TOUGHENED GLASS
DESIGN & GLAZING NOTES

APPLICATIONS

In the event of breakage, toughened glass will fragment into small relatively harmless pieces. However, depending on the method of framing and means of breakage, the fragments may also clump and fall out into larger more potentially hazardous pieces. Further to this, as the glass may fall out of the frame, this could leave no barrier preventing persons or objects from falling through the opening. Toughened glass is recommended for low level glazing in doors, side and low lites, frameless entries, low level balustrading and shower enclosures – refer to Australian Standards AS1288 for guidelines for use of toughened glass.

MANUFACTURING STANDARDS

- 4 to 12mm Grade 'A' safety glass manufactured to AS/NZS 2208-1996 Safety glazing materials in buildings;
- 15 and 19mm toughened glass – AS/NZS 2208 regulates and specifies the processes for testing of toughened safety glass. The principal method of determining the conformance is through a destructive test of a sample which creates fragments to be counted. Each thickness of glass upon breakage must produce a minimum number of fragments to pass. However, the fragment test in AS/NZS 2208 only covers thicknesses up to and including 12mm. There is a notation in the standard under Table 3.3 page14 stating that "There is no reference to particle count for 15mm, 19mm and 25mm due to the lack of scientific data".

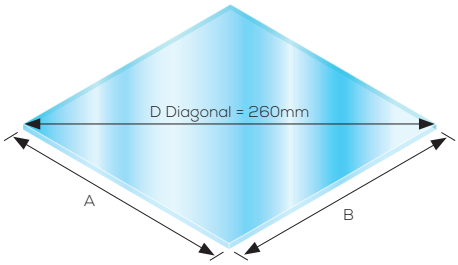
Though the Standard does not specify a fragment count, National Glass still perform a destructive test of a sample to be satisfied it is toughened. The Standard does specify testing for thickness and size tolerances and flatness for all thicknesses including 15mm and 19mm toughened which National Glass performs. As for toughened stamp identification, the glass is marked as toughened only and cannot be marked with AS/NZS 2208 marking;

- Flat automotive 4–12mm manufactured to AS2080:2019 Safety glazing for land vehicles.

SIZE LIMITS*

- Maximum Size – 5050mm x2800mm
- Minimum Size – 260mm measuring across the diagonal or 250mm x100mm for flat ground and polished edges

*subject to glass thickness, types and design specifications.



$A^2 + B^2 = C$

$\sqrt{C} = D$ (Diagonal measurement)

MINIMUM EDGEWORK – Edge finish on toughened glass up to and including 8mm is standard arrised edge. Minimum edge work on greater thicknesses will be a flat ground edge.

SURFACE TREATMENTS – Toughened glass cannot be drilled or edge worked in any manner. Processing after toughening may result in breakage.

VISUAL EFFECTS

BOWING – Slight distortion or bowing may occur after toughening but is largely controllable. It will vary with substance, tint, coating, size and shape of the glass. Ceramic painted, or low-E coated glass has a greater tendency to bow and special tolerances would be advised. Flatness will be measured when the glass is standing on edge with a straight edge placed along the full length of the panel and a wedge measurement taken at the centre position. AS/NZS 2208 Safety glazing material in buildings provides a tolerance guide on acceptable bow.

VISUAL DISTORTION – The furnacing of glass panels can produce slight corrugated distortion or roller waves. This visual effect is in the form of distortion bands 250–300mm apart. It is more noticeable in tinted and reflective toughened glass. It is recommended that the roller wave run horizontal on the glass subject to the sizing constraints of the toughening furnace.

QUENCH PATTERN – During the quenching phase of the toughening process, the glass is rapidly cooled by high velocity blasts of air. Inevitably this results in slightly higher levels of compression at those areas adjacent to the air nozzles. The consequence of this is the occasional appearance of a strain pattern or iridescent spots or darkish shadows. This effect is referred to as the quench pattern as it occurs in the furnace quench. Typically, the pattern is only visible at times of polarised light (polarised sunglasses) or viewing the glass from the inside at acute angles. It can also be seen if glass is wetted or has a layer of dust particles on the surface. These patterns are not considered defects.

PROTECTION WRAPPING – With the exception of low-E coated glass a plastic material wrapping is applied on toughened glass to protect the glass during transport. The plastic wrap should be removed no later than one month after exposure to sunlight.

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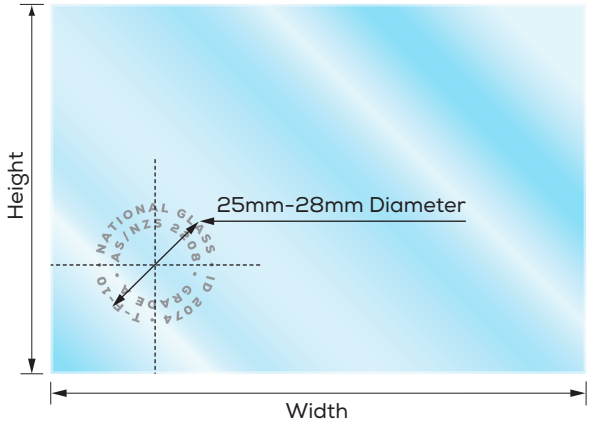
TOUGHENED IDENTIFICATION STAMP

Permanent stamps are located in the default position at the bottom left/right hand corner or special position to customer specification. Please state either glazing (or architectural), automotive or louvre stamps.

No stamp request: AS/NZS 2208:1996 Safety glazing materials in buildings allows for no permanent marking or stamping of glass. To assist with identification a small self-destroying label is attached to all squares of toughened glass that are ordered without a permanent stamp. National Glass labels conform to the requirement under AS/NZS2208 as a non-permanent marking. You may choose to remove the label in your factory or leave to confirm to your client that toughened safety glass has been used.

Stamps in special positions: Please nominate on drawing position of stamp.

ARCHITECTURAL STAMP DETAIL



LOUVRE STAMP DETAIL

3mm x 41mm long stamped on face of glass on short edge

HEAT SOAKING FOR SPONTANEOUS BREAKAGE

The use of toughened glass may involve a relatively small risk of breakage resulting from Nickel Sulphide (NiS) contamination. Nickel is a metallic substance that sometimes contaminates the raw stock of float glass. The Nickel combines with Sulphur during float glass manufacturing to form Nickel Sulphide (NiS) stones. These microscopic stones can cause the spontaneous breakage after toughening of glass, but does not affect ordinary annealed float or annealed laminated glass. A process called Heat Soaking can lessen the chances of spontaneous breakage of toughened glass.

Heat Soaking involves heating toughened glass in a special oven at temperatures close to 260oC for several hours to induce breakages that may be caused by contaminants in the glass. However heat soaking does not guarantee detection of all inclusions or contaminants that may lead to spontaneous breakages. For more details refer to Heat Soaking document in resources section.