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UNIGLAS® | SUN

Solar Control Glass

www.uniglas.net

Netto-Plusenergiegebäude in Leonberg-Warmbronn

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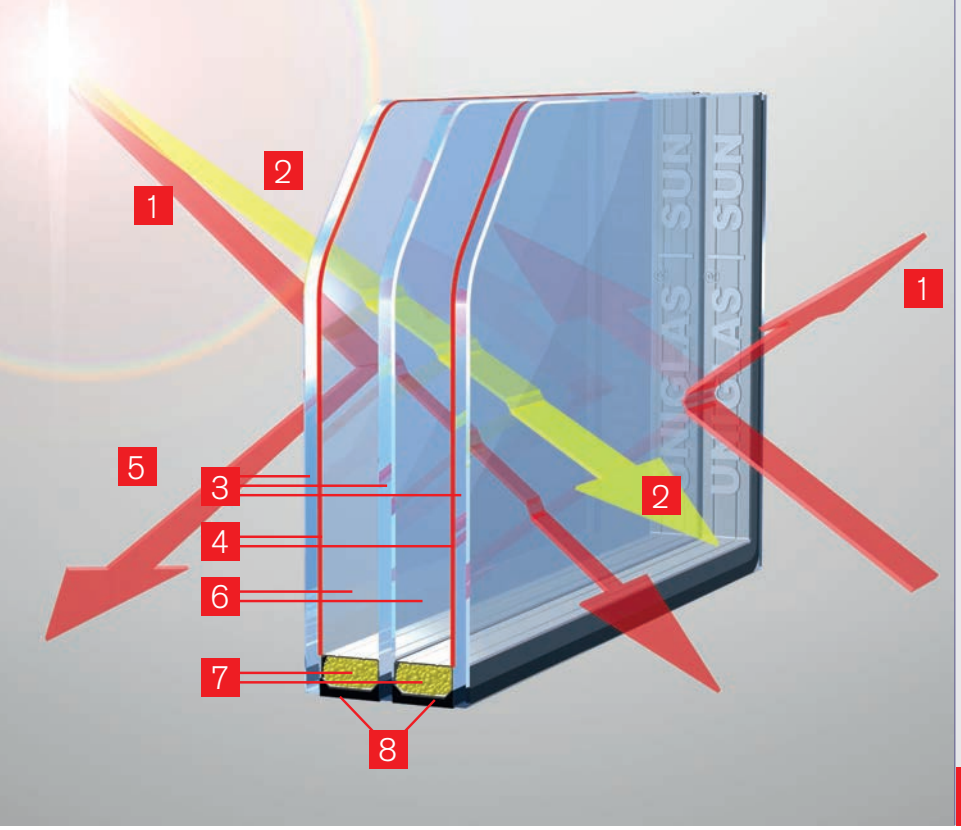
General Information about Solar Control Glass

The tradition of making facades more transparent by using glass continues. The precursor of this development is Joseph Paxton's glass palace from 1851, as well as extensively glazed industrial buildings of the 1920s and 1930s.

The use of glass in place of opaque components leads to the greatest possible degree of natural lighting in the rooms. In addition, the sun's rays support the building's heating system in the cold seasons. For this reason, glass is now used more than ever, not just as windows and room partitions, but it is also integrated as a component in the facade.

The sun's rays, which are so useful during the heating periods, quickly become a disaster in the summer if the planning has not been sufficiently thought-out. To counteract excessive heating of the building, the excessive heat energy tends to be discharged again through appropriately dimensioned air-conditioning systems. In doing so, it is necessary to note that the energy consumption required for an air-conditioning system is still many times more than that of a heating system.

Economy and ecology compel us to act in a sustainable manner. For this reason, the selection of the glazing that is appropriate for the building must be given the top priority. Various parameters must be taken into account here, such as the total energy transmittance, light transmittance, heat insulation, transparency and colour neutrality. Because what is the use of the most effective solar protection, if the view outside is extremely limited and artificial light sources have to be used inside the building by midday.



1. Heat radiation
2. Light transmission
3. Float glass pane
4. Precious metal coating
5. Reflection
6. Air cavity between the panes filled with noble gas
7. Spacer with drying agent
8. Two-tier, dense edge bond

Structure of solar control glass

What must Solar Control Glass be able to do?

