

ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH ISO 14025 AND ISO 21930:2017

SmartEPD-2023-005-0018-01

80% WOOL 20% NYLON CARPET WITH POLYPROPYLENE BACKING



Date of Issue:
Sep 22, 2023

Expiration:
Sep 22, 2028

Last updated:
Mar 11, 2024



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General Information

Bloomsburg Carpet Ind.

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Product Name:	80% WOOL 20% NYLON CARPET WITH POLYPROPYLENE BACKING
Functional Unit:	1 m2
Declaration Number:	SmartEPD-2023-005-0018-01
Date of Issue:	September 22, 2023
Expiration:	September 22, 2028
Last updated:	March 11, 2024
EPD Scope:	Cradle to grave A1 - A3, A4, A5, B1 - B7, C1 - C4
Market(s) of Applicability:	North America

Reference Standards

Standard(s):	ISO 14025 and ISO 21930:2017
Core PCR:	UL PCR for Building-Related Products and Services Part A v.3.2, ISO 21930:2017 Date of issue: December 12, 2018
Sub-category PCR:	UL Part B: Flooring v.2 Date of issue: September 28, 2018 Valid until: September 28, 2023
Sub-category PCR review panel:	Contact Smart EPD for more information.
General Program Instructions:	Smart EPD General Program Instructions v.1.0, November 2022

Verification Information

LCA Author/Creator:	Gaelle Guillaume Sphera info@sphera.com
EPD Program Operator:	Smart EPD info@smartepd.com www.smartepd.com 585 Grove St., Ste. 145 PMB 966, Herndon, VA 20170, USA



Verification:

Independent critical review of the LCA and data, according to ISO 14044 and ISO 14071 : External

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Independent external verification of EPD, according to ISO 14025 and reference PCR(s) : External

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Limitations, Liability, and Ownership

Environmental declarations from different programs (ISO 14025) may not be comparable. Comparison of the environmental performance of Flooring Products using EPD information shall be based on the product's use and impacts at the building level, and therefore EPDs may not be used for comparability purposes when not considering the building energy use phase as instructed under this PCR. Full conformance with the PCR for Flooring Products allows EPD comparability only when all stages of a life cycle have been considered. However, variations and deviations are possible. Example of variations: Different LCA software and background LCI datasets may lead to differences results for upstream or downstream of the life cycle stages declared.

Organization Information

Bloomsburg Carpet Industries is a renowned carpet manufacturing company, situated in the picturesque Susquehanna Valley of Pennsylvania, was founded in 1976 by Raymond P. Habib along with twelve experienced employees dedicated to maintaining the craft of carpet weaving in the U.S.A. As the company continues to grow and expand, their commitment to quality and design remains strong. They are dedicated to producing highly styled carpets of superior quality and are proud to be notably recognized as the only carpet mill in the world to offer Wilton, Axminster, Velvet, and Loc-Weave weaving all under one roof.

It is worth noting that Bloomsburg's carpet products are certified from the Carpet and Rug Institute (CRI) Green Label Plus, California DPH Section 01350 Version 1.2 and LEED v4.1 EQ Credit Low-Emitting Materials.

Further information can be found at: <https://bloomsburgcarpet.com/about/>

Product Description

This EPD covers the life cycle of Bloomsburg 80% wool 20% nylon carpets with polypropylene (PP) backing. These carpets are produced using traditional weaving techniques coupled with cutting-edge technology. Bloomsburg carpets offers a wide range of carpet styles, patterns, colors and have earned the CRI Green Label Plus certification.

This study covers all products and styles with mixed tufted wool and nylon face fiber on polypropylene backing. Due to a range of face weights offered with this product, an average face weight of 42.4 oz./sy (1437.6 g/m2) was used, which is an average based on annual sales.

Further information can be found at: <https://bloomsburgcarpet.com/about/>

Product Information

Functional Unit:	1 m2
Mass:	2.56 kg
Reference Service Life:	15 Years



Product Specificity: ✗ Product Average
✓ Product Specific

Averaging:
An average based on product construction was utilized for the life cycle assessment. The average was created by utilizing the standard formulation for the backing and the weighted sales average for the face fiber. This is deemed to be an accurate representation of an average flooring product of this family. The functional unit for carpet products is one (1) m2 of floor covering used and maintained over a 75 year building life.

