

TEST REPORT

Lucideon Reference: UK211035 (QT-62816/2/JB)/Ref. 2A

Project Title: Testing of Post and Rail Barrier to BS 6180:2011 Barrier with Glass Infill

Client: FH Brundle
81/82 Middlemore Industrial Estate
Middlemore Road
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For the Attention of: Mr Danny Hull

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Work Location: Lucideon UK



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1 INTRODUCTION

FH Brundle design and manufacture balustrades and barrier components to be used as architectural features in new and existing buildings. As part of their product development they required an extensive programme of testing to determine their product’s performance in accordance with British and other European Standards.

2 SAMPLES AND TESTING

A range of Barriers with Glass Infill Panels were to be tested in accordance with BS 6180:2011 - Barriers In and About Buildings – Code of Practice. Testing included a Horizontal Line Load to the Handrail, a UDL to the Glass Infill and a Point Load to the Glass Infill.

Other testing was in the form of horizontal and vertical shear load testing to various glass infill clamps.

The obsolete Standard (but still referred to) BS 6399-1:1996 Loading for Buildings — Part 1: Code of Practice for Dead and Imposed Loads, Section 10, states that a vertical load should be either a concentrated load of 1 kN, or a uniformly distributed load of 0.6 kN/m. Further, it states that horizontal imposed loads should be as detailed in Table 4 of that Standard.

FH Brundle stated that the aim was to establish that the resistance to imposed load failure for a single clamp was a minimum of 0.75 N (based on a barrier infill design containing 4 clamps).

Table 1 - List of Samples and Associated Test Numbers

Reference	Test	Sample	Standard
A	1a	Line Load - Timeless Square Post - Square Clamps – 10 mm Toughened Glass	BS 6180
	1b	UDL - Timeless Square Post - Square Clamps – 10 mm Toughened Glass	
	1c	Point Load - Timeless Square Post - Square Clamps – 10 mm Toughened Glass	
	2a	Line Load - Timeless Square Post – Square & D Clamps – 15 mm Toughened Glass	
	2b	UDL - Timeless Square Post – Square & D Clamps – 15 mm Toughened Glass	
	2c	Point Load - Timeless Square Post – Square & D Clamps – 15 mm Toughened Glass	
	3a	Line Load - Timeless Round Post - D Clamps – 10 mm Toughened Glass	
	3b	UDL - Timeless Round Post - D Clamps – 10 mm Toughened Glass	
	3c	Point Load - Timeless Round Post - D Clamps – 10 mm Toughened Glass	

Reference	Test	Sample	Standard
	4a	Line Load - Timeless Round Post - Black Aluminium D Clamps – 10 mm Toughened Glass	
	4b	UDL - Timeless Round Post - Black Aluminium D Clamps – 10 mm Toughened Glass	
	4c	Point Load - Timeless Round Post - Black Aluminium D Clamps – 10 mm Toughened Glass	

3 TEST ARRANGEMENT

A concrete block of dimensions 2300 mm (L) x 900 mm (W) x 500 mm (H) was fastened to the laboratory strong-floor. The concrete was C35 with glass fibres and aggregate size of 20 mm.

Representatives from FH Brundle (the client) fitted the systems under test to the concrete block, ready for testing. Lucideon fitted the test equipment in place and conducted the testing.

The Timeless Square Post and Timeless Round Post Barrier Systems were fitted to the top surface of the concrete block.

Each different type and thickness of glass infill to be tested was fixed, in turn, into the barrier systems.

4 TEST METHOD

In accordance with BS 6180, testing requirements include a Horizontal Line Load to the Barrier Handrail, a Uniformly Distributed Load (UDL) to the Barrier Infill and a Point Load to the Infill. Testing to UNI 10806:1999 was not conducted.

4.1 Horizontal Line-Load

A hardwood spreader beam was placed at a distance of 1100 mm from the finished floor height to simulate a uniformly distributed horizontal line-load.

A reaction frame consisting of 2 No. steel stanchions and a steel cross-member was fastened to the laboratory strong-floor such that a ram could be clamped to the steel cross-member at the same height as the hardwood spreader.

A 5 kN calibrated load cell was attached to the hydraulic ram by way of a steel cage, to measure the load during testing.

A calibrated Linear Voltage Displacement Transducer (LVDT), to measure the deflection, was attached to the opposite side of the glass panel as the load was applied in the centre width of the panel at 1100 mm from the finished floor height. The LVDT's were positioned at 1100 mm from the finished floor height.



For BS 6180 a load was steadily applied up to each loading increment, or until a deflection of 25 mm at the standard height of 1100 mm was reached as highlighted within BS 6180. The load at the last increment was then recorded.

It should be noted that the result values in Table 3 are expressed as kN/m. Therefore, for a barrier length of 1200 mm (between supports), the kN reading from the load cell has been divided by a factor representing the length of the barrier (1.2), to obtain the kN/m value.

4.2 UDL to the Glass Infill

A reaction frame was positioned over the glass infill. An additional calibrated (LVDT) was fitted to the test system to measure the deflections.

The LVDT's were positioned on the handrail and also the geometric centre of the glass infill. In accordance with BS 6180, the displacement at any point of the barrier should not exceed $L/65$ or 25 mm, whichever is the smaller.

Since the distance between the barrier supports (L) was 1200 mm, the maximum allowable deflection was calculated as 18.46 mm.

It should be noted that the result values in Table 4 are expressed as kN/m^2 . Therefore, the kN reading from the load cell has been divided by a factor representing the area of the glass infill, to obtain the kN/m^2 value.

4.3 Point Load

As with the UDL, the LVDT's were positioned on the handrail and also the geometric centre of the glass infill. In accordance with BS 6180, the displacement at any point of the barrier should not exceed $L/65$ or 25 mm, whichever is the smaller.

The testing was conducted using the same testing infrastructure as used for the horizontal line load.

The point load was applied via a wooden block approximately 50 mm x 50 mm x 30 mm depth, to the geometric centre of the glass infill.

It should be noted that the result values in Table 4 are expressed as kN. Therefore, the kN reading from the load cell has been reported.



5 RESULTS

Refer to Tables 2-4, Charts 1-4, Plates 1-11, the parts list in Table 5 and the Client's Drawings as follows:

- TR11-010-001 – Test 1.
- TR11-011-001 – Test 2.

It should be noted that for Test 2, the client made the decision to mix the clamps such that one end of the infill was secured with 2 off large D clamps and the other end of the infill was secured with 2 off large square clamps.

- TR11-012-001 – Test 3 and 4.

It should be noted that for Test 4, the 4 off D clamps were type 1805401DB.

It should also be noted that no testing to UNI 10806:1999 was carried out.

