ENVIRONMENTAL PRODUCT DECLARATION

In accordance with EN 15804 and ISO 14025

CONTRAFLAM

Fire resistant glazing

Programme :	The international EPD®System, www.environdec.com
Programme operator:	EPD International AB
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EPD Registration number
S-P-03251

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Programme information

Programme	The International EPD® System EPD International AB, Box 210 60, SE-100 31 Stockholm, Sweden More information at www.environdec.com
EPD® registration number	S-P-03251
Programme category rules (PCR)	EN 15804 as the core PCR and PCR for construction products and construction services issued by the International EPD System (PCR 2012:01 Construction products and construction services, version 2.33 2020-09-18)
CPC Classification	37115 "safety glass"
PCR review was conducted by	The Technical Committee of the International EPD® System. Contact via info@environdec.com
Owner of the declaration	Saint-Gobain India Private Limited Plot A-1, SIPCOT Industrial Park, Sripermbudur. Kanchipuram Dist.- 602 105. Email**:** manoj.v@saint-gobain.com
Manufacturer	SAINT GOBAIN-INDIA PRIVATE LIMITED Plot A-1, SIPCOT Industrial Park, Sripermbudur. Kanchipuram Dist.- 602 105
Independent third-party verification of the declaration and data, according to ISO 14025:2006	☐ EPD process certification ☒ EPD verification
EPD® prepared by	Elodie Ducourthial (Saint Gobain Glass) Contact: Elodie.ducourthial@saint-gobain.com
Third party verifier	Elena Antuña-Bernardo, EA consultant Elena@eaconsultant.eu
Approved by	The International EPD® System
Procedure for follow-up of data during EPD validity involves third party verifier	☐ Yes ☒ No
Declaration issued	**2021-03-15**
Valid until	**2026-03-15**

The EPD owner has the sole ownership, liability, and responsibility for the EPD.
According to EN 15804, EPD of construction products may not be comparable if they do not comply with this standard. According to ISO 21930, EPD might not be comparable if they are from different programmes.

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.

Reading note: In this document, the thousand separator and the decimal mark follow the International System English version, *i.e* 1 234.56

Product description

Product description and description of use

The Environmental Product Declaration (EPD®) describes the environmental impacts of 1m² of CONTRAFLAM, which is a fire resistant laminated glass.

Specific make-ups described in this EPD

CONTRAFLAM is a fire resistant laminated glass in conformance with EN 14449 and fire properties according to BS 476 part 22. It consists of two 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 in order to protect life and property in living places for the specific time frame.

In this Environmental Product Declaration, one square meter of 4 different glazing configurations will be analyzed:

- CONTRAFLAM 30-2 (5/4/5)
- CONTRAFLAM 60-3 (5/4/4/5)
- CONTRAFLAM 90-4 (5/4/4/4/5)
- CONTRAFLAM 120-5 (5/8/4/4/8/5)

CONTRAFLAM Range

Products of the CONTRAFLAM range are single fire-resistant glasses made of tempered safety glass and sealed to be completely moisture-resistant. The chamber is filled with transparent and UV-stable alkaline silicate based chemical mixture, which reacts in the event of fire. This intumescent interlayer expands as an opaque foam reduces panic by blocking the view to affected areas.

PERFORMANCE DATA

The range of CONTRAFLAM is very large and can be personalized according a wide range of multifunctional options.
Here are a few examples of configurations for each of the products described in this EPD.

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

In this Environmental Product Declaration, one glazing configuration will be analyzed:

	N° 1	**N° 2**	**N° 3**	**N° 4**
	CONTRAFLAM 30-2 (5/4/5)	CONTRAFLAM 60-3 (5/4/4/5)	CONTRAFLAM 90-4 (5/4/4/4/5)	CONTRAFLAM 120-5 (5/8/4/4/8/5)
Mechanical properties				
Nominal thickness (mm)	20	27	40	54
Weight (kg/m^2)	44	58.5	82	115
Visible parameters				
Light transmittance (LT) %	84	81.5	78.5	73.9
Light reflection (RLe/RLi) (%)	9.2 / 9.2	9.8 / 9.8	10.2 / 10.2	10.4 / 10.4
Thermal transmission				
U_g value	4.7	4.33	3.6	3.34
Thermal properties				
Energy transmittance (ET) %	60.9	56.1	50.8	45.4
Energy reflection (Ree/Rei) %	7.5 / 7.5	7.7 / 7.7	7.9 / 7.9	7.9 / 7.9
Solar factor g	0.68	0.65	0.60	0.56
Acoustics properties				
Rw	41 dB	43 dB	46 dB	47 dB

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 BS 476 part 22.

Declaration of the main product components and/or materials

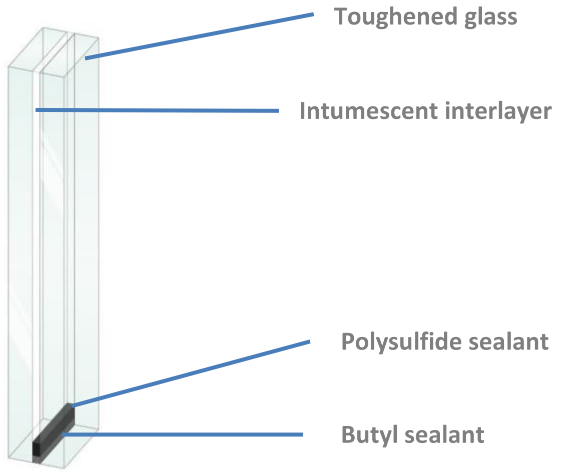


Illustration shows a CONTRAFLAM made of toughened glass

	N° 1	N° 2	N° 3	N° 4	
MATERIAL COMPOSITION Weight (%)	CONTRAFLAM 30-2 (5/4/5)	CONTRAFLAM 60-3 (5/4/4/5)	CONTRAFLAM 90-4 (5/4/4/4/5)	CONTRAFLAM 120-5 (5/8/4/4/8/5)	CAS number
Glass	79	83	66	72	65997-17-3
Fire resistant Interlayer	20	17	32	27	Confidential but no classified components inside
Butyl sealant	0,5	0,4	0,8	0,7	Polymer
Sealant polysulfide	0,4	0,4	0,7	0,6	Polymer

