/sy or 3.45 kg/m <sup>2</sup>

## Material Content

### Material Content of the Product

Material Content of Product					
Layers	Component	Material	Availability	Percent of total carpet mass, %	Origin
Face fiber	Yarn	Solution Dyed Nylon 6,6	Fossil resource, limited	20%	US
Primary layer	Nonwoven layer	Polypropylene	Fossil resource, limited	4%	US
		Polyethylene terephthalate	Post-industrial recycled source, abundant	1%	US
Primary coating	Latex	Styrene butadiene latex	Fossil resource, limited	7%	US
		Calcium carbonate	Mineral ore, abundant	6%	US
Hotmelt Tile Coat	Adhesive	Polypropylene/wax with Celceram® filler	Fossil resource with post-industrial filler, limited/abundant	41%	US
Secondary layer	Nonwoven fiberglass mat	Fiberglass with acrylic binder	Mineral ore with fossil binder, abundant/limited	2%	US
Secondary layer	Cushion	Polyurethane	Fossil resource, limited	15%	US
	Felt back	Polypropylene/poly-ethylene terephthalate	Fossil resource, limited	4%	US

Milliken

Milliken Carpet Americas  
Solution Dyed Nylon 6,6 ES Underscore® Backing

According to ISO 14025

Product Content

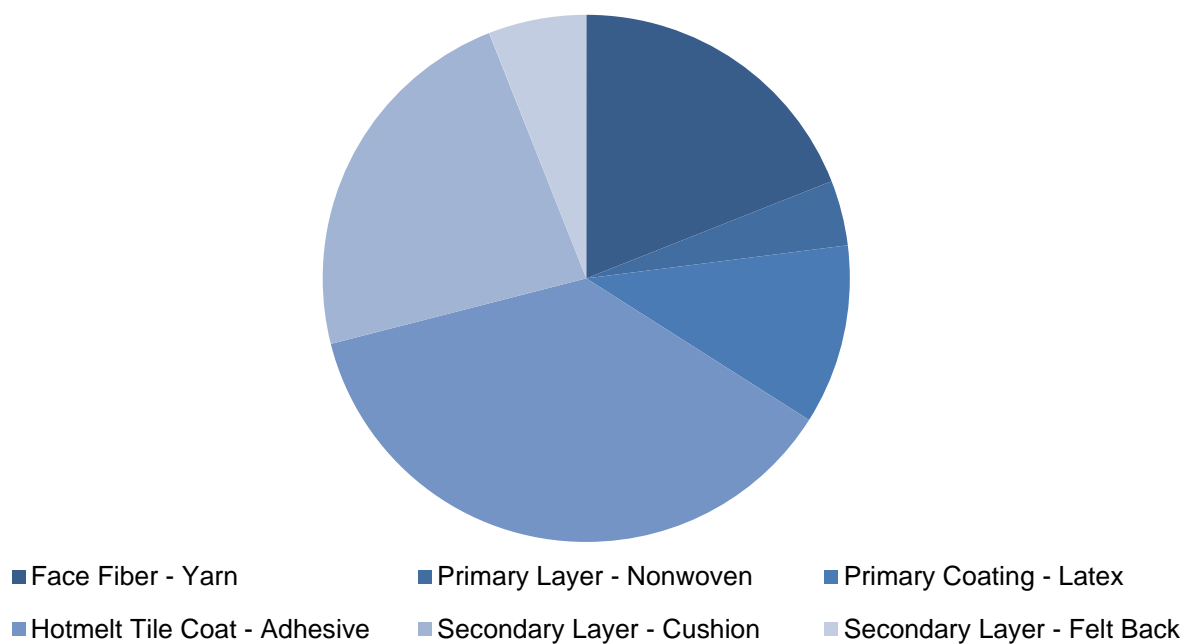


Figure 1: Product Content





Milliken Carpet Americas

Solution Dyed Nylon 6,6 ES Underscore® Backing

According to ISO 14025

## Production of Main Materials

Description	Primary Materials	Production
Face Fabric	Nylon Type 6,6 (Post-industrial/Post-Consumer content)	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.



