Test Report 3251300.

Smart Systems Limited

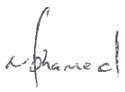
Incorporating Smart Extrusions

Introduction.

This report has been prepared by Jack Nicholls and relates to the activity detailed below:

Job/Registration Details		Client Details
Job number:	**3251300**	Smart Systems Limited
Job type:	Testing Samples Submitted	Incorporating Smart Extrusions
Start Date:	27/07/2020	Arnolds Way
Test type:	Direct	Yatton
Sample ID:	10191178	BS49 4QN
Registration:	**NA**	United Kingdom
Protocol:	NA	
Quality system:	NA	
Registration:	**NA**	
Protocol:	NA	
Quality system:	NA	

The report has been approved for issue by Mohamed Abukar – Subject Matter Expert

Approved For Issue	
	Issue Date: 11 August 2020

Objectives.

Direct test

Product Scope.

Alitherm Heritage double doors

Report Summary.

The samples were received on 23 July 2020 and the testing was started on 27 July 2020.

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

BS7412:2007 Weather Type Test.

1 off double leaf open in glaze in hinged door assembly with glass infill above and below the midrail and a standard threshold

1 off double leaf open out glaze in hinged door assembly with glass infill above and below the midrail and a standard threshold

(Sample ID No 10191178)

Date sample received: 23 July 2020

Test Results.

1.	Air Permeability	Test samples 1 and 2 met the requirements of the Specification, in respect of Clause 6, for Test Pressure Class 4.
2.	Watertightness	Test sample 1 met the requirements of the Specification, in respect of Clause 7, for Test Pressure Class 3A. Test sample 2 met the requirements of the Specification, in respect of Clause 7, for Test Pressure Class 8A.
3.	Wind Resistance	Test samples 1 and 2 met the requirements of the Specification, in respect of BS6375-2:2009, for Exposure Category B3 (1200Pa).
4.	Operational Strength	Test samples 1 and 2 met the requirements of the Specification in respect of BS6375-2:2009, Operating forces – Class 1.

Classifications for Operational Strength.

Operating forces	Class 1

Sample Selection.

The samples submitted for tests were selected using the PCP Scheme Document Specification. Each sample was submitted for test mounted in a 75mm x 100mm timber subframe in accordance with the manufacturer's installation requirements. The test samples were manufactured and supplied by the client, and the test results apply only to the sample as received. The results in this report are only valid for the conditions on which the testing was conducted and for the specified products only. Parts list supplied by client but not verified by BSI.

Clause 5 Sequence of Tests.

The sequence of testing the samples followed that detailed in Clause 5 of BS6375-1:2015.

Clause 5 Performance Requirements.

The performance of each sample was assessed against the requirements detailed in Table 1 Exposure Categories and Classifications.

The results contained within this test report are valid only for the conditions under which the tests were conducted and for the specific range of doorsets.

Methods of Test.

1. **Operating Forces**

The operating forces acting on the sample were determined by the methods given in BS EN 12046-2:2000.

2. **Air Permeability**

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

3. **Watertightness**

The watertightness of the sample 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.

Description of Weather Sample. (Sample 1)

Sample Type -	Double leaf open in glaze in hinged door assembly with glass infill above and below the midrail and a standard threshold
Material -	Aluminium
Construction -	Cleated
Fittings -	Master leaf - a six-point locking (four roller cams and two shoot bolts) FUHR espagnolette system, a lever/lever handle with key lockable 3* thumb turn cylinder, four Banks pin hinges and one run-up block Slave leaf - a two-point locking (two shoot bolts) FUHR espagnolette system, a lever/lever handle with key lockable 3* thumb turn cylinder, four Banks pin hinges and one run-up block
Glass -	Double glazed 4-20-4 mm toughened glass sealed units
Panel -	Not applicable
Glass Retention System -	Internal beads and gaskets
Weathersealing -	Double-sealed plastic weather strip

Sample dimensions -

Overall length:	1800mm	Height: 2200mm
Master leaf length:	885mm	Height: 2175mm
Slave leaf length:	900mm	Height: 2175mm

Date of test -	27 July 2020
Laboratory temperature -	18.8°C
Laboratory humidity -	74.6%RH
Atmospheric pressure -	99.0kPa

Alitherm Heritage, Open In, Double Door Set, Standard Threshold.

Outer Frame width	1800mm	**Outer Frame Material**	Aluminium
Outer Frame height	2200mm	**Outer Frame Gasket**	
Outer Frame Part Numbers		Gasket Type	EDPM
Top	W20015	Manufacturer	Reddplex
Bottom	W20015	Product Name	Flipper Gasket
Lock Side	W20015	Product Code	ACVL031N
Hinge Side	W20015	**Threshold**	
Outer Frame section dimensions		Manufacturer	Smarts
Width	33mm	Product name	Standard Threshold
Depth	52mm	Product Code	W20015
Mullion		Materials	Aluminium
Manufacturer	Smarts	**Outer Frame Joint Method**	
Product Name	Meeting Stile	Head	Cleat , Glue, Crimp
Product code	W20149	Foot	Cleat , Glue, Crimp
Material	Aluminium		

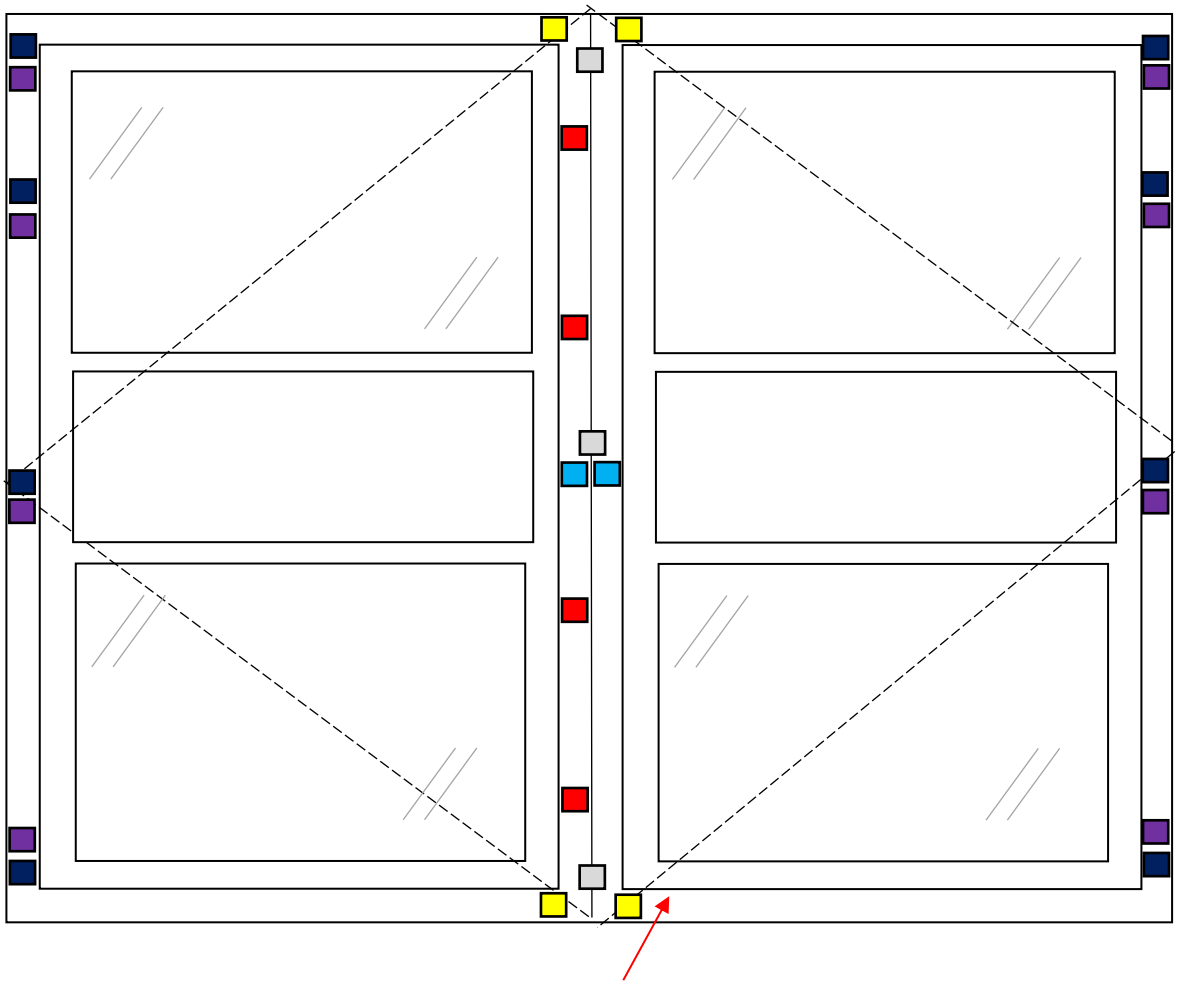
Leaf		**Leaf Material:**	Aluminium
Leaf Width:	883.5mm	**Leaf Gasket**	
Leaf Height:	2175mm	Gasket type:	EDPM
Leaf Part Numbers:		Manufacturer:	Reddiplex.
Top:	W20129	Product Name:	Flipper Gasket
Bottom:	W20129	Product Code	ACET160
Lock side:	W20129	**Leaf Transom**	
Hinge Side	W20129	Manufacturer:	Smarts
Leaf section size		Product name:	Transom
Width:	54MM	Product code:	W20135N
Depth:	59MM	Material:	Aluminium
Door Lock Housing		**Leaf joint method**	
Manufacturer:	Smarts	Head:	Cleat , Glue, Crimp
Product Name:	Door Lock Housing	Foot:	Cleat , Glue, Crimp
Product Code:	W20038		
Material:	Aluminium		
Bead			
Manufacturer:	Smarts		
Product Name:	Smarts		
Product Code:	W20171		
Material:	Aluminium		
Bead Size: **W20175**	15.5mm x 8.5mm **Threshold Infill.**		

