THERMAL BREAKAGE

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Thermal breakage occurs where annealed glass breaks due to excessive temperature differences between the centre and the edges of the glass. In this situation while the centre of the glass starts to warm and expand, the edges remain cool thus restricting the expansion, resulting in breakage.

Wired, tinted, reflective, low-E coated glass and IGU's are most susceptible to thermal breakage. Toughening or heat strengthening will prevent thermal breakage. It is recommended that a thermal assessment be carried out to determine the level of stress and/or the possibility of breakage. Consult our technical staff for more information.

FACTORS INFLUENCING THERMAL BREAKAGE

Climate

Consideration should be given to minimum and maximum daytime temperature differences. Breakages can occur, for example with morning temperature rises where the glass can heat up quickly while the edges remain cool.

Edge quality

Annealed glass edges should be clean cut with minimal defects. Thermally suspect laminated glass should have edges flat ground.

Panel size and thickness

The chances of thermal breakage increase as the area of glass and thickness increases because of potential cutting, glazing and handling problems. Any damage introduced to the edge at these stages can impact adversely on the thermal safety of the panel.

Edge cover

The chance of breakage increases with edge cover over 40mm.

Glazing material

Dark coloured materials will promote fewer edge temperature differences than light coloured frames. Concrete and wood have a higher thermal breakage factor than metal or plastic frames.

External shading devices

External shading devices, building overhangs and mullion or column depth which may cast unfavourable shadows will increase the possibility of breakage.

Internal shading and back-up material

Confined spaces can create excessive heat build up. Light coloured blinds or venetians which reflect heat have a higher thermal breakage factor than dark coloured ones. If there is a gap of 50mm or more around the perimeter of the internal shading device, the glass is considered ventilated and a lower breakage factor is applied. In confined spaces such as spandrel glass applications, the glass may be exposed to temperatures over 90°C.

Cooling and heating sources

Direct air streams from these sources onto the glass surface can create excessive temperature differences with resultant breakages.

IGU's

Multiple panel glazing creates higher thermal stress on the outside pane. Thus in certain situations, this pane may have to be heat strengthened or toughened.

Film application

Application of film products, paper, posters or paint will increase the possibility of thermal breakage.

THERMAL BREAKAGE RISK		
Glass type	**Solar absorption**	**Risk factor**
Clear	18%	Low
Tinted/Low-E	30–40%	Medium
High light transmitting coating on tinted	45–55%	Medium to High
Reflective coating on clear	60–70%	High
Reflective coating on tinted	80–85%	Very high

THERMAL STRENGTH	
Glass type	**Strength**
Toughened glass	Strong
Heat strengthened glass	
Thin annealed float glass	
Laminated annealed float glass	
Thick annealed float glass	
Thick annealed laminated glass	
Patterned annealed glass	
Wired glass	Weak

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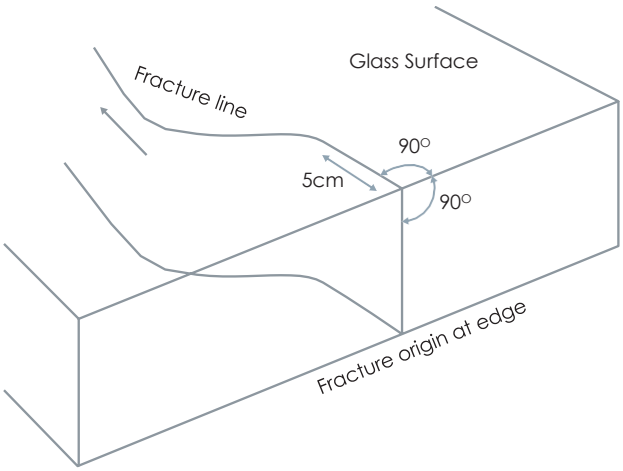
How to identify a thermal break?

A thermal stress breakage is easily identified and can be distinguished against a breakage caused by impact or other mechanical means. The start of the crack is always at a 90° angle to both the edge and the face of the glass. Depending on the intensity of the released energy, the crack will travel perpendicular to the edge for approximately 30-50mm before branching out and veering offline. Low stress thermal breakage forms a single 90° crack that then meanders across the glass surface and is often related to a small shell or edge damage. A high stress thermal breakage can be seen to initially have one crack which then branches into a number of separate cracks a short distance from the origin of the thermal break.

LOW STRESS THERMAL BREAKAGE



HIGH STRESS THERMAL BREAKAGE