ENVIRONMENTAL PRODUCT DECLARATION

In accordance with EN 15804 and ISO 14025

PRIVA-LITE® Classic 55.4

Transparent/translucent switchable glass

Date de réalisation : 30/11/2015
Version : V.1

EPD VERIFIED

SAINT-GOBAIN

General information

Manufacturer: GLASSOLUTIONS Saint-Gobain
Saint-Gobain Polska Sp. z o.o.
ul. Przejazdowa 22b
05-800 Pruszków, Poland
tel.+ 48 22 738 47 00
e-mail: salespru@saint-gobain.com

European standard EN 15804 served as core EPD	
Product / product family name and manufacturer represented	PRIVA-LITE® Classic (composition 55.4) produced by Glassolutions Saint-Gobain Polska
Declaration issued:	24-05-2016
valid until:	24-05-2021
Program used	**Programme used:** The International EPD® System EPD International AB Box 210 60 SE-100 31 Stockholm Sweden **For more information: www.environdec.com**
EPD registration number/declaration number:	S-P-00881
PCR identification	EN 15804 as the core PCR and PCR for construction products and construction services issue by the International EPD System (PCR 2012:01 Construction products and construction services, version 20.1.2015-03-03)
PCR review was conducted by	The technical committee of the international EPD system Chair: Massimo Marino Contact via info@environdec.com
CPC Classification:	37113 “Float glass and surface ground or polished glass, in sheets.”
Independent verification of the declaration and data, according to ISO 14025	An independent verification of the declaration was made, according to ISO 14025:2010. This verification was external and conducted by the third party mentioned below, based on the PCR mentioned above.
Third party verifier	François Charron-Doucet (Groupe Ageco)
Accredited or approved by	International EPD® System

Product description

Product description and description of use: PRIVA-LITE technology is a thermal and sound-insulating laminated glazing solution incorporating a liquid crystal film that can manage transparency on demand, changing instantly from clear state to translucent, and vice versa. The liquid crystals align when the electrical current is switched on, causing the glass to turn transparent instantly. When the power is switched off, the glass has a naturally opaque appearance, blocking vision (total privacy), yet permitting light to pass through (translucent).

PRIVA-LITE can be used in a wide range of applications, including:

Interiors:

- Partitions, doors and sliding doors, floor panels, counters, display cases, screens etc.
- Back-projections screens / multi-media walls.

Exteriors:

- Windows, single or double glazed facades.
- Opaque back projection screens / multi-media walls.

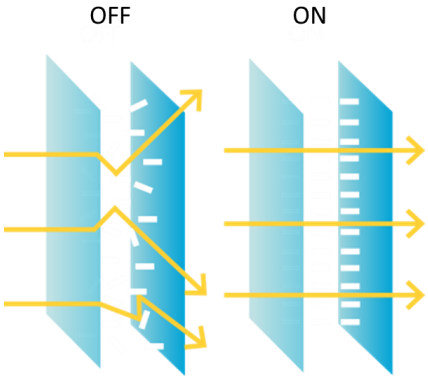


Figure 1 : simplified diagram of the operation of PRIVA-LITE

Description of the main product components and or materials: Two panes of 5mm standard glass (SGG PLANICLEAR or SGG DIAMANT) encapsulate a liquid crystal (LC) film inserted between 4 EVA* layers. This LC film is constituted by two PET** films coated with a transparent metallic deposit and laminated together thanks to a very fine layer of liquid crystal gel. PRIVA-LITE includes a class I power supply unit and the cables required to connect the unit.

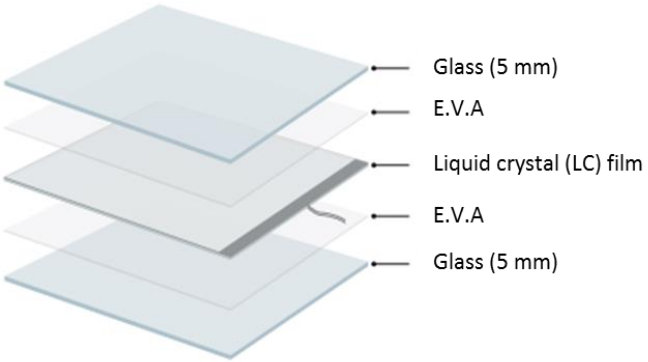


Figure 2 : PRIVA-LITE components

At the date of issue of this declaration, there is no “Substance of Very High Concern” (SVHC) in concentration above 0.1% by weight, and neither do their packaging, following the European REACH regulation (Registration, Evaluation, Authorization and Restriction of Chemicals).

