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TEST REPORT

Lucideon Reference:	N251565 (QT-77681/3/KNA)/Ref. 1/CR1
Project Title:	Window Safety Barrier Testing on Timber and Plasterboard Substrate
Client:	Rothley Ltd Unit 2 Discovery Park Wobaston Road Wolverhampton West Midlands WV10 6QJ
For the Attention of:	Mr Luke Hester
Author(s):	Mr Dominic Hallam Mr Matthew Amos
Report Date:	30 June, 2025
Purchase Order No.:	35106

This report supersedes the report issued on 13.06.25 and was re-issued following grammatical/typographical corrections.

Mr Kaleem Zar
Testing Team
Reviewer

Mr Matthew Amos
Testing Team
Project Manager

Lucideon Limited
Queens Road, Penkhull
Stoke-on-Trent
Staffordshire, ST4 7LQ, UK

T +44 (0)1785 331874
query@lucideon.com
www.lucideon.com
Reg. England 1960455

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1 INTRODUCTION

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The testing was carried out at the Lucideon Structures Laboratory at Queens Road, Penkhull, Stoke-on-Trent, ST4 7LQ on 3 June 2025.

2 TEST SAMPLES

The Window Safety Barrier System provided by Rothley for testing, consisted of a horizontal 40 mm diameter stainless steel tube secured between 40 mm handrail sockets.

The system was installed using 6 No. Fischer Duopower 6 x 50 mm Wall Plugs and SPAX 4 x 60 mm Screws at 2 No. lengths at 2400 mm.

All samples were fixed through the end cap and 12.5 mm plasterboard, into C24 Grade Timber, and assembled to simulate a typical window reveal.

A detail view of sample construction can be seen in Plate 1.

3 TEST EQUIPMENT

- 10 kN Load Cell Serial No. FOR023.
- Linear Voltage Displacement Transducer (LVDT) Serial No. TRD044.
- Hydraulic Ram + Hand Pump.
- Data Logger

4 TEST PREPARATION

A test rig was constructed using a rigid steel portal frame, bolted to the Laboratory Strong Floor using M32 Bolts. Under this frame, 2 No. Rigid Steel Stanchions were positioned, such that, they could support the substrate for the test sample at the required span. Two No. Hydraulic Rams were installed onto the portal frame pointing downwards, to apply a clamping load onto the sample substrate.

A hydraulic ram connected to a manual pump was installed onto a third stanchion, which was positioned to the front of the test specimen at the centre of the span. A load cell was installed in-line with the ram, and a loading head was fitted to it, to act upon the sample window barrier.

To the rear of the window barrier at the centre of the test span, a Linear Voltage Displacement Transducer (LVDT) was fixed to a scaffold support, and the measuring cable was attached to the centre of the sample using thin copper wire. The load cell and LVDT were both connected to a Data Logger.

A picture of the test set-up and sample installation can be seen in Plate 2.

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For uniformly distributed horizontal line load testing, a load was applied along the length of the barrier, using the hydraulic ram and timber load spreader beam.

For point load testing, a load was applied at the horizontal centre of the rail using the hydraulic ram, fitted with 50 mm wide timber loading head.

As per the Standard, the barrier sample was tested until the desired design load was achieved, or 25 mm of deflection was reached – whichever, occurred first.

The applied load for each test is displayed with the results.

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There is no requirement in BS 6180:2011 to determine the Ultimate Limit State (ULS). The Serviceability Limit State (SLS) that BS 6180:2011 requires, is load-driven with a maximum allowable deflection of 25 mm at different load values, depending upon the utilisation of the sample.

Section 6.4.1 of the Standard states that the maximum allowable deflection of barriers for the protection of people, should not exceed 25 mm at any point on the barrier, at the required design load.

For these tests, the client had specified a target design load of 0.74 kN/m for line load testing, and 0.50 kN for point load testing.

This would classify the balustrade system for use in domestic applications, and areas and walkways not susceptible to overcrowding.

