

TEST REPORT

Lucideon Reference: UK224793 (QT-70039/1/AS)/Ref. 2

Project Title: Testing of Pure Vista Posi-One Balustrade System Base Mounted into Steel in Accordance with BS 6180:2011 Barriers In and About Buildings

Client: Pure Vista
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Work Location: Lucideon UK



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1 INTRODUCTION

Lucideon Limited was commissioned by the client Pure Vista 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 on 12 December 2022.

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

2 TEST SAMPLES

A single system was tested designated as follows:

- Posi-One Balustrade system base mounted into steel.

The system and glass were installed by Pure Vista Personnel.

3 TEST PROGRAMME

A horizontal line load was applied to the systems using the following glazed sections:

- 12 mm Toughened Glass 1000 mm x 1200 mm (w x h).
- 13.5 mm PVB Glass 1000 mm x 1200 mm (w x h).
- 15 mm Toughened Glass 1000 mm x 1200 mm (w x h).
- 17.5 mm PVB Glass 1000 mm x 1200 mm (w x h).
- 19 mm Toughened Glass 1000 mm x 1200 mm (w x h).
- 21.5 mm PVB Glass 1000 mm x 1200 mm (w x h).
- 21.5 mm Sentry Glass 1000 mm x 1200 mm (w x h).

Tests were conducted under the following conditions:

3.1 Base Mounted

- Load application 1200 mm deflection recorded at 1200 mm.
- Load application 1100 mm deflection recorded at 1100 mm.

4 TEST PREPARATION

The Posi-One channel was bolted to the top of a piece of reinforced steel C-Section measuring 1500 mm x 90 mm x 5 mm. The section was welded to a steel anvil, which in turn was bolted to the floor of the test facility. The 1.0 m length of Posi-One channel was

bolted to the steel C-Section using standard 5 No. M12 Hex bolts at 200 mm centres (100 mm from the end and 200 mm thereafter).

The glass, having a width of 1000 mm, was installed and held in position using a glass clamping system consisting of three clamps per metre, equally spaced along the length of the channel. The exception to this was when 21.5 mm Sentry glass was used in the system, where 4 clamps per meter were used. The glass was fitted using nominal tightness to the clamps.

5 TEST METHOD

A horizontal imposed line load was applied to the glass of the base-mounted system at heights of 1200 mm above the datum level of the floor with deflections measured at a height of 1200 mm. The exception to this is when 19 mm toughened glass was used in the system where load and deflection were recorded at a height of 1100 mm. The deflections were recorded at the horizontal mid-span of the panel. The load was applied via a hydraulic ram; measured using a calibrated load cell and deflection was measured using a Linear Voltage Displacement Transducer (LVDT). Data was recorded using a calibrated Data Logger.

6 TEST REQUIREMENTS

The tests were carried out in accordance with the guidance given in BS 6180:2011 Barriers In and About Buildings – Code of Practice.

The Standard states that the maximum allowable deflection for a freestanding glass protective barrier panel, when loaded at a minimum height of 1100 mm, is 25 mm. Testing at a height above this is seen as a more onerous test than one which is conducted at 1100 mm.

Table 1 gives the minimum required horizontal imposed loads, depending on the type of building occupancy or structure, in accordance with BS 6180:2011 and an indication as to whether the tested system has achieved the required load.

7 RESULTS

The loads achieved by the balustrade system when tested under line load 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.

8 SUMMARY

A summary of the working line loads achieved by the system is given in Table 2-4.

TABLES

Table 1 - Working Load Deflections for Pure Vista Posi-One Systems Base Mounted into Steel Tested in Accordance with BS 6180:2011

Balustrade System	Glass	Load Application/Transducer Position (mm)	Imposed Line Load at 25 mm Deflection (kN/m)	Working Line Load for System (kN/m)	Deflection at Working Line Load for System (mm)
Posi-One	12 mm Toughened	1200/1200	-	0.36	12.80
	13.5 mm PVB	1200/1200	-	0.74	16.40
	15 mm Toughened	1200/1200	-	0.74	14.69
	17.5 mm PVB	1200/1200	-	0.74	15.63
	19 mm Toughened	1100/1100	-	1.50	24.22
	21.5 mm PVB	1200/1200	-	0.74	13.41
	21.5 mm Sentry	1200/1200	1.54	1.5	24.30

