24thJune2014

TECHNICAL SALES BULLETIN 008

THERMAL STRESS IN GLASS

Thermal Stress is the term used to describe the internal stresses created within a pane of glass when it is subjected to temperature variations across its area, relating particularly to solar control glass. Glass in the vision and spandrel areas of a façade expand in response to the solar radiation striking it. The more absorbent the glass, the greater and quicker it will respond to this solar radiation. However, with conventional bead glazing, the glass edges are encased within the rebate of the frame i.e. shaded, and are therefore protected from the direct solar radiation. This results in less expansion and slower heating up of the edges when compared to the exposed glass areas.
If the safe temperature difference between the exposed glass area and the edge is exceeded, the glass may crack. This crack is referred to as a thermal fracture.

A thermal fracture is generally recognisable by the fact that the crack always starts perpendicular to the glass edge, proceeding straight for approximately 50mm, then altering to a singular or double “meandering” crack. Damaged edges may cause thermal fractures at a lower than expected temperature differential, this lower figure being virtually impossible to accurately predict as it is dependent on the severity of the edge damage. Where a risk of thermal fracture exists, glass should be 4-side structurally glazed or toughened to ensure thermal safety. Armourplate toughened safety glass will always be thermally safe, even under the most extreme climatic conditions.

Thermal Safety Checklist

This checklist should be completed by you and/or your customer and returned to
GSA Technical Services before the commencement of the project.

LOCATION (e.g. Cape Town):

FRAMING TYPE: Steel or Light Colour Alum. (No thermal break)

Dark Colour Alum. (No thermal break)

4 Side Flush Glazing

Light Colour Alum. (With thermal break)

Dark Colour Alum. (With thermal break)

Timber, concrete or other material

BLINDS or DRAPES VENTILATED: YES NO
(See fig. 1 below)

BLIND COLOUR: LIGHT DARK

DIMENSION OF OVERHANG / TRANSOM: mm
(See fig. 2 below)

DIMENSIONS OF MULLION: mm
(See fig. 3 below)

IS GLASS VERTICAL? YES NO
(Or less than 15 deg off Vertical)

VISION GLASS TYPE & THICKNESS:

SPANDREL GLASS TYPE & THICKNESS:

SPANDREL AIRGAP BETWEEN GLASS & INSULATION: mm

IS SPANDREL AIRGAP VENTILATED: YES NO

Figure 1:

For the void between the inside face of the glass and the blinds to be considered as ventilated, there should be a minimum 50mm gap between glass and blinds, and at least 25mm between blind and reveals, top and bottom.

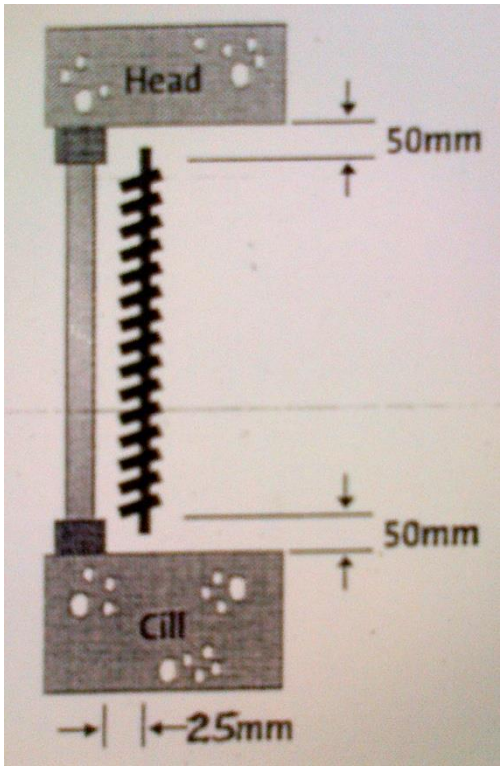

Figure 1

Figure 2:

The shaded area created by the overhang will result in a cooler temperature band within the glass, thereby accentuating the temperature differential within the pane. Trees, external louvers, adjacent buildings, etc, can also cause shading.

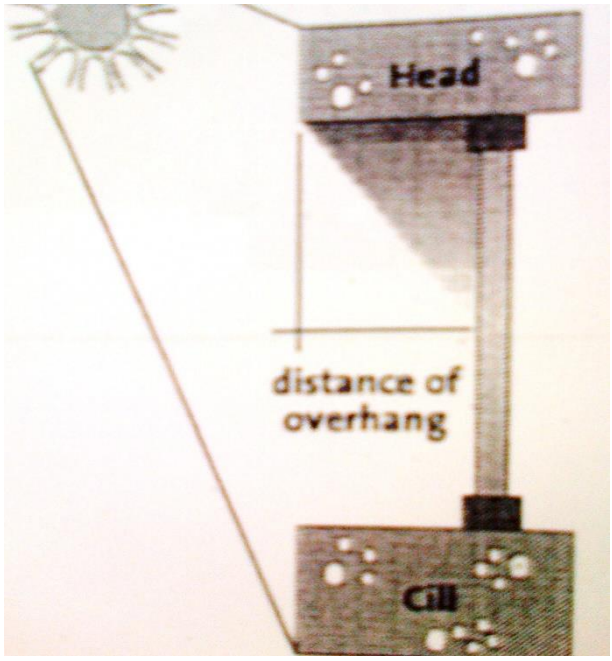

Figure 2

Figure 3:

The shaded areas created by deep mullions, columns, deep vertical reveals, building shape, etc. will also accentuate the temperature differentials within the pane.

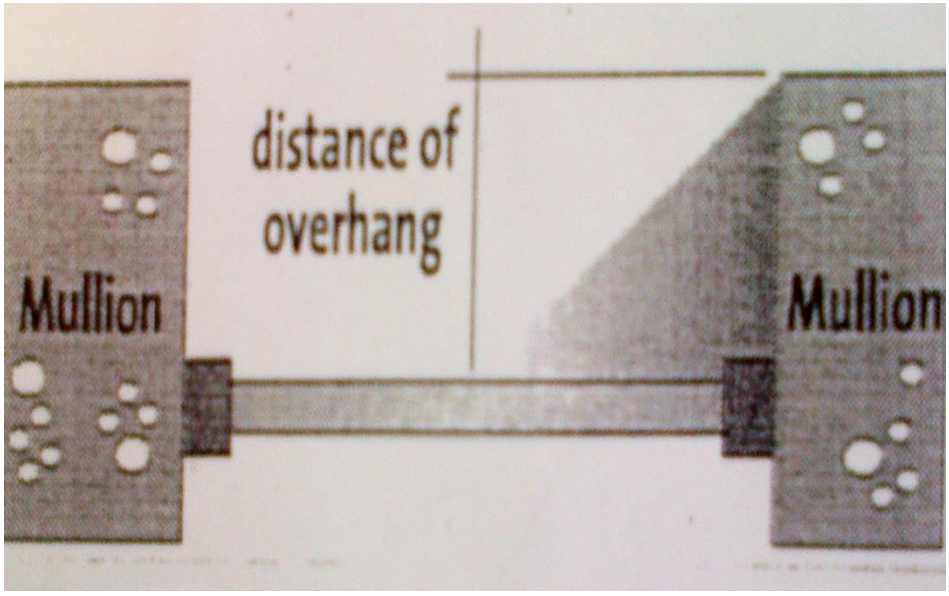

Figure 3

It is standard GSA policy to insist that all products having an absorption of greater than 50% are machine polished prior to installation.

Please do not hesitate to contact me for permutations not covered in this guideline document.

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