Test Report 8586203.

Smart Systems Limited

Incorporating Smart Extrusions

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Introduction.

This report has been prepared by David Vinyard and relates to the activity detailed below:

Job/Registration Details		Client Details
Job number:	**8586203**	Smart Systems Limited
Job type:	Testing Samples Submitted	Incorporating Smart Extrusions
Start Date:	12/09/2016	Arnolds Way
Test type:	Type	Yatton
Sample ID:	10165774	BS49 4QN
	10171895	United Kingdom
Registration:	**KM 530838**	
Scheme:	BS 4873 / PAS24	
Protocol:	PP519	
Scheme Mgr:	Lorraine Balch	
Quality system:	ISO 9001:2008	

The report has been approved for issue by Chris Rayment – Senior Engineer

Approved For Issue	
[redacted]	Issue Date: 27 April 2018

Objectives.

Type test for product certification

Product Scope.

Eco Futural Aluminium Alloy Double Doors

Report Summary.

The samples were received on 12 September 2016 and the testing was started on 12 September 2016.

The samples submitted complied with the requirements of the test work conducted.

BS4873:2009 Type Test. (Samples 1, 2, 3, 4 and 5)

1 off open out glaze in hinged door assemblies with full glass infill and low threshold. (Sample 1)

2 off open out glaze in hinged door assemblies with full glass infill and standard threshold. (Samples 2 and 5)

1 off open in glaze in hinged door assemblies with full glass infill and low threshold. (Sample 3)

1 off open in glaze in hinged door assemblies with full glass infill and standard threshold. (Sample 4)

(Sample ID No 10165774)

Date sample received: 12 September 2016

Test Results.

1.	Air permeability	Test samples 1, 2, 3 and 4 met the requirements of the Specification, in respect of Clause 13, for Test Pressure Class 2.
2.	Watertightness	Test sample 1 and 3 met the requirements of the Specification, in respect of Clause 13, for Test Pressure Class 3A. Test sample 2 met the requirements of the Specification, in respect of Clause 13, for Test Pressure Class E900. Test sample 4 met the requirements of the Specification, in respect of Clause 13, for Test Pressure Class 7A.
3.	Wind resistance	Test sample 1 met the requirements of the Specification, in respect of Clause 8, for Exposure Category Class A3.

Classification for Wind Resistance.

Test samples 1, 2, 3 and 4	Exposure Category 1200Pa

4.	Operational Strength	The test sample met the requirements of the Specification in respect of BS 6375-2.

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Classification for Operational strength.

Operating forces	Class 1
Vertical load	Class 2
Resistance to Static torsion	Class 2
Soft and Heavy body Impact Load bearing	Class 2
Hard body impact	Class 2
Load bearing capacity of safety devices	N/A
Closure against obstruction	Pass
Repeated opening and closing (Sample 5)	50,000 active, 5,000 slave

5. Basic security The test samples met the requirements of BS6375-3

Sample Selection.

The sample submitted for tests were selected using the PCP Scheme Document Specification.
The sample was submitted for test mounted in a 75mm x 100mm timber subframe in accordance with the manufacturer's installation requirements. The sample was manufactured by the client.

Clause 5 Sequence of Tests.

The sequence of testing the sample followed that detailed in Clause 5 of BS 6375-1:2015.

Clause 5 Performance Requirements.

The performance of the sample was assessed against the requirements detailed in
Table 1 Exposure categories and classifications

Methods of Test.

1. **Operating Forces**

The operating forces acting on the samples were determined by the methods given in BS EN 12046-2.

2. **Air Permeability**

The air permeability of the samples was determined by the method given in BS 6375-1:2015.

3. **Watertightness**

The watertightness of the samples was determined by the method given in BS 6375-1:2015.

4. **Wind Resistance**

The wind resistance of the samples was determined by the methods (P1 and P2) given in BS 6375-1:2015.

5. **Repeat Tests**

After testing for resistance to wind loading (P1 and P2) the air permeability test was repeated.

6. **Wind Resistance**

The wind resistance of the samples was determined by the method (P3) given in BS 6375-1:2015.

7. **Resistance to Vertical Loads**

The resistance to vertical loads test was carried out using the method given in BS EN 947.

8. **Resistance to Static Torsion**

The resistance to static torsion test was carried out using the method given in BS EN 948.

9. **Soft and Heavy Body Impact**

The resistance to soft and heavy body impact was carried out using the method given in BS EN 949.

10. **Hard Body Impact**

The resistance to hard body impact was carried out using the method given in BS EN 950.

Methods of Test (Continued).

11. **Closure against Obstruction**

The closure against obstruction was carried out using the method given in BS 6375-3.

12. **Basic Security**

The basic security test was carried out using the method given in BS 6375-3.

13. **Repeated opening and closing**

The repeated opening and closing was carried out using the method given in standard BS EN 1191.

Note.

Repeated Opening and Closing not UKAS accredited to BS6375-2

Basic Security and closure against obstruction not UKAS accredited to BS6375-3

Description of Sample. (Sample 1)

Sample Type -	1 off open out glaze in hinged door assemblies with full glass infill and low threshold.
Material -	Aluminium alloy
Finish -	Painted white
Fittings -	**Master leaf** A three point Sobinco Multipoint key locking hardware (three hook / Pins) Sobinco cylinder, Fapim handle and four Fapim Pin hinges with four hinge protector pins and two anti lift blocks **Slave leaf** A two point finger operated hardware (two shoot bolts), and four Fapim Pin hinges with four hinge protector pins and two anti lift blocks
Glass -	Double glazed 6-16-6mm toughened glass sealed units
Glass Retention System -	Internal beads and gaskets
Weathersealing -	E.D.P.M

Sample dimensions -	Overall length:	2842mm	Height: 2610mm
	Active leaf length:	1200mm	Height: 2534mm
	Slave leaf length:	1200mm	Height: 2534mm

Date of test -	22 May 2017
Laboratory temperature -	20.3°C
Laboratory humidity -	62.8%RH
Atmospheric pressure -	100.0kPa

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Description of Test Sample. (Sample 1 – open out, low threshold)

Note – Parts list supplied by client and not verified by BSI

Outer Frame width	2482mm	**Outer Frame Material**	Aluminium
Outer Frame height	2583mm	**Outer Frame Gasket**	
Outer Frame Part Numbers		Gasket Type	EDPM
Top	EF011	Manufacturer	Smart
Bottom	EF953 65MM X 25MM	Product Name	Eco Futural
Lock Side	EF011	Product Code	ACEF030A ACEF030B ACVL032
Hinge Side	EF011	**Mullion**	
Outer Frame section dimensions		Manufacturer	Smart
Width	65mm	Product name	Eco Futural
Depth	65mm	Product Code	EF040
Reinforcing:		Materials	Aluminium
Manufacturer	na	**Outer Frame Joint Method**	
Product Name		Head	Cleat And Glue
Product code		Foot	Mechanical Joint
Material			

Leaf		**Leaf Material:**	Aluminium
Leaf Width:	1200mm	**Leaf Gasket**	
Leaf Height:	2534mm	Gasket type:	EDPM
Leaf Part Numbers:		Manufacturer:	Smart
Top:	EF120	Product Name:	Eco Futural
Bottom:	EF120 X EF954	Product Code	ACVL031N
Lock side:	EF120	**Leaf Midrail:**	
Hinge Side	EF120	Manufacturer:	
Leaf section size		Product name:	
Width:	74mm	Product code:	
Depth:	93mm	Material:	
Reinforcing		**Leaf joint method**	
Manufacturer:	na	Head:	Cleat And Glue
Product Name:		Foot:	Cleat And Glue
Product Code:			
Material:			
Bead			
Manufacturer:	Smart		
Product Name:	Eco Futural		
Product Code:	GL526		
Material:	Aluminium		
Bead Size:	22mm x 26mm		

Description of Test Sample. (continued)

Glazing Unit		**Glazing Gasket**	
Manufacturer:	Ashton Glass	Gasket Type:	EDPM
Inner Thickness:	6mm Toughened	Manufacturer:	Smart
Spacer Material:	Aluminium	Product Name:	Eco Futural
Outer Thickness:	6mm Toughened	Product Code	ACVG31 ACVG34
Unit Sizes:	1044mm x 2378mm x 28mm	**Glazing Clip**	NA
Glazing Tape Details NA		Manufacturer:	
Manufacturer:		Product Name:	
Product Name:		Product Code	
Product Code			

Hardware			**Fixings**	**Quantity**
Hinges:	ACMX102	Two Part Hinge	ACMX 103 PINS. M5.	8
Hinge Protectors:	ACMX103	Hinge Protector Pins	ACMX 103 PINS.	16
Lock:	ACSZVL709	Three Point Lock	ACIM 020	1
Cylinder:	ACMX01627		Supplied with Cylinder	1
Handle:	ACFA120	Rivett Nuts M5 With Handle	M5 X 25mm	2
Touch Bar:	NA			
Cylinder Support:	NA			
Cylinder Escutcheon:	ACMX102	Cylinder Cover	No 8 Self Tapping Screw.	2
Keeps:	ACSZ650 ACSZ651	Center Keep Top And Bottom Keeps	ACET062	1 2
Drip Bar	VL 72			
Additional Hardware	ACFT512	Anti Lift Blocks	ACET 060	4 Pairs
	ACGT430 ACEF961 ACVL127 ACVL429	Shoot Bolt Shoot Bolt Adaptor Shoot Bolt Rods Shoot Bolt Keeps	ACET060 ACIM020	2 1 2
	ACEF055	Mullion End Cap		2
	ACEF057	Glass Setting Block		10
	ACET062	Mullion Fixing Screws		10
	MUA067 ACET062 ACGSL045 EF958 EF953	Mullion Fixing Screws Keep Fixing Screws Drain Caps Low Threshold End Caps. End caps		10 11 4 1Pair. 1 set.

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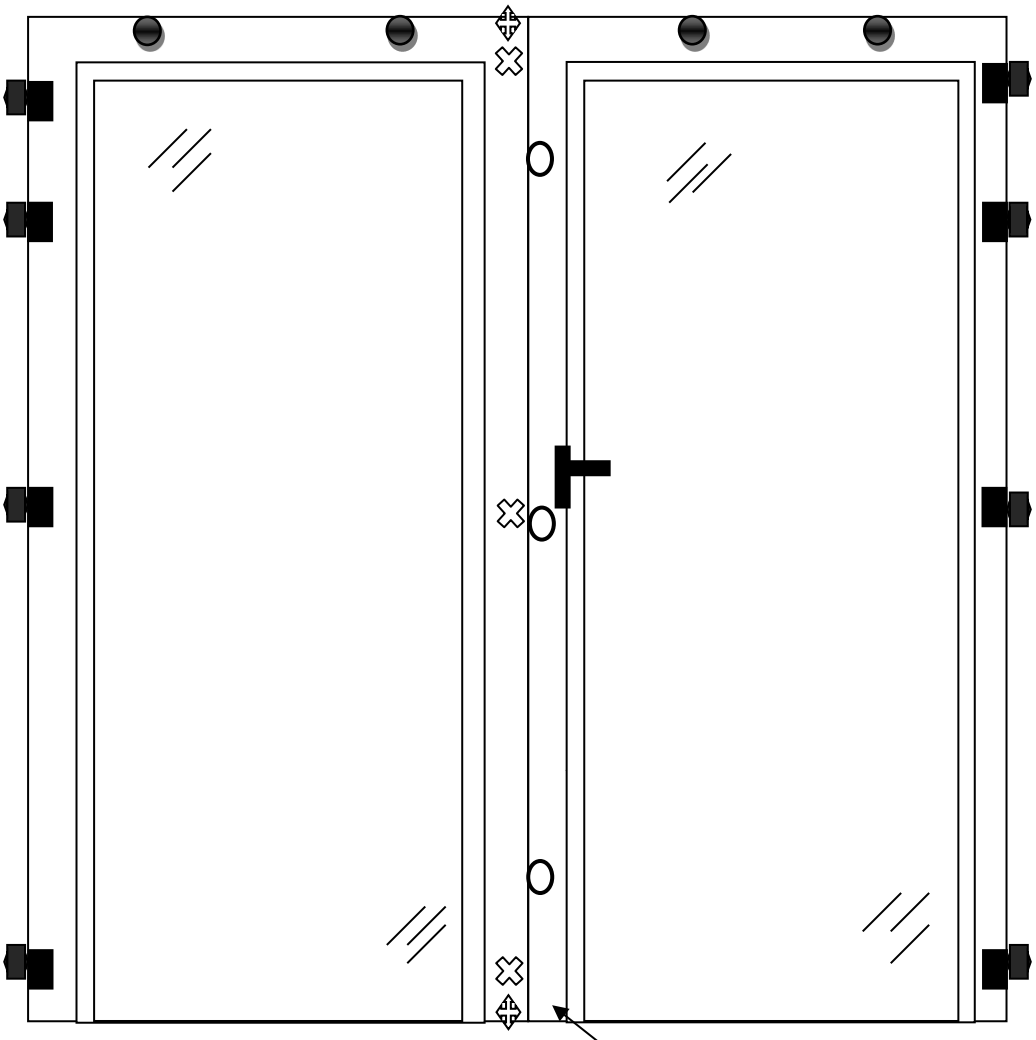
Elevation Drawing of Door Assembly.



- shoot bolt
- handle
- hook bolt / Pins
- Transducer placement
- Pin hinges
- Hinge protector pin
- Anti lift off blocks

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Graph of Air Permeability Before Gusting.

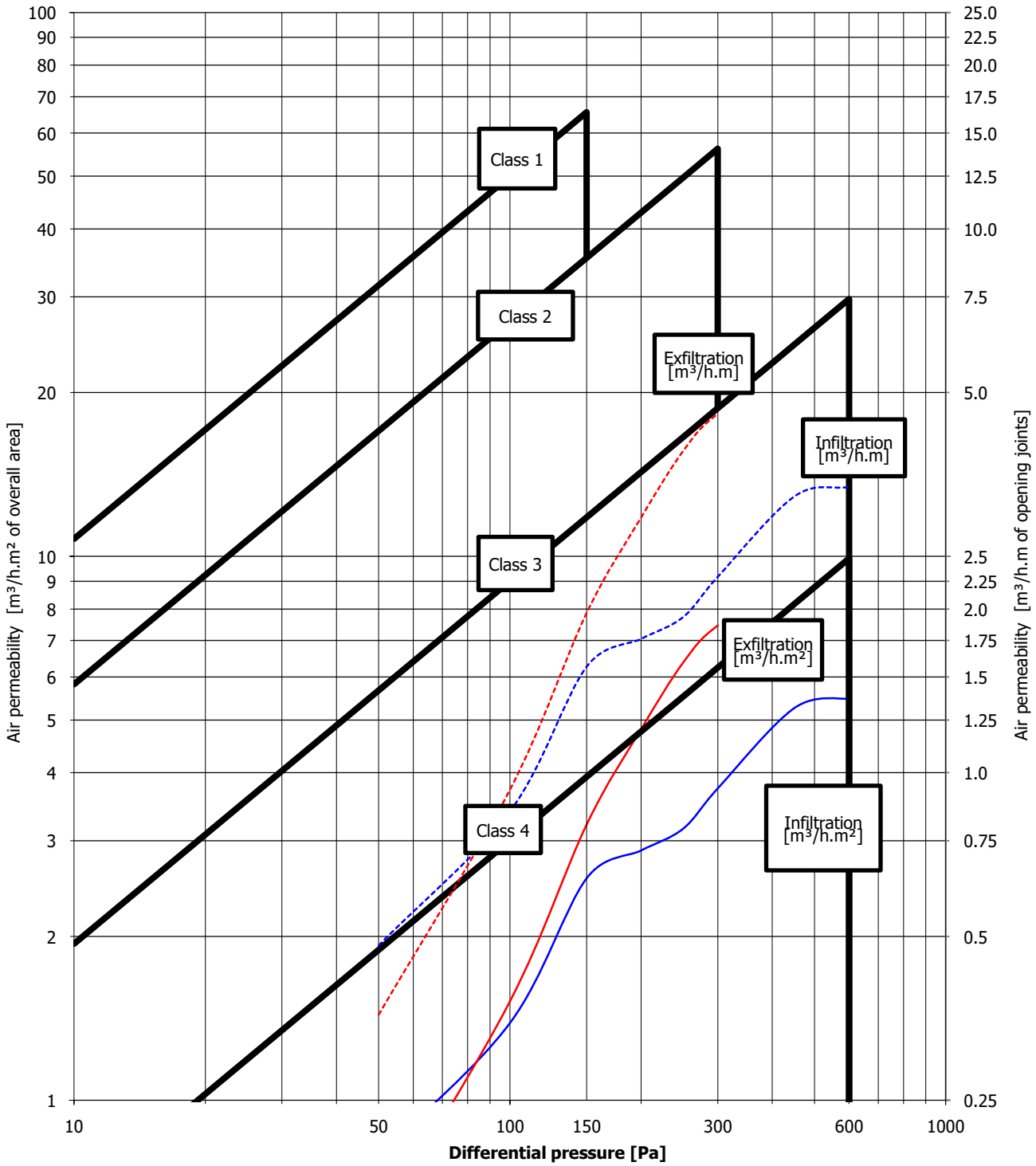

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Table of Average Air Permeability Before Gusting.

AIR PERMEABILITY TEST RESULTS - BS 6375-1:2015 / BS EN 1026:2000

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

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	5.1	0.42	0.69
100	10.8	0.89	1.45
150	21.4	1.77	2.88
200	28.5	2.35	3.84
250	35.3	2.92	4.77
300	41.5	3.43	5.60
450	53.1	4.39	7.17

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 = 12.1m

Overall area = 7.41m²

BS 6375-1:2015 Clause 6.3 - Joint class = 2

BS 6375-1:2015 Clause 6.3 - Area class = 2

BS 6375-1:2015 Clause 6.3 - Overall class = 2

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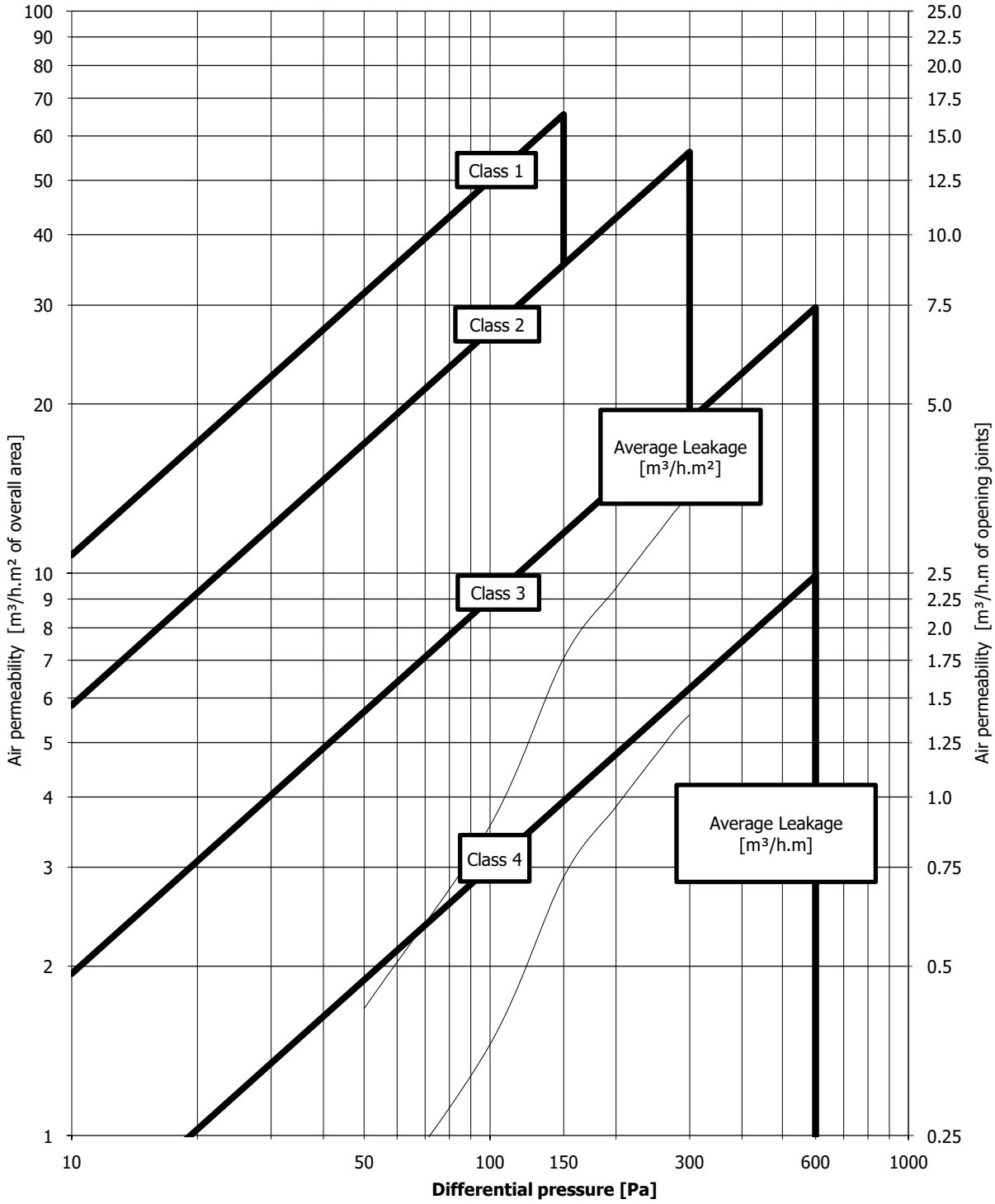
Graph of Average Air Permeability Before Gusting.



