ENVIRONMENTAL PRODUCT DECLARATION

Mannington COMMERCIAL

Mannington is a fifth-generation, family-owned company with manufacturing facilities in communities across America. Known for creating high performance products for over 100 years, the past decade has seen our company rise to a leadership position in the styling and development of long-lasting, low- maintenance flooring systems that incorporate reclaimed waste streams. We made dramatic water reductions at our carpet operations over the past years. We also hold certifications for ISO-14001, NSF/ ANSI sustainability standard for carpet, and CRI Green Label Plus. Our products contribute to LEED, Green Globes, and other rating systems.

Integra® HP Broadloom, a high-performance broadloom backing system, offers industry-leading quality and durability, with exceptional tuft bind and dimensional stability. This backing system is ideal for healthcare, education, retail, and corporate installations.

NSF

Certified Environmental Product Declaration
www.nsf.org

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ENVIRONMENTAL PRODUCT DECLARATION VERIFICATION

EPD Information			
Program Operator	NSF Certification, LLC		
Declaration Holder	Mannington Commercial		
Integra® HP	Date of Issue: June 30, 2020	Period of Validity: 5 years	Declaration Number: EPD10392
This EPD was independently verified by NSF Certification, LLC in accordance with ISO 14025: ☐ Internal X External			[signature] Jenny Oorbeck, joorbeck@nsf.org
This life cycle assessment was independently verified by in accordance with ISO 14044 and the reference PCR:			[signature] Matt Van Duinen, WAP Sustainability matt@wapsustainability.com

LCA Information	
Basis LCA	*Mannington rEvolve and Infinity 2 Life Cycle Assessment Report*, November 2018; *Appendix B: Integra HP Carpet Products*, April 2020
LCA Preparer	Sid Premchandani, sid@sustainablesolutionscorporation.com Sustainable Solutions Corporation
This life cycle assessment was critically reviewed in accordance with ISO 14044 by:	[signature] Matt Van Duinen, WAP Sustainability matt@wapsustainability.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:	Dr. Michael Overcash Environmental Clarity movercash@earthlink.net

ENVIRONMENTAL PRODUCT DECLARATION: DETAILED VERSION

Product Description

Product classification and description

Products covered in this Environmental Product Declaration (EPD) are a broad variety of carpet styles and colors manufactured by Mannington Commercial, backed with our Integra® HP Broadloom backing system and made with either Nylon 6,6 or Nylon 6 yarn. The fiber in these products (product wear layer) is constructed using Nylon 6,6 or Nylon 6 yarn that is either solution dyed, space dyed, or a combination of these methods. Integra® HP Broadloom is a vinyl composite backing that is engineered for strong performance, excellent tuft bind, moisture resistance and dimensional stability. Like most Mannington Commercial backing systems, these products are certified as environmentally preferable products to NSF/ANSI 140:2015 Sustainability Assessment for Carpet, to the Gold level and manufactured in the USA in an ISO 14001 registered facility.

The aggregate weight of Integra® HP Broadloom backing system is approximately 54.9 oz/yd². The variation in weight across the Integra® HP Broadloom carpet products is due to the yarn weight. The life cycle assessment for this product group was completed using a yarn weight of 25.2 oz/yd². Unless otherwise noted, data within this EPD represents an average yarn weight of 25.2 oz/yd² and the Integra® HP Broadloom backing system weighing 54.9 oz/yd² for a total product weight of 80.1 oz/yd².

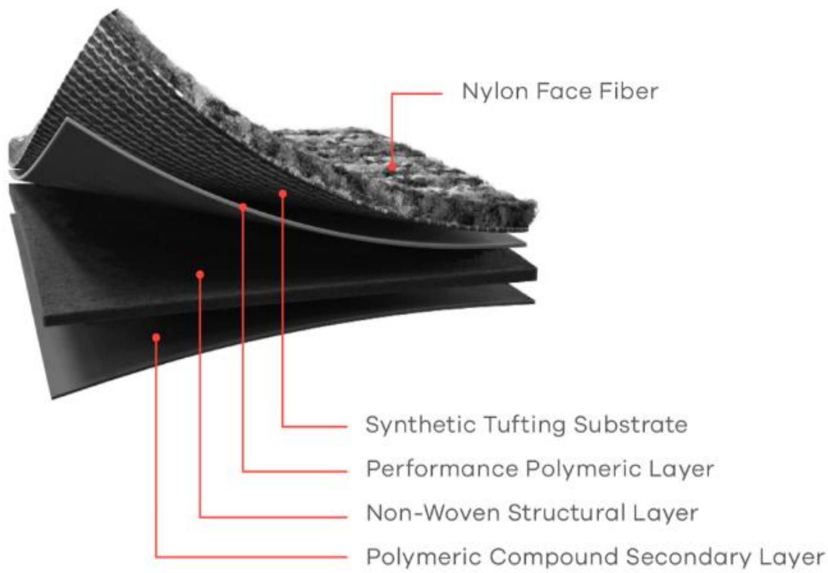

Figure 1 - Diagram of Integra® HP Broadloom carpet

Definitions

- Face fiber – Fibers of Nylon 6,6 or Nylon 6 yarn that are solution dyed, space dyed or a combination of the two.
- Synthetic tufting substrate – The yarn is tufted into a polyester woven sheet or PET/Nylon blended non-woven sheet, also known as primary backing. The polyester woven sheet is composed of 85% post-consumer recycled content.
- Non-aqueous polymer pre-coat moisture barrier – A polymeric material with post-consumer recycled content which bonds the tufts to the primary backing, giving the yarn fibers strength and durability.
- Non-woven layer – A fabric embedded into the backing, which provides dimensional stability.

