swisspacer
SAINT-GOBAIN

EPD®
THE INTERNATIONAL EPD® SYSTEM

ECO PLATFORM
EPD
VERIFIED

Environmental Product Declaration

In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021 2021 and PCR 2019:14 Construction products and construction services, Version 1.3.2 / 2022-11-01

swisspacer ultimate
SAINT-GOBAIN

6 mm to 56 mm

Programme: The International EPD® System www.environdec.com
Program operator: EPD International AB.
Registration number: **EPD-IES-0011837:001**

EPD of multiple products, based on a representative product

An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com

VERSION 2
Date of publication: **2024/12/16**
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Valid until: **2029/12/15**
Scope of the EPD®: **World**

Table of content

Programme information

- **Programme:** The International EPD® System
- **Address:** The International EPD® System
EPD International AB - Box 210 60 - SE-100 31 Stockholm – Sweden
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Accountabilities for PCR, LCA and independent, third-party verification

Product Category Rules (PCR)

CEN standard EN 15804 serve as the core Product Category Rules (PCR)

Product category rules (PCR): PCR 2019:14 Construction products, version 1.3.2

c-PCR-009 Flat glass products used in buildings and other construction works (EN 17074)

PCR review was conducted by: The Technical Committee of the International EPD® System. See www.environdec.com for a list of members. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact.

Life cycle assessment (LCA)

LCA accountability: Joffrey MARTIN, Saint-Gobain

Third-party verification

Independent third-party verification of the declaration and data, according to ISO 14025:2006:

☒ EPD verification by individual verifier

Third party verifier: ELYS CONSEIL
Pierre-Alexis DUVERNOIS - pa.duvernois@elys-conseil.com

Approved by: The International EPD® System

Procedure for follow-up of data during EPD validity involves third part verifier.

☐ Yes ☒ No

The EPD owner has the sole ownership, liability, and responsibility of the EPD.

EPDs within the same product category but registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

Product information

Company information

• **Manufacturer:** Vetrotech Saint-Gobain (Int.) AG, Zweigniederlassung Lengwil, Industriestrasse 8, 8574 Lengwil, Switzerland

• **Production plants:**
  • Bojkowska 61, 44-141 Gliwice, Poland;
  • Sonnenwiesenstrasse 15, 8280 Kreuzlingen, Switzerland;

• **Framework:** The LCA is based on 2023 production data for all 2 sites.

• **Prepared EN:** IVL Swedish Environmental Research Institute, EPD International Secretariat

• **UN CPC CODE:** 363 - Semi-manufactures of Plastics

• **Owner of the declaration:** Vetrotech Saint-Gobain (Int.) AG Zweigniederlassung Kreuzlingen Swisspacer Sonnenwiesenstrasse 158280 Kreuzlingen, Switzerland

• **Product name and manufacturer represented:** Swisspacer Ultimate from 6 mm to 56 mm width produced by Swisspacer

• **EPD® prepared by:** Joffrey Martin (Saint-Gobain LCA central team) and Alexandre Sobieski (SGR Germany)

The intended use of this EPD is for B2B communication.

• **Contact:** Bjorn Kluth - bjorn.kluth@saint-gobain.com

• **Geographical scope of the EPD®:** Global

• **EPD® registration number:** EPD-IES-0011837:001

• **Declaration issued:** 2024-12-16, valid until: 2029-12-15

• **Demonstration of verification:** an independent verification of the declaration was made, according to ISO 14025:2010. This verification was external and conducted by the following third party based on the PCR mentioned above.

Product description and description of use

This Environmental Product Declaration (EPD) describes the environmental impacts of 1 linear meter Swisspacer Ultimate spacer bar.

Swisspacer warm edge spacer bars are glass fibre reinforced plastic hollow profiles with a multilayer high-tech foil as an adhesion surface. A spacer bar determines the gap between the panes of an insulating glass unit. It serves as a limiter for the sealant and as a storage for the desiccant, and thus contributes to the permanent hermetic seal of insulating glass. The warm edge helps to insulate the window, prevents condensation and reduces the risk of mould, thus contributing to improved living comfort.

The service life of Swisspacer Ultimate spacer equals a glass' average lifetime; set to 30 years by default according to Glass PCR 17014.

