

Guide to visual quality of residential glass and Insulating Glass Units (IGUs)

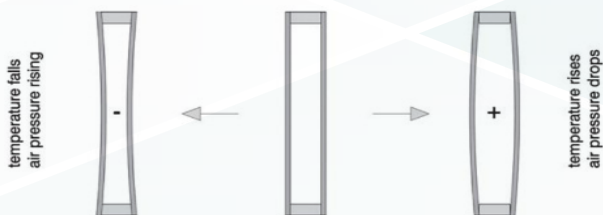
It is important to understand that although our glass and Insulating Glass Units (IGUs) are very good, they will not be everyone's idea of perfect. There are national and international standards about quality for the manufacture and processing of both glass and IGUs.

This guide is intended to explain the key points of visual characteristics, defects and the relevant standards in an easy to understand manner. Normal visual characteristics (not considered defects): Deflection, reflection, Brewster's Fringes, Iridescence, preferential wetting, spacer join, compliance markings, inherent colour and dew.

Deflection and reflection:

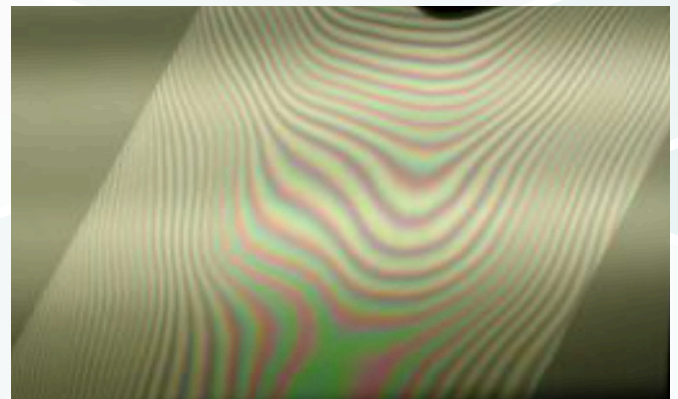
An IGU is a flexible pressure vessel that will expand and contract depending on the climate load on site at any given time compared to our factory at the time of manufacture.

The IGU panes will also flex under wind load which will make the reflection move, this is normal.



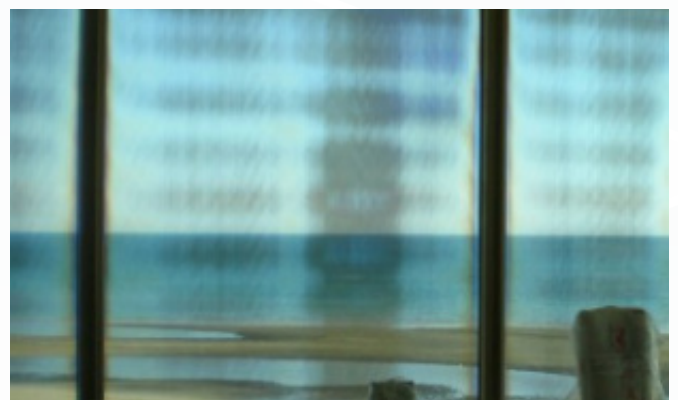
Brewster's Fringes:

A rainbow effect that can sometimes become visible in certain light conditions in IGUs made with identical glass thickness to each pane. Faint coloured bands of irregular shapes. Multiple light reflections interfering and overlapping.



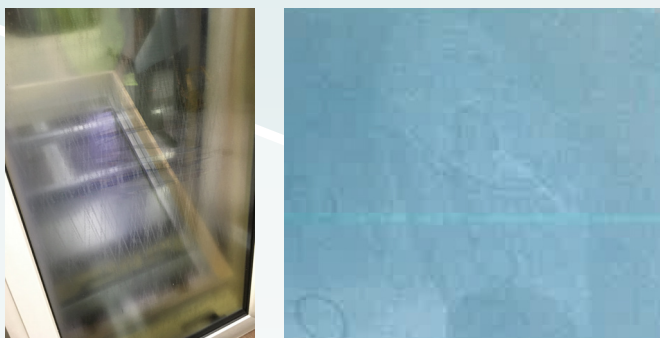
Iridescence (Anisotropy):

Often referred to as strain patterns, stress patterns or Leopard Spots. Optical light interference, non-uniform light refractions passing through the glass. Created by a variance in the stress through the thickness of the heat strengthened or toughened glass. A striped pattern sometimes visible in certain light conditions. More noticeable in polarised light, iridescence is a visible effect of the glass processing.



Preferential wetting:

When the glass is wet, patterns become visible on the damp surface, showing outlines of the processing and installation equipment that has been used. Although the equipment has not left a residue on the glass surface it has changed the surface tension.



