

TEST REPORT

Purevista Ltd
Pendewey
Stony Lane
Bodmin
Cornwall
PL31 2QX

Test Report Number:- 163383 (QT41067/1/JPS)/Ref. 1
172177 (QT46125/1/RK)/Ref.1

Report Date:- 09 August 2016 (163383) / 15 June 2017 (172177)

Work Location:- Lucideon Test Facility Stoke-On-Trent

Posi-Glaze
(400mm Centre)

Frameless Balustrade

Testing carried out by:-

The logo for Lucideon, with the word "LUCIDEON" in a bold, blue, sans-serif font. The letter "E" is stylized with a horizontal line through its center.

Queens Road
Penkhull
Stoke-On-Trent

T:- 01782 764 428

Contents:-

1. Introduction	Page 3
2. Test Samples	Page 3
3. Test Programme	Page 3 - 4
4. Test Preparation	Page 4
5. Test Method	Page 5
6. Results	Page 5
7. Results Concrete Base Fixed	Pages 6 – 8
8. Results Concrete Side Fixed	Page 9 – 11
9. Results Steel Base Fixed	Page 12 – 14
10. Results Steel Side Fixed	Page 15 – 17
11. Plates	Page 18
12. Product Detail	Page 19 - 20

1. INTRODUCTION

Lucideon Limited were commissioned by the client, Pure Vista Ltd, to carry out line load testing in accordance with BS 6180:2011 Barriers in and about buildings, to allow their balustrade system to be classified for use in accordance with the Code of Practice included within the standard.

The testing was carried out at Lucideon's facilities at Queens Road, Penkhull, Stoke on Trent.

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

2. Test Samples

The Test Sample below was to be tested:-

- Posi-Glaze

The system had been designed and intended to be used as the base mount for a free standing balustrade. The system and glass were installed by Pure Vista Ltd personnel.

3. Test Programme

A horizontal line load was applied to the system using the following glazed section:-

- Posi-Glaze base mount into Concrete (163383)
 - 12mm Toughened Glass
 - 15mm Toughened Glass
 - 17.5mm Toughened Laminated Glass (PVB)
 - 21.5mm Toughened Laminated Glass (PVB)
- Posi-glaze base mount into Steel
 - 12mm Toughened Glass
 - 13.5mm Toughened Laminate Extra Strong Interlayer
 - 15mm Toughened Glass
 - 17.5mm Toughened Laminated Glass (PVB)
 - 21.5mm Toughened Laminated Glass (PVB)
- Posi-Glaze side mount into Steel
 - 12mm Toughened Glass
 - 13.5mm Toughened Laminate Extra Strong Interlayer
 - 15mm Toughened Glass
 - 17.5mm Toughened Laminated Glass (PVB)

- Posi-Glaze side mount into Concrete
 - 12mm Toughened Glass
 - 13.5mm Toughened Laminate Extra Strong Interlayer
 - 15mm Toughened Glass
 - 17.5mm Toughened Laminated Glass (PVB)

4. Test Preparation

4.1 Posi-Glaze Top Mount Concrete

The Posi-Glaze Channel was bolted at 400mm centres to the top of the concrete slab, which was fixed to the floor of the test facility.

The 1000mm length of channel was bolted to the concrete block at 400mm centres (100mm from the ends and 400mm thereafter) with 3 clamps per metre spaced at 200mm from the end and with 300mm between the clamps.

4.2 Posi-Glaze Top Mount Steel Fix

The Posi-glaze channel was bolted to the top of a piece of steel C-Section measuring 150mm x 90mm x 5mm. the section was welded to a steel anvil which in turn was bolted to the facility floor.

The 1000mm length of Posi-glaze was fitted to the C-section with fixings at 400mm Centres (100mm from the end and 400mm thereafter) with 3 clamps per metre spaced at 200mm from the edge and 300mm between clamps.

The exception to this was the test carried out for glass with a 1350mm height with 21.5mm toughened PVB Laminated glass. The channel section was bolted at 200mm centres (100mm from the edge and 200mm thereafter) with 4 clamps per metre spaced at 125mm from the edge and 250mm thereafter.

4.3 Posi-Glaze Side Mount Steel Fix

The Channel was bolted to the side of a piece of reinforced steel C-Section measuring 150mm x 90mm x 5mm. The section was welded to a steel anvil which in turn was bolted to the floor of the test facility.

The 1000mm length of channel was bolted to the block at 400mm centres (100mm from the end and 400mm thereafter) with 3 clamps per metre spaced at 200mm from the edge and 300mm between the clamps.

