TEST REPORT

ISSUED BY	Chirag Patel
DATE OF ISSUE	09/03/2017

UKAS TESTING
4052

ERA
i54, Valiant way,
Wolverhampton
West Midlands WV9 5GB

Approved Signatory
Name Ben Benson
Signature

Client Name: SmartFrames South West Ltd

Address: Unit 4 Aller Vale Buildings
Kingskerswell
Newton Abbot
S Devon
TQ12 5AZ

Test Report Number: 1777

System Tested: Vertical Sliding Window

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
Manipulation Test a) & b)	C.4.3
Infill Medium Removal Manual Test	C.4.4.2
Infill Medium Removal Mechanical Test	C.4.4.3
Mechanical Loading Test	C.4.5
Manual Check Test	C.4.6
Additional Mechanical Loading Test	C.4.7

Testing Conducted By: Adrian Stokes & Chirag Patel (ERA)

Date of Test: 14/02/2018

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 Results Summary

Manipulation Test:	Pass
Infill Medium Removal Manual Test:	Pass
Infill Medium Removal Mechanical Test:	Pass
Mechanical Loading Test:	Pass
Manual Check Test:	Pass
Additional Loading Test:	N/A
Window Classification:	**W**

Test Conditions:	Temperature Range °C	17.9 - 18.1
	Relative Humidity Range %	29.9 - 31.2

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

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Sample Specification

System Manufacturer: Smartframes South West LTD

Model: Unknown

System Type: Vertical Sliding Window

System Size: W 1500 mm x H 2600 mm

Method of Jointing: Welded

Materials & Surface Treatment: UPVC

Profile Part Number: Frame VSW001
Top Sash VSW002
Bottom Sash VSW003

Reinforcing Part Number: Frame VSW6015 & VSW 6045
Sash VSW6025 & VSW6035

Glazing Description: 4-16-4 Toughened

Locking System: ERA SBD lock – VHCLCWH01 , SBD Keep - VHKPSWH11A

Hinges: ERA Top Sash - K085-47W
ERA Bottom Sash - K085-50W

Handle: N/A

Other Hardware Details: ERA - High Security Side Extrusion Strip BF-SES-SBD2

See test sample drawings as supplied by : **SmartFrames South West Ltd**

Test Descriptions

Test Specimens

Windows supplied for testing were fitted with toughened glass with all glazing carried out in accordance with the manufacturer's specification. The window specimens were fixed in a timber sub-frame (nominal 100 mm x 50 mm in section) in accordance with the defined installation requirements. For open-out windows and vertical sliders, the opening face of the outer frame was mounted flush with the timber sub-frame. For open-in windows, one sample was mounted with the non-opening face of the outer frame flush with the timber sub-frame. The sub-assembly was mounted into the test apparatus square and without twist.

During the test the hardware was locked and, where applicable, the key was removed.

The test specimens were stored for a minimum of 12 h prior to testing and tested in a non-destructive environment within the ranges of 15 °C to 30 °C.

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.

Apparatus

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

- *Articulated Pad*
- *Load Cells & Digital Indicators*
- *500mm Long Cylindroid of Diameter 50mm*
- *Digital Count Down/Up Timers*
- *5m Measuring Tape*

Tools Group A	Tools Group B
Mild Steel Wire	25 mm Wood Chisel
Credit Card	6 mm Wood Chisel
Paint Scraper	200 mm Flat Blade Screwdriver
Craft Knife	Brick Bolster
150 mm Flat Blade Screwdriver	Crosspoint Screwdriver
	Cross Head Screwdriver

Test Procedures

Manipulation Test

The manipulation test was conducted prior to the infill medium removal 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 mechanical loading test, if appropriate, the manual check 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 a tool to slide latches or bolts, undoing threaded fasteners in externally fixed hardware, blows by hand to dislodge locking devices.

Infill Medium Removal Test

General - Where the infill medium retention varies within a window, each variation was subjected to infill manual and mechanical test.

Infill Manual Test - This test was conducted using the tools specified in group A and group B.

