November 2012

Extract from the Environmental Product Declaration

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

AFNOR Registration Number N° 08-261 : 2012

SGG CLIMAPLUS® PROTECT
SGG CLIMAPLUS® SILENCE

4-16-44.2

Low E and Safety Double Glazed Units range

Other configurations studied:

- **4-14-44.2;**
- **4-15-33.1;**
- **6-16-44.2;**
- **8-16-44.2;**
- **10-16-66.2;**
- **12-16-44.2.**

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.

Version n°2.1

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EXTRACT FROM THE

ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH *ISO 14025 and ISO 14040*

SGG CLIMAPLUS® PROTECT
SGG CLIMAPLUS® SILENCE

(Low E and Safety Double Glazed Units range)

4-16-44.2 mm

Additional configurations 4-14-44.2 to 4-18-44.2,
4-13-33.1 to 4-17-33.1,
6-14-44.2 to 6-18-44.2,
8-14-44.2 to 8-18-44.2,
10-14-66.2 to 10-18-66.2,
12-14-44.2 to 12-18-44.

Version 2.1 November 2012
Verified under AFNOR programme
AFNOR Registration number N° 08-261: 2011

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.*

Contact : sustainable.glass@saint-gobain.com

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

2.1 Definition of the functional unit (FU)

1 m^2 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)

The DGU considered is representative of the products making up the SGG CLIMAPLUS® PROTECT / SGG CLIMAPLUS® SILENCE range; it consists of one SGG PLANITHERM® (low-E coated glass) pane and one laminated pane, SGG STADIP® who consist in two SGG PLANILUX® panes assembled using a PVB membrane 0.76 mm thick. 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 16 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 0.99 kg (29.6 kg over the whole RSL). This mass includes the two glass panes and the assembly accessories.

The reference flow of the FU is then 0.99 kg per year and 29.6 kg over the RSL of 30 years.

Distribution packaging (nature and quantity): a 1 m^2 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 m^2 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 STADIP® and 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 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 1.1 W/ (m2.K), the light transmittance T_L, is 78% and the solar factor is 58%.The product is classified P2A anti-intrusion (EN 1627) and 1B1 impact resistant (EN 12600).

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			
	Configuration	**4-16-44.2**	**4-15-33.1**	**6-16-44.2**	**Units**
1	Consumption of energy resources				
	Total primary energy	26.1	21.3	28.8	MJ/FU
	Renewable energy	0.92	0.81	0.97	MJ/FU
	Non-renewable energy	25.2	20.5	27.9	MJ/FU
	Fuel energy	24.4	20.0	27.0	MJ/FU
2	Depletion of natural resources	0.0105	0.0085	0.0116	kg eq Sb/FU
3	Total water consumption	12.7	10.5	14.5	l/FU
4	Solid waste:				
	Recovered waste (total)	0.0612	0.0514	0.0704	kg/FU
	Waste disposed of:				
	Hazardous waste	0.0139	0.0131	0.0145	kg/FU
	Non-hazardous waste	0.98	0.81	1.14	kg/FU
	Inert waste	0.0793	0.0722	0.0864	kg/FU
	Radioactive waste	0.000226	0.000144	0.000236	kg/FU
5	Climatic change	1.69	1.38	1.89	kg eq CO_2/FU
6	Atmospheric acidification	0.0099	0.0084	0.0113	kg eq SO_2/FU
7	Air pollution	183	160	205	m^3/FU
8	Water pollution	0.80	0.67	0.91	m^3/FU
9	Stratospheric ozone layer depletion	1.56 E-11	1.34 E-11	1.77 E-11	kg CFC éq R11/FU
10	Formation of photochemical oxidants	0.000481	0.000417	0.000533	kg eq ethylene/FU
Other indicator (not included in the NF P 01-010)					
11	Eutrophication	0.752	0.631	0.783	g eq PO_4^{3-}/FU

N°	Environmental impact	Indicator value for the Reference Service Life			
	Configuration	**4-16-44.2**	**4-15-33.1**	**6-16-44.2**	**Units**
1	Consumption of energy resources				
	Total primary energy	782	639	864	MJ
	Renewable energy	27.5	24.3	29.2	MJ
	Non-renewable energy	756	615	836	MJ
	Fuel energy	732	600	811	MJ
2	Depletion of natural resources	0.314	0.254	0.347	kg eq Sb
3	Total water consumption	381	315	434	l
4	Solid waste:				
	Recovered waste (total)	1.84	1.54	2.11	kg
	Waste disposed of:				
	Hazardous waste	0.418	0.393	0.436	kg
	Non-hazardous waste	29.3	24.2	34.1	kg
	Inert waste	2.38	2.17	2.59	kg
	Radioactive waste	0.00678	0.00433	0.00708	kg
5	Climatic change	50.6	41.3	56.6	kg eq CO_2
6	Atmospheric acidification	0.297	0.251	0.338	kg eq SO_2
7	Air pollution	5 502	4 796	6 146	m^3
8	Water pollution	23.9	20.0	27.2	m^3
9	Stratospheric ozone layer depletion	4.67 E-10	4.02 E-10	5.31 E-10	kg CFC eq R11
10	Formation of photochemical oxidants	0.0144	0.0125	0.0160	kg eq ethylene
Other indicator (not included in the NF P 01-010)					
11	Eutrophication	22.6	18.9	26.1	g eq PO_4^{3-}

