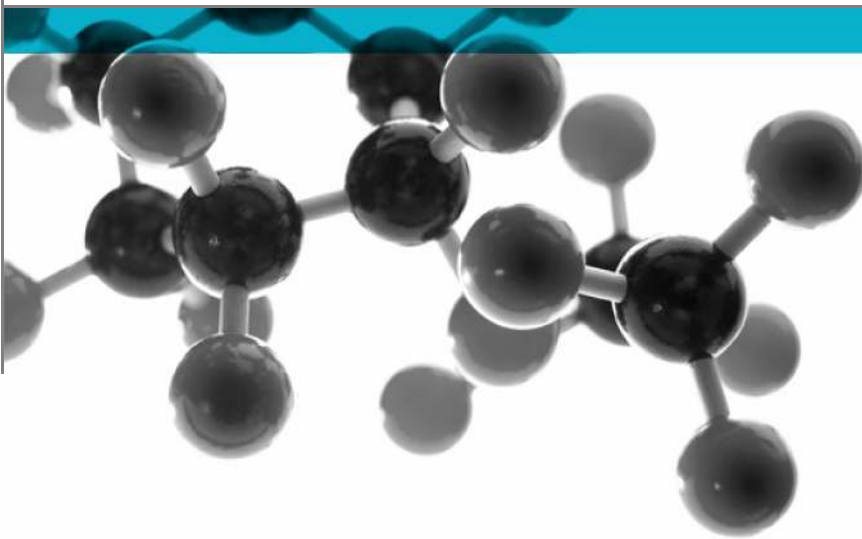




# BS 6375-1:2015



**Test of: Smarts 300 side hung window next to direct glaze**  
**Performance of windows & doors - Part 1: Weathertightness**

A Report To:  
Archibald Kenricks  
Kenrick Way, West Bromwich  
West Midlands B70 6BD

Document Reference:  
WIL 388634

Date: 05/10/2017

Copy: 1

Issue No.: 1

Page 1

Testing  
Advising  
Assuring



## TEST CONCLUSIONS

Samples of:  
 Manufacturer Garrards  
 Product Side hung window next to direct glaze  
 Model Smarts 300 side hung window next to direct glaze

have been tested in accordance with: BS6375-1:2015  
 By Exova Wednesbury, a UKAS accredited Testing Laboratory (No. 0621)

At Unit 3 Wednesbury One, Black Country New Road, Wednesbury, WS10 7NZ.  
 Results and comments as detailed below:

Clause No.	Description	Classification
<b>4</b>	<b>Exposure category and classification</b>	<b>2000</b>
6	Test for air permeability (to EN1026)	CLASS 4
7	Test for watertightness (to EN1027)	CLASS 6A
8	Test for resistance to wind (to EN12211)	CLASS C5

No inferences can be made regarding performance against other requirements of this standard

Tests marked "N/A" are not applicable to the sample under test.  
 Tests marked "N/T" were not applied to the sample under test

## AUTHORISATION

Tests performed by: Rehan Qureshi, Thermal Test Engineer  
Mark West, Door & Window Laboratory Manager

Report issued by: Mark West, Door & Window Laboratory Manager

Signed

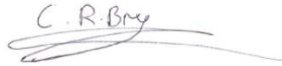


Date 4<sup>th</sup> October 2017

For and on behalf of Exova (UK) Ltd

Report authorised by: Chris Bryan, Senior Test Engineer

Signed



Date 4<sup>th</sup> October 2017

For and on behalf of Exova (UK) Ltd

Report issued: 05 October 2017



0621

### NOTE.

Tests marked "Not UKAS Accredited" are not covered by the Laboratory UKAS accreditation schedule.

The laboratory has tested the product supplied by the client as sampled in accordance with their own requirements

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Author: M. West

Client:

Archibald Kenricks

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## TEST DETAILS

### CLIENT DETAILS

Company name Archibald Kenricks  
 Address Kenrick Way  
 West Bromwich  
 West Midlands  
 B70 6BD

Contact Craig Barnett

### ORDER DETAILS

Order number PO7004  
 Dated 03/08/2017

### SAMPLE DETAILS

Outer frame 1200 x 1250 x 76mm  
 Opening joint 571 x 1196mm  
 Configuration Single leaf casement window open-out next to direct glazed  
 Material Aluminium  
 Details of Hardware  
 Hinges 2no. Archibald Kenricks Friction Hinges KS12  
 Hinge protection 1no. Archibald Kenricks Hinge Protector KSHS13 per hinge  
 Lock Archibald Kenricks Nemesis Twin Cam NEM1150205LH  
 Handles Winlock window handle with 2 fixings WHMRHBBLBC/20  
 Seals Smarts EPDM weatherseals in frame and casement ACVL032  
 Glazing details Double glazed 4-20-4 unit

### TEST DETAILS

Test specification BS 6375-1:2015 Performance of windows & doors  
 Full test Yes  
 Test to clauses N/a  
 Test methods BS EN 1026:2016 Windows & Doors - Air Permeability  
 BS EN 1027:2016 Windows & Doors – Watertightness  
 BS EN 12211:2016 Windows & Doors - Resistance to wind

Sample received 04/09/2017  
 Test started 11/09/2017  
 Test completed 12/09/2017

Special Test requirements  
 Other reports to be used in conjunction with this report

Airflow measurement device used 1691 Air and water permeability test rig

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## TEST PROCEDURE

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<b>Introduction</b>	<p>This test report should be read in conjunction with the Standard BS 6375-1:2015, Performance of Windows &amp; Doors – Part 1: Classification for weathertightness and guidance on selection and specification.</p> <p>The specimens were judged on their ability to comply with the performance criteria as required in BS EN 1026:2016, classified in accordance with BS EN 12207:2000, BS EN 1027:2016, classified in accordance with BS EN 12208:2000 and BS EN 12211:2016, classified in accordance with BS EN 12210:2016.</p>
<b>Instruction To Test</b>	<p>Initial requirement was for a performance of Class 2 (300 Pa) for air permeability, Class 5A (200 Pa) for watertightness, and Class A5 (2000 Pa) for wind resistance, appropriate to a UK exposure category of 2000.</p>
<b>Test Specimen Construction</b>	<p>A description of the test construction is given in the Schedule of Components. The description is based on a survey of the specimens and information supplied by the sponsor of the test.</p>
<b>Installation</b>	<p>The window was supplied mounted within a timber sub-frame of nominal section 68 x 91mm fitted flush with the exterior face, in accordance with the clients fitting instructions. The sample was set to the closed/latched/locked condition as defined by the manufacturer.</p>
<b>Sampling</b>	<p>The samples were not independently witnessed or selected and were provided direct from the test sponsor.</p>
<b>Test Climate</b>	<p>The sample was conditioned in the laboratory in the range 15-30°C and 25-75% humidity.</p> <p>The temperature and humidity in the lab was maintained in the range 20.1-23.4°C and 48.9-56.4% humidity for the duration of the test.</p> <p>The air pressure was 97.2 kPa.</p>

