



SCHLEGEL UK
Henlow Industrial Estate Henlow Camp Bedfordshire SG16 6DS
Telephone: Hitchin (01462) 815500/812812 Fax: (01462) 811963

Smart Systems Limited
North End Road
Yatton
Bristol
North Somerset
BS49 4AW

Report Number **3849**

Date **03 11 2003**

Project:

Tests Performed:

BS 6375: Part 1

BS 5368: Part 1

BS 5368: Part 2

BS 5368: Part3

Client Represented By:

Mr John Gardiner

Project Compiled By:

John F MacDonald, Laboratory Manager.

Authorised By:



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This report relates to the items selected and submitted by:

Smart Systems Limited

and to those items alone.

The results obtained do not necessarily relate to samples from the production line, and in no way imply performance or quality of the continuing production.

The results and conclusions shown in the report are confidential to

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DESCRIPTION: Top hung casement over a fixed light, next to a fixed light, next to a top hung casement over a fixed light.
Reference: Andersons

FRAME MATERIAL: Aluminium with a thermal barrier

METHOD OF FRAME JOINTING: Mitred and Cleated

TYPE OF HARDWARE: Projection hinges
Espagnolette locking mechanism
1x Opening restricter per sash

OVERALL SIZE: HEIGHT: 1.660 M
WIDTH : 3.025 M

TOTAL AREA: 5.02 M²

SURFACE AREA OF OPENING LIGHTS: 1.24 M²

OPENING JOINT PERIMETER: 6.56 M

TYPE AND THICKNESS OF GLASS: 6 - 16 - 6 mm sealed units

GLAZING METHOD: Internal glazing beads, and glazing wedge gasket
external captive glazing gasket

TYPE OF WEATHERSEAL: EPDM 'Flipper' seal



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AIR PERMEABILITY TEST

According to British Standard, BS 6375 : Part 1:1989. This test specimen achieved the following classification for air permeability:

CLASS C - 600 Pa

WATER TIGHTNESS TEST

According to British Standard, BS 6375 : Part 1:1989. This test specimen achieved the following classification for water tightness:

A LIMIT OF WATER TIGHTNESS OF 600 Pa

WIND RESISTANCE TEST

According to British Standard, BS 6375 : Part 1:1989. This test specimen achieved the following classification for wind resistance:

A LIMIT OF WIND RESISTANCE OF 2400 Pa

No permanent damage or deformation was noted during the testing procedure.

LABORATORY TEMPERATURE: 12.4 C

TEST CHAMBER TEMPERATURE:	Chamber A	Chamber B
	13.9 C	12 C



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THE EQUIPMENT

The equipment used to perform the weather tightness tests were designed by Schlegel UK to comply to the most stringent British or European Standards.

It consists of a fixed centre section, in which the test sample is mounted. Hinged on each side of the centre section is a door. One contains the water spray equipment the other contains the instruments to measure deflection and deformation during wind loading tests.

When the doors are closed and held in place with pneumatic clamps they provide air and water tight chambers.

All pressure differential and airflow instruments are controlled by computer, the data is stored on magnetic disc and printed out as a permanent record.

PREPARATION FOR THE TEST

The test specimen was cleaned and dried then fitted into the test chamber plumb and square, without twists or bends. The test specimen was subjected to three air pressure pulses 10% higher than the maximum pressure required for the test, but not less than 500Pa. The air temperature of the laboratory and test chambers was measured and recorded.

THE TEST

Any extraneous air permeability was assessed by blanking off the test specimen with polythene sheeting and masking tape and exerting the same differential pressure steps required for the air permeability test, any air loss at each pressure step was recorded. The blanking sheet was removed and all operating parts of the test sample were opened and closed five times and finally secured in the closed position. Differential pressure was again applied in steps described in BS5368 Part 1 1976 and the air loss at each pressure step was recorded. The air loss through the test specimen is calculated by subtracting the extraneous or blank test results from the air permeability test results.



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Extraneous (Blank) Reading Permeability (Gross) Reading

Pa	Pressure Increase M3/HR	Pressure Decrease M3/HR	Highest Reading M3/HR	Pressure Increase M3/HR	Pressure Decrease M3/HR	Highest Reading M3/HR	Net Airflow M3/HR
50	4.10	3.63	4.10	8.43	7.82	8.43	4.33
100	7.28	6.45	7.28	13.45	13.32	13.45	6.17
150	8.49	8.56	8.56	16.87	16.34	16.87	8.31
200	10.85	10.54	10.85	21.00	20.87	21.00	10.16
300	13.75	13.40	13.75	27.82	27.16	27.82	14.07
400	15.93	15.57	15.93	31.97	31.45	31.97	16.04
500	18.47	17.37	18.47	34.92	34.36	34.92	16.45
600	20.28	20.78	20.78	36.15	36.30	36.30	15.52

