

TEST REPORT

Lucideon Reference: 163112 (QT40025/1/SL)/Ref. 2

Project Title: Load Testing of FH Brundle Marano System, Comprising of 2 Uprights with Rectangular Bases, Handrail and 10 mm Thick Toughened Glass, to BS 6180:2011

Client: FH Brundle
Unit 6, Dorset Road
Saltley Business Park
Saltley
Birmingham
B8 1BG

For the Attention of: Mr Danny Hull

Author(s): Mr Dave Boon

Report Date: 20 December, 2016

Purchase Order No.: 361614

Work Location: Lucideon UK



Mr Dave Dix
**Consultancy Team
Reviewer**



Mr Dave Boon
**Consultancy Team
Project Manager**



CONTENTS

	Page
1 INTRODUCTION	3
2 SAMPLES RECEIVED	3
3 TEST METHOD	3
4 RESULTS	3
TABLES	5-6
PLATE	7
CHART	8
APPENDIX A - Drawing	

1 INTRODUCTION

Lucideon Limited were commissioned by the client, FH Brundle to carry out load testing in accordance with BS 6180:2011 Barriers in and about buildings, and EC1-1991-1-1:2002 UK National Annex to Eurocode 1: Actions on structures – Part 1-1: General actions - Densities, self-weight, imposed loads for buildings. This will allow their balustrade system to be classified for use in accordance with the Code of Practice included within the standard.

The system tested was referred to as T ~~ææ~~ [consisting of posts, handrail and toughened glass panel.

The testing was carried out at the Lucideon Laboratories located in Queens Road, Stoke-on-Trent.

This report summarises the test result obtained during the test and does not provide interpretation of those results.

2 SAMPLES RECEIVED

2 Posts nominally 1100 mm tall (including base thickness) and manufactured from 50 mm x 50 mm square aluminium with rectangular base.

Shuffle glazed with 10 mm toughened safety glass and fitted with an oval aluminium top rail.

Posts set at 1200 mm centres.

1 box of Fischer 040950 FBN II 12 X 105 Zinc Plated Fixings.

The T ~~ææ~~ [system is shown in the Figure in the Appendix.

3 TEST METHOD

The 2 posts were bolted to the top surface of a concrete substrate at 1200 mm centres.

Plate 2 shows the load arrangement.

A horizontal imposed line load was applied to the handrail at a height of 1.1 m above the datum level of the floor and the deflection measured at the top central point of the handrail 1.1 m above the datum level of the floor. The load was applied via a hydraulic ram and the deflection measured using a digital electronic displacement transducer (see Plate 1).

4 RESULTS

The tests were carried out in accordance with the guidance given in BS 6180 Barriers in and about buildings – Code of Practice. The standard states that the maximum allowable deflection for a free standing glass protective barrier panel is 25 mm.



Table 2 of BS 6180 Barriers in and about buildings – Code of Practice categorises parapets, barriers and balustrades for areas of use depending on the loads they have achieved under testing.

The load versus deflection curve for the FH Brundle Tææ [system with the load applied as a line load across the top handrail is shown in Chart 1.

The loads achieved by the FH Brundle Tææ [system under horizontal imposed line load to the maximum deflection of 25 mm is given in Table 1.

All figures quoted in the Tables contain no safety factors and are direct loads as achieved by the system under test conditions.

Tables 2 and 3 summarise the suitability of the tested systems in accordance with Table 2 of BS 6180:2011.

NOTE: The results given in this report apply only to the samples that have been tested.

