

Test Report

ISSUED BY Jason Taylor
DATE OF ISSUE 19/10/2018



4052



ERA
i54, Valliant Way,
Wolverhampton,
West Midlands WV9 5GB

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Approved Signatory

Name Chirag Patel
Signature 

Client Name: Smart Systems Ltd

Address: Arnolds Way
Yatton
North Somerset
BS49 4QN

Test Report Number: 1941

System Tested: Single Door

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

Test Standard: BS 6375-1:2015 - Performance of Windows and Doors

	Test Method	Classification
Air Permeability	BS EN 1026:2016	BS EN 12207:2000
Watertightness	BS EN 1027:2000	BS EN 12208:2000
Resistance to Wind Load	BS EN 12211:2016	BS EN 12210:2016

Testing Conducted By: Jason Taylor

Date of Test: 19/10/2018

Customer Witness:

Test Preliminaries: The ambient temperature and humidity close to the sample was within the range 10° to 30° and 25% to 75% RH and the sample was conditioned for at least 4h immediately before testing.

Airflow Measurement

Device: Mini Air 60Mini 0,5-40 m/s & Flügelrad 100 Bi

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Test Results Summary

Test Type	Classification Achieved
Overall Air Permeability (Up to 600 Pa)	2
Watertightness	3A (100 Pa)
Resistance to Wind Load	A3
Exposure Category and Classification	1200

Test Conditions:

Temperature °C	19.4
Relative Humidity %	45.9
Atmospheric Pressure kPa	101.5

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Sample Specification

System Manufacturer: Smart Systems Ltd

Model: Not Known

System Type: Single Designer Door (Open in)

System Size: 950mm W X 2150mm H

Method of Jointing: Mechanical Cleats

Materials & Surface

Treatment: Powder Coated

Profile Part Number: SPD702 Outer Frame/ SPD705 Sash/ SPD703 Low Threshold/ SPD706 Weather Drip

Reinforcing Part Number: N/A

Glazing Description: N/A

Locking System: ACPD780 Multi-point Lock (Key Operated)
Fixed With Self Tapping No.8 X 1" SS Screws

Hinges: SPD750 Aluminium Two Part Hinges Fixed With Machine Screws into
Aluminium Tapped Fixing Plates

Handle: Tubular

Other Hardware Details: Dog Bolts Fitted

*Above details are not fully verified ERA.

Presence of Ventilation: No

Exposed Face: Opening Inwards

Closing Conditions: Locked

This report and the results shown within are based upon the information, drawings, samples and tests referred to in the report. The results are valid only for the conditions under which the test was conducted and for the specific range of doorsets and windows. The results obtained do not necessarily relate to samples from the production line of the above named company.

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Air Permeability Test Description & Results

Air Permeability of Test Chamber

The air permeability of the test chamber was measured by sealing all joints in the test specimen. The air permeability of the test chamber with negative test pressures were measured, but without pressure pulses.

Overall Air Permeability of Test Specimen and the Test Chamber

All opening parts of the specimen were opened and closed before securing in the closed position in accordance with manufacturer's requirements. To commence testing, three pressure pulses each 10% greater than the maximum test pressure to be used in the test or 500Pa (150 Pa for internal pedestrian doorsets), whichever is greater was applied. The time to reach the maximum test pressure was not less than 1 s and the pressure was sustained for at least 3 s. Positive test pressure was applied in steps of 50 Pa up to 300 Pa and from 300 Pa in steps of 150 Pa. The air permeability at each step was measured and recorded. The duration of each step was sufficient to allow the test pressure to stabilise before the air permeability was measured. The procedure was repeated for negative pressures.

Test Results

The air flow measurements are adjusted at each step to calculate the air flow at normal conditions. The air permeability in terms of the length of the opening joint ($\text{m}^3/\text{h.m}$) and overall area ($\text{m}^3/\text{h.m}^2$) are calculated.

