



# **Thermotech TPS Insulated Glass Units**

## **Product Specification**

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# **1. Product Name**

Thermotech® TPS® Insulated Glass Units (IGU) -Thermotech and TPS are registered trade names of Viridian.

All units are manufactured to AS/NZS 4666:2000 (Insulating Glass Units)

# **2. General Description**

Thermotech® TPS® IGUs consist of two or more panes of glass separated by a thermoplastic black spacer (TPS®), hermetically sealed around the edges. The cavity between two panes is filled with argon gas as Viridian standard IGU products\* and may be filled with air on request. Any unit that does not have a 90° leading edge will be filled with air only.

# **3. Intended Applications**

Thermotech® TPS® IGU is 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.

# **4. Raw Material Specification**

## **4.1 Input Glass**

Thermotech® TPS® IGU 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.

# **5. Physical Characteristics**

## **5.1 Tolerances**

### **5.1.1 Size Limitations**

The limitations on size are:

Maximum Size: 4500mm x 2700 mm

Minimum Size: 350mm x 190mm

Unit Thickness: 12mm to 58mm

Spacer Thickness: 6mm to 18mm

Maximum Glass Thickness: 15mm

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

### 5.1.2 Dimensional Tolerances

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

#### (a) Substrate – Thickness Tolerances

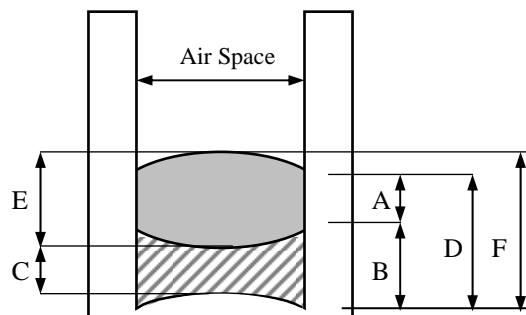
Nominal Thickness	Annealed Float, Heat Strengthened & Toughened	Laminated
3	$\pm 0.2\text{mm}$	
4	$\pm 0.2\text{mm}$	
5	$\pm 0.2\text{mm}$	4.6 - 5.4mm
6	$\pm 0.2\text{mm}$	5.6 – 6.4mm
8	$\pm 0.3\text{mm}$	7.6 – 8.4mm
10	$\pm 0.3\text{mm}$	9.6 – 10.4mm
12	$\pm 0.3\text{mm}$	11.6 – 12.4mm

Note: The thickness ranges specified for laminated glass types excludes interlayer. 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,  $\pm 1.0\text{mm}$
- ii) For two panes of glass each of over 6 mm plus air space,  $\pm 1.5\text{mm}$

### 5.1.3 Dimensions of Edge Seal



### Dimensions of edge seal with secondary seal of polysulphide

Designation	Function	Target (mm)	Tolerance (mm)
A	Visible glass-contact side of TPS	6.0	-0.5
B	Visible glass-contact side of secondary seal of polysulphide	5.0	-0.5
C	Seal depth of secondary sealant of polysulphide of TPS bead	4 *	-0.5
D	Visible edge seal height	11.0	+2.0 / -1.0
E	TPS height	≥ 7.5	
F	Total seal width	≤ 14.0	

\* Seal depth of secondary seal of structural silicone min. 6 to 7mm

#### 5.1.4 Squareness

To be determined by adherence to requirements for substrates in accordance with AS/NZS2208:1996 & 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.

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

### 5.1.6 Edge Quality

All glass for use in 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 - expect for the end of score up to a maximum size of 3mm.

### 5.1.7 Localised Warp

To be determined by adherence to requirements for substrates in accordance with AS/NZS2208:1996. Localised bow or kinks is not to exceed 1mm over any 200mm span.

### 5.1.8 Glass Alignment / Offset

Glass to be lined up as close to exactly as possible to ensure unit cures with no "slippage stress" on the sealants / thermoplastic spacer. Misalignment between two panes of glass shall be less than 1.0mm on the bearing edge of IGU.

## 5.2 Secondary Seal

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

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

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

## 5.3 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 IGU is supplied to conform to AS/NZS 4667:2000, the Australian / New Zealand Standard for Quality Requirements for Cut-to-Size and Processed Glass.

### 5.3.1 Traceability and Standards Markings

**Toughened Safety Glass** is marked with a tradestamp using a clear glass frit ink which is permanently furnaceed into the surface of the glass. This tradestamp contains information necessary for the standards requirements as well as traceability information as follows:

#### Traceability Codes

<i>Year designation</i>					<i>Month designation</i>				
○	○	○	○	1995	○	○	○	○	January
●	○	○	○	1996	●	○	○	○	February
○	●	○	○	1997	○	●	○	○	March
○	○	●	○	1998	○	○	●	○	April
○	○	○	●	1999	○	○	○	●	May
●	○	○	●	2000	●	○	○	●	June
○	●	○	●	2001	○	●	○	●	July
○	○	●	●	2002	○	○	●	●	August
●	○	●	●	2003	●	○	●	●	September
○	●	●	●	2004	○	●	●	●	October
●	●	●	●	2005	●	●	●	●	November
●	●	●	○	2006	●	●	●	○	December

#### **Example:**

○ ○ ● ●      Month

○ ● ○ ●      Year

Means: August 2001

**Laminated Safety Glass** is marked with a tradesticker using a temper proof sticker which is removed from the glass when identified. This tradesticker contains information necessary for the standards requirements as well as traceability information as follows:

**Traceability Code:**

**- Batch Numbering**

**xxx - yyy - zzz**

**xxx** - refers to the day of manufacture

**yyy** - refers to the year of manufacture

**zzz** - refers to the autoclave run number

**Example:**

**021-98-83**

**Means: manufactured on the 21st day of 1998 in the 83rd autoclave run.**

**Insulating Glass Unit** - The traceability information is printed on the TPS spacer as follows:

**ddd www mmm**

**ddd** - refers to the date of manufacture

**www** - refers to works order number

**mmm** - refers to IGU manufacturer

## 5.4 Performance Characteristics

### 5.4.1 Visual Distortion

#### 5.4.1.1 Roller Wave Distortion

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 MultiGlazing
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

#### **5.4.1.2 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.

#### **5.4.1.3 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.

#### **5.4.1.4 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 of faint coloured bands or irregular shapes, which can be located anywhere over the surface. It is rarely noticeable in normal lighting conditions.

#### **5.4.1.5 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 (pincushion) 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.

### **5.4.2 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 guide-lines assist in the inspection of the glass when it can not be viewed from 3 meters.

#### **5.4.2.1 Digs**

Digs are not permitted.

#### 5.4.2.2 Scratches

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

#### 5.4.2.3 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.

#### 5.4.2.4 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.

### 5.5 Specification of Thermoplastic Spacer (TPS)

TPS consists of a thermoplastic substrate with integrated desiccant for dehydrating the space between the panes.

Base	Synthetic rubber	
Colour	Black	
Consistency	Solid compound, can only be processed at high temperatures using applicators	
Stability	Functionality over a large range of temperatures: -40°C to +80°C	
Density	1.25 g/cm <sup>3</sup>	DIN 53 479, 23°C
Moisture absorption	3.9%	EN 1279 PZ, annex C 4
Lap shear strength	0.4 MPa	Glass/glass, layer thickness 0.5mm, 23°C
Torque	365Nmm	Elastograph at 80°C, DIN53529 P4
Specific thermal conductivity	0.28 W/(m.k)	23°C
Pore volume desiccant	3 A	