



# Test Report



Report No	2370/7612199	This Report consists of 40 pages
Client	Smarts Systems Limited Arnolds Way Yatton BS49 4QN	
Authority & date	Request by Client dated 25 November 2010	
Items tested	3 off single leaf hinged door assemblies, Smart Systems Alitherm Plus Aluminium Alloy Residential Door System	
Specification	Test Development Specification 01 Single and double leaf external door assemblies to dwellings Issue 2 - 6 February 2007	
Results	Fail – Clause 5.3 Mechanical Performance	
Prepared by	D Kirsop 	(Technician)
Authorized by	M Manito 	(Senior Engineer)
Issue Date	06 January 2011	
Conditions of issue	<p>This Test Report is issued subject to the conditions stated in current issue of CPO322 'General conditions relating to acceptance of testing'. 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 the Managing Director, BSI, who reserves the absolute right to agree or reject all or any of the details of any items or publicity for which consent may be sought.</p>	



0135

## **TEST, EXAMINATION AND ASSESSMENT OF THREE SINGLE LEAF HINGED DOOR ASSEMBLIES, SMART SYTEMS ALITHERM PLUS ALUNINIUM ALLOY RESIDENTIAL DOOR SYSTEM**

### **INTRODUCTION**

At the clients request the door assemblies submitted by Futuremost Limited, detailed below and described on pages 7, 8, 9, 30, 31, and 32 were tested and assessed to the requirements of Test Development Specification Single and double leaf door assemblies to dwellings Issue 2 - 6 February 2007, as indicated on the following pages of this Report.

This request was made on Quote No: 0000290889 dated 25 November 2010.

It is emphasized that assessments have not been made against the other Clauses of the Specification.

### **TEST SAMPLES**

1 off single leaf open in glaze in hinged door assembly glazed above and below midrail  
Standard threshold (Sample 1)

1 off single leaf open out glaze in hinged door assembly glazed above and below midrail  
Standard threshold (Sample 2)

1 off single leaf open in glaze in hinged door assembly glazed above and below midrail  
Standard threshold (Sample 3)

### **Note**

Sample 3 was not tested due to failure on sample one.

Equipment Record No 10119381

Date samples received: 13 December 2010

### **PERFORMANCE REQUIREMENTS REQUESTED BY CLIENT**

Exposure category - 1200

## SUMMARY OF RESULTS

- |     |  |   |
|-----|--|---|
| 1.  | Operating forces before weathertightness tests | Test sample 1 and 2 met the requirements of the Specification in respect of Clause 5.3.1, and its parts thereof, against which assessments have been made   |
| 2.  | Air permeability                               | Test sample 1 and 2 met the requirements of the Specification, in respect of Clause 5.2.1, for Test Pressure Class 4  |
| 3.  | Watertightness                                 | Test sample 1 met the requirements of the Specification, in respect of Clause 5.2.2, for Test Pressure Class 7A<br><br>Test sample 2 met the requirements of the Specification, in respect of Clause 5.2.2, for Test Pressure Class E1050 |
| 4.  | Wind resistance                                | Test samples met the requirements of the Specification, in respect of Clause 5.2.3, for Test Pressure Class A3  |
| 5.  | Classification                                 | Test samples met the requirements of the Specification for Exposure Category 1200.  |
| 6.  | Operating forces after weathertightness tests  | Test sample 1 met the requirements of the Specification in respect of Clause 5.3.1, and its parts thereof, against which assessments have been made   |
| 7.  | Resistance to vertical loads                   | Test sample 1 met the requirements of the Specification in respect of Clause 5.3.2  |
| 8.  | Resistance to static torsion                   | Test sample 1 met the requirements of the Specification in respect of Clause 5.3.3  |
| 9.  | Slamming resistance                            | Test sample 1 met the requirements of the Specification in respect of Clause 5.3.4.   |
| 10. | Closure against obstructions                   | Test sample 1 failed to meet the requirements of the Specification in respect of Clause 5.3.5.  |
| 11. | Abusive forces on handles                      | Not assessed  |
| 12. | Door resistance to soft and heavy impact       | Not assessed  |
| 13. | Door leaf resistance to hard body impact       | Not assessed  |
| 14. | Cyclic operation test                          | Not assessed  |
| 15. | Basic security                                 | Not assessed  |

#### **CLAUSE 4.2 SAMPLE SELECTION**

The samples submitted for tests were selected using the criteria in Clause 4.2 of the Specification.

Each sample was submitted for test mounted in a 75mm x 100mm timber subframe in accordance with the manufacturer's installation requirements.

#### **CLAUSE 4.3 SEQUENCE OF TESTS**

The sequence of testing the samples followed that detailed in Clause 4.3 of the Specification.

#### **CLAUSE 5 PERFORMANCE REQUIREMENTS**

The performance of each sample was assessed against the requirements detailed in Clause 5 of the Specification.

#### **CLAUSE 6 TEST METHODS**

The samples were prepared for test and tested in accordance with Clause 6 of the Specification.

## **METHODS OF TEST**

### **1. Operating Forces**

The operating forces acting on the sample were determined by the methods given in Clause 6.3 of TDS Issue 2 - 6 February 2007.

### **2. Air Permeability**

The air permeability of the sample was determined by the method given in BS 6375-1:2009.

### **3. Watertightness**

The watertightness of the sample was determined by the method given in BS 6375-1:2009.

### **4. Wind Resistance**

The wind resistance of the sample was determined by the methods (P1 and P2) given in BS 6375-1:2009.

### **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 sample was determined by the method (P3) given in BS 6375-1:2009.

### **7. Resistance to Vertical Loads**

The resistance to vertical loads test was carried out using the method given in TDS Issue 2 - 6 February 2007.

### **8. Repeat Test**

After testing for resistance to vertical loads test 1 was repeated.

### **9. Resistance to Static Torsion**

The resistance to static torsion test was carried out using the method given in TDS Issue 2 - 6 February 2007.

### **10. Repeat Test**

After testing for resistance to static torsion test 1 was repeated.

### **11. Slamming Resistance**

The resistance to slamming test was carried out using the method given in TDS Issue 2 - 6 February 2007.

### **12. Repeat Test**

After testing for slamming resistance test 1 was repeated.

**METHODS OF TEST (CONTINUED)**

**13. Closure Against Obstruction**

The closure against obstruction test was carried out using the method given in TDS Issue 2 - 6 February 2007.

