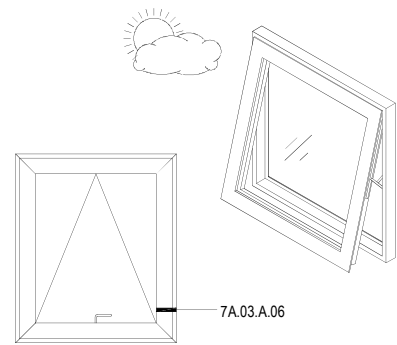


APA ST70 HI - Window Suite Architectural Manual



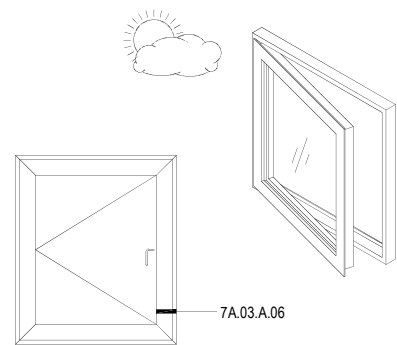
Top Hung- outward opening casement window

• Uw Whole window value:	ST70 Hi 1.4 / ST70 1.4W/m ² K	EN ISO 10077-1
• Uf Frame value:	ST70 Hi 1.9 / ST70 2.1W/m ² K	EN ISO 10077-2
• Air:	Class 4	BS 6375-1:2009
• Water:	Class E1050	BS 6375-1:2009
• Wind:	Class A5	BS 6375-1:2009
• Operating Forces:	Class 1	BS 6375-2:2009
• Mechanical strength:	Class 3	BS 6375-2:2009
• Repeated opening & closing (30,000):	Class 3 (Heavy Duty)	BS 6375-2:2009
• Security Classification:	Certisure	PAS 24:2012
• Maximum Size	1450x1500mm (contact APA Facade Systems technical department for sizes over and above)	



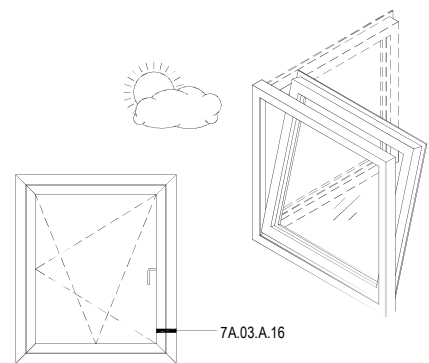
Side Hung- outward opening casement window

• Uw Whole window value:	ST70 Hi 1.4 / ST70 1.4W/m ² K	EN ISO 10077-1
• Uf Frame value:	ST70 Hi 1.9 / ST70 2.1W/m ² K	EN ISO 10077-2
• Air:	Class 4	BS 6375-1:2009
• Water:	Class E1050	BS 6375-1:2009
• Wind:	Class A5	BS 6375-1:2009
• Operating Forces:	Class 1	BS 6375-2:2009
• Mechanical strength:	Class 3	BS 6375-2:2009
• Repeated opening & closing (30,000):	Class 3 (Heavy Duty)	BS 6375-2:2009
• Security Classification:	Certisure	PAS 24:2012
• Maximum size	900x1450mm (contact APA FACADE SYSTEMS technical department for sizes over and above)	



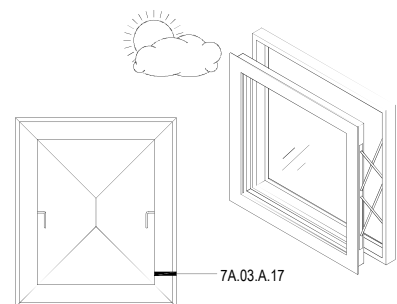
Tilt & Turn- inward opening window

• Uw Whole window value:	ST70 Hi 1.4 / ST70 1.4W/m ² K	EN ISO 10077-1
• Uf Frame value:	ST70 Hi 1.9 / ST70 2.1W/m ² K	EN ISO 10077-2
• Air:	Class 4	BS 6375-1:2009
• Water:	Class E1050	BS 6375-1:2009
• Wind:	Class A5	BS 6375-1:2009
• Operating Forces:	Class 1	BS 6375-2:2009
• Mechanical strength:	Class 3	BS 6375-2:2009
• Repeated opening & closing (10,000):	Class 3	BS 6375-2:2009
• Security Classification:	Certisure	PAS 24:2012
• Maximum size	1500x2100mm (contact APA FACADE SYSTEMS technical department for sizes over and above)	