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Water Tightness Test Results.

BS EN 1027:2000 Clause 7 Watertightness before resistance to wind loads

TABLE 2 - Spraying method 1A

Pressure (Pascals)	Point and time at which water leakage occurred
0	No leakage
50	No leakage
100	No leakage
150	Water leaked out and over the threshold at 8 seconds
200	-
250	-
300	-
450	-
600	-
750	-
900	-
1050	-

Wind Load Resistance Test Results - BS EN 12211:2000

Clause 8 Resistance to wind load

P1 Deflection Test

Three positive pressure pulses at 1320Pa were applied

No visible failures or functional defects to the test sample were observed after wind loads applied at a positive air pressure of 1200Pa.

Actual deflection – 5.58mm (maximum deflection allowed 16.03mm)

Deflection/span ratio 1/431 (maximum ratio allowed 1/150)

Three negative pressure pulses at 1320Pa were applied

No visible failures or functional defects to the test sample were observed after wind loads applied at a negative air pressure of 1200Pa.

Actual deflection – 7.05mm (maximum deflection allowed 16.03mm)

Deflection/span ratio 1/341 (maximum ratio allowed 1/150)

Wind Load Resistance Test Results (Continued).

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 600Pa.

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 600Pa.

In accordance with BS 6375-1:2009 Clause 6.5, as the classification after the resistance to wind load tests is the same as the classification before the resistance to wind load tests, the resulting classification for the sample is Class 2.

Graph of Air Permeability After Gusting.

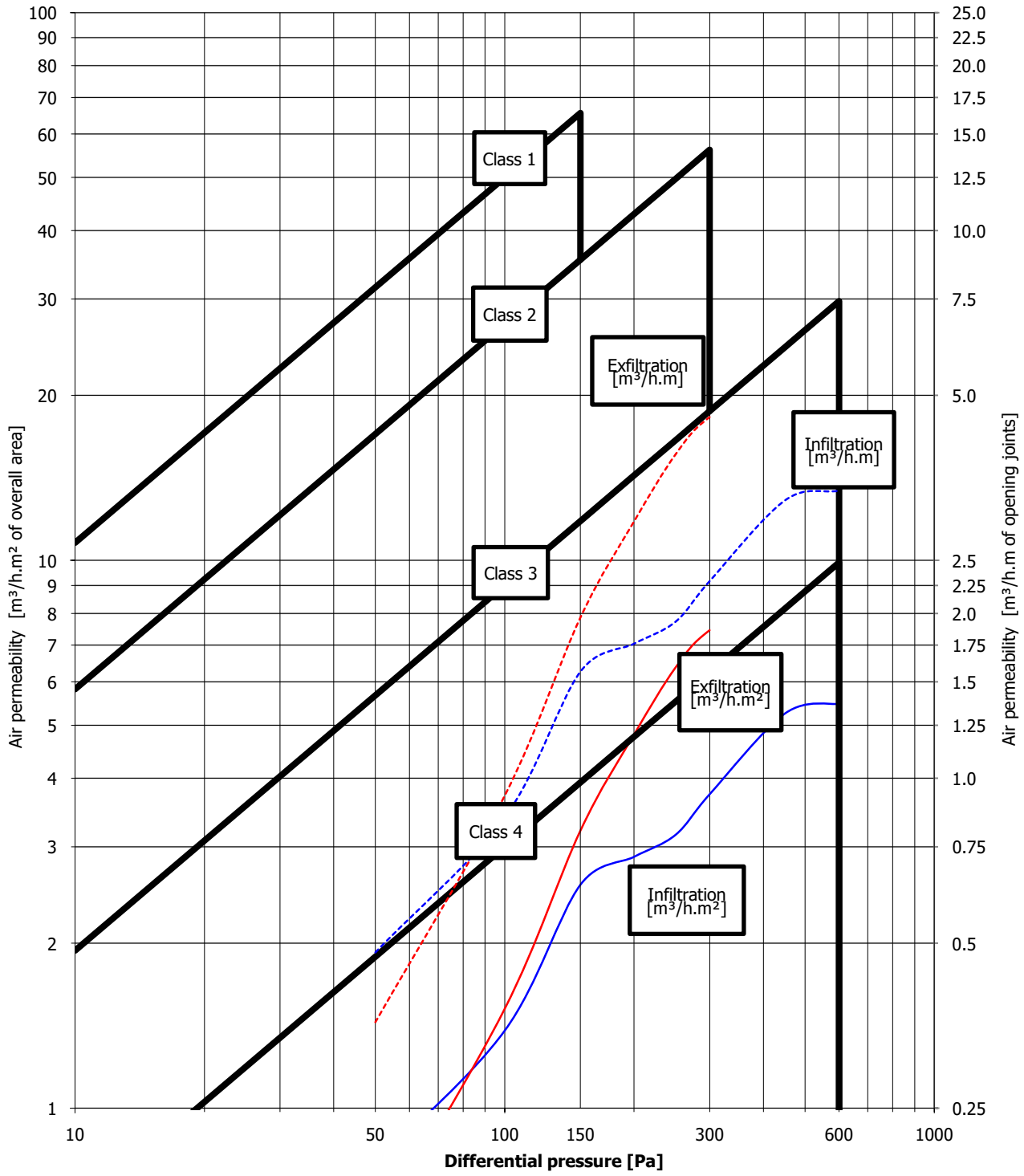

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Table of Air Permeability After Gusting.

AIR PERMEABILITY TEST RESULTS - BS 6375-1:2015 / BS EN 1026:2000

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

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	5.5	0.45	0.74
100	11.4	0.94	1.54
150	21.3	1.76	2.87
200	28.7	2.37	3.87
250	35.3	2.92	4.76
300	42.1	3.48	5.68
450	55.4	4.58	7.48

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 = 12.1m

Overall area = 7.41m²

BS 6375-1:2015 Clause 6.5 - Joint class = 2

BS 6375-1:2015 Clause 6.5 - Area class = 2

BS 6375-1:2015 Clause 6.5 - Overall class = 2

In accordance with BS 6375-1:2015 Clause 6.5, as the classification after the resistance to wind load tests is the same as the classification before the resistance to wind load tests, the resulting classification for the sample is Class 2.

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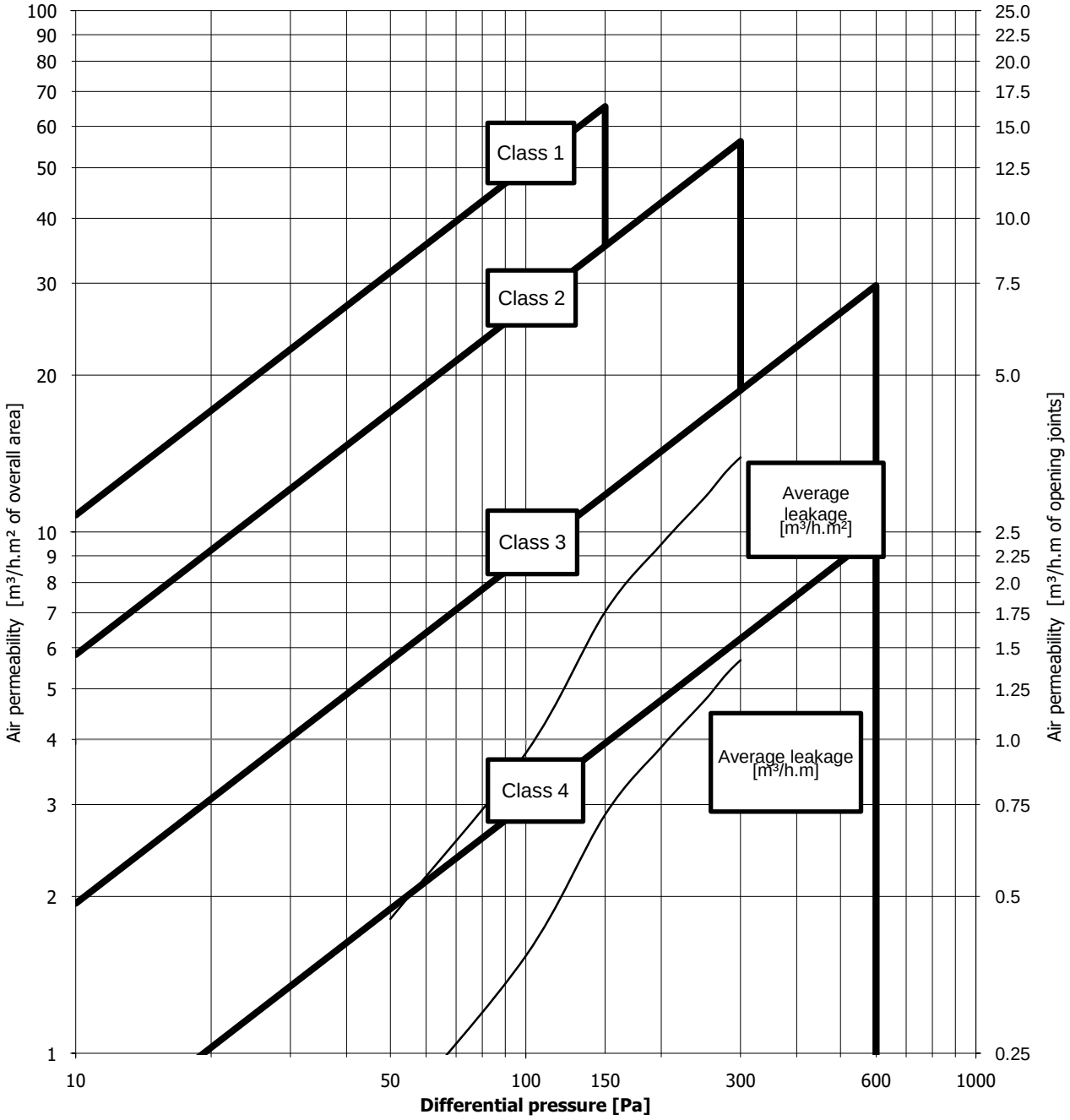
Graph of Average Air Permeability After Gusting.



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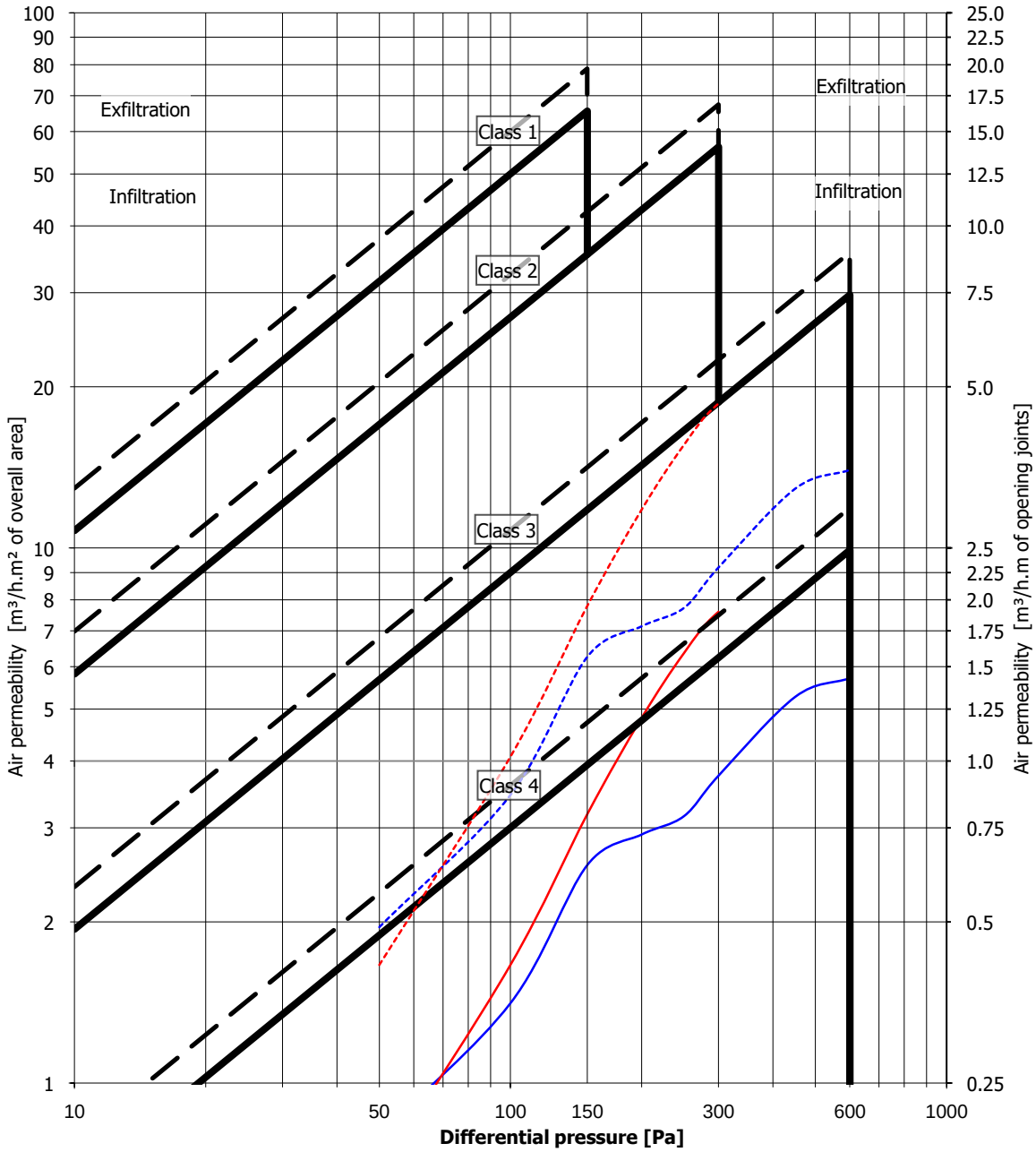
Graph of Average Air Permeability After Gusting.

(including +20% lines for each class)



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Wind Load Resistance Results- BS EN 12211:2000.

P3 Safety Test

No parts of the test sample became detached and the sample remained closed after a wind load safety test applied at a positive air pressure of 1800Pa.

No parts of the test sample became detached and the sample remained closed after a wind load safety test applied at a negative air pressure of 1800Pa

BS 6375: Part 2:2009

Clause 6
Performance characteristics and requirements for pedestrian doorsets **Assessment**

Clause 6.2 Operating Forces: EN12046-2 and EN12217

The sample was tested three times - locking the key and unlocking the key.

Key torque to lock – 0.20Nm (maximum 20Nm) Pass

Key torque to unlock – 0.20Nm (maximum 20Nm) Pass

Clause 6.3.1 Vertical Load

All loads were applied and removed in maximum increments of 100N.

The diagonal measurement of the door was recorded to the nearest 1mm (hinge-side bottom corner to lock-side top corner).

A pre-load of 200 ±4N was applied using weights vertically to the top lock-side corner of the door leaf, at 50 ±5mm from the opening edge, and maintained for 60 ±5 seconds. The load was then removed and the sample left to rest for a further 60 ±5 seconds.

The gauge was zeroed and the same loading point was loaded to (Class 1) 400N for 300 ±5 seconds and the maximum deformation measurement was recorded.

The load was then removed and after 180 ±5 seconds the residual deflection measurement was taken, along with the diagonal measurement.

Initial diagonal measurement – 2795mm

Maximum deformation – 2.10mm

Residual measurement – 0.56mm

Final diagonal measurement – 2795mm Pass

BS 6375: Part 2:2009 (Continued)

Clause 6
Performance characteristics and requirements for pedestrian **Assessment**

Clause 6.3.2 Resistance to Static Torsion

All loads were applied and removed in maximum increments of 100N.

The door leaf was opened to 90° then fixed at the top lockside corner, 50 ±5mm from the edge.

A pre-load of 200 ±4N was applied horizontally and normally to the plane of the leaf, at the lower lockside corner, at 50 ±5mm from the edge, and maintained for 60 ±5 seconds.

After one minute the gauge was zeroed and loaded to (Class 1) 200N for 300 ±5 seconds. The maximum deformation was recorded and then the load was then removed and the sample left to rest for 180 ±5 seconds. The residual deformation was then recorded.

For the door to achieve the required class the residual deformation must not exceed 2.0mm

Maximum deformation – 74mm

Residual measurement – 0.50mm Pass

Clause 6.3.3 Soft and Heavy Impact

The door was closed to its normal operating mode and the sample was marked at the centre of the door leaf.

The deviation across the width of the door was measured at the impact point.

A 30 ±0.6Kg leather impactor was raised to the required drop height and impacted on the exterior face. The deviation was then recorded again.

For the door to achieve the required class it shall not exceed 2mm residual deviation across the face of the impacted side.

Residual measurement – 0.0mm Pass

Clause 6.3.4 Hard Body Impact

The door leaf was mounted horizontally with rigid supports under the long edges of the leaf. Pattern 2 was selected.

Glazed impact points were omitted, and the exterior side was impacted.

If permanent damage is left after impact, measurements were taken after 30 minutes.

For the door to achieve the required class the mean of the diameter shall not exceed 20mm, and the mean of the depth shall not exceed 1.0mm.

Mean of the diameter – 4.00mm

Mean of the depth – 0.10mm Pass

BS 6375: Part 2:2009 (Continued)

Clause 6
Performance characteristics and requirements for pedestrian **Assessment**

Clause 6.4 Load Bearing Capacity of Safety Devices

None fitted

Closure against Obstruction

The objective of this test is to determine the resistance of a doorset to closure of the door leaf against small objects such as small toys which may be accidentally trapped between the frame and the outer leaf.

A 50 x 50 x 10mm aluminium block was placed in the gap between the leaf and the bottom of the hinge-side jamb.

A 200N force was applied to the lock side of the leaf and held for 15 ±5 seconds.

The leaf was then opened and closed five times and the operating forces were recorded Pass

Clause 6.2 Operating Forces: EN12046-2 and EN12217

The sample was tested three times – closing the leaf, locking the key, unlocking the key and opening the leaf.

Key torque to lock – 0.20Nm (maximum 20Nm) Pass

Key torque to unlock – 0.20Nm (maximum 20Nm) Pass

Basic Security (Annex A)

The objective of this test is to establish if, from the outside, entry can be gained by defeating the glazing or locking system.

The force used did not result in permanent set or plastic deformation of any tool.

Damaged tools shall be replaced and the test shall not exceed the maximum three minute time period.

No tools effective

No entry gained. Pass

Description of Sample. (Sample 2)

Sample Type -	1 off open out glaze in hinged door assemblies with full glass infill and Standard threshold
Material -	Aluminium alloy
Finish -	Painted white
Fittings -	**Master leaf** A three point Sobinco Multipoint key locking hardware (three hook / Pins) Sobinco cylinder, Fapim handle and four Fapim Lift off hinges with four hinge protector pins and two anti lift blocks **Slave leaf** A two point finger operated hardware (two shoot bolts), and four Fapim lift off hinges with four hinge protector pins and two anti lift blocks
Glass -	Double glazed 6-16-6mm toughened glass sealed units
Glass Retention System -	Internal beads and gaskets
Weathersealing -	E.D.P.M

Sample dimensions -	Overall length:	2842mm	Height: 2610mm
	Active leaf length:	1200mm	Height: 2534mm
	Slave leaf length:	1200mm	Height: 2534mm

Date of test -	22 May 2017
Laboratory temperature -	20.3°C
Laboratory humidity -	62.8%RH
Atmospheric pressure -	100.0kPa

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Description of Test Sample. (Sample 2 – open out, standard threshold)

Note – Parts list supplied by client and not verified by BSI.