Many requirements are placed on solar control glass today:

- High level of light transmittance to guarantee optimal use of the natural daylight
- Good thermal insulation (U_g value) to reduce energy consumption while creating a comfortable room atmosphere
- Customised solar protections to enable passive use of the solar energy in the winter as well

Formal requirements regarding colour and reflection are often added to these functional aspects. Not every type of solar control glass is suitable for every purpose. The expectations of planners, architects and building owners must be harmonised with the physical possibilities of solar control glass.

The options range from incredibly reflective with a strong colour to neutral glass, which is virtually undistinguishable from heat protection glass. The extensive range of solar control glass offers a wide spectrum of design options.

Sunlight with simultaneous protection against the sun

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Function and Effect of Solar Control Glass

The greater the surface of the glass, the greater the effect of the sun's rays in the room. UNIGLAS® | SUN solar control glass works selectively and filters out the sunlight radiating in. This means more light enters the interior without the rooms become excessively heated. This solar control effect is achieved through a coating and/or the use of mass-dyed glass or a combination of both. The external pane is always the "solar control glass".

Depending on the selected coating, the solar control glass has various functional properties. UNIGLAS® | SUN solar control glass can be adapted optimally to meet specific requirements with regards the solar control effect, light transmittance, reflection behaviour or colour effect.

Take advantage of the options of facade design, which range from completely neutral solar control glass to incredibly reflective or colour-reflective products. Incredibly reflective or colour-reflective panes provide a particular impression in entire glass facades and can be harmonised excellently with appropriately adapted, opaque glass elements in the ceiling or breast areas. As a slimline breast element with maximum insulating property, UNIGLAS® | PANEL ideally supplements the range for integrated facade design (see page 10).

UNIGLAS® | SUN solar control glass minimises heat losses at the same time and can be combined with other functions if required, such as sound insulation or safety glazing.

The Glass Factory

Manufacturing

Modern glass for solar control is either mass-dyed, coated or a combination of the two procedures. For dyed glass, the radiation absorption factor – which is the basis of the solar control effect – is very high, meaning this glass normally needs to be tempered into toughened safety glass.

Solar control glass, which is based on coated float glass, is characterised by a high level of radiation reflection. There are two coating procedures: the pyrolytic procedure, during which liquid metal oxide is applied to hot glass directly on the float glass sheet or in an immersion bath and fixed to the surface. Secondly, the magnetron high-powered vacuum procedure, which is currently the most modern and technically advanced procedure. From visually neutral glass to a multi-layered colour design in a very wide colour spectrum, it opens up almost unlimited options.

The surface of the pane heats up differently due to partial shadowing. If the temperature difference for glass which has been annealed for stress relieving is greater than 40 K, this can cause the glass to break. Through thermal tempering, it is possible to increase the thermal endurance to up to 200 K, thus minimising the risk of thermal glass breakage.

UNIGLAS® | SUN high-end solar control glass has a balanced ratio of selectivity, i.e. a g-value which is as low as required and, thus, a light transmission which is as high as possible.

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Important Terms

The light transmission ratio (τ_v) is the measurement of the ratio of the visible sunlight that is transmitted directly through glazing (normal light type D65), in the range of wave lengths from 380 nm to 780 nm relating to the brightness sensitivity of the human eye. The light transmission ratio is influenced by the thickness of the glass and the functional layer. A 4 mm thick float glass pane has a permeability of 90% of the visible light, insulating glass from 2 uncoated float glass panes 82% and UNIGLAS® | TOP Premium 80%.

The direct radiation transmission ratio (τ_e) is the measurement of the ratio of the sunlight that is transmitted directly through glazing in the range of wave lengths from 300 nm to 2,500 nm.

The light reflection ratio (r_v) states the percentage of visible light in the wavelength range of approx. 380 - 780 nm which is reflected on the glass pane surface. In terms of reflection, outwardly and inwardly must be differentiated between.

The direct radiation reflection ratio (ρ_e) is the measurement of the ratio of the directly reflected sunlight in the range of wave lengths from 300 nm to 2,500 nm.

The third factor is the direct radiation absorption ratio (α_e). According to the principle of conservation of energy, the total of transmission, reflection and absorption is always 1. Some of the absorbed energy is discharged outwardly and some inwardly. The inward radiation is described as “secondary heat transfer factor” q_i.

Office Park, Vienna International Airport

The general colour rendering index (r_a) describes what influence the spectral transmission has on the colour recognition of objects in a room, which is glazed with functional insulating glass. The calculation takes place in accordance with EN 410 taking into account a reference light (normal light type D65) of the same or similar colour temperature.