Alitherm Heritage, Open In, Double Door Set, Standard Threshold.

Glazing Unit		**Glazing Gasket**	
Manufacturer:	Ashton Glass	Gasket Type:	EDPM
Inner Thickness:	4mm	Manufacturer:	Reddiplex
Spacer Material:	Aluminium	Product Name:	E Gasket, Wedge
Outer Thickness:	4mm	Product Code	ACET842. ACW20038
Unit Sizes:	798mm x 789mm 731mm x 281mm 798mm x 978mm	**Glazing Clip**	NA.
Glazing Tape Details. NA.		Manufacturer:	
Manufacturer:		Product Name:	
Product Name:		Product Code	
Product Code			

Hardware			**Fixings**	**Quantity**
Hinges:	ACW20364	Banks.	M4 Machine Screws M4 Riv nuts.	8
Hinge Protectors:	ACW20375	FUHR	M4 Machine Screws	8
Lock: Main Door Lock : Secondary Door	ACW20365 ACW20366	FUHR FUHR	M4 Machine Screws M4 Machine Screws ACUN 3532	1 1
Cylinders:	ACCY4525NKTTS3	UAP.	M5 Machine Screws	2
Handle:	ACW20061	Trojan.	M5 Machine Screws	2 Pairs
Lock Extension 200mm	ACDV742	fUHR	M4 Machine	1
Drain Caps	ACGSL 045	Smart		4
Cylinder Escutcheon:	NA			
Keeps:	ACW20066 L/R ACW20367	FUHR Center Keep FUHR Roller Keeps.	ACUN3512 NO.8 Self Tapping Screw.	1 4
Mullion End Cap	ACW20148	Smarts	ACET 070	1 Pair.
Bottom Shoot Bolts.	ACDV737,	FUHR		2
Top Shoot bolts	ACDV 738	FUHR		2
Shoot Bolt Keeps	ACW20437	Smarts.		2
Hinge Protector Fixing Kit.	ACW20386	Smarts	M4 Machine Screws With M4 Riv Nuts.	8
Fixing Inserts	ACUN3532	Banks	M4 Machine Screws	20

Elevation Drawing Showing Position of Hardware.



Water Leakage Point

Handle:
Hinge:
Hinge Protectors:
Cam:
Shoot Bolt:
Transducer placement:

Graph of Air Permeability Before Gusting.

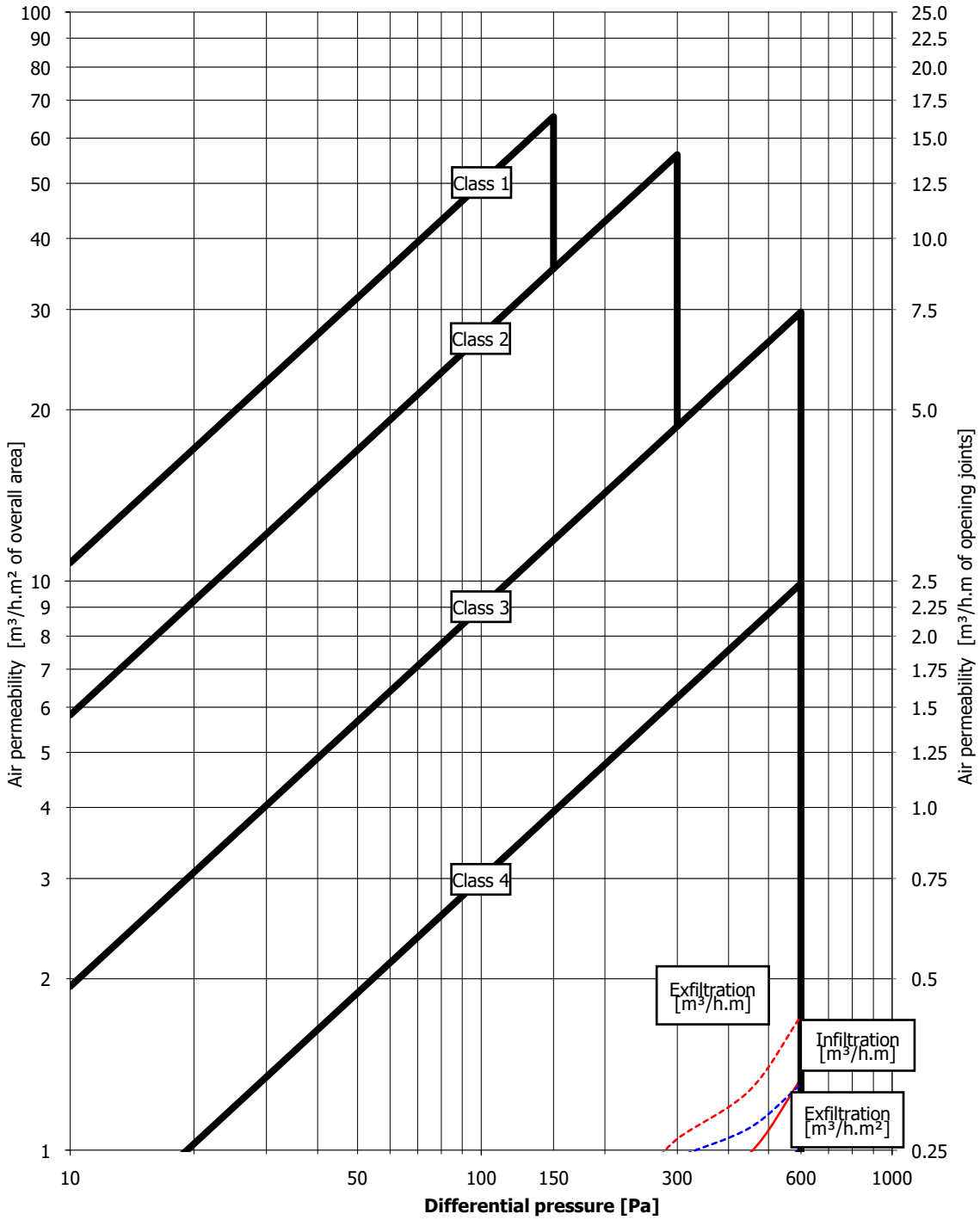


Table of Air Permeability Before Gusting.