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

Infill Mechanical Test - A perpendicular-to-plane load of 2.0 kN was applied to each corner of the infill medium in turn and in a direction towards the inside, progressively and without shock over a period of 10 s to 20 s and within 5° perpendicular to the plane . The load was applied via an articulated pad secured to a nominal 150 mm x 150 mm plywood block of 25 mm minimum thickness, and maintained until it has been held for 8 s to 12 s. If failure of the glazing system is exhibited at the corners then the loading test was continued along each of the section in an attempt to deglaze the window.

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 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.

Parallel-to-plane loading

Windows, not including vertical sliding windows - A parallel-to-plane load of 1.0 kN was applied progressively and without shock over a period of not more than 30 s. This parallel-to-plane load was maintained until either the perpendicular-to-plane loading is completed and removed or a perpendicular-to-plane movement of 150 mm was achieved. The load was removed without shock over a period not exceeding 30 s.

The load was applied through suitable bracket(s). The bracket was located on the opening face of the vent frame.

For loads that are parallel-to-plane along the edge, The force was applied at the corner of the vent with a line of action which is parallel to the edge and directed towards the adjacent corner.

For loads that are parallel-to-plane at right angles to edge, a force was applied at the vent frame between the corners and with a line of action which is at right angles to the edge and directed towards the opposite edge. On multilights only, an opposing force was applied to the mullion or transom (fixed or non-fixed) on the opposite side to the opening face, where the locking point is between the vent frame and the mullion or transom.

Vertical sliding windows - For parallel-to-plane loads of 1.0 kN applied in directions other than the normal vertical opening direction, these loads were applied as detailed above.

For parallel-to-plane loads of 3.0 kN applied vertically in the normal direction of opening, the loads depending

The load was applied through suitable bracket(s). The bracket was located on the opening face of the vent frame.

A load of 3.0 kN was applied progressively and without shock over a period of between 10 s and 20 s until either it has been held for between 8 s and 12 s or until entry has been gained.

Perpendicular-to-plane loading

Non-vertical sliding window - A perpendicular-to-plane load was applied to the face of the vent frame and in the direction of opening for an opening vent or in the direction of removal for a dummy vent and fixed light. It was ensured that the line of force of this load passes as closely as possible through the centre of the contact area of the locking point within a radial tolerance of 50 mm. The load was applied within 5° perpendicular to the plane. Where two adjacent loading points are within 100 mm, a single loading point was used midway between the original loading

In multilight windows, the mullion or transom was prop to prevent movement adjacent to the point where the perpendicular-to-plane load is applied (note - propping is only carried out when loading vent to mullion/transom locking points).

A load of 3.0 kN was applied progressively and without shock over a period of between 10 s and 20 s until either it has been held for between 8 s and 12 s or until entry has been gained.

If the 3.0 kN load is held, the load was removed without shock over a period not exceeding 20 s.

Vertical sliding window - The perpendicular-to-plane loading was applied directed from the exterior of the sample towards the interior. In the loading cases given in PAS 24:2016 table C.1, 11) and 12), an equal and opposite force was applied to the outer meeting rail. Where two adjacent loading points are within 100 mm, a single loading point midway between the original points was used. The load was applied as closely to the outer edge of the vent frame as is practicable.

For loads exerting a force of 1.0 kN, the perpendicular-to-plane load was applied progressively and without shock over a period of not more than 30 s. This load was maintained until either the parallel-to-plane loading is completed and removed or a parallel-to-plane movement of 150 mm was achieved. The load was removed without shock over a period not exceeding 30 s. The load was applied through suitable bracket(s).

For loads exerting a force of 3.0 kN, the load was applied in accordance with the procedures below, depending on the type of locking hardware fitted to the window.

A load of 3.0 kN was applied progressively and without shock over a period of between 10 s and 20 s until either it has been held for between 8 s and 12 s or until entry has been gained.

Manual Check Test

Tools specified in PAS 24:2016 B.4.6.2 were used, 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 are not replicated.

Attempts were made to gain entry by defeating any hinge, locking point, fixing point or other potentially vulnerable locations. All attempts were made from the exterior face of the sample.

The overall attack time limit for this test was 15 min. No single technique was used for more than 3 min and no location was attacked for more than 6 min.

The test was conducted with any one or two of the tools specified for each technique.

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

Where entry was gained in the manual check test and a mechanical loading test cannot be devised to replicate the mode of loading, such windows is considered as outside the scope of the specification.