Table 2 - Summary of Suitability for Pure Vista Posi-One Balustrade System Base Mounted into Steel Tested in Accordance with BS 6180:2011

Type of Occupancy for Part of the Building	Examples of Specific Use	Horizontal Uniformly Distributed Line Load (kN/m)	Posi-One		
			12 mm Toughened Glass	15 mm Toughened Glass	19 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	✓	✓	✓
	(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	✓	✓

Type of Occupancy for Part of the Building	Examples of Specific Use	Horizontal Uniformly Distributed Line Load (kN/m)	Posi-One		
			12 mm Toughened Glass	15 mm Toughened Glass	19 mm Toughened Glass
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	✓	✓	✓
	(v) areas not susceptible to overcrowding in office and institutional buildings, also industrial and storage buildings, except as given above	0.74	X	✓	✓
Areas where people might congregate	(vi) areas having fixed seating within 530 mm of the barrier, balustrade or parapet	1.50	X	X	✓
Areas with tables or fixed seating	(vii) restaurants and bars	1.50	X	X	✓
Areas without obstacles for moving people and not susceptible to overcrowding	(viii) stairs, landings corridors ramps	0.74	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	✓	✓
Areas susceptible to overcrowding	(x) footways or pavements less than 3 m wide adjacent to sunken areas	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	X	X	X
	(xii) grandstands and stadia	(Note 1)	X	X	X
Retail areas	(xiii) all retail areas, including public areas of banks/building societies or betting shops	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 (Note 2)	-	-	-

Type of Occupancy for Part of the Building	Examples of Specific Use	Horizontal Uniformly Distributed Line Load (kN/m)	Posi-One		
			12 mm Toughened Glass	15 mm Toughened Glass	19 mm Toughened Glass
	(xv) horizontal loads imposed by vehicles	3.00 (Note 2)	-	-	-

Note 1 – See requirements of the appropriate certifying authority.

Note 2 – Clause 8.1.1 of BS 6180:2011 states that “glass should not be used for vehicle protection barriers”.

Table 3 - Summary of Suitability for Pure Vista Posi-One Balustrade System Base Mounted into Steel Tested in Accordance with BS 6180:2011

Type of Occupancy for Part of the Building	Examples of Specific Use	Horizontal Uniformly Distributed Line Load (kN/m)	Posi-One		
			13.5 mm PVB Glass	17.5 mm PVB Glass	21.5 mm PVB 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	✓	✓	✓
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	✓	✓	✓
	(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	X	X	X

Type of Occupancy for Part of the Building	Examples of Specific Use	Horizontal Uniformly Distributed Line Load (kN/m)	Posi-One		
			13.5 mm PVB Glass	17.5 mm PVB Glass	21.5 mm PVB Glass
Areas with tables or fixed seating	(vii) restaurants and bars	1.50	X	X	X
Areas without obstacles for moving people and not susceptible to overcrowding	(viii) stairs, landings corridors ramps	0.74	X	✓	✓
	(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	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
	(xii) grandstands and stadia	(Note 1)	X	X	X
Retail areas	(xiii) all retail areas, including public areas of banks/building societies or betting shops	1.50	X	X	X
Vehicular	(xiv) pedestrian areas in car parks, including stairs, landings, ramps, edges of internal floors, footways, edges of roofs	1.50 (Note 2)	-	-	-
	(xv) horizontal loads imposed by vehicles	3.00 (Note 2)	-	-	-

Note 1 – See requirements of the appropriate certifying authority.

Note 2 – Clause 8.1.1 of BS 6180:2011 states that “glass should not be used for vehicle protection barriers”.

Table 4 - Summary of Suitability for Pure Vista Posi-One Balustrade System Base Mounted into Steel Tested in Accordance with BS 6180:2011

Type of Occupancy for Part of the Building	Examples of Specific Use	Horizontal Uniformly Distributed Line Load (kN/m)	Posi-One
			21.5 mm Sentry 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	✓
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	✓
	(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	✓
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	✓
	(x) footways or pavements less than 3 m wide adjacent to sunken areas	1.50	✓
Areas susceptible to overcrowding	(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 1)	X
Retail areas	(xiii) all retail areas, including public areas of banks/building societies or betting shops	1.50	✓

Type of Occupancy for Part of the Building	Examples of Specific Use	Horizontal Uniformly Distributed Line Load (kN/m)	Posi-One
			21.5 mm Sentry Glass
Vehicular	(xiv) pedestrian areas in car parks, including stairs, landings, ramps, edges of internal floors, footways, edges of roofs	1.50 (Note 2)	-
	(xv) horizontal loads imposed by vehicles	3.00 (Note 2)	-

Note 1 – See requirements of the appropriate certifying authority.