TABLES

Table 2 – BS 6180 Results – Timeless Square Post Barrier with Glass Infill Panel – Refer to Parts List in Table 5

Type of Occupancy for Part of the Building	Examples of Specific Use	Horizontal Uniformly Distributed Line Load (kN/m)	Uniformly Distributed Load Applied to the Infill (kN/m ²)	Point Load Applied to Part of the Infill (kN)	Timeless Square Post Barrier	
					10 mm Toughened Glass	15 mm Toughened Glass
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	0.50	0.25	✓	✓
	(ii) other residential, i.e. houses of multiple occupancy and balconies, including Juliette balconies and edges of roofs in single family dwellings	0.74	1.00	0.50	✓	✓
Offices and work areas not included elsewhere, including storage areas	(iii) light access stairs and gangways not more than 600 mm wide	0.22	-	-	✓	✓
	(iv) light pedestrian traffic routes in industrial and storage buildings except designated escape routes	0.36	0.50	0.25	✓	✓
	(v) areas not susceptible to overcrowding in office and institutional buildings, also industrial and storage buildings except as given above	0.74	1.00	0.50	✓	✓



Type of Occupancy for Part of the Building	Examples of Specific Use	Horizontal Uniformly Distributed Line Load (kN/m)	Uniformly Distributed Load Applied to the Infill (kN/m ²)	Point Load Applied to Part of the Infill (kN)	Timeless Square Post Barrier	
					10 mm Toughened Glass	15 mm Toughened Glass
Areas where people might congregate	(vi) areas having fixed seating within 530 mm of the barrier, balustrade or parapet	1.50	1.50	1.50	X	X
Areas with tables or fixed seating	(vii) restaurants and bars	1.50	1.50	1.50	X	X
Areas without obstacles for moving people and not susceptible to overcrowding	(viii) stairs, landings corridors ramps	0.74	1.00	0.50	✓	✓
	(ix) external balconies including Juliette balconies and edges of roofs; footways and pavements within building cartilage adjacent to basement/sunken areas	0.74	1.00	0.50	✓	✓
Areas susceptible to overcrowding	(x) footways or pavements less than 3 m wide adjacent to sunken areas	1.50	1.50	1.50	X	X
	(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	1.50	1.50	X	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	1.50	1.50	X	X
Vehicular	(xiv) pedestrian areas in car parks, including stairs, landings, ramps, edges of internal floors, footways, edges of roofs	1.50	1.50	1.50	X	X

Type of Occupancy for Part of the Building	Examples of Specific Use	Horizontal Uniformly Distributed Line Load (kN/m)	Uniformly Distributed Load Applied to the Infill (kN/m ²)	Point Load Applied to Part of the Infill (kN)	Timeless Square Post Barrier	
					10 mm Toughened Glass	15 mm Toughened Glass
	(xv) horizontal loads imposed by vehicles	(Note B)	-	-	-	-

*Note A) See requirements of the appropriate certifying authority.

*Note B) See Annex A (of BS 6180).

Table 3 – BS 6180 Results – Timeless Round Post Barrier with Glass Infill Panel – Refer to Parts List in Table 5

Type of Occupancy for Part of the Building	Examples of Specific Use	Horizontal Uniformly Distributed Line Load (kN/m)	Uniformly Distributed Load Applied to the Infill (kN/m ²)	Point Load Applied to Part of the Infill (kN)	Timeless Round Post Barrier	
					10 mm Toughened Glass	10 mm Toughened Glass – Black Aluminium D Clamps
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	0.50	0.25	✓	✓
	(ii) other residential, i.e. houses of multiple occupancy and balconies, including Juliette balconies and edges of roofs in single family dwellings	0.74	1.00	0.50	✓	✓



Type of Occupancy for Part of the Building	Examples of Specific Use	Horizontal Uniformly Distributed Line Load (kN/m)	Uniformly Distributed Load Applied to the Infill (kN/m ²)	Point Load Applied to Part of the Infill (kN)	Timeless Round Post Barrier	
					10 mm Toughened Glass	10 mm Toughened Glass – Black Aluminium D Clamps
Offices and work areas not included elsewhere, including storage areas	(iii) light access stairs and gangways not more than 600 mm wide	0.22	-	-	✓	✓
	(iv) light pedestrian traffic routes in industrial and storage buildings except designated escape routes	0.36	0.50	0.25	✓	✓
	(v) areas not susceptible to overcrowding in office and institutional buildings, also industrial and storage buildings except as given above	0.74	1.00	0.50	✓	✓
Areas where people might congregate	(vi) areas having fixed seating within 530 mm of the barrier, balustrade or parapet	1.50	1.50	1.50	X	X
Areas with tables or fixed seating	(vii) restaurants and bars	1.50	1.50	1.50	X	X
Areas without obstacles for moving people and not susceptible to overcrowding	(viii) stairs, landings corridors ramps	0.74	1.00	0.50	✓	✓
	(ix) external balconies including Juliette balconies and edges of roofs; footways and pavements within building cartilage adjacent to basement/sunken areas	0.74	1.00	0.50	✓	✓
Areas susceptible to overcrowding	(x) footways or pavements less than 3 m wide adjacent to sunken areas	1.50	1.50	1.50	X	X



Type of Occupancy for Part of the Building	Examples of Specific Use	Horizontal Uniformly Distributed Line Load (kN/m)	Uniformly Distributed Load Applied to the Infill (kN/m ²)	Point Load Applied to Part of the Infill (kN)	Timeless Round Post Barrier	
					10 mm Toughened Glass	10 mm Toughened Glass – Black Aluminium D Clamps
	(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	1.50	1.50	X	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	1.50	1.50	X	X
Vehicular	(xiv) pedestrian areas in car parks, including stairs, landings, ramps, edges of internal floors, footways, edges of roofs	1.50	1.50	1.50	X	X
	(xv) horizontal loads imposed by vehicles	(Note B)	-	-	-	-

*Note A) See requirements of the appropriate certifying authority.

*Note B) See Annex A (of BS 6180).