Inherent colour:

Variance in colour impression is possible due to the iron content and the use of various glass thicknesses, the coating process and the unit construction, these cannot be avoided. Specifically ordering all IGUs at a common thickness in one batch will minimise any variance.

External dew:

Solux-E IGUs are so efficient, dew can sometimes form on the outer surface. Higher performing Solux-E double glazing will deliver a lower external surface temperature compared to standard double glazing, hence a higher possibility of dew formation. This is not a defect, rather a by-product of the low emissivity coating (Low-E) and argon gas retaining the heat inside the home.

Lamination haze:

Visible due to the presence of laminated glass in the IGU make-up. The plastic interlayer partially reflects the light creating the look of a milky sheen in low light conditions which is an inherent property of this glass type.

ATS - Architectural Thermal Spacer™ join:

ATS has an automated factory seam where the slightly curved shape of the spacers is flattened to close the join.



Compliance marking:

Safety glass, heat strengthened glass and IGUs must be marked to show compliance with the New Zealand Building Code. Glass marking is a small roundel laser etched or sand blasted on the glass near a corner. IGU spacer marking is typically yellow printing on the spacer near the spacer join.



Figure 1.



Defects

Viewing defects:

Before inspecting for defects, the glass shall be cleaned in accordance with AGP's Cleaning and Maintenance Guide. Glass and IGUs shall be viewed from 3m and perpendicular to the glass face, inspected in transmission not reflection with a daylight background.

The glass or IGU shall not be in direct sunlight. The viewing period shall not exceed 60 seconds/m². Defects shall not be marked on the glass. There are two visible zones on an IGU, the edge zone measured as 50mm from the seen edge at the frame and the main zone the remainder in the centre of the IGU. Any defect exceeding the limits list below shall be deemed unacceptable.

Reference standards for visual quality:

AS/NZS 4667:2000 Quality requirements for cut to size and processed glass.

BS EN 1279.1 Annex F and Annex G.

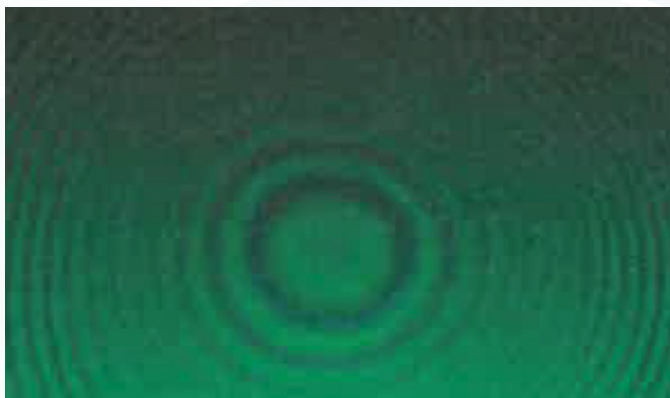
AS/NZS2208:1996 including amendment 1 1999. Section 2.

WGANZ Guide to visual quality - residential.

For any discrepancies between these standards the above list is the correct hierarchy.

Newton's rings:

Where the panes of an IGU come close to touching due to climate loads. Newton's rings can sometimes be visible as a basketball sized round area of condensation in the middle of the IGU. Suggestive of the incorrect spacer size for the application.



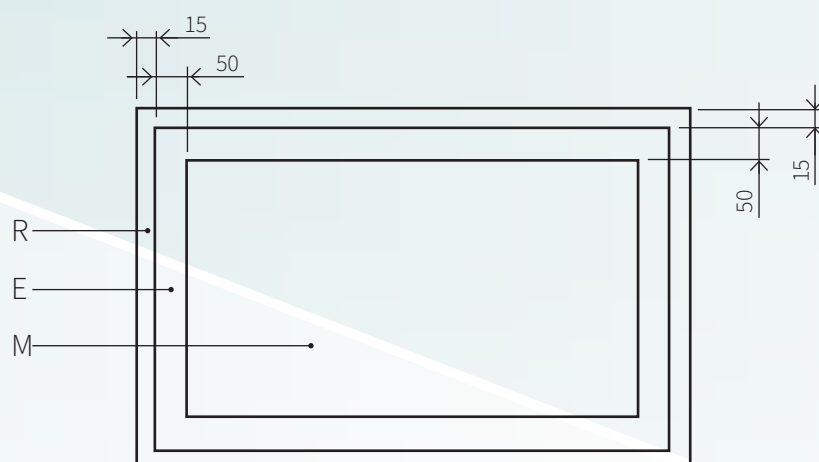
Roller wave:

Roller wave is only considered a defect when it exceeds the published limitations, also known as tempered glass distortion. It is an inherent property of this type of glass processing.

