



VALE PASSIVE
WINDOW PARTNERSHIP

The UK's first Passivhaus certified window - using Welsh timbers and Welsh joinery skills



bere:architects

woodknowledge
WALES

LCRI LOW CARBON
RESEARCH INSTITUTE



Bill Robertson of
SENIOR ARCHITECTURAL SYSTEMS
Leading window, door and curtain wall systems

bre wales



The Vale Passive Window

This project emerged from the design competition for the Welsh Passivhaus Housing Competition at Ebbw Vale.

The first house was designed and put into construction to a tight deadline in order to be ready for the opening day of the National Eisteddfod. German windows were specified as there were no UK passivhaus certified windows available.

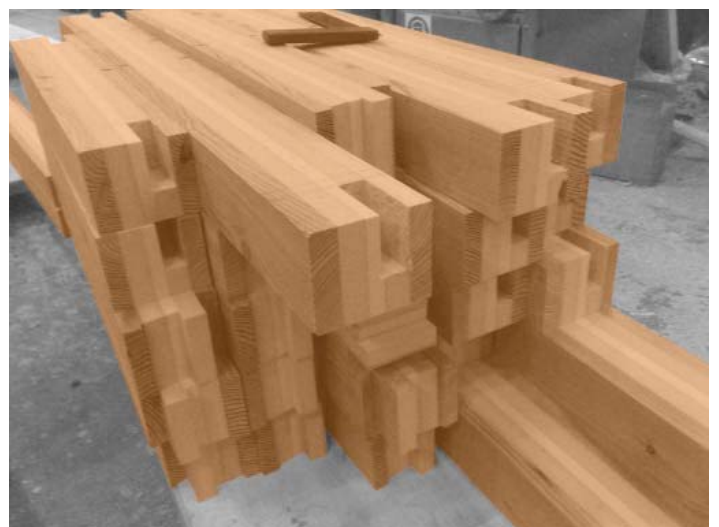
However the second house was given more time in procurement and this allowed the design team to explore the potential of locally manufacturing passivhaus windows, with the aim to establish a clear leadership in low carbon manufacturing so that the Welsh economy can benefit from the anticipated growth in demand for Passivhaus products in Wales and across the UK.

To carry out the project, Woodknowledge Wales brought together a consortium of Welsh joinery firms and bere:architects brought together a design and training team consisting of a designer of passivhaus windows, a German window manufacturer and bere:architects.

The Vale Passive Window system sets new standards in energy efficiency, longevity and design. It is the most radical development in window design in Wales for decades – it opens up massive new potential for Welsh timber to deliver not only new opportunities for high efficiency buildings but also new jobs.

The windows have been installed in the Lime House at the Future Homes site in Ebbw Vale, funded by the Welsh Assembly Government and officially opened by Jane Davidson, Minister for the Environment, Sustainability and Housing on August 4th, 2010.

Execution of the project took two and half months from concept to final product.



From top to bottom: The Vale Passive Window team, The Vale Passive Window factory environment, The Vale Passive Window members.

The Vale Passive Window

Passivhaus design requires triple glazed windows with an *overall* maximum U-value of 0.8 in order to avoid the risk of condensation and avoid thermal bridging in what is traditionally one of the weakest performing elements of a building's fabric.

This is the first window designed and manufactured in the UK to achieve certification from the Passivhaus Institute in Germany. It is designed by Bill Robertson of Senior Architectural Systems (SAS) to top German industry standards.

Research by the German timber industry has established that a timber passivhaus window can be achieved by means of a frame consisting of laminations of wood and two different densities of polyurethane foam insulation. One foam density is similar to that of mdf and the other is much softer. Timber facings, normally a softwood, are laminated to the insulating core. The frames are traditionally jointed for strength and longevity and into these frames, triple glazed panels with warm-edged spacers are fitted and sealed with silicone to ensure total air tightness. Continuous twin seals are fitted into finely toleranced frames to enable the necessary air-tightness to be achieved. The final important factor is the utilisation of advanced window ironmongery with multiple locking mechanisms to ensure the window seals fit tightly together and resist wind pressures without distortion.

The Vale Passive Window is designed with inward opening 'swivel and tilt' sections because this enables upper floor windows to be cleaned safely in the swivel mode, and ventilation to be provided safely and with reasonable security in the tilt mode.

The Vale Passive window section is designed with a Euroslot to give maximum choice of mechanisms produced by several different manufacturers that produce high quality multi-point locking mechanisms. The mechanisms are surface mounted into the Euroslot, enabling easy repair and maintenance of the window.



