





Environmental Product Declaration

Atlas Carpet Mills Broadloom Carpet Family





| EPD Information | | | |
|---|---------------------------------------|---|---------------------------------------|
| Program Operator | | NSF International | |
| Declaration Holder | | Atlas Carpet Mills 2200 Saybrook Ave. Los Angeles, CA 90040 | |
| Product Broadloom Carpet | Date of Issue July 14, 2016 | Period of Validity 5 Years | Declaration Number EPD10076 |
| This EPD was independently verified by NSF International in accordance with ISO 14025: | |  | |
| <input type="checkbox"/> Internal <input checked="" type="checkbox"/> External | | Jenny Oorbeck joorbeck@nsf.org | |
| 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, April 26, 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 | | | |
| | | 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 mrovercash@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.



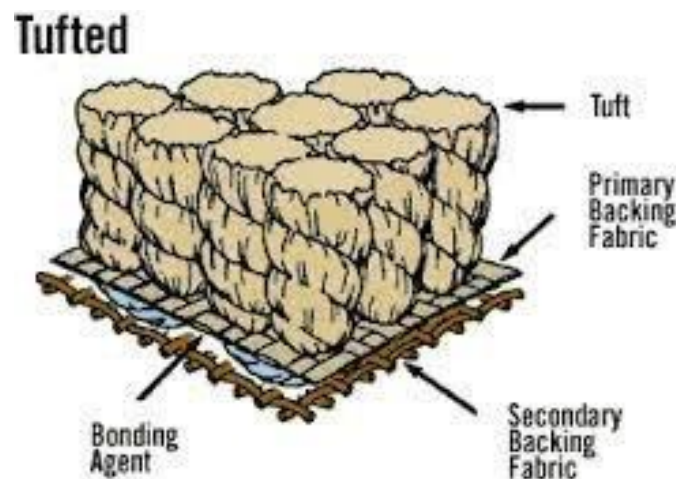
ENVIRONMENTAL PRODUCT DECLARATION: DETAILED VERSION



Product Description

Product Classification and Description

Products covered in this Environmental Product Declaration (EPD) are a broad variety of broadloom carpets manufactured by Atlas Carpet Mills backed by our Styrene Butadiene Rubber (SBR) Latex or Styrene Butyl Acrylate Latex (SBAL) and made with nylon 6,6. The SBR and SBAL are comprised of latex and calcium carbonate. The face fiber is 100% nylon 6,6 and is either solution or beck dyed. The products are covered by Atlas Carpet Mills' 10 year Limited Commercial Warranty. The products all pass the Carpet & Rugs Institutes Green Label Plus and are third party certified to the NSF/ANSI 140 Sustainable Carpet Assessment Standard at the Gold level (www.nsf.org). The average weight of the backing system is 38 oz/yd². The variation in weight in the broadloom products is due to the amount of yarn weight. The weighted average used in the Life Cycle Assessment (LCA) is 33.3 oz/yd² with the minimum yarn weight of 20 oz./yd² and the maximum yarn weight of 45 oz./yd².



Applicability

Atlas Carpet Mills' broadloom carpets are 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 the Carpet & Rug Institutes. For more detail on the performance recommendations refer to: <http://www.carpet-rug.org/commercial-customers/selecting-the-right-carpet/quality-and-performance/index.cfm> The Atlas Carpet Mills' family of products has a reference service life of 15 years.



Product Characteristics

| Category | Result | |
|--|---|--------------------|
| Type of manufacture | Tufted pattern loop, tufted pattern solid and cut pile, tufted pattern solid and tip shear | |
| Yarn type | Nylon 6,6 | |
| Additional characteristics according to NSF/ANSI 140 | Sustainability Assessment for Carpet: <i>Gold</i> | |
| Sustainable certifications | Certified to NSF/ANSI 140 | |
| VOC emissions test method | GLP 2306 and GLP 5278 for solution dyed products and GLP 4428 or 1700 for piece dyed products | |
| Texture Appearance Retention Rating | ≥3 | |
| Characteristics | Nominal Value | Unit |
| Total thickness | 0.182-0.361 | inch |
| Product weight | 57.7-82.7 | oz/ft ² |
| Surface pile thickness | 0.102-0.281 | inch |
| Number of tufts or loops/dm ² | 9216-31,104 | ft ² |
| Surface pile weight | 20-45 | oz/yd ² |
| Pile Fiber Composition | 100% Nylon 6,6 | % |
| Secondary Backing | 100% Polypropylene | % |
| Pre-Consumer Content | 20% Minimum | % |
| Post-Consumer Content | 0 | % |

| Product Standards | Results |
|--|-------------------|
| CRI Green Label Plus | Pass |
| NSF 140 | 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 Hexapod Tumble Drum Test (TARR) | ≥3.0 |



