Environmental Product Declaration

Chilewich Sultan LLC BioFelt 2.0 Floor Textiles

Composite Flooring System

This innovative felt-based backing for Chilewich flooring features an integrated moisture barrier and is made with post-consumer recycled content.

chilewich

Chilewich was born in 2000 out of a passion for reimagining overlooked materials and underused processes. In designing textile products that are not only aesthetically pleasing but also durable, versatile, and easy to clean, we address a key element of sustainability: longevity. Our design solutions are made to endure years of daily use and to look good doing it.

Sustainability is also the quest for better, and we're committed to continuing to make choices that are better for people and the planet—from raw materials to finished goods, design to production. It all starts with the yarn. Ours are extruded, and 100% free of the phthalates and heavy metals found in conventional plasticizers. We soften our yarns with a compound derived from soybeans rather than petroleum. Our yarns contain a minimum of 18% renewable vegetable content.

All woven and tufted Chilewich textiles are made with pride in the United States. Working with local and domestic suppliers reduces transport-related environmental impacts. Additionally, our products have been tested and certified by the Green Label Plus™ and GreenGuard® programs for low VOC emissions, and they can be found in healthcare settings that include major hospitals. For more information, visit chilewichcontract.com

UL CERTIFIED
ENVIRONMENTAL PRODUCT DECLARATION
UL.COM/EPD

This declaration is an environmental product declaration (EPD) in accordance with ISO 14025 and EN 15804+A2. EPDs rely on Life Cycle Assessment (LCA) to provide information on a number of environmental impacts of products over their life cycle. Exclusions: EPDs do not indicate that any environmental or social performance benchmarks are met, and there may be impacts that they do not encompass. LCAs do not typically address the site-specific environmental impacts of raw material extraction, nor are they meant to assess human health toxicity. EPDs can complement but cannot replace tools and certifications that are designed to address these impacts and/or set performance thresholds – e.g., Type 1 certifications, health assessments and declarations, environmental impact assessments, etc. Accuracy of Results: EPDs regularly rely on estimations of impacts, and the level of accuracy in estimation of effect differs for any particular product line and reported impact. Comparability: EPDs are not comparative assertions and are either not comparable or have limited comparability when they cover different life cycle stages, are based on different product category rules or are missing relevant environmental impacts. EPDs from different programs may not be comparable.

EPD PROGRAM AND PROGRAM OPERATOR NAME, ADDRESS, LOGO, AND WEBSITE	UL Solutions 2211 Newmarket Pkwy, Marietta, GA 30067 USA www.ul.com www.spot.ul.com
GENERAL PROGRAM INSTRUCTIONS AND VERSION NUMBER	UL Solutions Environmental Product Declaration Program, GENERAL PROGRAM INSTRUCTIONS, VERSION 2.7, MARCH 2020
MANUFACTURER NAME AND ADDRESS	Chilewich Sultan LLC Chilewich Greg Epperson Technical Services Manager 1512 Highway 225 South Chatsworth, GA 30705
DECLARATION NUMBER	4790813442.101.1
DECLARED PRODUCT & FUNCTIONAL UNIT OF DECLARED UNIT	Chilewich Sultan LLC BioFelt 2.0 Floor Textiles Functional Unit = 1 square meter of BioFelt 2.0 over 75 year building lifetime
REFERENCE PCR AND VERSION NUMBER	PCR Guidance-Texts for Building Related Products and Services, Part B: Requirements on the EPD for Floor Coverings, Institut Bauen und Umwelt e.V., v4, 20/06/2023.
DESCRIPTION OF PRODUCT(S) APPLICATION/USE	BioFelt 2.0 is a floor textile that can be purchased by businesses and used in a variety of buildings, including commercial, residential, and educational settings.
PRODUCT RSL DESCRIPTION	15 Years
MARKETS OF APPLICABILITY	Global
DATE OF ISSUE	October 1, 2023
PERIOD OF VALIDITY	5 years
EPD TYPE	Product Specific
DATASET VARIABILITY	N/A
EPD SCOPE	Cradle-to-Grave
YEAR(S) OF REPORTED PRIMARY DATA	2021
LCA SOFTWARE & VERSION NUMBER	SimaPro 9.4
LCI DATABASE(S) & VERSION NUMBER	Ecoinvent v3.5 & USLCI v2.0
LCIA METHODOLOGY & VERSION NUMBER	EN 15804+A2; TRACI 2.1; CML 4.1
The sub-category PCR review was conducted by:	Institut Bauen und Umwelt (IBU) - PCR Review Panel
This declaration was independently verified in accordance with ISO 14025: 2006. The PCR for Building-Related Products and Services, Institut Bauen und Umwelt e.V. (IBU) - Part A: Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Re-port according to EN 15804+A2:2019, Version 1.3, 2021, based on EN 15804+A2 serves as the core PCR. ☐ INTERNAL ☒ EXTERNAL	Cooper McC Cooper McCollum, UL Solutions
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	Lindita Bushi Lindita Bushi, PhD, Athena Sustainable Materials Institute

Environmental declarations from different programs (ISO 14025) may not be comparable. Comparison of the environmental performance using EPD information shall consider all relevant information modules over the full life cycle of the products within the building. This PCR allows EPD comparability only when the same functional requirements between products are ensured and the requirements of EN 15804+A2 §5.5 are met. It should be noted that different LCA software and background LCI datasets may lead to differences results for upstream or downstream of the life cycle stages declared.

