

TEST REPORT

Lucideon Reference: 155217 (QT38377/1/SL)/Ref. 9/Supp1

Project Title: Load Testing of FH Brundle's ProLight Channel and Wedge-Loc System with a Range of Glass Panels to BS 6180:2011

Client: FH Brundle
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For the Attention of: Mr Danny Hull

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This report supersedes the report issued on 04.02.16.



Miss Joanne Booth
Consultancy Team
Reviewer



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Project Manager



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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 (BS EN991-1-3:2003+A1:2015): 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 a ProLight system which incorporates a ProLight extruded slim (channel) together with wedges (Wedge-Loc) which are hammered in at specified centres.

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

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

2 SAMPLES RECEIVED

8 pieces of glass of varying types, of dimensions 1084 mm x 1000 mm as follows:

- 12 mm Clear Toughened Glass;
- 12.89 mm Clear Toughened Sentry Glass Laminated;
- 15 mm Clear Toughened Glass;
- 16.89 mm Clear Toughened Sentry Glass Laminated;
- 17.5 mm Clear Toughened PVB Laminated;
- 19 mm Clear Toughened Glass;
- 20.89 mm Clear Toughened Sentry Glass Laminated;
- 21.5 mm Clear Toughened PVB Laminated.

ProLight aluminium extruded moulding.

Wedges as follows to suit glass size coded as follows:

A34012	12 mm, 12.76 mm glass;
A34014	13.52 mm glass;
A34015	15 mm glass;
A34018	17.52 mm glass;
A34021	20.76 mm glass.

Gasket set coded 180544088A.

The system (channel and wedges) is referred to as a Wedge-Loc Slim Channel.

A Figure showing dimensions and glass mounted in the Wedge-Loc Slim Channel together with two general Figures of the glass/Wedge-Loc Slim Channel are shown in the Appendix.

3 TEST PROGRAMME

A horizontal line load was applied to system with the adaptors set at the following centres using a range of glass types as follows:

- 12 mm Clear Toughened Glass;
- 12.89 mm Clear Toughened Sentry Glass Laminated;
- 15 mm Clear Toughened Glass;
- 16.89 mm Clear Toughened Sentry Glass Laminated;
- 17.5 mm Clear Toughened PVB Laminated;
- 19 mm Clear Toughened Glass;
- 20.89 mm Clear Toughened Sentry Glass Laminated;
- 21.5 mm Clear Toughened PVB Laminated.

4 TEST METHOD

The ProLight aluminium slim moulding (Wedge-Loc) was bolted to the top of a concrete bloc which was fixed to the laboratory floor at the Lucideon test laboratories. A 1000 mm width glass panel of appropriate thickness and glass detail was fitted into the ProLight aluminium slim moulding in turn.

A horizontal imposed line load was applied to the glass 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 panel 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).

Plate 1 shows the general test arrangement.

5 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.

Load versus deflection curves for the glass panels tested with ProLight aluminium slim moulding (Wedge Loc system) are given in Chart 1.

The loads achieved by the FH Brundle ProLight aluminium slim Moulding (Wedge-Loc) system tested with the glass types, detailed above in Section 3, under horizontal imposed line load to the maximum deflection of 25 mm are 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

Table 1 - Summary of Performance of FH Brundle ProLight (Wedge-Loc) Tested with a Range of 1000 mm Glass Panels under Horizontal Imposed Line Load

Glass Width (mm)	Glass Type	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 Line Load for System (kN/m)
1000	12 mm Clear Toughened Glass	0.51	0.36	16.05	0.36
	12.89 mm Clear Toughened Sentry Glass Laminated	0.44	0.36	20.25	0.36
	15 mm Clear Toughened Glass	0.63	0.74	12.45	0.36
	16.89 mm Clear Toughened Sentry Glass Laminated	0.70	0.74	10.36	0.36
	17.5 mm Clear Toughened PVB Laminated	0.75	0.36	6.67	0.74
	19 mm Clear Toughened Glass	0.65	1.50	11.40	0.36
	20.89 mm Clear Toughened Sentry Glass Laminated	0.67	1.50	10.38	0.36
	21.5 mm Clear Toughened PVB Laminated	0.65	0.74	10.38	0.36

Table 2 - Summary of Suitability of FH Brundle ProLight (Wedge-Loc) with a Range of 1000 mm Wide Glass Panels in Accordance with Table 2 of BS 6180:2011

