

CALCULATION REPORT

THERMAL TRANSMITTANCE DOORSET



APPLICANT	PROFILE DEVELOPMENTS Ballygiltenan North, Glin, Co. Limerick V94-K220 – GLIN (LIMERICK, IRELAND)
MANUFACTURER ⁽¹⁾	PROFILE DEVELOPMENTS
PRODUCT	GLAZED SIDELIGHT
REFERENCE ⁽¹⁾	Side light frame 77 mm Side light frame 57 mm
MATERIAL ⁽¹⁾	PVC Glazing 4low/8 Ar / 4 / 14 Ar / 4 Spacer: THERMOBAR
DIMENSION	2100 mm x 500 mm (Hight x Width)
DATE OF TEST	14.03.2024
DATE OF ISSUE	15.03.2024

Calculation Standard :
UNE-EN ISO 10077-2 :2020.
Thermal performance of windows, doors and shutters - Calculation of thermal transmittance - Part 2: Numerical method for frames (ISO 10077-2:2017)
UNE-EN ISO 10077-1 :2020.
Thermal performance of windows, doors and shutters - Calculation of thermal transmittance - Part 1: General (ISO 10077-1:2017, Corrected version 2020-02).

Section



RESULTS	Side light 77:	$U_w = 1,1 \text{ W/m}^2\text{K}$
<i>Results</i>	Side light 57:	$U_w = 1,1 \text{ W/m}^2\text{K}$

Luis García Viguera

Department Director



The result of the present test(s) only concerns the tested object(s). The reports signed electronically on digital support are considered an original document, as well as the electronic copies of the same. Their printing on paper has no legal validity (1) ENSATEC, S.L.U., declines all responsibility for the information provided by the client.



1 SCOPE

The purpose of this report is to determine the thermal transmittance of the following elements:

- **Glazed sidelight** referenced by the customer as: **Side light frame 77 mm**, and
- **Glazed sidelight** referenced by the customer as: **Side light frame 57 mm**

by the numerical method described in the UNE-EN ISO 10077-1:2020 standard.

The simulation uses the BISCO software version 12, developed by the company Physibel, based on the two-dimensional finite element method for calculating heat transfer. This software has been validated in accordance with the specifications of the UNE-EN ISO 10077-2:2020 standard.

2 SAMPLE DESCRIPTION PROVIDED BY THE CLIENT

Description:	GLAZED SIDELIGHT
Reference ⁽¹⁾ :	SIDE LIGHT FRAME 77 MM SIDE LIGHT FRAME 57 MM
Material ⁽¹⁾ :	PVC

The technical specifications of the test sample have been provided by the applicant and delivered to the laboratory under reference MV76242

The dimensions of the calculated elements are 2100 mm x 500 mm (Height x Width)

3 PROCEDIMIENTO DE CÁLCULO

The UNE-EN ISO 10077-1:2020 standard establishes that the thermal transmittance of the door is calculated using the following expression:

$$U_D = \frac{\sum A_g \cdot U_g + \sum A_p \cdot U_p + \sum A_f \cdot U_f + \sum l_g \cdot \Psi_g + \sum l_p \cdot \Psi_p}{\sum A_g + \sum A_f + \sum A_p}$$

U_D	Thermal transmittance of the door
U_g	Thermal transmittance of glazing
U_f	Thermal transmittance of frame
U_p	Thermal transmittance of opaque panel
Ψ_g	Linear thermal transmittance due to the combined thermal effects of infill, glazing and frame
Ψ_p	Linear thermal transmittance due to the combined thermal effects of the panel and frame
A_g	Area of glazing
A_f	Projected area of frame
A_p	Area of opaque panel
l_g	Total visible perimeter of glazing
l_p	Total visible perimeter of opaque panel

The values corresponding to the heat transmission coefficients of the frames U_f has been calculated numerically according to UNE-EN ISO 10077-2:2020. These calculations are shown in section 5 of this report.



The value of U_g has been estimated by the laboratory according to EN 634 and the description of the insulating glass unit, provided by the petitioner.