Outer Frame width	2482mm	**Outer Frame Material**	Aluminium
Outer Frame height	2610mm	**Outer Frame Gasket**	
Outer Frame Part Numbers		Gasket Type	EDPM
Top	EF011	Manufacturer	Smart
Bottom	EF011	Product Name	Eco Futural
Lock Side	EF011	Product Code	ACEF030A ACEF030B
Hinge Side	EF011	**Mullion**	
Outer Frame section dimensions		Manufacturer	Smart
Width	65mm	Product name	Eco Futural
Depth	65mm	Product Code	EF040
Reinforcing:		Materials	Aluminium
Manufacturer	na	**Outer Frame Joint Method**	
Product Name		Head	Cleat And Glue
Product code		Foot	Cleat And Glue
Material			

Leaf		**Leaf Material:**	Aluminium
Leaf Width:	1200mm	**Leaf Gasket**	
Leaf Height:	2534mm	Gasket type:	EDPM
Leaf Part Numbers:		Manufacturer:	Smart
Top:	EF120	Product Name:	Eco Futural
Bottom:	EF120	Product Code	ACVL031N
Lock side:	EF120	**Leaf Midrail:**	
Hinge Side	EF120	Manufacturer:	
Leaf section size		Product name:	
Width:	74mm	Product code:	
Depth:	93mm	Material:	
Reinforcing		**Leaf joint method**	
Manufacturer:	na	Head:	Cleat And Glue
Product Name:		Foot:	Cleat And Glue
Product Code:			
Material:			
Bead			
Manufacturer:	Smart		
Product Name:	Eco Futural		
Product Code:	GL526		
Material:	Aluminium		
Bead Size:	22mm x 26mm		

Description of Test Sample. (continued)

Glazing Unit		**Glazing Gasket**	
Manufacturer:	Ashton Glass	Gasket Type:	EDPM
Inner Thickness:	6mm Toughened	Manufacturer:	Smart
Spacer Material:	Aluminium	Product Name:	Eco Futural
Outer Thickness:	6mm Toughened	Product Code	ACVG31 ACVG34
Unit Sizes:	1044mm x 2378mm x 28mm	**Glazing Clip**	NA
Glazing Tape Details NA		Manufacturer:	
Manufacturer:		Product Name:	
Product Name:		Product Code	
Product Code			

Hardware			**Fixings**	**Quantity**
Hinges:	ACMX102	Two Part Hinge	ACMX 103 PINS. M5.	8
Hinge Protectors:	ACMX103	Hinge Protector Pins	ACMX 103 PINS.	16
Lock:	ACSZVL709	Three Point Lock	ACIM 020	1
Cylinder:	ACMX01627		Supplied with Cylinder	1
Handle:	ACFA120	Rivett Nuts M5 With Handle	M5 X 25mm	2
Touch Bar:	NA			
Cylinder Support:	NA			
Cylinder Escutcheon:	ACMX102	Cylinder Cover	No 8 Self Tapping Screw.	2
Keeps:	ACSZ650 ACSZ651	Center Keep Top And Bottom Keeps	ACET062	1 2
Drip Bar	VL 72			
Additional Hardware	ACFT512	Anti Lift Blocks	ACET 060	4 Pairs
	ACGT430 ACEF961 ACVL127 ACVL429	Shoot Bolt Shoot Bolt Adaptor Shoot Bolt Rods Shoot Bolt Keeps	ACET060 ACIM062	2 1 2 2
	ACEF055	Mullion End Cap		2
	ACEF057	Glass Setting Block		10
	ACET062	Mullion Fixing Screws		10
	MUA067 ACET062 ACGSL045	Mullion Fixing Screws Keep Fixing Screws Drain Caps		10 11 8

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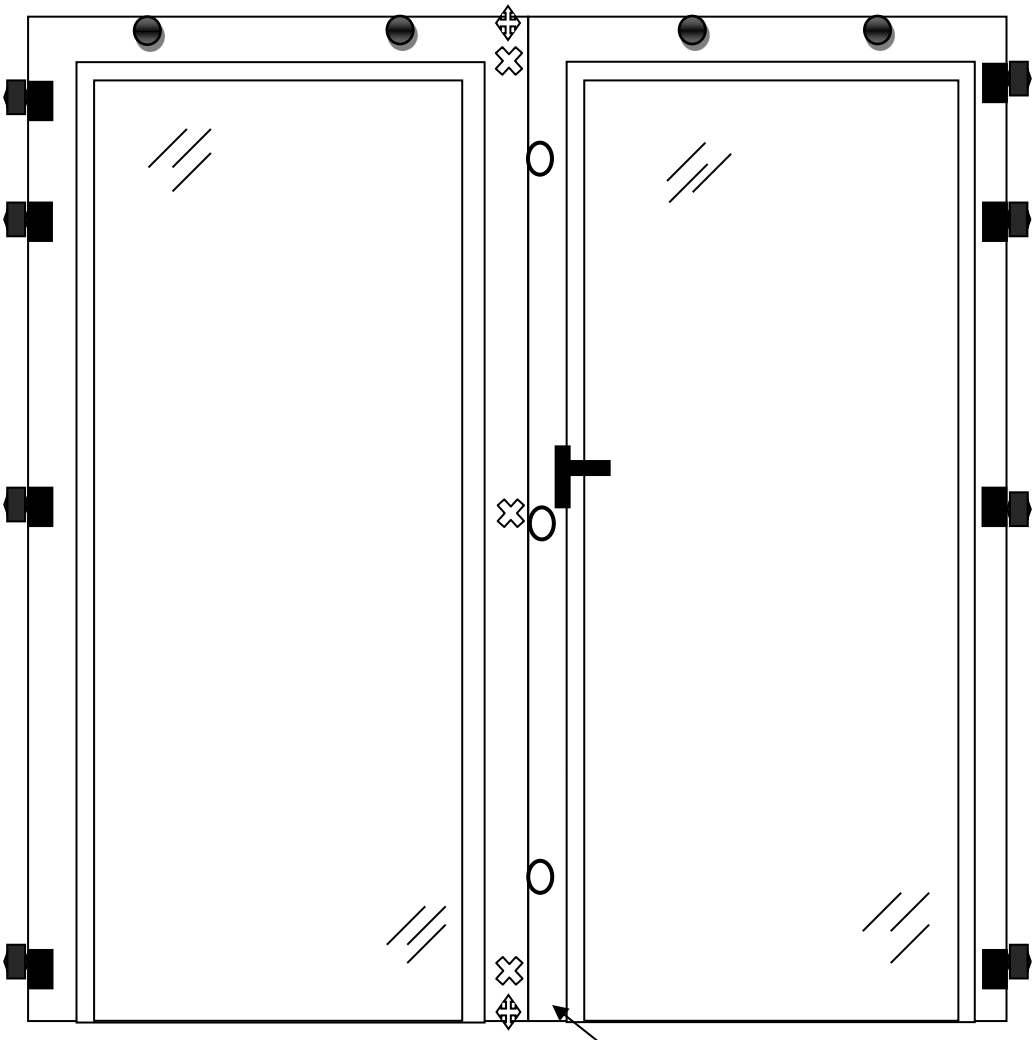
Elevation Drawing of Door Assembly.



- shoot bolt
- handle
- hook bolt / Pins
- Transducer placement
- Pin hinges
- Hinge protector pin
- Anti lift off blocks

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Graph of Air Permeability Before Gusting.

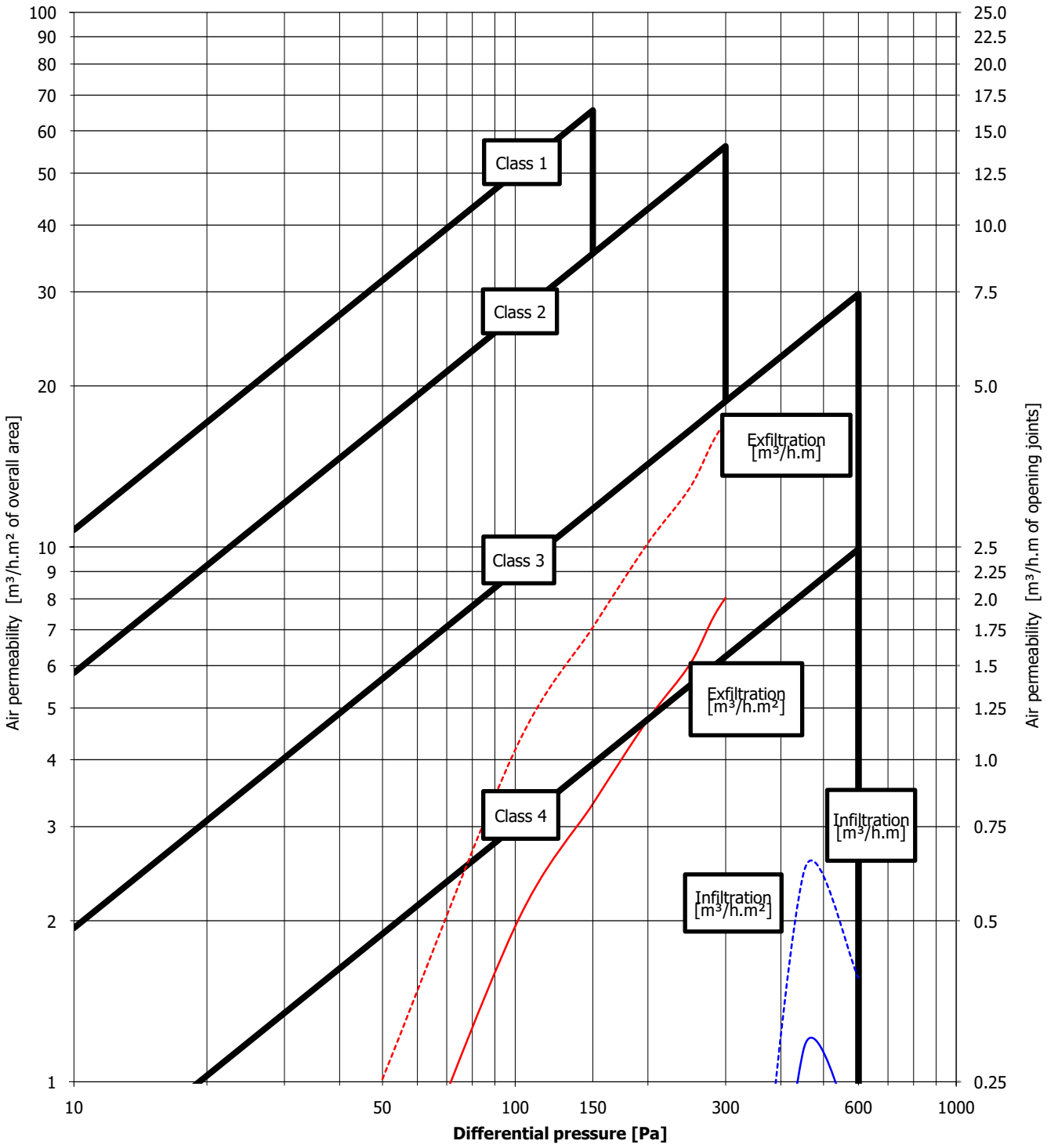

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Table of Air Permeability Before Gusting.

AIR PERMEABILITY TEST RESULTS - BS 6375-1:2015 / BS EN 1026:2000

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

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	1.5	0.13	0.24
100	6.3	0.52	0.98
150	10.7	0.88	1.65
200	15.4	1.27	2.38
250	19.8	1.63	3.06
300	26.2	2.16	4.05
450	41.8	3.46	6.46

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

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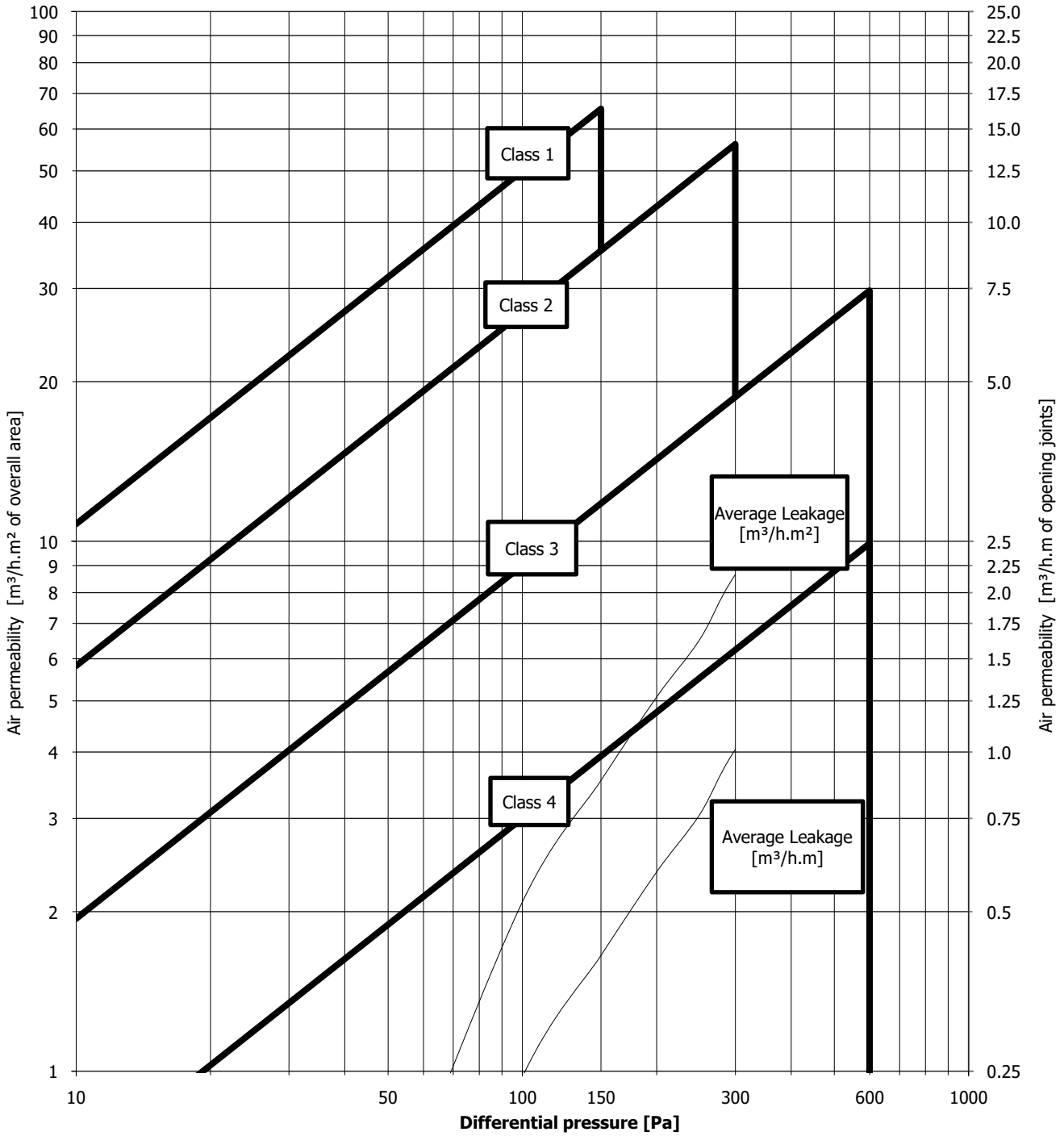
Graph of Air Permeability Before Gusting.



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Water Tightness Test Results.

BS EN 1027:2000 Clause 7 Watertightness before resistance to wind loads

TABLE 2 - Spraying method 1A

Pressure (Pascals)	Point and time at which water leakage occurred
0	No leakage
50	No leakage
100	No leakage
150	No leakage
200	No leakage
250	No leakage
300	No leakage
450	No leakage
600	No leakage
750	No leakage
900	No leakage
1050	Water leaked out and over the threshold at 3 minutes 33 seconds

Wind Load Resistance Test Results - BS EN 12211:2000

Clause 8 Resistance to wind load

P1 Deflection Test

Three positive pressure pulses at 1320Pa were applied

No visible failures or functional defects to the test sample were observed after wind loads applied at a positive air pressure of 1200Pa.

Actual deflection – 6.78mm (maximum deflection allowed 16.03mm)

Deflection/span ratio 1/354 (maximum ratio allowed 1/150)

Three negative pressure pulses at 1320Pa were applied

No visible failures or functional defects to the test sample were observed after wind loads applied at a negative air pressure of 1200Pa.

Actual deflection – 8.23mm (maximum deflection allowed 16.03mm)

Deflection/span ratio 1/292 (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 600Pa.

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 600Pa.

In accordance with BS 6375-1:2009 Clause 6.5, as the classification after the resistance to wind load tests is the same as the classification before the resistance to wind load tests, the resulting classification for the sample is Class 2.

Graph of Air Permeability After Gusting.

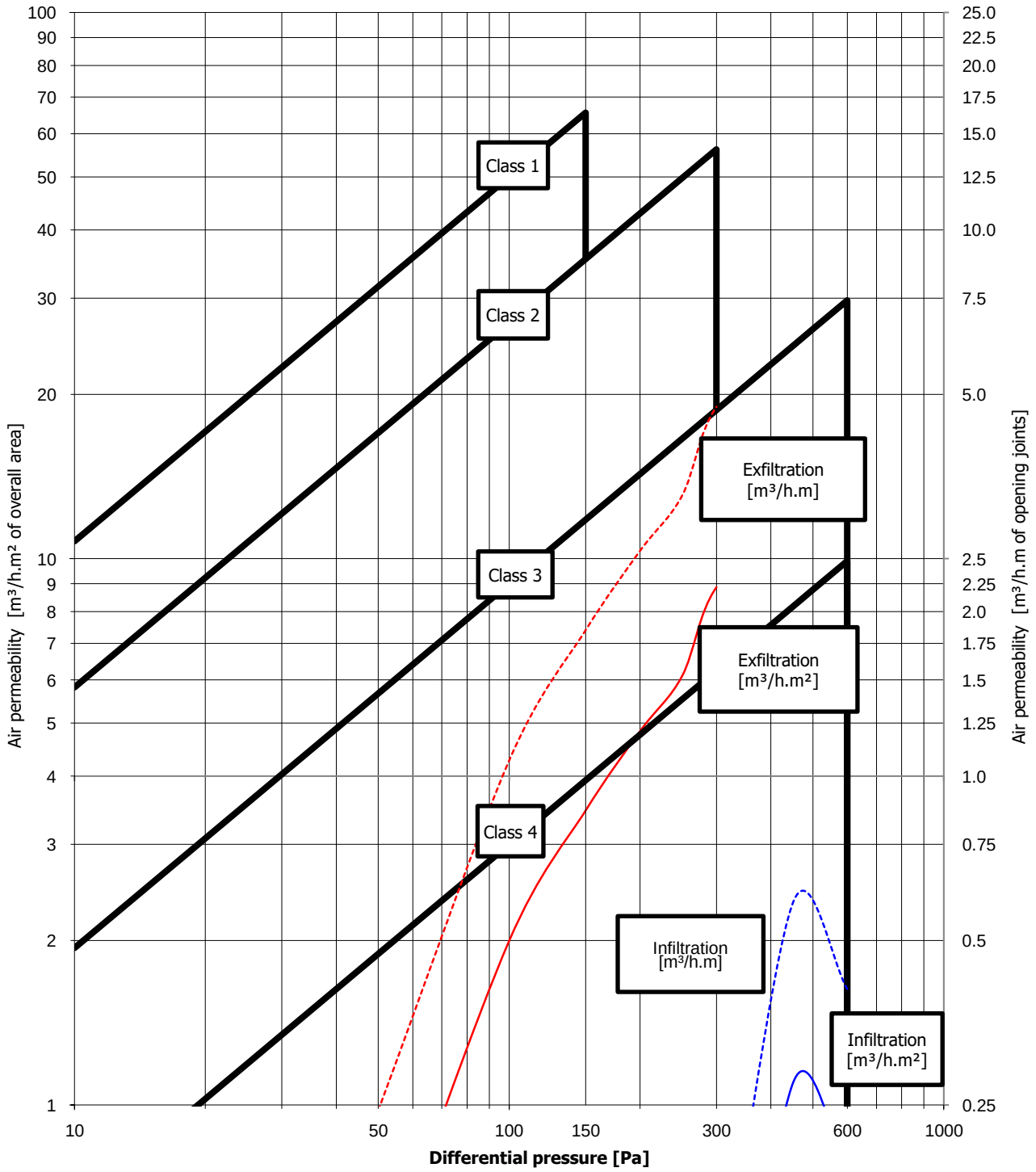

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Table of Air Permeability After Gusting.

AIR PERMEABILITY TEST RESULTS - BS 6375-1:2015 / BS EN 1026:2000

Clause 6.5 - After resistance to wind tests

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

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	1.6	0.13	0.24
100	6.6	0.54	1.01
150	11.3	0.93	1.75
200	15.7	1.30	2.43
250	20.1	1.66	3.11
300	29.3	2.42	4.53
450	42.0	3.47	6.49
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 = 12.1m

Overall area = 6.47m²

BS 6375-1:2015 Clause 6.5 - Joint class = 2

BS 6375-1:2015 Clause 6.5 - Area class = 2

BS 6375-1:2015 Clause 6.5 - Overall class = 2

In accordance with BS 6375-1:2015 Clause 6.5, as the classification after the resistance to wind load tests is the same as the classification before the resistance to wind load tests, the resulting classification for the sample is Class 2.

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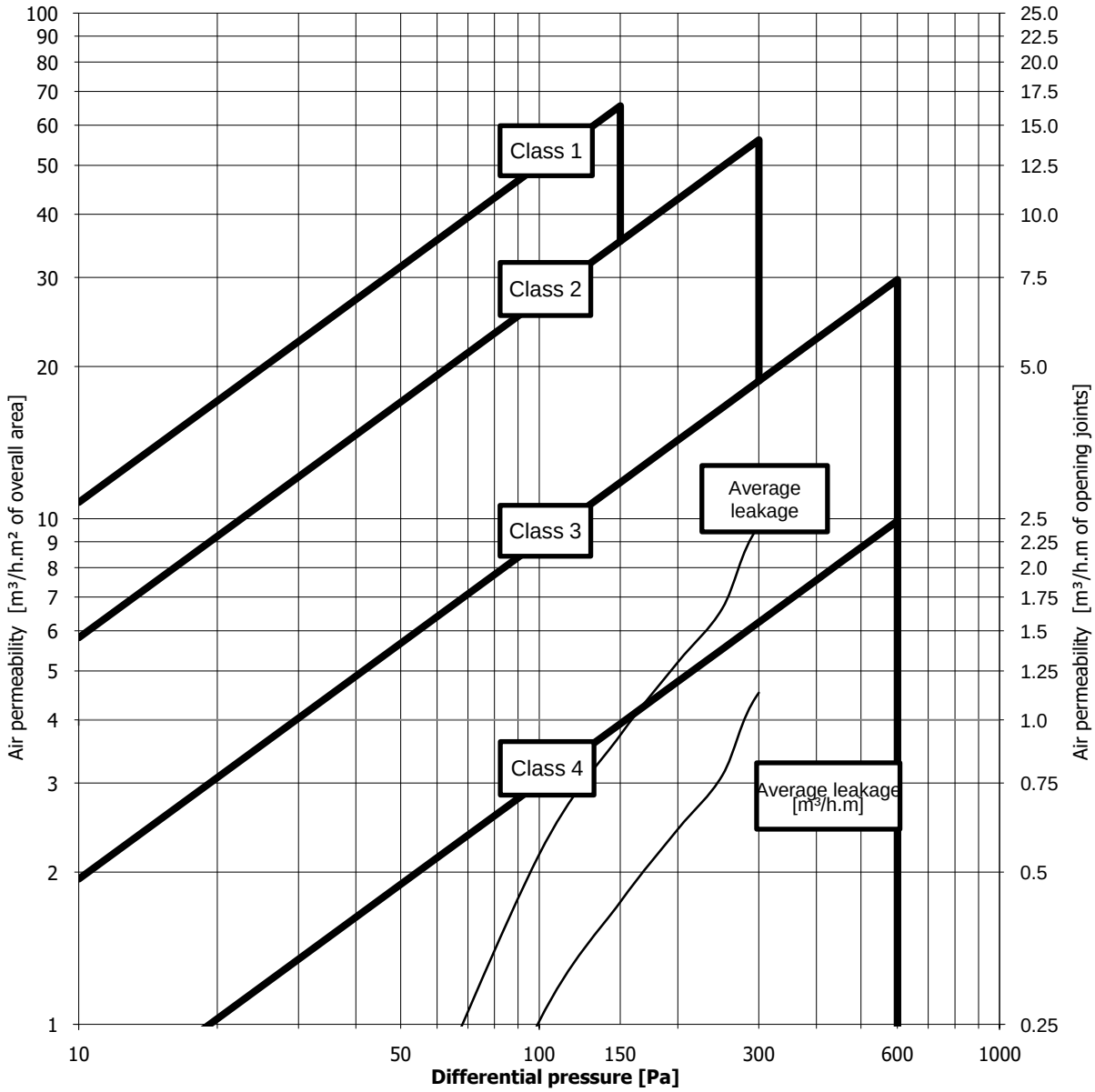
Graph of Average Air Permeability After Gusting.