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## INITIAL OBSERVATIONS

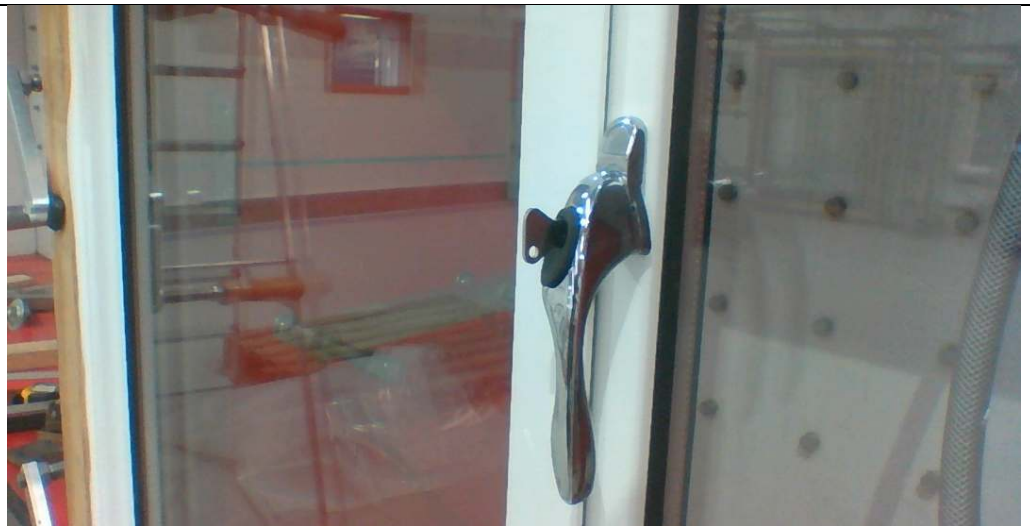
The internal face  
of the sample



**Sample hinge & protector**



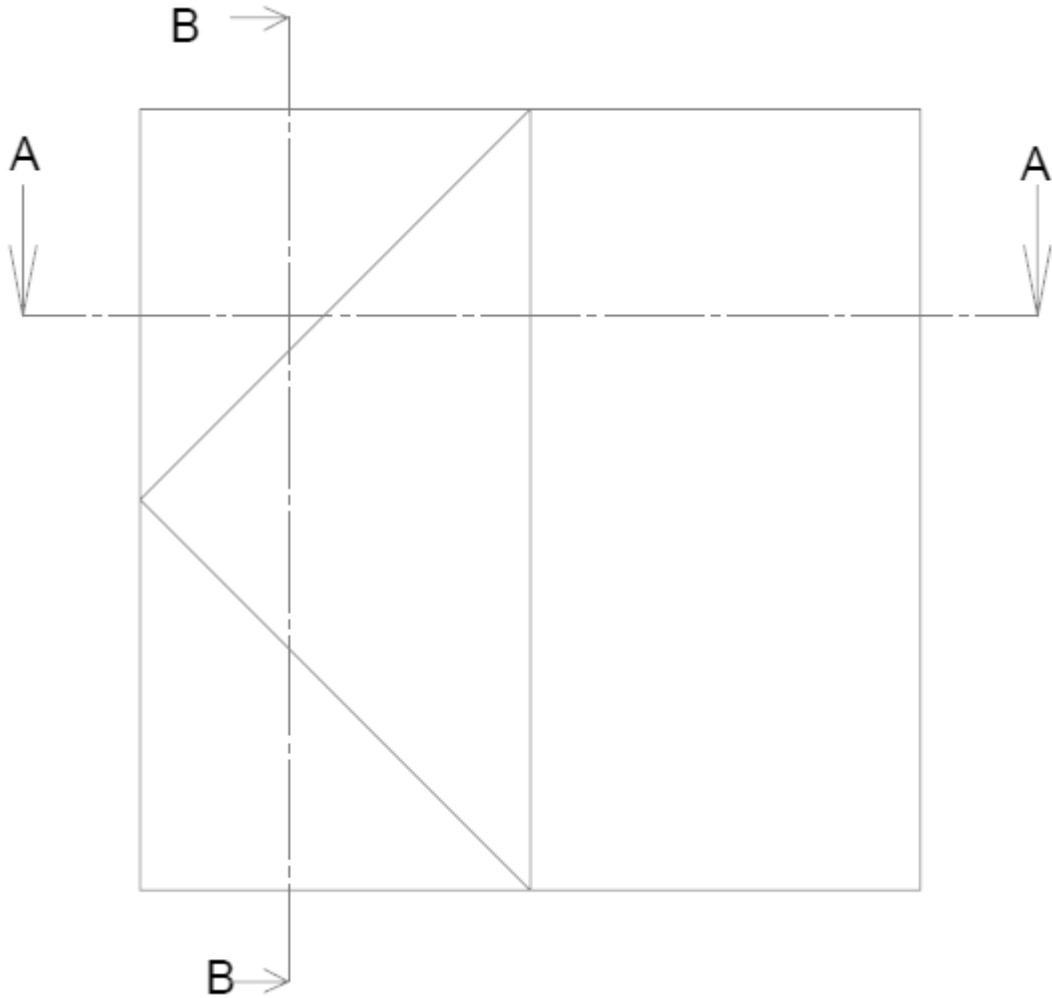
**Sample handle**





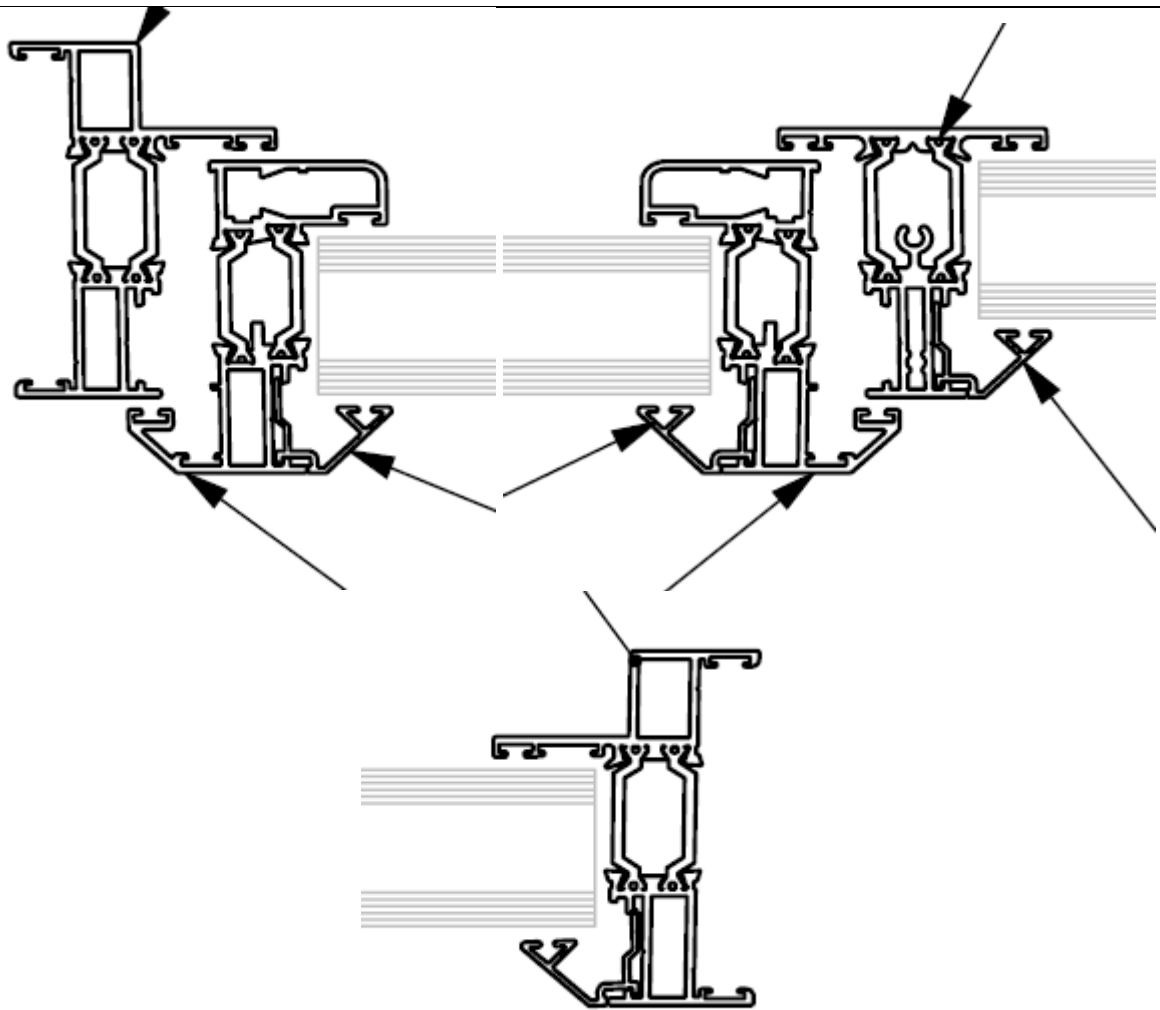
## TEST SPECIMEN

Figure 1- General Elevation of Test Specimen (External Face)



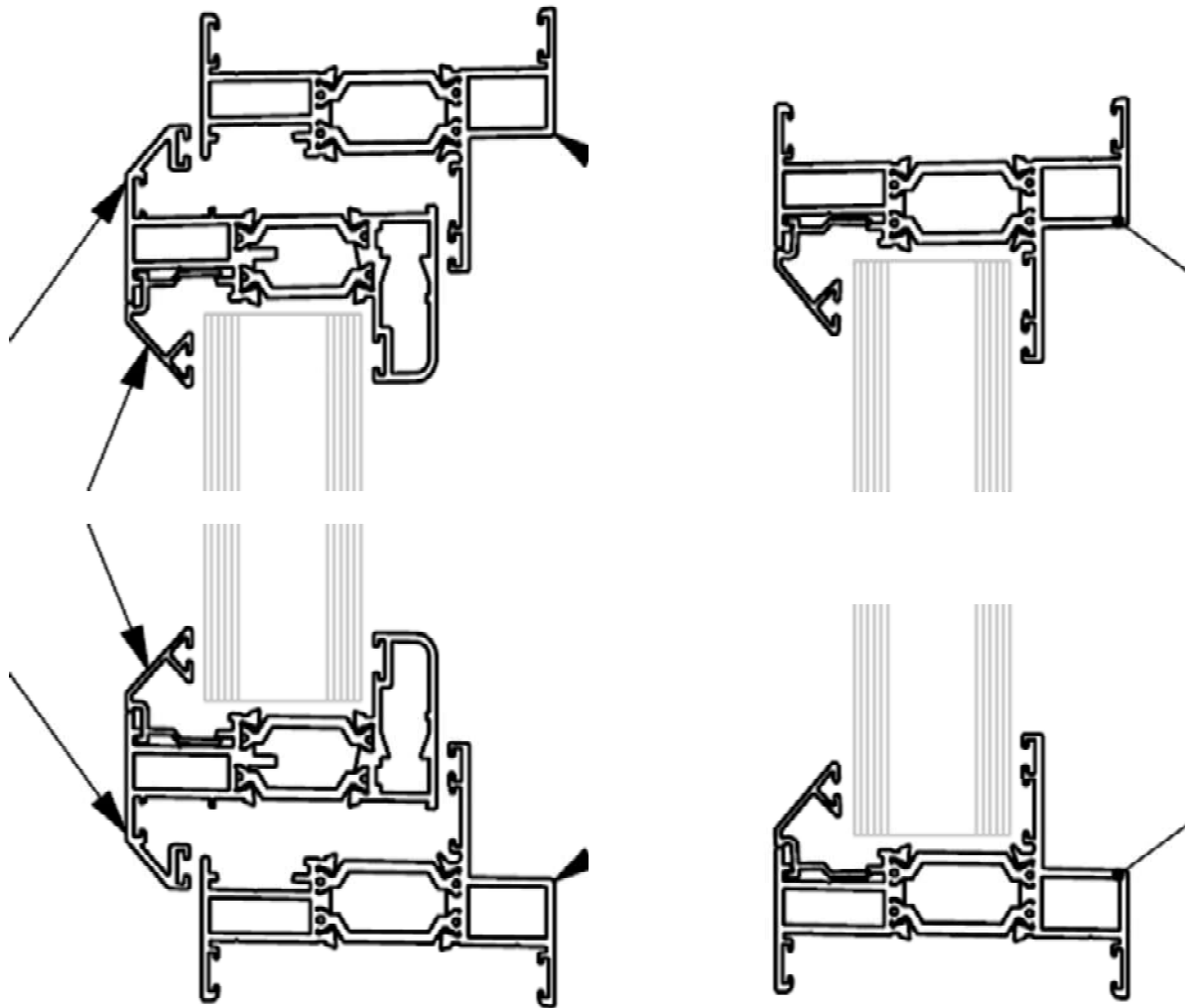
Do not scale. All dimensions are in mm

Figure 2 – Horizontal section



Do not scale. All dimensions are in mm

Figure 3 – Vertical section



Do not scale. All dimensions are in mm

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## SCHEDULE OF COMPONENTS

(Refer to Figures 1 to 3)  
 (All values are nominal unless stated otherwise)  
 (All other details are as stated by the sponsor)

