ENVIRONMENTAL PRODUCT DECLARATION

In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019 for:

Programme: The International EPD® System www.environdec.com
Program operator: EPD International AB.
Registration number: **S-P-09642**

EPD®
THE INTERNATIONAL EPD® SYSTEM

ECO PLATFORM EPD VERIFIED

EPD VERIFIED

VERSION 1

Date of publication (issue):
2023-06-23

Validity:
5 years

Valid until:
2028-06-22

Scope of the EPD®:
Europe

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

CONTRAFLAM 30 (5/5)

Table of content

General information

Company information

• **Manufacturer:** Vetrotech Saint-Gobain International AG, Bernstrasse 41-43, 3175 Flamatt, Switzerland

• **Production plants:**

- Vetrotech Saint-Gobain Romont (La Maillarde 7, 1680 Romont, Switzerland)
- Vetrotech Saint-Gobain Würselen (Jens-Otto-Krag-Straße 6, 52146 Würselen, Germany)
- Vetrotech Saint-Gobain Namyslow (Józefa Piłsudskiego 18, 46-100 Namysłów, Poland)

• **Management system-related certification:** Glass products are manufactured in production plants with an integrated management system certified according to ISO 9001:2015, ISO 14001:2015 and OHSAS 18001:2009 standards.

• **UN CPC CODE:** 3711 - Unworked glass, flat glass and pressed or moulded glass for construction; glass mirrors

• **Owner of the declaration:** Vetrotech Saint-Gobain International AG

• **Product name and manufacturer represented:** CONTRAFLAM 30 (5/5) produced by Vetrotech Saint-Gobain

• **EPD® prepared by:** Maureen Bernard (Vetrotech Saint-Gobain) and Joffrey Martin (Saint-Gobain LCA central team)

• **Contact:** maureen.bernard@saint-gobain.com

• **Geographical scope of the EPD®:** Europe, cradle to grave and module D

• **EPD® registration number:** S-P-09642

• **Declaration issued:** 2023-06-23, valid until: 2028-06-22

• **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.

Program information

- **Program**: The International EPD® System
- **Address:** The International EPD® System

EPD International AB - Box 210 60 - SE-100 31 Stockholm – Sweden

- **Website:** www.environdec.com
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CEN standard EN 15804:2012 + A2:2019 serves as the Core Product Category Rules (PCR)

Product category rules (PCR): PCR 2019:14 Construction Products, version 1.11

PCR review was conducted by: The Technical Committee of the International EPD® System. See www.environdec.com for a list of members.

President: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact - Contact via info@environdec.com

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

☐ EPD process certification ☒ EPD verification

Third party verifier: ELYS CONSEIL
Yannick LE GUERN - yannick.leguern@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 for the EPD.
EPDs within the same product category but from different programs may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804. For further information about comparability, see EN 15804 and ISO 14025.

Product information

Product description and description of use

The Environmental Product Declaration (EPD) describes the environmental impacts of 1m² of CONTRAFLAM 30, which is a fire-resistant laminated glass for an expected average service life of 30 years.

This EPD is a weighted average of the 3 Vetrotech Saint-Gobain production sites in Europe: Romont (Switzerland) / Würselen (Germany) / Namyslow (Poland). All the sites producing CF30 (5/5) for European market are considered. The average calculated is a weighted arithmetic mean.

CONTRAFLAM 30 is a monolithic fire-resistant glass with EI30 heat insulation properties according to European standard EN 13501-2. It consists of two or more sheets of toughened safety glass. The cavity between the sheets of glass is filled with a transparent intumescent interlayer. This enables the glass to react when exposed to radiant heat and fire to protect life and property in living places for the specific time frame of 30 minutes. Additionally, there is the possibility to customise this solution to add many multifunctional options to it (design, comfort, safety, environment), such as:

- add a PVB layer to create a laminated glazing to resist greater penetration, offer fall-out protection, greater acoustic insulation, or extended design features
- mount it as an insulated glazed unit to add thermal protection to it,
- add a coating or special glass for extra benefits,
- etc.

PERFORMANCE DATA

In this EPD, we will focus on the mono chamber CONTRAFLAM 30 (5/5) with a nominal thickness of 16mm.