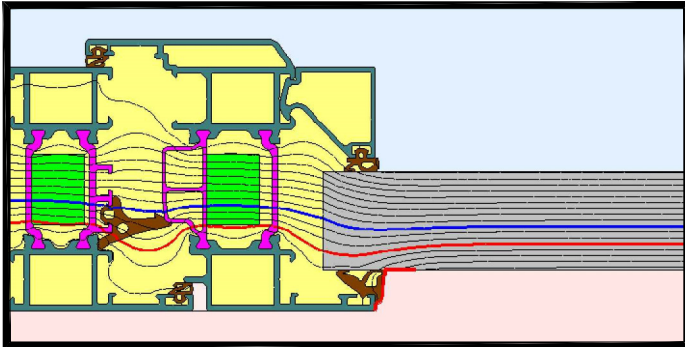
Parallel Stay - outward opening window

• Uw Whole window value:	1.5 W/m ² K	EN ISO 10077-1
• Uf Frame value:	2.2 W/m ² K	EN ISO 10077-2
• Air:	Class 4	BS 6375-1:2009
• Water:	Class E1200	BS 6375-1:2009
• Wind:	Class A5	BS 6375-1:2009
• Operating Forces:	Class 1	BS 6375-2:2009
• Mechanical strength:	Class 3	BS 6375-2:2009
• Repeated opening & closing (30,000):	Class 3 (Heavy Duty)	BS 6375-2:2009
• Maximum size	1500x1700mm (contact APA FACADE SYSTEMS technical department for sizes over and above)	



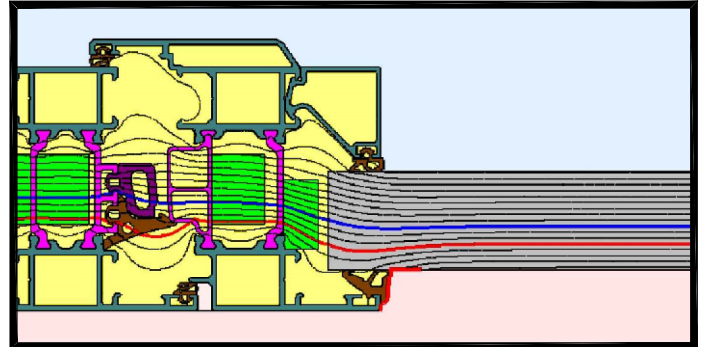
Thermal Performance

ST70



$U_f = 2.1 \text{ W/m}^2\text{k}$

ST70-Hi+



$U_f = 1.8 \text{ W/m}^2\text{k}$

U_w Simulation of profiles in accordance to EN ISO 10077-2

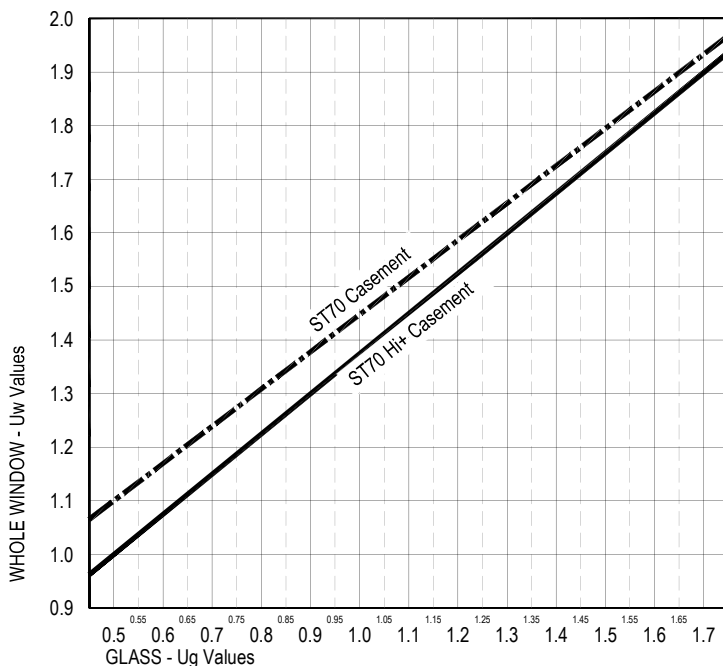
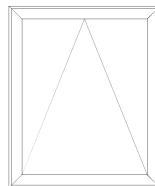
U_f Calculation of windows in accordance to EN ISO 10077-1

