

Report in Accordance with BFRC Guidelines and Regulations

Product description: Made For Trade Korniche Bi-Fold Doorset

CONFIDENTIAL

Client:	Aanco (UK) Ltd T/A Made For Trade Wellington House, Wynyard Avenue Wynyard Billingham TS22 5TB
Project:	Aluminium Korniche Bi-Fold Doorset
Project reference:	CU21577-28/2
Prepared By:	Richard Bate Technical Director
Issue date:	16 May 2022

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Approved Simulator 001

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1 Introduction

The U-value calculations of the Made For Trade, Korniche bi-fold doorset detailed below were commissioned by Ashley Gaunt of Made For Trade.

2 Validation of Program

The BISCO 12.0 analysis software has been validated against proofs in Annex I (I1 to I10) of BS EN ISO 10077-2:2017.

3 Analysis Method

The frame profile results detailed below are provided by computer simulation using BISCO 12.0 software program and BFRC guidelines and regulations.

4 Summary of Results

A summary of results are detailed in the following sections. The details supplied for the analysis as well as all information required to verify the analysis can be found in the attached CD.

4.1 Frame thermal transmittance (following the principles of BS EN ISO 10077-2)

Frame Profile	Frame Thermal Transmittance (U_f)
Head	3.2 W/(m ² ·K)
Left Jamb	3.0 W/(m ² ·K)
Right Jamb	3.2 W/(m ² ·K)
Threshold	3.2 W/(m ² ·K)
Meeting Stile	2.8 W/(m ² ·K)

4.2 Linear thermal transmittance (following the principles of BS EN ISO 10077-2)

Frame Profile	Linear Thermal Transmittance (ψ)
Head	0.024 W/(m·K)
Left Jamb	0.027 W/(m·K)
Right Jamb	0.024 W/(m·K)
Threshold	0.025 W/(m·K)
Meeting Stile	0.052 W/(m·K)

4.3 Centre pane U-Value of glazing calculated in accordance with BS EN 673.

Glazing Unit	Centre Pane U-value (U_g)
4-20-4 Low-E 0.05 uncorrected emissivity (St Gobain Planiclear), 90% Argon 10% Air filled, float outer pane (St Gobain Planitherm Total+) glazing unit with Superspacer Premium spacer bar with 5mm hot melt butyl secondary seal.	1.2 W/(m ² ·K)

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4.4 The thermal performance of the doorsets (U_D) in accordance with BFRC guidelines and regulations:

Korniche Frame Profile	Doorset U-Value
Aluminium frame system with 4-20-4 Low-E 0.05 uncorrected emissivity (St Gobain Planiclear), 90% Argon 10% Air filled, float outer pane (St Gobain Planitherm Total+) glazing unit with Superspacer Premium spacer bar with 5mm hot melt butyl secondary seal.	1.8 W/(m ² ·K)

4.6 The Effective L_{50} in accordance with BFRC guidelines and regulations:

Frame Profile	Effective L_{50}
Air permeability at 50 pa	0.00 W/(m ² ·K)

4.7 Total solar energy transmittance (g) in accordance with EN 410

Korniche Frame Profile	$g_{doorset}$
Aluminium frame system with 4-20-4 Low-E 0.05 uncorrected emissivity (St Gobain Planiclear), 90% Argon 10% Air filled, float outer pane (St Gobain Planitherm Total+) glazing unit with Superspacer Premium spacer bar with 5mm hot melt butyl secondary seal.	0.48


5.0 BFRC Rating

5.1 Made For Trade Korniche Bi-Fold doorset system

Korniche Frame Profile	Rating
Aluminium frame system with 4-20-4 Low-E 0.05 uncorrected emissivity (St Gobain Planiclear), 90% Argon 10% Air filled, float outer pane (St Gobain Planitherm Total+) glazing unit with Superspacer Premium spacer bar with 5mm hot melt butyl secondary seal.	- 17 (Rating Scale C)

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6.0 Authorisation

	Prepared by:
Signature:	
Name:	Richard Bate
Title:	Technical Director

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Technical Specification

Profiles	Ref. No.	Material Type/Manufacturer's Name & Density (Timber only)	Dimensions (Height & Width)
Head	A-04105	Made For Trade, thermally broken aluminium	Outer frame - 56mm x 84mm Sash – 60mm x 75mm
Left Jamb	A-04104	Made For Trade, thermally broken aluminium	Outer frame - 56mm x 84mm Sash – 82mm x 83mm
Right Jamb	A-04103	Made For Trade, thermally broken aluminium	Outer frame - 56mm x 84mm Sash – 60mm x 75mm
Threshold	A-04114	Made For Trade, thermally broken aluminium	Outer frame - 56mm x 84mm Sash – 60mm x 75mm
Meeting Stile	A-04117	Made For Trade, thermally broken aluminium	60mm x 75mm

