

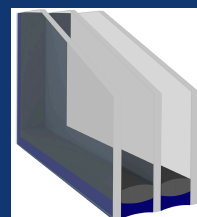


Environmental Product Declaration

IN ACCORDANCE WITH ISO 14025 AND ISO 21930:2017

Program Operator: Smart EPD®

www.smartepd.com



H.B. Fuller KOMMERLING

SmartEPD-2024-030-0154-01.1

Ködispace 4SG

Date of Issue

May 01, 2025

Expiration date

May 01, 2030

Last updated

May 01, 2025



Refer to the EPD Library at www.smartepd.com for the latest EPD listing information

General Information

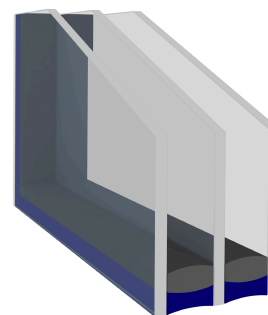
H.B. Fuller Company

📍 1200 Willow Lake Blvd, St Paul, MN 55110, USA

☎ +1 651-236-5900

✉ sustainability@hbfuller.com

🌐 hbfuller.com



Product Name:	Ködispace 4SG
Declared Unit:	1 linear meter
Declaration Number:	SmartEPD-2024-030-0154-01.1
Date of Issue:	May 01, 2025
Expiration:	May 01, 2030
Last updated:	May 01, 2025
EPD Scope:	Cradle to gate with other options A1 - A3, C1 - C4, D

Market(s) of Applicability:

General Organization Information

At H.B Fuller | Kömmerling (H.B. Fuller) sustainability is a core pillar of the business growth strategy aiming to generate value for all the stakeholders through innovation and high-performance solutions combined with a reduced environmental footprint and operational excellence. The company actively optimizes its processes to reduce resource usage, and engage employees to be knowledgeable about and accountable for reaching sustainability targets. H.B. Fuller monitors its environmental footprint and continuously innovates for improved sustainability in their products and manufacturing practices. H.B. Fuller also collaborates with customers to create adhesive solutions that allow them to meet their sustainability goals. H.B. Fuller adhesives help customers save energy, reduce waste, and enable recycling and reuse.

Further information can be found at: <https://www.hbfuller.com/en/brands/kommerling>

Limitations, Liability and Ownership

Environmental declarations from different programs, even if well in accordance with ISO 14025, may not be comparable. Comparison of the environmental performance of 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 whole building life cycle. EPD comparability is only possible 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. The EPD owner has sole ownership, liability, and responsibility for the EPD.

Reference Standards

Standard(s):	ISO 14025 and ISO 21930:2017
Core PCR:	Smart EPD® Part A Product Category Rules for Building and Construction Products and Services v.1.01

Date of issue: January 15, 2024

Valid until: January 15, 2029

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

ACLCA PCR Guidance Version:

1.0

ACLCA PCR Conformance Level:

Transparency

LCA Author/Creator:

Juan David Villegas

juan@parqhq.com

EPD Program Operator:

Smart EPD

info@smartepd.com

www.smartepd.com

585 Grove St., Ste. 145, Herndon, VA 20170, USA

Verification:

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

Lucas Pedro Berman | Senda - Consultoria Ambiental & Energetica

info@sendaconsultorias.com

External

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

Lucas Pedro Berman | Senda - Consultoria Ambiental & Energetica

info@sendaconsultorias.com

External

Product Information

Declared Unit:

1 linear meter

Mass:

0.098 kg

Product Specificity:

✗ Product Average

✓ Product Specific

Product Description

H.B. Fuller Ködispace 4SG is a high-performance warm edge system that is ideally suited for use in structural glazing façades. Due to its special material properties, 4SG meets the requirements of silicone-sealed glazing. Unlike conventional thermoplastic spacers, this reactive polyisobutylene chemically bonds with both the silicone edge seal usually used in glass façades and the glass surface. This EPD covers 1 linear meter of Ködispace 4SG as applied by a Bystronic-Lehnhardt Thermoplastic spacer applicator with a 5.8 mm nozzle and 12 mm of application height. These dimensions were used as a typical value for reference. To obtain the environmental impacts for the same product, applied with different nozzles and widths, please refer to the tables in the "Further Information" section at the end of the document and multiply the results by the corresponding multiplication factor, as indicated.