Positive Pressures

Pressure in Pascals (Pa)	Air Flow m^3/h	Window Area		Seal Length	
		$\text{m}^3/\text{h.m}^2$	Class	$\text{m}^3/\text{h.m}$	Class
50	15.41	7.88	2	2.67	2
100	23.08	11.80	2	4.00	2
150	30.69	15.69	2	5.32	2
200	37.27	19.05	2	6.46	2
250	43.21	22.09	2	7.49	2
300	49.17	25.13	2	8.52	2
450	71.08	36.33	2	12.32	2
600	91.46	46.75	2	15.85	2

Negative Pressures

Pressure in Pascals (Pa)	Air Flow m^3/h	Window Area		Seal Length	
		$\text{m}^3/\text{h.m}^2$	Class	$\text{m}^3/\text{h.m}$	Class
-50	7.72	3.95	3	1.34	3
-100	10.06	5.14	3	1.74	3
-150	11.00	5.63	3	1.91	3
-200	11.25	5.75	3	1.95	3
-250	10.92	5.58	3	1.89	3
-300	10.08	5.15	4	1.75	3
-450	4.46	2.28	4	0.77	4
-600	4.25	2.17	4	0.74	4

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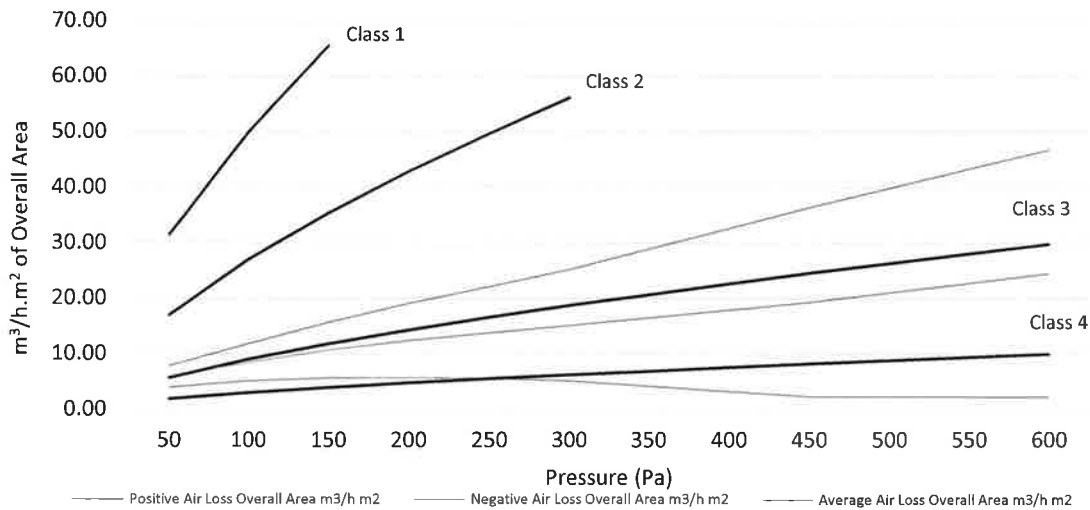
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Average Pressures