Glazing Component	Specification
Overall sealed unit: 1. Thickness (mm)	1. 28mm
Outer pane 1. Thickness (mm) 2. Manufacturer 3. Description	1. 4mm 2. St Gobain 3. Planiclear
Inner pane: 1. Thickness 2. Manufacturer 3. Description	1. 4mm 2. St Gobain 3. Planitherm Total+
Spacer bar: 1. Manufacturer 2. Description	1. Edgetech 2. Superspacer Premium
Cavity 1. Distance (mm) 2. Gas %	1. 20mm 2. Argon 90% Air 10%
Edge seal 1. Manufacturer 2. Description	1. N/A 2. 5mm hot melt butyl secondary seal

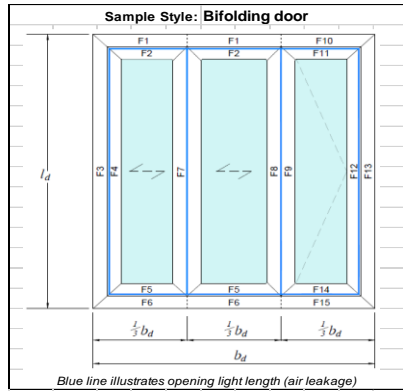
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Additional Notes

Air leakage data is taken from Build Check report ref. W22208 dated May 2022 (data at 50Pa pressure = 0.05).

Solar heat gain figures are calculated from g-values supplied by the product manufacturer from EN 410 calculations for the glass units used in this simulation. The value used is 0.73.

BFRC Spreadsheet



Report Number: U21577-28 Issue 2.3: 04/01/2016
 Report Date: 07 April 2022
 Project Details: Aluminium Bi-fold Doorset

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

Parameter	Symbol	Units
Total door height ODP	L_d	2180 mm
Total door width ODP	b_d	2500 mm

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_d 0.73

Frame dimensions: All frame values to nearest mm, gaskets to nearest 0.1mm		Frame height, b_f	Gasket protrusion, b_g	Frame with gasket	Total frame
		(mm)	(mm)	(mm)	(mm)
F1 + F2 L&M head rail	F1 left fixed head	56	n/a	56.0	106
	F2 left opening head	50	0.0	50.0	
F3 + F4 left jamb	F3 left fixed jamb	56	n/a	56.0	110
	F4 left opening jamb	54	0.0	54.0	
F5 + F6 L&M threshold	F5 left opening threshold	50	0.0	50.0	106
	F6 left fixed threshold	56	n/a	56.0	
F7 Meeting Stile	F7 Meeting Stile	132	0.0	132.0	
	F8 bi-fold opener	60	0.0	60.0	132
F8 + F9 Meeting stile	F9 opener	72	0.0	72.0	
	F10 + F11 right head rail	F10 right fixed head	56	n/a	56.0
F11 right opening head		50	0.0	50.0	
F12 + F13 right jamb	F12 right opening jamb	50	0.0	50.0	106
	F13 right fixed jamb	56	n/a	56.0	
F14 + F15 R threshold	F14 right opening threshold	50	0.0	50.0	106
	F15 right fixed threshold	56	n/a	56.0	
Recession depth F6 & F15:			n/a		
Total gasket area				0	m ²

Thermal transmittance of door from hot box test
 U_d - 2DP W/(m²·K)

Door Dimensions:		Area	
Section	Length (m)	Width (m)	With gasket (for U-value) (m ²)
Left Sliding light	1.9680	0.6573	1.2936
Middle Sliding light	1.9680	0.7073	1.3920
Right Opening light	1.9680	0.6553	1.2897
Total glazing, A_g			3.9754
Frame	(m)	(m)	(m ²)
F1	1.6667	0.0560	0.0918
F2	1.6107	0.0500	0.0744
F3	2.1800	0.0560	0.1189
F4	2.0680	0.0540	0.1090
F5	1.6107	0.0500	0.0744
F6	1.6667	0.0560	0.0918
F7	2.0680	0.1320	0.2664
F8	2.0680	0.0600	0.1211
F9	2.0680	0.0720	0.1453
F10	0.8333	0.0560	0.0451
F11	0.7773	0.0500	0.0358
F12	2.0680	0.0500	0.1009
F13	2.1800	0.0560	0.1189
F14	0.7773	0.0500	0.0358
F15	0.8333	0.0560	0.0451
Total Frame		1.4746	1.4746
Total door, Ad		5.4500	5.4500
Percentage left light glass area		23.74%	23.74%
Percentage middle light glass area		25.54%	25.54%
Percentage right light glass area		23.66%	23.66%
Percentage glass area (total)		72.94%	72.94%