7 RESULTS

Table 1 − Load and Deflection Results for Line Load Testing of Rothley Window Safety Barrier System

Substrate Type	Test Span (mm)	Line Load (kN/m)	Required Load (kN)	Load Withstood	Deflection at Required Load (mm)
12.5 mm Plasterboard onto Timber Frame	2400	0.74	1.78	Y	5.98

Table 2 − Load and Deflection Results for Point Load Testing of Rothley Window Safety Barrier System

Substrate Type	Test Span (mm)	Required Load (kN)	Load Withstood	Deflection at Required Load (mm)
12.5 mm Plasterboard onto Timber Frame	2400	0.50	Y	24.96

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

END OF REPORT

PLATES

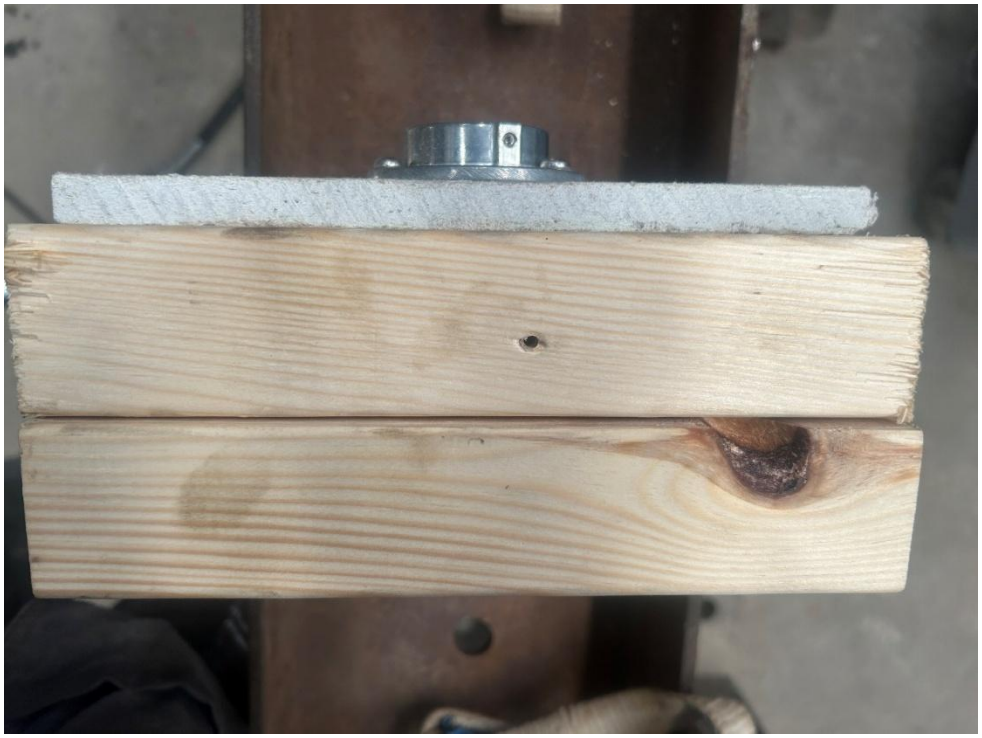

Plate 1 – Detail View of Sample Installation onto Substrate – Timber Frame

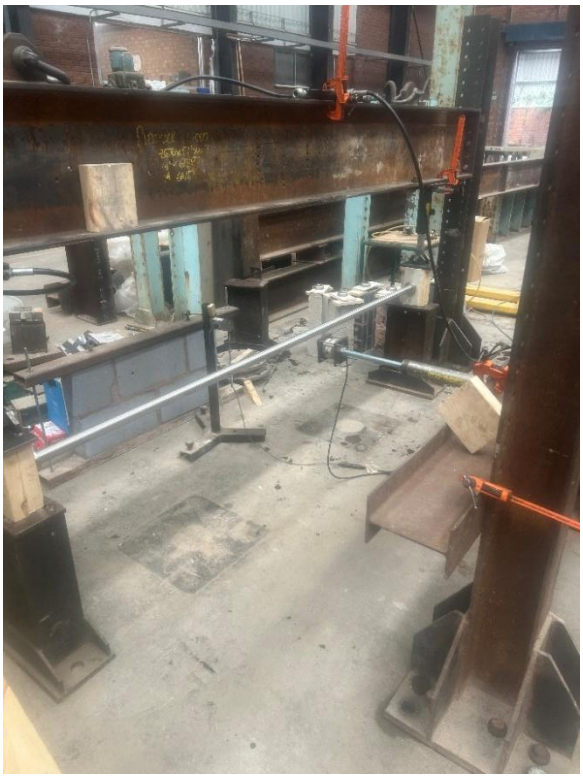

Plate 2 – General View of Test Set-Up

APPENDIX 1 − Consultant Biography

Dr Geoff Edgell

Expertise: Construction

Director & Principal Consultant

Geoff joined Lucideon Limited in August 1976 with a specialism in Construction, and more specifically, Masonry Construction. He began his career with us as a Research Worker in the masonry field and became a consultant during his lengthy career.

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TEST REPORT

Lucideon Reference:	N251565 (QT-77681/3/KNA)/Ref. 2/CR1
Project Title:	Window Safety Barrier Testing on an Aggregate Block and Plasterboard Substrate
Client:	Rothley Ltd Unit 2 Discovery Park Wobaston Road Wolverhampton West Midlands WV10 6QJ
For the Attention of:	Mr Luke Hester
Author(s):	Mr Austin Chapman Mr Matthew Amos
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2 TEST SAMPLES

The Window Safety Barrier System provided by Rothley for testing, consisted of a horizontal 40 mm diameter stainless steel tube secured between 40 mm handrail sockets.

The system was installed using 6 No. Fischer Duopower 6 x 40 mm Wall Plugs and SPAX 4 x 50 mm Screws with a 2400 mm length tube.

All samples were fixed through the end cap and 12.5 mm plasterboard onto the headers of aggregate blocks (7.3 N/mm²) with a 15 mm spacing to simulate Dot and Dab Construction and assembled to simulate a typical window reveal.