### Variants

None

<u>Item</u>	<u>Description</u>
<b>1. Window frame head</b>	
Supplier	: Smarts
Profile code	: ETC 317
Material	: Aluminium
Grade	: 6063 T6
Gauge / wall thickness	: 1.7mm
Thermal break material / method	: Polyamide
Thermal break size	: 28 x 15mm
Glazing / casement rebate size	: 49 x 15mm
Section size	: 76 x 47.5mm
Fixing jamb to head joints	
i. type	: Cleat
ii. material	: Aluminium
iii. size	: 5.5 x 19.6mm
iv. quantity	: 1
Details of adhesive	
i. supplier	: Soudal Fix All
ii. reference	: 320185-CAR
<b>2. Window frame jamb</b>	
Supplier	: Smarts
Profile code	: ETC 317
Material	: Aluminium
Grade	: 6063 T6
Gauge / wall thickness	: 1.7mm
Thermal break material / method	: Polyamide
Thermal break size	: 28 x 15mm
Glazing / casement rebate size	: 49 x 15mm
Section size	: 76 x 47.5mm
Fixing jamb to sill joints	
i. type	: Cleat
ii. material	: Aluminium
iii. size	: 5.5 x 19.6mm
iv. quantity	: 1
Details of adhesive	
i. supplier	: Soudal Fix All
ii. reference	: 320185-CAR

<u>Item</u>	<u>Description</u>
<b>3. Window frame mullion</b>	
Supplier	: Smarts
Profile code	: ETC 333
Material	: Aluminium
Grade	: 6063 T6
Gauge / wall thickness	: 1.7mm
Thermal break material / method	: Polyamide
Thermal break size	: 28 x 18mm
Glazing / casement rebate size	: 49 x 15mm
Section size	: 53 x 48mm
Fixing mullion to head/sill joints	
i. type	: S/S self-tap pan head
ii. size	: 10 x 50mm
iii. quantity	: 4mm
Details of adhesive	
i. supplier	: Soudal Fix All
ii. reference	: 320185-CAR
<b>4. Window frame sill</b>	
Supplier	: Smarts
Profile code	: ETC 317
Material	: Aluminium
Grade	: 6063 T6
Gauge / wall thickness	: 1.7mm
Thermal break material / method	: Polyamide
Thermal break size	: 28 x 15mm
Glazing / casement rebate size	: 49 x 15mm
Section size	: 76 x 47.5mm
<b>5. Window frame weather seals outer</b>	
Supplier	: Smarts
Reference	: ACVL032
Material	: Rubber
Fixing method	: Inserted

<u>Item</u>	<u>Description</u>
<b>6. Window casement (s)</b>	
Overall Size	: 570mm x 1198mm
Supplier	: Smarts
Profile codes	: ETC 321
Material	: Aluminium
Grade	: 6063 T6
Gauge / wall thickness	: 1.5mm
Thermal break material / method	: Polyamide
Thermal break size	: 26 x 15mm
Glazing rebate size	: 15 x 45mm
Casement framing section size	: 61.5 x 47.5mm
Corner fixing method	
i. type	: Cleat ACET321 & ACET327
ii. size	: (321) 5.5mm x 18.6mm & (327) 5.5mm x 9.3mm
iii. quantity	: 1 of each
Adhesive	:
i. supplier	: Soudal Fix All
ii. reference	: 320185-CAR
<b>7. Window casement glass</b>	
Supplier	: JCL Glass
Thickness / configuration	: 4mm glass 20mm spacer 4mm glass
Overall size	
i. side hung casement	: 498 x 1125mm
ii. direct glazing	: 552 x 1178mm
Nominal edge clearance	: 4mm
<b>8. Glazing setting blocks</b>	
Supplier	: Glazparts
Material	: Plastic
Thickness	: Various
Section size	: 100mm
<b>9. Glazing gasket</b>	
Supplier	: Smarts
Reference	: ACET 835 (Bead) & ACET 840 (Wedge)
Fixing method	: Insert and Wedge
<b>10. Glazing beads</b>	
Glazing method	: Externally beaded
Supplier	: Smarts
Profile code	: ETC 375
Material	: Aluminium
Grade	: 6063 T6
Gauge / wall thickness	: 1mm
Section size	: 15 x 13mm
Fixing method	: Push fit
<b>11. Hinges</b>	

<u>Item</u>	<u>Description</u>
Supplier	: Kenrick
Description	: 16" side hung 13mm stack height
Reference	: KS12
Material	: Ferritic S/S
Quantity	: 1 pair per sash
Fixing hinge to casement	
i. type	: Pan head screws
ii. size	: 3.8 x 25mm
iii. quantity	: 4
Fixing hinge to frame	
i. type	: Pan head screws
ii. size	: 3.8 x 25mm
iii. quantity	: 3

### 12. Hinge protectors

Supplier	: Kenrick
Description	: 13mm stack
Reference	: KSHS13
Material	: Zinc die-cast
Quantity	: 2 pairs one per hinge
Position	: Within 100mm of hinge
Fixing device to casement	
i. type	: Countersunk screws
ii. size	: 3.8 x 25mm
iii. quantity	: 2 x per hinge protector
Fixing device to frame	
i. type	: Countersunk screws
ii. size	: 3.8 x 25mm
iii. quantity	: 2 x per hinge protector

### 13. Lock

Supplier	: Kenrick
Description	: Nemesis Twin Cam
Reference	: NEM1150205LH
Material	: Stainless steel
Fixings	
i. type	: Countersunk screws
ii. size	: 3.8 x 19
iii. quantity	: x 10

