

Technical Report

Report No R15518

Product Tested: Westbury Joinery – Top Hung Window

Test Conducted for: Westbury Windows and Joinery Ltd
46-52 Cutlers Road
Saltcoates Industrial Estate
Essex
CM3 5XJ

Standard Specified: BS 6375 Pt 1:2009
BS EN 1026: 2000
BS EN 12207:2000
BS EN 1027:2000
BS EN 12208:2000
BS EN 12210:2000
BS EN 12211:2000

Project No: 15518

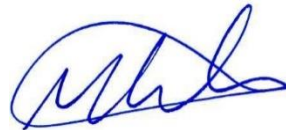
Date of Test: 10th November 2015

Test Conducted at: Wintech Engineering Limited
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1. Introduction

This report describes tests conducted at the test laboratory of Wintech Engineering Ltd to a window sample on behalf of Westbury Windows and Joinery Ltd.

The test sequence was conducted on the 10th November 2015 in order to determine the weather tightness of the sample. The test methods were in accordance with the following standards as per the request of Westbury Windows and Joinery Ltd.

Windows & Doors, Air Permeability test method	BS EN 1026: 2000
Windows & Doors, Air Permeability classification	BS EN 12207: 2000
Windows & Doors, Watertightness test method	BS EN 1027: 2000
Windows & Doors, Watertightness classification	BS EN 12208: 2000
Windows & Doors, Wind Resistance test method	BS EN 12211: 2000
Windows & Doors, Wind Resistance classification	BS EN 12210: 2000
Performance of Windows & Doors, Classification and Guidance for Weather Tightness	BS 6375 Part 1: 2009

Wintech Engineering Ltd is accredited by the United Kingdom Accreditation Service as UKAS Testing Laboratory No. 2223.

2. Summary of Results

The following summarises the results of testing carried out, in accordance with the relevant testing & classification standards.

	<i>Test Method & Classification Standard</i>	<i>Achieved Max. Test Pressure</i>	<i>Classification</i>
Air Permeability	BS EN 1026: 2000 BS EN 12207: 2000	600 Pa	Class 4
Water Tightness	BS EN 1027: 2000 BS EN 12208: 2000	450 Pa	8A
Wind Resistance	BS EN 12211:2000 BS EN 12210: 2000	2000 Pa	C5

More comprehensive details are reported in Section 6.

Note: These results are valid only for the conditions under which the test was conducted

Note: All measurement devices, instruments and other relevant equipment were calibrated and traceable to National Standards.

3. Description of Test Sample

Product range name:	WESTBURY CASEMENT
Configuration:	NON BAR
Opening direction:	TOP SWING

Outer Frame

Outer frame width:	735MM	Outer frame material:	ACCOYA FACED REDWOOD
Outer frame height:	1340MM	Outer frame gasket	
Outer frame Part Numbers		Gasket type:	SPV18
Top:	NA	Manufacturer:	DEVENTER
Bottom:	NA	Product name:	
Lock side:	NA	Product code:	
Hinge side:	NA	Threshold	
Outer frame section size		Manufacturer:	WESTBURY
Width:	74MM	Product name:	
Depth:	115MM	Product code:	
Reinforcing:		Material:	ACCOYA FACED REDWOOD
Manufacturer:	NA	Outer frame joint method	
Product name:		Head:	SCRIBED/DOWEL/GLUE
Product code:		Foot:	DITTO
Material:			

Leaf

Leaf width:	637MM	Leaf material:	ACCOYA FACED REDWOOD
Leaf height:	1229MM	Leaf gasket	
Leaf Part Numbers		Gasket type:	SPV18
Top:	NA	Manufacturer:	DEVENTER
Bottom:	NA	Product name:	
Lock side:	NA	Product code:	
Hinge side:	NA	Leaf midrail:	
Leaf section size		Manufacturer:	NA
Width:	68MM	Product name:	
Depth:	68MM	Product code:	
Reinforcing:		Material:	
Manufacturer:	NA	Leaf joint method	
Product name:		Head:	SCRIBLE/ DOWEL /GLUE
Product code:		Foot:	SCRIBLE/ DOWEL /GLUE
Material:			

