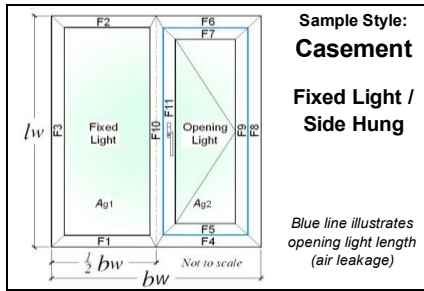


# BFRC Spreadsheet



**Sample Style:**  
**Casement**  
**Fixed Light / Side Hung**

Blue line illustrates opening light length (air leakage)

Report Number: **U20250-3** Issue No 22.3: 04/01/2016  
 Report Date: **27 July 2020**  
 Project Details: **Camden C70 Window - triple glazed**

**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	<b>4</b>	mm
Pane 1/2 distance	<b>14</b>	mm
Gas fill (1/2)	<b>Argon 90%</b>	
Thickness of pane 2	<b>4</b>	mm
Complete next 3 cells for TG IGU		
Pane 2/3 distance	<b>14</b>	mm
Gas fill (2/3)	<b>Argon 90%</b>	
Thickness of pane 3	<b>4.0</b>	mm
Glazing Trans. - <b>3DP</b>	$U_g$ <b>0.591</b>	W/(m <sup>2</sup> ·K)
g-value - <b>2DP</b>	$g_{\pm}$ <b>0.42</b>	

**Thermal transmittance of window from hot box test**

$U_w$ - <b>2DP</b>		W/(m <sup>2</sup> ·K)
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**Window Dimensions:**

Section	Length		Width		Area	
	(m)	(m)	No gasket (m <sup>2</sup> )	With gasket (m <sup>2</sup> )	(m <sup>2</sup> )	(m <sup>2</sup> )
Fixed Light	1.3800	0.5300	0.7314	0.7314		
Opening light	1.2860	0.4360	0.5607	0.5607		
Total glazing, $A_g$			1.2921	1.2921		
Frame	(m)	(m)	(m <sup>2</sup> )	(m <sup>2</sup> )		
F1	0.6150	0.0500	0.0286	0.0286		
F2	0.6150	0.0500	0.0286	0.0286		
F3	1.4800	0.0500	0.0715	0.0715		
F4	0.6150	0.0500	0.0286	0.0286		
F5	0.5300	0.0470	0.0227	0.0227		
F6	0.6150	0.0500	0.0286	0.0286		
F7	0.5300	0.0470	0.0227	0.0227		
F8	1.4800	0.0500	0.0715	0.0715		
F9	1.3800	0.0470	0.0627	0.0627		
F10	1.4800	0.0700	0.1001	0.1001		
F11	1.3800	0.0470	0.0627	0.0627		
Total Frame			0.5283	0.5283		
Total Window, $A_w$			1.8204	1.8204		
Percentage fixed light glass area			40.18%	40.18%		
Percentage opening light glass area			30.80%	30.80%		
Percentage glass area (total)			70.98%	70.98%		

**Solar Factor, g-value:**

$F_w$	<b>0.9</b>
$g_w$	<b>0.27</b>

**$U_{window}$**

No bars; or attached bars	<b>0.84</b>	W/(m <sup>2</sup> ·K)
Single cross bar in IGU	<b>0.94</b>	
Multiple cross bar in IGU	<b>1.0</b>	
Glazing bar (Georgian bar)	<b>1.2</b>	

**Energy Window**  
Energy Index

**1**

Window Rating

**A**

**BFRC Rating**  
kWh/(m<sup>2</sup>·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**

Parameter	Symbol	Units
Total window height <b>ODP</b>	$l_w$	1480 mm
Total window width <b>ODP</b>	$b_w$	1230 mm

**Frame dimensions:**

	( $b_f$ )	Frame width, $b_f$ (mm)	Gasket protrusion, $b_{gT}$ (mm)	Frame & gasket widths (mm)	
All frame values round to nearest 1mm, gaskets to <b>1DP</b>	F1 fixed sill	<b>50</b>	<b>0.0</b>	50.0	Total
	F2 fixed head	<b>50</b>	<b>0.0</b>	50.0	
	F3 fixed jamb	<b>50</b>	<b>0.0</b>	50.0	
F4 + F5 sash sill	F4 fixed sash sill	<b>50</b>	n/a	50.0	97.0
	F5 moving sash sill	<b>47</b>	<b>0.0</b>	47.0	
F6 + F7 sash head	F6 fixed sash head	<b>50</b>	n/a	50.0	97.0
	F7 moving sash head	<b>47</b>	<b>0.0</b>	47.0	
F8 + F9 sash jamb	F8 Fixed sash jamb	<b>50</b>	n/a	50.0	97.0
	F9 moving sash jamb	<b>47</b>	<b>0.0</b>	47.0	
F10 + F11 mullion	F10 fixed mullion	<b>70</b>	<b>0.0</b>	70.0	117.0
	F11 moving mullion	<b>47</b>	<b>0.0</b>	47.0	
Total gasket area				0	m <sup>2</sup>