From top to bottom: The Vale Passive Window frames, The Vale Passive Window opening mechanism

The Vale Passive Window

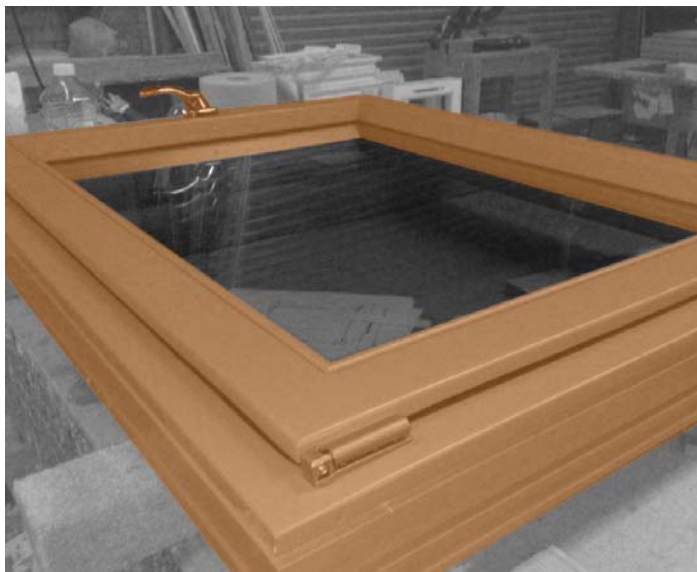
The design of the window itself meets the Passivhaus design requirements but to achieve certification, installation details must also be specified. The Vale Passive Window design specifies an approved method of installation and thereby met all the criterion necessary to gain certification in June 2010.

The Vale Passive Window comes with specific instructions to designers determining the approved detailing of the window opening and the specific interface with the building structure and envelope to avoid thermal bridging and air leakage.

In June and July 2010, as part of the quality control procedures, window fitting training was arranged for the Vale consortium by bere:architects and presented in collaboration with Bayer Schreinerei.

Research by the design team is ongoing, in collaboration with Woodknowledge Wales, to find ways of reducing manufacturing costs as well as constantly striving to ensure the highest product quality is maintained.

The Vale Passive Window is new and yet already shows immense promise. It shows British craftsmanship at its best and is a beacon of quality for the Welsh window making industry.



Clockwise, starting from bottom left: The Vale Passive Window, The Vale Passive Window building installation and air tightness tape, The Vale Passive Window installed.



Passivhaus
Institut
Dr. Wolfgang Feist
Rheinstraße 44/46
D-64283 Darmstadt

Certificate

valid until 31.12.2011

Component suitable for Passive Houses: Window Frame

**Manufacturer: Vale Passive Window Partnership Ltd.
Pembrokeshire SA41 3TH**

Name of product: The Vale Passive Window

The following criteria were checked to award the certificate:

The criteria are valid for the cool temperate climate.

Passive House comfort criterion:

Under standard conditions (use of glazing with $U_g = 0.7 \text{ W}/(\text{m}^2\text{K})$, width of window 1.23 m, height of window 1.48 m) the U-Value of the window fulfils the following condition:

$$U_w = 0.79 \leq 0.80 \text{ W}/(\text{m}^2\text{K})$$

Thermal data of the window frame:

Frame	jamb	parapet
U_f [W/(m ² K)]	0.77	0.80
Width [mm]	128	128

Spacer	Swisspacer V
Ψ_g [W/(mK)]	0.028

Conditions specific for Passive Houses:

The suitability for Passive Houses was checked only with the spacer denoted above; thermally worse spacers, especially those made of aluminium, lead to significantly higher thermal losses.

Installing the window suitable for Passive House:

Including all thermal bridge effects, the window fulfils the condition

$$U_{w,installed} \leq 0,85 \text{ W}/(\text{m}^2\text{K}),$$

if the window is installed into wall constructions suitable for Passive Houses (brick wall with thermal insulation, light weight wooden construction and form work for concrete of polysterene) according to the drawings of details given in the appendix.

