breglobal

Testing of Smart Architectural Aluminium Limited's Alitherm 700 Reversible windows to the requirements of Annex C of PAS 24:2012

Prepared for:

Smart Architectural Aluminium Limited
Arnold's Way
Yatton
Bristol
North Somerset
BS49 4QN

29 April 2014

Test report number 292869b-A

UKAS TESTING

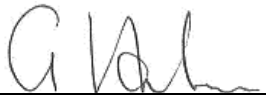
0578

Protecting People, Property and the Planet

Prepared on behalf of BRE Global by

Name Gareth Hulmes

Position Scheme Manager

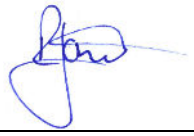
Signature 

Authorised on behalf of BRE Global by

Name Richard Flint

Position Physical Security Certification Scheme Manager

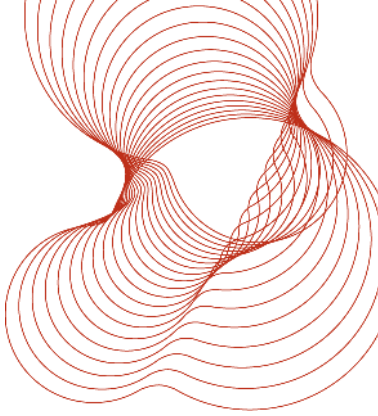
Date 29 April 2014

Signature 

BRE Global
Bucknalls Lane
Watford
Herts
WD25 9XX
T + 44 (0) 1923 664100
F + 44 (0) 1923 664994
E enquiries@breglobal.com
www.breglobal.com

BRE Global is not UKAS accredited to make opinions and interpretation. Any opinions and interpretations included as part of this report are clearly marked as such.

UKAS TESTING
0578



Contents

1 Introduction

This report details the results of tests conducted on Smart Architectural Aluminium Limited's top swing reversible multi-light windows to the requirements of Annex C of PAS 24:2012[1] *Enhanced security performance requirements for doorsets and windows in the UK – External doorsets and windows intended to offer a level of security suitable for dwellings and other buildings exposed to comparable risk*.

This test report does not cover other requirements of classification defined in clauses 4.1, 4.2, 4.3, 5 and 6 of PAS 24:2012[1].

The system supplier of the windows tested was Smart Architectural Aluminium Limited's and the fabricator was Window Warehouse, 8 French Road, Leicester, LE5 4AH.

2 Origin of test request

At the request of Mr Mark Walford of Smart Architectural Aluminium Limited, BRE Global Limited issued quotation SQ5950 on 24 March 2014 covering the testing of the windows to Annex C of PAS 24:2012[1]. The quotation was accepted on 24 March 2014 by Mr Mark Walford.

The tests to PAS 24:2012[1] detailed in this report were carried out on 26 March 2014 during BRE Global project 292869b under the BRE Global Limited Terms and Conditions for Testing (PN145/8.0[5]).

3 Details of test specimens

Two window specimens were submitted on 26 March 2014 for testing to the requirements of PAS 24:2012[1]. (Annex C method). These were allocated unique BRE reference numbers.

A summary of the test specimens is detailed in the following sub-sections. The documents submitted by Smart Architectural Aluminium Limited detailing the test specimens are listed in Annex A.

3.1 Specimen 292869b/01

Table 1 General description

Aspect	Details
Name and address of fabricator	Window Warehouse, 8 French Road, Leicester, LE5 4AH
Name and address of system supplier	Smart Architectural Aluminium Limited, Arnold's Way, Yatton, Bristol, North Somerset, BS49 4QN

Aspect	Details
Product designation (e.g. trade name / model)	Alitherm 700 Reversible
Configuration	Top swing reversible, next to fixed light
Profile frame material	Aluminium
Overall dimensions	1890 mm wide by 1340 mm high
Description of outer frame	ETC 716
Description of sash	ETC 725
Description of hardware	P and N Uni reversible hinges Trojan Reverse sspagnolettes and keep set VBH hinge protectors VBH run up blocks
Description of glazing/infill	28mm toughened double glazed unit
Description of seals	ACDV 268 gasket, ACRV 030 gasket

Table 2 Outer frame details

Component Description	Supplier	Part No./Code
Corner cleat	Smart Architectural Aluminium Limited	ACET721
Corner chevron	Smart Architectural Aluminium Limited	ACEC025
Outer frame jointing method	Glue and cleated	
Outer frame surface treatment	Mill finish	

Table 3 Sash/leaf details

Component Description	Supplier	Part No./Code
Corner cleat	Smart Architectural Aluminium Limited	ACET727
Corner cleat	Smart Architectural Aluminium Limited	ACET726
Corner chevron	Smart Architectural Aluminium Limited	WCA 106

Component Description	Supplier	Part No./Code
Sash/leaf jointing method:	Glue and cleated.	
Sash/leaf surface treatment:	Mill finish.	