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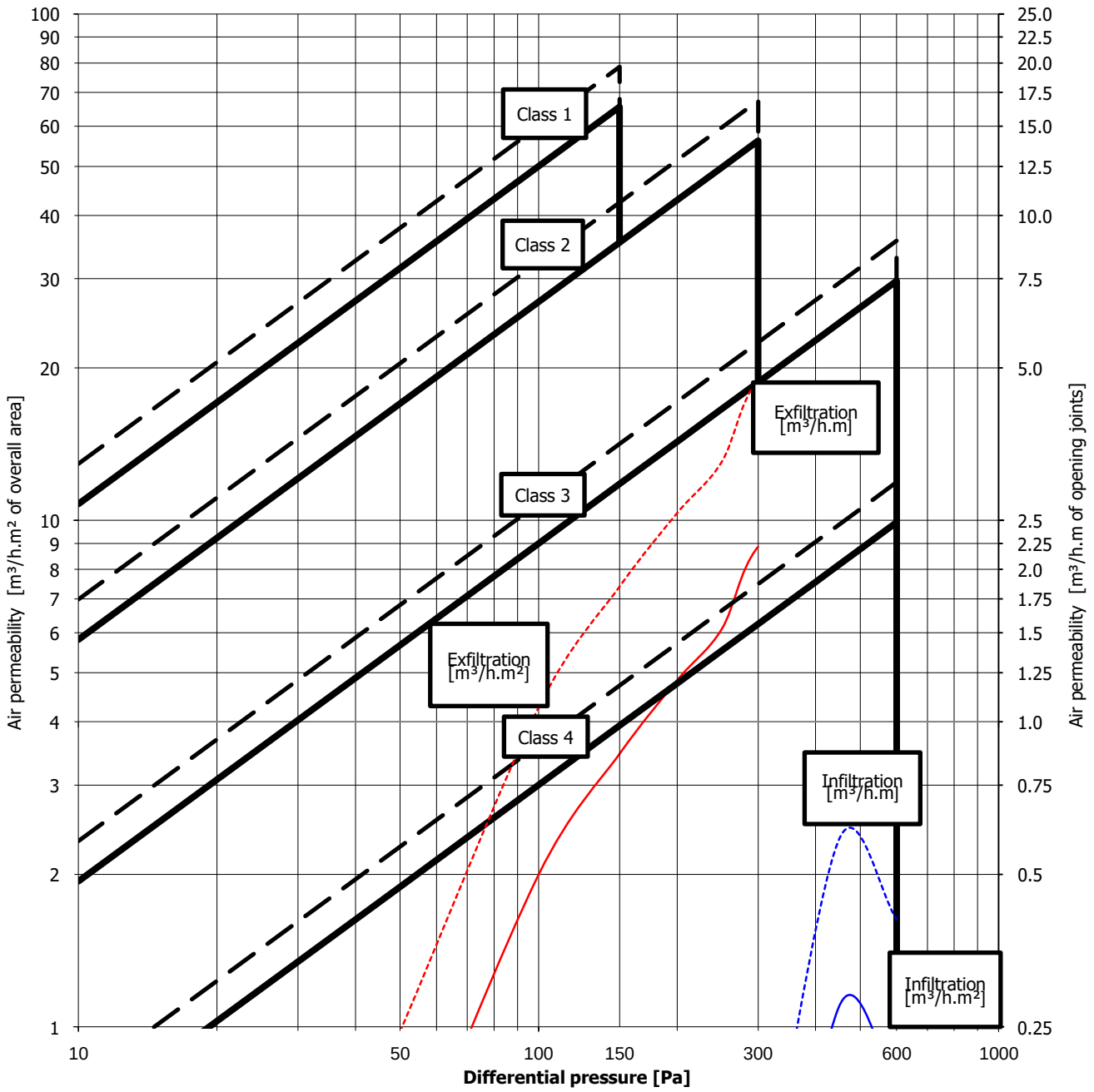
Graph of Average Air Permeability After Gusting.

(including +20% lines for each class)



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Wind Load Resistance 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 1800Pa.

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 1800Pa

Description of Sample. (Sample 3)

Sample Type -	1 off open in glaze in hinged door assemblies with full glass infill and low threshold.
Material -	Aluminium alloy
Finish -	Painted white
Fittings -	**Master leaf** A three point Sobinco Multipoint key locking hardware (three hook / Pins) Sobinco cylinder, Fapim handle and four Fapim Pin hinges with four hinge protector pins and two anti lift blocks **Slave leaf** A two point finger operated hardware (two shoot bolts), and four Fapim Pin hinges with four hinge protector pins and two anti lift blocks
Glass -	Double glazed 6-16-6mm toughened glass sealed units
Glass Retention System -	Internal beads and gaskets
Weathersealing -	E.D.P.M

Sample dimensions -	Overall length:	2842mm	Height: 2610mm
	Active leaf length:	1200mm	Height: 2534mm
	Slave leaf length:	1200mm	Height: 2534mm

Date of test -	22 May 2017
Laboratory temperature -	20.3°C
Laboratory humidity -	62.8%RH
Atmospheric pressure -	100.0kPa

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Description of Test Sample. (Sample 3 – open in, low threshold)

Note – Parts list supplied by client and not verified by BSI.

Outer Frame width	2482mm	**Outer Frame Material**	Aluminium
Outer Frame height	2583mm	**Outer Frame Gasket**	
Outer Frame Part Numbers		Gasket Type	EDPM
Top	EF011	Manufacturer	Smart
Bottom	EF952	Product Name	Eco Futural
Lock Side	EF011	Product Code	ACEF030A ACEF030B ACVL032
Hinge Side	EF011	**Mullion**	
Outer Frame section dimensions		Manufacturer	Smart
Width	65mm	Product name	Eco Futural
Depth	65mm	Product Code	EF040
Reinforcing:		Materials	Aluminium
Manufacturer	na	**Outer Frame Joint Method**	
Product Name		Head	Cleat And Glue
Product code		Foot	Mechanical Joint.
Material			

Leaf		**Leaf Material:**	Aluminium
Leaf Width:	1200mm	**Leaf Gasket**	
Leaf Height:	2534mm	Gasket type:	EDPM
Leaf Part Numbers:		Manufacturer:	Smart
Top:	EF023	Product Name:	Eco Futural
Bottom:	EF023 x EF095	Product Code	ACVL031N
Lock side:	EF023	**Leaf Midrail:**	
Hinge Side	EF023	Manufacturer:	
Leaf section size		Product name:	
Width:	74mm	Product code:	
Depth:	102mm	Material:	
Reinforcing		**Leaf joint method**	
Manufacturer:	na	Head:	Cleat And Glue
Product Name:		Foot:	Cleat And Glue
Product Code:			
Material:			
Bead			
Manufacturer:	Smart		
Product Name:	Eco Futural		
Product Code:	GL534		
Material:	Aluminium		
Bead Size:	22mm x 34mm		

Description of Test Sample. (continued)

Glazing Unit		**Glazing Gasket**	
Manufacturer:	Ashton Glass	Gasket Type:	EDPM
Inner Thickness:	6mm Toughened	Manufacturer:	Smart
Spacer Material:	Aluminium	Product Name:	Eco Futural
Outer Thickness:	6mm Toughened	Product Code	ACVG31 ACVG34
Unit Sizes:	1025mm x 2360mm x 28mm	**Glazing Clip**	NA
Glazing Tape Details NA		Manufacturer:	
Manufacturer:		Product Name:	
Product Name:		Product Code	
Product Code			

Hardware			**Fixings**	**Quantity**
Hinges:	ACUN102	Three Part Hinge	ACUN 103 PINS. M5.	8
Hinge Protectors:	ACUN103	Hinge Protector Pins	ACUN 103 PINS.	16
Lock:	ACSZVL709	Three Point Lock	ACIM 020	1
Cylinder:	ACMX01627		Supplied with Cylinder	1
Handle:	ACFA120	Rivett Nuts M5 With Handle	M5 X 25mm	2
Touch Bar:	NA			
Cylinder Support:	NA			
Cylinder Escutcheon:	ACMX102	Cylinder Cover	No 8 Self Tapping Screw.	2
Keeps:	ACSZ 650 ACSZ651	Center Keep Top And Bottom Keep	ACET062	1 2
Drip Bar	VL 72		ACVL061	
Additional Hardware	ACFT512	Anti Lift Blocks	ACET 060	4 Pairs
	ACGT430 ACEF961 ACVL127 ACVL429	Shoot bolt Shoot Bolt Adaptor Shoot Bolt Rods Shoot Bolt Keeps	ACET060 ACIM020	1 1 2 2
	ACEF055	Mullion End Cap		2
	ACEF057	Glass Setting Block		10
	ACET062	Mullion Fixing Screws		10
	MUA067 ACET062 ACGSL045	Mullion Fixing Screws Keep Fixing Screws Drain Caps		10 11 8

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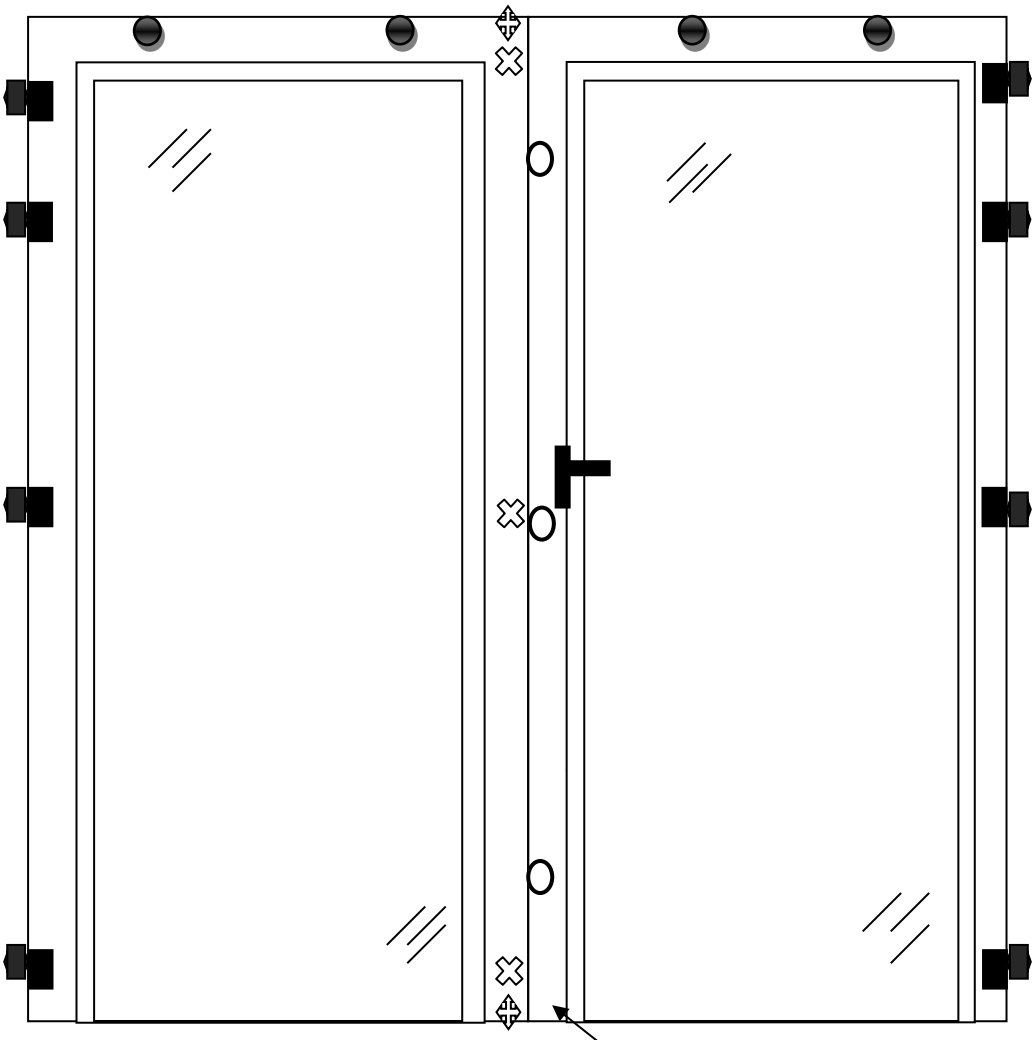
Elevation Drawing of Door Assembly.



- shoot bolt
- handle
- hook bolt / Pins
- Transducer placement
- Pin hinges
- Hinge protector pin
- Anti lift off blocks

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Graph of Air Permeability Before Gusting.

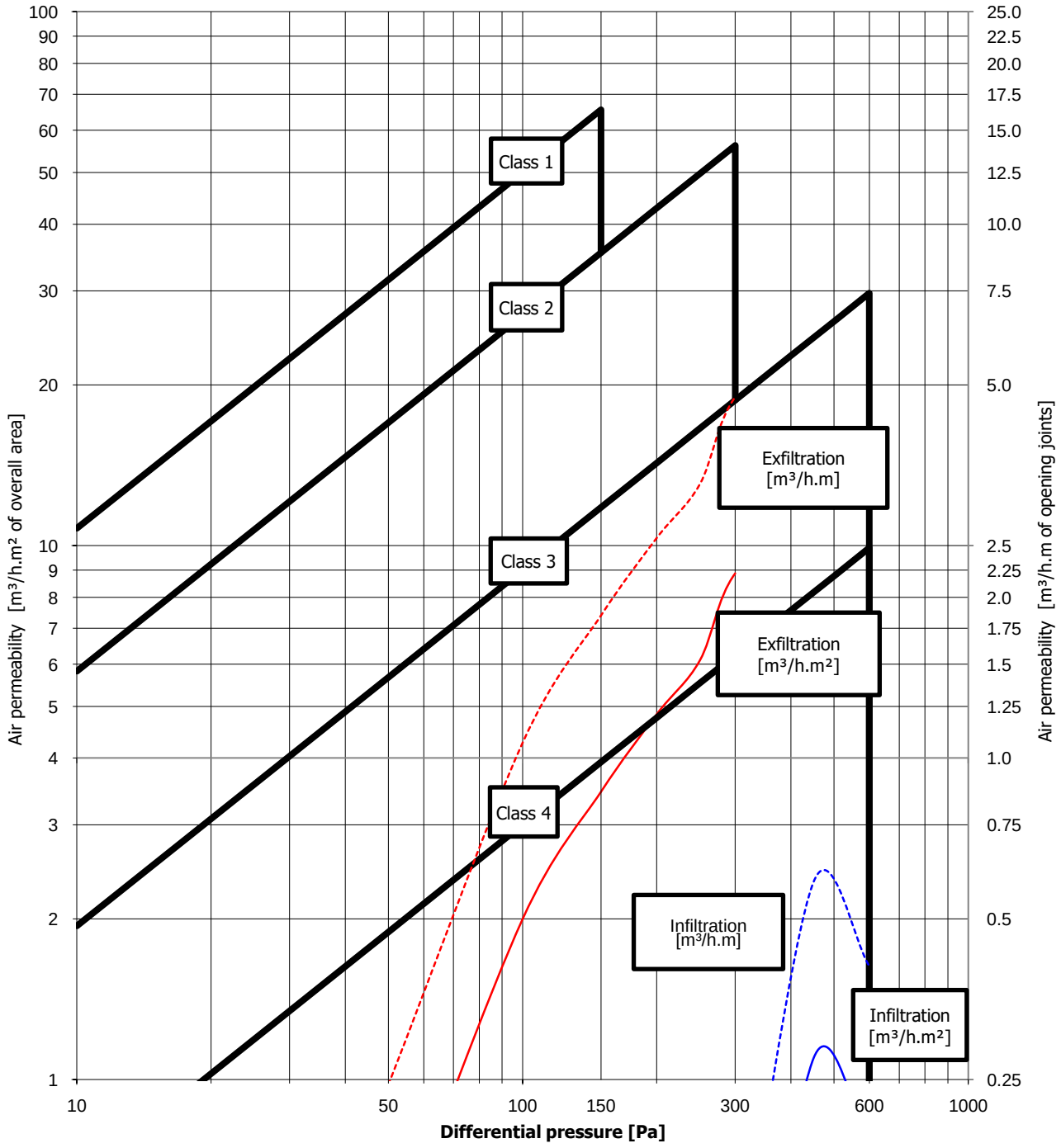

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Table of Air Permeability Before Gusting.

AIR PERMEABILITY TEST RESULTS - BS 6375-1:2015 / BS EN 1026:2000

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

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	5.1	0.42	0.69
100	10.7	0.89	1.45
150	21.4	1.76	2.88
200	28.5	2.35	3.84
250	35.3	2.92	4.76
300	41.5	3.43	5.60
450	53.1	4.38	7.16

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 = 12.1m

Overall area = 7.41m²

BS 6375-1:2015 Clause 6.3 - Joint class = 2

BS 6375-1:2015 Clause 6.3 - Area class = 2

BS 6375-1:2015 Clause 6.3 - Overall class = 2

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Water Tightness Test Results.

BS EN 1027:2000 Clause 7 Watertightness before resistance to wind loads

TABLE 2 - Spraying method 1A

Pressure (Pascals)	Point and time at which water leakage occurred
0	No leakage
50	No leakage
100	No leakage
150	Water leaked out and over the threshold at 3 seconds
200	-
250	-
300	-
450	-
600	-
750	-
900	-
1050	-

Wind Load Resistance Test Results - BS EN 12211:2000

Clause 8 Resistance to wind load

P1 Deflection Test

Three positive pressure pulses at 1320Pa were applied

No visible failures or functional defects to the test sample were observed after wind loads applied at a positive air pressure of 1200Pa.

Actual deflection – 7.05mm (maximum deflection allowed 16.01mm)

Deflection/span ratio 1/341 (maximum ratio allowed 1/150)

Three negative pressure pulses at 1320Pa were applied

No visible failures or functional defects to the test sample were observed after wind loads applied at a negative air pressure of 1200Pa.

Actual deflection – 5.58mm (maximum deflection allowed 16.01mm)

Deflection/span ratio 1/431 (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 600Pa.

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 600Pa.

In accordance with BS 6375-1:2009 Clause 6.5, as the classification after the resistance to wind load tests is the same as the classification before the resistance to wind load tests, the resulting classification for the sample is Class 2.

Graph of Air Permeability After Gusting.

