



Report No	2370/7948221/ 1 of 3	This Report consists of 18 pages
Licence/Certificate No	KM 81543	
Client	Smart Systems Limited Arnolds Way Yatton BS49 4QN	
Authority & date	Service Management Order No - 7948221 dated 31 January 2013 - Equipment Record No 10139986	
Items tested	1 off Aluminium alloy window, Alitherm 800 Internally Glazed Casement Window System	
Specification	BS 4873:2009 - Aluminium windows and doorsets BS 6375-1:2009 Performance of windows and doors Part 1: Classification for weathertightness and guidance on selection and specification BS 6375-2:2009 Performance of windows and doors - Part 2 Classification for operation and strength characteristics and guidance on selection and specification Type testing for Product Certification	
Results	Pass	
Prepared by	D Kirsop 	(Senior Technician)
Authorized by	M Manito 	(Senior Engineer)
Issue Date	02 December 2013	
Conditions of issue	This Test Report is issued subject to the conditions stated in current issue of CP0322 'Conditions of contract for testing'. The results contained herein apply only to the particular sample/s tested and to the specific tests carried out, as detailed in this Test Report. The issuing of this Test Report does not indicate any measure of Approval, Certification, Supervision, Control or Surveillance by BSI of any product. No extract, abridgement or abstraction from a Test Report may be published or used to advertise a product without the written consent of the Managing Director, BSI, who reserves the absolute right to agree or reject all or any of the details of any items or publicity for which consent may be sought.	

## **TEST AND EXAMINATION OF ONE ALUMINIUM ALLOY WINDOW SUBMITTED FOR TYPE ASSESSMENT, ALITHERM 800 INTERNALLY GLAZED CASEMENT WINDOW SYSTEM**

### **INTRODUCTION**

The Aluminium alloy window submitted by Smart Systems Limited, was tested and assessed to the requirements of BS 4873:2009, BS 6375-1:2009 and BS6375-2:2009, as indicated on the following pages 4 and 5 of this Report. This request was made on Service Management Order No 7948221 dated 31 January 2013.

It is emphasized that assessments have not been made against the other Clauses of the Specification.

### **TEST SAMPLE**

1 off projecting side hung next to fixed

(Equipment Record No: 10139986)

Date sample received: 18 February 2013

Parts list on page 16

### **SUMMARY OF RESULTS**

- |                           |  |
|---------------------------|--|
| 1. Air permeability       | The test sample met the requirements of the Specification, in respect of Clause 6, for Test Pressure Class 3.      |
| 2. Watertightness         | The test sample met the requirements of the Specification, in respect of Clause 7, for Test Pressure Class E1050.  |
| 3. Wind resistance        | The test sample met the requirements of the Specification , in respect of Clause 8, for Exposure Category Class A5 |
| 4. Operation and Strength | The test sample met the requirements of the Specification. (Excluding Cyclic, repeated opening and closing)        |

### **Classification**

The test sample met the requirements of BS 6375-1:2009 for Wind, Exposure Category 2000PA

## **PREPARATION AND METHOD OF TEST**

The samples were prepared as required by BS EN 1026:2000 Windows and doors - Air permeability, BS EN 1027:2000 Windows and doors - Watertightness and BS EN 12211:2000 Windows and doors - Resistance to wind load in respect of BS 6375 -1:2009.

The samples were mounted into a plywood surround for installation in the test apparatus. The joint between the samples and the plywood surround was sealed.

### **1. Air permeability**

The air permeability of the samples was determined by the method given in BS EN 1026:2000.

### **2. Watertightness**

The watertightness of the samples was determined by the method given in BS EN 1027:2000.

### **3. Resistance to wind load (P1 and P2)**

The resistance to wind load of the samples was determined by the method given in BS EN 12211:2000.

### **4. Repeat test**

After testing for resistance to wind load test 1 (air permeability) was repeated

### **5. Resistance to wind load (P3)**

The resistance to wind load of the samples was determined by the method given in BS EN 12211:2000.

### **6. Operational strength**

The operational strength characteristics were determined by the method given in BS 6375-2:2009.

