



Glass Balustrade Load Testing Report	
<b>Report Number:</b>	STS13-0071-01
<b>Client:</b>	The Glass Outlet
<b>Client Contact:</b>	Mr. Richard Van Lieshout & Mr. Luke Keong
<b>Job Description:</b>	Conformance testing of Glass Balustrade to AS/NZS 1170.1-2002
<b>Specifications:</b>	<p><b>'Summit' Nano Top Glaze Frameless Balustrade with Madrid Spigots</b>  <u>Glass Panel (3 off)</u>            Width: 900mm            Height: 970mm            Thickness: 12mm "HEAT SOAKED Toughened Glass"  <u>Spigots (6 off)</u>            Type: Madrid Spigot (MAD-SBP-P)            Material: 2205 Stainless Steel  <u>Hand Rail (1 off)</u>            Section: 25mm x 21mm x 1.2mm            Material: 316L Stainless Steel            Adhesive: Fuller – HBF 660</p>
<b>Test Standard:</b>	<p>AS/NZS 1170.1-2002            Structural Design Actions            Part 1: Permanent, imposed and other actions            Section: 3.6 Barriers            Class: C3 Stairs, landings, external balconies, edges, of roofs etc            AS 1288-2006 –Section 7.2.3 - Handrails Section (c)</p>
<b>Engineers Certification:</b>	<p>Noel F Straker <i>BEng, MEngSc, CPEng, NPER, RPEQ 10652</i></p> <p>Signed:  Date: 1/6/2013</p>
<b>Report Date:</b>	1-6-2013
<div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="width: 30%;">  <p><b>Paul McCarragher</b>            Senior Engineering Technician /            Director</p> </div> <div style="width: 65%;"> <p><b>Scope Testing Services Pty Ltd</b>            16 Willy Lane Mount Crosby            ABN No: 50 282 740 545            Mobile: 0413006692            Phone/Fax: 3201 1384            scopetesting@bigpond.com.au            Accreditation No: 17076</p> </div> </div>	

Note: This report is based on information supplied by the client.

## 1 Test Method

### 1.1 Balustrade Assembly

The balustrade was assembled and fixed to the floor of the Glass Outlet Warehouse with 10mm x 65mm Dyna bolts. The handrail was attached to the glass with Fuller – HBF 660 Adhesive. (Refer Photo 1)



**Photo 1** Balustrade Test Assembly

## 2 Testing

### 2.1 Horizontal Loading (Top Edge)

The handrail was removed from the center panel leaving the center panel self supporting. A rigid steel test beam was placed across the top edge of the center panel to provide a uniformly distributed line load. The load was applied horizontally to the center of the beam and 50mm from the top edge of the panel. The load was applied with a mechanical advantage thread system. The load was monitored with a calibrated load cell. The load was held for a period of 5 minutes. At the completion of the loading the balustrade assembly was inspected for any signs of failure.

(Refer Photo 2)

#### Test Load

AS/NZS 1170.1-2002

Class: C3

Load: 0.75kN/m

Combination Factor: 1.5 (AS/NZS 1170.0 2002 Section 4.2)

Test Load: 101kg x Coefficient of Variation (1.15) as per Table B1 AS/NZS 1170.0-2002

Actual Test Load: 116kg

### 2.2 Vertical Loading (Top Edge)

A rigid steel test beam, complete with a foam rubber insert was placed across the top edge of the center panel. The load was applied vertically to the center of the beam to provide a uniformly distributed line load. The load was applied with a mechanical advantage thread system. The load was monitored with a calibrated load cell. The load was held for a period of 5 minutes. At the completion of the loading the balustrade assembly was inspected for any signs of failure. (Refer Photo 3)

#### Test Load

AS/NZS 1170.1-2002

Class: C3

Load: 0.75kN/m

Combination Factor: 1.5 (AS/NZS 1170.0 2002 Section 4.2)

Actual Test Load: 101kg

### **2.3 Hand Rail Loading (Outwards & Downwards) (Top Edge)**

Outwards and downwards point load were applied to the centre point of the handrail. The load was applied with a mechanical advantage thread system. The load was monitored with a calibrated load cell. The load was held for a period of 2 minutes. (Refer Photo 4-5)

#### **Test Load**

Actual Test Load: 0.6 kN : 60 kg

### **2.4 Hand Rail Loading (Outwards & Downwards) (Middle Panel Removed )**

The middle glass panel was removed from the assembly. The Outwards and downwards point load were applied to the centre point of the handrail. The load was applied with a mechanical advantage thread system. The load was monitored with a calibrated load cell. The load was held for a period of 2 minutes. (Refer Photo 6-7)