Note

When comparing different systems for their thermal properties, a U value is given for standard window size of 1.23 X 1.48m (Type L2). This doesn't represent a project and an actual project report should be issued providing the actual U value for each position and finally the sum of all positions (the weighted U-value)

Whole window U_w Values
(L2 Type window 1230mm x 1480mm)

Glass Values 0.5 to 1.7 $\text{W/m}^2\text{/K}$



Example project U value report




U-Value Report		Page:	1
Various		Date:	09/07/2019
Person in Charge: Admin		Job:	U-Value testing
Pos Fixed Field 1230 x 1480 1 Pcs. Fixed Field 1230 mm x 1480 mm Scale 1:75 Exterior View System: APA Systems ST70 Standard H-I			
Area	Area/Length	U-Value	
Profiles (Uf) (Declaration by System Supplier)	0.276 m ²	1.9 W/(m ² K)	
ST7010102 (Test by System Supplier) Uf=1.9 W/(m ² K), A=0.28 m ²			
Glass (Ug)	1.544 m ²	1.0 W/(m ² K)	
DIG unit Ug 1.0 Ug=1.0 W/(m ² K), Psi= 0.039 W/(mK), A=1.54 m ²			
Interconnection Glass (Psi)	4.996 m 0.039 W/(m K)		
Total (Uw)	1.820 m²	1.2 W/(m²K)	
Pos Top hung window 1230 x 1481 1 Pcs. Top Hung Window 1230 mm x 1480 mm Scale 1:75 Exterior View System: APA Systems ST70 Standard H-I			
Area	Area/Length	U-Value	
Profiles (Uf) (Declaration by System Supplier)	0.527 m ²	1.9 W/(m ² K)	
ST7010107, ST7010102 (Test by System Supplier) Uf=1.9 W/(m ² K), A=0.53 m ²			
Glass (Ug)	1.293 m ²	1.0 W/(m ² K)	
DIG unit Ug 1.0 Ug=1.0 W/(m ² K), Psi= 0.039 W/(mK), A=1.29 m ²			
Interconnection Glass (Psi)	4.576 m 0.039 W/(m K)		
Total (Uw)	1.820 m²	1.4 W/(m²K)	
Pos Window element 2000 x 1800 1 Pcs. Window Element 2000 mm x 1800 mm, Consisting of two Fixed Fields and two Top Hung Windows. Scale 1:75 Exterior View System: APA Systems ST70 Standard H-I			
Area	Area/Length	U-Value	
Profiles (Uf) (Declaration by System Supplier)	0.997 m ²	1.9 W/(m ² K)	
ST7010102 (Test by System Supplier) Uf=1.9 W/(m ² K), A=0.19 m ²			
ST7010102, ST70106107 (Test by System Supplier) Uf=1.9 W/(m ² K), A=0.36 m ²			
ST70106107, ST70101103 (Test by System Supplier) Uf=1.9 W/(m ² K), A=0.24 m ²			
ST70106107, ST70101103, ST70106107 (Test by System Supplier) Uf=1.9 W/(m ² K), A=0.15 m ²			
ST70101103 (Test by System Supplier) Uf=1.9 W/(m ² K), A=0.06 m ²			
Glass (Ug)	2.603 m ²	1.0 W/(m ² K)	
DIG unit Ug 1.0 Ug=1.0 W/(m ² K), Psi= 0.039 W/(mK), A=2.6 m ²			
Interconnection Glass (Psi)	12.904 m 0.039 W/(m K)		
Total (Uw)	3.800 m²	1.4 W/(m²K)	
Sum of all Positions (Uw)	7.241 m²	1.3 W/(m²K)	
The thermal transmission coefficients U_w were calculated for windows according to EN ISO 10077-1: 2006 + AC:2009 Notice: Uw Kernel V1.0			
APA-Log/Kal 11.2 - APA Systems Ltd., Unit 12, Parkmore Industrial Estate, Longmile Road, IE-Dublin 12 Please check all results for plausibility, as we do not take responsibility for any errors.			