 **Material Content**

| Component | Material | Mass % | Availability | | | Origin of Raw Materials |
|--------------------------------------|-------------------|--------|--------------|--------------------------|-------------|-------------------------|
| | | | Renewable | Non-Renewable | Recycled | |
| Pile Material (Tuft) | Type 6,6 Nylon | 47% | | Fossil resource, limited | 0% | Global |
| Primary and Secondary Backing Fabric | Polypropylene | 8% | | Fossil resource, limited | 0% | Global |
| Back coating (Bonding Agent) | Latex | 45% | | Fossil resource, limited | 0% | Global |
| | Calcium Carbonate | | | Mineral, abundant | 20% minimum | US |

None of the materials and substances used in the manufacture of Atlas Broadloom Carpet is considered by any government regulation as adversely affecting human health or the environment. Atlas Broadloom 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 is solution dyed or beck dyed. Nylon 6,6 is produced through polycondensation of hexamethylenediamine and adipic acid.

Styrene Butadiene Rubber (SBR) is a synthetic copolymer that is used as a primary cross-linkable binder in the manufacture of rubber flooring products and tires. It is used to provide tuft bind and lamination strength between the nylon fiber and secondary backing.

Styrene Butyl Acrylate Latex (SBAL) is a synthetic copolymer that is used extensively in paper and textile applications. It is used to provide tuft bind and lamination strength between the nylon fiber and secondary backing that is generally more aggressive than SBR.

Calcium carbonate is an abundant mineral found in all parts of the world as the chief substance in rocks (i.e., marble and limestone). It can be ground to varying particle sizes and is widely used as filler in formulated flooring systems.

Polypropylene Backings – The primary backing is utilized to tuft the Type 6,6 nylon fiber to create the carpet. The secondary backing is utilized to provide dimensional stability to the finished carpet.



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 its source have passed the initial evaluation process, on-going evaluation is made using the suppliers' certificate of analysis.

Manufacturing Stage

The production process is designed for efficiency, utilizing the strengths of Atlas' technology and expertise. The determination of dye process lies in the intended purpose and aesthetics of the product. The fiber is 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 precoat locks the fibers into place giving strength to the material. The coating process uses electricity, gas, and water.

Backing of the broadloom carpet is accomplished by applying a layer of either SBR or SBAL latex. This layer adds stability and completes the performance package for the broadloom carpet. This process uses electricity and gas.

The last step in the broadloom process is packaging. This process utilizes electricity.

Solution Dyed Broadloom



Beck Dyed Broadloom





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 adhesive for Atlas broadloom carpet is Atlas Carpet Mills Broadloom Adhesive using a full spread of adhesive. The life cycle assessment modeled the installation stage with Atlas Carpet Mills Broadloom Adhesive at a spread rate of 0.15 kg adhesive/sy carpet. Complete installation instructions are available at: www.atlascarpetmills.com/installation

Health, safety, and environmental aspects during installation

MSDS sheets for recommended adhesives may be viewed at www.atlascarpetmills.com/technical

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

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

Packaging

Packaging Materials for Atlas Broadloom Carpet

| Category | Material |
|-----------|--------------|
| Cardboard | Cores |
| Plastics | Plastic wrap |

Use Stage

Use of the floor covering

The service life for Atlas Broadloom Carpet will vary depending on the amount of floor traffic, level of maintenance and the desired appearance of the floor covering. The reference service life for Atlas Broadloom Carpet is 15 years.

The EPD must present results for both a one year and sixty year period; impacts are calculated for both time periods. The standard assumes that the life of a building is sixty years.

- The one year impacts are based on the initial installation of one square meter of flooring (production, transport, installation, end-of-life, and use) phase impacts are based on annual cleaning and maintenance guidelines.
- The sixty 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 years of total floor maintenance.