Table 4 Hardware details

Hardware Description	Supplier	Part No./Code	Fixings
P and N Uni reversible hinges	VBH.	2AST0008.	Hinge to frame – Four M4 machine screws (14 mm long) and three No. 7 self-tapping screws (14 mm long) per hinge via ACSG023 fixing plate Sash – Four No. 7 self-tapping screws (25 mm long) per hinge
Top gliders	VBH.	Part of gear.	No 7 x 16mm CSK self-tapping screw
Center bracket	VBH.	Part of gear.	No 7 x 16mm CSK self-tapping screw
Trojan reverse espagnolette	Trojan Hardware	ACET 705.	Six No.7 self-tapping screws (25 mm long)
Keep	-	-	Two No. 7 self-tapping screws (25 mm long) per keep
VBH hinge protectors	VBH	-	To Frame - Three No.7 self-tapping screws (25 mm) To Sash - Three No.7 self-tapping screws (25 mm)
VBH run up blocks	VBH	-	One No. 7 self-tapping screw (16 mm long)
Is a key required to unlock the hardware from the inside?			Yes

Table 5 Glazing/infill details

Component Description	Supplier	Part No./Code
Glazing bead	Smart Architectural Aluminium Limited	ETC767
Reverse adaptor	Smart Architectural Aluminium Limited	ETC745
Glass packers	Glazepart	28mm x 5mm

Component Description	Supplier	Part No./Code
Glazing thickness and composition	28mm overall thickness. That comprised a 4 mm thick toughened glass outer pane, then a 16 mm cavity and a 4 mm toughened glass inner pane	
Internally or externally glazed	Internally	

Table 6 Gasket details

Component Description	Supplier	Part No./Code
Pane gasket	Smart Architectural Aluminium Limited	ACET 842 ACET 840
Frame gasket	Smart Architectural Aluminium Limited	ACDV 268
Sash gasket	Smart Architectural Aluminium Limited	ACRV 030