Note 2 – Clause 8.1.1 of BS 6180:2011 states that “glass should not be used for vehicle protection barriers”.

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

END OF REPORT

PLATE



Plate 1 - Typical Specimen Configuration Base Mount

Chart 1 - Load Deflection Curve for Horizontal Line Load of Pure Vista Posi-One Balustrade System Base Mounted into Steel Load Applied and Deflection Recorded at 1200 mm

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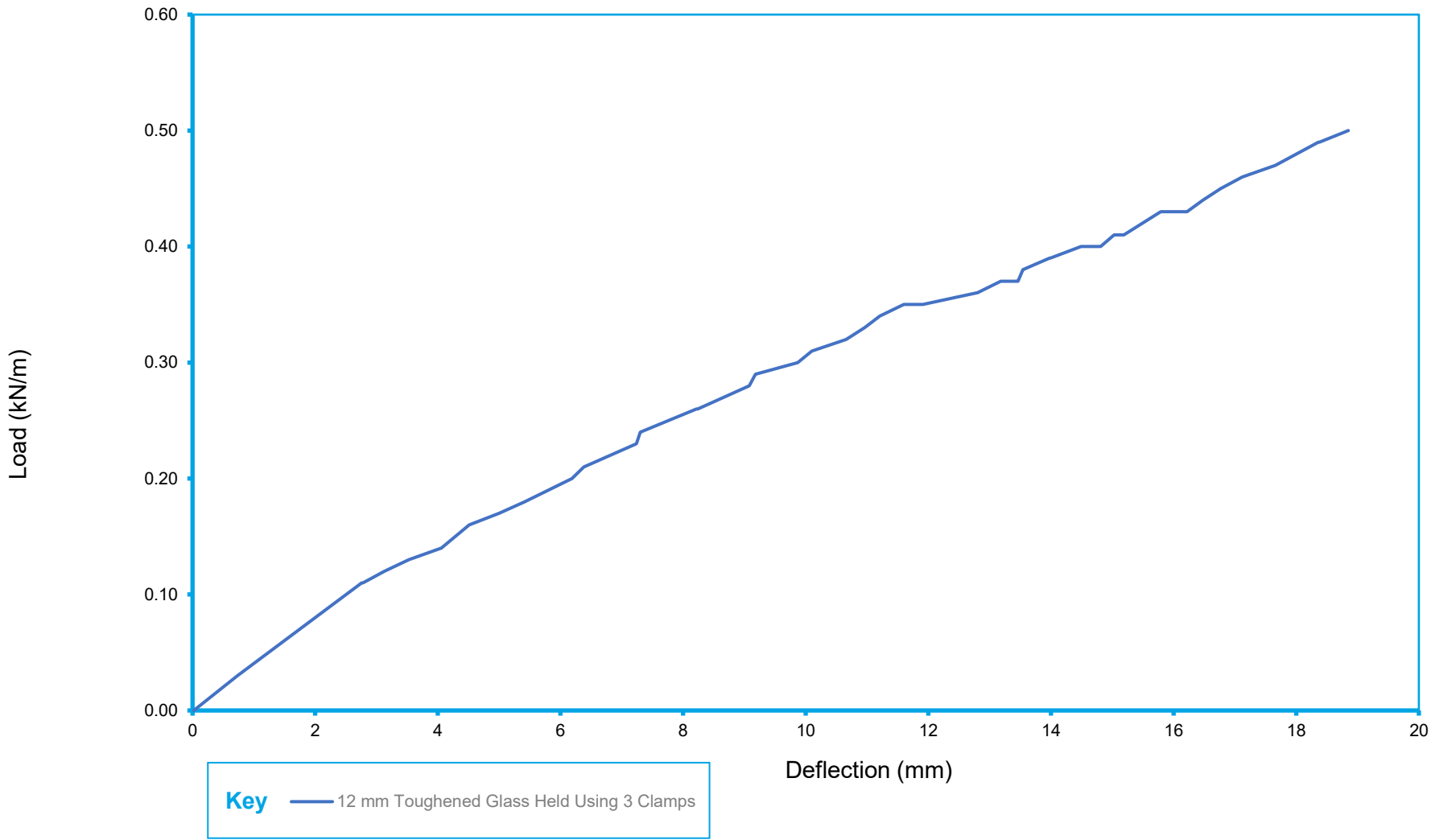