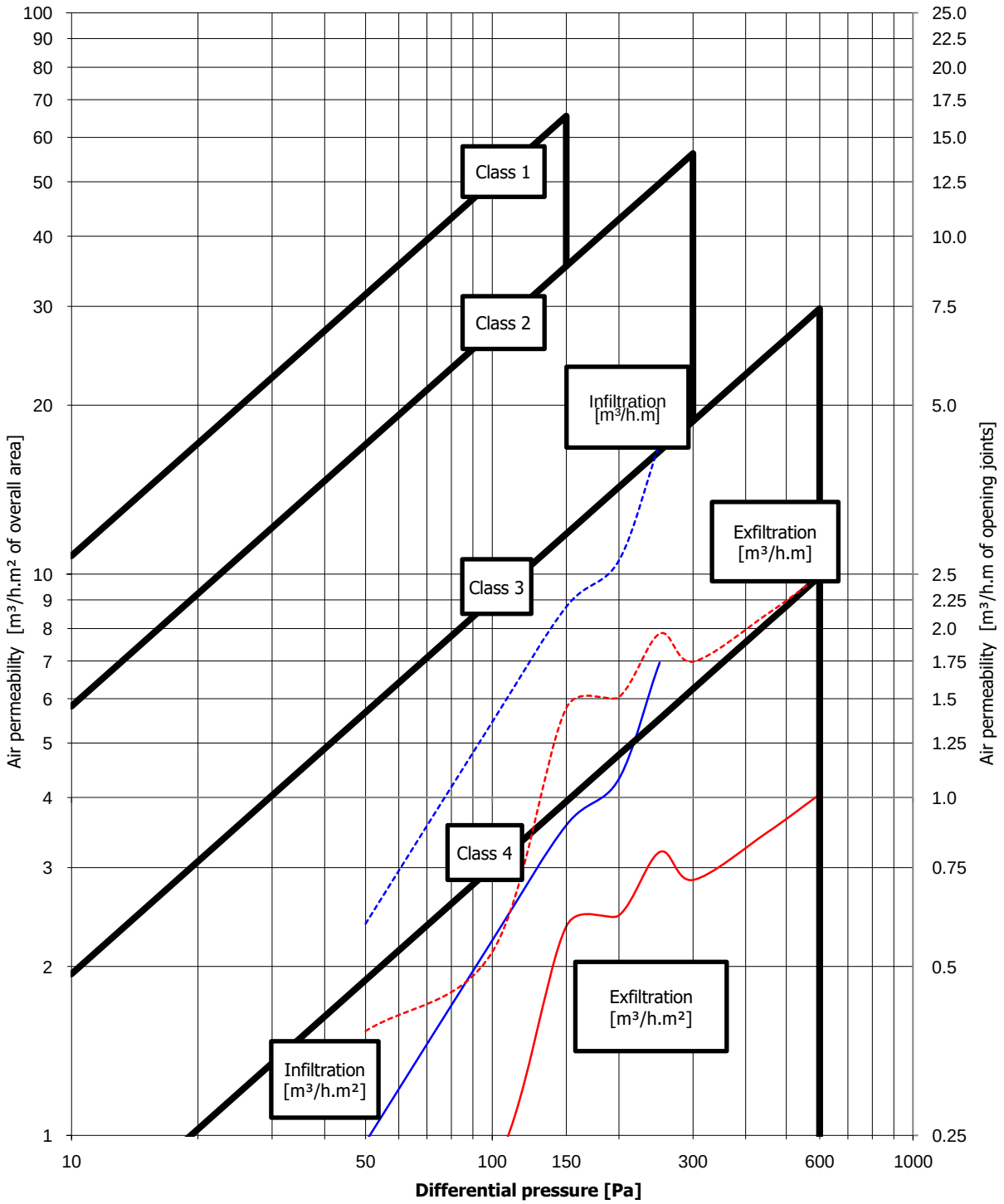

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Table of Air Permeability After Gusting.

AIR PERMEABILITY TEST RESULTS - BS 6375-1:2015 / BS EN 1026:2000

Clause 6.5 - After resistance to wind tests

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

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	5.5	0.45	0.74
100	11.4	0.94	1.54
150	21.3	1.76	2.87
200	28.6	2.37	3.87
250	35.3	2.91	4.76
300	42.1	3.48	5.68
450	55.4	4.58	7.47

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 = 12.1m

Overall area = 7.41m²

BS 6375-1:2015 Clause 6.5 - Joint class = 2

BS 6375-1:2015 Clause 6.5 - Area class = 2

BS 6375-1:2015 Clause 6.5 - Overall class = 2

In accordance with BS 6375-1:2015 Clause 6.5, as the classification after the resistance to wind load tests is the same as the classification before the resistance to wind load tests, the resulting classification for the sample is Class 2.

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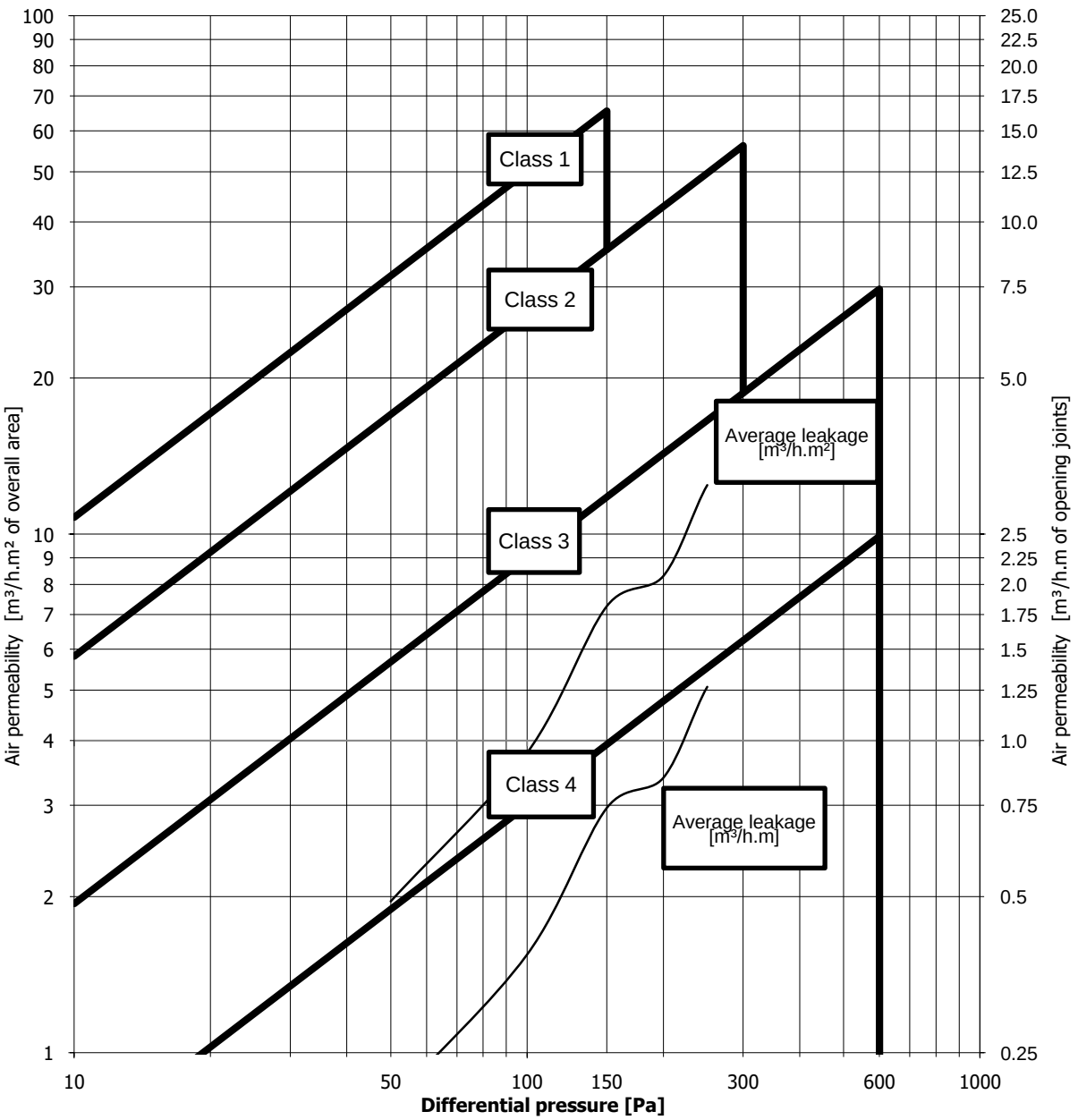
Graph of Average Air Permeability After Gusting.



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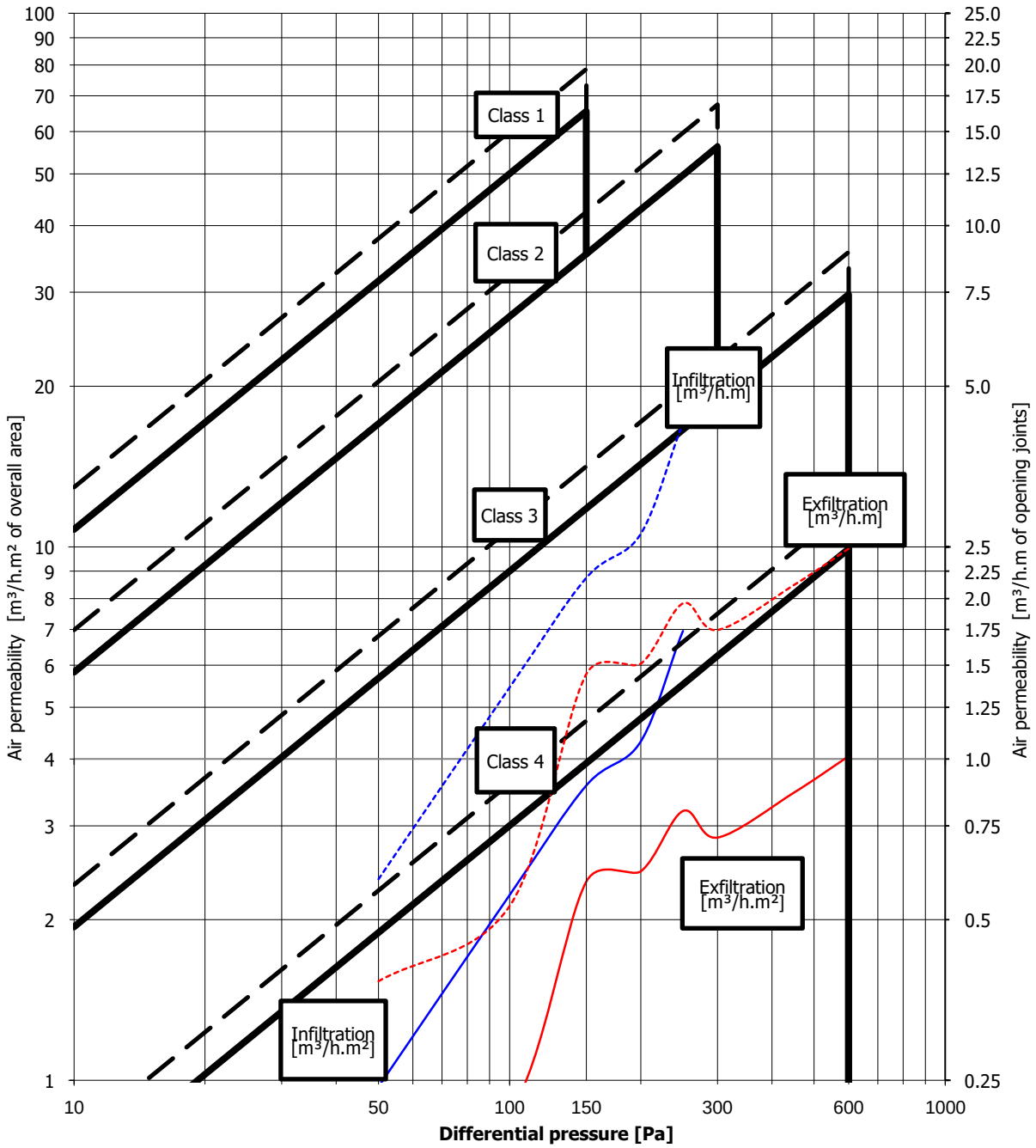
Graph of Average Air Permeability After Gusting.

(including +20% lines for each class)



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Wind Load Resistance 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 1800Pa.

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 1800Pa

Description of Sample. (Sample 4)

Sample Type -	1 off open in glaze in hinged door assemblies with full glass infill and standard threshold
Material -	Aluminium alloy
Finish -	Painted white
Fittings -	**Master leaf** A three point Sobinco Multipoint key locking hardware (three hook / Pins) Sobinco cylinder, Fapim handle and four Fapim Pin hinges with four hinge protector pins and two anti lift blocks **Slave leaf** A two point finger operated hardware (two shoot bolts), and four Fapim Pin hinges with four hinge protector pins and two anti lift blocks
Glass -	Double glazed 6-16-6mm toughened glass sealed units
Glass Retention System -	Internal beads and gaskets
Weathersealing -	E.D.P.M

Sample dimensions -	Overall length:	2842mm	Height: 2610mm
	Active leaf length:	1200mm	Height: 2534mm
	Slave leaf length:	1200mm	Height: 2534mm

Date of test -	22 May 2017
Laboratory temperature -	20.3°C
Laboratory humidity -	62.8%RH
Atmospheric pressure -	100.0kPa

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Description of Test Sample. (Sample 4 – open in, standard threshold)

Note – Parts list supplied by client and not verified by BSI.

Outer Frame width	2482mm	**Outer Frame Material**	Aluminium
Outer Frame height	2610mm	**Outer Frame Gasket**	
Outer Frame Part Numbers		Gasket Type	EDPM
Top	EF011	Manufacturer	Smart
Bottom	EF011	Product Name	Eco Futural
Lock Side	EF011	Product Code	ACEF030A ACEF030B
Hinge Side	EF011	**Mullion**	
Outer Frame section dimensions		Manufacturer	Smart
Width	65mm	Product name	Eco Futural
Depth	65mm	Product Code	EF040
Reinforcing:		Materials	Aluminium
Manufacturer	na	**Outer Frame Joint Method**	
Product Name		Head	Cleat And Glue
Product code		Foot	Cleat And Glue
Material			

Leaf		**Leaf Material:**	Aluminium
Leaf Width:	1200mm	**Leaf Gasket**	
Leaf Height:	2534mm	Gasket type:	EDPM
Leaf Part Numbers:		Manufacturer:	Smart
Top:	EF023	Product Name:	Eco Futural
Bottom:	EF023	Product Code	ACVL031N
Lock side:	EF023	**Leaf Midrail:**	
Hinge Side	EF023	Manufacturer:	
Leaf section size		Product name:	
Width:	74mm	Product code:	
Depth:	102mm	Material:	
Reinforcing		**Leaf joint method**	
Manufacturer:	na	Head:	Cleat And Glue
Product Name:		Foot:	Cleat And Glue
Product Code:			
Material:			
Bead			
Manufacturer:	Smart		
Product Name:	Eco Futural		
Product Code:	GL534		
Material:	Aluminium		
Bead Size:	22mm x 34mm		

Description of Test Sample. (continued)

Glazing Unit		**Glazing Gasket**	
Manufacturer:	Ashton Glass	Gasket Type:	EDPM
Inner Thickness:	6mm Toughened	Manufacturer:	Smart
Spacer Material:	Aluminium	Product Name:	Eco Futural
Outer Thickness:	6mm Toughened	Product Code	ACVG31 ACVG34
Unit Sizes:	1025mm x 2360mm x 28mm	**Glazing Clip**	NA
Glazing Tape Details NA		Manufacturer:	
Manufacturer:		Product Name:	
Product Name:		Product Code	
Product Code			

Hardware			**Fixings**	**Quantity**
Hinges:	ACUN102	Three Part Hinge	ACUN 103 PINS. M5.	8
Hinge Protectors:	ACUN103	Hinge Protector Pins	ACUN 103 PINS.	16
Lock:	ACSZVL709	Three Point Lock	ACIM 020	1
Cylinder:	ACMX01627		Supplied with Cylinder	1
Handle:	ACFA120	Rivett Nuts M5 With Handle	M5 X 25mm	2
Touch Bar:	NA			
Cylinder Support:	NA			
Cylinder Escutcheon:	ACMX102	Cylinder Cover	No 8 Self Tapping Screw.	2
Keeps:	ACSZ650 ACSZ651	Middle keep Top Bottom Keep	Acet 062	1 2
Drip Bar	VL 72			
Additional Hardware	ACFT512	Anti Lift Blocks	ACET 060	4 Pairs
	ACGT 430 ACEF 961 ACVL127 ACVL429	Shoot bolt Shoot bolt Adaptor Shoot bolt Rods Shoot Bolt Keeps	ACET 060 ACIM020	2 1 2 2
	ACEF055	Mullion End Cap		2
	ACEF057	Glass Setting Block		10
	ACET062	Mullion Fixing Screws		10
	MUA067 ACET062 ACGSL045	Mullion Fixing Screws Keep Fixing Screws Drain Caps		10 11 8

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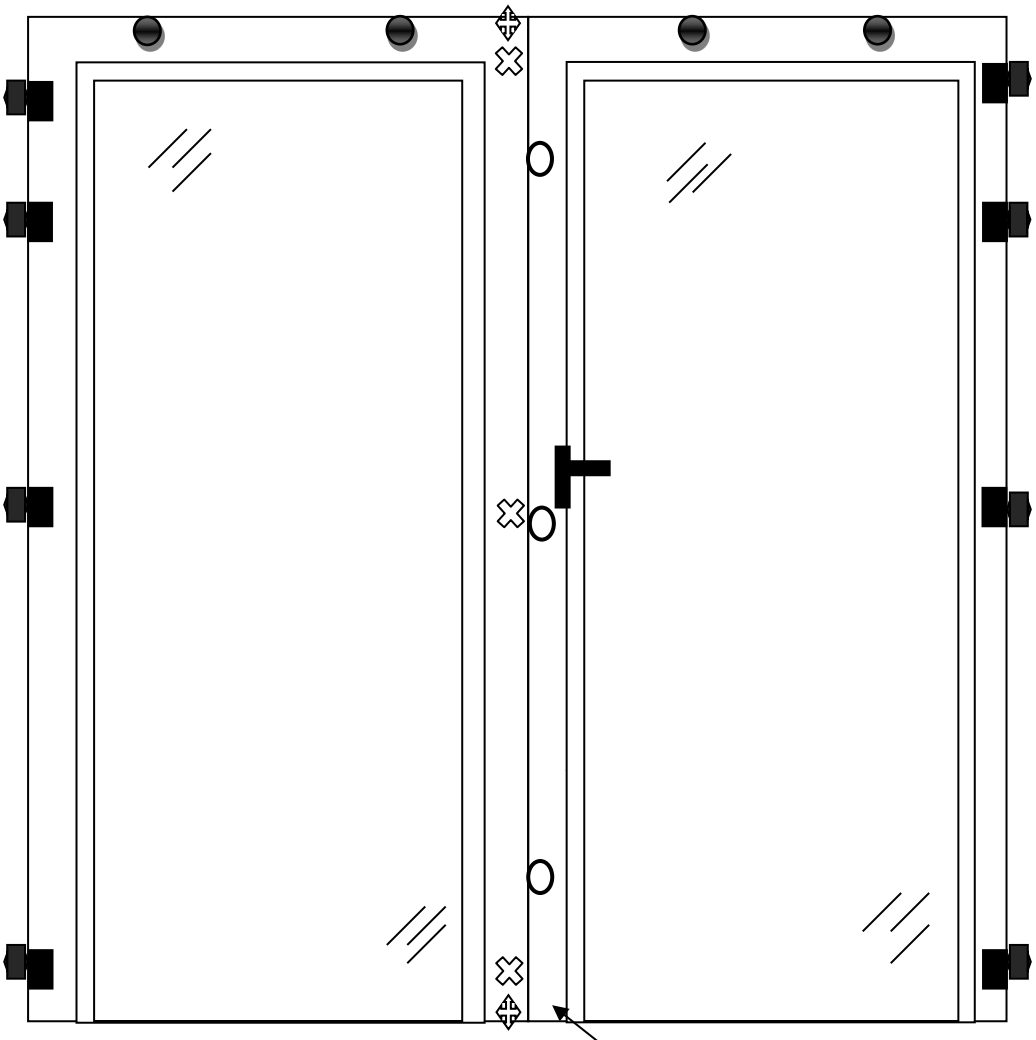
Elevation Drawing of Door Assembly.



- shoot bolt
- handle
- hook bolt / Pins
- Transducer placement
- Pin hinges
- Hinge protector pin
- Anti lift off blocks

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Graph of Air Permeability Before Gusting.

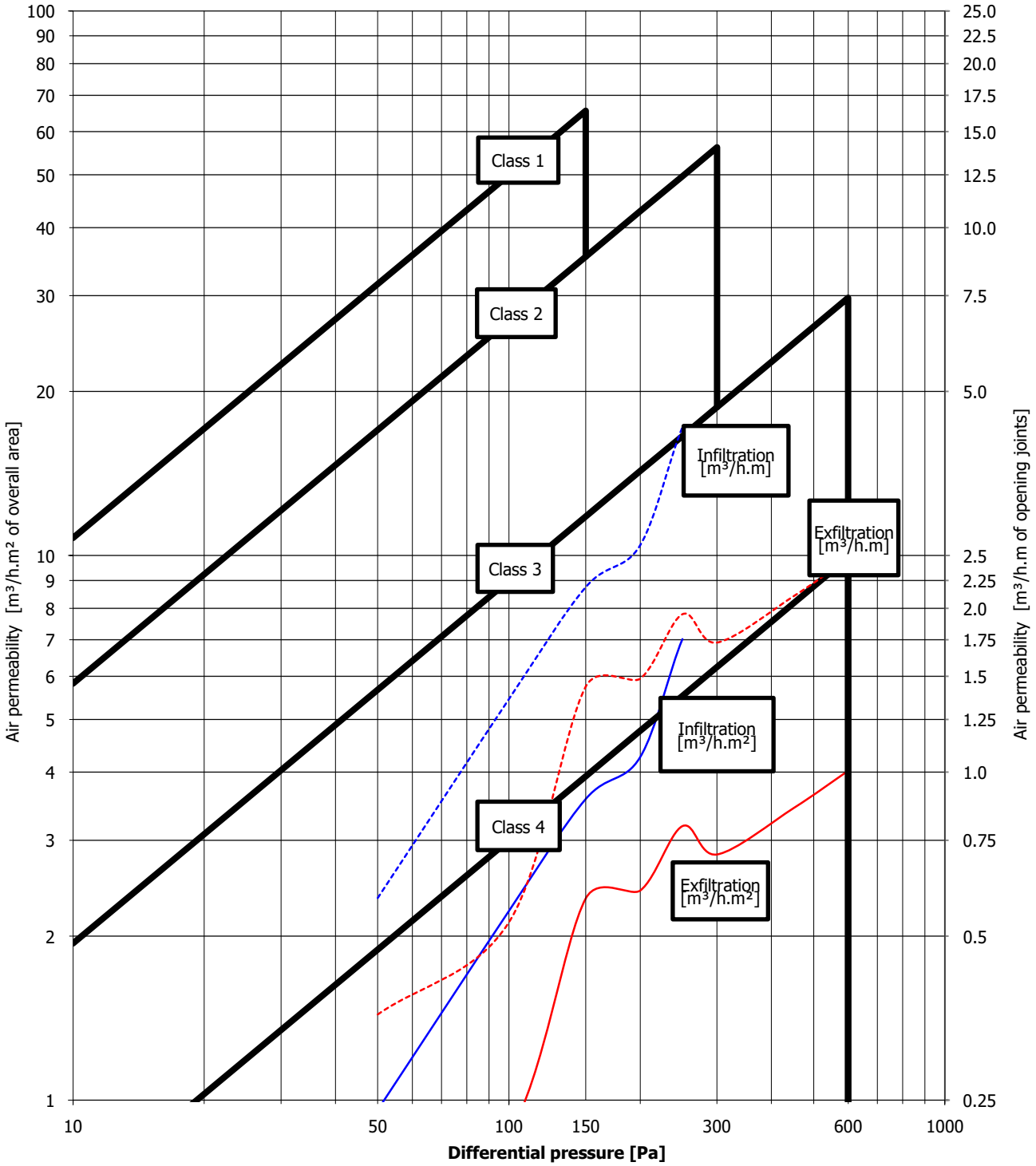

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Table of Air Permeability Before Gusting.