- Total thickness of IGU: 28 mm
- Composition 4 mm Low e glass/ 8 mm spacer+Argon/4 mm clear float glass/8 mm spacer+Argon/4mm clear glass
- U_g Value = 0.92 W/m²K

Linear thermal transmission coefficient Ψ_g It takes into account combined thermal effects of glazing, spacer and frame, provided by the applicant, in the THERMOBAR spacer data sheet. See annex 8 for the technical data sheets of the materials provided by the applicant.

Linear thermal transmission coefficient Ψ_p can be considered zero as the requirements of section 6.3.2.5. of UNE-EN ISO 10077-1:2020 are fulfilled.

4 BOUNDARY CONDITIONS AND MATERIAL PARAMETERS.

The boundary conditions used for the calculation are those described in Annex E of UNE-EN ISO 10077-2:2020.

Position	Exterior Rse (m2K/W)	Interior Rsi (m2K/W)
Normal (flat surface)	0.04	0.13
Radiation/Reduced convection (edges or joints between surfaces)	0.04	0.20

Reference temperature conditions are 20°C inside and 0°C outside.

The emissivity shall be taken as 0,9 in all cavities.

Thickness of simulated glass, 28 mm

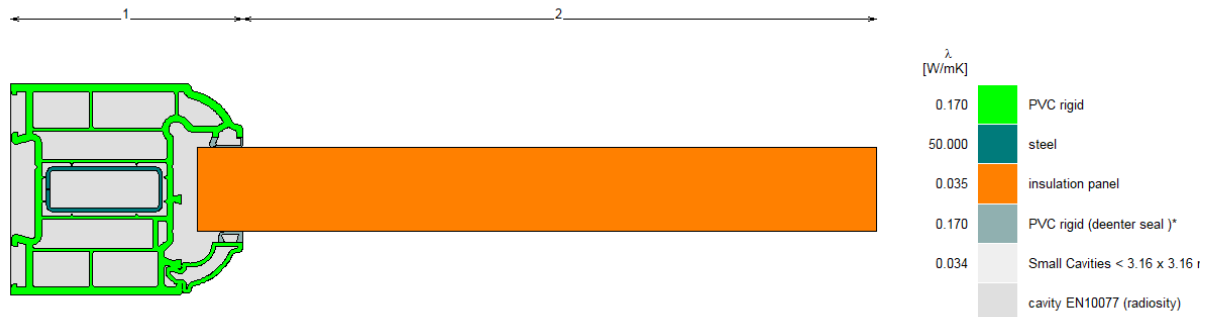
The calculation method used was the RADIOSITY

The thermal conductivity values of the materials used in the calculation are taken from the UNE-EN ISO 10456:2012 Standard "Building materials and products. Hygrothermal properties. Tabulated design values", except those marked with (*) which have been provided by the applicant.