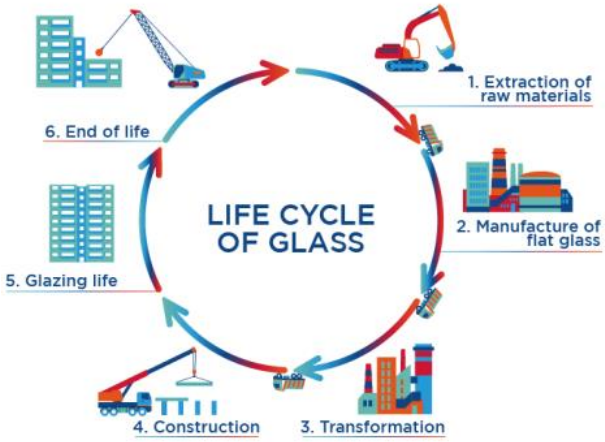
The above list gives the main components of the product, including those contributing to more than 5% of any environmental impact, if any. The percentages are given for the glass make-ups mentioned in this EPD; the % may vary depending on the glazing configuration.

LCA calculation information

FUNCTIONAL UNIT / DECLARED UNIT	One square meter of CONTRAFLAM to be incorporated into a building. The impacts of installation are not taken into account.
SYSTEM BOUNDARIES	Cradle to gate. Mandatory Stages = A1-A3
EXCLUDED LIFE CYCLE STAGES	Excluded stages = A4-A5; B1-B7; C1-C4, D
REFERENCE SERVICE LIFE (RSL)	n/a. Boundaries are cradle to gate
CUT-OFF RULES	All significant parameters shall be included. According to EN 15804, mass flows under 1% of the total mass input and/or energy flows representing less than 1% of the total primary energy usage of the associated unit process may be omitted. However, the total amount of energy and mass omitted must not exceed 5% per module. Substances of Very High Concern (SVHC), as defined in the REACH Regulation (article 57), in a concentration above 0.1% by weight, in glass final products, shall be included in the Life Cycle Inventory and the cut-off rules shall not apply. All inputs and outputs to the processes for which data is available were included in the calculation. No core processes were excluded. Particular care was taken to include materials and energy flows known to have the potential to cause significant emissions into air, water and soil related to the environmental indicators of the governing PCR.
ALLOCATIONS	No allocation. Attribution of total inputs and outputs are based on m² of production for Contraflam. Allocation of background data (energy and materials) taken from the GaBi databases is documented online at http://www.gabi-software.com/support/gabi/
GEOGRAPHICAL COVERAGE AND TIME PERIOD	Primary production data is from the year 2018 SAINT-GOBAIN INDIA PRIVATE LIMITED in India. LCI of SGG PLANILUX INDIA is coming from background data base used for their EPD publication.
BACKGROUND DATA SOURCE	GaBi data not older than 10 years were used to evaluate the environmental impacts.
SOFTWARE	Gabi 8 service pack 37 - GaBi envision

Life cycle stages

Diagram of the Life Cycle



Relevant stages: as this is a cradle to gate the only relevant stages are A1-A3.

A description of the relevant stages is given in the figures below, four types of CONTRAFLAM configurations are given in the Figure 1.

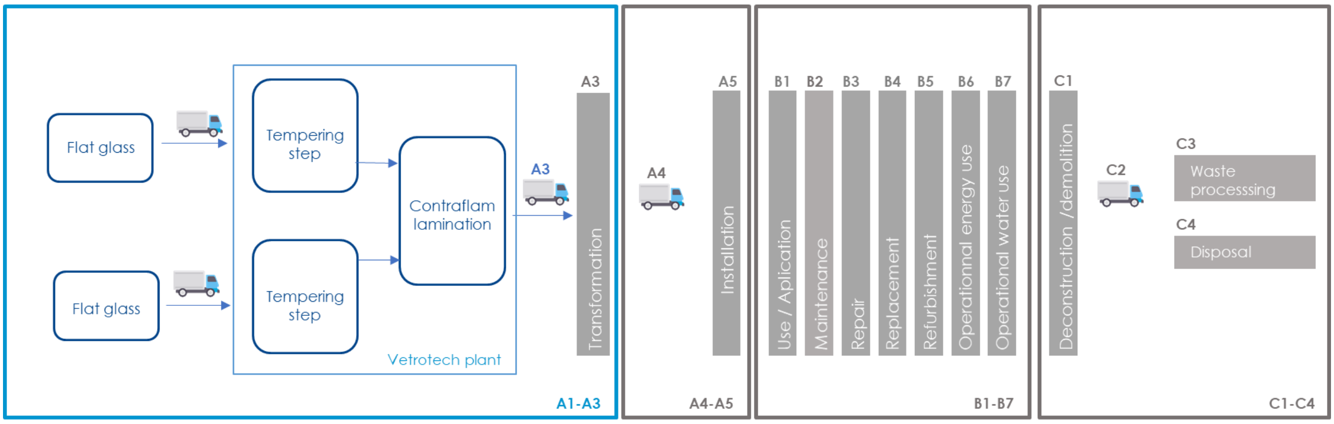


Figure 1 : Relevant LCA steps for CONTRAFLAM). Steps in blue are declared in this EPD, steps in grey are not declared.

Production			Installation		Use phase							End-of-Life				Next product system
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C3	C3	C4	D
Raw materials (extraction, processing, recycled material)premières	Transport to manufacturer	Manufacturing	Transport to building site	Installation into building	Use / application	Maintenance	Repair	Replacement	Refurbishement	Oerational; energy use	Operational water use	Deconstruction / demolition	Transport to EoL	Waste processing for reuse, recovery or recycling	Disposal	Reuse, recovery or recycling potential
X	X	X	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA

Table 1: Modules of the production life cycle included in the EPD (X = declared modules ; MNA = modules not assessed)

Product stage, A1-A3

Description of the configurations 1: CONTRAFLAM 30-2 (5/4/5)

CONTRAFLAM 30-2 (5/4/5) is based on the tempering of flat glass of different thickness before assembly with CF lamination process, as described in Figure 2.