## DESCRIPTION OF SAMPLE

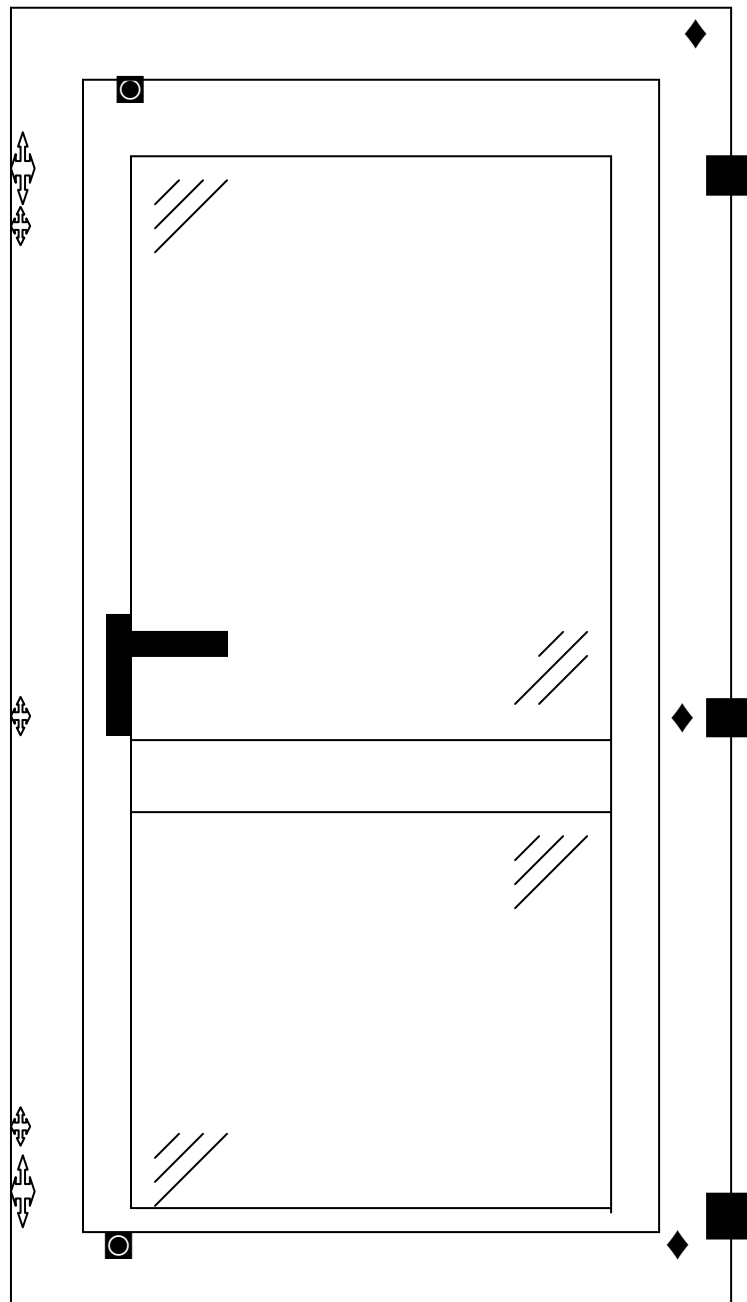
<b>Sample Type -</b>	A single leaf open in glaze in hinged door. The leaf has glass above and below the midrail.
<b>Material -</b>	Aluminium alloy
<b>Finish -</b>	Natural
<b>Profile reference -</b>	Outerframe: - ETD 017 Leaf: - ETD 025N Bead: - ETC164 Midrail - ETD033 Threshold - ETD095
<b>Construction -</b>	Outerframe - Thermally broken Leaf - Thermally broken Threshold - Thermally broken
<b>Fittings -</b>	A seven point locking (two hookbolts/bolt, two roller cams, two shootbolts and a key operated deadbolt/latch) Paddock Lockmaster ref: ACET183 espagnolette system with Paddock top and bottom shootbolts, a Sobinco euro profile cylinder 30/50 cylinder, a Hoppe Tokyo SBD key locking handle, three Fapim hinges, a VL72 drip bar and three Wagner dog bolts
<b>Weathersealing -</b>	Double sealed with plastics weatherstrip ref ACET160 Flipper gasket
<b>Glass -</b>	Double glazed with 4-20-4 mm toughened glass sealed units
<b>Glass retention system -</b>	Internal beads ref ETC161 and ACVG31 3mm E gasket ACVG34 5mm Wedge gasket







**DESCRIPTION OF SAMPLE (CONTINUED)**

<b>Sample dimensions -</b>	Overall	
	Length: 960mm	Height: 2180mm
	Door leaf	
	Length: 900mm	Height: 2105mm
<b>Date of test -</b>	14 December 2010 - conducted by P Waller	
<b>Laboratory temperature -</b>	20.9°C	
<b>Laboratory humidity -</b>	37.5%RH	
<b>Atmospheric pressure -</b>	101.9kPa	



**ELEVATION DRAWING OF DOOR ASSEMBLY**  
(indicating positions of hardware)



-  - hinge/dog bolt
-  - roller cam
-  - hook bolt/dead bolt
-  - handle, cylinder and lockcase
-  - shootbolts
-  - transducers

## **OPERATING FORCE RESULTS – BEFORE WEATHERTIGHTNESS TESTS**

### **Clause 5.3 Mechanical Performance**

### **ASSESSMENT**

#### **Clauses 5.3.1 and 6.3 Operating Forces**

The door was tested in accordance with Clause 6.3.1

#### **Clause 6.3.3 Latching Test**

Clause 5.3.1.a) latching force.

The tests were performed after manual operation of all moving parts five times.

The door leaf was opened for a distance of 100mm.

A closing force of 70N was applied at the operating point using the apparatus described in Clause 6.3.2.1.

The test was carried out five times

On each occasion the door latched

Pass

#### **Clause 6.3.4 Hardware Operating Test**

Clause 5.3.1.b) 1) hand operated hardware.

A perpendicular to plane load of 50N was applied to act at the handle position and in the direction of closing and maintained for the duration of the test.

A force was applied, without shock, to the operating hardware in the direction of locking and unlocking the hardware.

The test was carried out five times

The results were as follows

1)	Lock - 94N	Unlock - 76N	(maximum allowed 100N)	Pass
2)	Lock - 95N	Unlock - 71N	(maximum allowed 100N)	Pass
3)	Lock - 90N	Unlock - 78N	(maximum allowed 100N)	Pass
4)	Lock - 92N	Unlock - 81N	(maximum allowed 100N)	Pass
5)	Lock - 92N	Unlock - 71N	(maximum allowed 100N)	Pass

## **OPERATING FORCE RESULTS – BEFORE WEATHERTIGHTNESS TESTS**

### **Clause 5.3 Mechanical Performance**

### **ASSESSMENT**

#### **Clauses 5.3.1 and 6.3 Operating Forces**

The door was tested in accordance with Clause 6.3.1

#### **Clause 6.3.4 Hardware Operating Test**

Clause 5.3.1.b) 3) key operation.

A key was inserted into the locking handle and operated by means of a torque driver.

The test was carried out five times

The results were as follows

1)	Lock - 0.2Nm	Unlock - 0.1Nm	(maximum allowed 2Nm)	Pass
2)	Lock - 0.2Nm	Unlock - 0.2Nm	(maximum allowed 2Nm)	Pass
3)	Lock - 0.1Nm	Unlock - 0.1Nm	(maximum allowed 2Nm)	Pass
4)	Lock - 0.2Nm	Unlock - 0.2Nm	(maximum allowed 2Nm)	Pass
5)	Lock - 0.2Nm	Unlock - 0.2Nm	(maximum allowed 2Nm)	Pass

#### **Clause 6.3.5 Initiate Movement Test**

Clause 5.3.1.c) force to initiate movement.

The hardware was disengaged and the door closed.

A load without shock, to the operating point to initiate movement in the opening direction of the door leaf did not exceed 50N.

