

OCTOBER 2012

Extract from the Environmental Product Declaration

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

AFNOR Registration Number N° 08-262: 2011

SGG CLIMAPLUS[®] SOLAR CONTROL

6-12-6 mm

Solar control and Low Emissivity Double Glazed Units

Others configuration studied:

- 6-16-6 mm
- 8-16-6 mm
- 8-16-44.2 mm
- 10-16-66.2 mm
- 12-16-44.2 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 6-12-6 mm)

The DGU considered is representative of the products making up the SGG CLIMAPLUS[®] SOLAR CONTROL range; it consists of two panes, SGG PLANILUX[®] and SGG COOL-LITE[®]. The nominal thickness of the glass panes is 6 mm and the actual thickness is 4.85 mm in accordance with the EN 572-2 standard.

The two glass panes are separated by a spacer that is 12 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 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 1.0 kg (29.9 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 1 m² of product over a period of 30 years.

Distribution packaging (nature and quantity): a 1 m² 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 COOL-LITE[®] (SAINT-GOBAIN GLASS) and a panel of French GLASSOLUTIONS sites involved in the assembly of the DGUs (representative of other 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 1.2W/ (m².K) or 1.3 W/ (m².K), the light transmittance T_L, is between 40% and 70% and the solar factor is between 20% and 45%.

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			
		6-12-6	6-16-6	8-16-6	Units
1	Consumption of energy resources				
	Total primary energy	20.6	21.5	24.4	MJ/FU
	Renewable energy	0.740	0.802	0.86	MJ/FU
	Non-renewable energy	19.9	20.7	23.6	MJ/FU
	Fuel energy	19.7	20.4	23.3	
2	Depletion of natural resources	0.00818	0.00850	0.0097	kg eq Sb/FU
3	Total water consumption	11.4	11.6	13.5	l/FU
4	Solid waste:				
	Recovered waste (total)	0.0556	0.0556	0.0646	kg/FU
	Waste disposed of:				
	Hazardous waste	0.0120	0.0139	0.0146	kg/FU
	Non-hazardous waste	0.0288	0.0353	0.04	kg/FU
	Inert waste	0.996	1.00	1.18	kg/FU
	Radioactive waste	7.74 E-05	8.02 E-05	0.000091	kg/FU
5	Climatic change	1.39	1.44	1.65	kg eq CO ₂ /FU
6	Atmospheric acidification	0.00922	0.00944	0.0109	kg eq SO ₂ /FU
7	Air pollution	166	175	199	m ³ /FU
8	Water pollution	0.417	0.432	0.90	m ³ /FU
9	Stratospheric ozone layer depletion	1.55 E-11	1.55 E-11	1.78 E-11	kg CFC eq R11/FU
10	Formation of photochemical oxidants	0.000432	0.000450	0.000506	kg eq ethylene /FU
Other indicator (not included in the NF P 01-010)					
11	Eutrophication	0.681	0.683	0.80	g eq PO ₄ ³⁻ /FU

N°	Environmental impact Configuration	Indicator value for the Reference Service Life			
		6-12-6	6-16-6	8-16-6	Units
1	Consumption of energy resources				
	Total primary energy	619	645	733	MJ
	Renewable energy	22.2	24.1	25.9	MJ
	Non-renewable energy	597	621	707	MJ
	Fuel energy	590	613	699	MJ
2	Depletion of natural resources	0.245	0.255	0.290	kg eq Sb
3	Total water consumption	343	348	404	l
4	Solid waste:				
	Recovered waste (total)	1.67	1.67	1.94	kg
	Waste disposed of:				
	Hazardous waste	0.359	0.417	0.438	kg
	Non-hazardous waste	0.863	1.06	1.1	kg
	Inert waste	29.9	30.1	35.40	kg
	Radioactive waste	0.00232	0.00241	0.00273	kg
5	Climatic change	41.8	43.1	49.5	kg eq CO ₂
6	Atmospheric acidification	0.276	0.283	0.327	kg eq SO ₂
7	Air pollution	4 990	5 244	5 967	m ³
8	Water pollution	12.5	13.0	27.0	m ³
9	Stratospheric ozone layer depletion	4.64 E-10	4.64 E-10	5.33 E-10	kg CFC eq R11
10	Formation of photochemical oxidants	0.0130	0.0135	0.0152	kg eq ethylene
Other indicator (not included in the NF P 01-010)					
11	Eutrophication	20.4	20.5	24.0	g eq PO ₄ ³⁻

