ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH *ISO 14025 ISO 14040 And ISO 14044*

SGG CLIMAPLUS

(Range Double Glazed Units with Reinforced Thermal Insulation)

4-16-4 mm

Version 2.1 25 October 2011

This declaration is presented following the template validated by the AIMCC for the environmental and sanitary product declaration (FDE&S Version 2005)

CONTENTS

FOREWORD

The Environmental and sanitary product declaration produced by the AIMCC (FDE&S 2005version) is the framework used to present the environmental declaration of SGG CLIMAPLUS (Double glazed unit with reinforced thermal insulation) from SAINT-GOBAIN GLASS.

This document constitutes a suitable framework for presenting the environmental and sanitary characteristics of building products in accordance with the requirements of the NF P 01-010 standard and the supply of comments and useful additional information and data in respect of the spirit of the said standard from the point of view of sincerity and transparency (NF P 01-010 § 4.2).

NF P01-010 standard is the application to construction products of the standars ISO 14040 (life cycle assessment) and ISO 14025 (environmental labelling).

This declaration allows the presentation of environmental and sanitary characteristics of the Double Glazed Units with reinforced thermal insulation SGG CLIMAPLUS from SAINT-GOBAIN GLASS that will be used by:

- builders who put the product directly in the building
- producers of double glazed windows for them to produce their own Environmental Product Declarations.

A report accompanying the declaration has been drawn up and may be consulted, in accordance with terms of confidentiality, on the site of SAINT-GOBAIN GLASS.

Any total or partial use of information or data thus supplied shall, as a minimum, be constantly accompanied by the complete reference of the original declaration: "complete title, date of issue & issuer's address" who can remit an authentic copy.

Data suply entity (*NF P 01-010 § 4*).

In accordance with standard *NF P 01-010 § 4.6*, SAINT-GOBAIN GLASS is responsible for the supply of information and data contained in this declaration

Contact : sustainable.glass@saint-gobain.com

READING GUIDANCE

Figures display rules

Certain values are written in the scientific format as in this example:

-4,21 E-06 = -4,21 x 10^{-6}

Result display rules

Affixing rules applied are as follows:

- When the result of the calculation is null then zero is displayed.
- All values different to null will be affixed with three significant digits
- For each inventory flow, the values used to justify the 99.9 % of the values shown in the « total » column are retained; for the rest the box is left empty.
- If the value in the column « full life cycle » is less than 10^{-5}, then the line is in grey

The goal is to highlight significant values.

Abbreviations used

RSL : Reference Service Life

FU : Functional Unit

DGU: Double Glazed Unit

1 Product characterisation in accordance with NF 10-010 §4.3

1.1 Definition of the functional unit (FU)

Produce and deliver 1 m^2 of double glazed to be incorporated in a window frame for a building during an annuity. The typical life time considered is 30 years. The impacts of the window frame are not taken into account.

Reference Service Life: The RSL does not mean that after that period of time the DGU has to be changed or it will not be usable any longer. It means that after 30 years it is sensible to think that some refurbishment can be done.

1.2 Product mass required for the functional unit (FU)

Information and data about the functional unit are supplied for the product, distribution packaging and additional products on the basis of a Reference Service Life (RSL) of 30 years.

Product unit (nature and quantity)

The product considered is representative of the game SGG CLIMAPLUS. The product consists in one pane of clear glass SGG PLANILUX and one pane of coated glass SGG PLANITHERM. The nominal thickness of the glass panes is 4 mm and the actual thickness is 3.85 following EN 572-2

The two glass panes are separated by a spacer of 16 mm thick in aluminum or plastic composite (called warm-edge for a better thermal insulation in the edge of the unit).

The spacer is filled with desiccant 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 the peripheral seal.

The mass of the DGU per annuity is 0.971 kg (20.12 kg for the RSL). This mass include the two glass panes and the assembly accessories

The reference flow of this Life Cycle Analysis is 1 m^2 of product during 30 years.

The reference flow of the FU is then 0,671 kg per annuity and 20,12 kg for the RSL of 30 years.

Packaging (nature and quantity) : 1m^2 of double glazed needs the packaging as follows :

Metal (kg) : 6.33 E-5kg (0.0019 kg for the RSL)
Board (kg) : 3.9 E-04kg (0.0117 kg for the RSL)
Spacer powder (kg) :1.67 E-5 kg (0.0005 kg for the RSL)
Plastic materials (polyéthylène, polystyrène, polypropylène) (kg) : 7.67E-4kg (0.023 kg for the RSL)
Wood (kg) : 1.17 E-3kg (0.035 kg for the RSL)

Installation accesories :

Several ways of installation like wood, aluminum or PVC frames are possible therefore and in agreement with the standard NF P01-010§4.3c they are not taken into account.

Material losses

There are not material losses in the installation because the products are delivered in the required dimensions.

Using life

Cleaning is the only operation required. For the cleaning 0,2 l of cleaning solution per m^2 and year is considered.

Substantiation of information provided

The data were collected in 10 European sites producing SGG PLANILUX, 6 European sites producing SGG PLANITHERM and a panel of SAINT-GOBAIN GLASSOLUTIONS sites for the assembling of the units (representative of other GLASSOLUTIONS sites in Europe)

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

The thermal transmission value U_g of this product is 1.0 W/(m^2.K) or 1.1 W/(m^2.K), the light transmittance T_L, is between 71% et 80% and the solar factor between 40% et 64%.

The product complies with standard EN 1279-5

2 Inventory, other data in accordance with NF 01-010 §5 and comments relating to the environmental effects of the product in accordance with NF P 01-010 § 4.7.2

The life cycle inventory data presented here were calculated for the functional unit as defined 1.1 et 1.2

For a reading guidance for the tables see page 4.

2.1 Consumption of natural resources (*NF P 01-010 § 5.1*)

2.1.1 Consumption of natural energy resources and energy indicators (*NF P 01-010 § 5.1.1*)

	Units	Production	Transport	Process	Use	End of life	Full life cycle	
Flow							**Per year**	**Reference service life**
Consumption of natural energy resources								
Wood	kg	0.00131		0	0		0.00132	0.0395
Coal	kg	0.110		0	0.000151		0.110	3.30
Lignite	kg	0.0894		0	0		0.0895	2.68
Natural Gas	kg	0.148	0.000419	0			0.148	4.45
Oil	kg	0.0555	0.0169	0	0.000607	0.000366	0.0734	2.20
Uranium (U)	kg	6.40 E-06		0	1.49 E-08		6.42 E-06	0.000193
Etc.								
Energy indicators								
Total Primary Energy	MJ	15.2	0.738	0	0.158		16.1	484
Renewable Energy	MJ	0.575		0	0.116		0.691	20.7
Non-renewable Energy	MJ	14.7	0.738	0	0.0420	0.0160	15.4	463
Fuel Energy	MJ	14.4	0.738	0	0.0367	0.0160	15.2	457
Feedstock Energy	MJ	0.780		0	0.121		0.901	27.0
Electricity	kWh	0.702		0	0.00165		0.704	21.1

Comments related to the consumption of natural energy resources and energy indicators:

The main energy resources consumed are as follows:

Natural gas

Coal

Lignite

Oil

Electricity consumption is given as indicative value and concerns only to the glass factories.

