



Atlas

Environmental Product Declaration



Atlas Carpet Mills/ Perma-Tile Modular Carpet Family





Environmental Product Declarations

Atlas Carpet Mills | Perma-Tile Modular Carpet Family

EPD Information			
Program Operator		NSF International	
Declaration Holder		Atlas Carpet Mills 2200 Saybrook Ave. Los Angeles, CA 90040	
Product Perma-Tile Modular Carpet Family	Date of Issue July 14, 2016	Period of Validity 5 Years	Declaration Number EPD10075
This EPD was independently verified by NSF International in accordance with ISO 14025:		 Jenny Oorbeck Joorbeck@nsf.org	
<input type="checkbox"/> Internal <input checked="" type="checkbox"/> External			
This life cycle assessment was independently verified by in accordance with ISO 14044 and the reference PCR:		 Jack Geibig Jgeibig@ecoform.com	
LCA Information			
Basis LCA		Life Cycle Analysis of Atlas Carpets, March 25, 2016	
LCA Preparer		Michael Overcash, Eric Vozzola & Evan Griffing Environmental Clarity, Inc. www.environmentalclarity.com	
This life cycle assessment was critically reviewed in accordance with ISO 14044 by:		Jack Geibig EcoForm jgeibig@ecoform.com	
PCR Information			
Program Operator		NSF International	
Reference PCR		Flooring: Carpet, Resilient, Laminate, Ceramic, Wood Version 2	
Date of Issue		June 23, 2015	
PCR review was conducted by:		Michael Overcash Environmental Clarity movercash@earthlink.net	

All products are manufactured in the United States in facilities owned by the manufacturer: TDG Operations, LLC.
There are no ISO certifications for these facilities.



ENVIRONMENTAL PRODUCT DECLARATION: DETAILED VERSION



Product Description

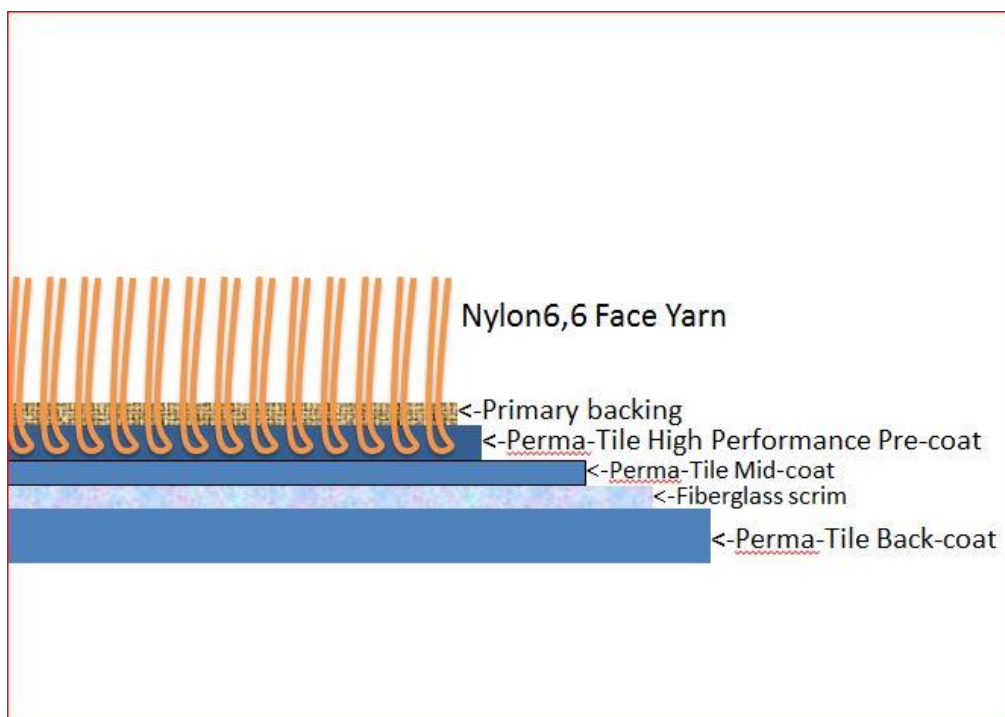
Product classification and description

Products covered in this Environmental Product Declaration (EPD) are a broad variety of Perma-Tile modular carpets manufactured by Atlas Carpet Mills backed by thermoplastic backing and made with a type 6,6 nylon. The thermoplastic is comprised of a polyvinyl chloride comprised of at least 30% recycled content with a minimum of 11% post-consumer. The face fiber is 100% nylon 6,6 and is either solution or beck dyed. The products are covered by Atlas Carpet Mills' Ten year Limited Commercial Warranty.

