

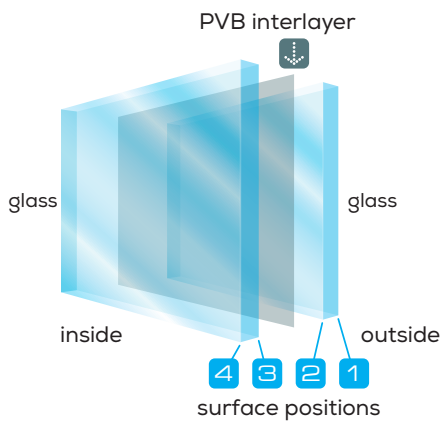
LAMINATED GLASS

DESIGN & GLAZING NOTES



Laminated glass is a Grade 'A' safety product made by laminating two or more panels of glass with a flexible plastic interlayer or PVB (polyvinyl butyral). The glass and interlayer are bonded together by heat and pressure in an autoclave. Many different laminated glass 'make-ups' are possible combining a large range of glass and interlayer types that can satisfy many requirements including energy, acoustics, decorative, strength and safety. For energy efficiency solutions, select either SOL-R™ or Sunergy® low-E glass types. For noise reduction, select Acousta™ laminated glass. For structural and strength applications, both panels can be either heat strengthened or toughened with thicker and stronger interlayers such as SentryGlas® (SGP) or DG41. Decorative elements can be added with Vanceva® coloured interlayers and ImageTek™ ceramic ink printed panels.

TYPICAL LAMINATED GLASS MAKE-UP



INTERLAYERS – Standard stocked laminated glass uses the same thickness and colour interlayer (generally 0.38mm thick). Only slight colour variation will occur as the overall glass thickness increases;

FURNACED LAMINATED GLASS – Toughened or heat strengthened laminated glass will require a thicker PVB interlayer of 1.52mm. The process of tempering glass creates some distortion and roller waves. The glass is generally not as flat as ordinary annealed glass such that a thicker interlayer is now required to adequately bond the glass and interlayer;

MATCHING – Coloured interlayers do not closely match tinted floats. This may cause a problem where float and safety glass are required in the same glazing situation. Solutions may include using all laminated glass or laminating the tinted float;

THERMAL BREAKAGE – Tinted, reflective and low-E coated laminated glass should have a thermal assessment carried out to determine risk of thermal breakage. Toughening or heat strengthening will prevent thermal breakage;

DISTORTION AND REFLECTION – Due to the controlled nature of the laminating process, facades glazed with laminated annealed glass avoid the risk of visible distortions, providing significantly sharper reflections. These benefits are dependent on the nature of the final processed product;

EDGE DELAMINATION/BLUSHING – Generally speaking, some degree of edge delamination or edge blush is inherent in most PVB laminated glass products. Edge delamination is usually the result of the breakdown of the bond between the glass and the interlayer by atmospheric moisture attack or sealant degradation. Certain conditions will accelerate or retard the manifestation of edge delamination, but as a rule edge delamination should not extend more than 6mm from edge. This extent of delamination does not effect the structural integrity of the glass. As it is most noticeable when laminated glass is installed with an exposed edge, if discolouration and edge delamination is a concern, it is recommended that the edges be fully glazed in a frame. For frameless applications select either DG41 or SentryGlas® interlayers which have proven superior edge stability over standard PVB. In glazing applications such as frameless balustrading, a stainless steel trim or channel maybe fixed to the edges to cover any delamination. Care should be taken that these trims do not capture water and that the fixing sealant used is compatible.

SILICONE, SEALANTS AND PUTTY USE – The edges of laminated glass should not be exposed to water, linseed oil putties or acid cure silicones.

LAMINATED GLASS DESIGN & GLAZING NOTES



MANUFACTURING STANDARDS

SIZE LIMITS*

Maximum Size:

5000mm x 2600mm

Minimum Size:

- > cutting from stock sheets – 260mm measuring across the diagonal or 250mm x 100mm for flat ground and polished edges;
- > custom laminated – minimum dimension 400mm x 400mm or 1000mm x 200mm.

*subject to glass thickness, types and design specifications.

MINIMUM EDGEWORK – Unless specified at time of order;

- > **Clear and tinted pvb, Sol-R Clear low E** – clean cut edges
- > **Body tinted, tinted Sol-R low E, Sunergy low E** – flat ground edges
- > **Furnaced laminated glass** – up to and including 8mm is standard arrised edge. Minimum edge work on greater thicknesses will be a flat ground edge.

FURNACED LAMINATED GLASS

Architects and building designers are pushing the size envelope for glazed panels. These larger panels require additional considerations including, public liability in the event of glass breakage, what type of glass to use, panels that are sufficiently strong enough to meet appropriate wind loading and energy efficiency requirements. Many of these issues can be resolved with the use of furnaced laminated glass products where depending on the application the product is safer in the advent of breakage, stronger for wind load demands and can meet energy requirements. Furnaced laminated glass is produced by toughening or heat strengthening glass panels and then laminating with selected interlayers.

TOUGHENED LAMINATED VS HEAT STRENGTHENED LAMINATED

There are two types of furnaced laminated glass, toughened or heat strengthened. Australian Standard AS1288 Glass in Buildings – Selection and Installation provides guidance on practical uses of either one. It focuses on the fracture characteristics of the panels if broken and possible consequences of use. Where the glazing design can't be clearly proven by the provisions in AS1288, specialist glass engineering advice should be undertaken.

TOUGHENED LAMINATED

This type of laminated glass consists of two or more lites of toughened glass and is required where there is a risk of breakage due to high loads (wind, permanent and imposed etc), heat stress or combinations of both. A 1.52mm thick interlayer is the minimum requirement and is considered an Grade 'A' safety glass.

A possible characteristic if one or both lites of the laminated panel are broken is that the glass loses its integrity and stiffness and sags under its own weight and falls out of the opening, posing a risk to people below e.g. Overhead glazing or structural balustrading with no handrail to support the load. To improve the overall strength of toughened laminated glass and to improve the post breakage characteristics as described above, structural interlayers (sometimes referred to as 'stiff' interlayers) have been developed such as SentryGlas® and DG41. Engineering advice should be undertaken when intended for use in applications such as overhead glazing and frameless balustrading.

HEAT STRENGTHENED LAMINATED

This type of laminated glass consists of two lites of heat strengthened glass and is required where there is a risk of breakage due to high loads (wind, permanent and imposed etc), heat stress or combinations of both. A 1.52mm thick interlayer is the minimum requirement and is considered an Grade 'A' safety glass.

The breakage behaviour of heat strengthened glass is generally characterised by the formation of larger pieces of glass, closer to that of ordinary annealed glass. This is useful for overhead glazing where the glass is less likely to sag and fall out of the opening unlike the post breakage characteristics of toughened laminated glass. To improve the overall strength in these situations SentryGlas® and DG41 interlayers can be added and engineered to meet load requirements.