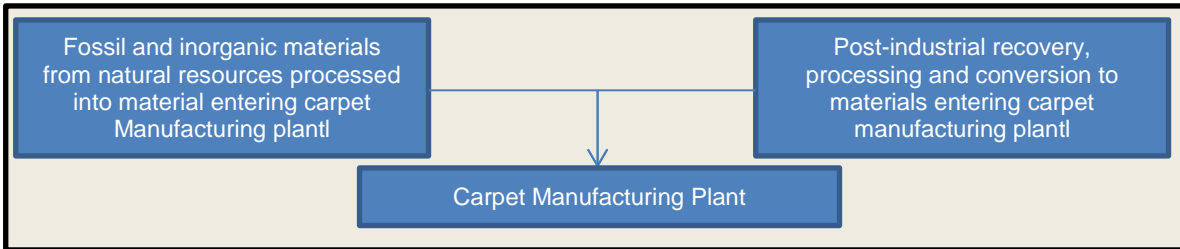


**Milliken Carpet Americas**

Solution Dyed Nylon 6,6 ES Underscore® Backing

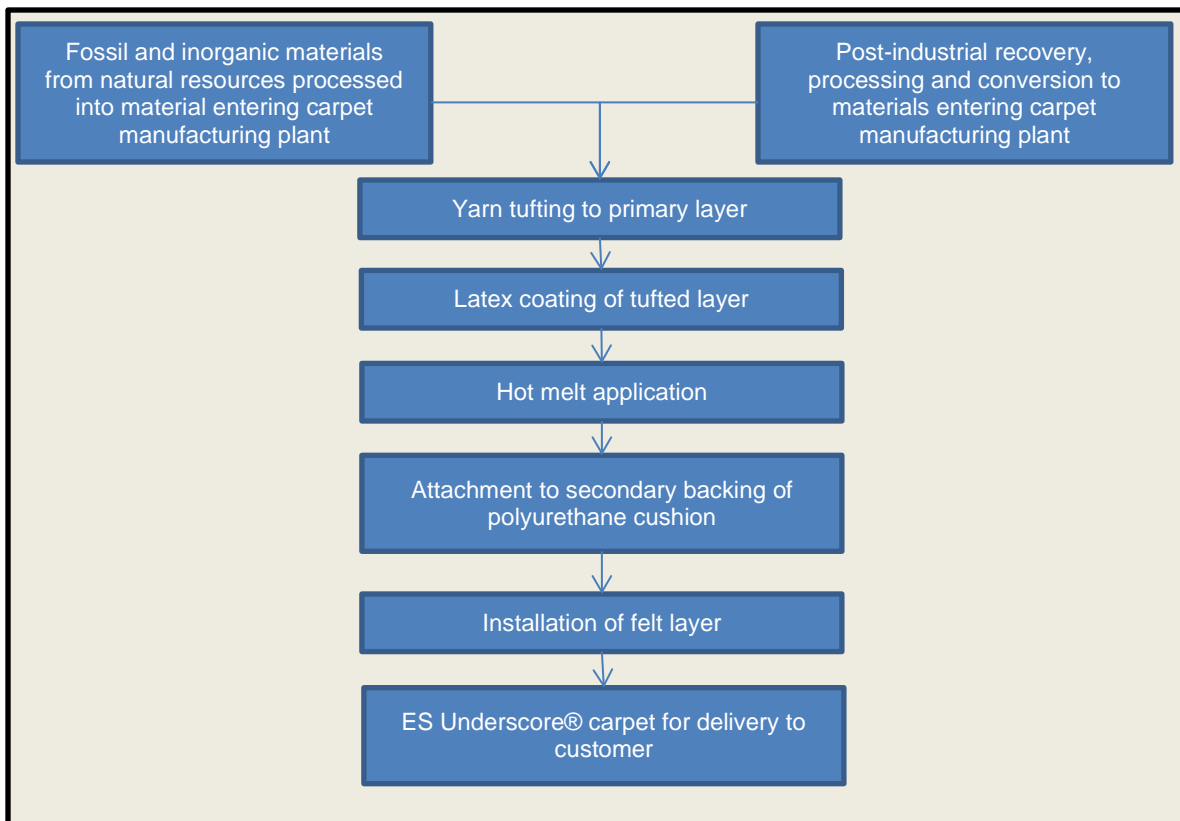
According to ISO 14025

## Production of the Floor Covering



**Figure 2: Sourcing / Extraction stage**

The information in Figure 3 describes the cradle-to-gate boundary for the carpet.



**Figure 3: Cradle-to-gate boundary for life cycle inventory of ES Underscore® Cushion Back Carpet Tile**



Milliken Carpet Americas

Solution Dyed Nylon 6,6 ES Underscore® Backing

According to ISO 14025

## Health, Safety, and Environmental Aspects During Production

- EPA's Landfill Methane Outreach Program Member
- EPA's Wastewise™ Member
- EPA's SmartWay Member
- ISO 14001 Certified
- OSHA VPP Star Certified
- Milliken Safety Way™ Compliant

Zero waste is sent to the landfill during our manufacturing process.

Milliken Carpet minimizes 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 continually monitoring the variation in our waste streams using six sigma statistical process control methodology. This waste monitoring process insures that waste is minimized.

Milliken has recycling programs set up for all recyclable waste streams.

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.

## Delivery and Installation of the Floor Covering

### Delivery

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. The average distance an order travels is 866 Miles.

### 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. If TractionBack® is not available; Milliken recommends Milliken Modular Carpet Adhesive 100V and Milliken Modular Carpet Spray Adhesive.



Milliken Carpet Americas

Solution Dyed Nylon 6,6 ES Underscore® Backing

According to ISO 14025

## 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 can document that 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 shipped in industrial cardboard boxes or stacked loose with a cardboard sleeve to protect the product and allow pallets to be double stacked to maximize trailer cube space and minimize transportation environmental impacts. In the U.S., such cardboard is 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.

## Use Stage

The ES Underscore® product 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).