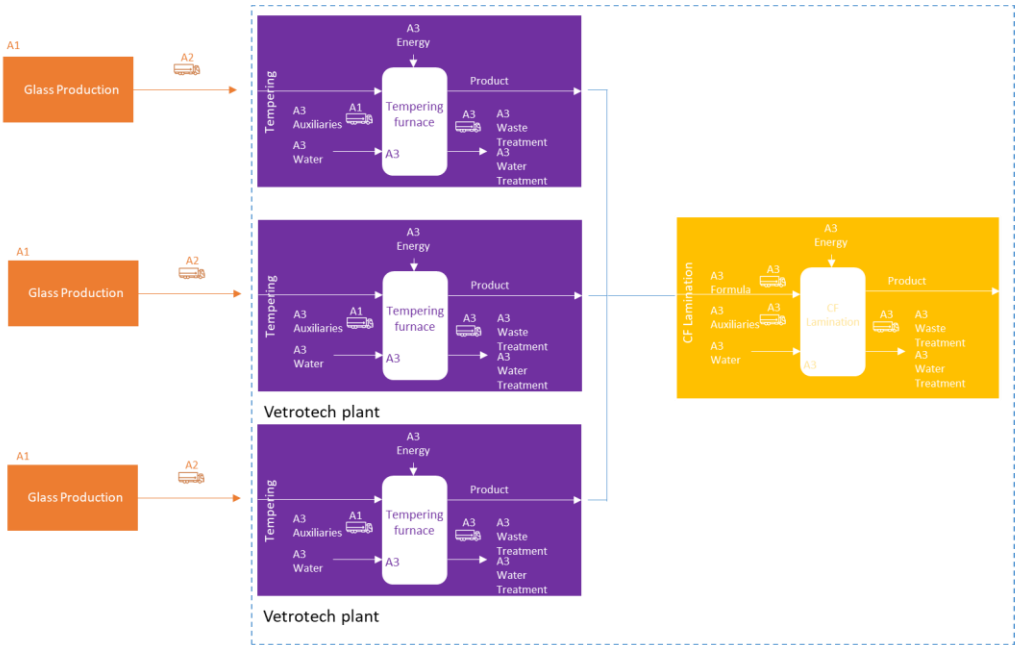


Figure 2: Details of Production of CONTRAFLAM 30-2 steps, declared in this EPD for Contraflam 30-2 (5/4/5) configuration

Description of the configurations 2: CONTRAFLAM 60-3 (5/4/4/5)

CONTRAFLAM 60-3 (5/4/4/5) is based on the tempering of flat glass of different thickness before assembly with CF lamination process, as described in Figure 3.

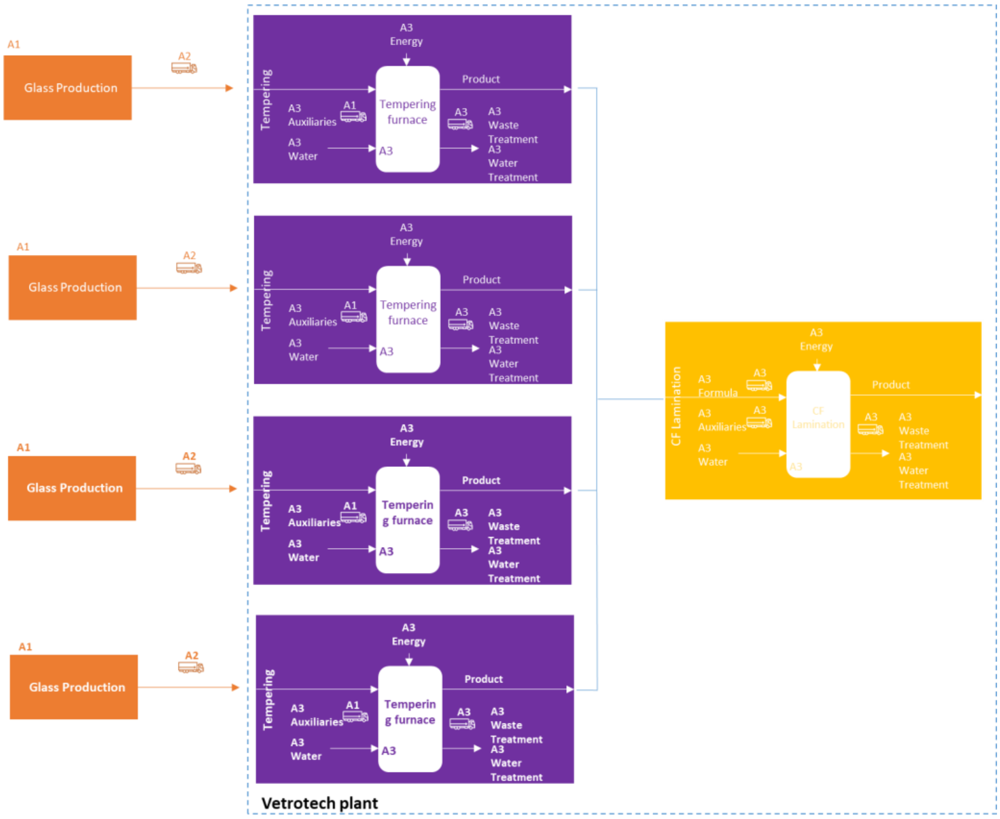


Figure 3: Details of Production of CONTRAFLAM 60-3 steps, declared in this EPD for Contraflam 60-3 (5/4/4/5) configuration

Description of the configurations 3: CONTRAFLAM 90-4 (5/4/4/4/5)

CONTRAFLAM 90-4 (5/4/4/4/5) is based on the tempering of flat glass of different thickness before assembly with CF lamination process, as described in Figure 4.