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

Frame conductance:	All L values to 4DP. All b values to ODP			
	$L_{r 2D}$	b_f (mm)	$L_{\psi 2D}$	b_g (mm)
F1 + F2 L&M head rail	0.5330	190	0.5930	190
F3 + F4 left jamb	0.5240	190	0.5870	190
F5 + F6 L&M threshold	0.5320	190	0.5930	190
F7 Meeting Stile	0.7600	380	0.8830	380
F8 + F9 Meeting stile	0.7600	380	0.8830	380
F10 + F11 right head rail	0.5330	190	0.5930	190
F12 + F13 right jamb	0.5300	190	0.5900	190
F14 + F15 R threshold	0.5320	190	0.5930	190

Frame:	Frame widths (no gaskets), B_f	Frame U-value, U_f	Frame areas (no gaskets), A_f	Frame heat flow, HU	Linear trans. ψ	Linear length, l_g	Junction Heat flow, H_{Hj}
Section	(m)	(W/(m ² ·K))	(m ²)	(W/K)	(W/(m·K))	(m)	(W/K)
F1 + F2 L&M head rail	0.1060	3.1804	0.1661	0.5284	0.0243	1.3647	0.0331
F3 + F4 left jamb	0.1100	2.9829	0.2279	0.6799	0.0273	1.9680	0.0537
F5 + F6 L&M threshold	0.1060	3.1710	0.1661	0.5269	0.0253	1.3647	0.0345
F7 Meeting Stile	0.1320	2.7898	0.2664	0.7431	0.0515	1.9680	0.1014
F8 + F9 Meeting stile	0.1320	2.7898	0.2664	0.7431	0.0515	1.9680	0.1014
F10 + F11 right head rail	0.1060	3.1804	0.0809	0.2573	0.0243	0.6553	0.0159
F12 + F13 right jamb	0.1060	3.1521	0.2198	0.6930	0.0243	1.9680	0.0478
F14 + F15 R threshold	0.1060	3.1710	0.0809	0.2566	0.0253	0.6553	0.0166
Totals		1.4746	4.4283			Total	0.4043

Solar Factor, g-value: F_d 0.9, g_d 0.48

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

U_{door}	No bars; or attached bars	1.78	W/(m ² ·K)
	Single cross bar in IGU	1.9	
	Multiple cross bar in IGU	2.0	
	Glazing bar (Georgian bar)	2.2	

Air Leakage loss:
 Air leakage at 50 Pa per hour & per unit length of opening light (BS 6375-1) - 2DP **0.05** m³/(m²·h)
 Opening light length 13.0480 m Total air leakage 0.652 m³/h
 L_{50} 0.12 m³/(m²·h) Heat loss = 0.0165 L_{50} 0.00 W/(m²·K)

Energy Window
 Energy Index
-17
 Window Rating
C

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_{door} - 68.5 x (U_{door} + Effective L₅₀) = -17.02
 Climate zone is: **UK**

Thermal transmittance, W/(m²·K) U_{door} **1.8**
Solar factor g_{door} **0.48**
Door air leakage heat loss, W/(m²·K) L_{factor} **0.00**

Simulator Name: **Richard Bate** **BFRC Certified Simulator No 001**

BS EN 673 Spreadsheet

Version 12 18/06/2015. Calculations according to BS EN 673:2011

Number of spaces	Help	
1		

Spaces 1

Glazing orientation	Vertical	
Resistivity panes	1	m·K/W

Outside

P a n e 1	90%	P a n e 2	
			Gas
Argon			
Thickness (mm)	4.0	20	4.0
Normal emissivity	0.89	0.05	
$\sum d_j \cdot r_j =$	0.008		

Uncoated

Calculate

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

External, R_{se}	0.04	$(m^2 \cdot K)/W$
Internal, R_{si}	0.13	$(m^2 \cdot K)/W$
Iteration number	U value	$\sum 1/h_s$
	$W/(m^2 \cdot K)$	$(m^2 \cdot K)/W$
1	1.219	0.6423
2	1.219	0.6423

λ_{eff}	ΔT
$W/(mK)$	
0.0311	15
0.0311	15

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Spacer Conductivity

May 2014 – No. W21 – Revision Index 3.06/2021 – valid until June 30th, 2023

'WARM EDGE' WORKING PARTY



Data sheet Psi values for windows

based on determination of the equivalent thermal conductivity of spacers by measurement

Only valid for use with hot-melt-sealant



Edgetech Europe GmbH
Gladbacher Straße 23
D-52525 Heinsberg

Profile description	Super Spacer Premium		Spacer height in mm	Material	Thickness d in mm
			4.7		
			Spacer category E	Mylar foil Silicone foam	0.10 4.7

Representative frame profiles	Representative glass constructions	Metal with thermal break	Plastic	Wood	Wood/Metal
Representative psi value double-glazed thermally insulated glass W/mK	 Double-sheet insulating glass $U_g=1.1$ W/m ² K	0.035	0.031	0.030	0.031
Representative psi value triple-glazed thermally insulated glass W/mK	 Triple-sheet insulating glass $U_g=0.7$ W/m ² K	0.030	0.029	0.028	0.029