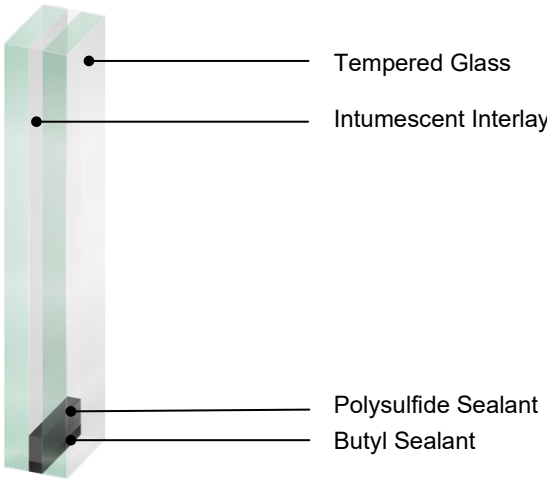
CONTRAFLAM EI30 (5/5)	
Mechanical properties	
Nominal thickness *(mm)*	16
Weight *(kg/m²)*	34
Visible parameters	
Light transmittance *(LT) %*	87
External light reflection *(RLE) %*	9/9
Thermal properties	
Energy transmittance *(ET) %*	69%
Energy absorbance *(EA) %*	8/8
Solar factor *g*	0,74
Safety properties	
Class EN 356 *(protection against vandalism and burglary)*	P1A
Acoustics properties	
Rw(C;Ctr) *(real test)*	38 (-2; -2) calculated

Table 1: Performance data of the product

The performance data are given according to the EN 410-2011 standard for thermal and visible parameters and following the EN 12758 for the acoustic data. Fire performance data is determined according to EN13823, EN1363-1, EN1363-2 and associated test standards. Fire classification is following EN15998, EN13501-1 and EN13501-2.

Discover more information about the CONTRAFLAM range on www.vetrotech.com.

Declaration of the main product components and/or materials



Components	Weight (in%)	Comments
Glass	72 %	CAS number 65997-17-3, EINECS number 266-046-0
Fire resistant Interlayer	26 %	n/a
Butyl sealant	0,7 %	Polymer
Sealant (polyurethane or polysulfide or silicone)	0,7 %	Polymer
Spacer bar (aluminium or plastic composite, called warm-edge)	No spacer	Article
Desiccant	No desiccant	CAS number 1318-02-1
Gas	No gas	Dehydrated air, argon, krypton or xenon
PVB interlayer	No PVB	CAS number 63148-65-2

Table 2: Composition of the product

Packaging	Weight (in%)	Weight biogenic carbon kg C/kg
Cardboard	3 %	43 %
Wood pallet	95 %	41 %
Aluminium foil	<1 %	0 %
PE	1%	0 %
PS	<1 %	0 %

Table 3: Composition of the packaging

For any glazing without laminated glass or with laminated glass (PVB interlayer)
There is no “Substance of Very High Concern” (SVHC) in concentration above 0.1% by weight, and neither do their packaging, following the European REACH regulation (Registration, Evaluation, Authorization and Restriction of Chemicals).

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	1m^2 of CONTRAFLAM EI30 to be incorporated into a building with a thickness of 16 mm.
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	According to EN 15804+A2, the energy used for the installation of 1m² of glass and the transport glass racks are included in the cut-off-rules.
Allocations	There is no co-product therefore no allocation.
Geographical coverage and time period	The information was compiled for the year 2019 for GLASSOLUTIONS plants in Europe. The information collected comes from European sites producing insulating glass solutions as well as from SAINT-GOBAIN GLASS INDUSTRY for PLANICLEAR.
Background data source	GaBi data were used to evaluate the environmental impacts. The data are representative of the years 2015-2019.
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.

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	EU-27																
Specific data used	<90 % GWP-GHG																
Variation products	Not relevant																
Variation sites	-17% to +15%																

Table 4: 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 -17%% to +15%. The variation of the sites comes from energy efficiency and the energy mix of the countries. For example, some plants use green electricity and can increase the variability.