AIR PERMEABILITY TEST RESULTS - BS 6375-1:2015 / BS EN 1026:2000

Clause 6.3 - 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 [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	5.7	0.47	0.77
100	11.5	0.95	1.55
150	21.9	1.81	2.96
200	24.8	2.05	3.34
250	37.8	3.12	5.10
300	44.2	3.65	5.96

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 = 12.1m

Overall area = 7.41m²

BS 6375-1:2015 Clause 6.3 - Joint class = 2

BS 6375-1:2015 Clause 6.3 - Area class = 2

BS 6375-1:2015 Clause 6.3 - Overall class = 2

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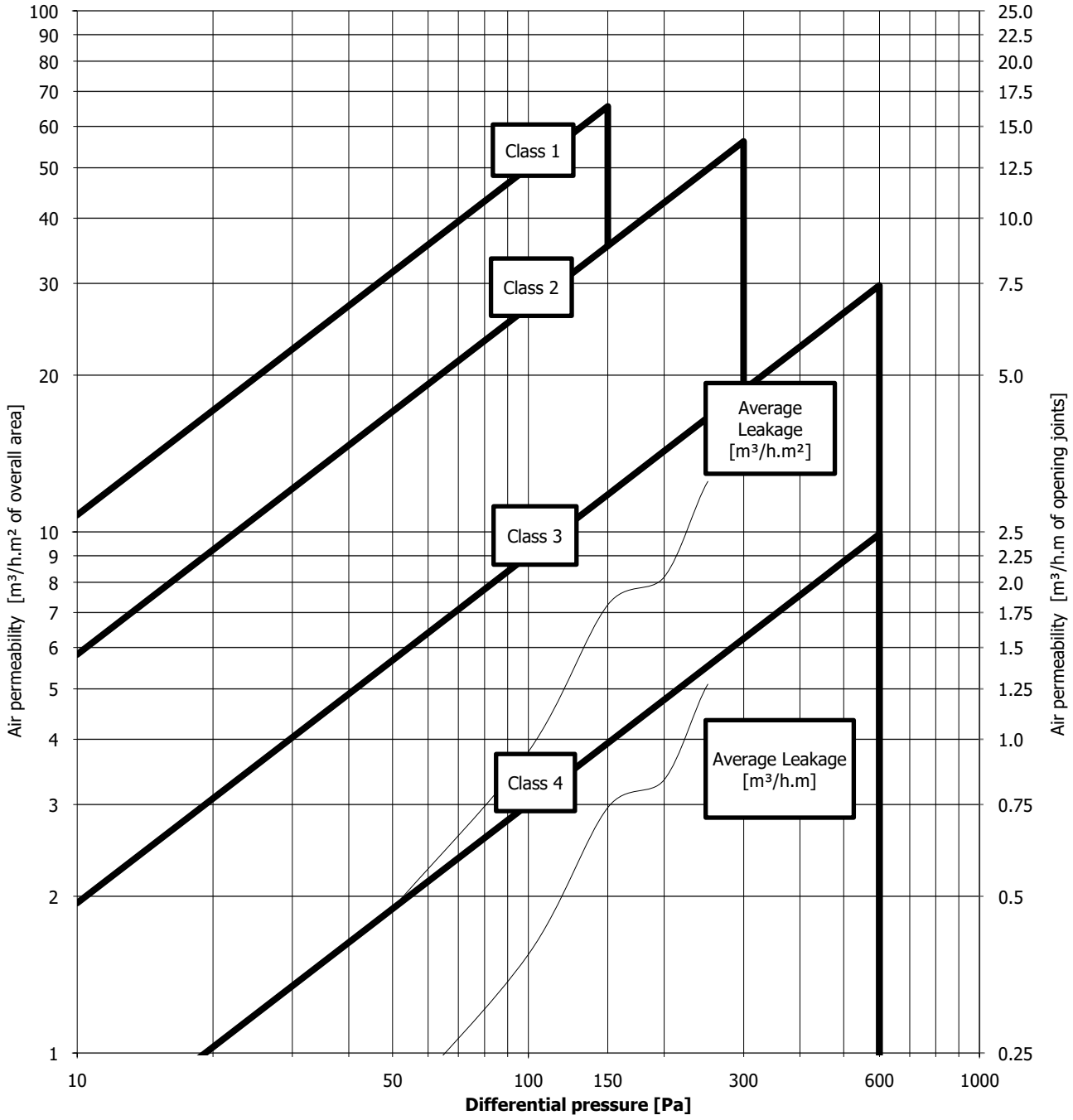
Graph of Average Air Permeability Before Gusting.



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Water Tightness Test Results.

BS EN 1027:2000 Clause 7 Watertightness before resistance to wind loads

TABLE 2 - Spraying method 1A

Pressure (Pascals)	Point and time at which water leakage occurred
0	No leakage
50	No leakage
100	No leakage
150	No leakage
200	No leakage
250	No leakage
300	No leakage
450	Water leaked out and over the threshold at 3 minutes 56 seconds
600	-
750	-
900	-
1050	-

Wind Load Resistance Test Results - BS EN 12211:2000

Clause 8 Resistance to wind load

P1 Deflection Test

Three positive pressure pulses at 1320Pa were applied

No visible failures or functional defects to the test sample were observed after wind loads applied at a positive air pressure of 1200Pa.

Actual deflection – 8.23mm (maximum deflection allowed 16.01mm)

Deflection/span ratio 1/292 (maximum ratio allowed 1/150)

Three negative pressure pulses at 1320Pa were applied

No visible failures or functional defects to the test sample were observed after wind loads applied at a negative air pressure of 1200Pa.

Actual deflection – 6.78mm (maximum deflection allowed 16.01mm)

Deflection/span ratio 1/354 (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 600Pa.

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 600Pa.

In accordance with BS 6375-1:2009 Clause 6.5, as the classification after the resistance to wind load tests is the same as the classification before the resistance to wind load tests, the resulting classification for the sample is Class 2.

Graph of Air Permeability After Gusting.

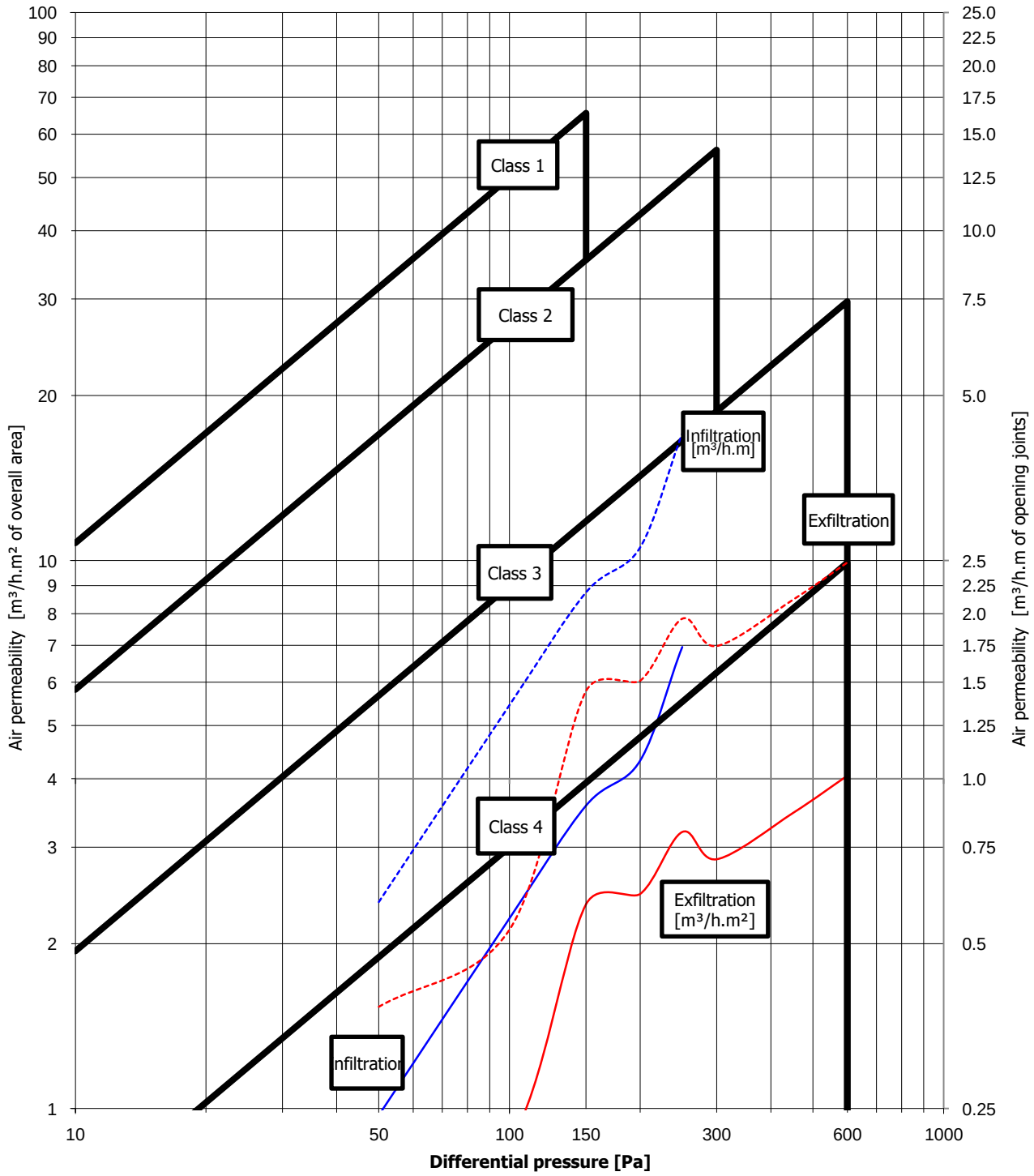

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Table of Air Permeability After Gusting.

AIR PERMEABILITY TEST RESULTS - BS 6375-1:2015 / BS EN 1026:2000

Clause 6.5 - After resistance to wind tests

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

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	5.9	0.49	0.80
100	11.5	0.95	1.55
150	22.0	1.82	2.96
200	25.1	2.08	3.39
250	37.6	3.11	5.08
300	45.6	3.77	6.15

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 = 12.1m

Overall area = 7.41m²

BS 6375-1:2015 Clause 6.5 - Joint class = 2

BS 6375-1:2015 Clause 6.5 - Area class = 2

BS 6375-1:2015 Clause 6.5 - Overall class = 2

In accordance with BS 6375-1:2015 Clause 6.5, as the classification after the resistance to wind load tests is the same as the classification before the resistance to wind load tests, the resulting classification for the sample is Class 2.

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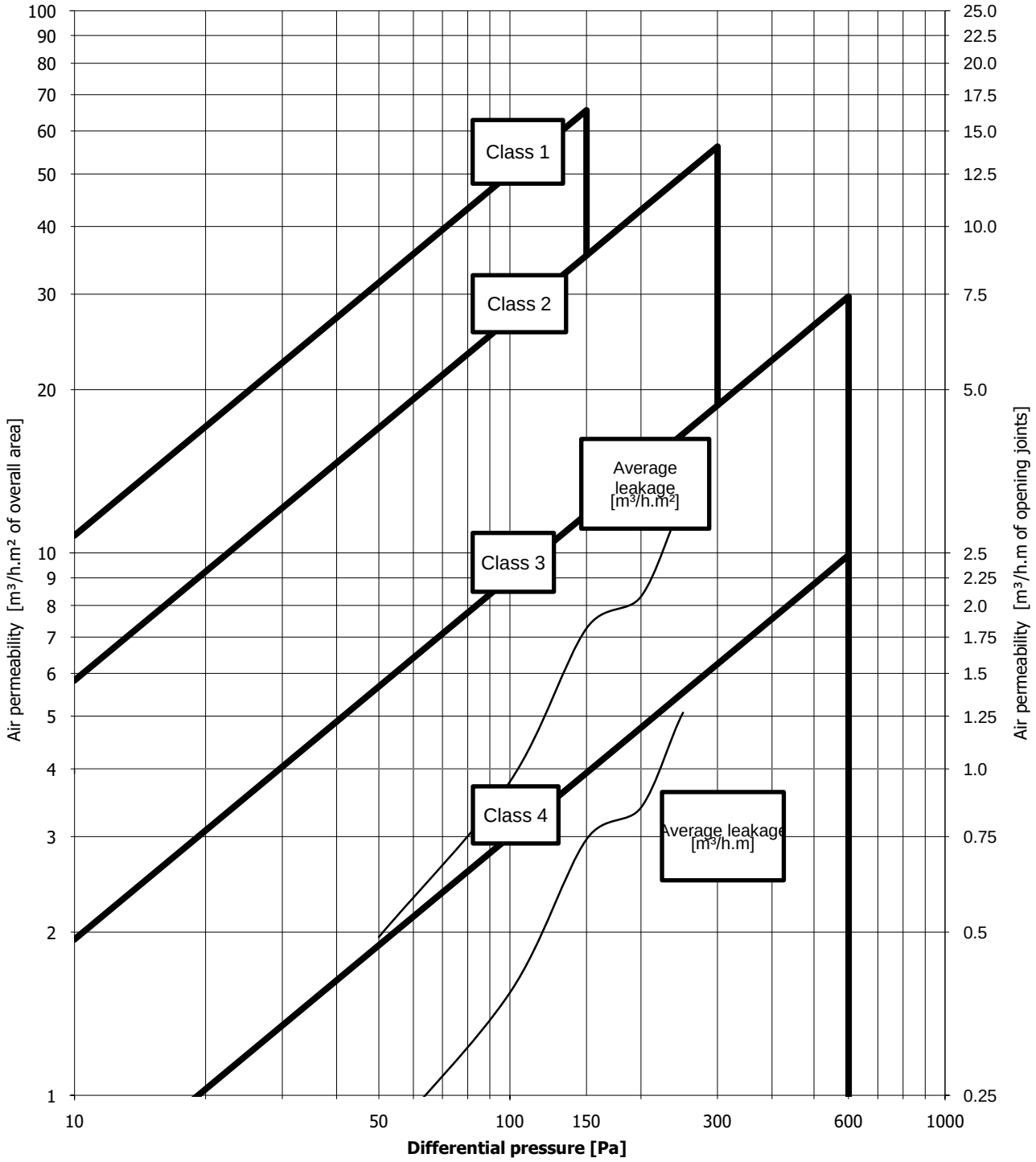
Graph of Average Air Permeability After Gusting.



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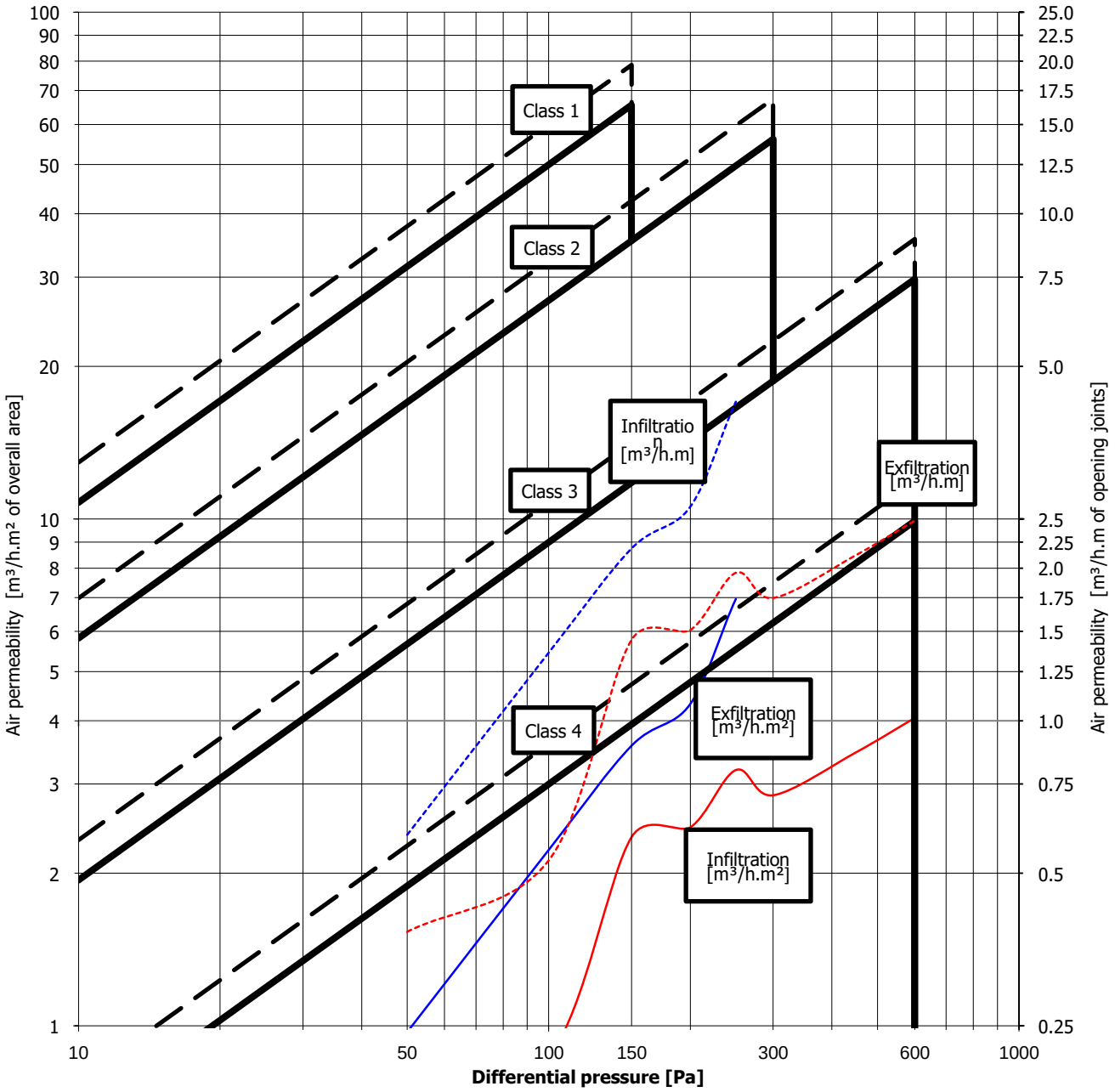
Graph of Average Air Permeability After Gusting.

(including +20% lines for each class)



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Wind Load Resistance 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 1800Pa.

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 1800Pa.

Description of Sample. (Sample 5 - Cyclic)

Sample Type -	1 off open in glaze in hinged door assemblies with full glass infill and low threshold
Material -	Aluminium alloy
Finish -	Painted white
Fittings -	**Master leaf** A three point Sobinco Multipoint key locking hardware (three hook / Pins) Sobinco cylinder, Fapim handle and three Fapim Lift off hinges with three hinge protector pins and two anti lift blocks **Slave leaf** A two point finger operated hardware (two shoot bolts), and three Fapim Pin hinges with three hinge protector pins and two anti lift blocks
Glass -	Double glazed 6-16-6mm toughened glass sealed units
Glass Retention System -	Internal beads and gaskets
Weathersealing -	E.D.P.M

Sample dimensions -

Overall length:	1800mm	Height: 2100mm
Active leaf length:	860mm	Height: 2030mm
Slave leaf length:	880mm	Height: 2030mm

Date of test -	22 May 2017
Laboratory temperature -	20.3°C
Laboratory humidity -	62.8%RH
Atmospheric pressure -	100.0kPa

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Description of Test Sample. (Sample 5 – open out, standard threshold)

Note – Parts list supplied by client and not verified by BSI.