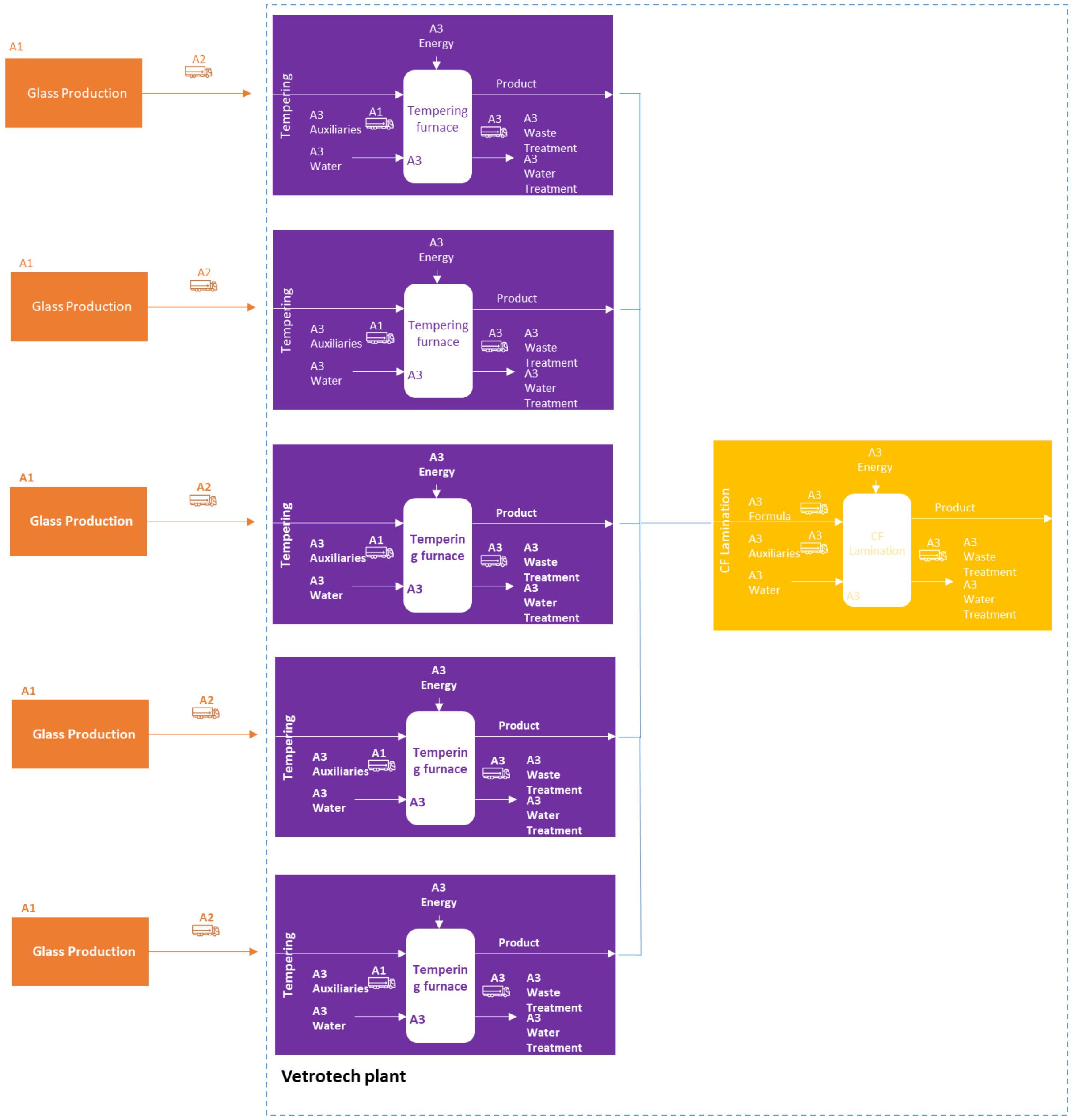


Figure 4 : Details of Production of CONTRAFLAM 90-4 steps, declared in this EPD for Contraflam 90-4(5/4/4/4/5) configuration

Description of the configurations 4: CONTRAFLAM 120-5 (5/8/4/4/8/5)

CONTRAFLAM 120-5 (5/8/4/4/8/5) is based on the tempering of flat glass of different thickness before assembly with CF lamination process, as described in Figure 5.

