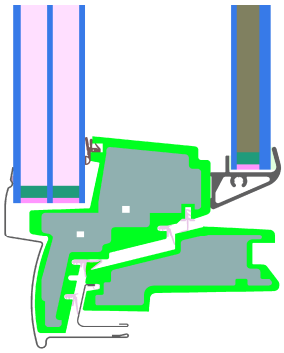
Certificate

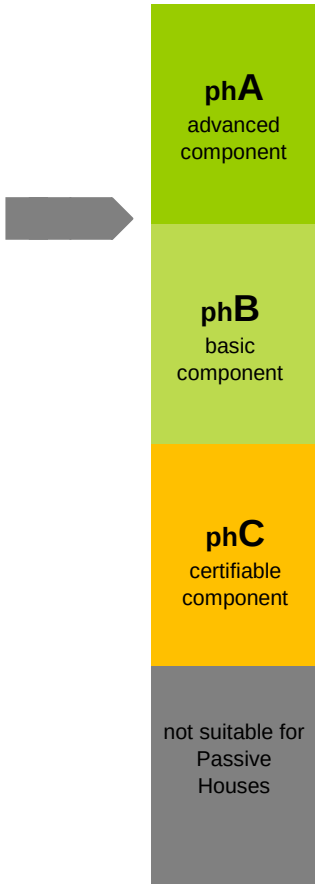
Certified Passive House Component
for cold climates; valid until 31.12.2014

Passive House Institute
Dr. Wolfgang Feist
64283 Darmstadt
GERMANY

Category: **Roof Window**
Manufacturer: **VELUX A/S**
2970 Hørsholm, DENMARK
Product name: **GGU -K-- 008230**



Passive House Efficiency Class



This certificate was awarded based on the following criteria:

Given a Ug value of 0.3840 W/(m²K) and a window size of 1.14 m by 1.40 m,

U_{RW} = **0.55 W/(m²K) ≤ 0.70 W/(m²K)**

Taking into account the installation based thermal bridges and provided that the installation is, with regard to the thermal bridges, equal or better than shown in the data sheet, the roof window meets the following criterion.

$U_{RW,installed}$ ≤ **0.70 W/(m²K)**

Thermal data

	U_f-value [W/(m²K)]	Width [mm]	Ψ_g [W/(mK)]	$f_{Rsi=0.25}$ [-]
Spacer			TGI*	
Bottom	0.71	123	0.019	0.77
Side oPV	0.74	106	0.025	0.78
Side uPV	0.73	106	0.025	0.78
Top	0.61	116	0.025	0.80

*Spacers of lower thermal quality, especially those made of aluminium, lead to significantly higher thermal losses and lower temperature factors.