RESULTS

Total Surface Area 5.02 M2
 Opening Lights 1.24 M2
 Opening Joint Perimet 6.56 M

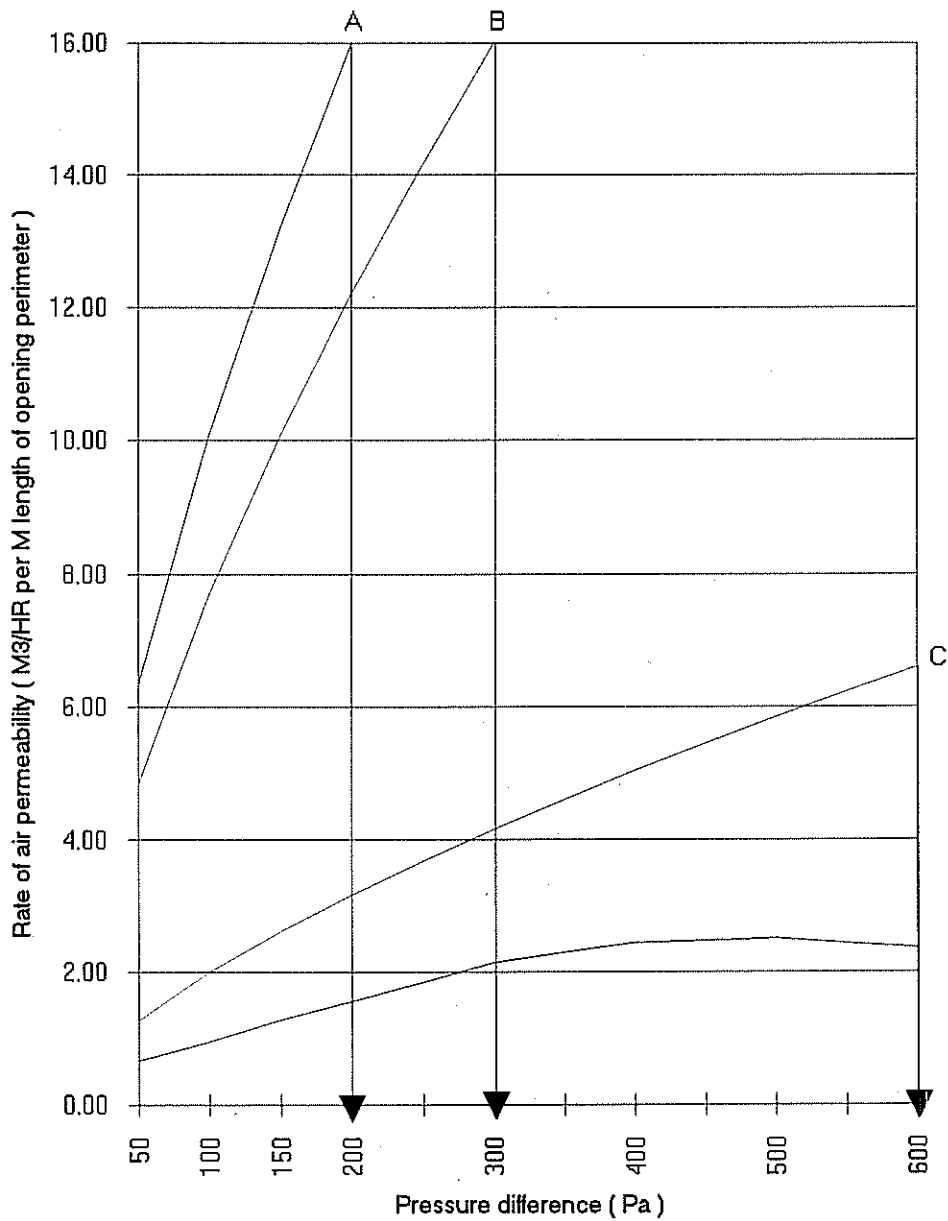
Pa	Net Airflow M3/HR	Total Area M3/HR/M2	Opening Light M3/HR/M2	Opening Joint M3/HR/M
50	4.33	0.86	3.49	0.66
100	6.17	1.23	4.98	0.94
150	8.31	1.65	6.70	1.27
200	10.16	2.02	8.19	1.55
300	14.07	2.80	11.34	2.14
400	16.04	3.19	12.93	2.44
500	16.45	3.28	13.27	2.51
600	15.52	3.09	12.51	2.37



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Air permeability limits for windows with opening lights BS 6375:Part 1:1989





Leakage

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PREPARATION FOR THE TEST

Three air pressure pulses were applied to the test specimen at a pressure 10% higher than the Pmax required for the test.