5 CALCULATION OF THE THERMAL TRANSMITTANCE OF THE ELEMENTS

5.1 Thermal transmittance Frame 77



Boundary conditions

The boundary conditions are represented below

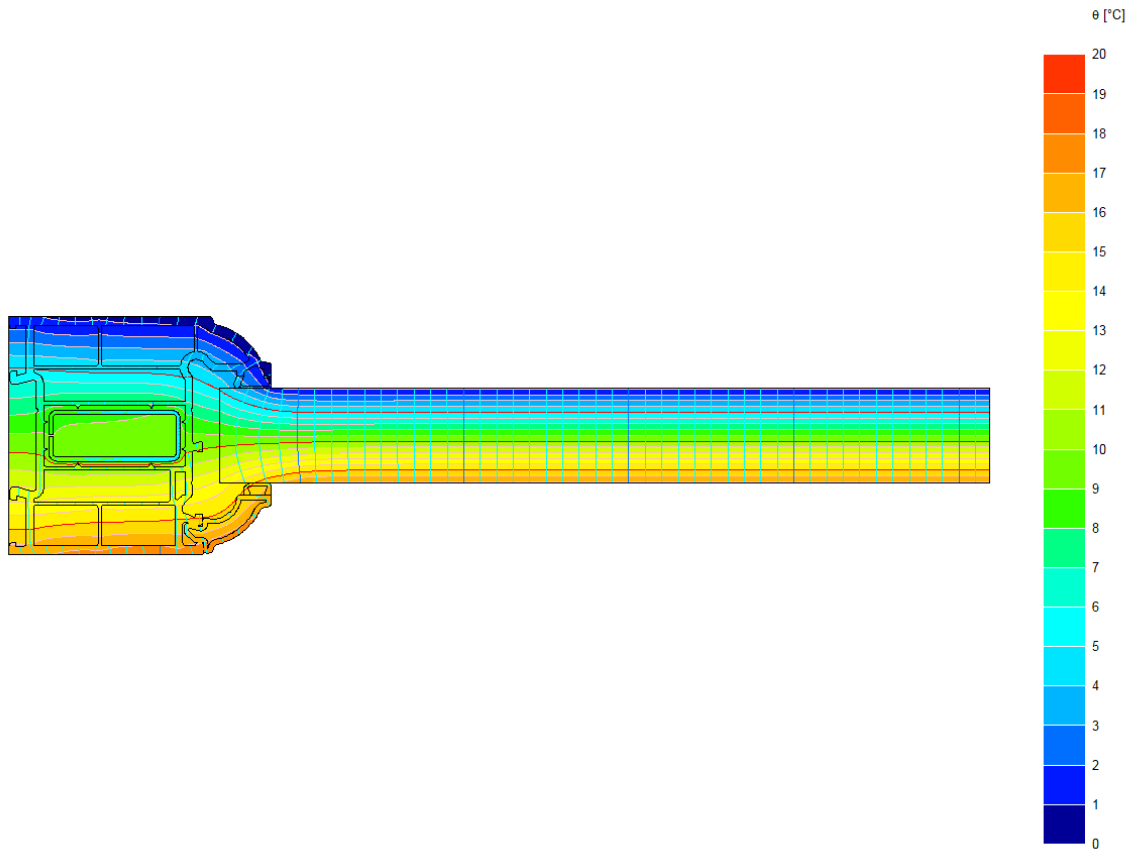


Total Heat Flow (Q)	6,186	W/m
Panel length (l_{p1})	0,2110	m
Frame length (l_f)	0,077	m
Thermal transmittance Panel (U_{p1})	1,031	W/m ² K
Thermal transmittance (U_f)	1,191	W/m²K