The products all pass the Carpet & Rugs Institute's (CRI) Green Label Plus.

The average weight of the backing system is 112 oz. per square yard. The variation in weight in the modular products is due to the amount of yarn weight. The weighted average used in the Life Cycle Assessment (LCA) is 30oz. per square yard, with the minimum yarn weight of 20 oz per square yard, and the maximum yarn weight of 34 oz per square yard.

Illustration 1 – Perma-Tile Modular Carpet cross-section





Environmental Product Declarations

Atlas Carpet Mills | Perma-Tile Modular Carpet Family

Applicability

Atlas Carpet Mills' Perma-Tile Modular Carpet is intended for installation in medium to high traffic commercial interior spaces. The specific product type determines the suitability for the traffic classification, as defined in the guidelines developed by CRI. For details on recommended commercial performance, refer to: <http://www.carpet-rug.org/commercial-customers/selecting-the-right-carpet/quality-and-performance/index.cfm>. Atlas Modular Carpets have a referenced service life of 15 years.



Product Characteristics

Category	Result	
Type of manufacture	Tufted textured loop, Tufted textured tip sheared loop, tufted cut pile, Cut and Loop	
Yarn type	Nylon 6,6	
Additional characteristics according to NSF/ANSI 140	Sustainability Assessment of Carpet: Gold	
Sustainable certifications	Certified to NSF/ANSI 140 (www.nsf.org)	
VOC emissions test method	Carpet & Rug Institute's Green Label Plus: GLP 1922 and GLP 7910	
CRI- TARR rating	≥3	
Characteristics	Nominal Value	Unit
Total thickness	.182 - .260	inch
Product weight	129.5 – 161.5	oz/yd ²
Surface pile thickness	.102 - .180	inch
Number of tufts or loops / ft ²	9,216 – 24,833	ft ²
Surface pile weight	20 - 33	oz/yd ²
Pile Fiber Composition	100% Nylon 6,6	%
Secondary Backing	72% PP, 28% PET	%
Post-Consumer Recycled Content	10% minimum	%
Pre-Consumer Recycled Content	25%	%
Product Standards		Results
CRI Green Label Plus		Pass - Certified
NSF 140		Certified Gold
ASTM E648	Radiant Panel Flammability Test	Class I
ASTM E662	NBS Smoke Test (Flaming Mode)	≤ 450
AATCC 134	Electrostatic Propensity	≤ 3.5KV
AATCC 16	Colorfastness to Light	≥ 4.0 at 40 AFU's
ASTM D5252/D7330-11 Hexapod Tumble Drum Test (TARR)		≥3.0
ASTM D7570 Dimensional Stability		+/- 0.027"



Environmental Product Declarations

Atlas Carpet Mills | Perma-Tile Modular Carpet Family

Material Content

Material content of the product

Component	Material	Mass %	Availability			Origin of Raw Materials
			Renewable	Non-Renewable	Recycled	
Pile Material	Type 6,6 Nylon	21.2%		Fossil resource, limited		Global
Primary Backing	Polyester/ Polypropylene Blend	3.7%		Fossil resource, limited		Global
Vinyl Backings	PVC	10.1%		Fossil resource, limited		Global
	Fillers (Calcium Carbonate, Coal Fly Ash)	41.4%		Mineral, abundant	50% pre-consumer	US
	DEHP	15.3%		Fossil resource, limited		Global
	Vinyl chloride - methyl acrylate (polyethyl covinyl chloride)	6.4%		Fossil resource, limited		Global
Secondary Backing	Fiberglass	1%		Silica, abundant	100% post-consumer	US

None of the materials and substances used in the manufacture of Atlas Modular Perma-Tile Modular Carpet is considered by any government regulation as adversely affecting human health or the environment. Atlas Perma-Tile Modular Carpet is not required to report on a MSDS. The material and its chemical discharges are not considered critical air pollutants or hazardous air pollutants. Likewise, none of the materials or discharges are subject to any governmental regulation for water pollutants or to US EPA disclosure policies for hazardous substances. No material produced is listed as a persistent organic pollutant by the Stockholm Convention.



Production of main materials

Nylon Face Fiber – Type 6,6 nylon that are solution dyed or beck dyed. Nylon 6,6 is produced through polycondensation of hexamethylenediamine and adipic acid.