With pressure reduced to zero, all operating parts were opened and closed 5 times and finally secured in the closed position.

TEST

Water was spraying onto the test specimen and set to apply about 2 litres/(M2 min) for 15 minutes at zero pressure.

The spraying of the specimen having been done, the air pressure was increased up to the required pressure step and held for 5 minutes at each stage.

The spraying method used for this test was - Area Spraying Method no. 2

TEST PRESSURE CLASS

The point and pressure difference at which gross leakage occurred and the test pressure class was recorded.

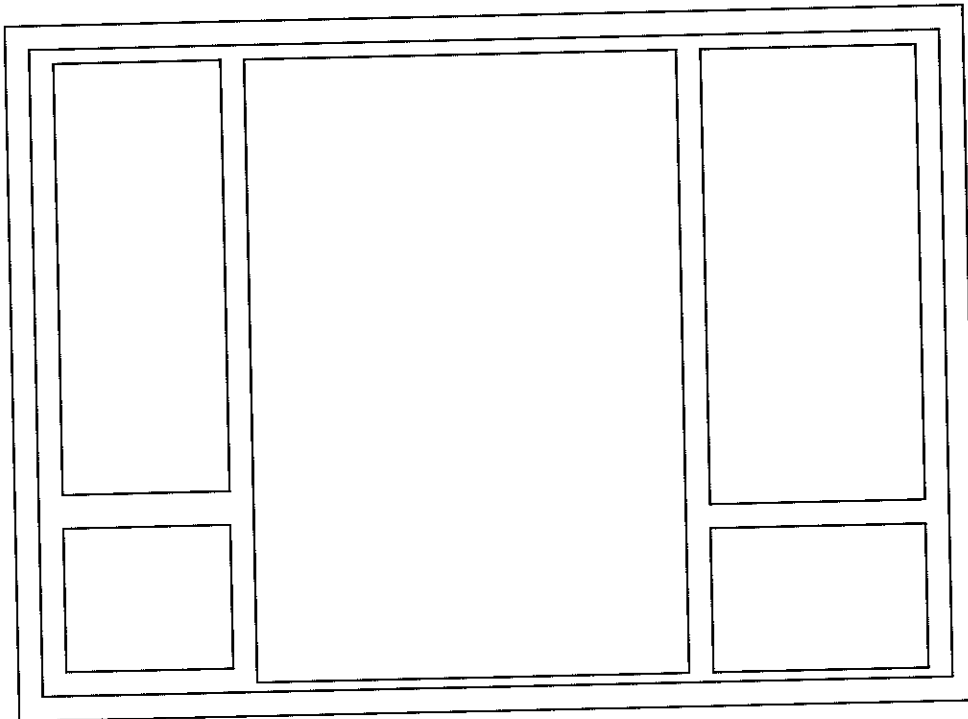


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Results

Limit of water tightness: 600 Pa





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PREPARATION FOR THE TEST

Three air pressure pulses were applied to the test specimen.

With pressure reduced to zero, all operating parts were opened and closed five times and finally secured in the closed position.

THE TEST

Transducers are placed in the position judged to show the maximum deflection under pressure.

Five positive and/or five negative gust pressures of 2400 Pa were put on the test specimen and the maximum deflection recorded. Any permanent residual deformation, damage or functional defects were noted.

The deflection of members such as couplings, glazing bars, or meeting rails shall be limited to 1/125 of the span, and in addition, such members retaining insulating glass units, shall not deflect more than 1/175 over the length of height of the glass unit.



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**RESULTS
POSITIVE PRESSURE**

Gust No.	Pressure Pa		Displacement (mm)					
	Target	Recorded	A	B	C	D	E	F
1	2400	2408	3.82					
2	2400	2397	3.87					
3	2400	2398	3.83					
4	2400	2406	3.93					
5	2400	2399	3.94					

**RESULTS
NEGATIVE PRESSURE**

Gust No.	Pressure Pa		Displacement (mm)					
	Target	Recorded	A	B	C	D	E	F
1	2400	2400	3.79					
2	2400	2407	3.90					
3	2400	2403	3.96					
4	2400	2394	4.02					
5	2400	2398	3.94					