Two Box model Characteristic values		Space between panes in mm	$\lambda_{eq,2b}$ in W/mK	
		Can be used for all spacer widths	Box 1 - $h_1 = 5$ mm	Box 2 - $h_2 = 4.7$ mm
			0.24	0.15

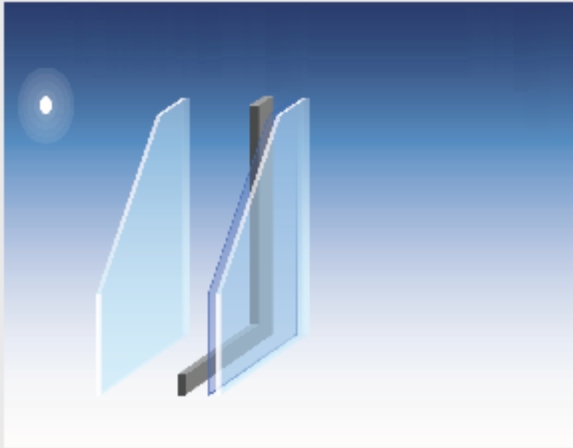
Explanation
The equivalent thermal conductivity has been determined in accordance with the ift guideline WA-17engl/1 "Thermally improved spacers – Determination of the equivalent thermal conductivity by measurement". The representative linear heat transfer coefficients calculated in this way (representative psi values) apply to typical frame profiles and glazing for the determination of the heat transfer coefficient U_w of windows. They have been determined under the boundary conditions (frame profiles, glazing, glass mounting depth, back covering, primary and secondary sealant) defined in the ift guideline WA-08engl/3 "Thermally improved spacers – Part 1: Determination of the representative Psi value for window frame profiles". This guideline also governs the area of validity and application of the representative psi values. In order to avoid rounding errors, the psi values in the data sheet have been given at 0.001 W/mK. The method for the arithmetical determination of the psi values has an accuracy of ± 0.003 W/mK. Differences of less than 0.005 W/mK are not significant. For further information, refer to the Bulletin 004/2008 "Guide to Warm Edge" of Bundesverband Flachglas.

Characteristic values determined by:



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G-Value Source



Glazing 1	PLANICLEAR 4 mm
Cavity 1	Argon 90% 20 mm
Glazing 2	PLANITHERM TOTAL+ FG PLANICLEAR 4 mm

Last name: Sue Peatey
Country: United Kingdom

Notes:

LUMINOUS FACTORS	EN410 (2011-04)
Light Transmittance (TL)	79 %
Outdoor Reflectance (RLe)	13 %
Indoor Reflectance (RLI)	12 %

ENERGY FACTORS	EN410 (2011-04)
Transmittance (TE)	64 %
Outdoor Reflectance (Ree)	20 %
Indoor Reflectance (Rel)	21 %
Absorptance A1 (AE1)	6 %
Absorptance A2 (AE2)	9 %

THERMAL TRANSMISSION	EN673-2011
Ug	1.2 W/(m².K)
Angle relative to the vertical	0 °

SOLAR FACTORS	EN410 (2011-04)
Solar Factor (g)	0.73
Shading Coefficient (SC)	0.83

MANUFACTURING SIZES	
Nominal Thickness	28.00 mm
Weight	20.0 kg/m²

COLOR RENDERING	
Transmission (Ra)	99
Reflection (Ra)	90

ACOUSTICS	EN 12758
Acoustic simulated values	
Rw (C;Ctr)	33 (-1; -5) dB
STC (ASTM E413)	34
OTC (ASTM E1332)	26

ANTI-BURGLARY	EN 358
Burglar Resistance	NPD

SAFETY CLASS	EN 12800
Pendulum Body Resistance	NPD

CARBON FOOTPRINT	EN 15804+A2
Global Warming Potential (GWP)	34.00
(kg. CO ₂ equiv/m²) European average	



Calumen calculates the photometric characteristics and thermal transmission of glass using calculation algorithms which comply with the following standards: the European standards EN 410 and EN 673, the international standard ISO9050, the Japanese standard JIS R 3106/3107 and the Korean standard KS L 2514/2525. The functional output and calculation rules of Calumen for standards EN 410 and EN 673 have been validated by TÜV Rheinland (report 11923R-11-33705). The technical performances obtained according to these standards are provided for information only and are subject to amendment. Only the values entered in the performance declaration available on the CE marking site of Saint-Gobain Glass are official. The sound attenuation indices are measured under laboratory conditions according to the standards EN ISO 10140 and EN 12758. The calculated indices are provided for information only. The accuracy for Rw index lies within a range of +/-2dB. The glass thickness calculations comply with the 2012 version of the DTU39-F4 description. The USER is responsible for ensuring that the correct calculation hypotheses are entered and the DTU39 is applied appropriately for the project concerned.