Plants

 THE BLOOMSBURG CARPET MILL
4999 Columbia Blvd, Bloomsburg, PA 17815, USA

Product Specifications

Product SKU(s): A157/24, A6301/5, A6356/6, A5683/25, A5692/25, A3468/28, A5318/3
Product Classification Codes: Masterformat - 09 68 00
UNSPSC - 30161701
EC3 - Finishes -> Flooring -> Carpet
Flooring type: Carpet
Product thickness: 9.53 mm
Product weight: 2559.88 g/m2
Recycled content: 3 %
Material composition: 80% Wool and 20% Nylon
Material composition of primary backing type: Polypropylene
Material composition of secondary backing type: Polyester
CRI rating: 2.5 Moderate
Surface pile weight: 1437.60 g/m2

Material Composition

Material/Component Category	Origin	% Mass
Nylon	US	10.9
Wool	India	43.5
Creel waste	US	3.2
Polypropylene	Turkey	19.2
Polyester	India	10.4
Latex	US	12.8



Packaging Material	Origin	kg Mass
Corrugated Cardboard	US	0.05
Polypropylene film (PP)	US	0.022

Hazardous Materials
No regulated hazardous or dangerous substances are included in this product.

EPD Data Specificity

- Primary Data Year:2022
- Manufacturing Specificity:

✗

 Industry Average

✗

 Manufacturer Average

✓

 Facility Specific

Software and LCI Data Sources

- LCA Software:

LCA for Experts v. 10.7
- LCI Foreground Database(s):

Managed LCA Content v. 2023.1

North America

Mass based
- LCI Background Database(s):

