

CalorGlass®

INTELLIGENT SOLUTIONS
FOR HEATING USING GLASS



gentle,
even heat

enhanced
thermal
insulation

anti-
condensation
or snow-
removal

COMFORT

SECURITY

ARCHITECTURAL

SMART GLASS



HIGH PERFORMANCE GLAZING



WELL-BEING & COMFORT

CalorGlass® is a high-performance insulating glazing product which acts as a fully integrated and invisible radiative electrical heating system.

CalorGlass® replaces all other methods of heating and does away with the need for radiators and other heating equipment on interior walls. The visual impact of heated glazing is identical in all respects to that of conventional glazing, since electrical supply cables and connections are built into the interior of structural sections. The heating face is made of 4 or 6 mm toughened glass and the rear-face can be made of annealed, toughened or laminated intruder-resistant glass.

CalorGlass® radiates a source of gentle, even heat towards the interior of all living spaces, whilst saving space and reducing energy consumption in comparison with conventional heating. It can act as a main or supplementary heating system for new-build projects or renovations, as well as for locations which need to be heated rapidly.

Designed for windows, facades and verandas, its supplementary anti-condensation and snow removal functions mean that it has a wide range of applications.

CalorGlass® takes up no space and requires no maintenance. It offers a high degree of freedom in terms of design with low energy consumption.

ENERGY SAVING & PROTECTING THE ENVIRONMENT

There are double savings with **CalorGlass®**. These can be measured in budgetary aspects in the short term: depending on the solution chosen, reduced expenditure on heating in winter, on air-conditioning in summer or lighting throughout the year... The energy savings achieved reduce the production of greenhouse gases. Choosing high-performance insulating glazing is a public-spirited action which helps preserve the environment.

COMPLIANCE WITH CONSTRUCTION STANDARDS

Choosing high-performance insulation glazing means complying with the law! In almost every case, insulating glazing with enhanced thermal insulation has become the norm and a minimum requirement both in renovation of older buildings and for new-build.

WARRANTY & CERTIFICATION

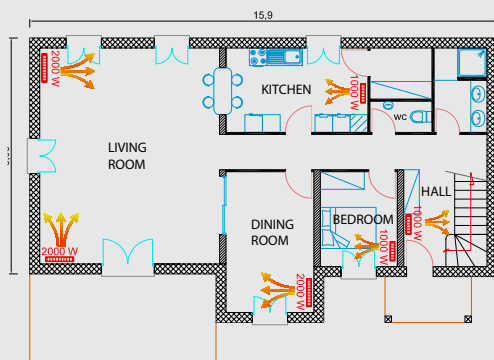
All **CalorGlass®** heating panels are covered by a ten-year warranty.

Technical Opinion in progress.



COMPARING THE ENERGY PERFORMANCE

DWELLING EQUIPPED WITH ELECTRICAL CONVECTORS

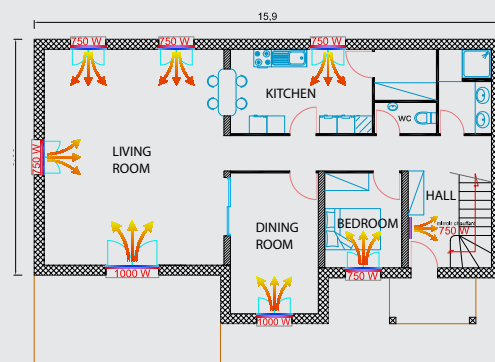


- Uneven heating with a permanent cold feeling through glazed panels
- Ugly convector heaters and stained walls
- Loss of options in terms of layout, due to cluttering of walls by convector heaters

Required heating power

| | |
|--------------------------|----------------|
| living room, dining room | 6.000 W |
| kitchen | 1.000 W |
| bedroom | 1.000 W |
| hall | 1.000 W |
| Total | 9.000 W |

DWELLING EQUIPPED WITH CalorGlass® GLAZING



- + Diffusion of gentle, even heat in rooms, immediate sensation of warmth
- + Elimination of "cold wall" effects on glazed surfaces
- + Independent thermostatic regulation if required on every window
- + Radiator-free walls for greater freedom in furnishing
- + Reductions in electricity consumption of up to 30%

Required heating power

| | |
|--------------------------|----------------|
| living room, dining room | 4.250 W |
| kitchen | 750 W |
| bedroom | 750 W |
| hall | 750 W |
| Total | 6.500 W |

That is, 2,500 Watts less power required in comparison with convector-based solutions for heating the same space!




CHARACTERISTICS OF HEATED GLAZING UNITS

The principle is simple: a coating that is invisible to the naked eye and which is made up of metallic micro-particles is deposited on the entire internal surface of the interior pane. This coating is connected to an electrical supply through a connector and acts as a low temperature heating element (20 to 45°C), radiating heat towards the interior of the room. The low-emissivity internal coating of the external pane acts as a reflector.