Energy consumption is mainly due to the production of the functional unit (94%). Main contribution is the production of the glass pane. Contribution of transport of the FU to the consumption of energy resources is around 5%

Energy indicators have to be handle with care as they encompassed energies from different origin which do not have the same environmental impacts.

2.1.2 Consumption of non-energy natural resources (*NF P 01-010 § 5.1.2*)

For a reading guidance for the tables see page 4.

Flow	Units	Production	Transport	Process	Use	End of life	Total life cycle	
							Per year	Reference service life
Antimony (Sb)	kg	1.36 E-13	0	0	0	0	1.36 E-13	4.09 E-12
Silver (Ag)	kg	1.23 E-05		0	0		1.23 E-05	0.000368
Clay	kg	0.00310		0	0		0.00310	0.0931
Arsenic (As)	kg	0	0	0	0	0	0	0
Bauxite (Al2O3)	kg	0.0224		0	0		0.0224	0.673
Bentonite	kg	1.73 E-05	5.27 E-08	0	0		1.74 E-05	0.000522
Bismuth (Bi)	kg	0	0	0	0	0	0	0
Boron (B)	kg	0	0	0	0	0	0	0
Cadmium (Cd)	kg	0	0	0	0	0	0	0
Limestone	kg	0.122		0	0		0.122	3.67
Sodium Carbonate (Na2CO3)	kg	0.0132	0	0	0	0	0.0132	0.396
Potassium Chloride (KCl)	kg	0.000503		0	0		0.000503	0.0151
Sodium Chloride (NaCl)	kg	0.0965		0	0.000327		0.0968	2.91
Chrome (Cr)	kg	6.13 E-05		0	0		6.13 E-05	0.00184
Cobalt (Co)	kg	4.67 E-11	0	0	0	0	4.67 E-11	1.40 E-09
Copper (Cu)	kg	8.63 E-05		0	0		8.63 E-05	0.00259
Dolomite	kg	0.111		0	0		0.111	3.32
Tin (Sn)	kg	2.10 E-05	0	0	0	0	2.10 E-05	0.000629
Feldspar	kg	4.30 E-07	0	0	0	0	4.30 E-07	1.29 E-05
Iron (Fe)	kg	0.00110	2.10 E-06	0	0		0.00111	0.0332
Fluorite (CaF2)	kg	0.000484	0	0	0	0	0.000484	0.0145
Gravel*	kg	0.0123	1.25 E-05	0	0		0.0124	0.371
Lithium (Li)	kg	0	0	0	0	0	0	0

Flow	Units	Production	Transport	Process	Use	End of life	Total life cycle	
							Per year	Reference service life
Kaolin (Al2O3, 2SiO2,2H2O)	kg	0	0	0	0	0	0	0
Magnesium (Mg)	kg	3.06 E-06	0	0	0	0	3.06 E-06	9.18 E-05
Manganese (Mn)	kg	0.000427		0	0		0.000427	0.0128
Mercury (Hg)	kg	3.70 E-09	0	0	0	0	3.70 E-09	1.11 E-07
Molybdenum (Mo)	kg	1.46 E-06	0	0	0	0	1.46 E-06	4.39 E-05
Nickel (Ni)	kg	0.000145		0	0		0.000145	0.00434
Gold (Au)	kg	0	0	0	0	0	0	0
Palladium (Pd)	kg	2.47 E-10	0	0	0	0	2.47 E-10	7.42 E-09
Platinum (Pt)	kg	0	0	0	0	0	0	0
Lead (Pb)	kg	7.20 E-08	1.70 E-10	0	0		7.22 E-08	2.17 E-06
Rhodium (Rh)	kg	0	0	0	0	0	0	0
Rutile (TiO2)	kg	2.01 E-11	0	0	0	0	2.01 E-11	6.02 E-10
Sand	kg	0.436		0	0		0.436	13.1
Silica (SiO2)	kg	5.76 E-05	0	0	0	0	5.76 E-05	0.00173
Sulphur (S)	kg	0.000118		0	0		0.000118	0.00353
Barium Sulphate (BaSO4)	kg	7.63 E-05	5.60 E-07	0	0		7.69 E-05	0.00231
Titanium (Ti)	kg	2.87 E-08	0	0	0	0	2.87 E-08	8.61 E-07
Tungsten (W)	kg	0	0	0	0	0	0	0
Vanadium (V)	kg	0	0	0	0	0	0	0
Zinc (Zn)	kg	3.16 E-05		0	0		3.16 E-05	0.000947
Zirconium (Zr)	kg	0	0	0	0	0	0	0
Vegetal raw materials not specified above	kg	0	0	0	0	0	0	0
Animal raw materials not specified above	kg	0	0	0	0	0	0	0
Intermediate products not integrated upstream (total)	kg	0.00942	2.67 E-05	0	0.00764		0.0171	0.513
Etc.	kg							

Comments related to the consumption of non-energy natural resources

The main consumptions are the raw material to produce the glass panes.

The flows are as follows :

- Sand
- Dolomite
- Limestone
- Sodium chloride (raw material to produce soda ash).

Comment related to the use of dangerous substances:

Complying with NF P01-010 standard, every substance classified as toxic following the regulation CE n° 1272/2008 related to classification and labelling of substances and mixtures (called regulation CLP -Classification, Labelling & Packaging-) that are intentionally included in the production process have been taken into account in the inventory. Intermediate products not taken into account do not contain toxic substances.

2.1.3 Consumption of water (water withdrawal) (*NF P 01-010 § 5.1.3*)

For a reading guidance for the tables see page 4.

	Units	Production	Transport	Process	Use	End of life	Total life cycle	
Flow							**Per year**	**Reference service life**
Water : Lake	litre	0	0	0	0	0	0	0
Water : Sea	litre	0.0262		0	0		0.0262	0.787
Water : Water table	litre	0.374		0	0		0.374	11.2
Water : Unspecified source	litre	6.55	0.0701	0	0		6.62	199
Water: River	litre	0.355		0	0		0.355	10.7
Drinking Water (network)	litre	0.566		0	0.200		0.766	23.0
Consumed Water (total)	litre	7.87	0.0701	0	0.200		8.15	244
Etc.	litre							

Comments relatedto water consumption (water withdrawal):

Over the whole life cycle, 97% of water use is due to the production of the functional unit stage (production of raw materials to produce the glass panes).