General Information

Description of Company/Organization

Chilewich combines original design with American craftsmanship for those who refuse to compromise beauty for practicality. Our durable, distinctive, easy-to-clean textile products bring depth to surfaces—floors, tabletops, walls, windows, and more—and stand up to whatever life brings, indoors and out.

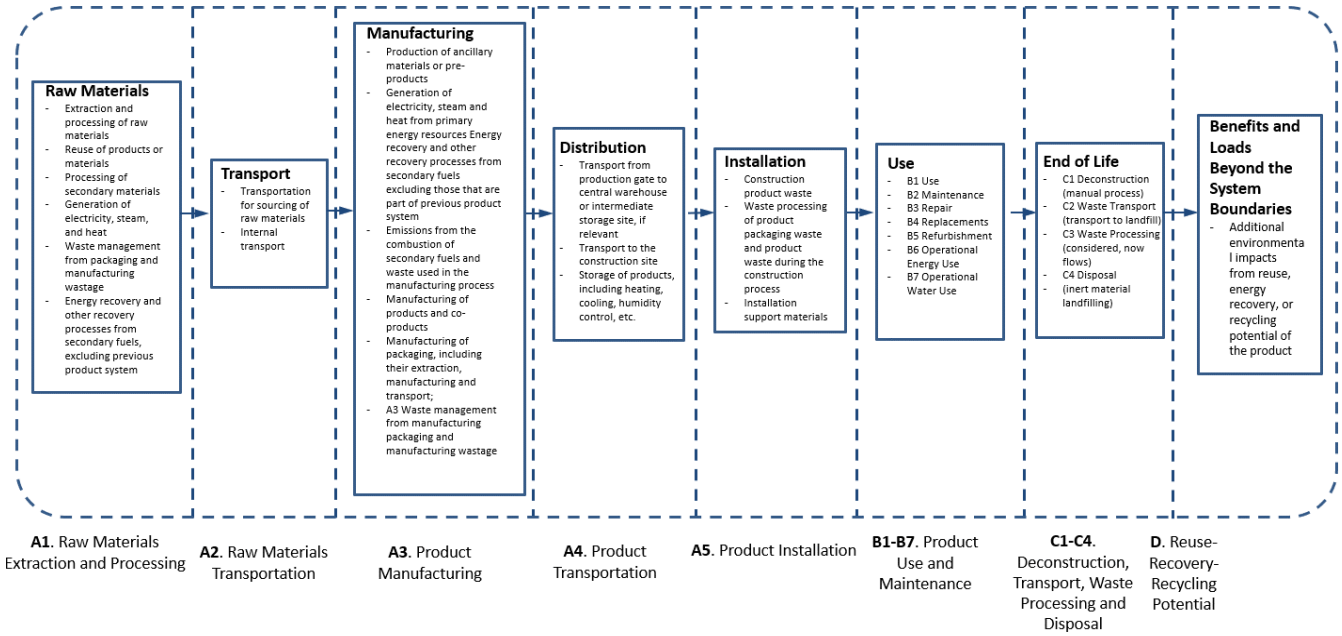
Product Description

Product Name: BioFelt 2.0

Product Characteristic: Felt-based flooring system

BioFelt 2.0 is a composite system for installed flooring. It combines a flat-woven textile surface, an integrated moisture barrier, and a felt underlayer made with post-consumer recycled content. Additional features include:
- Provides light cushioning underfoot
- Protects against spills and stains
- Can be spot cleaned, vacuumed, or extraction cleaned
- Bleach cleanable
- Resistant to mold and mildew for the lifetime of the product
- Free of phthalates and heavy metals
- Made in the USA

Flow Diagram



Manufacturer Specific EPD

This product-specific EPD was developed based on the Cradle-to-Grave Life Cycle Assessment. The EPD accounts for raw materials supply, transport, manufacturing, distribution, installation, use, maintenance, repair, replacement, refurbishment, operational energy use, operational water use, de-construction, transport, waste processing, disposal, reuse, recover, and/or recycling. Manufacturing data were gathered directly from company personnel. When updated company-specific data were not available the ratio of production units, within the 2021 calendar year, was used as a proxy. For any product group EPDs, an impact assessment was completed for each product and the highest impacts were reported as conservative representations of the product group. Product grouping was considered appropriate if the individual product impacts differed by no more than ±10% in any impact category.

Application

BioFelt 2.0 is ideal for a wide range of applications, including but not limited to, wall-to-wall flooring and floor tiles.

Material Composition

The primary product components and/or materials must be indicated as a percentage mass to enable the user of the EPD to understand the composition of the product in delivery status.

The average composition of BioFelt 2.0 is as follows:

Material	BioFelt 2.0
Fiberglass	30.00%
Polyester	22.01%
PVC	42.01%
Polyamide 6,6	5.98%
Total	**100.00%**

Technical Data

For the declared product, the following technical data in the delivery status must be provided with reference to the test standard:

Technical Data		
Requirement	**Specification**	**Unit**
Product thickness	4.09-5.22	mm
Grammage	2070-4170	g/m2
Abrasion Class	Heavy Commercial (ASTMD5252)/Class 33	-
Product Form	Broadloom/Modular	-
Type of manufacture	Woven/Lamination	-
Yarn type	PVC/FG	-
Pile fibre composition	80%(PVC)/20%(FG)	%
Total thickness	4.09-5.22	mm
Total carpet weight	2070-4170	g/m2
Surface pile thickness	0.97-2.34	mm
Number of tufts or loops (EPCM X PPCM)	(7-17)EPCM X (6-10)PPCM	-
Surface pile weight	600-973	g/m2
Secondary backing	PVC/Polyester	-
Thickness of the	4.06	mm
Length of the surface layer	Broadoom - Maximum 91.44 M)	mm
Width of the surface layer	Broadloom(1830 MM)	mm
Length and the width of squared elements	Modular Tile(457.2 x 457.2)/Modular Plank (914.4 X 152.4)	mm
Density	509.85-798.85	kg/m3
Layer thickness (Top layer)	N/A	mm