The heated glazing is always tempered (thermally toughened), and the double- or triple-glazed enhanced thermal insulation glazing unit contains a rare gas, rendering it super-insulating and ensuring the lowest possible levels of heat losses to the exterior. The electrical wiring is recessed in the frame sections, making the **CalorGlass®** solution a completely invisible and transparent heating system.

- Double- or triple-glazing with enhanced thermal insulation filled with Argon or Krypton gas
- Heating surface made of clear 4 or 6 mm toughened glass
- Rear-face: annealed, toughened or laminated glass, intrusion resistant for increased security
- Also available as laminated single-glazing
- Also available as heated mirrors
- Options for combination with other functions: sun control, enhanced sound insulation, privacy protection, security of persons and property, easy maintenance etc.
- Electric heating using radiation
- Temperature control by sensors on the glazing unit and room ambient thermostat
- Compatible with all home automation systems
- Glazing units can be connected to an alarm system
- Compatible with most window frames and wall systems (steel, aluminium, PVC, wood) including VEC façade walls
- Fixed, opening or sliding frames
- Invisible cables recessed in frame sections
- Cable glands for linking the casement to the frame

SPECTROPHOTOMETRIC VALUES OF THE MAIN GLAZING UNITS

| CalorGlass®  | Thk (mm) | Wt (Kg/m²) | Light | | | Energy | | | | | | Solar factor | Ug-value | |
|---|----------|------------|--------|---------------------|---------------------|----------|----------------------|----------------------|----------------------|----------------------|----------------------|--------------|----------------|------------------|
| | | | LT (%) | LR _e (%) | LR _i (%) | DSHT (%) | SHR _e (%) | SHR _i (%) | SHA ₁ (%) | SHA ₂ (%) | SHA ₃ (%) | g [Kr] (%) | Argon (W/m².K) | Krypton (W/m².K) |
| Double-glazing | | | | | | | | | | | | | | |
| 4# / 10 / #*4T | 18 | 20 | 71 | 10 | 9 | 45 | 27 | 20 | 16 | 13 | - | 57 | 1,4 | 1,0 |
| 4# / 16 / #*4T | 24 | 20 | 71 | 10 | 9 | 45 | 27 | 20 | 16 | 13 | - | 57 | 1,1 | 1,1 |
| 10# / 10 / #*4T | 24 | 35 | 69 | 10 | 9 | 42 | 20 | 20 | 27 | 11 | - | 53 | 1,4 | 1,0 |
| 44.2# / 12 / #*4T | 24,8 | 31 | 69 | 10 | 9 | 40 | 19 | 20 | 29 | 11 | - | 51 [52] | 1,3 | 1,0 |
| Triple-glazing | | | | | | | | | | | | | | |
| 4# / 10 / 4T / 10 / #*4T | 32 | 30 | 64 | 15 | 14 | 40 | 29 | 22 | 16 | 4 | 11 | 52 | 0,9 | 0,7 |
| 4# / 12 / 4T / 12 / #*4T | 36 | 30 | 64 | 15 | 14 | 40 | 29 | 22 | 16 | 4 | 11 | 52 | 0,8 | 0,6 |
| 4# / 14 / 4T / 14 / #*4T | 40 | 30 | 64 | 15 | 14 | 40 | 29 | 22 | 16 | 4 | 11 | 52 | 0,7 | 0,6 |
| 44.2# / 10 / 4T / 10 / #*4T | 36,8 | 41 | 63 | 15 | 14 | 36 | 21 | 21 | 30 | 3 | 10 | 47 | 0,9 | 0,7 |
| 44.2# / 12 / 4T / 12 / #*4T | 40,8 | 41 | 63 | 15 | 14 | 36 | 21 | 21 | 30 | 3 | 10 | 47 | 0,8 | 0,6 |
| 4# / 10 / 4W / 10 / #*4T | 32 | 30 | 65 | 16 | 14 | 41 | 30 | 22 | 16 | 1 | 12 | 53 | 0,9 | 0,7 |
| 4# / 12 / 4W / 12 / #*4T | 36 | 30 | 65 | 16 | 14 | 41 | 30 | 22 | 16 | 1 | 12 | 53 | 0,8 | 0,6 |
| 4# / 14 / 4W / 14 / #*4T | 40 | 30 | 65 | 16 | 14 | 41 | 30 | 22 | 16 | 1 | 12 | 53 | 0,7 | 0,6 |
| 44.2# / 10 / 4W / 10 / #*4T | 36,8 | 41 | 63 | 15 | 14 | 37 | 22 | 22 | 30 | 1 | 10 | 48 | 0,9 | 0,7 |
| 44.2# / 12 / 4W / 12 / #*4T | 40,8 | 41 | 63 | 15 | 14 | 37 | 22 | 22 | 30 | 1 | 10 | 48 | 0,8 | 0,6 |