Applicability

Integra® HP Broadloom carpet is intended for use in high traffic commercial interior spaces and has a reference service life of 15 years. The type of manufacturing (see Table 1) will determine if the flooring is suitable for extra- heavy traffic, as defined in the guidelines developed by the Carpet and Rug Institute (CRI)[1].

Product Characteristics

Table 1: Product Characteristic Table for Integra HP® Broadloom Carpet

Type of manufacture	Tufted Textured Loop, Tufted Texture Cut Pile, Tufted Patterned Loop, Tufted Patterned Tip Sheared, Tufted Tip Sheared or Tufted Cut Pile		
Yarn type	Nylon 6,6 or Nylon 6	100%	
Secondary backing	Polymeric vinyl compound	100%	
Characteristics	**Nominal Value**		**Unit**
Number of tufts or loops	981 – 2,710 (9,115 – 25,178)		per dm^2 (per ft^2)
Yarn weight	475 – 882 (14 - 26)		g/m^2 (oz/yd^2)
Backing weight	1,800 (53.1)		g/m^2 (oz/yd^2)
Total product weight	2,275 – 2,682 (67.1 – 79.1)		g/m^2 (oz/yd^2)
Pile thickness	2.134 – 6.858 (0.084 – 0.270)		mm (inch)
Backing thickness	2.36 (0.093)		mm (inch)
Total thickness	4.494 – 9.218 (0.284 – 0.470)		mm (inch)
Total recycled content	6 – 11		%
Product Standard / Approval			**Results**
AATCC 134-2011 Electrostatic Propensity			≤3.0 kV
AATCC 16-2004 Colorfastness to Light			≥4 at 40 AFUs
ASTM E648 – Radiant Panel Test			CLASS 1
ASTM E662 – NBS Smoke Test (Flaming Mode)			≤ 450
ASTM D2859 – Methenamine Pill Test			PASSES
ASTM D3936 – Delamination Strength			≥ 3 lbs / in
ASTM D5252, ASTM D7330, CRI TM-101 – Test for Surface Appearance Change (CRI-TARR rating)			≥ 3
British Spill Test			PASSES
The laboratories used for testing have NVLAP Accreditation (NIST)2.			
Accreditation			
Carpet and Rug Institute Green Label Plus – Category 17X (CRI indoor air quality control green label plus ID: GLP7616)			
EN14041:2004/A1:2006 CE-Labeling (1121-CPR-DA0029)			
NSF/ANSI 140:2015 Sustainability Assessment for Carpet: Gold			

[1] http://www.carpet-rug.org/documents/factsheets/Guidelines_for_levels_of_traffic.pdf

[2] http://www.nist.gov/nvlap/

Material Content

Material Content of the product

Table 2 - Material content table for Integra® HP Broadloom Carpet

Component	Material	Mass %	Availability (nature of resource, renewable / recycled, availability)	Origin
Nylon face fiber	Nylon 6,6 (products: 95%)	21 - 33 %	Fossil resource, non-renewable, limited	Global
	Nylon 6 (products: 5%)		Fossil resource, non-renewable, limited	Global
Synthetic tufting substrate	Polyester (products: 60%)	4 – 8 %	Fossil resource, non-renewable, limited (15%) Post-consumer recycled, abundant (85%)	Global
	PET / Nylon (products: 40%)		Fossil resource, non-renewable, limited	Global
Non-aqueous polymer pre-coat	Polyvinyl chloride polymer	55 – 72 %	Fossil resource, non-renewable, limited	Global
	DOTP		Fossil resource, non-renewable, limited	Global
	BBCH		Fossil resource, non-renewable, limited	Global
	Calcium carbonate		Mineral, non-renewable, abundant	Global
	Glass filler		Post-consumer recycled material, abundant	US
Non-woven layer	Polypropylene	1 – 2 %	Fossil resource, non-renewable, abundant	Global
Modifiers	Various	1 – 3%	Various	Global

Production of main materials

Nylon 6,6, CAS# 32131-17-2, is synthesized by polycondensation of hexamethylene diamine and adipic acid. (Nylon 6-6, 2007)

Nylon 6, CAS# 25038-54-4, is synthesized by ring opening polymerization of caprolactam. Caprolactam is comprised of 6 carbons creating the 6 in Nylon 6. (Nylon 6, 2005)

Polyester (PET), CAS# 25038-59-9, is a synthetic polymer made of purified terephthalic acid (PTA). (Polyester, 2002)

Polyvinyl chloride (PVC), CAS# 9002-86-2, is prepared by polymerization of vinyl chloride monomer. Vinyl chloride monomer is produced from salt and ethylene.

Calcium carbonate, CAS# 1317-65-3, is an abundant mineral found worldwide and is the chief substance found in rocks (i.e., marble and limestone). It can be ground into varying particle sizes and is widely used as filler material in formulated flooring systems.

Dioctyl terephthalate (DOTP), CAS# 6422-86-22, is prepared by the reaction of dimethyl terephthalate and 2-ethylhexanol.

1,2-cyclohexanedicarboxylic acid, 1-butyl 2-(phenylmethyl) ester (BBCH), CAS# 1200806-67-2, is synthesized from reacting the salt of mono-butyl dicarboxylic acid and benzyl chloride.

Glass filler (Glass Cullet), CAS# 065997-17-3, is post-consumer recycled glass. It can be ground into varying particle sizes.

Polypropylene, CAS# 9003-07-0, is a thermoplastic polymer created by addition polymerization with the monomer propylene.