*EVA: Ethylene Vinyl Acetate, plastic film for glass lamination
**PET: Polyethylene Terephthalate, plastic film

LCA calculation information

FUNCTIONAL UNIT / DECLARED UNIT	1 m^2 of PRIVA-LITE CLASSIC glass in 55.4
SYSTEM BOUMNDARIES	Cradle-to-Gate
REFERENCE SERVICE LIFE (RSL)	Not specified,
CUT-OFF RULES	All significant parameters shall be included. According to EN 15804, mass flows under 1% of the total mass input; and/or energy flows representing less than 1% of the total primary energy usage of the associated unit process may be omitted. However, the total amount of energy and mass omitted must not exceed 5% per module. Substances of Very High Concern (SVHC), as defined in the REACH Regulation (article 57), in a concentration above 0.1% by weight, in glass final products, shall be included in the Life Cycle Inventory and the cut-off rules shall not apply.
ALLOCATIONS	All on-site consumptions and emissions where allocated according to the yearly PRIVA-LITE production volume
GEOGRAPHICAL COVERAGE AMND TIME PERIOD	The values presented in this EPD are representative of the production of PRIVA-LITE in Poland in 2015.
BACKGROUMND DATA SOURCES	Both GaBi and ecoinvent v2.2 data were used to evaluate the environmental impacts of the PRIVA-LITE

According to EN 15804, EPD of construction products may not be comparable if they do not comply with this standard. According to ISO 21930, EPD might not be comparable if they are from different programmes.

Life cycle stages

Flow diagram of the Life Cycle

Product stage			Construction process stage		Use Stage							End of Life Stage				Resource recovery stage
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Raw Materials	Transport	Manufacturing	Transport	Construction - Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
X	X	X	MND	MND	MND	MND	MND					MND	MND	MND	MND	MND