This EPD is a weighted average of the 2 Swisspacer production sites in Europe: Kreuzlingen (Switzerland) and Gliwice (Poland). The average calculated is a weighted arithmetic mean based on produces quantities.
The 2 sites are considered for this EPD because they all produce for the worldwide market without distinction between clients or countries. This grouping is allowed by PCR since the EPD doesn't claim accordance with ISO 21930.

Information related on EPDs of Multiple Products

Representative Product:

Swisspacer Ultimate 16 mm width.

Justification of representativeness:

Despite the differences in width, these products are made of the same material. They follow identical core processes, leading to an expected similarity in their environmental impact per unit of weight.
The production volume of Swisspacer Ultimate at 16mm width was the largest of the range in 2023 and is therefore chosen as reference.

Calculation of result:

To determine the environmental impacts per linear metre of the different product width, the results of the representative product presented in this EPD must be multiplied by the corresponding conversion factor based on their weight.

Performance data

Psi values of the Swisspacer Ultimate spacers for different window types.

Wood	PVC	wood / aluminium	Aluminium
1,4 - 1,3 W/m2K	1,2 W/m2K	1,4 W/m2K	1,6 W/m2K
0,031 | 0,029[1]	0,032 | 0,030	0,032 | 0,030	0,036 | 0,031

CALUWIN allows Uw values to be accurately calculated and offers a multitude of additional features: https://www.Swisspacer.com/fr/caluwin

[1] Double | triple insulating glazing

Declaration of the main product components and/or materials

Functional/declared unit:
"Ensure over 1 linear meter the role of glazing-spacer for integration into a window for a lifespan of 30 years."

Product components	Weight (%)	Post-consumer material weight (%)	Biogenic material weight- kg C/product
Polymer resin and glass fibre	>95%	0%	0
Desiccant, colour pigment, glue and minor components	<5%	0%	0
Sum	100%	0%	0%
Packaging materials	**Weight (%)**	**Weight-% (vs the product)**	**Biogenic material, weight- kg C/product**
Paper label	1-5%	<1%	3.32E-05
PP Tape	<1%	<1%	0
PET Tape	<1%	<1%	0
Polypropylene film	1-5%	<1%	0
Cardboard	60%	2%	4.63E-04
Wood	30%	1%	2.44E-04

Product width (mm)	Mass in g
6	23.9
7	24.6
8	27.9
9	30.5
10	33.6
11	39.3
12	42.4
13	43
14	48.5
15	48.9
16	50.5
18	57.3
20	61.5
22	66.5
24	75.7
27	79.7
32	99.8

Product width (mm)	Mass in g
36	110.3
45	136.7
56	163.3

At the date of issue of this declaration, there is no “Substance of Very High Concern” (SVHC) in concentration above 0.1% by weight, and neither in their packaging, following the European REACH regulation (Registration, Evaluation, Authorization and Restriction of Chemicals).

The verifier and the program operator do not make any claim nor have any responsibility of the legality of the product.

LCA calculation information

Type of EPD	Cradle to grave and module D Mandatory Stages = A1-A3; B1-B7; C1-C4 and D
Functional unit/declared unit	Ensure over 1 linear meter the role of glazing-spacer for integration into a window for a lifespan of 30 years
System boundaries	Cradle to grave and module D Mandatory Stages = A1-A3; B1-B7; C1-C4 and D
Reference service life (RSL)	According to PCR EN 17074:2019, the reference service life is 30 years
Cut-off rules	The following flows are not recorded in the system boundaries: • Flows related to human activities such as employee transport are excluded • The construction of plants, production of machines and transportation systems is excluded since the related flows are supposed to be negligible compared to the production of the building product when compared at these systems lifetime level • The manufacture and heavy maintenance of the production tool
Allocations	There is no co-product therefore no allocation.
Geographical coverage and time period	The information was compiled for the year 2023 for Swisspacer plants in Europe covering all the production in the world. Electricity modelled using residual electricity mix for Switzerland, Poland according to AIB 2023[2] and GO's.
Background data source	Ecoinvent v3.9.1 (2023) and GaBi 2023.2. Package EF 3.1
Software	GaBi 10

According to EN 15804+A2, EPD of construction products may not be comparable if they do not comply with this standard. According to ISO 21930:2017, EPD might not be comparable if they are from different programs.