**Description of sample**

**Manufacturer:** Smart systems

**Window type:** Projecting side hung next to fixed

**Material -** Aluminium alloy

**Finish -** Natural

**Construction -** Outerframe: Cleated  
Sash: Cleated

**Fittings -** Hinges: 16" Securistyle side hung stays  
Locking: A six point locking (six mushroom bolts)  
Trojan espagnolette system operated by a  
key locking handle  
7 of run up blocks  
2 of securistyle Vector hinge protectors

**Manufacturing sizes:** Outerframe: Length - 2000mm Height - 1450mm  
Sash: Length - 700mm Height - 1400mm

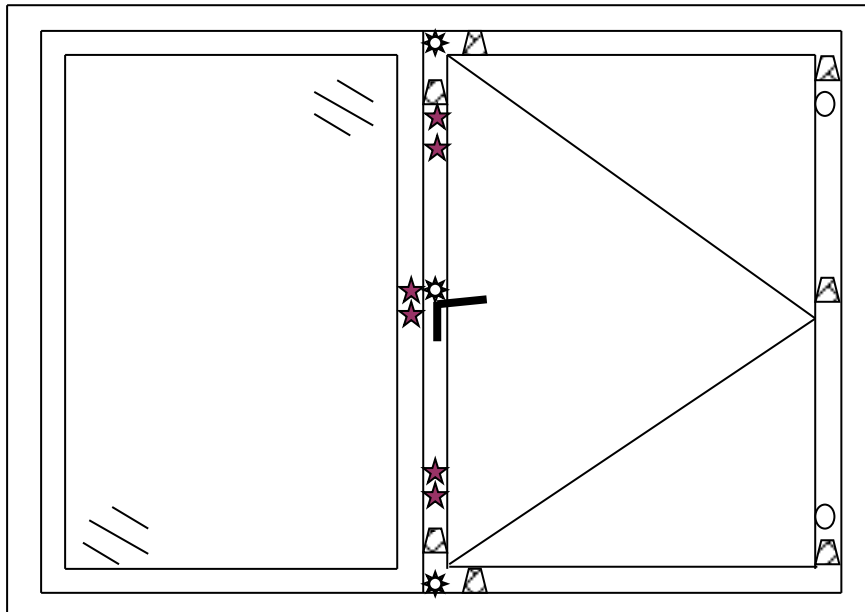
**Glass thickness:** Double glazed, 4-20-4mm sealed units