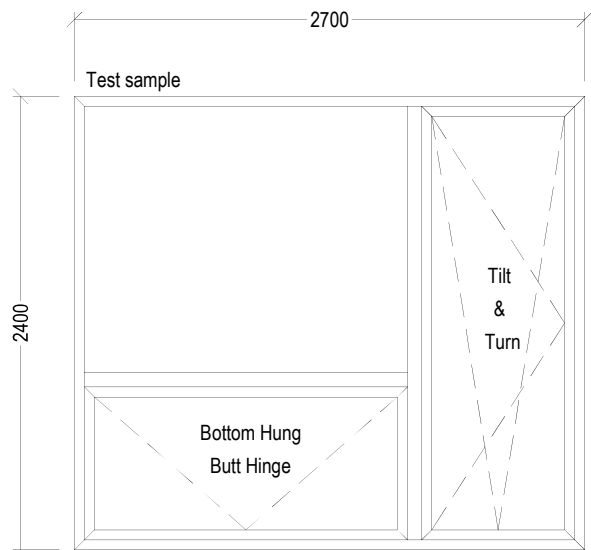
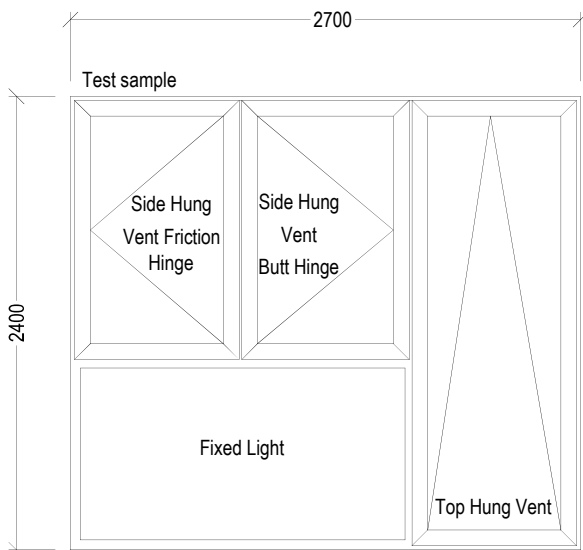
DATE: 08-08-2019	REVISION: 0	TITLE: Thermal Performance	SYSTEM: ST70 HI Window Suite	1:1	A4	7A.01.A.01
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Weather Performance

BS 6375-1:2009. Part 1: Classification for weathertightness

The purpose of BS 6375-1 is to measure the air permeability, watertightness and wind load resistance respectively.

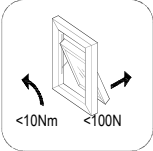
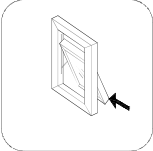
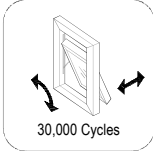
 <p>Air Permeability</p> <p>Class 4 for the average of positive & negative test result</p>	 <p>Watertightness</p> <p>Class E1050</p>	 <p>Wind Load Resistance</p> <p>P1 = 2000Pa P2 = 1000Pa P3 = 3000Pa</p> <p>Met requirements for class A5</p>
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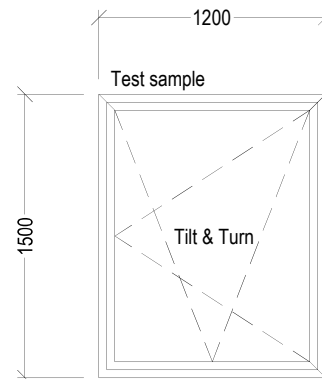
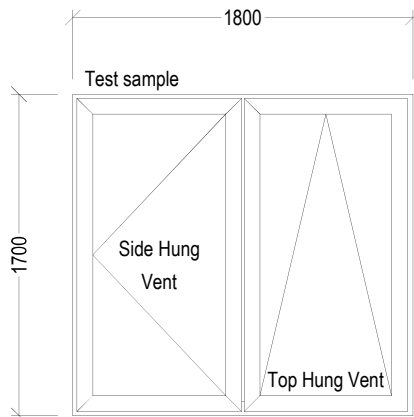


Operational Performance

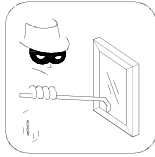
BS 6375-2:2009. Part 2: Classification for operation and strength characteristics

Defines the performance Class for operating forces, mechanical strength, load-bearing capacity of safety devices, impact resistance and repeated opening and closing

 <p>Operating Forces</p> <p>Class 1 Lever handle operation <10Nm Movement of vent <100N</p>	 <p>Mechanical strength</p> <p>Class 3 No damage or permanent deformation & remain functional</p>	 <p>Resistance to repeated opening & closing</p> <p>Class 3 (Heavy Duty) Maintain fit for purpose after 30,000 cycles</p>
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PAS 24: 2012: Enhanced security performance requirements for doorsets and windows



Security Classification

Certisure
Certificate
No CS 5023 - Casement

Certificate
No CS 5023 - Tilt & Turn

Manipulation Test
Multiple attempts to open the windows are made with progressive hand tools for approx. 5 to 6 minutes.

