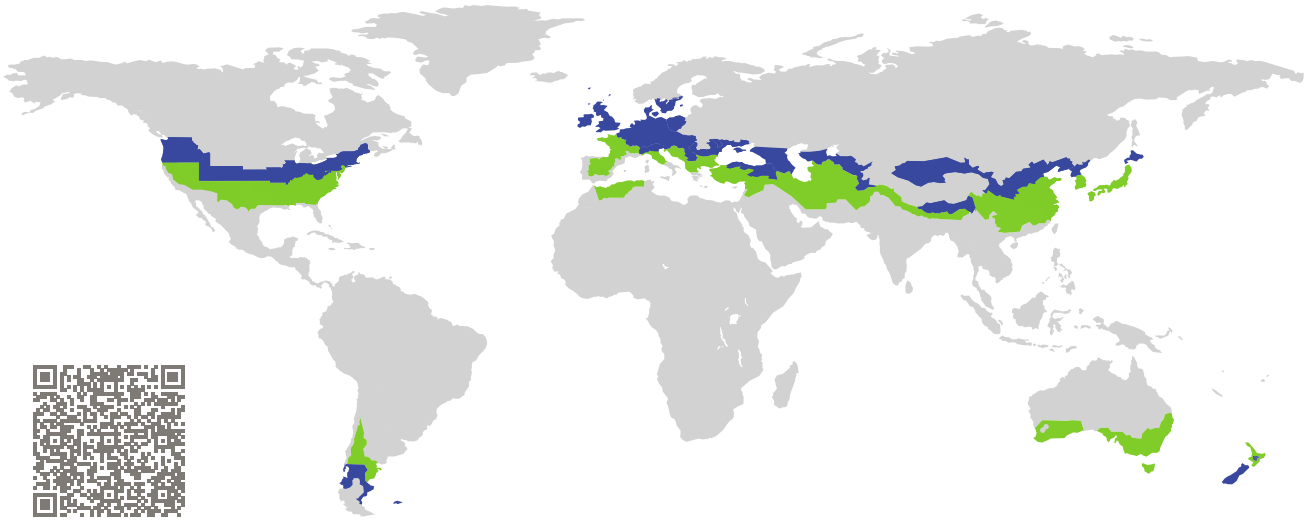
CERTIFICATE

Certified Passive House Component

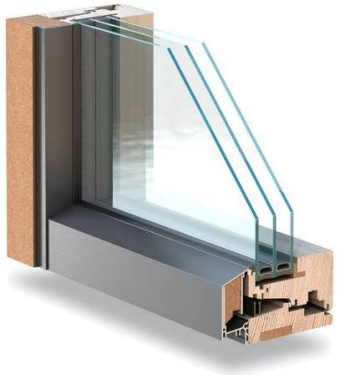
Component-ID 0905ws03 valid until 31st December 2025

Passive House Institute
Dr. Wolfgang Feist
64283 Darmstadt
Germany



Category:	**Window system**
Manufacturer:	**pro Passivhausfenster GmbH, Oberaudorf, Germany**
Product name:	**smartwin**

This certificate was awarded based on the following criteria for the cool, temperate climate zone



Comfort	U_W = 0.77	≤	0.80 W/(m² K)
	$U_{W,\text{installed}}$	≤	0.85 W/(m² K)
	with U_g	=	0.70 W/(m² K)
Hygiene	$f_{Rsi=0.25}$	≥	0.70
Airtightness	Q_{100} = 0.11	≤	0.25 m³/(h m)

cool, temperate climate

phA

CERTIFIED COMPONENT

Passive House Institute

Passive House efficiency class	phE	phD	phC	phB	phA

www.passivehouse.com

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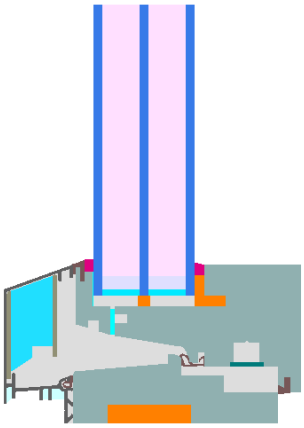
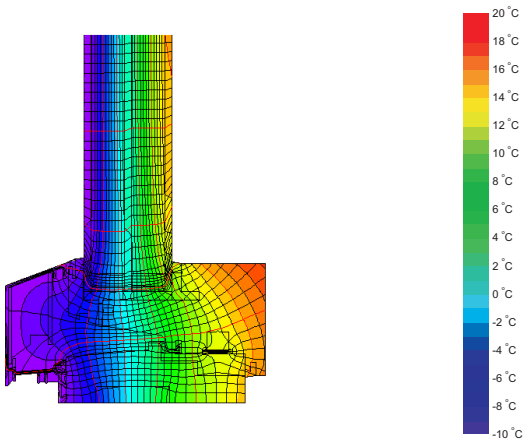
Martin-Greif-Straße 20, 83080 Oberaudorf, Germany
☎ +49 8033 / 30 40 98 | ✉ ff@propassivhausfenster.net | http://www.propassivhausfenster.net |