Outer Frame width	1800mm	**Outer Frame Material**	Aluminium
Outer Frame height	2100mm	**Outer Frame Gasket**	
Outer Frame Part Numbers		Gasket Type	EDPM
Top	EF011	Manufacturer	Smart
Bottom	EF011	Product Name	Eco Futural
Lock Side	EF011	Product Code	ACEF030A ACEF030B
Hinge Side	EF011	**Mullion**	
Outer Frame section dimensions		Manufacturer	Smart
Width	65mm	Product name	Eco Futural
Depth	65mm	Product Code	EF040
Reinforcing:		Materials	Aluminium
Manufacturer	na	**Outer Frame Joint Method**	
Product Name		Head	Cleat And Glue
Product code		Foot	Cleat And Glue
Material			

Leaf		**Leaf Material:**	Aluminium
Leaf Width:	859mm	**Leaf Gasket**	
Leaf Height:	2024mm	Gasket type:	EDPM
Leaf Part Numbers:		Manufacturer:	Smart
Top:	EF120	Product Name:	Eco Futural
Bottom:	EF120	Product Code	ACVL031N
Lock side:	EF120	**Leaf Midrail:**	
Hinge Side	EF120	Manufacturer:	
Leaf section size		Product name:	
Width:	74mm	Product code:	
Depth:	93mm	Material:	
Reinforcing		**Leaf joint method**	
Manufacturer:	na	Head:	Cleat And Glue
Product Name:		Foot:	Cleat And Glue
Product Code:			
Material:			
Bead			
Manufacturer:	Smart		
Product Name:	Eco Futural		
Product Code:	GL526		
Material:	Aluminium		
Bead Size:	22mm x 26mm		

Description of Test Sample. (continued)

Glazing Unit		**Glazing Gasket**	
Manufacturer:	Ashton Glass	Gasket Type:	EDPM
Inner Thickness:	6mm Toughened	Manufacturer:	Smart
Spacer Material:	Aluminium	Product Name:	Eco Futural
Outer Thickness:	6mm Toughened	Product Code	ACVG31 ACVG34
Unit Sizes:	703mm x 1868mm x 28mm	**Glazing Clip**	NA
Glazing Tape Details NA		Manufacturer:	
Manufacturer:		Product Name:	
Product Name:		Product Code	
Product Code			

Hardware			**Fixings**	**Quantity**
Hinges:	ACMX102 ACUN102	Two Part Hinge Three Part Hinge	ACMX 103 PINS. M5. ACUN103 Pins M5	4 4
Hinge Protectors:	ACMX103,ACUN103	Hinge Protector Pins	ACMX 103 PINS. ACUN103 Pins	8 8
Lock:	ACSZVL709	Three Point Lock	ACIM 020	1
Cylinder:	ACMX01627		Supplied with Cylinder	1
Handle:	ACFA120	Rivett Nuts M5 With Handle	M5 X 25mm	2
Touch Bar:	NA			
Cylinder Support:	NA			
Cylinder Escutcheon:	ACMX102	Cylinder Cover	No 8 Self Tapping Screw.	2
Keeps:	ACSZ650 ACSZ651	Center Keep Top And Bottom Keep	ACET062	1 2
Drip Bar	VL 72			
Additional Hardware	ACFT512	Anti Lift Blocks	ACET 060	4 Pairs
	ACGT430 ACEF961 ACVL127 ACVL429	Shoot Bolt Shoot Bolt Adaptor Shoot Bolt Rods Shoot Bolt Keeps	ACET060 ACIM020	2 1 2 2
	ACEF055	Mullion End Cap		2
	ACEF057	Glass Setting Block		10
	ACET062	Mullion Fixing Screws		10
	MUA067 ACET062 ACGSL045	Mullion Fixing Screws Keep Fixing Screws Drain Caps		10 11 8

BS EN 1191:2012 Repeated Opening and Closing.

Clause 5 Performance characteristics and requirements for doors **Assessment**

Master Leaf – Operated for 50,000 cycles

Clause 5.5 Repeated opening and closing

The sample was opened and closed 5 times before testing started

Key rotation of key to unlock: 360 degrees

Clause 6.2 Operating Forces: EN12046-1 and EN12217 (pre-test operation)

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

Key force to unlock – 2.48Nm (maximum 5Nm)	Pass
Handle opening force – 62.23 (maximum 100N)	Pass
Leaf opening force – 31.38N (maximum 100N)	Pass
Leaf closing force – 45.98N (maximum 100N)	Pass
Handle closing force – N/A (maximum 100N)	Pass
Key force to unlock – 2.65Nm (maximum 20Nm)	Pass

At 100% of the complete cycles the Operating forces were taken again

Key force to unlock – 2.62Nm (maximum 5Nm)	Pass
Handle opening force – 62.00 (maximum 100N)	Pass
Leaf opening force – 33.60N (maximum 100N)	Pass
Leaf closing force – 43.98N (maximum 100N)	Pass
Handle closing force – N/A (maximum 100N)	Pass
Key force to unlock – 2.62Nm (maximum 5Nm)	Pass

The sample met the requirements of the standard and remained within the forces for 50,000 cycles

BS EN 1191:2012 Repeated Opening and Closing.

Clause 5 Performance characteristics and requirements for doors **Assessment**

Slave Leaf – Operated for 5,000 cycles

Clause 5.5 Repeated opening and closing

The sample was opened and closed 5 times before testing started

Key rotation of key to unlock: 360 degrees

Clause 6.2 Operating Forces: EN12046-1 and EN12217 (pre-test operation)

The sample was tested three times; leaf opening force, leaf closing force, and average of the three results were then recorded.

Key force to unlock – N/A (maximum 5Nm)	Pass
Handle opening force – N/A (maximum 100N)	Pass
Leaf opening force – 11.70N (maximum 100N)	Pass
Leaf closing force – 26.31N (maximum 100N)	Pass
Handle closing force – N/A (maximum 100N)	Pass
Key force to unlock – N/A (maximum 20Nm)	Pass

At 100% of the complete cycles the Operating forces were taken again

Key force to unlock – N/A (maximum 5Nm)	Pass
Handle opening force – N/A (maximum 100N)	Pass
Leaf opening force – 11.81N (maximum 100N)	Pass
Leaf closing force – 27.61N (maximum 100N)	Pass
Handle closing force – N/A (maximum 100N)	Pass
Key force to unlock – N/A (maximum 5Nm)	Pass

The sample met the requirements of the standard and remained within the forces for 5,000 cycles

PAS24:2016 Type Test. (Samples 6 and 7)

1 off open out glaze in hinged door assemblies with full glass infill and standard threshold. (Sample 6)

1 off open out glaze in hinged door assemblies with full glass infill and low threshold. (Sample 7)

(Sample ID No 10165774)

Date sample received: 12 September 2016

Test Results.

1.	Manipulation	Test samples 6 and 7 met the requirements of the Specification in respect of B.4.3
2.	Infill Removal	Test samples 6 and 7 met the requirements of the Specification in respect of B.4.4
3.	Mechanical Loading	Test samples 6 and 7 met the requirements of the Specification in respect of B.4.5
4.	Manual Check Test	Test samples 6 and 7 met the requirements of the Specification in respect of B.4.6
5.	Soft Body Impact	Test samples 6 and 7 met the requirements of the Specification in respect of B.4.8
6.	Hard Body Impact	Test samples 6 and 7 met the requirements of the Specification in respect of B.4.9
7.	Security Hardware and Cylinder Test	Test samples 6 and 7 met the requirements of the Specification in respect of Annex A
8.	Letter Plate	None fitted

B.2 Sample Selection.

The sample submitted for tests were selected using the criteria in B.2 of the Specification. The sample was submitted for test mounted in a 75mm x 100mm timber subframe in accordance with the manufacturer's installation requirements. The test sample was manufactured by the client.

B.3 Requirements for Test Apparatus.

The test apparatus for the manual and mechanical tests is shown in figures B.2 to B.5.

B.4 Test Methods.

The method of testing the samples followed the sequence detailed in B.4 of the Specification.

Note - PAS24:2016 not UKAS accredited

Description of Sample. (Sample 6 - Security)

Sample Type -	1 off open in glaze in hinged door assemblies with full glass infill and standard threshold
Material -	Aluminium alloy
Finish -	Painted white
Fittings -	**Master leaf** A three point Sobinco Multipoint key (D) locking hardware (three hook / Pins) Sobinco cylinder, Fapim handle and four Fapim Lift off hinges with four hinge protector pins and two anti lift blocks **Slave leaf** A two point finger operated hardware (two shoot bolts), and four Fapim lift off hinges with four hinge protector pins and two anti lift blocks
Glass -	Double glazed 6-16-6mm toughened glass sealed units
Glass Retention System -	Internal beads and gaskets
Weathersealing -	E.D.P.M

Sample dimensions -	Overall length:	2842mm	Height: 2610mm
	Active leaf length:	1200mm	Height: 2534mm
	Slave leaf length:	1200mm	Height: 2534mm

Date of test -	18 May 2017
Laboratory temperature -	21.6°C

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Description of Test Sample. (Sample 6 – open in, standard threshold)

Note – Parts list supplied by client and not verified by BSI.

Outer Frame width	2482mm	**Outer Frame Material**	Aluminium
Outer Frame height	2610mm	**Outer Frame Gasket**	
Outer Frame Part Numbers		Gasket Type	EDPM
Top	EF011	Manufacturer	Smart
Bottom	EF011	Product Name	Eco Futural
Lock Side	EF011	Product Code	ACEF030A ACEF030B
Hinge Side	EF011	**Mullion**	
Outer Frame section dimensions		Manufacturer	Smart
Width	65mm	Product name	Eco Futural
Depth	65mm	Product Code	EF040
Reinforcing:		Materials	Aluminium
Manufacturer	na	**Outer Frame Joint Method**	
Product Name		Head	Cleat And Glue
Product code		Foot	Cleat And Glue
Material			

Leaf		**Leaf Material:**	Aluminium
Leaf Width:	1200mm	**Leaf Gasket**	
Leaf Height:	2534mm	Gasket type:	EDPM
Leaf Part Numbers:		Manufacturer:	Smart
Top:	EF023	Product Name:	Eco Futural
Bottom:	EF023	Product Code	ACVL031N
Lock side:	EF023	**Leaf Midrail:**	
Hinge Side	EF023	Manufacturer:	
Leaf section size		Product name:	
Width:	74mm	Product code:	
Depth:	102mm	Material:	
Reinforcing		**Leaf joint method**	
Manufacturer:	na	Head:	Cleat And Glue
Product Name:		Foot:	Cleat And Glue
Product Code:			
Material:			
Bead			
Manufacturer:	Smart		
Product Name:	Eco Futural		
Product Code:	GL534		
Material:	Aluminium		
Bead Size:	22mm x 34mm		

Description of Test Sample. (continued)

Glazing Unit		**Glazing Gasket**	
Manufacturer:	Ashton Glass	Gasket Type:	EDPM
Inner Thickness:	6mm Toughened	Manufacturer:	Smart
Spacer Material:	Aluminium	Product Name:	Eco Futural
Outer Thickness:	6mm Toughened	Product Code	ACVG31 ACVG34
Unit Sizes:	1025mm x 2360mm x 28mm	**Glazing Clip**	NA
Glazing Tape Details NA		Manufacturer:	
Manufacturer:		Product Name:	
Product Name:		Product Code	
Product Code			

Hardware			**Fixings**	**Quantity**
Hinges:	ACUN102	Three Part Hinge	ACUN 103 PINS. M5.	8
Hinge Protectors:	ACUN103	Hinge Protector Pins	ACUN 103 PINS.	16
Lock:	ACSZVL709	Three Point Lock	ACIM 020	1
Cylinder:	ACMX01627		Supplied with Cylinder	1
Handle:	ACFA120	Rivett Nuts M5 With Handle	M5 X 25mm	2
Touch Bar:	NA			
Cylinder Support:	NA			
Cylinder Escutcheon:	ACMX102	Cylinder Cover	No 8 Self Tapping Screw.	2
Keeps:	ACSZ650 ACSZ651	Middle keep Top Bottom Keep	Acet 062	1 2
Drip Bar	VL 72			
Additional Hardware	ACFT512	Anti Lift Blocks	ACET 060	4 Pairs
	ACGT 430 ACEF 961 ACVL127 ACVL429	Shoot bolt Shoot bolt Adaptor Shoot bolt Rods Shoot Bolt Keeps	ACET 060 ACIM020	2 1 2 2
	ACEF055	Mullion End Cap		2
	ACEF057	Glass Setting Block		10
	ACET062	Mullion Fixing Screws		10
	MUA067 ACET062 ACGSL045	Mullion Fixing Screws Keep Fixing Screws Drain Caps		10 11 8

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Test Results.

Performance Requirements	Assessment

B.4.3 Manipulation Test

The sample was mounted, vertically and square, in the test rig as described in B.3.1.

The test was carried out in accordance with the given objective of this Annex using the procedure detailed in B.4.3.1 and the tools described in Group A and Group B where applicable.

The sample was closed and locked and the key removed. Although there is no overall time limit no one technique was used for more than three minutes.

A scraper was used to try and remove the gasket.

No entry could be affected by any technique within three minutes. Pass

B.4.4 Cutting and Infill Medium Removal Test

B.4.4.2 Infill Manual Test

The sample was mounted, vertically and square, in the test rig as described in B.3.1.

The test was carried out in accordance with the requirements of this Annex using the tools described in Group A and Group B where applicable.

No tools effective

No entry could be affected within three minutes. Pass

B.4.4.3 Infill Mechanical Test

The sample was mounted, vertically and square, in the test rig as described in B.3.1.

The test was carried out with a perpendicular-to-plane load of 2.0kN applied to each corner of the glazing.

No evidence of bead failure. No entry could be affected. Pass

B.4.4.4 Manual Cutting Test

Not applicable

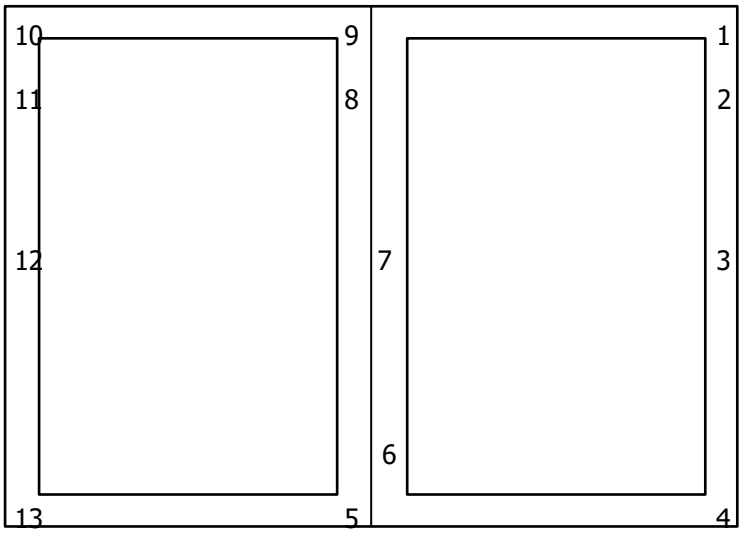
Test Results (Continued).

B.4.5 Mechanical Loading Test

The sample was mounted, vertically and square, in the test rig.

The test was carried out in accordance with the procedures detailed in B.4.5, using loading cases B.1 to B.6 and Figures B.12 for loading sequence, and using the test apparatus detailed in Figures B.6 to B.6.

Diagram of load points



B.4.5.2 Loading Procedure

First Sequence

Point of application of load

1. Hinge / Hinge protector pins (upper right jamb)

   Standard loading case used: 2 / 7

   Load applied in plane: 1.5kN along the edge in the direction to disengage the hinge
   Load applied perpendicular to plane: 4.5kN applied for 10 seconds

   Load applied in plane: 1.5kN at right angles to the edge and towards the opposite edge
   Load applied perpendicular to plane: 4.5kN applied for 10 seconds

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Test Results (Continued).

B.4.5.2 Loading Procedure (continued)

First Sequence (continued)

2. Hinge / Hinge protector pins (upper right jamb)

   Standard loading case used: 2 / 7

   Load applied in plane: 1.5kN along the edge in the direction to disengage the hinge
   Load applied perpendicular to plane: 4.5kN applied for 10 seconds

   Load applied in plane: 1.5kN at right angles to the edge and towards the opposite edge
   Load applied perpendicular to plane: 4.5kN applied for 10 seconds

3. Hinge / Hinge protector pins (centre right jamb)

   Standard loading case used: 2 / 7

   Load applied in plane: 1.5kN along the edge in the direction to disengage the hinge
   Load applied perpendicular to plane: 4.5kN applied for 10 seconds

   Load applied in plane: 1.5kN at right angles to the edge and towards the opposite edge
   Load applied perpendicular to plane: 4.5kN applied for 10 seconds

4. Hinge / Hinge protector pins (centre right jamb)

   Standard loading case used: 2 / 7

   Load applied in plane: 1.5kN along the edge in the direction to disengage the hinge
   Load applied perpendicular to plane: 4.5kN applied for 10 seconds

   Load applied in plane: 1.5kN at right angles to the edge and towards the opposite edge
   Load applied perpendicular to plane: 4.5kN applied for 10 seconds

5. Shoot bolt (mullion threshold)

   Standard loading case used: 3

   Load applied in plane: 1.5kN along the mullion in the direction to disengage the shoot bolt
   Load applied perpendicular to plane: 4.5kN applied for 10 seconds

Test Results (Continued).

B.4.5.2 Loading Procedure (continued)

First Sequence (continued)

6. Hook Bolt / Pins (lower mullion)

   Standard loading case used: 4 / 7

   Load applied in plane: 1.5kN along the edge in the direction to disengage the bolt
   Load applied perpendicular to plane: 4.5kN applied for 10 seconds

   Load applied in plane: 1.5kN at right angles to the edge and towards the opposite edge
   1.5kN at the mullion to oppose the above load
   Load applied perpendicular to plane: 4.5kN applied for ten seconds

7. Hook Bolt / Pins (centre mullion)

   Standard loading case used: 4 / 7

   Load applied in plane: 1.5kN along the edge in the direction to disengage the bolt
   Load applied perpendicular to plane: 4.5kN applied for 10 seconds

   Load applied in plane: 1.5kN at right angles to the edge and towards the opposite edge
   1.5kN at the mullion to oppose the above load
   Load applied perpendicular to plane: 4.5kN applied for ten seconds

8. Hook Bolt / Pins (upper mullion)

   Standard loading case used: 4 / 7

   Load applied in plane: 1.5kN along the edge in the direction to disengage the bolt
   Load applied perpendicular to plane: 4.5kN applied for 10 seconds

   Load applied in plane: 1.5kN at right angles to the edge and towards the opposite edge
   1.5kN at the mullion to oppose the above load
   Load applied perpendicular to plane: 4.5kN applied for ten seconds

9. Shoot bolt (mullion head)

   Standard loading case used: 3

   Load applied in plane: 1.5kN along the mullion in the direction to disengage the shoot bolt
   Load applied perpendicular to plane: 4.5kN applied for 10 seconds

Test Results (Continued).

B.4.5.2 Loading Procedure (continued) Assessment

First Sequence (continued)

10. Hinge / Hinge protector pins (upper left jamb)

    Standard loading case used: 2 / 7

    Load applied in plane: 1.5kN along the edge in the direction to disengage the hinge
    Load applied perpendicular to plane: 4.5kN applied for 10 seconds

    Load applied in plane: 1.5kN at right angles to the edge and towards the opposite edge
    Load applied perpendicular to plane: 4.5kN applied for 10 seconds

11. Hinge / Hinge protector pins (upper left jamb)

    Standard loading case used: 2 / 7

    Load applied in plane: 1.5kN along the edge in the direction to disengage the hinge
    Load applied perpendicular to plane: 4.5kN applied for 10 seconds

    Load applied in plane: 1.5kN at right angles to the edge and towards the opposite edge
    Load applied perpendicular to plane: 4.5kN applied for 10 seconds

12. Hinge / Hinge protector pins (centre left jamb)

    Standard loading case used: 2 / 7

    Load applied in plane: 1.5kN along the edge in the direction to disengage the hinge
    Load applied perpendicular to plane: 4.5kN applied for 10 seconds

    Load applied in plane: 1.5kN at right angles to the edge and towards the opposite edge
    Load applied perpendicular to plane: 4.5kN applied for 10 seconds

13. Hinge / Hinge protector pins (lower left jamb)

    Standard loading case used: 2 / 7

    Load applied in plane: 1.5kN along the edge in the direction to disengage the hinge
    Load applied perpendicular to plane: 4.5kN applied for 10 seconds

    Load applied in plane: 1.5kN at right angles to the edge and towards the opposite edge
    Load applied perpendicular to plane: 4.5kN applied for 10 seconds

    No entry gained Pass

Test Results (Continued).

Performance Requirements	Assessment

B.4.6 Manual Check Test

The sample was mounted, vertically and square, in the test rig as described in B.3.1.

The test was carried out in accordance with the given objectives of this Clause using the procedure detailed in B.4.6.3 and the tools described in B.4.6.2.

The sample was attacked with two nail bars.

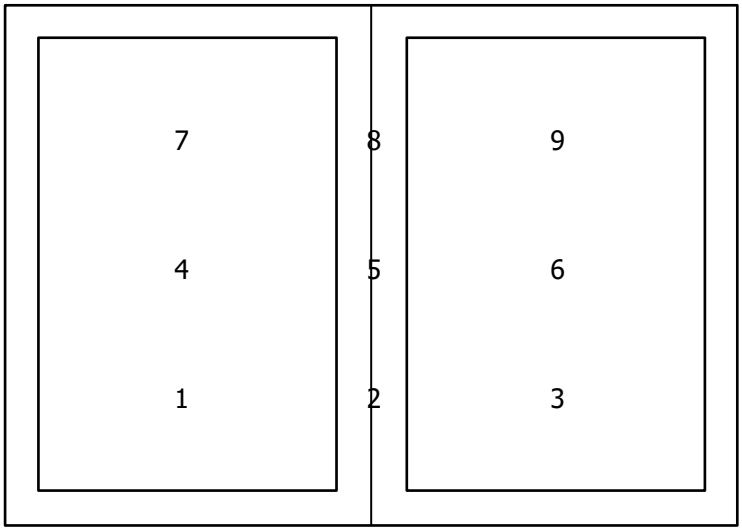
No entry was gained after a total attack time of 3 minutes. Pass

B.4.8 Soft Body Impact Test

The sample was mounted, vertically and square, in the test rig as described in B.3.1.