AIR PERMEABILITY TEST RESULTS - BS EN 1026:2000 / BS EN 12207:2000

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

Air Pressure [Pa]	Blank reading [m³/h]	Maximum total air flow [m³/h]	Actual rate of air leakage [m³/h]	Rate of air leakage per meter length of opening joint [m³/h.m]	Rate of air leakage relative to area of sample [m³/h.m²]
50	7.7	8.7	1.0	0.08	0.26
100	12.6	14.2	1.6	0.13	0.41
150	16.9	19.0	2.1	0.17	0.52
200	20.7	23.2	2.4	0.20	0.61
250	24.3	27.1	2.7	0.22	0.68
300	27.7	30.7	3.0	0.24	0.75
450	38.8	42.3	3.4	0.27	0.85
600	49.2	53.3	4.0	0.33	1.01
-50	7.4	8.7	1.2	0.10	0.31
-100	11.8	13.6	1.8	0.15	0.46
-150	15.3	17.5	2.1	0.17	0.54
-200	18.3	20.9	2.5	0.20	0.63
-250	20.9	23.8	2.8	0.23	0.70
-300	23.1	26.4	3.2	0.26	0.81
-450	29.3	33.3	3.9	0.32	0.99
-600	34.6	39.9	5.3	0.43	1.33

Total opening perimeter = 12.27m

Overall area = 3.96m²

BS EN 12207:2000 - Joint class = 4

BS EN 12207:2000 - Area class = 4

BS EN 12207:2000 - Overall class before gusting = 4

Graph of Average Air Permeability Before Gusting.

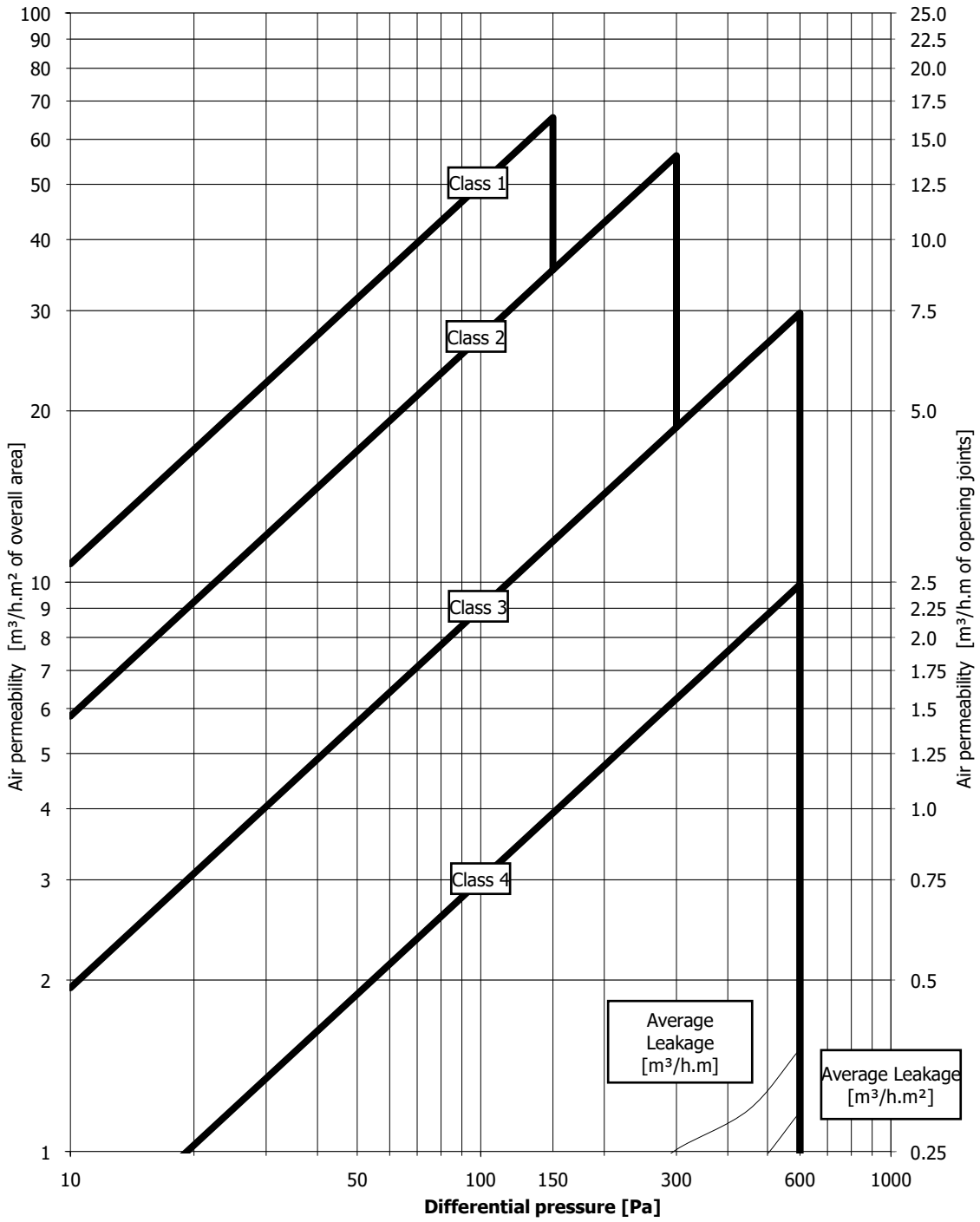


Table of Average Air Permeability Before Gusting.

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	1.1	0.09	0.29
100	1.7	0.14	0.43
150	2.1	0.17	0.53
200	2.5	0.20	0.62
250	2.7	0.22	0.69
300	3.1	0.25	0.78
450	3.6	0.30	0.92
600	4.6	0.38	1.17

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 = 12.27m

Overall area = 3.96m²

BS 6375-1:2015 Clause 6.3 - Joint class = 4

BS 6375-1:2015 Clause 6.3 - Area class = 4

BS 6375-1:2015 Clause 6.3 - Overall class = 4

Watertightness Test Results.

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

TABLE 2 – Spraying method 1A

Pressure (Pa)	Point at which water leakage occurred
0	No leakage
50	No leakage
100	No leakage
150	Water leaked out and over the threshold at 1 minute 39 seconds
200	-
250	-
300	-
450	-
600	-
750	-
900	-
1050	-

Wind Load Resistance Test Results.

Clause 8 Resistance to Wind Load

P1 Deflection Test

Three positive pulses of 1320Pa were applied.

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

Actual deflection 8.60mm (maximum deflection allowed 10.65mm)

Deflection/span ratio 1/248 (maximum ratio allowed 1/200)

Three negative pulses of 1320Pa were applied.

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

Actual deflection 8.40mm (maximum deflection allowed 10.65mm)

Deflection/span ratio 1/254 (maximum ratio allowed 1/200)

Wind Load Resistance Test Results. (continued)

Clause 8 Resistance to Wind Load (continued)

P2 Repeated Pressure Test

No visible failures or defects of the test sample were observed after 50 cycles of repeated wind loads were applied at a positive air pressure of 600Pa.

No visible failures or defects of the test sample were observed after 50 cycles of repeated wind loads were applied at a negative air pressure of 600Pa.

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 B3.

Date of test - 27 July 2020

Atmospheric pressure – 99.0kPa

Laboratory temperature – 18.8°C

Test engineers – Jack Nicholls

Laboratory humidity – 74.6%RH

Graph of Air Permeability After Gusting.