Figure 1 Cross section through top of sash on specimen 292869b/01

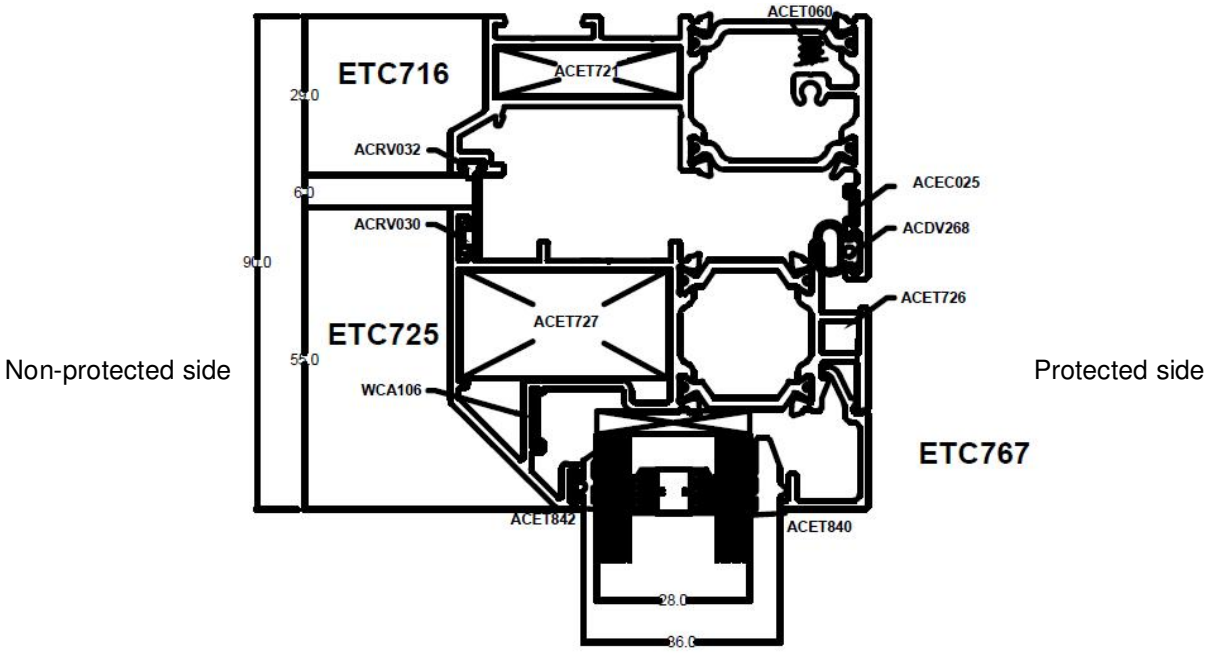


Figure 2 Cross section through bottom of sash*

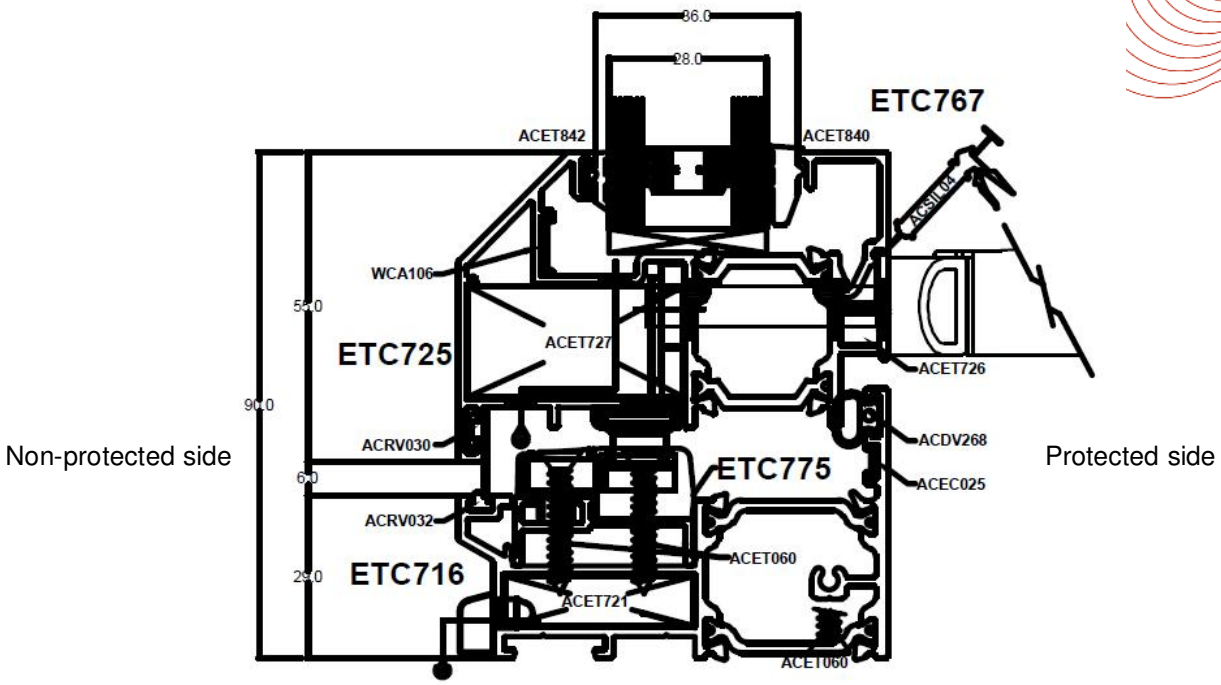
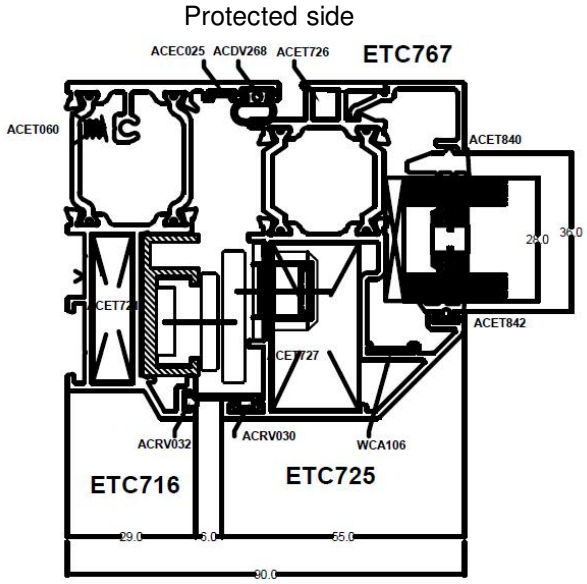


Figure 3 Cross section through side of sash and frame



* The specimen submitted for testing did not incorporate a cill as shown in this figure.

Figure 4 Cross section through side of sash frame, mullion and side of fixed light

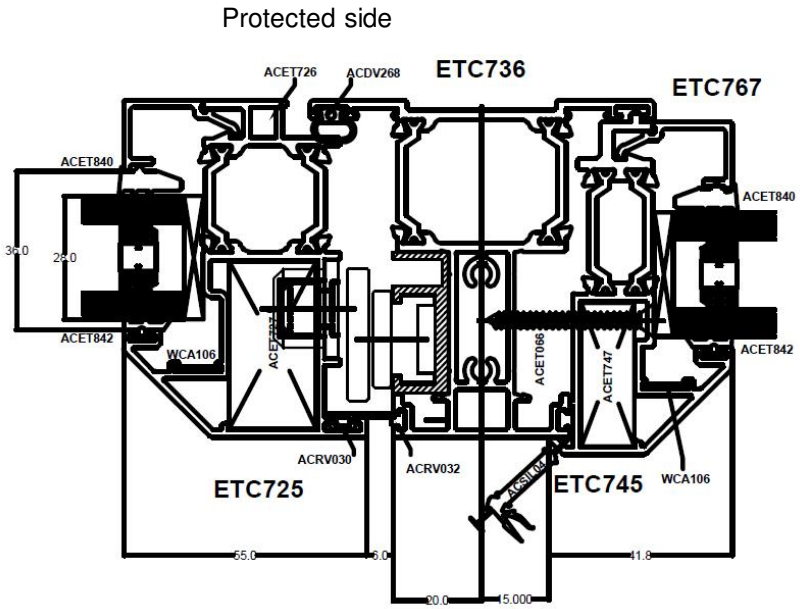


Figure 5 Specimen 292869b/01 (external view)