The test was carried out in accordance with the requirements, objectives and procedures detailed in B.4.8.1 using the impact point and procedure described in B.4.8.2 and B.4.8.3 and Figure B.10.

Diagram of load points



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Test Results (Continued).

Performance Requirements | Assessment

B.4.8 Soft Body Impact Test (Continued)

Impact point	Position from floor level	Effect
1	0.80m	None
2	0.80m	None
3	0.80m	None
4	1.25m	None
5	1.25m	None
6	1.25m	None
7	1.70m	None
8	1.70m	None
9	1.70m	None

No entry gained — Pass

Test Results (Continued).

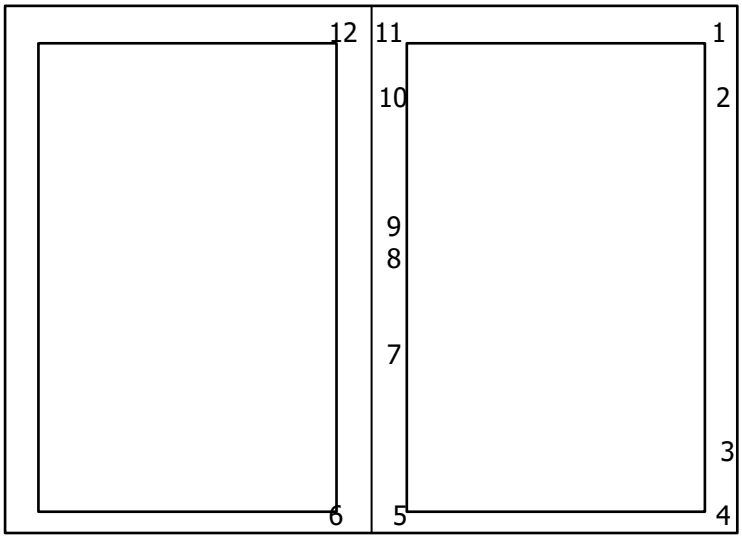
Performance Requirements

B.4.9 Hard Body Impact Test

The sample was mounted, vertically and square, in the test rig as described in B.3.1.

The test was carried out in accordance with the requirements, objectives and procedures detailed in B.4.9.1, B.4.9.2.1, B.4.9.2.2 and B.4.9.2.3 using procedure B.4.9.3, using the test apparatus detailed in B.11 and using the impact sequence in figure B.14.

Diagram of load points



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Test Results (Continued).

Performance Requirements | Assessment

B.4.8 Hard Body Impact Test (Continued)

Impact point	Position	Effect
1	Hinge/dog/corner	None
2	Hinge/dog	None
3	Hinge/dog	None
4	Hinge/dog/corner	None
5	Corner	None
6	shoot bolt	None
7	hook/pin	None
8	cylinder	None
9	hook/pin	None
10	hook/pin	None
11	Corner	None
12	shoot bolt	None

No entry gained — Pass

Annex A Security Hardware and Cylinder Test

Annex A.3.2 (Part 1)

The sample was mounted, vertically and square, in the test rig as described in Clause 3.1.

The test was carried out in accordance with the given objectives of this Annex using the procedure detailed in Annex A.3.1 and the tools described in A.2.

Mole grips were used to remove the handle and snap the cylinder.

No entry gained in three minutes — Pass

Annex A.3.2 (Part 2)

Not assessed

Description of Sample. (Sample 7 - Security)

Sample Type -	1 off open in glaze in hinged door assemblies with full glass infill and low threshold
Material -	Aluminium alloy
Finish -	Painted white
Fittings -	**Master leaf** A three point Sobinco Multipoint key(D) locking hardware (three hook / Pins) Sobinco cylinder, Fapim handle and four Fapim Pin hinges with four hinge protector pins and two anti lift blocks **Slave leaf** A two point finger operated hardware (two shoot bolts), and four Fapim Pin hinges with four hinge protector pins and two anti lift blocks
Glass -	Double glazed 6-16-6mm toughened glass sealed units
Glass Retention System -	Internal beads and gaskets
Weathersealing -	E.D.P.M

Sample dimensions -	Overall length:	2842mm	Height: 2610mm
	Active leaf length:	1200mm	Height: 2534mm
	Slave leaf length:	1200mm	Height: 2534mm

Date of test -	18 May 2017
Laboratory temperature -	21.6°C

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Description of Test Sample. (Sample 7 – open in, low threshold)

Note – Parts list supplied by client and not verified by BSI.

Outer Frame width	2482mm	**Outer Frame Material**	Aluminium
Outer Frame height	2583mm	**Outer Frame Gasket**	
Outer Frame Part Numbers		Gasket Type	EDPM
Top	EF011	Manufacturer	Smart
Bottom	EF952	Product Name	Eco Futural
Lock Side	EF011	Product Code	ACEF030A ACEF030B ACVL032
Hinge Side	EF011	**Mullion**	
Outer Frame section dimensions		Manufacturer	Smart
Width	65mm	Product name	Eco Futural
Depth	65mm	Product Code	EF040
Reinforcing:		Materials	Aluminium
Manufacturer	na	**Outer Frame Joint Method**	
Product Name		Head	Cleat And Glue
Product code		Foot	Mechanical Joint.
Material			

Leaf		**Leaf Material:**	Aluminium
Leaf Width:	1200mm	**Leaf Gasket**	
Leaf Height:	2534mm	Gasket type:	EDPM
Leaf Part Numbers:		Manufacturer:	Smart
Top:	EF023	Product Name:	Eco Futural
Bottom:	EF023 x EF095	Product Code	ACVL031N
Lock side:	EF023	**Leaf Midrail:**	
Hinge Side	EF023	Manufacturer:	
Leaf section size		Product name:	
Width:	74mm	Product code:	
Depth:	102mm	Material:	
Reinforcing		**Leaf joint method**	
Manufacturer:	na	Head:	Cleat And Glue
Product Name:		Foot:	Cleat And Glue
Product Code:			
Material:			
Bead			
Manufacturer:	Smart		
Product Name:	Eco Futural		
Product Code:	GL534		
Material:	Aluminium		
Bead Size:	22mm x 34mm		

Description of Test Sample. (continued)

Glazing Unit		**Glazing Gasket**	
Manufacturer:	Ashton Glass	Gasket Type:	EDPM
Inner Thickness:	6mm Toughened	Manufacturer:	Smart
Spacer Material:	Aluminium	Product Name:	Eco Futural
Outer Thickness:	6mm Toughened	Product Code	ACVG31 ACVG34
Unit Sizes:	1025mm x 2360mm x 28mm	**Glazing Clip**	NA
Glazing Tape Details NA		Manufacturer:	
Manufacturer:		Product Name:	
Product Name:		Product Code	
Product Code			

Hardware			**Fixings**	**Quantity**
Hinges:	ACUN103	Three Part Hinge	ACUN 103 PINS. M5.	8
Hinge Protectors:	ACUN103	Hinge Protector Pins	ACUN 103 PINS.	16
Lock:	ACSZVL709	Three Point Lock	ACIM 020	1
Cylinder:	ACMX01627		Supplied with Cylinder	1
Handle:	ACFA120	Rivett Nuts M5 With Handle	M5 X 25mm	2
Touch Bar:	NA			
Cylinder Support:	NA			
Cylinder Escutcheon:	ACMX102	Cylinder Cover	No 8 Self Tapping Screw.	2
Keeps:	ACSZ 650 ACSZ651	Center Keep Top And Bottom Keep	ACET062	1 2
Drip Bar	VL 72		ACVL061	
Additional Hardware	ACFT512	Anti Lift Blocks	ACET 060	4 Pairs
	ACGT430 ACEF961 ACVL127 ACVL429	Shoot bolt Shoot Bolt Adaptor Shoot Bolt Rods Shoot Bolt Keeps	ACET060 ACIM020	1 1 2 2
	ACEF055	Mullion End Cap		2
	ACEF057	Glass Setting Block		10
	ACET062	Mullion Fixing Screws		10
	MUA067 ACET062 ACGSL045	Mullion Fixing Screws Keep Fixing Screws Drain Caps		10 11 8

Test Results.

Performance Requirements	Assessment
B.4.3 Manipulation Test	
The sample was mounted, vertically and square, in the test rig as described in B.3.1.	
The test was carried out in accordance with the given objective of this Annex using the procedure detailed in B.4.3.1 and the tools described in Group A and Group B where applicable.	
The sample was closed and locked and the key removed. Although there is no overall time limit no one technique was used for more than three minutes.	
A scraper was used to try and remove the gasket.	
No entry could be affected by any technique within three minutes.	Pass
B.4.4 Cutting and Infill Medium Removal Test	
B.4.4.2 Infill Manual Test	
The sample was mounted, vertically and square, in the test rig as described in B.3.1.	
The test was carried out in accordance with the requirements of this Annex using the tools described in Group A and Group B where applicable.	
A craft knife was used to try and remove the gasket.	
No entry could be affected within three minutes.	Pass
B.4.4.3 Infill Mechanical Test	
The sample was mounted, vertically and square, in the test rig as described in B.3.1.	
The test was carried out with a perpendicular-to-plane load of 2.0kN applied to each corner of the glazing.	
No evidence of bead failure. No entry could be affected.	Pass
B.4.4.4 Manual Cutting Test	
Not applicable	

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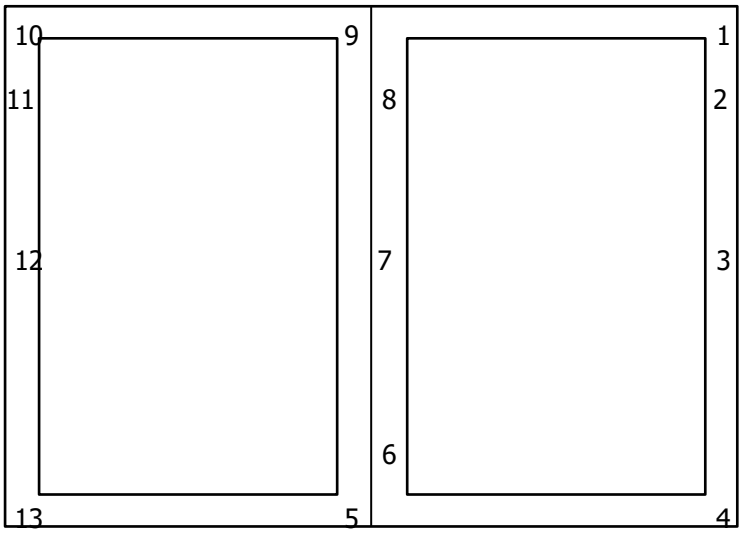
Test Results (Continued).

B.4.5 Mechanical Loading Test

The sample was mounted, vertically and square, in the test rig.

The test was carried out in accordance with the procedures detailed in B.4.5, using loading cases B.1 to B.6 and Figures B.12 for loading sequence, and using the test apparatus detailed in Figures B.6 to B.6.

Diagram of load points



B.4.5.2 Loading Procedure

First Sequence

Point of application of load

1. Hinge / Hinge protector pins (upper right jamb)

   Standard loading case used: 1 / 7

   Load applied in plane: 1.5kN at right angles to the edge and towards the opposite edge
   Load applied perpendicular to plane: 4.5kN applied for 10 seconds

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Test Results (Continued).

B.4.5.2 Loading Procedure (continued)

First Sequence (continued)

2. Hinge / Hinge protector pins (upper right jamb)

   Standard loading case used: 1 / 7

   Load applied in plane: 1.5kN at right angles to the edge and towards the opposite edge
   Load applied perpendicular to plane: 4.5kN applied for 10 seconds

3. Hinge / Hinge protector pins (centre right jamb)

   Standard loading case used: 1 / 7

   Load applied in plane: 1.5kN at right angles to the edge and towards the opposite edge
   Load applied perpendicular to plane: 4.5kN applied for 10 seconds

4. Hinge / Hinge protector pins (centre right jamb)

   Standard loading case used: 1 / 7

   Load applied in plane: 1.5kN at right angles to the edge and towards the opposite edge
   Load applied perpendicular to plane: 4.5kN applied for 10 seconds

5. Shoot bolt (mullion threshold)

   Standard loading case used: 3

   Load applied in plane: 1.5kN along the mullion in the direction to disengage the shoot bolt
   Load applied perpendicular to plane: 4.5kN applied for 10 seconds

6. Hook Bolt / Pins (lower mullion)

   Standard loading case used: 4 / 7

   Load applied in plane: 1.5kN along the edge in the direction to disengage the bolt
   Load applied perpendicular to plane: 4.5kN applied for 10 seconds

   Load applied in plane: 1.5kN at right angles to the edge and towards the opposite edge
   1.5kN at the mullion to oppose the above load
   Load applied perpendicular to plane: 4.5kN applied for ten seconds

Test Results (Continued).

B.4.5.2 Loading Procedure (continued)

First Sequence (continued)

7. Hook Bolt / Pins (centre mullion)

   Standard loading case used: 4 / 7

   Load applied in plane: 1.5kN along the edge in the direction to disengage the bolt
   Load applied perpendicular to plane: 4.5kN applied for 10 seconds

   Load applied in plane: 1.5kN at right angles to the edge and towards the opposite edge
   1.5kN at the mullion to oppose the above load
   Load applied perpendicular to plane: 4.5kN applied for ten seconds

8. Hook Bolt / Pins (upper mullion)

   Standard loading case used: 4 / 7

   Load applied in plane: 1.5kN along the edge in the direction to disengage the bolt
   Load applied perpendicular to plane: 4.5kN applied for 10 seconds

   Load applied in plane: 1.5kN at right angles to the edge and towards the opposite edge
   1.5kN at the mullion to oppose the above load
   Load applied perpendicular to plane: 4.5kN applied for ten seconds

9. Shoot bolt (mullion head)

   Standard loading case used: 3

   Load applied in plane: 1.5kN along the mullion in the direction to disengage the shoot bolt
   Load applied perpendicular to plane: 4.5kN applied for 10 seconds

10. Hinge / Hinge protector pins (upper left jamb)

    Standard loading case used: 1 / 7

    Load applied in plane: 1.5kN at right angles to the edge and towards the opposite edge
    Load applied perpendicular to plane: 4.5kN applied for 10 seconds

Test Results (Continued).

B.4.5.2 Loading Procedure (continued) Assessment

First Sequence (continued)

11. Hinge / Hinge protector pins (upper left jamb)

    Standard loading case used: 1 / 7

    Load applied in plane: 1.5kN at right angles to the edge and towards the opposite edge
    Load applied perpendicular to plane: 4.5kN applied for 10 seconds

12. Hinge / Hinge protector pins (centre left jamb)

    Standard loading case used: 1 / 7

    Load applied in plane: 1.5kN at right angles to the edge and towards the opposite edge
    Load applied perpendicular to plane: 4.5kN applied for 10 seconds

13. Hinge / Hinge protector pins (lower left jamb)

    Standard loading case used: 1 / 7

    Load applied in plane: 1.5kN at right angles to the edge and towards the opposite edge
    Load applied perpendicular to plane: 4.5kN applied for 10 seconds

    No entry gained Pass

B.4.6 Manual Check Test

The sample was mounted, vertically and square, in the test rig as described in B.3.1.

The test was carried out in accordance with the given objectives of this Clause using the procedure detailed in B.4.6.3 and the tools described in B.4.6.2.

The sample was attacked with two nail bars.

No entry was gained after a total attack time of 3 minutes. Pass

Test Results (Continued).

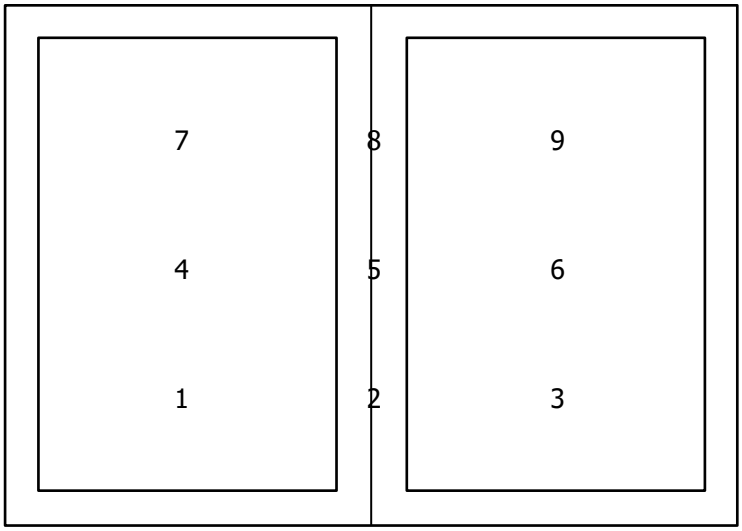
Performance Requirements

B.4.8 Soft Body Impact Test

The sample was mounted, vertically and square, in the test rig as described in B.3.1.

The test was carried out in accordance with the requirements, objectives and procedures detailed in B.4.8.1 using the impact point and procedure described in B.4.8.2 and B.4.8.3 and Figure B.10.

Diagram of load points



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Test Results (Continued).

Performance Requirements | Assessment

B.4.8 Soft Body Impact Test (Continued)

Impact point	Position from floor level	Effect
1	0.80m	None
2	0.80m	None
3	0.80m	None
4	1.25m	None
5	1.25m	None
6	1.25m	None
7	1.70m	None
8	1.70m	None
9	1.70m	None

No entry gained — Pass

Test Results (Continued).

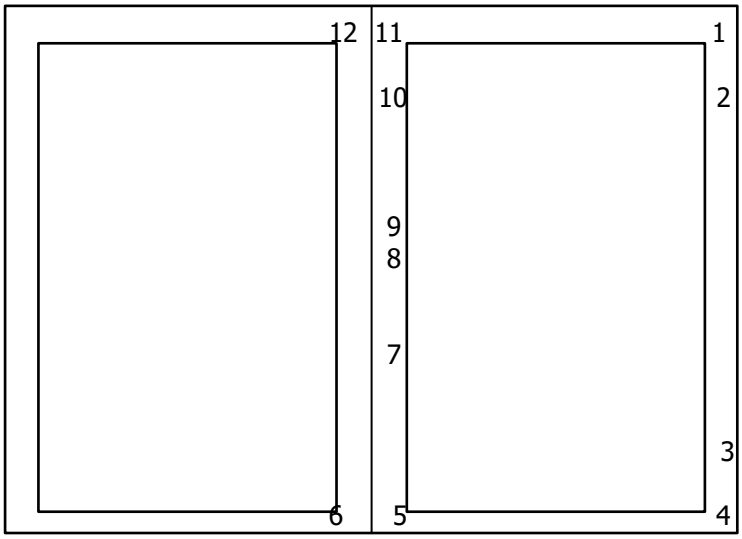
Performance Requirements

B.4.9 Hard Body Impact Test

The sample was mounted, vertically and square, in the test rig as described in B.3.1.

The test was carried out in accordance with the requirements, objectives and procedures detailed in B.4.9.1, B.4.9.2.1, B.4.9.2.2 and B.4.9.2.3 using procedure B.4.9.3, using the test apparatus detailed in B.11 and using the impact sequence in figure B.14.

Diagram of load points



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Test Results (Continued).

Performance Requirements | Assessment

B.4.8 Hard Body Impact Test (Continued)

Impact point	Position	Effect
1	Hinge/dog/corner	None
2	Hinge/dog	None
3	Hinge/dog	None
4	Hinge/dog/corner	None
5	Corner	None
6	shoot bolt	None
7	hook/pin	None
8	cylinder	None
9	hook/pin	None
10	hook/pin	None
11	Corner	None
12	shoot bolt	None

No entry gained — Pass

Annex A Security Hardware and Cylinder Test

Annex A.3.2 (Part 1)

The sample was mounted, vertically and square, in the test rig as described in Clause 3.1.

The test was carried out in accordance with the given objectives of this Annex using the procedure detailed in Annex A.3.1 and the tools described in A.2.

Mole grips were used to remove the handle and snap the cylinder.

No entry gained in three minutes — Pass

Annex A.3.2 (Part 2)

Not assessed

Photograph of Sample.

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Test Samples.

Sample Id	ER Number	Description
1	10165774	Double leaf Aluminium Alloy doors

Description of Test Samples.

Sample Description
2 off open out glaze in hinged door assemblies with full glass infill and low threshold
3 off open out glaze in hinged door assemblies with full glass infill and standard threshold
1 off open in glaze in hinged door assemblies with full glass infill and standard threshold
1 off open in glaze in hinged door assemblies with full glass infill and low threshold

Test Requirements.

PAS24/BS4873 door type test

Clause	Requirements
Results table	*PAS24/ BS4873 door type test*

Glossary of Terms.

PASS: Complies. Tested by BSI engineers at BSI laboratories.

PASS1: Complies. Witnessed by BSI engineers in manufacturers laboratory.

PASS2: Complies. Tests carried out by third party lab; results accepted by BSI.

PASS*: Report resulted in uncertainty and states that Compliance is more probable than non-compliance.

FAIL: Non compliance – Product does not meet the requirements of this clause.

FAIL*: Report resulted in uncertainty and states that Non-compliance is more probable than compliance.

N/A: Not applicable to design under consideration.

N/T: Not tested due to similarity to previously tested item; reference earlier test report.

Conditions of Issue.

This Test Report is issued subject to the conditions stated in current issue of 'BSI Terms of Service'. 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 BSI, who reserve the absolute right to agree or reject all or any of the details of any items or publicity for which consent may be sought.

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End of Report