[2] https://www.aib-net.org/facts/european-residual-mix/2023

LCA scope

System boundaries (X=included. MND=module not declared)

	Product stage			Construction stage		Use stage							End of life stage				Benefits and loads beyond the system boundary
	Raw material supply	Transport	Manufacturing	Transport	Construction-Installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-recovery
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules declared	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Geography	CH, PL			GLO													
Specific data used	<1% GWP-GHG																
Variation products	-53% to +223%																
Variation sites	-2% to +1%																

Table 1: system boundaries

According to the PCR, the variation for the GWP indicators (GWP-GHG) has been calculated for the different sites and compared to the product groups formed as averages (similar products from different plants). The variation between the different manufacturing sites and the average is from -2% to +1%. The variation of the sites comes from energy efficiency and the energy mix of the countries.

Life cycle stages

Diagram of the life cycle

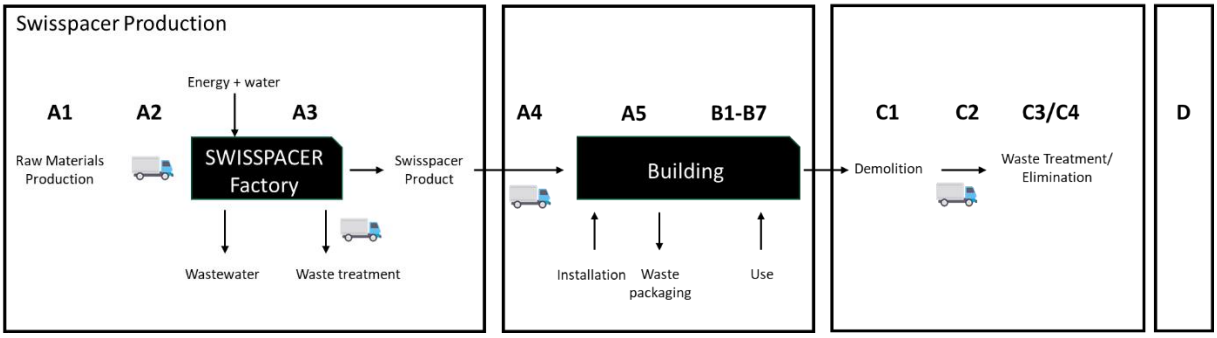

Figure 1 : Life cycle of spacer

A1-A3, Production stage

- A1 Raw materials supply

This module takes into account the extraction and processing of all raw materials and energy consumption upstream of the studied manufacturing process.

- A2 Transport

The raw materials are transported to the manufacturing site. The modelling includes road, boat and train.

- A3 Manufacturing

This module includes the manufacturing of the product and packaging. Specifically, it covers the manufacturing of polymeric membranes, the assembly, winding and packaging steps. A loss rate is considered in this step as well as the amount of packaging waste (cardboard mandrel and polyethylene). In addition, the production of packaging is taken into account at this stage.
Swisspacer produces profiles made of plastic. In the production process, we use automated lines for extruding and drying granulate. The production process starts with warming and drying the styrene-acrylonitrile resin (SAN) granules with dry air inbuffer. the granules are automatically weighed, dosed, and mixed with colour pigments in a single line. The mixture is then transported to the extruder‘s feeding hopper and afterwards to the extruder‘s cylinder. The feed screw transports the mixture to the extrusion tool. Melting of extruded mass takes place in a thermal process through the introduction of heat from the outside, generated by heating elements on the sides of the extruder and by friction.
The SAN is melted and pumped into the extrusion die a forming tool that gives the profile a proper shape. The still warm and unstable profile coming from the tool needs to be cooled in the calibration process and receive its final shape. The vacuum generated in the calibration zone makes the surface of the profiles fit to the sides of the calibration zone. After having passed the suction mechanism and a cooldown in water and having passed the suction mechanism, profile is perforated by means of a heated perforation wheel. Next, glue is applied to the profile, and a foil is affixed. These profiles are cut to specific sizeslength. The line opera- tor binds the spacer bars and, if required, adds elements such as linear connectors. Finally, the profiles are packed into boxes or onto pallets.

A4-A5, Construction process stage

Description of the stage: The construction process is divided into 2 modules: A4, transport to the building site and A5, installation in the building.