Life cycle stages

DIAGRAM OF THE LIFE CYCLE

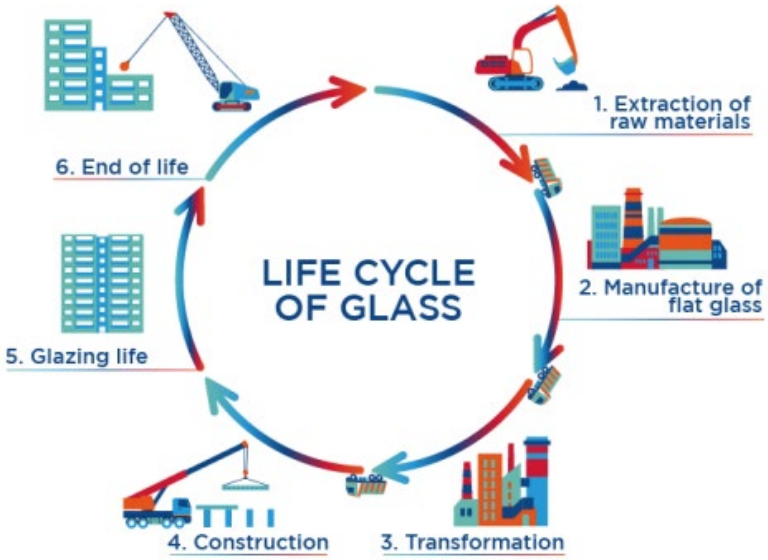


Figure 1 : Life cycle of glass

Relevant stages: as this is a cradle to gate the only relevant stages are A1-A3.
In conformity with EN 15804+A2, production step includes:

- Extraction and processing of raw materials;
- Generation of electricity, steam and heat from primary energy resources, also including their extraction, refining and transport;
- Transportation up to the factory gate and internal transport;
- Manufacturing of ancillary materials or pre-products;
- Manufacturing of product;
- Processing up to the end-of-waste state or disposal of final residues including any packaging not leaving the factory gate with the product.

All glasses are transported in specific trucks (inloaders), with returnable racks. Other components, like intumescent layer are delivered in drums, which are return to the supplier.

A description of the relevant stages is given for two types of CONTRAFLAM 30 configurations in the Table 4 and Figure 2. All production configurations are similar to these 2 examples.

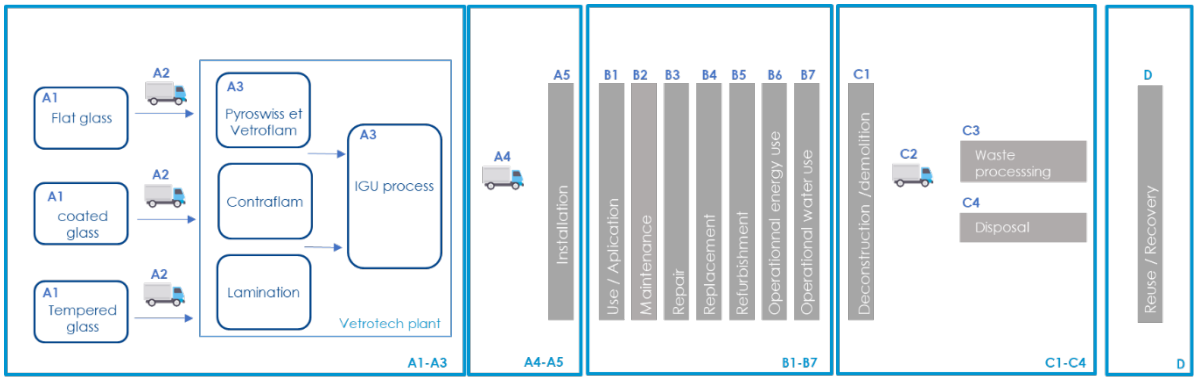


Figure 2 : Relevant LCA steps for CONTRAFLAM 30 (5/5).

CONTRAFLAM MANUFACTURING PROCESS FLOW DIAGRAM

Description of the stage: For CONTRAFLAM EI30 (5/5), A1 to A3 represents the production of glass in the float, the transportation to the processing site, and the processing into fire resistant glass.

The product stage includes the extraction and processing of raw materials and energies, transport to the manufacturer, manufacturing and processing of flat glass.