Calculation model



Isothermal

Description

Aluminum cladded timber frame (Spruce/Fir, 0.11 W/(mK)), insulated by low dense timber-faser board (0,05 & 0,04 W/(mK)) & PU insulation (0,03 W/(mK)). Glazing: 4/18/4/18/4, Glass intersection: 15 mm Q100 = 0,11 m²/mh tested at a two-sash window with flying mullion (200 * 260 cm) Pane thickness: 48 mm (4/18/4/18/4), rebate depth: 15 mm, spacer: SWISSPACER Ultimate with polyurethane as secondary seal.

Explanation

The window U-values were calculated for the test window size of 2.46 m × 1.48 m with U_g = 0.70 W/(m² K). If a higher quality glazing is used, the window U-values will improve as follows:

Glazing	U_g =	0.70	0.64	0.58	0.52	W/(m² K)
		↓	↓	↓	↓	
Window	U_W =	0.77	0.72	0.67	0.62	W/(m² K)

Transparent building components are classified into efficiency classes depending on the heat losses through the opaque part. The frame U-Values, frame widths, thermal bridges at the glazing edge, and the glazing edge lengths are included in these heat losses. A more detailed report of the calculations performed in the context of certification is available from the manufacturer.
The Passive House Institute has defined international component criteria for seven climate zones. In principle, components which have been certified for climate zones with higher requirements may also be used in climates with less stringent requirements. In a particular climate zone it may make sense to use a component of a higher thermal quality which has been certified for a climate zone with more stringent requirements.

Further information relating to certification
can be found on www.passivehouse.com and passipedia.org.

Frame values			Frame width b_f mm	U-value frame U_f W/(m² K)	Ψ-glazing edge Ψ_g W/(m K)	Temp. Factor $f_{Rsi=0.25}$ [-]
Mullion fixed	(0M1)		110	0.62	0.021	0.74
Mullion fixed	(0M2)		110	0.78	0.020	0.72
Transom fixed	(0T1)		110	0.79	0.020	0.71
Transom fixed	(0T2)		110	0.79	0.020	0.72
Mullion 1 casement	(1M1)		110	0.73	0.021	0.73
Mullion 1 casement	(1M2)		110	0.92	0.020	0.71
Transom 1 casement	(1T1)		110	0.90	0.020	0.71
Transom 1 casement	(1T2)		110	0.90	0.020	0.71
Mullion 2 casements	(2M1)		142	0.71	0.021	0.74
Mullion 2 casements	(2M2)		142	0.92	0.020	0.72
Transom 2 casements	(2T1)		142	0.92	0.020	0.71
Transom 2 casements	(2T2)		142	0.95	0.020	0.70
door side	(DS1)		142	0.72	0.020	0.73
Bottom fixed	(FB1)		76	0.72	0.020	0.74
Top fixed	(FH1)		67	0.53	0.021	0.76
Lateral fixed	(FJ1)		67	0.53	0.021	0.76
Flying Mullion	(FM1)		110	0.73	0.020	0.74
Flying Mullion	(FM2)		110	0.90	0.020	0.72
Bottom	(OB1)		76	0.93	0.020	0.72

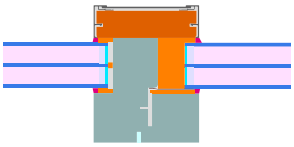
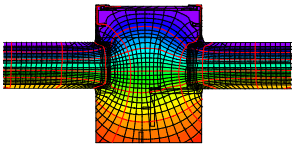
Spacer: SWISSPACER Ultimate Secondary seal: Polyurethan

Frame values		Frame width b_f mm	U-value frame U_f W/(m² K)	Ψ-glazing edge Ψ_g W/(m K)	Temp. Factor $f_{Rsi=0.25}$ [-]
Top	(OH1)	67	0.71	0.021	0.75
Lateral	(OJ1)	67	0.71	0.021	0.75
Threshold	(OT2)	76	0.97	0.020	0.72