An annual schedule of maintenance and cleaning was defined, with the largest segment being vacuum cleaning. We



Milliken Carpet Americas

Solution Dyed Nylon 6,6 ES Underscore® Backing

According to ISO 14025

recommend MilliCare® Textile and Carpet Care. This dry polymer technology not only cleans better than wet systems, but is also environmentally sustainable and removes dirt, dust and allergens without the use of toxic chemicals. Plus, MilliCare meets CRI criteria as an effective deep-extraction method of cleaning, which means fibers stay cleaner longer and your investment lasts longer. ([www.millicare.com](http://www.millicare.com))

The ES Underscore® product 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.

## 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).

## End-of-Life

### Recycling or Reuse

Landfill Diversion Program: The ES Underscore® family of carpet is 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.

## 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 service life is used. The user may scale up the service life to meet their requirements.

### Cut-off Criteria



**Milliken Carpet Americas**

Solution Dyed Nylon 6,6 ES Underscore® Backing

According to ISO 14025

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.

## 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 PlasticsEurope and the USLCI databases were utilized when the PE datasets were either not available or less representative of actual conditions.

## 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. For background data, domestic data was preferred; however the absence of US specific data required some international data to be 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 M2 of Milliken carpet includes:

- Sourcing/extraction Stage
- Manufacturing Stage
- Delivery and installation Stage
- Use Stage
- End of Life Stage

## Notes on use stage

---

Carpet manufactured by Milliken carries a limited lifetime warranty. While the actual life time of the carpet is related to



Milliken Carpet Americas  
Solution Dyed Nylon 6,6 ES Underscore® Backing

According to ISO 14025

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, as well as for a 60-year reference service life of a building, as directed by the PCR.

