

TEST REPORT

ISSUED BY

Jason Taylor

DATE OF ISSUE

03/01/2019



ERA

i54, Valiant Way, Wolverhampton
West Midlands WV9 5GB

Page 1 of 15 pages

Approved Signatory

Name Chirag Patel

Signature

Client Name: Smart Systems Ltd

Address: Arnolds Way
Yatton
North Somerset
BS49 4QN

Test Report Number: 1760

System Tested: Single Door

System Tested By: ERA
i54 Valiant Way
Wolverhampton
West Midlands
WV9 5GB

Test Standard: PAS 24 :2016 - Enhanced Security Performance Requirements for Doorsets and Windows in the UK

	Clause
Security Hardware and Cylinder Test	Annex A - Part 1 & 2
Letter Plate Test	4.3
Manual Check Test	B.4.6
Addition Mechanical Loading Test (If Required)	B.4.7
Mechanical Test on Infill	B.4.4.3
Manipulation Test a) & b)	B.4.3
Manual Cutting Test	B.4.4.4
Mechanical Loading	B.4.5
Manual Test on Infill	B.4.4.2
Soft Body Impact Test	B.4.8
Hard Body Impact Test - Door Leaf	B.4.9.2.2
Hard Body Impact Test - Infill Medium	B.4.9.2.3

Testing Conducted By: Adrian Stokes & Sean Spellen

(ERA)

Date of Test: 09/01/2018

Test Preliminaries: The ambient temperature and humidity close to the sample was within the range 10° to 30° and 25% to 75% RH

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TEST REPORT

UKAS Accredited Testing Laboratory No. 4052

Certificate
Number 1760

Page 2 of 15 pages

Contents

	Page Number
Test Details:	1
Contents:	2
Test Results Summary:	2
Sample Specification:	3
Test Descriptions:	4
Test Procedures:	4 - 8
Test Results:	9 -13
Drawing of Test Sample:	14-15

Test Results Summary

Annex A: (Security Hardware & Cylinder Test)	Pass
Letter Plate Test: (TS008 Not Tested)	N/A
Manual Check Test:	Pass
Mechanical Test on Infill:	N/A
Manipulation Test:	Pass
Manual Cutting Test:	Pass
Mechanical Loading Test:	Pass
Manual Test on Infill:	N/A
Soft & Heavy Body Impact:	Pass
Hard Body Impact Test: (Door Leaf)	Pass
Hard Body Impact Test: (Infill Medium)	N/A
Doorset Classification:	D

Test Conditions:	Temperature Range °C	16.8-17.5
	Relative Humidity Range %	34.3-37.2

The results are valid only for the conditions under which the test was conducted and for the specific range of doorsets.

TEST REPORT

UKAS Accredited Testing Laboratory No. 4052

Certificate
Number 1760

Page 3 of 15 pages

Sample Specification

System Manufacturer: Smart Systems Ltd

Model: Not Known

System Type: Single Designer Door (Open in)

System Size: 1200mm W X 2400mm H

Method of Jointing: Mechanical Cleats

Materials & Surface

Treatment: Powder Coated Aluminum

Profile Part Number: SPD702 Outer Frame/ SPD705 Sash/ SPD703 Low Threshold

Reinforcing Part Number: N/A

Glazing Description: N/A

Locking System: MCM 10 Point Locking, Key Operated, Aluminium Keep

Hinges: Tecnac Hinges Fitted With Machine Screws Into Aluminium Clamp Plate

Handle: Pull Handle

Other Hardware Details: 2 X Dog Bolts

*Above details are not fully verified ERA.

TEST REPORT

UKAS Accredited Testing Laboratory No. 4052

Certificate Number 1760

Page 4 of 15 pages

Test Descriptions

Test Specimens

Doors which are designed to be glazed were supplied for testing with all glazing carried out in accordance with the door manufacturer's specification. The door specimens were fixed in a timber or aluminium sub-frame of rectangular section (nominal 75 mm x 100 mm), using suitable fixings at centres as specified in the system suppliers instructions. The fixings entered the sub-frame through the door frame. All protective packaging were removed before testing.