Table 4 – Results - Horizontal Line Load Applied at 1100 mm from the Finished Floor Height BS 6180
Test Date: 24 March 2021

Test	1	2	3	4
Barrier Type	Timeless Square Posts	Timeless Square Posts	Timeless Round Posts	Timeless Round Posts
Barrier Length (between supports)	1200 mm	1200 mm	1200 mm	1200 mm
Glass Infill Type	10 mm Toughened Glass	15 mm Toughened Glass	10 mm Toughened Glass	10 mm Toughened Glass
Size of Glass Infill (mm)	1100 (L) x 900 (H)	1087 (L) x 900 (H)	1100 (L) x 900 (H)	1100 (L) x 900 (H)
Glass Clamp Type	4 x Square	2 x Large Square + 2 x Large D	4 x D	4 x Black Aluminium D
Horizontal Line Load (a)				
Deflection at 0.36 kN/m (mm)	8.07	9.37	8.39	9.80
Deflection at 0.74 kN/m (mm)	25.00	21.16	23.01	20.33
Load at 25 mm deflection (kN/m)	0.74	0.83	0.78	0.94
UDL to Infill (b)				
Deflection at 0.5 kN/m ² (mm)	4.87	5.00	5.08	4.60
Deflection at 1.0 kN/m ² (mm)	10.16	9.66	9.48	8.44
Deflection at 1.5 kN/m ² (mm)	14.85	13.43	14.04	12.46
Point Load (c)				
Deflection at 0.25 kN (mm)	2.04	2.91	1.94	2.37
Deflection at 0.5 kN (mm)	4.67	4.89	4.43	4.77
Deflection at 1.5 kN (mm)	14.79	14.06	13.83	12.95

Table 5 – Parts List

Test	Item	FH Brundle Part Number	Quantity (per test)
1	Timeless Square End Post	1806731S40	2
	Adjustable Spigot Saddle	1806312S40C	2
	Stainless Steel Tube (42.4 mm x 1500 mm)	1806708CXL	1
	M8 x 75 mm Concrete Screw	5002HCS875	4
	Square Clamps	1806442F	4
	10 mm Toughened Glass	1855101100900	1
2	Timeless Square End Post	1806731S40	2
	Adjustable Spigot Saddle	1806312S40C	2
	Stainless Steel Tube (42.4 mm x 1500 mm)	1806708CXL	1
	M8 x 75 mm Concrete Screw	5002HCS875	4
	Large Square Clamps	1806445F	2
	Large D Clamps	1806440F	2
	15 mm Toughened Glass	1855159001087	1
3	Timeless Round End Post	1806791D	2
	Adjustable Spigot Saddle	1806312DD	2
	Stainless Steel Tube (48.3 mm x 1500 mm)	1806708DXL	1
	M8 x 75 mm Concrete Screw	5002HCS875	8
	D Clamps	1806401D	4
	10 mm Toughened Glass	1855101100900	1
4	Timeless Round End Post	1806791D	2
	Adjustable Spigot Saddle	1806312DD	2
	Stainless Steel Tube (48.3 mm x 1500 mm)	1806708DXL	1
	M8 x 75 mm Concrete Screw	5002HCS875	8
	Black Aluminium D Clamps	1805401DB	4
	10 mm Toughened Glass	1855101100900	1

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

END OF REPORT

PLATES



Plate 1 – Test 1a – Timeless Square Posts – 10 mm Toughened Glass
– Horizontal Line Load – Load Application Side



Plate 2 – Test 1a – Timeless Square Posts – 10 mm Toughened Glass
– Horizontal Line Load - Deflection Measurement Side



Plate 3 – Test 1c – Timeless Square Posts – 10 mm Toughened Glass
– Point Load – Load Application Side

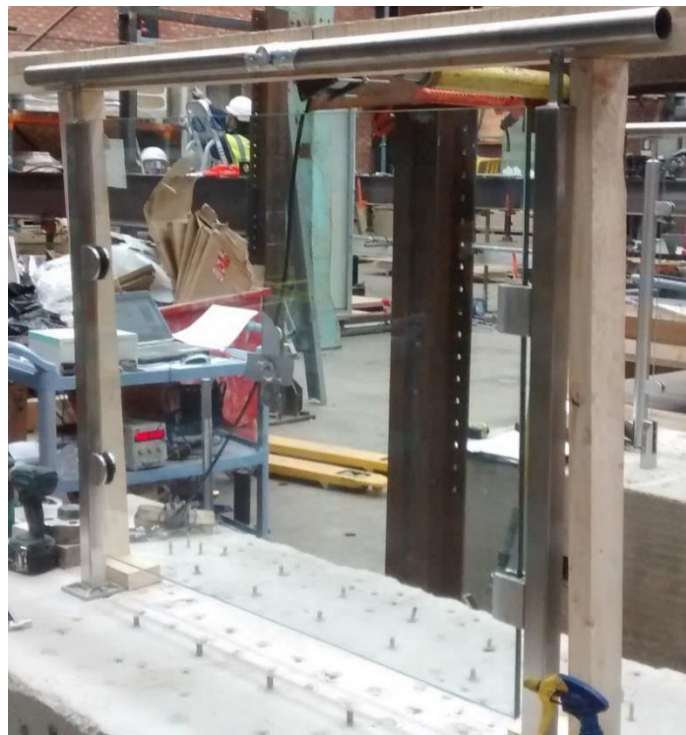


Plate 4 – Test 2a – Timeless Square Posts – 15 mm Toughened Glass
– Horizontal Line Load – Deflection Measurement Side



Plate 5 – Test 2a – Timeless Square Posts – 15 mm Toughened Glass
– Mixture of Clamp Types



Plate 6 – Test 3a – Timeless Round Posts – 10 mm Toughened Glass
– Horizontal Line Load – Deflection Measurement Side



Plate 7 – Test 3b – Timeless Round Posts – 10 mm Toughened Glass
– UDL – Load Application Side



Plate 8 – Test 3b – Timeless Round Posts – 10 mm Toughened Glass
– UDL – Deflection Measurement Side



Plate 9 – Test 3c – Timeless Round Posts – 10 mm Toughened Glass
– Point Load – Load Application Side