Managed LCA Content v. 2023.1

North America

Mass based

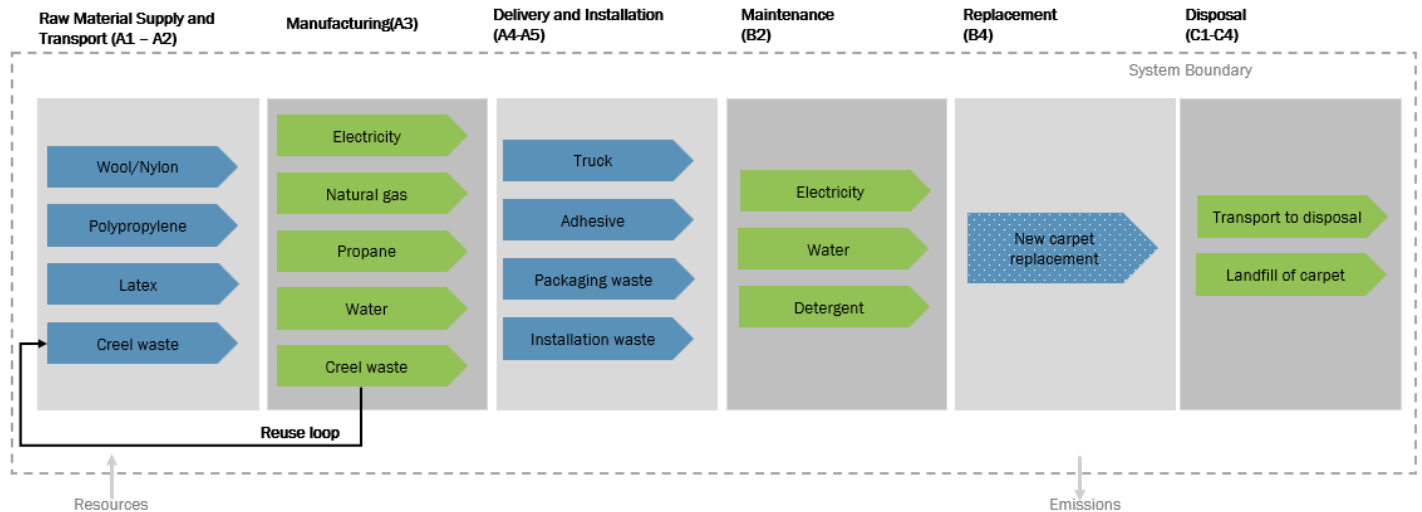
Renewable Electricity

Renewable electricity is used:No

System Boundary

Production	A1	Raw material supply	✓
	A2	Transport	✓
	A3	Manufacturing	✓
Construction	A4	Transport to site	✓
	A5	Assembly / Install	✓
Use	B1	Use	✓
	B2	Maintenance	✓
	B3	Repair	✓
	B4	Replacement	✓
	B5	Refurbishment	✓
	B6	Operational Energy Use	✓
	B7	Operational Water Use	✓
End of Life	C1	Deconstruction	✓
	C2	Transport	✓
	C3	Waste Processing	✓
	C4	Disposal	✓
Benefits & Loads Beyond System Boundary	D	Recycling, Reuse Recovery Potential	ND

Product Flow Diagram



Life Cycle Module Descriptions

The system boundary of this study is cradle-to-grave, i.e., all stages of the life cycle have been considered including raw material extraction, manufacturing, maintenance, and disposal. The following modules are defined by PCR Part A for building products (UL Environment, 2018).

Modules B1, B3, B5, B7 are zero for these carpet products. Similarly, module B6 is zero as no electricity is consumed during operation. Impacts associated with deconstruction (C1) are zero as manual deconstruction has been assumed. Waste processing (C3) is also zero as no other waste processing is required before landfilling the product. Module D is excluded from this analysis.

A1 Product stage: Raw material supply: It includes Raw material sourcing and processing as defined by secondary data.

A2 Product stage: Transport: It includes shipping from supplier to manufacturing site. Fuel use requirements are estimated based on product weight and reported distance.

A3 Product stage: Manufacturing: It includes energy, water, and material inputs required for manufacturing from raw materials. Packaging materials and manufacturing waste are also included.

A4 Construction process stage: Transport: It includes shipping from manufacturing site to project site. Fuel use requirements are estimated based on product weight and estimated distance.

A5 Construction process stage: Installation: It includes installation process, installation, and packaging waste.

B2 Use stage: Maintenance: It includes cleaning energy, water and materials required for maintenance.

B4 Replacement: Replacement carpet required to fulfil the required function over the building service life (75 years).

C2 End-of-life: Transport: It includes shipping from project site to landfill. Fuel use requirements are estimated based on product weight and estimated distance.

C4 End-of-life: Disposal: It assumes all products are sent to landfill. Landfill impact modeled based on secondary data.

Manufacturing:

At Bloomsburg, the manufacturing process of carpets starts with the sourcing of 100% natural wool animal fiber, renewable nylon fibers, followed by yarn conversion which includes the preparation of the yarn to be introduced in the loom system. Once the design and materials have been determined, the carpet backing is selected. The next step in the process is tufting, where the carpet pile is looped through the backing material using a 12-foot rolling machine with needles that weaves the loops in and out. The next stage is cutting, where sharp blades are gently run over the tufted carpet loops, doubling the number of surface fibers on the piece of carpets. Once the carpet has been woven and taken off the machine, it then goes through a vat dyeing or screen-printing process to apply the required colors and design. Once this process is completed, a latex adhesive is applied to the backing material. After the latex application, the carpet passes through a dryer to solidify the adhesive. Throughout these stages, the carpets are routinely inspected to locate any imperfections or broken threads. Once the carpet is dry and ready, it is rolled into specific dimensions and the finished carpets are then packaged and ready for shipping.

Packaging:

The broadloom carpets are rolled onto a cardboard core and then wrapped in plastic film for shipping.

Transportation:

Transport of raw materials from suppliers to the Bloomsburg facility was included in the model. Transportation distances and modes of transportation were provided by Bloomsburg.

When transportation information was not available, the default distances from the PCR Part B were used for calculation (UL Environment, 2018).

1.Outbound transportation distances from manufacturing plant to building site were not provided, a default assumption of 800 km is considered as per the PCR.