**Date of test:** 20 February 2013

**Laboratory temperature:** 19.2°C

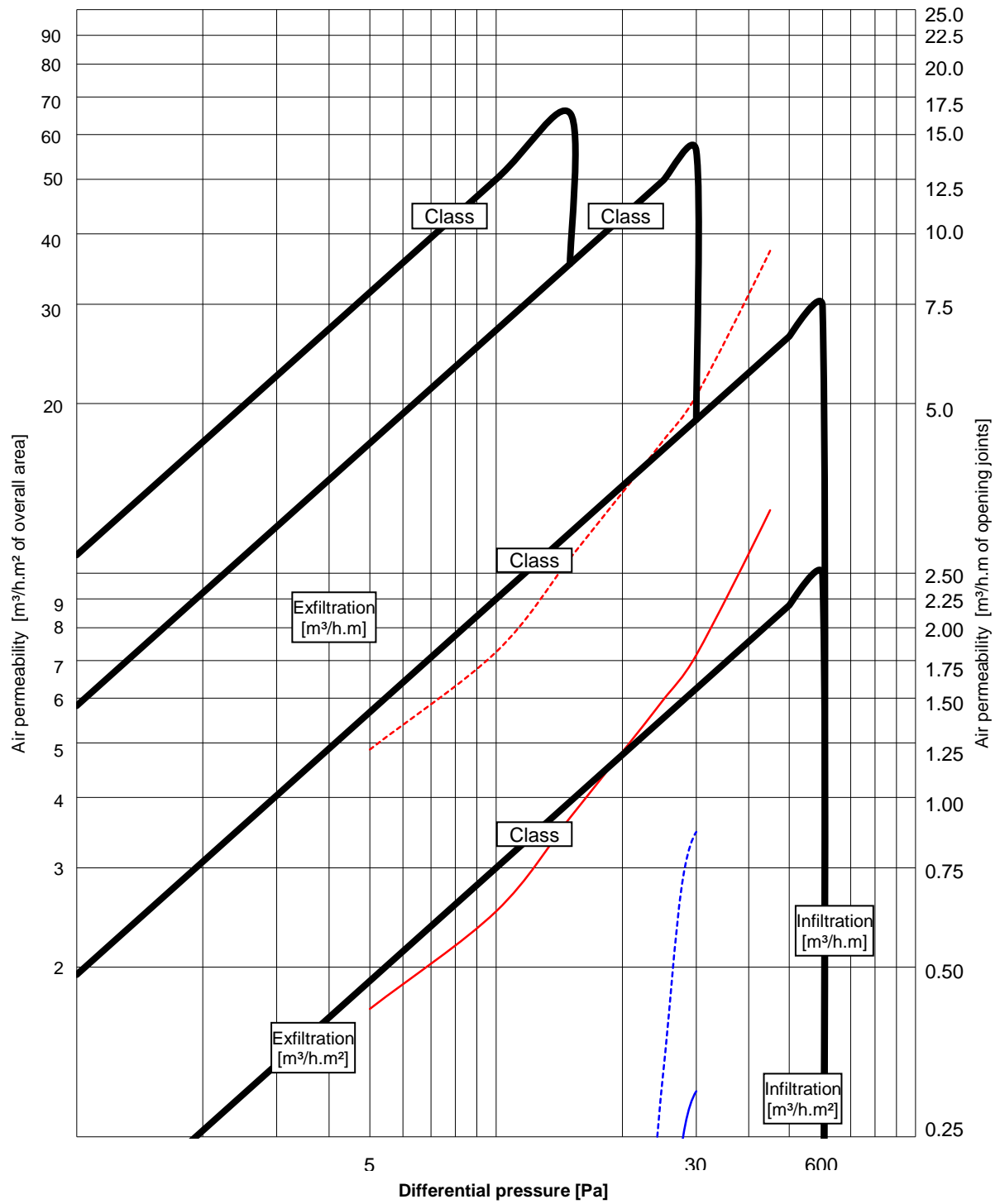
**Laboratory humidity:** 34.0%

## ELEVATION DRAWING INDICATING POSITION OF HARDWARE



- - hinge protector
- ★ - mushroom bolt
- └ - handle
- ⊛ - deflection transducer
- ▤ - run up block

GRAPH OF AIR PERMEABILITY BEFORE GUSTING



**AIR PERMEABILITY TEST RESULTS - BS 6375-1:2009 Clause 6 / BS EN  
1026:2000**

**Clause 6 Before resistance to wind tests**

Three positive pressure pulses of 660Pa were applied prior to testing

**Table 4**

Air Pressure [Pa]	Average rate of air leakage [m <sup>3</sup> /h]	Average rate of air leakage per meter length of opening joint [m <sup>3</sup> /h.m]	Average rate of air leakage relative to area of sample [m <sup>3</sup> /h.m <sup>2</sup> ]
50	2.5	0.63	0.88
100	3.7	0.92	1.27
150	5.4	1.34	1.86
200	7.1	1.76	2.44
250	9.3	2.31	3.20
300	12.1	3.02	4.18
450	20.1	4.99	6.92
600	-	-	-

Note: The figures in the table above give the leakage as an average of the leakage at positive pressure and the leakage at negative pressure