(including +20% lines for each class)

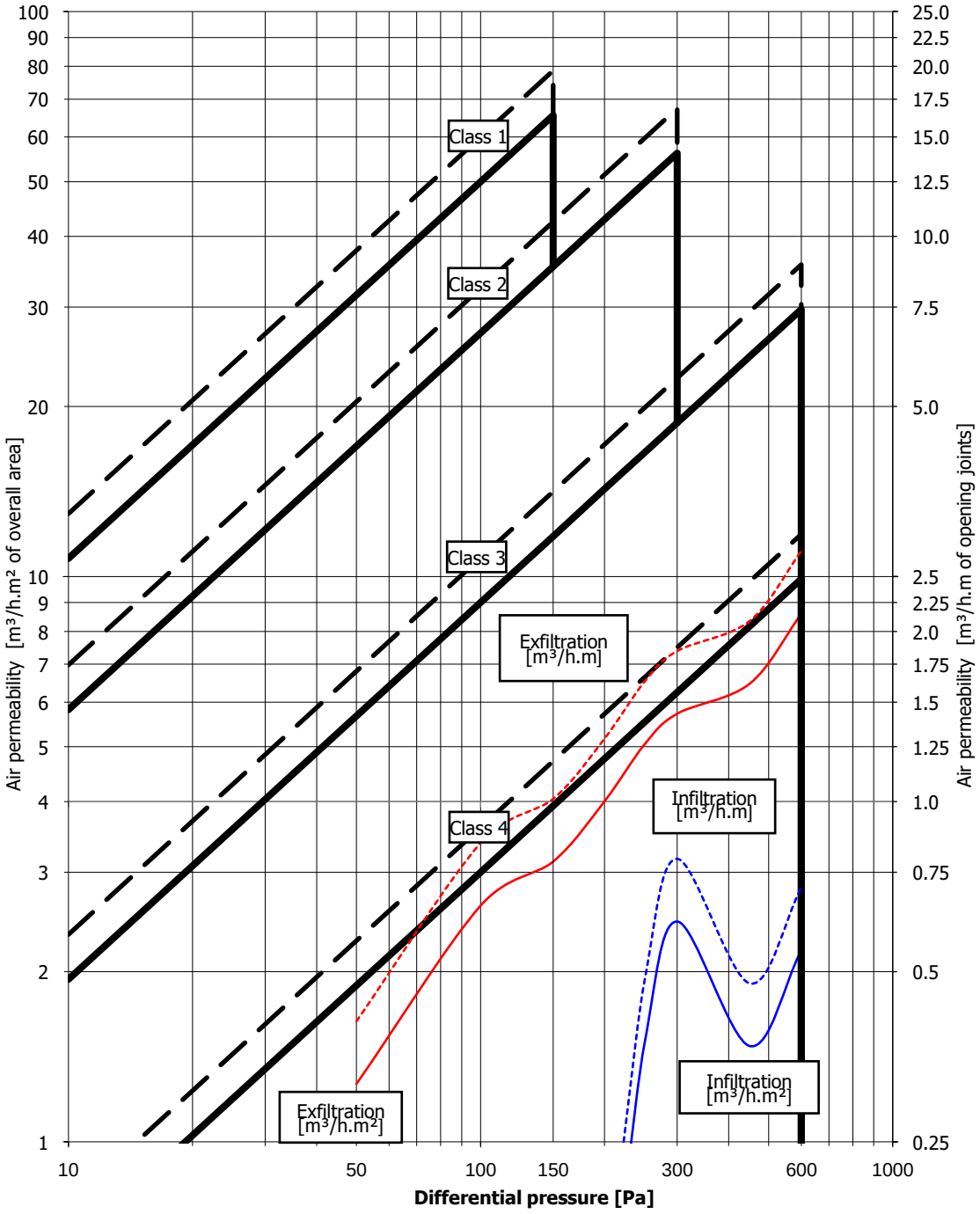


Table of Air Permeability After Gusting.

AIR PERMEABILITY TEST RESULTS - BS EN 1026:2000 / BS EN 12207:2000

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

Air Pressure [Pa]	Blank reading [m³/h]	Maximum total air flow [m³/h]	Actual rate of air leakage [m³/h]	Maximum rate of air leakage per meter length of opening joint [m³/h.m]	Maximum rate of air leakage relative to area of sample [m³/h.m²]
50	8.4	8.9	0.4	0.03	0.11
100	14.2	16.3	2.0	0.17	0.52
150	19.0	22.1	3.0	0.25	0.76
200	22.5	24.6	2.0	0.17	0.52
250	25.1	31.1	5.9	0.48	1.49
300	28.5	38.4	9.7	0.79	2.45
450	38.9	44.8	5.8	0.48	1.48
600	43.3	52.1	8.6	0.70	2.18
-50	7.2	12.3	5.0	0.41	1.27
-100	11.1	21.7	10.4	0.84	2.62
-150	13.8	26.5	12.4	1.01	3.13
-200	17.3	33.5	15.9	1.29	4.01
-250	20.5	40.9	20.0	1.63	5.05
-300	23.0	46.1	22.7	1.85	5.72
-450	30.8	56.9	25.6	2.09	6.47
-600	35.6	70.2	34.0	2.77	8.59

Total opening perimeter = 12.27m

Overall area = 3.96m²

For classification to BS EN 12210:2000 - Section 6.1: Resistance to wind load, the change in air permeability due to the wind pressure and repeated pressure tests HAS NOT exceeded the achieved class (4) by more than 20%.

Graph of Average Air Permeability After Gusting.

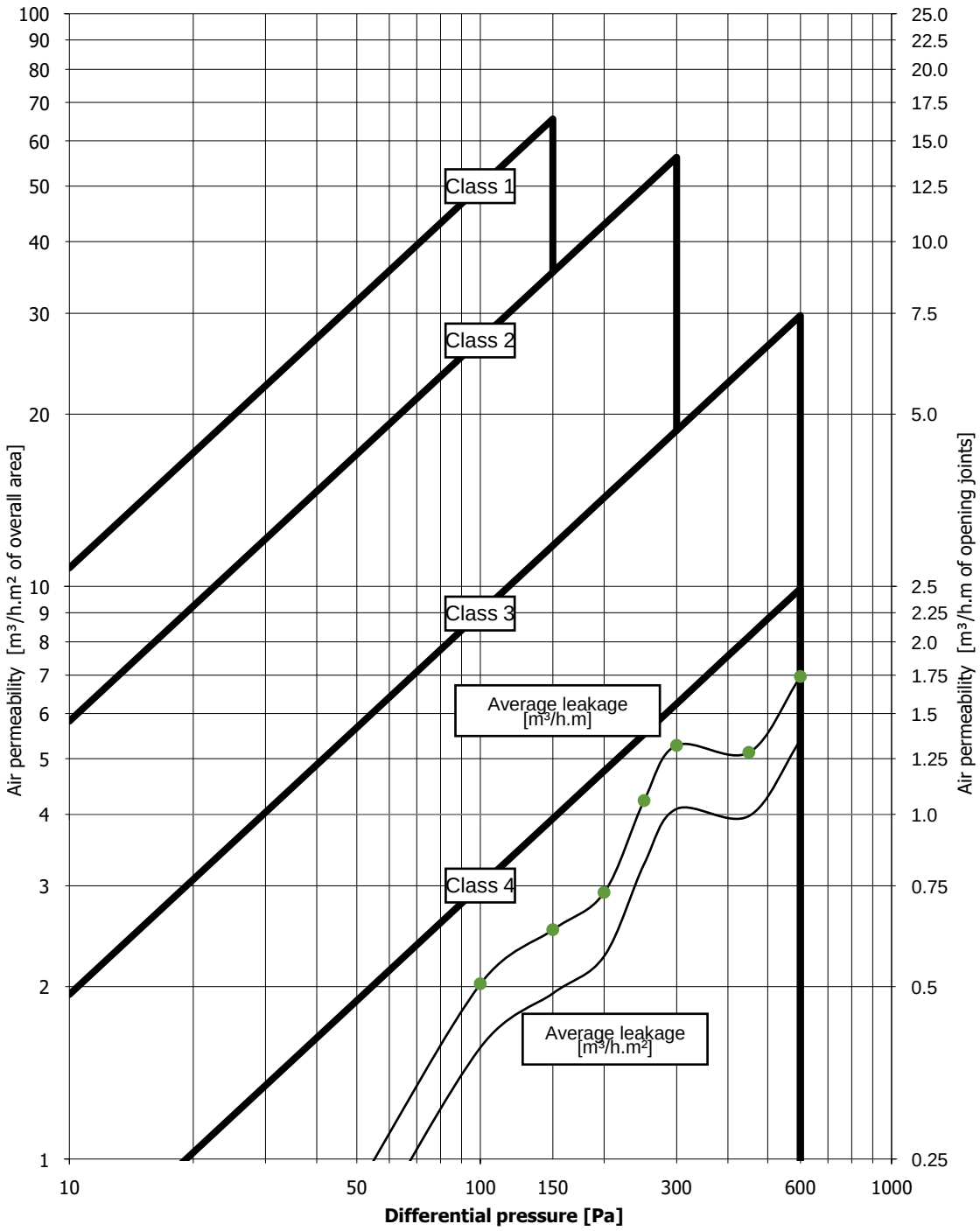


Table of Average Air Permeability After Gusting.