Atlas Broadloom Carpet is guaranteed by Atlas' warranted performance. These warranties may be found at www.atlascarpetmills.com/technical



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. The Carpet and Rug Institute’s publication titled *Carpet Maintenance Guidelines for Commercial Applications* offers guidance on how to maintain the carpet at various floor traffic levels.

Atlas’ maintenance guidelines may be found at: www.atlascarpetmills.com/maintenance

The table below is a guideline for the frequency of cleaning established by the 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.

Recommended Maintenance for Atlas Broadloom Carpet

| Traffic Soil Rating | Vacuuming | Spot Cleaning | Interim Maintenance (between restorative cleanings) | Restorative Cleanings |
|---|---|---|---|------------------------|
| Light <500 foot traffics per day | 1 to 2 per week | Daily or as soon as noticed | 1 to 3 times annually | 1 to 2 times annually |
| Medium 500-1000 foot traffics per day | Daily in traffic areas, overall 3 to 4 X per week | Daily or as soon as noticed | 3 to 6 times annually | 2 to 4 times annually |
| Heavy 1000-2500 foot traffics per day | Daily in traffic areas, overall 4 to 7 X per week | Daily in traffic areas, overall 4 to 7 X per week | 6 to 12 times annually | 3 to 6 times annually |
| Very Heavy >2500 foot traffics per day | 1 to 2 X daily in traffic areas. Overall 7 X per week | 1 to 2 X daily in traffic areas. Overall 7 X per week | 12 to 52 times annually | 6 to 12 times annually |

End of Life Stage

Recycling, reuse, or repurpose

The Atlas families of carpets are designed to achieve a commitment to enhance recycle and reuse. Reuse, repurpose, and recycling of carpet are the preferred methods 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. We support the use of CARE Recycling Partners for the landfill diversion process.

Disposal



Atlas Broadloom Carpet can be landfilled where local regulations allow. It can also be incinerated as part of a waste to energy program.

With the end-of-life, 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* (NSF International, 2014). The functional unit is one square meter 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 yard 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 yard 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 Carpet and Rug Institute database (2010) as well as that of Environmental Clarity (Overcash and Griffing, 2016) 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 are also felt to be reasonable for the U.S. as global competition and manufacturing technologies are prevalent. Overall the data quality is in the good to very good categories.

Life cycle energy consumption results are provided in units of natural resource energy (nre) (MJ/square meter 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. Life cycle impact assessment results are provided on a square meter basis in the required impact categories.



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

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.

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 Carpet and Rug Institute database (2010) as well as that of Environmental Clarity (Overcash and Griffing, 2016) 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 are also felt to be reasonable for the U.S. as global competition and manufacturing technologies are prevalent. Overall the data quality is in the good to excellent categories.



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 are also felt 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. The data are considered to be good to excellent which meets the requirements of the product category rules. (NSF International, 2012) 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.

Time related coverage – The process data were based on one year of data between 2014 and 2015. 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 were 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 Broadloom 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 Broadloom Carpet during its useful life as well as the extraction, manufacturing, and transport of all supporting materials, if relevant for the maintenance.
- 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 of Atlas Broadloom Carpet as per *Section 6.8.1 Impact declaration and use stage normalization*. (NSF International, 2012)

“For Table A, the LCIA is for 1 year. 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.

Results of the Assessment

Table 1 - Life cycle inventory analysis in MJ natural resource energy/sy carpet

| Carpet LCI stages | Sourcing/Extraction | Manufacturing | Delivery and installation | Use (one year) | End-of-Life | Total |
|-----------------------|---------------------|---------------|---------------------------|----------------|-------------|-------|
| Carpet Type | | | | | | |
| SBL backed broadloom | 118 | 108 | 4.4 | 41 | 1.2 | 273 |
| SBAL backed broadloom | 124 | 108 | 4.4 | 41 | 1.2 | 279 |

Life Cycle Impact Assessment

The life cycle inventory data were converted to life cycle impact assessment (Icia) results for the impact categories specified in the NSF International flooring product category rules (PCR) (NSF International, 2014). Six impact assessment categories from the CML 1A baseline 2013 version 4.2 method (CML, 2013) were used. 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 Icia are shown in Table 3. LCIA results relevant to the NSF flooring PCR are shown in Tables 4, 4A, 5, 6, and 6A. These results are expressed per square meter of carpet. Most of the environmental impacts are derived from energy consumption throughout the life cycle.