Chart 2 - Load Deflection Curve for Horizontal Line Load of Pure Vista Posi-One Balustrade System Base Mounted into Steel Load Applied and Deflection Recorded at 1200 mm

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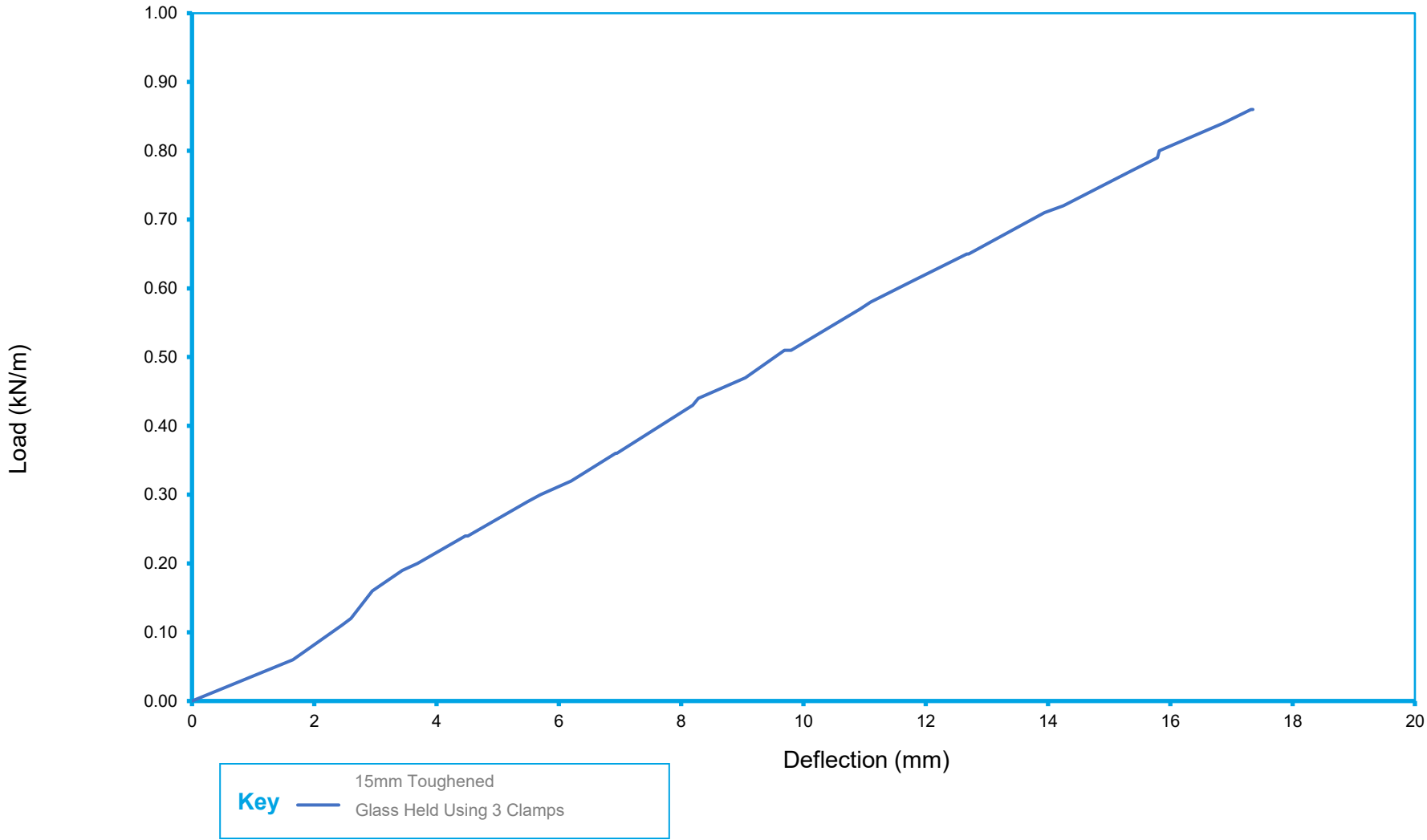