Glazing

Glass unit		Glazing gasket	
Manufacturer:	ST GOBAIN	Gasket type:	SILICONE CAP
Inner thickness:	4MM TOUGH	Manufacturer:	DOW CORNING
Spacer material:	20MM THERMOBAR	Product name:	
Outer thickness:	4MM TOUGH	Product code:	
Unit sizes:		Glazing clip	
Bead		Manufacturer:	NA
Manufacturer:	WESTBURY	Product name:	
Product name:	ACCOYA	Product code:	
Product code:		Glazing tape details	
Bead size:	17 X 17	Manufacturer:	TECHNIBOND
Bead material:		Product name:	DOUBLE SIDED
		Product code:	HTA/HSA

Hardware

	Manufacturer:	Product description:	Product code:	Quantity:
Hinges	SECURISTYLE	DEFENDER TOP HUNG		1 PR
Hinge fixing:	SCREWS	4 X 40MM +4X30MM		
Hinge protectors:	SECURISTYLE	VECTOR EXCLUDER		2 PRS
Hinge protector fixings:	SCREWS	4 X 40MM		
WINDOW lock:	MACO	RAIL		1
WINDOW lock fixings:	SCREWS	4 X30MM		
Cylinder:	NA			
Cylinder fixing:	NA			
Handle:	TITON	SELECT WITH LOCK		1
Handle fixings:	SCREWS	MACHINE SCREW		
Touch Bar	NA			
Cylinder Support	NA			
Cylinder Escutcheon	NA			
Keeps:	MACO	RAIL KEEPS		2
Keep fixings:	SCREWS	4 X 40MM		
Drip bar:	NA			
Drip bar fixings:	NA			
Additional Hardware:	WESTBURY	PVC LIFT BLOCK		2

See Section 7 for test sample drawings as supplied by Westbury Windows and Joinery Ltd.

4. Test Arrangement

4.1 Test Chamber

A window specimen, supplied for testing in accordance with the relevant British and European Standards, was mounted into a rigid test chamber. The pressure within the chamber was controlled by means of a centrifugal fan and a system of ducting and valves. The static pressure difference between the outside and inside of the chamber being measured by means of a liquid manometer.

4.2 Instrumentation

4.2.1 Static Pressure

A liquid manometer capable of measuring rapid changes in pressure to an accuracy within 2%, was used to measure the pressure differential across the sample.

4.2.2 Air Flow

An air flow meter, mounted in the air system ducting was used to measure the airflow required to obtain pressures within the test chamber. The system has the capability of measuring airflow through the sample to an accuracy of $\pm 5\%$.

4.2.3 Water Flow

An in line flow meter, mounted in the spray frame water supply system, was used to measure water flow to the test sample to an accuracy of $\pm 5\%$.

4.2.4 Deflection

DTI's with an accuracy of 0.1mm were used to measure deflection of principle framing members. These measurement devices were mounted at mid span and as near to the supports of the members and located in such a way that any measurement was not influenced by the application of any loading to the sample. The gauges were mounted as shown in Figure 2.

4.2.5 Temperature & Humidity

A digital data logger capable of measuring temperature with an accuracy of $\pm 1^\circ\text{C}$ and humidity with an accuracy of $\pm 5\% \text{Rh}$ was used.

4.3 Pressure Generation

4.3.1 Static Air Pressure

The air supply system comprised of a centrifugal fan assembly and associated ducting and control valves and was used to create both positive and negative static pressure differentials. The fan provided a constant airflow at the required pressure and period required for the tests.

Note: References are made to both positive and negative pressures in this document, it should be noted that in these instances, positive pressure is when pressure on the weather face of the sample is greater than that on the inside face and vice versa.

