



## Data Sheet

Pilkington Toughened Safety Glass



PILKINGTON

## Introduction

Pilkington has manufactured and marketed toughened glass for over 60 years. Its properties and performance have been proven in countless applications, from windows to curtain walling, roof glazing, interior design, balustrades, and all applications of the Pilkington **Planar** System.

Pilkington Toughened Safety Glass is up to five times stronger than ordinary glass of the same thickness.

Because of its increased strength, Pilkington Toughened Safety Glass allows architects and builders far greater scope in their use of glass in buildings. It meets worldwide safety standards for glass subjected to accidental human impact at the highest level of severity.

Pilkington Toughened Safety Glass is available in heat soaked form for those applications where a reduction in the risk of spontaneous fracture is advantageous, such as structural applications, spandrel panels and roof glazing.

Wherever the benefits of ordinary glass need to be combined with extra strength, safety or heat resistance, Pilkington Toughened Safety Glass can offer a complete and proven solution.

## Advantages

- Conforms to British Standards and other International Standards
- Recognised worldwide as a safety glass
- 60 years experience of manufacturing across the world
- High quality and service
- Available in heat soaked form for extra confidence in use
- Professional advice available for all applications



*Impact Safety Test to BS 6206*

## Product Description

**Pilkington Toughened Safety Glass** is manufactured by subjecting final size, edgeworked panes of glass to a heating and cooling treatment whereby high compressive stresses are set up at the surfaces with balancing tensile stresses in the centre. The high compressive surface stresses give the Pilkington Toughened Safety Glass its increased strength.

Pilkington Toughened Safety Glass in heat soaked form is much less susceptible to fracture from nickel sulphide inclusions.

## Technical Description

Pilkington Toughened Safety Glass is available in versions of most of the range of basic glass products:–

- 4 to 19mm Pilkington **Optifloat**
- all 4 and 6mm Pilkington Texture Glass

The range of glass types, thicknesses and maximum/minimum sizes available are shown in Table 1.

**Table 1 – Pilkington Toughened Safety Glasses**

Glass Type	Thickness (mm)	Minimum Size (mm)	Maximum Size* (mm)
Pilkington <b>Optifloat</b> Clear	4	300 x 500	1500 x 2200
	5, 6, 8, 10, 12	300 x 500	2000 x 4200
	15	300 x 500	1700 x 4200
	19	300 x 500	1500 x 4200
Pilkington <b>Optifloat</b> Bronze, Grey, Green Bronze, Grey Green	4	300 x 500	1500 x 2200
	5, 6, 8, 10, 12	300 x 500	2000 x 4200
	6, 10	300 x 500	2000 x 4200
Pilkington <b>Eclipse</b>	4	300 x 500	1500 x 2200
	5, 6	300 x 500	1800 x 3300
Pilkington <b>Suncool</b> Classic**	6	300 x 750	1500 x 2200
		300 x 750	2000 x 3500
Pilkington <b>Suncool</b> Low Reflection**	6	300 x 750	1500 x 2200
		300 x 750	2000 x 3500
Pilkington <b>Suncool</b> High Performance**	6	300 x 750	2000 x 3500
Pilkington <b>K Glass</b>	4	300 x 500	1500 x 2200
	6	300 x 500	2000 x 4200
Pilkington <b>Optitherm</b>	6, 10	300 x 750	2000 x 3500
Pilkington Texture Glass	4, 6	300 x 500	1200 x 2000
Pilkington Spandrel Glass	6, 8, 10, 12	300 x 500	1500 x 3000

\* The aspect ratio should not exceed 10:1 \*\* Other thicknesses and sizes may be available to special order

Weight. The weights are approximate, based on nominal glass thickness.