The test was carried out five times

On each occasion the door opened

Pass

**AIR PERMEABILITY TEST RESULTS - BS 6375-1:2009 Clause 6 / BS EN  
1026:2000**

**Clause 6 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 [m <sup>3</sup> /h]	Average rate of air leakage per meter length of opening joint [m <sup>3</sup> /h.m]	Average rate of air leakage relative to area of sample [m <sup>3</sup> /h.m <sup>2</sup> ]
50	3.5	0.60	1.68
100	5.5	0.95	2.64
150	7.1	1.22	3.38
200	8.0	1.37	3.81
250	9.0	1.55	4.31
300	10.5	1.80	5.01
450	15.1	2.60	7.21
600	20.6	3.55	9.85
750	-	-	-

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 = 5.81m

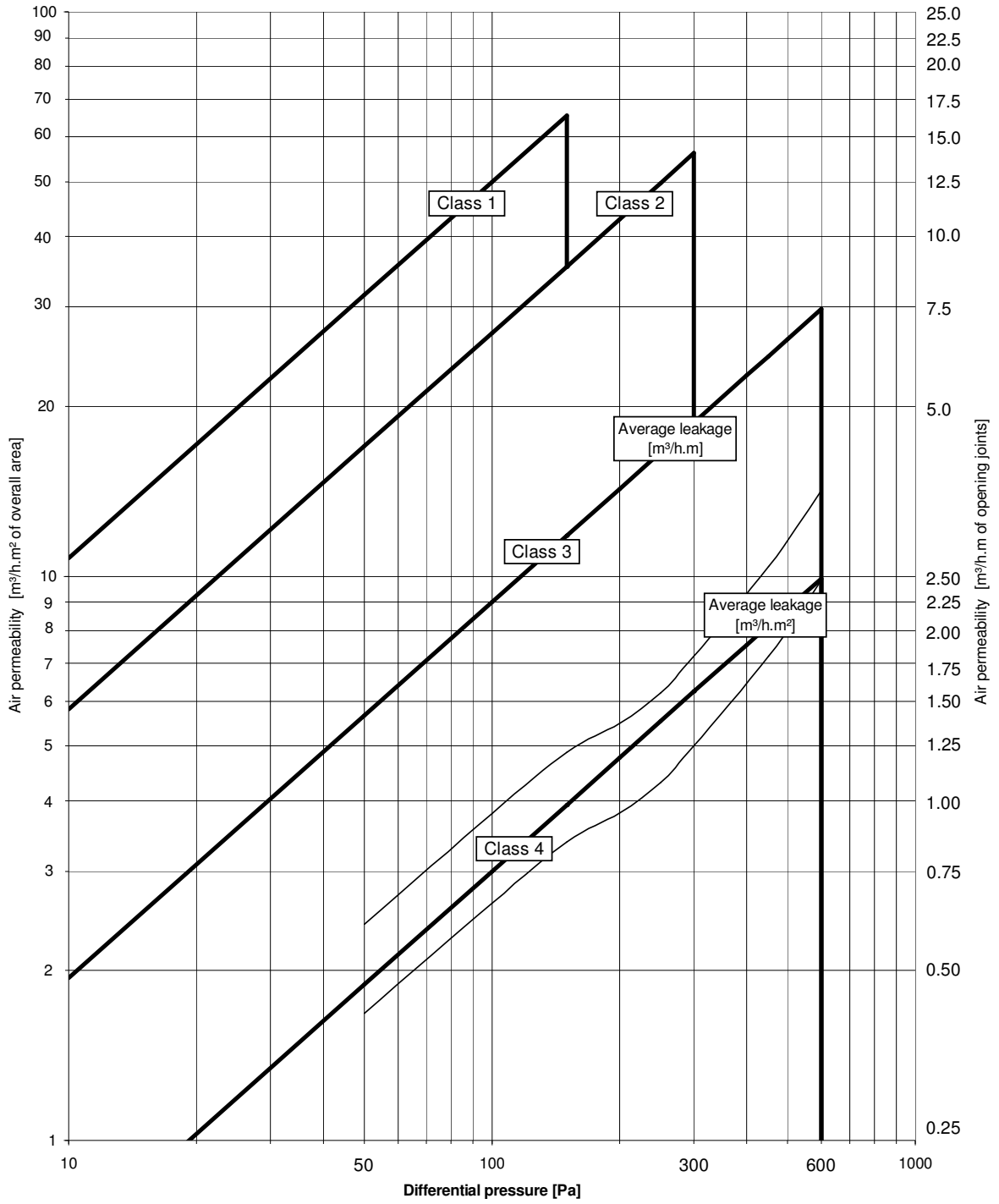
Overall area = 2.0928m<sup>2</sup>

BS 6375-1:2009 Clause 6.2 - Joint class = 3

BS 6375-1:2009 Clause 6.2 - Area class = 4

BS 6375-1:2009 Clause 6.2 - Overall class =  
4

GRAPH OF AVERAGE AIR PERMEABILITY BEFORE GUSTING



## **WATERTIGHTNESS TEST RESULTS - BS EN 1027:2000**

### **Clause 5.2.2 Watertightness before resistance to wind loads**

**TABLE 2 - Spraying method 1A**

Pressure (Pa)	Point at which water leakage occurred
450	Water, from the glazing bead, ran onto and over the threshold

## **WIND RESISTANCE TEST RESULTS - BS EN 12211:2000**

### **Clause 5.2.3 Resistance to wind load**

#### **P1 DEFLECTION TEST**

Three positive pressure pulses at 1320 Pa were applied

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

Actual deflection – 2.14mm (maximum deflection allowed 13.06mm)

Deflection/span ratio 1/915 (maximum ratio allowed 1/150)

Three negative pressure pulses at 1320 Pa were applied

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

Actual deflection – 2.10mm (maximum deflection allowed 13.06m)

Deflection/span ratio 1/933 (maximum ratio allowed 1/150)

#### **P2 REPEATED PRESSURE TEST**

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

No visible failures or functional defects to the sample were observed after 50 cycles of repeated wind loads applied at a negative 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 4 (see following Table).

**AIR PERMEABILITY TEST RESULTS - BS 6375-1:2009 Clause 6 / BS EN  
1026:2000**

**Clause 6 After 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 [m <sup>3</sup> /h]	Average rate of air leakage per meter length of opening joint [m <sup>3</sup> /h.m]	Average rate of air leakage relative to area of sample [m <sup>3</sup> /h.m <sup>2</sup> ]
50	3.0	0.51	1.41
100	4.5	0.77	2.13
150	5.2	0.90	2.49
200	6.1	1.05	2.92
250	7.3	1.25	3.47
300	8.3	1.43	3.98
450	11.8	2.03	5.63
600	16.5	2.85	7.91
750	-	-	-