Synthetic Primary Backing – The yarn is tufted into a woven polyester/polypropylene backing. The term "polyester" as a specific material most commonly refers to polyethylene terephthalate (PET). The material is categorized as containing core ester functional groups in their main chain.

Thermoplastic Layers -- Three layers of polyvinyl chloride material are utilized to bond the tufted carpet to the primary backing giving the product stability and long term performance. The backing layers contain both post-consumer and pre-consumer recycled content. Polyvinyl chloride is produced by polymerization of the monomer vinyl chloride. It can be made softer and more flexible by the addition of plasticizers.

Reinforcement Layer – A fiberglass fabric is embedded in backing layers to provide dimensional stability. Fiberglass is the common name for glass-reinforced plastic or alternatively glass-fiber reinforced plastic. Fiberglass is a fiber reinforced polymer made of plastic reinforced by glass fibers, commonly woven into a mat or used as a non-woven.

Calcium Carbonate – an abundant mineral found in all parts of the world as the chief substance in marble and limestone. It can be ground to varying particle sizes and is widely used as filler in formulated flooring systems.



Life Cycle Assessment Stages and Reported EPD Information

Sourcing/extraction (raw material acquisition) stage

The life cycle assessment stage for sourcing and material extraction begins at the point of the raw materials' extraction from the source and ends at the receipt of the raw material at the carpet manufacturing facility. All raw materials are evaluated for quality, availability, consistency, performance, and value before acceptance into the manufacturing process. Once the material and source have passed the initial evaluation process, on-going evaluation is made using the suppliers' certificate of analysis.

Manufacturing stage

Solution Dyed Perma-Tile Modular Carpet



Beck Dyed Perma-Tile Modular Carpet



Environmental Product Declarations

Atlas Carpet Mills | Perma-Tile Modular Carpet Family



The production process is designed for efficiency, utilizing the strengths of Atlas Carpet Mills' technology and expertise. The determination of the dyeing process lies in the intended purpose and aesthetics of the product. The fiber is then converted into yarn in the spinning process. These processes utilize water, electricity, and natural gas.

The tufting process incorporates tufting machines that utilize needles to insert the yarn into a synthetic backing material. The needles are controlled to determine the myriad of aesthetics that the marketplace desires. This process requires electricity.

Next, the coating process, applies a high performance precoat to the back of the tufted substrate. This coat locks the fibers into place giving strength to the material. The coating process uses electricity, gas, and water.

Backing of the carpet tiles is accomplished by applying a vinyl composition layer to the carpeting. This layer adds dimensional stability and completes the performance package for the carpet tile. This process uses electricity and gas.

The last step in the carpet tile process is cutting and packaging. The material that has now been completed in widths up to 12'6" feet is slit and goes to a tile cutter to give 24 inch squares and packaged for shipment. This process utilizes electricity.

Delivery and installation stage

Delivery

Delivery to the customer is typically through the use of diesel powered trucks. Truck transportation is optimized by load size and geographical logistics. This life cycle analysis has modeled truck transportation with an average distance of 500 miles.

Installation

The recommend adhesives for Atlas Perma-Tile Modular Carpet are: Taylor Adhesives 2027 Pressure Sensitive Adhesive; Parabond Signature Series 5080 Pressure Sensitive Adhesive; or XL Brands Stix 2230 using a full spread of adhesive. The life cycle assessment modeled the installation stage with these recommended adhesives at a spread rate of 0.15 kg adhesive per square yard of carpet.

Complete installation instructions are available at: <http://www.atlascarpetmills.com/installation>.

Health, safety, and environmental aspects during installation



Environmental Product Declarations

Atlas Carpet Mills | Perma-Tile Modular Carpet Family

For MSDS on adhesive, please contact Atlas Carpet Mills' Technical Services Department at (323) 724-9000.

Atlas Carpet Mills Perma-Tile Modular Adhesive is CRI Green Label Plus certified and meets the requirements of California South Coast Air Quality Management District Rule #1168.

Waste

Atlas Perma-Tile Modular Carpet is designed with the end in mind. Manufacturing waste is recycled and an aggressive resource stewardship program is in place. Waste materials from installation may be recycled into new carpet or other new products utilizing CARE recyclers and other local recyclers. Other post-installation carpet waste may be thermally recycled in a waste incineration plant and materially recycled in the cement industry. The packaging materials may be recycled utilizing local recyclers.