The test specimens were stored and tested in a non-destructive environment within the ranges of 15 °C to 30 °C and 25 % to 75 % relative humidity for a minimum of 12 h.

The test specimens were mounted into a test rig which is sufficiently rigid to withstand the test loads without the deflection which could influence the test result.

The hardware were checked for correct operation. Before testing, samples were closed and locked from the outside and any keys were removed.

Apparatus

The following **calibrated** test instruments were available;

- Articulated Pad
- Hard Body Impactor
- Soft body impactor
- Load Cells & Digital Indicators
- 500mm Long Cylindroid 225mm Minor & 380mm Major Diameters
- 500mm Long Cylindroid of Diameter 50mm
- Digital Count Down/Up Timers
- 5m Measuring Tap
- Torque Gauge

Tools Group A	Tools Group B	Tools Group C
Mild Steel Wire	25 mm Wood Chisel	Straight Jaw Self-Gripping Pliers
Credit Card	6 mm Wood Chisel	Curved Jaw Self-Gripping Pliers
Paint Scraper	200 mm Flat Blade Screwdriver	Torque Gauge
Craft Knife	Brick Bolster	Shallow Curve Head Attachment
150 mm Flat Blade Screwdriver	Crosspoint Screwdriver	Hooked Head Attachment
	Cross Head Screwdriver	Carbon Steel Traction Screws

Test Procedures

Security Hardware & Cylinder Test

General - Test was conducted on all doorset locking mechanisms. Test was carried out from the exterior face of the doorset with the full knowledge of the sample's construction and hardware details.

Part 1 of this test was conducted on all doorset locking mechanisms using any of the following tools specified in, Tools group A, Tools group B and Tools group C.

Part 2 of this test was conducted on all doorsets that contain a cylinder as a component of the locking mechanism using any of the following tools specified in, Tools group A, Tools group B and Tools group C.

TEST REPORT

UKAS Accredited Testing Laboratory No. 4052

Certificate
Number 1760

Page 5 of 15 pages

Part 1

Part 1 of the test consists of three activities. Where applicable, each activity was conducted as detailed:

- i) attempted to remove, dislodge or otherwise gain access to the cylinder and/or lock by attacking any protective item.
- ii) attempted to break and defeat any cylinder by applying a twisting and/or bend force.
- iii) if access to the internal workings of the hardware, cylinder or lock is gained, then attempted to defeat the lock and gain entry by operating any accessible mechanism.

Part 2

Part 2 of the test consists of four activities. Where applicable, each activity was conducted as detailed:

- iv) attempted to remove, dislodge or otherwise gain access to the cylinder by attacking any item protecting the cylinder.
- v) attempted to screw the self-cutting traction screw into any exposed part of the cylinder so that it provides suitable fixing force for activity vi).
- vi) attempted to break and defeat the cylinder by applying a nominally axial force to the screw using the hooked head attachment and torque gauge.
- vii) if access to the internal workings of the hardware, cylinder or lock is gained, then attempted to defeat the lock and gain entry by operating any accessible mechanism.

Letter Plates

Where a letter plate is included:

- a) the letter plate aperture size was measured.
- b) the letter plate installation height was measured to meet the requirements specified in BS EN 13724:2013, 5.4.1.2, and
- c) the letter plate to meet the requirements of TS 008:2105, Enhanced security grade 2 with all fixing accessible from the external face removed.

Manual Check Test

The test was carried out from the exterior face of the doorset and with full knowledge of the sample's construction and hardware details.

Attempt was made to gain entry by levering at any location and in any direction such that the combined direction and location of the forces exhibited by the standard loading cases used was not replicated.

Attempts were made to gain entry by defeating any hinge, locking point and fixing point or other potentially vulnerable locations. Attempts were made to apply loads to the ends of locking devices and attacks made at unsupported

Additionally, in the case of double doors, the vulnerability of the fixing of false meeting styles to leaf was explored.

One continuous period of 15 min overall attack time was used for this test, maximum 3 min for single test technique was used and no location was attacked for more than 6 min.
corners.