Chart 3 - Load Deflection Curve for Horizontal Line Load of Pure Vista Posi-One Balustrade System Base Mounted into Steel Load Applied and Deflection Recorded at 1100 mm

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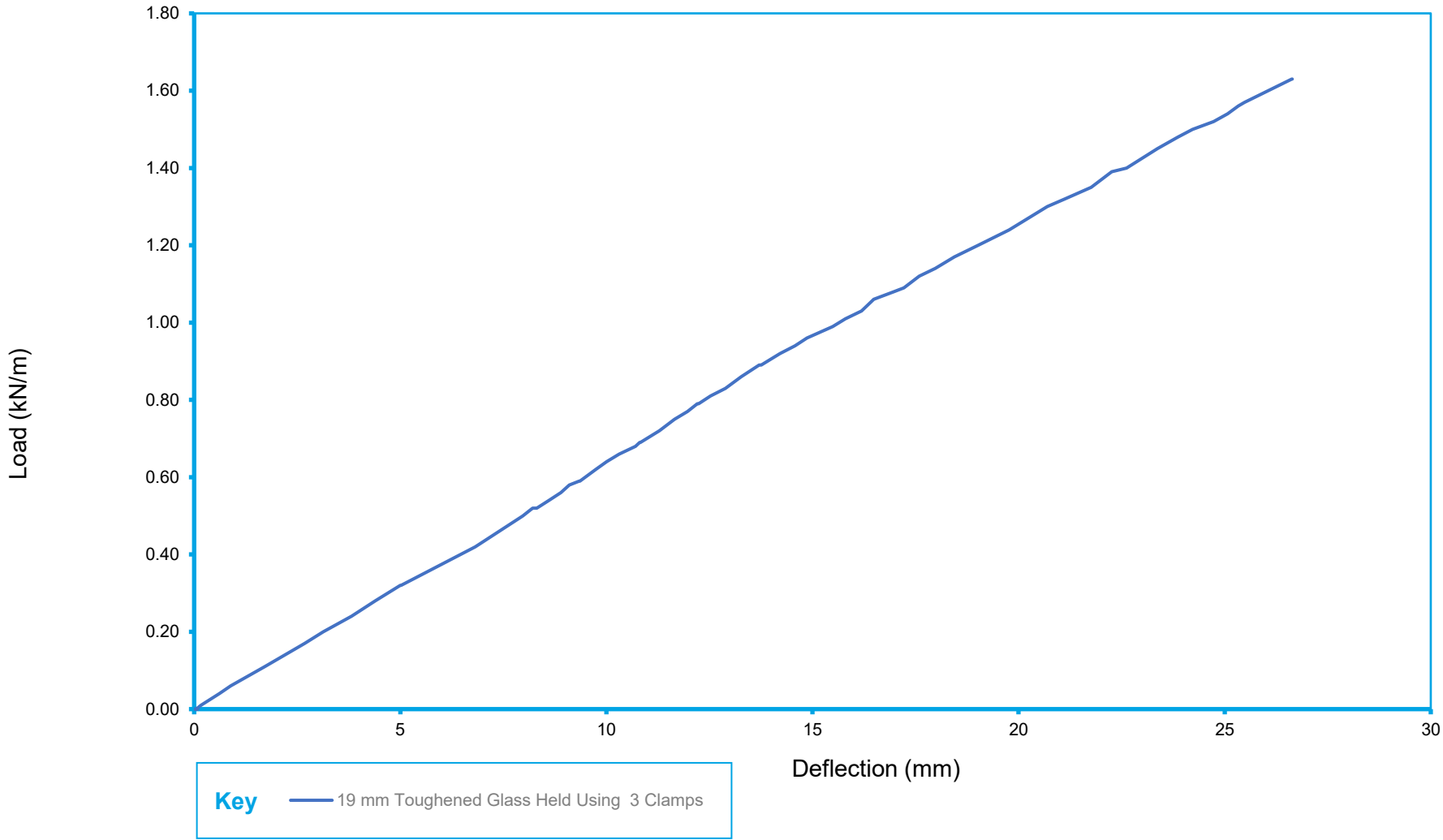