Atlas Perma-Tile Modular Carpet may also be reconditioned by cleaning and reused in less critical areas of a facility or in lower category spaces.

Packaging

Table 1 – Packaging Materials for Atlas Perma-Tile Modular Carpet

Category	Material
Pallet	Wood
Tray Caps	Cardboard
Shrink Wrap	Plastic
Labeling and Instructions	Paper

These materials are below the cut-off and are not considered in the LCA review.

Use stage

Use of the floor covering

The service life for Atlas Perma-Tile Modular Carpet will vary depending on the amount of floor traffic, level of maintenance, and the desired appearance of the floor covering. Impacts for the use stage are primarily due to cleaning and periodic maintenance. These activities have been stated on a yearly basis and can therefore be used for any carpet service life or building service life. The referenced service life for Atlas Perma-Tile Modular Carpet is 15 years.

The EPD presents results for both a one-year and 60-year period; impacts are calculated for both time periods. The EPD assumes that the life of a building is 60 years.

- The one-year use phase impacts are based on the initial installation of one square meter of flooring (transport, installation) phase impacts are based on annual cleaning and maintenance guidelines.
- The 60-year impacts are based on four replacements (occurring once every 15 years) of one square meter of flooring (production, transport, installation, end-of-life and the use phase) impacts for 60



Environmental Product Declarations

Atlas Carpet Mills | Perma-Tile Modular Carpet Family

years of total floor maintenance.

Atlas Perma-Tile Modular Carpet is guaranteed by Atlas' warranted performance. These warranties may be found at: <http://www.atlascarpetmills.com/warranties>.

Cleaning and maintenance

The level of cleaning and maintenance varies depending on the amount of floor traffic and the desired appearance of the floor that the end user is seeking. CRI's publication titled *Carpet Maintenance Guidelines for Commercial Applications* offers guidance on how to maintain the carpet at various floor traffic levels.

Atlas's maintenance guidelines may be found at: <http://www.atlascarpetmills.com/maintenance>.

The table below is a guideline for the frequency of cleaning established by the The Institute of Inspection, Cleaning and Restoration Certification (IICRC). This is a very good guide for a maintenance schedule. However, each building and traffic patterns are different and modifications to the table may need to be implemented.

Table 2 - Recommended Maintenance for Atlas Perma-Tile Modular Carpet

Traffic Soil Rating (foot traffic per day)	Vacuuming (times per week)	Spot Cleaning (times per week)	Interim Maintenance (times per year)	Restorative Cleanings (times per year)
Light <500	1-2	Daily or as soon as noticed	1-3	1-2
Medium 500-1,000	Daily in traffic areas, overall 3-4	Daily or as soon as noticed	3-6	2-4
Heavy 1000-2,500	Daily in traffic areas, overall 4-7	Daily in traffic areas, overall 4-7	6-12	3-6
Very Heavy >2,500	1-2 daily in traffic areas, overall 7	1-2 daily in traffic areas, overall 7	12-52	6-12

End of life stage

Recycling, reuse, or repurpose

The Atlas family of carpets are designed to achieve the company's commitment to enhance recycle and reuse opportunities. Reuse, repurpose, and recycling of carpet is the preferred method of disposal of carpet at the end of its useful life. Atlas Carpet Mills is a long-standing member of CARE and supports the efforts to divert carpet from landfills. Atlas Carpet Mills supports the use of CARE Recycling Partners for the landfill diversion process.

Disposal



Environmental Product Declarations

Atlas Carpet Mills | Perma-Tile Modular Carpet Family

Atlas Perma-Tile Modular Carpet can be landfilled where local regulations allow. It can also be incinerated as part of a waste to energy program or it may be recycled as a component of other products.

In the end-of-life phase, we have used energy for collection and transport to landfill as well as energy to operate the landfill. The total process energies (and natural resource energies) are:

- 48.5 MJ electricity/as is mt of solid waste (0.167 MJ nre/kg carpet)
- 335 MJ diesel/ as is mt of solid waste (0.385 MJ nre/kg carpet)



Life Cycle Assessment (LCA)

General

The Life Cycle Inventory (LCI) and Life Cycle Impact Assessment (LCIA) were undertaken with guidelines from ISO 14040/ISO 14044 with respect to *Product Category Rule for Environmental Product Declarations Flooring: Carpet, Resilient, Laminate, Ceramic, Wood* (Flooring PCR, NSF International, 2015). The functional unit is one square meter (sm) of carpet (note: the intermediate life cycle inventory data are on a per square yard basis for use by carpet company personnel). The use phase is one year and can then be scaled to the desired carpet or building life. As cut-off criteria, materials with low mass and environmental impacts of inputs or use per square meter of carpet (less than one percent) are not included in this life cycle as the impact on results is small. Similarly energy-consuming steps with low values per square meter of carpet (less than one percent) are also not included. No excluded materials were found to have unique environmental relevance in the context of this functional unit.