4.4 Posi-Glaze Side Mount Concrete Fix

The channel was bolted to the side of a concrete block, which was fixed to the floor of the test facility.

The 1000mm length of channel was bolted to the block at 400mm centres (100mm from the end and 400mm thereafter) with 3 clamps per metre spaced at 200mm from the edge and 300mm between the clamps.

The bolts used into concrete:-

Spit:- Guardia 12x105/20 **Art no.**051061

Wurth:- W-Haz 12/10 **Art no.** 0905 212 002

5. Test Method

A horizontally imposed line load was applied to the glass at a height of 1100 millimetres above the datum level of the floor and the deflection measured at the top central point of the glass panel 1100 millimetres above the datum level of the floor. The load was applied via a hydraulic ram and the deflection measured using a linear voltage displacement transducer attached directly to the glass. The exception to this was the 21.5mm Toughened laminated PVB glass test where it was tested at a height of 1350mm.

6. 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 25mm.

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 loads achieved by the Pure Vista system (Posi-Glaze) tested under horizontally imposed line load to the maximum deflection of 25mm are given in Table 1. All figures quoted in the table contain no safety factors and are direct loads as achieved by the system under test conditions.

Table 2 summarises the suitability of the tested system 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.

Test Performance:- Concrete substrate 400mm centres Base Fixed

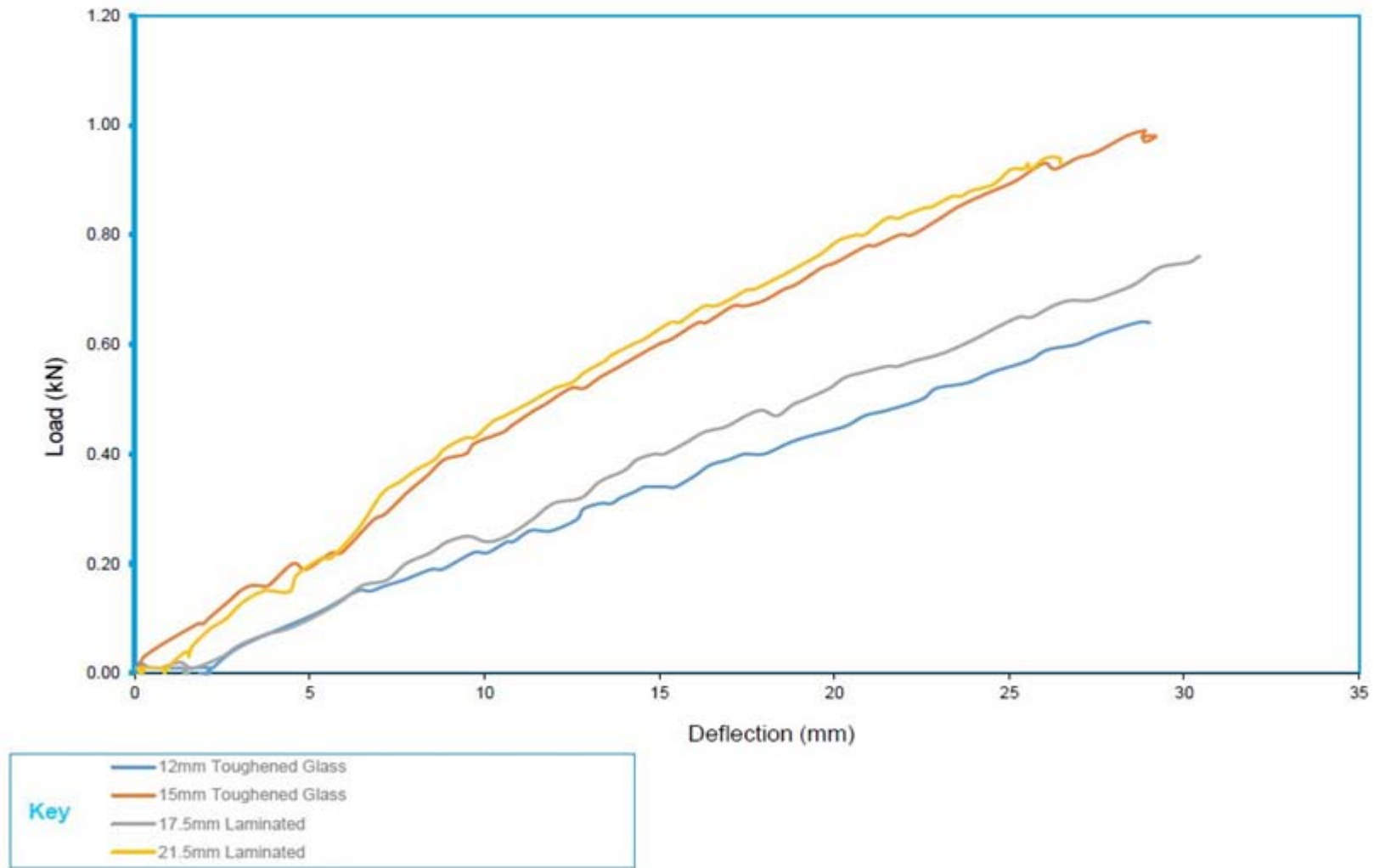
Tables

Table 1 – Summary of performance of Pure Vista Ltd Posi-Glaze Balustrade System base mounted into concrete tested under Horizontally imposed Line Load. (163383)

Glass Span (mm)	Glass Type	Test Height (mm)	Imposed Line Load Deflection at 25mm Deflection (KN/M)	Working Line Load for System (KN/M)	Deflection at Working Line Load for system (mm)