$$U_f = \frac{\left(\frac{Q}{t_i - t_e}\right) - U_{p1} \cdot l_{p1}}{l_f}$$

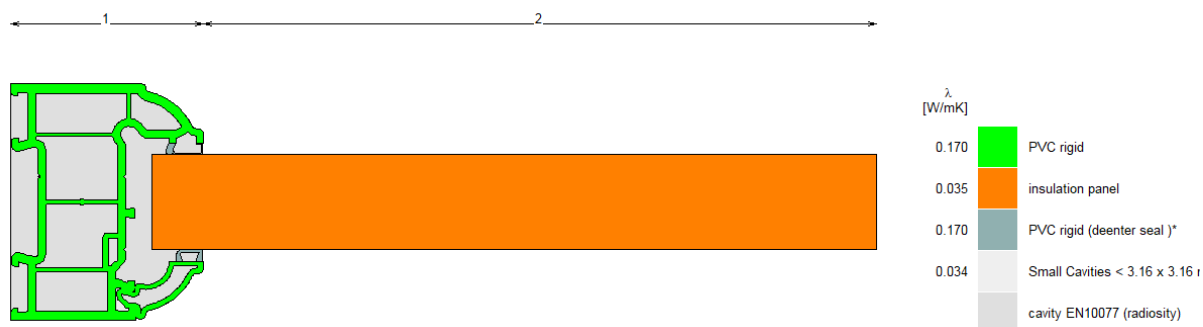


Isotherms and heat flux graph



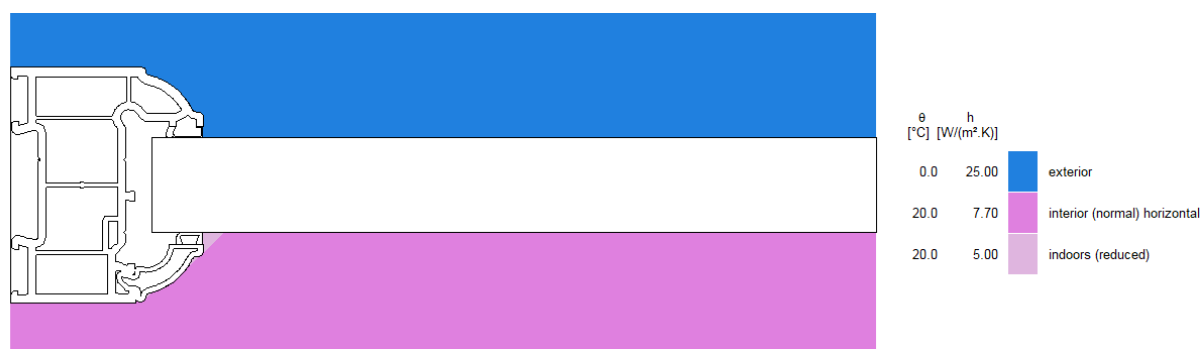


5.2 Thermal transmittance Frame 57



Boundary conditions

The boundary conditions are represented below

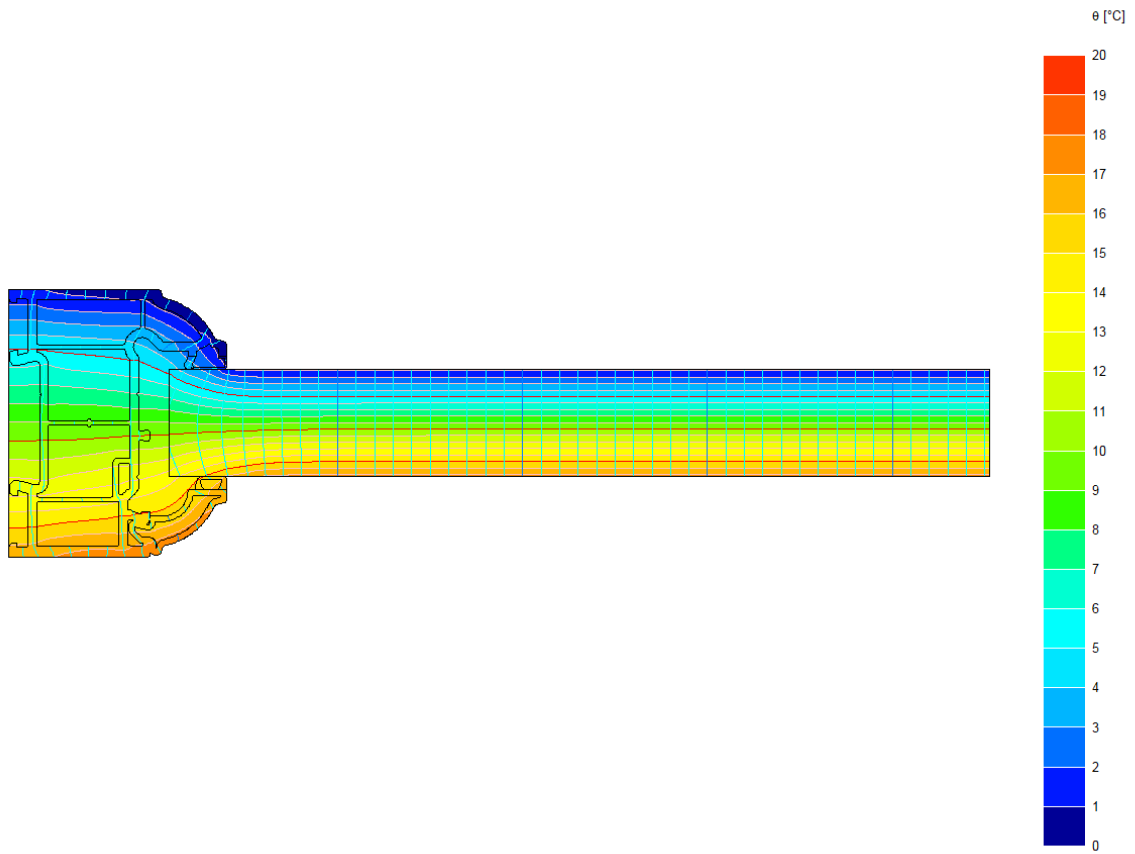


Total Heat Flow (Q)	5,525	W/m
Panel length (l_{p1})	0,200	m
Frame length (l_f)	0,057	m
Thermal transmittance Panel (U_{p1})	1,031	W/m²K
Thermal transmittance (Uf)	1,227	W/m²K