In cases where products and byproducts are made in a life cycle inventory gate-to-gate, mass allocation is used. In keeping with standard life cycle practice, the life cycle impacts of materials leaving the boundaries that are recycled (such as most carpet packaging), are assigned to the replacement use and not to the current floor covering.

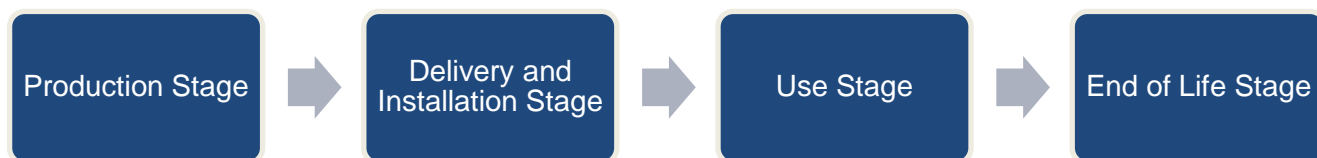
The CRI (2010) and Environmental Clarity (Overcash and Griffing, 2016) databases were utilized for this life cycle. The life cycle inventory data include all relevant process steps and technologies found in the sourcing/extraction, manufacturing, use, and end-of-life stages. The databases are derived primarily from the carpet industry data supplemented by sourcing/extraction information. For the manufacturing, use, and end-of-life stages, the geographical aspects are relevant and therefore reasonable. The use of data on chemical manufacturing found for the commodity chemicals in the sourcing/extraction were also determined to be reasonable for the U.S., as global competition and manufacturing technologies are prevalent. Overall the data quality is in the good to high categories.

Results are uniformly provided in units of natural resource energy (nre) (MJ/sm 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). Natural resource energy is similar to cumulative energy demand (CED) in European literature.



Environmental Product Declarations

Atlas Carpet Mills | Perma-Tile Modular Carpet Family



Description of the functional unit

The functional unit has been defined as one square meter, as defined in section 6.2 of the PCR. The reference service life for this product group is 15 years, while the reference service life for a building is 60 years.

Cut-off criteria

Materials with low mass and environmental impacts of inputs or use (less than one percent) are not included in this life cycle, as the impact on results is small. Similarly, energy-consuming steps with low values per square meter of carpet (less than one percent) are also not included. No excluded materials were found to have unique environmental relevance in the context of this functional unit.

Allocation

In cases where products and byproducts are made in a life cycle inventory gate-to-gate, mass allocation is used. In keeping with standard life cycle practice, the life cycle impacts of materials leaving the boundaries that are recycled (such as most carpet packaging), are assigned to the replacement use and not to the current floor covering

Background data

The CRI (2010) and Environmental Clarity (Overcash and Griffing, 2014) databases were utilized for this life cycle. These gate-to-gate datasets were combined with USLCI energy modules throughout the life cycle. The life cycle inventory data includes all relevant process steps and technologies found in the sourcing/extraction, manufacturing, use, and end-of-life stages.

Data quality and data quality assessment

The databases are derived primarily from the carpet industry data supplemented by sourcing/extraction information. For the manufacturing, use, and end-of-life stages the geographical aspects are relevant and therefore reasonable. The use of data on chemical manufacturing found for the commodity chemicals in the sourcing/extraction were also determined to be reasonable for the U.S. as global competition and manufacturing technologies are prevalent. Overall, the data quality is in the good to high categories.

The data used in the life cycle assessment represents current products and processes. This data is considered to be good to excellent which meets the requirements of the product category rules. (NSF International, 2015) A variety of checks were built into the model. Additionally, a series of tests were conducted on the model to ensure that the model quality is very good.



Environmental Product Declarations

Atlas Carpet Mills | Perma-Tile Modular Carpet Family

Time related coverage – The process data were based on one year of data between 2012 and 2013. The background data sources are based on data less than 10 years old. All of the background data sources are modeled using 2010 or newer North American energies. The time related coverage is good.