Note on Use Stage

The Atlas Broadloom Carpet family of products has a reference service life of 15 years. Recommended maintenance schedules for these products can be reviewed on-line at: www.atlascarpetmills.com/maintenance.



Table 2: Energy Consumption – Atlas Broadloom Carpet

| | Units | Amount | % |
|--------------------------------|-------|--------------------------|-----|
| Primary Energy, Non- Renewable | MJ | 350(SBL) - 357 (SBAL) | >95 |
| Primary Energy, Renewable | MJ | 18(SBL) - 18.1 (SBAL) | <5 |

The life-cycle inventories for all materials used in the product and evaluated in the LCA are contained in the CRI, Carpet and Rug Institute, Life cycle database developed by Georgia Institute of Technology and carpet industry, Dalton, GA, 2010.

Table 3. 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 m3 / 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 |



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Table 3A. Impact assessment and primary energy results for a market average of broadloom carpets. All results are per square meter of carpet for one year of use.

| 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 | 0.110 | 0.0677 | 2.31E-03 | 1.68 E-03 | 4.23E- 04 | 0.182 |
| Eutrophication | kg PO ₄ --- eq | 0.0161 | 2.23E-03 | 2.35E-04 | 4.91E-05 | 2.38E- 05 | 0.0187 |
| Global warming (GWP100) | kg CO ₂ eq | 9.5 | 6.91 | 0.365 | 0.178 | 0.094 | 17.1 |
| Ozone layer depletion (ODP) | kg CFC-11 eq | 5.92E-11 | 1.73E-11 | 2.95E-11 | 1.07 E-12 | 2.94E- 12 | 1.10E- 10 |
| Photochemical oxidation | kg C ₂ H ₄ eq | 0.0340 | 4.967E-03 | 1.20E-03 | 1.43 E-04 | 3.39E- 05 | 0.0404 |
| Primary energy, non- renewable | MJ | 223 | 115.0 | 8.20 | 2.64 | 1.39 | 350 |
| Primary energy, renewable | MJ | 6.4 | 11.1 | 0 | 0.4 | 0.1 | 18.0 |



Table 4. Impact assessment and primary energy results for a market average of SBL broadloom carpets. All results are per square meter of carpet used for one 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 | 0.110 | 0.0677 | 2.31E-03 | 1.68E-03 | 4.23E-04 | 0.182 |
| Eutrophication | kg PO ₄ --- eq | 0.0161 | 2.23E-03 | 2.35E-04 | 4.91E-05 | 2.38E-05 | 0.0187 |
| Global warming (GWP100) | kg CO ₂ eq | 9.5 | 6.91 | 0.365 | 0.178 | 0.094 | 17.1 |
| Ozone layer depletion (ODP) | kg CFC-11 eq | 5.92E-11 | 1.73E-11 | 2.95E-11 | 1.07E-12 | 2.94E-12 | 1.10E-10 |
| Photochemical oxidation | kg C ₂ H ₄ eq | 0.0340 | 4.97E-03 | 1.20E-03 | 1.43E-04 | 3.39E-05 | 0.0404 |
| Primary energy, non-renewable | MJ | 223 | 115.0 | 8.2 | 2.64 | 1.39 | 350 |
| Primary energy, renewable | MJ | 6.4 | 11.1 | 0 | 0.4 | 0.1 | 18.0 |



Table 4A. Impact assessment and primary energy results for a market average of SBAL broadloom carpets. All results are per square meter of carpet used for one 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 SO2 eq | 0.114 | 0.0677 | 2.31E-03 | 1.68E-03 | 4.23E-04 | 0.186 |
| Eutrophication | kg PO4--- eq | 0.0163 | 2.23E-03 | 2.35E-04 | 4.91E-05 | 2.38E-05 | 0.0188 |
| Global warming (GWP100) | kg CO2 eq | 10.0 | 6.91 | 0.365 | 0.178 | 0.094 | 17.5 |
| Ozone layer depletion (ODP) | kg CFC-11 eq | 1.51E-10 | 1.73E-11 | 2.95E-11 | 1.07E-12 | 2.94E-12 | 2.01E-10 |
| Photochemical oxidation | kg C2H4 eq | 0.0354 | 4.97E-03 | 1.20E-03 | 1.43E-04 | 3.39E-05 | 0.0418 |
| Primary energy, non-renewable | MJ | 230 | 115.0 | 8.2 | 2.64 | 1.39 | 357 |
| Primary energy, renewable | MJ | 6.5 | 11.1 | 0 | 0.4 | 0.1 | 18.1 |