Life Cycle Assessment Stages and Reported EPD Information

Sourcing/extraction (raw material acquisition) stage

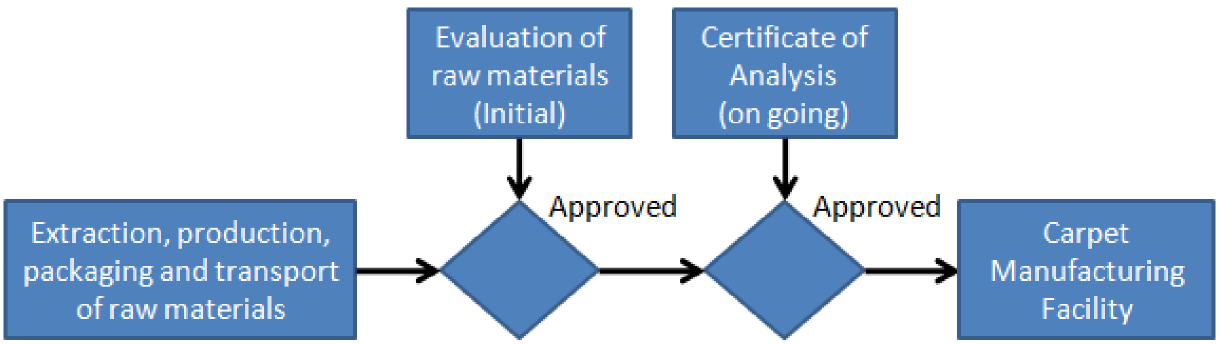

Figure 2: Diagram of the raw material sourcing and extraction stage

The life cycle assessment stage for sourcing and extraction begins at the point of the raw material being extracted and ends at the point when the packaged raw material is received by the carpet manufacturing facility.

Before a raw material is used, it must first be evaluated for quality, availability, consistency, performance and value before the material will be considered acceptable. Once the material has passed the initial evaluation process; future shipments are evaluated using the suppliers' certificate of analysis.

Manufacturing stage

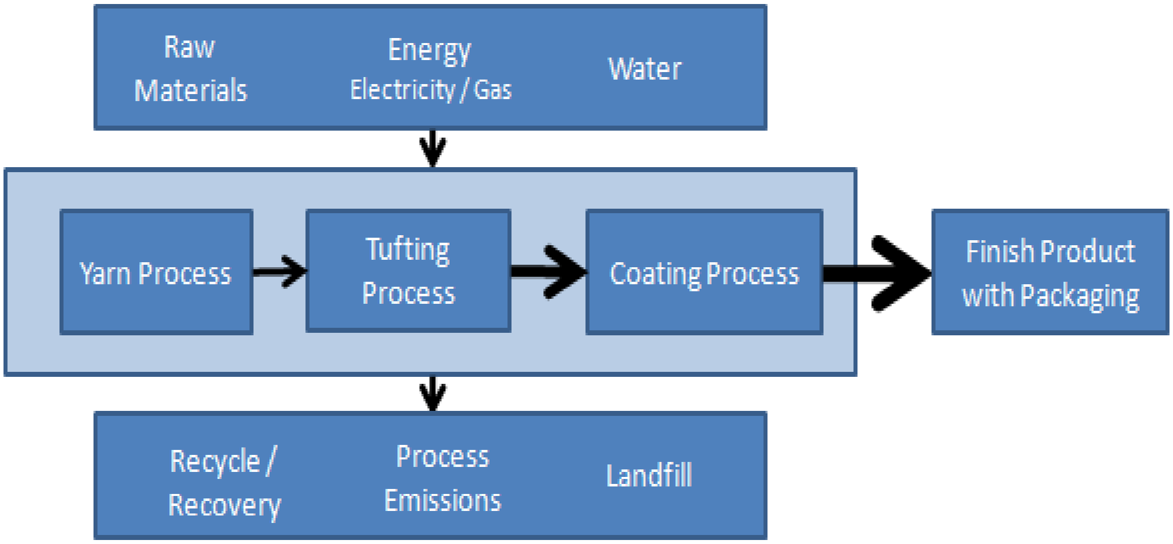

Figure 3: Diagram of the manufacturing stage

The manufacturing stage begins with the yarn process. The yarn is processed by converting the raw yarns (singles) into a finished yarn that is sent to the tufting process. The processing of raw yarn usually requires electricity, gas and water.

The tufting process involves using a tufting machine utilizing needles to insert the finished yarn into a synthetic tufting substrate (primary backing) to produce various aesthetically pleasing products which are generically referred to as greige carpet. The tufting process requires electricity.

The coating process is the final manufacturing step. The coating process applies a non-aqueous polymer pre-coat moisture barrier, bonds the finished yarn into the primary backing, and the nonwoven layer to complete the product. The product is rolled, packaged and made ready for shipment at the end of the coating process. The coating process requires electricity, gas and water.

Health, safety, and environmental aspects during production

- ISO 14001:2015 Environmental Management System
- NSF/ANSI 140:2015 Sustainability Assessment for Carpet – Section Public health and environment
- Aggressive water conservation program began in 2007 yielding dramatic improvements thru current day.

Production waste

- All packaging materials (cardboard, stretch wrap, shrink wrap and pallets) are recycled / repurposed.
- All scraps and trimmings of yarn, primary backing and backing material are recycled / repurposed.
- Any finish waste is recycled / repurposed.

Delivery and installation stage

Delivery

Integra® HP Broadloom carpet and sundries are typically transported to the installation site using a diesel-powered semi-truck. Truck transportation plays a significant role in the distribution of the product.

This life cycle assessment has modeled the delivery using an average distance of 500 miles (805 km) with the diesel-powered semi-truck having an 90% utilization of its payload.