END OF REPORT



TABLES

Table 1 - Summary of Performance of FH Brundle Marano System with Load Applied to Top Rail at 1200 mm Post Centres

Detail	Imposed Line Load at 25 mm Deflection (kN/m)	Expected Working Line Load for System (kN/m)	Deflection at Working Line Load for System (mm)	Achieved Classification (kN/m)
Marano System with rectangular base, handrail and 10 mm toughened glass	1.73	1.50	19.94	1.5

Table 2 - Summary of Suitability of FH Brundle Marano System with Load Applied to Top Rail, at 1200 mm Post Centres

Type of Occupancy for Part of the Building	Examples of Specific Use	Horizontal Uniformly Distributed Line Load (kN/m)	Marano System (Rectangular Base on Posts)
Domestic and residential activities	(i) all areas within or serving exclusively one single family dwelling including stairs, landings, etc. but excluding external balconies and edges of roofs	0.36	
	(ii) other residential, i.e. houses of multiple occupancy and balconies, including Juliette balconies and edges of roofs in single family dwellings	0.74	
Offices and work areas not included elsewhere, including storage areas	(iii) light access stairs and gangways not more than 600 mm wide	0.36	
	(iv) light pedestrian traffic routes in industrial and storage buildings except designated escape routes	0.36	
	(v) areas not susceptible to overcrowding in office and institutional buildings, also industrial and storage buildings except as given above	0.74	
Areas where people might congregate	(vi) areas having fixed seating within 530 mm of the barrier, balustrade or parapet	1.50	
Areas with tables or fixed seating	(vii) restaurants and bars	1.50	



Table 2 (Continued)

Type of Occupancy for Part of the Building	Examples of Specific Use	Horizontal Uniformly Distributed Line Load (kN/m)	Marano System (Rectangular Base on Posts)
Areas without obstacles for moving people and not susceptible to overcrowding	(viii) stairs, landings corridors ramps	0.74	
	(ix) external balconies including Juliette balconies and edges of roofs; footways and pavements within building cartilage adjacent to basement/sunken areas	0.74	
Areas susceptible to overcrowding	(x) footways or pavements less than 3 m wide adjacent to sunken areas	1.50	
	(xi) theatres, cinemas, discotheques, bars, auditoria, shopping malls, assembly areas, studios; footways or pavements greater than 3 m wide adjacent to sunken areas	3.00	X
	(xii) grandstands and stadia	(Note A)	-
Retail areas	(xiii) all retail areas including public areas of banks/building societies or betting shops	1.50	
Vehicular	(xiv) pedestrian areas in car parks, including stairs, landings, ramps, edges of internal floors, footways, edges of roofs	(Note B)	X
	(xv) horizontal loads imposed by vehicles	(Note B)	-

Note A - See requirements of the appropriate certifying authority.