Geographical coverage – The process data was based on North America. The geographical coverage is good.

Technology coverage – Process data were collected from the actual processes and thus the technology coverage is very good. The background data were selected for technology relevance to ensure the best fit of the life cycle inventory to the real world. The technology coverage is very good.

System boundaries

The life cycle assessment for the Atlas Perma-Tile Modular Carpet family was a cradle to grave study. System boundaries for this study are as follows:

- Source/Extraction Stage – This stage begins with the end in mind for the selection and sourcing of materials, evaluation of viable alternatives, and the results of the design parameters through the extraction of raw materials. This may include the growth, manufacture, extraction and conversion of all raw materials and their delivery to the production facilities. This is known as sourcing/extraction. Packaging materials are considered in this study.
- Manufacturing Stage – All relevant manufacturing processes indicated by the design concepts are included in this stage. This is optimized for the materials selected in the Source/Extraction Stage. Packaging is included. Overhead and personnel related items are not included.
- Delivery and Installation Stage – This stage includes the transportation of material from the production facility to the point of use. Materials used for installation and site preparation are included.
- Use Stage – This stage includes cleaning and maintenance of the Atlas Carpet Mills Perma-Tile Modular Carpet during its useful life as well as the extraction, manufacturing, and transport of all supporting materials, if relevant for the maintenance and above the cut-off levels.
- End of Life Stage – The End of Life Stage includes the transportation of the used carpet to end of life processes. All the relevant end of life processes are included in the report.



Impact declaration and use stage normalization

The life cycle impact assessments (LCIA) were calculated for two different model scenarios of one square meter



Environmental Product Declarations

Atlas Carpet Mills | Perma-Tile Modular Carpet Family

of Atlas Perma-Tile Modular Carpet as per *Section 6.8.1 Impact declaration and use stage normalization*.

- For Table A, the LCIA for each life cycle stage shall be based on the RSL (reference service life) of a building which is currently 60 years. The use stage shall be for one year of routine maintenance (cleaning and other daily/weekly/monthly/annual maintenance) and extrapolated out to the reference service life of a building. This one year of LCA impacts will not include the maintenance activities that occur infrequently to the flooring product (refinishing, grout restoration, etc.) during the RSL of the building.
- For Table B, the LCA impacts for each life cycle stage shall be based on the RSL of a building which is currently 60 years. Table B use stage will not only include the annual maintenance activities calculated in table A, but also includes the activities that occur infrequently (refinishing, grout restoration, etc.) throughout the RSL of the building. For example, tile re-grouting impact every 30 years would be included in the use stage for Table B.” (NSF International, 2015)

Results of the Assessment

Table 3 - Life cycle inventory analysis in MJ natural resource energy/square meter of carpet

Carpet LCI stages	Sourcing/extraction	Manufacturing	Delivery & Installation	Use (one year)	End-of-Life	Total
Perma-Tile (PVC-backed)	159.0	96	7.0	41.0	2.3	306.0

Life Cycle Impact Assessment

The life cycle inventory data were converted to Life Cycle Impact Assessment (LCIA) results for the impact categories specified in the NSF International flooring product category rules (PCR) (NSF International, 2014). The abiotic depletion potential excludes primary energy materials (coal, oil and gas) to comply with the PCR. Non-renewable and renewable primary energy usage was calculated using the cumulative energy demand method version 1.08 from ecoinvent (Ecoinvent, 2010). This method was modified to include raw materials from the Environmental Clarity database. The inventory was calculated by combining Environmental Clarity gate-to-gate data with energy modules from the USLCI database. The energy modules used for the LCIA are shown in Table 4. LCIA results relevant to the NSF flooring PCR are shown in Tables 5, 5A, 6, 7, and 8. These results are expressed per square meter of carpet. Most of the environmental impacts are derived from energy consumption throughout the life cycle.

Table 4: Energy Consumption – Atlas Perma-Tile Modular Carpet

	Units	Amount	Percent
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Environmental Product Declarations

Atlas Carpet Mills | Perma-Tile Modular Carpet Family

Primary Energy, Non-Renewable	MJ	433	>95
Primary Energy, Renewable	MJ	19.6	<5

Table 5. Energy modules used in the life cycle impact assessment.