Where a  $U_w$  value from hot box testing is available, no  $L_f^{2DP}$  or  $L_{\psi}^{2DP}$  values need to be entered

**Frame conductance:**

Section	All $L$ values to <b>4DP</b> . All $b$ values to <b>ODP</b>		All $L$ values to <b>4DP</b> . All $b$ values to <b>ODP</b>	
	$W/(m^2 \cdot K)$	$b_g$ (mm)	$W/(m^2 \cdot K)$	$b_g$ (mm)
F1 fixed sill	<b>0.1889</b>	<b>190</b>	<b>0.1838</b>	<b>190</b>
F2 fixed head	<b>0.1889</b>	190	<b>0.1838</b>	190
F3 fixed jamb	<b>0.1889</b>	190	<b>0.1838</b>	190
F4 + F5 sash sill	<b>0.2509</b>	190	<b>0.2453</b>	190
F6 + F7 sash head	<b>0.2509</b>	190	<b>0.2453</b>	190
F8 + F9 sash jamb	<b>0.2509</b>	190	<b>0.2453</b>	190
F10 + F11 mullion	<b>0.4320</b>	380	<b>0.4218</b>	380

**Frame:**

Section	Frame width, $b_f$ (m)	Frame U-value, $U_f$ (W/(m <sup>2</sup> ·K))	Frame area, $A_f$ (m <sup>2</sup> )	Frame heat flow, HU (WK)	Linear trans, $\psi$ (W/(m·K))	Linear length, $l_g$ (m)	Junction heat flow, $H_{\psi}$ (WK)
F1 fixed sill	0.0500	0.8835	0.0286	0.0253	0.0273	0.5300	0.0145
F2 fixed head	0.0500	0.8835	0.0286	0.0253	0.0273	0.5300	0.0145
F3 fixed jamb	0.0500	0.8835	0.0715	0.0632	0.0273	1.3800	0.0377
F4 + F5 sash sill	0.0970	1.0946	0.0513	0.0562	0.0268	0.4360	0.0117
F6 + F7 sash head	0.0970	1.0946	0.0513	0.0562	0.0268	0.4360	0.0117
F8 + F9 sash jamb	0.0970	1.0946	0.1342	0.1468	0.0268	1.2860	0.0345
F10 + F11 mullion	0.1170	1.2184	0.1628	0.1983	0.0547	1.3330	0.0729
Totals		0.5283	0.5713			Total	0.1975

Other parameters needed for calculation, taken from simulations:

$d_p = d_g =$	<b>0.04</b>	m
$\lambda_p =$	<b>0.035</b>	W/(m·K)
$R_{se} =$	<b>0.04</b>	m <sup>2</sup> ·K/W
$R_p =$	<b>1.1429</b>	m <sup>2</sup> ·K/W
$R_{tot} =$	<b>1.3129</b>	m <sup>2</sup> ·K/W
$U_p =$	<b>0.7617</b>	W/(m <sup>2</sup> ·K)

**Air Leakage loss:**

Air leakage at 50 Pa per hour & per unit length of opening light (BS 6375-1) - <b>2DP</b>	<b>0.02</b>	m <sup>3</sup> /(m·h)
Opening light length	3.8200	m
Total air leakage	0.076	m <sup>3</sup> /h
$L_{50}$	0.04	m <sup>3</sup> /(m <sup>2</sup> ·h)
Heat loss = 0.0165 $L_{50}$	0.00	W/(m <sup>2</sup> ·K)

**BFRC Rating =**

**218.6g window - 68.5 x ( $U_{window}$  + Effective  $L_{50}$ ) =** **1.06**

**Climate zone is:** **UK**

<b>Thermal transmittance, W/(m<sup>2</sup>·K)</b>	$U_{window}$	<b>0.84</b>
<b>Solar factor</b>	$g_{window}$	<b>0.27</b>
<b>Window air leakage heat loss, W/(m<sup>2</sup>·K)</b>	$L_{factor}$	<b>0.00</b>

**BFRC Certified Simulator No**

**Simulator Name: Richard Bate** **001**

The legal validity of this report can only be claimed on presentation of the complete report with supporting electronic information.