TEST REPORT

UKAS Accredited Testing Laboratory No. 4052

Certificate
Number 1760

Page 6 of 15 pages

If entry is gained, the method of entry was recorded, the direction of applied loads noted, new loading positions and directions defined for parallel-to-plane and perpendicular-to-plane loads and an additional mechanical loading test was performed.

Additional Mechanical Loading Test

This additional mechanical loading test was conducted if entry was gained during the manual check test. The test was carried out in accordance with standard loading cases as defined in PAS 24:2016 Table B.1 to Table B.6.

If entry is gained during this additional mechanical loading test, the doorset is regarded as having failed. Where entry is gained in the manual check test and a mechanical loading test cannot be devised to replicate the mode of failure, such doorset is considered to be unclassified and outside of this PAS.

Infill Mechanical Test

A load of 2.0 kN was applied progressively and without shock to every corner of any infill medium and each corner of the boundaries of components within the infill medium in turn and in a direction towards the inside, over a period of 10 s to 20 s and within 5° perpendicular to the plane and maintain until it was held for 8 s to 12 s. If the local failure of the infill medium retention system was exhibited, the loading tests at points along the remainder of the retention system was repeated in an attempt to gain entry.

Manipulation Test

The manipulation test was conducted prior to the manual cutting test. The overall attack time of 15 min was used, although no single test technique was used for more than 3 min.

The manipulation test was repeated after the additional mechanical loading test, if the additional mechanical loading test was not required then the manipulation test was repeated after the mechanical loading test. The overall attack time was 3 min with the primary intention of releasing threaded fasteners exposed as a result of the mechanical load tests.

Tools specified in group A and where applicable, one brick bolster, one crosspoint and one cross head screwdriver.

Various methods of manipulation was attempted, such as removal of trim sections, insertion of an implement to disengage locking devices, undoing threaded fasteners in externally fixed hardware, blows by hand to dislodge locking devices, removal of any hinge pin.

The aperture within any letter plate was not used to gain entry during this test.

Manual Cutting Test

Two tests were conducted, one in zone 1 and a second in zone 2.

Zone 1 is a horizontal band with an upper limit 400_{-10}^0 mm above the centre of rotation of the upper hardware unlocking point and a lower limit 400_{-10}^0 mm below the centre of the rotation of the lower unlocking point. In case of a single hardware unlocking point zone 1 is a horizontal band with limits 400_{-10}^0 mm above and below the centre of rotation of the hardware unlocking point.

Zone 2 covers any point of the doorset not in zone 1.

Tools such as paint scrapers, craft knife, wood chisel 25 mm and wood chisel 6 mm were used in an attempt to gain entry, by generating an aperture in the infill panel or fabric of the door leaf. Glass was not subjected to this test. Only one tool was used at any one time. Methods including, but not limited to, cutting and gouging was

TEST REPORT

UKAS Accredited Testing Laboratory No. 4052

Certificate Number	1760
Page 7 of 15 pages	

used. When using a tool to strike the infill panel or fabric of the door leaf, the impact point of the tool did not travel more than 100 mm, thus controlling the impact force. The test was directed at the surface and core of the infill panel or fabric of the door leaf from the exterior face of the doorset for a period of not more than 3 min.

Mechanical Loading Test

General - Applied and removed the loads at each loading point within a 5 min period (at each loading point).

The loading consisted of an application of parallel-to-plane load which was maintained until a perpendicular-to-plane load has been applied and removed.

The required loads were applied to each designated loading point in turn until all loading points have been subjected to test. If, during the loading, primary component failure occurs, the effect this failure has on the security of the product was assessed by loading all designated points up to but not including the loading point that exhibited this primary component failure. If further primary component failure occurs the process was repeated with all designated loading points up to, but not including, the loading point that exhibited this primary component failure being subjected to test, including those that may have been previously loaded. If secondary component failure occurs a further sequence was not initiated but the present sequence was completed. Loading was continued until there has been a complete sequence of loading with no further primary component failure.

General - A parallel to plane load of 1.5 kN was applied progressively and without shock over a period of between 10 s and 20 s. This parallel to plane load was maintained until either the perpendicular-to-plane loading was completed and removed or a 100 mm perpendicular-to-plane movement was achieved. The load was removed without shock over a period not exceeding 30 s.