1000	12mm Toughened Monolithic	1100	0.56	0.36	16.00
1000	15mm Toughened Monolithic	1100	0.89	0.74	19.64
1000	17.5mm Toughened Laminated (PVB)	1100	0.64	0.36	13.63
1000	21.5mm Toughened Laminated (PVB)	1100	0.91	0.74	18.91

Type of Occupancy for Part of the Building	Examples of Specific Use	Horizontal Uniformly Distributed Line Load (Kn/M)	Posi-Glaze			
			12mm	15mm	17.5mm	21.5mm
Domestic and residential activities	All areas within or serving exclusively one single family dwelling including stairs, etc. but excluding balconies and edge of roofs	0.36	✓	✓	✓	✓
	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	Light access stairs and gangways not more than 600mm wide	0.22	✓	✓	✓	✓
	Light pedestrian traffic routes in industrial and storage buildings except designated escape routes	0.36	✓	✓	✓	✓
	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	Areas having fixed seating within 530mm of the barrier, balustrade or parapet.	1.50	✗	✗	✗	✗
Areas with Tables or Fixed Seating	Restaurants and Bars	1.50	✗	✗	✗	✗
Areas without obstacles for moving people and not susceptible to overcrowding	Stairs, landings, corridors, ramps	0.74	✗	✓	✗	✓
	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	Footways or pavements less than 3m wide adjacent to sunken areas	1.50	✗	✗	✗	✗
	Theatres, cinemas, discotheques, bars, auditoria, shopping malls, assembly areas, studio; footways or pavements greater than 3m wide adjacent to sunken areas	3.00	✗	✗	✗	✗
	Grandstands and Stadia	(Note 1)	-	-	-	-
Retail Areas	All retail areas including public areas of banks/building societies or betting shops	1.50	✗	✗	✗	✗
Vehicular	Pedestrian areas in car parks including stairs, landings, ramps, edges of internal floors, footways, edges of roofs	1.50 (Note 2)	✗	✗	✗	✗
	Horizontal loads imposed by vehicles	(Note 2)	-	-	-	-

Chart 1 – Load Deflection Curve for Pure Vista Posi-Glaze balustrade system base mounted into concrete



