



## Thermal load of glass

### Glas and partial shading

When heated by 50 °C, a glass with an edge length of 1 m expands by about 0.5 mm. This "thermal expansion" is not critical when the glass is evenly heated.

It is quite different if the glass pane is not heated evenly: Then some areas of the pane expand more, others less strongly. This results in stresses in the glass. These "thermal" stresses are greater the larger the difference in temperature in the glass becomes. Float glass "tolerates" temperature differences of about 40 °C. If uneven heating produces a higher temperature difference, breakage of glass is to be expected.

Often one part of a pane of glass is exposed to direct sunlight, while another part is in the shade. Such "partially shaded" glass will always be heated unevenly. The size of the tensions generated by the partial shading in the glass depends on a number of circumstances.

Such factors include:

- Intensity of the sun irradiation,
- Pane format and installation situation,
- Geometric distribution of the glass surface portions in the sun and in the shade,
- Absorption of sun irradiation.

Increased absorption is mainly due to coated and coloured glass. For glass that is subject to heavy exposure due to partial shading, the use of thermally toughened safety glass may be a suitable preventive measure.

### Painting and adhesives on panes

The subsequent application of foils and colours to glazing generally leads to an additional high thermal load on the glass when exposed to sunlight. In particular, when it comes to strongly absorbent foils and colours, the thermal stress of the glass generated by sun irradiation can reach a considerable degree. Due to the expected local temperature difference or heat build-up in sun irradiation, high stresses develop in the glass, which can lead to breakage or cracks in the glass.

If it is already known in the planning phase of a building that adhesives or paint will be used on the windows (for example kindergartens), the windows can be made of TSG. Thermally Toughened Safety Glass, as toughened glass, can withstand significantly higher thermal loads than the float glass normally used. The risk of breakage is significantly reduced.

It must also be considered which direction the respective panes are facing. The decisive factor is the question of whether such panes are exposed to vertical or almost vertical sun irradiation. In that case the thermal load is greatest.

Therefore, it is highly recommended to consult a specialist before using adhesives or paint on the glazing units.

Your **ISOLAR® partner** will be happy to help you choose the right glass.