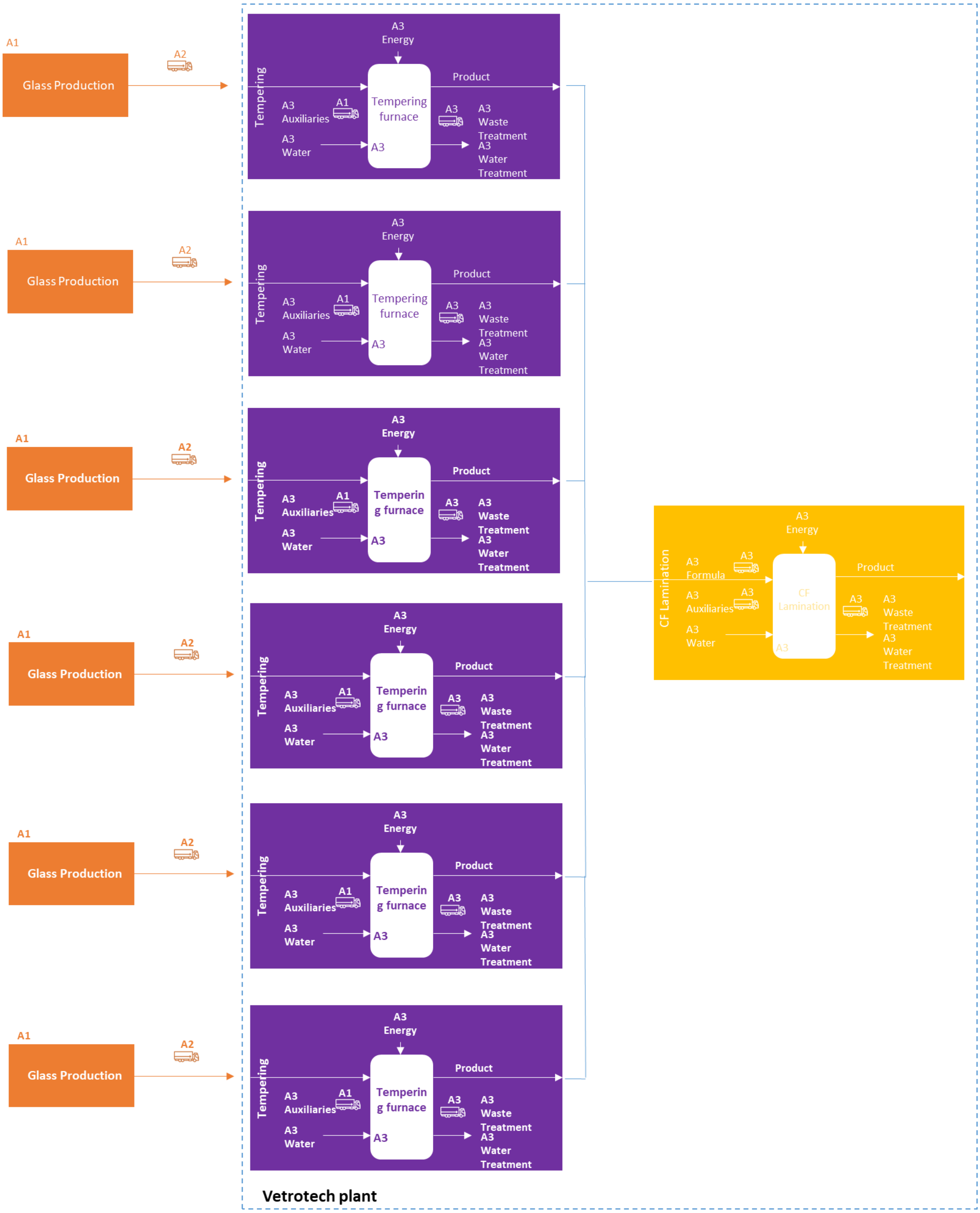
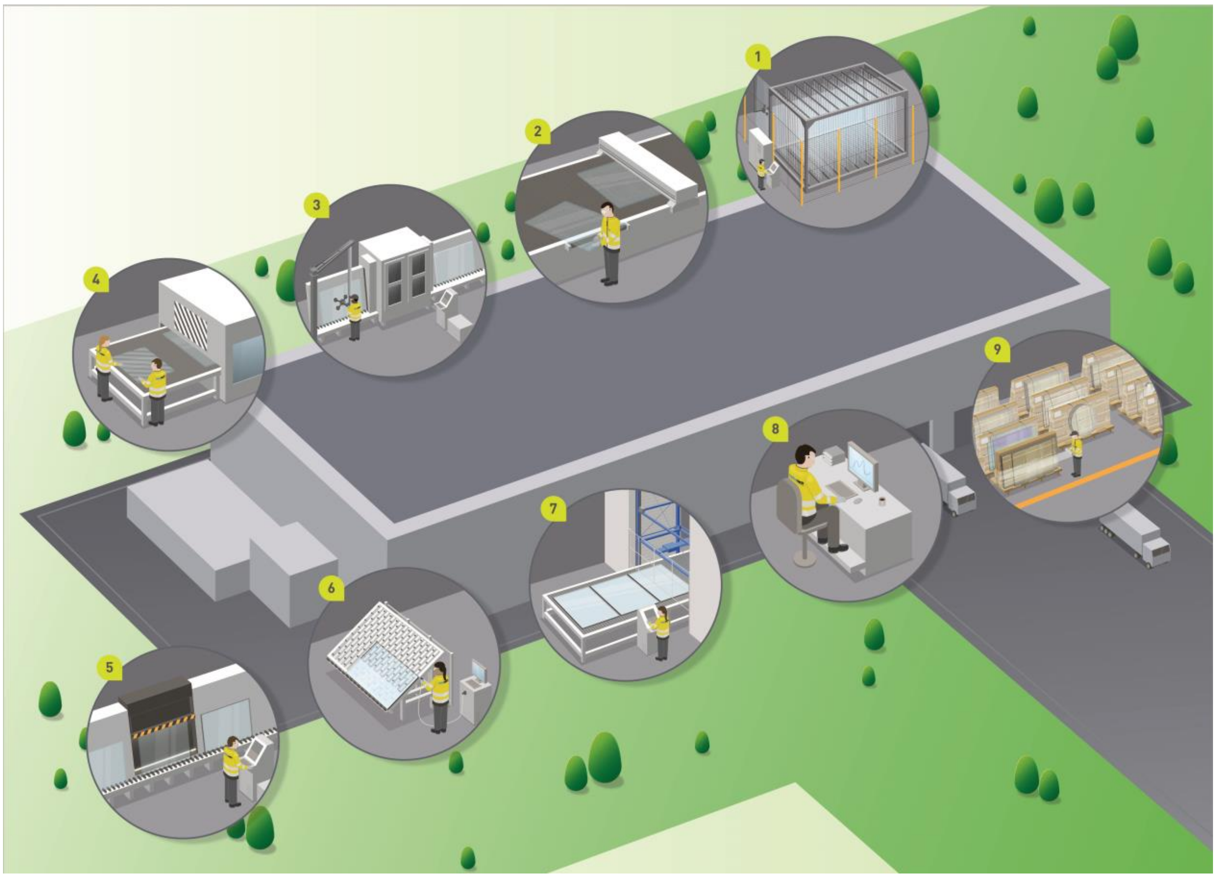


Figure 5: Details of Production of CONTRAFLAM 120-5 steps, declared in this EPD for Contraflam 120-5(5/8/4/4/8/5) configuration

CONTRAFLAM manufacturing process flow diagram



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 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.
5. **INSULATING GLASS UNIT (IGU) ASSEMBLY**: On a specially designed IGU processing-line, two pieces of glass are assembled together 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.
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.

LCA results

The table below present the environmental impacts associated with the production of one square meter of CONTRAFLAM. This is a Cradle-to-Gate EPD. The environmental impacts of all the other stages in the life cycle of CONTRAFLAM are not declared (INA).