However, 65% of the water use dis linked to the production of soda ash (cleaning water is included) and not to the production of the glass panes.

Only 2% of water usage is related to the life-in stage : cleaning the glass with a soapy solution (including the production of the solution).

2.1.4 Consumption of recovered energy and material (*NF P 01-010 § 5.1.4*)

For a reading guidance for the tables see page 4.

	Units	Production	Transport	Process	Use	End of life	Total life cycle	
Flow							**Per year**	**Reference service life**
Recovered Energy (stock)	MJ	6.63 E-05	0	0	0	0	6.63 E-05	0.00199
Recovered Material (stock) : Total	kg	0.0481		0	0		0.0481	1.44
Recovered Material (stock) : Steel	kg	2.77 E-05	1.40 E-05	0	0	3.02 E-07	4.20 E-05	0.00126
Recovered Material (stock) : Aluminium	kg	0	0	0	0	0	0	0
Recovered Material (stock) : Metal (unspecified)	kg	0	0	0	0	0	0	0
Recovered Material (stock) : Paper-Cardboard	kg	0.000271	0	0	0	0	0.000271	0.00813
Recovered Material (stock) : Plastic	kg	0	0	0	0	0	0	0
Recovered Material (stock) : Cullet	kg	0.0424	0	0	0	0	0.0424	1.27

Recovered Material (stock) : Biomass	kg	0	0	0	0	0	0	0
Recovered Material (stock): Mineral	kg	0	0	0	0	0	0	0
Recovered Material (stock) : Unspecified	kg	0.00534	0	0	0	0	0.00534	0.160
Etc.	kg							

Comments related to the consumption of recovery energy and materials:

Recovery of energy and raw materials happens mainly in the production of the glass. This valorisation in done through the use of cullets. The recycling of internal cullets is not included here as « recovered material : cullet » corresponds to external manufacturing scrap incorporated into production.

The carriers and racks use for transporting the glass panes are reuse and thus contribute to reduce the amount of packaging waste. This does not appear either as it is an internal process.

2.2 Emissions to air, water and soil (*NF P 01-010 § 5.2*)

2.2.1 Emissions to air (*NF P 01-010 § 5.2.1*)

For a reading guidance for the tables see page 4.

	Units	Production	Transport	Process	Use	End of life	Total life cycle	
Flow							**Per year**	**Reference service life**
Hydrocarbons (unspecified)	g	0.550		0	0		0.550	16.5
PAHs (unspecified)	g	0.000564		0	0		0.000564	0.0169
Methane (CH4)	g	2.61	0.0756	0	0.0477		2.73	81.9
Volatile organic compounds (e.g. acetone, acetate…)	g	0.0494		0	0.000400		0.0498	1.49
Carbon Dioxide (CO2 total)	g	929	55.2	0	3.74	1.20	989	29 666
Carbon Dioxide (CO2 fossil)	g	925	55.2	0	2.25	1.20	984	29 522
Carbon Dioxide (CO2 biomass)	g	3.29	0	0	1.49	0	4.78	143
Carbon Monoxide (CO)	g	3.71	0.145	0	0.00373		3.86	116
Nitrogen oxides (NOx in NO2)	g	3.55	0.652	0	0.0175	0.0141	4.23	127
Nitrous Oxide (N2O)	g	0.0139	0.00708	0	0	0.000153	0.0211	0.633
Ammonium Hydroxide (NH3)	g	0.124		0			0.124	3.71
Dust (unspecified)	g	1.20	0.0377	0	0.0107		1.25	37.4
Sulphur oxides (SOx in SO2)	g	3.39	0.0246	0	0.0230		3.43	103
Hydrogen Sulphide (H2S)	g	0.00293	6.73 E-06	0	0		0.00293	0.0880
Hydrocyanic Acid (HCN)	g	6.25 E-05		0	0		6.25 E-05	0.00187

	Units	Production	Transport	Process	Use	End of life	Total life cycle	
Flow							**Per year**	**Reference service life**
Phosphoric Acid	g	0	0	0	0	0	0	0
Organic chlorine compounds (in Cl)	g	3.17 E-05		0	0		3.17 E-05	0.000951
Hydrochloric Acid (HCl)	g	0.136		0	0.000100		0.136	4.07
Inorganic chlorine compounds (in Cl)	g	0.000676		0	1.10 E-05		0.000687	0.0206
Unspecified chlorine compounds (in Cl)	g	5.57 E-05		0	0		5.57 E-05	0.00167
Organic fluorine compounds (in F)	g	0.000918	1.31 E-06	0	0		0.000919	0.0276
Inorganic fluorine compounds (in F)	g	0.0184		0	2.24 E-05		0.0184	0.551
Unspecified halogen compounds	g	0.000374		0	0		0.000375	0.0112
Unspecified fluorine compounds (in F)	g	0	0	0	0	0	0	0
Metals (unspecified)	g	0.0995	9.63 E-05	0			0.0996	2.99
Antimony and its compounds (in Sb)	g	5.55 E-05		0	0		5.55 E-05	0.00167
Arsenic and its compounds (in As)	g	9.04 E-05	2.86 E-07	0	0		9.07 E-05	0.00272
Cadmium and its compounds (in Cd)	g	0.000101	1.42 E-06	0	0		0.000102	0.00307
Chrome and its compounds (in Cr)	g	9.39 E-05	3.83 E-07	0	0		9.43 E-05	0.00283
Cobalt and its compounds (in Co)	g	8.65 E-05	6.73 E-07	0	0		8.71 E-05	0.00261
Copper and its compounds (in Cu)	g	0.000274	9.97 E-07	0	0		0.000275	0.00824
Tin and its compounds (in Sn)	g	7.63 E-06		0	0		7.63 E-06	0.000229
Manganese and its compounds (in Mn)	g	8.90 E-05	1.26 E-07	0	0		8.92 E-05	0.00267
Mercury and its compounds (in Hg)	g	6.04 E-05		0	1.10 E-06		6.15 E-05	0.00184
Nickel and its compounds (in Ni)	g	0.000906	1.27 E-05	0	0		0.000919	0.0276
Lead and its compounds (in Pb)	g	0.000357	4.70 E-06	0			0.000362	0.0109
Selenium and its compounds (in Se)	g	5.70 E-05	2.90 E-07	0	0		5.73 E-05	0.00172
Tellurium and its compounds (in Te)	g	0	0	0	0	0	0	0
Zinc and its compounds (in Zn)	g	0.000800	0.00212	0	0	4.59 E-05	0.00297	0.0891
Vanadium and its compounds (in V)	g	0.00304	5.05 E-05	0	0		0.00309	0.0928
Silicium and its compounds	g	0.0937		0	0		0.0938	2.81
Etc.	g							

NB: With regards to radioactive emissions, this table must be completed as soon as the transposition of the European Directive on radioactive emissions is published.