### 14. Lock Keeps

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<u>Item</u>	<u>Description</u>
Supplier	: Kenrick
Description	: Nemesis
Reference	: RLCO8136F
Material	: Die-cast
Quantity	: 3
Fixing keeps to frame	
i. type	: Countersunk screws
ii. size	: 3.8 x 19mm
iii. quantity	: 2 x per keep
<b>15. Lever handles</b>	
Supplier	: Winlock
Description	: Right hand chrome key locking2
Reference	: WHMRHBBLBC/20
Material	: Zinc
Fixings	
i. type	: Machine screws
ii. size	: M5 x 16mm
iii. quantity	: 2
<b>16. Sash compression wedge</b>	
Supplier	: GT Window Products
Description	: Sash Seal
Reference	: SS002 Wedge & SS001 Spring
Material	: Wedge – plastic. Spring – spring steel
Quantity	: 1x set
Position	: Centre of sash hinge side
Fixing spring to casement	
i. type	: Countersunk Screw
ii. size	: 3.8 x 16mm
iii. quantity	: 2
Fixing wedge to frame	
i. type	: Countersunk Screw
ii. size	: 3.8 x 25mm
iii. quantity	: 2



## PERFORMANCE CRITERIA & TEST RESULTS

### Clause 4 Exposure category and classification

Exposure Category Required:	2000
<b>Atmospheric Conditions</b>	
Air Temp	22°C
Humidity	49%RH
Air Pressure	97.2kPa
<b>Test Sample</b>	
Overall Size of Sample	1200 x 1250mm
Overall Area	1.5m <sup>2</sup>
Joint length leaf/casement	571 x 1196mm
Opening Joint Length (m)	3.53m

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**Clause 6 Air Permeability**


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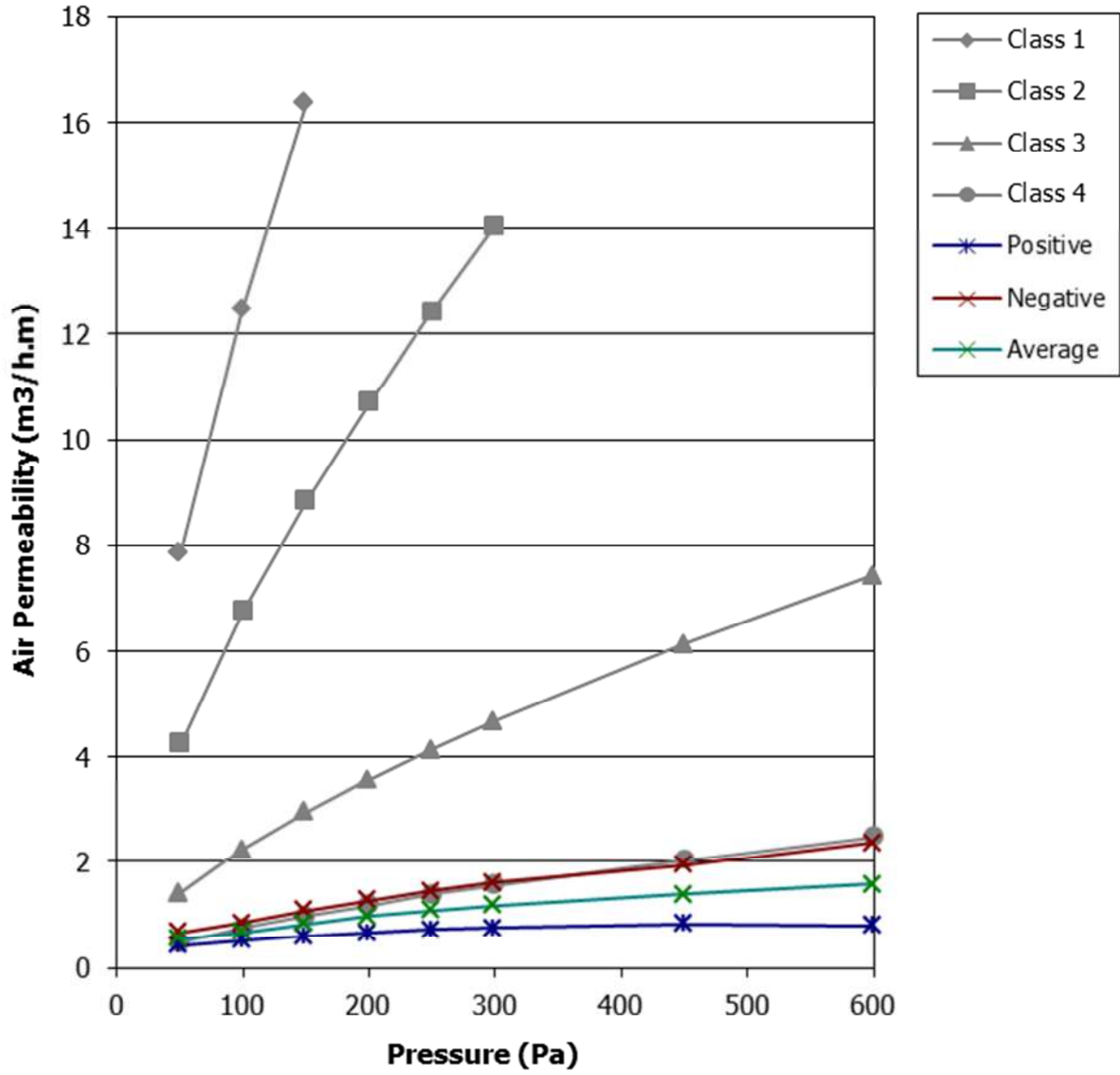
Test Pressure	Calculated Air Permeability per unit length		
	Positive m <sup>3</sup> / h.m	Negative m <sup>3</sup> / h.m	Average m <sup>3</sup> / h.m
50 Pa	0.43	0.68	0.55
100 Pa	0.51	0.85	0.68
150 Pa	0.60	1.08	0.84
200 Pa	0.67	1.28	0.97
250 Pa	0.73	1.45	1.09
300 Pa (if required)	0.76	1.61	1.19
450 Pa (if required)	0.84	1.95	1.40
600 Pa (if required)	0.81	2.36	1.58

Test Pressure	Calculated Air Permeability per unit area		
	Positive m <sup>3</sup> / h.m	Negative m <sup>3</sup> / h.m	Average m <sup>3</sup> / h.m
50 Pa	1.00	1.60	1.30
100 Pa	1.21	2.01	1.61
150 Pa	1.40	2.55	1.98
200 Pa	1.57	3.01	2.29
250 Pa	1.71	3.42	2.56
300 Pa (if required)	1.79	3.80	2.80
450 Pa (if required)	1.98	4.59	3.29
600 Pa (if required)	1.90	5.57	3.73