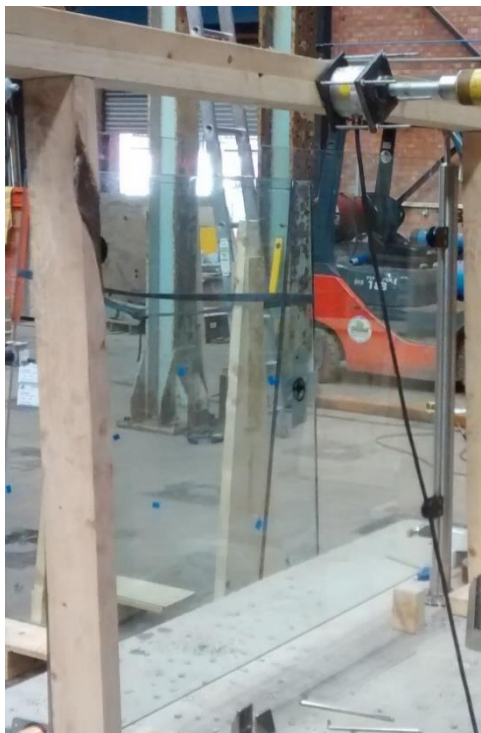
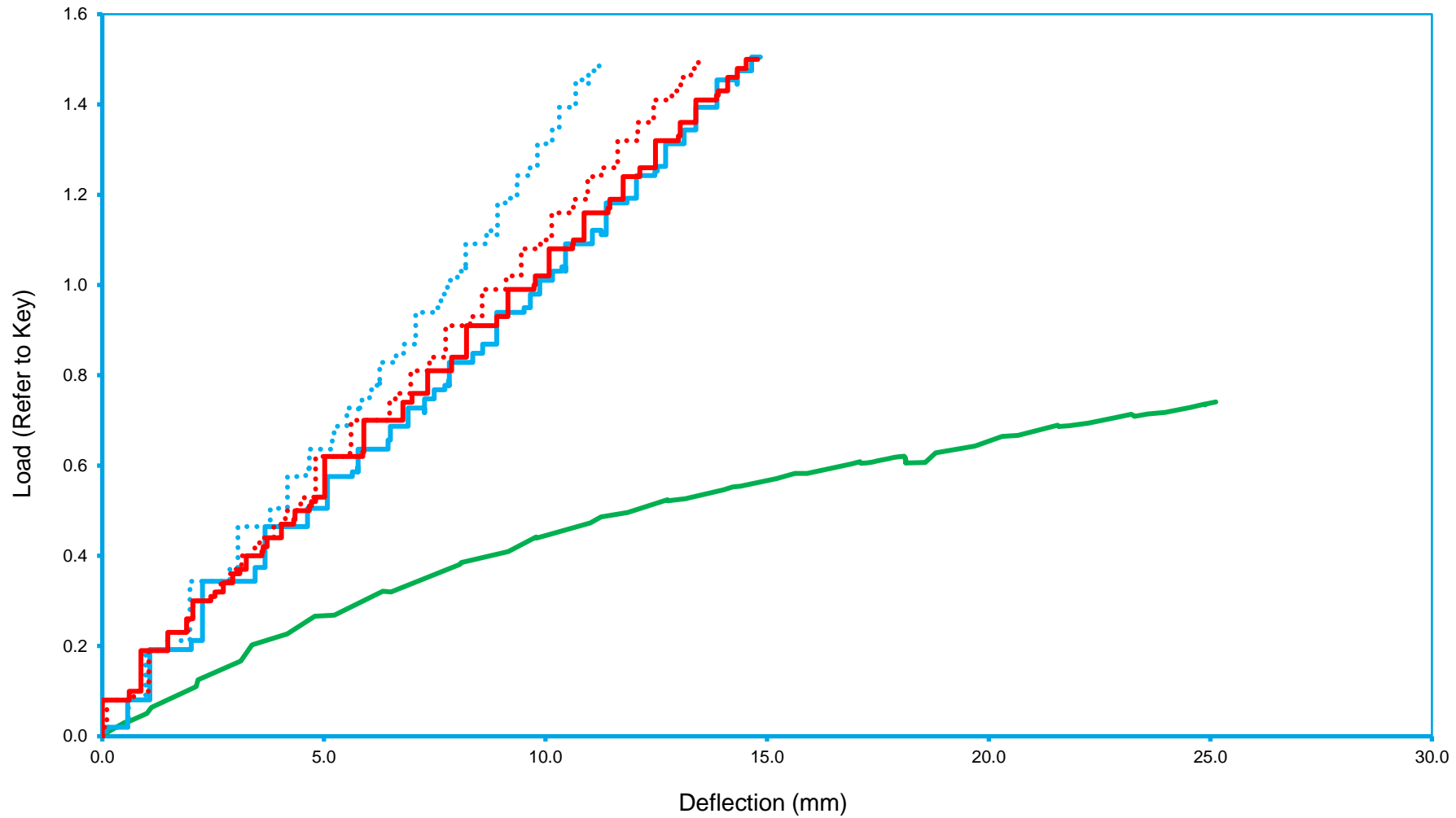


Plate 10 – Test 4a – Timeless Round Posts – 10 mm Toughened Glass
– Black Clamps -Horizontal Line Load – Load Application Side



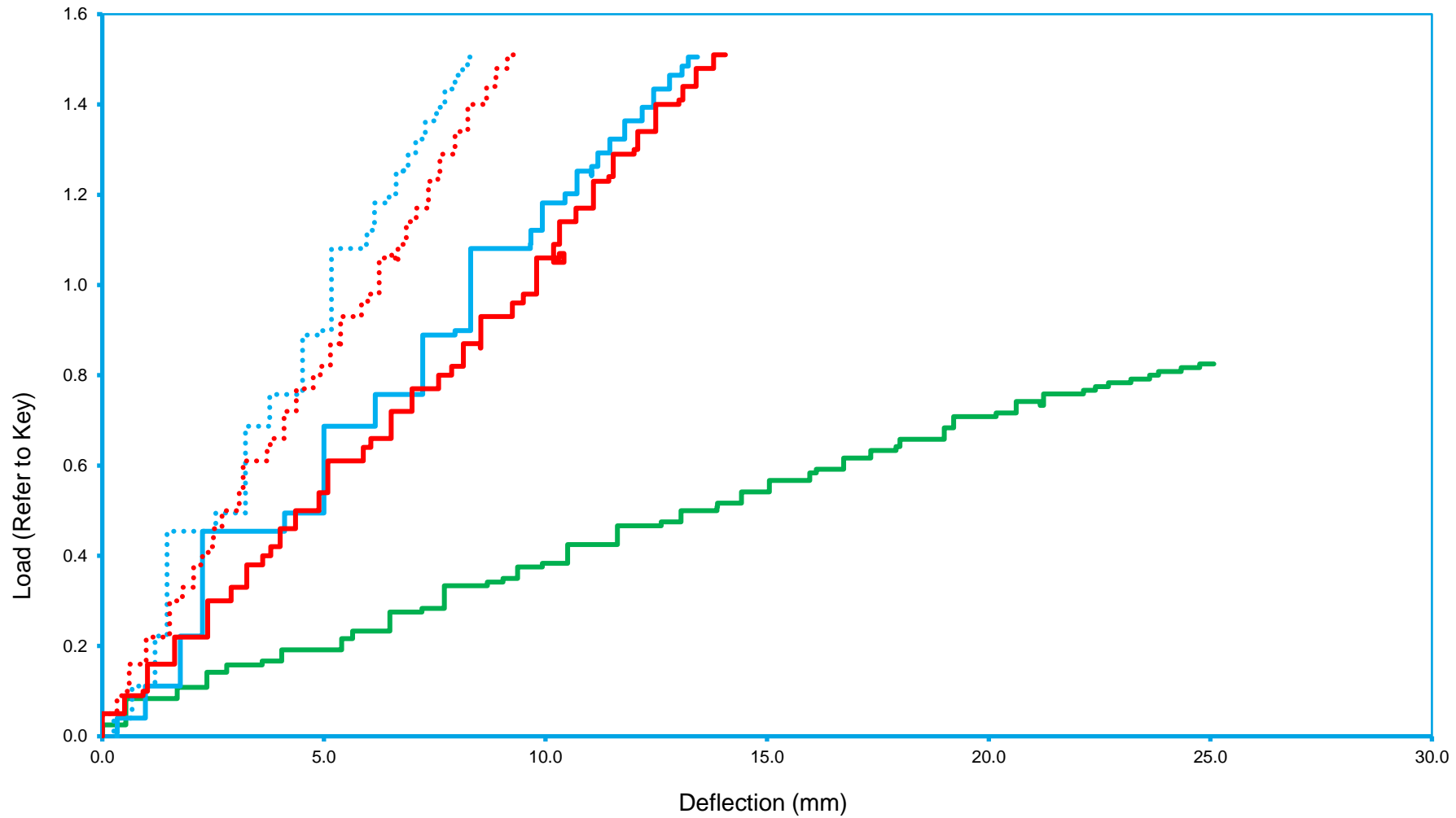
Plate 11 – Test 4a – Timeless Round Posts – 10 mm Toughened Glass
– Black Clamps -Horizontal Line Load – Deflection Measurement Side