2.Transportation distance from usage site to waste management facility was not provided, a default assumption of 161 km is considered as per the PCR.



Installation:

Installation is assumed to be manual. Detailed installation instructions can be found on CRI guidelines (CRI, 2016). While installation equipment is required to install the flooring product, it is not included in the study as these are multi-use tool and the impacts per declared unit is considered to be negligible. All waste generated during installation, including packaging waste, is disposed off as per Part A: Life Cycle Assessment Calculation Rules and Report Requirements from UL Environment (UL Environment, 2018).

Use:

Indoor emissions during the use stage have been evaluated via Indoor Air Quality testing (Green Label Plus). No health-related concerns are present during the normal use of the flooring.

The method of maintenance is using a vacuum cleaner to remove dust and debris from carpet. To calculate the use phase energy, three different types of traffic on carpet were modeled: high, medium and low. High traffic areas are vacuumed every work day. Medium traffic areas are vacuumed on alternative work days while low traffic areas are vacuumed once a week.

Carpet products are traditionally not repaired or refurbished and are only replaced if the product fails or a new look is desired. Detailed maintenance instructions are provided online by the Carpet and Rug Institute (CRI, 2016).

Reference Service Life and Estimated Building Service Life

The reference service life of woven broadloom carpets is 15 years. For a building's estimated service life of 75 years, this means the carpet will be replaced 4 times, meaning 5 m² of carpet is needed over the full life of the building. The reference service life assumes the product was installed according to the manufacturer's recommendations.

End-of-Life:

Disposal pathways in the EPD are modeled in accordance with disposal routes and waste classification referenced in Sections 2.8.5 and 2.8.6 of Part A: Life Cycle Assessment Calculation Rules and Report Requirements from UL Environment (UL Environment, 2018). This indicates that after usage the carpet is sent to landfill. There is no waste recycling or energy recovery involved for the product.

LCA Discussion

Cut-off Criteria:

No cut-off criteria are defined for this study. The system boundary was defined based on relevance to the goal of the study. For the processes within the system boundary, all available energy and material flow data have been included in the model. In cases where no matching life cycle inventories are available to represent a flow, proxy data have been applied based on conservative assumptions regarding environmental impacts.

Allocation:

Multiple carpet types are produced at the Bloomsburg facility at one given time so production outputs cannot be directly generated by carpet type or family. Bloomsburg then collected the annual production data at the facility and averaged the amount of raw materials used based on the area (number of square yards produced) for each carpet construction during that period of time. As such, the data used for this study is separated by product family based on a weighted average. Allocation of background data (energy and materials) taken from the the Managed LCA Content 2023.1 database. The information is documented online at <https://sphaera.com/product-sustainability-gabi-data-search/>.

There is no end-of-life allocation considered in the study. A cut-off approach was followed therefore no credit was assigned at end of life. As such, the creel waste generated at the facility and reused as a raw material enters the system burden-free.

Data Quality:

A variety of tests and checks were performed throughout the project to ensure high quality of the completed LCA. Checks included a review of project specific LCA models as well as the background data used.

Geographical Coverage

To satisfy cut-off criteria, proxy datasets were used as needed for raw material inputs to address lack of data for a specific material or for a specific geographical region. These proxy datasets were chosen for their representation of the actual product. Additionally, European data or global data were used when North American data (for raw materials sourced in the US) were not available.

Temporal Coverage

The intended time coverage for the study is the year 2022. Primary data for the foreground system was collected for this reference year, and the results of the study are therefore representative of 2022. The results are expected to be relevant until there is a significant change in production technology, production of input materials, or energy mixes.

The majority of background datasets are based on data from 2019 onwards.

Technological Coverage

The primary data represent production of the products under evaluation. Secondary data were chosen to be specific to the technologies in question (or appropriate proxy data used where necessary).

Completeness



Foreground processes were checked for mass balance and completeness of the emissions inventory. No data were knowingly omitted.