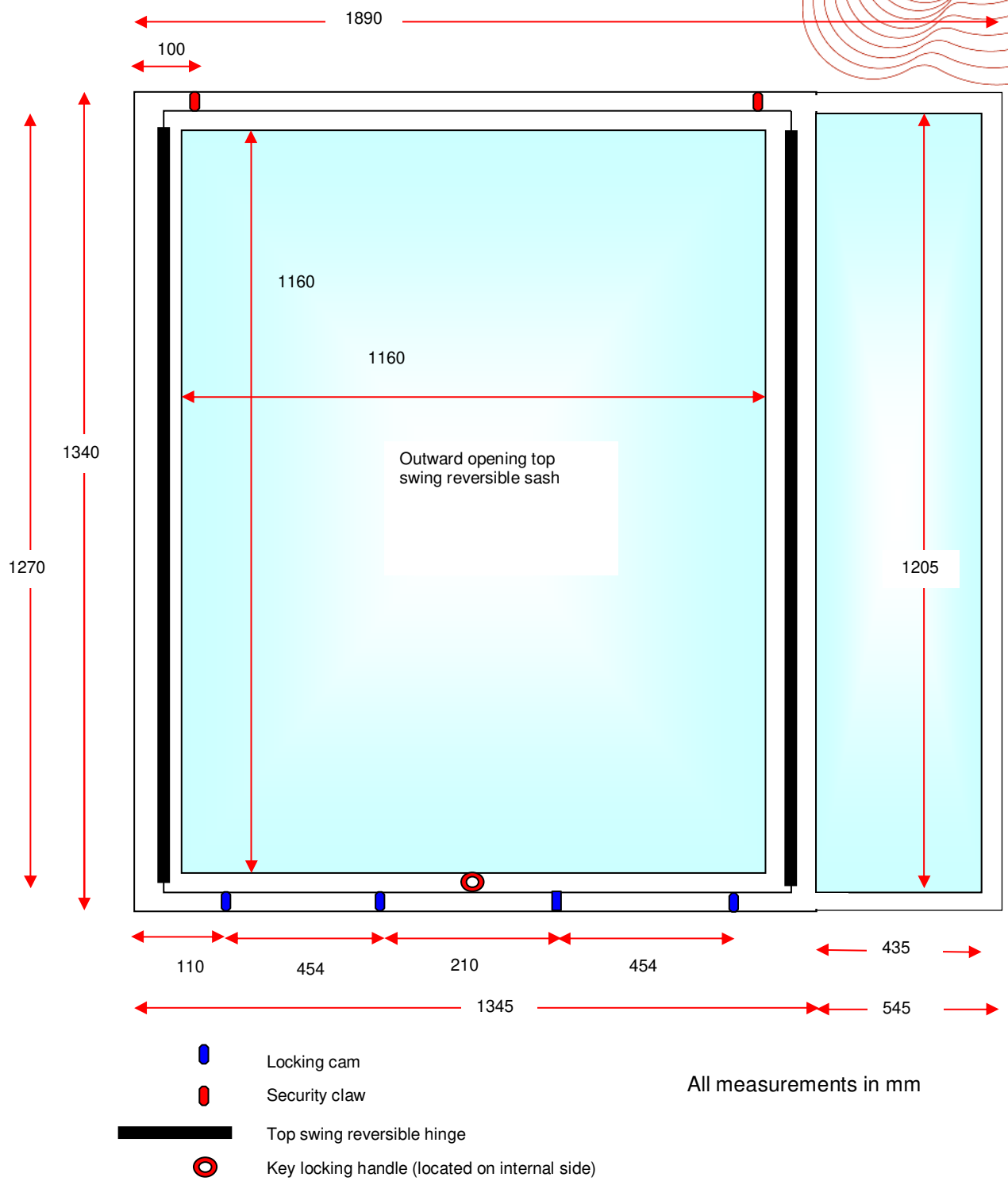


Figure 6 External view of specimen 292869b/01

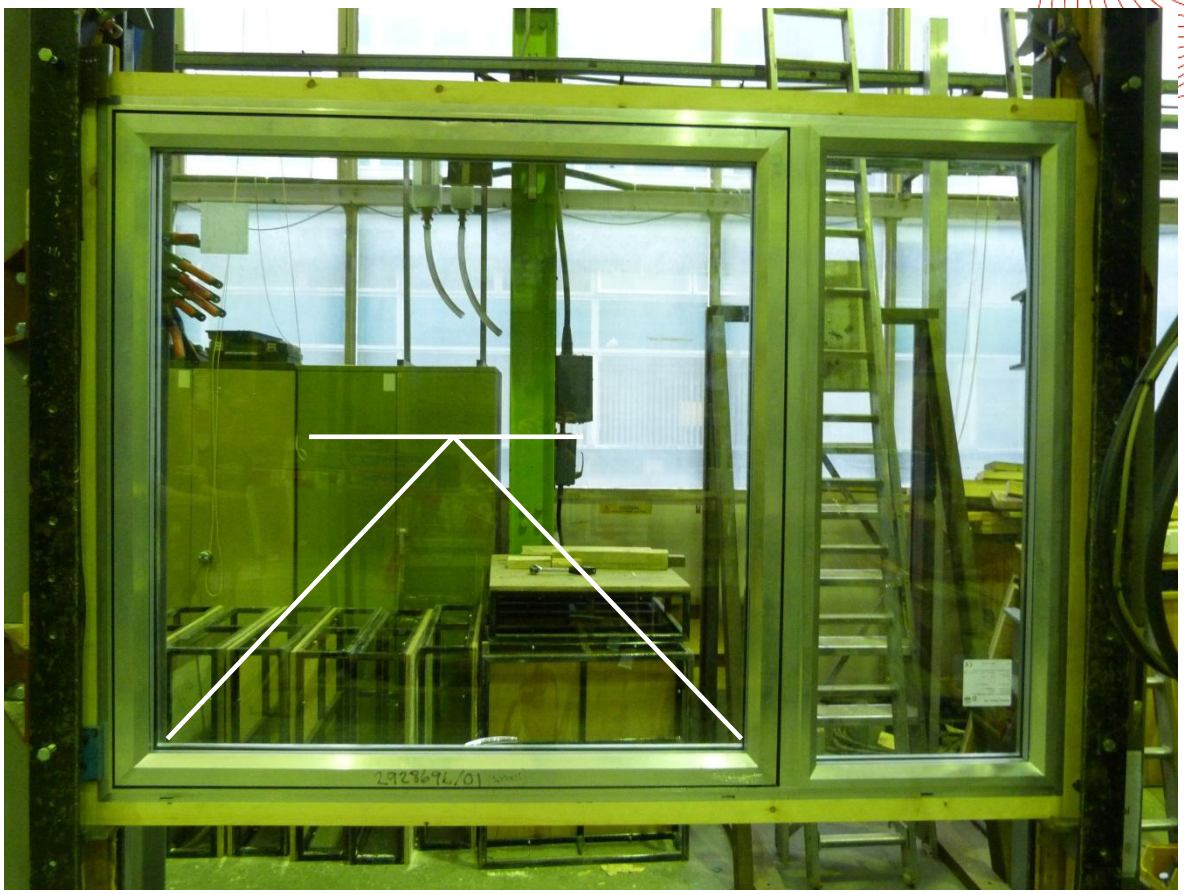


Figure 7 View of keep