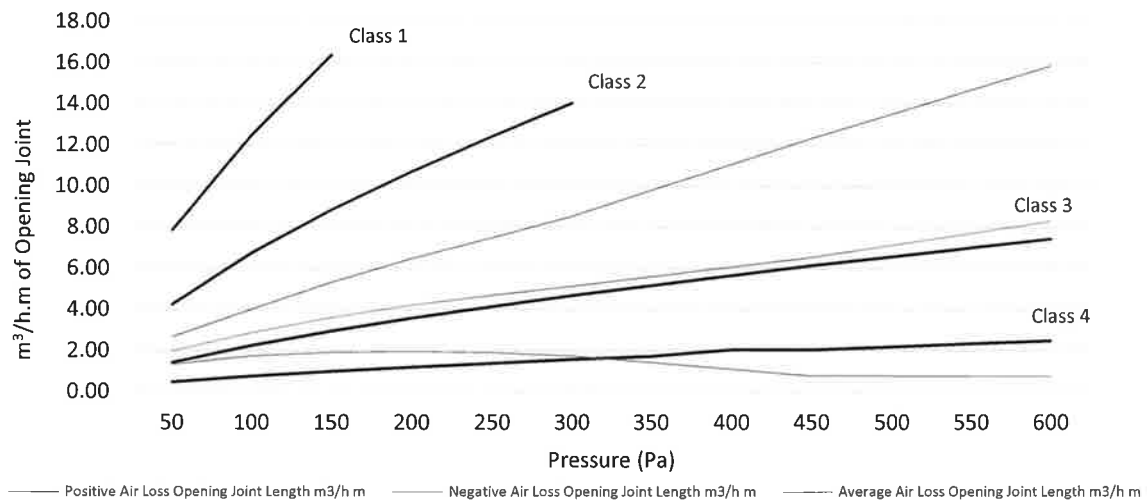
Pressure in Pascals (Pa)	Air Flow m ³ /h	Window Area		Seal Length	
		m ³ /h.m ²	Class	m ³ /h.m	Class
50	11.57	5.91	2	2.00	2
100	16.57	8.47	3	2.87	2
150	20.85	10.66	3	3.61	2
200	24.26	12.40	3	4.20	2
250	27.07	13.84	3	4.69	2
300	29.62	15.14	3	5.13	2
450	37.77	19.31	3	6.55	2
600	47.85	24.46	3	8.29	2

Graphs

A Graph of Air Permeability Rate vs Pressure Difference (Overall Area)



A Graph of Air Permeability Rate vs Pressure Difference (Opening Joint)



Classification:	Overall Area	2	Length of Opening Joints	2
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Watertightness Test Description & Results

Spraying Phase

Spraying was applied first with the test pressure at 0 Pa for 15 min then the test pressure was increased every 5 min. The test pressures was applied in steps of 50 Pa up to 300 Pa and from 300 Pa in steps of 150 Pa. Prior to testing the flow of each row of nozzles were adjusted in accordance with BS EN 1027:2016 clause 5.6.

Test Results

The location and pressure at which any water penetrated the specimen and the time for which the maximum pressure was maintained before water penetrated was record.

The positioning of the spraying system was recorded and shown below.

Specification	Results
Angle of Nozzles (°)	24.1, 24.2, 24
Distance Between Outer Edge & Outermost Nozzles (mm)	Left Edge 70, Right Edge 80
Distance Between Nozzles (mm)	400, 400
Nozzle Line from External Face (mm)	250
Nozzle Line from Topmost Joint Line (mm)	80
Spraying Method	1A

Maximum Pressure At Which Any Water Penetrated The Specimen (Pa)	150
Time For Which The Maximum Pressure Was Maintained Before Water Penetrated	04:40
The Location At Which Water Penetrated	Leakage Observed From Bottom Corner Hinge Side

Resistance to Wind Load Test Description & Results

Principles of Test

Application of a defined series of positive and negative test pressures at which measurements and inspections are made to assess relative frontal deflection and resistance to damage from wind loads.

Deflection Test

Measuring devices were fixed in position at each end and at the centre of the frame member to be measured

Test Pressure P1 (Pa)	1200
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Three positive pressure pulses were applied, each 10% greater than the test pressure P1. The time to reach the maximum pressure was not less than 1 s and it was sustained for at least 3 s. All the gauges were zeroed.

After the test pressure was applied for 30 s, the required frontal deflection(s) and frontal displacement(s) were recorded.

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The test pressure was reduced to 0 Pa, at a rate not greater than 100 Pa/s and the residual frontal deflection(s) and frontal displacement(s) were recorded.

The positive pressure procedure was repeated using negative test pressures.