Maximum Span 1510 mm

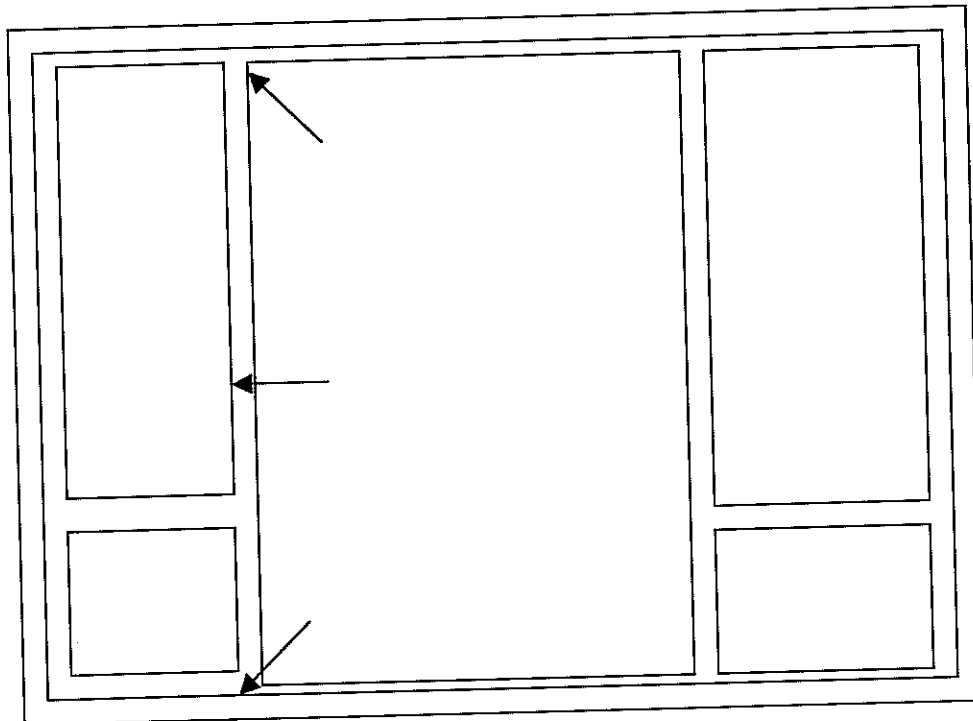
Maximum permissible deflection is 8.63 mm



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Diagram showing the position of the displacement transducers.





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**TRANSDUCER READINGS
POSITIVE PRESSURE**

DATUM TRANSDUCERS

Gust No.	Pressure Pa		Displacement (mm)	
	Target	Recorded	D1	D2
Zero	0	7	13.30	5.46
1	2400	2408	22.26	11.06
2	2400	2397	22.37	11.17
3	2400	2398	22.37	11.25
4	2400	2406	22.49	11.35
5	2400	2399	22.29	11.36

MEASURING TRANSDUCERS

Gust No.	Pressure Pa		Displacement (mm)					
	Target	Recorded	A	B	C	D	E	F
Zero	0	7	28.43					
1	2400	2408	39.53					
2	2400	2397	39.69					
3	2400	2398	39.69					
4	2400	2406	39.90					
5	2400	2399	39.81					



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**TRANSDUCER READINGS
NEGATIVE PRESSURE**

DATUM TRANSDUCERS

Gust No.	Pressure Pa		Displacement (mm)	
	Target	Recorded	D1	D2
Zero	0	8	13.67	14.27
1	2400	2400	22.57	19.37
2	2400	2407	22.39	19.39
3	2400	2403	22.37	19.50
4	2400	2394	22.41	19.56
5	2400	2398	22.45	19.57

MEASURING TRANSDUCERS

Gust No.	Pressure Pa		Displacement (mm)					
	Target	Recorded	A	B	C	D	E	F
Zero	0	8	25.13					
1	2400	2400	35.92					
2	2400	2407	35.95					
3	2400	2403	36.05					
4	2400	2394	36.16					
5	2400	2398	36.09					



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Pa	Pressure Increase M3/HR	Pressure Decrease M3/HR	Highest Reading M3/HR	Pressure Increase M3/HR	Pressure Decrease M3/HR	Highest Reading M3/HR	Net Airflow M3/HR
50	5.28	5.01	5.28	9.44	9.44	9.44	4.16
100	9.43	8.97	9.43	15.17	14.97	15.17	5.74
150	12.33	12.56	12.56	18.71	18.40	18.71	6.15
200	15.28	14.92	15.28	21.99	21.55	21.99	6.71
300	19.51	19.71	19.71	27.06	26.82	27.06	7.35
400	22.67	22.12	22.67	30.99	30.84	30.99	8.32
500	27.63	27.44	27.63	35.10	34.93	35.10	7.47
600	30.39	30.55	30.55	37.74	36.89	37.74	7.19