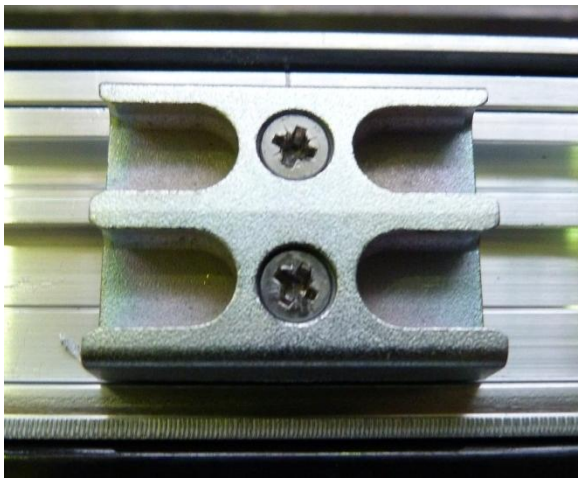


Figure 8 View of security claw

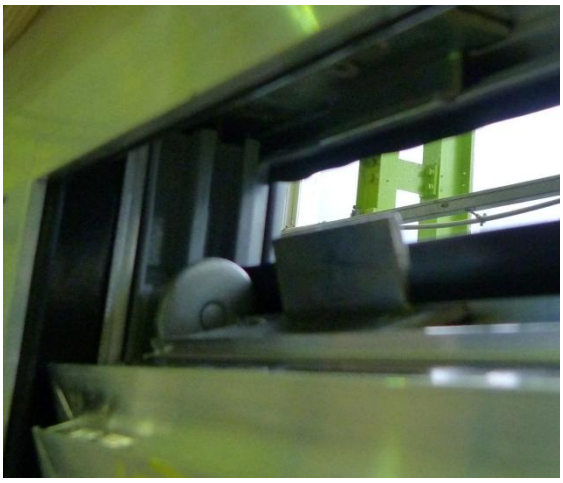
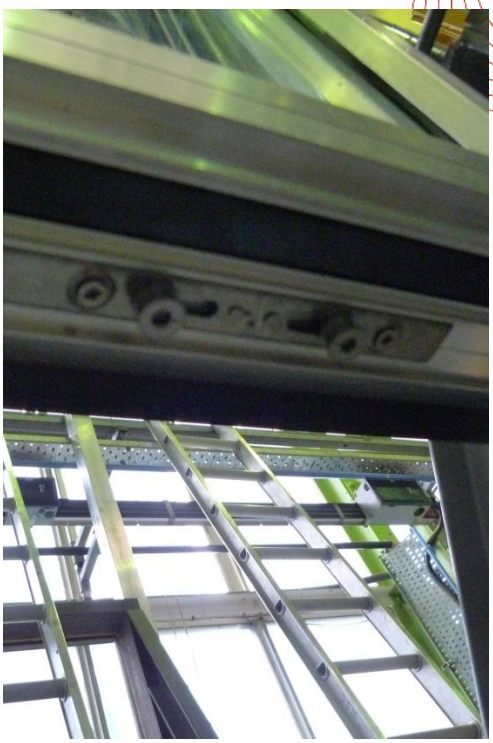