Measuring Point	Positive Pressure		Negative Pressure	
	At Test Pressure (mm)	Residual (mm)	At Test Pressure (mm)	Residual (mm)
A ₀	-0.6	0	2.1	0
M ₀	-1.3	0	1.9	0
B ₀	-2.3	0.2	0.2	0

Relative Frontal Deflections (Positive Pressure) ≤ 1/-7980

Relative Frontal Deflections (Negative Pressure) ≤ 1/-2660

Repeated Pressure Test

The test specimen was subjected to 50 cycles including negative and positive pressures with the following features:

Test Pressure P2 (Pa)	600
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- test pressure equal P2
- first step was negative, next was positive as is the last of the sequence of 50 impulses;
- variation from -P2 to +P2 and the reverse took (7 ± 3) s;
- value P2 was maintained at least for (7 ± 3) s

After completion of the 50 cycles, the moving parts of the specimen were opened and closed and any damage or functioning defects were noted

Any damage or functioning Defects	None
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The test for air permeability was repeated in accordance with BS EN 1026:2016.

Positive Pressures

Pressure in Pascals (Pa)	Air Flow m ³ /h	Window Area		Seal Length	
		m ³ /h.m ²	Class	m ³ /h.m	Class
50	17.57	8.98	2	3.05	2
100	27.59	14.10	2	4.78	2
150	36.69	18.75	2	6.36	2
200	45.28	23.15	2	7.85	2
250	54.20	27.71	2	9.39	2
300	63.42	32.42	2	10.99	2
450	95.15	48.64	2	16.49	2
600	113.36	57.95	2	19.65	2

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Negative Pressures

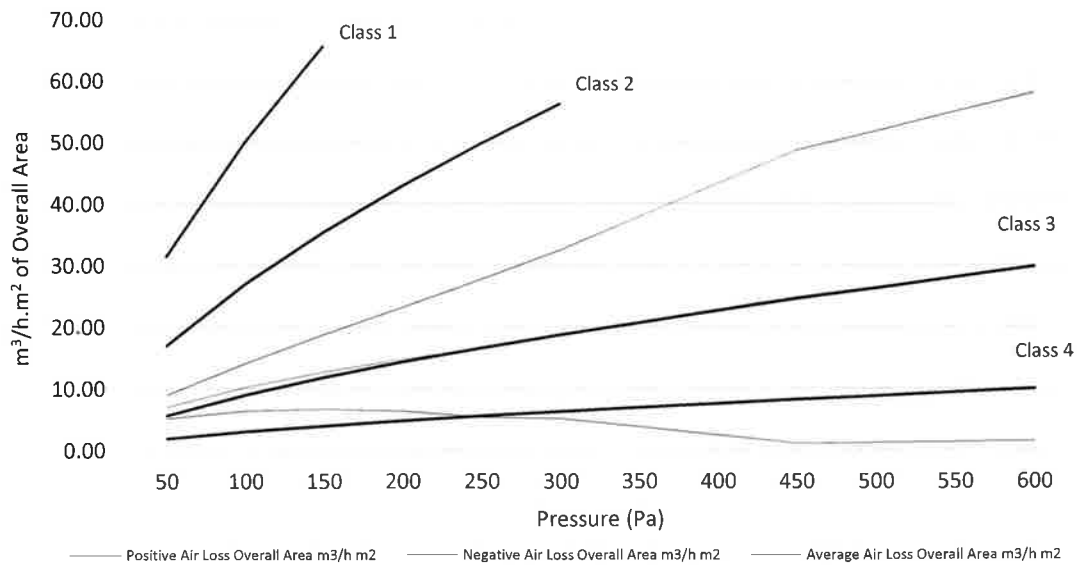
Pressure in Pascals (Pa)	Air Flow m ³ h	Window Area		Seal Length	
		m ³ /h.m ²	Class	m ³ /h.m	Class
-50	10.10	5.16	3	1.75	2
-100	12.49	6.39	3	2.16	3
-150	13.02	6.66	3	2.26	3
-200	12.37	6.32	3	2.14	3
-250	10.35	5.29	4	1.79	3
-300	10.04	5.13	4	1.74	3
-450	2.02	1.03	4	0.35	4
-600	2.85	1.46	4	0.49	4