Installation

The recommended method for installing Integra® HP Broadloom carpet is to use the full adhesive method with Mannington Commercial INTEGRA 2 adhesive. The instructions for this installation procedure can be found on the Mannington Commercial web site (Mannington/Commercial Flooring/Technical/Carpet Installation).[3]

The life cycle assessment modeled the installation stage with INTEGRA 2 adhesive being applied at a rate of 0.353 kg/m^2 or 0.650 lb/yd^2.

Health, safety, and environmental aspects during installation

The Mannington Commercial INTEGRA 2 adhesive is CRI Green Label Plus (GLP# 07281) certified.[4] The SDS for INTEGRA 2 can be found on the Mannington Commercial web site (Mannington/Commercial Flooring/Technical/Carpet Adhesives).[5]

Waste

Product packaging wastes can be recycled at local recycling centers.

The life cycle assessment modeled a 2% loss of broadloom carpet during the installation process. This life cycle assessment modeled all of the installation waste as being disposed of in a commercial landfill.

Packaging

The carpet is wrapped on a cardboard core and the roll of carpet is then wrapped with a sheet of polyethylene covering. The ends of the roll are secured with cardboard core inserts. Each roll, on average, contains 139.6 m^2 (167 yd^2) of product. The material, category and weight of packaging are identified in Table 3.

Table 3: Packaging Materials

Material	Category	Weight
Convoluted tube	cardboard	7.3 kg (16.1 lbs)
Core inserts	cardboard	0.2 kg (0.4 lbs)
Roll Wrap	plastic	1.0 kg (2.2 lbs)
Labeling	paper	3.4 gr (0.12 oz)

[3] http://www.mannington.com/commercial/assets/pdfs/Literature/IntegraHP%20-%20%20IntegraHPRE%20Inst%20-%20INTEGRA%202.pdf
[4] http://www.mannington.com/commercial/assets/pdfs/Literature/INTEGRA-2%20Adhesive%20Spec%202012.pdf
[5] http://www.mannington.com/commercial/assets/pdfs/Literature/MSDS%20INTEGRA-2%20HP%20RE.pdf

Use stage

Use of the floor covering

The service life for Integra® HP 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 Integra® HP Broadloom carpet is 15 years.

Integra® HP Broadloom backing system and carpet is guaranteed by Mannington's warranted performance.

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 CRI publication titled *Carpet Maintenance Guidelines for Commercial Applications* offers guidance on how to maintain the carpet at various floor traffic levels.[6] Mannington Commercial's web site also has guidance on the maintenance of carpet (Mannington/Commercial Flooring/Technical/ Carpet Maintenance).[7]

The cleaning and maintenance for the life cycle assessment was modeled as shown in Table 4. It was also assumed that each of the cleaning processes were implemented in equal proportions during the cleaning and maintenance phase.

Table 4: Cleaning and Maintenance

Level of use	Cleaning process	Cleaning frequency	Consumption of energy and resources
Commercial (light to moderate)	Vacuum	2 x week or 100 x year	Electricity
Commercial (heavy)	Vacuum	5 x week or 250 x year	Electricity
Commercial (light to heavy)	Hot water extraction	2 x year	Electricity, water, cleaning chemicals

[6] http://www.carpet-rug.org/documents/publications/078_Carpet_Maintenance_Guidelines.pdf
[7] http://www.mannington.com/commercial/assets/pdfs/Literature/CarpetCleaning_Brochure_08.pdf

Structural damage

The subfloor requirements and instructions for floor preparation can be found on the Mannington Commercial web site (Mannington/Commercial Flooring/Technical/Carpet Installation).[8]

End of life stage

Recycling, reuse, or repurpose

Recycling, reuse and repurpose of carpet is the preferred method of disposal for used carpet. According to the Carpet America Recovery Effort^{SM} (CARE) latest annual report, over 534 million pounds of carpet was diverted from U.S. landfills in 2013.[9] The CARE website provides information on recycling, reuse and repurposing opportunities across the U.S. Mannington Commercial is an original and long-standing member of CARE.

Disposal

Another method of disposal for used carpet is through a local municipal landfill or commercial incinerator facility.

The life cycle assessment modeled the end of life stage with 9% of carpet being recycled, reused, repurposed or incinerated while the remainder was disposed of in a commercial landfill. The benefit of waste to energy from the incineration of used carpet was not factored into this model. The transport of the used carpet to a commercial landfill was modeled using an average distance of 75 miles (121 km) with a diesel power semi-truck.

[8] http://www.mannington.com/commercial/assets/pdfs/Literature/IntegraHP%20-%20%20IntegraHPRE%20Inst%20-%20INTEGRA%202.pdf
[9] http://www.carpetrecovery.org/

Life Cycle Assessment (LCA)

General

A cradle to grave life cycle assessment (LCA) was completed on this product group in accordance with ISO 14040 (ISO, 2006), ISO 14044 (ISO, 2006), ISO 21930 (ISO, 2017), and *Product Category Rule for Environmental Product Declarations Flooring: Carpet, Resilient, Laminate, Ceramic, Wood version 2*. (NSF International, 2014)

The life cycle stages for this study were:

- Sourcing/extraction stage
- Manufacturing stage
- Delivery and installation stage
- Use stage
- End of life stage

All life cycles stages as described in System Boundaries, section 6.9 of the Product Category Rule (PCR) have been included. (NSF International, 2014)

Description of the functional unit

The functional unit has been defined as one square meter (m^2). (NSF International, 2014) 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

The Mass / energy flows and environmental impacts consisting of less than 1% may be omitted from the inventory analysis. Cumulative omitted mass / energy flows or environmental impacts shall not exceed 5%.
This does not apply to background data. Variations of these rules shall be documented and justification provided.