Figure 9 View of reversible hinge

Figure 10 View of mushroom cam bolts

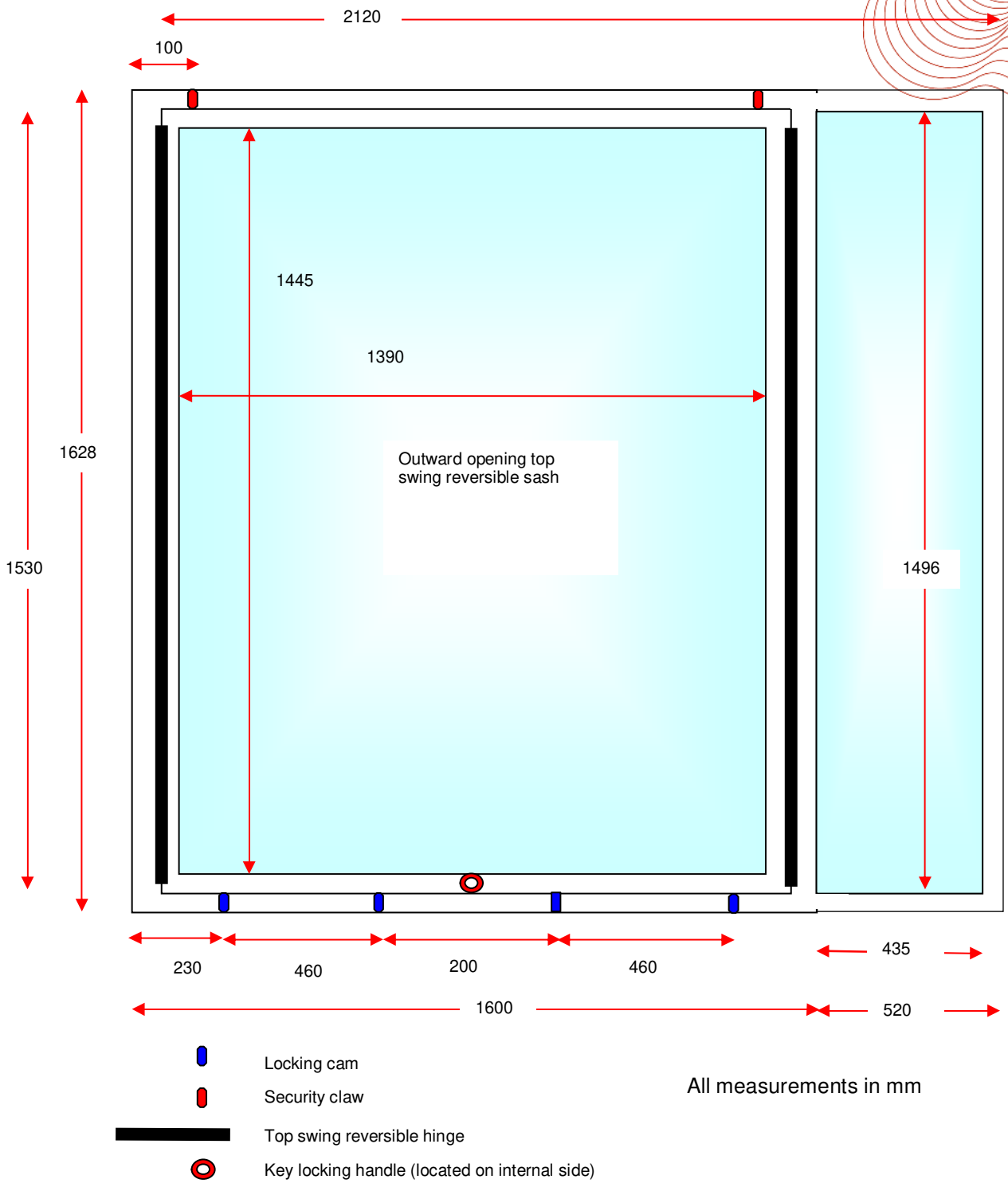


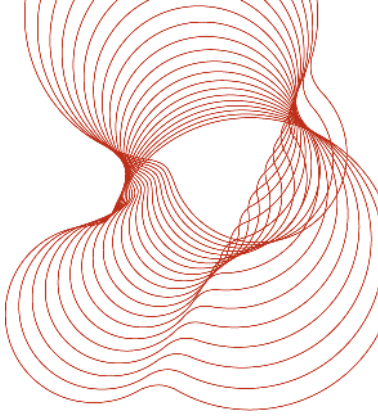
3.2 Specimen 292869b/02

Specimen 292869b/02 was generally identical to specimen 292869b/01 but with the following exceptions:

- The width and height of the specimen were greater. Specimen 292869b/02 was 2120 mm wide by 1628 mm high.
- The double glazed units incorporated within the opening light incorporated 6 mm thick toughened panes in place of the 4 mm thick toughened panes.

Figure 11 Specimen 292869b/02 (external view)





4 Test Programme

The tests were carried out in accordance with the procedures described in:

1. Annex C of PAS 24:2012[1].
2. BRE Specific procedures Series F[6].

The tests were conducted in the sequence listed in Table 7.

In order to carry out the tests the windows were fitted into the BRE Global Limited security test rig.

The specimens were tested by Mr Paul Dillon and Mr Gareth Hulmes of BRE Global Limited.

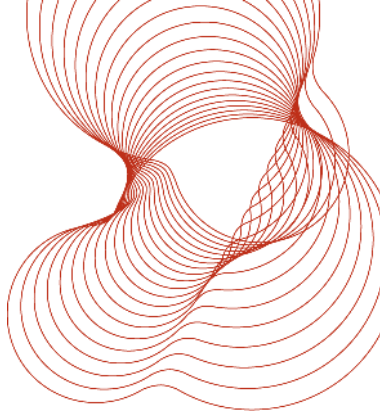
At the start of the test the temperature was recorded as 20.2°C and relative humidity 30.4%. The temperature and humidity of the laboratory was recorded and found to be within the limits specified in Clause C.4.1 of PAS 24:2012[1] for a period of 24 hours before the testing and for the duration of the testing.

