



Report Number: **W3809** Issue No 22.3: 04/01/2016
 Report Date: **08 March 2023**
 Project Details: **Flush Sash, Optifloat, Argon, K glass S, Swiss Ultimate, Butyl**

THIS SPREADSHEET IS THE PROPERTY OF THE BFRC AND CAN ONLY BE USED IN CONJUNCTION WITH A BFRC LICENCE APPLICATION

Input Values:
 Yellow input, green intermediary, blue finals X' DP is no. of decimal places to enter

Frame offset: **No**

Nominal 4mm etc to **ODP**, others **1DP**

Glazing dimensions and properties:

Thickness of pane 1	4	mm
Pane 1/2 distance	20	mm
Gas fill (1/2)	Argon 90%	
Thickness of pane 2	4	mm
Complete next 3 cells for TG IGU		
Pane 2/3 distance		mm
Gas fill (2/3)		
Thickness of pane 3		mm
Glazing Trans. - 3DP	U_g	1.219 W/(m ² ·K)
g-value - 2DP	g_{\perp}	0.71

Thermal transmittance of window from hot box test

U_w - **2DP** W/(m²·K)

Parameter	Symbol	Units
Total window height ODP	l_w	1480 mm
Total window width ODP	b_w	1230 mm

Frame dimensions:

	(b _f)	Frame width, b _f (mm)	Gasket protrusion, b _{gr} (mm)	Frame & gasket widths (mm)	
All frame values round to nearest 1mm, gaskets to 1DP					
F1 fixed sill	F1 fixed sill	57		57.0	Total
	F2 fixed head	57		57.0	
	F3 fixed jamb	57		57.0	
F4 + F5 sash sill	F4 fixed sash sill	57	n/a	57.0	102.0
	F5 moving sash sill	45		45.0	
F6 + F7 sash head	F6 fixed sash head	57	n/a	57.0	102.0
	F7 moving sash head	45		45.0	
F8 + F9 sash jamb	F8 Fixed sash jamb	57	n/a	57.0	102.0
	F9 moving sash jamb	45		45.0	
F10 + F11 mullion	F10 fixed mullion	67		67.0	112.0
	F11 moving mullion	45		45.0	
Total gasket area				0	m ²

Window Dimensions:

Section	Length (m)	Width (m)	Area	
			No gasket (m ²)	With gasket (m ²)
Fixed Light	1.3660	0.5245	0.7165	0.7165
Opening light	1.2760	0.4345	0.5544	0.5544
Total glazing, A _g			1.2709	1.2709
Frame				
F1	0.6150	0.0570	0.0325	0.0325
F2	0.6150	0.0570	0.0325	0.0325
F3	1.4800	0.0570	0.0811	0.0811
F4	0.6150	0.0570	0.0325	0.0325
F5	0.5245	0.0450	0.0216	0.0216
F6	0.6150	0.0570	0.0325	0.0325
F7	0.5245	0.0450	0.0216	0.0216
F8	1.4800	0.0570	0.0811	0.0811
F9	1.3660	0.0450	0.0594	0.0594
F10	1.4800	0.0670	0.0953	0.0953
F11	1.3660	0.0450	0.0594	0.0594
Total Frame			0.5495	0.5495
Total Window, A _w			1.8204	1.8204
Percentage fixed light glass area			39.36%	39.36%
Percentage opening light glass area			30.46%	30.46%
Percentage glass area (total)			69.81%	69.81%

Where a U_w value from hot box testing is available, no L_f^{2D} or L_ψ^{2D} values need to be entered

Frame conductance:

Section	All L values to 4DP . All b values to ODP		L _f ^{2D}	L _ψ ^{2D}	W/(m·K)	b _g (mm)
	W/(m·K)	b _p (mm)				
F1 fixed sill	0.2589	190			0.3181	190
F2 fixed head	0.2589	190			0.3181	190
F3 fixed jamb	0.2589	190			0.3181	190
F4 + F5 sash sill	0.3252	190			0.3861	190
F6 + F7 sash head	0.3252	190			0.3861	190
F8 + F9 sash jamb	0.3252	190			0.3861	190
F10 + F11 mullion	0.5486	380			0.6690	380

Frame:

Section	Frame width, b _f (m)	Frame U-value, U _f (W/(m ² ·K))	Frame areas, A _f (m ²)	Frame heat flow, HU (W/K)	Linear trans, ψ (W/(m·K))	Linear length, l _g (m)	Junction heat flow, Hψ (W/K)
F1 fixed sill	0.0570	1.1048	0.0325	0.0359	0.0235	0.5245	0.0123
F2 fixed head	0.0570	1.1048	0.0325	0.0359	0.0235	0.5245	0.0123
F3 fixed jamb	0.0570	1.1048	0.0811	0.0896	0.0235	1.3660	0.0321
F4 + F5 sash sill	0.1020	1.2674	0.0541	0.0685	0.0252	0.4345	0.0109
F6 + F7 sash head	0.1020	1.2674	0.0541	0.0685	0.0252	0.4345	0.0109
F8 + F9 sash jamb	0.1020	1.2674	0.1406	0.1781	0.0252	1.2760	0.0321
F10 + F11 mullion	0.1120	1.4000	0.1548	0.2167	0.0490	1.3210	0.0647
Totals				0.5495	0.6932	Total	0.1755

Other parameters needed for calculation, taken from simulations:

$d_p = d_g = 0.028$ m
 $\lambda_p = 0.035$ W/(m·K) $R_{se} = 0.04$ m²·K/W $R_{se} = 0.13$ m²·K/W
 $R_p = 0.8000$ m²·K/W $R_{tot} = 0.9700$ m²·K/W $U_p = 1.0309$ W/(m²·K)

Solar Factor, g-value:

F_w	0.9
g_w	0.45

U_{window}

No bars; or attached bars	1.33	W/(m ² ·K)
Single cross bar in IGU	1.4	
Multiple cross bar in IGU	1.5	
Glazing bar (Georgian bar)	1.7	

Air Leakage loss:

Air leakage at 50 Pa per hour & per unit length of opening light (BS 6375-1) - **2DP**

Opening light length	3.7810 m	Total air leakage	0.00 m ³ /(m ² ·h)
L ₅₀	0.00 m ³ /(m ² ·h)	Heat loss = 0.0165 L ₅₀	0.00 W/(m ² ·K)

Energy Window
Energy Index

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Window Rating

A

BFRC Rating
kWh/(m²·yr)

- ≥20 **A** ++
- >10 to 20 **A** +
- 0 to <10 **A** ✓
- 10 to <0 **B**
- 20 to <-10 **C**
- 30 to <-20 **D**
- 50 to <-30 **E**

BFRC Rating =

218.6g_{window} - 68.5 x (U_{window} + Effective L₅₀) = **6.41**

Climate zone is: **UK**

Thermal transmittance, W/(m ² ·K)	U_{window}	1.3
Solar factor	g_{window}	0.45
Window air leakage heat loss, W/(m ² ·K)	L_{factor}	0.00

BFRC

BFRC Certified Simulator No

018

Simulator Name: **Andy Gibson**