- A4, Transport to the building site:

This module includes transport from the production gate to the building site.
Transport is calculated based on a scenario with the parameters described in the following table

	Parameter	Value
Truck	**Fuel type and consumption of vehicle or vehicle type used for transport e.g., long distance truck, boat, etc.**	Average truck trailer (27 t payload) with a real 24 t payload, diesel consumption 38 liters for 100 km
	Distance	501 km. Average distance between production site and customer facilities
	Capacity utilisation (including empty returns)	Use of GaBi data, default: 85% of mass capacity 30% empty returns
Boat	**Fuel type and consumption of vehicle or vehicle type used for transport e.g., long distance truck, boat, etc.**	Container ship, 5.000 to 200.000 dwt payload capacity, deep sea
	Distance	143 km
	Capacity utilisation (including empty returns)	Use of GaBi data, default: 85% of mass capacity 30% empty returns
	Bulk density of transported products*	500 kg/m3
	Volume capacity utilisation factor	Coefficient < 1

Table 2: Parameters for transportation to site (A4)

- A5, Installation in the building:

The accompanying table quantifies the parameters for installing the product at the building site. All installation materials and their waste processing are included and given per DU.

Parameter	Value/Description
Wastage of materials on the building site before waste processing, generated by the product's installation (specified by type)	1E-03 kg of paper/cardboard 5E-04 kg of wooden compounds 8E-05 kg of Plastics foil
Output materials (specified by type) as results of waste processing at the building site e.g. of collection for recycling, for energy recovering, disposal (specified by route)	15% landfilled 81% incinerated with energy recovery 4% incinerated without energy recovery

Ancillary materials for installation (specified by materials)	According to PCR NF EN 17074, none ancillary materials are considered
Other resource use	None
Quantitative description of energy type (regional mix) and consumption during the installation process	According to EN 15804+A2, the energy needed during the installation is less than 0,1% of the total life cycle energy. It's included in the cut-off-rules.
Direct emissions to ambient air, soil and water	None

Table 3: Parameters for installation (A5)

B1-B7, Use stage (excluding potential savings)

Description of the stage: the use stage is divided into the following modules:

- B1: Use
- B2: Maintenance
- B3: Repair
- B4: Replacement
- B5: Refurbishment
- B6: Operational energy use
- B7: Operational water use

The declared module B is zero, as no maintenance, repair or replacement is required during the product's lifetime.

C1-C4, End of Life Stage

Description of the stage: this stage includes the next modules:

- C1: Deconstruction, demolition
- C2: Transport to waste processing
- C3: Waste processing or reuse, recovery and/or recycling
- C4: Disposal

Parameters	Value / Description
Collection process specified by type	0 kg collected individually, 50.5 g collected with mixed construction waste

Recovery system specified by type	0 kg for reuse 0 kg for recycling 0 kg for energy recovery
Disposal specified by type	50.5 g of product or material for final disposal in a landfill site
Assumptions for scenario development (e.g. transport)	50 km for transport to sanitary landfill

D, Reuse/recovery/recycling potential

An end-of-life recycling 0% has been assumed considering the recyclability of the product.

The module D accounts for the reuse, recovery and/or recycling potentials. This allows to account for substitution effects (i.e. impacts or benefits) of using secondary materials (by including recycled content in the product) and/or putting back on the market (by recycling the product at its end-of-life).

The only source of contribution to module D is the end of life of packaging and in particular, the incineration with energy recovery that represent 81% of their EoL.

The estimated exported thermal and electric energy were calculated using the yield of the process:

Material	EEE (MJ/kg)	EET (MJ/kg)
Cardboard	2.14	3.89
Plastic	6.68	11.9
Wood	4.7	2.62

LCA results

As specified in EN 15804:2012+A2:2019/AC:2021 and the PCR 2019:14 Construction Products, version 1.3.2. Raw materials and energy consumption, as well as transport distances have been taken directly from the manufacturing plant (Production data of 2023). Characterisation factors EN15804 based on EF 3.1.

According to the EN 15804:2012+A2:2019/AC:2021 standard, the LCIA results are relative expressions translating impacts into environmental indicators (midpoint impact categories). Thus, the estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks.