**Table 2 – Glass Weight**

Thickness (mm)	Weight (kg/m <sup>2</sup> )
4	10
5	12.5
6	15
8	20
10	25
12	30
15	37.5
19	47.5

## Dimensional Tolerances.

**Rectangles** Height and length  $\pm 2.0\text{mm}$

**Diagonals** up to 4000mm max. 4mm difference  
over 4000mm max. 5mm difference

*Note. Tighter tolerances may be available dependent on glass type/thickness and type of edgework. Enquiries should be submitted.*

**Edgework.** Three different types of edgework are available.

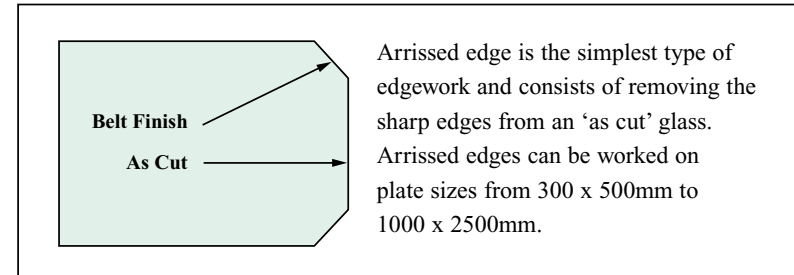


Figure 1. Arriused Edge

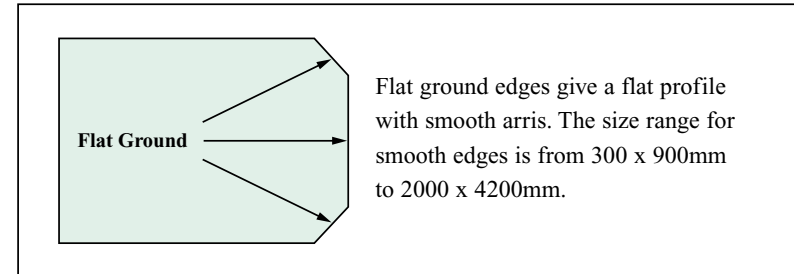


Figure 2. Flat Ground and Smoothed Edge

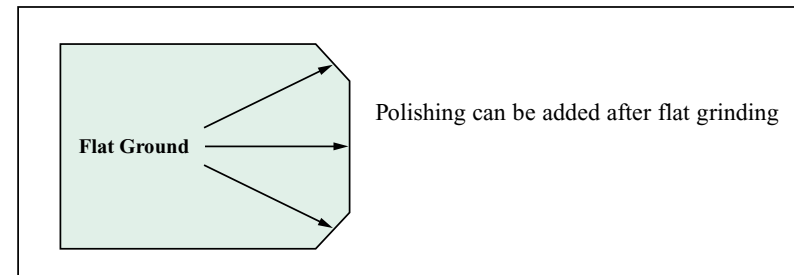


Figure 3. Flat Ground and Polished Edge

**Holes.** All Pilkington Toughened Safety Glass can be supplied with drilled holes. The diameter of holes should, however, not be less than the thickness of the glass. Enquiries should be submitted for holes of diameter greater than 30mm.

The positions of holes relative to each other and the edge of the plate are shown in Figure 4.

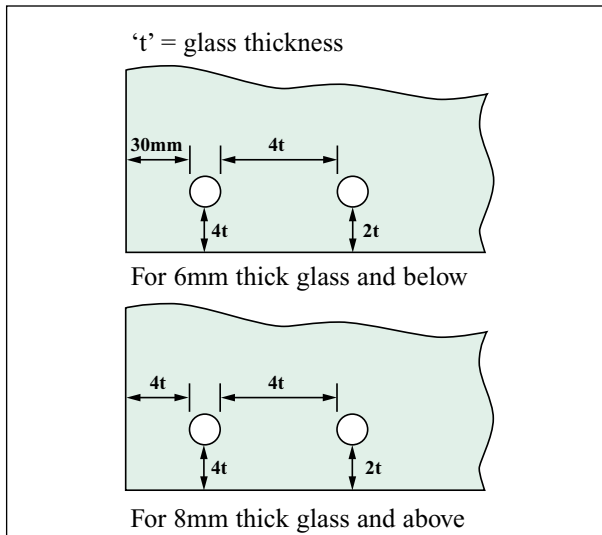


Figure 4. Positions of holes in Pilkington Toughened Safety Glass

Tolerance on hole diameter  $\pm 0.5\text{mm}$ . The positional tolerance on hole centres is  $\pm 1.0\text{mm}$  from one given datum point.

The maximum number of holes per plate is 24. Normally only two different hole diameters can be drilled in the same plate.

For complex hole configurations please submit enquiries. Many configurations of notches (and non circular holes) can be supplied but enquiries must be submitted.

**Shapes.** Shapes other than rectangles can be manufactured; advice should be sought before ordering. Templates are required for the manufacture of shapes. Tolerances on shape and hole position are subject to the complexity of shape.