Placing on the Market / Application Rules

The BioFelt 2.0 Floor Textiles conforms to the certifications and sustainability regulations below:
- Colorfastness - Nitrogen AATCC 164
- Colorfastness - Light AATCC 129
- Accelerated Heat Aging
- Methamine Pill Text CSPC FF1-70
- Critical Radiant Flux ASTM E648
- Optical Smoke Density Flaming/Non Flaming
- Floorwear Contract Walker
- Hexapod Walker ASTM D5252
- Static Generator AATCC 134
- Dimensional Stability 2199-99
- Compression Recovery after 96 hours
- Resistance to Chemicals ASTM F925
- Slip Resistance ASTM C1028
- Impact Sound Transmission ASTM E989-89
- Aachen Stability Test ASTM D7570
- Aachen Curl and Doming Test ASTM D7570
- Static Load Deflection ASTM F970
- Castor Chair ISO TR 4918
- Dimensional Stability ISO 2551
- Colour Fastness to Light ISO 105-802
- Wear Change in Appearance ISO 10361
- Squareness and Straightness ISO 994
- Dimensional Stability RN 986
- Dimensional Stability Curling EN 986
- Electrical Resistance Horizonal ISO 10965
- Determination of Static Charge ISO 6356
- Determination of Static Charge EN 1815
- Steady State Thermal Resistance ISO 8302
- Reduction in Transmitted Noise EN ISO 10140-1
- Sound Absorption EN ISO 354/EN 20354
- Residual Indentation EN 24343-1
- Coefficient of Friction EN 13893
- Anti-Slip Properties EN 51130
- Fire Test EN 13501-1
- Classification EN 15114
- Green Label Plus
- CDPH 03150 V 1.2
- HPD
- Sound Testing - ASTM E2179, ASTM E492, ASTM C423, ASTM E90

Properties of Declared Product as Shipped

BioFelt 2.0 can be delivered as either modular flooring or as wall-to-wall flooring. Modular flooring is wrapped, boxed, and placed on a pallet. Wall-to-wall flooring is packaged around a cardboard core and then wrapped, but they are not palletized. The modular flooring packaging was used in the analysis of this study.

Methodological Framework

Functional Unit

The declaration refers to the functional unit of 1 square meter of Chilewich Sultan LLC BioFelt 2.0 Floor Textiles as specified in the PCR.

	BioFelt 2.0	
Name	**Value**	**Unit**
Functional unit	One square meter of BioFelt 2.0 floor covering over 75 years of building lifetime.	
Grammage	2.44	kg
Average Thickness	5.17	mm

System Boundary

This is a Cradle-to-Grave Environmental Product Declaration. The following life cycle phases were considered:

Product Stage			**Construction Process Stage**		**Use Stage**							**End-of-Life Stage***				**Benefits and Loads Beyond the System Boundaries**
Raw material supply	Transport	Manufacturing	Transport from gate to the site	Construction/ installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction /demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Description of the System Boundary Stages Corresponding to the PCR
(X = Included; MND = Module Not Declared)

*This includes provision of all materials, products and energy, packaging processing and its transport, as well as waste processing up to the end-of waste state or disposal of final residues.

Modules B1, B3, B5, B6, B7, C1, C3, and D are included and assumed to have zero impacts.

Reference Service Life

The reference service life of a properly installed Floor Textiles is 15 years. The building estimated service life is 75 years.

Allocation

Allocation was determined on a per m2 basis for primary data. For secondary data, cut-off methodology was used. No burdens are allocated across the system boundary with secondary material, secondary fuel, or recovered energy flows arising from waste.

Cut-off Criteria

Processes whose total contribution to the final result, with respect to their mass and in relation to all considered impact categories, is less than 1% can be neglected. The sum of the neglected processes may not exceed 5% by mass of the considered impact categories. For that a documented assumption is admissible.

For Hazardous Substances the following requirements apply:

- The Life Cycle Inventory (LCI) of hazardous substances will be included, if the inventory is available.
- If the LCI for a hazardous substance is not available, the substance will appear as an input in the LCI of the product, if its mass represents more than 0.1% of the product composition.
- If the LCI of a hazardous substance is approximated by modeling another substance, documentation will be provided.

This EPD is in compliance with the cut-off criteria. No processes were neglected or excluded. Capital items for the production processes (machine, buildings, etc.) were not taken into consideration.

Data Sources

Primary data were collected for every process in the product system under the control of Chilewich Sultan LLC. Secondary data from the SimaPro Ecoinvent v3.5 & USLCI v2.0 databases were utilized. These data were evaluated and have temporal, geographic, and technical coverage appropriate to the scope of the Floor Textiles product category.

Lower heating values (LHVs) were used.

Data Quality

The data sources used are complete and representative of North America in terms of the geographic and technological coverage and are a recent vintage (i.e. less than ten years old).The data used for primary data are based on direct information sources of the manufacturer. Secondary data sets were used for raw materials extraction and processing, end of life, transportation, and energy production flows.Wherever secondary data is used, the study adopts critically reviewed data for consistency, precision, and reproducibility to limit uncertainty.