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 [m^3/h]	Average rate of air leakage per meter length of opening joint [$m^3/h.m$]	Average rate of air leakage relative to area of sample [$m^3/h.m^2$]
50	2.7	0.22	0.69
100	6.2	0.51	1.57
150	7.7	0.63	1.95
200	9.0	0.73	2.26
250	13.0	1.06	3.27
300	16.2	1.32	4.09
450	15.7	1.28	3.97
600	21.3	1.74	5.39

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 = 12.27m

Overall area = 3.96m^2

BS 6375-1:2015 Clause 6.5 - Joint class = 4

BS 6375-1:2015 Clause 6.5 - Area class = 4

BS 6375-1:2015 Clause 6.5 - Overall class = 4

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 4.

Wind Load Resistance Test Results. (continued)

Clause 8 Resistance to Wind Load (continued)

P3 Safety Test

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

BS 6375-2:2009.

Clause 6.2 Operating Forces: EN12046-2:2000 and EN12217:2015 (Class 1)

Assessment

The sample was tested three times – closing the leaf, lifting the handle, locking the key, unlocking the key, opening the handle and opening the leaf – and the average force recorded

Closing leaf force – 24.96N (maximum 75N)	Pass
Handle closing – 88.80N (maximum 100N)	Pass
Key Torque to lock – < 1.00Nm (maximum 5Nm)	Pass
Key Torque to unlock – < 1.00Nm (maximum 5Nm)	Pass
Handle opening – 66.01N (maximum 100N)	Pass
Force to maintain opening – 20.11N (maximum 75N)	Pass

Description of Weather Sample. (Sample 2)

Sample Type -	Double leaf open out glaze in hinged door assembly with glass infill above and below the midrail and a standard threshold
Material -	Aluminium
Construction -	Cleated
Fittings -	Master leaf - a six-point locking (four roller cams and two shoot bolts) FUHR espagnolette system, a lever/lever handle with key lockable 3* thumb turn cylinder, four Banks pin hinges and one run-up block Slave leaf - a two-point locking (two shoot bolts) FUHR espagnolette system, a lever/lever handle with key lockable 3* thumb turn cylinder, four Banks pin hinges and one run-up block
Glass -	Double glazed 4-20-4 mm toughened glass sealed units
Panel -	Not applicable
Glass Retention System -	Internal beads and gaskets
Weathersealing -	Double-sealed plastic weather strip

Sample dimensions -

Overall length:	1800mm	Height: 2200mm
Master leaf length:	885mm	Height: 2175mm
Slave leaf length:	900mm	Height: 2175mm

Date of test -	28 July 2020
Laboratory temperature -	20.7°C
Laboratory humidity -	44.7 %RH
Atmospheric pressure -	99.9kPa

Alitherm Heritage, Open Out, Double Door Set, Standard Threshold.

Outer Frame width	1800mm	**Outer Frame Material**	Aluminium
Outer Frame height	2200mm	**Outer Frame Gasket**	
Outer Frame Part Numbers		Gasket Type	EDPM
Top	W20015	Manufacturer	Reddplex
Bottom	W20015	Product Name	Flipper Gasket
Lock Side	W20015	Product Code	ACET160
Hinge Side	W20015	**Threshold**	
Outer Frame section dimensions		Manufacturer	Smarts
Width	33mm	Product name	Standard Threshold
Depth	52mm	Product Code	W20015
Mullion		Materials	Aluminium
Manufacturer	Smarts	**Outer Frame Joint Method**	
Product Name	Meeting Stile	Head	Cleat , Glue, Crimp
Product code	W20046	Foot	Cleat , Glue, Crimp
Material	Aluminium		

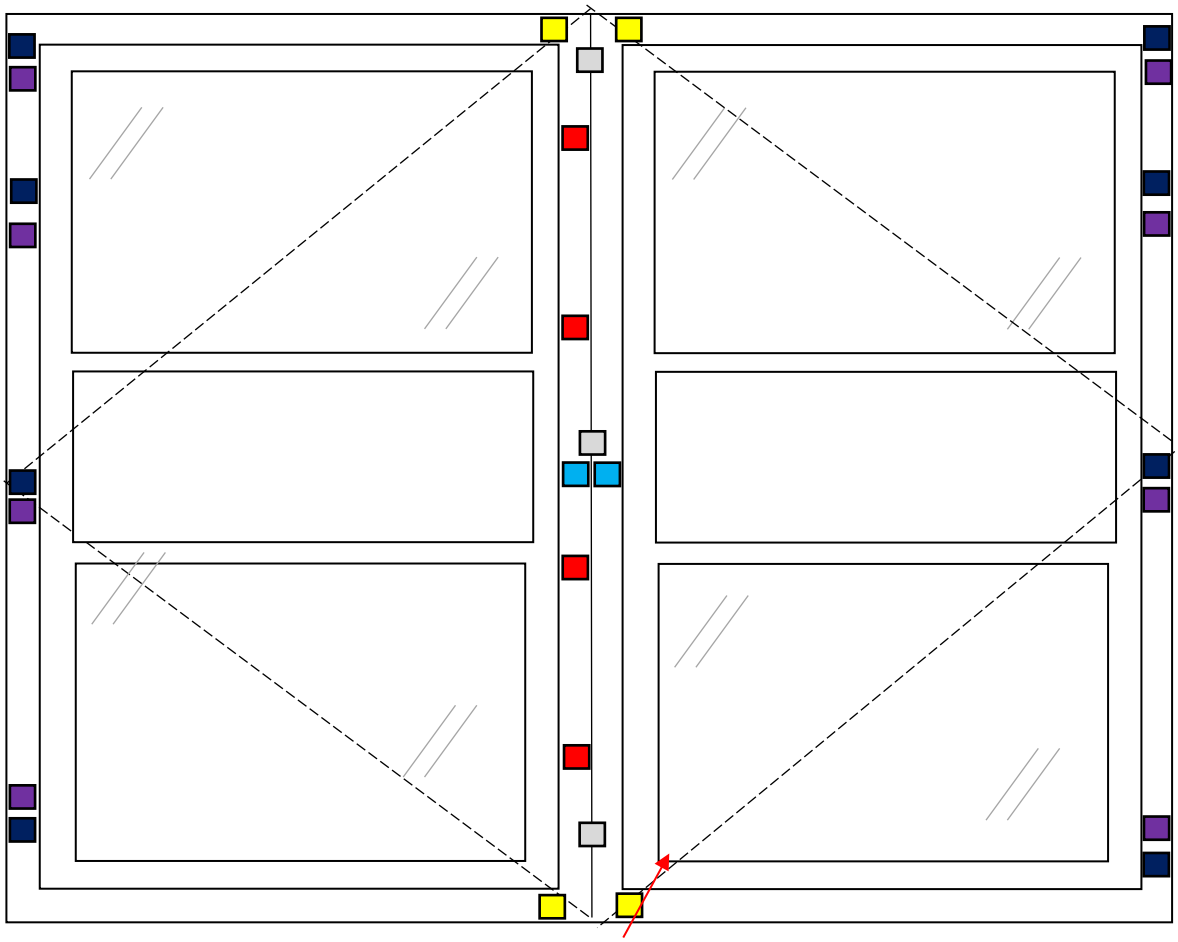
Leaf		**Leaf Material:**	Aluminium
Leaf Width:	884mm	**Leaf Gasket**	
Leaf Height:	2175mm	Gasket type:	EDPM
Leaf Part Numbers:		Manufacturer:	Reddiplex.
Top:	W20126	Product Name:	Flipper Gasket
Bottom:	W20126	Product Code	ACET160
Lock side:	W20126	**Leaf Transom**	
Hinge Side	W20126	Manufacturer:	Smarts
Leaf section size		Product name:	Transom
Width:	49.5MM	Product code:	W20135N
Depth:	59MM	Material:	Aluminium
Door Lock Housing		**Leaf joint method**	
Manufacturer:	Smarts	Head:	Cleat , Glue, Crimp
Product Name:	Door Lock Housing	Foot:	Cleat , Glue, Crimp
Product Code:	W20038		
Material:	Aluminium		
Bead			
Manufacturer:	Smarts		
Product Name:	Smarts		
Product Code:	W20171		
Material:	Aluminium		
Bead Size:	15.5mm x 8.5mm		

Alitherm Heritage, Open Out, Double Door Set, Standard Threshold.