To avoid complicating the analysis, this study did not omit any mass / energy flows or environmental impacts from the life cycle inventories.

Allocation

The allocation procedure used in this study focused on either mass or square yards of output. For example: gallons of process water metered, pounds of greige waste, or finished carpet generated would be allocated proportionately to the square yards of carpet produced by the production line.

The principle of modularity was maintained throughout the study by modeling the material and energy flows to/from the environment at each material, or process element, where they occurred.

An open-loop allocation procedure was used for the packaging of raw materials. An example would be the stretch wrap used to unitize the bags of raw material on a pallet. The stretch wrap life cycle inventory includes transport to the recycle vendor. However, none of the life cycle inventories required to prepare the recycled material for its new life are included nor any credits are taken for the recycled material.

Open-loop allocation procedure was used for the recycled raw materials. An example would be the glass filler. The life cycle inventory includes the transportation from the recycle center to the vendor, energies to transform, wastes, packaging and transport to the Calhoun, GA carpet manufacturing facility. However, none of the life cycle inventories of the materials former life were included.

Background data

As a general rule, specific data derived from specific production processes and/or average data derived from specific production processes was the first choice for the basis of creating this EPD.

SimaPro 9.0, developed by PRe' Consultants, was used to create the model used for this life cycle assessment.[10] ecoinvent v3.5 software database was used in most of the background datasets required for this model.[11] The database was used for energy, transportation and auxiliary materials to ensure comparability of the results in the life cycle assessment, see Table 5.

Table 5: Background Data Sources

Material	Data Source	Date
Nylon 6,6	ecoinvent v3.5	2018
Nylon 6	ecoinvent v3.5	2018
Polyester	ecoinvent v3.5	2018
Calcium Carbonate	ecoinvent v3.5	2018
Polyvinyl chloride	ecoinvent v3.5	2018
Dioctyl terephthalate (DOTP)	Life Cycle Inventory by Vendor	2019
BBCH	ecoinvent v3.5	2018
Polypropylene	ecoinvent v3.5	2018
Modifiers	ecoinvent v3.5	2018

[10] http://www.pre-sustainability.com/
[11] http://www.earthshift.com/software/simapro/databases

Data quality

The data used in the life cycle assessment represents current products and processes. This data is considered to be good to very good which meets the requirements of the product category rules. (NSF International, 2014) 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 (foreground data) was based on one year of data, 2019. The background data sources are based on data less than 10 years old. All of the background data sources are modeled using 2018 or newer North American energies. The time related coverage is good.

Geographical coverage – The process data was based on North America. The background data sources were first selected based on technological appropriateness and then geographical appropriateness was considered. An example of this is calcium carbonate. Calcium carbonate was modeled on a technological equivalent process while the geographical location of the process was Europe and the energies were modeled for North America. The geographical coverage is good.

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

Table 6: Process Data Quality (Foreground Data)

Process	Type of data	Period	Origin of data	Data source	Completeness	Accuracy
Yarn Process	Primary	2019	North America	Manufacturing Plant	Very Good	Very Good
Tufting Process	Primary	2019	North America	Manufacturing Plant	Very Good	Very Good
Coating Process	Primary	2019	North America	Manufacturing Plant	Very Good	Very Good

System boundaries

The life cycle assessment for Integra® HP Broadloom backing system was a cradle to grave study. The system boundaries for this study are as follows:

- Sourcing / extraction stage – This stage begins with the design of product concepts, selection and sourcing or materials, evaluation of optimum alternatives, and the results of design decisions through the extraction of materials. This includes extraction of virgin materials from the earth (pre-consumer supply chain). This may include the growth or extraction of all raw materials, and their delivery to the production site. Packaging materials are included.

- Manufacturing stage – This includes all relevant manufacturing processes once the optimum materials to manufacture a product have been selected. Packaging is included. Production of capital goods, infrastructure, production of manufacturing equipment, and personnel-related activities are not included. Heating, artificial lighting, and transport within the production site are excluded, unless they are directly used for the production process.
- Delivery and installation stage – This stage includes the delivery of the floor covering to the point of installation, fitting, and the raw material extraction, and manufacturing of all sundry material for the fitting, if relevant.
- Use stage – The use stage includes the cleaning and maintenance of the floor covering during its life time as well as extraction, manufacturing and transport of all sundry material, it relevant (e.g. cleaning materials, floor finishes) for the maintenance.
- End of life stage – The end of life stage includes the transport of the floor covering to end of life processes such as incineration, recycling and final disposition. All waste management processes are included in the calculation until final disposition, with the exception of the disposition of nuclear waste, which cannot be modeled due to its extremely long disposition times.

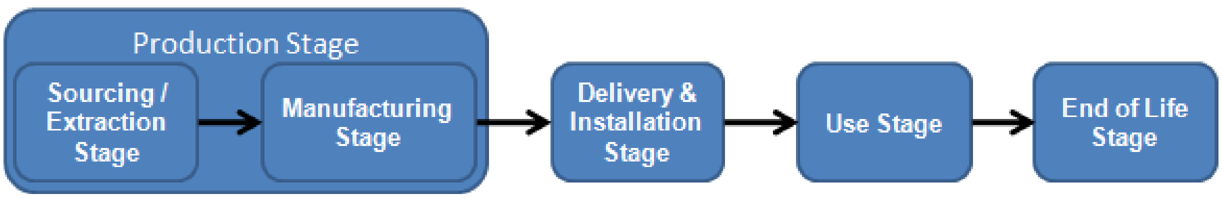

Figure 4: System Boundaries

Note on use stage

"The estimated service of a floor covering and references thereof depend on the type of floor covering, its application, the user, and required maintenance of the product. Comparisons of different floor coverings are allowed only if these parameters are considered in a consistent way and if LCA impacts are evaluated under the same normalized conditions. For this purpose, the use stage impacts shall be reported for a single year (1/60th of the total) of use and for the expected life of the building (60 years)." (NSF International, 2014)

Integra® HP Broadloom carpet has a reference service life of 15 years. The recommended maintenance schedule for Integra® HP Broadloom carpet can be reviewed in Table 4.