Comments on emissions to air:

Emissions to air are linked to the production and transport stages.

94% of CO_2 emissions are attributable to the production stage, particularly to the combustion in the glass furnace and the glass raw materials (production and decarbonizing in the furnace). Additional 6% of emissions are due to the transport of the functional unit.

NO_X emissions are mainly associated to functional unit production (84%) and road transport (15% approximately).

2.2.2 Emissions to water (*NF P 01-010 § 5.2.2*)

For a reading guidance for the tables see page 4.

	Units	Production	Transport	Process	Use	End of life	Total life cycle	
Flow							**Per year**	**Reference service life**
COD (Chemical Oxygen Demand)	g	0.173	0.00250	0	0.0310	0.0154	0.221	6.64
5-day BOD (Biochemical Oxygen Demand)	g	0.0684		0	0.0113	0.00369	0.0835	2.50
Matter in Suspension (MIS)	g	0.146	0.000438	0	0.00640	0.00432	0.157	4.71
Cyanide (CN-)	g	0.000319	3.62 E-06	0	0		0.000322	0.00967
AOX (Adsorbable organic halogen compounds)	g	7.10 E-05	3.53 E-06	0	0	0.000123	0.000198	0.00593
Hydrocarbons (unspecified)	g	0.127	0.0250	0	0.000265	0.00178	0.154	4.63
Nitrogen compounds (in N)	g	0.0604	0.00269	0	0.00453	0.00744	0.0751	2.25
Phosphorous compounds (in P)	g	0.147		0	0		0.147	4.41
Organic fluorine compounds (in F)	g	0.0317		0		0.00185	0.0336	1.01
Inorganic fluorine compounds (in F)	g	0	0	0	0	0	0	0
Unspecified fluorine compounds (in F)	g	0	0	0	0	0	0	0
Organic chlorine compounds (in Cl)	g	0.000133		0	0		0.000133	0.00400
Inorganic fluorine compounds (in Cl)	g	18.3	0.859	0	0		19.1	574
Unspecified chlorine compounds (in Cl)	g	0.00157	1.61 E-05	0	0		0.00159	0.0476
PAHs (unspecified)	g	0.000117	2.16 E-05	0	0	4.67 E-07	0.000139	0.00416
Metals (unspecified)	g	0.147	0.0144	0		0.00154	0.162	4.87
Aluminium and its compounds (in Al)	g	0.00543	8.74 E-06	0	0		0.00544	0.163
Arsenic and its compounds (in As)	g	0.000441	7.00 E-07	0	0		0.000441	0.0132
Cadmium and its compounds (in Cd)	g	0.000159	1.16 E-06	0	0		0.000160	0.00481
Chrome and its compounds (in Cr)	g	0.000614	4.09 E-06	0	6.70 E-07		0.000619	0.0186

	Units	Production	Transport	Process	Use	End of life	Total life cycle	
Flow							**Per year**	**Reference service life**
Copper and its compounds (in Cu)	g	0.00178	2.37 E-06	0	0		0.00178	0.0534
Tin and its compounds (in Sn)	g	0.000134		0	0		0.000134	0.00401
Iron and its compounds (in Fe)	g	0.266	0.000327	0	0.00207		0.268	8.05
Mercury and its compounds (in Hg)	g	6.00 E-05		0	1.27 E-07		6.01 E-05	0.00180
Nickel and its compounds (in Ni)	g	0.00412	4.04 E-06	0			0.00413	0.124
Lead and its compounds (in Pb)	g	0.00121		0			0.00122	0.0365
Zinc and its compounds (in Zn)	g	0.0105		0			0.0105	0.315
Discharged water	Litre	1.02	0.00319	0	0.00138		1.03	30.8
Organic dissolved coumpounds (unspecified)	g	0.0436	0.000592	0	0		0.0442	1.33
Inorganic dissolved coumpounds (unspecified)	g	0.0296	0.000221	0	0.00228		0.0321	0.964
Non toxic unspecified alkaline and alkaline-earth metals	g	9.97	0.581	0	0	0.0126	10.6	317
Non toxic unspecified inorganic coumpounds	g	4.83	0.0147	0	0.0413		4.89	147
Etc.	g							

Comments on emissions to water:

The amount of water discharged is associated mainly to the production stage. Glass furnace cooling circuits are working in a closed loop, thus limiting the water discharged and the pollution.

2.2.3 Emissions to soil (*NF P 01-010 § 5.2.3*)

For a reading guidance for the tables see page 4.

	Units	Production	Transport	Process	Use	End of life	Total life cycle	
Flow							**Per year**	**Reference service life**
Arsenic and its compounds (in As)	g	3.83 E-07	2.85 E-09	0	0		3.86 E-07	1.16 E-05
Biocides [a]	g	3.81 E-06	0	0	0	0	3.81 E-06	0.000114
Cadmium and its compounds (in Cd)	g	8.13 E-08		0	0		8.13 E-08	2.44 E-06
Chrome and its compounds (in Cr)	g	3.49 E-06	3.57 E-08	0	0		3.52 E-06	0.000106
Copper and its compounds (in Cu)	g	1.26 E-05		0	0		1.26 E-05	0.000378
Tin and its compounds (in Sn)	g	0	0	0	0	0	0	0
Iron and its compounds (in Fe)	g	0.00580	1.42 E-05	0	0		0.00581	0.174
Lead and its compounds (in Pb)	g	2.09 E-06		0	0		2.09 E-06	6.26 E-05
Mercury and its compounds (in Hg)	g	3.37 E-08		0	0		3.37 E-08	1.01 E-06

Nickel and its compounds (in Ni)	g	9.63 E-07		0	0		9.63 E-07	2.89 E-05
Zinc and its compounds (in Zn)	g	3.94 E-05	1.07 E-07	0	0		3.96 E-05	0.00119
Heavy metals (unspecified)	g	5.17 E-05	2.85 E-07	0	0		5.20 E-05	0.00156
Non toxic unspecified inorganic coumpounds spread in soil	g	0.00884	3.31 E-05	0	0		0.00888	0.266
Non toxic unspecified alkaline and alkaline-earth metals	g	0.00455	2.85 E-05	0	0		0.00458	0.137
Etc.	g							

[a] Biocides : as pesticides, fungicides, bactericides, insect killers, herbicides, etc...

Comments on emissions to soil:

The production of glass and DGU SGG CLIMAPLUS does not produce emissions to soil that can be directly attributable.