Disclaimer 1: 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 following indicators:

- Resource use, mineral and metals [kg Sb eq.]
- Resource use, energy carriers [MJ]
- Water deprivation potential [m^3 world equiv.]
- Land use [Pt]
- Human toxicity (cancer) [CTUh]
- Human toxicity(noncancer) [CTUh]
- Ecotoxicity (freshwater [CTUe]

Disclaimer 2: The impact category Ionizing radiation, human health [kBq U235 eq.] 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 material is also not measured by this indicator.

Disclaimer 3: This EPD including module C, we strongly discourage using the results of modules A1-A3 without considering the results of module C.

Disclaimer 4: The assumptions for the modules are in accordance with the project report (LCA study).

Environmental Impacts

Environmental indicators		Product stage	Construction stage		Use stage							End of life stage				Reuse, recovery recycling
		A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
	Climate Change [kg CO_2 eq.]	1.40E-01	1.88E-03	3.11E-03	0	0	0	0	0	0	0	0	3.58E-04	0	2.56E-03	-3.48E-04
	Climate Change (fossil) [kg CO_2 eq.]	1.42E-01	1.86E-03	2.64E-04	0	0	0	0	0	0	0	0	3.54E-04	0	2.55E-03	-3.45E-04
	Climate Change (biogenic) [kg CO_2 eq.]	-2.46E-03	4.77E-06	2.85E-03	0	0	0	0	0	0	0	0	9.38E-07	0	4.32E-06	-3.29E-06
	Climate Change (land use change) [kg CO_2 eq.]	5.05E-05	1.67E-05	1.19E-08	0	0	0	0	0	0	0	0	3.33E-06	0	1.62E-06	-4.49E-08
	Ozone depletion [kg CFC-11 eq.]	1.34E-10	1.64E-16	8.45E-14	0	0	0	0	0	0	0	0	3.15E-17	0	3.79E-15	-1.26E-12
	Acidification terrestrial and freshwater [Mole of H+ eq.]	6.98E-04	5.23E-06	5.78E-07	0	0	0	0	0	0	0	0	4.14E-07	0	8.83E-06	-6.44E-07
	Eutrophication freshwater [kg P eq.]	2.39E-06	6.59E-09	4.11E-10	0	0	0	0	0	0	0	0	1.31E-09	0	4.43E-07	-6.17E-09
	Eutrophication marine [kg N eq.]	1.52E-04	1.46E-06	5.42E-07	0	0	0	0	0	0	0	0	1.43E-07	0	2.02E-06	-1.73E-07
	Eutrophication terrestrial [Mole of N eq.]	1.52E-03	1.65E-05	2.50E-06	0	0	0	0	0	0	0	0	1.68E-06	0	2.21E-05	-1.80E-06
	Photochemical ozone formation - human health [kg NMVOC eq.]	4.74E-04	3.92E-06	6.30E-07	0	0	0	0	0	0	0	0	3.60E-07	0	6.40E-06	-4.65E-07
	Resource use, mineral and metals [kg Sb eq.]	3.11E-08	1.18E-10	1.64E-11	0	0	0	0	0	0	0	0	2.33E-11	0	1.91E-10	-5.28E-11
	Resource use, energy carriers [MJ]	3.54E+00	2.56E-02	7.41E-04	0	0	0	0	0	0	0	0	4.89E-03	0	3.70E-02	-6.83E-03
	Water deprivation potential [m^3 world equiv.]	3.37E-02	2.09E-05	2.87E-04	0	0	0	0	0	0	0	0	4.14E-06	0	4.37E-06	-5.40E-05

Resources Use

Resources Use indicators	Product stage	Construction stage		Use stage							End of life stage				D reuse, recovery, recycling
	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
Use of renewable primary energy (PERE) [MJ]	7.02E-01	1.74E-03	1.73E-04	0	0	0	0	0	0	0	0	3.46E-04	0	3.27E-03	-4.02E-03
Primary energy resources used as raw materials (PERM) [MJ][3]	2.50E-02	0	-8.70E-03	0	0	0	0	0	0	0	0	0	0	0	0
Total use of renewable primary energy resources (PERT) [MJ]	7.27E-01	1.74E-03	-8.52E-03	0	0	0	0	0	0	0	0	3.46E-04	0	3.27E-03	-4.02E-03
Use of non-renewable primary energy (PENRE) [MJ][2]	2.53E+00	2.57E-02	7.41E-04	0	0	0	0	0	0	0	0	4.90E-03	0	3.70E-02	-6.83E-03
Non-renewable primary energy resources used as raw materials (PENRM) [MJ]	9.43E-01	0	-1.21E-03	0	0	0	0	0	0	0	0	0	0	0	0
Total use of non-renewable primary energy resources (PENRT) [MJ]	3.48E+00	0.0257	-4.65E-04	0	0	0	0	0	0	0	0	4.90E-03	0	3.70E-02	-6.83E-03
Input of secondary material (SM) [kg]	7.26E-06	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Use of renewable secondary fuels (RSF) [MJ]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Use of non-renewable secondary fuels (NRSF) [MJ]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Use of net fresh water (FW) [m3]	9.10E-04	1.92E-06	6.74E-06	0	0	0	0	0	0	0	0	3.81E-07	0	1.28E-06	-1.49E-06

