

 GLASS MARKET	Glass Market Ltd 147 McCleod Rd, Te Atatu, Auckland Standards: AS/NZS 2208, ISO 9001 Compliance with: CSI Product Assessment Scheme.	Doc ID: SP-01 Revision: 0 Revision Date: 6/03/2018 Effective Date: 6/03/2018 Page: 1 of 8
SPECIFICATION TOUGHENED BUILDING GLASS		

1.0 Product Name

Glass Market, Toughened Safety Glass for use in buildings.

2.0 General Description

Toughened or tempered glass is a type of safety glass processed by controlled thermal or chemical treatments to increase its strength compared with normal glass. Tempering puts the outer surfaces into compression and the inner surfaces into tension. Such stresses cause the glass, when broken, to crumble into small granular fragmentations instead of splintering into jagged shards as happens with float glass. The granular fragmentations are less likely to cause injury.

As a result of its safety and strength, toughened glass is used in a variety of demanding building glazing applications, where there is a possibility of human impact.

3.0 Intended Applications

Glass Market Toughened Safety Glass is used in architectural applications where safety is important against impact.

4.0 Raw Material Specification

4.1 Input Glass

Float glass is supplied by leading float manufacturers to minimum internationally recognised specifications for clear and tinted float and figured rolled glass.

5.0 Physical Characteristics

5.1 Tolerances

5.1.1 Size Limitations

The limitations on size on the toughening line are: 5000mm x 2440 mm bed size, glass can be toughened from 4mm to 15mm nominal thickness.

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

5.1.2 Dimension Tolerances

All dimensions ± 2 mm unless otherwise specified. The thickness of glass substrate shall be within ± 0.2 mm of nominal for 4mm, 5mm and 6mm float glass, ± 0.3 mm of nominal for 8mm, 10mm and 12mm glass, ± 0.5 mm of nominal for 15mm glass and ± 1.0 mm of nominal for 19mm glass, unless otherwise specified. Size tolerance dimensions are given in Table 2.2 of AS/NZS 2208.

5.1.3 Squareness

Difference in diagonals of panel to be no more than 4mm. The overall shape of the glass must fit within a box ± 2 mm of the true nominal size.

5.1.4 Overall Bow (Flatness)

The following standards for flatness limits (Bow and Warpage) are in accordance with Table 2.3 of AS/NZS2208. Flatness limits (Bow and Warpage) shall be checked on the long edge using a straight edge with the panel standing within 5° of vertical.

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FLATNESS LIMITS FOR GLASS OF STANDARD NOMINAL THICKNESS

Standard nominal thickness	millimetres		
	Bow		
	0 to 1500	1501 to 3000	3001 to 5000
3	1 in 200	1 in 150	—
4	1 in 200	1 in 150	—
5	1 in 300	1 in 200	1 in 200
6	1 in 350	1 in 250	1 in 200
8	1 in 400	1 in 300	1 in 250
10	1 in 400	1 in 300	1 in 250
12	1 in 400	1 in 300	1 in 250
15	1 in 400	1 in 300	1 in 250
19	1 in 400	1 in 300	1 in 250
25	1 in 400	1 in 300	1 in 250

NOTES:

- 1 Flatness measurements shall be checked against a straightedge with the panel standing within 5° of vertical and measurement taken horizontally.
- 2 For non-standard glass thicknesses, interpolation will be required.

5.1.5 Edge Quality

Toughened safety glass shall have a minimum standard of edgework such that:-


- (a) Flared or splayed edges are not acceptable - except for the end of score up to a maximum size of 3mm.
- (b) Scallops, flakes, shells and chips are permitted up to a maximum of 3mm.
- (c) 'Shark's teeth' are not to extend to more than 50% of the thickness of the glass substrate.
- (d) Shells are not acceptable on Flat Polish, Flat Smoothed or Mitred processed edges.
- (e) Broken corners and corners on/off are not permitted
- (f) Vented edges are not permitted

5.1.6 Localised Warp

Localised bow or kinks is not to exceed 1mm in 200mm for nominal thickness 5mm and 6mm and 1mm in 300mm for substances greater than 6mm.

5.2 Standards Requirements

Toughened Safety Glass for Buildings is tested in accordance with AS/NZS 2208 the Australian / New Zealand Standard for Safety Glazing Materials in Buildings. Every production run of toughened safety glass is sampled to Appendix A, one sample for fragmentation testing is taken every hour or change of thickness or type of glass being manufactured into toughened safety glass, using the procedure outlined in Appendix E AS/NZS 2208.

