AUSTRALIAN GLASS & WINDOW ASSOCIATION

TECHNICAL FACT SHEET
UNFRAMED SHOWER SCREENS

GUIDANCE ON MAXIMUM WIDTH OF UNFRAMED FIXED SHOWER SCREEN PANELS SUPPORTED ON TWO ADJACENT EDGES

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INTRODUCTION

The major design considerations for frameless fixed shower screen applications are:

1. Human impact requirements as per Australian Standard (AS) 1288.
2. Support conditions of the shower screen.

Generally, for these applications toughened glass is used, however for frameless shower screens supported on two adjacent edges, the minimum recommended thickness of toughened glass is 6 mm. It is to be ensured that the glass complies with AS/NZS 2208. Although we have some guidance on glass thickness, unfortunately, it is not clear in AS 1288 how to determine the appropriate panel dimensions to limit unwanted deflection or flex. As panel width increases so does the amount of deflection on the unsupported corner. There is also concerns about the level of stress that could be applied to fixing brackets and silicone joints. This document provides recommendations for a safe panel width for fixed frameless shower screens.

MAXIMUM WIDTH RECOMMENDATIONS

These recommendations have been derived from the Table 1 (page 2) in order to establish an easy-to-use guide for determining suitable glass panel sizes and limit excessive deflection at the free edges.

Table 1 illustrates how panel deflection is not influenced by its height and is governed by its width and glass thickness. For any height, the recommended maximum width for a specific thickness of toughened glass is as follows:

- 6 mm toughened glass panel = 500 mm
- 8 mm toughened glass panel = 750 mm
- 10 mm toughened glass panel = 1500 mm
- 12 mm toughened glass panel = 1500 mm

CALCULATION ASSUMPTIONS

Using finite element analysis, different panel widths have been modelled for various glass thicknesses and panel heights. The various glass thicknesses selected for toughened glass are 6 mm, 8 mm, 10 mm, and 12 mm. This analysis provides an engineering justification to limit the width of an unframed shower screen so as to restrict excessive deflection or flex at the free edge. **Appendix A** (page 3) presents results of the finite element analysis for 10 mm thick toughened glass for a shower panel of 1500 mm width.

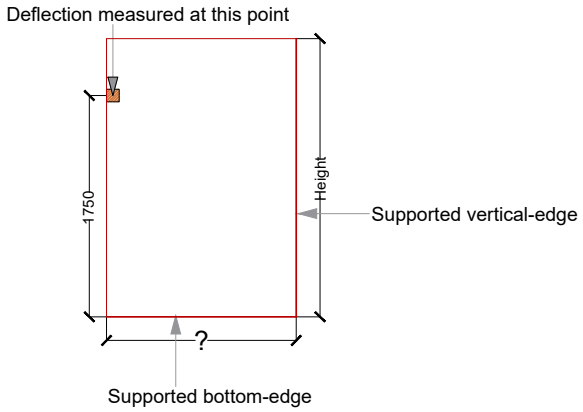

Figure 1 Load location for shower panel supported on two adjacent edges.

The following key assumptions have been used for the finite element modelling:

- **Support Condition**
  One of the key considerations for any shower screen application is the support conditions. Supports for the two adjacent edges are considered to be rigid. By rigid support, it is implied that two adjacent edges need to be mechanically secured/fixed. In cases where it is difficult to have mechanical fixings at the bottom for certain designs, it is recommended to have one of the edges along the vertical to be mechanically fixed into the structure (wall/ stud) and its adjacent edge (along the bottom) to be fixed in place with a silicone. It is recommended that the minimum silicone height by the glass thickness is 3 mm. For all silicone work, surface preparation is critical for long term performance.

- **Load magnitude and location**
  A force of 200 N is applied horizontally at the height of 1750 mm to an area of 0.01 m^2. Load is applied at the free edge. This force magnitude is considered to be representative of a maximum human force that could be applied on the panel during cleaning or maintenance services.

- **Glass type**

  Monolithic toughened glass is assumed for the purpose of this modelling.

- **Width**

  Maximum allowable width of unframed shower panel as shown in **Figure 1** is assumed to be limited to 1500 mm.

- **Deflection**

  Maximum acceptable deflection at free edge is assumed to be 50 mm.

MEASURED DEFLECTION AT VARIOUS WIDTHS

Table 1 provides an overview of the finite element analysis. It illustrates how panel deflection is governed by panel width and glass thickness. One of the findings from the finite element analysis was that the height of the panel did not impact the deflection or flex of the unframed shower screen.