A detail view of sample construction can be seen in Plate 1.

3 TEST EQUIPMENT

- 10 kN Load Cell Serial No. FOR023.
- Linear Voltage Displacement Transducer (LVDT) Serial No. TRD044.
- Hydraulic Ram + Hand Pump.
- Data Logger Serial No. DAQ026.

4 TEST PREPARATION

A test rig was constructed using a rigid steel portal frame, bolted to the Laboratory Strong Floor using M32 Bolts. Under this frame, 2 No. Rigid Steel Stanchions were positioned, such that, they could support the substrate for the test sample at the required span. Two No. Hydraulic Rams were installed onto the portal frame pointing downwards, to apply a clamping load onto the sample substrate.

A hydraulic ram connected to a manual pump was installed onto a third stanchion, which was positioned to the front of the test specimen at the centre of the span. A load cell was installed in-line with the ram, and a loading head was fitted to it, to act upon the sample window barrier.

To the rear of the window barrier at the centre of the test span, a Linear Voltage Displacement Transducer (LVDT) was fixed to a scaffold support, and the measuring cable was attached to the centre of the sample using thin copper wire. The load cell and LVDT were both connected to a Data Logger.

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5 TEST METHOD

For uniformly distributed horizontal line load testing, a load was applied along the length of the barrier, using the hydraulic ram and timber load spreader beam.

For point load testing, a load was applied at the horizontal centre of the rail using the hydraulic ram, fitted with 50 mm wide timber loading head.

As per the Standard, the barrier sample was tested until the desired design load was achieved, or 25 mm of deflection was reached – whichever occurred first.

The applied load for each test is displayed with the results.

6 TEST REQUIREMENTS

There is no requirement in BS 6180:2011 to determine the Ultimate Limit State (ULS). The Serviceability Limit State (SLS) that BS6180:2011 requires, is load-driven with a maximum allowable deflection of 25 mm at different load values, depending upon the utilisation of the sample.