Results

Environmental Impact Assessment Results

IPCC AR5 GWP 100, TRACI 2.1
per 1 m2 of product.
LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

Impact Category	Unit	A1A2A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
GWP-total	kg CO2 eq	1.91e+1	2.88e-2	2.18e-2	0	2.04e+0	0	8.48e+1	0	0	0	0	2.66e-2	0	5.24e-2
ODP	kg CFC 11 eq	1.23e-12	7.37e-17	1.76e-16	0	2.08e-13	0	5.75e-12	0	0	0	0	6.80e-17	0	2.50e-15
AP	kg SO2 eq	4.57e-2	9.26e-5	4.67e-5	0	2.89e-3	0	1.95e-1	0	0	0	0	8.55e-5	0	2.69e-4
EP	kg N eq	1.81e-2	9.15e-6	2.98e-5	0	2.16e-4	0	7.32e-2	0	0	0	0	8.44e-6	0	4.32e-4
POCP	kg O3 eq	6.59e-1	2.14e-3	5.27e-4	0	3.87e-2	0	2.80e+0	0	0	0	0	1.98e-3	0	4.91e-3
ADP-fossil	MJ	2.07e+2	3.98e-1	7.63e-2	0	2.51e+1	0	9.31e+2	0	0	0	0	3.68e-1	0	7.87e-1

Abbreviations:
GWP = Global Warming Potential, 100 years (may also be denoted as GWP-total, GWP-fossil (fossil fuels), GWP-biogenic (biogenic sources), GWP-luluc (land use and land use change)), ODP = Ozone Depletion Potential, AP = Acidification Potential, EP = Eutrophication Potential, SFP = Smog Formation Potential, POCP = Photochemical oxidant creation potential, ADP-Fossil = Abiotic depletion potential for fossil resources, ADP-Minerals&Metals = Abiotic depletion potential for non-fossil resources, WDP = Water deprivation potential, PM = Particular Matter Emissions, IRP = Ionizing radiation, human health, ETP-fw = Eco-toxicity (freshwater), HTP-c = Human toxicity (cancer), HTP-nc = Human toxicity (non-cancer), SQP = Soil quality index.

Comparisons cannot be made between product-specific or industry average EPDs at the design stage of a project, before a building has been specified. Comparisons may be made between product-specific or industry average EPDs at the time of product purchase when product performance and specifications have been established and serve as a functional unit for comparison. Environmental impact results shall be converted to a functional unit basis before any comparison is attempted. Any comparison of EPDs shall be subject to the requirements of ISO 21930 or EN 15804. EPDs are not comparative assertions and are either not comparable or have limited comparability when they have different system boundaries. EPDs are not comparative assertions and are either not comparable or have limited comparability when they have different system boundaries, are based on different product category rules or are missing relevant environmental impacts. Such comparison can be inaccurate, and could lead to erroneous selection of materials or products which are higher-impact, at least in some impact categories.



Resource Use Indicators
per 1 m2 of product.

Indicator	Unit	A1A2A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
RPRE	MJ	1.17e+2	1.60e-2	7.34e-3	0	8.19e+0	0	4.99e+2	0	0	0	0	1.48e-2	0	9.52e-2
RPRM	MJ	3.11e+1	0	0	0	0	0	1.24e+2	0	0	0	0	0	0	0
NRPRE	MJ	1.93e+2	4.02e-1	7.85e-2	0	3.45e+1	0	9.13e+2	0	0	0	0	3.71e-1	0	8.13e-1
NRPRM	MJ	3.89e+1	0	0	0	0	0	1.56e+2	0	0	0	0	0	0	0
SM	kg	8.48e-2	0	0	0	0	0	3.39e-1	0	0	0	0	0	0	0
RSF	MJ, net calorific value	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NRSF	MJ, net calorific value	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FW	m3	5.69e-1	5.49e-5	3.47e-5	0	1.39e-2	0	2.33e+0	0	0	0	0	5.06e-5	0	1.01e-4

Abbreviations:

RPRE or PERE = Renewable primary resources used as energy carrier (fuel), RPRM or PERM = Renewable primary resources with energy content used as material, RPRT or PERT = Total use of renewable primary resources with energy content, NRPRE or PENRE = Non-renewable primary resources used as an energy carrier (fuel), NRPRM or PENRM = Non-renewable primary resources with energy content used as material, NRPRRT or PENRT = Total non-renewable primary resources with energy content, SM: Secondary materials, RSF = Renewable secondary fuels, NRSF = Non-renewable secondary fuels, RE = Recovered energy, ADPF = Abiotic depletion potential, FW = Use of net freshwater resources, VOCs = Volatile Organic Compounds.