Total opening perimeter = 4.02m

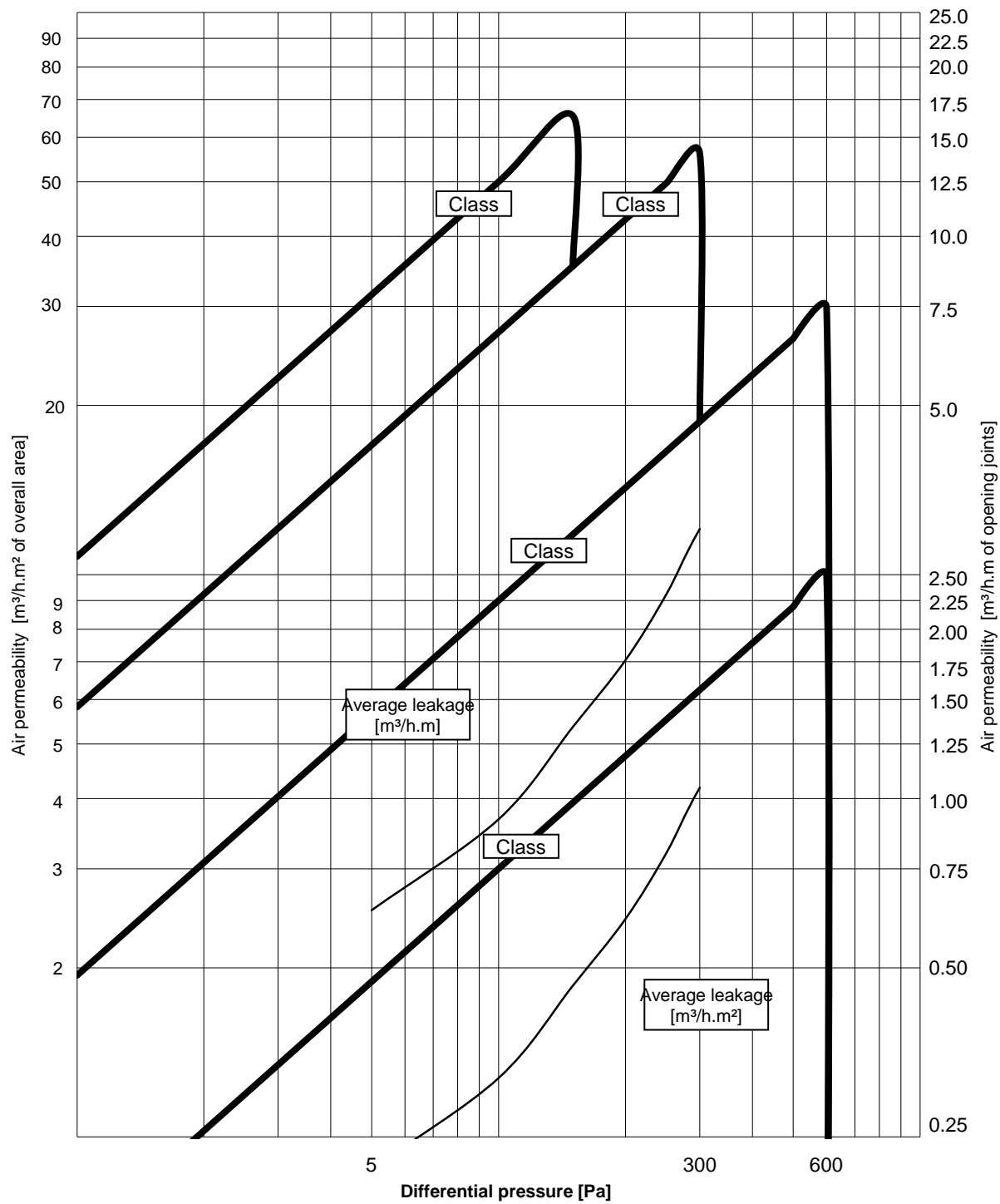
Overall area = 2.9m<sup>2</sup>

BS 6375-1:2009 Clause 6.2 - Joint class = 3

BS 6375-1:2009 Clause 6.2 - Area class = 4

BS 6375-1:2009 Clause 6.2 - Overall class =  
4

GRAPH OF AVERAGE AIR PERMEABILITY BEFORE GUSTING





**WATERTIGHTNESS TEST RESULTS - BS EN 1027:2000**  
**Clause 7 Watertightness before resistance to wind loads**

**TABLE 2 - Spraying method 1A**

Air pressure (Pa)	Point at which water leakage occurred
1050	No leakage

**WIND LOAD RESISTANCE TEST RESULTS - BS EN 12211:2000**

**Clause 8 Resistance to wind load**

**P1 DEFLECTION TEST**

Three positive pressure pulses at 2200Pa were applied

No visible failures or functional defects to the test sample were observed after wind loads applied at a positive air pressure of 2000Pa.

Actual deflection – 2.16mm (maximum deflection allowed 8.80mm)

Deflection/span ratio 1/611 (maximum ratio allowed 1/150)

Three negative pressure pulses at 2200Pa were applied

No visible failures or functional defects to the test sample were observed after wind loads applied at a negative air pressure of 2000Pa.

Actual deflection – 1.78mm (maximum deflection allowed 8.80mm)

Deflection/span ratio 1/741 (maximum ratio allowed 1/150)