Parallel to plane loading along the edge - Applied the force at the corner of the leaf with a line of action which is parallel to the edge and directed towards the adjacent corner.

Parallel to plane loading at right angles to the edge - Applied the force at the leaf frame between the corners with a line of action which is at right angles to the edge and directed towards the opposite edge. On a doorset that is supplied with a fanlight or sidelight an equal and opposing force to the mullion or transom at the location of the locking point was applied.

In the case of a double leaf and folding sliding doorset, an equal and opposite force was applied as detailed in the standard loading cases as defined in PAS 24:2016 Table B.3 to Table B.4.

Perpendicular-to-plane loading - For hinged and pivot doorsets, the perpendicular-to-plane load was applied to the face of the leaf at the position given in the standard loading cases as defined in PAS 24:2016 Table B.1 to Table B.6 and in the direction of opening.

For sliding doors, the perpendicular-to-plane load was applied to the face of the leaf at the position given in the standard loading cases as defined in PAS 24:2016 Table B.1 to Table B.6 and in the most onerous direction.

During the test, ensuring that the load passes through the centre of the contact area of the locking point with a radial tolerance of 50 mm. The load was applied via a loading pad. The load was applied within 5° perpendicular to the plane.

Where two adjacent loading points on the same leaf are within 100 mm, a single loading point that is of equal distance between them was used.

For double doorsets, each leaf-to-leaf locking point was considered as a single point. The perpendicular-to-plane load was applied to the active leaf and propping applied to the false mullion or inactive leaf in the same horizontal plane ± 25 mm as the applied load and adjacent to the visible edge of the active leaf but not directly restricting the movement of the active leaf.

If, during the application of the perpendicular load a doorset component failure occurs, the remaining load was applied in a period of between 10 s and 20 s. This period was started from the moment doorset component failure occurred. If further doorset component failures occur, the total time to apply the load or reach the stated deflection was not greater than 40 s

TEST REPORT

UKAS Accredited Testing Laboratory No. 4052

Certificate
Number 1760

Page 8 of 15 pages

When loading a leaf adjacent to a transom or mullion, this member was propped on the opposing face to prevent movement adjacent to the point where the perpendicular-to-plane load was applied. The position of the prop shall be ± 25 mm from the position of the interlocking point, as measured along the transom or mullion.

When loading an active or inactive leaf propping was applied.

A load of 4.5 kN was applied progressively without shock over a period of between 10 s to 20 s, until either it has been held for between 8 s to 12 s or entry has been gained.

Infill Manual Test

The test was conducted on any infill medium, including glass. The test was conducted using the tools specified in both group A and group B.

Attempt to remove gaskets, beads, security devices (if applicable) was made and the infill medium from the exterior face of the glazing system for a period of 3 min.

Soft Body Impact Test

Impacts were carried out on all doorset types and regardless of the infill medium.

For doorsets other than stable doorsets, the soft body impacts were applied to the exterior of the doorset, on the vertical centre line of the door leaf and of any side light, at positions 0.8 m and 1.7 m above floor level.

For stable doorsets, the soft body impacts were applied to the exterior of the doorset, on the vertical centre line of the door leaf and of any side light. The impacts were at the horizontal centre of the lower half leaf, meeting edge between leaves and the horizontal centre of the upper half leaf within ± 25 mm.

At rest, the impact surface of the impactor was within 10 mm of the surface of the doorset and within 25 mm in any direction of the designated impact point. The centre of gravity of the impactor was raised through a vertical height of 800 mm. The impactor was allowed to fall freely and strike the doorset once only. This was repeated so that each point is impacted three times.

If glass breakage occurred, the glass was replaced. If the glass broke three times, this test was terminated and the product range declared as unclassified.

Hard Body Impact Test - Door Leaf & Infill Medium

The hard body impacts were applied to the exterior face of the doorset so that the centre of the nose of the impactor strikes the defined impact point within ± 25 mm in any direction. Location were determined using measurements taken when the door is closed. All impact points were impacted in the order detailed in PAS 24:2016 Figure B.15.

