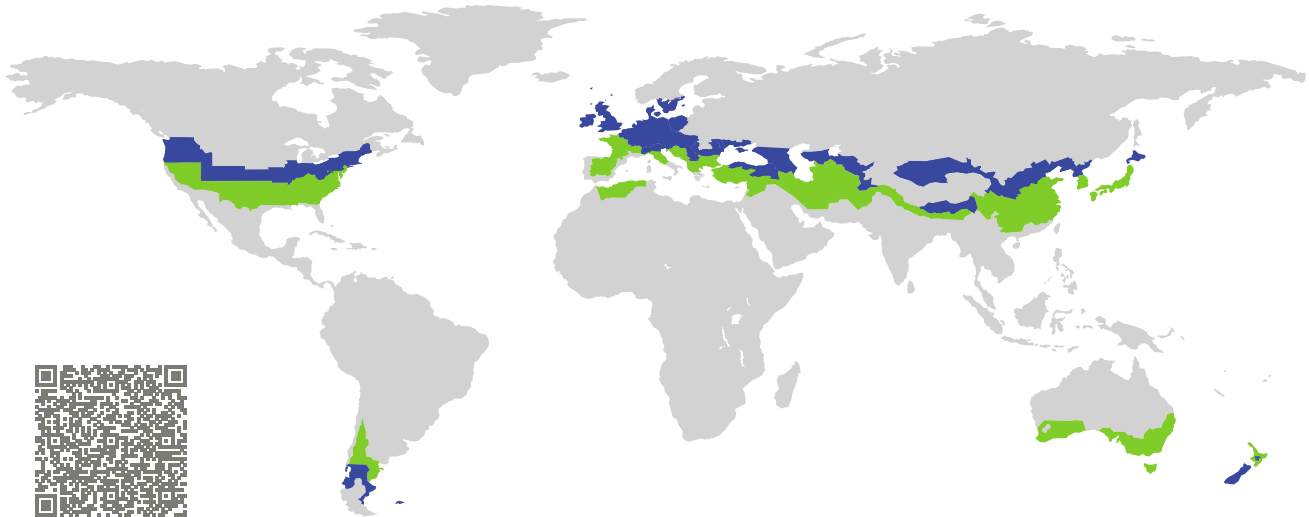


CERTIFICATE

Certified Passive House Component

Component-ID 1906wi03 valid until 31st December 2026

Passive House Institute
Dr. Wolfgang Feist
64283 Darmstadt
Germany

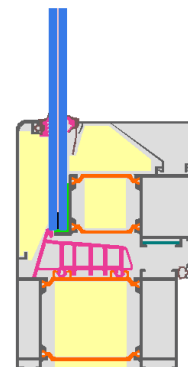


Category: **Window Frame**
Manufacturer: **Werkman (Shandong) vacuum glass technology Co.,Ltd, Jinan, China**
Product name: **GVG90 vacuum**

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

Comfort $U_W = 0.78 \leq 0.80 \text{ W}/(\text{m}^2 \text{ K})$
 $U_{W,\text{installed}} \leq 0.85 \text{ W}/(\text{m}^2 \text{ K})$
with $U_g = 0.70 \text{ W}/(\text{m}^2 \text{ K})$