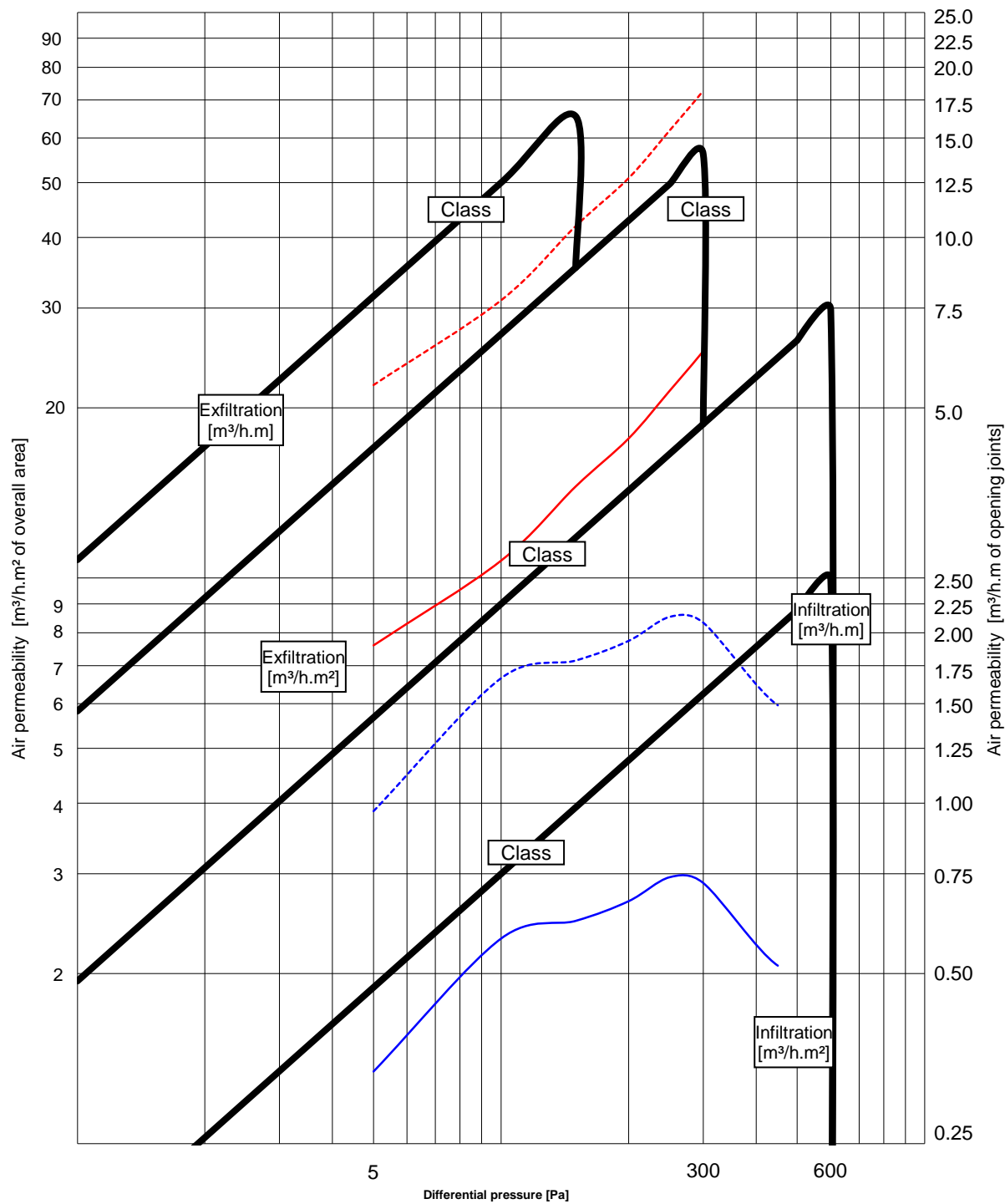
**P2 REPEATED PRESSURE TEST**

No visible failures or functional defects to the test sample were observed after 50 cycles of repeated wind loads applied at a positive air pressure of 1000Pa.

No visible failures or functional defects to the test sample were observed after 50 cycles of repeated wind loads applied at a negative air pressure of 1000Pa.

In accordance with BS 6375-1:2009 Clause 6.5, as the classification after the resistance to wind load tests is lower than the classification before the resistance to wind load tests, the resulting classification for the sample is Class 3.  
(see following Table).

GRAPH OF AIR PERMEABILITY AFTER GUSTING



**AIR PERMEABILITY TEST RESULTS - BS 6375-1:2009 Clause 6 / BS EN  
1026:2000**

**Clause 6 After resistance to wind tests**

Three positive pressure pulses of 660Pa were applied prior to testing

**Table 4**

Air Pressure [Pa]	Average rate of air leakage [m³/h]	Average rate of air leakage per meter length of opening joint [m³/h.m]	Average rate of air leakage relative to area of sample [m³/h.m²]
50	13.0	3.23	4.47
100	18.9	4.70	6.52
150	24.6	6.13	8.50
200	29.5	7.33	10.17
250	35.4	8.80	12.20
300	40.7	10.13	14.04
450	56.1	13.96	19.35
600	-	-	-
0	0.0	0.00	0.00

Note: The figures in the table above give the leakage as an average of the leakage at positive pressure and the leakage at negative pressure