The certificate has to be used as follows:

**Component suitable for Passive Houses
Dr. Wolfgang Feist**



Window frame:

$$U_f = 0.77 / 0.80 \text{ W}/(\text{m}^2\text{K})$$

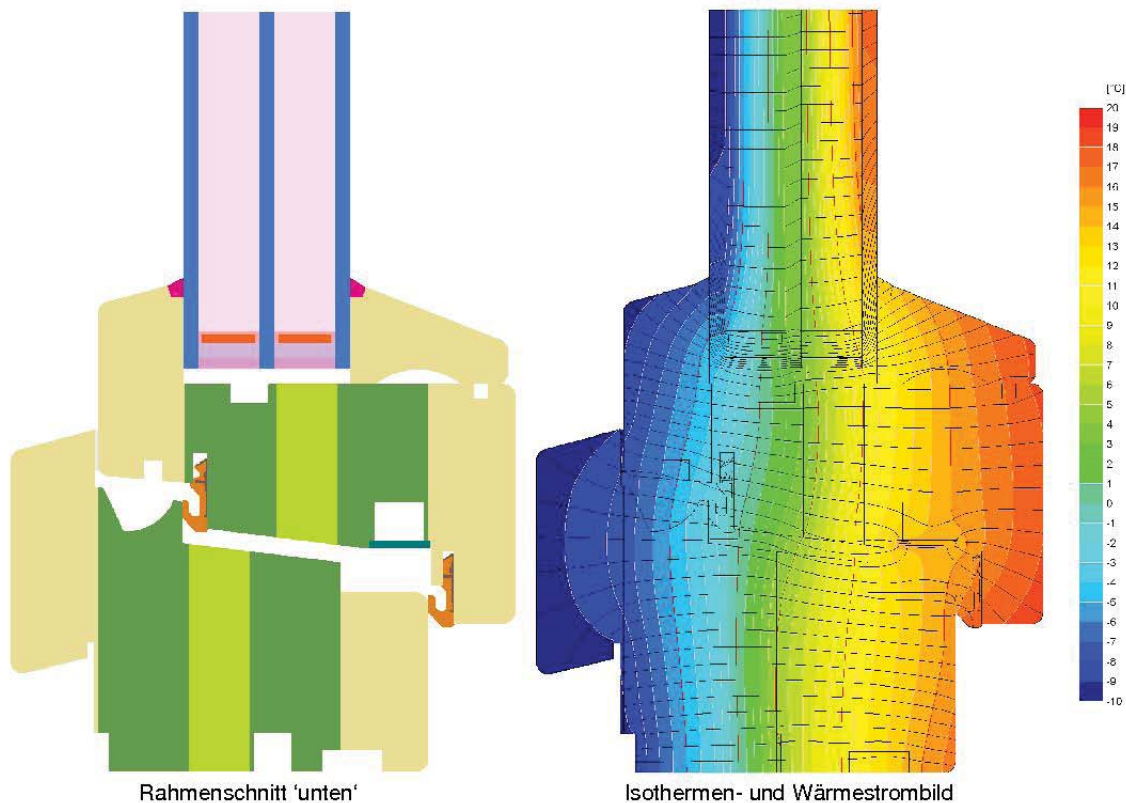
$$\Psi_g = 0.028 \text{ W}/(\text{mK})$$

$$\text{Width} = 128 / 128 \text{ mm}$$

Datenblatt zum Zertifikat



Passivhaus
geeignete
Komponente
Dr. Wolfgang Feist



Vale Passive Window Partnership 'The Vale Passive Window'

Fensterrahmen aus gedämmten Holzprofilen; Holzanteile des Rahmens aus Lärche mit einer Rohdichte $\rho \approx 600 \text{ kg/m}^3$ und $\lambda = 0,15 \text{ W/(mK)}$; Dämmung aus Polyurethan-Hartschaum mit $\lambda = 0,048 \text{ W/(mK)}$ und Polyurethan-Recyclingmaterial mit $\lambda = 0,09 \text{ W/(mK)}$

Verglasung ¹⁾ 44 mm (4/16/4/16/4)

		seitl./oben	unten
Rahmenkennwerte	U_f [W/(m ² K)]	0,77	0,80
	Ansichtsbreite [mm]	128	128
Abstandhalter: 'Swisspacer V'	Ψ_g [W/(mK)]	0,028	
Temperaturfaktor am Glasrand	$f_{Rsi=0,20 \text{ m}^2\text{K/W}}$ [-]	0,79	
Fenster-U-Wert ¹⁾ (1,23 x 1,48 m)	U_w [W/(m ² K)]	0,79 ¹⁾	

Hersteller: Vale Passive Window Partnership Ltd.
c/o Thomas Joinery Bancyffynnon, Brynberian, Crymych,
Pembrokeshire SA41 3TH

Berechnung: Passivhaus Institut 2010



¹⁾ Bei der Ermittlung des Fenster-U-Wertes ($b = 1,23 \text{ m}$; $h = 1,48 \text{ m}$) wurde ein Glas-U-Wert $U_g = 0,70 \text{ W/(m}^2\text{K)}$ angesetzt.