Further information can be found at: <https://www.hbfullerproducts.com/products/h-b-fuller-kodispace-4sg>

Product Specifications

Product Classification Codes: EC3 - Openings -> Glazing -> FenestrationParts -> FenestrationAccessories

Material Composition

Material/Component Category	Origin	% Mass
Polyisobutene	GLO	48-52
Filler	GLO	24-28
Other	GLO	20-24

Packaging Material	Origin	kg Mass
Steel	RER	0.0098
Wood (Pallet)	RER	0.0049

Biogenic Carbon Content	kg C per linear meter
Biogenic carbon content in product	0None
Biogenic carbon content in accompanying packaging	0.00217

Hazardous Materials
calcium oxide (CAS 1305-78-8)

EPD Data Specifity

- Primary Data Year: FY 2023
- Manufacturing Specificity:
 - ✗ Industry Average
 - ✗ Manufacturer Average
 - ✓ Facility Specific

Averaging:
Averaging was not conducted for this EPD.

System Boundary

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

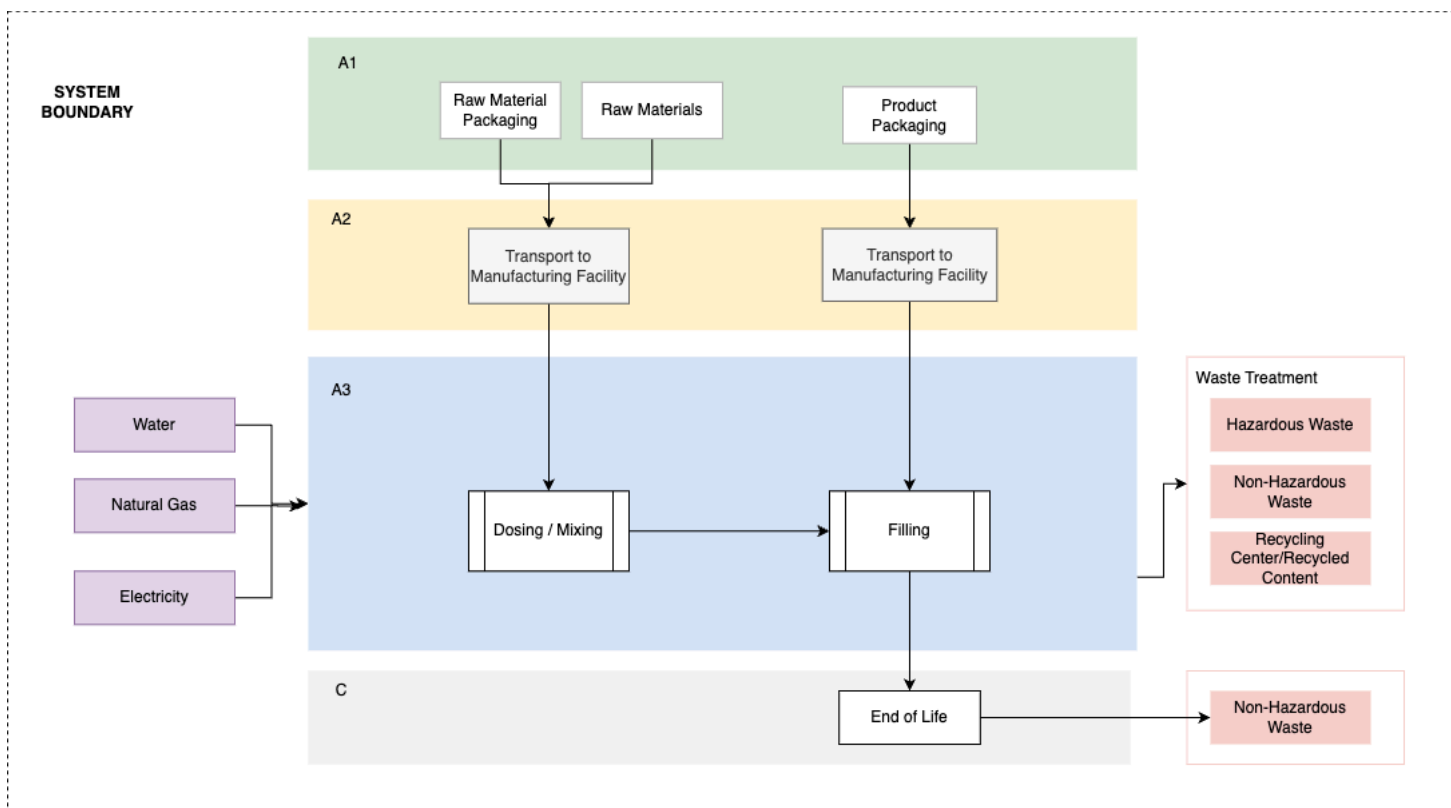
Note:

ND = Module not declared

Plants

 Pirmasens Kömmerling Chemische Fabrik GmbH, Zweibrücker Straße, Pirmasens, Germany

Product Flow Diagram



Software And Database

LCA Software:	SimaPro v. 9.5
LCI Foreground Database(s):	Ecoinvent v. 3.9.1
LCI Background Database(s):	Ecoinvent v. 3.9.1

A foreground LCI database is the database used to model the primary, site-specific data collected for this EPD. A background LCI database is the database used to model generic or non-specific data.

Data Quality

The inventory data used in this study were either directly measured, calculated, or estimated based on primary data sources, ensuring high precision. Background data from ecoinvent v3.9.1 database also has documented precision to the extent available. The product system's mass balance and inventory completeness were thoroughly checked. Some exclusions were made in line with the PCR requirements. However, no data was intentionally omitted. Primary data were collected with a similar level of detail, while background data came from the ecoinvent v3.9.1 database. The modelling approach and other methodological choices were applied consistently throughout the model. Reproducibility: This study ensures reproducibility by providing comprehensive disclosure of input-output data, dataset choices, and modelling approaches. A knowledgeable third party should be able to approximate the results using the same data and modelling methods. Primary data were collected for the Fiscal year of 2023, from December 2022 to November 2023 to ensure representativeness. Secondary data from the ecoinvent v3.9.1 database is typically representative of recent years. Primary data represent H.B. Fuller's

production facilities. The use of country-specific data ensures high geographical representativeness, and proxy data were only used when country-specific data were unavailable. Both primary and secondary data were tailored to the specific technologies studied, ensuring high technological representativeness.

Life Cycle Module Description

The raw materials are shipped via ground freight (truck) and/or ship to the H.B. Fuller site at Pirmasens in Germany. Once the raw materials are received, they are stored in a warehouse. Blending or mixing components that require blending is done in mixing vats. Ingredients are dosed either mechanically (automatically) or measured and added by hand (manually.) Mixing is carried out in a semi-automated process by kneaders. Once the ingredients have been blended according to standard operating procedures, the intermediate product is filled into tins, drums and pails. Power, heating and water usage per mass of product is based on reports from their system. Other utilities such propane fuel used in forklifts and diesel are monitored for the entire facility and mass-allocated to the product. The impact of infrastructure and capital goods was excluded from the LCA, as it is explicitly accepted in the PCR. Non hazardous waste consisted of uncontaminated packaging material. This stream was assumed, as per information provided by H.B. Fuller, to be sent 100% to recycling to facilities located at 60 km using heavy-duty trucks. Hazardous waste (mainly contaminated packaging) is sent to facilities located at 60 km.

LCA Discussion

Allocation Procedure

Allocation of co-products was avoided, to the extent it was possible, based on the guidance given in ISO 14044:2006, 4.3. and in EN 15804+A2.

At the Pirmasens (Germany) facility, natural gas used for heating, process water used in wet scrubber, and process electricity come from direct metering of specific consumption per mass of product, as reported by H.B Fuller. Mass allocation was performed only for the following joint production processes: Packaging waste transported to a recycling plant, hazardous waste transported to an incineration facility, propane use (forklift and foil shrinking station), and diesel consumption.

Cut-off Procedure

A cut-off rule of 1% was applied to all raw materials, packaging materials, energy, water and waste flows.

Renewable Electricity

Energy Attribute Certificates (EACs) such as Renewable Energy Certificates (RECs) or Power Purchase Agreements (PPAs) are included in the baseline reported results:	✓ Yes
Electricity Source:	Offsite
Renewable type(s):	wind, solar, biomass, hydro
Percent of EPD Owner's product-related electricity covered:	58.9 %
Grid type used to model remaining electricity:	consumption grid
Commitment pledged for entire EPD validity period:	✓ Yes

Scenarios

End of Life (C1 - C4)

C1 - C4 Modules

Collection Process

Collected Separately: 0.113 kg

Recovery

Recycling: 0.0147 kg

Incineration: 0.098 kg

Assumptions for scenario development:

No losses at installation, product is considered to be 100% sent to incineration. Packaging is 100% recycled.