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 = 5.81m

Overall area = 2.0928m<sup>2</sup>

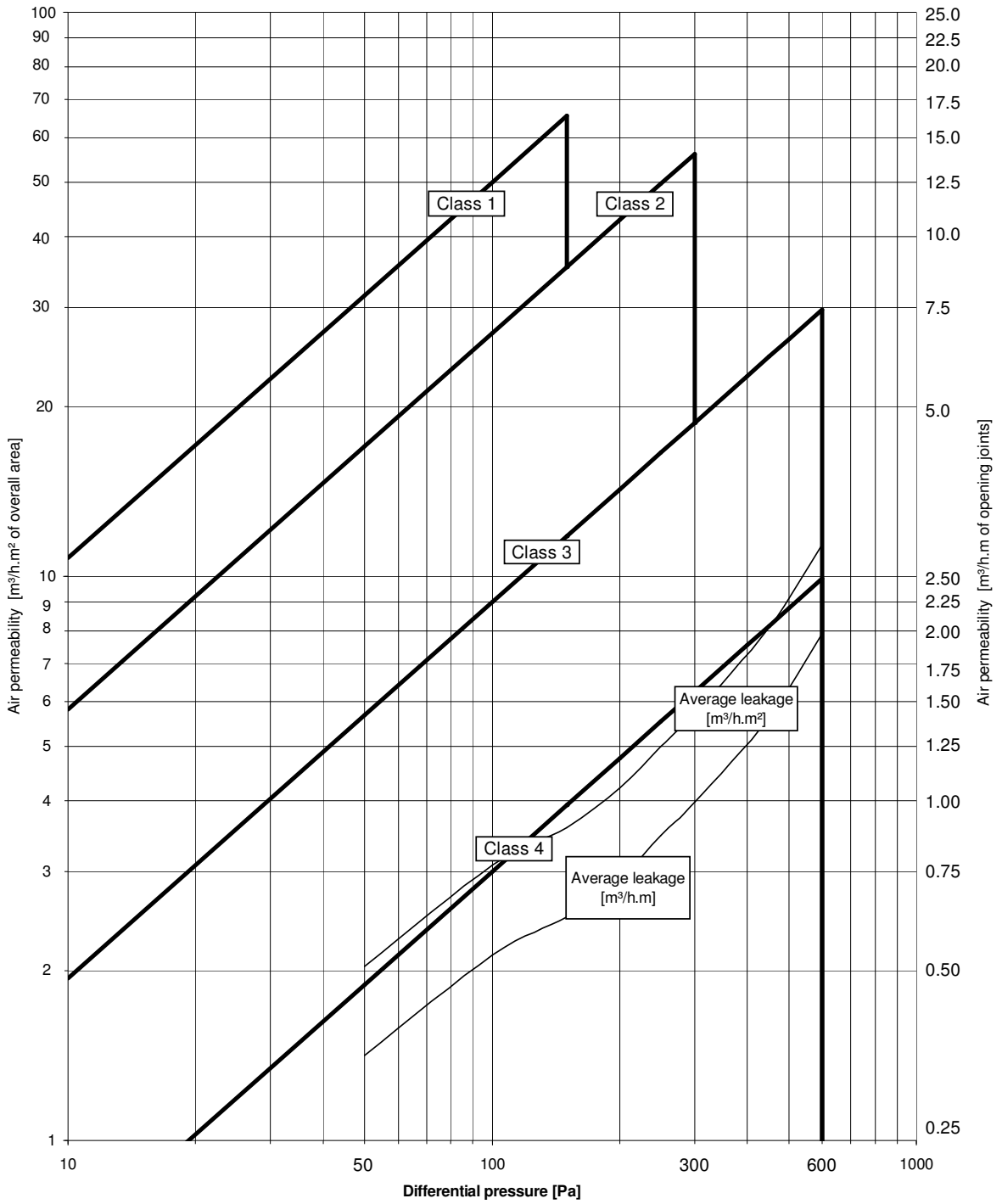
BS 6375-1:2009 Clause 6.5 - Joint class = 3

BS 6375-1:2009 Clause 6.5 - Area class = 4

BS 6375-1:2009 Clause 6.5 - Overall class =  
4

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 4.

GRAPH OF AVERAGE AIR PERMEABILITY AFTER GUSTING





## **WIND RESISTANCE TEST RESULTS - BS EN 12211:2004**

### **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

## **OPERATING FORCE RESULTS – AFTER WEATHERTIGHTNESS TESTS**

### **Clause 5.3 Mechanical Performance**

### **ASSESSMENT**

#### **Clauses 5.3.1 and 6.3 Operating Forces**

The door was tested in accordance with Clause 6.3.1

#### **Clause 6.3.3 Latching Test**

Clause 5.3.1.a) latching force.

The tests were performed after manual operation of all moving parts five times.

The door leaf was opened for a distance of 100mm.

A closing force of 70N was applied at the operating point using the apparatus described in Clause 6.3.2.1.

The test was carried out five times

On each occasion the door latched

Pass

#### **Clause 6.3.4 Hardware Operating Test**

Clause 5.3.1.b) 1) hand operated hardware.

A perpendicular to plane load of 50N was applied to act at the handle position and in the direction of closing and maintained for the duration of the test.

A force was applied, without shock, to the operating hardware in the direction of locking and unlocking the hardware.

The test was carried out five times

The results were as follows

1)	Lock - 62N	Unlock - 58N	(maximum allowed 100N)	Pass
2)	Lock - 76N	Unlock - 62N	(maximum allowed 100N)	Pass
3)	Lock - 82N	Unlock - 61N	(maximum allowed 100N)	Pass
4)	Lock - 88N	Unlock - 64N	(maximum allowed 100N)	Pass
5)	Lock - 71N	Unlock - 67N	(maximum allowed 100N)	Pass

## **OPERATING FORCE RESULTS – AFTER WEATHERTIGHTNESS TESTS**

### **Clause 5.3 Mechanical Performance**

### **ASSESSMENT**

#### **Clauses 5.3.1 and 6.3 Operating Forces**

The door was tested in accordance with Clause 6.3.1

#### **Clause 6.3.4 Hardware Operating Test**

Clause 5.3.1.b) 3) key operation.

A key was inserted into the locking handle and operated by means of a torque driver.

The test was carried out five times

The results were as follows

1)	Lock - 0.1Nm	Unlock - 0.1Nm	(maximum allowed 2Nm)	Pass
2)	Lock - 0.1Nm	Unlock - 0.1Nm	(maximum allowed 2Nm)	Pass
3)	Lock - 0.1Nm	Unlock - 0.1Nm	(maximum allowed 2Nm)	Pass
4)	Lock - 0.1Nm	Unlock - 0.1Nm	(maximum allowed 2Nm)	Pass
5)	Lock - 0.1Nm	Unlock - 0.1Nm	(maximum allowed 2Nm)	Pass

#### **Clause 6.3.5 Initiate Movement Test**

Clause 5.3.1.c) force to initiate movement.

The hardware was disengaged and the door closed.

A load without shock, to the operating point to initiate movement in the opening direction of the door leaf did not exceed 50N.

The test was carried out five times

On each occasion the door opened

Pass

## **MECHANICAL PERFORMANCE TESTS RESULTS**

### **Clauses 5.3.2 and 6.4 Resistance to Vertical Loads**

Loads were applied using suitable apparatus as required by Clause 6.4.1.1

The door leaf, fixed in its own frame and without any vertical restraint, was positioned at an angle of 90° to the plane of the frame.

A vertical downward load of 500N was applied to the free edge of the open door leaf.

The load was applied and removed in 100N maximum increments over a minimum of 1s for each increment.

### **Clauses 5.3.1 and 6.3 Operating Forces (After Resistance to Vertical Loads Test)**

### **ASSESSMENT**

The door was tested in accordance with Clause 6.3.1

#### **Clause 6.3.3 Latching Test**

Clause 5.3.1.a) latching force.

The tests were performed after manual operation of all moving parts five times.

The door leaf was opened for a distance of 100mm.