CONTRAFLAM 30-2 (5/4/5)

ENVIRONMENTAL IMPACTS CONTRAFLAM 30-2 (5/4/5)															
Parameters	Product stage	Construction process 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	
Global Warming Potential (GWP) - *kg CO_2 equiv/FU*	1.24E+2	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
	The global warming potential of a gas refers to the total contribution to global warming resulting from the emission of one unit of that gas relative to one unit of the reference gas. carbon dioxide. which is assigned a value of 1.														
Ozone Depletion (ODP) *kg CFC 11 equiv/FU*	5.19E-5	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
	Destruction of the stratospheric ozone layer which shields the earth from ultraviolet radiation harmful to life. This destruction of ozone is caused by the breakdown of certain chlorine and/or bromine containing compounds (chlorofluorocarbonsor halons). Which break down when they reach the stratosphere and then catalytically destroy ozone molecules.														
Acidification potential (AP) *kg SO_2 equiv/FU*	9.52E-1	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
	Acid depositions have negative impacts on natural ecosystems and the man-made environment incl. buildings. The main sources for emissions of acidifying substances are agriculture and fossil fuel combustion used for electricity production. heating and transport.														
Eutrophication potential (EP) *kg $(PO_4)^{3-}$ equiv/FU*	6.68E-2	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
	Excessive enrichment of waters and continental surfaces with nutrients. and the associated adverse biological effects.														
Photochemical ozone creation potential (POCP) *kg Ethene equiv/FU*	2.98E-2	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
	Chemical reactions brought about by the light energy of the sun. The reaction of nitrogen oxides with hydrocarbons in the presence of sunlight to form ozone is an example of a photochemical reaction.														
Abiotic depletion potential for non-fossil ressources (ADP-elements) - *kg Sb equiv/FU*	4.05E-4	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Abiotic depletion potential for fossil ressources (ADP-fossil fuels) - *MJ/FU*	1.35E+3	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
	Consumption of non-renewable resources. thereby lowering their availability for future generations.														

RESOURCE USE CONTRAFLAM 30-2 (5/4/5)

Parameters	Product stage	Construction process 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	
Use of renewable primary energy excluding renewable primary energy resources used as raw materials - *MJ/FU*	1.12E+2	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Use of renewable primary energy used as raw materials *MJ/FU*	0	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials) *MJ/FU*	1.12E+2	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw	1.39E+3	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Use of non-renewable primary energy used as raw materials *MJ/FU*	0	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials) - *MJ/FU*	1.39E+3	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Use of secondary material *kg/FU*	2.94	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Use of renewable secondary fuels- *MJ/FU*	0	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Use of non-renewable secondary fuels - *MJ/FU*	0	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Use of net fresh water - *m^3/FU*	5.48E-1	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA

WASTE CATEGORIES CONTRAFLAM 30-2 (5/4/5)															
Parameters	Product stage	Construction process 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	
Hazardous waste disposed *kg/FU*	7.31E-3	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Non-hazardous (excluding inert) waste disposed *kg/FU*	6.38	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Radioactive waste disposed *kg/FU*	1.46E-2	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA

OUTPUT FLOWS CONTRAFLAM 30-2 (5/4/5)																
Parameters	**Product stage**	**Construction process 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**	
Components for re-use *kg/FU*	**0**	**INA**	**INA**	**INA**	**INA**	**INA**	**INA**	**INA**	**INA**	**INA**	**INA**	**INA**	**INA**	**INA**	**INA**
Materials for recycling *kg/FU*	**1.56E-1**	**INA**	**INA**	**INA**	**INA**	**INA**	**INA**	**INA**	**INA**	**INA**	**INA**	**INA**	**INA**	**INA**	**INA**
Materials for energy recovery *kg/FU*	**0**	**INA**	**INA**	**INA**	**INA**	**INA**	**INA**	**INA**	**INA**	**INA**	**INA**	**INA**	**INA**	**INA**	**INA**
Exported energy. detailed by energy carrier *MJ/FU*	**0**	**INA**	**INA**	**INA**	**INA**	**INA**	**INA**	**INA**	**INA**	**INA**	**INA**	**INA**	**INA**	**INA**	**INA**

CONTRAFLAM 60-3 (5/4/4/5))

ENVIRONMENTAL IMPACTS CONTRAFLAM 60-3 (5/4/4/5)																
Parameters	Product stage	Construction process stage		Use stage							End-of-life stage				
	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
Global Warming Potential (GWP) - *kg CO_2 equiv/FU*	1.56E+2	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
	The global warming potential of a gas refers to the total contribution to global warming resulting from the emission of one unit of that gas relative to one unit of the reference gas. carbon dioxide. which is assigned a value of 1.														
Ozone Depletion (ODP) *kg CFC 11 equiv/FU*	7.78E-5	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
	Destruction of the stratospheric ozone layer which shields the earth from ultraviolet radiation harmful to life. This destruction of ozone is caused by the breakdown of certain chlorine and/or bromine containing compounds (chlorofluorocarbonsor halons). Which break down when they reach the stratosphere and then catalytically destroy ozone molecules.														
Acidification potential (AP) *kg SO_2 equiv/FU*	1.15	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
	Acid depositions have negative impacts on natural ecosystems and the man-made environment incl. buildings. The main sources for emissions of acidifying substances are agriculture and fossil fuel combustion used for electricity production. heating and transport.														
Eutrophication potential (EP) *kg $(PO_4)^{3-}$ equiv/FU*	8.3E-2	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
	Excessive enrichment of waters and continental surfaces with nutrients. and the associated adverse biological effects.														
Photochemical ozone creation potential (POCP) *kg Ethene equiv/FU*	3.53E-2	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
	Chemical reactions brought about by the light energy of the sun. The reaction of nitrogen oxides with hydrocarbons in the presence of sunlight to form ozone is an example of a photochemical reaction.														
Abiotic depletion potential for non-fossil ressources (ADP-elements) - *kg Sb equiv/FU*	5.31E-4	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Abiotic depletion potential for fossil ressources (ADP-fossil fuels) - *MJ/FU*	1.7E+3	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
	Consumption of non-renewable resources. thereby lowering their availability for future generations.														

