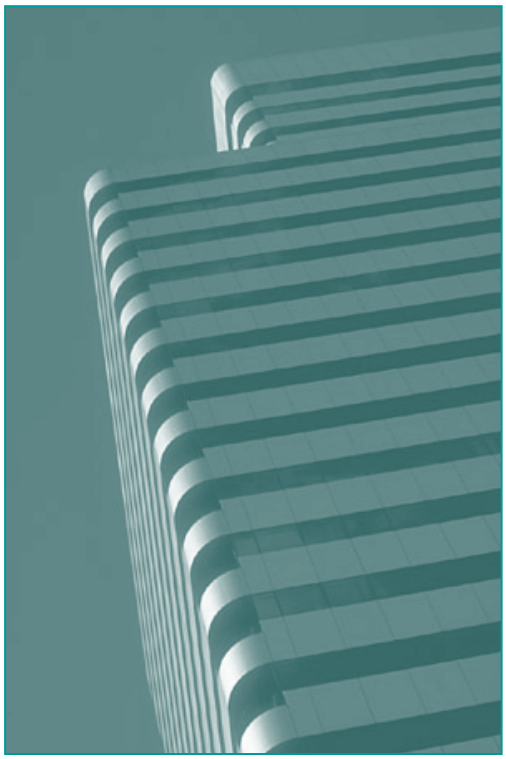


Building Facade Testing: Air Permeability (EN 1026:2016) Test Report

Client	-	STIRA
Project	-	STIRA Product Airtightness Testing
Product	-	STIRA Semi-Automatic Loft Ladder System (Attic Hatch)
Job No. 23057	Rev. 1	15/09/2023

Building Envelope Technologies Ltd.
Building Performance & Compliance Experts

HEAD OFFICE: Building Envelope Technologies Ltd., Ballylacey Crossroads, Inch, Gorey, Co. Wexford, Ireland. Y25 XW93
TEST FACILITY: Building Envelope Technologies Ltd., Arklow Business Park, Ballynattin, Arklow, Co. Wicklow, Ireland. Y14 PK27
CONTACT: www.betechnologies.ie & info@betechnologies.ie
PHONE: 0402 21873

Table of Contents: Page No:

1. INTRODUCTION 4

2. SUMMARY OF TEST RESULTS 4

3. TEST CHECKS AND SUPPLEMENTARY INFORMATION 5

3.1 TEST CHECKS 5

4. TEST ARRANGEMENT 6

4.1 TEST CHAMBER 6
4.2 INSTRUMENTATION 6
4.2.1 Static Pressure 6
4.2.2 Air Flow 6
4.2.3 Temperature & Humidity 6
4.3 PRESSURE GENERATION 6
4.3.1 Static Air Pressure 6

5. TEST PROCEDURES 7

5.1 SEQUENCE OF TESTING 7
5.2 AIR PERMEABILITY – INFILTRATION. 7
5.3 AIR PERMEABILITY - EXFILTRATION 7

6.0 TEST RESULTS 8

6.1 AIR PERMEABILITY 8
6.1.1 Allowable Air Permeability Results 8
6.1.2 Initial Air Permeability Tests 1 & 2 9

APPENDIX A: DESCRIPTION OF TEST SAMPLE 11

APPENDIX B: SAMPLING REPORT 12

Rev No.	Description	Prepared By	Checked by	Title	Signature	Date
~~0~~	~~FINAL~~	~~RN~~	~~Ross Norman~~	~~Lab Testing Manager~~	~~RNorman~~	~~31/07/2023~~
1	FINAL	RN	Ross Norman	Lab Testing Manager	RNorman	15/09/2023

Report Format = FINAL

The results are valid only for the conditions under which the test was conducted. All measuring devices/equipment including instruments have been calibrated and are traceable to National Standards. This report and the results shown within are based upon the information, drawings, samples and tests referred to in the report. The results obtained do not necessarily relate to samples from the production line of the above-named company and in no way constitute any form of representation or warranty as to the performance or quality of any products supplied or to be supplied by them. Building Envelope Technologies or its employees accept no liability for any damages charges cost or expenses in respect of or in relation to any damage(s) to any property or other loss whatsoever arising either directly or indirectly from the use of this technical report.