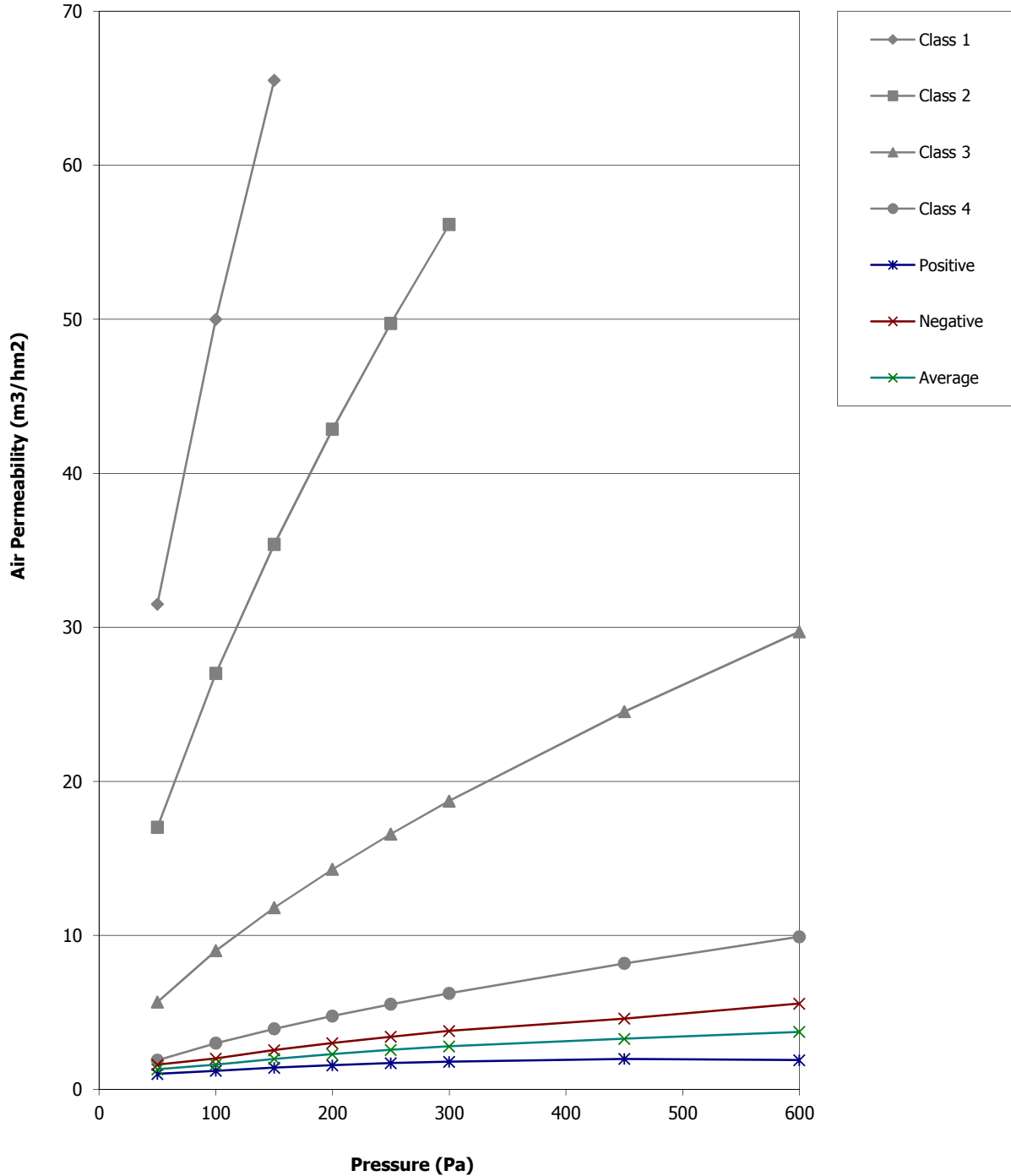
**Note:**

The instrument used for measuring air permeability is only calibrated in the range 0-300m<sup>3</sup>/h. Measurements above 300m<sup>3</sup>/h are therefore outside of the calibrated range for the instrument. Affected results are marked with a #.

Graph of air permeability per unit length



Graph of air permeability per unit area



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**Clause 7 Watertightness**


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Quantity of 2 l/min nozzles (row 1)	3
Total water quantity	6 l/min
Distance of nozzles from sample (250mm +10 -0mm)	260mm
Angle of nozzles (24° +2° - 0°)	25°
Height of nozzle above joint (0 – 150mm)	48mm

---

Pressure (Pa)	Duration (m:s)	Observations	
0 Pa	15mins	no leakage occurred	CLASS 1A ACHIEVED
50 Pa	5mins	no leakage occurred	CLASS 2A ACHIEVED
100 Pa	5mins	no leakage occurred	CLASS 3A ACHIEVED
150 Pa	5mins	no leakage occurred	CLASS 4A ACHIEVED
200 Pa	5mins	no leakage occurred	CLASS 5A ACHIEVED
250 Pa	5mins	no leakage occurred	CLASS 6A ACHIEVED
300 Pa	5mins	Water leaked between the casement and the frame of the bottom of the locking edge after 0s	FAILED CLASS 7A

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**Clause 7 Watertightness test observations**

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**Water has come through between the casement and the frame and the bottom of the locking edge**



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**Clause 8 Wind Resistance**


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**Positive wind pressure**

Member tested	Pressure applied	Member Length	Deflection	Fraction
Mullion	2017 Pa	1145 mm	2.3 mm	$\frac{1}{498}$

**Negative wind pressure**

Member tested	Pressure applied	Member Length	Deflection	Fraction
Mullion	-2008 Pa	1145 mm	2.15 mm	$\frac{1}{533}$

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**Clause 6 Repeated Air Permeability following wind resistance test**


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Test Pressure	Calculated Air Permeability per unit length		
	Positive m <sup>3</sup> / h.m	Negative m <sup>3</sup> / h.m	Average m <sup>3</sup> / h.m
50 Pa	0.45	0.62	0.54
100 Pa	0.52	0.75	0.64
150 Pa	0.59	0.96	0.77
200 Pa	0.63	1.13	0.88
250 Pa	0.67	1.29	0.98
300 Pa (if required)	0.70	1.44	1.07
450 Pa (if required)	0.70	1.76	1.23
600 Pa (if required)	0.65	2.18	1.42