Category	Simapro name	Library	Conversions and notes
Electricity, manufacturing	Electricity, CA grid mix	Based on USLCI	Generated using CA average consumption grid mix for 2014 (Nyberg, 2015)
Electricity, sourcing/extraction	Electricity, US grid mix	Based on USLCI	Generated using EIA US average grid mix for 2015 (EIA, 2016)
Natural gas	Natural gas, combusted in industrial boiler/US	USLCI	0.027027 m ³ / MJ
Dowtherm	Natural gas, combusted in industrial boiler/US	USLCI	1 MJ natural gas / 0.8 MJ Dowtherm to process
Steam	Natural gas, combusted in industrial boiler/US	USLCI	1 MJ natural gas / (0.8 * 0.92) MJ steam to process
Direct fuel	Natural gas, combusted in industrial boiler/US	USLCI	1 MJ natural gas / MJ direct fuel
Coal	Bituminous coal, combusted in industrial boiler/US	USLCI	1 kg coal = 25 MJ
Diesel (process)	Diesel, combusted in industrial boiler/US	USLCI	0.85 kg/L & 45 MJ/kg
Diesel (transport)	Transport, combination truck, average fuel mix/US	USLCI	0.027224 L/tkm (USLCI), 45 MJ/kg, 0.85 kg/L
Undefined	Same as diesel (process)		
Heavy oil: refinery	Same as diesel (process)		
Hydro power: refinery	Dummy_Electricity, hydropower, at power plant, unspecified/US	USLCI	This process is a placeholder and has a no impacts.
Nuclear power: refinery	Electricity, nuclear, at power plant/US	USLCI	
Refrigeration	1/3 of Electricity value		Most industrial refrigeration temperatures use approximately this much electricity
Potential recovery	Same as steam, but negative values		Potential recovery is assumed to off-set steam use

Table 5A. Impact assessment and primary energy results for a market average of Perma-Tile Modular Carpet. All results are per square meter of carpet for one year of use.



Environmental Product Declarations

Atlas Carpet Mills | Perma-Tile Modular Carpet Family

Impact category	Units	Sourcing/ Extraction	Manufacturing	Delivery & Installation	Use (one year)	End of Life	Total
Abiotic depletion, non-energy	kg Sb eq	0	0	0	0	0	0
Acidification	kg SO ₂ eq	0.135	0.0593	3.43E-03	1.68E-03	8.16E-04	0.200
Eutrophication	kg PO ₄ --- eq	0.0163	2.17E-03	4.33E-04	4.91E-05	4.59E-05	0.0190
Global warming (GWP100a)	kg CO ₂ eq	12.3	6.21	0.591	0.178	0.182	19.5
Ozone layer depletion (ODP)	kg CFC-11 eq	9.67E-11	2.71E-11	3.81E-11	1.07E-12	5.66E-12	1.69E-10
Photochemical oxidation	kg C ₂ H ₄ eq	0.0503	4.28E-03	1.25E-03	1.43E-04	6.54E-05	0.0560
Primary energy, non renewable	MJ	315	101.6	11.3	2.63	2.67	433
Primary energy, renewable	MJ	9.8	9.3	0	0.4	0.1	19.6

Life cycle impact assessment



Environmental Product Declarations

Atlas Carpet Mills | Perma-Tile Modular Carpet Family

The results of the calculations on impact assessments for one square meter of Atlas Modular Carpet are reflected in tables below, which satisfy the PCR requirements.

Table 6. Impact assessment and primary energy results for a market average of Perma-Tile Modular Carpet. All results are per square meter of carpet for 1 year. This table satisfies the requirement of Table A in the PCR.

Impact category	Units	Sourcing/ Extraction	Manufacturing	Delivery and installation	Use (one year)	End of life	Total
Abiotic depletion, non-energy	kg Sb eq	0	0	0	0	0	0
Acidification	kg SO ₂ eq	0.135	0.0593	3.43E-03	1.68E-03	8.16E-04	0.200
Eutrophication	kg PO ₄ --- eq	0.0163	2.17E-03	4.33E-04	4.91E-05	4.59E-05	0.0190
Global warming (GWP100)	kg CO ₂ eq	12.3	6.21	0.591	0.178	0.182	19.5
Ozone layer depletion (ODP)	kg CFC-11 eq	9.67E-11	2.71E-11	3.81E-11	1.07E-12	5.66E-12	1.69E-10
Photochemical oxidation	kg C ₂ H ₄ eq	0.0503	4.28E-03	1.25E-03	1.43E-04	6.54E-05	0.0560
Primary energy, non renewable	MJ	315	101.6	11.3	2.63	2.67	433
Primary energy, renewable	MJ	9.8	9.3	0	0.4	0.1	19.6

Table 7. Impacts over the use stage of one square meter of Perma-Tile Modular Carpet. This table satisfies the requirements of Table B in the PCR.