Total opening perimeter = 4.02m

Overall area = 2.9m²

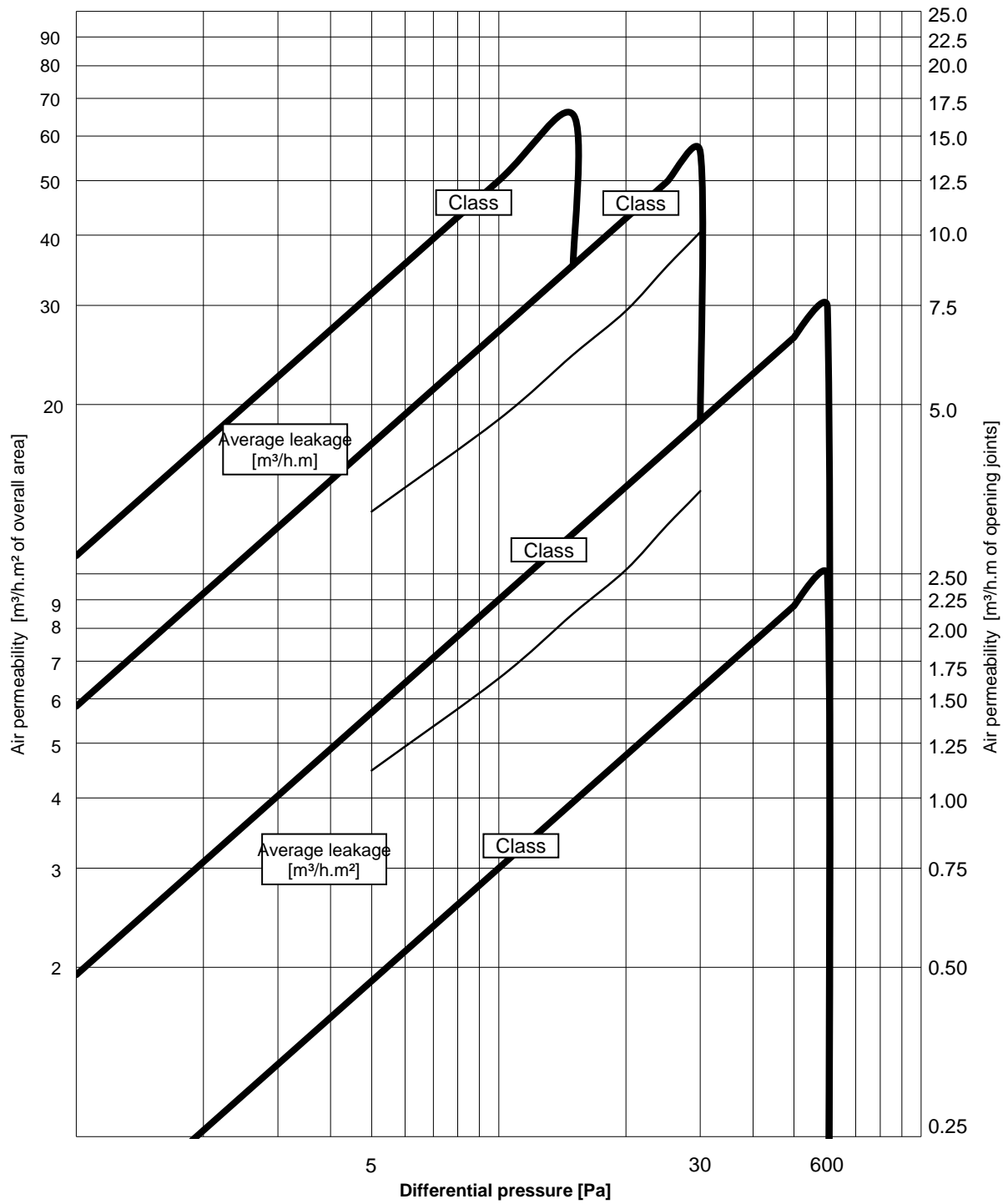
BS 6375-1:2009 Clause 6.5 - Joint class = 2

BS 6375-1:2009 Clause 6.5 - Area class = 3

BS 6375-1:2009 Clause 6.5 - Overall class =  
3

In accordance with BS 6375-1:2009 Clause 6.5, as the classification after the resistance to wind load tests is lower than the classification before the resistance to wind load tests, the resulting classification for the sample is Class 3.

GRAPH OF AVERAGE AIR PERMEABILITY AFTER GUSTING



## **WIND LOAD RESISTANCE TEST RESULTS - BS EN 12211:2000**

### **P3 SAFETY TEST**

No parts of the test sample became detached and the test sample remained closed after a wind load safety test applied at a positive air pressure of 3000Pa.

No parts of the test sample became detached and the test sample remained closed after a wind load safety test applied at a negative air pressure of 3000Pa.