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

5.2.1 Traceability and Standards Markings

Toughened Safety Glass is marked with a removable label. This removable label contains information necessary for conforming to the marking requirements stated in Clause 1.7 Marking of AS/NZS 2208, as follows:

Toughened Float Permanent Compliance Marking by Silk Screening Ceramic Ink onto glass



Toughened Pattern Permanent Compliance Marking by Silk Screening Ceramic Ink onto glass



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Where the customer does not want a permanent silk screen marking on the finished product in Australia a removable label is applied to each piece of toughened safety glass after furnacing.



A removable label cannot be applied to toughened safety glass manufactured for New Zealand as it this form of marking is not allowed by law, a permanent silk screen marking on the finished product must be applied to each piece of toughened safety glass.

5.3 Performance Characteristics

5.3.1 Visual Distortion and Surface Quality

The standard for toughened safety glass is based on the faults being not readily visible at 3 meters when viewed perpendicular to the surface and as the glass would normally be viewed. The following guide-lines assist in the inspection of the glass when it cannot be viewed from 3 meters. Further information on defects is available in AS/NZS 4667.

5.3.1.1 Digs

Digs are not permitted.

5.3.1.2 Scratches

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

Heavy scratches less than 75mm in length and less than 0.75mm in width are permissible if within 100 mm of the glass edge.

5.3.1.3 Stones

No stones greater than 2mm is permitted.

Stones 1mm to 2mm in size, one stone allowed in 4m².

Up to 3 stones below 1mm in diameter are allowed in 4m².

Where the glass is coated, a different set of guide-lines apply.

5.3.1.4 Linear Distortion

linear distortion (roller wave) is to be maintained at 0.15mm over 300mm.

5.3.1.5 Surface Vent and Blisters

Surface vent and blisters are not permitted.

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5.3.1.6 Stains

Stains are not permitted.

5.3.2 Spot Defects in the Vision Area

Inspect the toughened safety glass held in a perpendicular position and in front of and parallel to a matt grey screen, lit by diffuse daylight or equivalent at a distance of 2m from the glass. The spot defects in the vision area when viewed from 2m shall not exceed the number of the permissible defects in table below.

Defects less than 0.5mm are not considered and defects greater than 3mm are not permitted.

Size of defect d in mm		0.5 < d ≤ 1.0	1.0 < d ≤ 3.0			
Size of pane A in m ²		for all sizes	A ≤ 1	1 < A ≤ 2	2 < A ≤ 8	A > 8

Note: An accumulation of defects occurs if four or more defects are at a distance of < 200mm from each other.

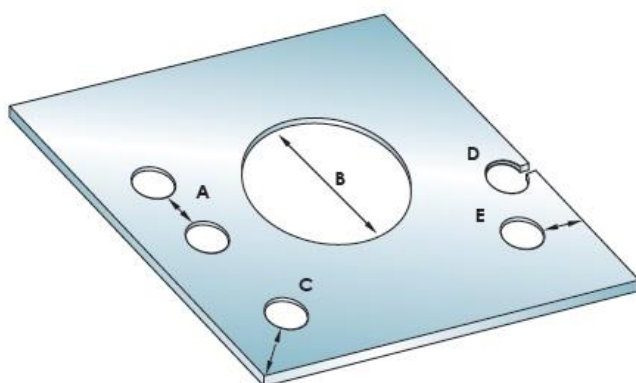
5.3.3 Defects in the edge area of toughened Safety Glass

Inspect the toughened safety glass and ensure there is no edge damage or sharp edges. All toughened safety glass should have all edges including holes and cut outs arrised prior to furnacing.


Other edge finished acceptable prior to furnacing are “Flat Polished”, “Flat Grind” and Bevelled.

6.0 Performance Characteristics

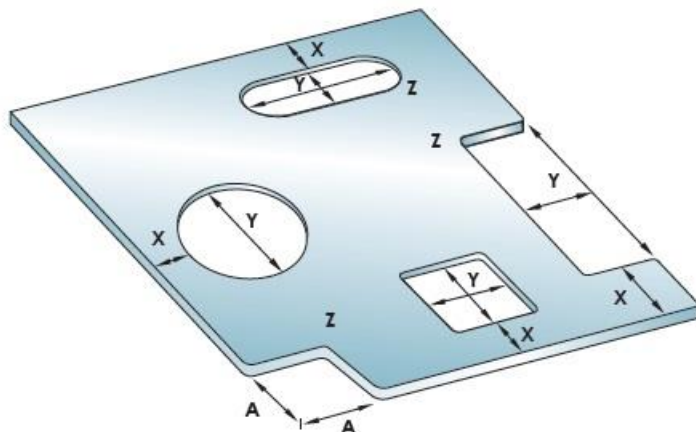
6.1 Hole Guidelines for Toughened Glass



- A: Distance between the holes must be at least 4 x the glass thickness
- B: Diameter of the hole must not be greater than 33% of the panel measurement at the narrowest point
- C: Distance from the edge of the hole to the corner must be 4 x glass thickness
- D: For a hole that is positioned closer than the recommended distance, a saw cut is made to minimise stresses and chance of breakage
- E: Distance from the edge of the glass must be at least 1.5 x thickness 4-6mm glass or 2 x thickness 8-15mm glass