**Flatness.** By the nature of the toughening process it is not possible to produce toughened glass as flat as annealed glass. Two types of deviation, known as overall bow and roller wave, can be produced.

Overall bow may vary dependent upon the glass type/ thickness, size, aspect ratio and other factors.

It is measured with the glass in the vertical plane and supported at quarter points. The maximum deviation from a straight edge is measured on the concave surface. The maximum allowable overall bow is 0.2%.

Roller wave is caused by the glass moving across rollers at high temperatures. This will give a very slight waviness which varies with glass thickness and pitch of rollers.

**Laminated.** Pilkington Toughened Safety Glass can be supplied in laminated form.

**Appearance.** The actual appearance of Pilkington Toughened Safety Glass depends upon the type of glass, the colour and the thickness of the glass selected to be toughened.

Under particular lighting conditions and viewing angles the stress pattern induced by the heat treatment can sometimes be seen. This 'strain' pattern is usually noticed in slightly polarised light and is an inherent characteristic of the toughening process. Some slight distortion (bow and roller wave) can occur in such heat treated glass due to the directional nature of the process. This will be accentuated in the more reflective glasses when viewed from the outside of a building.

**Identification.** A safety glass only complies with BS 6206 if it is marked as doing so. The standard requires that all installed panels shall be marked to include the following:

- An identifiable tradename or other mark capable of identification through a suitable source
- The type of material
- The number of the British Standard i.e. BS 6206 and the classification achieved



## Product Performance

**Strength.** Pilkington Toughened Safety Glass has Class A impact performance to BS 6206. In general, the strength is up to five times that of annealed glass, but is to some extent dependent on glass type and thickness.

Pilkington Toughened Safety Glass can withstand extremes of heat and cold and offers greatly increased resistance to sudden temperature changes compared with annealed glass. They can also be used in service within the temperature range from 280°C down to -70°C without affecting their performance and unlike annealed glass, withstand sudden shock temperature of approximately 200°C.

**Breakage.** Pilkington Toughened Safety Glass, if ever broken, disintegrates into small relatively harmless pieces which are neither large enough or sharp enough to cause serious injury.

**Abrasion resistance.** The toughening process does not increase the resistance of the surface to scratching or abrasion compared with that of annealed glass.

## Application

In any areas of particular hazard where national standards or Codes of Practice specifically require the use of safety glazing material, Pilkington Toughened Safety Glass provides an economical and proven solution.

The benefits of glass can therefore be enjoyed, for example, along passageways, and areas of high pedestrian traffic; in doors and adjacent panels; in shower and bath enclosures; in garden windbreaks; in balconies; barriers and staircases and through the Pilkington **Planar** System, Pilkington Toughened Safety Glass can be used to provide uninterrupted single or double glazed cladding for the whole building.

Pilkington Toughened Safety Glass will eliminate the risk from thermal fracture due to excessive solar radiation absorption.

Heat soaking is recommended where toughened glass is specified for use in roofs, spandrel areas or structural glazing.

## Handling and Storage

- Toughened glass must not be cut, drilled or worked after manufacture.
- Any work on the glass will affect its properties and may result in breakage. Therefore, all work on the glass must be done before toughening.

As with all glass, the edge of toughened glass is vulnerable and care is necessary both in handling and installation, since an edge damaged in handling may result in subsequent breakage.

Special care should be taken to protect the glass, especially the edges, from impact damage (knocks, abrasions and excessive local pressure). Upon receipt and before glazing each glass should be checked for damage. Damaged glass should not be glazed.

Water must not be allowed to reach the edges of stacked glass as it can be drawn between the plates by capillary action and cause damage.

The glass must be protected from site contamination such as welding, cementitious, plaster products or adhesives.

## Glazing

Edge clearance must always be allowed and cushioning, e.g setting blocks, gaskets, etc., installed to prevent contact with hard material. Glass to hard material contact should be eliminated at all times by the use of gaskets, bushes, neoprene linings and neoprene or hardwood setting blocks. All fittings must be free from high spots and/or burrs.

Glazing should generally be carried out in accordance with the requirements of BS 6262 and BS 8000: Part 7.

*This publication gives a general description of the product and materials. It is the responsibility of the user of this document to ensure that their use is appropriate for any particular application and that such application complies with all relevant local and national legislation, standards, codes of practice and other requirements.*

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