$$U_f = \frac{\left(\frac{Q}{t_i - t_e}\right) - U_{p1} \cdot l_{p1}}{l_f}$$



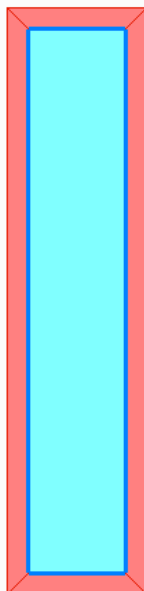
Isotherms and heat flux graph





6 CALCULATION OF THERMAL TRANSMITTANCE OF THE SIDELIGHT

6.1 Sidelight 77



Width	500	mm
Height	2100	mm
Total Area	1.0500	m ²
U*A total	1.0681	W/K
ψ*L total	0.1375	W/K
Transmittance U_D	1.1482	W/m²K

The expanded uncertainty for the calculation of thermal transmittance is less than 5%

NOTE: The uncertainty has been calculated taking into account what is indicated in the EN UNE-EN ISO 10077-2:2020 standard.

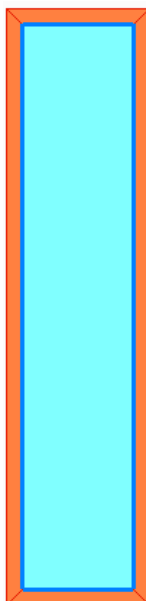
The individual values for each element are shown below:

Reference	color	U [W/m ² K]	Width [mm]	Height [mm]	A [m ²]	U*A [W/K]
glazing		0,92	346	1946	0,67332	0,6195
frame_77		1,191	500	77	0.03257	0.0388
frame_77		1,191	77	2100	0.15577	0.1855
frame_77		1,191	77	2100	0.15577	0.1855
frame_77		1,191	500	77	0.03257	0.0388

ψ material	color	ψ [W/mK]	Total length L [mm]	ψ*L [W/K]
thermobar		0,030	4584	0.1375



6.2 Sidelight 77



Width	500	mm
Height	2100	mm
Total Area	1.0500	m ²
U*A total	1.0513	W/K
ψ*L total	0.1423	W/K
Transmittance U_D	1.1368	W/m²K

The expanded uncertainty for the calculation of thermal transmittance is less than 5%

NOTE: The uncertainty has been calculated taking into account what is indicated in the EN UNE-EN ISO 10077-2:2020 standard.

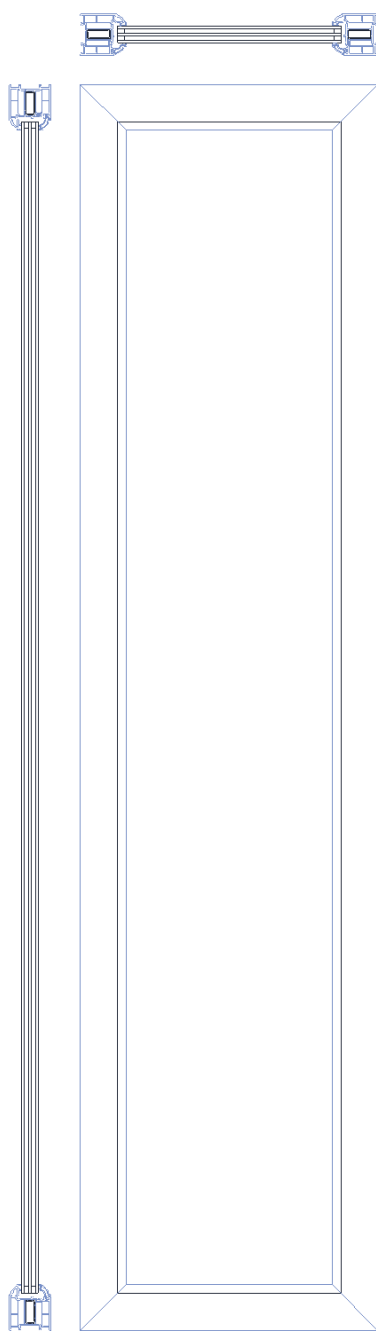
The individual values for each element are shown below:

Reference	color	U [W/m ² K]	Width [mm]	Height [mm]	A [m ²]	U*A [W/K]
glazing		0,92	386	1986	0,7666	0,7053
frame_77		1,2210	500	57	0,02525	0,0308
frame_77		1,2210	57	2100	0,11645	0,1422
frame_77		1,2210	57	2100	0,11645	0,1422
frame_77		1,2210	500	57	0,02525	0,0308

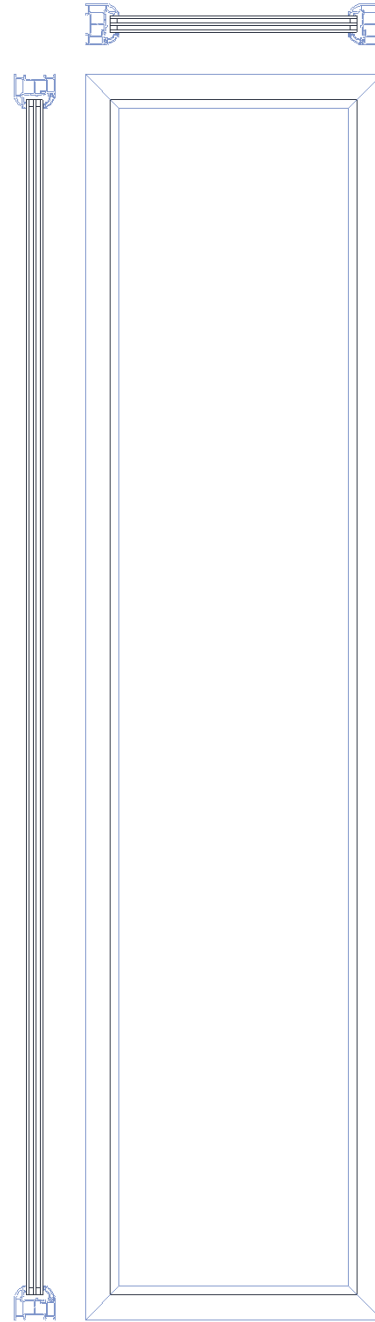
ψ material	color	ψ [W/mK]	Total length L [mm]	ψ*L [W/K]
thermobar		0,030	4584	0,1423



7 SECTIONS PROVIDED BY THE CUSTOMER ⁽¹⁾



Frame 77



Frame 55



8 DOCUMENTATION PROVIDED BY THE CUSTOMER (1)



The Thermobar™ range is the result of 40 years of dedication to insulated glass.

pH
advanced component



Thermobar
Warm Edge Spacer Tube

Available in black, grey or white

- SAVE energy with Lowest Conductivity Spacers - 0.14W/mK
- SAVE energy with lowest Psi values
- SAVE energy with reduced overall window U-values
- SAVE costs on the best futureproof window components

	Plastic window frame	Wood window frame
Double Glazing	0.032	0.031
Triple Glazing	0.030	0.029

Lower Psi values available with Hot Melt.

www.thermobarwarmedge.com



Thermobar™
Warm Edge Spacer Tube

For further information on specifying Thermobar in various window types contact Thermoseal Group on: 0845 331 3950, International: +44 (0)121 331 3950