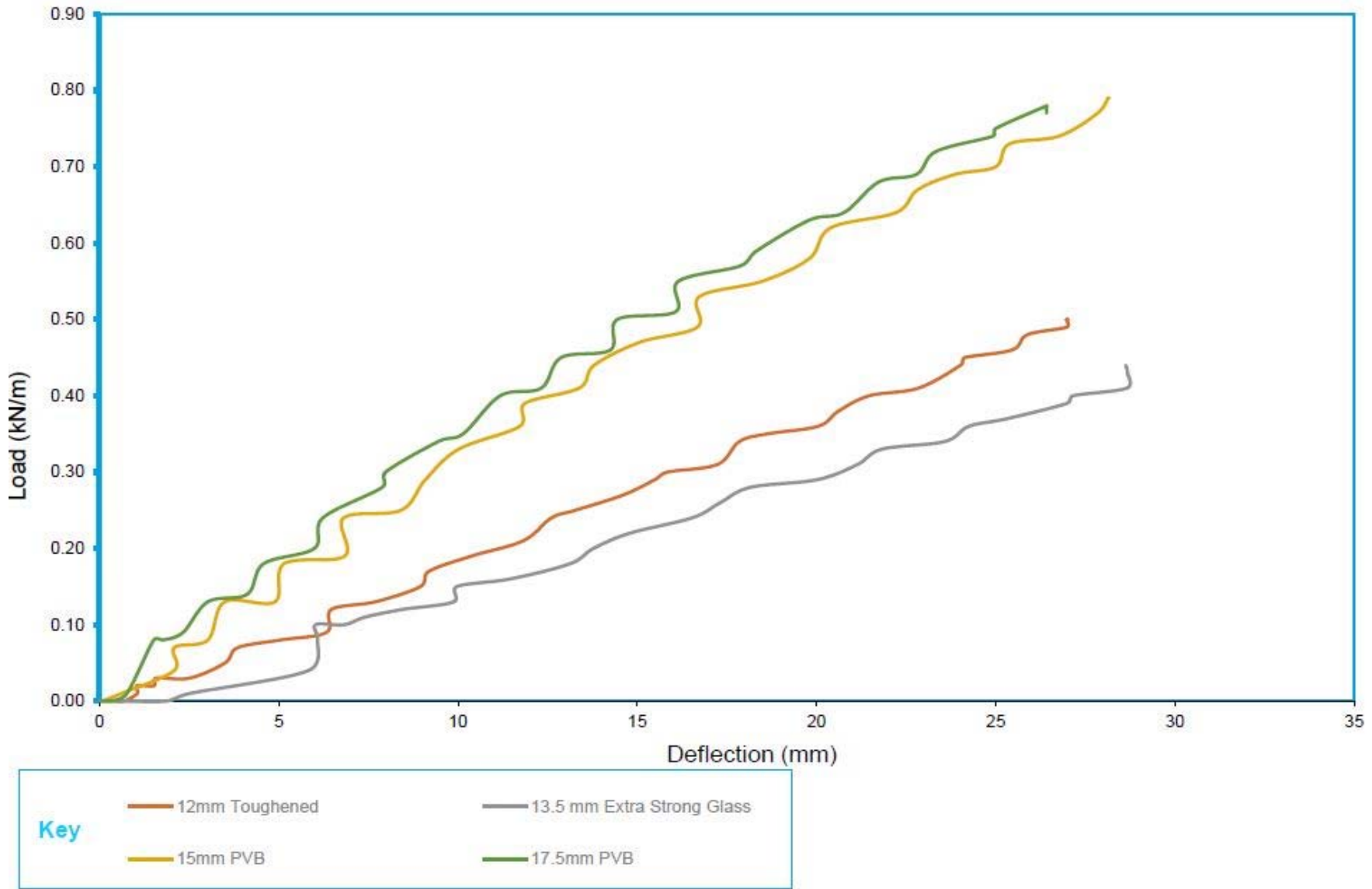
Test Performance:- Concrete substrate 400mm centres Side Fixed

Table 2 – Summary of Performance of Pure Vista Ltd Posi-Glaze balustrade system Side mounted into concrete under horizontal line load

Glass Span (mm)	Glass Type	Test Height (mm)	Imposed Line Load Deflection at 25mm Deflection (KN/M)	Working Line Load for System (KN/M)	Deflection at Working Line Load for system (mm)
1000	12mm Toughened Monolithic	1100	0.45	0.36	20.05
1000	13.5mm extra strong Laminated	1100	0.37	0.36	24.26
1000	15mm Toughened Monolithic	1100	0.70	0.36	11.72
1000	17.5mm Toughened Laminated (PVB)	1100	0.75	0.74	24.92

