TEST REPORT

Lucideon Reference:	173446 (QT44718/2/RK)/Ref. 1/Supp1
Project Title:	Balustrade Testing of TITAN spigot in Accordance with BS 6180
Client:	OnLevel Ltd Unit 6-7 Alexandria Court Alexandria Drive Ashton-under-Lyne OL7 0QN
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Report Date:	05 December, 2017
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Work Location:	Lucideon UK

This report supersedes the report issued on 03.11.17.

Miss Lisa Cobden
Consultancy Team
Reviewer

Mr Justin Fryer
Consultancy Team
Project Manager

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1 INTRODUCTION

OnLevel design and manufacture balustrades and balustrade 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 on the whole systems and on components, to determine their products performance in accordance with British and other European standards.

All tests were to be carried out to BS 6180:2011 Barriers in and about buildings.

2 TEST ARRANGEMENT

A concrete block of dimensions 2000 mm x 700 mm x 500 mm was fastened to the laboratory strong-floor.

The TITAN spigots were attached to the top surface of said concrete block by way of fixings as highlighted in Figure 1 per manufacturer's instructions.

Each different thickness of glass was placed, in turn, into the spigots and the spigots tightened prior to testing.

3 TEST METHOD

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

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

4 RESULTS

Table 1 – BS 6180 Results

Type of Occupancy for Part of the Building	Examples of Specific Use	Horizontal Uniformly Distributed Line Load (kN/m)		TITAN spigots 1000 mm Panel				
				12 mm Toughened	15 mm Toughened	17.5 mm Laminated	19 mm Toughened	21.5 mm Laminated
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	✓	✓	✓	✓
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	X	X	X
Areas with tables or fixed seating	(vii) restaurants and bars	1.50		X	X	X	X	X

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				12 mm Toughened	15 mm Toughened	17.5 mm Laminated	19 mm Toughened	21.5 mm Laminated
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	✓	✓	✓	✓
Areas susceptible to overcrowding	(x) footways or pavements less than 3 m wide adjacent to sunken areas	1.50		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
	(xii) grandstands and stadia	(Note 1)		-	-	-	-	
Retail areas	(xiii) all retail areas including public areas of banks/building societies or betting shops	1.50		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 2)		X	X	X	X	X
	(xv) horizontal loads imposed by vehicles	(Note 2)		X	X	X	X	X