Additional Mechanical Loading Test

This additional mechanical loading test was carried out in accordance with testing method, using the loading configurations as defined by the manual check test.

Where entry was gained in the manual check test and a mechanical loading test cannot be devised to replicate the mode of failure, such windows shall be considered to be outside the scope of this specification.

Test Results

Manipulation Test a)

Location	Attack Method	Tools	Time
MNA1	Removal of trim sections	Craft Knife Paint Scraper	03:00
MNA2	Removal of trim sections	Craft Knife	03:00
MNA3	Removal of trim sections	Paint Scraper Paint Scraper	03:00
MNA4	Removal of trim sections	Craft Knife Paint Scraper	03:00
MNA5	Removal of trim sections	Paint Scraper Paint Scraper	03:00

Result	Pass

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Infill Medium Removal Manual Test

Location*	Sash	Attack Method	Tools	Time
IM1	Upper Sash	Attempt to remove gaskets Attempt to remove beads	Craft Knife 6 mm Wood Chisel	03:00
IM2	Lower Sash	Attempt to remove gaskets Attempt to remove beads	Craft Knife 25 mm Wood Chisel	03:00

Result	Pass

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.	Nail Bar Nail Bar	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.	Nail Bar Flat Bladed Screwdriver	03:00
MCH3	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
MCH4	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.	Nail Bar Flat Bladed Screwdriver	03:00
MCH5	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

Result	Pass

Mechanical Test on Infill

Sash	Location	Load (kN)	Result
Lower Sash	Bottom Right Corner	2.0	Pass
Lower Sash	Bottom Left Corner	2.0	Pass
Lower Sash	Top Left Corner	2.0	Pass
Lower Sash	Top Right Corner	2.0	Pass
Upper Sash	Bottom Right Corner	2.0	Pass
Upper Sash	Bottom Left Corner	2.0	Pass
Upper Sash	Top Left Corner	2.0	Pass
Upper Sash	Top Right Corner	2.0	Pass

Result	Pass

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Mechanical Loading Testing

Location*	Standard Loading Case	Parallel to Plane Load	Equal & Opposite	Perpendicular-to-Plane	Propping Condition	Direction of Load	Result
ML1	At non-meeting corners of sliding windows	First test: 3.0 kN in the direction of normal opening Second test: 1.0 kN towards the opposite edge	First test: None Second test: None	First test: 1.0 kN at corner Second test: 3.0 kN at the corner	First test: None Second test: None	↓ →	Pass
ML2	At the centre of the non-meeting edge of sliding windows	3.0 kN at right angles to the edge towards the opposite edge	None	None	None	↓	Pass
ML3	At non-meeting corners of sliding windows	First test: 3.0 kN in the direction of normal opening Second test: 1.0 kN towards the opposite edge	First test: None Second test: None	First test: 1.0 kN at corner Second test: 3.0 kN at the corner	First test: None Second test: None	↓ ←	Pass
ML4	At the meeting edge corners of sliding windows	First test: None Second test: 1.0 kN at right angles to the frame edge towards the opposite edge.	First test: None Second test: None	First test: 3.0 kN on the meeting edge corners Second test: 3.0 kN at the sash meeting edge corners.	First test: 3.0 kN opposing load at corner Second test: None	↕ ←	Pass
ML5	At each sash to sash locking point of sliding windows	None	None	3.0 kN centred over the locking point	3.0 kN opposing load	↕	Pass

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Location*	Standard Loading Case	Parallel to Plane Load	Equal & Opposite	Perpendicular-to-Plane	Propping Condition	Direction of Load	Result
ML6	At each sash to sash locking point of sliding windows	None	None	3.0 kN centred over the locking point	3.0 kN opposing load	↕	Pass
ML7	At the meeting edge corners of sliding windows	First test: None Second test: 1.0 kN at right angles to the frame edge towards the opposite edge.	First test: None Second test: None	First test: 3.0 kN on the meeting edge corners Second test: 3.0 kN at the sash meeting edge corners.	First test: 3.0 kN opposing load at corner Second test: None	↕ →	Pass
ML8	At non-meeting corners of sliding windows	First test: 3.0 kN in the direction of normal opening Second test: 1.0 kN towards the opposite edge	First test: None Second test: None	First test: 1.0 kN at corner Second test: 3.0 kN at the corner	First test: None Second test: None	↑ →	Pass
ML9	At the centre of the non-meeting edge of sliding windows	3.0 kN at right angles to the edge towards the opposite edge	None	None	None	↑	Pass
ML10	At non-meeting corners of sliding windows	First test: 3.0 kN in the direction of normal opening Second test: 1.0 kN towards the opposite edge	First test: None Second test: None	First test: 1.0 kN at corner Second test: 3.0 kN at the corner	First test: None Second test: None	↑ ←	Pass