Impact Declaration and Use Stage Normalization

Results of the Assessment

The CML-IA Baseline Aug 2014 version 3.02 methodology was used to calculate the LCIA values.[12] The following categories from the methodology were selected for the assessment. (NSF International, 2014)

- Abiotic depletion potential (AD) – kb Sb eq
- Abiotic depletion potential – fossil fuels (AD ff) – MJ
- Global warming potential 100a (GWP) – kg CO_2 eq
- Acidification potential (AP) – kg SO_2 eq
- Photochemical oxidant formation potential (POCP) – kg C_2H_2 eq
- Eutrophication potential (NP) – kg PO_4^- eq
- Ozone depletion potential (ODP) – Steady State / Infinite – kg CFC-11 eq
- Biomass CO_2 emissions (Bio) – kg
- Primary energy of non-renewable resources (PE N) – MJ
- Primary energy of renewable resources (PE R) – MJ

Life Cycle Inventory Analysis

The following inventory data is calculated based on one square meter of Integra HP® broadloom product over a 60-year building lifetime including replacement. Table 7 below shows the primary and secondary resources use inventory data over a 60-year building lifetime.

Table 7: Primary and Secondary Resources Use

Indicator	Unit per m^2	Sourcing and Extraction	Manufacturing	Installation and Delivery	Use	End of Life	Total
Renewable Primary Energy (Energy)	MJ, LHV	2.1E+01	1.2E+00	5.3E+00	2.5E+01	1.4E-01	5.3E+01
Non-renewable Primary Energy (Energy)	MJ, LHV	5.1E+02	1.3E+02	1.2E+02	4.1E+02	3.6E+00	1.2E+03
Renewable Primary Energy (Materials)	MJ, LHV	9.3E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Non-renewable Primary Energy (Materials)	MJ, LHV	2.6E+02	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.6E+02
Secondary Fuel (Renewable)	MJ, LHV	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Secondary Fuel (Non-renewable)	MJ, LHV	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Recovered Energy (MJ)	MJ, LHV	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Secondary Material	kg	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

[12] http://cml.leiden.edu/software/data-cmlia.html

Table 8 below shows additional resources use data and carbon emissions inventory over a 60-year building lifetime.

Table 8: Additional Resources Use and Carbon Emissions

Indicator	Unit per m^2	Sourcing and Extraction	Manufacturing	Installation and Delivery	Use	End of Life	Total
Abiotic Depletion Potential (Fossil Fuels)	MJ, LHV	7.7E+02	1.1E+02	1.2E+02	2.9E+02	3.4E+00	1.3E+03
Freshwater Consumption	m^3	1.4E+00	1.4E-02	7.0E-02	1.3E-01	3.2E-03	1.6E+00
Carbon Removals Associated with Biogenic Carbon Content of Packaging	kg CO_2 eq	2.9E-02	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.9E-02
Carbon Emissions Associated with Biogenic Carbon Content of Packaging	kg CO_2 eq	0.0E+00	0.0E+00	2.9E-02	0.0E+00	0.0E+00	2.9E-02

Finally, Table 9 below shows the waste and output flow inventory data over a 60-year building lifetime.

Table 9: Waste and Output Flow Inventory

Indicator	Unit per m^2	Sourcing and Extraction	Manufacturing	Installation and Delivery	Use	End of Life	Total
Hazardous Waste	kg	3.5E-04	2.5E-04	7.4E-05	7.8E-04	1.0E-05	1.5E-03
Non-hazardous Waste	kg	3.7E+00	1.9E+00	9.3E-01	1.2E+00	9.9E+00	1.8E+01
Radioactive Waste	kg	3.5E-04	2.3E-04	1.4E-04	1.8E-03	1.9E-05	2.5E-03
Recycling	kg	6.3E-02	1.2E+00	9.7E-02	0.0E+00	9.8E-01	2.3E+00

Life Cycle Impact Assessment

The CML-IA Baseline Aug 2014 version 3.02 methodology was used to calculate the impact assessments for one square meter of Integra® HP Broadloom carpet product with a face weight of 25.2 oz/yd². Table 11 displays the impacts for a single installation (Production Stage, Delivery & Installation Stage, End of Life Stage) while Table B displays the impacts of the use stage which represents an average one year of use. Table C displays the impacts of the flooring for the entire life of a building (60 year service life) which would require 4 replacements of the carpet product (15 year service life).