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7 RESULTS

Table 1 − Load and Deflection Results for Line Load Testing of Rothley Window Safety Barrier System

Substrate Type	Test Span (mm)	Line Load (kN/m)	Required Load (kN)	Load Withstood	Deflection at Required Load (mm)
12.5 mm Plasterboard onto Aggregate Block	2400	0.74	1.78	Y	4.83

Table 2 − Load and Deflection Results for Point Load Testing of Rothley Window Safety Barrier System

Substrate Type	Test Span (mm)	Required Load (kN)	Load Withstood	Deflection at Required Load (mm)
12.5 mm Plasterboard onto Aggregate Block	2400	0.50	Y	14.62

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

END OF REPORT

PLATES

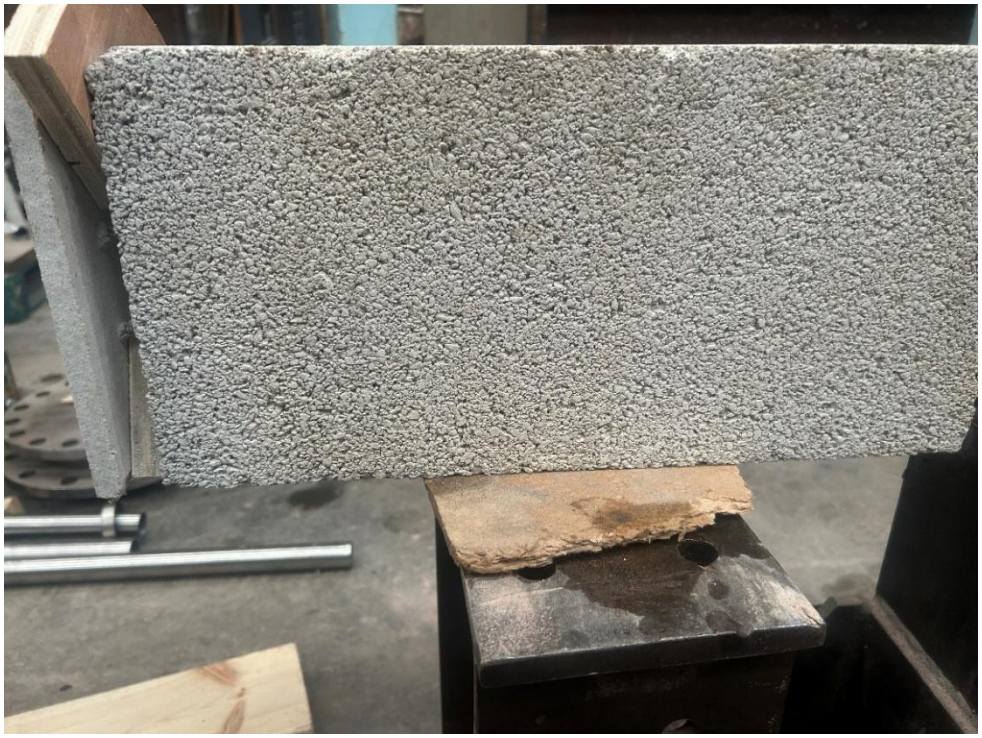

Plate 1 – Detail View of Sample Installation onto Substrate − Aggregate Blockwork