THERMOBAR - Thermal performance in various window types						
Spacer System	DOUBLE GLAZING			TRIPLE GLAZING		
	Aluminium	Stainless Steel	Thermobar	Aluminium	Stainless Steel	Thermobar
WOODEN WINDOWS:	Frame value: U _f =1.4 W/m²K; Glass value: U _g =1.1 W/m²K			Frame value: U _f =1.3 W/m²K; Glass value: U _g =0.7 W/m²K		
Psi value [W/mK]	0.082	0.053	0.031	0.089	0.054	0.029
Window, U _w 1-pane [W/m²K]	1.40	1.32	1.27	1.10	1.02	0.95
Window, U _w 2-pane [W/m²K]	1.52	1.41	1.33	1.26	1.13	1.04
Minimal surface temperature* [°C]	4.1	7.3	9.7	6	9.6	12.1
PVC WINDOWS:	Frame value: U _f =1.2 W/m²K; Glass value: U _g =1.1 W/m²K			Frame value: U _f =1.2 W/m²K; Glass value: U _g =0.7 W/m²K		
Psi value [W/mK]	0.076	0.051	0.032	0.078	0.050	0.030
Window, U _w 1-pane [W/m²K]	1.32	1.26	1.21	1.05	0.98	0.93
Window, U _w 2-pane [W/m²K]	1.42	1.33	1.26	1.19	1.08	1.01
Minimal surface temperature* [°C]	5.3	8.3	10.4	6.7	9.9	12.0
WOOD ALUMINIUM WINDOWS:	Frame value: U _f =1.4 W/m²K; Glass value: U _g =1.1 W/m²K			Frame value: U _f =1.4 W/m²K; Glass value: U _g =0.7 W/m²K		
Psi value [W/mK]	0.094	0.059	0.032	0.100	0.060	0.030
Window, U _w 1-pane [W/m²K]	1.43	1.34	1.28	1.17	1.08	1.00
Window, U _w 2-pane [W/m²K]	1.57	1.44	1.34	1.35	1.21	1.10
Minimal surface temperature* [°C]	2.2	6.1	8.8	4.4	8.6	11.3
ALUMINIUM WINDOWS:	Frame value: U _f =1.6 W/m²K; Glass value: U _g =1.1 W/m²K			Frame value: U _f =1.6 W/m²K; Glass value: U _g =0.7 W/m²K		
Psi value [W/mK]	0.110	0.068	0.036	0.120	0.064	0.031
Window, U _w 1-pane [W/m²K]	1.54	1.44	1.36	1.30	1.17	1.09
Window, U _w 2-pane [W/m²K]	1.72	1.56	1.45	1.53	1.32	1.21
Minimal surface temperature* [°C]	4.7	8.4	10.8	6.8	10.6	12.9

The equivalent heat conductivity was calculated as per the ift WA-17/1 guidelines. The representative Psi values were calculated under the conditions laid down in the ift WA-08/2 guidelines.

Psi value: linear heat throughput at edge of glass
[W/mK] as per EN ISO 10077-2:2012-06

* corresponds to conditions in DIN 4108-3

External temperature T_a: -10°C
Internal temperature T_i: +20°C

Geometry	Wood	PVC	Wood-Aluminium	Aluminium
Total Area: (1.23 x 1.48m) A _w in m²	1.82	1.82	1.82	1.82
Frame width b _f in mm:	110	117	120	130
Frame area A _f in m² (1-pane/2-pane)	0.548/0.686	0.579/0.725	0.593/0.742	0.637/0.796
Length of glass edge l _g in m (1-pane/2-pane)	4.540/6.840	4.484/6.742	4.460/6.700	4.380/6.560



DEVENTER

Member of
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TECHNICAL DATA SHEET



PVC 58° Shore A

M 5018

58° Shore A

- Density: 1.16g/cm³
- Pull strength: 11 Mpa
- Tear stretch: 440 %
- Tear force: 31 N/mm²
- Pressure deformation rest: 20% (24h/23°C)
- Pressure deformation rest: 60% (24h/23°C)

- ISO 868
- ISO 1183-1
- ISO 527
- ISO 527
- ISO 34-B
- ISO 815
- ISO 815

Working Temperature:
- -10° to +55° C

Physical Characteristics
- Color stability
- Ozone Resistant N/A

Paint Compatibility:
The material used in DEVENTER M is **NOT** compatible with thinned acrylic paints and alkyd resin paints containing conventional solvents. Paint and coatings, of which the properties are unknown must be tested for compatibility in contact with the weather seals.



Available colours:

