

Glass Quality

● Perceived Quality

Quality is a subjective issue and often depends on the location of the glass in the building or application.

The angle, distance of the view, and lighting conditions have a significant bearing on the appearance of the glass. Detailed and close inspection of most glass surfaces in the right lighting conditions will reveal scratches and small surface faults, which, under normal conditions of use, are not noticeable.

Glass quality is specified in the joint New Zealand and Australian Glass Standard AS/NZS 4667:2000 'Quality requirements for cut to size and processed glass'. It sets out allowable tolerances for thickness, size, squareness, flatness, bow, surface imperfections and internal imperfections.

This Standard also sets out test methods and methods of inspection, with inspection distances and lighting conditions. Other glass quality issues are normally covered by the façade consultants, and the manufacturer's or installer's specifications or terms of trade.



● Quality Faults

The main quality issues associated with glass are as follows:

1. Surface scratches, scuffs or rubs*
 2. Internal inclusions*
 3. Edge faults or damage*
 4. Surface staining or corrosion**
 5. Internal contamination in laminated glass or an IGU**
 6. Optical phenomena in an IGU***
 7. Distortion in heat treated glass#
 8. A "milky sheen" in laminated glass**
 9. Delamination of laminated glass**
 10. Haze in Low E glass***
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1. Surface scratches can occur during manufacture, cutting, processing, handling, glazing, and cleaning and are, consequently, the most common problem. They can take the form of very light scratches, that can only be seen under certain lighting conditions, to very deep digs or scores that can affect the strength of the glass.
 2. Internal inclusions occur during the manufacturing process and are often removed, if evident, during the cutting or processing of glass.
 3. Edge faults or damage most commonly occur during cutting, processing, handling and glazing, and are of no significance if they are inside the frame rebate and do not lead to thermal or mechanical breakage.
 4. Surface staining and corrosion can occur if the glass gets wet in transport or storage, or is subject to on site attack from alkaline substances. Problems can occur if alkaline solutions from cement based products are washed onto the glass surface, which can result from salt or dirt deposits on the glass, or from incorrect cleaning with "hard" water. These problems are well documented in BRANZ Bulletin 236.

Glass Quality

5. Internal contamination in laminated glass or an IGU can be caused by foreign bodies, such as dust or dirt, entering the air space during manufacture, or by the break-down of the edge seal causing moisture or solvent film to form on the inside surface of the unit. Other problems, such as scratches or marks on the internal glass surfaces, can also occur during manufacture.
6. Phenomena, such as Newton's rings, Brewster's fringes, reflected double images, and haze, can occur in an IGU and these are covered in Data Sheet "Optical Effects in IGU'S".
7. Distortion can occur in toughened glass and heat strengthened glass due to the heat treatment process, and is called "roller wave". The effect appears in the form of distortion bands 250-300mm apart horizontally or vertically. It is more noticeable if the bands are glazed vertically and/or if reflective glass is used. Heat treated glass may also experience bow, and Low-E glass may exhibit a distorted area in the centre of the pane. Manufacturing tolerances for surface flatness, such as warp and bow, are specified in AS/NZS 2208:1996. Roller wave tolerances are determined by the manufacturer, or by the specification.
8. A "milky sheen" is occasionally observed in laminated glass. This is caused by partial reflection of light by the plastic interlayer. Normally associated with polarised light in the early morning or late evening, this milky sheen is not a deterioration of the interlayer, and cannot be overcome unless it is replaced with another product, as it is a phenomenon of the product.
9. Edge or centre delamination of laminated glass can occur. This may be due to manufacturing defects, exposure of the interlayer to moisture or chemical attack, or advanced ageing. Most manufacturers will specify an allowable tolerance for "edge delamination" in mm from the edge.
10. Haze in Low E glass in an IGU can sometimes be observed under specific lighting conditions. Refer to Data Sheet "Optical Effects in IGU'S".

Inspection Procedure

The recommended procedure to determine if the glass quality is suitable is as follows:

1. Clean the glass with a proprietary glass cleaner.
2. Stand 3m from the glass and at 90 degrees (square) to the plane of the glass.
3. View the glass in normal day lighting conditions without direct sun on the glass. Imperfections should not be visible from the distance of 3m.
4. If any quality faults are evident, first try to clean the surfaces to ensure they cannot be removed.
5. Re-examine, and mark the faults and contact your window supplier for inspection.

Note:

For a more detailed guide to quality refer to AS/NZS 4667:2000 Quality requirements for cut to size and processed glass.

*Refer AS/NZS 4667:2000

**Refer manufacturers or installers specifications/policies.

Refer AS/NZS2208:1996

*** Refer Data File Sheet "Optical Effects in IGU'S"