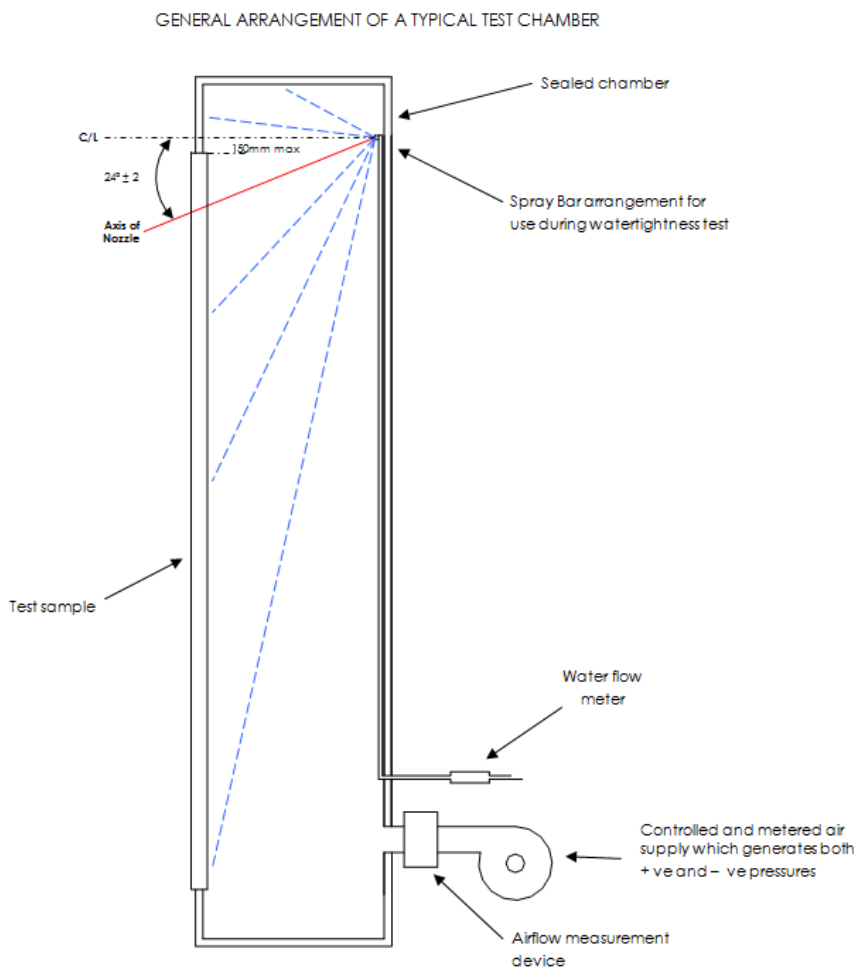
4.4 Water Spray System

The spray nozzles have a circular full cone spray pattern and a spray angle of $120^\circ (+0^\circ/-10^\circ)$ at working pressure of 2 – 3 bar and a flow rate of 2 litres/min (± 0.2 litres/min) per nozzle. The nozzles were spaced at 400 mm (± 10 mm) along the axis of the spraybar and the nozzles were arranged so that the lateral distance between the outer edge of the surround and the outermost nozzles shall be greater than 50mm but not exceeding 250mm.

The nozzle line was located not more than 150mm above the topmost horizontal joint line of any moving frame or the glazing line of any fixed glazing, in order to provide complete wetting of the adjacent

horizontal frame member(s). The nozzle line was also located at a distance of 250mm (+10mm/- 0mm) from the external face of the specimen as defined by the outermost external joint plane of moving parts or the glazing plane of fixed parts.

Figure 1 – Test arrangement



5. Test Procedures

5.1 Sequence of Testing

1. Air Permeability – Infiltration
2. Air Permeability – Exfiltration
3. Watertightness
4. Wind Resistance - P1
5. Wind Resistance - P2
6. Repeat Air Permeability – Infiltration
7. Repeat Air Permeability – Exfiltration
8. Wind Resistance - P3

Note: Prior to all testing the sample was conditioned for at least 4 hours at between 10 – 30°C & 25 – 75% RH, as required by the relevant testing standards.

5.2 Air Permeability - Infiltration

Three (3) preparatory pulses of 660 Pa positive pressure were applied to the test sample and any opening lights opened and closed at least once.

The test results were determined by measuring the rate of air flow through the test chamber whilst subjecting the sample to positive pressure differentials as follows: 50, 100, 150, 200, 250, 300, 450 and 600 Pa, each step being held for at least 10 seconds.

Leakage through the test chamber and joints between the chamber and test sample was determined by sealing the sample with adhesive tape and polythene sheeting and measuring the air flows at the above pressures. The preparation pulses and test sequence were then repeated with the sample unsealed and the difference between readings being the air leakage through the test sample.

5.3 Air Permeability - Exfiltration

Three (3) preparatory pulses of 660 Pa negative pressure were applied to the test sample and any opening lights opened and closed at least once.

The test results were determined by measuring the rate of air flow through the test chamber whilst subjecting the sample to positive pressure differential as follows: 50, 100, 150, 200, 250, 300, 450 and 600 Pa, this step being held for at least 10 seconds.