Spacer: SWISSPACER Ultimate | Secondary seal: Polyurethan

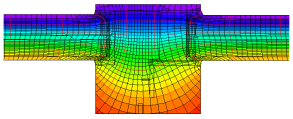
Mullion
fixed

b_f = 110 mm
U_f = 0.62 W/(m² K)
Ψ_g = 0.021 W/(m K)
f_{Rsi} = 0.74

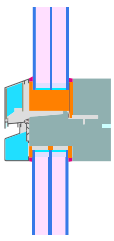
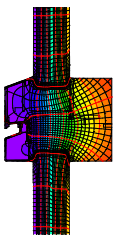
Mullion
fixed

b_f = 110 mm
U_f = 0.78 W/(m² K)
Ψ_g = 0.020 W/(m K)
f_{Rsi} = 0.72

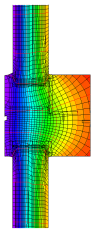
Transom
fixed

b_f = 110 mm
U_f = 0.79 W/(m² K)
Ψ_g = 0.020 W/(m K)
f_{Rsi} = 0.71

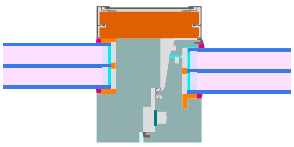
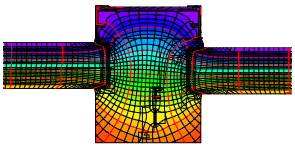
Transom
fixed

b_f = 110 mm
U_f = 0.79 W/(m² K)
Ψ_g = 0.020 W/(m K)
f_{Rsi} = 0.72

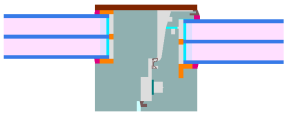
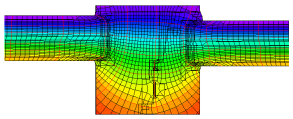
Mullion
1 casement

b_f = 110 mm
U_f = 0.73 W/(m^2 K)
Ψ_g = 0.021 W/(m K)
f_{Rsi} = 0.73

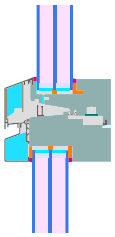
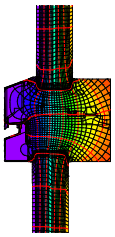
Mullion
1 casement

b_f = 110 mm
U_f = 0.92 W/(m^2 K)
Ψ_g = 0.020 W/(m K)
f_{Rsi} = 0.71

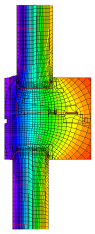
Transom
1 casement

b_f = 110 mm
U_f = 0.90 W/(m^2 K)
Ψ_g = 0.020 W/(m K)
f_{Rsi} = 0.71

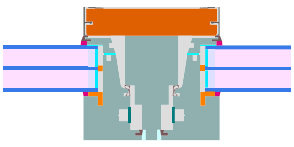
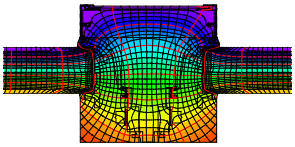
Transom
1 casement

b_f = 110 mm
U_f = 0.90 W/(m^2 K)
Ψ_g = 0.020 W/(m K)
f_{Rsi} = 0.71

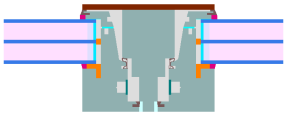
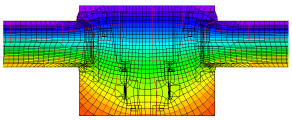
Mullion
2 casements

b_f = 142 mm
U_f = 0.71 W/(m^2 K)
Ψ_g = 0.021 W/(m K)
f_{Rsi} = 0.74

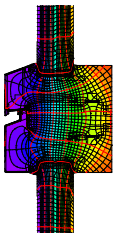
Mullion
2 casements

b_f = 142 mm
U_f = 0.92 W/(m² K)
Ψ_g = 0.020 W/(m K)
f_{Rsi} = 0.72

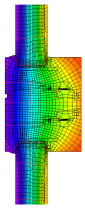
Transom
2 casements

b_f = 142 mm
U_f = 0.92 W/(m² K)
Ψ_g = 0.020 W/(m K)
f_{Rsi} = 0.71

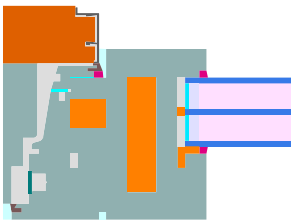
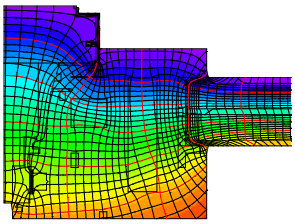
Transom
2 casements