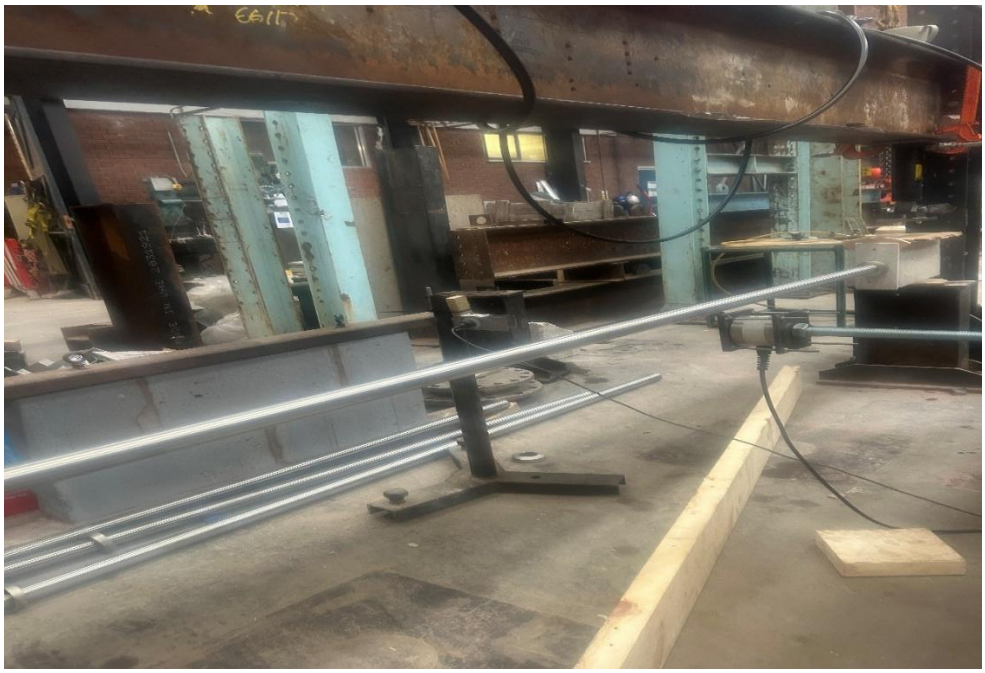

Plate 2 – General View of Test Set-Up

TEST REPORT

Lucideon Reference:	N251565 (QT-77681/3/KNA)/Ref. 3/CR1
Project Title:	Window Safety Barrier Testing on an Autoclaved Aerated Concrete (AAC) Block and Plasterboard Substrate
Client:	Rothley Ltd Unit 2 Discovery Park Wobaston Road Wolverhampton West Midlands WV10 6QJ
For the Attention of:	Mr Luke Hester
Author(s):	Mr Dominic Hallam Mr Matthew Amos
Report Date:	30 June, 2025
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The testing was carried out at the Lucideon Structures Laboratory at Queens Road, Penkhull, Stoke-on-Trent, ST4 7LQ on 3 June 2025.

2 TEST SAMPLES

The Window Safety Barrier System provided by Rothley for testing, consisted of a horizontal 40 mm diameter stainless steel tube secured between 40 mm handrail sockets.

The system was installed using 6 No. Fischer Duopower 6 x 50 mm Wall Plugs and SPAX 4 x 60 mm Screws at 2 No. lengths at 2400 mm.

All samples were fixed through the end cap and 12.5 mm plasterboard onto the headers of Autoclaved Aerated Concrete (AAC) Blocks (3.6 N/mm²), with a 15 mm spacing to simulate Dot and Dab Construction and assembled to simulate a typical window reveal.

A detail view of sample construction can be seen in Plate 1.

3 TEST EQUIPMENT

- 10 kN Load Cell Serial No. FOR023.
- Linear Voltage Displacement Transducer (LVDT) Serial No. TRD044.
- Hydraulic Ram + Hand Pump.
- Data Logger

4 TEST PREPARATION

A test rig was constructed using a rigid steel portal frame, bolted to the Laboratory Strong Floor using M32 Bolts. Under this frame, 2 No. Rigid Steel Stanchions were positioned, such that, they could support the substrate for the test sample at the required span. Two No. Hydraulic Rams were installed onto the portal frame pointing downwards, to apply a clamping load onto the sample substrate.

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Table 1 − Load and Deflection Results for Line Load Testing of Rothley Window Safety Barrier System

Substrate Type	Test Span (mm)	Line Load (kN/m)	Required Load (kN)	Load Withstood	Deflection at Required Load (mm)
12.5 mm Plasterboard onto AAC Block	2400	0.74	1.78	Y	7.79