Leakage through the test chamber and joints between the chamber and test sample was determined by sealing the sample with adhesive tape and polythene sheeting and measuring the air flows at the above pressures. The preparation pulses and test sequence were then repeated with the sample unsealed and the difference between readings being the air leakage through the test sample.

5.4 Watertightness

Any opening lights were opened and closed at least once before testing. Water was then sprayed on to the sample as per section 4.4, for 15 minutes at 0 Pa. The water spray continued and the pressure was increased in the following increments: 50, 100, 150, 200, 250, 300 and 450 Pa (each stage being held for 5 minutes).

The interior face of the sample was continuously monitored for water ingress throughout the test.

5.5 Wind Resistance

5.5.1 Wind Resistance – P1

Three pressure pulses were applied to the test sample equal to 2200 Pa positive pressure (Pressure P1 + 10%) and each peak held for at least 3 seconds. After returning to zero pressure, all sensors were then zeroed.

Peak test of 2000 Pa was applied at a rate not exceeding 100 Pa/sec, either incrementally or continuously. Once the peak pressure was reached, it was maintained for a period of 30 seconds, and the required frontal deflections were recorded. The pressure was then reduced to 0 Pa, at a rate not greater than 100 Pa/sec, and the residual deformation was recorded within 60 ± 5 secs of returning to 0 Pa.

The test was then repeated at Negative pressure.

After each of the above tests, the sample was checked for damage in a manner described in the test standard.

5.5.2 Wind Resistance – P2

The sample was subjected to 50 cycles including negative & positive pressures.

The first step was at a test pressure of 1000 Pa negative pressure and followed by 1000 Pa positive pressure, as was the last of the sequence of 50 cycles. The time in which the variation from – 1000 Pa and + 1000 Pa and the reverse was 7 secs (± 3 secs), with each peak being maintained for 7 secs (± 3 secs).

Following completion of the required 50 cycles, all moving parts of the test sample were opened and closed and note was taken of any damage or defects.

The standard then requires that a repeat air permeability test is conducted prior to a Safety test.

5.5.3 Wind Resistance – P3

The safety test consisted of one cycle of a negative and positive test pressures, with the peak test pressure being 3000 Pa and negative test pressure applied first.

The time in which the variation from 0 Pa to – 3000 Pa and back to 0 Pa was 7 secs (± 3 secs) between each stage, with the peak being maintained for 7 secs (± 3 secs).

Positive test pressure was applied following a 7 secs (± 3 secs) rest at 0 Pa. Variation from 0 Pa to + 3000 Pa and back to 0 Pa was the same duration as for the negative test pressure P3.

Following completion of the test, the sample was checked to ensure it stayed closed and any parts of the sample which had come detached were recorded.

6. Test Results

6.1 Lab Conditions

The conditions measured inside the laboratory were as follows:

Temperature °C	Humidity %rh	Atmospheric Pressure kPa
19.5	64	100

6.2 Air Permeability

6.2.1 Reference Air Permeability

Class	Reference air permeability @ 100 Pa based on Area (m ³ /h/m ²)	Reference air permeability @ 100 Pa based on length of opening joint (m ³ /h/m)
0	Not Tested	Not Tested
1	50	12.50
2	27	6.75
3	9	2.25
4	3	0.75

The required air permeability figures for all additional pressure steps in all classifications were calculated using the equation given in BS EN 12207: 2000.

6.2.2 Air Permeability – Results

Calculated area of test sample 0.98 m²
Measured length of opening joints 3.52 m

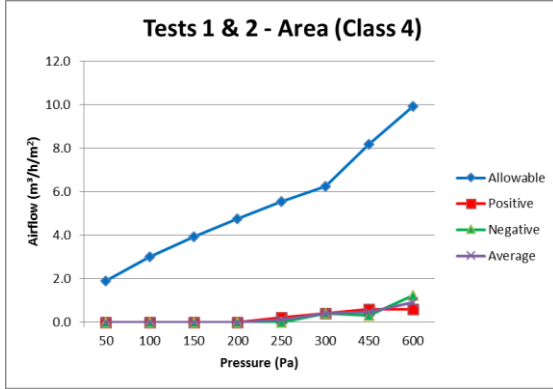
6.2.2.1 Initial Air Permeability Tests 1 & 2

