

TechDirect™ Specifications

**Metal Spacer**

**Insulated Glass Unit (IGU)**

**Product Specification**

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## 1. PRODUCT DESCRIPTION

Insulated Glass Units (IGU) with a metal spacer.

IGUs consist of two or more panes of glass separated by a metal spacer hermetically sealed around the edges. The cavity between two panes is filled with argon gas as standard but may be filled with air on request.

All units are manufactured in accordance with the requirements of AS/NZS 4666:2000.

## 2. INTENDED APPLICATIONS

IGUs are used in applications where a high level of energy efficiency is required. It improves the thermal resistance of the window which reduces heat loss in winter and heat gain in summer.

## 3. RAW MATERIAL SPECIFICATION

### 3.1 Input Glass

IGUs can be manufactured in a variety of configurations with different types of glass.

All glass for use in IGU is supplied to the minimum Glass Standard for Clear, Tint, Reflective or Figured Rolled as manufactured by local or overseas manufacturers.

## 4. PHYSICAL CHARACTERICS

### 4.1 Tolerances

#### 4.1.1 Size Limitations

Maximum Size: 3500mm x 2000mm

Minimum Size: 350mm x 350mm

Unit Thickness: 12mm to 47mm

Spacer Thickness (mm): 6, 8, 10, 12, 14, 16, 18, 20

Maximum Glass Thickness: 12mm float or 13.52mm laminate

Shapes: Are available but limited based on angles of shape

**For sizes outside these limitations, technical approval is required, refer to Operations Manager.**

#### 4.1.2 Dimensional Tolerances

All dimensions (Length/Width)  $\pm 2$ mm for completed units unless otherwise specified. Individual squares of glass cut for use in the same insulating glass unit shall be within 1.0mm of each dimension.

##### (a) Substrate – Thickness Tolerances

Nominal Thickness (mm)	Annealed Float, Heat Strengthened & Toughened	Laminated
3	$\pm 0.2$ mm	
4	$\pm 0.2$ mm	
5	$\pm 0.2$ mm	4.6 - 5.4mm
6	$\pm 0.2$ mm	5.6 – 6.4mm
8	$\pm 0.3$ mm	7.6 – 8.4mm
10	$\pm 0.3$ mm	9.6 – 10.4mm
12	$\pm 0.3$ mm	11.6 – 12.4mm

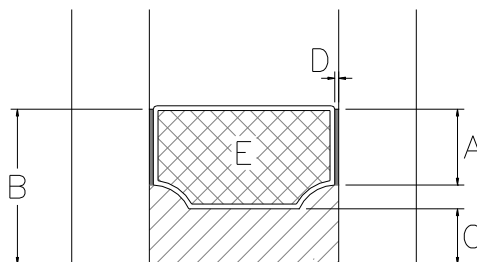
Note: The thickness ranges specified for laminated glass types exclude interlayers. Interlayer thickness shall be added to the specified range in order to reflect the overall thickness of laminated glass.

##### (b) Total Unit Thickness

Total unit thickness shall be as follows:

- (i) For two panes of glass each of 6 mm or less plus air space,  $\pm 1.0$ mm
- (ii) For two panes of glass each of over 6 mm plus air space,  $\pm 1.5$ mm

#### 4.1.3 Dimensions of Edge Seal



## Minimum Sealant Dimensions

Designation	Function	mm
A	Primary Seal (PIB)	4
B	Total Seal Height	10
C	Secondary Seal Beneath Spacer (Polysulphide or Silicone)	3.5
D	Primary Seal Thickness (PIB)	0.25
E	Desiccant	

### 4.1.4 Squareness

To be determined by adherence to requirements for substrates in accordance with AS/NZS 2208:1996 & AS/NZS 4667:2000 and difference in diagonals of rectangular panel to be no more than 5mm where the largest dimension is less than 1200mm and 10mm for all other panels.

### 4.1.5 Flatness (Bow)

To be determined by adherence to requirements for substrates in accordance with AS/NZS2208:1996 & AS/NZS 4667:2000. Bow and Warpage shall be checked on the long edge using a straight edge with the panel standing within 5° of vertical.