Waste and Output Flow Indicators

per 1 m2 of product.

Indicator	Unit	A1A2A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
HWD	kg	0	0	0	0	0	0	0	ND	0	0	0	0	0	0
NHWD	kg	0	0	1.57e-1	0	0	0	6.27e-1	ND	0	0	0	0	0	2.43e+0
HLRW	kg	1.03e-5	1.37e-9	8.64e-10	0	4.02e-6	0	5.71e-5	ND	0	0	0	1.26e-9	0	1.01e-8
ILLRW	kg	8.86e-3	1.15e-6	7.62e-7	0	3.36e-3	0	4.89e-2	ND	0	0	0	1.06e-6	0	8.99e-6
CRU	kg	0	0	0	0	0	0	0	ND	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	0	0	ND	0	0	0	0	0	0
MER	kg	0	0	0	0	0	0	0	ND	0	0	0	0	0	0
EE	MJ	3.70e-3	0	3.94e-2	0	0	0	1.72e-1	ND	0	0	0	0	0	0

Abbreviations:

HWD = Hazardous waste disposed, NHWD = Non-hazardous waste disposed, RWD = Radioactive waste disposed, HLRW = High-level radioactive waste, ILLRW = Intermediate- and low-level radioactive waste, CRU = Components for re-use, MFR or MR = Materials for recycling, MER = Materials for energy recovery, MNER = Materials for incineration, no energy recovery, EE or EEE = Recovered energy exported from the product system, EET = Exported thermal energy.

Carbon Emissions and Removals

per 1 m2 of product.

Indicator	Unit	A1A2A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
BCRP	kg CO2	2.56e+0	0	0	0	0	0	1.02e+1	0	0	0	0	0	0	0
BCEP	kg CO2	3.48e-2	0	0	0	0	0	1.02e+1	0	0	0	0	0	0	1.73e+0
BCRK	kg CO2	9.96e-2	0	0	0	0	0	3.98e-1	0	0	0	0	0	0	0
BCEK	kg CO2	0	0	9.96e-2	0	0	0	3.98e-1	0	0	0	0	0	0	0
BCEW	kg CO2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CCE	kg CO2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CCR	kg CO2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CWNR	kg CO2	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Abbreviations:

BCRP = Biogenic Carbon Removal from Product, BCEP = Biogenic Carbon Emission from Product, BCRK = Biogenic Carbon Removal from Packaging, BCEK = Biogenic Carbon Emission from Packaging, BCEW = Biogenic Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes, CCE = Calcination Carbon Emissions, CCR = Carbonation Carbon Removals, CWNR = Carbon Emissions from Combustion of Waste from Non-Renewable Sources used in Production Processes, GWP-luc = Carbon Emissions from Land-use Change.

Scenarios

Transport to the building/construction site (A4)

A4 Module

Fuel Type:	Diesel
Liters of Fuel:	0.00521 l/100km
Vehicle Type:	Truck
Transport Distance:	800 km
Packaging Mass:	0.072 kg
Weight of products transported:	2.56 kg
Capacity utilization volume factor:	0.6

Installation in to the building/construction site (A5)

A5 Module

Installation Scrap Rate Assumed:	5 %
Product Lost per Functional Unit:	0.132 kg
Waste Materials at the Construction Site Before Waste Processing:	0.072 kg
Biogenic Carbon Contained in Packaging:	0.0996 kg

Reference Service Life

B1 Module

RSL:	15 Cycles
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Maintenance (B2)

B2 Module

Energy Input:	17.4 kWh
Maintenance Process Information:	The maintenance stage considers a routine carpet cleaning which involves the use of water, detergent, and energy consumption for vacuuming to ensure their longevity. The cleaning assumptions used in the LCA model are based on estimates from other published broadloom carpet EPDs in order to help establish comparability with publicly available carpet EPDs.



