

## **Glazing of laminated glass balustrades.**

### **Protecting interlayer integrity**

#### **Introduction**

Balustrades using laminated glass are increasingly finding their way into designs and are being glazed using traditional methods that historically have been in place for monolithic type products.

The following recommendations are to increase the awareness and importance of considering the interlayer when glazing it into these applications. Whilst interlayers are largely either standard PVB or a more structural interlayer material, all have characteristics and reactions against sealants, glazing materials and environmental conditions that need to be considered.

There is common Industry comment in relation to exposed laminated edges and their relative resistance to edge-creep or delamination against both external elements and sealant materials.

Made to size laminates are generally seen to have superior edge adhesion over laminate panels which are cut down from stock sheets. Whilst cutting methods for annealed laminates differ, most techniques involve heating and stretching of interlayers, which can compromise the adhesion of the interlayer along the line of the cut and leave it more susceptible to delamination effects of chemicals and weathering.

In addition, improvements to the formulation of standard PVB interlayers over time, appears to have reduced the incidence of delamination in exposed situations, compared to earlier formulations of the interlayers prior to 1997. That said few manufacturers of laminated glass will provide warranties against delamination of exposed laminated edges.

Structural interlayers made from ionomers or structural PVB generally have superior edge stability and sealant compatibility. Reference to brochure material from some manufacturers illustrate laminated products which have been under continuous exposure to outside conditions in Florida, USA since 1997. These panels show excellent edge stability after subsequent years of continuous exposure without any evidence of interlayer shrinkage or delamination. In addition products have also been subject to other rigorous accelerated weathering testing.

## Technical Application

It must still be noted that whilst these structural interlayers are much more weather resistant, they are not waterproof. If any laminate product is glazed in such a way that water is actually allowed to pool around the interlayer for extended periods, the moisture will eventually leach into the interlayer which will then lose adhesion and could delaminate. This is typically seen initially as edge blush, a gradual white misty ingress from the source of moisture which seeps into the panel.

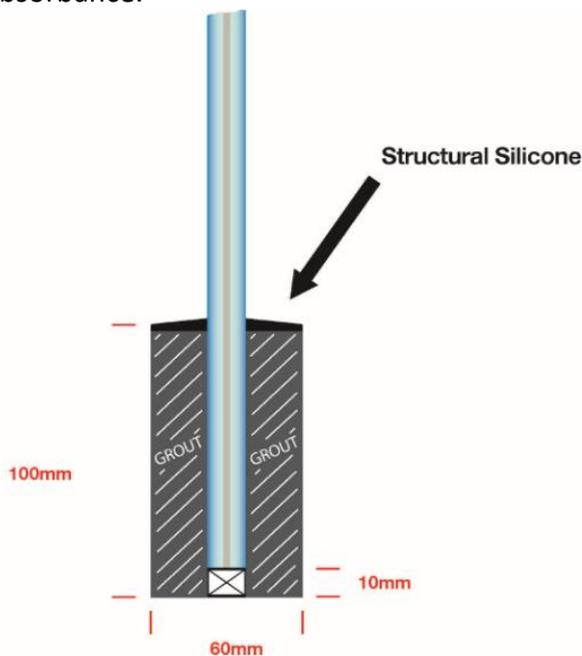
In addition, the ability of the interlayer to maintain adhesion of the glass shards between the time of breakage and the replacement of the glass needs to be part of the design consideration. PVB laminated glass is well known to contain the glass shards for extended durations after breakage with minimal glass fragments loosening from the interlayer.



*Typical moisture ingress of interlayer*

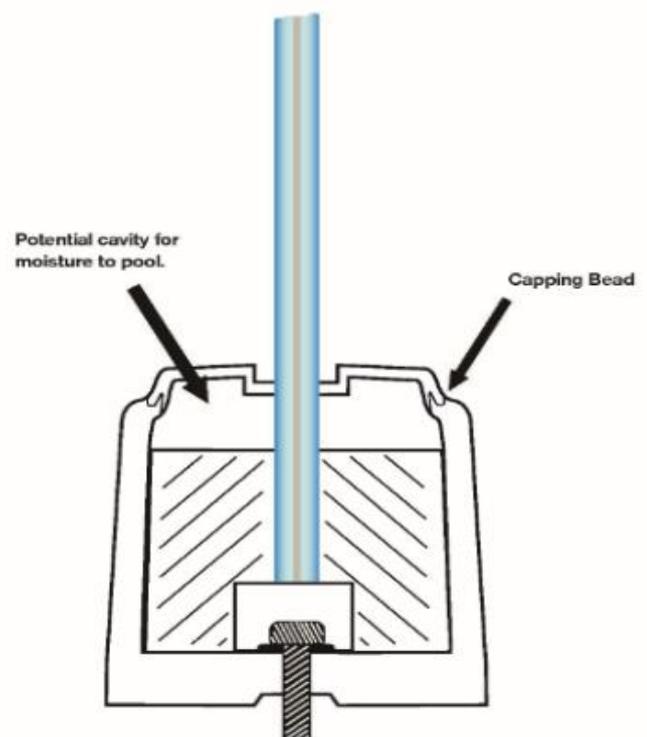
## Typical Channel Fixing Detail

Where the laminated product is channel glazed, the channel must be completely filled with an approved, compatible and non-moisture absorbing grout. Grout to glass surfaces must be sealed to ensure water is not able to enter the glazing pocket. If porous grouts are used they need to be sealed against moisture absorbance.



**Note : Balustrade channel designs with a top cap or bead may create a potential internal cavity for water to pool. Also, where dry glazed systems are used, consideration must still be given to ensure that any water which enters the channel is able to drain away.**

**Whichever systems are used, if laminates are allowed to sit for extended periods in water or against moisture, the potential of delamination is high and warranties may be void.**



## Use of Cement based non shrink grouts.

The use of cement based grouts for external glazing of glass has been common practice and popular in Australia for fixing of glass products, however there are several risks associated with cement based grouts which must be highlighted when installing any laminate product.

**Interlayer manufacturers typically advise against the use of cement based grouts in intimate contact with laminated glass edges.**

The following areas of concern have been identified

- Cement based products are caustic and may react when in contact with incompatible materials (such as aluminum for example). There is little known long term testing available on cement based grouts and Ionomer laminates.
- The importance of mixing correct grout quantities is crucial and the grade of grout also is a factor as some grouts actually shrink more than others. Once grouts shrink, their adhesion to the glass can be lost allowing hairline cracks along the glass/grout intersections for water to potentially penetrate.
- Any movement of the panel, whilst grouts are curing can again cause internal cavities and cracks for moisture to enter.
- Cement based grouts have a level of porosity and should be sealed against external moisture.
- Thermal breakage due to cool edge or differences in the thermal coefficient of expansion between the grout and the glass.

There are epoxy based products which will not allow moisture to be absorbed and these should be considered for use in these applications. Consult the sealant manufacturers regarding availability.

*This information is offered as a general guide only and we confirm that all projects require site specific assessments.*

**The Australian Glass Group issues technical bulletins to provide clarity on a range of technical aspects of high performance glass, including glass properties, performance, application and other interest areas**

*This guidance does not preclude the use of other methods, materials or equipment, however the user should undertake careful evaluation and make suitable enquiries on the suitability of alternative methods, materials or equipment, before using them.*