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Air Leakage Test Evidence



Glazing Component	Specification
Overall sealed unit: 1. Thickness (mm)	1. 28mm
1. Outer pane 2. Cavity 3. Inner pane	1. 4mm clear toughened glass 2. 20mm 3. 4mm clear toughened glass

The above specimen description has been supplied by the client and not verified by Build Check.

Dimensions: Outer frame (w x h): 2500mm x 2180mm

3. Test Details

Test Date: 14 April 2022

Test performed by: Angelo Wells

Test carried out at Build Check Ltd's test laboratory, Unit 3 Lincoln Park Business Centre, Lincoln Road, High Wycombe, HP12 3RD

Test conditions in accordance with standard.

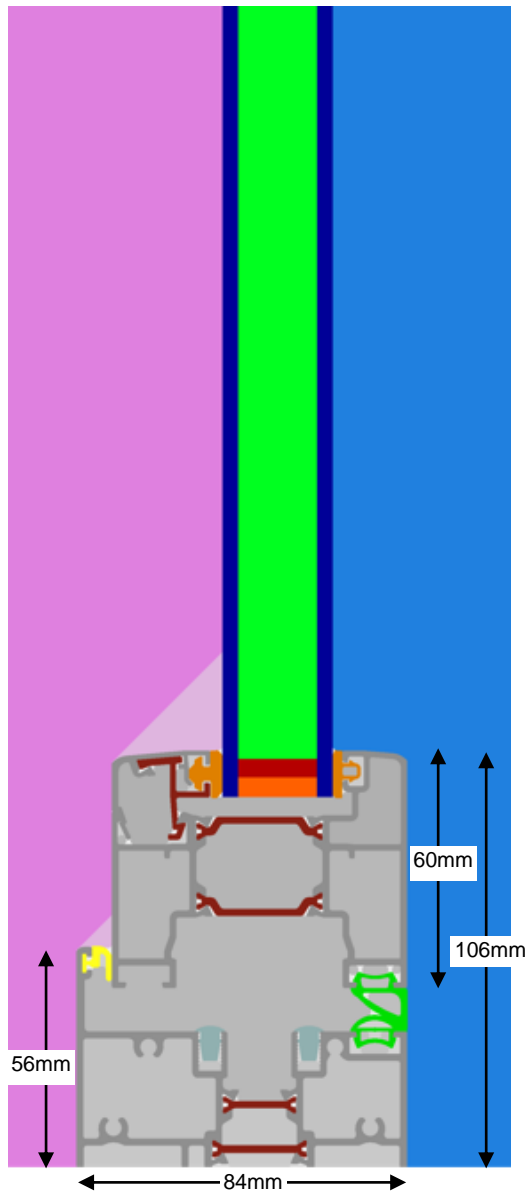
4. Results

Air Pressure (Pa)	Average between positive and negative pressure					
	Positive pressure		Negative pressure		Mean	
	Net permeability per m ² area (m ³ /h-m ²)	Net permeability per m opening length (m ³ /h-m)	Net permeability per m ² area (m ³ /h-m ²)	Net permeability per m opening length (m ³ /h-m)	Per m ² area (m ³ /h-m)	Per m opening length (m ³ /h-m)
50	0.15	0.06	0.10	0.04	0.13	0.05

* During the test, the chamber leakage was greater than 30% of the combined chamber and specimen leakage rate.

Appendix - Profile Drawings

Head



BISCO Calculation Results

BISCO data file: A-04105 head.bsc

Number of nodes = 68371

Heat flow divergence for total object = 0.00047665

Heat flow divergence for worst node = 0.568572

Thermal transmittance of frame (EN 10077-2)

$U_f = (Q / (t_i - t_e) - U_{p1} \cdot w_{p1} - U_{p2} \cdot w_{p2}) / w_f = -3.472 \text{ W}/(\text{m}^2 \cdot \text{K})$

Thermal coupling coefficient

$L2D = Q / (t_i - t_e) = 0.593 \text{ W}/(\text{m} \cdot \text{K})$

$Q = 11.857 \text{ W}/\text{m}$

$t_i = 20.00^\circ\text{C}$

$t_e = 0.00^\circ\text{C}$

$U_{p1} = 5.054 \text{ W}/(\text{m}^2 \cdot \text{K})$ (top edge of bitmap)

$w_{p1} = 0.1900 \text{ m}$ (distance no. 2)