N°	Environmental impact	Indicator value for the Functional Unit			
	Configuration	**8-16-44.2**	**10-16-66.2**	**12-16-44.2**	**Units**
1	Consumption of energy resources				
	Total primary energy	32.2	39.7	37.6	MJ/FU
	Renewable energy	1.067	1.223	1.180	MJ/FU
	Non-renewable energy	31.1	38.5	36.5	MJ/FU
	Fuel energy	30.2	37.6	35.5	MJ/FU
2	Depletion of natural resources	0.01290	0.01595	0.01510	kg eq Sb/FU
3	Total water consumption	16.4	21.3	19.9	l/FU
4	Solid waste:				
	Recovered waste (total)	0.0803	0.1076	0.0987	kg/FU
	Waste disposed of:				
	Hazardous waste	0.0162	0.0179	0.0174	kg/FU
	Non-hazardous waste	1.309	1.784	1.625	kg/FU
	Inert waste	0.0969	0.1164	0.1110	kg/FU
	Radioactive waste	0.000248	0.000275	0.000268	kg/FU
5	Climatic change	2.12	2.67	2.52	kg eq CO_2/FU
6	Atmospheric acidification	0.01283	0.01660	0.01555	kg q SO_2/FU
7	Air pollution	232	292	275	m^3/FU
8	Water pollution	1.034	1.343	1.255	m^3/FU
9	Stratospheric ozone layer depletion	2.00 E-11	2.59 E-11	2.43 E-11	kg CFC eq R11/FU
10	Formation of photochemical oxidants	0.000597	0.000740	0.000700	kg eq ethylene/FU
Other indicator (not included in the NF P 01-010)					
11	Eutrophication	0.998	1.33	1.23	g eq PO_4^{3-}/FU

N°	Environmental impact	Indicator value for the Reference Service Life			
	Configuration	**8-16-44.2**	**8-16-44.2**	**12-16-44.2**	**12-16-44.2**
1	Consumption of energy resources				
	Total primary energy	965	1 192	1 128	MJ
	Renewable energy	32.0	36.7	35.4	MJ
	Non-renewable energy	934	1 156	1 095	MJ
	Fuel energy	907	1 128	1 066	MJ
2	Depletion of natural resources	0.387	0.478	0.453	kg eq Sb
3	Total water consumption	493	639	598	l
4	Solid waste:				
	Recovered waste (total)	2.41	3.23	2.96	kg
	Waste disposed of:				
	Hazardous waste	0.486	0.538	0.523	kg
	Non-hazardous waste	39.3	53.5	48.8	kg
	Inert waste	2.91	3.49	3.33	kg
	Radioactive waste	0.00744	0.00826	0.00803	kg
5	Climatic change	63.6	80.1	75.5	kg eq CO_2
6	Atmospheric acidification	0.385	0.498	0.467	kg eq SO_2
7	Air pollution	6 964	8 747	8 251	m^3
8	Water pollution	31.0	40.3	37.7	m^3
9	Stratospheric ozone layer depletion	6.00 E-10	7.78 E-10	7.29 E-10	kg CFC eq R11
10	Formation of photochemical oxidants	0.0179	0.0222	0.0210	kg eq ethylene
Other indicator (not included in the NF P 01-010)					
11	Eutrophication	29.9	39.8	37.0	g eq PO_4^{3-}

These values are also valid for the following extended configurations**:**

Reference Configuration	**Extended configurations**
4-15-44.2	4-13-44.2, 4-14-44.2, 4-16-44.2, 4-17-44.2.
4-15-33.1	4-13-33.1, 4-14-33.1, 4-16-33.1, 5-17-33.1.
6-16-44.2	8-14-44.2, 8-15-44.2, 8-17-44.2, 8-18-44.2.
8-16-44.2	8-14-44.2, 8-15-44.2, 8-17-44.2, 8-18-44.2.
10-16-66.2	10-14-66.2, 10-15-66.2, 10-17-66.2, 10-18-66.2.
12-16-44.2	12-14-44.2, 12-15-44.2, 12-17-44.2, 12-18-44.2.

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	VOC emissions during use after 28 days: a) polysulfide: total VOC < 76 µg/m^3 (Eurofins G07103 et G07104). b) polyurethane: total VOC < 4 µg /m^3 (Eurofins G08363). c) PVB: total VOC = 160 µg /m^3(Eurofins G10504). Radioactive emissions: no natural radioactivity measured. Fibres and particulates emissions: not relevant for glass. 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).
	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 (Ug = 1.0 or 1.1 W/ (m^2.K)).
	Acoustic comfort	§ 4.2.2	Contr**ibu**tion to acoustic comfort: $R_{a;tr}$ index = 31 dB.
	Visual comfort	§ 4.2.3	Light transmission T_L = 78% and a solar factor g = 58%.
	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 RSL	Benefits	Units
1	Consumption of energy resources			
	Total primary energy	782	61 421	MJ
	Renewable energy	27.5	2094.3	MJ
	Non-renewable energy	756	59 326	MJ
	Fuel energy	732	61 501	
2	Depletion of natural resources (ADP)	0.314	9.362	kg equivalent antimony (Sb)
3	Total water consumption	381	9 410	litre
4	Solid waste:			
	Recovered waste (total)	0	0	kg
	Waste disposed of:			
	Hazardous waste	0.418	6.129	kg
	Non-hazardous waste	0	0	kg
	Inert waste	2.38	755.13	kg
	Radioactive waste	0.00678	0.55962	kg
5	Climate change	50.6	1357.9	kg equivalent CO_2
6	Atmospheric acidification	0.297	8.686	kg equivalent SO_2
7	Air pollution	5 502	72 605	m^3
8	Water pollution	23.9	367.6	m^3
9	Stratospheric ozone depletion	0	0	kg CFC equivalent R11
10	Formation of photochemical smog	0.0144	0.7100	kg equivalent ethylene

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.