Period Under Review

The period under review is the full calendar year of 2021.

Treatment of Biogenic Carbon

The uptake and release of biogenic carbon throughout the product life cycle follows EN 15804+A2

	BioFelt 2.0	
Name	Value	Unit
Biogenic Carbon Content in Product	0.00	kg C
Biogenic Carbon Content in Accompanying Packaging	0.04	kg C

Comparability and Benchmarking

A comparison or an evaluation of EPD data is only possible if all data sets to be compared were created according to EN 15804+A2 and the building context, respectively the product-specific characteristics of performance, are taken into account. Environmental declarations from different programs may not be comparable. Full conformance with the PCR for Building-Related Products and Services, Institut Bauen und Umwelt e.V. (IBU) - Part A: Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Re-port according to EN 15804+A2:2019, Version 1.3, 2021 and PCR Guidance-Texts for Building Related Products and Services, Part B: Requirements on the EPD for Floor Coverings, Institut Bauen und Umwelt e.V., v4, 20/06/2023. allows EPD comparability only when all stages of the product's life cycle have been considered. However, variations and deviations are possible.

Estimates and Assumptions

End of Life
In the End of Life phase, 100% of materials were assumed to go to landfill.

Units

The LCA results within this EPD are reported in SI units.

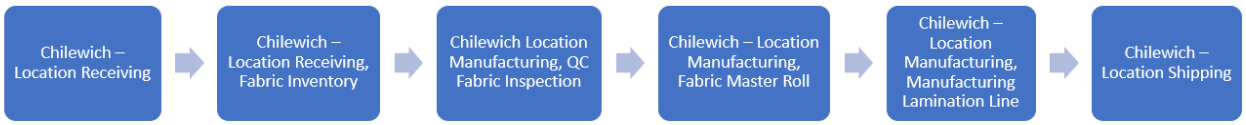
Additional Environmental Information

Background data

For life cycle modeling, the SimaPro v9.4 Software, a recognized LCA modeling software program, was used. All background data sets relevant for production and disposal were taken from this software. Datasets include those from Ecoinvent v3.5 and the US LCI database.

Manufacturing

During production at the Chilewich site, fabrics are chosen, quality controlled, and loaded onto the fabric master roll. Next, the master roll lays the materials in the correct position and order. Then, they are laminated, cut if needed, and packaged for distribution.



Packaging

All packaging is fully recyclable. The packaging material is composed by wood, cardboard, LDPE, and paper.

	BioFelt 2.0
Material	**Quantity (% By Weight)**
Wood	43%
Cardboard	56%
LDPE	0%
Paper	0%
Total	**100%**

Transformation

Transport to Building Site (A4)		
Name	**BioFelt 2.0**	**Unit**
Fuel type	Diesel	-
Liters of fuel	38	l/100km
Transport distance	3679	km
Capacity utilization (including empty runs)	90	%
Weight of products transported	2.61	kg
Capacity utilization volume factor	1	-

Product Installation

BioFelt 2.0 flooring is installed by industry professionals following local/national guidelines. This includes an application of acrylic adhesive to the floor. It is assumed that 10% of the product is disposed of as installation scrap.

Installation into the building (A5)		
Name	**BioFelt 2.0**	**Unit**
Auxiliary materials	0.310	kg
Water consumption	0.000	m^3
Other resources	0.000	kg
Electricity consumption	0.000	kWh
Other energy carriers	0.000	MJ
Product loss per functional unit	0.244	kg
Waste materials at construction site	0.338	kg
Output substance (recycle)	0.000	kg
Output substance (landfill)	0.244	kg
Output substance (incineration)	0.000	kg
Packaging waste (recycle)	0.070	kg
Packaging waste (landfill)	0.019	kg
Packaging waste (incineration)	0.005	kg
Direct emissions to ambient air*, soil, and water	0.248	kg CO_2
VOC emissions	-	kg

*CO2 emissions to air from disposal of packaging

Reference Service Life / Replacements (B4)		
Name	**Value**	**Unit**
Reference Service Life	15	years
Estimated Building Service Life	75	years
Number of Replacements	4	replacements

Replacement (B4) / Refurbishment (B5)		
Name	**Value**	**Unit**
Replacement Cycle	1 per 15 years	Number/RSL
Electricity Consumption	0	kWh
Replacement of Worn Parts	0	Number/RSL

Product Use

It is assumed that this product requires 100 vacuumings per year, captured in the “maintenance” phase. See below for the energy usage of this activity.

Maintenance (B2)		
Name	**Value**	**Unit**
Maintenance Cycle	7500.0	Number/RSL
Water consumption (from tap, to sewer)	-	m^3
Auxiliary	0.0	kg
Electricity consumption	28.3	kWh
Material Loss	0.0	kg
Equipment output	-	kW
Direct emissions to ambient air, soil, and water	-	kg

Disposal

100% of this product is disposed of in a landfill.

End of life (C1-C4)		
Name	**BioFelt 2.0**	**Unit**
Collected separately	0.00	kg
Collected as mixed construction waste	2.44	kg
Reuse	0.00	kg
Recycling	0.00	kg
Landfilling	2.44	kg
Incineration with energy recovery	0.00	kg
Energy conversion	N/A	%
Material for final deposition	2.44	kg
Removals of biogenic carbon	0.00	kg

Re-use Phase

This product cannot be re-used.