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

END OF REPORT

PLATES



Plate 1 - TITAN spigots

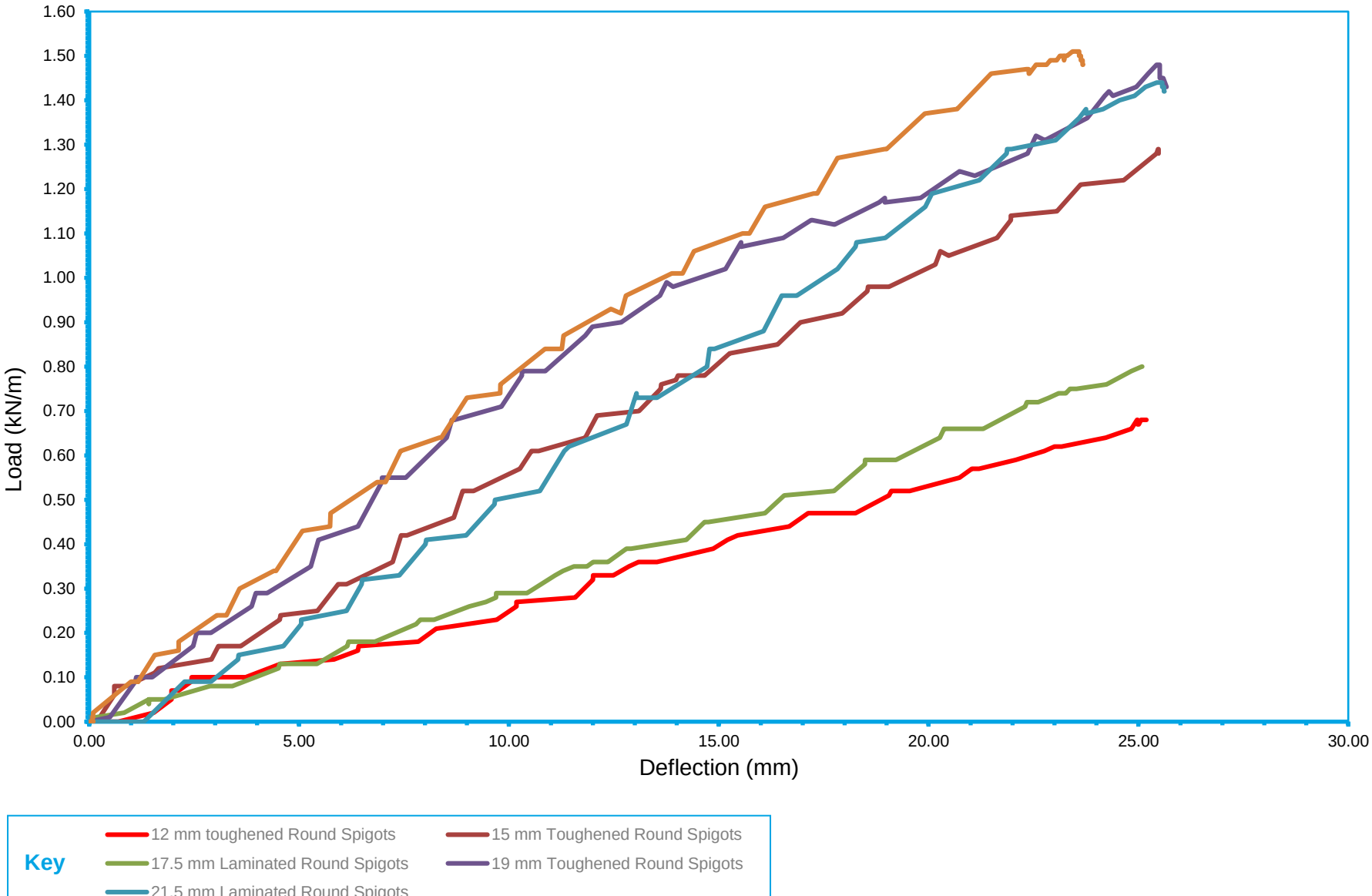


Plate 2 - Spigots under Test



Plate 3 - Rear View of Spigots under Test

Chart 1 - Load Deflection Curves for BalustradeTesting in Accordance with BS 6180 of OnLevel's TITAN spigots at 700 mm Centres with Various Glass Thicknesses