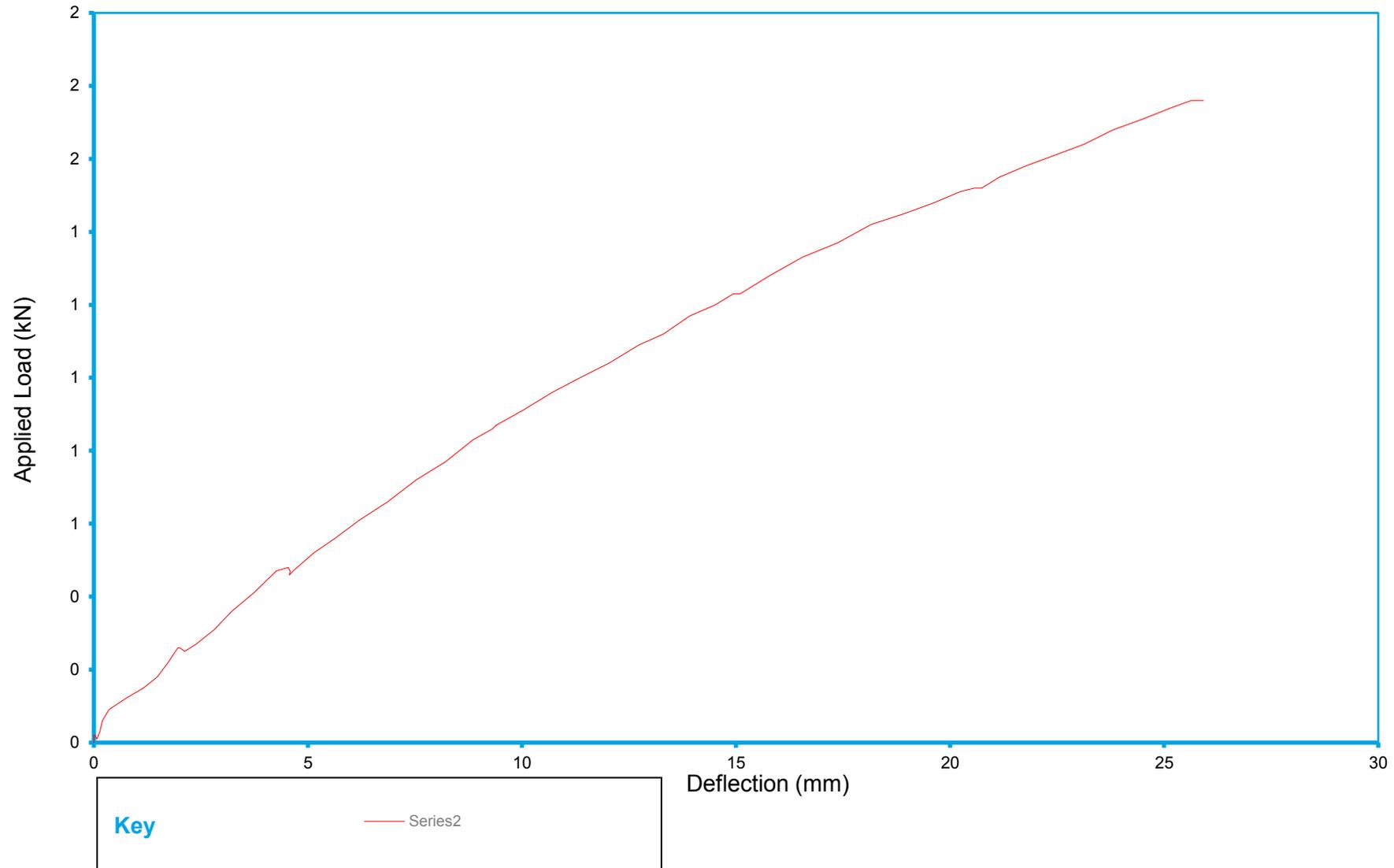
Note B - See Appendix A of BS 6180:2011.