Chart 1 - Ref. 2A - Tests 1a, 1b & 1c - Times Square Posts fitted with 10 mm Toughened Glass - BS 6180



Line Style/Color	Description
Solid Green	Test 1a Timeless Square Posts Horizontal line load - Load in kN/m
Solid Blue	Test 1b Timeless Square Post UDL applied to Infill - Deflection at handrail position - Load in kN/m ²
Dotted Blue	Test 1b Timeless Square Post UDL applied to Infill - Deflection at mid-infill position - Load in kN/m ²
Solid Red	Test 1c Timeless Square Post point load applied at mid-infill position - Deflection at handrail position - Load in kN
Dotted Red	Test 1c Timeless Square Post point load applied at mid-infill position - Deflection at mid-infill position - Load in kN

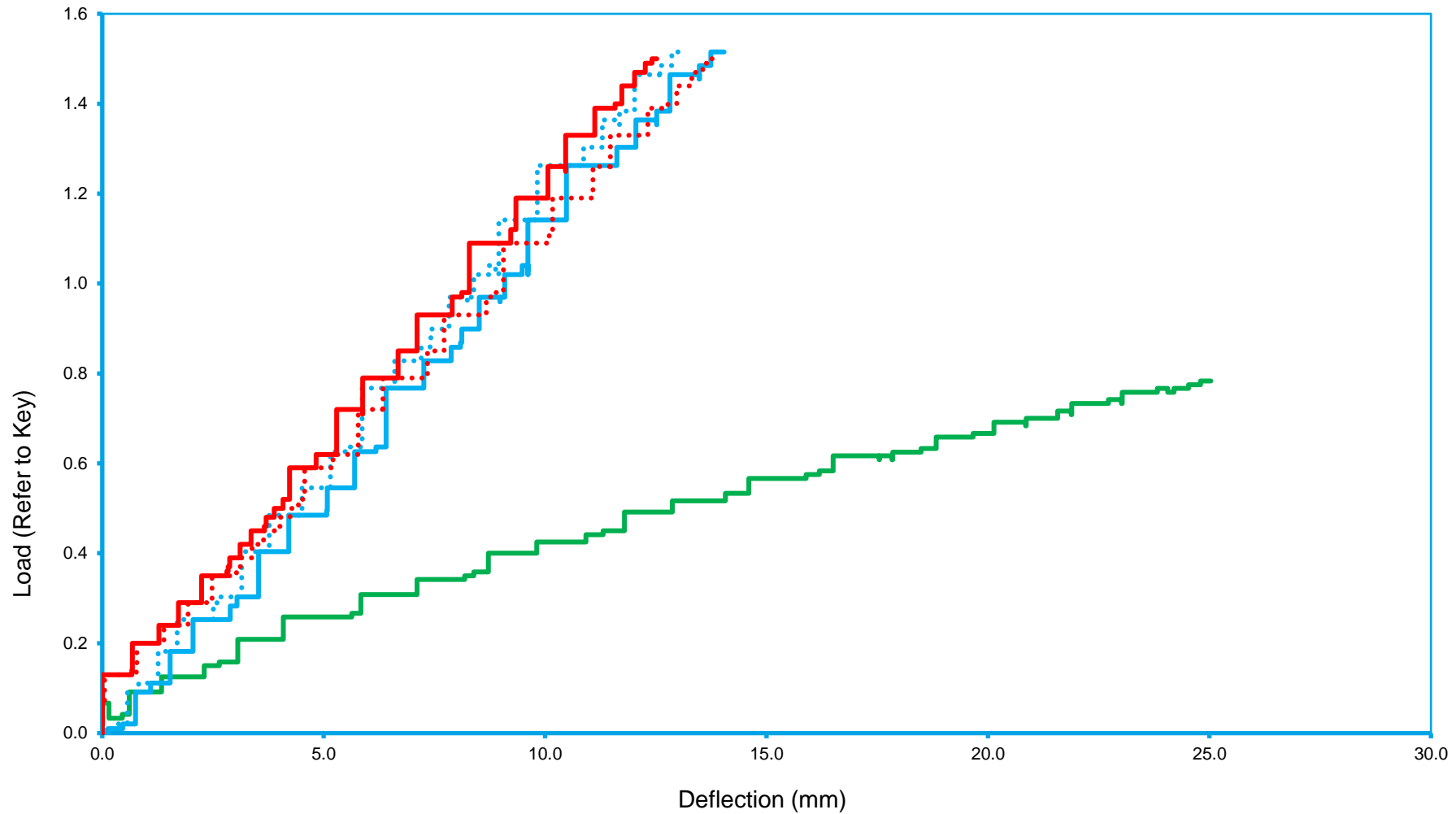
Chart 2 - Ref 2A - Tests 2a, 2b & 2c - Times Square Posts fitted with 15 mm Toughened Glass - BS 6180