A closing force of 70N was applied at the operating point using the apparatus described in Clause 6.3.2.1.

The test was carried out five times

On each occasion the door latched

Pass

**Clauses 5.3.1 and 6.3 Operating Forces  
(After Resistance to Vertical Loads Test)**

**ASSESSMENT**

**Clause 6.3.4 Hardware Operating Test**

Clause 5.3.1.b) 1) hand operated hardware.

A perpendicular to plane load of 50N was applied to act at the handle position and in the direction of closing and maintained for the duration of the test.

A force was applied, without shock, to the operating hardware in the direction of locking and unlocking the hardware.

The test was carried out five times

The results were as follows

1)	Lock - 79N	Unlock - 68N	(maximum allowed 100N)	Pass
2)	Lock - 69N	Unlock - 63N	(maximum allowed 100N)	Pass
3)	Lock - 87N	Unlock - 74N	(maximum allowed 100N)	Pass
4)	Lock - 80N	Unlock - 84N	(maximum allowed 100N)	Pass
5)	Lock - 79N	Unlock - 78N	(maximum allowed 100N)	Pass

Clause 5.3.1.b) 3) key operation.

A key was inserted into the locking handle and operated by means of a torque driver.

The test was carried out five times

The results were as follows

1)	Lock - 0.1Nm	Unlock - 0.1Nm	(maximum allowed 2Nm)	Pass
2)	Lock - 0.1Nm	Unlock - 0.1Nm	(maximum allowed 2Nm)	Pass
3)	Lock - 0.1Nm	Unlock - 0.1Nm	(maximum allowed 2Nm)	Pass
4)	Lock - 0.1Nm	Unlock - 0.1Nm	(maximum allowed 2Nm)	Pass
5)	Lock - 0.1Nm	Unlock - 0.1Nm	(maximum allowed 2Nm)	Pass

**Clauses 5.3.1 and 6.3 Operating Forces  
(After Resistance to Vertical Loads Test)**

**ASSESSMENT**

**Clause 6.3.5 Initiate Movement Test**

Clause 5.3.1.c) force to initiate movement

The hardware was disengaged and the door closed.

A load was applied, without shock, to the operating point to initiate movement in the opening direction of the door leaf and did not exceed 50N.

The test was carried out five times

On each occasion the door opened

Pass

## **MECHANICAL PERFORMANCE TESTS RESULTS**

### **Clauses 5.3.3 and 6.5 Resistance to Static Torsion**

Loads were applied using suitable apparatus as required by Clause 6.5.1.1

The door leaf, fixed in its own frame, was closed and all locking hardware, including latch mechanisms, was disengaged.

The lower corner of the opening side of the door leaf was restrained using a block which covered the door leaf 50mm from the edge.

A load of 350N was applied in the direction of opening, on the unrestrained corner of the opening side, at a point 50mm from both edge of the door frame.

The load was applied and removed in 100N maximum increments over a minimum of 1s for each increment.

### **Clauses 5.3.1 and 6.3 Operating Forces (After Resistance to Static Torsion Test)**

### **ASSESSMENT**

The door was tested in accordance with Clause 6.3.1

#### **Clause 6.3.3 Latching Test**

Clause 5.3.1.a) latching force.

The tests were performed after manual operation of all moving parts five times.

The door leaf was opened for a distance of 100mm.

A closing force of 70N was applied at the operating point using the apparatus described in Clause 6.3.2.1.

The test was carried out five times

On each occasion the door latched

Pass

**Clauses 5.3.1 and 6.3 Operating Forces  
(After Resistance to Static Torsion Test)**

**ASSESSMENT**

**Clause 6.3.4 Hardware Operating Test**

Clause 5.3.1.b) 1) hand operated hardware.

A perpendicular to plane load of 50N was applied to act at the handle position and in the direction of closing and maintained for the duration of the test.

A force was applied, without shock, to the operating hardware in the direction of locking and unlocking the hardware.

The test was carried out five times

The results were as follows

1)	Lock - 75N	Unlock - 79N	(maximum allowed 100N)	Pass
2)	Lock - 93N	Unlock - 86N	(maximum allowed 100N)	Pass
3)	Lock - 93N	Unlock - 80N	(maximum allowed 100N)	Pass
4)	Lock - 87N	Unlock - 84N	(maximum allowed 100N)	Pass
5)	Lock - 92N	Unlock - 86N	(maximum allowed 100N)	Pass

Clause 5.3.1.b) 3) key operation.

A key was inserted into the locking handle and operated by means of a torque driver.

The test was carried out five times

The results were as follows

1)	Lock - 0.1Nm	Unlock - 0.1Nm	(maximum allowed 2Nm)	Pass
2)	Lock - 0.1Nm	Unlock - 0.1Nm	(maximum allowed 2Nm)	Pass
3)	Lock - 0.1Nm	Unlock - 0.1Nm	(maximum allowed 2Nm)	Pass
4)	Lock - 0.1Nm	Unlock - 0.1Nm	(maximum allowed 2Nm)	Pass
5)	Lock - 0.1Nm	Unlock - 0.1Nm	(maximum allowed 2Nm)	Pass



**Clauses 5.3.1 and 6.3 Operating Forces  
(After Resistance to Static Torsion Test)**

**ASSESSMENT**

**Clause 6.3.5 Initiate Movement Test**

Clause 5.3.1.c) force to initiate movement

The hardware was disengaged and the door closed.

A load was applied, without shock, to the operating point to initiate movement in the opening direction of the door leaf did not exceed 50N.

The test was carried out five times

On each occasion the door opened

Pass

## **MECHANICAL PERFORMANCE TESTS RESULTS**

### **Clause 5.3.4 and 6.6 Slamming Resistance**

Loads were applied using suitable apparatus as described in Clauses 6.6.1.1, 6.6.1.2 and 6.6.1.3.

The door leaf, fixed in its own frame, was to be closed through an angle of 60° by the descent of a 15kg weight.

A line was attached to the door leaf at a point within 150mm of the lockside edge at the level of the handle.

This line was arranged to pass horizontally from the door leaf over a steel bar, arranged horizontally and with its axis parallel to the plane of the door frame, and then descend vertically from the steel bar carrying a 15kg weight at its lower extremity.

The steel bar was set 400mm from the leaf face when the leaf was closed so that it spanned the width of the doorset.

The length of line was arranged so that as the door leaf was closed by the action of the descending weight, the weight struck a platform, so removing tension from the line just prior to the instant of closing.

The door leaf was opened to an angle of 60° and then slammed by the action of the descending weight.

The test was carried out twenty times.

### **Clause 5.3.1 and 6.3 Operating Forces (After Slamming Resistance Tests)**

### **ASSESSMENT**

The door was tested in accordance with Clause 6.3.1

#### **Clause 6.3.3 Latching Test**

Clause 5.3.1.a) latching force.

The tests were performed after manual operation of all moving parts five times.

The door leaf was opened for a distance of 100mm.

A closing force of 70N was applied at the operating point using the apparatus described in Clause 6.3.2.1.

The test was carried out five times

On each occasion the door latched

Pass

**Clauses 5.3.1 and 6.3 Operating Forces  
(After Slamming Resistance Tests)**

**ASSESSMENT**

**Clause 6.3.4 Hardware Operating Test**

Clause 5.3.1.b) 1) hand operated hardware.