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Table 5. Impacts over the use stage of one square meter of SBA or SBAL backed broadloom 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 SO2 eq | 1.68E-03 |
| Eutrophication | kg PO4--- eq | 4.59E-05 |
| Global warming (GWP100) | kg CO2 eq | 0.178 |
| Ozone layer depletion (ODP) | kg CFC-11 eq | 1.07E-12 |
| Photochemical oxidation | kg C2H4 eq | 1.43E-04 |
| Primary energy, non-renewable | MJ | 2.64 |
| Primary energy, renewable | MJ | 0.4 |

Table 6. Impact assessment and primary energy results for a market weighted average of SBL backed broadloom carpets. All results are per square meter of carpet used for 60 years. This table satisfies Table C in the PCR.

| Impact category | Units | Sourcing/ Extraction | Manufacturing | Delivery and installation | Use (60 years) | End of life | Total |
|-------------------------------|------------------|-------------------------|---------------|------------------------------|-------------------|----------------|----------|
| Abiotic depletion, non-energy | kg Sb eq | 0 | 0 | 0 | 0 | 0 | 0 |
| Acidification | kg SO2 eq | 0.439 | 0.271 | 9.25E-03 | 0.101 | 1.69E-03 | 0.822 |
| Eutrophication | kg PO4--- eq | 0.0645 | 0.0089 | 9.42E-04 | 2.95E-03 | 9.52E-05 | 0.0774 |
| Global warming (GWP100) | kg CO2 eq | 38.03 | 27.63 | 1.459 | 10.693 | 0.3775 | 78.19 |
| Ozone layer depletion (ODP) | kg CFC- 11 eq | 2.37E-10 | 6.91E-11 | 1.18E-10 | 6.42E-11 | 1.17E-11 | 5.00E-10 |
| Photochemical oxidation | kg C2H4 eq | 0.1360 | 1.99E-02 | 0.0048 | 8.56E-03 | 1.36E-04 | 0.1694 |
| Primary energy, non-renewable | MJ | 890 | 460 | 33.0 | 159 | 5.57 | 1547 |
| Primary energy, renewable | MJ | 25.7 | 44.5 | 0 | 25.7 | 0.2 | 96.1 |



Table 6A. Impact assessment and primary energy results for a market weighted average of SBAL backed broadloom carpets. All results are per square meter of carpet used for 60 years. This table satisfies Table C in the PCR.

| Impact category | Units | Sourcing/ Extraction | Manufacturing | Delivery and installation | Use (60 years) | End of life | Total |
|-------------------------------|------------------|-------------------------|---------------|------------------------------|-------------------|----------------|----------|
| Abiotic depletion, non-energy | kg Sb eq | 0 | 0 | 0 | 0 | 0 | 0 |
| Acidification | kg SO2 eq | 0.458 | 0.271 | 9.25E-03 | 0.101 | 1.69E-03 | 0.840 |
| Eutrophication | kg PO4--- eq | 0.0651 | 0.0089 | 9.42E-04 | 2.95E-03 | 9.52E-05 | 0.0780 |
| Global warming (GWP100) | kg CO2 eq | 39.82 | 27.63 | 1.459 | 10.693 | 0.3775 | 80.0 |
| Ozone layer depletion (ODP) | kg CFC- 11 eq | 6.03E-10 | 6.91E-11 | 1.18E-10 | 6.42E-11 | 1.17E-11 | 8.66E-10 |
| Photochemical oxidation | kg C2H4 eq | 0.1416 | 1.99E-02 | 0.0048 | 8.56E-3 | 1.36E-04 | 0.1750 |
| Primary energy, non-renewable | MJ | 919 | 460 | 33.0 | 159 | 5.57 | 1576 |
| Primary energy, renewable | MJ | 26.0 | 44.5 | 0 | 25.7 | 0.2 | 96.4 |

Interpretation

Interpretations gleaned from the Atlas Broadloom Carpet family reinforces that the manufacturing 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 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 broadloom 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.



Additional Environmental Information

Health, safety, and environmental aspects during production

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 stresses that a safe and clean operation is essential for the accident-free production of products.

Atlas continues emphasis on these efforts to be accident free by on-going Safety Training through Safe Start, 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: 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

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