5 Summary of test results

A summary of the results of each test is given in Table 7. Full details of the results of each test are noted in Annex B.

Table 7 Results of PAS 24:2012[1] tests on Smart Architectural Aluminium Limited's top swing reversible multi-light windows

Test	Test method	Result	Observations/Comments
Specimen 292869b/02			
Manipulation test	C.4.3	Pass	No entry achieved.
Mechanical glazing removal	C.4.4.3	Pass	No entry achieved.
Mechanical loading test	C.4.5	Pass	No entry achieved.
Additional mechanical loading test	C.4.7	-	Not required.
Specimens 292869b/01 and 292869b/02			
Manual glazing removal test	C.4.4.2	Pass	No entry achieved.
Manual check test	C.4.6	Pass	No entry achieved. No additional mechanical loading test required.



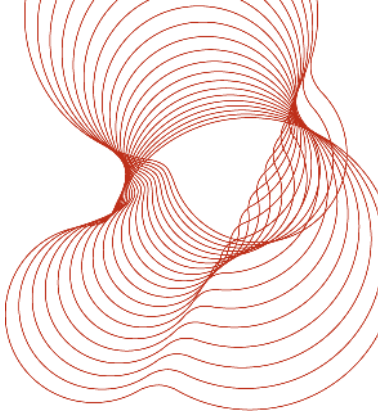
6 Conclusions

The Alitherm 700 Reversible window specimens submitted by Smart Architectural Aluminium Limited, met the enhanced security requirements defined in Annex C (for windows) of PAS 24:2012 for a W K classification.

The results detailed in this report relate only to the specimens tested.

This report should not be used to convey or infer approval or certification of the product by BRE Global Limited unless it is supported by a valid certificate for the product issued by BRE Global Limited and is listed in the Red Book. Furthermore, this report should not be used to convey or infer conformity of products of alternative sizes and configurations without further testing or expert assessments, because such differences may affect the windows performance to the requirements of PAS 24:2012[1].

Copies of this report shall only be distributed in full without any abridgement or amendment.



7 References

1. PAS 24:2012 *Enhanced security performance requirements for doorsets and windows in the UK – External doorsets and windows intended to offer a level of security suitable for dwellings and other buildings exposed to comparable risk*. British Standards Institution.

2. BS 6375-1:2009 *Performance of windows and doors – Part 1: Classification for weathertightness and guidance on selection and specification*. British Standards Institution.

3. BS 6375-2:2009 *Performance of windows and doors – Part 2: Classification for operation and strength characteristics and guidance on selection and specification* British Standards Institution.

4. BS 4873:2009 *Aluminium alloy windows and doorsets – Specification*. British Standards Institution.

5. PN145/8.0 Standard terms and conditions of testing. BRE Global Limited, 6 April 2008

6. BRE Specific procedures Series F. BRE Global Limited.

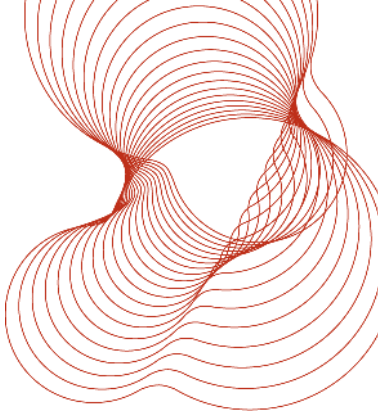
7. BS EN 356:2000 *Glass in building - Security glazing - Testing and classification of resistance against manual attack.* British Standards Institution.

8. BS 6262:2005 *Glazing for buildings*. British Standards Institution.

9. BS 3621:2007+A1:2009 Thief resistant lock assembly – Key egress. British Standards Institution.

Annex A - Documents supplied by Smart Architectural Aluminium Limited

Document Reference	Title	Date
-	Alitherm 700 series reversible (relates to specimen 292869b/01).	Received 17/03/14
-	Alitherm 700 series reversible (relates to specimen 292869b/02).	Received 17/03/14



Annex B - Test Results

Clause C.4.5 - Mechanical loading test (Specimen 292869b/02)

The test was conducted in accordance with the requirements of Clause C.4.5.

Test date: 26/03/14

Location	Case *(From Table C.1 in PAS 24:2012[1])*	Parallel To Plane Load	Perpendicular To Plane Load	Prop Applied	Observations
Security claw/top right corner	3/5	At right angles to the edge (1 kN). Then along the edge towards the opposite edge (1 kN).	3 kN	No	Load held.
Top swing pivot	8	At right angles to the edge towards the opposite edge (1 kN).	3 kN	No	Load held.
Bottom right corner	3	Along the edge in the direction to disengage the nearest locking point (1 kN). Then at right angles towards the opposite edge (1 Kn).	3 kN	No	Load held.
Cam set	4	Along the edge in the direction to disengage the first locking point (1 kN).	3 kN	No	Load held.
		Along the edge in the direction to disengage the second locking point (1 kN).	3 kN	No	Load held.
		At right angles to the edge towards the opposite edge from the locking points (1 kN).	3 kN	No	Load held.