PLATE

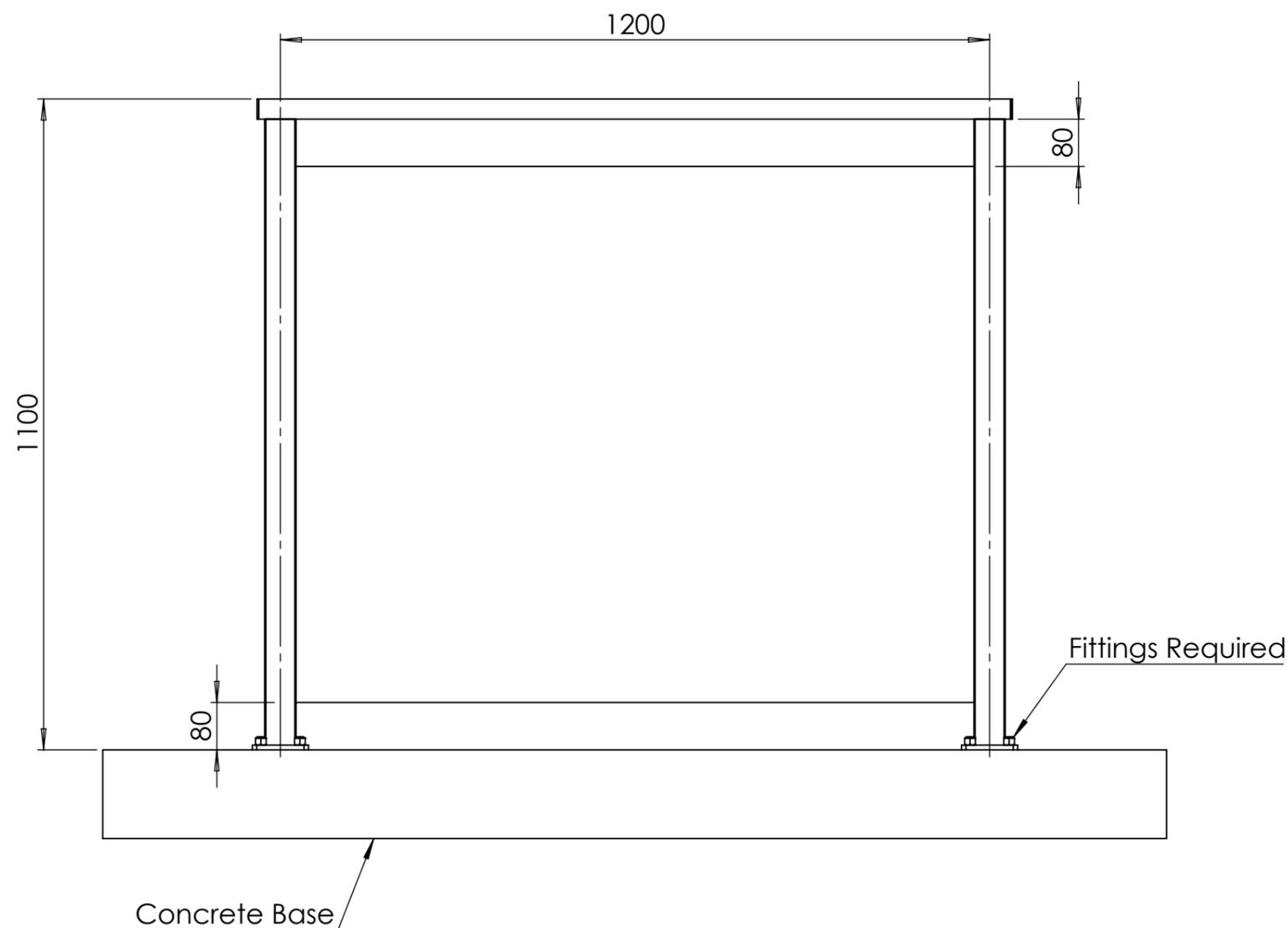
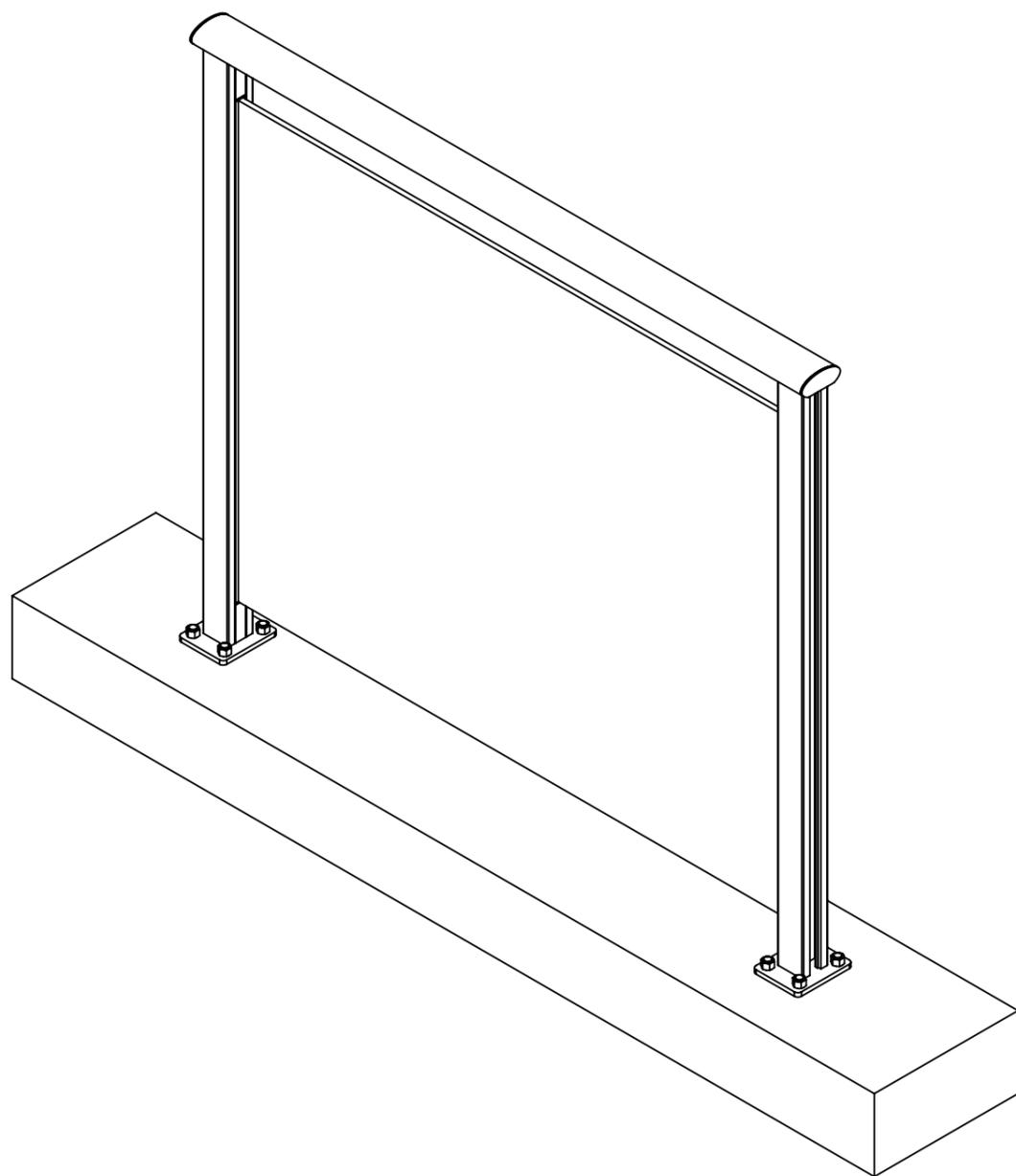