b_f = 142 mm
U_f = 0.95 W/(m² K)
Ψ_g = 0.020 W/(m K)
f_{Rsi} = 0.70

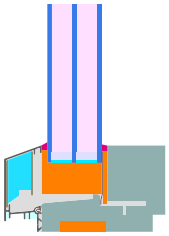
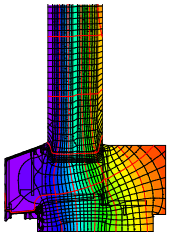
door side

b_f = 142 mm
U_f = 0.72 W/(m² K)
Ψ_g = 0.020 W/(m K)
f_{Rsi} = 0.73

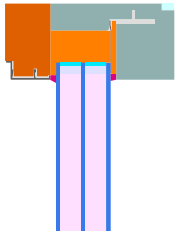
Bottom
fixed

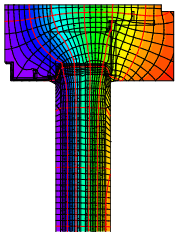
b_f = 76 mm
U_f = 0.72 W/(m² K)
Ψ_g = 0.020 W/(m K)
f_{Rsi} = 0.74

Top
fixed

b_f = 67 mm
U_f = 0.53 W/(m² K)
Ψ_g = 0.021 W/(m K)
f_{Rsi} = 0.76



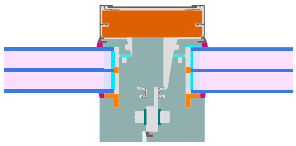


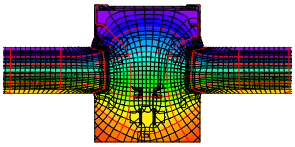
Lateral
fixed

b_f = 67 mm
U_f = 0.53 W/(m² K)
Ψ_g = 0.021 W/(m K)
f_{Rsi} = 0.76

Flying Mullion

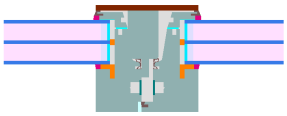
b_f = 110 mm
U_f = 0.73 W/(m² K)
Ψ_g = 0.020 W/(m K)
f_{Rsi} = 0.74

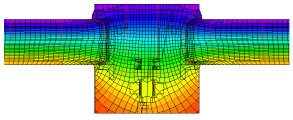




Flying Mullion

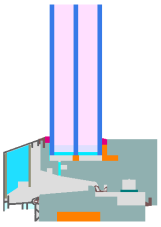
b_f = 110 mm
U_f = 0.90 W/(m² K)
Ψ_g = 0.020 W/(m K)
f_{Rsi} = 0.72

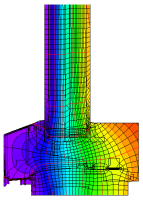




Bottom

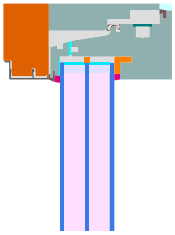
b_f = 76 mm
U_f = 0.93 W/(m² K)
Ψ_g = 0.020 W/(m K)
f_{Rsi} = 0.72

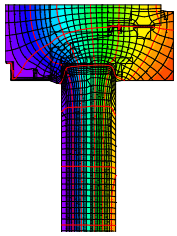




Top

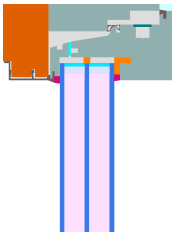
b_f = 67 mm
U_f = 0.71 W/(m^2 K)
Ψ_g = 0.021 W/(m K)
f_{Rsi} = 0.75

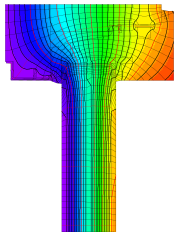




Lateral

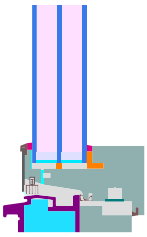
b_f = 67 mm
U_f = 0.71 W/(m^2 K)
Ψ_g = 0.021 W/(m K)
f_{Rsi} = 0.75

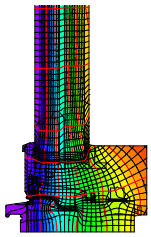




Threshold

b_f = 76 mm
U_f = 0.97 W/(m^2 K)
Ψ_g = 0.020 W/(m K)
f_{Rsi} = 0.72

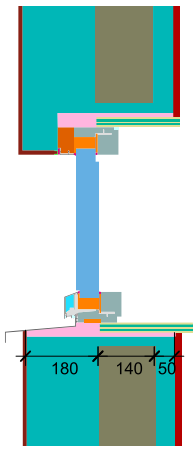




Validated installations

Formwork blocks (fixed)