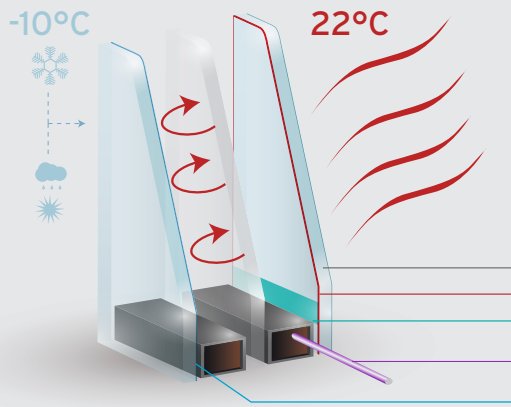
Calculations carried out in compliance with European standards EN 410 & EN 673 (with 90% gas filling). Performances calculated according to spectral values. Indicative data, modifiable without notice. Other references in stock. Other combinations possible. # indicates the position of the low-e coating. * indicates the position of the heating coating. T: Toughened glass. W: Extra-clear float glass.

FOR MORE
INFORMATION

ENHANCED THERMAL INSULATION

When the heating is not in operation, **CalorGlass®** still provides a high degree of insulation and has the same qualities as enhanced heat insulation glazing. When in operation almost no energy is lost at the glazed surface.





Radiation provides heat through radiative processes (infra-red radiation) with no movement of air, unlike convection which transfers heat through the movement of the surrounding air. Heat, in the form of radiation, is absorbed then re-transmitted by the objects and surfaces that it meets, resulting in a pleasant, even warmth!

- toughened interior glass
- heating coating
- conductive strip
- electrical supply
- low-emissivity reflective coating

PERFORMANCE LEVELS FOR HEATED GLASS

COMFORT

- Immediate, gentle, even and healthy heat throughout all living spaces
- Elimination of the well-known "cold wall" effect experienced when facing or touching a glazing unit, even though the latter is insulated
- Simple heat regulation
- All condensation is removed from the glass, which stays cleaner for longer. No mould growth on frames (wood).
- Windows are de-iced
- Melts any build-up of snow on glazing: reduces the weight of structures, allows freedom to design larger glazed surfaces

SAVINGS

- Reduced electricity consumption, up to 30% lower compared with conventional heating

APPEARANCE

- Space saving and no constraints on layout since no radiators are required
- No specialist servicing of glazing required

The power density and dimensions of the glazing will be determined by the applications and the desired functions.

| Desired functions | Power (W/m ²) |
|-----------------------|---------------------------|
| Main source of heat | 250 to 300 |
| Supplementary heating | 100 to 300 |
| Snow-removal | 250 to 300 |
| Anti-condensation | 50 to 150 |

LEVELS OF HEATING PERFORMANCE USING RADIATION

COMFORT

Heat is radiated almost instantaneously once it is switched on, unlike conventional convection heating systems which first of all heat the surrounding air.

AIR QUALITY

The air is not dried, and above all the system eliminates the drawbacks associated with convection with its currents of unhealthy air and airborne dust (of benefit to individuals suffering from asthma or with dust allergy). Cleaner air, less frequent ventilation is required, with comfortable and uniform heating in all locations.

EVEN TEMPERATURES

Reduced air temperatures due to radiation: an even temperature from floor to ceiling means a reduction in the average temperature of between 2 to 3°C, thus saving heating energy without loss of comfort. Heating walls, floors and ceilings reduces their moisture levels: dry walls provide better insulation, and in humid rooms the condensation and growth of mould on walls is significantly reduced. Extremely easy to regulate.

APPEARANCE

Does not result, overall, in staining, blackening or scorching. Solutions which are more aesthetically pleasing and harmonious.



APPLICATIONS

The levels of performance of super-insulating **CalorGlass®** heating glass mean that it can be used in dwellings, service industry projects, public access spaces, transportation, industrial or commercial construction, whether new-build or undergoing renovation.

It provides a main or supplementary heating source and can be used both in the outer surfaces of buildings or in internal partitions. It can be used in both large and small surfaces. Its heating, anti-condensation, anti-snow and alarm functions provide for a wide range of applications.

In cold weather **CalorGlass®** transforms interiors into pleasant living spaces in which to spend time with others.

With **CalorGlass®** glazing any "cold wall" effects are effectively removed. Simply place your hand on the interior surface of conventional insulating glazing to feel an unpleasant cold sensation. **CalorGlass®** therefore enables operators of restaurants, bars and food outlets to place seating immediately next to any windows and still ensure exceptional levels of thermal comfort.