Average Pressures

Pressure in Pascals (Pa)	Air Flow m ³ h	Window Area		Seal Length	
		m ³ /h.m ²	Class	m ³ /h.m	Class
50	13.84	7.07	2	2.40	2
100	20.04	10.24	2	3.47	2
150	24.85	12.71	2	4.31	2
200	28.83	14.74	2	5.00	2
250	32.27	16.50	3	5.59	2
300	36.73	18.78	2	6.37	2
450	48.59	24.84	2	8.42	2
600	58.10	29.70	3	10.07	2

Graphs

A Graph of Air Permeability Rate vs Pressure Difference (Overall Area)

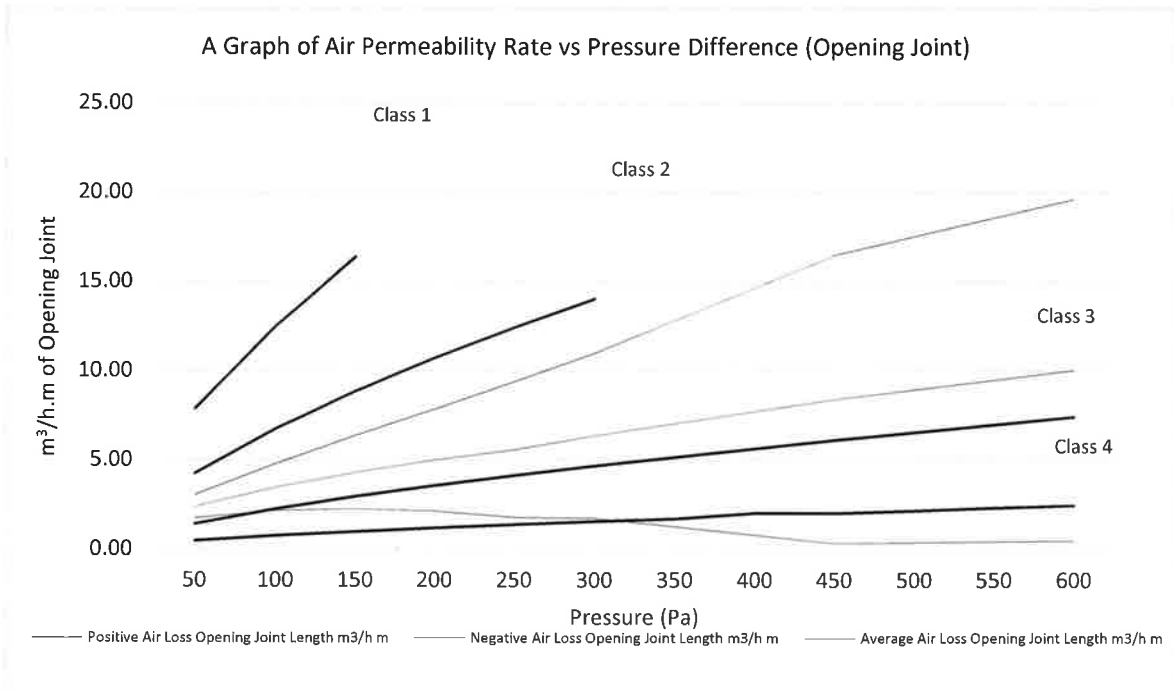


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Classification:	Overall Area	2	Length of Opening Joints	2
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Safety Test

The specimen was subjected to one cycle including negative and positive test pressure with the following features:

Test Pressure P3 (Pa)	1800
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- test pressure equal P3
- negative test pressure was applied first;
- variation from 0 Pa to -P3 and back from -P3 to 0 took (7 ± 3) s, the maximum test pressure P3 was maintained for (7 ± 3) s;
- positive test pressure was applied after (7 ± 3) s rest at 0 Pa;
- variation from 0 Pa to +P3 and back to 0 Pa was the same duration as for the negative test pressure -P3.