Glazing Unit		**Glazing Gasket**	
Manufacturer:	Ashton Glass	Gasket Type:	EDPM
Inner Thickness:	4mm	Manufacturer:	Reddiplex
Spacer Material:	Aluminium	Product Name:	E Gasket, Wedge
Outer Thickness:	4mm	Product Code	ACET842. ACW20038
Unit Sizes:	798mm x 789mm 731mm x 281mm 798mm x 978mm	**Glazing Clip**	NA.
Glazing Tape Details. NA.		Manufacturer:	
Manufacturer:		Product Name:	
Product Name:		Product Code	
Product Code			

Hardware			**Fixings**	**Quantity**
Hinges:	ACW20360	Banks.	M4 Machine Screws M4 Riv nuts.	8
Hinge Protectors:	ACW20375	FUHR	M4 Machine Screws	8
Lock: Main Door Lock : Secondary Door	ACW20365 ACW20366	FUHR FUHR	M4 Machine Screws M4 Machine Screws ACUN 3532	1 1
Cylinders:	ACCY4525NKTTS3	UAP.	M5 Machine Screws	2
Handle:	ACW20061	Trojan.	M5 Machine Screws	2 Pairs
Drain Caps	ACET131	Smart		4
Cylinder Support:	NA			
Cylinder Escutcheon:	NA			
Keeps:	ACW20066 L/R ACW20367	FUHR Center Keep FUHR Roller Keeps.	ACUN3512 NO.8 Self Tapping Screw.	1 4
Mullion End Cap	ACW20144	Smarts	ACET 070	1 Pair.
Bottom Shoot Bolts.	ACDV737,	FUHR		2
Top Shoot bolts	ACDV 738	FUHR		2
Shoot Bolt Keeps	ACW20437	Smarts.		2
Hinge Protector Fixing Kit.	ACW20386	Smarts	M4 Machine Screws With M4 Riv Nuts.	8
Fixing Inserts	ACUN3532	Banks	M4 Machine Screws	20
Lock Extension 200mm	ACDV742	Fuhr	M4 Machine Screws	1

Elevation Drawing Showing Position of Hardware.



Water Leakage Point

Handle:
Hinge:
Hinge Protectors:
Cam:
Shoot Bolt:
Transducer placement:

Graph of Air Permeability Before Gusting.

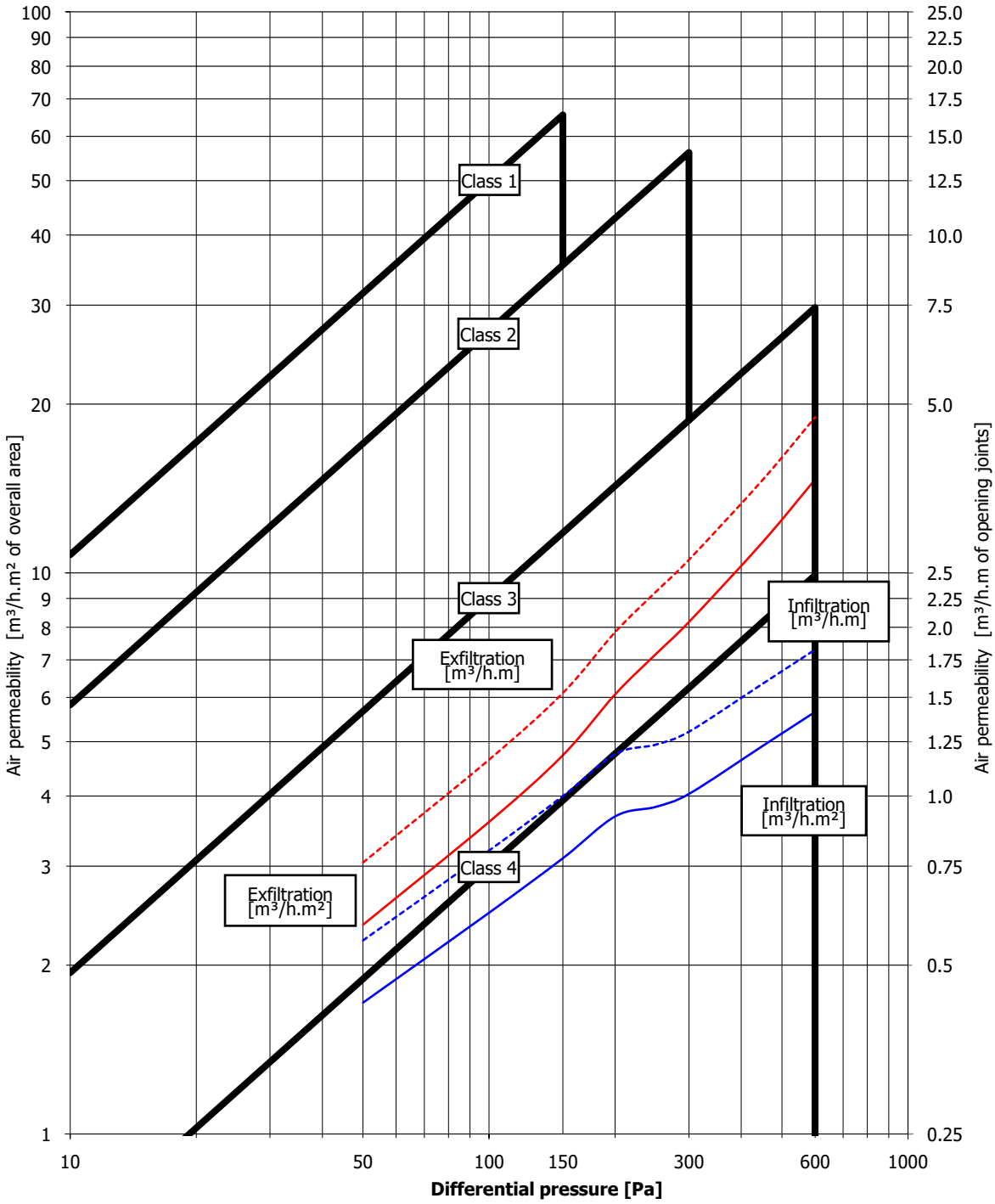


Table of Air Permeability Before Gusting.

AIR PERMEABILITY TEST RESULTS - BS EN 1026:2000 / BS EN 12207:2000

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

Air Pressure [Pa]	Blank reading [m³/h]	Maximum total air flow [m³/h]	Actual rate of air leakage [m³/h]	Rate of air leakage per meter length of opening joint [m³/h.m]	Rate of air leakage relative to area of sample [m³/h.m²]
50	7.3	14.2	6.8	0.55	1.71
100	11.3	21.3	9.8	0.80	2.48
150	14.6	27.0	12.3	1.00	3.10
200	17.1	32.0	14.6	1.19	3.68
250	21.6	37.0	15.2	1.24	3.83
300	25.0	41.2	16.0	1.30	4.04
450	32.4	52.2	19.5	1.59	4.92
600	38.8	61.6	22.4	1.82	5.65
-50	5.4	14.9	9.3	0.76	2.36
-100	8.2	22.7	14.3	1.16	3.60
-150	10.1	29.2	18.7	1.53	4.73
-200	11.5	35.9	24.1	1.96	6.08
-250	12.6	41.4	28.4	2.31	7.17
-300	13.5	46.4	32.4	2.64	8.18
-450	17.0	62.7	45.0	3.66	11.35
-600	19.9	78.9	58.1	4.73	14.67

Total opening perimeter = 12.27m

Overall area = 3.96m²

BS EN 12207:2000 - Joint class = 3

BS EN 12207:2000 - Area class = 3

BS EN 12207:2000 - Overall class before gusting = 3

Graph of Average Air Permeability Before Gusting.