Hygiene $f_{Rsi=0.25} \geq 0.70$



cool, temperate climate



CERTIFIED COMPONENT

Passive House Institute

Passive House
efficiency class

phE

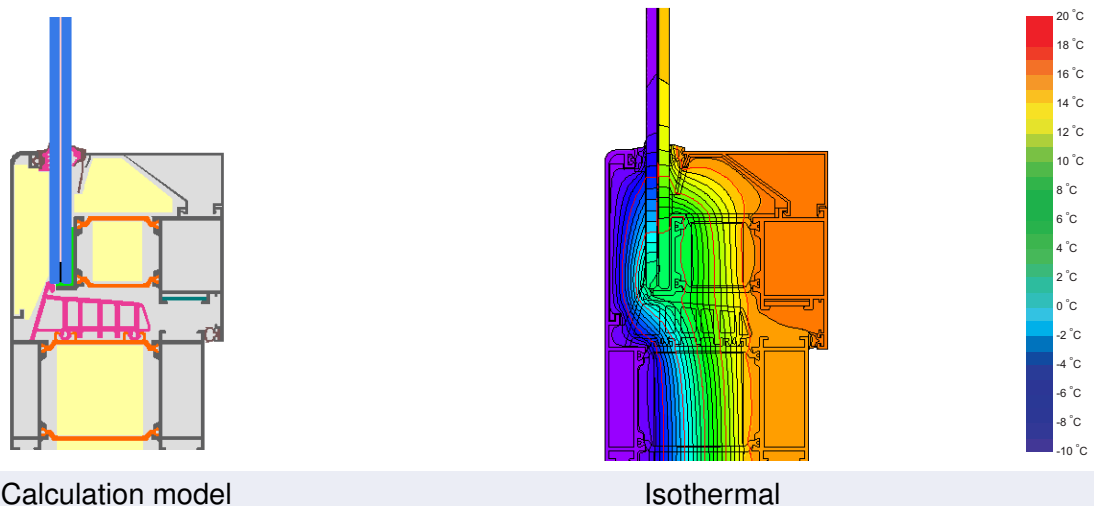
phD

phC

phB

phA

www.passivehouse.com



Calculation model Isothermal

Description

Thermally separated aluminium window frame for vacuum glazing. Insulated by phenolic foam, 0.022 W/(mK). Thermal separation: Low lambda PA, 0.21 W/(mK). Pane thickness: 10,4 mm (5/0,4/5). rebate depth: 61 mm

Explanation

The window U-values were calculated for the test window size of 1.23 m × 1.48 m with $U_g = 0.70 \text{ W}/(\text{m}^2 \text{ K})$. If a higher quality glazing is used, the window U-values will improve as follows:

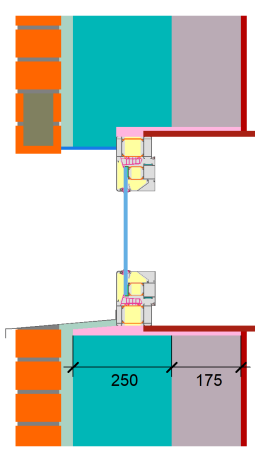
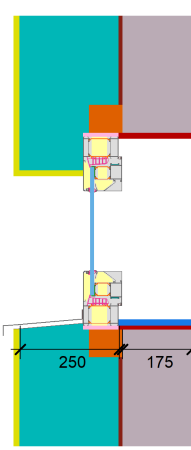
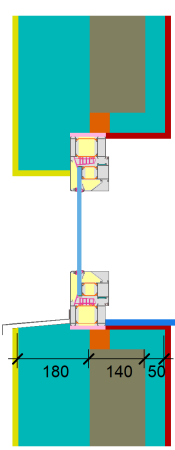
Glazing	$U_g =$	0.70	0.59	0.59	0.59	W/(m ² K)
		↓	↓	↓	↓	
Window	$U_W =$	0.78	0.71	0.71	0.71	W/(m ² K)





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.

Validated installations

Cavity wall (operable)	Exterior insulation and finishing system (EIFS) (operable)	Formwork blocks (operable)
$U_{\text{Wall}} = 0.13 \text{ W}/(\text{m}^2 \text{ K})$	$U_{\text{Wall}} = 0.13 \text{ W}/(\text{m}^2 \text{ K})$	$U_{\text{Wall}} = 0.15 \text{ W}/(\text{m}^2 \text{ K})$
		
Ψ_{install} W/(m K)	Ψ_{install} W/(m K)	Ψ_{install} W/(m K)
Top 0.015	Top 0.015	Top 0.013
Side 0.015	Side 0.015	Side 0.013
Bottom 0.015	Bottom 0.024	Bottom 0.022
$U_{W,\text{installed}} = 0.83 \text{ W}/(\text{m}^2 \text{ K})$	$U_{W,\text{installed}} = 0.83 \text{ W}/(\text{m}^2 \text{ K})$	$U_{W,\text{installed}} = 0.83 \text{ W}/(\text{m}^2 \text{ K})$

Frame values		Frame width b_f mm	U -value frame U_f W/(m ² K)	Ψ -glazing edge Ψ_g W/(m K)	Temp. Factor $f_{Rsi=0.25}$ [-]
Flying Mullion (FM1)		178	0.81	0.026	0.71
Bottom (OB1)		138	0.81	0.018	0.75
Top (OH1)		138	0.81	0.018	0.75
Lateral (OJ1)		138	0.81	0.018	0.75
		Spacer: -	Secondary seal: -		

