

MAY 2012

Extract from the Environmental Product Declaration

In conformity with International Standards ISO 14025, ISO 14040 & ISO 14044

AFNOR Registration Number N° 08-259:2011

SGG CLIMATOP®

4-14-4-14-4 mm

Low Emissivity Triple Glazed Units

Others configuration studied:

- 4-10-4-10-4 mm
- 4-12-4-12-6 mm
- 4-18-4-18-4 mm
- 6-12-44.1-12-44.1 mm

The environmental impacts of this product have been assessed over its whole life cycle.

Its Environmental Product Declaration has been verified by an independent third party.



1 Data Sources

SAINT-GOBAIN GLASS is responsible for disclosing any information contained in this declaration in accordance with NF P 01-010 § 4.6.

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2 Product characterisation in accordance with NF P 01-010 § 4.3

2.1 Definition of the functional unit (FU)

1 m² triple glazed unit incorporated into a window frame for a building for one year. The Reference Service Life (RSL) considered is 30 years. The impacts of the window frame are not taken into account.

2.2 Product mass and basic data required to calculate the functional unit (FU)

Product unit (nature and quantity for the reference configuration 4-14-4-14-4 mm)

The TGU considered is representative of the products making up the SGG CLIMATOP[®] range; it consists of one pane, SGG PLANILUX[®] and two panes SGG PLANITHERM[®] (low-E coated glass). The nominal thickness of the glass panes is 4 mm and the actual thickness is 3.85 mm in accordance with the EN 572-2 standard.

The three glass panes are separated by two spacers that are 14 mm thick made from aluminium or plastic composite (called warm-edge for a better thermal insulation at the edge of the unit). The spacer is filled with a molecular sieve to avoid condensation inside the triple glazed unit. The space between the 3 panes of glass is filled with argon. The whole unit is sealed with butyl, polyurethane or polysulfide sealants to ensure a peripheral seal.

The mass of the full TGU for each year is 1.02 kg (30.61 kg over the whole RSL). This mass includes the three glass panes and the assembly accessories.

The reference flow of the product Life Cycle Assessment (LCA) is 1 m² of product over a period of 30 years.

Distribution packaging (nature and quantity): a 1 m² triple glazed unit needs the following packaging:

- Metal: 6.33 E-5kg (0.0019 kg over the whole RSL);
- Board: 3.9 E-04kg (0.0117 kg over the whole RSL);
- Spacer powder: 1.67 E-5 kg (0.0005 kg over the whole RSL);
- Plastic materials (polyethylene, polystyrene, polypropylene) : 7.67E-4 kg (0.023 kg over the whole RSL);
- Wood (kg): 1.17 E-3 kg (0.035 kg over the whole RSL).

Installation accessories: Not taken into account because there are several methods of installation: wood, aluminium or PVC window-frames... This in accordance with the standard NF P 01-010 § 4.3c.

Material losses: There are no material losses in the installation or on the building because there is no cutting to be done on the job-site, the products being delivered with the final dimensions.

Use: Cleaning is taken into account: 0.2 l of cleaning solution per m² of triple glazing and per year.

Substantiation of information disclosed: the information collected comes from 10 European sites producing SGG PLANILUX[®], 6 European sites producing SGG PLANITHERM[®] (SAINT-GOBAIN GLASS) and a panel of French GLASSOLUTIONS sites involved in the assembly of the TGU's (representative of all GLASSOLUTIONS sites in Europe).

2.3 Useful technical characteristics not contained in the definition of the functional unit

The thermal transmission value U_g of the product described is 0.6 W/ (m².K) or 0.7 W/ (m².K) or 0.8 W/ (m².K), the light transmittance TL, is between 71% and 73% and the solar factor is between 50% and 63%.

The product complies with the EN 1279-5 standard.