### Results of the Assessment

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). In the multi stage system for the life cycle of the family of Aquafil Econyl® Solution Dyed Nylon 6,6 with Milliken ES Underscore® Cushion Back Carpet Tile, the natural resource energy is given in Table 5.

Natural Resources [MJ]	12 oz.	20 oz.	28 oz.
Total	251	313	375

Table 5: Natural resource energy for 1 m2 of the Aquafil Econyl® Solution Dyed Nylon 6,6 with Milliken ES Underscore® Cushion Back Carpet Tile

### Life Cycle Inventory Analysis

The natural resource energy was subdivided into energy sources that are non-renewable and renewable, Tables 6 and 7. In general the average renewables contribution is about 11% of the total energy use.

Non-Renewable Resources [MJ]	12 Oz		20 oz		28 oz	
<b>Total</b>	232.2	<b>100%</b>	293.4	<b>101%</b>	354.6	<b>100%</b>
Natural Gas	106.0	46%	128.2	44%	150.5	42%
Crude Oil	97.8	42%	133.3	45%	160.9	45%
Hard Coal	17.2	7%	22.0	7%	26.8	8%
Uranium	8.5	4%	10.6	4%	12.7	4%
Lignite	2.7	1%	3.2	1%	3.7	1%
Peat	0.0	0%	0.0	0%	0.0	0%

Table 6: Non-renewable energy use for Solution Dyed Nylon 6,6 with Milliken ES Underscore® Cushion Back Carpet Tile

Renewable Resources [MJ]	12 Oz		20 oz		28 oz	
<b>Total</b>	18.6	<b>100%</b>	19.5	<b>100%</b>	<b>20.4</b>	<b>100%</b>
Hydro Power	7.5	41%	7.9	43%	8.3	45%
Solar Energy	9.9	53%	10.2	55%	10.4	56%





Milliken Carpet Americas  
Solution Dyed Nylon 6,6 ES Underscore® Backing

According to ISO 14025

Wind Power	1.0	5%	1.2	6%	1.4	7%
Geothermic	0.2	1%	0.2	1%	0.3	2%

Table 7: Renewable energy use for Solution Dyed Nylon 6,6 with Milliken ES Underscore® Cushion Back Carpet Tile

Resources [kg]	12 oz.	20 oz.	28 oz.
Non-Renewable Material Resources	8.6	10.3	11.9
Wastes [kg]			
Hazardous Waste	0	0	0
Non-Hazardous Waste	9.6	11.4	13.3

Table 8: Non-Renewable energy and Waste use for Econyl® Solution Dyed Nylon 6,6 with Milliken ES Underscore® Cushion Back Carpet Tile

### 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. Landfill waste, as an impact category showed a different result because the actual carpet tile is landfilled.

Relative Contribution to CML Life Cycle Impacts for 1 year of Use - Light Weight Product (12 oz)					
	Production	Delivery & Installation	Use (1 yr)	End of Life	Total
Abiotic Depletion (ADP elements) [kg Sb-Equiv.]	2.1E-05	9.0E-09	1.0E-08	-1.7E-07	2.1E-05
Acidification Potential (AP) [kg SO <sub>2</sub> -Equiv.]	2.9E-02	8.2E-05	4.4E-04	2.4E-03	3.1E-02
Eutrophication Potential (EP) [kg Phosphate - Equiv.]	4.3E-03	1.0E-05	2.0E-05	1.4E-03	5.7E-03
Global Warming Potential (GWP 100 years) [kg CO <sub>2</sub> -Equiv.]	12.91	0.04	0.09	0.93	13.97
Ozone Layer Depletion Potential (ODP, steady state) [kg R11-Equiv.]	1.3E-08	1.9E-12	4.1E-11	3.3E-09	1.6E-08
Photochem. Ozone Creation Potential (POCP) [kg Ethene-Equiv.]	4.5E-03	1.7E-05	2.4E-05	9.1E-04	5.4E-03

The following tables 9-11 present the LCIA results and contribution analysis based on CML 2001-November 2010.