Reuse, Recovery and / or Recycling Potentials & Relevant Scenario Information (D)

D Module

Further assumptions for scenario development:

Recycling of packaging material was not declared in module D following the conservative approach recommended in section 6.4.3.3 of EN 15804 +A2 and following the "additionality" principle, given the high rates of industrial packaging recycling in Germany.

Results

Environmental Impact Assessment Results

EF 3.1

LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

1 linear meter of applied product (5.8 mm nozzle / 12 mm air space)

Impact Category	Method	Indicator	A1 - A3	C1	C2	C3	C4	D
GWP-total	EF 3.1	ND	2.44e-1	0	1.81e-3	0	1.25e-1	0
GWP-biogenic	EF 3.1	ND	-7.96e-3	0	0	0	7.96e-3	0
GWP-fossil	EF 3.1	ND	2.52e-1	0	1.81e-3	0	5.10e-2	0
GWP-luluc	EF 3.1	ND	1.61e-4	0	8.94e-7	0	1.06e-6	0
ODP	EF 3.1	ND	8.72e-9	0	3.94e-11	0	1.47e-10	0
AP	EF 3.1	ND	9.68e-4	0	3.96e-6	0	2.92e-5	0
EP-freshwater	EF 3.1	ND	3.77e-5	0	1.29e-7	0	3.76e-6	0
EP-marine	EF 3.1	ND	1.96e-4	0	9.99e-7	0	1.57e-5	0
EP-terrestrial	EF 3.1	ND	2.01e-3	0	1.01e-5	0	1.34e-4	0
POCP	EF 3.1	ND	9.14e-4	0	6.14e-6	0	3.52e-5	0
ADP-minerals&metals	EF 3.1	ND	1.13e-6	0	5.92e-9	0	6.31e-9	0
ADP-fossil	EF 3.1	ND	6.12e+0	0	2.57e-2	0	3.21e-2	0
WDP	EF 3.1	ND	1.75e-2	0	1.06e-4	0	6.07e-4	0

Note:

Not all abbreviated indicators listed below may be present in the results above. The inclusion of indicators varies based on PCR requirements.

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 Indicator

1 linear meter of applied product (5.8 mm nozzle / 12 mm air space)

Indicator	Unit	A1 - A3	C1	C2	C3	C4	D
PERE	MJ	2.99e-1	0	4.04e-4	0	1.10e-3	0
PERM	MJ	0	0	0	0	0	0
PERT	MJ	2.99e-1	0	4.04e-4	0	1.10e-3	0
PENRE	MJ	6.12e+0	0	2.57e-2	0	3.21e-2	0
PENRM	MJ	3.73e-4	0	1.29e-6	0	2.83e-6	0
PENRT	MJ	6.12e+0	0	2.57e-2	0	3.21e-2	0
SM	kg	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0
FW	m3	5.93e-4	0	3.17e-6	0	1.09e-4	0

Note:

Not all abbreviated indicators listed below may be present in the results above. The inclusion of indicators varies based on PCR requirements.

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

1 linear meter of applied product (5.8 mm nozzle / 12 mm air space)

Indicator	Unit	A1 - A3	C1	C2	C3	C4	D
HWD	kg	1.57e-3	0	0	0	0	0
NHWD	kg	0	0	0	0	9.80e-2	0
RWD	kg	1.59e-6	0	8.45e-9	0	1.99e-8	0
CRU	kg	0	0	0	0	0	0
MFR	kg	3.70e-3	0	0	0	1.47e-2	0
MER	kg	0	0	0	0	0	0

Note:

Not all abbreviated indicators listed below may be present in the results above. The inclusion of indicators varies based on PCR requirements.