The door leaf was impacted, as shown in PAS 24:2016 Figure B.15, and assessed the doorsets' ability to resist these impact using the appropriate entry definition.

The infill medium was impacted, as shown in PAS 24:2012 Figure B.15, and assessed the performance of the infill medium and retention systems' ability to resist these impact using the appropriate entry definition.

At rest, the impact surface of the impactor was within 10 mm of the surface of the doorset and within 25 mm in any direction of the designated impact point. The centre of gravity of the impactor was raised through a vertical height of 165 mm. The impactor was allowed to fall freely and strike the doorset once only. This was repeated so that each point is impacted three times.

If glass breakage occurred more than twice during the impact test, the glass was replaced with plywood of the same nominal thickness and overall dimensions.

TEST REPORT

UKAS Accredited Testing Laboratory No. 4052

Certificate
Number 1760

Page 9 of 15 pages

Test Results

Annex A - Security Hardware & Cylinder Test & Assessment

Part 1

Attack Method	Tools Used
i) Attempt to remove, dislodge or otherwise gain access to the cylinder and/or lock by attacking any protective item.	Torque Gauge Hooked Head Attachment
ii) Attempt to break and defeat any cylinder by applying a twisting and/or bend force.	Straight Jaw Self-Gripping Pliers
iii) If access to the internal workings of the hardware, cylinder or lock is gained then attempt to defeat the lock and gain entry by operating any accessible mechanism.	Mild Steel Wire 6 mm Wood Chisel

Total Attack Time (mm:ss)	03:00
Total Rest Time (mm:ss)	00:00
Result	Pass

Part 2

Attack Method	Tools Used
iv) Attempt to remove, dislodge or otherwise gain access to the cylinder by attacking any item protecting the cylinder.	Torque Gauge Hooked Head Attachment
vi) attempt to break and defeat the cylinder by applying a nominal axial force to the screw using the hooked head attachment and torque gauge (a hardwood block may be used).	Steel Traction Screws Straight Jaw Self-Gripping Pliers
vii) if access to the internal workings of the hardware, cylinder or lock is gained, then attempt to defeat the lock and gain entry by operating any accessible mechanism.	6 mm Wood Chisel

Total Attack Time (mm:ss)	03:00
Total Rest Time (mm:ss)	00:00
Result	Pass

TEST REPORT

UKAS Accredited Testing Laboratory No. 4052

Certificate
Number 1760

Page 10 of 15 pages

Manual Check Test

Location*	Attack Method	Tools	Time
MCH1	Attempt to gain entry by levering in any direction such that the combined direction & location of the forces exhibited by the standard loading cases are not replicated.	Flat Bladed Screwdriver Flat Bladed Screwdriver	03:00
MCH2	Attempt to gain entry by levering in any direction such that the combined direction & location of the forces exhibited by the standard loading cases are not replicated.	Flat Bladed Screwdriver Nail Bar	03:00
MCH3	Attempts made to gain entry by defeating any hinge, locking point & fixing point or other potentially vulnerable locations.	Nail Bar Nail Bar	03:00
MCH4	Attempts made to apply loads to ends of locking devices & attacks made at unsupported corners.	Flat Bladed Screwdriver Flat Bladed Screwdriver	03:00
MCH5	Attempts made to apply loads to ends of locking devices & attacks made at unsupported corners.	Flat Bladed Screwdriver Nail Bar	03:00

Result	Pass
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Manipulation Test a)

Location	Attack Method	Tools	Time
MNA1	Removal of trim sections	150 mm Flat Blade	03:00
MNA2	Insertion of an implement to disengage locking devices	200 mm Flat Blade	03:00
MNA3	Blows by hand to dislodge locking devices	200 mm Flat Blade	03:00
MNA4	Insertion of an implement to disengage locking devices	Paint Scraper	03:00
MNA5	Insertion of an implement to disengage locking devices	200 mm Flat Blade	03:00

