

THERMAL SIMULATION REPORT

Report Number:	GM2011-002
Prepared For:	Steel Window Association 42 Heath Street Tamworth Staffordshire B79 7HJ
Window System Identifier:	W30
Fixed Outer Frame Identifier:	WX7 (Fixed)
Transom Frame Identifier:	N/A
Vent Frame Identifier:	WX7 (Moving)
Glazing System:	4mm Planilux – 10 mm 90% Krypton – 4 mm Planitherm One
Spacer Bar:	10mm Swiss Spacer V with PIB Primary and 4mm Butyl Secondary sealants
Notes:	

Results

Thermal Transmittance (U_{window})	1.7	W/(m ² K)
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(Window Configuration as defined in BS EN 14351-1 Annex E)
(1230mm wide x 1480mm high – single pane vent)

Report Prepared By Dr Gary Morgan
 Therm Consulting

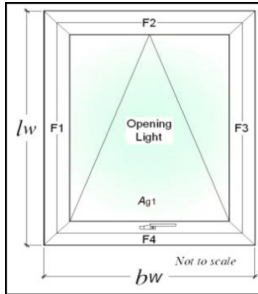
Signed: *G Morgan*

Date: 17th March 2011

The simulations in this report were performed using Therm 5.2.14
according to EN ISO 10077 – 2.
The Therm files generated are attached to this report as appendices



**BFRC Certified
Simulator 016**



Window Style:
L2
Top Hung
Casement

Report Number: **GM2010-002** Report Issue Status: 02 (04/2008)
 Report Date: **17 March 2011**
 Project Details: **4-10-4 Optiwhite 90% Krypton Planitherm One Plus Swiis Spacer V Butyl Secondary Sealant**

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

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

Glazing dimensions and properties:
 Nominal 4mm etc to **ODP**, others **1DP**

Thickness of pane 1	4	mm
Pane 1/2 distance	10	mm
Gas fill (1/2)	90	%
Thickness of pane 2	4	mm
No further entry required for double glazed units		
Pane 2/3 distance (n/a for DG)		mm
Gas fill (2/3)		%
Thickness of pane 3 (n/a for DG)		mm
Thermal transmittance of glazing - 3DP		
U_g	0.966	W/(m ² ·K)

Frame dimensions:

	(b _r)	No gasket (mm)	Gasket protrusion (mm)	With gasket (mm)
All frame values to nearest 0.5mm, gaskets to 1DP	F1 LH jamb	51	2	53
	F2 head	51	2	53
	F3 RH jamb	51	2	53
	F4 sill	51	2	53
Total gasket area				0.01 m ²

Window Dimensions:

Section	Length (mm)	Width (mm)	Area	
			No gasket (m ²)	With gasket (m ²)
Window	1378	1128	1.5544	1.5444
Total glazing, A_g			1.5544	1.5444

All L values to **4DP**. All b values to **ODP**

Section	L_f^{2D}	b_p (mm)	L_{ψ}^{2D}	W/(m·K)	b_g (mm)
F1 LH jamb	L_f^{2D}	190	L_{ψ}^{2D}	0.4860	190
F2 head		190		0.4860	190
F3 RH jamb		190		0.4860	190
F4 sill		190		0.4860	190

Frame	(mm)	(mm)	(m ²)	(m ²)
F1	1480	51	0.0729	0.0756
F2	1230	51	0.0601	0.0624
F3	1480	51	0.0729	0.0756
F4	1230	51	0.0601	0.0624
Total Frame			0.2660	0.2760
Total Window, A_w			1.8204	1.8204
Percentage glass area			85.39%	84.84%

Frame:

Section	b_r (with gaskets) (m)	U_r W/(m ² ·K)	Frame areas (with gaskets) m ²	Heat flow W/K	ψ W/(m·K)	l_g (m)	Heat flow W/K
F1 LH jamb	0.0530	4.7630	0.0756	0.3602	0.0500	1.3740	0.0687
F2 head	0.0530	4.7630	0.0624	0.2971	0.0500	1.1240	0.0562
F3 RH jamb	0.0530	4.7630	0.0756	0.3602	0.0500	1.3740	0.0687
F4 sill	0.0530	4.7630	0.0624	0.2971	0.0500	1.1240	0.0562
Totals			0.2760	1.3147		Total	0.2498

Other parameters needed for calculation, taken from simulations: Panel thickness, $d_p = d_g = 0.018$ m $U_p = 1.4614$ W/(m²·K)
 $\lambda_p = 0.035$ W/(m·K) $R_{se} = 0.04$ m²·K/V $R_{tot} = 0.6843$ m²·K/W $R_p = 0.5143$ m²·K/W $R_{si} = 0.13$ m²·K/W

U_{window}	$U_w =$	1.68	W/(m ² ·K)
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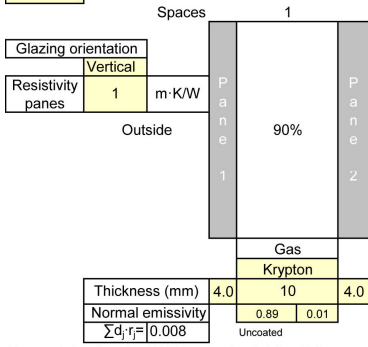
Thermal transmittance, W/(m ² ·K)	U_{window}	1.7
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Simulator Name: **Dr Gary Morgan**