Result	Yes

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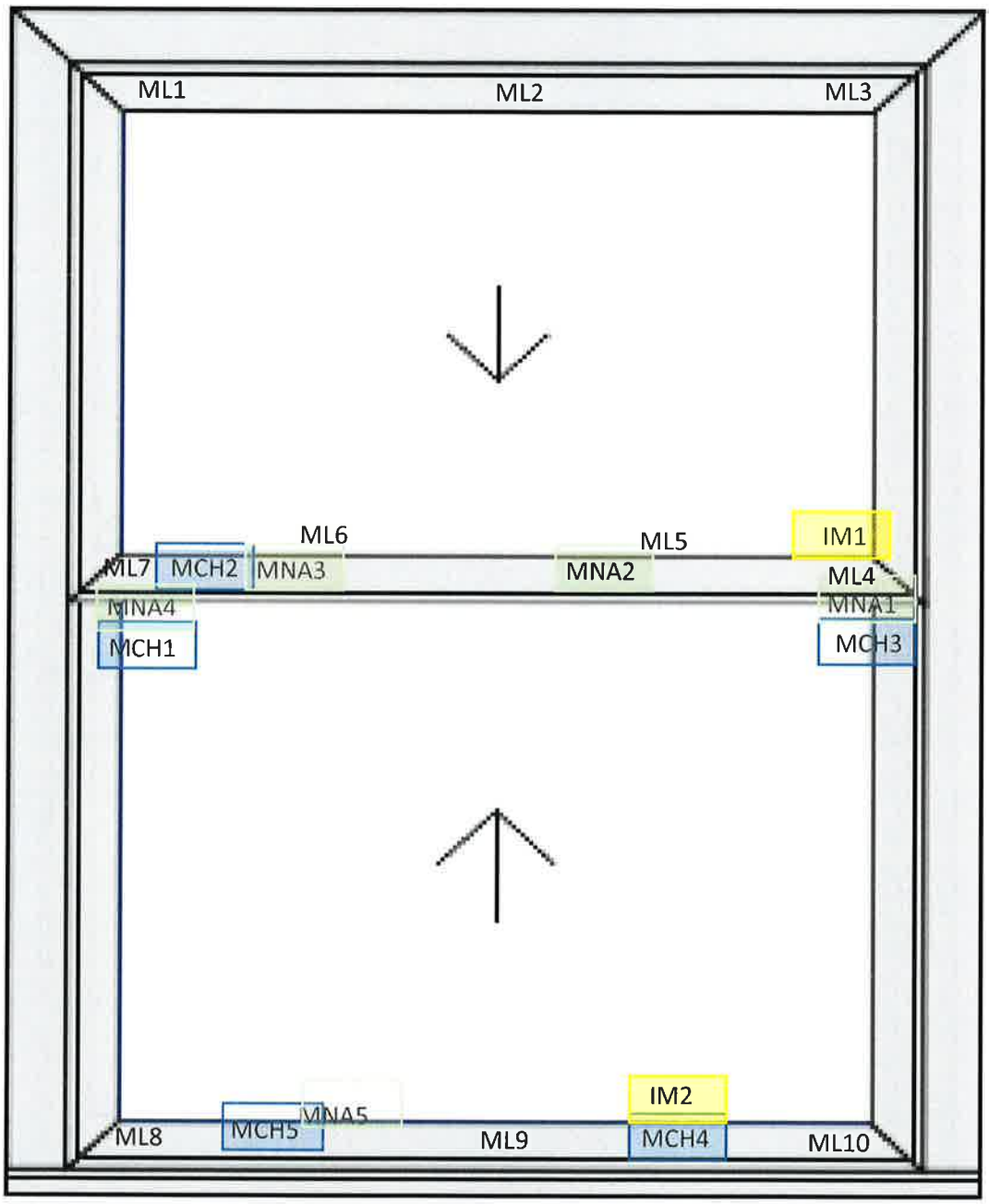