Relative Contribution to CML Life Cycle Impacts for 60 years of Use - Light Weight Product (12 oz)					
	Production	Delivery & Installation	Use (1 yr)	End of Life	Total
Abiotic Depletion (ADP elements) [kg Sb-Equiv.]	8.49E-05	3.61E-08	6.04E-07	-6.83E-07	8.49E-05
Acidification Potential (AP) [kg SO <sub>2</sub> -Equiv.]	1.14E-01	3.29E-04	2.67E-02	9.41E-03	1.51E-01
Eutrophication Potential (EP) [kg Phosphate - Equiv.]	1.73E-02	4.00E-05	1.21E-03	5.50E-03	2.40E-02
Global Warming Potential (GWP 100 years) [kg CO <sub>2</sub> -Equiv.]	51.62	0.16	5.60	3.74	61.12
Ozone Layer Depletion Potential (ODP, steady state) [kg R11-Equiv.]	5.23E-08	7.76E-12	2.49E-09	1.31E-08	6.79E-08
Photochem. Ozone Creation Potential (POCP) [kg Ethene-Equiv.]	1.79E-02	6.97E-05	1.46E-03	3.62E-03	2.31E-02

Table 9: Life cycle impact category results for Solution Dyed Nylon 6,6 with Milliken ES Underscore® 12 oz Product



Milliken Carpet Americas  
Solution Dyed Nylon 6,6 ES Underscore® Backing

According to ISO 14025

Relative Contribution to CML Life Cycle Impacts for 1 year of Use - Mid Weight Product (20 oz)					
	Production	Delivery & Installation	Use (1 yr)	End of Life	Total
Abiotic Depletion (ADP elements) [kg Sb-Equiv.]	2.33E-05	9.83E-09	1.01E-08	-1.86E-07	2.31E-05
Acidification Potential (AP) [kg SO <sub>2</sub> -Equiv.]	3.74E-02	8.97E-05	4.45E-04	2.56E-03	4.05E-02
Eutrophication Potential (EP) [kg Phosphate - Equiv.]	6.05E-03	1.09E-05	2.02E-05	1.50E-03	7.58E-03
Global Warming Potential (GWP 100 years) [kg CO <sub>2</sub> -Equiv.]	17.50	0.04	0.09	1.02	18.66
Ozone Layer Depletion Potential (ODP, steady state) [kg R11-Equiv.]	1.35E-08	2.12E-12	4.14E-11	3.56E-09	1.71E-08
Photochem. Ozone Creation Potential (POCP) [kg Ethene-Equiv.]	5.90E-03	1.90E-05	2.44E-05	9.87E-04	6.93E-03

Relative Contribution to CML Life Cycle Impacts for 60 years of Use - Mid Weight Product (20 oz)					
	Production	Delivery & Installation	Use (1 yr)	End of Life	Total
Abiotic Depletion (ADP elements) [kg Sb-Equiv.]	9.32E-05	3.93E-08	6.04E-07	-7.44E-07	9.31E-05
Acidification Potential (AP) [kg SO <sub>2</sub> -Equiv.]	1.50E-01	3.59E-04	2.67E-02	1.03E-02	1.87E-01
Eutrophication Potential (EP) [kg Phosphate - Equiv.]	2.42E-02	4.36E-05	1.21E-03	6.00E-03	3.14E-02
Global Warming Potential (GWP 100 years) [kg CO <sub>2</sub> -Equiv.]	70.01	0.18	5.60	4.07	79.86
Ozone Layer Depletion Potential (ODP, steady state) [kg R11-Equiv.]	5.40E-08	8.46E-12	2.49E-09	1.42E-08	7.08E-08
Photochem. Ozone Creation Potential (POCP) [kg Ethene-Equiv.]	2.36E-02	7.60E-05	1.46E-03	3.95E-03	2.91E-02