Key

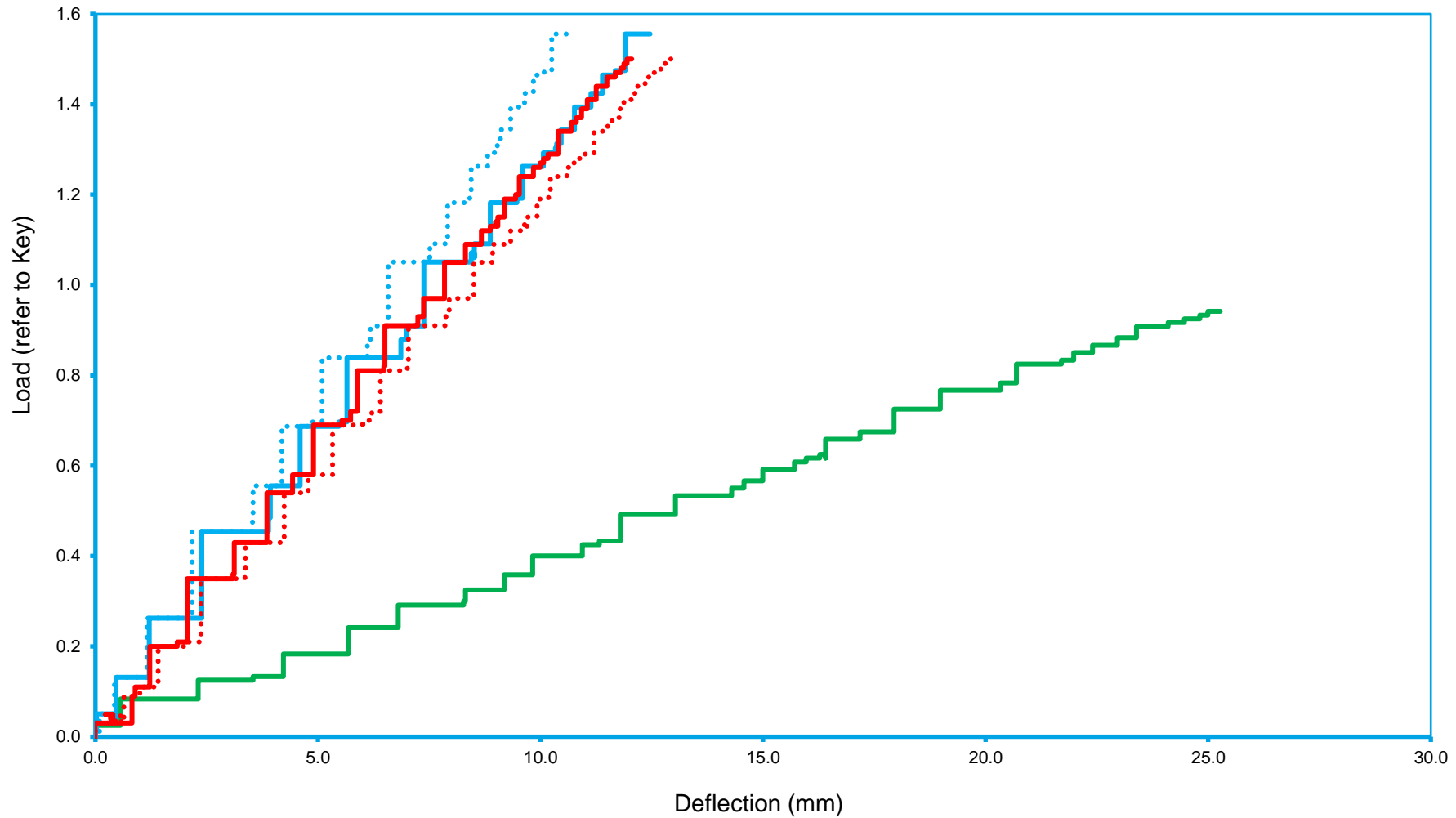
- Test 2a Timeless Square Posts Horizontal line load - Load in kN/m
- Test 2b Timeless Square Post UDL applied to Infill - Deflection at handrail position - Load in kN/m²
- Test 2b Timeless Square Post UDL applied to Infill - Deflection at mid-infill position - Load in kN/m²
- Test 2c Timeless Square Post point load applied at mid-infill position - Deflection at handrail position - Load in kN
- Test 2c Timeless Square Post point load applied at mid-infill position - Deflection at mid-infill position - Load in kN

Chart 3 - Ref 2A - Tests 3a, 3b & 3c - Times Round Posts fitted with 10 mm Toughened Glass - BS 6180



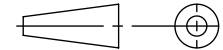
Line Style/Color	Description
— (Green)	Test 3a Timeless round Posts Horizontal line load - Load in kN/m
— (Blue)	Test 3b Timeless Round Post UDL applied to Infill - Deflection at handrail position - Load in kN/m ²
..... (Blue)	Test 3b Timeless Round Post UDL applied to Infill - Deflection at mid-infill position - Load in kN/m ²
— (Red)	Test 3c Timeless Round Post point load applied at mid-infill position - Deflection at handrail position - Load in kN
..... (Red)	Test 3c Timeless Round Post point load applied at mid-infill position - Deflection at mid-infill position - Load in kN

Chart 4 - Ref 2A - Tests 4a, 4b & 4c - Times Round Posts fitted with 10 mm Toughened Glass - Black D Clamps - BS 6180

