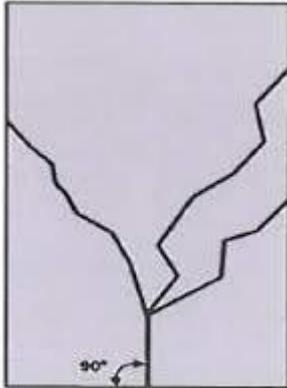


### Thermal breakage/thermal stress in glass

There are several factors which can lead to a cracking of the pane- it has been tested extensively in Germany

If it is a thermal crack the crack should look like this:



The crack starts with a 90 degree angle at the glass edge. If the crack looks differently (no 90 degree angle at the edge) than it has not been caused by thermal stress.

Block out /very dense fabrics do assist in heating up the glass pane when in direct sunlight- but that alone does not cause a crack in the glass!

In general: The problems can occur when the glass pane does encounter significant temperature-differences within the same glass pane (which can be caused by e.g. "hard shadows" from e.g. trees, eaves, other buildings, partly covering sun shading systems ( external and internal), etc. **PLUS a damaged glass edge.**

When the glass heats up/is under stress and there is a small damage at the glass edge a crack can occur. Those "thermal cracks" do usually not happen in safety glass- mostly only in annealed glass (as the glass- edges can easily be damaged during production/transport/installation when using annealed glass). A small damage/chip at the glass edge can cause such a crack when the glass heats up or is under other thermal stress (e.g. caused by shadows which cover only part of the glass pane during full sunshine).

The glass edges of safety glass usually have a bevel-which prevents damages/broken edges, plus that glass does not break that easily compared to annealed glass.

The test from the IFT Rosenheim found out that annealed glass usually does not break if there is no damage to the glass corners, but a chip in a corner/edge can cause the crack once the thermal stress of the glass increases.

The problematic thing for the customer is that he/she cannot see if there is such a small damage at the edge of the glass as it is covered by the glass bead frame.

Another reason for glass- breakages caused by thermal stress can e.g. also be cushions: when a cushion is leaning at a glass pane ( e.g. from a bench seat), the heat- difference can cause such a stress in the glass that it can crack. The same can happen when stickers are applied to glass panes, or even furniture which is standing very close to a glass pane.

There are a couple of things which can be done to reduce the thermal stress on the glass pane (assuming that the glass pane itself is undamaged, especially at the corners/edges, that the unit has been glazed

correctly (glass blocks, etc) and that no external effects are influencing the thermal stress):

- check that the blind has been fitted with sufficient distance to the glass pane ( a minimum of 17mm between the drilled hole for the tensioning shoes and the glass for honeycomb fabrics))
- if the glass bead frame is too narrow to achieve the desired distance between fabric and glass pane, use L- brackets or glass bead- brackets to fit the blind
- use a pleated or translucent fabric which allows a higher grade of air exchange (compared to block out honeycomb fabrics)

Glass- bead brackets are a good solution to reduce the thermal stress- it is a slim "face fit" bracket, but fitted onto the glass bead frame. That means it does look similar to the "inside fit" in the glass bead frame, but gives a greater distance of the fabric to the glass pane

If in doubt we recommend to use the glass bead brackets - but as there are many other factors which could influence the thermal stress (and the cracking) it does not mean that no cracking will ever occur.

As soon as there is a chip in the glass-pane edge there is a risk of cracking.

Therefore always check the installation situation carefully when using blockout fabrics and explain your customer the risk of the temperature differences in double glazing in general and the possibility of glass cracking.