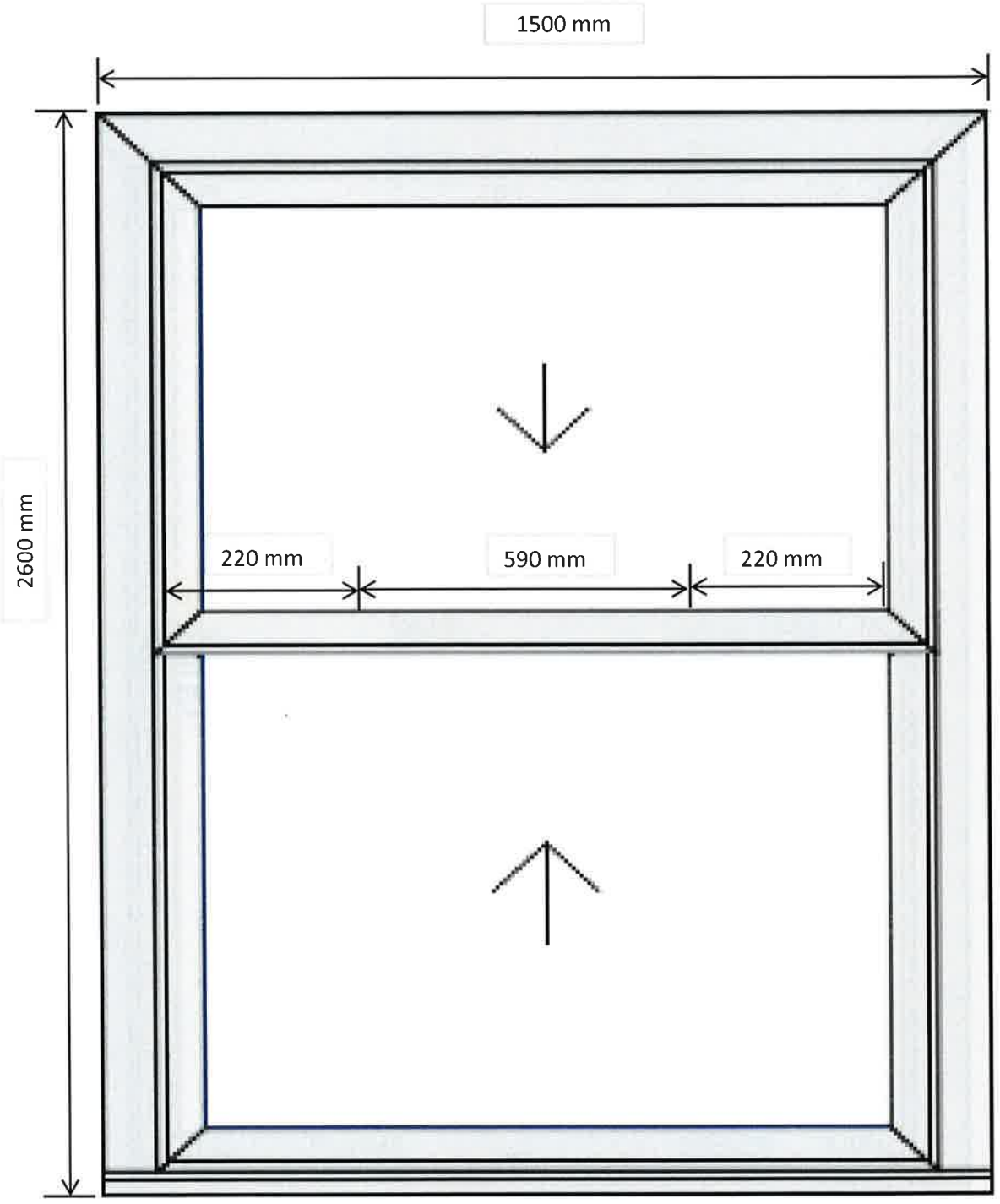
Drawing of Test Sample




1500 mm
2600 mm
220 mm
590 mm
220 mm