QUANTUM GLASS
SAINT-GOBAIN

ELECTROCHROME SageGlass®

Dynamic light and heat control for architecture

SOLAR PROTECTION • ENERGY EFFICIENCY • TRANSPARENCY

ELECTROCHROME SageGlass® is a double or triple insulating glazing which under a low voltage current can be switched from clear to darkly tinted (and reversibly) without blocking the view. Replacing standard shading systems, ELECTROCHROME SageGlass® is an ideal transparent solution for windows, skylights or facades applications controlling the level of natural light and heat entering the building.

Intermediate state

Tinted state

Space optimization through variable tint.

Clear state

Tinted state

Energy efficiency and well being during every season.

Clear state

Tinted state

Integrity of the architectural project respected - substitution of mechanical shadings.

In January 2011, QUANTUM GLASS™ has carefully selected ELECTROCHROME SageGlass® technology to offer a first reliable electrochromic solution to architects.
ELECTROCHROME SageGlass® is already installed into hundreds of homes and buildings.

v1.3

SageGlass® / FEATURES

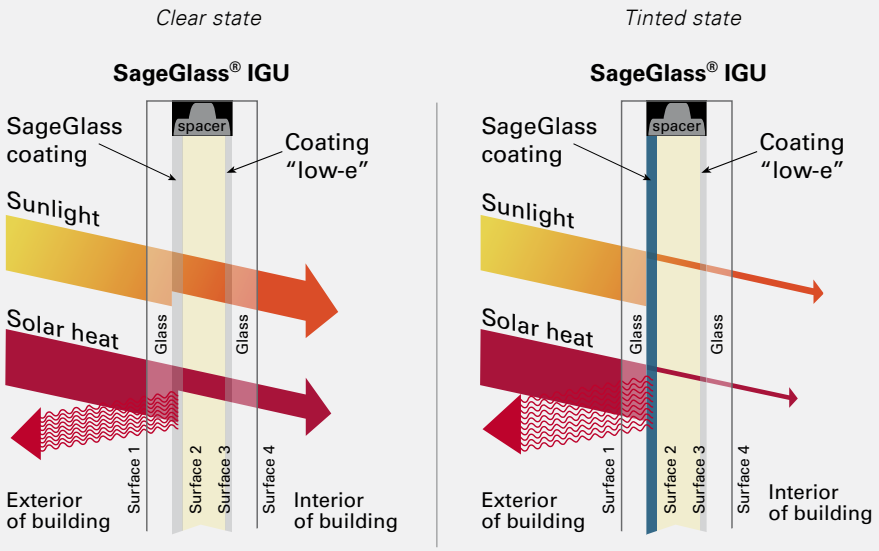
QUANTUM GLASS SAINT-GOBAIN

HOW IT WORKS

ELECTROCHROME SageGlass® is an active insulating glazing which, under the effect of a low voltage electric current, can be switched from clear to darkly tinted (and reversibly) while always remaining transparent.

The exterior pane of the double or triple glazing unit is sputtered with layers of metal oxides (total thickness less than 1/50th of a human hair). The glass tints thanks to the principle of oxidation / reduction.
When a low voltage is applied across the coating, ions travel from one layer to another layer causing the coating to tint and decrease the amount of light passing through. Reversing the polarity of the applied voltage causes the ions to migrate back to their original layer, and the glass returns to its clear state.

QUANTUM GLASS is delivering a complete system with its electronic controls, allowing manual, automatic control or both. This solution can be fully and easily integrated in building management systems.



DIAGRAM

This diagram is based on a double glazing unit with a standard assembly

SIZE
Minimal: 457 x 457 mm
Maximal: 1016 x 1524 mm (available now)
1500 x 3050 mm (available in 2013)

THICKNESS
Minimum thickness: 20 mm
Standard double glazing

GLASS CUTTING
The glazings are delivered in the required dimension.
No further cutting or drilling is possible.

DOUBLE GLAZING COMPOSITION
Outboard lite: 6 mm, toughened clear glass with ELECTROCHROME SageGlass® coating.

Inboard lite: 6 mm, toughened clear glass with LowE coating or heat-strenghted laminated with LowE coating.

Spacer: 100% desiccant-filled stainless steel spacer from 8 to 16 mm.

Seal: High performance dual seal system consisting of silicone and polyisobutylene (PIB).

Air space: 90% Argon-filled.