Chart 4 - Load Deflection Curve for Horizontal Line Load of Pure Posi-One Balustrade System Base Mounted into Steel Load Applied and Deflection Recorded at 1200 mm

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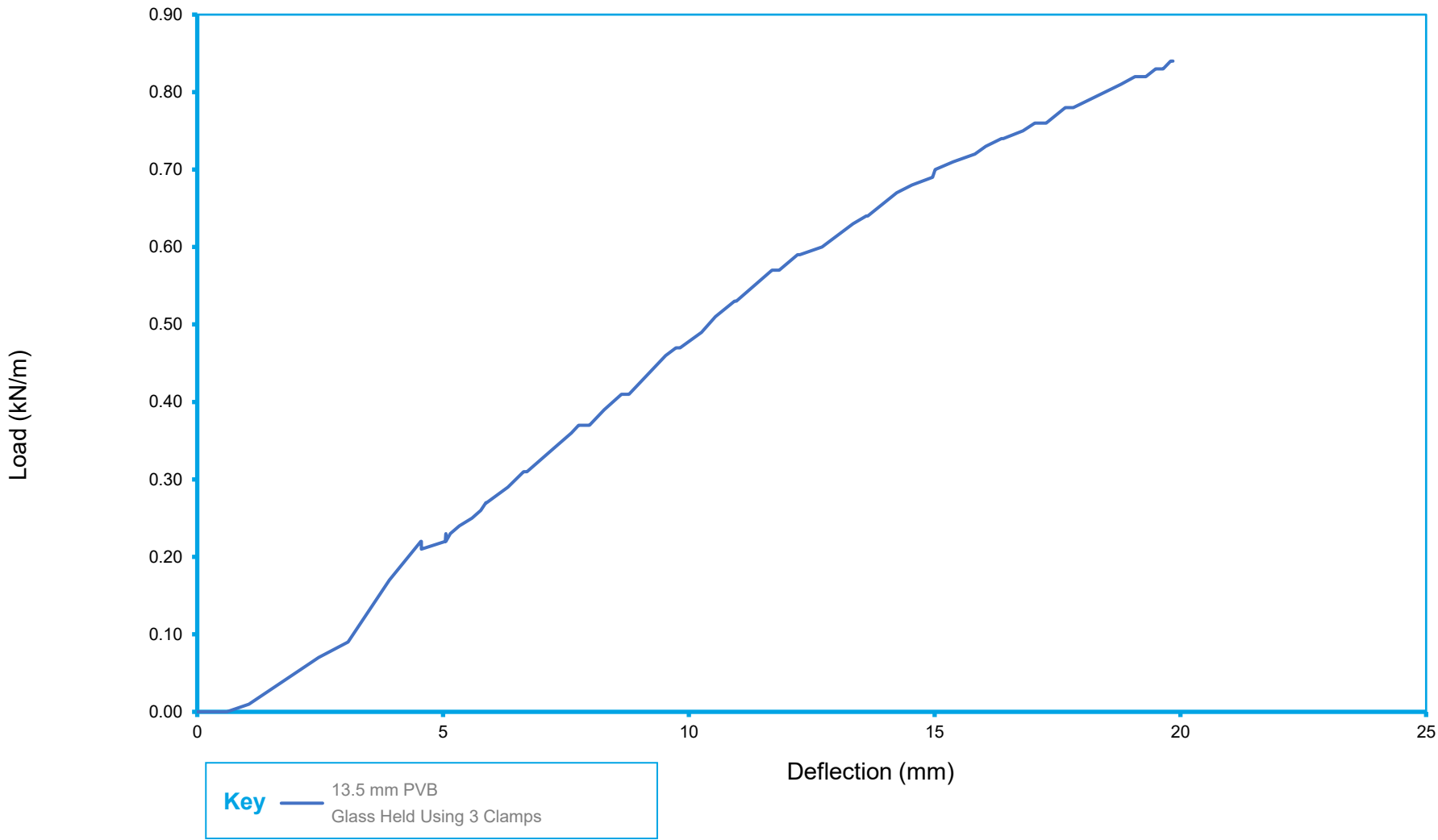