Job No. 23057
Rev No. 1
15/09/2023

Test Conducted for:	STIRA
Testing Conducted by:	Building Envelope Technologies Ballylacey Crossroads Gorey Co. Wexford
Test Conducted at:	B.E.T. Laboratory Arklow Business Park, Ballynattin Arklow Co. Wicklow
Test Witnessed by:	Paddy Tamplin (STIRA) Eddie Smith (STIRA)
Standard Specified:	BS EN 12207:2016 & BS EN 1026:2016, EN 14351-1:2006+A2:2016
Project No:	23057
Test Date:	30/06/2023
Product Tested:	STIRA Semi-Automatic Loft Ladder System (Attic Hatch)
Test Performed:	EN 1026:2016 *Windows & Doors, Air Permeability test method*
Testing Conducted by:	Ross Norman Teo Pahomi Michael Murphy

Results Summary = PASS

Results	Achieved peak test Pressure	Classification According to EN12207:2016
Air Permeability	600 Pa	Class 4

Job No. 23057
Rev No. 1
15/09/2023

1. Introduction

This report describes tests conducted at B.E.T. Laboratory, Arklow Business Park, Ballynattin, Arklow, Co. Wicklow on the STIRA Semi-Automatic Loft Ladder System (Attic Hatch), on behalf of STIRA. BET is INAB Accredited to ISO:17025 for the standards below and herein this test report/sequence.

The test methods were in accordance with the following standards:

Windows & Doors, Product Standard Performance Characteristics	*EN14351-1:2006+A2:2016*
Windows & Doors, Air Permeability test method	*EN 1026:2016*
Windows & Doors, Air Permeability classification	*EN 12207:2016*

The test sample was supplied to us fixed to a timber sub-frame and was mounted onto the test chamber by Building Envelope Technologies. The exposed face had an outward opening door in relation to the test chamber.

2. Summary of Test Results

The following summarises the results of testing carried out, in accordance with the relevant testing & classification standards and EN 14351-1:2006+A2:2016.

The test sample was tested in the following sequence and the combined results are as follows

Test Type	**Achieved max test pressure (Pa)**	**Test Method & Classification Standard**	**Classification as per EN 12207: 2016. Test as per BS EN 1026: 2016**
Air Permeability	*600*	*BS EN 1026: 2016 & BS EN 12207: 2016*	*Class 4*

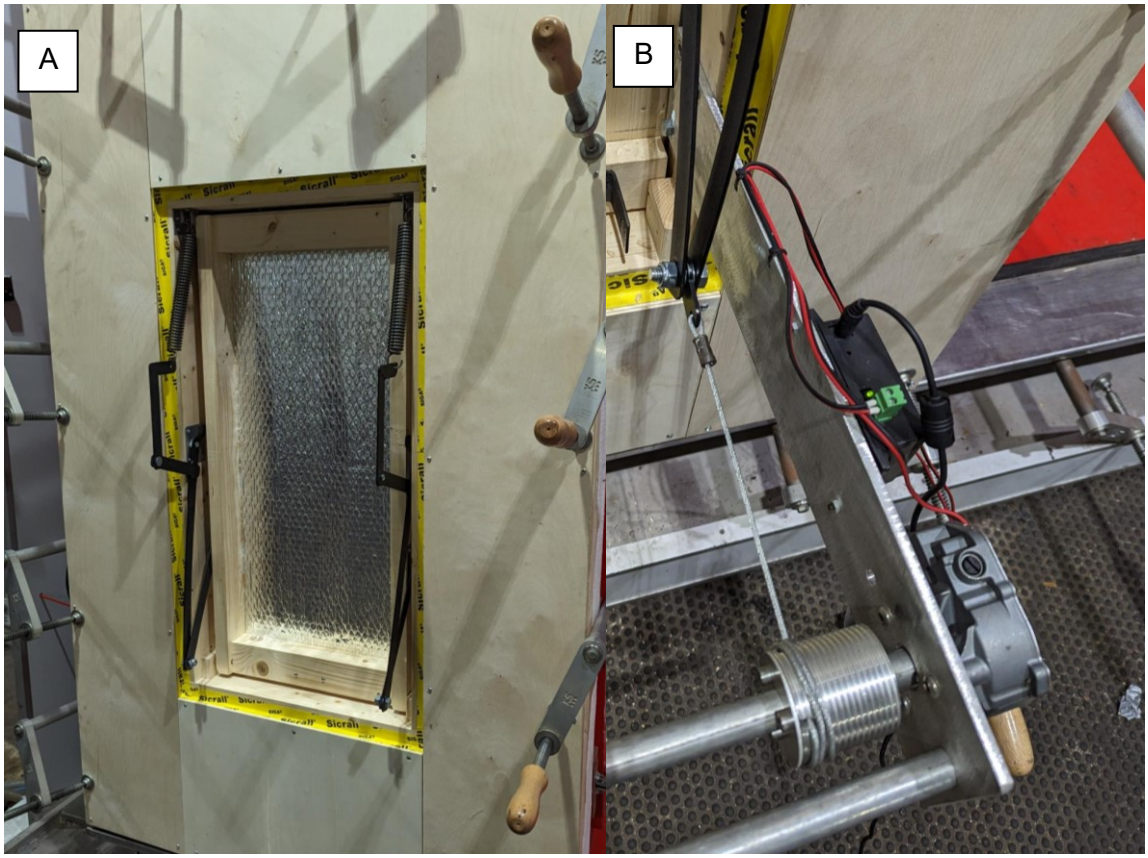
The above results classify the products tested to the above class.

