Spandrels and shadow boxes are typically used to conceal regions of the building containing utilities (pipes/cables) or structural elements, whilst still maintaining the appearance of a full glass façade. Spandrel units will typically have an opaque pane, and insulation in contact with the rear of the glazing unit, either adhered to the glass or secured in metal trays.

It is becoming more commonplace to consider laminated glass types for the external leaf of spandrel units, predominantly to reduce the potential for falling glass in the event of fracture of the outer pane. Whilst the internal ply of a double glazed unit would never likely be suitable as a laminate, due to potential temperature extremes through solar gain, the external pane may be considered suitable if criteria are met.

INTERLAYER STABILITY AT HIGH TEMPERATURES

The thermal stability of interlayers will depend on the interlayer type, as well as the processing. As a result of the dependence on processing, any discussion of permissible temperatures within this document is for guidance only, and confirmation should be sought from the manufacturer of the laminated pane.

The primary consideration with regards suitability in spandrel applications is delamination, which can occur when the bond strength between the interlayer and the glass decreases under elevated temperatures. Of course, delamination can occur for other reasons, including humidity effects and material incompatibilities; however, for the purposes of this document, temperature is the key consideration.

Table 1 - Interlayer Temperature Limits

Interlayer Type	Temperature Limit (ºC)
PVB	80 [1]
EVA	92 - 96 [2, 3]
SentryGlas™	100 (Duration < 16 hours) 82 (Duration > 16 hours) [4]
Resin	85 – 100 [2, 3]

As above, the processing of the laminate will influence the final performance, and so the above values should be considered as optimum limits, which in reality may be lower.

GLASS FLATNESS

For spandrel applications, as a minimum the glass will need to be heat strengthened, in order to reduce the risk of fracture due to thermal stress. Any heat treatment will impart a lack of flatness in the glass, potentially both local (roller wave) and overall bow. If plies are mismatched, this can lead to interlayer thinning, and potentially regions where the interlayer is already under some stress. Stress can be imparted to the interlayer if the glass edges are clamped during autoclaving and the glass is temporarily locally deformed, and then returns back to its original form when the clamps are released.

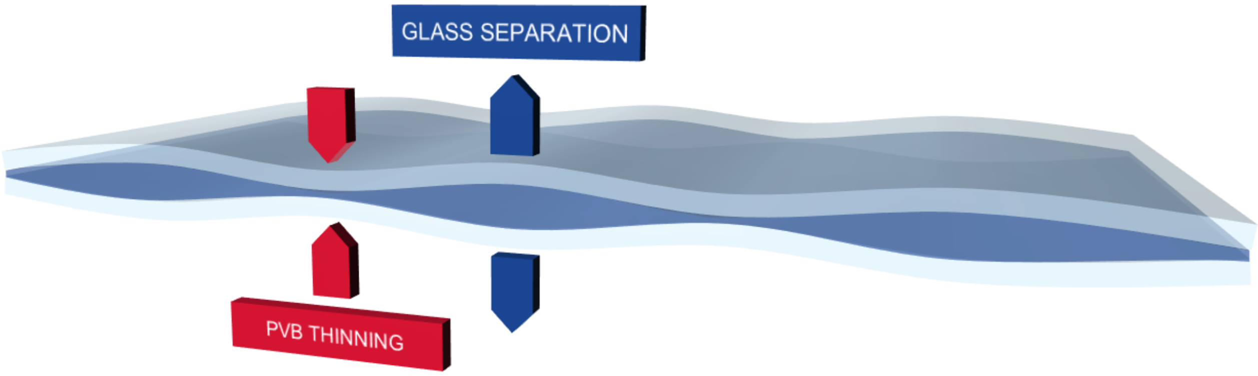

Figure 1 - Illustration of Thinning and Separation from Ply Mismatch

CONTAMINATION

Residual salts from glass washing can also affect the adhesion of the interlayer to the glass, as well as the presence of dirt, dust or other contaminants.

MOISTURE CONTENT

For PVB, moisture content of the interlayer prior to processing, can also affect the bond strength. As such, PVB should be stored under conditions that control humidity and temperature, and the moisture content of PVB should typically be less than approximately 0.45 %.

DETERMINING PANE TEMPERATURES

Currently no harmonised European Norm or British Standard exists for determining the temperatures of panes within spandrel configurations. Energy balance methodologies are provided within EN 13363-2 [5] and ISO 15099 [6] for determining the thermal performance of glazing assemblies and shading devices, however, these consider glazing assemblies without adhered insulation, and aren't specifically written to allow determination of pane temperatures.

There is a simpler methodology for pane temperature provided in NF DTU 39-3 [7], however, this again is not suitable for insulated spandrels, and is only applicable to double gazed units.

Saint-Gobain Building Glass UK uses an in-house energy balance methodology to assess spandrel pane temperatures, details of which can be provided where required.

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