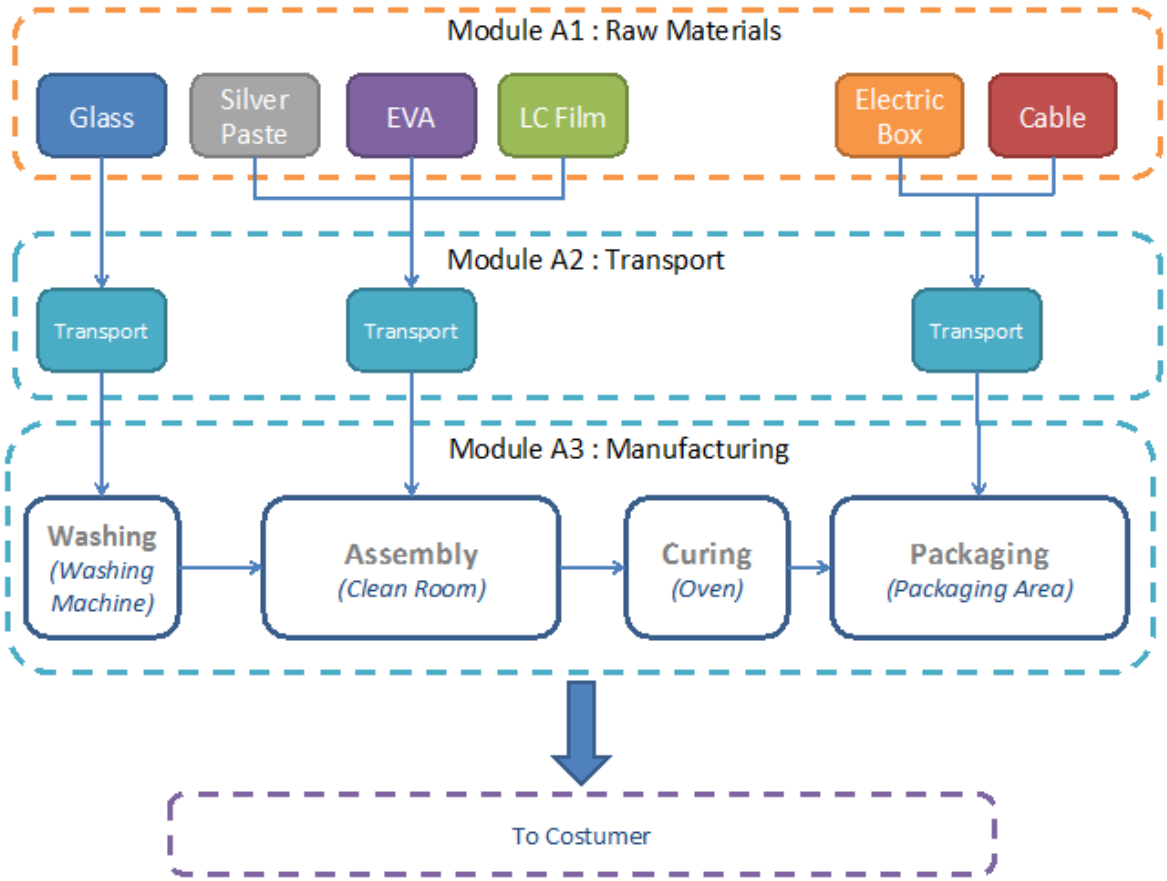
Not relevant stages: This is a Cradle-to-Gate EPD; all stages taking place after the production stage are not taken into account in the current evaluation. The system boundaries therefore exclude the construction process stage (modules A4 to A5), the use stage (modules B1 to B7) and the End-of-Life stage (modules C1 to C4).

Product stage, A1-A3

Description of the stage: Module A1 (Raw material supply) includes the extraction and processing of all raw materials and energy carriers necessary for the production of the final product, as well as the upstream processes needed for the production and processing of all other inputs (ex. packaging). The transport of all raw materials from the provider to the production site is included in module A2 (Transport). Finally, the PRIVA-LITE manufacturing process, including energy and water consumption, direct emissions and waste treatment arising from this stage, is taken into account in module A3 (Manufacturing).

N.B. The energy power supply system may vary from one surface to another. In this EPD it was considered that one electric box could power 6 square meters of PRIVA-LITE.

Manufacturing process flow diagram



LCA results

The table below present the environmental impacts associated with the production of 1 square meter of PRIVA-LITE. This is a Cradle-to-Gate EPD. The environmental impacts of all the other stages in the life cycle of the PRIVA-LITE glass are not declared (MND).

ENVIRONMENTAL IMPACTS

Parameters	Product stage	Construction process stage		Use stage							End-of-life stage				D Reuse, recovery, recycling
	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	
Global Warming Potential (GWP) - *kg CO_2 equiv/DU*	7,83E+2	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
	The global warming potential of a gas refers to the total contribution to global warming resulting from the emission of one unit of that gas relative to one unit of the reference gas, carbon dioxide, which is assigned a value of 1.														
Ozone Depletion (ODP) *kg CFC 11 equiv/DU*	4,69E-6	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
	Destruction of the stratospheric ozone layer which shields the earth from ultraviolet radiation harmful to life. This destruction of ozone is caused by the breakdown of certain chlorine and/or bromine containing compounds (chlorofluorocarbonsor halons), Which break down when they reach the stratosphere and then catalytically destroy ozone molecules.														
Acidification potential (AP) *kg SO_2 equiv/DU*	4,20E-1	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
	Acid depositions have negative impacts on natural ecosystems and the man-made environment incl. buildings. The main sources for emissions of acidifying substances are agriculture and fossil fuel combustion used for electricity production, heating and transport.														
Eutrophication potential (EP) *kg $(PO_4)^{3-}$ equiv/DU*	6,53E-2	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
	Excessive enrichment of waters and continental surfaces with nutrients, and the associated adverse biological effects.														
Photochemical ozone creation (POPC) *kg Ethene equiv/DU*	-1,40E-2	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
	Chemical reactions brought about by the light energy of the sun. The reaction of nitrogen oxides with hydrocarbons in the presence of sunlight to form ozone is an example of a photochemical reaction.														
Abiotic depletion potential for non-fossil ressources (ADP-elements) - *kg Sb equiv/DU*	1,89E-3	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Abiotic depletion potential for fossil ressources (ADP-fossil fuels) - *MJ/DU*	1,05E+3	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
	Consumption of non-renewable resources, thereby lowering their availability for future generations.														