Result	Pass
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TEST REPORT

UKAS Accredited Testing Laboratory No. 4052

Certificate Number 1760

Page 11 of 15 pages

Manual Cutting Test

Zone 1			
Location*	Attack Method	Tools	Time
MCU1	Using a tool to strike the infill panel or fabric of the door leaf	25 mm Wood Chisel 6 mm Wood Chisel	03:00

Result	Pass
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Zone 2			
Location*	Attack Method	Tools	Time
MCU2	Gouging the infill panel or fabric of the door leaf	25 mm Wood Chisel	03:00

Result	Pass
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Mechanical Loading

Location*	Standard Loading Case	Parallel to Plane	Equal & Opposite	Perpendicular-to-Plane	Propping Condition	Direction of Load	Result
ML1	Rising butt hinges and all types of lift off hinges	First test: Along the hinged edge in an upwards direction Second test: At right angles to the hinged edge and towards the opposite edge	First test: None Second test: None	First test: Centred over hinge Second test: Centred over hinge	First test: None Second test: None	↑ ←	Pass
	Dog bolts or other hardware specifically to provide security where there is not normally contact until the door is forced and with contact length not greater than 150 mm and or contact area not greater than 500 mm ²	At right angles to the edge and towards the opposite edge	None	Centre over bolt	None		Pass

TEST REPORT

UKAS Accredited Testing Laboratory No. 4052

Certificate Number 1760

Page 12 of 15 pages

ML2	Rising butt hinges and all types of lift off hinges	First test: Along the hinged edge in an upwards direction Second test: At right angles to the hinged edge and towards the opposite edge	First test: None Second test: None	First test: Centred over hinge Second test: Centred over hinge	First test: None Second test: None	↑ ←	Pass
ML3	Rising butt hinges and all types of lift off hinges	First test: Along the hinged edge in an upwards direction Second test: At right angles to the hinged edge and towards the opposite edge	First test: None Second test: None	First test: Centred over hinge Second test: Centred over hinge	First test: None Second test: None	↑ ←	Pass
	Dog bolts or other hardware specifically to provide security where there is not normally contact until the door is forced and with contact length not greater than 150 mm and or contact area not greater than 500 mm ²	At right angles to the edge and towards the opposite edge	None	Centre over bolt	None		Pass
ML4	Shoot and mortice bolts	At right angles to the edge and towards the opposite edge	None	Centre over bolt	None	→	Pass
ML5	Shoot and mortice bolts	At right angles to the edge and towards the opposite edge	None	Centre over bolt	None	→	Pass

TEST REPORT

UKAS Accredited Testing Laboratory No. 4052

Certificate Number 1760

Page 13 of 15 pages

ML6	Shoot and mortice bolts	At right angles to the edge and towards the opposite edge	None	Centre over bolt	None	→	Pass
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Result	Pass
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Soft Body Impact Test

Sash	Impact Location*	Impact 1	Impact 2	Impact 3
Active Leaf	0.8 m	Pass	Pass	Pass
	1.25 m	Pass	Pass	Pass
	1.7 m	Pass	Pass	Pass

Result	Pass
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Hard Body Impact Test - Door Leaf

Location	Sash	Impact Location	Impact 1	Impact 2	Impact 3
HBD1	Active	Corner of the leaf at points 60 x 60 mm from the visible edges	Pass	Pass	Pass
HBD2	Active	On the door leaf at each hinge point	Pass	Pass	Pass
HBD3	Active	On the door leaf at each hinge point	Pass	Pass	Pass
HBD4	Active	Corner of the leaf at points 60 x 60 mm from the visible edges	Pass	Pass	Pass
HBD5	Active	Corner of the leaf at points 60 x 60 mm from the visible edges	Pass	Pass	Pass
HBD6	Active	On the door leaf at each locking point	Pass	Pass	Pass
HBD7	Active	On the lock cylinder when fitted	Pass	Pass	Pass
HBD8	Active	On the door leaf at each locking point	Pass	Pass	Pass
HBD9	Active	On the door leaf at each locking point	Pass	Pass	Pass
HBD10	Active	Corner of the leaf at points 60 x 60 mm from the visible edges	Pass	Pass	Pass