Discharges booked are indirect discharges. They come from upstream flows like the refining of fuel for the transport.

2.3 Waste production (*NF P 01-010 § 5.3*)

2.3.1 Recovered waste (*NF P 01-010 § 5.3*)

For a reading guidance for the tables see page 4.

	Units	Production	Transport	Process	Use	End of life	Total life cycle	
Flow							**Per year**	**Reference service life**
Recovered Energy	MJ	0.0408	0	0	0	0	0.0408	1.22
Recovered Material: Total	kg	0.00442		0	0		0.00442	0.132
Recovered Material: Steel	kg	3.82 E-05		0	0		3.82 E-05	0.00114
Recovered Material: Aluminium	kg	0.000393	0	0	0	0	0.000393	0.0118
Recovered Material: Metal (unspecified)	kg	0	0	0	0	0	0	0
Recovered Material: Paper-Cardboard	kg	4.24 E-05	0	0	0	0	4.24 E-05	0.00127
Recovered Material: Plastic	kg	2.28 E-08	0	0	0	0	2.28 E-08	6.85 E-07
Recovered Material : Cullet	kg	0	0	0	0	0	0	0
Recovered Material: Biomass	kg	0	0	0	0	0	0	0
Recovered Material: Mineral	kg	0.000767	0	0	0	0	0.000767	0.0230
Recovered Material: Unspecified	kg	0.00318		0	0		0.00318	0.0953
Etc.	...							

2.3.2 Waste disposal (*NF P 01-010 § 5.3*)

For a reading guidance for the tables see page 4.

	Units	Production	Transport	Process	Use	End of life	Total life cycle	
Flow							**Per year**	**Reference service life**
Hazardous waste	kg	0.0127	2.24 E-05	0	0		0.0127	0.381
Non-hazardous waste	kg	0.00597			0.000168	0.0290	0.0351	1.05
Inert waste	kg	0.0619		0	0	0.610	0.672	20.1
Radioactive waste	kg	4.88 E-05	1.18 E-05	0	0	2.55 E-07	6.08 E-05	0.00182
Etc.	kg							

Comments on waste production and management

There is not waste production in the use of the product as the window frame is out of the boundaries.

End of life is the main stage of waste generation (94%) whilst the waste from production is only a 6%. In fact, the recovery rate of windows glazed at the end of life for recycling or recovery is about 5%. The additional 95% are non-hazardous waste that are landfilled. (Glass is an inert waste; the presence of mastics make the waste non-hazardous)

The presence of a stack of coatings in the SGG PLANITHERM pane does not change the possibility of this glass to be recycled in a glass furnace or the inert nature of the glass waste.

3 Contribution of the product to environmental impacts in accordance with NF P 01-010 § 6

All these impacts are entered or calculated in compliance with indications of § 6.1 of the NF P01-010 standard, based on data in § 2 and for the benchmark functional unit per year defined in § 1.1 and 1.2 hereof, as well as for the functional unit for the whole of the Reference Service Life

No.	Environmental impact	Indicator value for the functional unit		Indicator value for the Reference Service Life	
1	Consumption of energy resources				
	Total primary energy	16.1	MJ/FU	484	MJ
	Renewable energy	0.691	MJ/FU	20.7	MJ
	Non-renewable energy	15.4	MJ/FU	463	MJ
2	Depletion of natural resources	0.00634	kg of antimony (Sb) eq./FU	0.190	kg of antimony (Sb) eq.
3	Total water consumption	8.15	litre/FU	244	litre
4	Solid waste:				
	Recovered waste (total)	0.00442	kg/FU	0.132	kg
	Waste disposed of:				
	Hazardous waste	0.0127	kg/FU	0.381	kg
	Non-hazardous waste	0.0351	kg/FU	1.05	kg
	Inert waste	0.672	kg/FU	20.1	kg
	Radioactive waste	6.08 E-05	kg/FU	0.00182	kg
5	Climatic change	1.05	kg of CO_2 eq./FU	31.4	kg of CO2 eq.
6	Atmospheric acidification	0.00677	kg of SO_2 eq./FU	0.203	kg of SO2 eq.
7	Air pollution	133	m^3/FU	3 992	m3
8	Water pollution	0.326	m^3/FU	9.78	m3
9	Stratospheric ozone layer depletion	1.13 E-11	kg CFC eq. R11/FU	3.38 E-10	kg CFC eq. R11
10	Formation of photochemical oxidants	0.000350	kg of ethylene eq./FU	0.0105	kg of ethylene eq.
Other indicator (not included in the NF P 01-010)					
11	Eutrophication	0.471	g eq PO_4^{2-} /FU	14.1	g eq PO_4^{2-}

4 Contribution of the product to assessing sanitary risks and the indoor quality of life in accordance with NF P 01-010 §7

Product contribution		**Related paragraph**	**Expression (Measurement values, calculations…)**
To asses sanitary risks	Indoor air quality	§ 4.1.1	*VOC emissions after 28 days :* a) polysulfide : total VOC < 76 µg/m^3 (Eurofins G07103 et G07104) b) polyuréthane : total VOC < 4 µg /m^3 (Eurofins G08363) *Radioactive emissions* : not measured *Fibres and particulates emissions*: not relevant for glass *Micro-organisms and mould*: some moulds can growth in the glass surface, but they do not produce any degradation. These moulds are easy to take out (report CONIDIA DEV 0111-006).
	Water quality	§ 4.1.2	There is not impact. No migration of elements occurs when glass is in contact with water (REACH Dossier CPIV)
To the quality of life	Hygrothermal comfort	§ 4.2.1	The use of double glazed SGG CLIMAPLUS 4-16-4 contributes the the thermal comfort due to its low Ug value between 1,0 and 1,1 W/(m².K). the DGU contributes to the elimination of the cold wall phenomenon and the indoors condensation at the surface of the glass, especially in damp rooms
	Acoustic comfort	§ 4.2.2	Glass units from the range SGG CLIMAPLUS with 4-16-4 mm composition has a Ra;tr of 27 dB measured following the standard EN ISO 140-3.When in an appropriated window frame the Ra;tr can reach 29 dB and allow the façade to reach 30dB.
	Visual comfort	§ 4.2.3	Glass units from the range SGG CLIMAPLUS 4-16-4 mm transmit between 80 and 70 % of sun light.
	Olfactive comfort	§ 4.2.4	As an inert material, glass does not emit any odour

4.1 Useful information for the sanitary risks assessment (*NF P 01-010 § 7.2*)

4.1.1 Contribution to indoor air quality (*NF P 01-010 § 7.2.1*)

Glass is an inert material which releases no substances.