## **Operation and strength**

### **(BS 6375-2:2009)**

#### **Clause 5 Performance characteristics and requirements for windows**

##### **Clause 5.1 Operating Forces: EN13115 and EN12046**

The sample was tested three times, operating the key, handle opening, sash closing, handle closing, then key to lock, and average of the three results were then recorded.

Key Unlock – 0.08Nm (maximum 5Nm)	Pass
Handle opening – 39.85N (maximum 100N)	Pass
Sash opening – 21.75N (maximum 100N)	Pass
Sash closing – 27.52N (maximum 100N)	Pass
Handle closing – 43.65N (maximum 100N)	Pass
Key lock – 0.05Nm (maximum 5Nm)	Pass

##### **Clause 5.2.1 Resistance to static torsion BS EN 14609 and BS EN 13115**

The sample was open and closed 5 times before the test, all loads were applied in accordance with BS EN 14609:2004, maximum increments of 100N in minimum 1 second intervals.

The window was opened 90° or its maximum opening position and blocked, and the 30N pre load applied for 60 seconds.

300(N) was applied in 1second min intervals, for 5 minutes, measuring the max deformation and finally the Residual deformation after 1 min rest

Maximum deformation – 27.42mm

Residual deformation – 7.23mm

After Resistance to static torsion the Performance characteristics were tested again

The sample was tested three times, operating the key, handle opening, sash closing, handle closing, then key to lock, and average of the three results were then recorded.

## **Operation and strength (continued)**

**(BS 6375-2:2009)**

**Clause 5 Performance characteristics and requirements for windows**

Key Unlock – 0.08Nm (maximum 5Nm)	Pass
Handle opening – 35.45N (maximum 100N)	Pass
Sash opening – 18.00N (maximum 100N)	Pass
Sash closing – 35.57N (maximum 100N)	Pass
Handle closing – 48.37N (maximum 100N)	Pass
Key lock – 0.05Nm (maximum 5Nm)	Pass

**Clause 5.2.2 Racking BS EN 14608 and BS EN 13115**

The sample was opened and closed 5 times before the test, the loads were applied in accordance with BS EN 14608:2004, maximum increments of 100N in minimum 1 second intervals.

The window was opened at an angle of 90° or it's maximum opening position, and a 60N pre load was applied for 60 second.

600(N) was applied in 1second min intervals for 5 minutes, measuring the max deformation, then finally the Residual deformation after 1 min rest.

Maximum deformation – 6.64mm

Residual deformation – 2.40mm

After Resistance to static torsion the Performance characteristics were tested again.

**Operation and strength (continued)**

**(BS 6375-2:2009)**

## **Clause 5 Performance characteristics and requirements for windows**

### **Clause 5.2.2 Racking BS EN 14608 and BS EN 13115**

The sample was tested three times, operating the key, handle opening, sash closing, handle closing, then key to lock, and average of the three results were then recorded.

Key Unlock – 0.08Nm (maximum 5Nm)	Pass
Handle opening – 46.35N (maximum 100N)	Pass
Sash opening – 18.05N (maximum 100N)	Pass
Sash closing – 26.12N (maximum 100N)	Pass
Handle closing – 48.08N (maximum 100N)	Pass
Key lock – 0.05Nm (maximum 5Nm)	Pass

### **Clause 5.3 Load bearing capacity of safety devices**

No restrictor fitted

### **Clause 5.4 Impact resistance BS EN 13049 and BS EN 13115**

The sample was opened and closed 5 times before the test, the testing was carried out accordance with BS EN 13049.

The BS 12600 Impactor was used for the impact, and only one impact was carried out on one sample.

The maximum particle weight of any part of the sample that comes away may not be more than 50g, the sash, casement, hardware or infill retaining components may not disconnect, or become dislodged in a dangerous manner.

Impact height achieved: 200mm

Direction of impact: From outside

Point of impact: Centre of sample

Details of damage: None Pass

## **Parts list**



# smart

architectural aluminium

Alith 800 Tests

Update 14.0  
WARNING SOFTWARE NEEDS UPDATE  
Software last updated 03/07/2012  
New update now available from  
www.smartsystems.co.uk/v6

Page 1  
Quote 2  
Item: 1 of 6  
Version: 2 | 25/01/2013

BSI

Quote:2 Item: 1

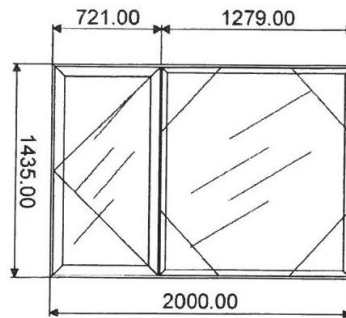
BS6375 Pt 1 & 2

Qty 1

1

## BS6375 Pt 1 & 2

ETC811: Outer Frame  
ETC824: Vent  
ETC831: Mullion/Transom  
NONE: Cill  
NONE: Head Extension