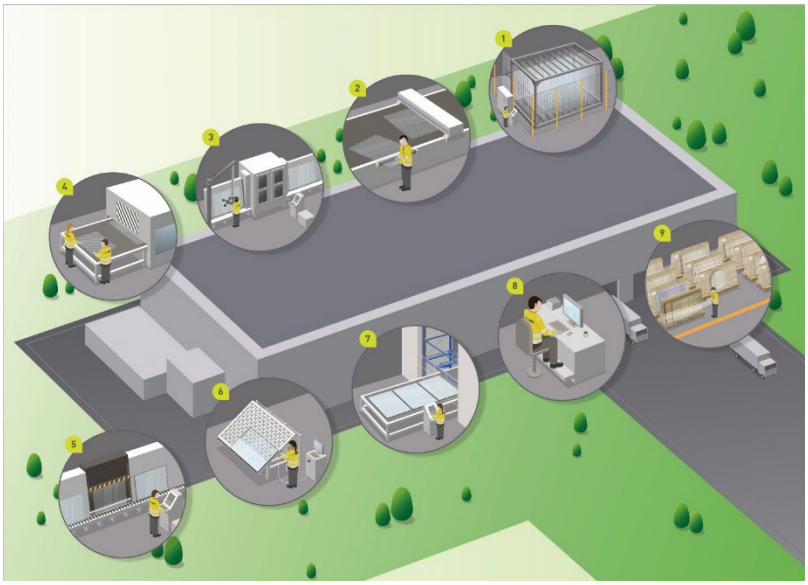


Figure 3 : Manufacturing process

1. RECEPTION AND STORAGE

Sheets of glass arrive from float glass plants by special transport inloaders and are stored in our plants.

2. CUTTING

The right sheet of glass is automatically taken from the glass storage and cut-to-size according to the customer's requirements (cut to order).

3. EDGE TREATMENT

Glass edges are treated to the prescribed quality to prepare the next processing step.

4. TEMPERING

In general, all glasses are tempered to ensure the overall performance in terms of break resistance and accidental impact safety aspects. Of course, we can supply every protective glass demanded within our product make-up.

5. INSULATING GLASS UNIT (IGU) ASSEMBLY

On a specially designed IGU processing-line, two pieces of glass are assembled to create an inner chamber, made air and moisture tight by a primary and secondary sealant for maximum durability.

6. INJECTION OF INTERLAYER

The chamber is then filled in with an intumescent interlayer and filling holes are sealed.

7. CURING OF INTERLAYER

The injected interlayer is cured in a thermal treatment process to achieve transparency and hardness.

8. QUALITY CONTROL

All glass units are inspected and checked to regulatory requirements and quality standards before being packed on stillages. That gives us the possibility to meet 100% of customer needs.

9. STORAGE AND TRANSPORT

All glass units are packed on stillages and dispatched to the final place of application.

Use of sustainable light bulbs, recycling of broken glass culets, recycling of cardboard, metal, timber and installation of pollution abatement systems and closed circuit management of water: every measure is taken to limit the consumption of energy, extraction of natural resources, production of waste and emissions into the atmosphere.

10. ELECTRICITY MIXES USED

For each country, the residual electricity mixes are used, according to AIB 2021.

	Poland	Germany	Switzerland
CO2 emission kg CO2 eq. / kWh	0.972	0.658	0.045

Table 5: Emission of residual electricity mixes used (kgCO2 eq. / kWh)

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
Fuel type and consumption of vehicle or vehicle type used for transport e.g. long distance truck, boat, etc.	Freight truck trailer with a 27t payload, diesel consumption 38 liters for 100 km
Distance	800 km
Capacity utilisation (including empty returns)	100% of the capacity in volume
Bulk density of transported products*	30 % of empty returns in mass
Volume capacity utilisation factor	2500 kg/m^3

Table 6: 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.

Parameter	Value/Description
Wastage of materials on the building site before waste processing, generated by the product's installation (specified by type)	According to PCR EN 17074, no waste is considered
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)	None
Ancillary materials for installation (specified by materials)	According to PCR NF EN 17074, none ancillary materials 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 7: 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

- **B2, Maintenance:**

Parameter	Value
Maintenance process	Water and cleaning agent
Maintenance cycle	Annual average
Ancillary materials for maintenance (e.g. cleaning agent, specify materials)	cleaning agent: 0,001 kg/m² of glass/year
Wastage material during maintenance (specify materials)	0 kg
Net fresh water consumption during maintenance	0,2 kg/m² of glass/year
Energy input during maintenance	None required during product lifetime

Table 8: Parameters for use (B)

Description of the scenarios and additional technical information:
The product has a reference service life of 30 years. This assumes that the product will last in situ with no requirements for repair, replacement or refurbishment throughout this period. Therefore, it has no impact at this stage, except for maintenance.