Chart 5 - Load Deflection Curve for Horizontal Line Load of Pure Vista Posi-One Balustrade System Base Mounted into Steel Load Applied and Deflection Recorded at 1200 mm

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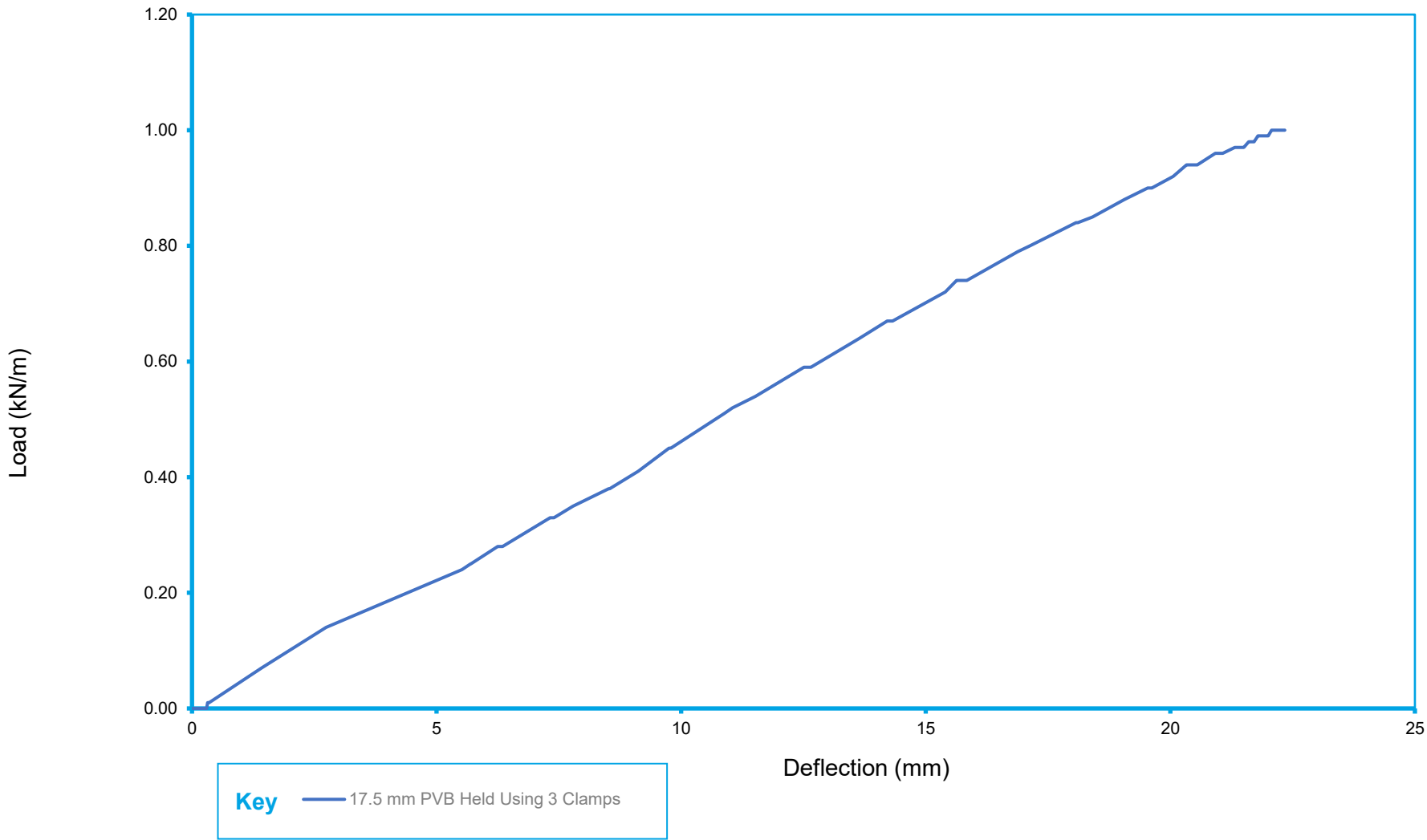