Result	Pass
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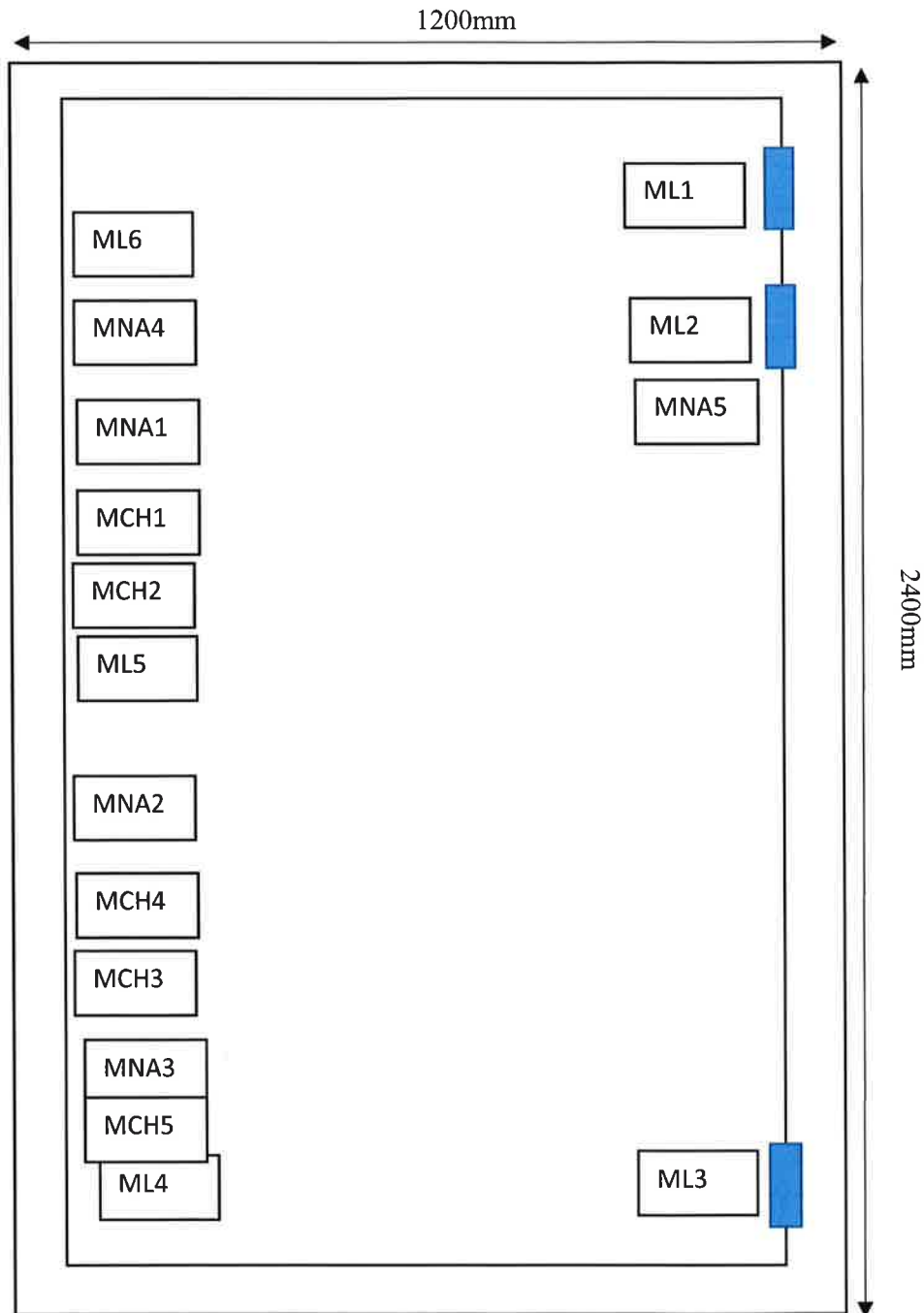
TEST REPORT

UKAS Accredited Testing Laboratory No. 4052

Certificate Number 1760

Page 14 of 15 pages

Drawing of Test Sample



TEST REPORT

UKAS Accredited Testing Laboratory No. 4052

Certificate
Number 1760

Page 15 of 15 pages