For further information, please see the data sheet

www.passivehouse.com **0592rw02**

Data Sheet VELUX A/S, GGU -K-- 008230

Manufacturer VELUX A/S
Ådalsvej 99, 2970 Hørsholm, DENMARK
Tel.: +45 45 16 45 16
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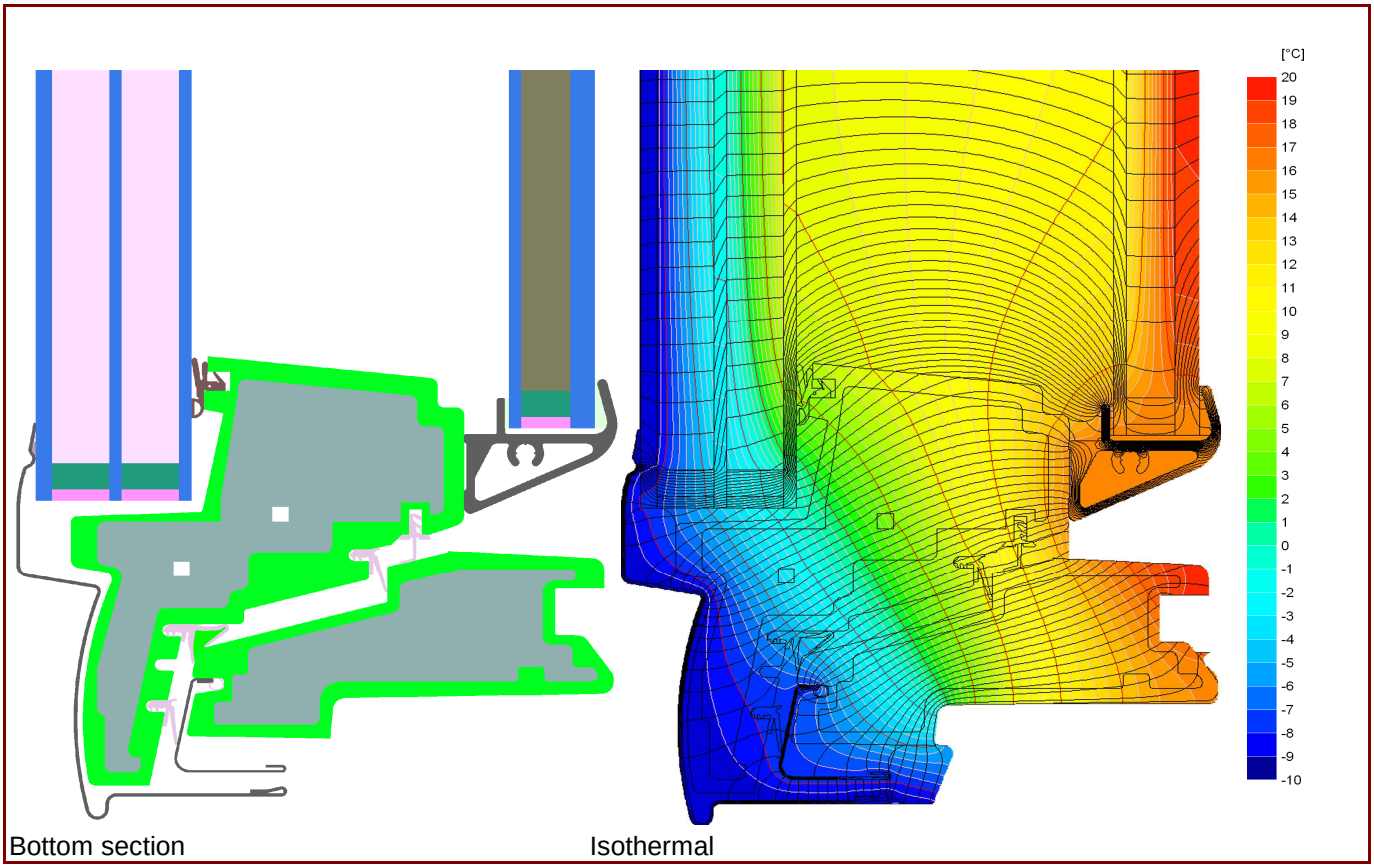


Bottom section Isothermal

Description

Timberframe (0.11W/(mK)) covered with PUR and exterieur facing shell of aluminium. A quintuple glazing is used. Pane thickness: 137 mm (4/14/3/14/3 - 77,6mm air gap - 3/12/6), Rebate depth: 15-38 mm.