Any Damage and Failure or Operating Difficulties	None
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Total Uncertainty of Measurement 5 % m³/h

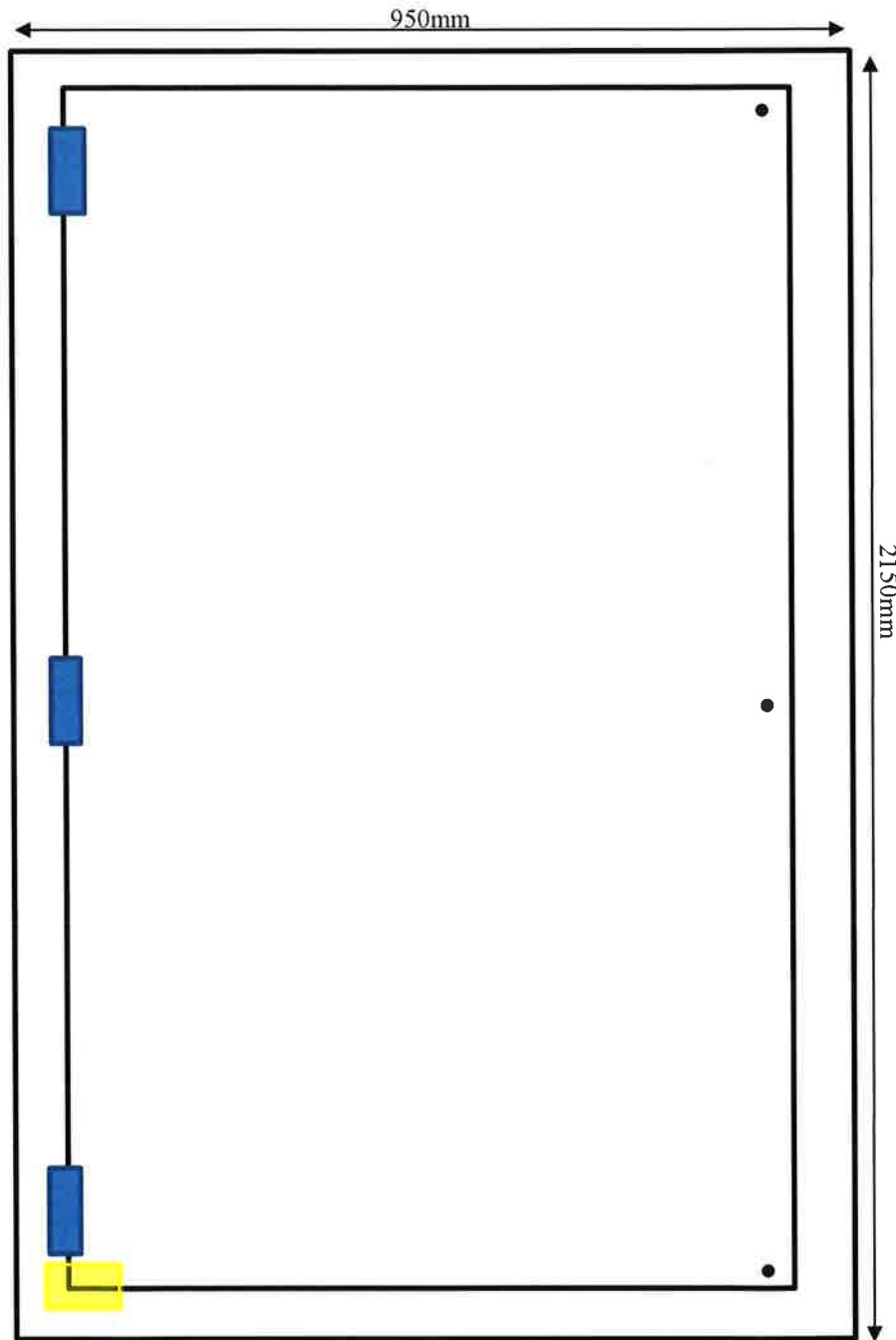
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Drawing of Test Sample



● Transducer Probes

■ Water Leakage