RESOURCE USE CONTRAFLAM 60-3 (5/4/4/5)															
Parameters	Product stage	Construction process 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	
Use of renewable primary energy excluding renewable primary energy resources used as raw materials - *MJ/FU*	1.39E+2	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Use of renewable primary energy used as raw materials *MJ/FU*	0	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials) *MJ/FU*	1.39E+2	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw	1.75E+3	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Use of non-renewable primary energy used as raw materials *MJ/FU*	0	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials) - *MJ/FU*	1.75E+3	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Use of secondary material *kg/FU*	3.78	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Use of renewable secondary fuels- *MJ/FU*	0	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Use of non-renewable secondary fuels - *MJ/FU*	0	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Use of net fresh water - *m^3/FU*	6.62E-1	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA

WASTE CATEGORIES CONTRAFLAM 60-3 (5/4/4/5)															
Parameters	Product stage	Construction process 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	
Hazardous waste disposed *kg/FU*	1.1E-2	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Non-hazardous (excluding inert) waste disposed *kg/FU*	8.29	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Radioactive waste disposed *kg/FU*	1.88E-2	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA

OUTPUT FLOWS CONTRAFLAM 60-3 (5/4/4/5)																
Parameters	Product stage	Construction process 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	
Components for re-use *kg/FU*	0	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Materials for recycling *kg/FU*	2.01E-1	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Materials for energy recovery *kg/FU*	0	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Exported energy. detailed by energy carrier *MJ/FU*	0	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA

CONTRAFLAM 90-4 (5/4/4/4/5)

ENVIRONMENTAL IMPACTS CONTRAFLAM 90-4 (5/4/4/4/5)															
Parameters	Product stage	Construction process 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	
Global Warming Potential (GWP) - *kg CO_2 equiv/FU*	2.01E+2	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
	The global warming potential of a gas refers to the total contribution to global warming resulting from the emission of one unit of that gas relative to one unit of the reference gas. carbon dioxide. which is assigned a value of 1.														
Ozone Depletion (ODP) *kg CFC 11 equiv/FU*	1.56E-4	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
	Destruction of the stratospheric ozone layer which shields the earth from ultraviolet radiation harmful to life. This destruction of ozone is caused by the breakdown of certain chlorine and/or bromine containing compounds (chlorofluorocarbonsor halons). Which break down when they reach the stratosphere and then catalytically destroy ozone molecules.														
Acidification potential (AP) *kg SO_2 equiv/FU*	1.37	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
	Acid depositions have negative impacts on natural ecosystems and the man-made environment incl. buildings. The main sources for emissions of acidifying substances are agriculture and fossil fuel combustion used for electricity production. heating and transport.														
Eutrophication potential (EP) *kg $(PO_4)^{3-}$ equiv/FU*	1.04E-1	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
	Excessive enrichment of waters and continental surfaces with nutrients. and the associated adverse biological effects.														
Photochemical ozone creation potential (POCP) *kg Ethene equiv/FU*	4.08E-2	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
	Chemical reactions brought about by the light energy of the sun. The reaction of nitrogen oxides with hydrocarbons in the presence of sunlight to form ozone is an example of a photochemical reaction.														
Abiotic depletion potential for non-fossil ressources (ADP-elements) - *kg Sb equiv/FU*	7.05E-4	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Abiotic depletion potential for fossil ressources (ADP-fossil fuels) - *MJ/FU*	2.26E+3	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
	Consumption of non-renewable resources. thereby lowering their availability for future generations.														

RESOURCE USE CONTRAFLAM 90-4 (5/4/4/4/5)

Parameters	Product stage	Construction process 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	
Use of renewable primary energy excluding renewable primary energy resources used as raw materials - *MJ/FU*	1.85E+2	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Use of renewable primary energy used as raw materials *MJ/FU*	0	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials) *MJ/FU*	1.85E+2	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw	2.33E+3	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Use of non-renewable primary energy used as raw materials *MJ/FU*	0	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials) - *MJ/FU*	2.33E+3	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Use of secondary material *kg/FU*	4.62	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Use of renewable secondary fuels- *MJ/FU*	0	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Use of non-renewable secondary fuels - *MJ/FU*	0	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Use of net fresh water - m^3/FU	8.2E-1	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA

WASTE CATEGORIES CONTRAFLAM 90-4 (5/4/4/4/5)

Parameters	Product stage	Construction process 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	
Hazardous waste disposed *kg/FU*	2.19E-2	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Non-hazardous (excluding inert) waste disposed *kg/FU*	1.09E+1	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Radioactive waste disposed *kg/FU*	2.74E-2	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA

OUTPUT FLOWS CONTRAFLAM 90-4 (5/4/4/4/5)															
Parameters	Product stage	Construction process 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	
Components for re-use *kg/FU*	0	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Materials for recycling *kg/FU*	2.45E-1	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Materials for energy recovery *kg/FU*	0	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Exported energy. detailed by energy carrier *MJ/FU*	0	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA

CONTRAFLAM 120-5 (5/8/4/4/8/5)