Location	Case *(From Table C.1 in PAS 24:2012[1])*	Parallel To Plane Load	Perpendicular To Plane Load	Prop Applied	Observations
Cam set	4	Along the edge in the direction to disengage the locking point (1 kN).	3 kN	No	Load held.
		At right angles to the edge towards the opposite edge from the locking point (1 kN).	3 kN	No	Load held.
Cam set	4	Along the edge in the direction to disengage the locking point (1 kN),	3 kN	No	Load held.
		At right angles to the edge towards the opposite edge from the locking point (1 kN).	3 kN	No	Load held.
Cam set	4	Along the edge in the direction to disengage the first locking point (1 kN).	3 kN	No	Load held.
		Along the edge in the direction to disengage the second locking point (1 kN).	3 kN	No	Load held.
		At right angles to the edge towards the opposite edge from the locking points (1 kN).	3 kN	No	Load held.
Bottom left corner	3	Along the edge in the direction to disengage the nearest locking point (1 kN)., Then at right angles towards the opposite edge (1 Kn).	3 kN	No	Load held.

Location	Case *(From Table C.1 in PAS 24:2012[1])*	Parallel To Plane Load	Perpendicular To Plane Load	Prop Applied	Observations
Top swing pivot	8	At right angles to the edge towards the opposite edge (1 kN).	3 kN	Holding prop applied to mullion.	Load held.
Security claw/top left corner	3/5	At right angles to the edge (1 kN). Then along the edge towards the opposite edge (1 kN).	3 kN	No	Load held.

Following the tests, there was 10 mm permanent deflection in the direction of opening in the lower left corner of the opening light.

Clause C.4.4.3 – Mechanical glazing removal tests (Specimen 292869b/02)

The test was conducted in accordance with the requirements of Clause C.4.4.3.

Test date: 26/03/14

Location	Load (kN)	Observations
Top left corner of opening sash	2	No damage. No entry achieved.
Top right corner of opening sash	2	No damage. No entry achieved.
Bottom right corner of opening sash	2	No damage. No entry achieved.
Bottom left corner of opening sash	2	No damage. No entry achieved.
Top left corner of fixed light	2	No damage. No entry achieved.
Top right corner of fixed light	2	No damage. No entry achieved.
Bottom right corner of fixed light	2	No damage. No entry achieved.
Bottom left corner of fixed light	2	No damage. No entry achieved.

Clause C.4.3 - Manipulation test (Specimen 292869b/02)

The test was conducted in accordance with the requirements of Clause C.4.3.

Test date: 26/03/14

Attack Location	Tools	Overall Time (min:secs)	Observations
Bottom edge locking points and adjacent to handle.	Craft knife, two paint scrapers, two small screwdrivers	06:00	No entry achieved.
Reversible hinge edge.	Craft knife, two paint scrapers, two small screwdrivers	03:00	No entry achieved.

It was evident that entry would not be possible through the window using this test method with the tools available. Furthermore, due to the design of the window, it would not be possible to apply greater force using the tools permitted by the standard without breakage of the tools. No further locations were tested. No entry achieved.

Clause C.4.6 - Manual check test (Specimens 292869b/02 and 292869b/01)

The test was conducted in accordance with the requirements of Clause C.4.6. Only the top edge of the opening light of specimen 292869b/01 was attacked. This was because of the similarities in design of that specimen with specimen 292869b/02.

Test date: 26/03/14

Attack Location	Tools	Overall Time (min:secs)	Result	Comments
Hinge edge between pivot and bottom corner (conducted on specimen 292869b/02).	Nail bar, screwdriver	03:00	No entry achieved.	Unable to attack top hinge edge from floor level due to height of window specimen. Refer to subsequent test on the top edge conducted on specimen 292869b/01.
Bottom locking edge between locking points (conducted on specimen 292869b/02).	Nail bar, screwdriver	03:00	No entry achieved.	-
Top edge between top corners (conducted on specimen 292869b/01).	Two nail bars	03:00	No entry achieved.	-

It was evident that entry through the windows would not be achieved in the maximum allowed time of 15 minutes using the tools permitted by the standard. Therefore the manual check test was halted. No entry was achieved. No additional loading test was required.

Clause C.4.4.2 – Manual glazing removal test (Specimens 292869b/02 and 292869b/01)

The test was conducted in accordance with the requirements of Clause C.4.4.2.

Test date: 26/03/14

Attack Location	Tools	Overall Time (min:secs)	Methodology	Result
Opening sash (conducted on specimen 292869b/02).	Craft knife, paint scraper, screwdriver, 6 mm and 25 mm wood chisel	03:00	Cut the gasket and attempt to lever out using screwdriver and paint scraper. Insert chisel into gap between glazing unit and opening sash frame.	No entry achieved.
Fixed light (conducted on specimen 292869b/02).	6 mm and 25 mm wood chisel	01:00	Insert chisel into gap between glazing unit and opening sash frame.	Glazing broke due to leverage forces. Method halted. No entry achieved.

Attack Location	Tools	Overall Time (min:secs)	Methodology	Result
Opening sash (conducted on specimen 292869b/01).	6 mm and 25 mm wood chisel	03:00	Gouge hole through aluminium sash frame to gain access to internal beading.	Unable to create hole through frame. No entry achieved.

==========REPORT ENDS==========