Plate 1 - Test Arrangement

Chart 1 - Load v Deflection for FH Brundle Tera [System, Incorporating 2 Posts 1100 mm Tall with Rectangular Bases, Shuffe Glazed with 10 mm Toughened Safety Glass and Fitted with Oval Aluminium Rail, Line Load applied 1100 mm from Base of Concrete



BS Standard	Fixed Into	Glass	Loading	Hole Size	Fixings Needed	Notes
BS6180:2011 and EC1-1991-1-1:2002	Concrete	10mm toughened glass	1.5kn	12mm	040950 - FBN II 12 X 105 - Zinc Plated	Trying to achieve 1.5kn at the fixed 1200mm post centres



FH BRUNDLE

Tel: 01708 253545
 Email: sales@brundle.com
 Web: www.fhbrundle.co.uk

NOTES:
 Technical Information Drawing - Not To Be Supplied To Customers

DESCRIPTION:
 Marano General arrangement of tested system

PART NO:
 N/A

DWG NO:
 0001-001-001

A3



UNLESS OTHERWISE SPECIFIED
 ALL DIMENSIONS ARE IN MILLIMETERS

MATERIAL:
 N/A

FINISH:
 N/A

GRIT SIZE:
 N/A

WEIGHT: N/A

	NAME	DATE	REVISION
DRAWN	GC	13/12/2016	
CHECKED			A