According to PCR EN 17074, only the maintenance by cleaning glass with water and cleaning agent is included in this study.

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

End of life scenario used in this study is:
100% of glass is landfilled and the distance to the landfill site considered is 50 km.

D, Reuse/recovery/recycling potential

An end of life recycling 0% (100% of glass wastes are landfilled) has been assumed using local demolition waste data and adjusted considering the recyclability of the product.

LCA results

Environmental Footprint 3.0 (EF 3.0 from PEF) method has been used as the impact model. Specific data has been supplied by the plant, and generic data come from GaBi and ecoinvent databases.

The estimated impact results are only relative statements which do not indicate the end points of the impact categories, exceeding threshold values, safety margins or risks.

All emissions to air, water, and soil, and all materials and energy used have been included.

Raw materials and energy consumption, as well as transport distances have been taken directly from the manufacturing plant.

All result tables refer to a functional unit/declared unit of 1 m² of CONTRAFLAM 30 (5/5) and an expected average service life of 30 years.

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.]	6.70E+01	1.36E+00	4.58E-01	0	8.13E-03	0	0	0	0	0	0	8.50E-02	0	5.20E-01	0
	Climate Change (fossil) [kg CO_2 eq.]	6.58E+01	1.33E+00	2.39E-02	0	3.60E-03	0	0	0	0	0	0	8.34E-02	0	5.19E-01	0
	Climate Change (biogenic) [kg CO_2 eq.]	1.16E+00	1.73E-02	4.34E-01	0	4.53E-03	0	0	0	0	0	0	1.08E-03	0	0	0
	Climate Change (land use change) [kg CO_2 eq.]	5.04E-02	7.59E-03	4.11E-05	0	2.43E-06	0	0	0	0	0	0	4.74E-04	0	9.58E-04	0
	Ozone depletion [kg CFC-11 eq.]	2.02E-05	8.15E-14	1.07E-14	0	4.42E-15	0	0	0	0	0	0	5.10E-15	0	1.22E-12	0
	Acidification terrestrial and freshwater [Mole of H+ eq.]	2.48E-01	5.69E-03	6.91E-05	0	1.19E-05	0	0	0	0	0	0	3.55E-04	0	3.68E-03	0
	Eutrophication freshwater [kg P eq.]	2.12E-04	4.06E-06	3.20E-06	0	3.80E-06	0	0	0	0	0	0	2.54E-07	0	8.80E-07	0
	Eutrophication marine [kg N eq.]	6.28E-02	2.71E-03	5.11E-05	0	1.76E-05	0	0	0	0	0	0	1.70E-04	0	9.41E-04	0
	Eutrophication terrestrial [Mole of N eq.]	7.58E-01	3.01E-02	3.00E-04	0	3.64E-05	0	0	0	0	0	0	1.88E-03	0	1.03E-02	0
	Photochemical ozone formation - human health [kg NMVOC eq.]	1.66E-01	7.30E-03	1.17E-04	0	9.23E-06	0	0	0	0	0	0	4.56E-04	0	2.86E-03	0
	Resource use, mineral and metals [kg Sb eq.][1]	1.67E-05	1.14E-07	1.08E-09	0	4.53E-10	0	0	0	0	0	0	7.11E-09	0	5.32E-08	0
	Resource use, energy carriers [MJ][1]	9.70E+02	1.82E+01	1.94E-01	0	4.04E-02	0	0	0	0	0	0	1.14E+00	0	6.80E+00	0
	Water deprivation potential [m³ world equiv.][1]	8.60E+00	1.22E-02	6.91E-04	0	2.59E-01	0	0	0	0	0	0	7.63E-04	0	5.69E-02	0