Type of Occupancy for Part of the Building	Examples of Specific Use	Horizontal Uniformly Distributed Line Load (Kn/M)	Posi-Glaze			
			12mm	13.5mm	15mm	17.5mm
Domestic and residential activities	All areas within or serving exclusively one single family dwelling including stairs, etc. but excluding balconies and edge of roofs	0.36	✓	✓	✓	✓
	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	✓
Offices and work areas not included elsewhere, including storage areas	Light access stairs and gangways not more than 600mm wide	0.22	✓	✓	✓	✓
	Light pedestrian traffic routes in industrial and storage buildings except designated escape routes	0.36	✓	✓	✓	✓
	Areas not susceptible to overcrowding in office and institutional buildings, also industrial and storage buildings except as given above.	0.74	x	x	x	✓
Areas where people might congregate	Areas having fixed seating within 530mm of the barrier, balustrade or parapet.	1.50	x	x	x	x
Areas with Tables or Fixed Seating	Restaurants and Bars	1.50	x	x	x	x
Areas without obstacles for moving people and not susceptible to overcrowding	Stairs, landings, corridors, ramps	0.74	x	x	x	✓
	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	✓
Areas susceptible to overcrowding	Footways or pavements less than 3m wide adjacent to sunken areas	1.50	x	x	x	x
	Theatres, cinemas, discotheques, bars, auditoria, shopping malls, assembly areas, studio; footways or pavements greater than 3m wide adjacent to sunken areas	3.00	x	x	x	x
	Grandstands and Stadia	(Note 1)	-	-	-	-
Retail Areas	All retail areas including public areas of banks/building societies or betting shops	1.50	x	x	x	x
Vehicular	Pedestrian areas in car parks including stairs, landings, ramps, edges of internal floors, footways, edges of roofs	1.50 (Note 2)	x	x	x	x
	Horizontal loads imposed by vehicles	(Note 2)	-	-	-	-

Chart 4 – Load deflection curve for Pure Vista Posi-Glaze balustrade system side mounted into concrete



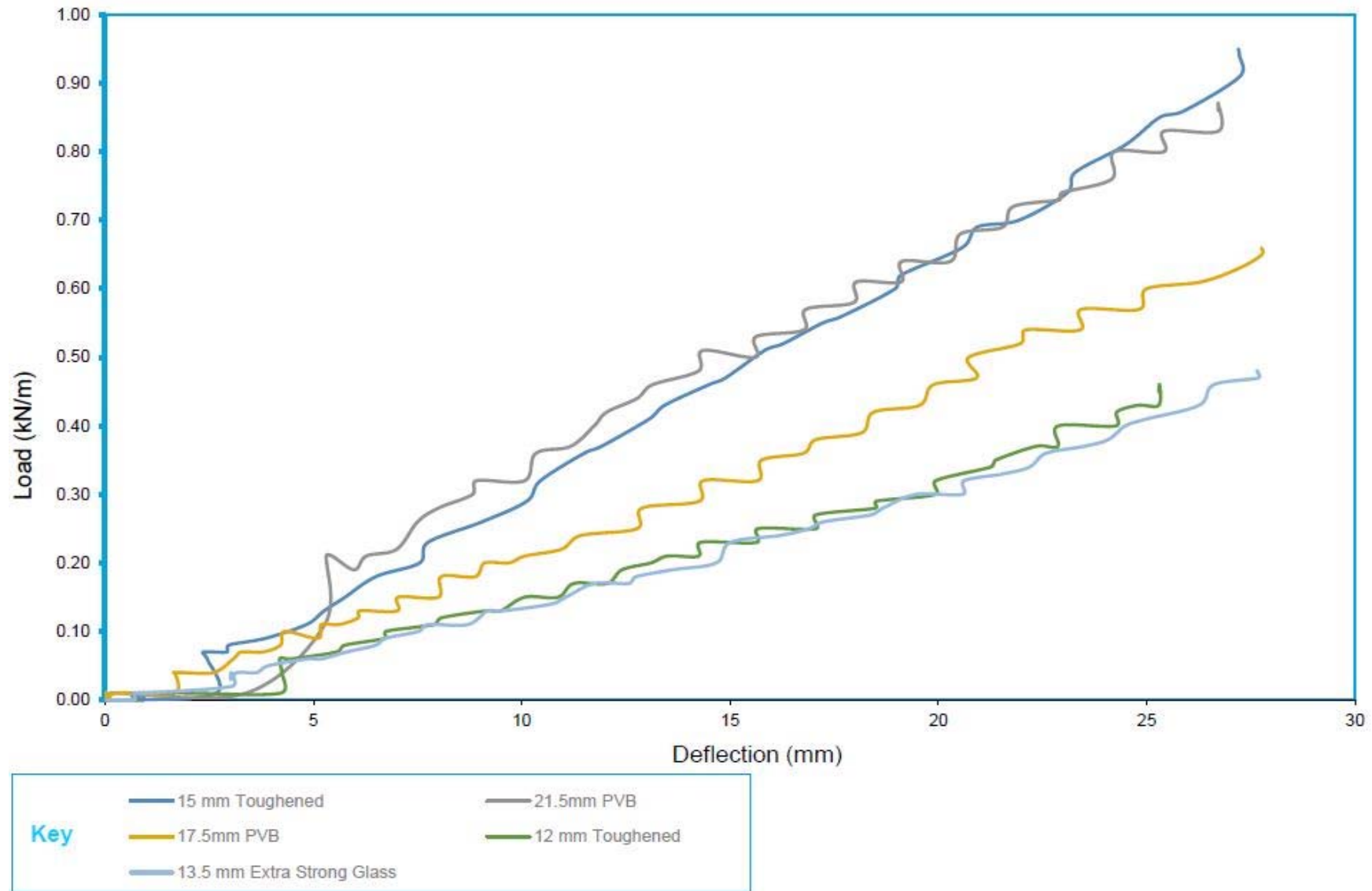
Test Performance:- Steel substrate 400mm centres Base Fixed