Pressure Differential Pa	Air Permeability Rate Infiltration & Exfiltration Tests m ³ /hr/m ² - Area			Air Permeability Rate Infiltration & Exfiltration Tests m ³ /hr/m - Length of Joint		
	Test No. 1	Test No. 2	Average	Test No. 1	Test No. 2	Average
50	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00
150	0.00	0.00	0.00	0.00	0.00	0.00
200	0.00	0.00	0.00	0.00	0.00	0.00
250	0.20	0.00	0.10	0.06	0.00	0.03
300	0.40	0.40	0.40	0.11	0.11	0.11
450	0.60	0.30	0.45	0.17	0.08	0.13
600	0.60	1.21	0.91	0.17	0.34	0.25

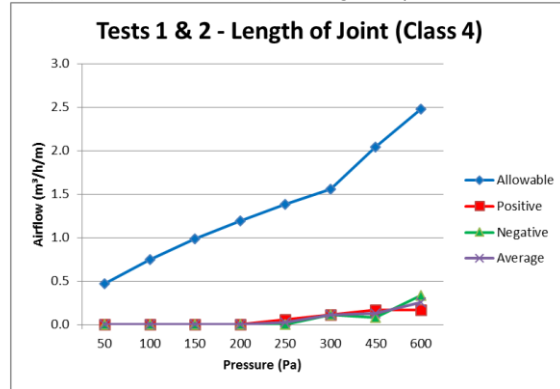
6.2.2.1 Repeat Air Permeability Tests 6 & 7

Pressure Differential Pa	Air Permeability Rate Infiltration & Exfiltration Tests m ³ /hr/m ² - Area			Air Permeability Rate Infiltration & Exfiltration Tests m ³ /hr/m - Length of Joint		
	Test No. 6	Test No. 7	Average	Test No. 6	Test No. 7	Average
50	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00
150	0.00	0.00	0.00	0.00	0.00	0.00
200	0.20	0.50	0.35	0.06	0.14	0.10
250	0.20	0.59	0.40	0.06	0.17	0.11
300	0.30	1.09	0.69	0.08	0.30	0.19
450	0.59	2.97	1.78	0.17	0.83	0.50
600	0.69	17.43	9.06	0.19	4.86	2.53

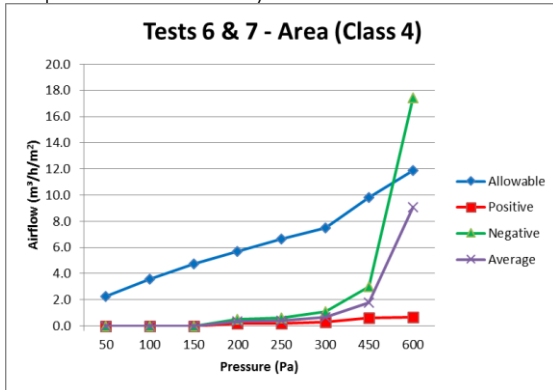
Graph 1 –Air Permeability - Area



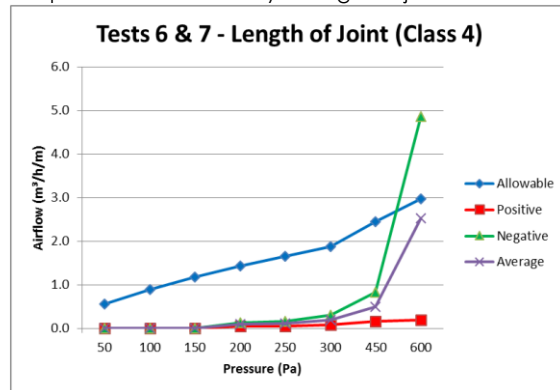
Graph 2 – Air Permeability – Length of joint



Graph 3 –Air Permeability - Area



Graph 4 – Air Permeability – Length of joint



6.2.3 Areas of Significant Leakage

During the test, there were no areas of significant air leakage identified.