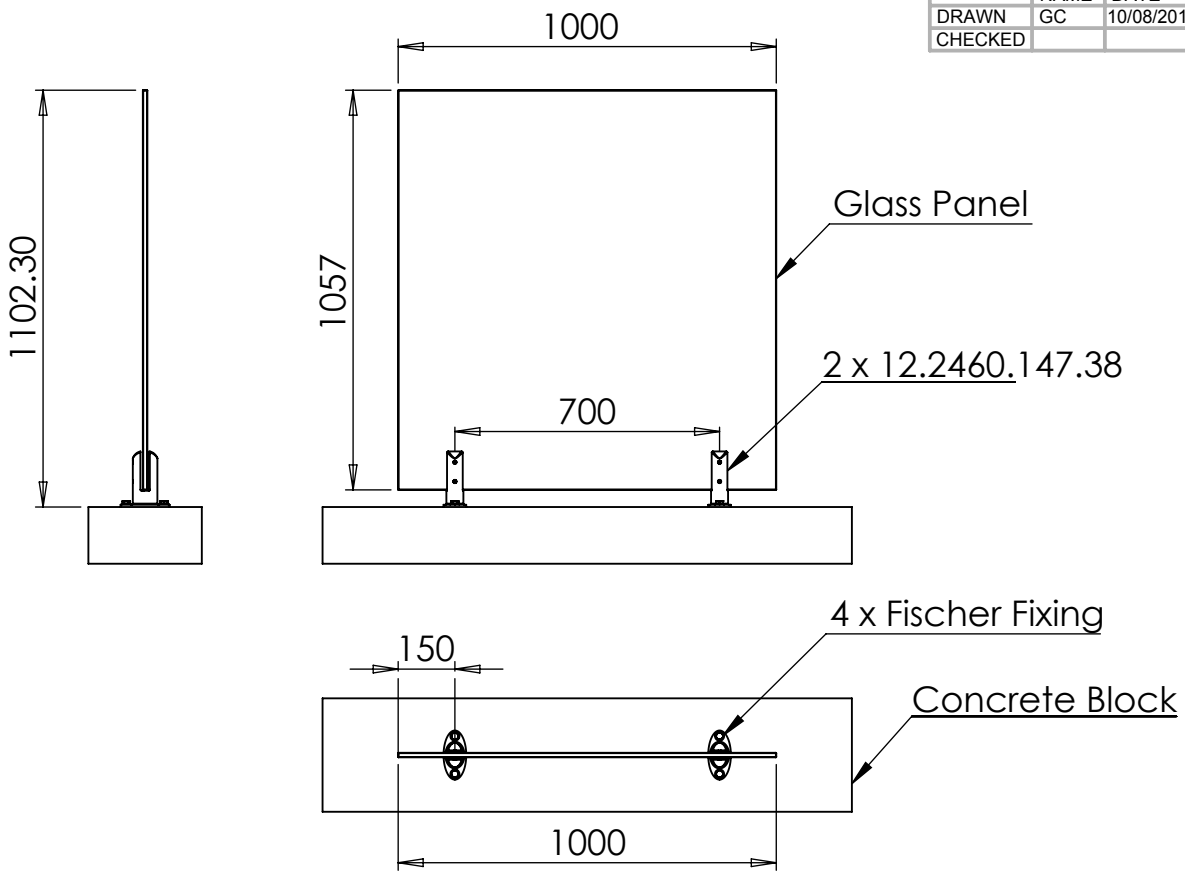
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ONLEVEL - TITAN SPIGOT

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Load Testing of OnLevel's TITAN Spigot System, Which Comprises of Two Spigots With A Range of Glass Panels to BS EN 6180:2011

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 OnLevel's TITAN spigot system to be classified for use in accordance with the Code of Practice included within the standard.

Test In Accordance	Parts Required	Foundation Material	Glass Size & Type	Loading Kn	Fischer Innovative Solutions Fixings www.fischer.co.uk	Notes
BS EN 6180:2011	2 x 12.2460.147.38	C35 with glass fibres aggregate size 20mm slump 100	1057 x 1000mm 12mm Toughened	0.36kn	FBN II 12 X 105 - 316	Spigots Spaced at 700mm Centres
BS EN 6180:2011	2 x 12.2460.147.38	C35 with glass fibres aggregate size 20mm slump 100	1057 x 1000mm 15mm Toughened	0.74kn	FBN II 12 X 105 - 316	Spigots Spaced at 700mm Centres
BS EN 6180:2011	2 x 12.2460.147.38	C35 with glass fibres aggregate size 20mm slump 100	1057 x 1000mm 17.5mm Laminated	0.36kn	BN II 12 X 105 - 316	Spigots Spaced at 700mm Centres
BS EN 6180:2011	2 x 12.2460.147.38	C35 with glass fibres aggregate size 20mm slump 100	1057 x 1000mm 19mm Toughened	1.5kn	FBN II 12 X 105 - 316	Spigots Spaced at 700mm Centres
BS EN 6180:2011	2 x 12.2460.147.38	C35 with glass fibres aggregate size 20mm slump 100	1057 x 1000mm 21.5mm Laminated	0.74kn	FBN II 12 X 105 - 316	Spigots Spaced at 700mm Centres