RESOURCE USE

Parameters	Product stage	Construction process stage		Use stage							End-of-life stage				D Reuse, recovery, recycling
	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	
Use of renewable primary energy excluding renewable primary energy resources used as raw materials - *MJ/DU*	9,30E+1	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Use of renewable primary energy used as raw materials *MJ/DU*	6,11E+1	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials) *MJ/DU*	1,54E+2	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials - *MJ/DU*	1,06E+3	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Use of non-renewable primary energy used as raw materials *MJ/DU*	6,09E+1	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials) - *MJ/DU*	1,12E+3	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Use of secondary material *kg/DU*	0,00E+0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Use of renewable secondary fuels- *MJ/DU*	0,00E+0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Use of non-renewable secondary fuels - *MJ/DU*	0,00E+0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Use of net fresh water - m^3/DU	2,89E+1	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

WASTE CATEGORIES

Parameters	Product stage	Construction process stage		Use stage							End-of-life stage				D Reuse, recovery, recycling
	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	
Hazardous waste disposed *kg/DU*	1,36E-4	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Non-hazardous(excluding inert) waste disposed *kg/DU*	3,17E+0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Inert waste disposed *kg/DU*	2,7E-10	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Radioactive waste disposed *kg/DU*	2,29E-2	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

OUTPUT FLOWS

Parameters	Product stage	Construction process stage		Use stage							End-of-life stage				D Reuse, recovery, recycling
	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	
Components for re-use *kg/DU*	0,00E+0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Materials for recycling *kg/DU*	1,63E-1	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Materials for energy recovery *kg/DU*	0,00E+0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Exported energy, detailed by energy carrier *MJ/DU*	0,00+E0	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

LCA results interpretation

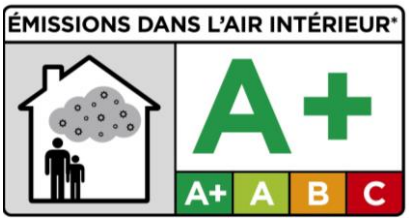
It is interesting to notice that most impacts are associated with the extraction and manufacturing of raw materials (mainly glass[1], liquid crystal, EVA and silver paste). This stage contributes to 74 % of the potential climate change indicator and virtually 100 % of the depletion of minerals and metals is caused by this stage. However, the transport of raw materials to the production site is significant as well for some of the evaluated indicators, most notably the climate change potential and the fossil fuels depletion, where it represents up to 18 % of the impact.

It should be noted, that the manufacturing stage has little impact on the overall results, representing less than 11 % of the total impact for all evaluated indicators.

[1] The production of float glass seems to have a beneficial impact on the creation of photochemical ozone. The calculation method used considers some emissions (most notably nitrogen monoxide) to be able to neutralize some emissions responsible for POCP. However the variability of NO emissions during float glass production is highly variable, these results should be taken into account carefully as the may vary between -3,00 E-2 and +3,00E-2 kg of Ethene equivalent.

Health characteristics

The product was tested for volatile organic compounds (VOC) emissions according to the requirements of the French legislation concerning the labeling of construction products or coverings of walls or floors and paint and varnishes on their emissions of volatiles pollutants (order of April 2011). In accordance with legislative requirements, the product rank highest and is classified as A+ (see test report EUROFINS no. 392-2014-00254501A).



*Information sur le niveau d'émission de substances volatiles dans l'air intérieur, présentant un risque de toxicité par inhalation, sur une échelle de classe allant de A+ (très faibles émissions) à C (fortes émissions)

The fibers and particulates emissions are not relevant for glass.

Some moulds can grow on the glass surface, but they don't produce any degradation and can be easily removed by rinsing with water (report CONIDIA DEV 0111-006).

Additional environmental information

Saint-Gobain's environmental policy

Saint-Gobain's environmental vision is to ensure the sustainable development of its Activities, while preserving the environment from the impacts of its processes and services throughout their life cycle. The Group thus seeks to ensure the preservation of resources, meet the expectations of its relevant stakeholders, and offer its customers the highest added value with the lowest environmental impact.

The Group has set two long-term objectives: zero environmental accidents and a minimum impact of its activities on the environment. Short and medium-term goals are set to address these two ambitions. They concern five environmental areas identified by the Group: raw materials and waste; energy, atmospheric emissions and climate; water; biodiversity; and environmental accidents and nuisance.

Saint-Gobain's long term objectives:

	Non recovered waste (2010-2025) : -50% Long-term: zero non-recovered waste
	Energy consumption: -15% (2010-2025) CO_2 emissions: -20% (2010-2025)
	Water discharge: -80% (2010-2025) Long-term: zero industrial water discharge in liquid form
	2025: promote the preservation of natural areas at Company sites as much as possible
	2025: EvE2 / site / year < 0.25 (EvE: Environmental Event management standard from Saint-Gobain)

More information on our website: www.saint-gobain.com and our Registration Document.

Our products' contribution to Sustainable Buildings

Saint-Gobain encourages sustainable construction and develops innovative solutions for new and renovated buildings that are energy efficient, comfortable, healthy and esthetically superior, while at the same time protecting natural resources.

The following information might be of help for green building certification programs:

RECYCLED CONTENT

Recycled content: proportion, by mass, of recycled material in a product or packaging. Only pre-consumer and post-consumer materials shall be considered as recycled content.

- Post-consumer material: material generated by households or commercial, industrial and institutional facilities in their role as end-users of the product which can no longer be used for its intended purpose.

In practice, in the case of flat glass, all material coming from glass recycling collection schemes falls under this category, i.e. glass waste from end-of-life vehicles, construction and demolition waste, etc.

- Pre-consumer material: material diverted from the waste stream during a manufacturing process. Excluded is reutilization of materials such as rework, regrind, or scrap generated in a process and capable of being reclaimed within the same process that generated it.

  In the case of flat glass, this waste originates from the processing or re-processing of glass that takes place before the final product reaches the consumer market. Pre-consumer waste flat glass is made of cut-offs, losses during laminating, bending and other processing, including the manufacture of insulating glass units or automotive windscreens.

Cullet generated in the furnace plant and which is reintroduced into the furnace cannot be considered as pre-consumer recycled content, since there was never an intent to discard it and therefore it would never have entered the solid waste stream.

LEED v4 Building product disclosure and optimization - sourcing of raw materials

Pre-consumer cullet	~7%
Post-consumer cullet	< 1%

In the future, Saint-Gobain Glass intends to continue the increase of recycled material in its products, especially when recycling building post-consumer cullet glass dismantling and recycling networks will be available in every country.

RESPONSIBLE SOURCING

PRIVA-LITE® production site in Poland (Glassolutions Saint-Gobain Polska) is ISO 14001 certified.

All Saint-Gobain Glass sites with a glassmaking furnace, manufacturing line producing mirrors, magnetron or pyrolyzed coated glass, lacquered or laminated glass are ISO 14001 certified

All internal Saint-Gobain Glass quarries are certified ISO 14001 like, for example, SAINT-GOBAIN SAMIN (sand) in France. Many Saint-Gobain Glass raw material suppliers are certified ISO 14001. Our policy consists in encouraging the sourcing of raw materials extracted or made in sites certified ISO 14001 (or the equivalent).

For any other question / document / certification, please contact our local sales teams.