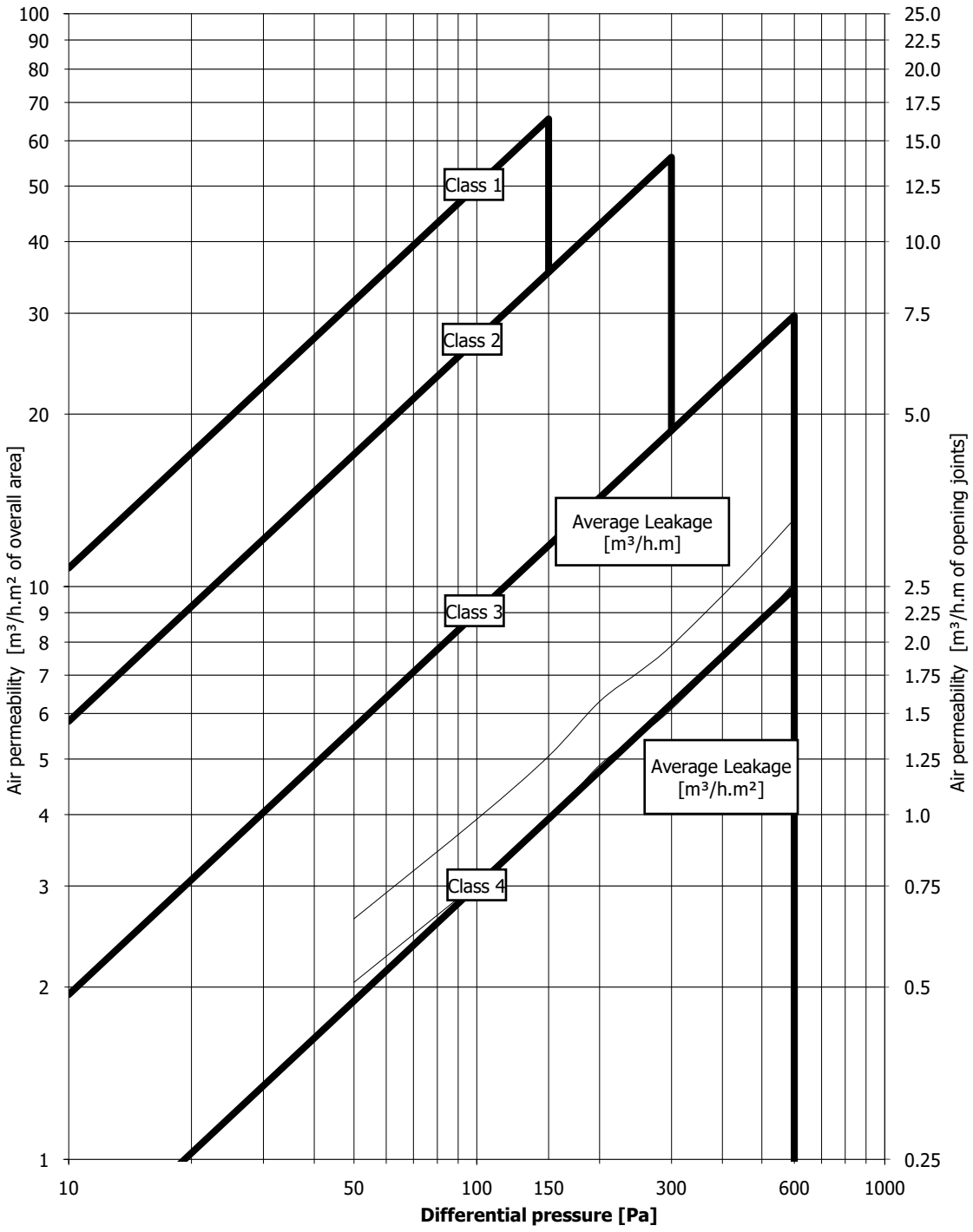


Table of Average Air Permeability Before Gusting.

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	8.1	0.66	2.04
100	12.0	0.98	3.04
150	15.5	1.26	3.92
200	19.3	1.57	4.88
250	21.8	1.77	5.50
300	24.2	1.97	6.11
450	32.2	2.63	8.13
600	40.2	3.28	10.16

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 = 12.27m

Overall area = 3.96m²

BS 6375-1:2015 Clause 6.3 - Joint class = 3

BS 6375-1:2015 Clause 6.3 - Area class = 3

BS 6375-1:2015 Clause 6.3 - Overall class = 3

Watertightness Test Results.

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

TABLE 2 – Spraying method 1A

Pressure (Pa)	Point 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	Water leaked out and over the threshold at 5 seconds
750	-
900	-
1050	-

Wind Load Resistance Test Results.

Clause 8 Resistance to Wind Load

P1 Deflection Test

Three positive pulses of 1320Pa were applied.

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

Actual deflection 8.80mm (maximum deflection allowed 10.65mm)

Deflection/span ratio 1/242 (maximum ratio allowed 1/200)

Three negative pulses of 1320Pa were applied.

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

Actual deflection 8.70mm (maximum deflection allowed 10.65mm)

Deflection/span ratio 1/245 (maximum ratio allowed 1/200)

Wind Load Resistance Test Results. (continued)

Clause 8 Resistance to Wind Load (continued)

P2 Repeated Pressure Test

No visible failures or defects of the test sample were observed after 50 cycles of repeated wind loads were applied at a positive air pressure of 600Pa.

No visible failures or defects of the test sample were observed after 50 cycles of repeated wind loads were applied at a negative air pressure of 600Pa.

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 B3.

Date of test - 28 July 2020

Atmospheric pressure – 99.9kPa

Laboratory temperature – 20.7°C

Test engineers – Errol Creary

Laboratory humidity – 44.7%RH

Graph of Air Permeability After Gusting.

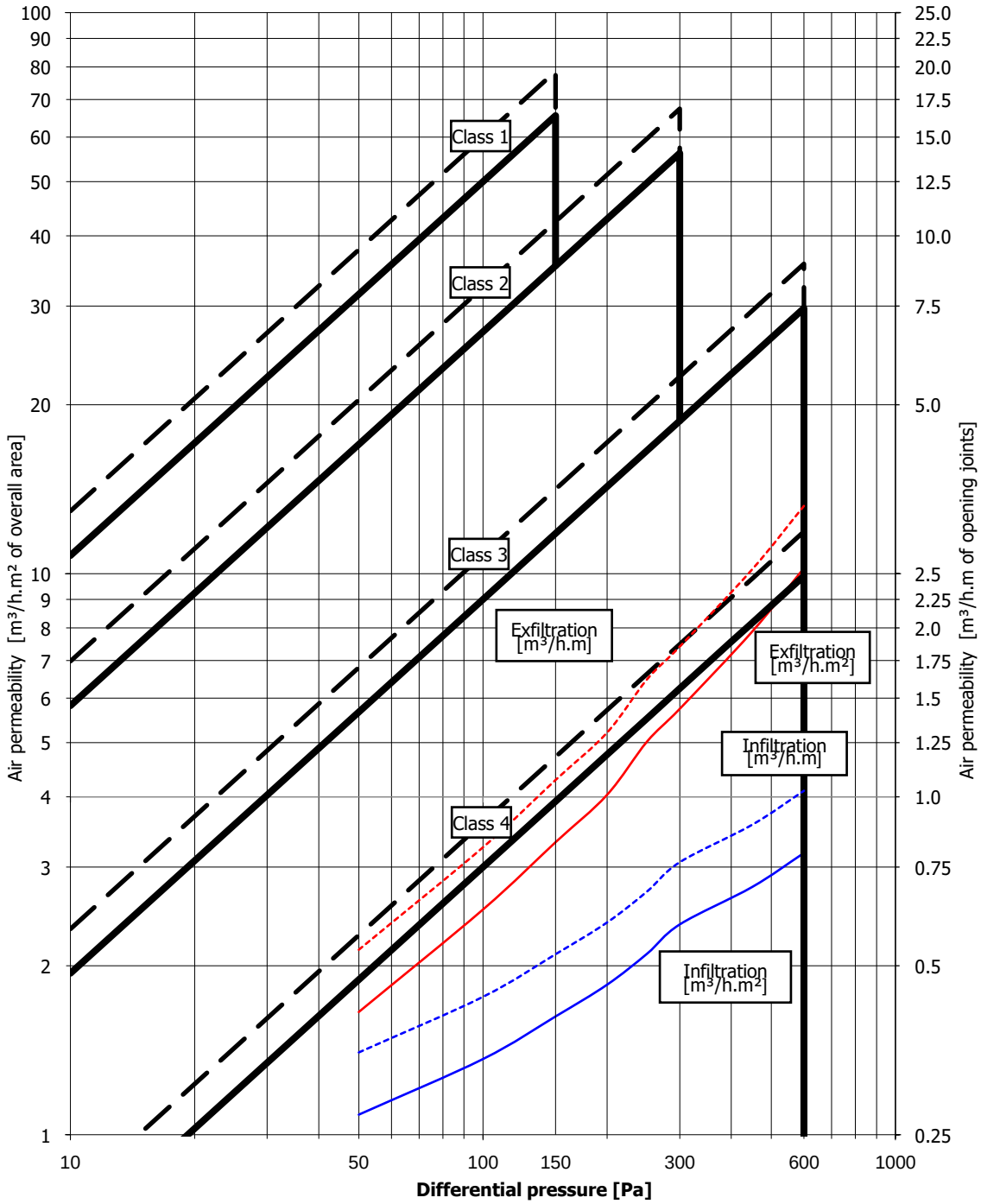


Table of Air Permeability After Gusting.