The peripheral sealing mastics were tested to evaluate eventual VOC emissions in accordance with ISO 16000. The polysulfide released < 76 µg/m^3 and polyurethane < 4 µg /m^3. Test reports Eurofins G07103 et G07104 for polysulfide, G08363 for polyurethane.

Micro-organisms and mould: some moulds can growth in the glass surface, but they do not produce any degradation. These moulds are easy to take out (report CONIDIA DEV 0111-006).

4.1.2 Contribution to water quality (*NF P 01-010 § 7.2.2*)

When in contact with rain water or cleaning solutions there is no migration of substances from the glass panes to the water (dossier REACH « Exemption from registration for glass under REACH regulation » available at CPIV in Brussels).

4.2 Contribution to indoor quality of life (*NF P 01-010 § 7.3*)

4.2.1 Characteristics of the product contributing to thermic comfort inside buildings (*NF P 01-010 § 7.3.1*)

Using SGG CLIMAPLUS 4-16-4 DGU contributes to thermic comfort due to a combination of a performing insulation (low U_g coefficient 1.0 or 1,1 W/(m².K) which reduce the heat losses) and a high transparency to sun light (high solar factor 40 à 64 %, enabling greater solar energy gains) :
- Elimination of the cold wall effect : even in winter the difference of temperature between the indoor climate at 20°C and the internal face of the DGU is rarely bigger than 3°C. This difference goes practically unnoticed by the human body largely improving the comfort.

- Elimination of condensation in the inside glass surface particularly in damp rooms.

4.2.2 Characteristics of the product contributing to acoustic comfort inside buildings (*NF P 01-010 § 7.3.2*)

Indoors acoustic comfort is part of the daily well-being for building users (housing, working, studying, relaxing…). The absence of it is a source of general discomfort and can even lead to adverse health effects 5(lack of sleep, concentration difficulties, tiredness…) .

DGU play a key role protecting the inside against aerial noise from external sources. (urban traffic, miscellaneous external activities, rail and air traffic…).

Acoustic performance measured using EN ISO 717-1 is given in dB.

DGU 4-16-4 mm SGG CLIMAPLUS has a index $R_{a;tr}$=27 dB in accordance with the standard EN ISO 140-3.

This value can be improved by replacing one or both of the glass panes by thicker (assymetric)° panes or using acoustic laminated panes

When incorporated in a good quality, air-tight window frame, the 4-16-4 DGU can increase the acoustic insulation of the window to traffic noise ($R_{a;tr}$) to 28 dB. And to meet the minimum requirement of 30dB for the facade.

4.2.3 Characteristics of the product contributing to visual comfort inside buildings (*NF P 01-010 § 7.3.3*)

Dayligth is at origin of life and no-one can do without it. Nowadays, most people spend more than 90% of their time indoors or in transport vehicles. Glass gives access to natural light inside the buildings. Furthermore it allows people living inside to notice the time going by throughout the days, the seasons, to notice changes in the weather … Glass is a sort of filter between indoors and outdoors.

DGU 4-16-4 from the game SGG CLIMAPLUS lets between 70 and 80% of the natural light going through it.

The impact of the DGU on the perceived visual comfort depends on:

- Glazed area in relation with the surface area of the room
- The position in the façade or roofing. The highest the position of the glazed area deeper the light inside the room goes.
- On the external environment (shadows, buildings nearby…)
- Internal environment (colours of decorations…)
- Type of activities inside (reading, sprts activity, working at a monitor…)
- The way of handling contrast (curtains, interior blinds, external shutters, sunscreens…)

Two coefficients allow the qualification of the visual comfort and natural lighting indoors.

Deux coefficients permettent de qualifier le confort visuel et de quantifier l'éclairage naturel des locaux :

- The daylight factor; expressed as a percentage, it indicates the theoretical quantity of daylight received in a working plan placed 1.5 m away from the glazing and 80 cm from the floor irrespective of the orientations, season or time, clear or cloudy days. It does not allow to evaluate if the amount of light received is sufficient to ensure a correct vision. The daylight factor of a DGU SGG CLIMAPLUS with a light transmission between 70% and 80% is around 4 %.

- The daylight factor autonomy in percentage express the amount of time when artificial lighting is not required. This value is dependent of the occupation scenario, the glazed surface, orientation of facades… this concept is more precise than the daylight factor. Using a DGU SGG CLIMAPLUS, depending on the glazed surface, distance from other buildings, the daylight factor autonomy can increase from under 40% to more than 75%.

4.2.4 Characteristics of the product contributing to olfactive comfort inside buildings (*NF P 01-010 § 7.3.4*)

Double Glazed units do not release odours.

5 Other contributions particularly to the eco-management of buildings, economy and global environmental policy.

5.1 Eco-management of buildings

5.1.1 Energy management

Double glazed range SGG CLIMAPLUS allows energy savings by reducing the amount of heating required.

Based on a Saint-Gobain internal study carried out in September 2010 ("apport des vitrages à Isolation Thermique Renforcée (ITR) sur maison individuelle"), the table of environmental impacts in accordance with NF P 01-010 §6 is completed with the environmental benefits derived from the energy savings (the impacts related to the DGU are already deducted)

N°	Environmental impact	Benefits Indicator value for the functional unit		Benefits Indicator value for the Reference Service Life	
1	Consumption of energy resources				
	Total primary energy	2 057	MJ/UF	61 719	MJ
	Renewable energy	70.0	MJ/UF	2 101	MJ
	Non-renewable energy	1 987	MJ/UF	59 618	MJ
2	Depletion of natural resources (ADP)	0.316	kg équivalent antimoine (Sb)/UF	9.49	kg équivalent antimoine (Sb)
3	Total water consumption	318	litre/UF	9 547	litre
4	Solid waste:				
	Recovered waste (total)	0.0247	kg/UF	0.740	kg
	Waste disposed of:				
	Hazardous waste	0.206	kg/UF	6.17	kg
	Non-hazardous waste	0.0387	kg/UF	1.16	kg
	Inert waste	24.6	kg/UF	737	Kg
	Radioactive waste	0.0188	kg/UF	0.565	Kg
5	Climat change	46.0	kg équivalent CO_2/UF	1 379	kg équivalent CO_2
6	Atmospheric acidification	0.293	kg équivalent SO_2/UF	8.78	kg équivalent SO_2
7	Air pollution	2 471	$m^{3/}$UF	74 116	m^3
8	Water pollution	12.7	m^3/UF	382	m^3
9	Stratospheric ozone depletion	0	kg CFC équivalent R11/UF	0	kg CFC équivalent R11
10	Formation of photochemical smog	0.0238	kg équivalent éthylène/UF	0.714	kg équivalent éthylène
Other indicator (not included in the NF P 01-010)					
11	Eutrophication	0	g eq.PO_4^{3-}	0	g eq.PO_4^{3-}

Energy gains have been calculated over 30 years (service life time) using a SAINT-GOBAIN GLASS internal study performed in september 2010 (Apport des vitrages à Isolation Thermique Renforcée (ITR) sur maison individuelle).