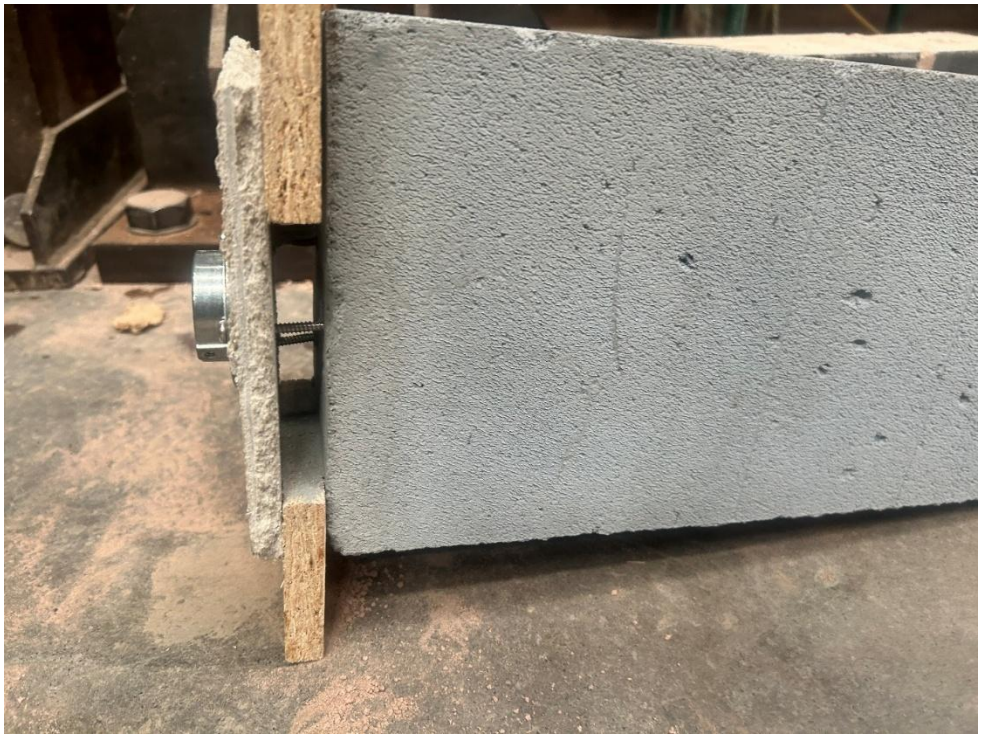
Table 2 − Load and Deflection Results for Point Load Testing of Rothley Window Safety Barrier System

Substrate Type	Test Span (mm)	Required Load (kN)	Load Withstood	Deflection at Required Load (mm)
12.5 mm Plasterboard onto AAC Block	2400	0.50	Y	3.77

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

END OF REPORT

PLATES



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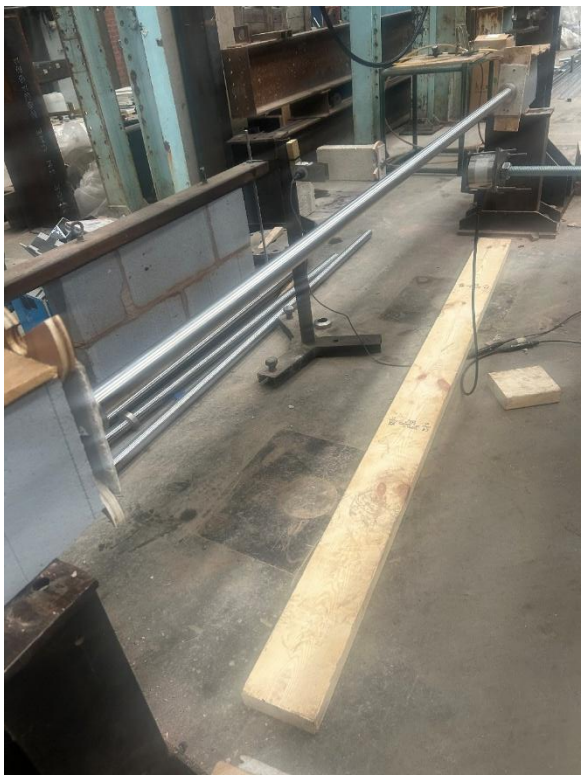

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Client:	Rothley Ltd Unit 2 Discovery Park Wobaston Road Wolverhampton West Midlands WV10 6QJ
For the Attention of:	Mr Luke Hester
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- Linear Voltage Displacement Transducer (LVDT) Serial No. TRD044.
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Substrate Type	Test Span (mm)	Line Load (kN/m)	Required Load (kN)	Load Withstood	Deflection at Required Load (mm)
12.5 mm Plasterboard onto Clay Brickwork	2400	0.74	1.78	Y	5.61

Table 2 − Load and Deflection Results for Point Load Testing of Rothley Window Safety Barrier System