[3] The option B from ANNEX 3 in the PCR 2019:14 Construction Products, version 1.3.2 is used for how to separate the use of primary energy into energy used as raw material and energy used as energy carrier.

Waste Category & Output flows

	Waste Category & Output Flows	Product stage	Construction stage		Use stage							End of life stage				D reuse, recovery, recycling
		A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
	Hazardous waste disposed (HWD) [kg]	3.76E-05	9.43E-14	3.07E-10	0	0	0	0	0	0	0	0	1.81E-14	0	5.36E-12	-2.16E-09
	Non-hazardous waste disposed (NHWD) [kg]	2.00E-02	3.64E-06	3.70E-04	0	0	0	0	0	0	0	0	7.06E-07	0	5.04E-02	-1.26E-05
	Radioactive waste disposed (RWD) [kg]	3.79E-05	3.30E-08	3.66E-08	0	0	0	0	0	0	0	0	6.34E-09	0	4.50E-07	-1.07E-06
	Components for re-use (CRU) [kg]	0.00E+00	0.00E+00	0.00E+00	0	0	0	0	0	0	0	0	0.00E+00	0	0.00E+00	0.00E+00
	Materials for Recycling (MFR) [kg]	0.00E+00	0	0.00E+00	0	0	0	0	0	0	0	0	0	0	0	0
	Material for Energy Recovery (MER) [kg]	0.00E+00	0	0.00E+00	0	0	0	0	0	0	0	0	0	0	0	0
	Exported electrical energy (EEE) [MJ]	0.00E+00	0	3.53E-03	0	0	0	0	0	0	0	0	0	0	0.00E+00	0
	Exported thermal energy (EET) [MJ]	0.00E+00	0	6.37E-03	0	0	0	0	0	0	0	0	0	0	0.00E+00	0

Additional mandatory indicators from EN 15804

Environmental indicators		Product stage	Construction stage		Use stage							End of life stage				Reuse, recovery recycling
		A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
	GWP-GHG [kg CO2 eq.][4]	1.42E-01	1.88E-03	2.64E-04	0	0	0	0	0	0	0	0	3.57E-04	0	2.55E-03	-3.45E-04

[4] The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus almost equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

Optional indicators

	Product stage	Construction stage		Use stage							End of life stage				D reuse, recovery, recycling
Waste Category & Output Flows	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
Particulate matter (PM) [Disease incidences]	4.39E-09	6.83E-11	3.58E-12	0	0	0	0	0	0	0	0	2.67E-12	0	8.97E-11	-5.40E-12
Ionising radiation, human health (IR) [kBq U235 eq.]	2.15E-02	4.77E-06	6.37E-06	0	0	0	0	0	0	0	0	9.15E-07	0	6.50E-05	-9.97E-05
Ecotoxicity, freshwater (Etox) [CTUe]	1.58E+00	1.80E-02	1.06E-03	0	0	0	0	0	0	0	0	3.44E-03	0	3.15E-02	-1.74E-03
Human toxicity, cancer (HT-C) [CTUh]	4.93E-11	3.62E-13	2.51E-14	0	0	0	0	0	0	0	0	6.94E-14	0	1.76E-12	-1.19E-13
Human toxicity, non-cancer (HT-NC) [CTUh]	1.78E-09	1.58E-11	1.40E-12	0	0	0	0	0	0	0	0	3.06E-12	0	1.49E-10	-1.66E-12
Land Use (LU) [Pt]	2.99E+00	1.02E-02	3.55E-04	0	0	0	0	0	0	0	0	2.04E-03	0	3.15E-03	-3.06E-03

○

Information on biogenic carbon content

		PRODUCT STAGE
Biogenic Carbon Content		**A1 / A2 / A3**
	Biogenic carbon content in product [kg]	0.00E+00
	Biogenic carbon content in packaging [kg]	7.40E-04

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO2.