Table 1 Deflection of various panel sizes

Panel Height (mm)	Panel Width (mm)	Panel Deflection According to Toughened Glass Thickness			
		6 mm	8 mm	10 mm	12 mm
1800	1500	118	78	51	32
	1200	105	69	43	26
	900	94	58	33	20
	600	79	42	22	13
2000	1500	118	79	51	32
	1200	105	69	43	26
	900	94	58	33	20
	600	80	42	22	13
2200	1500	118	79	51	32
	1200	105	70	43	26
	900	94	59	33	20
	600	80	42	22	13
2400	1500	118	79	51	32
	1200	105	70	43	26
	900	95	59	33	20
	600	80	42	22	13
2600	1500	120	79	51	32
	1200	106	70	43	26
	900	95	59	33	20
	600	80	42	22	13

NOTES & DISCLAIMERS

a. This document was formulated after conducting a thorough finite element analysis using the software SJ Mepla.

b. AGWA performed analysis for loads at different locations. It was found that with loads applied at lower than 1750 mm position, the deflection measures were reduced by around 12%. Hence, the recommendation is based on load position as shown in **Figure 1** which is conservative and believed to be a safe and practical assumption.

c. This Technical Fact Sheet has been developed to provide general guidance, awareness, and education to AGWA members, stakeholder groups and consumers. It should not be viewed as a definitive guide. While every effort has been made to ensure the information is accurate, the AGWA expressly disclaims all and any liability to any person for anything done in reliance on this publication. No responsibility is accepted by the AGWA for any mistakes, errors or omissions in this publication.

APPENDIX A

MEASURED DEFLECTION OF A FRAMELESS SHOWER PANEL, 1500 MM WIDE BY 2000 MM HIGH

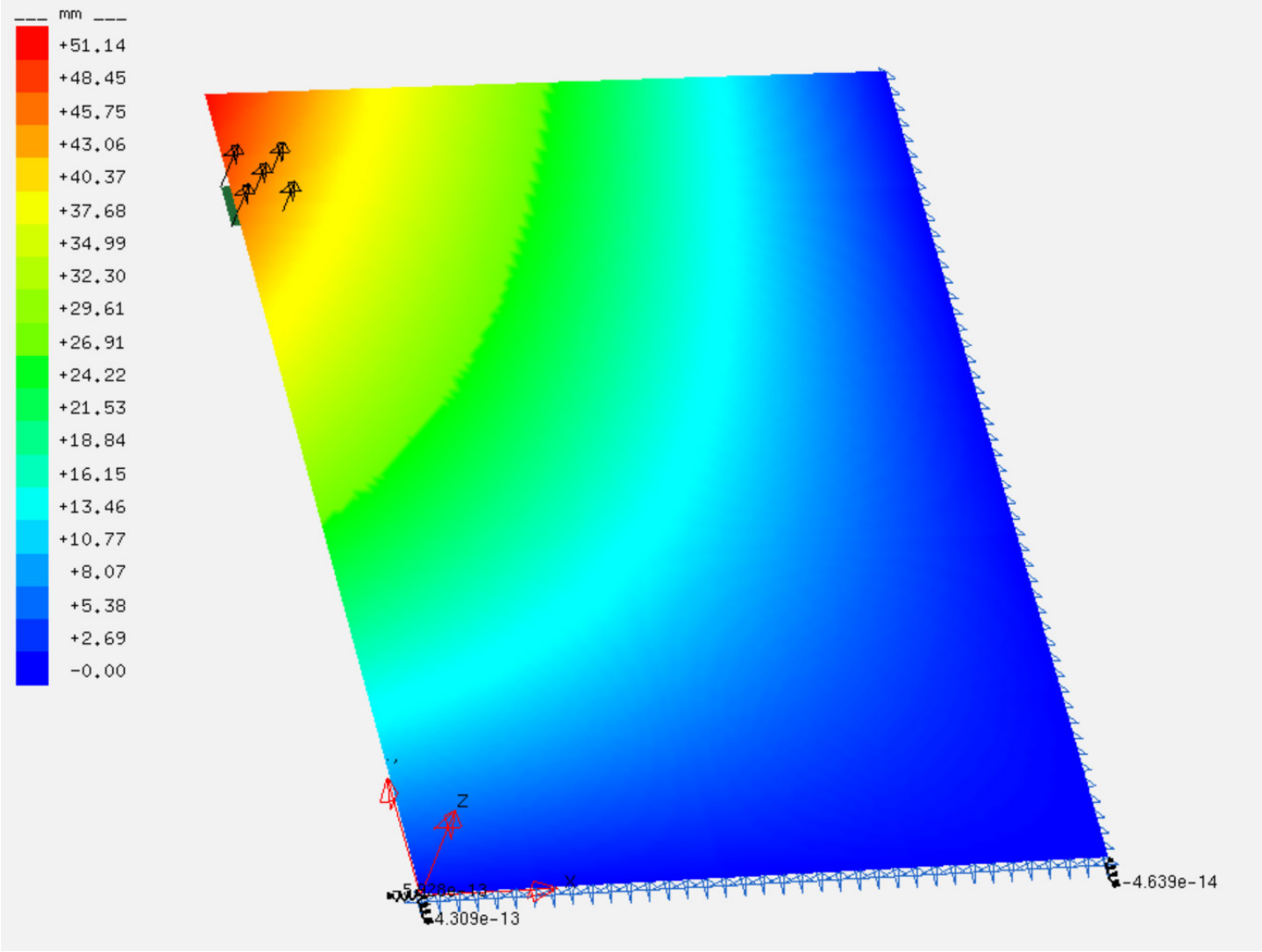

Figure A 10 mm thick panel showing about 50 mm deflection