Substrate Type	Test Span (mm)	Required Load (kN)	Load Withstood	Deflection at Required Load (mm)
12.5 mm Plasterboard onto Clay Brickwork	2400	0.50	Y	3.65

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

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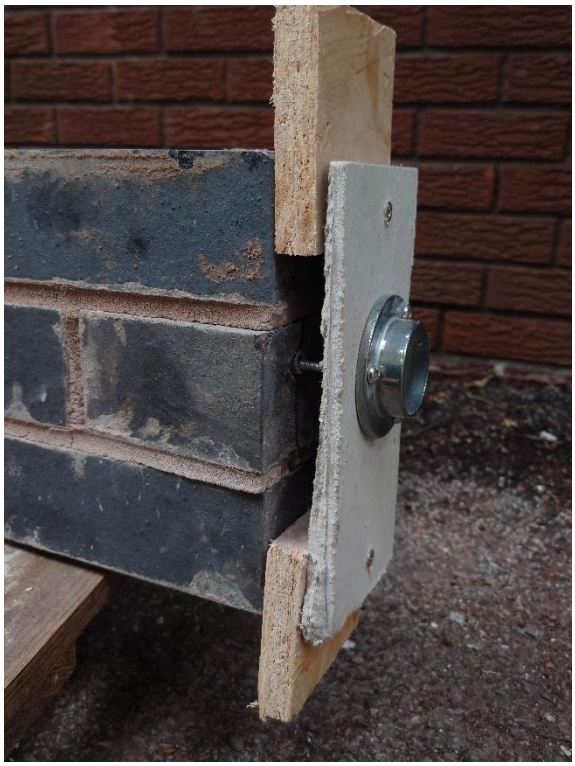

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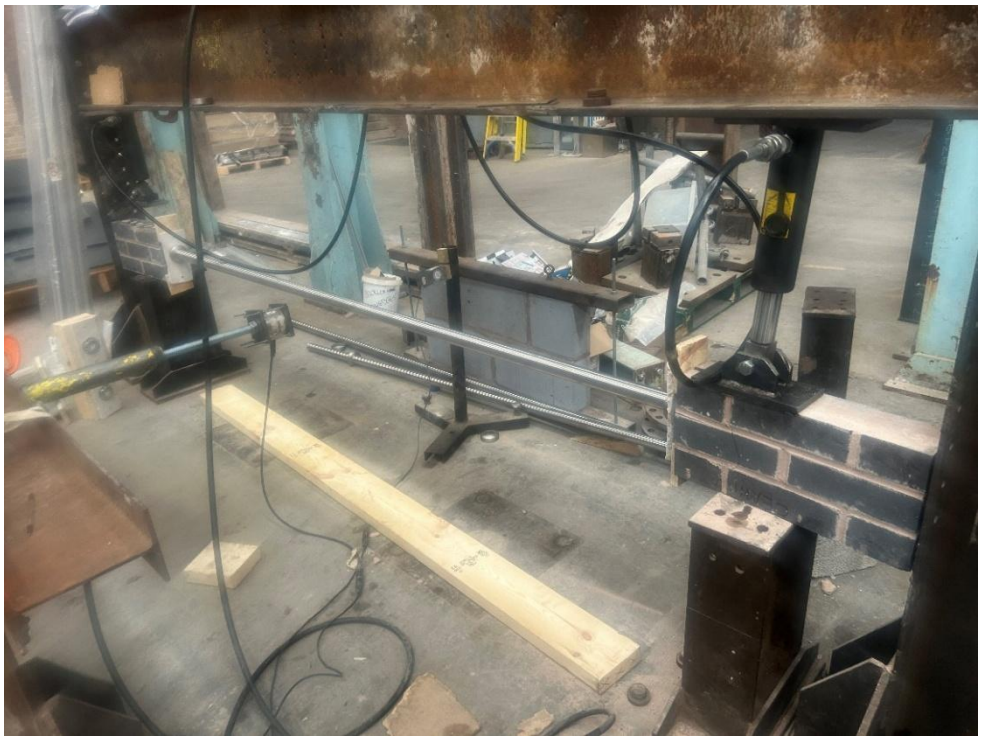

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