$U_{p2} = 0.000 \text{ W}/(\text{m}^2 \cdot \text{K})$

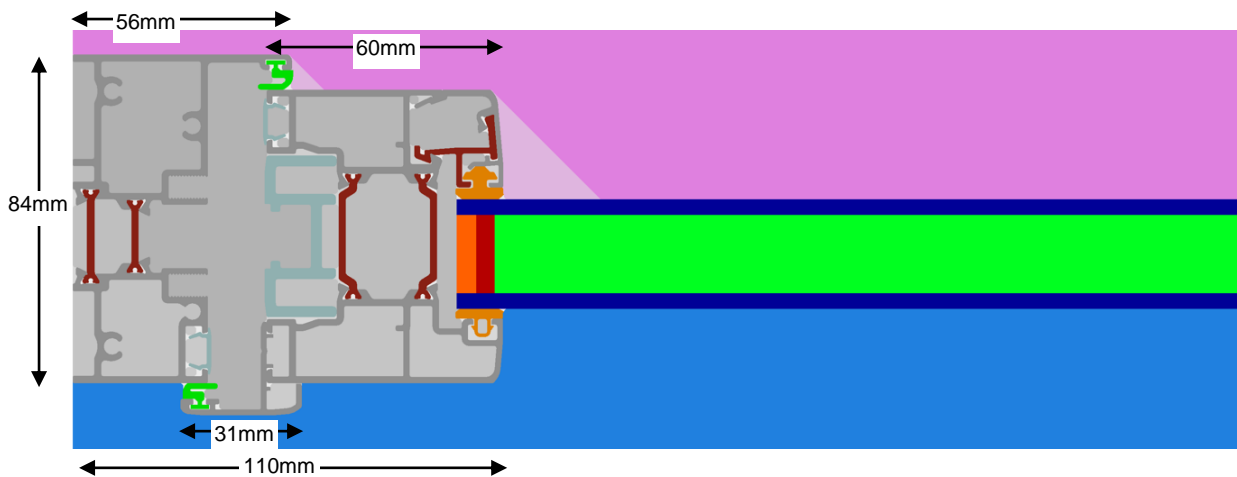
$w_{p2} = 0.0000 \text{ m}$

$w_f = 0.1058 \text{ m}$ (distance no. 1)

	Material	Thermal Conductivity W/(m.K)
	PVC-U Rigid, BS EN 10077-2	0.17
	PVC Flexible, BS EN 10077-2	0.14
	Aluminium, BS EN 10077-2	160.0
	Soda Lime Glass, BS EN 10077-2	1.0
	Superspacer Premium, IFT Rosenheim report 13-002649-PR02 (declared value)	0.15
	Hot Melt Butyl, BS EN 10077-2	0.24
	Polyurethane Foam, BS 10456	0.05
	EPDM, BS EN 10077-2	0.25
	Polyamide, BS EN 10077-2	0.30

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Left Jamb



BISCO Calculation Results

```

BISCO data file: A-04104 left jamb.bsc

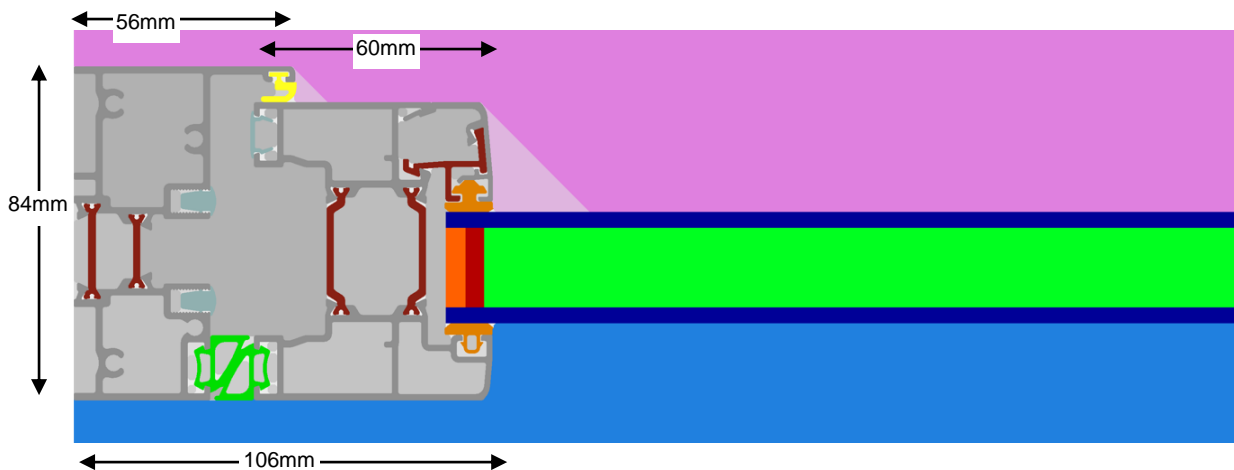
Number of nodes = 71341
Heat flow divergence for total object = 0.00091044
Heat flow divergence for worst node = 0.674075]

Thermal transmittance of frame (EN 10077-2)
Uf = (Q/(ti-te) - Up1*wp1 - Up2*wp2) / wf = 3.238 W/(m².K)
Thermal coupling coefficient
L2D = Q/(ti-te) = 0.587 W/(m.K)
Q = 11.745 W/m
ti = 20.00°C
te = 0.00°C
Up1 = 1.218 W/(m².K) (right edge of bitmap)
wp1 = 0.1900 m (distance no. 2)
Up2 = 0.000 W/(m².K)
wp2 = 0.0000 m
wf = 0.1099 m (distance no. 1)
    
```