Table 2 – Summary of Performance of Pure Vista Ltd Posi-Glaze balustrade system base mounted into steel under horizontal line load.

Glass Span (mm)	Glass Type	Test Height (mm)	Imposed Line Load Deflection at 25mm Deflection (KN/M)	Working Line Load for System (KN/M)	Deflection at Working Line Load for system (mm)
1000	12mm Toughened Monolithic	1200	0.43	0.36	21.38
1000	13.5mm extra strong Laminated	1200	0.41	0.36	22.59
1000	15mm Toughened Monolithic	1100	0.82	0.74	23.09
1000	17.5mm Toughened Laminated (PVB)	1200	0.60	0.36	16.76
1000	21.5mm Toughened Laminated (PVB)	1350	0.80	0.74	23.95

Type of Occupancy for Part of the Building	Examples of Specific Use	Horizontal Uniformly Distributed Line Load (Kn/M)	Posi-Graze				
			12mm	13.5mm	15mm	17.5mm	21.5mm
Domestic and residential activities	All areas within or serving exclusively one single family dwelling including stairs, etc. but excluding balconies and edge of roofs	0.36	✓	✓	✓	✓	✓
	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	Light access stairs and gangways not more than 600mm wide	0.22	✓	✓	✓	✓	✓
	Light pedestrian traffic routes in industrial and storage buildings except designated escape routes	0.36	✓	✓	✓	✓	✓
	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	Areas having fixed seating within 530mm of the barrier, balustrade or parapet.	1.50	✗	✗	✗	✗	✗
Areas with Tables or Fixed Seating	Restaurants and Bars	1.50	✗	✗	✗	✗	✗
Areas without obstacles for moving people and not susceptible to overcrowding	Stairs, landings, corridors, ramps	0.74	✗	✗	✓	✗	✓
	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	Footways or pavements less than 3m wide adjacent to sunken areas	1.50	✗	✗	✗	✗	✗
	Theatres, cinemas, discotheques, bars, auditoria, shopping malls, assembly areas, studio; footways or pavements greater than 3m wide adjacent to sunken areas	3.00	✗	✗	✗	✗	✗
	Grandstands and Stadia	(Note 1)	-	-	-	-	-
Retail Areas	All retail areas including public areas of banks/building societies or betting shops	1.50	✗	✗	✗	✗	✗
Vehicular	Pedestrian areas in car parks including stairs, landings, ramps, edges of internal floors, footways, edges of roofs	1.50 (Note 2)	✗	✗	✗	✗	✗
	Horizontal loads imposed by vehicles	(Note 2)	-	-	-	-	-

Chart 2 – Load deflection curve for Pure Vista Posi-Glaze balustrade system base mounted into steel



Test Performance:- Steel substrate 400mm centres Side Fixed

Table 3 – Summary of Performance of Pure Vista Ltd Posi-Glaze balustrade system Side mounted into steel under horizontal line load

Glass Span (mm)	Glass Type	Test Height (mm)	Imposed Line Load Deflection at 25mm Deflection (KN/M)	Working Line Load for System (KN/M)	Deflection at Working Line Load for system (mm)
1000	12mm Toughened Monolithic	1100	0.47	0.36	18.45
1000	13.5mm extra strong Laminated	1100	0.50	0.36	17.76
1000	15mm Toughened Monolithic	1100	0.76	0.74	24.87
1000	17.5mm Toughened Laminated (PVB)	1100	0.64	0.36	14.15