There is no biogenic carbon in the product.

LCA interpretation

- **Climate change**

The majority of contribution to this environmental impact stems from the production modules (A1-A3). The production of raw materials, and SAN and glass fibre in particular, is responsible for the majority of emissions. GHGs are also generated during manufacturing through the consumption of electricity and natural gas.

- **Non-renewable resources consumption**

Consumption of non-renewable resources is once again the highest in production modules. This is due to the energy used to produce raw materials and the type of plastic used (derived from non-renewable fossil fuels). The plant's consumption of natural gas and electricity also influences this indicator. The contribution of the other modules to this impact is very low, and mainly due to the non-renewable resources consumed during transport.

- **Energy consumption**

For the same reasons, the emissions profile is similar to the previous indicator in that very little renewable energy is used.

- **Water consumption**

As water is not used in any of the other modules (A4 - A5, C1 - C4), the contribution to water consumption is low. For the production phase, water is used in the manufacturing plant and in the production of raw materials, and it is here that the contribution is highest.

- **Waste production**

Waste generation does not follow the same trend as the above impacts. This is because module C corresponds to the end-of-life phase of the spacer, and it is therefore during this stage that "spacer waste" is generated. However, there remains a slight impact linked to the production module, since waste is generated on site.

Additional information:

Health transparency

Concerning the indoor air quality, clear flat glass is an inert material that doesn't release any inorganic & organic compounds, in particular no VOC (volatile organic compounds).

Conversion factors

In this EPD, the results presented are those of the Swisspacer Ultimate 16 mm which serves as the representative product for this EPD of multiple products based on a representative product.
To obtain the environmental impacts for other width of the product, multiply the result of the Swisspacer Ultimate 16 mm by the corresponding conversion factor.

	Weight	Difference with reference	Conversion factor
Ultimate - 16 mm	50.5	Reference	1
Ultimate - 6 mm	23.9	-53%	0.47
Ultimate - 7 mm	24.6	-51%	0.49
Ultimate - 8 mm	27.9	-45%	0.55
Ultimate - 9 mm	30.5	-40%	0.60
Ultimate - 10 mm	33.6	-33%	0.67
Ultimate - 11 mm	39.3	-22%	0.78
Ultimate - 12 mm	42.4	-16%	0.84
Ultimate - 13 mm	43	-15%	0.85
Ultimate - 14 mm	48.5	-4%	0.96
Ultimate - 15 mm	48.9	-3%	0.97
Ultimate - 18 mm	57.3	13%	1.13
Ultimate - 20 mm	61.5	22%	1.22
Ultimate - 22 mm	66.5	32%	1.32
Ultimate - 24 mm	75.7	50%	1.50
Ultimate - 27 mm	79.7	58%	1.58
Ultimate - 32 mm	99.8	98%	1.98
Ultimate - 36 mm	110.3	119%	2.19
Ultimate - 45 mm	136.7	171%	2.71
Ultimate - 56 mm	163.3	223%	3.23

The difference and conversion factor listed in the table before are valid for all environmental impact categories and for the indicators GWP-GHG.

Electricity information

Both sites are covering by electricity PPA for 100% of the electricity consumption. The following table describe

this PPA for each site.

Type of information	Description
Location	Representative of electricity purchased by Swisspacer vetrotech-Saint-Gobain (International) AG als hinterliegender Bezüger

Geographical representativeness description	Share of energy sources
	• 94% hydropower
	• 6% subsidized electricity
	  ○ 53.4% hydropower
	  ○ 18.2% solar energy
	  ○ 4.3% wind energy
	  ○ 20.6% biomass
	  ○ 3.5% municipal waste renewable

Reference year	2023
Type of dataset	Cradle to gate from Gabi and ecoinvent databases
Source	Saint-Gobain Construction Products, a.s.

Type of information	Description
Location	Representative of electricity purchased by Swisspacer vetrotech-Saint-Gobain (International) AG als hinterliegender Bezüger
Geographical representativeness description	Share of energy sources • 100% biomass
Reference year	2023
Type of dataset	Cradle to gate from Gabi and ecoinvent databases
Source	Saint-Gobain Construction Products, a.s.

