




Balustrade Testing Report			
Report Number:	STS16-0052-02		
Client:	Harkk		
Client Contact:	Mr. Dave Willmott – Operations Manager		
Job Description:	Conformance testing of Aluminum Balustrade to AS/NZS 1170.1-2002		
Description:	Harkk View Balustrade (Refer Page 2 for full Balustrade Specifications)		
Test Standard:	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 and below		
Equipment:	1000kg Load Cell – Serial No: 184320 – Calibration Certificate: Q.AC/10005-H-2		
RESULT:	PASS		
Test Date:	08-03-2016		
Report Date:	17-03-2016		
 Paul McCarragher Senior Engineering Technician / Director		Scope Testing Services Pty Ltd 16 Willy Lane Mount Crosby ABN No: 50 282 740 545 Mobile: 0413006692 Phone/Fax: 3201 1384 scopetesting@bigpond.com.au Accreditation No: 17076	
		 Accreditation compliance ISO/IEC 17025.	

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

<p>Specifications:</p>	<p>Harkk View Balustrade <u>Balustrade (3 Panel assembly)</u> Overall Length: 4500mm Overall Height:1810mm <u>Glass Panel (3 off)</u> Width: 1454mm Height: 1695mm Thickness: 10mm HEAT SOAKED Toughened Glass (or equivalent to AS 1288-2006) <u>Posts (4 off)</u> Type: Oval Extrusion Dimensions: 100mm x 74mm Mounting: Base Plate Mounted Welding: 12mm 3 Rung Fillet Base Plate Dimensions: 125mm x 125mm x 10mm Material: Aluminum Grade 6060 T6 <u>Hand Rail</u> Section: Oval Extrusion Dimensions: 67mm x 33mm Material: Aluminum Grade 6060 T6 Section: Hollow Section Dimensions: Ø50mm – Welded to Stainless Steel Bracket Material: Stainless Steel Section: Hollow Section Dimensions: Ø50mm – Riveted to Stainless Steel Bracket Material: Stainless Steel <u>Fixing Details</u> Concrete Substrate: HILTI – HUS3-HF 10 h_nom3 – 10mm x 50mm Concrete requirement 20MPa Minimum (actual concrete test strength 38 to 44MPa) Steel Fixing: M10 x 50mm Grade 4.6 galvanized hex set screws Timber Fixing: 316 Stainless Steel M10 x 100mm CSK-100</p>
	
<p>Photo 1</p>	<p>Balustrade Assembly</p>

1 Test Method

1.1 Balustrade Assembly

The balustrade was assembled in a three panel assembly and fixed to the Harkk factory floor. A single panel Steel Fixed and Timber fixed assemblies were also fixed to the Harkk factor floor. The Steel fixed and Timber fixed assemblies were tested to prove the suitability of the balustrade in both Steel and Timber fixings.

2 Testing

2.1 Horizontal Loading (Top Edge)

A rigid timber test beam was placed across the balustrade panel at a height of 1100mm to provide a uniformly distributed line load. The load was applied horizontally to the center of the test beam. The load was applied with a mechanical advantage thread system. The load was monitored with 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, 8, 9)

*Note: The test load was applied at a height of 1100mm to replicate true in services crowd loading point.

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: X Coefficient of Variation (1.20) as per Table B1 AS/NZS 1170.0-2002

Actual Test Load: 200kg

2.2 Vertical Loading (Top Edge)

A rigid timber test beam was placed across the top edge of the center balustrade panel. The load was applied vertically to the center of the test 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)

Test Load: x Coefficient of Variation (1.20) as per Table B1 AS/NZS 1170.0-2002

Actual Test Load: 200kg

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

Outwards and downwards point loads were applied to 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 5 minutes. (Refer Photo 4-5-12-13)

Test Load

Load: 0.6kN

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

Test Load: x Coefficient of Variation (1.20) as per Table B1 AS/NZS 1170.0-2002

Actual Test Load: 110kg

2.4 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 6-9-11)

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)

Test Load: Coefficient of Variation (1.20) as per Table B1 AS/NZS 1170.0-2002

Test Load: 445kg

2.5 Any Direction (Point Loading)

The load point was applied horizontally to the center balustrade 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 7)

Test Load

AS/NZS 1170.1-2002

Class: C3

Load: 0.5kN

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

Test Load: x Coefficient of Variation (1.20) as per Table B1 AS/NZS 1170.0-2002

Actual Test Load: 92kg

3 Results

Table 1 Balustrade Test Results

Test		Range of Approval	Result
Test Date: 08-03-2016			
Top Edge	Horizontal Loading	Type A Type B Type E Type C3	PASS
	Vertical Loading		PASS
Hand Rail	Hand Rail Loading - Outwards		PASS
	Hand Rail Loading - Downwards		PASS
Infill	Horizontal Loading		PASS
Point Loading	Any Direction		PASS



Photo 2 Horizontal Loading



Photo 3 Vertical Loading



Photo 4 Hand Rail Loading Outwards



Photo 5 Hand Rail Loading Downwards



Photo 6 Infill Horizontal Loading – Wind Loading



Photo 7 Any Direction (Point Loading)



Photo 8 Horizontal Loading – Steel Fixed



Photo 9 Wind Loading – Steel Fixed



Photo 10 Horizontal Loading – Timber Fixed



Photo 11 Wind Loading – Timber Fixed



Photo 12 Hand Rail Loading Outwards & Downwards - Welded to Stainless Steel Bracket



Photo 13 Hand Rail Loading Outwards & Downwards – Riveted to Stainless Steel Bracket