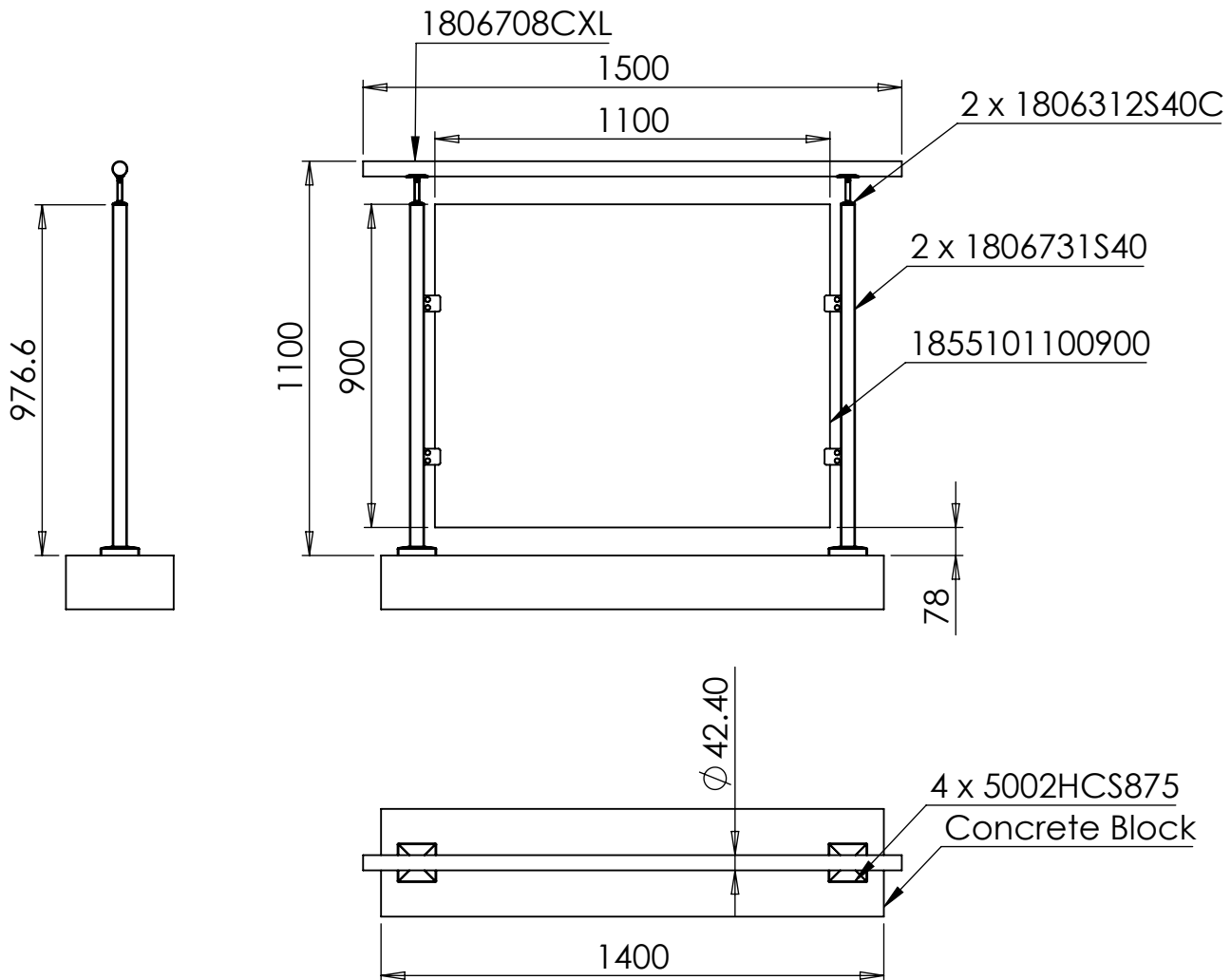


Line Style/Color	Description
Solid Green	Test 4a Timeless round Posts Horizontal line load - Load in kN/m
Solid Blue	Test 4b Timeless Round Post UDL applied to Infill - Deflection at handrail position - Load in kN/m2
Dotted Blue	Test 4b Timeless Round Post UDL applied to Infill - Deflection at mid-infill position - Load in kN/m2
Solid Red	Test 4c Timeless Round Post point load applied at mid-infill position - Deflection at handrail position - Load in kN
Dotted Red	Test 4c Timeless Round Post point load applied at mid-infill position - Deflection at mid-infill position - Load in kN

PRO RAILING - TIMELESS SQUARE END POSTS



	NAME	DATE	REVISION
DRAWN	CH	07/01/2019	A
CHECKED			



Load Testing of Pro-Railing Timeless Square End Post Pre-Assembled Post System, Which Comprises of Two Timeless Square End Posts, Adjustable Spigot Saddles & 42.4mm Top Rail.

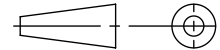
Tested With A 10mm Toughened Glass Panel to BS EN 6180:2011 & UNI 10806:1999

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.

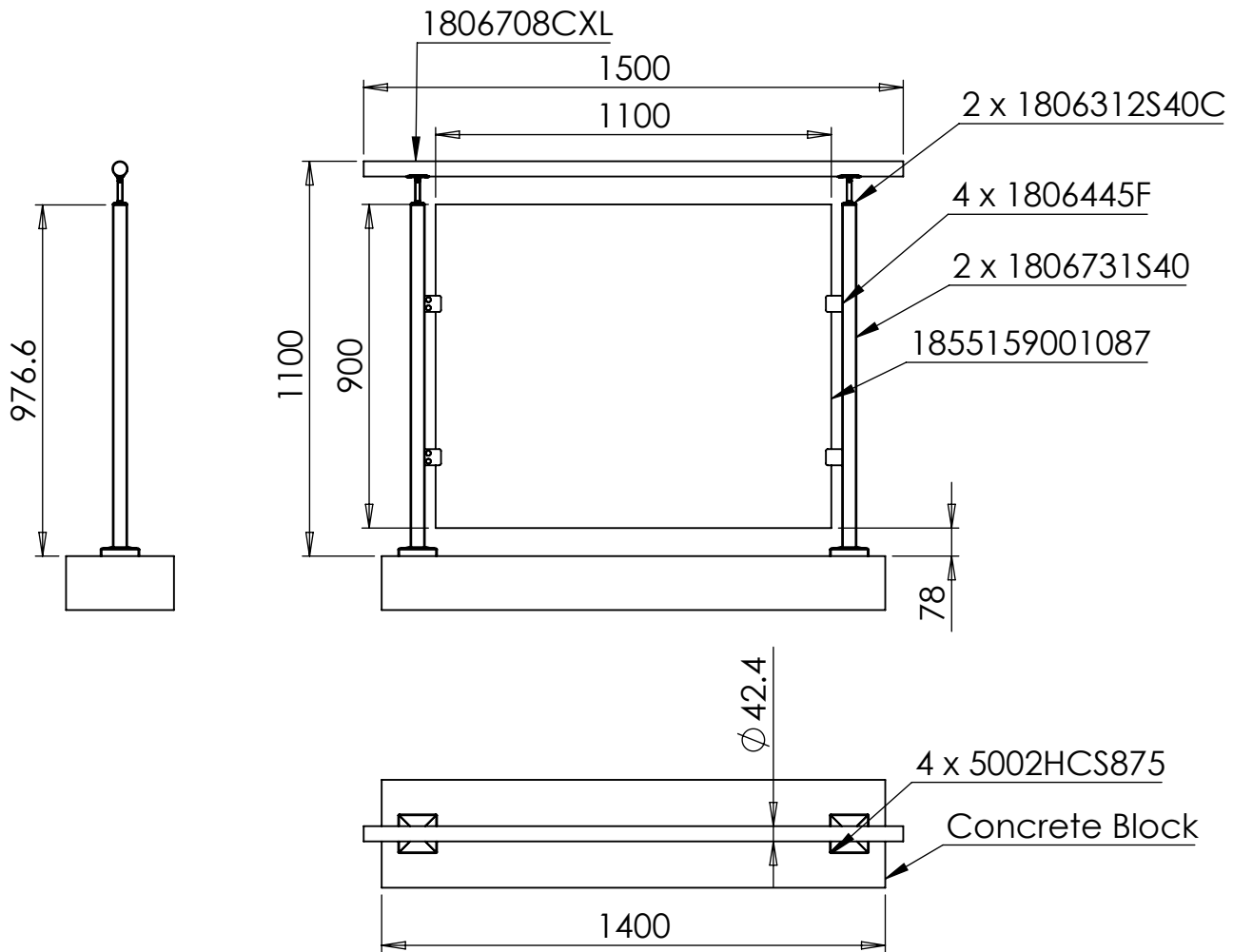
Carry out load testing in accordance with UNI 10806:1999 Prefabricated Railing Systems - Determination of the mechanical strength under static load.