For these different sites using residual mixes the CO_2 eq./kWh has been calculated and are presented in the following table:

	Climate Change ($kgCO_{2e}$/kWh)	Total use of renewable primary energy resources (MJ/kWh)	Total use of non-renewable primary energy resources (MJ/kWh)
Poland	0.036	11.1	0.40
Switzerland	0.0099	5.1	0.034

For each country, the residual electricity mixes are used, according to AIB 2023

Table 4: Emission of residual electricity mixes used (kgCO2 eq. / kWh)

Data quality

Inventory data quality is judged by geographical, temporal, and technological representativeness. To cover these requirements and to ensure reliable results, first-hand industry data crossed with LCA background datasets were used. The data was collected from internal records and reporting documents. After evaluating the inventory, according to the defined ranking in the LCA report, the assessment reflects good inventory data quality.

	Reliability	Completeness	Geographical rating	Temporal rating	Technology Rating	Total score (average)
Ultimate	1.1	2.0	1.3	2.1	1.1	1.5

Saint-gobain's environmental policy

Swisspacer is a partner for "warm edge" spacers and its products offer better PSI values than aluminium or steel spacers (see table at end of paragraph), as confirmed by tests carried out by ift Rosenheim directive WA 08/3 (Link). The results of these tests are verified by the Warm Edge Working Group and documented in the official data sheets on spacer values issued by the Bundesverband Flachglas (German Federal Flat Glass Association).
Swisspacer products are also certified by the Passive House Institute. For many years, the Darmstadt (Germany) institute and Swisspacer have been collaborating on studies that provide information for the market. One such study, for example, examined the influence of spacers in insulated window glazing on the total energy demand of buildings in different climate zones (cold climate, cold-moderate climate, warm-moderate climate, warm climate). Compared with aluminium spacers, highly efficient "warm edge" plastic spacers reduce energy consumption, CO2 emissions and heating costs in buildings. In another study on living comfort, the Passive House Institute examined the effects of "warm edge" spacers on well-being, comfort and prevention of mold formation.

Please refer to www.Swisspacer.com for more information about the company, its products and studies.

Sustainable resource management at Saint-Gobain

Saint-Gobain's environmental vision is to ensure the sustainable development of its activities, while protecting the environment from the impacts of its processes and services throughout their life cycle. The Group has therefore sought to ensure the preservation of resources, to meet the expectations of the various relevant stakeholders and to offer its customers the highest added value with the lowest possible environmental impact. Saint-Gobain has set a target for 2030 of having "all our product ranges and systems covered by Life Cycle Assessments (LCA) and all published results (e.g. in the form of Environmental Product Declarations, EPDs) verified by third parties. This objective applies to all products manufactured by Saint-Gobain or marketed products that are part of systems sold by Saint-Gobain."
The contribution of our products to sustainable buildings (Required for the optimization and diffusion of LEED v4 building products - raw material sourcing)

For any questions/documents/certification, please contact our local sales teams.
More documents on https://www.Swisspacer.com/fr/downloads

Differences with older versions of the EPD

Swisspacer Ultimate had an EPD covering 2 products of the range: 16 mm and 20 mm.

The 2 main difference with this EPD are:

- Data collection: previous data were collection in 2019.
- Version of tool used.

References

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2. ISO 14044:2006: Environmental Management-Life Cycle Assessment-Requirements and guidelines.
3. ISO 21930:2017 Sustainability in buildings and civil engineering works — Core rules for environmental product declarations of construction products and services.
4. ISO 14025:2006: Environmental labels and Declarations-Type III Environmental Declarations-Principles and procedures.
5. EN 15804:2012+A1:2013: Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
6. EN 15804:2019+A2 - Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
7. European Chemical Agency, Candidate List of substances of very high concern for Authorization. http://echa.europa.eu/chem_data/authorisation_process/candidate_list_table_en.asp
8. EPD International, General Program Instructions (GPI) for the international EPD® (version 4.0) www.environdec.com
9. PCR 2019:14 Construction products (EN 15804:2012: A2) version 1.3.2 and c-PCR-009 Flat glass products (EN 17074)
10. LCA Report for the Environmental Product Declaration of Swisspacer products