Type of Occupancy for Part of the Building	Examples of Specific Use	Horizontal Uniformly Distributed Line Load (Kn/M)	Posi-Glaze			
			12mm	13.5mm	15mm	17.5mm
Domestic and residential activities	All areas within or serving exclusively one single family dwelling including stairs, etc. but excluding balconies and edge of roofs	0.36	✓	✓	✓	✓
	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	Light access stairs and gangways not more than 600mm wide	0.22	✓	✓	✓	✓
	Light pedestrian traffic routes in industrial and storage buildings except designated escape routes	0.36	✓	✓	✓	✓
	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	Areas having fixed seating within 530mm of the barrier, balustrade or parapet.	1.50	✗	✗	✗	✗
Areas with Tables or Fixed Seating	Restaurants and Bars	1.50	✗	✗	✗	✗
Areas without obstacles for moving people and not susceptible to overcrowding	Stairs, landings, corridors, ramps	0.74	✗	✗	✓	✗
	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	Footways or pavements less than 3m wide adjacent to sunken areas	1.50	✗	✗	✗	✗
	Theatres, cinemas, discotheques, bars, auditoria, shopping malls, assembly areas, studio; footways or pavements greater than 3m wide adjacent to sunken areas	3.00	✗	✗	✗	✗
	Grandstands and Stadia	(Note 1)	-	-	-	-
Retail Areas	All retail areas including public areas of banks/building societies or betting shops	1.50	✗	✗	✗	✗
Vehicular	Pedestrian areas in car parks including stairs, landings, ramps, edges of internal floors, footways, edges of roofs	1.50 (Note 2)	✗	✗	✗	✗
	Horizontal loads imposed by vehicles	(Note 2)	-	-	-	-

Chart 3 – Load deflection curve for Pure Vista Posi-Glaze balustrade system side mounted into steel