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

1 linear meter of applied product (5,8 mm nozzle / 12 mm air space)

Indicator	Unit	A1 - A3	C1	C2	C3	C4	D
BCRP	kg CO2	0	0	0	0	0	0
BCEP	kg CO2	0	0	0	0	0	0
BCRK	kg CO2	7.96e-3	0	0	0	0	0
BCEK	kg CO2	0	0	0	0	7.96e-3	0
BCEW	kg CO2	0	0	0	0	0	0
CCE	kg CO2	0	0	0	0	0	0
CCR	kg CO2	0	0	0	0	0	0
CWNR	kg CO2	0	0	0	0	0	0

Note:

Not all abbreviated indicators listed below may be present in the results above. The inclusion of indicators varies based on PCR requirements.

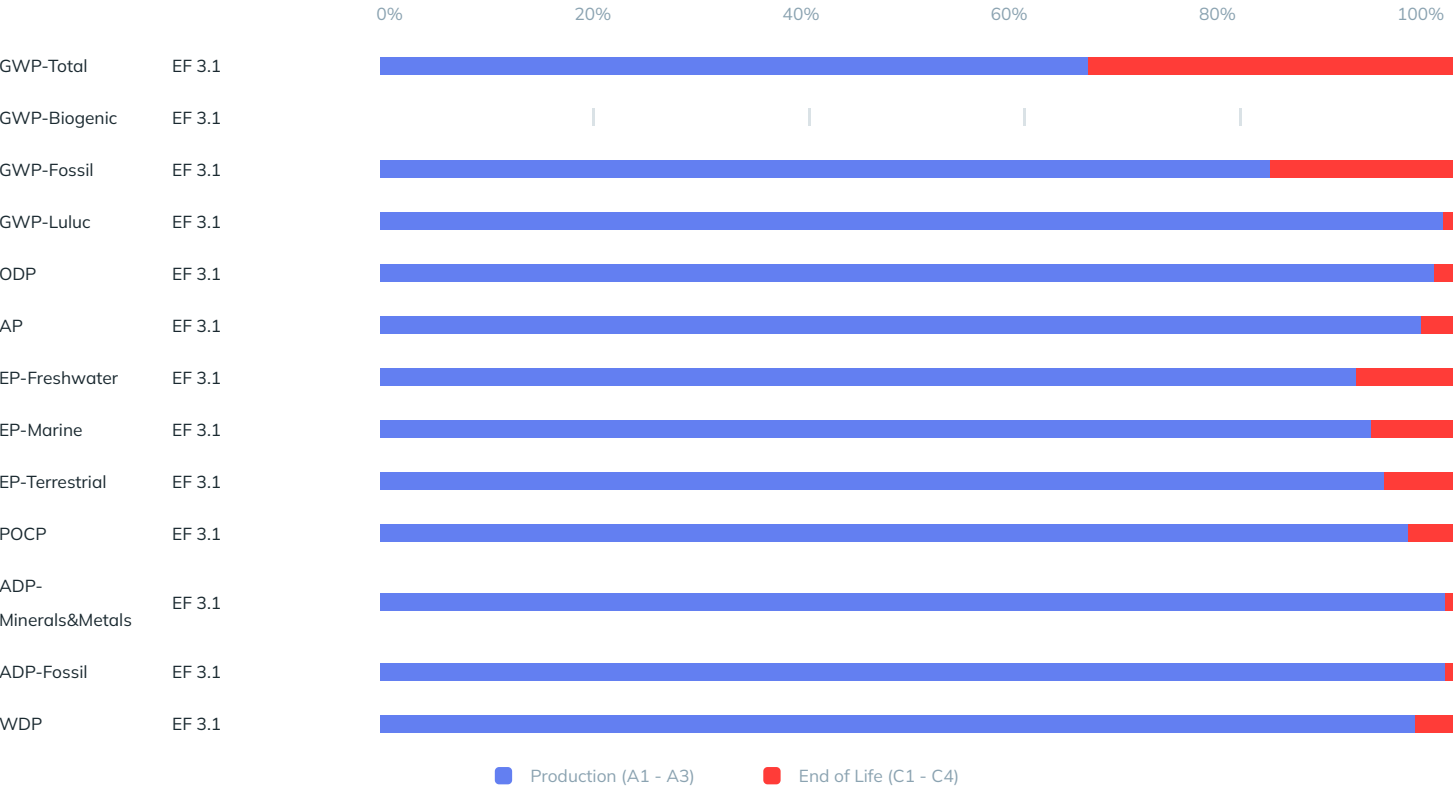
Abbreviations:

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.