6.2.4 Air Permeability – Classification

Based on Area	Based on Length of Opening Joint
Class 4	Class 4

Note: The standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%, for the above measurements is $\pm 6.86\%$ of the result

6.3 Watertightness Testing

6.3.1 Reference Watertightness Classification

Test Pressure (Pa)	Classification	Specifications
-	0	No Requirement
0	1A	Water Spray for 15 mins
50	2A	As Class 1 + 5 mins
100	3A	As Class 2 + 5 mins
150	4A	As Class 3 + 5 mins
200	5A	As Class 4 + 5 mins
250	6A	As Class 5 + 5 mins
300	7A	As Class 6 + 5 mins
450	8A	As Class 7 + 5 mins
600	9A	As Class 8 + 5 mins
>600	Exxxx	Above 600 Pa, in steps 150 Pa (each step 5 mins)

6.3.2 Watertightness – Results

Water Temperature °C	19
Spray method used	1A

Observations	
Air Pressure (Pa)	Comments
0 x 15 mins	No Leakage Observed
50 x 5 mins	No Leakage Observed
100 x 5 mins	No Leakage Observed
150 x 5 mins	No Leakage Observed
200 x 5 mins	No Leakage Observed
250 x 5 mins	No Leakage Observed
300 x 5 mins	No Leakage Observed
450 x 5 mins	No Leakage Observed

6.3.3 Watertightness - Classification

Overall Classification
8A

6.4 Wind Resistance

6.4.1 Reference Wind Resistance Classification

Classification of Wind Load

Class	Test Pressures (Pa)		
	P1	P2	P3
0	Not Tested		
1	400	200	600
2	800	400	1200
3	1200	600	1800
4	1600	800	2400
5	2000	1000	3000
Exxxx	xxxx	xxxx (x 0.5)	xxxx (x 1.5)

Note The test pressure, P2, is repeated 50 times. Specimens tested with wind loads above class 5 are classification Exxxx, where xxxx is the actual test pressure P1.

Classification of Deflection

Class	Relative Frontal Deflection
A	<L/150
B	<L/200
C	<L/300

Overall Wind Load Classification

Wind Load Class	Relative Frontal Deflection Class		
	A	B	C
1	A1	B1	C1
2	A2	B2	C2
3	A3	B3	C3
4	A4	B4	C4
5	A5	B5	C5
Exxxx	Axxxx	BExxxx	CExxxx

6.4.2 Test 4 – Wind Resistance – P1 Results

Member Under Test	Test Pressure Pa	Maximum Deflection mm	Residual Deformation mm	Deflection Class	Relative Frontal Deflection
Member A	2000	0.5	0.0	Class C	1/2157
	-2000	1.1	0.0	Class C	1/1094

Note Calculation of deformation was conducted using formula $(02-(03+01))/2$. Following the above tests, there was no visible damage to the test sample when viewed as required by the test standard.

The standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%, for the above measurements is + 2.4 % of the result.

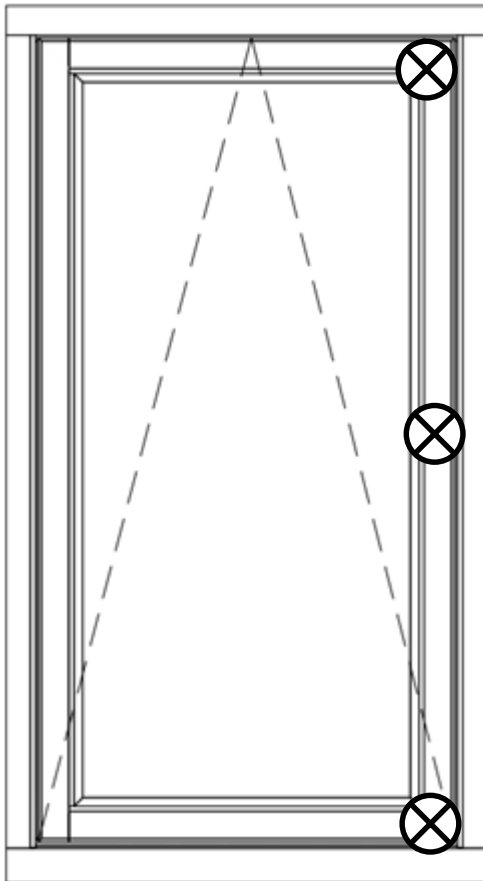
6.4.3 Test 5 – Wind Resistance – P2 Results

An inspection carried out following Test 5 – Wind Resistance, P2, after 50 cycles at both positive and negative pressure testing at 1000 Pa, showed no evidence of any permanent deformation or damage to the test sample.