ENVIRONMENTAL IMPACTS CONTRAFLAM 120-5 (5/8/4/4/8/5)																
Parameters	Product stage	Construction process 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	
Global Warming Potential (GWP) - *kg CO_2 equiv/FU*	2.6E+2	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
	The global warming potential of a gas refers to the total contribution to global warming resulting from the emission of one unit of that gas relative to one unit of the reference gas. carbon dioxide. which is assigned a value of 1.														
Ozone Depletion (ODP) *kg CFC 11 equiv/FU*	1.73E-4	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
	Destruction of the stratospheric ozone layer which shields the earth from ultraviolet radiation harmful to life. This destruction of ozone is caused by the breakdown of certain chlorine and/or bromine containing compounds (chlorofluorocarbonsor halons). Which break down when they reach the stratosphere and then catalytically destroy ozone molecules.														
Acidification potential (AP) *kg SO_2 equiv/FU*	1.72	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
	Acid depositions have negative impacts on natural ecosystems and the man-made environment incl. buildings. The main sources for emissions of acidifying substances are agriculture and fossil fuel combustion used for electricity production. heating and transport.														
Eutrophication potential (EP) *kg $(PO_4)^{3-}$ equiv/FU*	1.35E-1	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
	Excessive enrichment of waters and continental surfaces with nutrients. and the associated adverse biological effects.														
Photochemical ozone creation potential (POCP) *kg Ethene equiv/FU*	5.04E-2	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
	Chemical reactions brought about by the light energy of the sun. The reaction of nitrogen oxides with hydrocarbons in the presence of sunlight to form ozone is an example of a photochemical reaction.														
Abiotic depletion potential for non-fossil ressources (ADP-elements) - *kg Sb equiv/FU*	1.03E-3	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Abiotic depletion potential for fossil ressources (ADP-fossil fuels) - *MJ/FU*	2.91E+3	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
	Consumption of non-renewable resources. thereby lowering their availability for future generations.														

RESOURCE USE CONTRAFLAM 120-5 (5/8/4/4/8/5)															
Parameters	Product stage	Construction process 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	
Use of renewable primary energy excluding renewable primary energy resources used as raw materials - *MJ/FU*	2.21E+2	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Use of renewable primary energy used as raw materials *MJ/FU*	0	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials) *MJ/FU*	2.21E+2	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw	3E+3	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Use of non-renewable primary energy used as raw materials *MJ/FU*	0	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials) - *MJ/FU*	3E+3	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Use of secondary material *kg/FU*	7.15	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Use of renewable secondary fuels- *MJ/FU*	0	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Use of non-renewable secondary fuels - *MJ/FU*	0	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Use of net fresh water - *m^3/FU*	9.97E-1	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA

WASTE CATEGORIES CONTRAFLAM 120-5 (5/8/4/4/8/5)															
Parameters	Product stage	Construction process 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	
Hazardous waste disposed *kg/FU*	2.44E-2	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Non-hazardous (excluding inert) waste disposed *kg/FU*	1.33E+1	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Radioactive waste disposed *kg/FU*	3.3E-2	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA

OUTPUT FLOWS CONTRAFLAM 120-5 (5/8/4/4/8/5)

Parameters	Product stage	Construction process 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	
Components for re-use *kg/FU*	0	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Materials for recycling *kg/FU*	3.79E-1	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Materials for energy recovery *kg/FU*	0	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA
Exported energy. detailed by energy carrier *MJ/FU*	0	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA

LCA results interpretation

CONTRAFLAM is made of tempered glass and intumescent interlayer(s).
Most of the CO_2 emissions are linked to the glass production phase and the integration of the intumescent interlayer in the glazing.
Water consumption is linked to the electrical energy used for the transformation process of the glass and to the production of the intumescent interlayer.

	Environnemental impacts (A1-A3) CONTRAFLAM 60-3 (5/4/4/5)	**Unit**
Global warming	1.56E+2	kg CO_2 eq./FU
Non-Renewable resources consumption[1]	1.7E+3	MJ/FU
Energy consumption[2]	1.89E+3	MJ/FU
Water consumption[3]	6.62E-1	m^3/FU
Waste production[4]	8,32	kg/FU

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

Health characteristics

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).

The sealant of CONTRAFLAM is made of organic materials which have been tested regarding their VOC emissions (following ISO 16000 standard):

- Polysulfide: total VOC after 28 days < 38 µg/m3 (Eurofins report G07104)

Additional Environmental Information

Disposal considerations

Disposal may be in accordance with local and national legal requirements for the disposal of glass waste. The local regulations for discharging waste water in sewage treatment plants must be taken into consideration for water-soluble material. In the EU, waste code 200102[1] is applied (Test report 66988008 Eurofins).

Saint-Gobain's environmental policy

Saint-Gobain's environmental vision is to ensure the sustainable development of its activities, while preserving the environment from the impacts of its processes and services throughout their life cycle. The Group thus seeks to ensure the preservation of resources, meet the expectations of its relevant stakeholders, and offer its customers the highest added value with the lowest environmental impact.

The Group has set two long-term objectives: zero environmental accidents and a minimum impact of its activities on the environment. Short and medium-term goals are set to address these two ambitions. They concern five environmental areas identified by the Group: raw materials and waste; energy, atmospheric emissions and climate; water; biodiversity; and environmental accidents and nuisance.

Saint-Gobain's long term objectives:

	Non recovered waste (2010-2025): -50% Long-term: zero non-recovered waste
	Energy consumption: -15% (2010-2025) CO_2 emissions: -20% (2010-2025) Emissions of NOx. SO_2 and dust: -20% for each emissions category (2010-2025)
	Water discharge: -80% (2010-2025) Long-term: zero industrial water discharge in liquid form
	2025: promote the preservation of natural areas at Company sites as much as possible
	2025: all environmental events are recorded. registered and investigated

More information on our website: www.saint-gobain.com and our Registration Document.

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 esthetically superior, while at the same time protecting natural resources.

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

<u>RECYCLED CONTENT</u>

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

[1] EWC code 200102 – glass – Absolute Non-hazardous

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-off, 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 intent to discard it and therefore it would never have entered the solid waste stream.

Pre-consumer cullet	~11%
Post-consumer cullet	< 1%

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.

References

EN 15804 + A1(2013) – Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction product.
PCR 2012:01 Construction products and construction services, version 2.33 2020-09-18
GPI 3.01 - GENERAL PROGRAMME INSTRUCTIONS FOR THE INTERNATIONAL EPD® SYSTEM
EN 410 - Glass in building - Determination of luminous and solar characteristics of glazing
EN 12758 - Glazing and airborne sound insulation - Product descriptions and determination of properties
EN 14449 - Glass in building - Laminated glass and laminated safety glass - Evaluation of conformity/Product standard
BS 476 part 22 – Fire tests on buildings materials and structures