Table 10: (Table A) CML Impacts Excluding Use and Replacement

Impact Category		Life Cycle Stage				
Parameter	Unit per m^2	Sourcing and Extraction	Manufacturing	Delivery and Installation	End of Life	Total
Abiotic Depletion Potential, Elements	kg Sb Eq.	1.5E-05	6.1E-07	5.8E-06	5.2E-08	2.1E-05
Abiotic Depletion Potential, Fossil Fuels	MJ	1.9E+02	2.8E+01	2.8E+01	8.5E-01	2.5E+02
Acidification Potential	kg SO_2-Eq.	5.5E-02	3.3E-03	6.3E-03	3.7E-04	6.5E-02
Eutrophication Potential	kg PO_4^{---} Eq.	1.3E-02	5.6E-03	2.6E-03	6.3E-03	2.7E-02
Global Warming Potential	kg CO_2 Eq.	1.3E+01	2.7E+00	1.7E+00	1.6E+00	1.9E+01
Ozone Depletion Potential	kg CFC_{-11} Eq.	2.8E-05	5.3E-08	1.6E-07	8.0E-09	2.8E-05
Photochemical Oxidation Potential	kg C_2H_4	3.5E-03	2.7E-04	8.2E-04	3.4E-04	5.0E-03
Primary Energy Demand - Non-Renewable	MJ Eq.	2.1E+02	3.5E+01	3.2E+01	9.6E-01	2.8E+02
Primary Energy Demand - Renewable	MJ Eq.	5.8E+00	2.9E-01	9.7E-01	3.5E-02	7.1E+00

Figure 5 below shows the percent contribution of each life cycle stage in each selected impact category over the 15 year reference service life (RSL).

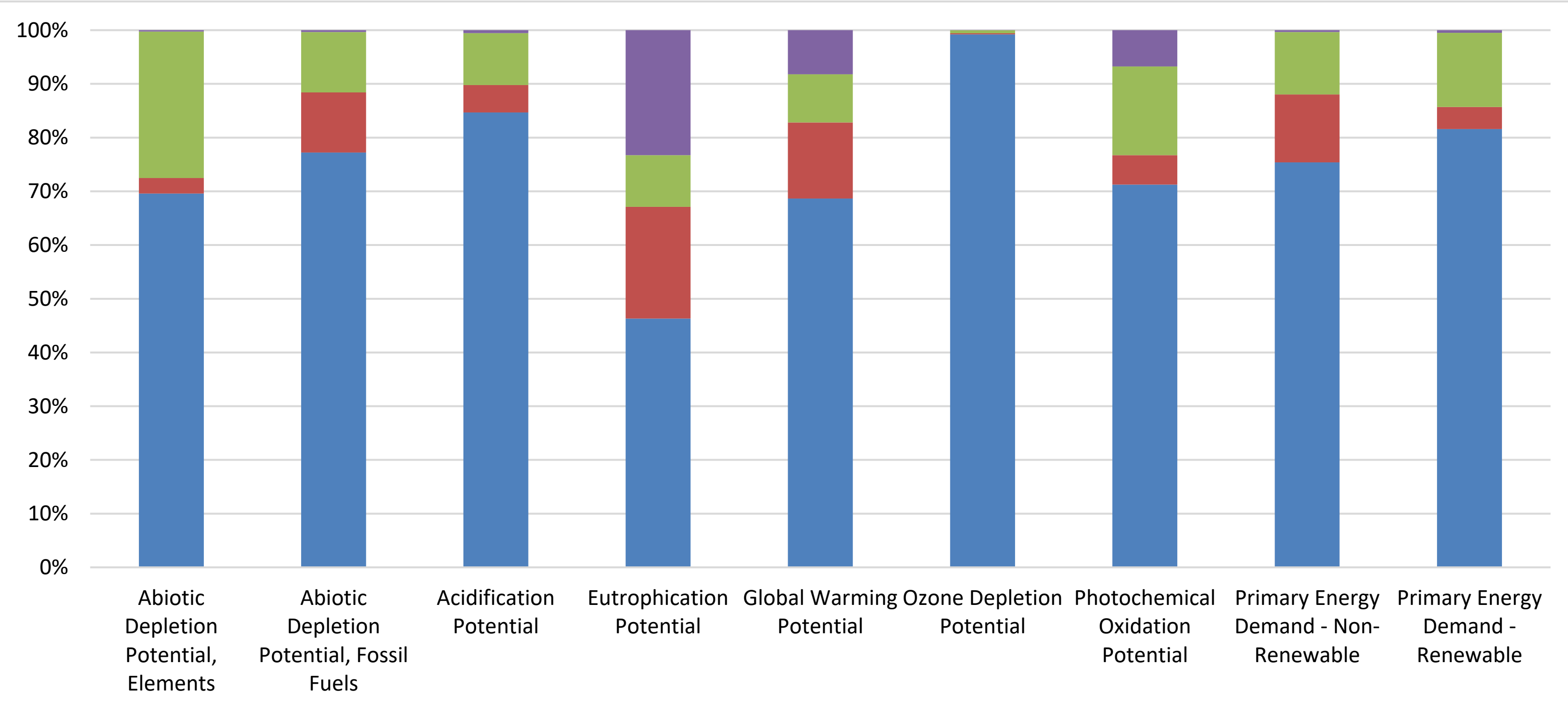

Figure 5: Cradle to Grave Impact Breakdown over the Reference Service Life of Years

Table 11 below shows Table B as required by the PCR – the average 1-year impacts associated with the use and maintenance of the product.

Table 11: (Table B) CML Impacts for Average Annual Use and Maintenance

Impact Category		Life Cycle Stage
Parameter	Unit per m^2	Average 1-year Use and Maintenance Impacts
Abiotic Depletion Potential, Elements	kg Sb Eq.	3.7E-07
Abiotic Depletion Potential, Fossil Fuels	MJ	4.8E+00
Acidification Potential	kg SO_2-Eq.	1.4E-03
Eutrophication Potential	kg PO_4^{---} Eq.	1.6E-03
Global Warming Potential	kg CO_2 Eq.	4.5E-01
Ozone Depletion Potential	kg CFC_{-11} Eq.	2.9E-08
Photochemical Oxidation Potential	kg C_2H_4	6.3E-05
Primary Energy Demand - Non-Renewable	MJ Eq.	7.2E+00
Primary Energy Demand - Renewable	MJ Eq.	4.2E-01

Table 12 details the impacts (Using CML methodology) over a 60-year building lifetime, which includes replacements of the product and use.