[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 indicator

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]	2.53E+02	1.03E+00	1.40E-02	0	1.02E-02	0	0	0	0	0	0	6.46E-02	0	1.02E+00	0
	Primary energy resources used as raw materials (PERM) [MJ]	3.37E+00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total use of renewable primary energy resources (PERT) [MJ]	2.56E+02	1.03E+00	1.40E-02	0	1.02E-02	0	0	0	0	0	0	6.46E-02	0	1.02E+00	0
	Use of non-renewable primary energy (PENRE) [MJ]	9.70E+02	1.82E+01	1.94E-01	0	4.04E-02	0	0	0	0	0	0	1.14E+00	0	6.81E+00	0
	Non-renewable primary energy resources used as raw materials (PENRM) [MJ]	2.37E+01	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total use of non-renewable primary energy resources (PENRT) [MJ]	9.94E+02	1.82E+01	1.94E-01	0	4.04E-02	0	0	0	0	0	0	1.14E+00	0	6.81E+00	0
	Input of secondary material (SM) [kg]	3.12E+00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Use of renewable secondary fuels (RSF) [MJ]	4.24E-11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Use of non-renewable secondary fuels (NRSF) [MJ]	4.98E-10	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Use of net fresh water (FW) [m3]	3.39E-01	1.17E-03	2.36E-05	0	6.03E-03	0	0	0	0	0	0	7.31E-05	0	1.73E-03	0

Waste Category & Output flows

	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
Hazardous waste disposed (HWD) [kg]	3.50E-02	8.73E-11	1.64E-11	0	5.92E-11	0	0	0	0	0	0	5.46E-12	0	3.50E-10	0
Non-hazardous waste disposed (NHWD) [kg]	4.98E+00	2.61E-03	1.09E-01	0	6.45E-03	0	0	0	0	0	0	1.63E-04	0	3.48E+01	0
Radioactive waste disposed (RWD) [kg]	5.85E-02	2.25E-05	1.45E-06	0	2.83E-06	0	0	0	0	0	0	1.40E-06	0	7.56E-05	0
Components for re-use (CRU) [kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Materials for Recycling (MFR) [kg]	8.12E-01	0	2.28E-01	0	0	0	0	0	0	0	0	0	0	0	0
Material for Energy Recovery (MER) [kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Exported electrical energy (EEE) [MJ]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Exported thermal energy (EET) [MJ]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Additional voluntary indicators from EN 15804 (according to ISO 21930:2017)

	Product stage	Construction stage		Use stage							End of life stage				Reuse, recovery recycling
Environmental indicators	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 CO2 eq.][2]	6.58E+01	1.33E+00	2.39E-02	0	3.60E-03	0	0	0	0	0	0	8.34E-02	0	5.19E-01	0

[2] 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.

Information on biogenic carbon content

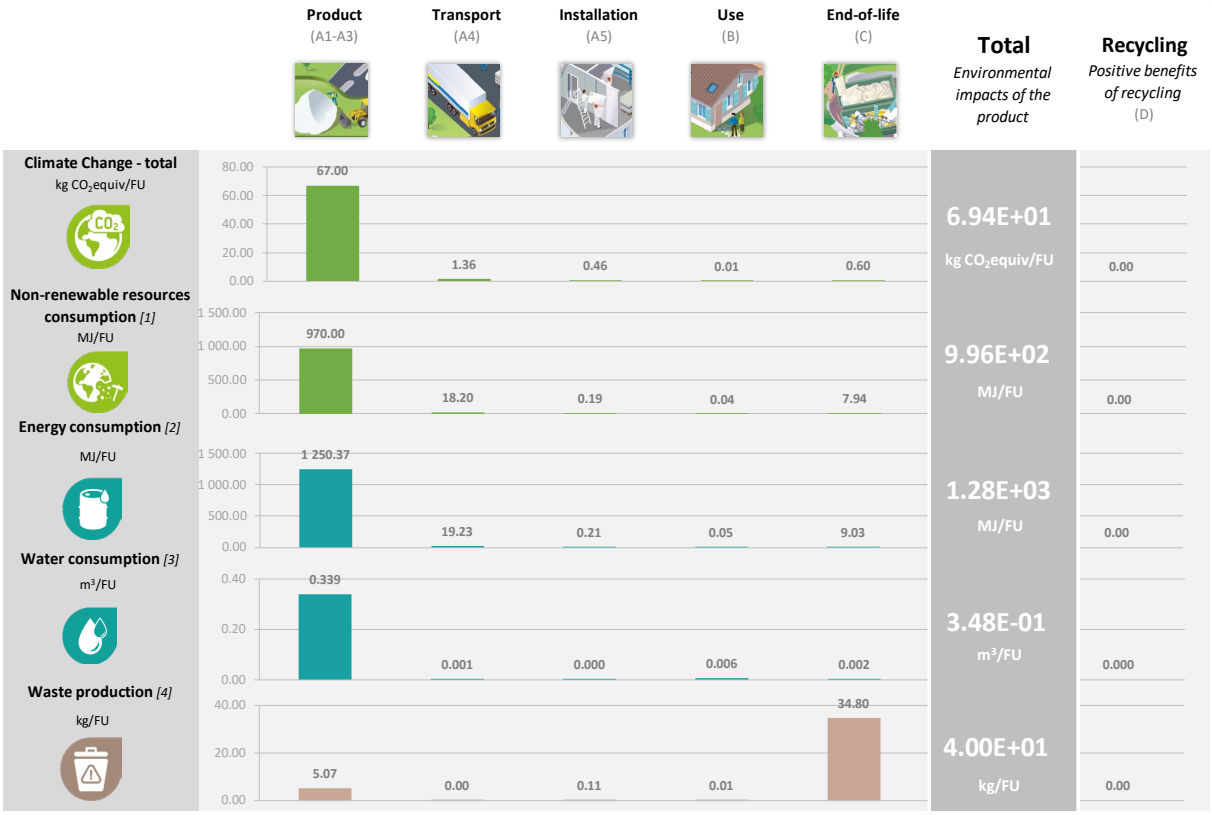
		PRODUCT STAGE
Biogenic Carbon Content		**A1 / A2 / A3**
	Biogenic carbon content in product [kg]	0
	Biogenic carbon content in packaging [kg]	**9.26E-02**