Nominal Thickness (mm)	Annealed Float, Heat Strengthened & Toughened Glass	Standard Laminating	Laminated Toughened Glass
4	1 in 300, 7mm maximum	--	--
5 & 6	1 in 350, 6mm maximum	1 in 350, 6mm maximum	1 in 400, 5mm maximum
8, 10 & 12	1 in 400, 5mm maximum	1 in 400, 5mm maximum	1 in 450, 4mm maximum
15 & 19	1 in 500, 5mm maximum	1 in 500, 5mm maximum	1 in 600, 4mm maximum

### 4.1.6 Edge Quality

All glass for use in an IGU shall have a minimum standard of edgework such that:-

- (a) Any damage caused to the edge after furnacing is not acceptable.
- (b) Scallops are permitted up to a maximum of 3mm.
- (c) Shells are acceptable in toughened glass that have been ground for furnacing provided they extend no greater than 5mm from the plate edge.
- (d) Shells are not acceptable on Flat Polish, Flat Smoothed or Mitred processed edges.
- (e) Flared or splayed edges are not acceptable in laminated glass - except for the end of score up to a maximum size of 3mm.

### 4.1.7 Localised Warp

To be determined by adherence to requirements for substrates in accordance with AS/NZS 2208:1996. Localised bow or kinks are not to exceed 1mm over any 200mm span.

### 4.1.8 Glass Alignment / Offset

Glass to be lined up as close to exactly as possible to ensure unit cures with no “slippage stress” on the primary and secondary seals. Misalignment between two panes of glass shall be less than 1.0mm on the bearing edge of IGU.

### 4.2 Secondary Seal

All units are supplied standard with Polysulphide as the secondary seal. Structural silicone is available upon request.

It is strongly recommended that structural silicone be specified as the secondary seal on IGUs in applications where the secondary seal is exposed to UV including but not limited to butt joints, overhead installations or shallow rebates, etc. the integrity of the IGU may be compromised and potentially will void the warranty.

It is also suggested reading this in conjunction with the Viridian Technical Glazing specification for IGUs.

### 4.3 Standards Requirements

Insulating glass units are manufactured in accordance with the requirements of AS/NZS 4666:2000, the Australian / New Zealand Standard for Insulating Glass Units.

Insulating glass units are tested to the international performance Standard EN 1279 – The European Standard for Glass in Building - Insulating Glass Units.

Toughened Safety Glass (4mm to 12mm) and Laminated Safety Glass for Buildings are tested in accordance with AS/NZS 2208:1996, the Australian / New Zealand Standard for Safety Glazing Materials in Buildings.

All glass for use in IGUs are supplied to conform to AS/NZS 4667:2000, the Australian / New Zealand Standard for Quality Requirements for Cut-to-Size and Processed Glass.

### 4.4 Performance Characteristics

#### 4.4.1 Visual Distortion

##### 4.4.1.1 Roller Wave Distortion in Heat Treated Glass

Evaluation of the level of distortion that is caused by the furnacing process is a subjective judgement. The use of a Tamglass Rollerwave Gauge to measure the surface profile of the glass will give a good indication of the level of visual distortion in the glass.

The standards for visual distortion are based on a surface profile that will result in an acceptable level of visual distortion. The roller wave is measured from peak to trough and maximum standards are as follows:

Substance	Custom Toughened Glass	Toughened Glass for Laminating	Toughened Glass for Multi-Glazing
4mm	0.14 mm	0.1 mm	0.14 mm
5 & 6mm	0.14 mm	0.1 mm	0.14 mm
8 - 12mm	0.14 mm	0.08 mm	0.14 mm
15 - 19mm	0.14 mm	0.08 mm	0.14 mm

#### **4.4.1.2 Photoelasticity or Anisotropy (iridescence)**

The variation of stress across the surface of toughened glass due to the toughening process can result in light and dark areas being visible, sometimes known as 'leopard spots', when polarized light is incident upon the glass. This phenomenon is known as photoelasticity and the intensity of the visible photoelastic pattern depends upon the degree of polarization of light and the glass thickness. This photoelastic effect is an inherent characteristic of all heat treated glass and is not a cause for rejection.

The photoelastic effect is more noticeable either at a glancing angle or through polarized spectacles.