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6.2 Cut out Guidelines for Toughened Glass

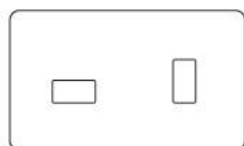


- X: Distance between the holes/cut-outs and/or glass edge must be at least 4 x the glass thickness.
- Y: Height/width of the hole/centre cut-out must not be more than 33% of the glass height/width.
Dimensions of hole/centre cut-out should not be less than the thickness of the glass
- Z: All non-circular centre cut-outs must have a minimum radius of not less than the glass thickness

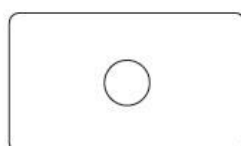
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6.3 Edge & Finish Specifications for Toughened Safety Glass



Power Point Cut Out -
applies to std size - 100mm x 60mm
Central Cut out -
applies to any cut out > 120mm
Oversized Central Cut out -
applies to any cut out > 220mm



Polished Hole
Internal polishing is performed by the CNC machine to create perfectly smooth finishes for exposed holes or slots
Minimum size hole - 40mm



Back Mitre - 22.5° - 45° edge
Back Mitre > 45° edge
Back Mitres are polished



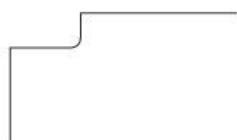
Tipped Corners
Tipped corners are standard for 6 - 10mm glass thickness.



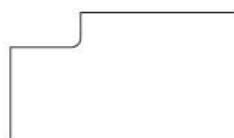
Polished Tipped Corners
Polished Tipped Corners are standard for 12 - 15mm glass.
Maximum 3mm radius



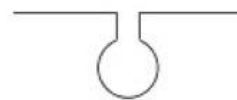
Polished Radius Corners
Polished radius corners > 3mm will incur an additional fee



Corner Cut Out
Internal radius must have a minimum radius of 7mm
Oversized Corner Cut Out -
applies to a corner where one of the dimensions > 400mm



Polished Cut Out
Internal radius must have a minimum radius of 15mm



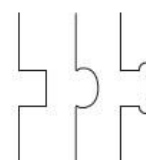
Slotting
Saw Cut as specified in 'Hole Guidelines for Toughened Glass'.



Holes
Minimum diameter not less than glass thickness.
Holes > 85mm will incur an additional fee



Counter Sunk Holes
< 85 mm diameter

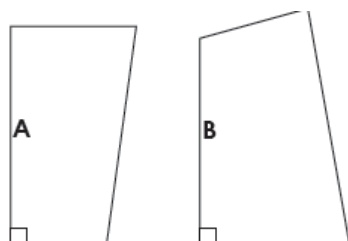


Edge Cut Out
Hinge Edge Cut Outs
Oversized Edge Cut Out
applies to a Hinge Cut Out where one of the dimension > 120mm

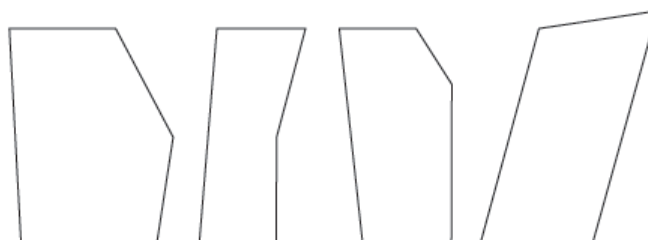
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Simple Shape

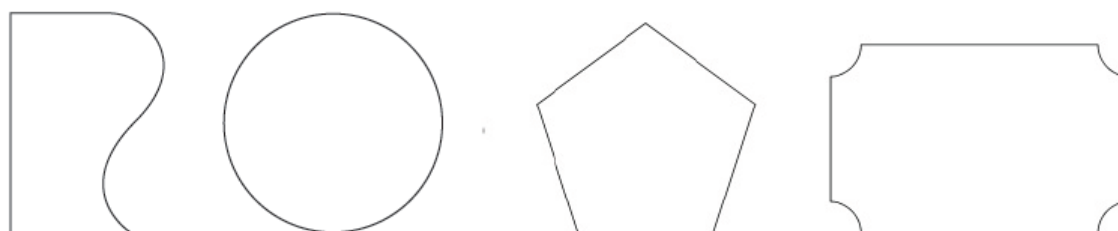


Complex Shape



Multi Complex Shape

An irregular shape that contains curved edges or more than 5 edges



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