AIR PERMEABILITY TEST RESULTS - BS EN 1026:2000 / BS EN 12207:2000

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

Air Pressure [Pa]	Blank reading [m³/h]	Maximum total air flow [m³/h]	Actual rate of air leakage [m³/h]	Maximum rate of air leakage per meter length of opening joint [m³/h.m]	Maximum rate of air leakage relative to area of sample [m³/h.m²]
50	9.0	13.4	4.3	0.35	1.09
100	14.8	20.3	5.4	0.44	1.36
150	19.2	25.7	6.4	0.52	1.62
200	23.1	30.5	7.3	0.60	1.85
250	26.7	35.2	8.3	0.68	2.10
300	29.9	39.4	9.4	0.76	2.37
450	38.7	49.8	11.0	0.89	2.77
600	45.6	58.4	12.6	1.03	3.18
-50	7.7	14.4	6.6	0.53	1.65
-100	11.8	22.0	10.0	0.81	2.52
-150	15.0	28.3	13.2	1.07	3.32
-200	17.8	34.0	16.0	1.30	4.03
-250	20.5	40.7	19.9	1.62	5.02
-300	22.9	46.0	22.7	1.85	5.74
-450	29.6	61.4	31.2	2.55	7.89
-600	35.4	76.6	40.5	3.30	10.23

Total opening perimeter = 12.27m

Overall area = 3.96m²

For classification to BS EN 12210:2000 - Section 6.1: Resistance to wind load, the change in air permeability due to the wind pressure and repeated pressure tests HAS NOT exceeded the achieved class (3) by more than 20%.

Graph of Average Air Permeability After Gusting.

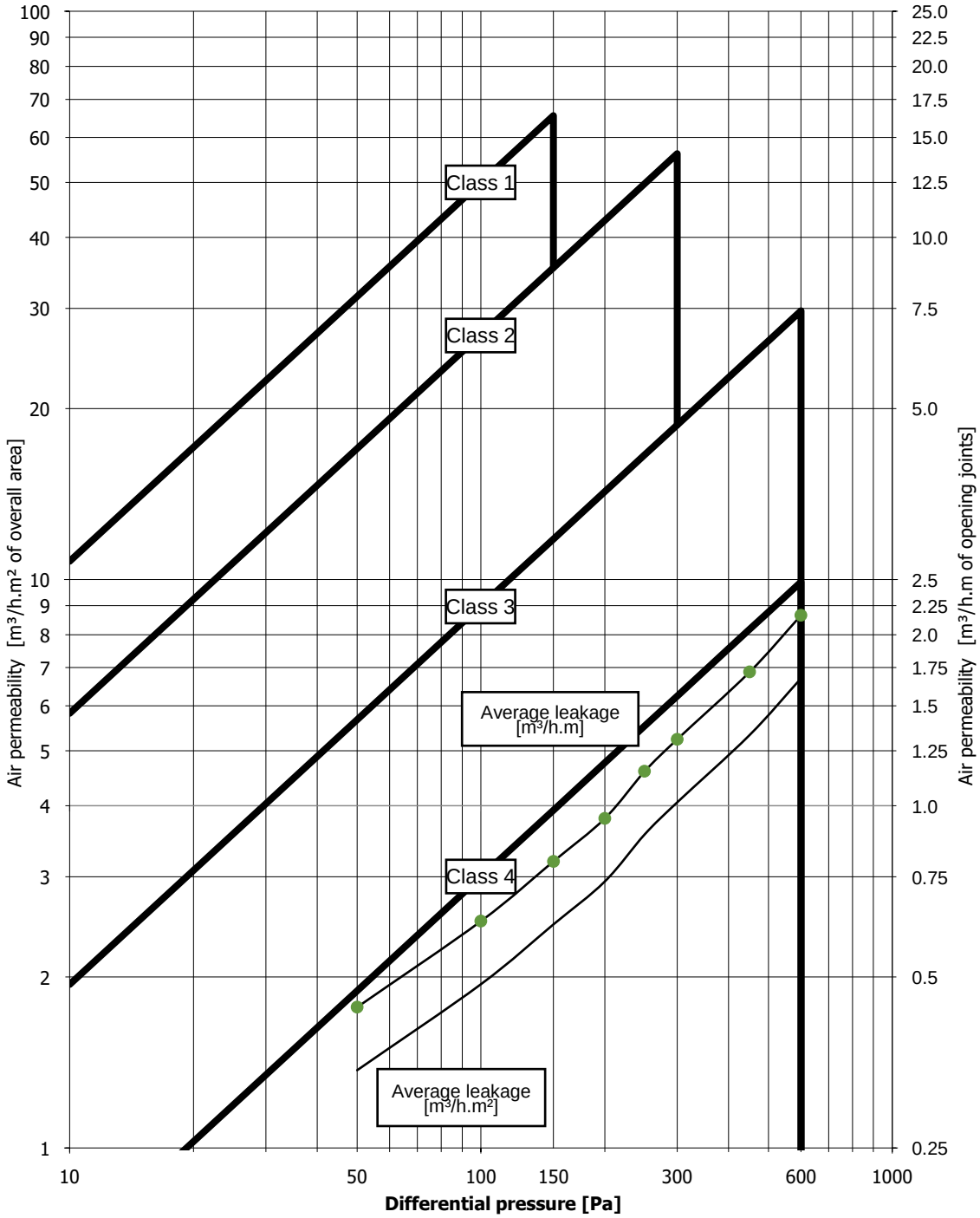


Table of Average Air Permeability After Gusting.

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	5.4	0.44	1.37
100	7.7	0.63	1.94
150	9.8	0.80	2.47
200	11.7	0.95	2.94
250	14.1	1.15	3.56
300	16.1	1.31	4.06
450	21.1	1.72	5.33
600	26.5	2.16	6.70

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 = 12.27m

Overall area = 3.96m²

BS 6375-1:2015 Clause 6.5 - Joint class = 4

BS 6375-1:2015 Clause 6.5 - Area class = 4

BS 6375-1:2015 Clause 6.5 - Overall class = 4

In accordance with BS 6375-1:2015 Clause 6.5, although the classification after the resistance to wind load tests is greater than the classification before the resistance to wind load tests, the resulting classification for the sample is Class 3.

Wind Load Resistance Test Results. (continued)

Clause 8 Resistance to Wind Load (continued)

P3 Safety Test

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

BS 6375-2:2009.

Clause 6.2 Operating Forces: EN12046-2:2000 and EN12217:2015 (Class 1)

Assessment

The sample was tested three times – closing the leaf, lifting the handle, locking the key, unlocking the key, opening the handle and opening the leaf – and the average force recorded

Closing leaf force – 22.83N (maximum 75N)	Pass
Handle closing – 86.40N (maximum 100N)	Pass
Key Torque to lock – < 1.00Nm (maximum 5Nm)	Pass
Key Torque to unlock – < 1.00Nm (maximum 5Nm)	Pass
Handle opening – 65.38N (maximum 100N)	Pass
Force to maintain opening – 21.00N (maximum 75N)	Pass

Photograph of Sample.

Test Samples.

Sample Id	ER Number	Description
1	10191178	Aluminium double doors

Description of Test Samples.

Sample Description
1 off double leaf open in glaze in hinged door assembly with glass above and below the midrail with a standard threshold
1 off double leaf open out glaze in hinged door assembly with glass above and below the midrail with a standard threshold

Test Requirements.

BS4873 direct test

Clause	Requirements
Results table	*BS4873 direct 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 ***