N°	Environmental impact	Indicator value for the Functional Unit			
		8-16-44.2	10-16-66.2	12-16-44.2	unités
	Configuration				
1	Consumption of energy resources				
	Total primary energy	30.7	39.7	37.2	MJ/FU
	Renewable energy	1.01	1.22	1.17	MJ/FU
	Non-renewable energy	29.7	38.5	36.1	MJ/FU
	Fuel energy	25.4	34.2	31.7	MJ/FU
2	Depletion of natural resources	0.0123	0.0160	0.0149	kg eq Sb/FU
3	Total water consumption	15.7	21.3	19.7	l/FU
4	Solid waste:				
	Recovered waste (total)	0,080	0.108	0.0985	kg/FU
	Waste disposed of:				
	Hazardous waste	0.0155	0.0180	0.0174	kg/FU
	Non-hazardous waste	1.31	1.78	1.63	kg/FU
	Inert waste	0.0888	0.116	0.11	kg/FU
	Radioactive waste	0.000242	0.000275	0.000266	kg/FU
5	Climatic change	2.03	2.67	2.49	kg eq CO ₂ /FU
6	Atmospheric acidification	0.0123	0.0166	0.0153	kg eq SO ₂ /FU
7	Air pollution	219	292	272	m ³ /FU
8	Water pollution	0.997	1.34	1.24	m ³ /FU
9	Stratospheric ozone layer depletion	1.93 E-11	2.59 E-11	2.39 E-11	kg CFC eq R11/FU
10	Formation of photochemical oxidants	0.000571	0.000740	0.0000692	kg eq ethylene /FU
Other indicator (not included in the NF P 01-010)					
11	Eutrophication	0.964	1.33	1.22	g eq PO ₄ ³⁻ /FU

N°	Environmental impact	Indicator value for the Reference Service Life			
		8-16-44.2	10-16-66.2	12-16-44.2	unités
	Configuration				
1	Consumption of energy resources				
	Total primary energy	920	1 192	1 116	MJ
	Renewable energy	30.3	36.7	35,1	MJ
	Non-renewable energy	892	1 156	1 082	MJ
	Fuel energy	762	1 026	952	MJ
2	Depletion of natural resources	0.369	0.478	0,448	kg eq Sb
3	Total water consumption	472	639	590	l
4	Solid waste:				
	Recovered waste (total)	2.40	3.23	2,96	kg
	Waste disposed of:				
	Hazardous waste	0.464	0.538	0,521	kg
	Non-hazardous waste	39.3	53.5	48,8	kg
	Inert waste	2.66	3.49	3,30	kg
	Radioactive waste	0.00726	0.00826	0,00799	kg
5	Climatic change	60.8	80.1	74,6	kg eq CO ₂
6	Atmospheric acidification	0.368	0.498	0,460	kg eq SO ₂
7	Air pollution	6 577	8 747	8 153	m ³
8	Water pollution	29.9	40.3	37,2	m ³
9	Stratospheric ozone layer depletion	5.80 E-10	7.78 E-10	7,18 E-10	kg CFC eq R11
10	Formation of photochemical oxidants	0.0171	0,0222	0,0208	kg eq ethylene
Other indicator (not included in the NF P 01-010)					
11	Eutrophication	28.9	39.8	36,5	g eq PO ₄ ³⁻

These values are also valid for the following extended configurations:

Reference Configuration	Extended configurations
6-12-6 mm	6-10-6 mm, 6-11-6 mm, 6-13-6 mm, 6-14-6 mm
6-16-6 mm	6-15-6 mm, 6-17-6 mm, 6-18-6 mm
8-16-6 mm	8-14-6 mm, 8-15-6 mm, 8-17-6 mm, 8-18-6 mm
8-16-44.2 mm	8-14-44.2 mm, 8-15-44.2 mm, 8-17-44.2 mm, 8-18-44.2 mm
10-16-66.2 mm	10-14-66.2 mm, 10-15-66.2 mm, 10-17-66.2 mm, 10-18-66.2 mm
12-16-44.2 mm	12-14-44.2 mm, 12-15-44.2 mm, 12-17-44.2 mm, 12-18-44.2 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	Contribution to thermal comfort due to effective insulation of DGU ($U_g = 1.2$ or $1.3 \text{ W}/(\text{m}^2.\text{K})$). 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: $R_{a,ir}$ index = 28dB.
	Visual comfort	§ 4.2.3	Light transmittance T_L between 40% and 70%.
	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® SOLAR CONTROL range enables heating and conditioning energy to be saved.

The environmental benefits derived from energy savings resulting from using an SGG CLIMAPLUS® SOLAR CONTROL 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	619	65 422	MJ
	Renewable energy	22.2	2 231	MJ
	Non-renewable energy	597	63 192	MJ
2	Depletion of natural resources (ADP)	0.245	10.0	kg antimony eq (Sb)
3	Total water consumption	343	10 052	l
4	Solid waste:			
	Recovered waste (total)	1.67	0	kg
	Waste disposed of:			
	Hazardous waste	0.359	6.59	kg
	Non-hazardous waste	0.863	0	kg
	Inert waste	29.9	774	kg
	Radioactive waste	0.00232	0.599	kg
5	Climate change	41.8	1 461	kg CO ₂ equivalent
6	Atmospheric acidification	0.276	9.26	kg SO ₂ equivalent
7	Air pollution	4 990	77 936	m ³
8	Water pollution	12.5	403	m ³
9	Stratospheric ozone depletion	4.64 E-10	0	kg CFC equivalent R11
10	Formation of photochemical smog	0.0130	0.756	kg ethylene equivalent

After 4 months of use the energy savings brought by the use of a SGG CLIMAPLUS® SOLAR CONTROL 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