Re-Use, recovery, And/Or Recycling Potential (D)		
Name	**Value**	**Unit**
Net energy benefit from energy recovery from waste treatment declared as exported energy in C3 (R>0.6)	0.00	MJ
Net energy benefit from thermal energy due to treatment of waste declared as exported energy in C4 (R<0.6)	0.00	MJ
Net energy benefit from material flow declared in C3 for energy recovery	0.00	MJ
Process and conversion efficiencies	-	
Further assumptions for scenario development (e.g. further processing technologies, assumptions on correction factors);	-	

LCA Results

BioFelt 2.0 Results per Functional Unit Over the Building Lifetime of 75 Years - Including 4 Replacements

Results shown below were calculated using TRACI 2.1 Methodology.

TRACI 2.1 Impact Assessment

Parameter	Parameter	Unit	A1-A3	A4	A5	B2	B4	C1	C2	C3	C4	D
GWP	Global warming potential	kg CO_2-Eq.	7.95E+00	4.16E-01	1.57E+00	1.42E+01	4.08E+01	0.00E+00	1.46E-02	0.00E+00	2.43E-01	0.00E+00
ODP	Depletion potential of the stratospheric ozone layer	kg CFC-11 Eq.	1.82E-06	1.59E-11	2.36E-07	2.14E-10	2.07E-06	0.00E+00	5.55E-13	0.00E+00	9.37E-09	0.00E+00
AP Air	Acidification potential for air emissions	kg SO_2-Eq.	3.82E-02	2.49E-03	7.40E-03	1.23E-01	4.84E-02	0.00E+00	8.69E-05	0.00E+00	2.49E-04	0.00E+00
EP	Eutrophication potential	kg N-Eq.	1.83E-02	1.39E-04	7.23E-03	1.57E-03	6.14E-02	0.00E+00	4.84E-06	0.00E+00	3.57E-02	0.00E+00
SP	Smog formation potential	kg O_3-Eq.	5.29E-01	6.81E-02	1.12E-01	7.71E-01	7.18E-01	0.00E+00	2.38E-03	0.00E+00	5.48E-03	0.00E+00
FFD	Fossil Fuel Depletion	MJ-surplus	1.66E+01	7.98E-01	3.27E+00	1.65E+01	2.08E+01	0.00E+00	2.79E-02	0.00E+00	9.55E-02	0.00E+00

**Modules B1, B3, B5, B6, B7, C1, C3, and D are included and assumed to have zero impacts.*

Results shown below were calculated using EN 15804+A2 Methodology.

EN 15804+A2 Impact Categories

Parameter	Parameter	Unit	A1-A3	A4	A5	B2	B4	C1	C2	C3	C4	D
GWP	Climate change, Total	kg CO2 eq	8.09E+00	4.26E-01	1.73E+00	1.47E+01	4.23E+01	0.00E+00	1.49E-02	0.00E+00	3.22E-01	0.00E+00
ODP	Ozone depletion	kg CFC-11 eq	1.78E-06	1.08E-11	2.28E-07	1.14E-10	8.05E-06	0.00E+00	3.79E-13	0.00E+00	8.86E-09	0.00E+00
IRP	Ionising radiation	kBq U-235 eq	4.71E-01	0.00E+00	8.53E-02	0.00E+00	2.24E+00	0.00E+00	0.00E+00	0.00E+00	3.43E-03	0.00E+00
POCP	Photochemical ozone formation	kg NMVOC eq	2.88E-02	3.10E-03	6.14E-03	4.58E-02	1.54E-01	0.00E+00	1.09E-04	0.00E+00	3.42E-04	0.00E+00
PM	Particulate matter	disease inc.	4.02E-07	8.61E-09	7.32E-08	8.86E-07	1.96E-06	0.00E+00	3.01E-10	0.00E+00	4.99E-09	0.00E+00
HTP-nc	Human toxicity, non-cancer	CTUh	1.54E-07	7.21E-09	2.63E-08	6.75E-08	7.55E-07	0.00E+00	2.52E-10	0.00E+00	6.23E-10	0.00E+00
HTP-c	Human toxicity, cancer	CTUh	4.44E-09	5.69E-11	7.72E-10	9.85E-10	2.12E-08	0.00E+00	1.99E-12	0.00E+00	2.36E-11	0.00E+00
AP	Acidification	mol H+ eq	4.46E-02	2.27E-03	8.31E-03	1.53E-01	2.22E-01	0.00E+00	7.94E-05	0.00E+00	2.64E-04	0.00E+00
EP-freshwater	Eutrophication, freshwater	kg P eq	1.75E-03	0.00E+00	3.39E-04	0.00E+00	8.36E-03	0.00E+00	0.00E+00	0.00E+00	4.85E-06	0.00E+00
EP-marine	Eutrophication, marine	kg N eq	9.57E-03	1.07E-03	2.59E-03	1.14E-02	7.66E-02	0.00E+00	3.73E-05	0.00E+00	5.88E-03	0.00E+00
EP-terrestrial	Eutrophication, terrestrial	mol N eq	9.45E-02	1.16E-02	1.96E-02	1.24E-01	5.09E-01	0.00E+00	4.07E-04	0.00E+00	9.55E-04	0.00E+00
ETP-fw	Ecotoxicity, freshwater	CTUe	1.29E+02	1.12E+01	2.83E+01	1.23E+02	6.81E+02	0.00E+00	3.91E-01	0.00E+00	1.47E+00	0.00E+00
SQP	Land use	Pt	4.22E+01	0.00E+00	6.44E+00	0.00E+00	2.01E+02	0.00E+00	0.00E+00	0.00E+00	1.63E+00	0.00E+00
WDP	Water use	m3 depriv.	4.21E+00	0.00E+00	8.20E-01	0.00E+00	2.02E+01	0.00E+00	0.00E+00	0.00E+00	2.99E-02	0.00E+00
ADPF	Resource use, fossils	MJ	1.37E+02	5.35E+00	2.67E+01	2.01E+02	6.80E+02	0.00E+00	1.87E-01	0.00E+00	7.03E-01	0.00E+00
ADPE	Resource use, minerals and metals	kg Sb eq	8.41E-05	0.00E+00	1.63E-05	0.00E+00	4.02E-04	0.00E+00	0.00E+00	0.00E+00	1.02E-07	0.00E+00
GWP- Fossil	Climate change - Fossil	kg CO2 eq	8.28E+00	4.26E-01	1.52E+00	1.47E+01	4.23E+01	0.00E+00	1.49E-02	0.00E+00	3.22E-01	0.00E+00
GWP- Biogenic	Climate change - Biogenic	kg CO2 eq	-1.97E-01	0.00E+00	2.02E-01	0.00E+00	2.22E-02	0.00E+00	0.00E+00	0.00E+00	2.12E-04	0.00E+00
GWP-luluc	Climate change - Land use and LU change	kg CO2 eq	7.44E-03	0.00E+00	1.34E-03	0.00E+00	3.53E-02	0.00E+00	0.00E+00	0.00E+00	3.30E-05	0.00E+00