They correspond to the average gains expected over a European perimeter.

Main assumptions considered are as follows :

- Calculations made using dynamic heat simulation software TRNSYS 16.0.
- Building considered: one storey residential house designed by CSTB called Maison Mozart. Its insulation level correspond to the French standard RT2005. The inhabitable surface is 100 m².
- The various parameters used in the study allow the evaluation of the energy efficiency of the building. Each simulation evaluates the heating needs.
- 4 French towns, located in 4 different climatic areas were evaluated:
    * Carpentras (climatic area RT : H2d)
    * Nice (climatic area RT : H3)
    * La Rochelle (climatic area RT : H2b)
    * Nancy (climatic area RT : H1b)
- Heating needs were calculated considering a control temperature Tc=19°C over a period running from October 15 to May 15. The energy mix for heating taken is the French average for residential heating (Bilan Carbone™ ADEME : Electricity 55%, natural gas 30%, fuel oil 15%).

The report is available for consultation in SAINT-GOBAIN GLASS, bureaux de Paris La Défense.

After 3 months of use the energy savings brought by the use of DGU SGG CLIMAPLUS (compared to a single glass pane) have offset the energy used in the production and transportation of the DGU. In relation to the indicator Global warming the offset is achieve after 10 month of use.

After one month of use the energy savings brought by the use of DGU SGG CLIMAPLUS (compared to a single glass pane) have offset the excess of energy required to produce the DGU instead of a single 4 mm pane. For the global warming, the offset is achieved in 4 months**.**

5.1.2 Water management

Not relevant.

5.1.3 Maintenance

Cleaning is the main maintenance operation for a DGU. This cleaning is carried out using a common soapy solution. The frequency of cleaning is related to external environment i.e. pollution level.

In the study the cleaning frequency considered is quarterly and the yearly use of cleaning solution is 200ml. and the

The DGU itself does not require any maintenance

5.2 Economical concern

Using a DGU instead a single glass pane allows a reduction in the energy bill by cutting down on energy use.

5.3 Global environmental policy

All the SAINT-GOBAIN GLASS (SGG) SGG PLANILUX and SGG PLANITHERM production sites are certified ISO 14001. 20% of GLASSOLUTIONS processing sites where the DGU are assambled are as well certified ISO 14001. In all means around 50% of the SGG CLIMAPLUS production sites.

5.3.1 Natural resources

Several raw materials' suppliers of SAINT-GOBAIN GLASS are certified ISO 14001 as an example in France the company SAINT-GOBAIN SAMIN (sand).

They are in place programmes to recover and recycle cullets : Indeed the use of 1 t or recovered cullets means the reduction of 1.2 t of raw materials.

Waste management and reduction of water withdrawal is one of the main objectives of the SGG environmental policy. It has the same level of concern than the reduction of the carbon footprint. As a result the quantities of water withdrawal were reduced by 12% between 2007 and 2010.

5.3.2 Air and water emissions

Basic actions (optimisation of combustion) are applied as a priority. Particularly, to reduce NO_x emissions during glass production. Thus, NO_x emissions have been cut down by 25% between 2007 and 2010 (to a constant production). In addition, waste gas treatment systems to abate dust emissions, SO_x, heavy metals and acid gases (HF et HCl) have been installed. In 2012 all the all European Saint-Gobain Glass floats will be equipped with these waste-gas treatment systems.

Dust emissions in Europe to a constant production have been reduced by more than 65% between 2007 and 2010.

In relation to CO_2 emissions the optimisation of the energy consumption and the increase of recovered cullets lead to a reduction by 8% of the emission coefficient per ton of glass between 2005 and 2010.

The impact on water of the float and processing remains low. Water use is limited to cooling of some furnace elements (normally in closed loops) and cleaning in the transformation process. There is not contact with dangerous substance for the aquatic environment.

5.3.3 Waste

The SAINT-GOBAIN waste policy tries to look for and develop possible ways of local recovering in order to achieve the SAINT-GOBAIN goal of "zero non recovered waste".

On every SAINT-GOBAIN GLASS and GLASSOLUTIONS, production scrap is not considered as waste but as secondary raw material; Therefore are carefully treated before being used in the furnace. **As an average 30% of weight of a glass pane produced by SAINT-GOBAIN GLASS comes from internally recycled cullet** (compared to 2% 10 years ago).

Cullets from DGU can be recycled in the furnace after treatment to separate the glass from mastics and spacers. Nowadays nearly 95% of glass at the end of life goes to landfill due to a lack of dismantling, sorting and colecting networks. Indeed the collect rate of glass at the end of life is only 5 %.

6 Characterisation of data for the calculation of the Life cycle inventory (LCI)

This annex comes from the accompanying report (see introduction).

6.1 LCA system definition

Description of flows taken into account in the product's life cycle.

For each sub-stage of the life cycle of the DGU, the flows taken into account are:

- raw material consumption (sand, limestone,…)
- energy resources (electricity, natural gas, light fuel) consumption
- water consumption
- air emissions
- water emissions
- generation of waste, its valorisation and discharge.

On the boundaries of the system, the flows taken into account are those listed in the standard NF P 01-010.

6.1.1 Stages included

Production

The modelling of the stage of production takes into account:

- the production of glass, its processing as well as its assembling;
- production of raw materials ;
- transport of raw materials and packaging
- production of energies used in the production sites;

Transport

The modeling of the stage of transport takes into account the production and the combustion of the diesel, as well as the the impact of rail transport involved.

Implementation

This modelling of the implementation stage only takes into account the production of packaging waste

Use

The impacts of these steps are those of the production of the cleaning solution used in the maintenance.

End of life phase

- Modelling the end of life stage takes into account:
- Transport of waste from the demolition site to landfill

- Disposal of waste in an adequate landfill
- Quantification of the amount of glass recycled

6.1.2 Flows excluded

NF P01-010 standard allows the following flows to be left out from system borders:
- lighting, heating and cleaning of workshops
- the administrative department,
- transportation of employees,
- manufacture of the production tool and transport systems (machines, trucks etc...).

6.1.3 System boundaries

Standard NF P01-010 fixed the threshold of cut at 98 % according to paragraph 4.5.1 of the standard.

Within the framework of this declaration, the percentage of the percentage of upstream integrated flows is 98.8%.
At the production stage, the flows not taken into account in the result tables are those omitted (see 6.1.2). At the system boundaries the not reported flows are those of the manufacturing facility together with those of the upstream stages.

