

MAY 2012

Extract from the Environmental Product Declaration

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

AFNOR Registration Number N° 08-257:2011

SGG CLIMAPLUS®

4-16-4 mm

Low Emissivity Double Glazed Units

Others configuration studied:

- 4-12-4 mm
- 6-16-6 mm
- 6-15-4 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 double 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 4-16-4 mm)

The DGU considered is representative of the products making up the SGG CLIMAPLUS[®] range; it consists of two panes, SGG PLANILUX[®] and 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 two glass panes are separated by a spacer that is 16mm 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 double glazed unit. The space between the 2 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 DGU for each year is 0.671 kg (20.12 kg over the whole RSL). This mass includes the two glass panes and the assembly accessories.

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

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

- Metal: 6.33 E-5 kg (0.0019 kg over the whole RSL);
- Board: 3.9 E-04 kg (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 double 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 DGUs (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 1.0 W/ (m².K) or 1.1 W/ (m².K), the light transmittance T_L, is between 71% and 80% and the solar factor is between 40% and 64%.

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	Indicator value for the Functional Unit				Units
		4-16-4	6-16-6	4-12-4	6-15-4	
	Configuration					
1	Consumption of energy resources					
	Total primary energy	16.1	21.5	15.3	18.4	MJ/FU
	Renewable energy	0.691	0.802	0.629	0.716	MJ/FU
	Non-renewable energy	15.4	20.7	14.6	17.7	MJ/FU
	Fuel energy	15.2	20.4	14.5	17.5	MJ/FU
2	Depletion of natural resources	0.00634	0.00850	0.00602	0.00728	kg éq Sb/FU
3	Total water consumption	8.15	11.6	7.98	9.82	l/FU
4	Solid waste:					
	Recovered waste (total)	0.0363	0.0548	0.0363	0.047	kg/FU
	Waste disposed of:					
	Hazardous waste	0.0127	0.0139	0.0107	0.0123	kg/FU
	Non-hazardous waste	0.0351	0.0353	0.0286	0.0320	kg/FU
	Inert waste	0.672	1.00	0.666	0.834	kg/FU
	Radioactive waste	6.08 E-05	8.02 E-05	5.80 E-05	6.93 E-05	kg/FU
5	Climatic change	1.05	1.44	1.00	1.23	kg éq CO ₂ /FU
6	Atmospheric acidification	0.00677	0.00944	0.00655	0.00802	kg éq SO ₂ /FU
7	Air pollution	133	175	125	150	m ³ /FU
8	Water pollution	0.326	0.432	0.310	0.372	m ³ /FU
9	Stratospheric ozone layer depletion	1.13 E-11	1.55 E-11	1.13 E-11	1.34 E-11	kg CFC éq R11/FU
10	Formation of photochemical oxidants	0.000350	0.000450	0.000331	0.000392	kg éq éthylène/FU
Other indicator (not included in the NF P 01-010)						
11	Eutrophication	0.471	0.683	0.470	0.578	g éq PO ₄ ³⁻ /FU

N°	Environmental impact	Indicator value for the Reference Service Life				Units
		4-16-4	6-16-6	4-12-4	6-15-4	
	Configuration					
1	Consumption of energy resources					
	Total primary energy	484	645	458	553	MJ
	Renewable energy	20.7	24.1	18.9	21.5	MJ
	Non-renewable energy	463	621	439	532	MJ
	Fuel energy	457	613	434	525	MJ
2	Depletion of natural resources	0.190	0.255	0.181	0.218	kg éq Sb
3	Total water consumption	244	348	239	295	l
4	Solid waste:					
	Recovered waste (total)	1.095	1.644	1.090	1.390	kg
	Waste disposed of:					
	Hazardous waste	0.381	0.417	0.322	0.370	kg
	Non-hazardous waste	1.05	1.06	0.857	0.959	kg
	Inert waste	20.1	30.1	20.0	25.0	kg
	Radioactive waste	0.00182	0.00241	0.00174	0.00208	kg
5	Climatic change	31.4	43.1	30.1	36.8	kg éq CO ₂
6	Atmospheric acidification	0.203	0.283	0.197	0.241	kg éq SO ₂
7	Air pollution	3 992	5 244	3 738	4 503	m ³
8	Water pollution	9.78	13.0	9.31	11.2	m ³
9	Stratospheric ozone layer depletion	3.38 E-10	4.64 E-10	3.38 E-10	4.02 E-10	kg CFC éq R11
10	Formation of photochemical oxidants	0.0105	0.0135	0.00993	0.0117	kg éq éthylène
Other indicator (not included in the NF P 01-010)						
11	Eutrophication	14.1	20.5	14.1	17.3	g éq PO ₄ ³⁻

These values are also valid for the following extended configurations:

Reference Configuration	Extended configurations
4-16-4 mm	4-14-4 mm, 4-15-4 mm, 4-17-4 mm, 4-18-4 mm
6-16-6 mm	6-14-6 mm, 6-15-6 mm, 6-17-6 mm, 6-18-6 mm
6-15-4 mm	6-13-4 mm, 6-14-4 mm, 6-16-4 mm, 6-17-4 mm
4-12-4 mm	4-10-4 mm, 4-11-4 mm, 4-13-4 mm, 4-14-4 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 5 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	<p>Contribution to thermal comfort due to effective insulation of DGU ($U_g = 1.0$ or $1.1 \text{ W} / (\text{m}^2 \cdot \text{K})$).</p> <p>Elimination of the cold wall phenomenon and indoor condensation at the surface of the glass in damp rooms.</p>
	Acoustic comfort	§ 4.2.2	Contribution to acoustic comfort: $R_{a, \text{tr}}$ index = 27dB.
	Visual comfort	§ 4.2.3	<p>Contribution to visual comfort (encourages natural light, according to surface glazed, orientation of the façades...):</p> <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 DGU from the SGG CLIMAPLUS® range enables heating energy to be saved.

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

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	484	61 719	MJ
	Renewable energy	20.7	2 101	MJ
	Non-renewable energy	463	59 618	MJ
2	Depletion of natural resources (ADP)	0.190	9.49	kg équivalent antimoine (Sb)
3	Total water consumption	244	9 547	l
4	Solid waste:			
	Recovered waste (total)	1.095	0	kg
	Waste disposed of:			
	Hazardous waste	0.381	6.17	kg
	Non-hazardous waste	1.05	0	kg
	Inert waste	20.1	719	kg
	Radioactive waste	0.00182	0.565	kg
5	Climate change	31.4	1 379	kg équivalent CO ₂
6	Atmospheric acidification	0.203	8.78	kg équivalent SO ₂
7	Air pollution	3 992	74 116	m ³
8	Water pollution	9.78	382	m ³
9	Stratospheric ozone depletion	3.38 E-10	0	kg CFC équivalent R11
10	Formation of photochemical smog	0.0105	0.714	kg équivalent éthylène

After 3 months of use the energy savings brought by the use of a SGG CLIMAPLUS® DGU (compared to a single glass pane) have offset the energy consumed in producing and transporting the DGU. Concerning climate change, the savings related to using the same DGU offset the emissions related to its production and transport after 10 months.

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 DGUs 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.

DGU: Double Glazed Unit.

VOC: Volatile Organic Compounds.