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

There is no biogenic carbon in glass product. Every thickness considered in this EPD have the same value to biogenic carbon 0 kg C.

LCA interpretation

The following figure refers to a functional/declared unit 1 m² of CONTRAFLAM EI30 (5/5) product.



[1] This indicator corresponds to the abiotic depletion potential of fossil resources.
[2] This indicator corresponds to the total use of primary energy.
[3] This indicator corresponds to the use of net fresh water.
[4] This indicator corresponds to the sum of hazardous, non-hazardous and radioactive waste disposed.

- **Global Warming Potential total (Climate Change) (GWP)**

When analyzing the above figure for GWP, it can clearly be seen that most of the contribution to this environmental impact is from the production modules (A1 – A3). This is primarily because the sources of greenhouse gas emissions are predominant in this part of the life cycle. CO2 is generated upstream from the production of electricity and is also released on site by the combustion of natural gas. Production of one of raw material will generate the second highest percentage of greenhouse gas emissions. We can see that other sections of the life cycle also contribute to the GWP; however, the production modules contribute to over 90% of the contribution.

- **Non-renewable resources consumptions**

We can see that the consumption of non – renewable resources is once more found to have the highest value in the production modules. This is because a large quantity of natural gas is consumed within the factory. The contribution to this impact from the other modules is very small and primarily due to the non – renewable resources consumed during transportation.

- **Energy Consumptions**

As we can see, modules A1 – A3 have the highest contribution to total energy consumption. Energy in the form of electricity and natural gas is consumed in a vast quantity during the manufacture of glass so we would expect the production modules to contribute the most to this impact category.

- **Water Consumption**

As we don't use water in any of the other modules (A4 – A5, C1 – C4), we can see that there is no contribution to water consumption. For the production phase, water is used within the manufacturing facility and therefore we see the highest contribution here. However, we recycle a lot of the water on site, so the contribution is still relatively low. We also use water during the use phase to clean the product.

- **Waste Production**

Waste production does not follow the same trend as the above environmental impacts. The largest contributor is the end-of-life module. This is because 100% of the product is sent to landfill. However, there is still an impact associated with the production module since we do generate waste on site.

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).

Additional information:

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.

Geographic representativity	Temporal representativity	Technical representativity
1.44 Very good	1.6 Good	1.88 Good

SAINT-GOBAIN'S ENVIRONMENTAL POLICY

The ambition of Saint-Gobain is to develop more and more sustainable solutions and to provide robust proofs about the sustainability performance of its products and systems. To this end, Life Cycle Assessments (LCAs) and associated Environmental Product Declarations (EPDs) have been for many years at the heart of Saint-Gobain strategy.