QUALITY CONTROL	
Approved	
Cut	
Fabricated	
Checked	
Glazed	

2,000 mm x 1,435 mm

Extrusions	End Prep	Qty	Length	Status
ETC811 61mm Equal Leg Outer Frame	-45.0 -45.0	2	1,435 mm	[ ]
ETC811 61mm Equal Leg Outer Frame	-45.0 -45.0	2	2,000 mm	[ ]
ETC824 Internally Beaded Flat Vent	45.0T 45.0T	2	699.5 mm	[ ]
ETC824 Internally Beaded Flat Vent	45.0T 45.0T	2	1,400 mm	[ ]
ETC831 Square Transom/Mullion	0.0T 0.0T	1	1,387 mm	[ ]
ETC846 Reverse Adapter	45.0T 45.0T	2	1,251.5 mm	[ ]
ETC846 Reverse Adapter	45.0T 45.0T	2	1,394 mm	[ ]
ETC866 28mm Internal Square Glazing Bead	0.0T 0.0T	2	601.5 mm	[ ]
ETC866 28mm Internal Square Glazing Bead	0.0T 0.0T	2	1,211 mm	[ ]
ETC866 28mm Internal Square Glazing Bead	0.0T 0.0T	2	1,269 mm	[ ]
ETC866 28mm Internal Square Glazing Bead	0.0T 0.0T	2	1,320.5 mm	[ ]
Glazing		Qty	Width	Height
28MM GLAZING 28mm Glazing		1	592.5 mm	1,293 mm
28MM GLAZING 28mm Glazing		1	1,200.5 mm	1,343 mm
Components		Qty	Unit	
ACDV21 Stainless Steel Chevron		4	Each	[ ]
ACET064 Screws (for Handles) No. 8 X5/8 Csk Hd.		12	Each	[ ]
ACET066 Screws No. 7 x 1.5 Csk head S/S s/tapping screw		4	Each	[ ]
ACET069 Screws (for ACET081)		2	Each	[ ]
ACET070 8X 1/2" Pozi Flange S.S. Self Tapping Screws		6	Each	[ ]
ACET099 8 X 3/4 Pozi Flange S/S Self Tapper		6	Each	[ ]
ACET122 M4 MC.Screw x 10mm C/S		4	Each	[ ]
ACET131WP Drain Hole Cover [White]		4	Each	[ ]
ACET165WPR Espag Handle Right - White		1	Each	[ ]
ACET290 20mm Polyamide Screw		8	Each	[ ]

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Estimating Software by Smarts Architectural Aluminium (c) 2008  
Report Name: FabSumShort\_Rev12.0

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## Alith 800 Tests

ACET621	CHEVRON FOR ETC621/846	4	Each	[ ]
ACET811	Outer Crimp Cleat for ETC810,811,821	4	Each	[ ]
ACET813	Outer Crimp Cleat for ETC811,821	4	Each	[ ]
ACET820	Inner Crimp Cleat for ETC820,822,824	4	Each	[ ]
ACET824	CHEVRON S/S FOR ETC 324/820/821/824	4	Each	[ ]
ACET826	Outer Crimp Cleat for ETC824	4	Each	[ ]
ACET832	Transom/Mullion Fixing Block	2	Each	[ ]
ACET836	Flipper Gasket for ali300	4	Each	[ ]
ACET838	Long Tail Flipper Gasket	4	Each	[ ]
ACET842	Low Line Gasket Captive for ali300	9	Each	[ ]
ACET846	Outer Crimp Cleat for ETC846	4	Each	[ ]
ACET84R8	<del>TROJAN SHOOTBOLT GASKET REBATE 945/140</del> *	1	Each	[ ]
ACET855	Insulation	16	Each	[ ]
ACET857	Bridge Packer	4	Each	[ ]
ACET880WP	Run Up Block - White	1	Each	[ ]
ACINDSSH16	16" SH. Standard Hinge	1	Each	[ ]
ACW20034	4mm Wedge Gasket	9	Each	[ ]
WCA106SSZ	Aluminium Corner Chevron (ETC105)	8	Each	[ ]
ACET513- VECTOR EXCLUDER				

\* TROJAN ESPAGNOLETTE SYSTEM  
(SIX MULLION BOLTS)

**END OF REPORT**