	Material	Thermal Conductivity W/(m.K)
	PVC-U Rigid, BS EN 10077-2	0.17
	PVC Flexible, BS EN 10077-2	0.14
	Aluminium, BS EN 10077-2	160.0
	Soda Lime Glass, BS EN 10077-2	1.0
	Superspacer Premium, IFT Rosenheim report 13-002649-PR02 (declared value)	0.15
	Hot Melt Butyl, BS EN 10077-2	0.24
	Polyurethane Foam, BS 10456	0.05
	EPDM, BS EN 10077-2	0.25
	Polyamide, BS EN 10077-2	0.30

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Right Jamb



BISCO Calculation Results

BISCO data file: A-04103 right jamb.bsc

Number of nodes = 68138

Heat flow divergence for total object = 0.000940014

Heat flow divergence for worst node = 0.861953

Thermal transmittance of frame (EN 10077-2)

$U_f = (Q / (t_i - t_e) - U_{p1} \cdot w_{p1} - U_{p2} \cdot w_{p2}) / w_f = -3.495 \text{ W}/(\text{m}^2 \cdot \text{K})$

Thermal coupling coefficient

$L2D = Q / (t_i - t_e) = 0.590 \text{ W}/(\text{m} \cdot \text{K})$

$Q = 11.802 \text{ W}/\text{m}$

$t_i = 20.00^\circ\text{C}$

$t_e = 0.00^\circ\text{C}$

$U_{p1} = 5.054 \text{ W}/(\text{m}^2 \cdot \text{K})$ (right edge of bitmap)

$w_{p1} = 0.1900 \text{ m}$ (distance no. 2)

$U_{p2} = 0.000 \text{ W}/(\text{m}^2 \cdot \text{K})$

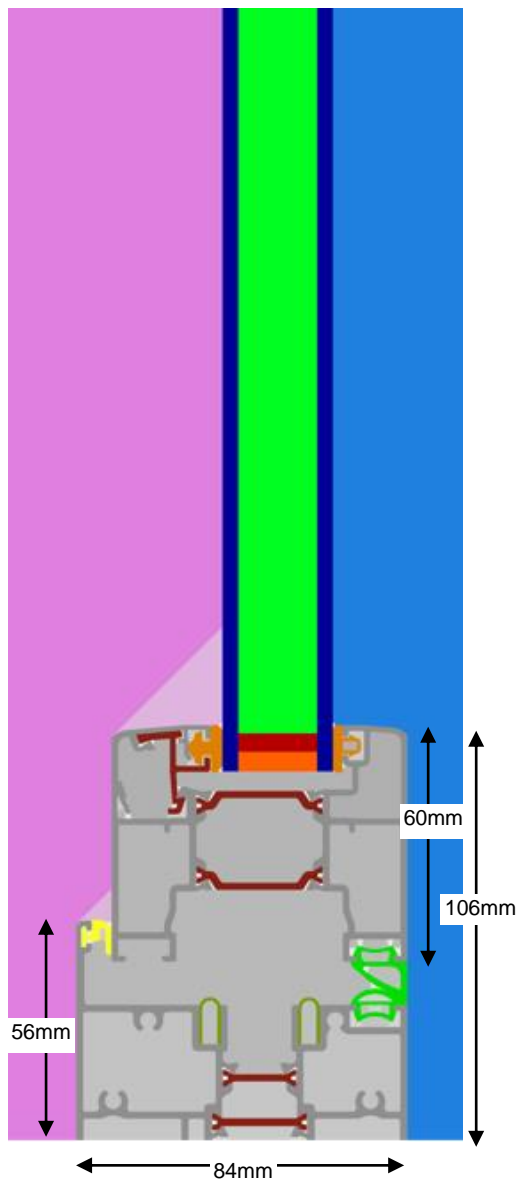
$w_{p2} = 0.0000 \text{ m}$

$w_f = 0.1059 \text{ m}$ (distance no. 1)

	Material	Thermal Conductivity W/(m.K)
	PVC-U Rigid, BS EN 10077-2	0.17
	PVC Flexible, BS EN 10077-2	0.14
	Aluminium, BS EN 10077-2	160.0
	Soda Lime Glass, BS EN 10077-2	1.0
	Superspacer Premium, IFT Rosenheim report 13-002649-PR02 (declared value)	0.15
	Hot Melt Butyl, BS EN 10077-2	0.24
	Polyurethane Foam, BS 10456	0.05
	EPDM, BS EN 10077-2	0.25
	Polyamide, BS EN 10077-2	0.30