Glazing removal test.
Manual: For approximately 3 minutes hand tools (small and large chisels) are used to try and remove the glazing to gain entry.


Mechanical: 200Kgs load is applied to each corner of the glazing.

Mechanical load test
A 100Kgs parallel load is applied in each of the opposing directions plus a 300Kgs perpendicular load is applied to all of the locking point including the hinges. No entry should be gained after the sequence of applied loads. This particular test sample was subject to 10 load tests per opening sash.

Manual check test
Subsequent to the mechanical load test the window is attacked with 2 levers around the perimeter to try and open the window.

Acoustic Performance

BS EN ISO 140-3:1995: Acoustics. Measurement of sound insulation in buildings and building elements



Acoustic Performance

Example Only.

Glass	Reduction	Total
37 dB	0 dB	37 dB
40 dB	- 2 dB	38 dB
44 dB	- 4 dB	40 dB

Project testing required.

In heavy weight walls the window will usually be the weakest component. It is an industry standard and has being shown in laboratory & field measurement that when using glazing with a R_w up 37 dB the window frame has an insignificant effect on the sound insulation and therefore the glazing can be adopted as representative the whole window.

It is prudent to evaluate a window that requires a higher R_w .

Care should also be taken when using data from a standard size test sample (example type L2 - 1.23x1.48) changes in the window design (size & shape) will have an effect on the acoustic performance, therefore it is important to project test for a valid evaluation.

Top / Side Hung- outward opening casement window

The calculation for the physical free area is the WRO (window restricted opening) multiplied by the width of the handle side of the opening vent.

Example

Size 1m*1m

WRO = 100mm

Width x WRO = Physical free area

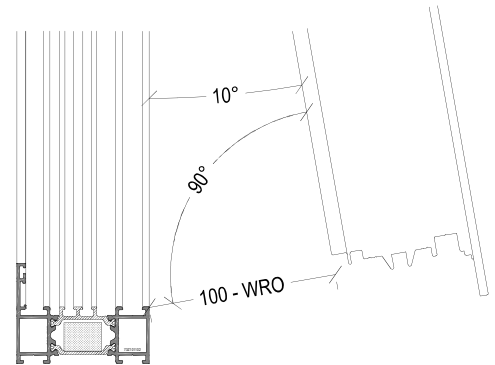
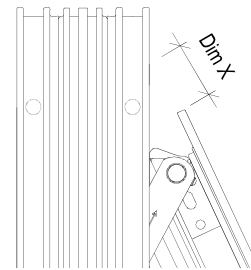
1m x 0.1m = 0.1m²

Note : The max WRO is restricted by the angle of opening. See hinge tables for max opening angles.

When the vent is open more that 25° there is a physical free area available at the hinge side of the vent (see Dim X). NA to Egress Hinges

25° = 20mm

30° = 30mm



Tilt & Turn - Inward opening window

The calculation for the physical free area is the WRO multiplied by the width of the topside of the opening vent.

Example

Size 1m*1m

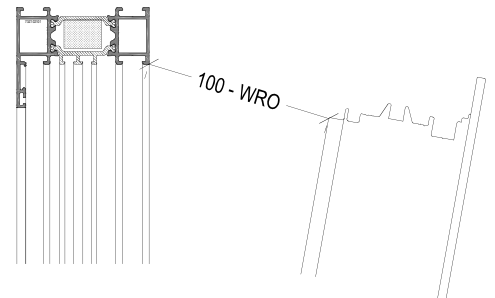
WRO = 100mm

Width x WRO = Physical free area

1m x 0.1m = 0.1m²

Note: The standard arm for tilt and turn gives a physical free area of 100mm

Internal structure must also be taken into consideration.



Parallel Stay - Outward opening window

The calculation for the physical free area is the WRO (window restricted opening) multiplied by the perimeter of the opening vent.

Example

Size 1m*1m

WRO = 100mm

(Height x 2) + (Width x 2) x WRO = Physical free area

(1m x 2) + (1m x 2) x 0.1m = 0.4m²

Note: The Max WRO in the parallel stay vent is 110mm

External structure must also be taken into consideration.