#### **4.4.1.3 Newton's Rings**

In a large IGU, the two glass panes may be so displaced by air pressure as to touch in the middle. If this happens, then Newton's Rings may be visible in this area. They are roughly circular, coloured bands like oil films on water, but normally less intense in colour. They occur only near the centre of a unit and cannot appear if the cavity, internal pressure and/or glass thickness is sufficient.

#### **4.4.1.4 Brewsters Fringes**

Brewsters Fringes are not a fault. They can occur only with very high quality float glass IGUs and are the consequence of the thickness of the two glasses being so accurately similar and their surfaces so flat, that the multiple reflections of light within one glass can combine with those similarly reflected within the other, with such small path differences as to cause interference. The effect is faint coloured bands or irregular shapes, which can be located anywhere over the surface. It is rarely noticeable in normal lighting conditions.

#### **4.4.1.5 Deflection and Reflection**

With typical IGU constructions, quite small changes in temperature and pressure are sufficient to cause significant changes in the images reflected from the windows due to glass deflection. Usually the appearance is of a convex (pin cushion) distortion when the glass is bowing outwards and a concave (dished) distortion when bowing inwards. These ever-changing distortions are superimposed on any small local edge deflection due to variation in manufacture or glazing of the unit. They are an inevitable consequence of the laws of physics and cannot be eliminated.

### **4.4.2 Surface Quality**

The standard for IGU is based on the faults being not readily visible at 3 meters when viewed perpendicular to the surface using daylight without direct sunlight, or with a background light suitable for observing any imperfections and as the glass would normally be viewed. The following guidelines assist in the inspection of the glass when it cannot be viewed from 3 meters.

#### **4.4.2.1 Digs**

- Digs are not permitted.

#### 4.4.2.2 Scratches

- Scratches less than 75mm in length and less than 0.5mm in width are allowable.

#### 4.4.2.3 Furnace Pick-ups

- The furnace Pick-up is not to exceed 3mm in diameter.
- More than 3 Pick-up markings between 1 and 3 in diameter per plate are unacceptable.
- Any number of Pick-up markings below 1mm in diameter are allowed. Where the glass is coated, a different set of guidelines apply.

#### 4.4.2.4 Heat Markings and “Orange Peel”

Heat markings or “Orange Peel” is acceptable if not visible from 3m when viewed between an angle normal to the glass and 45° to the glass.

#### 4.5 Specification of Primary Seal (PIB-969)

PIB-969 is a solvent free, permanently plastic and load depending deformable one component adhesive/sealant based on polyisobutylene (PIB), which does not cure. The material is remarkably softened by heat. The adhesion is physical; final adhesion is obtained after a press procedure.

<b>Base</b>	Polyisobutylene (PIB)
<b>Colour</b>	Black
<b>Odor</b>	Ordorless
<b>Consistency</b>	Permanently plastic
<b>In Service Temperature Range</b>	-30°C to +80°C
<b>Density</b>	Approx. 1.25 g/cm <sup>3</sup>
<b>Thermal Conductivity</b>	0.2W/(m.k)

#### 4.6 Specification of Metal Spacer

IGUs are separated by a metal spacer and the cavity of the spacer is filled with desiccant.

Spacer Material: Aluminium

Spacer Colour: Black

Thermal Conductivity: 160W/(m.k)



#### 4.7 Specification of Desiccant (Molecular Sieve 3A)

Molecular Sieve 3A is a highly porous, crystalline alkali metal alumino-silicate in beaded form. It's the potassium form of the type A crystal structure. The pore opening in the crystals have a diameter of approximately 3A (3 Angstroms). It's large enough to allow in moisture, but excludes molecules such as unsaturated hydrocarbons, which can potentially from polymers.

Typical Chemical Formula -  $K_{72}Na_{48}[(AlO_2)_{12}(SiO_2)_{12}] \cdot xH_2O$

Property	Unit	Specification
Appearance		Bead
Total Volatile(575 °C,1 hr)	%	1.5 max.
H <sub>2</sub> O-Adsorption Capacity(* 24h)	%	20.0 min
Dust	ppm	40 max
Bulk density	g/l	700 min
Delta T(20g/20g)	°C	35 min
* Lbs H <sub>2</sub> O/100 lbs activated adsorbent at 17.5 mmHg, 25°C, 60% RH		