These tests will allow FH Brundle Timeless Square End Post system to be classified for use in accordance with the Code of Practice included within the standards.

Test In Accordance	Parts Required	Foundation Material	Glass Size & Type	Fixing	Notes
BS EN 6180:2011 UNI 10806:1999	2 x 1806731S40 2 x 1806312S40C 2 x 1806708CXL	C35 with glass fibres, aggregate size 20mm slump 100	1100 x 900mm 10mm Toughened	M8 x 75mm Concrete Screw	Posts Spaced At 1200mm Centres



	NAME	DATE	REVISION
DRAWN	CH	07/01/2019	A
CHECKED		CH	



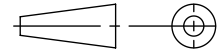
**Load Testing of Pro-Railing Timeless Square End Post Pre-Assembled Post System, Which Comprises of Two Timeless Square End Posts, Adjustable Spigot Saddles & 42.4mm Top Rail.
Tested With A 15mm Toughened Glass Panel to BS EN 6180:2011 & UNI 10806:1999**

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.

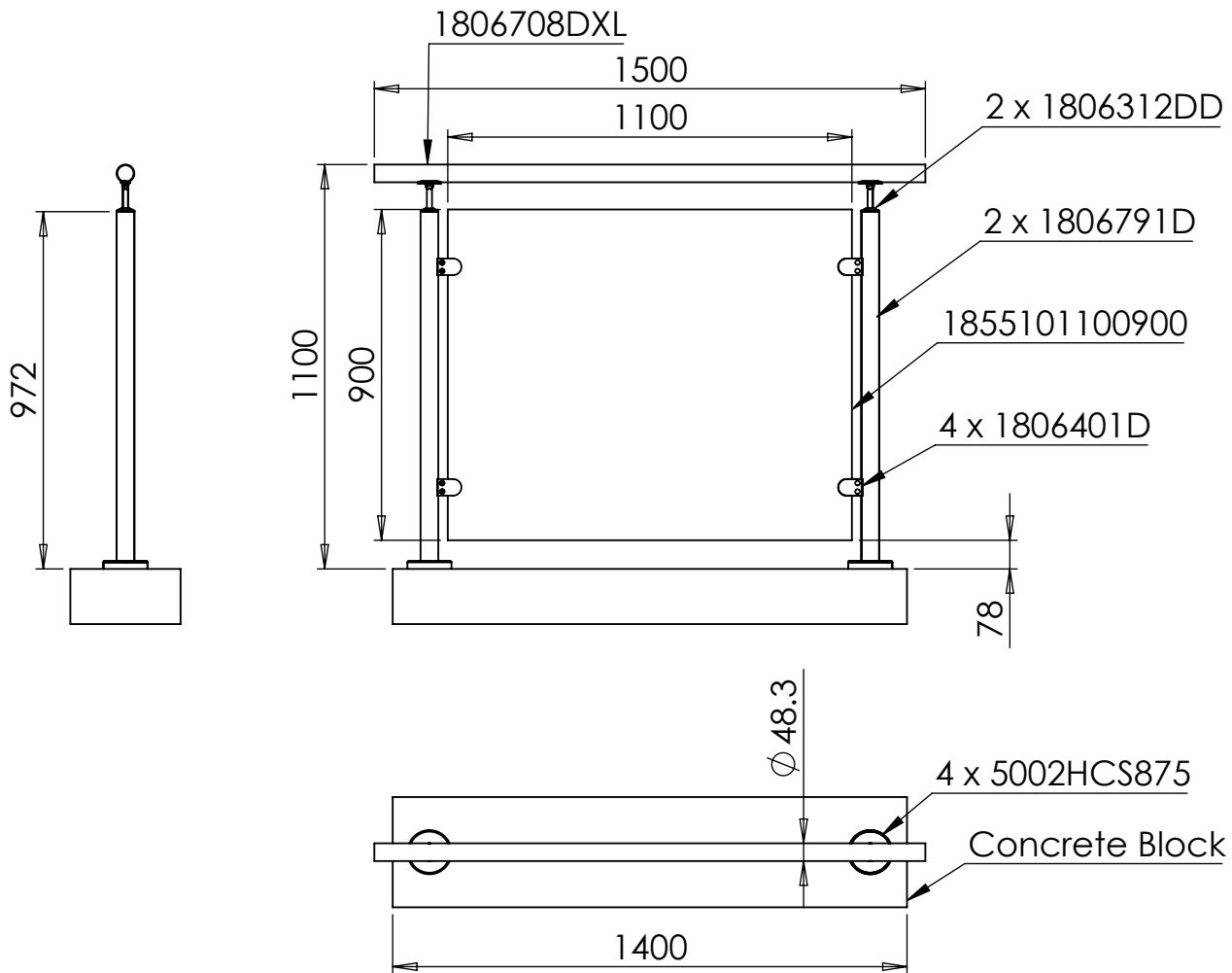
Carry out load testing in accordance with UNI 10806:1999 Prefabricated Railing Systems - Determination of the mechanical strength under static load.

These tests will allow FH Brundle Timeless Square End Post system to be classified for use in accordance with the Code of Practice included within the standards.

Test In Accordance	Parts Required	Foundation Material	Glass Size & Type	Fixing	Notes
BS EN 6180:2011 UNI 10806:1999	2 x 1806731S40 2 x 1806312S40C 2 x 1806445F 2 x 1806708CXL	C35 with glass fibres, aggregate size 20mm slump 100	900 x 1087mm 15mm Toughened	M8 x 75mm Concrete Screw	Posts Spaced At 1200mm Centres



	NAME	DATE	REVISION
DRAWN	CH	07/01/2019	A
CHECKED		CH	



**Load Testing of Pro-Railing Timeless Round End Post Pre-Assembled Post System, Which Comprises of Two Timeless Square End Posts, Adjustable Spigot Saddles & 48.3mm Top Rail.
Tested With A 10mm Toughened Glass Panel to BS EN 6180:2011 & UNI 10806:1999**

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.

Carry out load testing in accordance with UNI 10806:1999 Prefabricated Railing Systems - Determination of the mechanical strength under static load.

These tests will allow FH Brundle Timeless Round End Post system to be classified for use in accordance with the Code of Practice included within the standards.

Test In Accordance	Parts Required	Foundation Material	Glass Size & Type	Fixing	Notes
BS EN 6180:2011 UNI 10806:1999	2 x 1806791D 2 x 1806312DD 2 x 1806401D 2 x 1806708DXL	C35 with glass fibres, aggregate size 20mm slump 100	1100 x 900mm 10mm Toughened	M8 x 75mm Concrete Screw	Posts Spaced At 1200mm Centres