BFRC Certified Simulator **016**

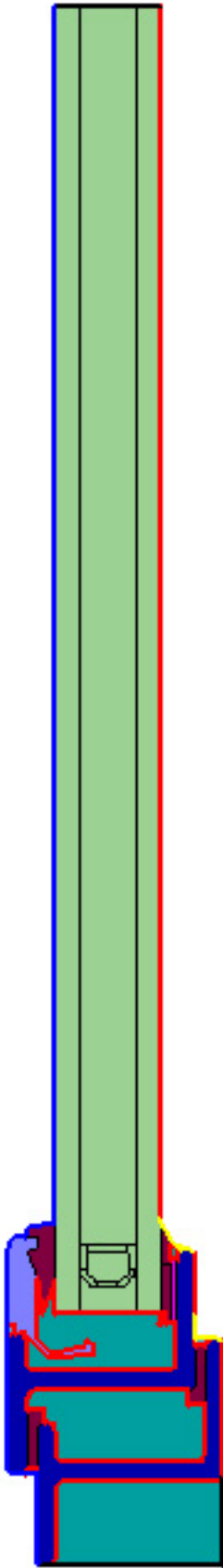
Number of spaces	1
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For uncoated surfaces input 0.89 for normal emissivity, which corresponds to a corrected emissivity of 0.837

Iteration number	U value	$\Sigma 1/h_s$	λ_{eff}	ΔT
	W/(m ² ·K)	(m ² ·K)/W		
1	0.966	0.8592	0.0116	15
2	0.966	0.8592	0.0116	15





Therm Version 5.2 (5.2.14)
 Date: Thu Mar 17 15:56:04 2011

Created by:
 Created for:

Therm Filename: D:\MyDocs from Thermbridge\Therm Output Files\Steel Window Association\September 2010\W30\With Swiss Spacer\opener_Panel Planithrm One Swiss V.THM
 Cross Section Type: Sill
 Underlay Name:

U-factors

Name	Length mm	Basis	U-factor W/m2-K
Linear Transmittance	1000.00	Custom	0.5301

Solid Materials

Name	Conductivity W/m-K	Emissivity
CEN Insulation Panel	0.04	0.90
CEN EPDM	0.25	0.90
CEN PVC Foam Elastomer	0.05	0.90
CEN Aluminium Si Alloys	160.00	0.90
CEN Steel	50.00	0.90

Cavities

Name: CEN Cavity (Unventilated) - Detailed
 Gas Fill: Air
 Convection Model: CEN
 Radiation Model: Advanced

Poly ID	Heat Cavity Flow	Dir	Side 1		Side 2		Dimension		Nu #
			Temp	Emis	Temp	Emis	Horz.	Vert.	
W/m-K	mm		C		C		mm	mm	
26	Horizontal		7.00	0.90	-4.00	0.90	1.16	1.66	N/A
0.0250	N/A								
140	Horizontal		7.00	0.90	-4.00	0.90	0.52	0.41	N/A
0.0250	N/A								
203	Horizontal		7.00	0.90	-4.00	0.90	28.30	13.22	N/A
0.0459	N/A								
55	Horizontal		7.00	0.90	-4.00	0.90	28.36	10.28	N/A
0.0460	N/A								
31	Horizontal		15.00	0.90	5.00	0.90	0.61	3.64	N/A
0.0250	N/A								
33	Horizontal		15.00	0.90	5.00	0.90	0.71	1.15	N/A
0.0250	N/A								
34	Horizontal		15.00	0.90	5.00	0.90	19.50	10.67	N/A
0.0307	N/A								

Name: CEN Cavity (Slightly Ventilated) - Detailed
 Gas Fill: Air
 Convection Model: CEN Ventilated
 Radiation Model: Advanced

Poly ID	Heat Cavity Flow	Dir	Side 1		Side 2		Dimension		Nu #
			Temp	Emis	Temp	Emis	Horz.	Vert.	
W/m-K	mm		C		C		mm	mm	
139	Horizontal		7.00	0.90	-4.00	0.90	0.79	1.58	N/A
0.0500	N/A								
8	Horizontal		7.00	0.90	-4.00	0.90	2.59	0.87	N/A
0.0500	N/A								
7	Horizontal		7.00	0.90	-4.00	0.90	2.60	0.87	N/A
0.0500	N/A								