RESULTS

Total Surface Area 5.02 M2
 Opening Lights 1.24 M2
 Opening Joint Perimeter 6.56 M

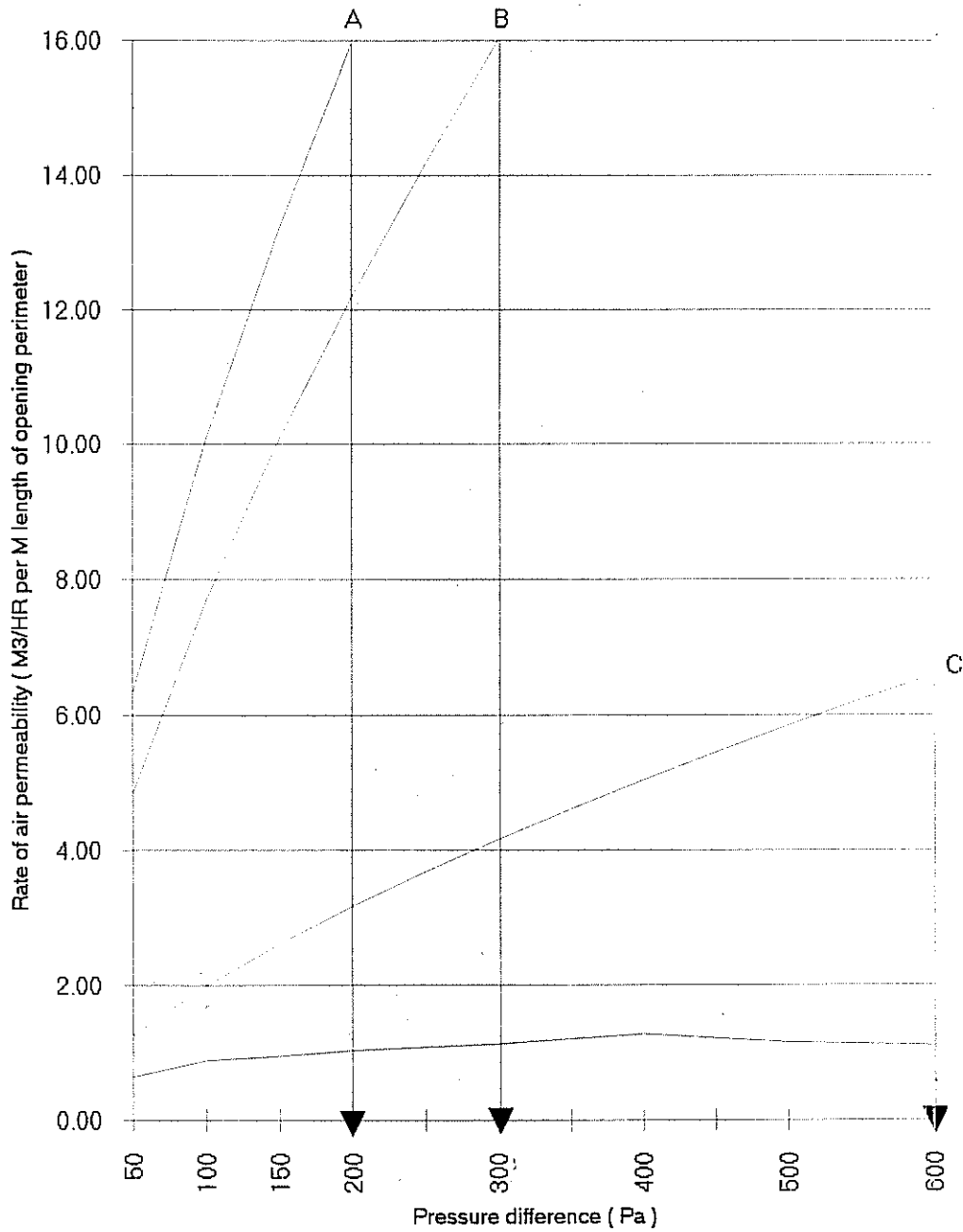
Pa	Net Airflow M3/HR	Total Area M3/HR/M2	Opening Light M3/HR/M2	Opening Joint M3/HR/M
50	4.16	0.83	3.35	0.63
100	5.74	1.14	4.63	0.88
150	6.15	1.23	4.96	0.94
200	6.71	1.34	5.41	1.02
300	7.35	1.46	5.93	1.12
400	8.32	1.66	6.71	1.27
500	7.47	1.49	6.02	1.14
600	7.19	1.43	5.80	1.10



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Air permeability limits for windows with opening lights BS 6375:Part 1:1989





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Results

Limit of water tightness: 600 Pa