Table 10: Life cycle impact category results for Solution Dyed Nylon 6,6 with Milliken ES Underscore® 20 oz Product

Relative Contribution to CML Life Cycle Impacts for 1 years of Use - Heavy Weight Product (28 oz)					
	Production	Delivery & Installation	Use (1 yr)	End of Life	Total
Abiotic Depletion (ADP elements) [kg Sb-Equiv.]	2.53E-05	1.06E-08	1.01E-08	-2.01E-07	2.52E-05
Acidification Potential (AP) [kg SO <sub>2</sub> -Equiv.]	4.63E-02	9.71E-05	4.45E-04	2.77E-03	4.96E-02
Eutrophication Potential (EP) [kg Phosphate - Equiv.]	7.78E-03	1.18E-05	2.02E-05	1.62E-03	9.43E-03
Global Warming Potential (GWP 100 years) [kg CO <sub>2</sub> -Equiv.]	22.10	0.05	0.09	1.10	23.34
Ozone Layer Depletion Potential (ODP, steady state) [kg R11-Equiv.]	1.39E-08	2.29E-12	4.14E-11	3.85E-09	1.78E-08
Photochem. Ozone Creation Potential (POCP) [kg Ethene-Equiv.]	7.33E-03	2.06E-05	2.44E-05	1.07E-03	8.44E-03

Relative Contribution to CML Life Cycle Impacts for 60 years of Use - Mid Weight Product (28 oz)					
	Production	Delivery & Installation	Use (1 yr)	End of Life	Total
Abiotic Depletion (ADP elements) [kg Sb-Equiv.]	1.01E-04	4.26E-08	6.04E-07	-8.05E-07	1.01E-04
Acidification Potential (AP) [kg SO <sub>2</sub> -Equiv.]	1.85E-01	3.88E-04	2.67E-02	1.11E-02	2.23E-01
Eutrophication Potential (EP) [kg Phosphate - Equiv.]	3.11E-02	4.72E-05	1.21E-03	6.49E-03	3.89E-02
Global Warming Potential (GWP 100 years) [kg CO <sub>2</sub> -Equiv.]	88.40	0.19	5.60	4.41	98.61
Ozone Layer Depletion Potential (ODP, steady state) [kg R11-Equiv.]	5.57E-08	9.16E-12	2.49E-09	1.54E-08	7.36E-08
Photochem. Ozone Creation Potential (POCP) [kg Ethene-Equiv.]	2.93E-02	8.22E-05	1.46E-03	4.28E-03	3.51E-02



Milliken Carpet Americas

Solution Dyed Nylon 6,6 ES Underscore® Backing

According to ISO 14025

**Table 11: Life cycle impact category results for Solution Dyed Nylon 6,6 with Milliken ES Underscore® 28 oz Product**

## 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 Solution Dyed Nylon 6,6 with Milliken ES Underscore® Backing 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

- NSF – 140-2010 Sustainable Carpet Assessment Standard
- MTS / SMaRT Consensus Sustainable Product Standard – Platinum
- 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

Federal Trade Commission (FTC) Environmental Guidelines



Milliken Carpet Americas  
Solution Dyed Nylon 6,6 ES Underscore® Backing

According to ISO 14025

## Appendix

The following tables are included to allow various face weigh products to be evaluated within this EPD for the product listed.