A perpendicular to plane load of 50N was applied to act at the handle position and in the direction of closing and maintained for the duration of the test.

A force was applied, without shock, to the operating hardware in the direction of locking and unlocking the hardware.

The test was carried out five times

The results were as follows

1)	Lock - 92N	Unlock - 78N	(maximum allowed 100N)	Pass
2)	Lock - 78N	Unlock - 81N	(maximum allowed 100N)	Pass
3)	Lock - 90N	Unlock - 81N	(maximum allowed 100N)	Pass
4)	Lock - 86N	Unlock - 98N	(maximum allowed 100N)	Pass
5)	Lock - 91N	Unlock - 83N	(maximum allowed 100N)	Pass

Clause 5.3.1.b) 3) key operation.

A key was inserted into the locking handle and operated by means of a torque driver.

The test was carried out five times

The results were as follows

1)	Lock - 0.1Nm	Unlock - 0.1Nm	(maximum allowed 2Nm)	Pass
2)	Lock - 0.1Nm	Unlock - 0.1Nm	(maximum allowed 2Nm)	Pass
3)	Lock - 0.1Nm	Unlock - 0.1Nm	(maximum allowed 2Nm)	Pass
4)	Lock - 0.1Nm	Unlock - 0.1Nm	(maximum allowed 2Nm)	Pass
5)	Lock - 0.1Nm	Unlock - 0.1Nm	(maximum allowed 2Nm)	Pass

**Clauses 5.3.1 and 6.3 Operating Forces  
(After Slamming Resistance Tests)**

**ASSESSMENT**

**Clause 6.3.5 Initiate Movement Test**

Clause 5.3.1.c) force to initiate movement

The hardware was disengaged and the door closed.

A load was applied, without shock, to the operating point to initiate movement in the opening direction of the door leaf and did not exceed 50N.

The test was carried out five times

On each occasion the door opened

Pass

## **MECHANICAL PERFORMANCE TESTS RESULTS**

### **Clauses 5.3.5 and 6.7 Closure Against Obstruction**

Loads were applied using suitable apparatus as described in Clauses 6.7.1.1, and 6.6.1.2.

The door leaf, fixed in its own frame, had a block placed in the gap between the door leaf and the bottom of the hinge side jamb of the door frame to hold the door ajar.

The block was inserted from the closing face with its plane vertical and parallel to the door frame.

A progressively increasing force was applied, perpendicular to the plane of the frame, to the lockside edge at the handle height until 200N was reached and then removed.

### **Clause 5.3.1 and 6.3 Operating Forces (After Closure Against Obstruction Test)**

### **ASSESSMENT**

The door was tested in accordance with Clause 6.3.1

#### **Clause 6.3.3 Latching Test**

Clause 5.3.1.a) latching force.

The door leaf was opened for a distance of 100mm.

The door leaf would not close due to the leaf moving from it's hinges

Fail

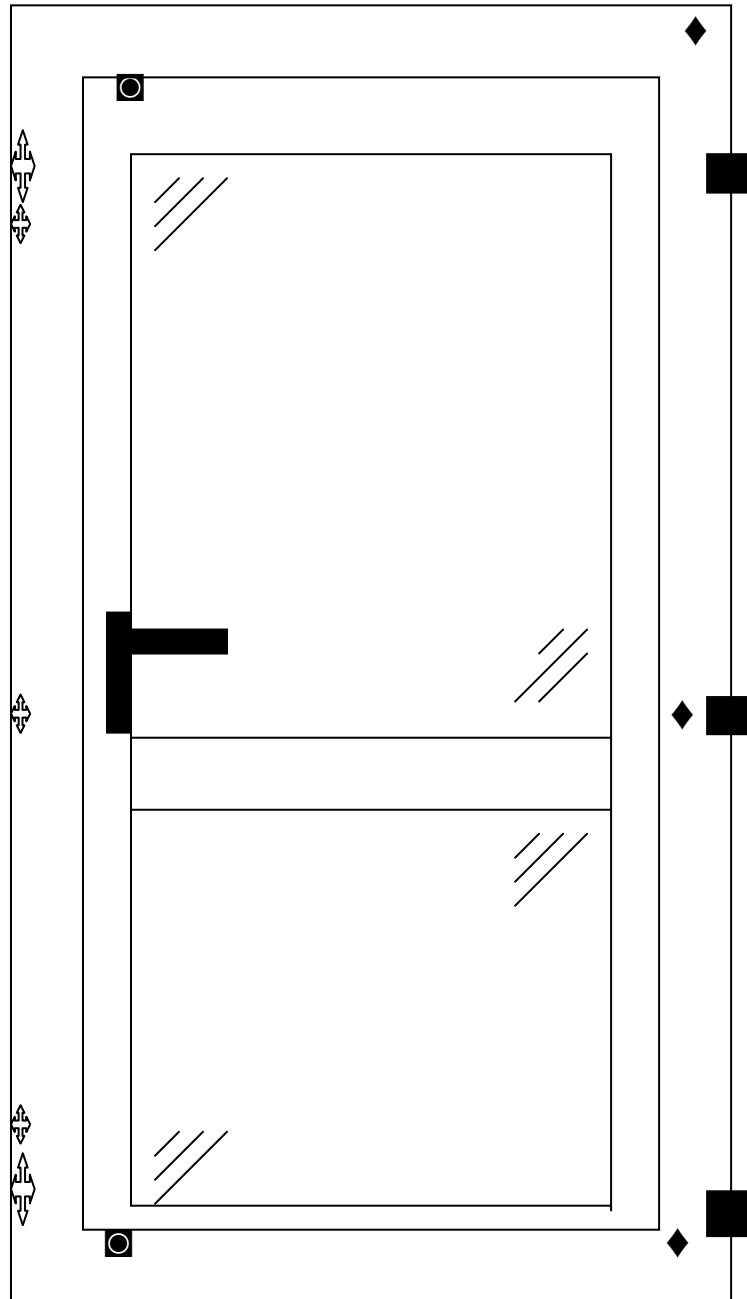
## DESCRIPTION OF SAMPLE







<b>Sample Type -</b>	A single leaf open out glaze in hinged door. The leaf has glass above and below the midrail.
<b>Material -</b>	Aluminium alloy
<b>Finish -</b>	Natural
<b>Profile reference -</b>	Outerframe: - ETD 017 Leaf: - ETD 025N Bead: - ETC164 Midrail - ETD033 Threshold - ETD095
<b>Construction -</b>	Outerframe - Thermally broken Leaf - Thermally broken Threshold - Thermally broken
<b>Fittings -</b>	A seven point locking (two hookbolts/bolt, two roller cams, two shootbolts and a key operated deadbolt/latch) Paddock Lockmaster ref: ACET183 espagnolette system with Paddock top and bottom shootbolts, a Sobinco euro profile cylinder 30/50 cylinder, a Hoppe Tokyo SBD key locking handle, three Fapim hinges, a VL72 drip bar and three Wagner dog bolts
<b>Weathersealing -</b>	Double sealed with plastics weatherstrip
<b>Glass -</b>	Double glazed with 4-20-4 mm toughened glass sealed units
<b>Glass retention system -</b>	Internal beads and gaskets

**DESCRIPTION OF SAMPLE (CONTINUED)**

<b>Sample dimensions -</b>	Overall	
	Length: 960mm	Height: 2180mm
	Door leaf	
	Length: 900mm	Height: 2100mm
<b>Date of test -</b>	13 December 2010 - conducted by M Manito	
<b>Laboratory temperature -</b>	20.9°C	
<b>Laboratory humidity -</b>	33.5%RH	
<b>Atmospheric pressure -</b>	101.3kPa	

**ELEVATION DRAWING OF DOOR ASSEMBLY**  
(indicating positions of hardware)



-  - hinge
-  - roller cam
-  - hook bolt/dead bolt
-  - handle, cylinder and lockcase
-  - shootbolts
-  - transducers



## **OPERATING FORCE RESULTS – BEFORE WEATHERTIGHTNESS TESTS**

### **Clause 5.3 Mechanical Performance**

### **ASSESSMENT**

#### **Clauses 5.3.1 and 6.3 Operating Forces**

The door was tested in accordance with Clause 6.3.1

#### **Clause 6.3.3 Latching Test**

Clause 5.3.1.a) latching force.