Results shown below were calculated using CML 2001 - April 2013 Methodology.

CML 4.1 Impact Assessment

Parameter	Parameter	Unit	A1-A3	A4	A5	B2	B4	C1	C2	C3	C4	D
GWP	Global warming potential	kg CO_2-Eq.	8.04E+00	4.18E-01	1.62E+00	1.43E+01	4.15E+01	0.00E+00	1.46E-02	0.00E+00	2.76E-01	0.00E+00
ODP	Depletion potential of the stratospheric ozone layer	kg CFC-11 Eq.	1.74E-06	1.57E-11	2.15E-07	9.06E-11	7.86E-06	0.00E+00	5.50E-13	0.00E+00	7.03E-09	0.00E+00
AP Air	Acidification potential for air emissions	kg SO_2-Eq.	3.73E-02	2.05E-03	7.07E-03	1.35E-01	1.87E-01	0.00E+00	7.17E-05	0.00E+00	2.01E-04	0.00E+00
EP	Eutrophication potential	kg$(PO_4)^3$-Eq.	1.03E-02	3.63E-04	3.35E-03	3.90E-03	1.09E-01	0.00E+00	1.27E-05	0.00E+00	1.32E-02	0.00E+00
POCP	Formation potential of tropospheric ozone	kg ethane-Eq.	1.87E-03	9.46E-05	5.15E-04	9.96E-03	1.01E-02	0.00E+00	3.31E-06	0.00E+00	4.83E-05	0.00E+00
ADPE	Abiotic depletion potential for non-fossil resources	kg Sb-Eq.	8.41E-05	0.00E+00	1.63E-05	0.00E+00	4.02E-04	0.00E+00	0.00E+00	0.00E+00	1.02E-07	0.00E+00
ADPF	Abiotic depletion potential for fossil resources	MJ	1.28E+02	5.35E+00	2.52E+01	2.01E+02	6.36E+02	0.00E+00	1.87E-01	0.00E+00	6.84E-01	0.00E+00

**Modules B1, B3, B5, B6, B7, C1, C3, and D are included and assumed to have zero impacts.*

Results below contain the resource use throughout the life cycle of the product.

Resource Use

Parameter	Parameter	Unit	A1-A3	A4	A5	B2	B4	C1	C2	C3	C4	D
PERE	Renewable primary energy as energy carrier	MJ	3.92E+00	0.00E+00	6.77E-01	0.00E+00	1.84E+01	0.00E+00	0.00E+00	0.00E+00	1.12E-02	0.00E+00
PERM	Renewable primary energy resources as material utilization	MJ	5.61E+00	0.00E+00	7.17E-01	0.00E+00	2.53E+01	0.00E+00	0.00E+00	0.00E+00	3.39E-03	0.00E+00
PERT	Total use of renewable primary energy resources	MJ	9.53E+00	0.00E+00	1.39E+00	0.00E+00	4.37E+01	0.00E+00	0.00E+00	0.00E+00	1.45E-02	0.00E+00
PENRE	Nonrenewable primary energy as energy carrier	MJ	1.47E+02	5.68E+00	2.87E+01	2.11E+02	1.57E+03	0.00E+00	1.99E-01	0.00E+00	7.47E-01	0.00E+00
PENRM	Nonrenewable primary energy as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	Total use of non-renewable primary energy resources	MJ	1.47E+02	5.68E+00	2.87E+01	2.11E+02	1.57E+03	0.00E+00	1.99E-01	0.00E+00	7.47E-01	0.00E+00
SM	Use of secondary material	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	Use of nonrenewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RE	Energy recovered from disposed waste	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	Use of net fresh water	m^3	-5.20E-02	0.00E+00	-2.54E-03	0.00E+00	-2.16E-01	0.00E+00	0.00E+00	0.00E+00	4.56E-04	0.00E+00

**Modules B1, B3, B5, B6, B7, C1, C3, and D are included and assumed to have zero impacts.*

Results below contain the output flows and wastes throughout the life cycle of the product.