N.B. These results are only valid for the conditions on the day in which testing was conducted, all measurement devices, instruments and other relevant equipment are calibrated and traceable to National Standards.

3. Test Checks and Supplementary Information

3.1 Test Checks

Description of closing conditions (Closed/Latched/Locked)	**Closed**
Ventilation – Type and Condition (Closed/Taped/Other)	**N/A**
Exposed Face – (Opening Inwards or Outwards with reference to test chamber)	**Inwards**



Picture 1: [A] STIRA Semi-Automatic Loft Ladder System (Attic Hatch) Test Sample prior to fitting of semi automatic mechanism. [B] semi automatic mechanism close up.

4. Test Arrangement

4.1Test Chamber

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

4.2 Instrumentation

4.2.1 Static Pressure

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

4.2.2 Air Flow

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

4.2.3 Temperature & Humidity

A digital data logger capable of measuring temperature with an accuracy of ± 1ºC and humidity with an accuracy of ± 5% Rh was used.

4.3 Pressure Generation

4.3.1 Static Air Pressure

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

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

5. Test Procedures

5.1 Sequence of Testing

1. Air Permeability- Infiltration
2. Air Permeability- Exfiltration

5.2 Air Permeability – Infiltration.

Three preparatory pulses of 660 Pa positive pressures were applied to test the sample and any opening lights opened and closed at least once.
The results were determined by measuring the rate of air flow through the test chamber while subjecting the sample to positive pressure differentials as follows: 50, 100, 150, 200, 250, 300, 450 and 600 Pa (each step being held for at least 10 seconds).
Leakage through the test chamber and joints between the chamber and test sample was determined by sealing the sample with adhesive tape and polythene sheeting and measuring the air flows at the above pressures. The preparation pulses and test sequence were then repeated with the sample unsealed and the difference between the readings being air leakage through the test sample.

5.3 Air Permeability - Exfiltration

Three preparatory pulses of 660 Pa negative pressures were applied to test the sample and any opening lights opened and closed at least once.
The results were determined by measuring the rate of air flow through the test chamber while subjecting the sample to positive pressure differentials as follows: 50, 100, 150, 200, 250, 300, 450 and 600 Pa (each step being held for at least 10 seconds).
Leakage through the test chamber and joints between the chamber and test sample was determined by sealing the sample with adhesive tape and polythene sheeting and measuring the air flows at the above pressures. The preparation pulses and test sequence were then repeated with the sample unsealed and the difference between the readings being air leakage through the test sample.

6.0 Test Results

6.1 Air permeability

Classification according to BS EN 12207:2016

Overall Average Classification	Area	Length of Opening Joint
	Class 4	Class 4

As per section 4.7 of BS EN 12207: 2016, If a specimen is classified according to the overall area and the length of the opening joint, which give the same class, the specimen shall be classified in the most in one and the same class.

The lines shown in Figure 1 defining the upper limits of each class are derived from the reference air permeabilities at 100 Pa related to the overall area and the length of opening joint. Other pressure steps in each class are defined by the following equation;

$$Q = Q_{100} (p/100Pa)^{2/3}$$

Q_{100} = reference air permeability in cubic metres per hour at a test pressure of 100 Pa.

Q = the air permeability in cubic metres per hour (m^3/h) at a test pressure p (p in Pa)

A specimen belongs to a specified class if the measured air permeability does not exceed the upper limit at any test pressure step in that class

Environmental Conditions

Ambient Temperature (°C): 18.4	Apparatus Used: LAB-TRH-01
Relative Humidity (%): 70.8	Apparatus Used: LAB-TRH-01
Atmospheric Pressure (Pa): 100700	Apparatus Used: LAB-BAR-02

6.1.1 Allowable Air Permeability Results

Calculated Area of Test Sample (m2)	=	0.49 m^2
Measured Length of Opening Joints (m)	=	2.95 m
Class	=	Class 4

6.1.2 Initial Air Permeability Tests 1 & 2

6.1.2.1 Section 4.5 & 4.6 EN 12207:2016 – Classification

4.5 Classification based on the overall area

4.5.1 Classification for windows and pedestrian doorsets

Table 1 — Reference air permeability related to overall area

Class	Reference air permeability at 100 Pa $m^3/(h \cdot m^2)$	Maximum test pressure Pa
1	50	150
2	27	300
3	9	600
4	3	600

4.6 Classification based on opening joint length

4.6.1 Classification for windows and pedestrian doorsets

Table 3 — Reference air permeability related to opening joint length

Class	Reference air permeability at 100 Pa $m^3/(h \cdot m)$	Maximum test pressure Pa
1	12,50	150
2	6,75	300
3	2,25	600
4	0,75	600

6.1.2.2 Air Permeability –Test Average [Infiltration (Positive pressure) & Exfiltration (negative pressure)]

Test - Pressure Results (Average)			
Pressure (Pa)	**m^3/h**	**$(m^3/h)/m$**	**$(m^3/h)/m^2$**
50	0.365	**0.12**	**0.74**
100	0.825	**0.28**	**1.68**
150	0.95	**0.32**	**1.94**
200	1.08	**0.37**	**2.20**
250	1.25	**0.42**	**2.55**
300	1.29	**0.44**	**2.63**
450	1.565	**0.53**	**3.19**
600	1.9	**0.64**	**3.88**

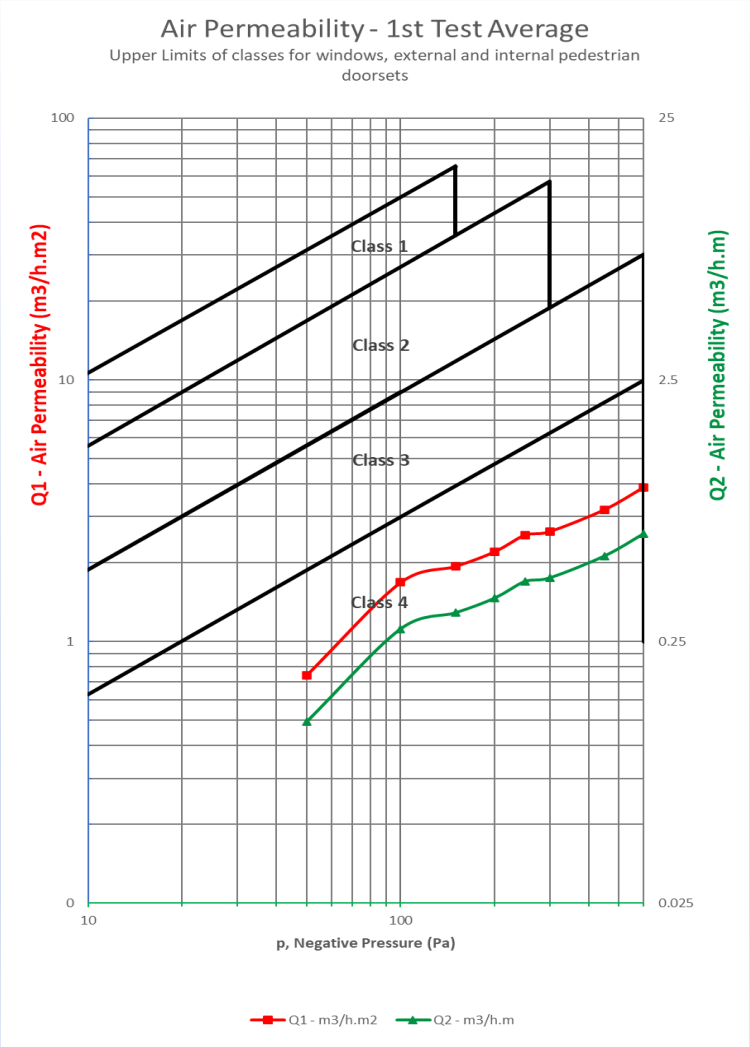


Figure 1: Upper limits of classes for windows and pedestrian doorsets. STIRA Semi-Automatic Loft Ladder System (Attic Hatch) system tested to max test pressure of 600Pa (as required by Class 4).

Appendix A: Description of Test Sample

Customer Name/Project	Project Number	Date of Test	Sheet No.
STIRA Semi-Automatic Loft Ladder System (Attic Hatch)	23057	30/06/23	1
Type of Test	**EN 1026: 2016**		

Description of SAMPLE	STIRA Semi-Automatic Loft Ladder System (Attic Hatch)
Sample size (L) x (h) mm	1048mm x 560mm
Framing Material.	White deal
Manufactured By	Folding Attic Stairs Ltd. T/A STIRA
Date of Manufacture	23/06/2023
Perimeter Seals/Mastic Used and properties of same.	Schlegal Q-Lon Polyethylene foam seal. QL 3116 TT8019, low friction, UV stable
Fixings – Screws Used And Quantity	Upper Arms x 2, Lower Arms x 2, Piano Hinge x 1, Handle x 1, 4x50, 30mm Coach Screws x 8, Screws x 8, 8x1 Screws x 27, 35mm Spax screws x 9, 4x70 Screws x 6, M10x20 Bolts x 2, M10 Washers x 2, M10 Locknuts x 2, M4x70 Handle Screws x 2.
Surface Finishes	6mm Birch Ply
Locking Points, their position and specific design detail (Include drawings if required)	Electric powered motor, spool and cables.
Fixing Bracket Details	N/A
Typical ceiling replication frame buildup	Internal - 12.5mm Plasterboard - Air / Vapour Control Layer - 150mm Mineral Wool (bridged by joist) - 150mm Mineral Wool (cross lapped) - Attic space

Job No. 23057
Rev No. 1
15/09/2023

Appendix B: Sampling Report

Customer Name/Project	Project Number	Date of Test	Sheet No.
STIRA Semi-Automatic Loft Ladder System (Attic Hatch)	23057	30/06/23	1
Type of Test	**EN 1026:2016**		

Description Of SAMPLE	STIRA Semi-Automatic Loft Ladder System (Attic Hatch)
Manufacturer And Manufacturing Unit	Folding Attic Stairs Ltd. T/A STIRA
Place Of Sampling;	Building Envelope Technologies Ltd. Testing facility, Arklow, Co. Wicklow.
Stock Or Batch Quantity (From Which The Samples Have Been Taken), If Necessary	Sample taken from Stock
Number Of Samples;	1
Identification Or Description Of The Sample(S) (E.G. By Means Of Cross Sections);	
Marking Of The Sample(s) By The Sampler	Yes
Purpose Of Test (E.G. Initial Type Test, Audit Test);	Airtightness
Characteristics To Be Determined And Clear Identification Of Which Sample(S) To Be Used For The Required Characteristic(S), Where Necessary	N/A
Place And Date	Building Envelope Technologies Ltd. Testing facility, Arklow, Co. Wicklow. Tested 30/06/2023