Tested as per: AS 1288-2006 –Section 7.2.3 - Handrails Section (c)

#### **Test Load**

Actual Test Load: 0.6 kN : 60 kg

### **2.5 Horizontal Loading (Infill)**

A rigid timber sheet and foam underlay was placed across the front face of the center panel to produce a uniformly distributed load. The load was applied horizontally to the center of the panel. The load was applied with a mechanical advantage thread system. The load was monitored with a calibrated load cell. The load was held for a period of 5 minutes. At the completion of the loading the balustrade assembly was inspected for any signs of failure. (Refer Photo 8)

#### **Test Load**

AS/NZS 1170.1-2002

Class: C3

Load: 1.0 kPa

Combination Factor: 1.5 (AS/NZS 1170.0 2002 Section 4.2)

Actual Test Load: 131 kg

### **2.6 Any Direction (Point Loading)**

The load point was applied horizontally to the center of the panel 150mm from the top edge. The load was applied with a mechanical advantage thread system. The load was monitored with a calibrated load cell. The load was held for a period of 5 minutes. At the completion of the loading the balustrade assembly was inspected for any signs of failure. (Refer Photo 9)

#### **Test Load**

AS/NZS 1170.1-2002

Class: C3

Load: 0.5kN

Safety Factor: 1.5 (AS/NZS 1170.0 2002 Section 4.2)

Actual Test Load: 75kg

### 3 Results

**Table 1 Balustrade Test Results**

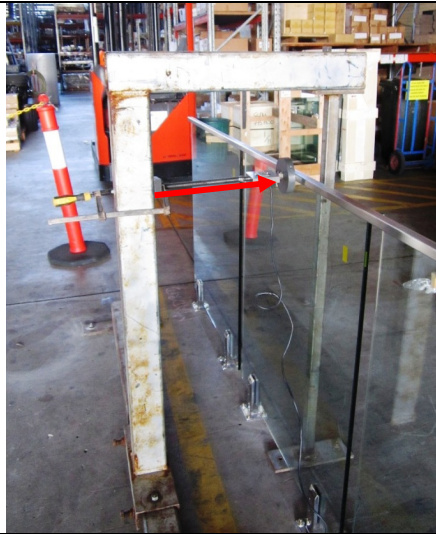
Test		Range of Approval	Result
<b>Test Date: 04-05-2013</b>			
<b>Top Edge</b>	Horizontal Loading	<b>Type A</b> <b>Type B</b> <b>Type E</b> <b>Type C3</b>	<b>PASS</b>
	Vertical Loading		<b>PASS</b>
<b>Hand Rail</b>	Hand Rail Loading - Outwards		<b>PASS</b>
	Hand Rail Loading - Downwards		<b>PASS</b>
<b>Hand Rail No Middle Panel</b>	Hand Rail Loading - Outwards		<b>PASS</b>
	Hand Rail Loading - Downwards		<b>PASS</b>
<b>Infill</b>	Horizontal Loading - 1.0 kPa		<b>PASS</b>
	Any Direction		<b>PASS</b>



**Photo 2** Horizontal Loading



**Photo 3** Vertical Loading



**Photo 4** Hand Rail Loading Outwards



**Photo 5** Hand Rail Loading Downwards

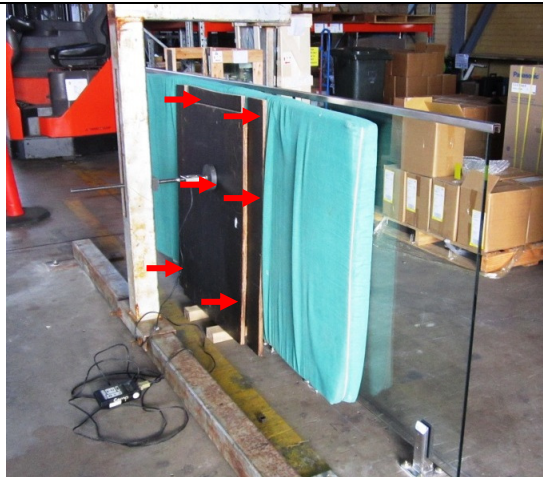


**Photo 6** Hand Rail Loading Outwards with middle panel removed - AS 1288





**Photo 7** Hand Rail Loading Downwards with middle panel removed – AS 1288



**Photo 8** Horizontal Loading (Infill - Wind Loading)



**Photo 9** Any Direction (Point Loading)(Arrow represents actual load location & direction)