Ultimate Pull Test

AZUMA
Design

Yintec

Bi-Fold System

Tested By
AZUMA DESIGN Pty Ltd

AZT 0346.15

1 Aim

To determine the breaking force of the test specimen.

2 Test Sample Information

Product Name/Number	Vinco Phoenix Bi-Fold System
Customer	Yintec
Azuma Test Number	AZT 0346.15
Date	08/10/2015
Test Force Direction	Pulling away from the frame
Test Constraints	Sashes all open and folded
Material	Aluminium profiles

3 Testing

3.1 Procedure

The following method is applied to the test specimen:

1. The test specimen was set up in the Security Door Test Rig
2. The specimen was clamped to the rig extrusion and then sashes were open to the fullest extent
3. The force was then applied to pull the collapsed sashes away from the frame
4. The force was increased until breakage occurred
5. The force is recorded and the damage to the test specimen noted

Azuma Design PTY LTD
38 Redfern Street Wetherill Park, NSW, 2164 Australia
+61(02) 9604 0255

3.2 Results

Force Reached Before Breakage	527.8 N

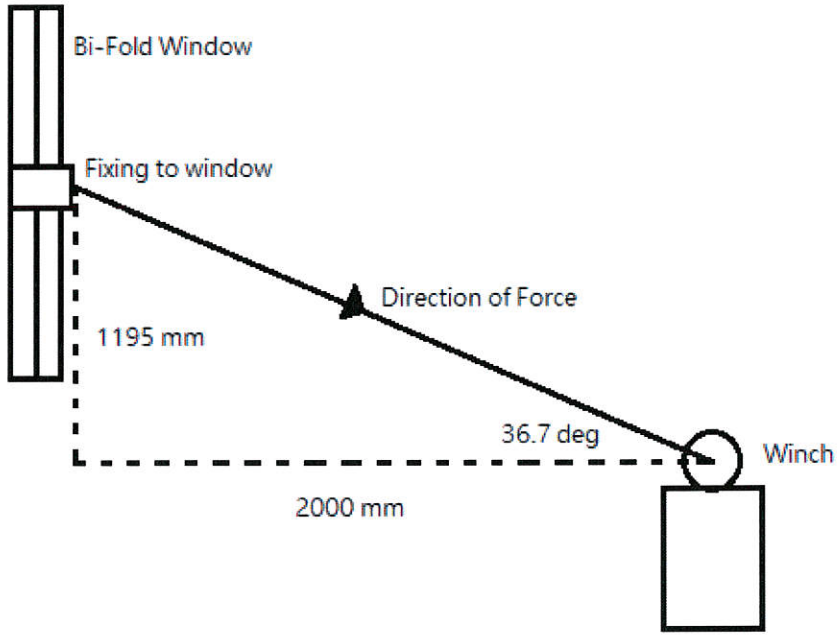

Figure 1: Diagram of test setup

Angle shown in figure one determined by the following equation:

$$sin\theta = (\frac{1195}{2000}) \tag{1}$$

$$\theta = sin^{-1}(\frac{1195}{2000}) = 36.7\,\text{deg} \tag{2}$$

Azuma Design PTY LTD
38 Redfern Street Wetherill Park, NSW, 2164 Australia
+61(02) 9604 0255

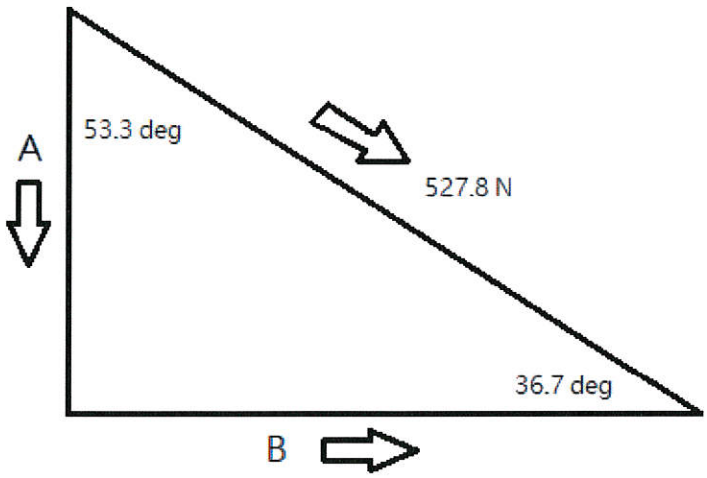

Figure 2: Working out Horizontal force

Calculation of A:

$$sin36.7 = (\frac{A}{527.8}) \tag{3}$$

$$A = sin36.7 * 527.8 = 315.4N \tag{4}$$

Calculation of B:

$$sin53.3 = (\frac{B}{527.8}) \tag{5}$$

$$A = sin53.3 * 527.8 = 423.2N \tag{6}$$

Azuma Design PTY LTD
38 Redfern Street Wetherill Park, NSW, 2164 Australia
+61(02) 9604 0255

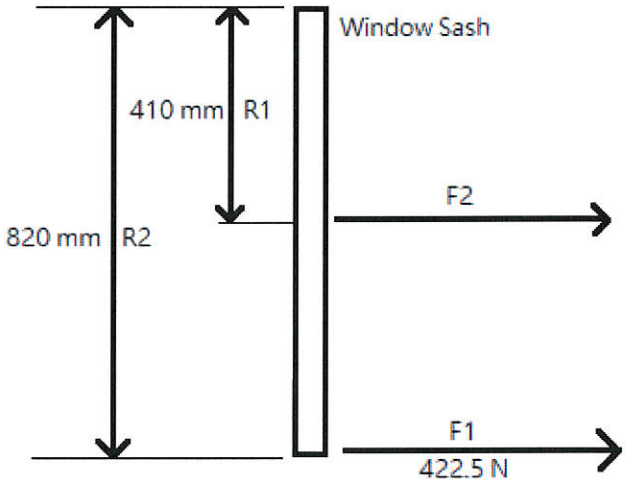

Figure 3: Working out Horizontal force

Calculation of F2:

$$F1 * R1 = F2 * R2 \tag{7}$$

where R is the distance in meters (m) and F is the force in Newtons (N)

$$F2 = \frac{(423.2 * 0.82)}{0.41} = 846.4N \tag{8}$$

Area of Panel:

$$A = 1.33 * 0.82 = 1.091m^2 \tag{9}$$

Determining the Pressure at which the window would fail:

$$P = \frac{F}{A} = \frac{845}{1.091} = 774.5Pa \tag{10}$$

where, F is the force at the center of the panel in Newtons (N) and A is the area of the panel in m^2

The equivalent pressure at which the window will break is therefore:

$$P = 774.5Pa \tag{11}$$

Azuma Design PTY LTD
38 Redfern Street Wetherill Park, NSW, 2164 Australia
+61(02) 9604 0255

4 Pictures

Figure 4: Set-up of point of pull (strap is loose)

Figure 5: Force Reading after pull

Azuma Design PTY LTD
38 Redfern Street Wetherill Park, NSW, 2164 Australia
+61(02) 9604 0255

Figure 6: Damage to the top hinge after pull

Figure 7: Damage to the bottom hinge after pull

Azuma Design PTY LTD
38 Redfern Street Wetherill Park, NSW, 2164 Australia
+61(02) 9604 0255

5 Conclusion and Signatories

5.1 Conclusion

By conducting a pull test and the relevant calculations it is determined that the window sash can withstand a pressure of 774.5 Pa before failure occurs.

5.2 Signatories

Tested By: ROB IRWIN

Signatory Name: ROB IRWIN

Signature: RJ

Date: 8/10/15

Azuma Design PTY LTD
38 Redfern Street Wetherill Park, NSW, 2164 Australia
+61(02) 9604 0255