Output Flows and Waste Categories

Parameter	Parameter	Unit	A1-A3	A4	A5	B2	B4	C1	C2	C3	C4	D
HWD	Hazardous waste disposed	kg	8.33E-05	0.00E+00	1.75E-05	0.00E+00	4.07E-04	0.00E+00	0.00E+00	0.00E+00	1.06E-06	0.00E+00
NHWD	Non-hazardous waste disposed	kg	1.00E+00	0.00E+00	5.23E-01	0.00E+00	1.71E+01	0.00E+00	0.00E+00	0.00E+00	2.76E+00	0.00E+00
HLRW	High-level radioactive waste	kg or m^3	1.80E-04	0.00E+00	4.14E-05	0.00E+00	9.01E-04	0.00E+00	0.00E+00	0.00E+00	4.13E-06	0.00E+00
ILLRW	Intermediate- and low-level radioactive waste	kg or m^3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CRU	Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MR	Materials for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE	Recovered energy exported from system	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

**Modules B1, B3, B5, B6, B7, C1, C3, and D are included and assumed to have zero impacts.*

Results below contain direct greenhouse gas emissions and removals throughout the life cycle of the product.

Biogenic Carbon

Parameter	Parameter	Unit	A1-A3	A4	A5	B2	B4	C1	C2	C3	C4	D
BCRP	Biogenic Carbon Removal from Product	kg CO_2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEP	Biogenic Carbon Emissions from Product	kg CO_2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCRK	Biogenic Carbon Removal from Packaging	kg CO_2	2.48E-01	0.00E+00	0.00E+00	0.00E+00	9.92E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEK	Biogenic Carbon Emissions from Packaging	kg CO_2	0.00E+00	0.00E+00	2.48E-01	0.00E+00	9.92E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEW	Biogenic Carbon Emissions from Combustion of Waste from Renewable Sources Used in Production Process	kg CO_2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCE	Calcination Carbon Emissions	kg CO_2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCR	Carbonation Carbon Removal	kg CO_2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CWNR	Carbon Emissions from Combustion of Waste from Non-renewable Sources Used in Production Process	kg CO_2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

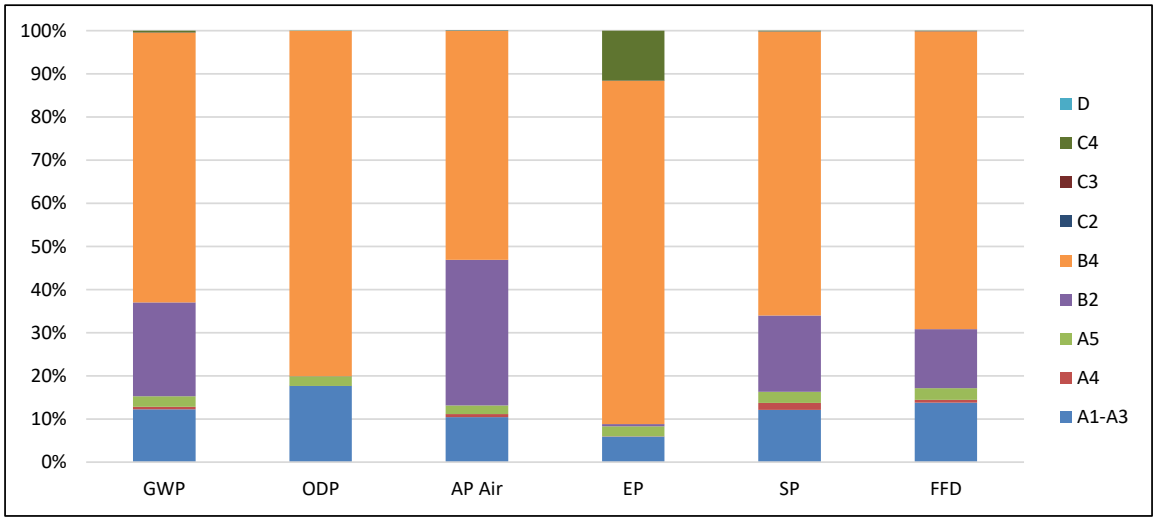
**Modules B1, B3, B5, B6, B7, C1, C3, and D are included and assumed to have zero impacts.*

The following table contains disclaimers from EN 15804+A2 for the impact categories used above.

ILCD classification	Indicator	Disclaimer
ILCD Type 1	Global warming potential (GWP)	None
	Depletion potential of the stratospheric ozone layer (ODP)	None
	Potential incidence of disease due to PM emissions (PM)	None
ILCD Type 2	Acidification potential, Accumulated Exceedance (AP)	None
	Eutrophication potential, Fraction of nutrients reaching freshwater end compartment (EP-freshwater)	None
	Eutrophication potential, Fraction of nutrients reaching marine end compartment (EP-marine)	None
	Eutrophication potential, Accumulated Exceedance (EP-terrestrial)	None
	Formation potential of tropospheric ozone (POCP)	None
	Potential Human exposure efficiency relative to U235 (IRP)	1
ILCD Type 3	Abiotic depletion potential for non-fossil resources (ADP-minerals&metals)	2
	Abiotic depletion potential for fossil resources (ADP-fossil)	2
	Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	2
	Potential Comparative Toxic Unit for ecosystems (ETP-fw)	2
	Potential Comparative Toxic Unit for humans (HTP-c)	2
	Potential Comparative Toxic Unit for humans (HTP-nc)	2
	Potential Soil quality index (SQP)	2
Disclaimer 1 – This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.		
Disclaimer 2 – The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.		