Glazing Systems

None

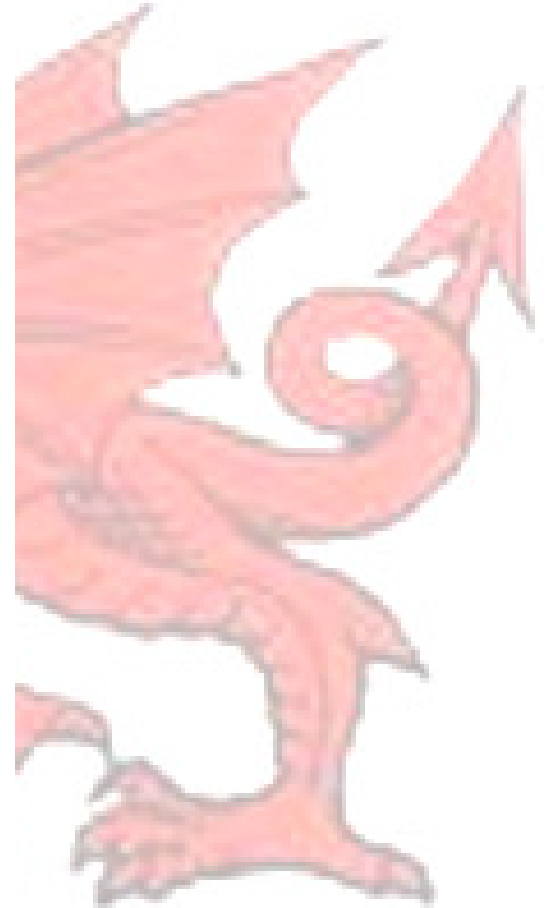
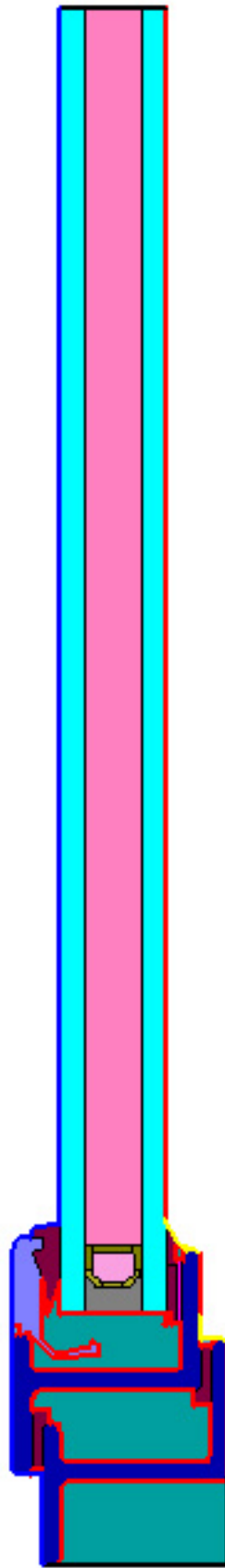
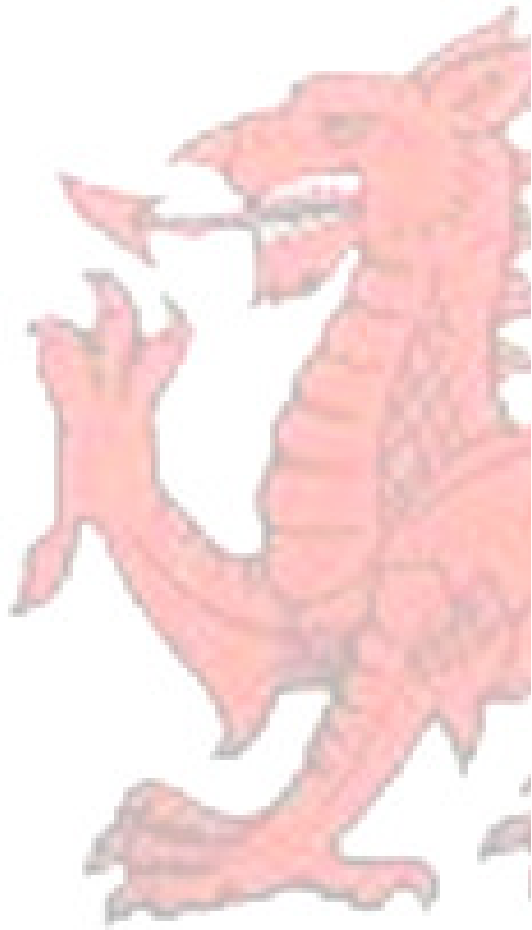
Standard Boundary Conditions

Name	Temperature C	Film Coefficient W/m ² -K
CEN Exterior	0.00	25.000
CEN Interior	20.00	7.692
CEN Red Rad	20.00	5.000

Calculation Specifications

Mesh Parameter : 9
Estimated Error: 3.6%
Calculations done in Version 5.2 (5.2.14)





139	Horizontal	7.00	0.90	-4.00	0.90	0.79	1.58	N/A
0.0500	N/A							
8	Horizontal	7.00	0.90	-4.00	0.90	2.59	0.87	N/A
0.0500	N/A							
7	Horizontal	7.00	0.90	-4.00	0.90	2.60	0.87	N/A
0.0500	N/A							

Glazing Systems

None

Standard Boundary Conditions

Name	Temperature C	Film Coefficient W/m2-K
CEN Exterior	0.00	25.000
CEN Interior	20.00	7.692
CEN Red Rad	20.00	5.000

Calculation Specifications

Mesh Parameter : 9
 Estimated Error: 4.2%
 Calculations done in Version 5.2 (5.2.14)