Table 12: (Table C) CML Impacts Over 60-year Building Lifetime Including Use and Replacement

Impact Category		Life Cycle Stage User Defined Reference Service Life of Product = 15 years Number of Installations over 60 years = 4					
Parameter	Unit per m^2	Sourcing and Extraction	Manufacturing	Delivery and Installation	Use	End of Life	Total
Abiotic Depletion Potential, Elements	kg Sb Eq.	5.9E-05	2.4E-06	2.3E-05	2.2E-05	2.1E-07	1.1E-04
Abiotic Depletion Potential, Fossil Fuels	MJ	7.7E+02	1.1E+02	1.2E+02	2.9E+02	3.4E+00	1.3E+03
Acidification Potential	kg SO_2-Eq.	2.2E-01	1.3E-02	2.6E-02	8.6E-02	1.5E-03	3.5E-01
Eutrophication Potential	kg PO_4 Eq.	5.0E-02	2.3E-02	1.1E-02	9.8E-02	2.5E-02	2.1E-01
Global Warming Potential	kg CO_2 Eq.	5.2E+01	1.1E+01	7.0E+00	2.7E+01	6.2E+00	1.0E+02
Ozone Depletion Potential	kg CFC_{-11} Eq.	1.1E-04	2.1E-07	6.3E-07	1.7E-06	3.2E-08	1.1E-04
Photochemical Oxidation Potential	kg C_2H_4	1.4E-02	1.1E-03	3.3E-03	3.8E-03	1.3E-03	2.4E-02
Primary Energy Demand - Non-Renewable	MJ Eq.	8.3E+02	1.4E+02	1.3E+02	4.3E+02	3.9E+00	1.5E+03
Primary Energy Demand - Renewable	MJ Eq.	2.3E+01	1.2E+00	5.3E+00	2.5E+01	1.4E-01	5.3E+01

Figure 6 below shows the percent contribution of each life cycle stage in each selected impact category over the 60-year building service life (BSL).

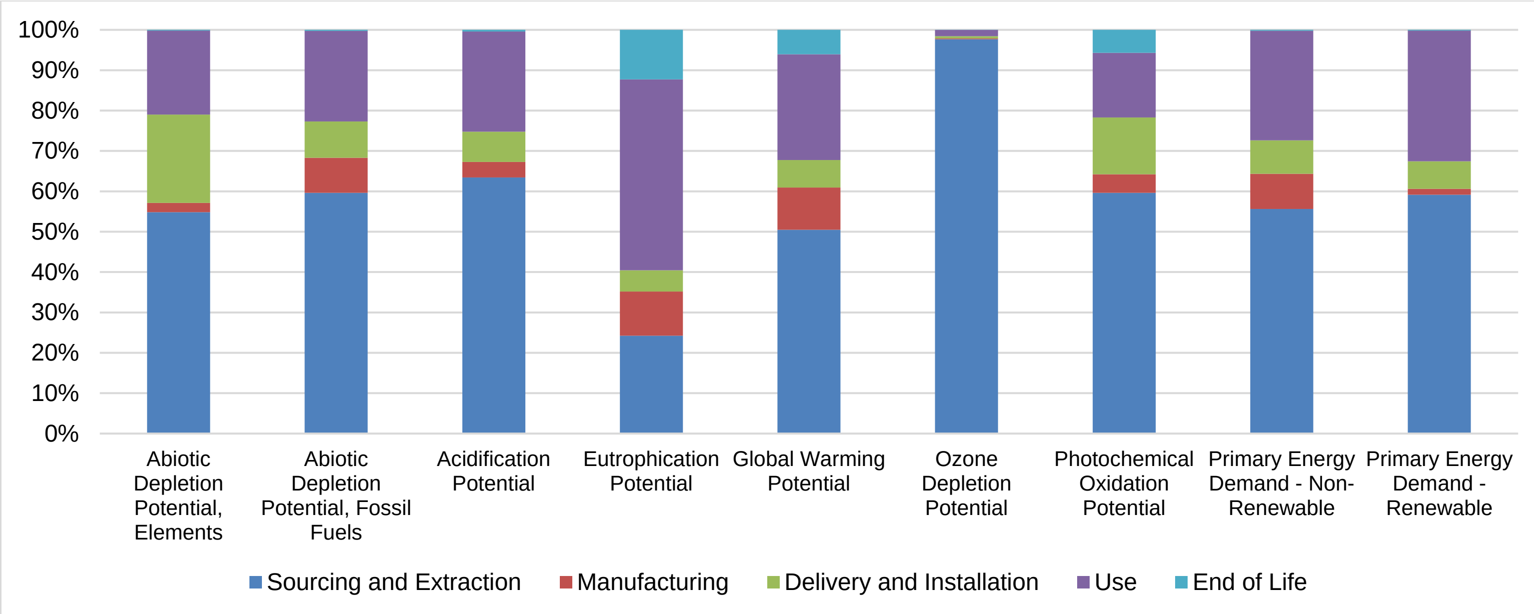

Figure 6: Cradle to Grave Impact Breakdown over the Building Service Life of 60 years

Interpretation

The LCIA results for one square meter of Integra® HP Broadloom carpet yields several observations. The largest contributor in most of the studied impact categories is the sourcing / extraction stage and the second largest contributor to the impact categories is the delivery & installation stage. Over the life of the building, the second largest contributor to the impact categories is typically the use stage. Specifically, the hot water extraction deep cleaning drives the impacts in this stage. Therefore, the level of use and associated required maintenance is an important consideration to understanding the environmental impacts of the Integra® HP Broadloom product.

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