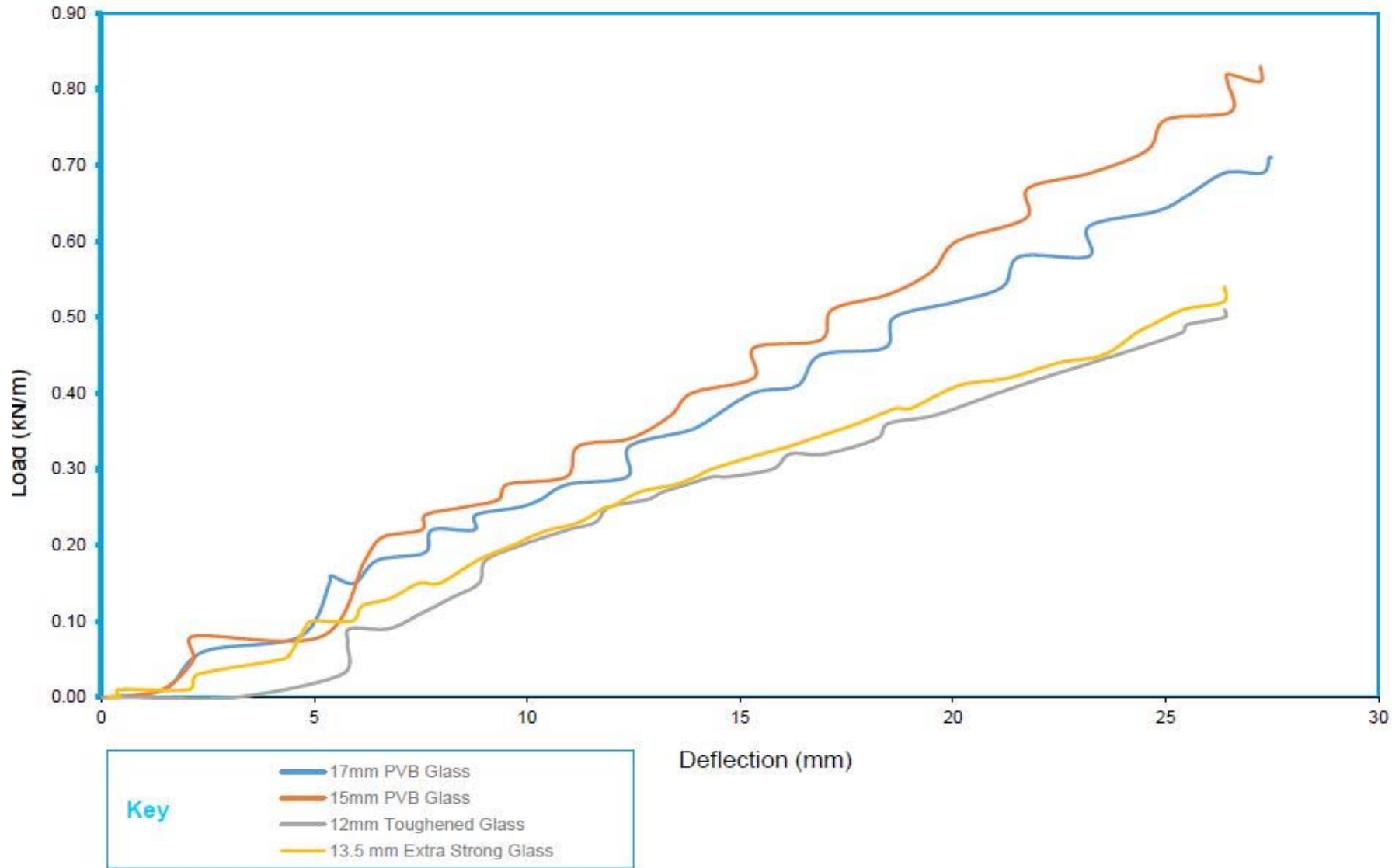
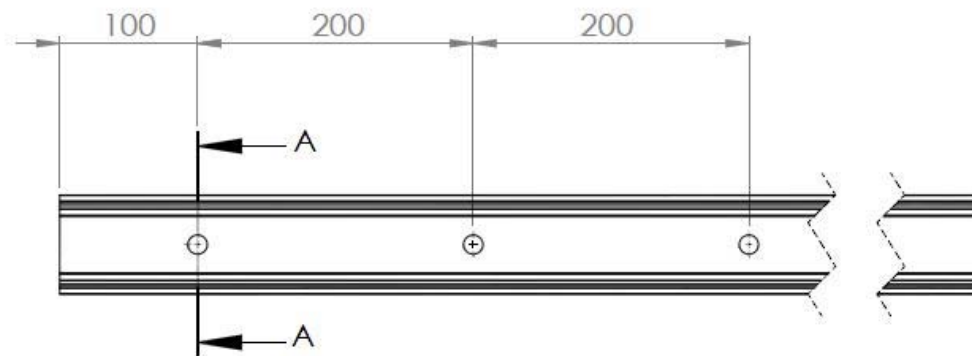
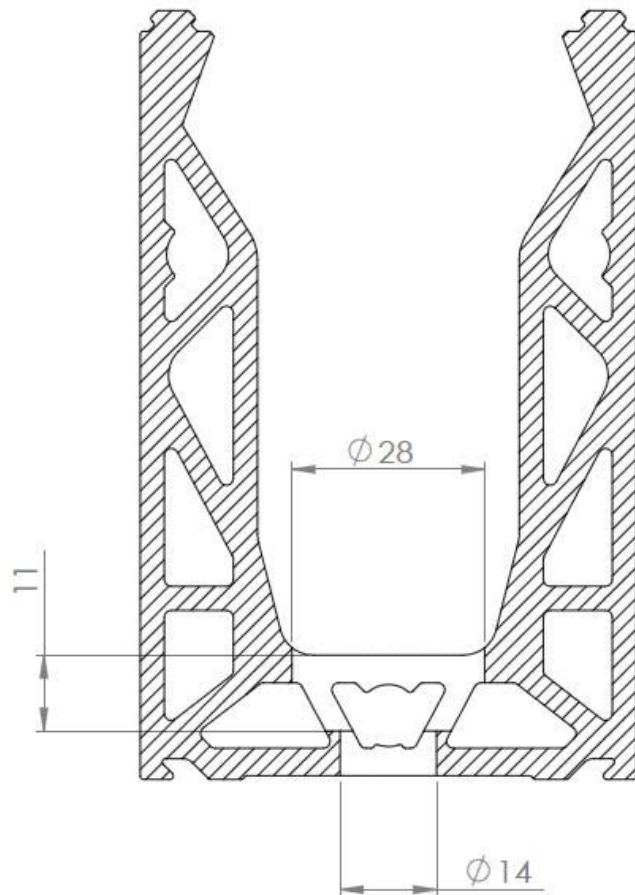




Plate 1 - General Test Configuration

DO NOT SCALE DRAWING	REVISION
Purevista	
TITLE: Channel Base Drilling	
DWG NO.	A4
SCALE:1:10	SHEET 2 OF 2



DO NOT SCALE DRAWING	REVISION
Purevista	
TITLE: G2623 Channel Side Drilling	
DWG NO.	A4
SCALE:1:10	SHEET 2 OF 2