Type of Occupancy for Part of the Building	Examples of Specific Use	Horizontal Uniformly Distributed Line Load (kN/m)	ProLight Channel and Wedge (Wedge-Loc) Glass Balustrade System							
			12 mm Clear Toughened Glass	12.89 mm Clear Toughened Sentry Glass Laminated	15 mm Clear Glass	16.89 mm Clear Toughened Sentry Glass Laminated	17.5mm Clear Toughened PVB Laminated Glass	19 mm Clear Toughened Glass	20.89 mm Clear Toughened Sentry Glass Laminated	21.5 mm Clear Toughened PVB Laminated 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	✓	✓	✓	✓	✓	✓	✓	✓
	(ii) other residential i.e. houses of multiple occupancy and balconies, including Juliette balconies and edges of roofs in single family dwellings	0.74	X	X	X	X	✓	X	X	X
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	✓	✓	✓	✓	✓	✓	✓	✓

Table 2 (Continued)

Type of Occupancy for Part of the Building	Examples of Specific Use	Horizontal Uniformly Distributed Line Load (kN/m)	ProLight Channel and Wedge (Wedge-Loc) Glass Balustrade System							
			12 mm Clear Toughened Glass	12.89 mm Clear Toughened Sentry Glass Laminated	15 mm Clear Glass	16.89 mm Clear Toughened Sentry Glass Laminated	17.5mm Clear Toughened PVB Laminated Glass	19 mm Clear Toughened Glass	20.89 mm Clear Toughened Sentry Glass Laminated	21.5 mm Clear Toughened PVB Laminated Glass
	(v) areas not susceptible to overcrowding in office and institutional buildings, also industrial and storage buildings except as given above	0.74	X	X	X	X	✓	X	X	X
Areas where people might congregate	(vi) areas having fixed seating within 530 mm of the barrier, balustrade or parapet	1.50	X	X	X	X	X	X	X	X
Areas with tables or fixed seating	(vii) restaurants and bars	1.50	X	X	X	X	X	X	X	X

Table 2 (Continued)

Type of Occupancy for Part of the Building	Examples of Specific Use	Horizontal Uniformly Distributed Line Load (kN/m)	ProLight Channel and Wedge (Wedge-Loc) Glass Balustrade System							
			12 mm Clear Toughened Glass	12.89 mm Clear Toughened Sentry Glass Laminated	15 mm Clear Toughened Glass	16.89 mm Clear Toughened Sentry Glass Laminated	17.5 mm Clear Toughened PVB Laminated Glass	19 mm Clear Toughened Glass	20.89 mm Clear Toughened Sentry Glass Laminated	21.5 mm Clear Toughened PVB Laminated Glass
Areas without obstacles for moving people and not susceptible to overcrowding	(viii) stairs, landings corridors ramps	0.74	X	X	X	X	✓	X	X	X
	(ix) external balconies including Juliette balconies and edges of roofs; footways and pavements within building cartilage adjacent to basement/sunken areas	0.74	X	X	X	X	✓	X	X	X
Areas susceptible to overcrowding	(x) footways or pavements less than 3 m wide adjacent to sunken areas	1.50	X	X	X	X	X	X	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	X	X	X	X	X	X	X	X
	(xii) grandstands and stadia	(Note A)	-	-	-	-	-	-	-	-

Table 2 (Continued)

Type of Occupancy for Part of the Building	Examples of Specific Use	Horizontal Uniformly Distributed Line Load (kN/m)	ProLight Channel and Wedge (Wedge-Loc) Glass Balustrade System							
			12 mm Clear Toughened Glass	12.89 mm Clear Toughened Sentry Glass Laminated	15 mm Clear Toughened Glass	16.89 mm Clear Toughened Sentry Glass Laminated	17.5 mm Clear Toughened PVB Laminated Glass	19 mm Clear Toughened Glass	20.89 mm Clear Toughened Sentry Glass Laminated	21.5 mm Clear Toughened PVB Laminated Glass
Retail areas	(xiii) all retail areas including public areas of banks/building societies or betting shops	1.50	X	x	X	X	X	x	x	x
Vehicular	(xiv) pedestrian areas in car parks, including stairs, landings, ramps, edges of internal floors, footways, edges of roofs	(Note B)	X	X	X	X	X	x	x	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.