RANGE OF PRODUCT AND PERFORMANCE*

	Composition	State	According to D65 2°			According to EN410	According to EN673
			Light Transmission	External Reflexion	Internal Reflexion	Solar Factor g	U value W/m²K
Double glazing unit	**6mm toughened with coating SageGlass®** 16mm Spacer - gap Argon filled 90% **6mm heat treated clear float glass**	clear	63%	11%	12%	0,47	1,4
		intermadiate 1	21%	6%	10%	0,16	1,4
		intermadiate 2	6%	5%	9%	0,09	1,4
		tinted	2%	5%	10%	0,06	1,4
	6mm toughened with coating SageGlass® 16mm Spacer - gap Argon filled 90% **6mm heat treated LowE glass (CEN272)**	clear	55%	10%	9%	0,39	1,1
		intermadiate 1	19%	6%	7%	0,14	1,1
		intermadiate 2	5%	5%	7%	0,07	1,1
		tinted	1%	5%	7%	0,05	1,1
Triple glazing unit**	**6mm toughened with coating SageGlass®** 13mm Spacer - gap Argon filled 90% **6mm heat treated clear glass** 13mm Spacer - gap Argon filled 90% **6mm heat treated LowE glass (CEN180)**	clear	54%	14%	18%	0,4	0,8
		intermadiate 1	19%	6%	16%	0,12	0,8
		intermadiate 2	5%	5%	16%	0,06	0,8
		tinted	1%	5%	16%	0,04	0,8

** Applicable tolerances according to EN1096-4 ; values according to EN410 and EN673*

***By filling with Krypton gas instead of Argon, U=0,6W/m²K*

CLAUSE OF PARTICULAR TECHNICAL SPECIFICATIONS

- Electrochromic glazings that switch from clear to dark state (and reversibly), remaining transparent.
- Light transmittance range from 55% to 2%.
- Solar heat gain range from 0,39 to 0,06.
- Transition from transparent to dark state (and back) in around 5 min.
- Fully independent and integrable automatic control system managed according to the external light and solar heat level.

v1.3

SageGlass® / IMPLEMENTATION

APPLICATIONS

Like a transparent skin, ELECTROCHROME SageGlass® excels at the functional optimisation of glazed surfaces which are exposed to light, most notably for façades, atria and lobbies. Particularly ideal for low-energy consumption buildings and in many cases in replacement of mechanical shading solutions. Depending on the application and requirements, QUANTUM GLASS is providing the most relevant glazing and control configurations adjusted to the geographical location, facade-orientation and usage of the building.

CUSTOMISATION OF THE GLAZING

COMPOSITION
Double or triple glazings. The external pane can't be changed while the internal one can be customised to the project characteristics.

CUTTING
The glazings are delivered in the required dimension. No further cutting or drilling is possible.

SHAPES
Standard: rectangle, square

Special: trapezoid, triangle

SPECIFICITY
If the base or the height of the glazing is bigger than 685 mm, it is equipped with a busbar to tint efficiently.

INSTALLATION

TYPE OF FRAME / FIXING
Fixed, opening or sliding frame.
ELECTROCHROME SageGlass® is compatible with almost all window and facades frames (aluminum, uPVC, wood).
The mechanical installation is the same as for a standard double or triple glazing. Rebate needed: 16 mm

MAIN PRECAUTIONS FOR USE AND IMPLEMENTATION
The installation has to comply with the local electrical regulations and must be performed by a certified electrician.

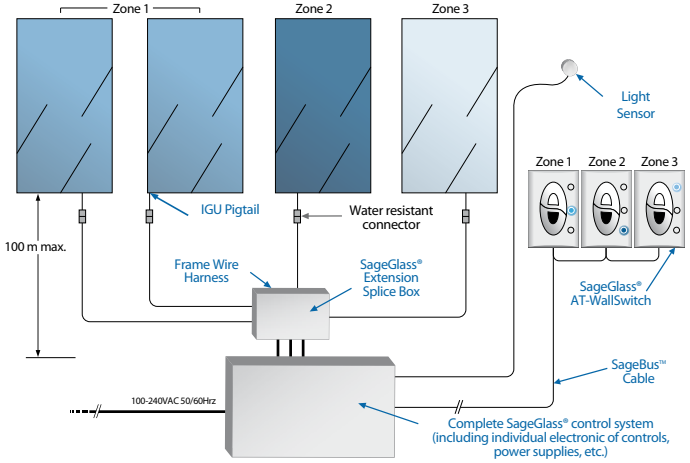
CONTROL SYSTEM

Designed specifically, the control system includes proprietary algorithms to manage manually or automatically using low voltage the tint of the ELECTROCHROME SageGlass® according to the light level based on light sensors. The system can be independent or fully integrated in a building management system (BMS). Quantum Glass offers a complete system including cables, glazings-electronics, manual wall-switches, intelligent control units, light sensor, etc.

INTERFACES
RS-232, RS-485, USB, Dry contacts inputs, LonWorks, BACnet (MS/TP or TCP/IP)

SWITCHING TIME
Transition takes typically 3 to 5mns to reach 90% of its range.

Example of ELECTROCHROME SageGlass® System Components for automatic 3 zones management based on the external light level



TECHNICAL DATA

Operating voltage	- power supply - electronics (AT-410)	100-240VAC 50/60Hz glazing electronics 12VDC
Typical Power Consumption	Power up to 200 m² of ELECTROCHROME SageGlass® for the equivalent of powering a 60 Watt light bulb.	
Power per unit area in W/m²	Peak : 2.5 Watts	Average : 0.4 Watts
Standards and certification	Complies with US and EN standards	

GUARANTEE
ELECTROCHROME SageGlass® IGUs have a standard 10 year warranty on the seals.
The ELECTROCHROME SageGlass® control system and electronic functionality has a 5 year warranty.

v1.3

SageGlass® / BENEFITS

ELECTROCHROME SageGlass® offers not only glare management, but also energy-efficiency, and a sensation of well-being (creating more comfortable and productive environment), reinforced by:

- Always transparent: preserve the view regardless of its tint
- Silent and smooth switching from one state to another
- Four different states of tints
- Fully automated system including glazing and electronic control
- Maintenance free and easy to integrate solution
- Energy savings optimized with each season.

ELECTROCHROME SageGlass® also has undeniable aesthetic and economic advantages:

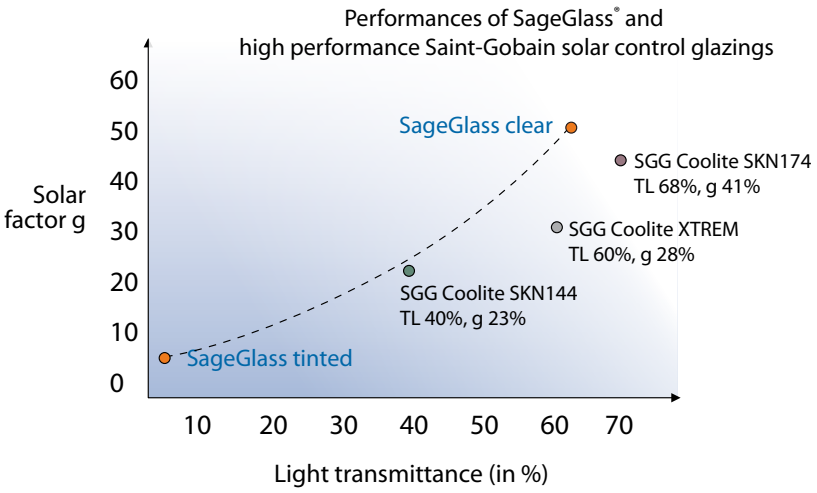
- Exterior and interior mechanical solar protection no longer required
- Daylighting optimisation
- The integrity of the architectural project is respected
- Network energy optimisation (lighting, climate control, heating)
- Reliability of the system over time, low maintenance
- 'Plug & Play' and low voltage system.

DURABILITY

The inorganic, all-ceramic structure of the ELECTROCHROME SageGlass® System provides a superior level of durability that has passed ASTM E2141-06: High temperature cycling, intense solar exposure while being continuously cycled between clear and tinted states to test coating. Samples tested by the NREL have reached 100.000 cycles during 9924 hours, exceeding the test standard by 50.000 cycles (equivalent to switching a window 9 times/day for 30 years).

CERTIFICATIONS

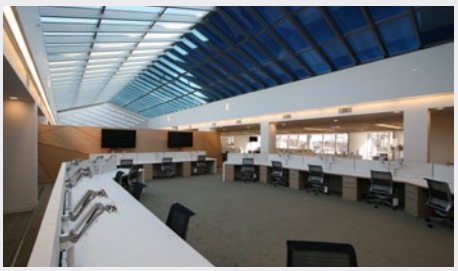
EN 12150, EN 12600, EN 410, EN 1096, EN 1279



SELECTED REFERENCES

CHABOT COLLEGE, Hayward, California USA.
170m² of ELECTROCHROME SageGlass® installed in a façade on 12/2009 divided in 6 distinct zones of switching directly controlled by the building's energy management system.

BALL STATE UNIVERSITY, Indiana, USA.
162m² of ELECTROCHROME SageGlass® was installed in 2010 into an existing skylight covering an open courtyard to create an indoor space for student activities. The glass is controlled automatically using feedback from light sensors to maintain a set light level in the space. Manual over-ride allows the glass to be fully tinted as needed for visual presentations.



PUTNAM AVENUE, Greenwich, Connecticut, USA
232m² of ELECTROCHROME SageGlass® was installed in September 2008 to replace an existing skylight as part of an interior upgrade to manage glare issues. All the glazings are controlled over 8 zones by the ELECTROCHROME SageGlass® control system and powered by integrated photovoltaic panels.

DISTRIBUTEUR

DULLAART GLAS
Kabelbaan 1 • 2352 BL Leiderdorp
T 071- 589 6882 • F 071- 589 6335
E info@dullaartglas.nl • I www.dullaartglas.nl