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- Windows, verandas, enclosed balconies, conservatories, indoor pools, spas and rooms with humid atmospheres
 - Internal partitions
 - Bay windows in cafés, bars, restaurants and food outlets
 - Shop windows
 - Building facades, glass roofs and atrium spaces
 - Facades and interior partitions in schools, health care environments, offices, factories, commercial centres, stations and airports etc.
 - Glazing in monitoring and control stations (control towers, transport etc.)
 - Heated mirrors for bathrooms in homes or hotels, health centres, saunas etc.
 - Retail sales furniture
-



RELATED FUNCTIONS

CalorGlass®

ANTI-CONDENSATION FUNCTION



CalorGlass® removes the condensation which can form on the surface of the glass.

This effect is increasingly common as interiors become ever better insulated and/or are increasingly air-conditioned.

Removing any condensation ensures that glass stays clean and transparent. External views and light transmission are preserved.

The anti-condensation function also ensures that windows of food outlets are always clean and transparent. Shop windows, cabinets and refrigerated trays can therefore display products to greater advantage without adverse effects on the degree of preservation of products or foodstuffs.

CalorGlass®

ALARM FUNCTION



CalorGlass® reinforces safety for people and goods thanks to effective protection against burglary.

Coupled with a central alarm or surveillance system, in the event of attempted intrusion, **CalorGlass®** transmits a signal as soon as the special coating is broken - before intrusion - triggering the alarm immediately.

CalorGlass® offers an additional solution for connectable security and dissuasion, according to your home automation system, with a remote control alarm or video-surveillance system for smartphone or computer.

CalorGlass®

SNOW-CLEARANCE FUNCTION



The levels of performance offered by CalorGlass® offer architects a new degree of freedom of design: reduction in the weight of structures, increased roof window areas etc. In the event of heavy snowfalls the snow-clearance function means that the excess weight that accumulates on the structure can be quickly removed. The risks associated with snowfall or ice on roofs are avoided without loss of natural overhead light and of views to the exterior.



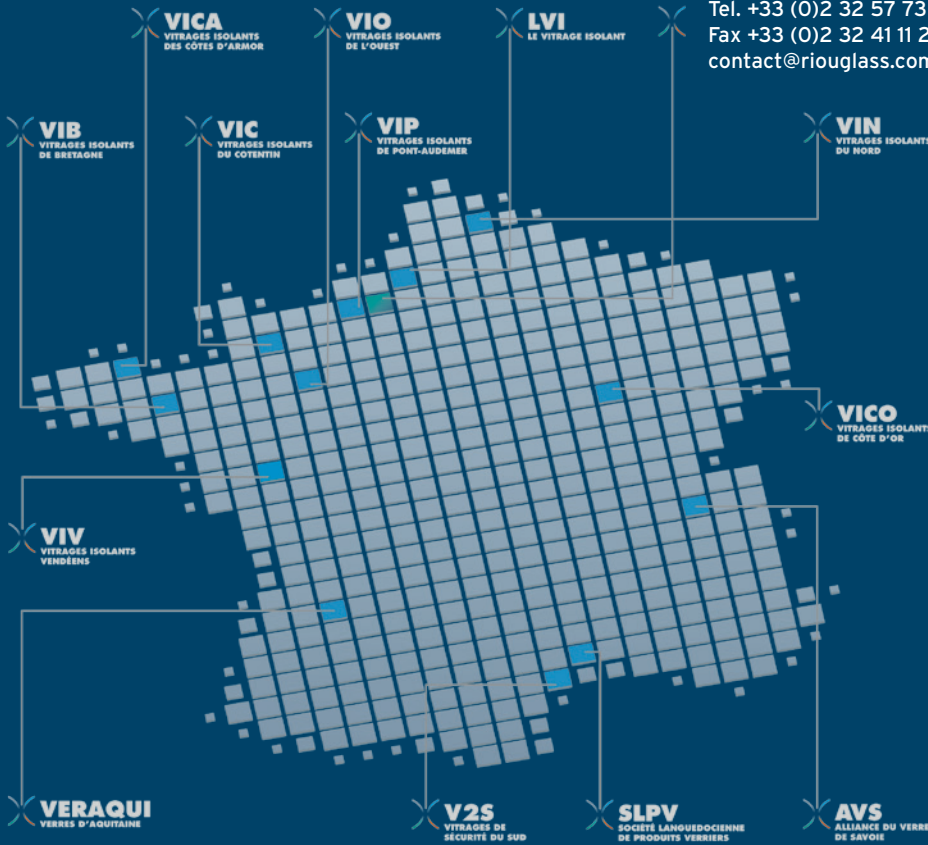


HIGH PERFORMANCE GLAZING

A NETWORK OF SKILLS TO MEET YOUR REQUIREMENTS

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REUNION

MAURITIUS



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