6.2 Data sources

6.2.1 Characterisation of primary data

Production

- Year: 2008
- Geographical zone: Data are from 10 European sites producing SGG PLANILUX, 6 sites producing SGG PLANITHERM (SAINT-GOBAIN GLASS) and a panel of French SAINT-GOBAIN GLASSOLUTIONS (sites representative of other European sites) for the mounting of the DGU
- Technological representativeness: data used correspond to standards technologies employed for the production and processing of glass.
- Source: SAINT-GOBAIN GLASS

Transport

- Year: 2008
- Geographical zone: logistic data for Europe
- Technological representativeness: transport by road modelled in accordance with the standard.
- Source: SAINT-GOBAIN GLASS

Process

- No impacts considered (see FU definition)

End of life

- Origin
  - Transportation distance: 30 km
  - Landfil impact : Council decission 2003/33/CE on

6.2.2 Energy data

NCV of fuels
The data of various fuels are those of booklet AFNOR FD P 01-015.

Electric model
Upstream data: Europe (booklet AFNOR FD P 01-015)

6.2.3 Non-LCI data

Data were provided by SAINT-GOBAIN GLASS.

6.3 Traceability

The life cycle inventory was performed in 2010 and 2011 by PwC – Ecobilan. Data were treated using the software TEAM™ version 4.0.

7 Annex: Environmental impacts for other SGG CLIMAPLUS game products in accordance with NF P 01-010 § 6

7.1 SGG CLIMAPLUS 4-12-4 mm

No.	Environmental impact	Indicator value for the functional unit		Indicator value for the Reference Service Life	
1	Consumption of energy resources				
	Total primary energy	15.3	MJ/FU	458	MJ
	Renewable energy	0.629	MJ/FU	18.9	MJ
	Non-renewable energy	14.6	MJ/FU	439	MJ
2	Depletion of natural resources (ADP)	0.00602	kg of antimony (Sb) eq./FU	0.181	kg of antimony (Sb) eq.
3	Total water consumption	7.98	litre/FU	239	litre
4	Solid waste:				
	Recovered waste (total)	0.00416	kg/FU	0.125	kg
	Waste disposed of:				
	Hazardous waste	0.0107	kg/FU	0.322	kg
	Non-hazardous waste	0.0286	kg/FU	0.857	kg
	Inert waste	0.666	kg/FU	20.0	kg
	Radioactive waste	5.80 E-05	kg/FU	0.00174	kg
5	Climatic change	1.00	kg of CO_2 eq./FU	30.1	kg of CO2 eq.
6	Atmospheric acidification	0.00655	kg of SO_2 eq./FU	0.197	kg of SO2 eq.
7	Air pollution	125	m^3/FU	3 738	m3
8	Water pollution	0.310	m^3/FU	9.31	m3
9	Stratospheric ozone layer depletion	1.13 E-11	kg CFC eq. R11/FU	3.38 E-10	kg CFC eq. R11
10	Formation of photochemical oxidants	0.000331	kg of ethylene eq./FU	0.00993	kg of ethylene eq.
Other indicator (not included in the NF P 01-010)					
11	Eutrophication	0.470	g eq PO_4^{2-} /FU	14.1	g eq PO_4^{2-}

7.2 SGG CLIMAPLUS 6-16-6 mm

No.	Environmental impact	Indicator value for the functional unit		Indicator value for the Reference Service Life	
1	Consumption of energy resources				
	Total primary energy	21.5	MJ/FU	645	MJ
	Renewable energy	0.802	MJ/FU	24.1	MJ
	Non-renewable energy	20.7	MJ/FU	621	MJ
2	Depletion of natural resources (ADP)	0.00850	kg of antimony (Sb) eq./FU	0.255	kg of antimony (Sb) eq.
3	Total water consumption	11.6	litre/FU	348	litre
4	Solid waste:				
	Recovered waste (total)	0.00603	kg/FU	0.181	kg
	Waste disposed of:				
	Hazardous waste	0.0139	kg/FU	0.417	kg
	Non-hazardous waste	0.0353	kg/FU	1.06	kg
	Inert waste	1.00	kg/FU	30.1	kg
	Radioactive waste	8.02 E-05	kg/FU	0.00241	kg
5	Climatic change	1.44	kg of CO2 eq./FU	43.1	kg of CO2 eq.
6	Atmospheric acidification	0.00944	kg of SO2 eq./FU	0.283	kg of SO2 eq.
7	Air pollution	175	m3/FU	5 244	m3
8	Water pollution	0.432	m3/FU	13.0	m3
9	Stratospheric ozone layer depletion	1.55 E-11	kg CFC eq. R11/FU	4.64 E-10	kg CFC eq. R11
10	Formation of photochemical oxidants	0.000450	kg of ethylene eq./FU	0.0135	kg of ethylene eq.
Other indicator (not included in the NF P 01-010)					
11	Eutrophication	0.683	g eq PO42- /FU	20.5	g eq PO42-

7.3 SGG CLIMAPLUS 6-15-4 mm

No.	Environmental impact	Indicator value for the functional unit		Indicator value for the Reference Service Life	
1	Consumption of energy resources				
	Total primary energy	18.4	MJ/FU	553	MJ
	Renewable energy	0.716	MJ/FU	21.5	MJ
	Non-renewable energy	17.7	MJ/FU	532	MJ
2	Depletion of natural resources (ADP)	0.00728	kg of antimony (Sb) eq./FU	0.218	kg of antimony (Sb) eq.
3	Total water consumption	9.82	litre/FU	295	litre
4	Solid waste:				
	Recovered waste (total)	0.00511	kg/FU	0.153	kg
	Waste disposed of:				
	Hazardous waste	0.0123	kg/FU	0.370	kg
	Non-hazardous waste	0.0320	kg/FU	0.959	kg
	Inert waste	0.834	kg/FU	25.0	kg
	Radioactive waste	6.93 E-05	kg/FU	0.00208	kg
5	Climatic change	1.23	kg of CO2 eq./FU	36.8	kg of CO2 eq.
6	Atmospheric acidification	0.00802	kg of SO2 eq./FU	0.241	kg of SO2 eq.
7	Air pollution	150	m3/FU	4 503	m3
8	Water pollution	0.372	m3/FU	11.2	m3
9	Stratospheric ozone layer depletion	1.34 E-11	kg CFC eq. R11/FU	4.02 E-10	kg CFC eq. R11
10	Formation of photochemical oxidants	0.000392	kg of ethylene eq./FU	0.0117	kg of ethylene eq.
Other indicator (not included in the NF P 01-010)					
11	Eutrophication	0.578	g eq PO42- /FU	17.3	g eq PO42-