- Solution Dyed Nylon 6,6 with Milliken ES Underscore® Backing (CML Results) – 1 Year

Yarn Face Weight [oz/sq yd]	12	13	14	15	16	17	18	19	20
<b>CML Impact Categories</b>									
Abiotic Depletion (ADP elements) [kg Sb-Equiv.]	2.11E-05	2.13E-05	2.16E-05	2.18E-05	2.21E-05	2.24E-05	2.26E-05	2.29E-05	2.31E-05
Acidification (AP) [kg SO2-Equiv.]	3.14E-02	3.25E-02	3.37E-02	3.48E-02	3.60E-02	3.71E-02	3.82E-02	3.94E-02	4.05E-02
Eutrophication (EP) [kg Phosphate-Equiv.]	5.73E-03	5.96E-03	6.19E-03	6.42E-03	6.65E-03	6.88E-03	7.12E-03	7.35E-03	7.58E-03
Global Warming (GWP 100 years) [kg CO2-Equiv.]	13.97	14.56	15.14	15.73	16.32	16.90	17.49	18.07	18.66
Ozone Depletion (ODP, steady state) [kg R11-Equiv.]	1.64E-08	1.65E-08	1.66E-08	1.67E-08	1.68E-08	1.68E-08	1.69E-08	1.70E-08	1.71E-08
Photochem. Ozone Creation Potential (POCP) [kg Ethene-Equiv.]	5.43E-03	5.61E-03	5.80E-03	5.99E-03	6.18E-03	6.37E-03	6.56E-03	6.75E-03	6.93E-03
<b>Primary Energy [MJ]</b>									
Primary Energy - non renewable	232.2	239.8	247.5	255.1	262.8	270.4	278.1	285.7	293.4
Primary Energy -renewable Resources	18.6	18.7	18.8	19.0	19.1	19.2	19.3	19.4	19.5
<b>Resources [Kg]</b>									
Non Renewable Material Resources	8.6	8.8	9.0	9.2	9.4	9.6	9.8	10.0	10.3
<b>Waste [Kg]</b>									
Non Hazardous Wastes	9.6	9.8	10.0	10.3	10.5	10.7	11.0	11.2	11.4
Hazardous Waste	0	0	0	0	0	0	0	0	0

Yarn Face Weight [oz/sq yd]	21	22	23	24	25	26	27	28
<b>CML Impact Categories</b>								
Abiotic Depletion (ADP elements) [kg Sb-Equiv.]	2.34E-05	2.36E-05	2.39E-05	2.41E-05	2.44E-05	2.47E-05	2.49E-05	2.52E-05
Acidification (AP) [kg SO2-Equiv.]	4.16E-02	4.28E-02	4.39E-02	4.50E-02	4.62E-02	4.73E-02	4.84E-02	4.96E-02
Eutrophication (EP) [kg Phosphate-Equiv.]	7.81E-03	8.04E-03	8.27E-03	8.51E-03	8.74E-03	8.97E-03	9.20E-03	9.43E-03
Global Warming (GWP 100 years) [kg CO2-Equiv.]	19.24	19.83	20.42	21.00	21.59	22.17	22.76	23.34
Ozone Depletion (ODP, steady state) [kg R11-Equiv.]	1.72E-08	1.73E-08	1.74E-08	1.75E-08	1.76E-08	1.76E-08	1.77E-08	1.78E-08
Photochem. Ozone Creation Potential (POCP) [kg Ethene-Equiv.]	7.12E-03	7.31E-03	7.50E-03	7.69E-03	7.88E-03	8.07E-03	8.25E-03	8.44E-03
<b>Primary Energy [MJ]</b>								
Primary Energy - non renewable	301.0	308.7	316.3	324.0	331.6	339.3	346.9	354.6
Primary Energy -renewable Resources	19.6	19.7	19.8	19.9	20.1	20.2	20.3	20.4
<b>Resources [Kg]</b>								
Non Renewable Material Resources	10.5	10.7	10.9	11.1	11.3	11.5	11.7	11.9
<b>Waste [Kg]</b>								
Non Hazardous Wastes	11.7	11.9	12.1	12.3	12.6	12.8	13.0	13.3
Hazardous Waste	0	0	0	0	0	0	0	0