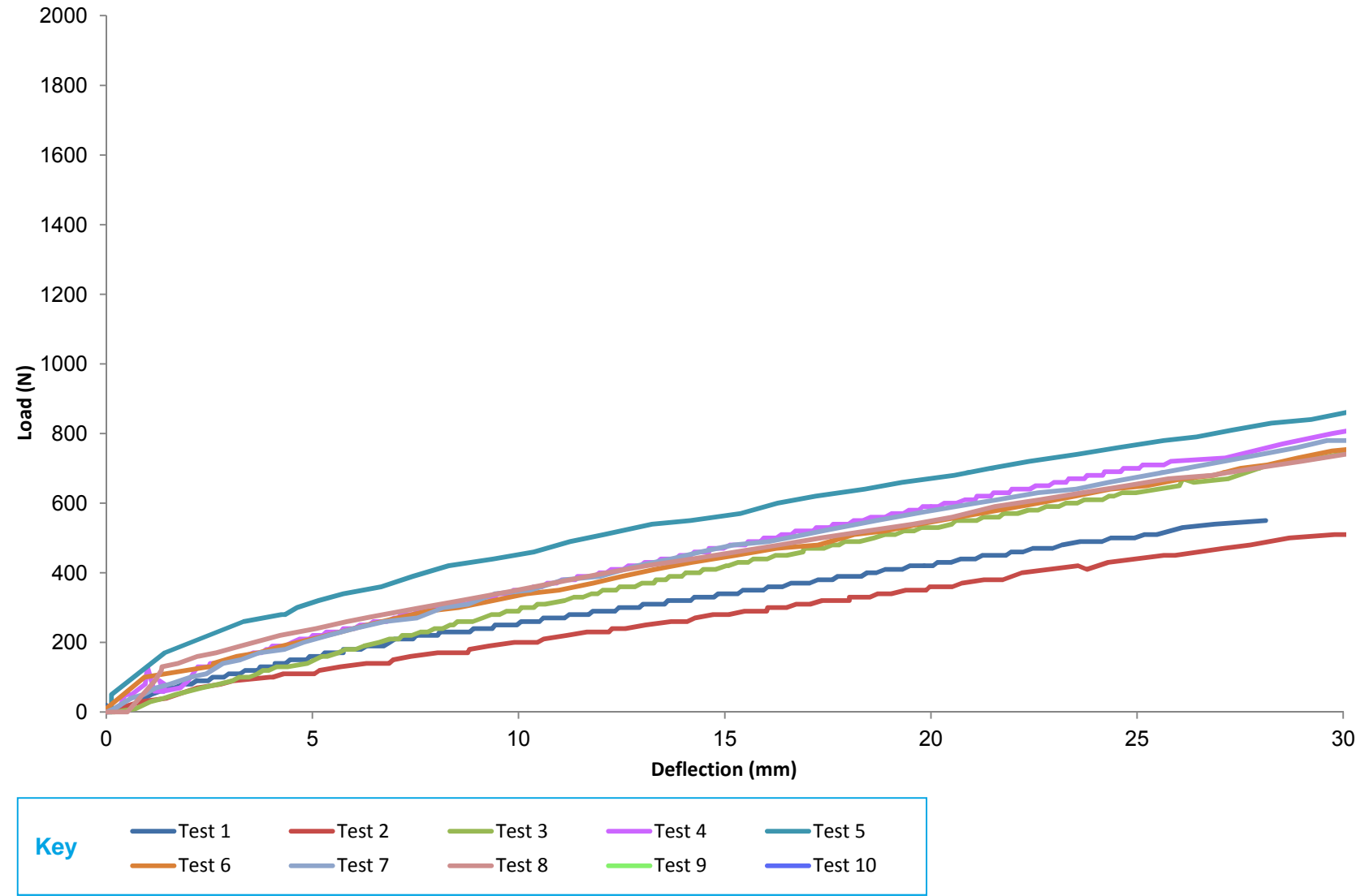


Plate 1 - Generic Test Arrangement Line Load

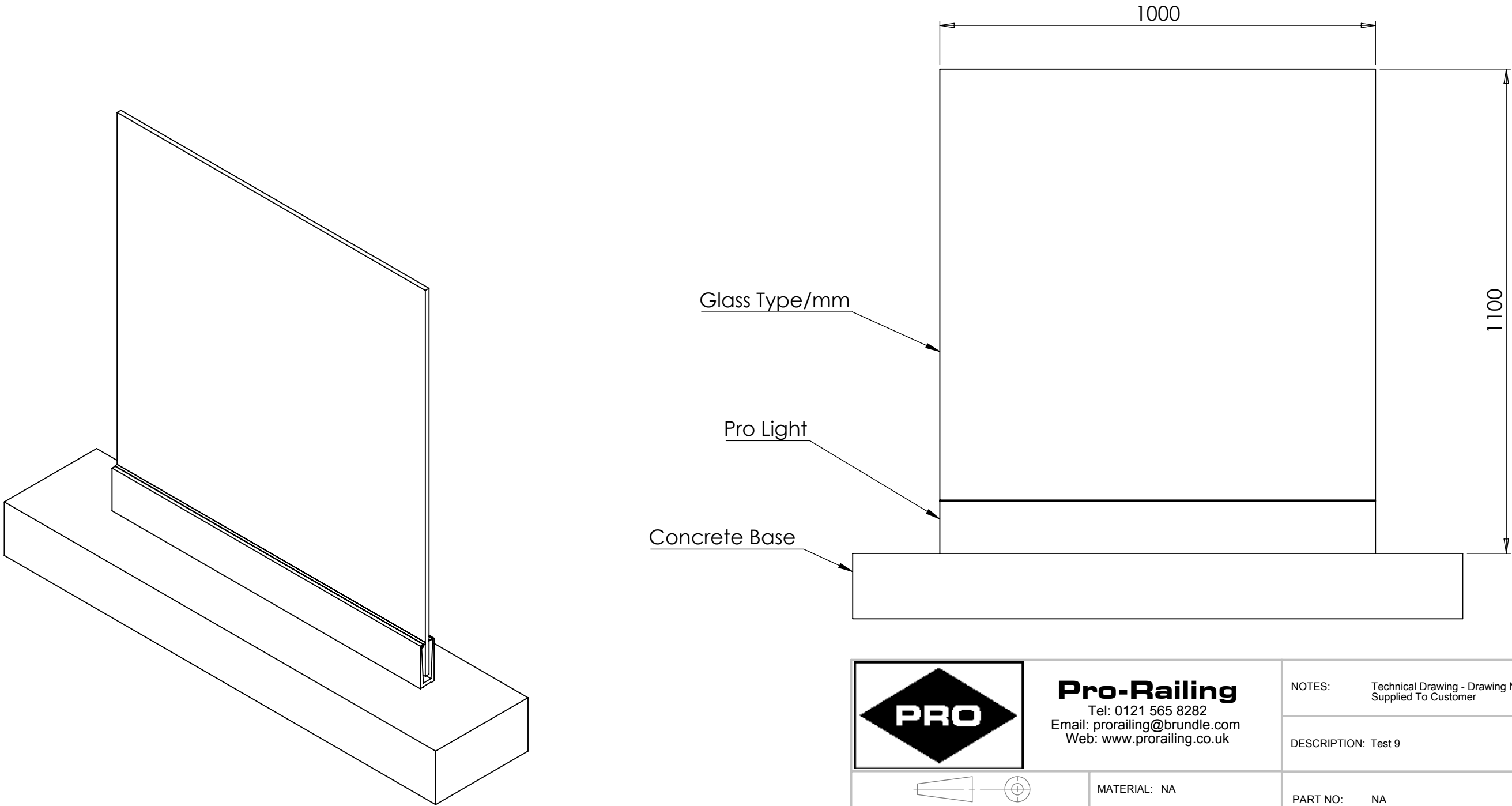


Chart 1 - Load v Deflection for ProLight Channel and Wedge Sysem Tested with a Range of 1000 mm Wide Glass Panels

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Test:	BS Standard	Parts Needed	Fixed Into	Glass Size	Glass Type/mm	Loading	Hole Size	Fixings Needed
Test 9: Pro Light	BS6180:2011 and EC1-1991-1-1:2002	Channel and Wedges	Concrete	1084 x 1000mm	12mm Toughened	0.36kn	14mm	510933 - FH II 12/50 SK - A4
	BS6180:2011 and EC1-1991-1-1:2002	Channel and Wedges	Concrete	1084 x 1000mm	12.89mm Sentry	0.36kn	14mm	507563 - FBN 11 12 X 105 - 316
	BS6180:2011 and EC1-1991-1-1:2002	Channel and Wedges	Concrete	1084 x 1000mm	15mm Toughened	0.74kn	14mm	510933 - FH II 12/50 SK - A4
	BS6180:2011 and EC1-1991-1-1:2002	Channel and Wedges	Concrete	1084 x 1000mm	16.89mm Sentry	0.74kn	14mm	510933 - FH II 12/50 SK - A4