The shading coefficient SC as per EN 410, also called the b-factor as per VDI Guideline 2078, is the average shading coefficient of solar energy, related to the total energy transmittance of an uncoated two-pane insulating glass element. The coefficient is essential to calculate the necessary cooling load of a building.

The total energy transmittance ratio (g-value) is the total of the direct radiation transmission ratio (τ_e) and the secondary heat transfer factor of the glazing inwardly q_i. A low total energy transmission always involves a reduced light transmission ratio.

The selectivity S describes the ratio of the light transmission ratio (τ_v) to the total energy transmission g and is the measurement for the efficiency of the glass. The higher the number S, the more favourable the ratio. The currently achievable maximum is 2.14, which is achieved with UNIGLAS® | SUN 60/28. The selectivity is calculated from the ratios of τ_v and the g-value.

VR-Bank Würzburg

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Practical Report

The buildings on the west side of the market place in Würzburg were lost in the damage of the Second World War. The VR-Bank Würzburg built a new office building and business premises in the style of the historic building contours. SGT GmbH Sicherheits- und Glastechnik from Tauberbischofsheim, partner of UNIGLAS®, produced the glass facades.

A new building has been built, which follows the historic contours and dimensions. It returns the original shape of the urban development to the market, but not without opening up interesting views into the outgoing streets and alleys, which make the visitor curious.

The glazing from UNIGLAS® | SUN 51/26 solar control insulating glass protects the offices on the top floor (see photo) and the entire building effectively from heating up and provides an unobstructed view over the Altstadt. The clear, crystalline appearance of the roof is also maintained. External solar control measures would have disturbed the design, especially here.

With this elegant glazing solution from UNIGLAS®, the architecture remains unchanged in all types of sun and light conditions. In addition, the maintenance and repair requirements of external solar control are reduced, which has a positive effect on the maintenance costs.

Arguments for UNIGLAS® | SUN

- With the high-quality solar control glass from UNIGLAS®, you can protect rooms from reaching a high temperature due to the sun's rays.
- Due to the different colours of the glass, you can decide how light your interior rooms should be.
- Solar control glass in different colours also permits you to make optical adjustments to your facade.
- Through the high-quality heat protection in the solar control glass, the glass itself does not feel cold.
- In comparison with the options for energy saving, solar control glass is the most cost-effective alternative with the lowest procurement and maintenance costs.
- It is easy to change the glass in existing window constructions.
- Every pane of solar control glass from UNIGLAS® can be supplemented with further functions, such as heat insulation, sound insulation and safety.

UNIGLAS® | **PANEL**
Vacuum Insulation

Opaque Glass Elements to combine with UNIGLAS® | SUN

In facades made entirely of glass, there are always areas which must be clad in suitable opaque glass. Irrespective of whether a glass element is needed for a ventilated or non-ventilated facade; UNIGLAS® always offers you the right products, tailored to the colour effect of the facade.

UNIGLAS® | PANEL vacuum insulation has a special use when designing non-ventilated facades.

UNIGLAS® | PANEL is a highly heat insulating panel with an extremely slimline structure, which is built using insulating glass technology.

The vacuum insulation (VIP) is protected between panes of glass or plate coverings. It is made of pressed silica, which is coated with a fleece and welded and evacuated in a metallic high-barrier foil. Because no static thermal conduction takes place in the vacuum, 10 x more thermal resistance occurs in comparison with conventional insulating materials.

UNIGLAS® | PANEL can be used with particular advantages where there is the opportunity for additional usable or rentable space due to its slimline structure, but also in places where there is no more space when building in existing properties.

Efficient Use and Advantages which inspire

UNIGLAS® | PANEL is made – from external to internal – from a H-pane of toughened safety glass, which is coated on the inside in any colour to match the facade design. Furthermore, it contains a high-barrier foil, the vacuum insulation panel and a pane of toughened safety glass as the internal conclusion or a sheet of aluminium or steel. The panels can be installed in all conventional post / mullion constructions for individual facade design. The relevant, technical requirements must be taken into account, depending on the use (e.g. TRAV, fire protection, etc.).

Arguments for UNIGLAS® | PANEL

- Gain in usable space despite highest level of thermal insulation
- Installation in all conventional post / mullion constructions or window breasts possible
- Space-saving, slimline constructions
- General technical approval (abZ) for the VIP

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Our proximity: your advantage

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