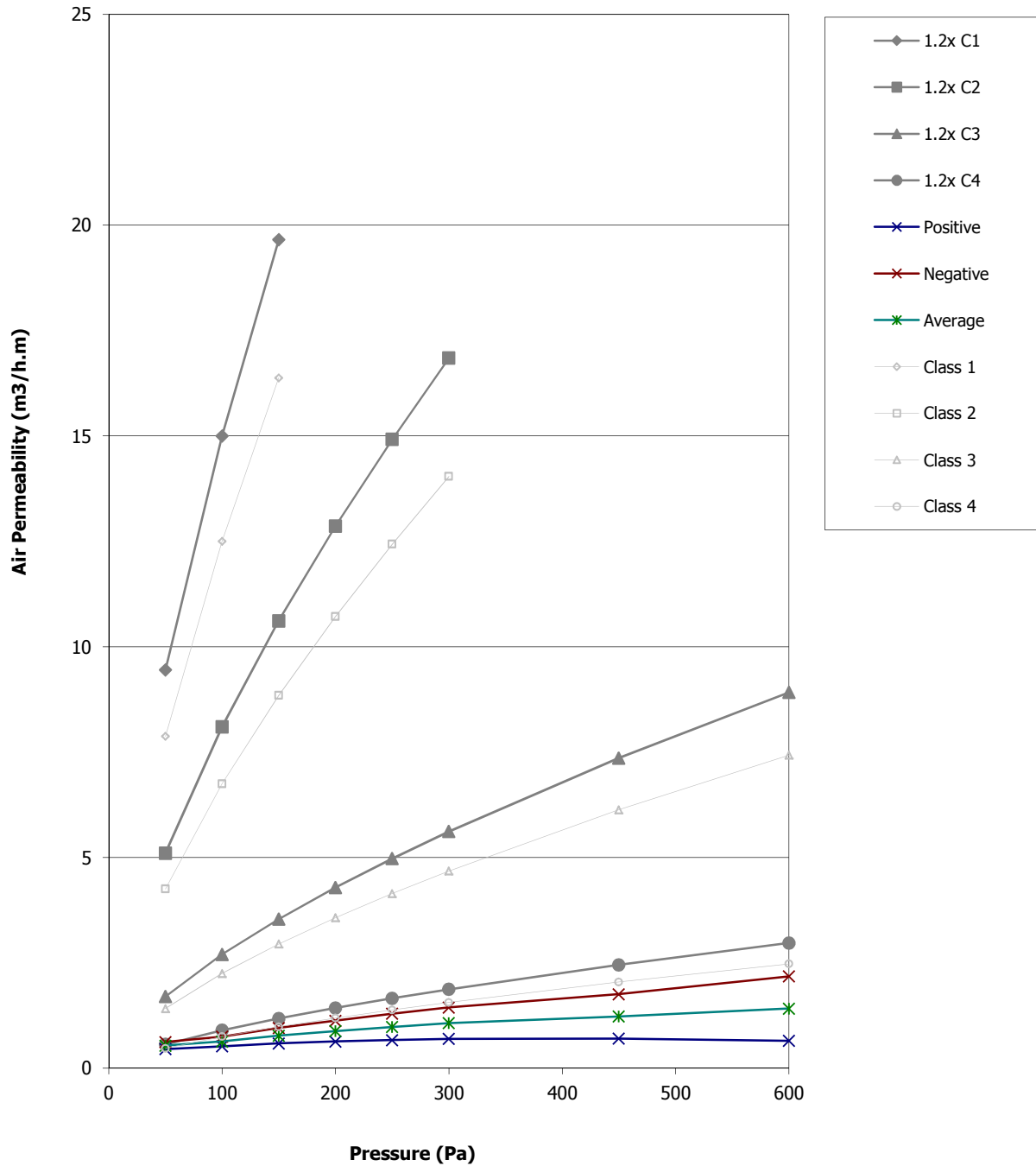
Test Pressure	Calculated Air Permeability per unit area		
	Positive m <sup>3</sup> / h.m <sup>2</sup>	Negative m <sup>3</sup> / h.m <sup>2</sup>	Average m <sup>3</sup> / h.m
50 Pa	1.07	1.46	1.27
100 Pa	1.23	1.77	1.50
150 Pa	1.39	2.25	1.82
200 Pa	1.50	2.65	2.07
250 Pa	1.57	3.05	2.31
300 Pa (if required)	1.64	3.40	2.52
450 Pa (if required)	1.66	4.14	2.90
600 Pa (if required)	1.53	5.13	3.33

**Note:**

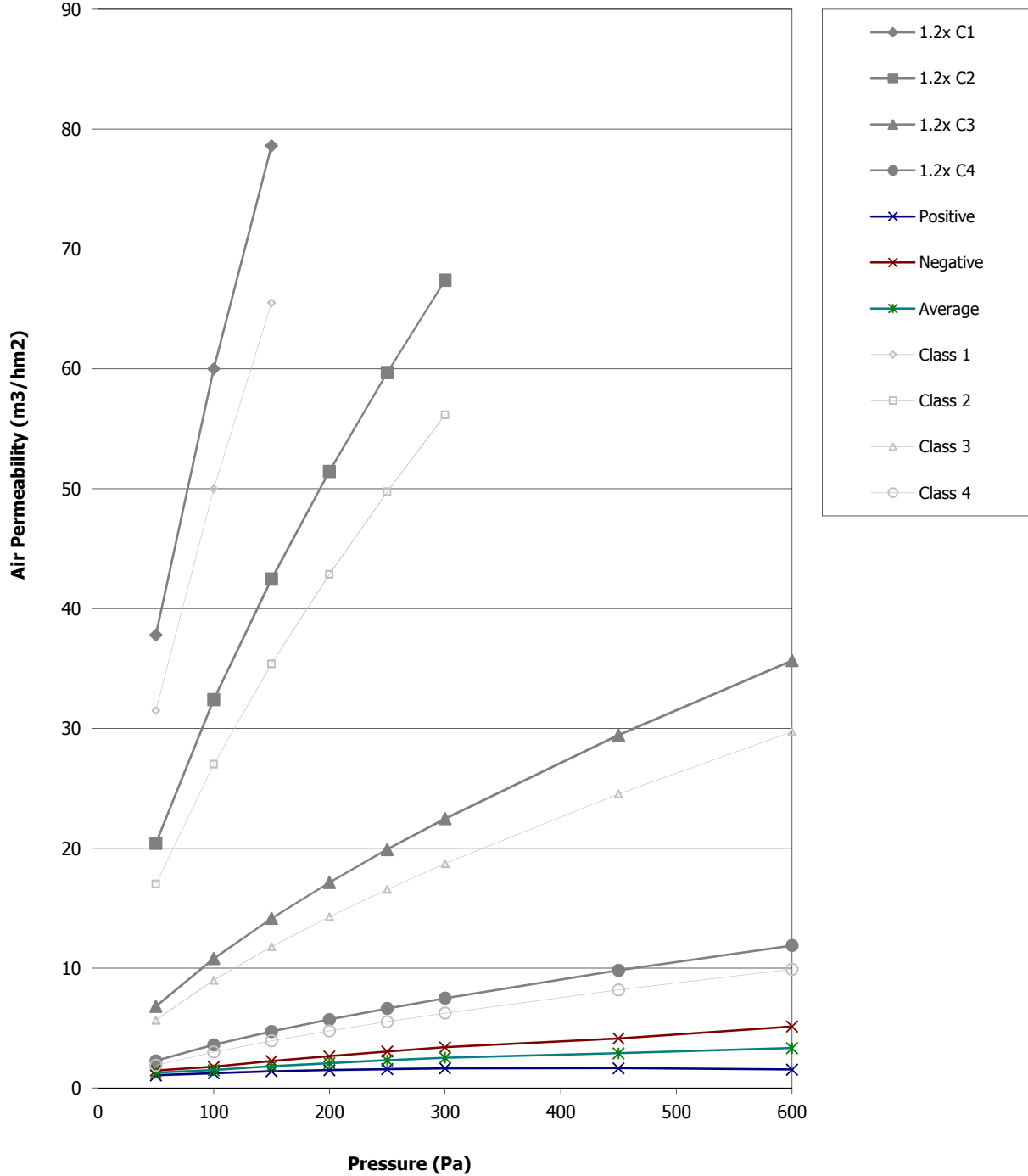
The instrument used for measuring air permeability is only calibrated in the range 0-300m<sup>3</sup>/h. Measurements above 300m<sup>3</sup>/h are therefore outside of the calibrated range for the instrument. Affected results are marked with a #.