The tests were performed after manual operation of all moving parts five times.

The door leaf was opened for a distance of 100mm.

A closing force of 70N was applied at the operating point using the apparatus described in Clause 6.3.2.1.

The test was carried out five times

On each occasion the door latched

Pass

#### **Clause 6.3.4 Hardware Operating Test**

Clause 5.3.1.b) 1) hand operated hardware.

A perpendicular to plane load of 50N was applied to act at the handle position and in the direction of closing and maintained for the duration of the test.

A force was applied, without shock, to the operating hardware in the direction of locking and unlocking the hardware.

The test was carried out five times

The results were as follows

1)	Lock - 74N	Unlock - 43N	(maximum allowed 100N)	Pass
2)	Lock - 79N	Unlock - 46N	(maximum allowed 100N)	Pass
3)	Lock - 71N	Unlock - 41N	(maximum allowed 100N)	Pass
4)	Lock - 73N	Unlock - 42N	(maximum allowed 100N)	Pass
5)	Lock - 76N	Unlock - 44N	(maximum allowed 100N)	Pass

## **OPERATING FORCE RESULTS – BEFORE WEATHERTIGHTNESS TESTS**

### **Clause 5.3 Mechanical Performance**

### **ASSESSMENT**

#### **Clauses 5.3.1 and 6.3 Operating Forces**

The door was tested in accordance with Clause 6.3.1

#### **Clause 6.3.4 Hardware Operating Test**

Clause 5.3.1.b) 3) key operation.

A key was inserted into the locking handle and operated by means of a torque driver.

The test was carried out five times

The results were as follows

1)	Lock - 0.2Nm	Unlock - 0.2Nm	(maximum allowed 2Nm)	Pass
2)	Lock - 0.2Nm	Unlock - 0.2Nm	(maximum allowed 2Nm)	Pass
3)	Lock - 0.2Nm	Unlock - 0.2Nm	(maximum allowed 2Nm)	Pass
4)	Lock - 0.2Nm	Unlock - 0.2Nm	(maximum allowed 2Nm)	Pass
5)	Lock - 0.2Nm	Unlock - 0.2Nm	(maximum allowed 2Nm)	Pass

#### **Clause 6.3.5 Initiate Movement Test**

Clause 5.3.1.c) force to initiate movement.

The hardware was disengaged and the door closed.

A load without shock, to the operating point to initiate movement in the opening direction of the door leaf did not exceed 50N.

The test was carried out five times

On each occasion the door opened

Pass

**AIR PERMEABILITY TEST RESULTS - BS 6375-1:2009 Clause 6 / BS EN  
1026:2000**

**Clause 6 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 [m <sup>3</sup> /h]	Average rate of air leakage per meter length of opening joint [m <sup>3</sup> /h.m]	Average rate of air leakage relative to area of sample [m <sup>3</sup> /h.m <sup>2</sup> ]
50	0.2	0.03	0.10
100	0.4	0.07	0.19
150	0.7	0.13	0.36
200	1.1	0.19	0.55
250	1.3	0.22	0.62
300	1.7	0.28	0.81
450	9.0	1.51	4.29
600	14.8	2.48	7.05
750	-	-	-