	BS6180:2011 and EC1-1991-1-1:2002	Channel and Wedges	Concrete	1084 x 1000mm	17.5mm Laminated	0.36kn	14mm	510933 - FH II 12/50 SK - A4
	BS6180:2011 and EC1-1991-1-1:2002	Channel and Wedges	Concrete	1084 x 1000mm	19mm Toughened	1.5kn	14mm	510933 - FH II 12/50 SK - A4
	BS6180:2011 and EC1-1991-1-1:2002	Channel and Wedges	Concrete	1084 x 1000mm	20.89mm Sentry	1.5kn	14mm	510933 - FH II 12/50 SK - A4
	BS6180:2011 and EC1-1991-1-1:2002	Channel and Wedges	Concrete	1084 x 1000mm	21.5 Laminated	0.74kn	14mm	510933 - FH II 12/50 SK - A4



Pro-Railing
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NOTES: Technical Drawing - Drawing Not To Be Supplied To Customer

DESCRIPTION: Test 9

PART NO: NA

DWG NO: 0197-010-09

A3



MATERIAL: NA

FINISH: NA

GRIT SIZE: N/A

WEIGHT: NA

UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS ARE IN MILLIMETERS

	NAME	DATE	REVISION
DRAWN	GC	27/01/2016	A
REV. BY			