3 Environmental impacts representative of construction products in accordance with NF P 01-010 6

N°	Environmental impact Configuration	Indicator value for the Functional Unit				Units
		4-14-4-14-4	4-10-4-10-4	4-12-4-12-6	4-18-4-18-4	
1	Consumption of energy resources Total primary energy Renewable energy Non-renewable energy Fuel energy	26.2 1.15 25.0 24.6	23.2 0.928 22.2 21.9	26.6 1.04 25.6 24.2	27.4 1.24 26.2 24.8	MJ/FU MJ/FU MJ/FU MJ/FU
2	Depletion of natural resources	0.0102	0.00912	0.0105	0.0107	kg of antimony (Sb) eq./FU
3	Total water consumption	12.4	11.8	13.7	12.7	litre/FU
4	Solid waste: Recovered waste (total) Waste disposed of: Hazardous waste Non-hazardous waste Inert waste Radioactive waste	0.0554 0.0242 0.0680 1.02 9.61 E-05	0.0545 0.0173 0.0451 1.00 8.64 E-05	0.0639 0.0199 0.0518 1.18 9.86 E-05	0.0558 0.0271 0.0778 1.03 0.000100	kg/FU kg/FU kg/FU kg/FU kg/FU
5	Climatic change	1.67	1.51	1.75	1.73	kg of CO ₂ eq./FU
6	Atmospheric acidification	0.0106	0.00978	0.0113	0.0109	kg of SO ₂ eq./FU
7	Air pollution	221	192	222	235	m ³ /FU
8	Water pollution	0.513	0.457	0.920	0.874	m ³ /FU
9	Stratospheric ozone layer depletion	1.53 E-11	1.53 E-11	1.73 E-11	1.53 E-11	kg CFC eqR11/FU
10	Formation of photochemical oxidants	0.00055	0.000484	0.000552	0.000578	kg of ethylene eq./FU
Other indicator (not included in the NF P 01-010)						
11	Eutrophication	0.677	0.673	0.777	0.678	g eq PO ₄ ³⁻ /FU

N°	Environmental impact Configuration	Indicator value for the Reference Service Life				Units
		4-14-4-14-4	4-10-4-10-4	4-12-4-12-6	4-18-4-18-4	
1	Consumption of energy resources Total primary energy Renewable energy Non-renewable energy Fuel energy	785 34.4 751 739	695 27.9 667 658	799 31.3 767 758	823 37.2 786 773	MJ MJ MJ MJ
2	Depletion of natural resources	0.307	0.274	0.315	0.322	kg eq antimony (Sb)
3	Total water consumption	372	355	410	380	litre
4	Solid waste: Recovered waste (total) Waste disposed of: Hazardous waste Non-hazardous waste Inert waste Radioactive waste	1.661 0.725 2.04 30.7 0.00288	1.635 0.520 1.35 30.1 0.00259	1.92 0.596 1.55 35.3 0.00296	1.67 0.812 2.33 31.0 0.00301	kg kg kg kg kg
5	Climatic change	50.0	45.4	52.4	51.9	kg eqCO ₂
6	Atmospheric acidification	0.317	0.293	0.339	0.326	kg eqSO ₂
7	Air pollution	6 640	5 751	6 649	7 046	m ³
8	Water pollution	15.4	13.7	27.6	26.2	m ³
9	Stratospheric ozone layer depletion	4.58 E-10	4.58 E-10	5.19 E-10	4.58 E-10	kg CFC eq R11
10	Formation of photochemical oxidants	0.0165	0.0145	0.0166	0.0173	kg eq ethylene
Other indicator (not included in the NF P 01-010)						
11	Eutrophication	20.3	20.2	23.3	20.3	g eq PO ₄ ³⁻

N°	Environmental impact	Indicator value for the Functional Unit		Indicator value for the Reference Service Life	
	Configuration	6-12-44.1-12-44.1			
1	Consumption of energy resources				
	Total primary energy	46.0	MJ/FU	1 379	MJ
	Renewable energy	1.51	MJ/FU	45.2	MJ
	Non-renewable energy	44.6	MJ/FU	1 337	MJ
	Fuel energy	36.1	MJ/FU	1 084	MJ
2	Depletion of natural resources	0.0185	kg of antimony (Sb) eq./FU	0.555	kg eq antimony (Sb)
3	Total water consumption	22.3	litre/FU	670	litre
4	Solid waste:				
	Recovered waste (total)	0.112	kg/FU	3.36	kg
	Waste disposed of:				
	Hazardous waste	0.0236	kg/FU	0.707	kg
	Non-hazardous waste	1.77	kg/FU	53.1	kg
	Inert waste	0.135	kg/FU	4.05	kg
	Radioactive waste	0.000426	kg/FU	0.0128	kg
5	Climatic change	2.98	kg of CO ₂ eq./FU	89.5	kg eq CO ₂
6	Atmospheric acidification	0.0173	kg of SO ₂ eq./FU	0.518	kg eq SO ₂
7	Air pollution	317	m ³ /FU	9 518	m ³
8	Water pollution	1.39	m ³ /FU	41.8	m ³
9	Stratospheric ozone layer depletion	2.53 E-11	kg CFC eq. R11/FU	7.58 E-10	kg CFC equivalent R11
10	Formation of photochemical oxidants	0.000809	kg of ethylene eq./FU	0.0243	kg eq ethylene
Other indicator (not included in the NF P 01-010)					
11	Eutrophication	1.30	g eq PO ₄ ³⁻ /FU	39.0	g eq PO ₄ ³⁻

These values are also valid for the following extended configurations:

Reference Configuration	Extended configurations
4-14-4-14-4 mm	4-13-4-13-4 mm, 4-15-4-15-4 mm
4-10-4-10-4 mm	4-9-4-9-4 mm, 4-11-4-11-4 mm
4-12-4-12-6 mm	4-11-4-11-6 mm, 4-13-4-13-6 mm
4-18-4-18-4 mm	4-17-4-17-4 mm, 4-19-4-19-4 mm
6-12-44.1-12-44.1 mm	6-11-44.1-11-44.1 mm, 6-13-44.1-13-44.1 mm

NB: Increasing the width of the spacer by 2 mm increases by 2 to 3% the main impact indicators (energy, resources, climate change, pollution) which is why a single table is published for 3 similar configurations (cf. supporting report).

4 Product contribution to assessing health risks and quality of life inside buildings in accordance with NF P 01-010 § 7

Product contribution		Related paragraph	Expression (Measurement values, calculations...)
To assess health risks	Indoor air quality	§ 4.1.1	<p>VOC emissions during use after 28 days :</p> <p>a) polysulfide: total VOC < 76 µg/m³ (Eurofins G07103 et G07104) ;</p> <p>b) polyurethane: total VOC < 4 µg /m³ (Eurofins G08363).</p> <p>Radioactive emissions: no natural radioactivity measured.</p> <p>Fibres and particulates emissions: not relevant for glass.</p> <p>Micro-organisms and mould: some moulds can grow on the glass surface, but they do not produce any degradation. These moulds can be removed easily (report CONIDIA DEV 0111-006).</p>
	Water quality	§ 4.1.2	There is no impact. No migration of glass elements occurs when in contact with water (REACH Dossier CPIV).
To the quality of life	Hygrothermal comfort	§ 4.2.1	Contribution to thermal comfort due to effective insulation of TGU ($U_g = 0.6$ or 0.7 or $0.8 \text{ W}/(\text{m}^2.\text{K})$). Elimination of the cold wall phenomenon and indoor condensation at the surface of the glass in damp rooms.
	Acoustic comfort	§ 4.2.2	Contribution to acoustic comfort: R_{atr} index = 27dB.
	Visual comfort	§ 4.2.3	Contribution to visual comfort (encourages natural light, according to surface glazed, orientation of the façades...): <ul style="list-style-type: none"> • Daylight factor (DLF): 4%; • Daylight autonomy: up to 75%.
	Olfactive comfort	§ 4.2.4	No odour emission test has been conducted.

5 Additional information

NF P 01-010 is the Product Category Rule for this EPD

A TGU from the SGG CLIMATOP® range enables heating energy to be saved.

The environmental benefits derived from energy savings resulting from using an SGG CLIMATOP® TGU (compared to a single pane), after deducting the environmental impacts related to producing the TGU:

N°	Environmental impact	Indicator value for the Reference Service Life	Benefits for the Reference Service Life	Units
1	Consumption of energy resources			
	Total primary energy	785	65 169	MJ
	Renewable energy	34.4	2 215	MJ
	Non-renewable energy	751	62 954	MJ
2	Depletion of natural resources (ADP)	0.307	9.95	kg eq antimony (Sb)
3	Total water consumption	372	10 009	litre
4	Solid waste:			
	Recovered waste (total)	0.218	0.707	kg
	Waste disposed of:			
	Hazardous waste	0.725	6.22	kg
	Non-hazardous waste	2.04	0.308	kg
	Inert waste	30.7	772	kg
	Radioactive waste	0.00288	0.598	kg
5	Climate change	50.0	1 451	kg eq CO ₂
6	Atmospheric acidification	0.317	9.21	kg eq SO ₂
7	Air pollution	6 640	76 178	m ³
8	Water pollution	15.4	400	m ³
9	Stratospheric ozone depletion	4.58 E-10	0	kg CFC equivalent R11
10	Formation of photochemical smog	0.0165	0.752	kg eq ethylene

After 5 months of use the energy savings brought by the use of a SGG CLIMATOP® TGU (compared to a single glass pane) have offset the energy consumed in producing and transporting the TGU. Concerning climate change, the savings related to using the same TGU offset the emissions related to its production and transport after one year.

On average, 30% of the weight of a glass pane produced by SAINT-GOBAIN GLASS comes from internally recycled cullet (compared to 20% 10 years ago).

Cullet from TGUs can be recycled in a glass furnace after treatment to separate the glass from mastics and spacers. Nowadays however, nearly 95% of glass at the end of life goes to landfill due to a lack of dismantling, sorting and collecting networks. The collect rate of glass at the end of life is thus only 5 %.

Abbreviations used

RSL : Reference Service Life

FU : Functional Unit

TGU: Triple Glazed Unit

VOC: Volatile Organic Compounds