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Threshold



BISCO Calculation Results

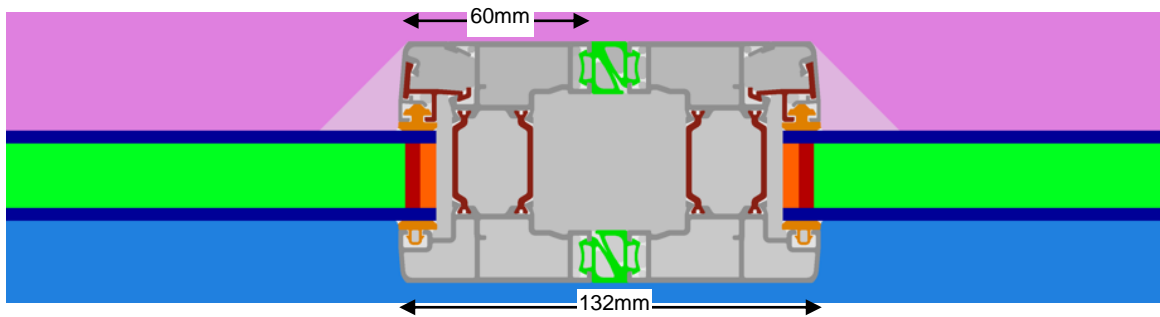
BISCO data file: A-04114 threshold.bsc
 |
 Number of nodes = 67652
 Heat flow divergence for total object = 0.000896211
 Heat flow divergence for worst node = 0.710278

Thermal transmittance of frame (EN 10077-2)
 $U_f = (Q / (t_i - t_e) - U_{p1} \cdot w_{p1} - U_{p2} \cdot w_{p2}) / w_f = -3.474 \text{ W}/(\text{m}^2 \cdot \text{K})$
 Thermal coupling coefficient
 $L2D = Q / (t_i - t_e) = 0.593 \text{ W}/(\text{m} \cdot \text{K})$
 $Q = 11.853 \text{ W}/\text{m}$
 $t_i = 20.00^\circ\text{C}$
 $t_e = 0.00^\circ\text{C}$
 $U_{p1} = 5.054 \text{ W}/(\text{m}^2 \cdot \text{K})$ (top edge of bitmap)
 $w_{p1} = 0.1900 \text{ m}$ (distance no. 2)
 $U_{p2} = 0.000 \text{ W}/(\text{m}^2 \cdot \text{K})$
 $w_{p2} = 0.0000 \text{ m}$
 $w_f = 0.1058 \text{ m}$ (distance no. 1)

	Material	Thermal Conductivity W/(m.K)
	PVC-U Rigid, BS EN 10077-2	0.17
	PVC Flexible, BS EN 10077-2	0.14
	Aluminium, BS EN 10077-2	160.0
	Soda Lime Glass, BS EN 10077-2	1.0
	Superspacer Premium, IFT Rosenheim report 13-002649-PR02 (declared value)	0.15
	Hot Melt Butyl, BS EN 10077-2	0.24
	Polyurethane Foam, BS 10456	0.05
	EPDM, BS EN 10077-2	0.25
	Polyamide, BS EN 10077-2	0.30

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Meeting Stile



BISCO Calculation Results

BISCO data file: A-04117 meeting stile.bsc

Number of nodes = 100401
 Heat flow divergence for total object = 8.2593e-05
 Heat flow divergence for worst node = 0.212354

Thermal transmittance of frame (EN 10077-2)
 $U_f = (Q / (t_i - t_e) - U_{p1} \cdot w_{p1} - U_{p2} \cdot w_{p2}) / w_f = -7.877 \text{ W}/(\text{m}^2 \cdot \text{K})$
 Thermal coupling coefficient
 $L2D = Q / (t_i - t_e) = 0.883 \text{ W}/(\text{m} \cdot \text{K})$
 $Q = 17.660 \text{ W}/\text{m}$
 $t_i = 20.00^\circ\text{C}$
 $t_e = 0.00^\circ\text{C}$
 $U_{p1} = 5.054 \text{ W}/(\text{m}^2 \cdot \text{K})$ (left edge of bitmap)
 $w_{p1} = 0.1900 \text{ m}$ (distance no. 2)
 $U_{p2} = 5.054 \text{ W}/(\text{m}^2 \cdot \text{K})$ (right edge of bitmap)
 $w_{p2} = 0.1900 \text{ m}$ (distance no. 3)
 $w_f = 0.1317 \text{ m}$ (distance no. 1)

	Material	Thermal Conductivity W/(m.K)
	PVC-U Rigid, BS EN 10077-2	0.17
	PVC Flexible, BS EN 10077-2	0.14
	Aluminium, BS EN 10077-2	160.0
	Soda Lime Glass, BS EN 10077-2	1.0
	Superspacer Premium, IFT Rosenheim report 13-002649-PR02 (declared value)	0.15
	Hot Melt Butyl, BS EN 10077-2	0.24
	Polyurethane Foam, BS 10456	0.05
	EPDM, BS EN 10077-2	0.25
	Polyamide, BS EN 10077-2	0.30

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