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 = 5.95m

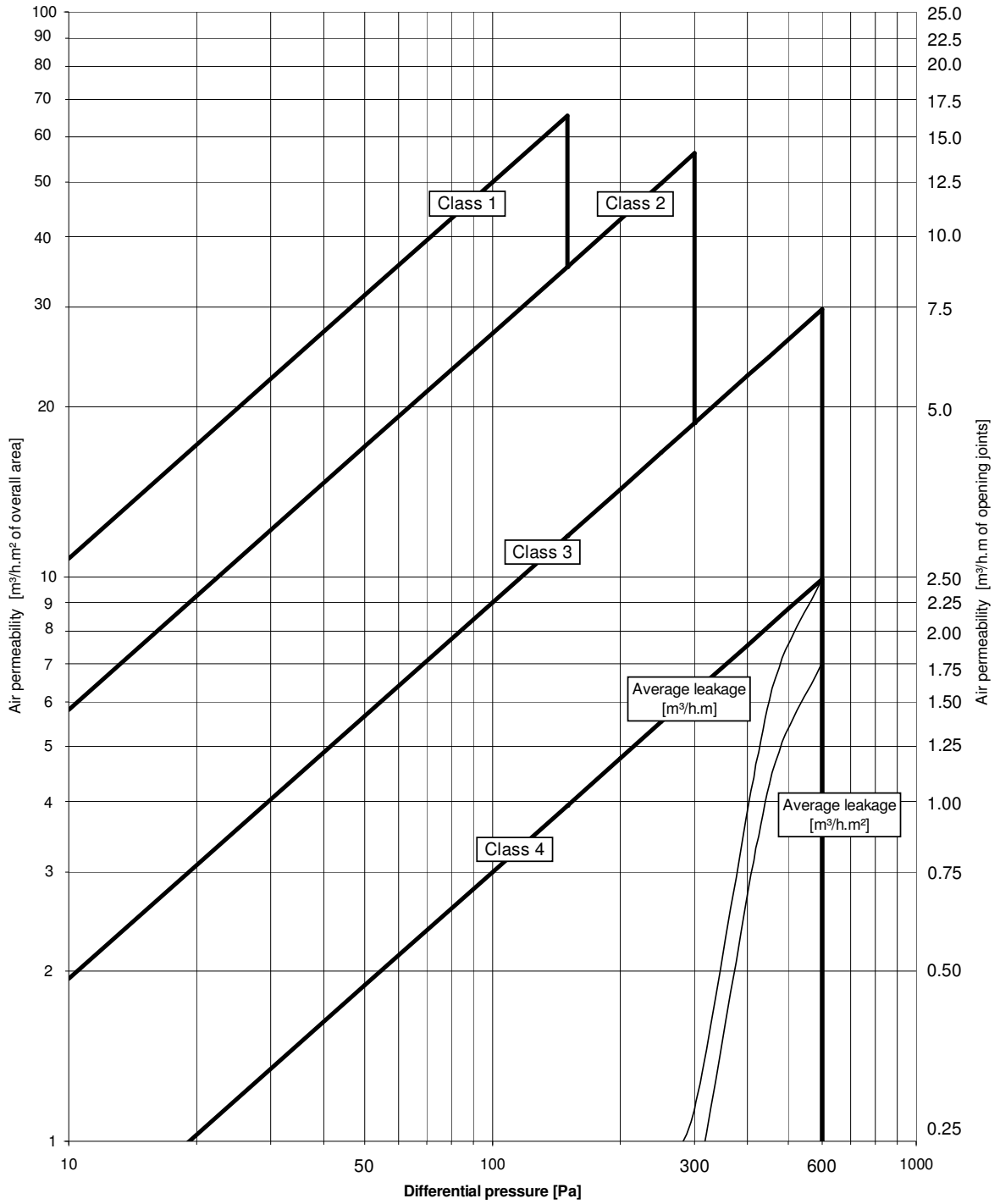
Overall area = 2.0928m<sup>2</sup>

BS 6375-1:2009 Clause 6.2 - Joint class = 3

BS 6375-1:2009 Clause 6.2 - Area class = 4

BS 6375-1:2009 Clause 6.2 - Overall class =  
4

GRAPH OF AVERAGE AIR PERMEABILITY BEFORE GUSTING



## **WATERTIGHTNESS TEST RESULTS - BS EN 1027:2000**

### **Clause 5.2.2 Watertightness before resistance to wind loads**

**TABLE 2 - Spraying method 1A**

Pressure (Pa)	Point at which water leakage occurred
1050	No leakage

## **WIND RESISTANCE TEST RESULTS - BS EN 12211:2000**

### **Clause 5.2.3 Resistance to wind load**

#### **P1 DEFLECTION TEST**

Three positive pressure pulses at 1320 Pa were applied

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

Actual deflection – 2.14mm (maximum deflection allowed 13.16mm)

Deflection/span ratio 1/922 (maximum ratio allowed 1/150)

Three negative pressure pulses at 1320 Pa were applied

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

Actual deflection – 2.07mm (maximum deflection allowed 13.16m)

Deflection/span ratio 1/954 (maximum ratio allowed 1/150)

#### **P2 REPEATED PRESSURE TEST**

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

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

In accordance with BS 6375-1:2009 Clause 6.5, as the classification after the resistance to wind load tests is lower than the classification before the resistance to wind load tests, the resulting classification for the sample is Class 4.  
(see following Table)

**AIR PERMEABILITY TEST RESULTS - BS 6375-1:2009 Clause 6 / BS EN  
1026:2000**

**Clause 6 After 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 [m <sup>3</sup> /h]	Average rate of air leakage per meter length of opening joint [m <sup>3</sup> /h.m]	Average rate of air leakage relative to area of sample [m <sup>3</sup> /h.m <sup>2</sup> ]
50	0.4	0.08	0.21
100	0.6	0.10	0.29
150	1.1	0.19	0.55
200	1.0	0.18	0.50
250	1.5	0.25	0.71
300	1.4	0.24	0.69
450	7.6	1.28	3.64
600	16.1	2.70	7.67
750	-	-	-

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 = 5.95m

Overall area = 2.0928m<sup>2</sup>

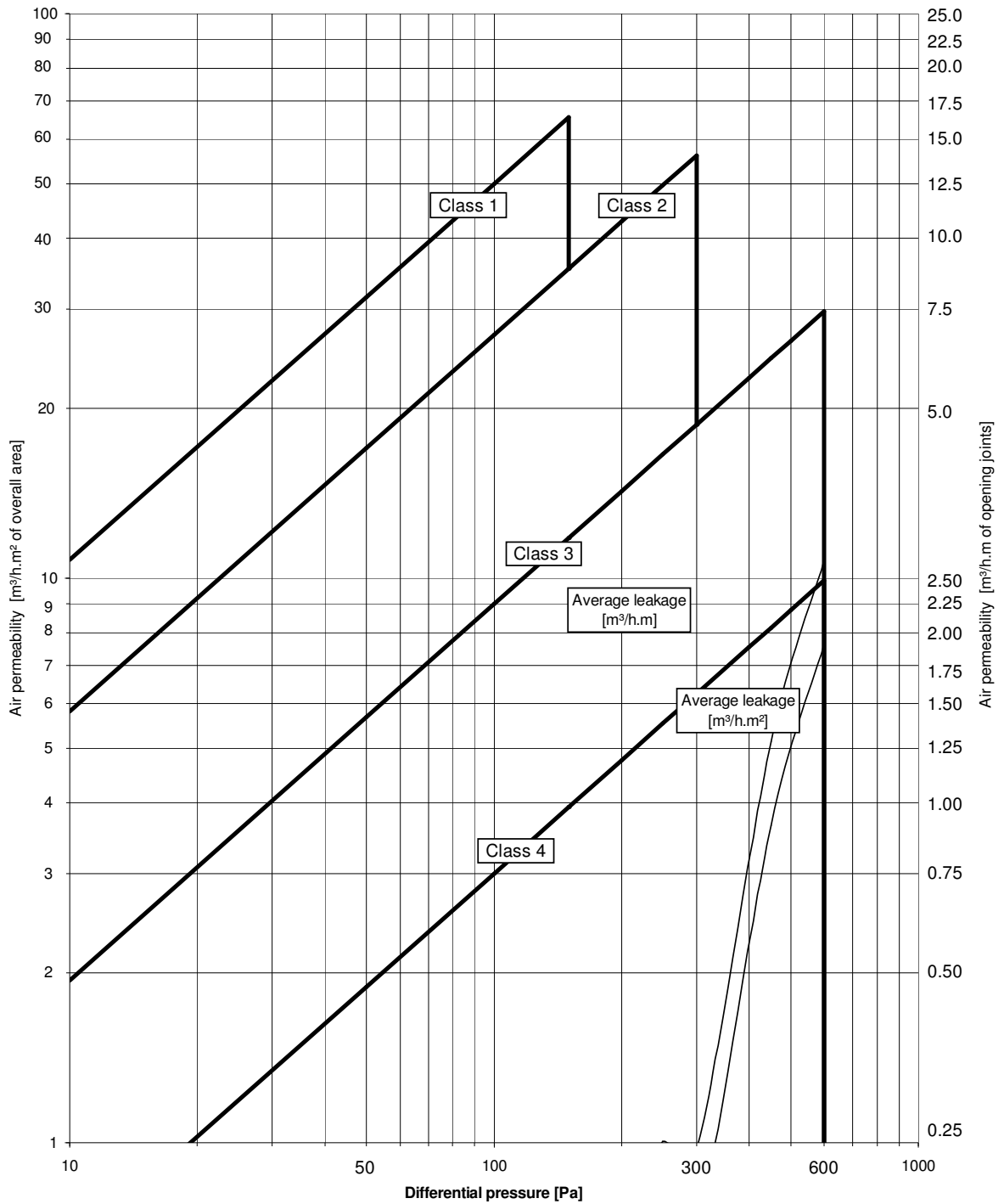
BS 6375-1:2009 Clause 6.5 - Joint class = 3

BS 6375-1:2009 Clause 6.5 - Area class = 4

BS 6375-1:2009 Clause 6.5 - Overall class =  
4

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 4.

GRAPH OF AVERAGE AIR PERMEABILITY AFTER GUSTING



**WIND RESISTANCE TEST RESULTS - BS EN 12211:2004**

**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

**END OF REPORT**