Chart 6 - Load Deflection Curve for Horizontal Line Load of Pure Vista Posi-One Balustrade System Base Mounted into Steel Load Applied and Deflection Recorded at 1200 mm

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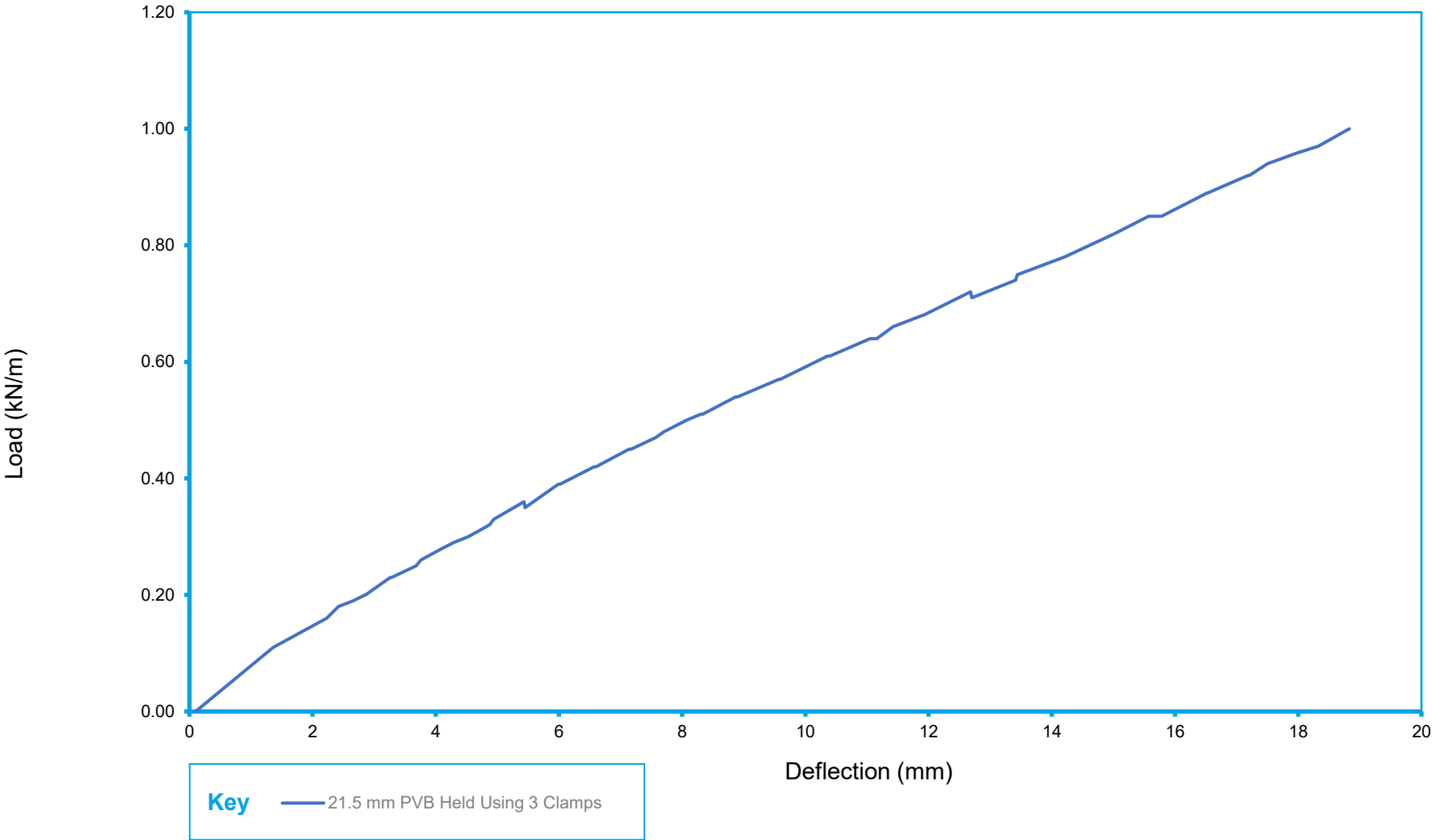


Chart 7 - Load Deflection Curve for Horizontal Line Load of Pure Vista Posi-One Balustrade System Base Mounted into Steel Load Applied and Deflection Recorded at 1200 mm

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