U_{Wall} = 0.15 W/(m² K)

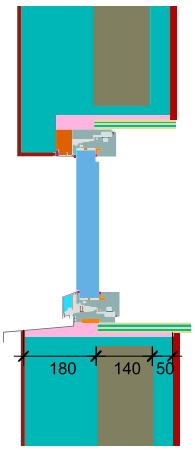


$\Psi_{install}$	W/(m K)
Top	0.005
Left	0.005
Right	0.005
Bottom	0.022

$U_{W,installed}$ = 0.79 W/(m² K)

Formwork blocks (operable)

U_{Wall} = 0.15 W/(m² K)

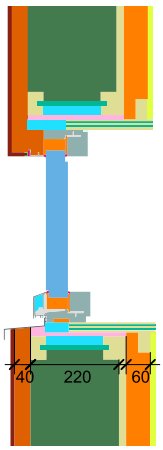


$\Psi_{install}$	W/(m K)
Top	0.006
Left	0.006
Right	0.006
Bottom	0.024

$U_{W,installed}$ = 0.79 W/(m² K)

Lightweight timber (fixed glazed)

U_{Wall} = 0.13 W/(m² K)

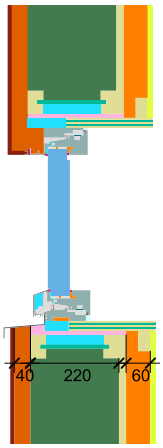


$\Psi_{install}$	W/(m K)
Top	0.015
Left	0.015
Right	0.015
Bottom	0.024

$U_{W,installed}$ = 0.81 W/(m² K)

Lightweight timber (operable)

U_{Wall} = 0.13 W/(m² K)

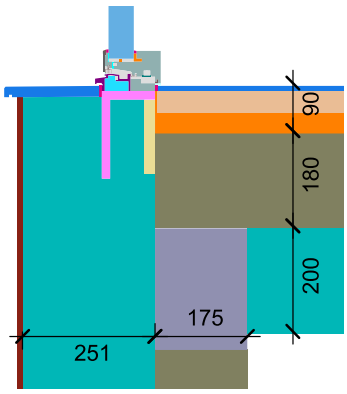


$\Psi_{install}$	W/(m K)
Top	0.015
Left	0.015
Right	0.015
Bottom	0.023

$U_{W,installed}$ = 0.81 W/(m² K)

Threshold balcony door

U_{Wall} = 0.13 W/(m² K)

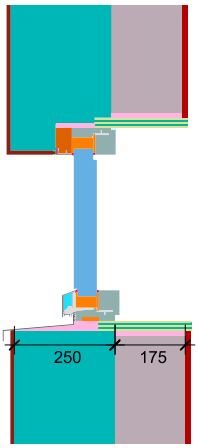


$\Psi_{install}$	W/(m K)
Top	
Left	
Right	
Bottom	0.014

$U_{W,installed}$ = W/(m² K)

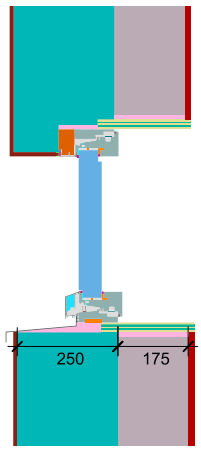
Exterior insulation and finishing system (EIFS) (fixed glazed)

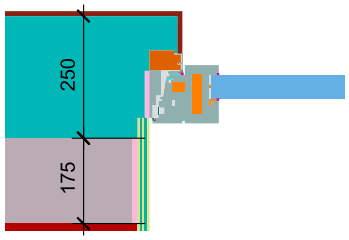
U_{Wall} = 0.13 W/(m² K)



$\Psi_{install}$	W/(m K)
Top	0.003
Left	0.003
Right	0.003
Bottom	0.021

$U_{W,installed}$ = 0.79 W/(m² K)

Exterior insulation and finishing system (EIFS) (operable)	
U_{Wall} = 0.13 W/(m² K)	
	
$\Psi_{install}$	W/(m K)
Top	0.005
Left	0.005
Right	0.005
Bottom	0.022
$U_{W,installed}$ = 0.79 W/(m² K)	

Exterior insulation and finishing system (EIFS) side (operable)	
U_{Wall} = 0.13 W/(m² K)	
	
$\Psi_{install}$	W/(m K)
Top	
Left	
Right	
Bottom	
$U_{W,installed}$ = W/(m² K)	