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EVALUATION CENTER

Intertek Testing Services Ltd., Shanghai
No.7 Building, No. 6958 Daye Road, Fengxian District., Shanghai

RENDERED TO

**SHANGHAI YIRONG WINDOWS & DOORS INSTALLATION &
DESIGN CO., LTD.**
**NO. 750, WAI QINGSONG HW, JIADING DISTRICT,
SHANGHAI , CHINA**

PRODUCT EVALUATED

Aluminum Window
Model: CRM-T001

EVALUATION PROPERTY

Deflection / Span Ratio Test, Operating Force Test,
Air Infiltration Test, Water Penetration Test and Ultimate Strength Test

TEST REPORT

Report of Testing an Aluminum Window (Model: CRM-T001) for compliance with the applicable requirements of the following criteria: AS 2047-2014 "Windows and external glazed doors in buildings", AS 4420.2-1996 "Windows—Methods of test, Method 2: Deflection test", AS 4420.3-1996 "Windows—Methods of test, Method 3: Operating force test", AS 4420.4-1996 "Windows—Methods of test, Method 4: Air infiltration test", AS 4420.5-1996 "Windows—Methods of test, Method 5: Water penetration resistance test", AS 4420.6-1996 "Windows—Methods of test, Method 6: Ultimate strength test".

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2 Introduction

Intertek has conducted testing for Shanghai Yirong Windows & Doors Installation & Design Co., Ltd., on an Aluminum Window (Model: CRM-T001) to evaluate Deflection / Span Test, Operating Force Test, Air Infiltration Test, Water Penetration Test and Ultimate Strength Test. Testing was conducted in accordance with AS 2047-2014 specifications and method standards of:

- AS 4420.2-1996 “Windows—Methods of test, Method 2: Deflection test”
- AS 4420.3-1996 “Windows—Methods of test, Method 3: Operating force test”
- AS 4420.4-1996 “Windows—Methods of test, Method 4: Air infiltration test”
- AS 4420.5-1996 “Windows—Methods of test, Method 5: Water penetration resistance test”
- AS 4420.6-1996 “Windows—Methods of test, Method 6: Ultimate strength test”.

This evaluation began on August 16, 2016 and was completed on August 16, 2016.

3 Test Samples

3.1. SAMPLE SELECTION

Samples were submitted to Intertek directly from the client. Samples were not independently selected for testing. Samples were received at the Evaluation Center on August 15, 2016.

3.2. SAMPLE AND ASSEMBLY DESCRIPTION

A full scale sample of Aluminum Window (Model: CRM-T001) was provided by the manufacturer that was not weathered nor conditioned.

Table 1 Product Information

Product Name	Aluminum Window
Model	CRM-T001
Dimension of Window Frame	1200mm X 800mm X 65mm
Dimension of Window Sash	Operable: 470.5mm X 753mm X 55mm Fix: 729.5 mm X 753mm X 65mm
Aluminum Profile	Model: H65 Thermal Broken Aluminum Alloy Manufacturer: Zhejiang Dongliang Aluminum Extrusion Co., Ltd
Glazing	Dimension: 354.5 X 637mm, 648.5 X 734mm Structure: 6 Low-E+12Air + 6 Tempered Double Glazing Glass Supplier: Wujiang Jingang Glass Co., Ltd
Hardware	Handle: German ROTO Black RAL 9005 R06.2 Lock: German ROTO R86F 10mm V.01 D59C Hinge & Glide: German ROTO A212C12161 Bolt: German ROTO T30mm 571384 53mm lock bolt Supplier: German Roto Co., Ltd
Weather Bar	Material: EPDM Model: 4.0 Supplier: Shanghai Wangdi Plastic Product Co., Ltd
Thermal Break	Model: PI66 Supplier: Shanghai Yutai Co., Ltd
Gasket (between leaf and frame)	Material: EPDM Model: 4.0 Supplier: Shanghai WangDi Plastic Product Co., Ltd
Sealant of Glass	Material: Seal Rubber Model: S-320 Supplier: Shanghai Ouzu Co., Ltd.

The sample ID number was S160815005SHF-001. The drawings of the representative sample were referenced in Appendix A.

4 Testing and Evaluation Methods

4.1. DEFLECTION / SPAN RATIO TEST

The Deflection Test was conducted in accordance with AS 4420.2-1996. The pressure was applied to test specimen in not less than four approximately equal increments until the test pressure was reached; first to the exterior surface (positive) and then to the interior surface (negative). The load duration was held for at least 1 minute at each pressure increment. The test specimen was evaluated for deflection during load, and was evaluated for permanent deflection after differential pressure removed for 2 minutes. According to Section 2.3.1.3 in AS 2047-2014, no structure members in a completely assembled and window should deflect by an amount greater than span/250 when the specimen was tested at the serviceability design wind pressure specified in Table 2.1 *WINDOW RATING FOR HOUSING* in AS 2047-2014.

4.2. OPERATING FORCE TEST

The Operating Force Test was conducted in accordance with AS 4420.3-1996. For the movable sash of the window, the force was applied at the fixed handle position; and forces to initiate the sash in motion and to maintain the motion should be recorded. The test force should be not greater than the value for windows given in Table 2.2 *OPERATING FORCE FOR TEST* in AS 2047-2014.

4.3. AIR INFILTRATION TEST

The Air Infiltration Test was conducted in accordance with AS 4420.4-1996. The test was performed using positive and negative differential pressures of 75 Pa. The air infiltration rates through the specimen should be determined. The air infiltration should not exceed the value specified in Table 2.3 *MAXIMUM AIR INFILTRATION* in AS 2047-2014.

4.4. WATER PENETRATION TEST

The Water Penetration Test was conducted in accordance with AS 4420.5-1996. The test specimen was subjected to water spraying uniformly and continuously over the exterior face of the test specimen at a rate not less than 0.5 L/m².s. At the start of test, the water sprays should operate for 5 minutes with zero air pressure. And then, the test pressures specified in Table 2.4 *Water Penetration Resistance Test Pressure* in AS 2047-2014 were applied and maintained for 15 minutes with the water sprays still operating. During the test sequence, there should be no uncontrolled water penetration observed.

4.5. ULTIMATE STRENGTH TEST

The Ultimate Strength Test was conducted in accordance with AS 4420.6-1996. The ultimate strength test pressure specified in Table 2.5 *ULTIMATE STRENGTH TEST PRESSURES* in AS 2047-2014 was increased smoothly and was applied to the test specimen for 10 seconds in both positive and negative direction. The test specimen should not collapse when subjected to the ultimate strength pressure, and was evaluated for permanent damage after loading.

5 Testing and Evaluation Results

5.1. RESULTS AND OBSERVATIONS

The test results are summarized in Table 2 below. A more comprehensive set of test data is included in Appendix B.

Table 2 Test Results

Test Description	Test Result	Verdict
Deflection / Span Ratio Test	Serviceability design wind pressure: 1600 Pa Rating: N6 (General)	Pass
Operating Force Test	Force to Initial Movement: 33 N Force to Maintain Movement: 31 N	Pass
Air Infiltration Test	Overall Area +75 Pa: 0.04 L/s·m ² ; -75 Pa: 0.06 L/s·m ² ; Average air leakage rate: 0.05 L/s·m ² Rating: Low	Pass
	Operable Area +75 Pa: 0.05 L/s·m ² ; -75 Pa: 0.02 L/s·m ² ; Average air leakage rate: 0.04 L/s·m ² Rating: Low	Pass
Water Penetration Test	Test Pressure: 150 Pa Rating: N3 (Non-exposed)	Pass
Ultimate Strength Test	Test Pressure: 4000 Pa Rating: N6 (General)	Pass

6 Conclusion

The Aluminum Window (Model: CRM-T001) identified in this report has been tested in accordance with Deflection / Span Ratio Test, Operating Force Test, Air Infiltration Test, Water Penetration Test and Ultimate Strength Test requirements as per AS 2047-2014.

The test specimen met the requirements for Rating of N6 for Deflection / Span Ratio Test, Operating Force Test, Rating of Low for Air Infiltration, Rating of N3 for Water Penetration Test and Rating of N6 for ultimate strength test as per AS 2047-2014.

The conclusions of this test report may not be used as part of the requirements for Intertek product certification. Authority to Mark must be issued for a product to become certified.

INTERTEK

Reported by: Weber Wang
Weber Wang
Senior Project Engineer



Reviewed by: Fred Bao
Fred Bao
Senior Technical Supervisor

7 Appendix A: Sample Drawings

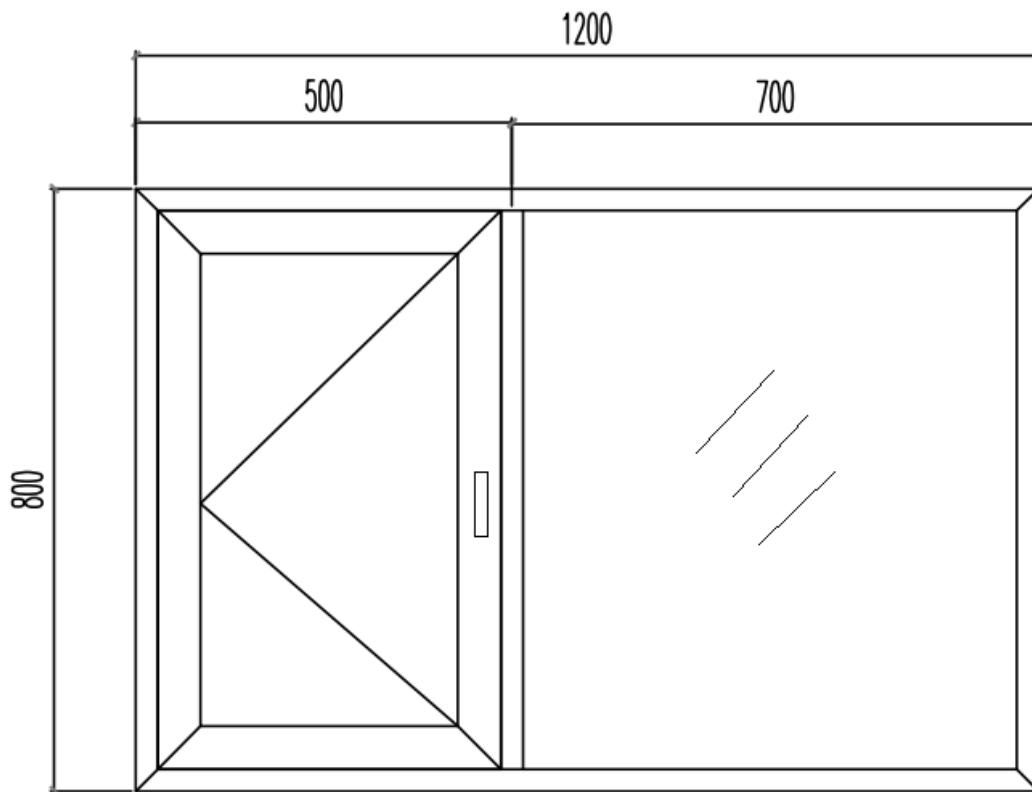


Fig.1 Drawing of Representative Sample

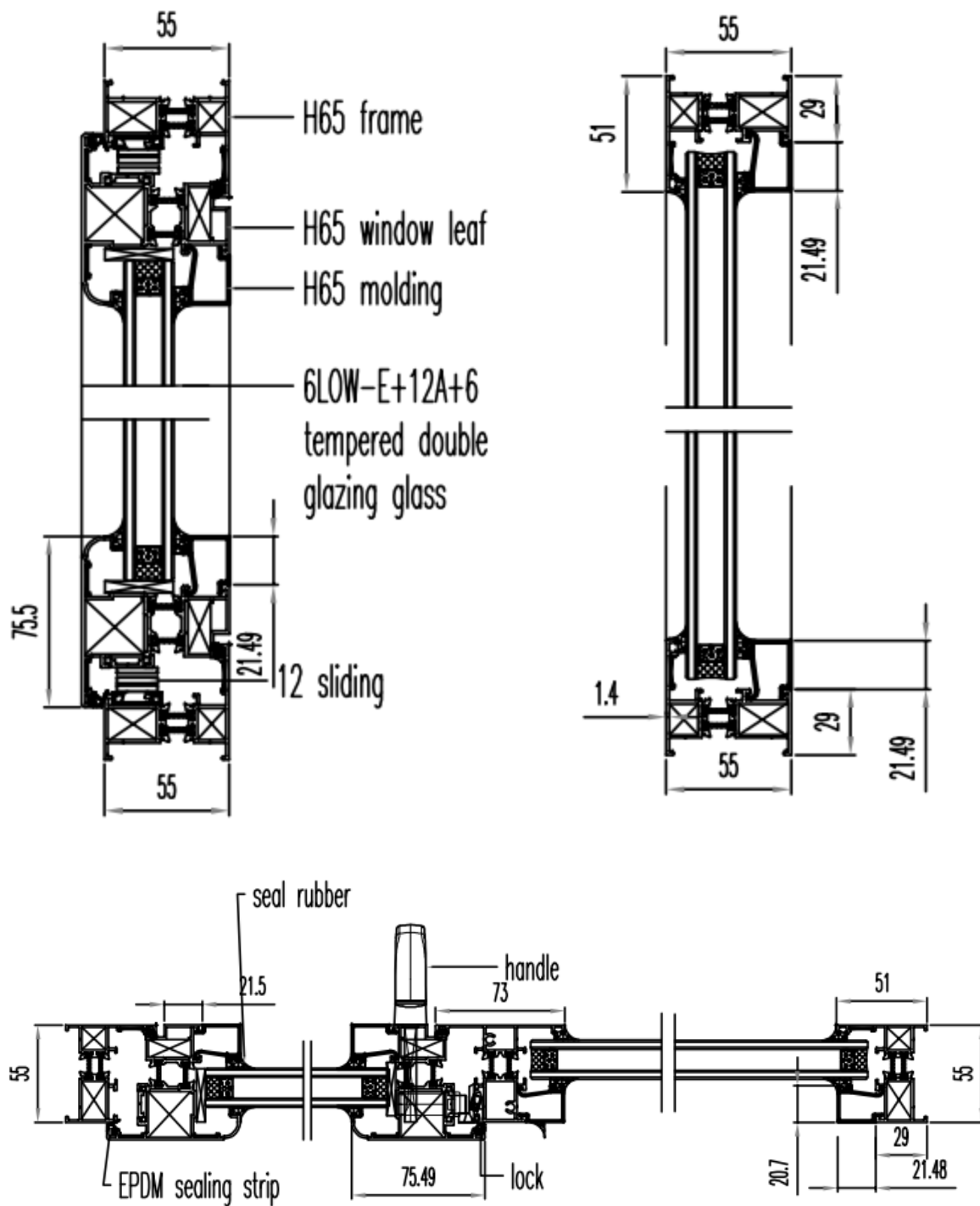


Fig.2 Drawing of Representative Sample

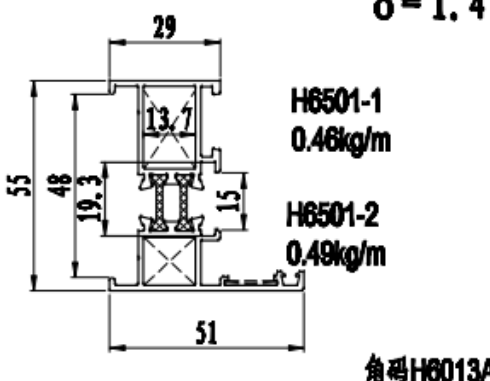
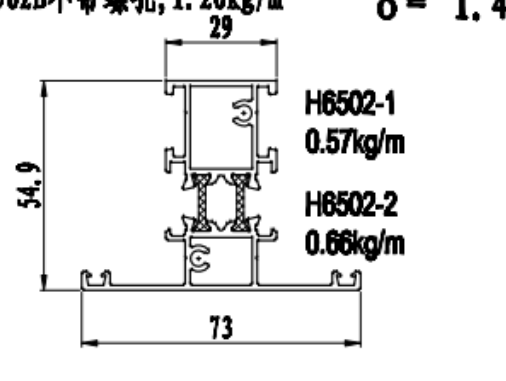
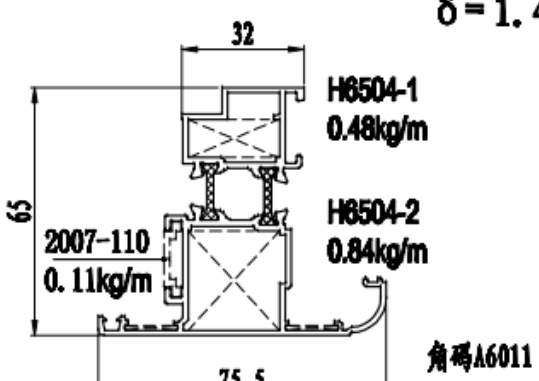
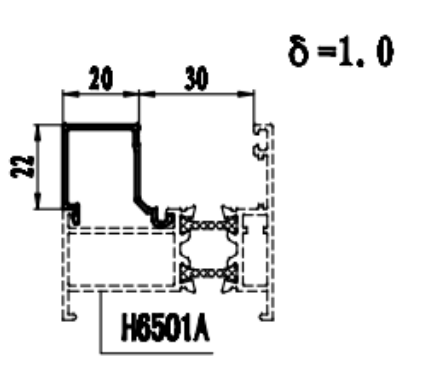
H6501	外框	1.05 kg/m	H6502	中挺	1.33 kg/m
 <p>$\delta = 1.4$</p> <p>H6501-1 0.46kg/m</p> <p>H6501-2 0.49kg/m</p> <p>角码H6013A</p>			 <p>H6502B不带螺孔, 1.26kg/m</p> <p>$\delta = 1.4$</p> <p>H6502-1 0.57kg/m</p> <p>H6502-2 0.66kg/m</p>		
H6504	外开扇	1.43 kg/m	H6562	压线	0.23 kg/m
 <p>$\delta = 1.4$</p> <p>H6504-1 0.48kg/m</p> <p>H6504-2 0.84kg/m</p> <p>2007-110 0.11kg/m</p> <p>角码A6011</p>			 <p>$\delta = 1.0$</p> <p>H6501A</p>		

Fig.3 Sectional View of the Profiles

8 Appendix B: Test Data

1. Deflection Test – Test method AS4420.2-1996

- Span length, $L = 740 \text{ mm}$
- Maximum allowable deflection (Sash) = $\text{Span} / 250 = 2.96 \text{ mm}$
- Test Pressure (Serviceability design wind pressure), $P = 1600 \text{ Pa}$, Rating N6.

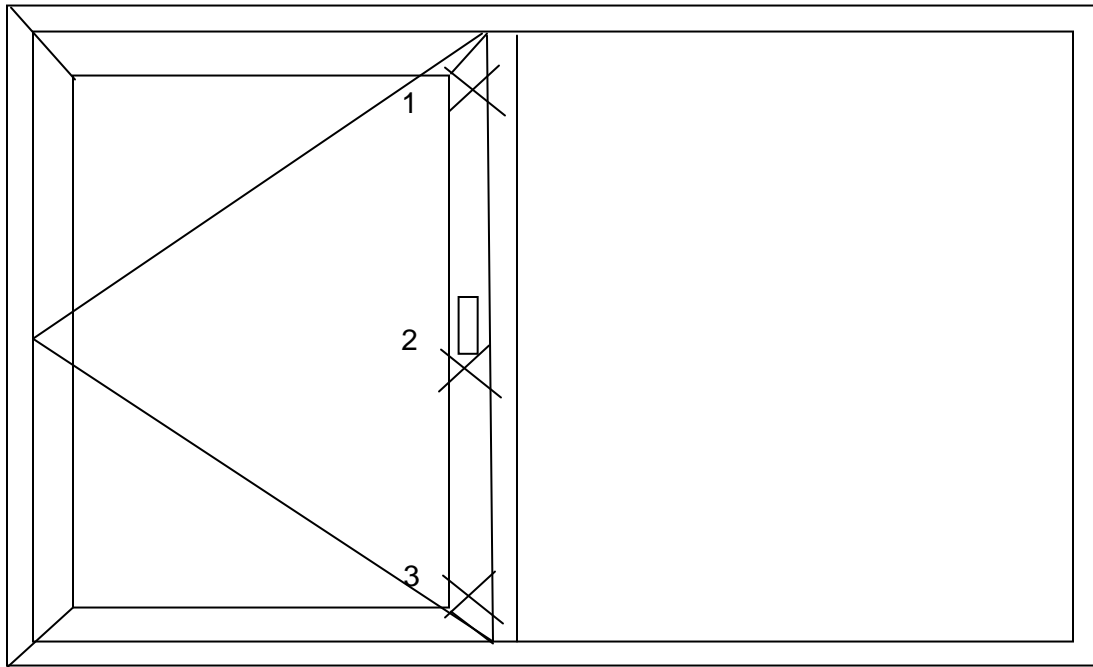


Fig.4 Locations of Displacement Measuring Devices

Table 3 Test Data of Deflection Test

Member (mm)		Test Pressure (Pa)	Deflection (mm)			Actual Deflection	Maximum allowable Deflection /Span Ratio	Verdict
Item	Span Length		1	2	3			
Sash	740	+P/4 = 400	0.1	0.1	0.1	<0.1	2.96	Pass
		+2P/4 = 800	0.3	0.3	0.3			
		+3P/4 = 1200	0.4	0.5	0.5			
		+P = 1600	0.6	0.6	0.6			
		0	0.0	0.0	0.0			
Sash	740	-P/4 = -400	0.2	0.2	0.2	<0.1	2.96	Pass
		-2P/4 = -800	0.3	0.3	0.3			
		-3P/4 = -1200	0.5	0.5	0.5			
		-P = -1600	0.7	0.7	0.7			
		0	0.1	0.1	0.1			
		-2P/4 = -800	0.0	0.1	0.0			
		-3P/4 = -1200	0.0	0.2	0.0			
		-P = -1600	0.0	0.2	0.1			
		0	0.1	0.2	0.1			

2. Operating force test – Test method AS4420.3-1996

Table 4 Test Data of Operating Force Test

Force Type	Force Data	Requirements	Verdict
To Initial Movement (N)	33	160	Pass
To Maintain Movement (N)	31	80	Pass

3. **Air infiltration test – Test method AS4420.4-1996**

- Overall area: 0.96 m²

Table 5 Test Data of Air Infiltration Test

Test pressure of 75 Pa	Infiltration rate (positive direction)	0.04 L/s·m ²
	Exfiltration rate (negative direction)	0.06 L/s·m ²
	Average air leakage rate	0.05 L/s·m ²
	Rating	Low
	Requirement: Maximum Air Infiltration	1.0 L/s·m ²

- Operable Area: 0.40 m²

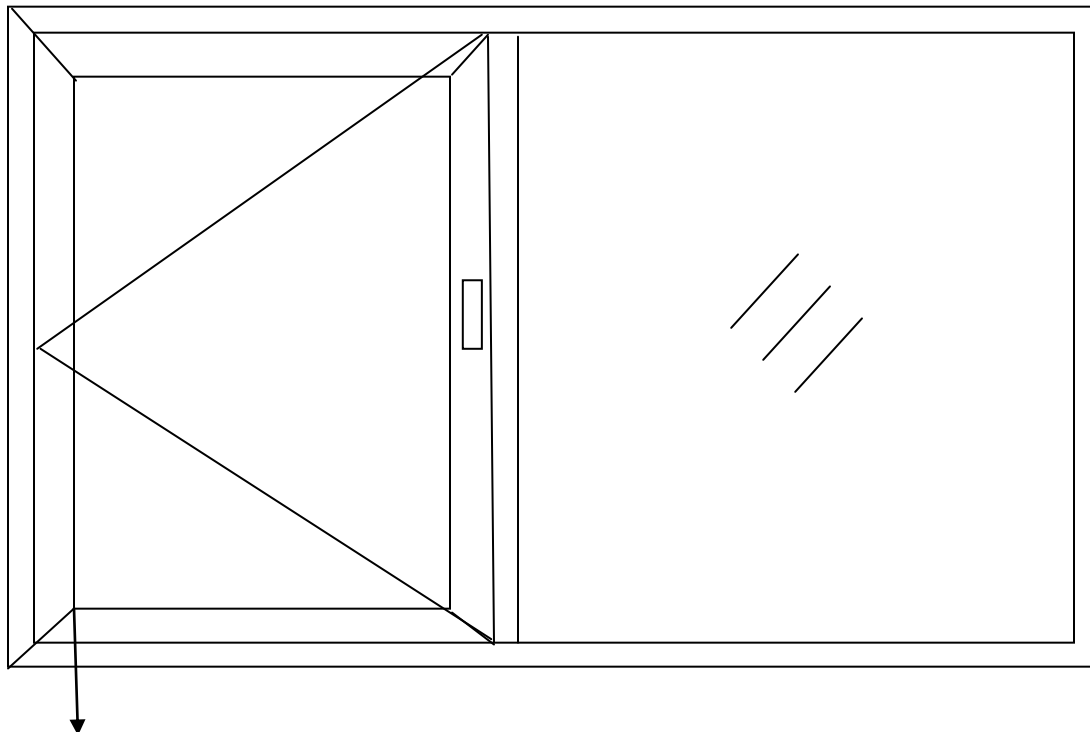
Table 6 Test Data of Air Infiltration Test

Test pressure of 75 Pa	Infiltration rate (positive direction)	0.05 L/s·m ²
	Exfiltration rate (negative direction)	0.02 L/s·m ²
	Average air leakage rate	0.04 L/s·m ²
	Rating	Low
	Requirement: Maximum Air Infiltration	1.0 L/s·m ²

4. Water resistance test – Test method AS4420.5-1996

There was no water penetration after water sprayed for 15 minutes at 150 Pa. The pressure of 150 Pa for water penetration was requested by the applicant.

Water penetration: After water sprayed for 12 minutes at 200 Pa, the water penetration started at the bottom under hinge side.



Water penetration point

Fig.5 Location of Water Penetration

Test result:

$P_{\max} = 150 \text{ Pa}$

Rating: N3

5. Ultimate strength test – Test method AS4420.6-1996

Required ultimate strength test pressure: 4000 Pa

Rating: N6

Test result:

The window was not collapsed when subjected to ultimate strength of 4000 Pa (N6).

No significant breakage, permanent deformation or operational malfunction after ultimate strength was released.

9 Revision Page

Revision No.	Date	Changes	Author	Reviewer
0	September 6, 2015	First issue	Weber Wang	Fred Bao

END OF DOCUMENT