6.4.4 Test 8 – Wind Resistance – P3 Results

An inspection carried out following Test 8 – Wind Resistance, P3, after both positive and negative pressure testing at 3000 Pa, showed no evidence of any permanent deformation or damage to the test sample.

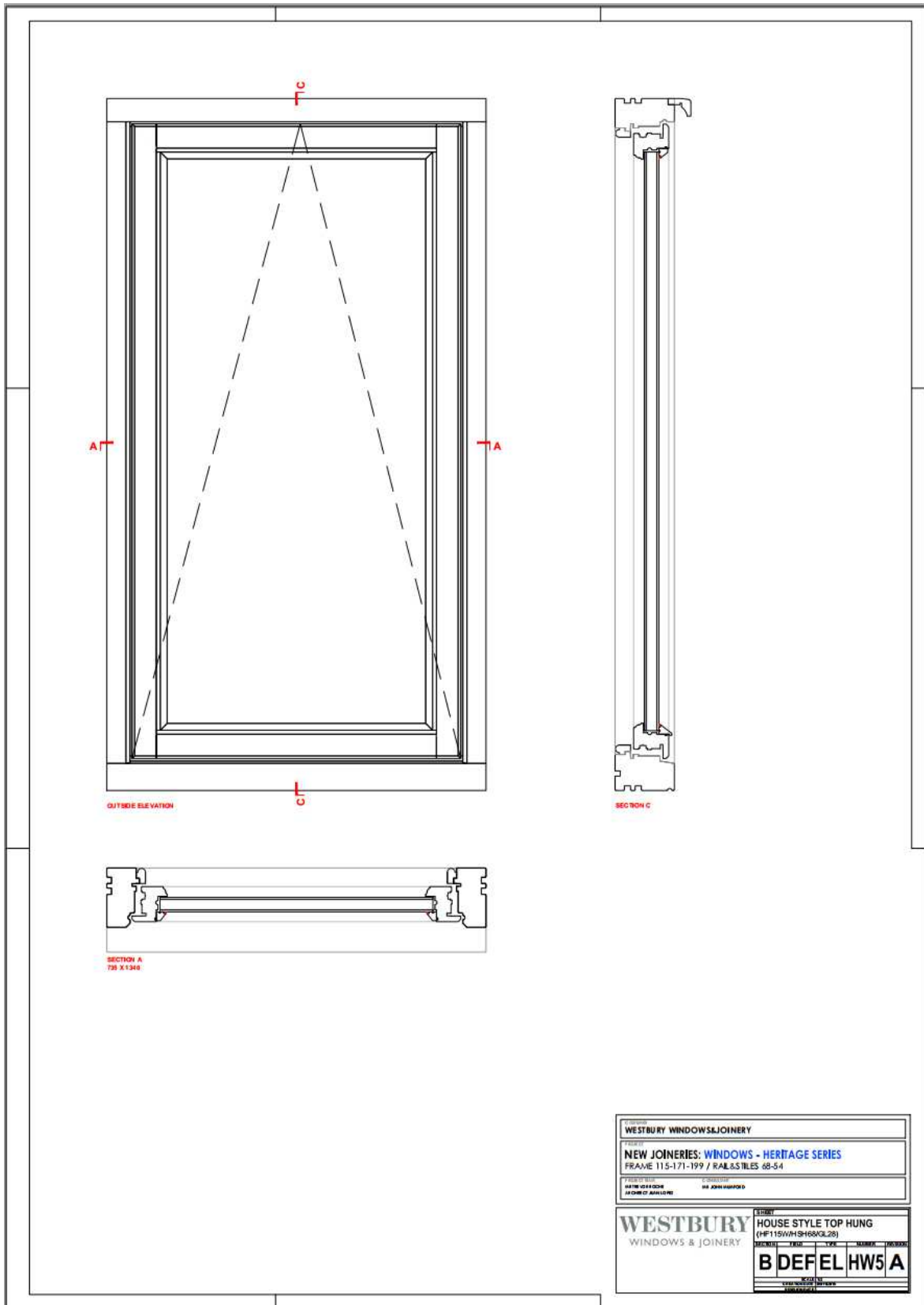
Figure 2 – Position of deflection measurement sensors



6.4.5 Wind Resistance - Classification

Overall Classification
C5

7. System Drawings



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