Impact category	Units	Use (one year)
Abiotic depletion, non-energy	kg Sb eq	0
Acidification	kg SO ₂ eq	1.68E-03
Eutrophication	kg PO ₄ --- eq	4.91E-05
Global warming (GWP100)	kg CO ₂ eq	0.178
Ozone layer depletion (ODP)	kg CFC-11 eq	1.07E-12
Photochemical oxidation	kg C ₂ H ₄ eq	1.43E-04
Primary energy, non renewable	MJ	2.63
Primary energy, renewable	MJ	0.4

Table 8. Impact assessment and primary energy results for a market weighted average of Perma-Tile Modular Carpet. All results are per square meter of carpet for 60 years. This table satisfies the Table C requirement from the PCR.



Environmental Product Declarations

Atlas Carpet Mills | Perma-Tile Modular Carpet Family

Impact category	Units	Sourcing/ Extraction	Manufacturing	Delivery & installation	Use (one year)	End of life	Total
Abiotic depletion, non-energy	kg Sb eq	0	0	0	0	0	0
Acidification	kg SO ₂ eq	0.538	0.237	0.0137	0.101	3.26E-03	0.893
Eutrophication	kg PO ₄ --- eq	0.0650	0.0087	1.73E-03	2.95E-03	1.84E-04	0.0786
Global warming (GWP100)	kg CO ₂ eq	49.37	24.84	2.36	10.693	0.728	88.00
Ozone layer depletion (ODP)	kg CFC-11 eq	3.87E-10	1.08E-10	1.52E-10	6.42E-11	2.26E-11	7.24E-10
Photochemical oxidation	kg C ₂ H ₄ eq	0.2011	1.71E-02	0.0050	8.56E-03	2.62E-04	0.2320
Primary energy, non renewable	MJ	1260	406	45.1	158	10.7	1880
Primary energy, renewable	MJ	39.0	37.3	0	25.6	0.4	102.4

Interpretation

Interpretations gleaned from the Atlas Perma-Tile Modular Carpet family reinforces that the sourcing/extraction stage is the largest contributor of the studied impact categories. However, when these studies are reviewed over the useful life of the product, it is apparent that the use stage, namely maintenance, is an area that requires development of less impactful processes. These results show that using carpets for longer time periods results in better environmental performance as long as performance criteria are met. From the manufacturer perspective, Atlas carpets provide sustainability benefits by using the appropriate amount of materials for each of these products.

Some caution should be used when interpreting the life cycle impact assessment results and comparing these results to results based on different energy module/impact assessment method combinations. There are significant variations between frequently used life cycle inventory databases and impact assessment methods in some impact categories. Consequently, the intermediate results given in Table 9 are known to a much greater level of accuracy than the impact assessment results. Abiotic depletion values of zero reflect the lack of characterization values for raw materials used for capital equipment in energy sourcing/extractions. This value is non-zero when Ecoinvent energy modules are used.

Future modular product developments should consider waste water conservation and contaminant clean-up for manufacturing and maintenance. Additional innovations in the area of maintenance are important for overall product impact improvements. The consideration of manufacturing location and logistics is another area that should be reviewed. The ability to minimize transportation between carpet manufacturing facilities will reduce energy considerations.



Additional Environmental Information

Health, safety, and environmental aspects during production



Environmental Product Declarations

Atlas Carpet Mills | Perma-Tile Modular Carpet Family

Atlas Carpet Mills has a long term policy of providing its associates with modern, clean, safe, and pleasant working conditions. In recent years, there have been investments in modernizing all facilities. Atlas Carpet Mills stresses that a safe and clean operation is essential for the accident-free production of products.

Atlas Carpet Mills continues emphasis on these efforts to be accident free by on-going Safety Training, an awareness and culture of being mindful of associates' surroundings and the production processes around them. There are daily stand up safety meetings, monthly safety inspections of all plants and operations, and annual OSHA training and corporate audits.

Structural damage

Subfloor preparation instructions can be found at: <http://www.atlascarpetmills.com/installation>.

Disclaimer

It should be noted that environmental declarations from different programs may not be comparable and may not be qualified as replacements for each other without detailed analysis.



References



Environmental Product Declarations

Atlas Carpet Mills | Perma-Tile Modular Carpet Family

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