**Graph of air permeability per unit length following wind resistance test**



Graph of air permeability per unit area following wind resistance test



Clause	Result	Pass/Fail
<b>6 Test for air permeability</b>	<p>BS6375-1 requires a performance of Class 2 defined in BS EN 12207 for UK exposure category 2000. The client's initial requirement was for Class 2.</p> <p>The sample was tested in accordance with BS EN 1026. The air leakage per unit area and per unit joint length should be less than those for the required class.</p> <p>When positive and negative pressure was applied the average air leakage per unit joint length met the requirements of Class 3, and per unit area met the requirements of Class 4.</p> <p>During the repeat air permeability test the average air leakage continued to meet the requirements of Class 4.</p> <p><b>The sample could therefore be classified as Class 4 for the air permeability test.</b></p>	<b>PASS CLASS 4</b>
<b>7 Test for water tightness</b>	<p>BS6375-1 requires a performance of Class 5A, defined in BS EN 12208 for UK exposure category 2000. The client's initial requirement was for Class 5A.</p> <p>These requirements were satisfied up to a point 0min and 0sec into a test pressure of 300 Pa when water penetration was observed at the bottom corner of locking edge.</p> <p><b>The sample could therefore be classified as Class 6A for the watertightness test.</b></p>	<b>PASS CLASS 6A</b>
<b>8 Test for resistance to wind - Deformation test</b>	<p>BS6375-1 requires a performance of Class A5, defined in BS EN 12210, for UK exposure category 2000. The client's initial requirement was for Class A5.</p> <p>The sample was tested in accordance with BS EN 12211. For Class A5 the test pressure P1 to be applied is 2000Pa, and the frontal displacement following the positive and negative pressure test should be less than 1/150th of the length of the member tested.</p> <p>For positive pressure the member tested was the mullion, it was 1145mm long, and was subject to a maximum deflection of 2.3mm (1/498) for positive wind pressure.</p> <p>For negative pressure the member tested was the mullion, it was 1145mm long, and was subject to a maximum deflection of 2.15mm (1/533) for negative wind pressure.</p> <p>The sample met the requirements for Class C5 for the deflection test.</p>	<b>PASS</b>
<b>Repeated pressure test</b>	No visible failures should occur during the repeated air test, and the resultant air permeability should not exceed the upper limits of the	<b>PASS</b>

Clause	Result	Pass/Fail
	<p>claimed class by 20%.</p> <p>Following a test pressure P2 of -1000Pa and 1000Pa repeated 50 times there were no visible failures.</p> <p>The air permeability of the sample continued to meet the requirements of Class 4, and the sample met the requirements of Class C5 for the repeated pressure test.</p>	
<b>Safety test</b>	<p>During the safety test under a pressure P3 of -3000Pa &amp; 3000Pa the sample must remain closed and no parts must come detached. On the application of the test pressure the sample remained closed</p> <p>The sample met the requirements for Class C5 for the safety test.</p> <p><b>The sample could therefore be classified as Class C5 for the wind resistance test.</b></p>	<p><b>PASS</b> <b>CLASS C5</b></p>

## CONCLUSIONS

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**Evaluation against objective**

The sample as provided by the client was subjected to weather performance testing in accordance with BS 6375-1:2015, and achieved a performance of Class 4 for air permeability, Class 6A for watertightness, and Class C5 for wind resistance. The sample could therefore be classified as 2000 in accordance with BS6375-1.

**Observations & comments**

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## LIMITATIONS

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**Limitations**

The results relate only to the behaviour of the specimens of the element of construction under the particular conditions of test. They are not intended to be the sole criteria for assessing the potential performance of the element in use, nor do they reflect the actual behaviour in use.

**Range of assemblies covered by this report**

It is our opinion that the range of assemblies covered by this report are limited to the following

- Assemblies with identical hardware fitted no further apart than in the tested assembly
- Assemblies of the same or smaller overall dimensions to the tested assembly

**Uncertainty of Measurement**

The uncertainties of measurements calculated for a confidence level of 95% throughout these tests are within the limits of these tolerances.

The standard specifies the following tolerances

- Air flow  $\pm 5\%$
  - Air pressure  $\pm 5\%$
  - Water flow  $\pm 10\%$
  - Distance  $\pm 1\text{mm}$  for tape measures  $\pm 0.1\text{mm}$  for displacement transducers
-

## REVISION HISTORY

This issue of the report replaces all previous issues that are now withdrawn.

<b>Issue No :</b>	<b>Re - Issue Date :</b>
<b>Revised By:</b>	<b>Approved By:</b>
<b>Reason for Revision:</b>	

<b>Issue No :</b>	<b>Re - Issue Date :</b>
<b>Revised By:</b>	<b>Approved By:</b>
<b>Reason for Revision:</b>	

**END OF REPORT**