BioFelt 2.0 LCA Interpretation

The production life cycle stage (A1-A3) dominates the impacts of one product lifetime across all impact categories. This is due to the upstream production of materials used in the product, along with electricity use in the manufacturing of the product. However, since there are four product lifetimes over a life-span of a building, the replacement stage (B4) contributes significant amount from duplicating these stages. The maintenance stage (B2) is also a significant driver of impact, as it includes resources required for the entire 75-year building lifetime.



Additional Environmental Information

Environmental and Health During Manufacturing

Chilewich takes exceptional care to ensure a safe and healthy environment at our factory in Chatsworth, Georgia. This fully owned facility is in compliance with all state and federal regulations for workplace safety, including inspections by the Occupational Safety and Health Administration (OSHA). In addition to testing our products to ensure low VOC emissions, we test our manufacturing environment. We also ask employees to report any conditions they observe or believe to be unsafe, so that they can be addressed immediately.

Environmental and Health During Installation

There is no harmful emissive potential. No damage to health or impairment is expected under normal use corresponding to the intended installation and/or use of the product.

Extraordinary Effects

Fire
Meets or exceeds Class 1 rating as specified in NFPA Life Safety Code 101 (ASTM E648).

Water
The surface of the product is waterproof by penetration except for joints, seams, and edges. All the face fabric is closed cell chemistry that is not affected or penetrated by water.

Mechanical Destruction
There are no adverse environmental effects anticipated from the mechanical destruction of the product.

Delayed Emissions

Global warming potential is calculated using the TRACI 2.1 and CML 4.1 impact assessment methodologies. Delayed emissions are not considered.

Environmental Activities and Certifications

Chilewich is committed to continuous improvement, both in product and in process. Among our most significant environmental advancements is discontinuing the use of petroleum-based plasticizers that are typically used to soften PVC yarns and replacing them with phthalate-free, renewable vegetable compounds. We call these innovative yarns TerraStrand. Every square yard of TerraStrand saves 0.02 gallons of petroleum and 0.41 pounds of CO2 as compared to conventional woven vinyls. Made in the USA, our textiles are certified for low VOC emissions by the GreenGuard® Environmental Institute, which protects human health and quality of life through the reduction of chemical exposure and improved indoor air quality. All of these efforts help our products contribute to LEED points.

Further Information

Chilewich
Greg Epperson
Technical Services Manager
1512 Highway 225 South
Chatsworth, GA 30705

References

- PCR Part A — PCR for Building-Related Products and Services, Institut Bauen und Umwelt e.V. (IBU) - Part A: Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Re-port according to EN 15804+A2:2019, Version 1.3, 2021
- PCR Part B — PCR Guidance-Texts for Building Related Products and Services, Part B: Requirements on the EPD for Floor Coverings, Institut Bauen und Umwelt e.V., v4, 20/06/2023.
- SimaPro 9.4 — PRe Sustainability. SimaPro Life Cycle Assessment version 9.4 (software).
- ISO 14025 — ISO 14025:2006, Environmental labels and declarations — Type III environmental declarations — Principles and procedures.
- ISO 14040 — ISO 14040: 2006/Amd1 2020 Environmental management — Life cycle assessment — Principles and framework.
- ISO 14044 — ISO-14044:2006/Amd1:2017/Amd2:2020 Environmental management — Life cycle assessment — Requirements and guidelines.
- EN 15804+A2 — EN 15804+A2:2019: Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction product
- ULE 2020 — UL Environment, General Program Instructions, v2.5, March 2020.
- ADAAG-1998 — Americans with Disabilities Act Accessibility Guidelines
- ANSI A117.1 — Accessible and Usable Buildings and Facilities
- CBC, Title 24 — Barrier Free guidelines
- ASTM E90 — Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and
- ASTM E283 — Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors
- BHMA A156.21 — Thresholds
- UL 10(b) — Gasketing Material for Fire Doors
- UL 10(c) — Positive Pressure Gasketing Material for Fire Doors
- UL 2818 — GREENGUARD Certification Program for Chemical Emissions for Building Materials, Finishes and Furnishings
- Characterization Method — IPCC. 2014. Climate Change 2013. The Physical Science Basis. Cambridge University Press. (http://www.ipcc.ch/report/ar5/wg1/).
- Characterization Method — Hauschild M.Z., & Wenzel H. Environmental Assessment of Products. Springer, US, Vol. 2, 1998.
- Characterization Method — Heijungs R., Guinée J.B., Huppes G., Lankreijer R.M., Udo de Haes H.A., Wegener Sleeswijk A. Environmental Life Cycle Assessment of Products: Guide and Backgrounds. CML. Leiden University, Leiden, 1992.
- Characterization Method — Jenkin M.E., & Hayman G.D. Photochemical ozone creation potentials for oxygenated volatile organic compounds: sensitivity to variations in kinetic and mechanistic parameters. Atmospheric Environment. 1999, 33 (8) pp. 1275-1293.
- Characterization Method — WMO. 1999. Scientific Assessment of Ozone Depletion: 1998, World Meteorological Organization Global Ozone Research and Monitoring Project - Report No. 44, WMO, Geneva.
- Characterization Method — Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources using Environmental Chambers- version 1.2, January 2017.

Contact Information

Study Commissioner

Chilewich
Greg Epperson
Technical Services Manager
1512 Highway 225 South
Chatsworth, GA 30705
gepperson@chilewich.com
chilewichcontract.com

LCA Practitioner

Sustainable Solutions Corporation
155 Railroad Plaza, Suite 203
Royersford, PA 19468 USA
(+1) 610 569-1047
info@sustainablesolutionscorporation.com
www.sustainablesolutionscorporation.com