

PRODUCT SPECIFICATION – EVASAFE™ LAMINATE

1. PRODUCT RANGE

EVASAFE laminate is suitable for the following product types:

- Annealed laminated glass
- Toughened laminated glass
- Decorative laminated glass

The number of EVASAFE™ interlayers required for each laminate combination is dependent upon the product type, thickness of the glass and overall dimension of the individual glass panels.

The following general specification applies to the number of EVASAFE™ interlayers required for each laminated glass panel:

	<u>Clear glass</u>	<u>Obscure & coated glass</u>	<u>Images & patterns</u>
• Annealed (up to 12mm combined glass thickness)	One	Three	Two
• Annealed (13mm – 24mm glass combined thickness)	Two	Three	Four
• Toughened (up to 12mm glass combined thickness)	Two	Three	Four
• Toughened (over 13mm glass combined thickness)	Three	Four	Six
• Multi-laminates (3-ply glass)	Four	Six	Six

Each layer of EVASAFE™ laminate is approximately 0.4mm thick.

Variations exist for the number of interlayers required for large toughened panels of lightweight glass as additional inserts may be required to overcome minor distortion that occurs during the toughening process.

To ensure that the laminated panels do not damage the laminating equipment, all glass over 5mm must be flat polished. Glass thicknesses up to and including 5mm may be rough arised.

Multi-laminates are subject to approval prior to order acceptance.

National Glass reserves the right to add up to one additional interlayer without consulting the client (at no charge) to ensure the optical quality.

2. SIZE RANGE

Minimum size

The minimum size of our laminated panels is 100mm x 350 mm;

Maximum size

The maximum size of our laminated panels is restricted by the maximum size of our laminating oven (4,500mm x 2,190mm) and glass size (as below).

Glass size restrictions

- 3mm clear float glass – 2,420mm x 1,810mm
- 4mm and above clear float glass (non-jumbo)– 3,650mm x 2,190mm
- 6mm, 10mm, 12mm, 15mm and 19mm clear float (jumbo sheets) – 4,500mm x 2,190mm
- Pattern glass – 2,130mm x 1,830mm
- Tinted glass – 3,650mm x 2,190mm

Toughened glass restrictions

Toughened glass combinations are limited to a maximum size of 4,200mm x 2,190

Standards and code compliance must be considered in final glass size and combination.

Decorative interlayers

The maximum width of decorative images to be printed on PET interlay is 1,200mm (no length restrictions).

Maximum weight

The maximum weight of each laminated panel is 350kg.

For larger sizes that described above, please contact us for technical approval.

Normal optical and human impact standards apply for all toughened glass specifications.

3. PRICING

Pricing is a combination of customer trade cost for glass, plus cost of laminating for each specification. Refer to the latest National Glass price list for laminating costs.

There is a minimum charge of 1m² per panel.

4. PRODUCT ACCEPTANCE STANDARDS

4.1 Dimension tolerances

	<u>Glass Thickness</u> <u>< 10mm</u>	<u>Glass Thickness</u> <u>> 10mm</u>
• Length/width (tolerance) for glass < 1200mm	± 2mm	± 2mm
• Length/width (tolerance) for glass ≥ 1200mm	± 2mm	± 3mm

4.2 Squareness

Maximum difference in diagonals is 5mm for panels with the largest dimension less than 1,200mm, or 10mm maximum if the largest dimension is greater than 1,200mm.

4.3 Misalignment:

Edge slip of up to 3mm between glass components is acceptable.

4.4 Bow

Bow is not to exceed 1:300 when glass is standing vertically. Total bow across panel is not to exceed 10mm in depth.

4.5 Holes

Misalignment of holes up to 4mm.

4.6 Surface quality

The glass is to be inspected in transmission (looking through the glass) at a distance of 3 metres at a viewing angle of 90° (perpendicular) to the surface and as normally viewed using daylight without direct sunlight or with a background light suitable for observing imperfections. Scratches, scars, surface marks and imperfections are acceptable if not readily visible from the viewing distance.

4.7 Roller Wave Distortion

An inherent consequence of the heat treatment process is roller wave which is caused by the heated, slightly softened glass being in continual contact with the oscillating ceramic rollers. This distortion is more noticeable in reflective or dark tinted glasses and if applicable, the direction of roller wave should be specified.

Roller wave on toughened laminated glass not to exceed 0.15mm over 300mm. Edge kink not to exceed 0.25mm in 300mm.

4.8 Edge quality (flat smooth & flat ground edges)

No shells are permitted.

Grind marks are permitted but must be of light intensity (not visible at greater than 900mm).

Chips and shells are permitted provided:

- They extend no greater than 2mm from the edge of the panel.
- They extend no greater than 2mm into the glass thickness.

Flat polished, mitred and arris edge finish must be uniform. Chips and shells are not permitted.

5. INTERLAYER SNAP BACK / SHRINKAGE / EDGE DELAMINATION

Laminated glass within specification may exhibit a measure of delamination. From any edge of the laminate interlayer, snap back, shrinkage or delamination is acceptable if no more than:

- 6mm for laminates containing two interlayers (0.8mm thickness).
- 10mm for laminates containing three or more interlayers (1.2mm and above thickness).

6. INTERLAYER BUBBLES

Interlayer bubbles are acceptable if they are not visible from a viewing distance of 3 metres. In addition, the following applies to visible inclusions from less than 3 metres:

	<u>Up to 2.5m²</u>	<u>Over 2.5m²</u>
• Up to 1mm inclusion	No limit	No limit
• 1.0mm – 5.0mm inclusion	2	4