On 2030 targets Saint-Gobain has defined an objective for LCA: All our product ranges and systems are covered with Life Cycle Assessments (LCAs) and all published results (e.g. in the form of Environmental Product Declarations, EPDs) are third party verified. This objective is valid for all products manufactured by Saint-Gobain or traded goods that enter into the systems sold by Saint-Gobain.

OUR PRODUCTS' CONTRIBUTION TO SUSTAINABLE BUILDINGS

Saint-Gobain encourages sustainable construction and develops innovative solutions for new and renovated buildings that are energy efficient, comfortable, healthy and aesthetically superior, while at the same time protecting natural resources.

The following information might be of help for green building certification programs:

- **Recycled content**

(Required for LEED v4 Building product disclosure and optimization - sourcing of raw materials)

Recycled content: proportion, by mass, of recycled material in a product or packaging. Only pre-consumer and post-consumer materials shall be considered as recycled content.

Post-consumer material: material generated by households or commercial, industrial and institutional facilities in their role as end-users of the product which can no longer be used for its intended purpose. In practice, in the case of flat glass, all material coming from glass recycling collection schemes falls under this category, i.e. glass waste from end-of-life vehicles, construction and demolition waste, etc.

Pre-consumer material: material diverted from the waste stream during a manufacturing process. Excluded is reutilization of materials such as rework, regrind, or scrap generated in a process and capable of being reclaimed within the same process that generated it.

In the case of flat glass, this waste originates from the processing or re-processing of glass that takes place before the final product reaches the consumer market. Pre-consumer waste flat glass is made of

cut-offs, losses during laminating, bending and other processing, including the manufacture of insulating glass units or automotive windscreens.

Cullet generated in the furnace plant and which is reintroduced into the furnace cannot be considered as pre-consumer recycled content, since there was never an intent to discard it and therefore it would never have entered the solid waste stream.

In the future, Saint-Gobain Glass intends to continue the increase of recycled material in its products, especially when recycling building post-consumer cullet glass dismantling and recycling networks will be available in every country.

- **Responsible sourcing**

(Required for BREEAM International new construction 2013 – MAT 03 Responsible sourcing)

Romont is certified ISO: 9001, 14001 and 45001

Namyslow is certified ISO: 14001 and 45001

Würselen is certified ISO: 9001 and 50001

- **9001 is Quality Management System**
- **14001 is Environmental Management System**
- **45001 is Safety Management System**
- **50001 is Energy Management System**

All Saint-Gobain Glass Industry sites with a glassmaking furnace, are ISO 14001 certified.

All internal Saint-Gobain Glass quarries are certified ISO 14001 like, for example, SAINT-GOBAIN SAMIN (sand) in France. Many Saint-Gobain Glass raw material suppliers are certified ISO 14001. Our policy consists in encouraging the sourcing of raw materials extracted or made in sites certified ISO 14001 (or the equivalent). For any other question / document / certification, please contact our local sales teams.

Differences with older versions of the EPD

	EPD1 (2019)	EPD2 (2023) / A1-A3	EPD2 (2023)
Global warming (kgCO2eq./FU)	6.70E+01	6.12E+01	6.94E+01
Non-renewable resources consumption (MJ./FU)	9.70E+02	9.71E+02	9.96E+02
Energy consumption (MJ/FU)	1.24E+03	1.29E+03	1.27E+03
Water consumption (m3/FU)	3.39E-01	3.44E-01	3.48E-01
Waste production (kg/FU)	5.07E+00	5.03E+00	4.00E+01

Main changes are related to:

- The multi-product aspect of the previous EPD1 (2019) means that the reference make-up used to display results in this old document is another make-up (CONTRAFLAM 30 (5/5)) of the range.
- Evolution of life cycle stages included since the previous EPD was cradle-to-gate (A1-A3).
- Evolution in scope, with one less plant (UK) and site relocation from Aachen to Würselen.

- Production data actualized in addition to the LCA database and LCA software.

References

1. ISO 14040:2006: Environmental Management-Life Cycle Assessment-Principles and framework.
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. ISO 21930: 2017 Sustainability in building construction – Environmental declaration of building products
10. PCR 2019:14 Construction products (EN 15804:2012: A2) version 1.1 and c-PCR-009 Flat glass products (EN 17074)
11. LCA report, Information for the Environmental Product Declaration of insulation products

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