For published limitations refer to Window and Glass Association NZ (WGANZ) visual quality document for these limits.

<https://www.wganz.nz/wp-content/uploads/2019/11/Tech-Bulletin-Guide-to-Glass-Quality-011119.pdf>

Viewing Areas Diagram



Key

- R** zone of 15 mm usually covered by the frame, or corresponding to the edge seal in case of unframed edge
- E** zone at the edge of the visible area, with a width of 50 mm
- M** main zone

Table F.1 - Allowable number of spot faults

Zone	Size of fault (excluding halo) (Ø in mm)	Size of the pane S (m ²)			
		S ≤ 1	1 < S ≤ 2	2 < S ≤ 3	3 < S
R	All sizes	No limitation			
E	Ø ≤ 1	Accepted if less than 3 in each area of Ø ≤ 20cm			
	1 < Ø ≤ 3	4	1 per metre of perimeter		
	Ø > 3	Not Allowed			
M	Ø ≤ 1	Accepted if less than 3 in each area of Ø ≤ 20cm			
	1 < Ø ≤ 2	2	3	5	5 + 2/m ²
	Ø > 2	Not Allowed			

Table F.2 - Allowable number of residue spot and stains

Zone	Dimension and type (Ø in mm)	Size of the pane S (m ²)	
		S ≤ 1	1 < S
	All	No limitation	
R	Spots Ø ≤ 1	No limitation	
E	Spots 1mm < Ø ≤ 3	4	1 per m of perimeter
	Stain Ø ≤ 17	1	
	Ø > 3 and stain Ø > 17	maximum 1	
M	Spots Ø ≤ 1	Maximum 3 in each area of Ø ≤ 20cm	
	Spots 1 < Ø ≤ 3	Maximum 2 in each area of Ø ≤ 20cm	
	Spot Ø > 3 and stain Ø > 17	Not Accepted	

Table F.3 - Allowable number of linear / extended faults

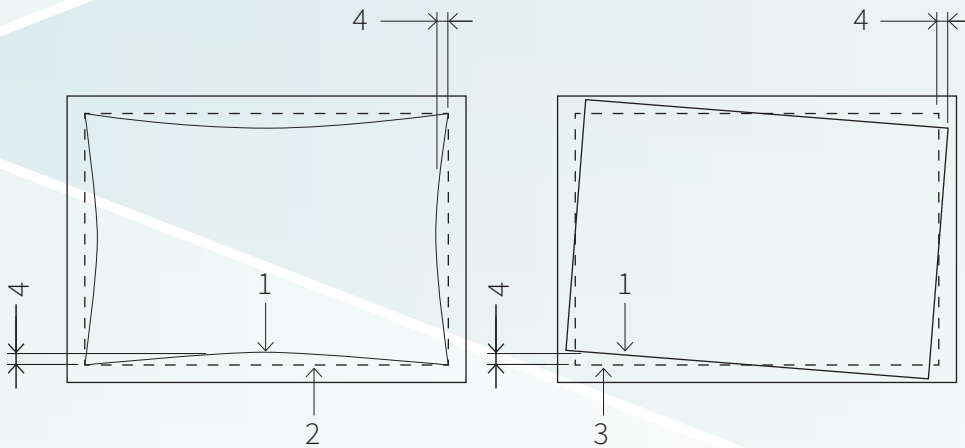
Zone	Individual lengths (mm)	Total of individual lengths (mm)
R	No limitation	
E	≤ 30	≤ 90
M	≤ 15	≤ 45

These tables are for double glazed IGUs made with monolithic glass panes. The number of allowable defects increases by 25% per additional glass component.

i.e. a double glazed unit with one pane of laminated glass or a triple glazing with three panes of monolithic glass the above defect limits are to be multiplied by 1.25.

The number of allowable defects is to be rounded up to the next whole number.

Spacer deviation diagram:



Key

- 1 spacer
- 2 theoretical shape of the spacer
- 3 theoretical position of the spacer
- 4 deviation

Figure F.2 - Examples of spacer deviation

The allowable tolerance for straightness and deviation from parallel is 3mm for lengths <3.5m or 6mm for lengths ≥3.5m

For further details of the limitations for visible defect please also refer to Window and Glass Association (WGANZ) document Guide to visual quality-residential which can be found here:

<https://www.wganz.nz/wp-content/uploads/2019/11/Tech-Bulletin-Guide-to-Glass-Quality-011119.pdf>

agpl.co.nz

137 Swayne Road, RD1 Cambridge 3493

PO Box 1028, Cambridge 3450

info@agpl.co.nz | 07 849 8880