Interpretation

The module of raw material extraction and processing (A1) was the main driver of most environmental impacts, with particular influence of the upstream manufacture of resins, followed by the impact of the end-of-life incineration treatment. Biogenic carbon is removed from the atmosphere by product

packaging and emitted at the end of life. The module of raw material extraction and processing (A1) was the main driver of most resource use indicators, except for the use of renewable energy, driven by the manufacturing stage use of grid electricity at Pirmasens (54% renewable). The recycling of packaging materials is captured by the MR indicator at A3 and C4.



Additional Environmental Information

H.B. Fuller is committed to the protection of the environment. In keeping with this commitment, we continue to take actions — including implementing programs to reduce our demand for water, minimize the generation and disposal of waste and limit our emissions of air pollutants and greenhouse gases. Accountability and transparency are fundamental to the trust we built, therefore H.B. Fuller regularly reports to CDP Climate Change and CDP Water Security as well as completes EcoVadis sustainability assessment of our environmental, social, ethics and supply chain practices.

Recently, H.B. Fuller committed to set near-term company-wide reduction targets for our Scope 1, 2 and 3 greenhouse gas (GHG) emissions, in line with Science Based Target Initiative (SBTi) standards. When adopted and approved, these targets are expected to require ambitious reductions in our absolute GHG emissions levels, consistent with limiting global temperature rise to 1.5°C, using a 2025 baseline.

H.B. Fuller | KÖMMERLING has been a trusted partner for warm edge spacer for more than 25 years, with products consistently ranked among the best on the market. This is regularly confirmed by tests conducted by ift Rosenheim (Germany). These test results are verified by the Warm Edge Working Group and documented in the official data sheets on thermoplastic spacer of the Bundesverband Flachglas (German Federal Flat Glass Association).

Additionally, H.B. Fuller | KÖMMERLING products are certified by the Passive House Institute. For years, the esteemed institute from Darmstadt (Germany) has collaborated with H.B. Fuller | KÖMMERLING on studies providing essential market information. One such study examined the impact of warm edge spacer in insulating glazing on the total energy demand of buildings across different climate zones (cold, cold-moderate, warm-moderate, warm). The findings revealed that, compared to aluminium spacer bars, highly efficient thermoplastic spacer significantly reduce energy consumption, CO2 emissions,

and heating costs for buildings. Another study by the Passive House Institute focused on living comfort, highlighting the positive effects of warm edge spacer on well-being, comfort, and mould prevention.

Further Information

Multiplication Factors per Declared Unit using a 5.8 mm nozzle

Air Space, mm	Consumption g / linear m	Multiplication Factor
6	49	0.5
8	65	0.67
10	82	0.83
12	98	1.00*
14	114	1.17
16	131	1.33
18	147	1.50
20	163	1.67

* Declared Unit for this EPD is 1 linear meter applied with a 5.8 mm nozzle, 12 mm of air space and a consumption of 98 g / linear meter.

Multiplication Factors per Declared Unit using a 6.8 mm nozzle

Air Space, mm	Consumption g / linear m	Multiplication Factor
6	57	0.59
8	77	0.78
10	96	0.98
12	115	1.17
14	134	1.37
16	153	1.56
18	172	1.76
20	191	1.95

References

- ISO 14040:2006, "Environmental management - Life cycle assessment - Principles and framework".
- ISO 14044:2006, "Environmental management - Life cycle assessment - Requirements and guidelines".
- EN 15804:2012+A2:2019. Sustainability of construction works. Environmental product declarations. Core rules for the product category of construction products. Brussels: European Committee for Standardization (CEN).
- Smart EPD™ Part A Product Category Rules for building and construction products and services, Standard 1000, version 1.01 January 15, 2024.
- ecoinvent v3.9.1, December 2022, <https://ecoinvent.org/the-ecoinvent-database/data-releases/ecoinvent-3-9-1/>
- Dong, Y., Hossain, M. U., Li, H., & Liu, P. (2021). Developing conversion factors of LCIA methods for comparison of LCA results in the construction sector. Sustainability, 13(16), 9016.
- UN Environment, 2011 Global Guidance on LCA database development. Life Cycle Initiative.
- ISO 14025:2006, "Environmental labels and declarations - Type III environmental declarations - Principles and procedures".