Repair (B3)
B3 Module

Repair Process Information: The module B3 is zero as no repair work of carpets is involved in this study.

Replacement (B4)
B4 Module

Reference Service Life:	15 Years
Replacement Cycle:	4 (ESL/RSL)-1
Replacement of Worn Parts:	2.43 kg
Product loss per functional unit:	kg 0.132
Waste materials at the construction site before waste processing, generated by product installation:	kg 0.072

Refurbishment (B5)
B5 Module

Refurbishment Process Description: The module B5 is zero as no refurbishment work of carpets is involved in this study.

Operational Energy Use & Operational Water Use
B6 & B7 Modules

Characteristic Performance:
Modules B6 and B7 are zero as no electricity or water are directly consumed during building operation.

End of Life
C1 - C4 Modules

Collection Process

Collected Separately: 2.43 kg

Recovery

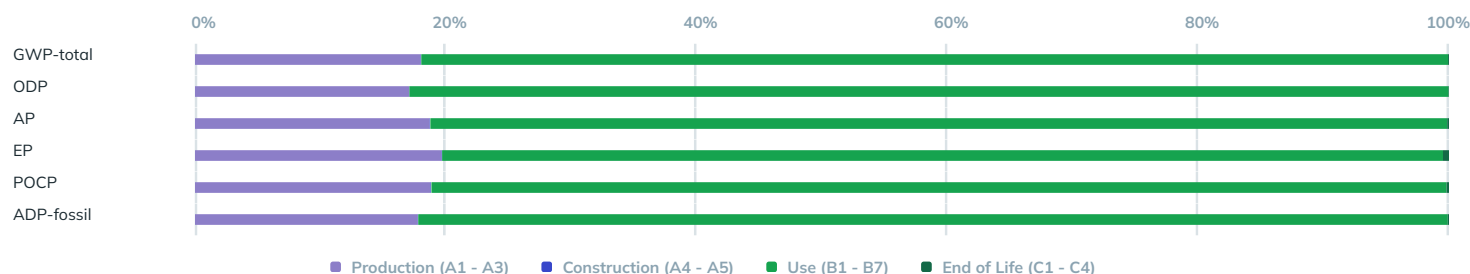
Landfill: 2.43 kg

Disposal

Product or Material for Final Disposal: 2.43 kg

Interpretation

The primary drivers of burden are the replacement (B4) accounting for 80% of all reported categories and indicators. The raw materials (A3) are the second largest contributor and account for 15% of GWP and 14% of ADPf, due to the wool and nylon required for carpet production. Manufacturing (A3) also displays a significant contribution to all impacts categories (3% of GWP, 4% of APDf). The remaining modules contribute to less than 3% of impacts when combined. Within the product stage, the largest contributors are the face fiber materials. The higher face weight products have, the higher the expected impact should be.



Additional Environmental Information

Environment and Health During Manufacturing:

More information on Bloomsburg sustainability and environmental programs can be found at <https://bloomsburgcarpet.com/>.

Environment and Health During Installation:

All personnel must be equipped with personal protective equipment (PPE) at the time of installation process.

Extraordinary Effects:

Fire

ASTM E 648-15e1 (Critical Radiant Flux) Class 1 - 0.85 watts/cm²

Water

Should the product become flooded, the water should be removed through means of extraction and drying and the product should behave as originally intended. There are no environmental impacts associated with the product being flooded.

Mechanical Destruction

If the product is mechanically destroyed, it should be disposed of using standard procedures and replaced in a timely manner.

Environmental Activities and Certifications

Certification

The Carpet and Rug Institute (CRI) GREEN LABEL PLUS

References

- ACLCA. (2019, May). ACLCA Guidance to Calculating Non-LCIA Inventory Metrics in Accordance with ISO 21930:2017. Retrieved from American Center for Life Cycle Assessment: <https://aclca.org/wp-content/uploads/ISO-21930-Final.pdf>
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