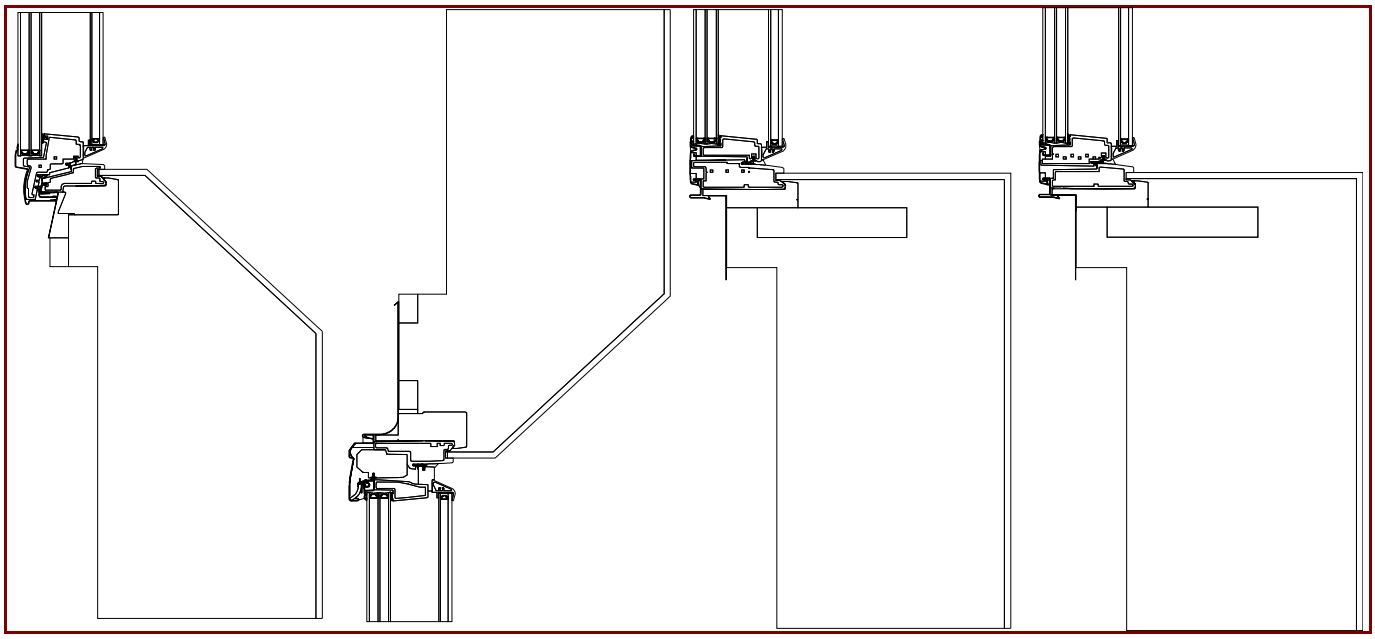
Thermal data for the window frame

	U_f-value [W/(m²K)]	**Width** [mm]	**Ψ_g** [W/(mK)]	**$f_{Rsi=0.25}$** [-]
Spacer			TGI*	
Bottom	0.71	123	0.019	0.77
Side oPV	0.74	106	0.025	0.78
Side uPV	0.73	106	0.025	0.78
Top	0.61	116	0.025	0.80

* Spacers of lower thermal quality lead to higher thermal losses and lower glass edge temperatures.

Data Sheet VELUX A/S, GGU -K-- 008230

Installation



Installation based thermal bridge $\Psi_{instal.}$ in Passive House suitable walls

Position	Bottom	Top	oPV	uPV
Timber roof construction [W/(mK)]	0.052	0.054	0.046	0.046
$U_{W,installed}$ [W/(m²K)]	0.70	0.70	0.70	0.70

Explanatory notes

The window U-values were calculated based on a 1.23 m by 1.48 m window U_g = 0.384 W/(m²K).
If another glazing is used, the window U-values change as follows:

U Glazing	U_g [W/(m²K)]	0.70	0.60	0.50
U Window	U_W [W/(m²K)]	0.76	0.69	0.63

Depending on the thermal losses through opaque elements, transparent components are categorised according to efficency classes. These thermal losses include the losses through the frame, the frame width, the thermal bridge at the glass edge as well as the length of the glass edge. Certificates for arctic regions are too valid vor cold, certificates for cold regions are too valid for cool, temperate zones.
Please ask the manufacturer for a detailed report containing all calculations and results.
For further information, please visit www.passivehouse.com or www.passipedia.org.