CERTIFICATE

Certified Passive House Component

ID: 1236cs04 valid until 31. December 2022

Passive House Institute
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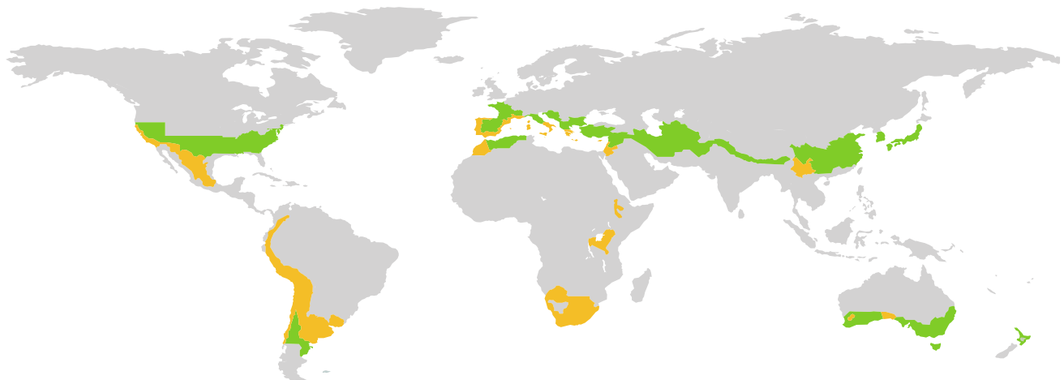
Aditional thermal bridges

Name	Thermal bridge	f_{Rsi}	Description
Steel bracket	X= 0,025 W/K	0,88	Facade mounting bracket



Category **Construction system | Steel construction**
Manufacturer **Knauf Insulation S. L.**
Sant Boi de Llobregat
SPAIN
Product name **Passivhaus External Wall System**

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

Hygiene criterion

The minimum temperature factor of the interior surfaces is $f_{Rsi=0,25m^2K/W} \geq$ **0,65**

Comfort criterion

The U-value of the installed windows is $U_{W,i} \leq$ **1,05** W/(m²K)

Efficiency criteria

Heat transfer coefficient of building envelope	$U*f_{PHI} \leq$	**0,25** W/(m²K)
Temperature factor of opaque junctions	$f_{Rsi=0,25m^2K/W} \geq$	**0,82**
Thermal bridge-free design for key connection details	$\Psi \leq$	**0,01** W/(m²K)

An airtightness concept for all components and connection details was provided

warm, temperate climate

CERTIFIED COMPONENT
Passive House Institute

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Opaque building envelope

The Passivhaus External Wall System is a lightweight steel system, designed by Knauf GmbH Sucursal en España, Knauf Insulation S.L., and SIGA, comprising Knauf 100/50 mm steel C-sections and Knauf 48/35 mm steel C-sections filled with Knauf Insulation Ultracoustic 035 (0,035 W/mK) and closed with Knauf Gypsum board between cavities, double Knauf Gypsum board internally and Knauf Aquapanel Outdoor Board externally. The system is further insulated externally with 160mm of Knauf Insulation Naturoll 032 (0,032 W/mK), fixed with steel angles to Knauf Aquapanel Outdoor Board; these also function as fasteners for a rainscreen facade. The system is to be used with a reinforced concrete floor slab, insulated to the underneath with rigid XPS insulation (0,035 W/mK) and internally with Ultracoustic Suelo TP by Knauf Insulation (0,037 W/mK); the roof deck is a flat reinforced concrete slab, insulated to the outside with Knauf Naturoll 032. The system has undergone analysis by the Passive House Institute against the thermal performance criteria for construction systems, and has been deemed suitable for the construction of passive houses in both warm-temperate and warm climates. The ceiling connection does not meet the efficiency criteria of <0,01 W/mK, however this is typical for such details and, because the hygiene criterion is met, the system has been deemed certifiable.

Windows

Analysis was undertaken using a generic, passive house-standard timber-framed, triple-glazed window unit, featuring phA thermal values for the spacer and a polysulfide secondary seal. The calculations undertaken demonstrate that the window installation locations are suited to the warm-temperate climate zone, with no risk of surface condensation and subsequent mould growth.

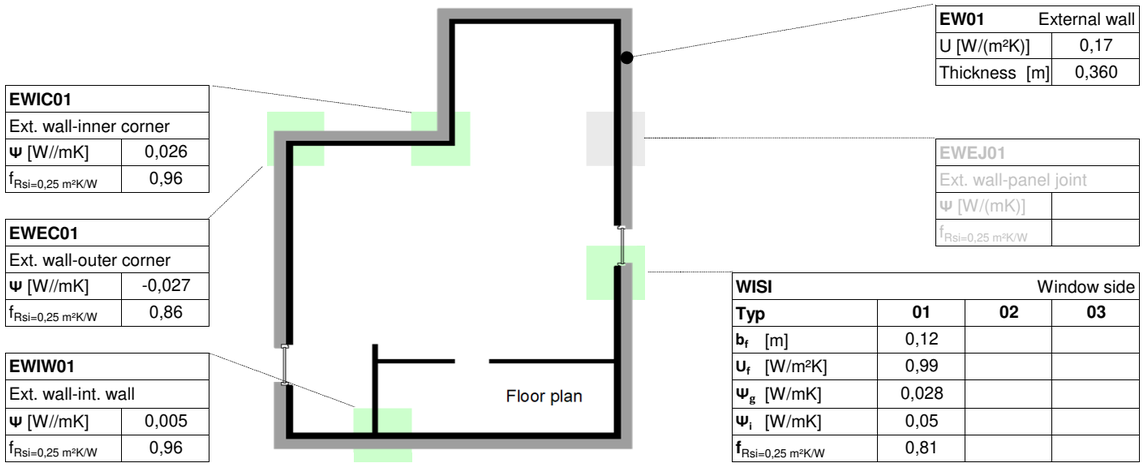
Airtightness concept

The airtightness of the construction system is achieved through the use of a SIGA Majrex airtight membrane fitted to the insterior of the steel frame, to the inside of a plasterboard layer. For the junctions between membrane sections and connections to openings and the floor slab, SIGA Sicrall adhesive tape is used.

Explanatory notes

The Passive House Institute has defined international component criteria for seven climate zones based on hygiene, comfort and affordability criteria. In principle, components which have been certified for climate zones with higher requirements may also be used in climates with less stringent requirements. Their use might make economic sense in certain circumstances.

Thermal bridge not calculated
Criteria achieved
Efficieny criteria not achieved
Hygiene or comfort criterion not achieved



EWIC01	
Ext. wall-inner corner	
Ψ [W//mK]	0,026
$f_{Rsi=0,25\ m^2K/W}$	0,96

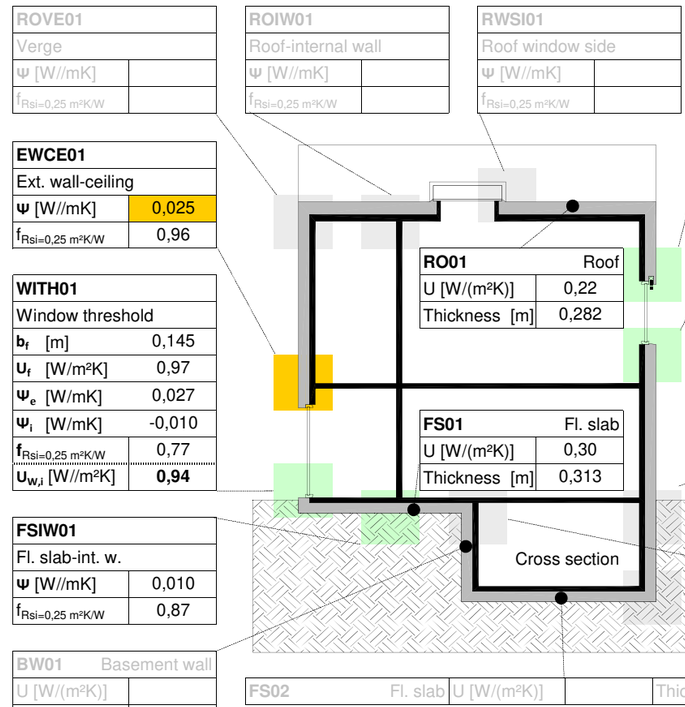
EWEC01	
Ext. wall-outer corner	
Ψ [W//mK]	-0,027
$f_{Rsi=0,25\ m^2K/W}$	0,86

EWIW01	
Ext. wall-int. wall	
Ψ [W//mK]	0,005
$f_{Rsi=0,25\ m^2K/W}$	0,96

EW01	External wall
U [W/(m²K)]	0,17
Thickness [m]	0,360

EWEJ01	
Ext. wall-panel joint	
Ψ [W/(mK)]	
$f_{Rsi=0,25\ m^2K/W}$	

WISI			Window side
Typ	**01**	**02**	**03**
b_f [m]	0,12		
U_f [W/m²K]	0,99		
Ψ_g [W/mK]	0,028		
Ψ_i [W/mK]	0,05		
$f_{Rsi=0,25\ m^2K/W}$	0,81		



ROVE01	
Verge	
Ψ [W//mK]	
$f_{Rsi=0,25\ m^2K/W}$	

ROIW01	
Roof-internal wall	
Ψ [W//mK]	
$f_{Rsi=0,25\ m^2K/W}$	

RWSI01	
Roof window side	
Ψ [W//mK]	
$f_{Rsi=0,25\ m^2K/W}$	

WITO			Window top
Typ	**01**	**02**	**03**
b_f [m]	0,12		
U_f [W/m²K]	0,99		
Ψ_g [W/mK]	0,028		
Ψ_i [W/mK]	0,051		
$f_{Rsi=0,25\ m^2K/W}$	0,81		

WIBO			Window bottom
b_f [m]	0,12		
U_f [W/m²K]	0,99		
Ψ_g [W/mK]	0,028		
Ψ_i [W/mK]	0,075		
$f_{Rsi=0,25\ m^2K/W}$	0,79		
$U_{w,i}$ [W//m²K]	**1,03**		

EWCE01	
Ext. wall-ceiling	
Ψ [W//mK]	0,025
$f_{Rsi=0,25\ m^2K/W}$	0,96

RO01	Roof
U [W/(m²K)]	0,22
Thickness [m]	0,282

WITH01	
Window threshold	
b_f [m]	0,145
U_f [W/m²K]	0,97
Ψ_e [W/mK]	0,027
Ψ_i [W/mK]	-0,010
$f_{Rsi=0,25\ m^2K/W}$	0,77
$U_{w,i}$ [W//m²K]	**0,94**

FS01	Fl. slab
U [W/(m²K)]	0,30
Thickness [m]	0,313

FSIW01	
Fl. slab-int. w.	
Ψ [W//mK]	0,010
$f_{Rsi=0,25\ m^2K/W}$	0,87

BW01	Basement wall
U [W/(m²K)]	
Thickness [m]	

FS02	Fl. slab	U [W/(m²K)]		Thickness [m]	

BWBC01	Bsmnt w.-bsmnt c.
Ψ [W//mK]	
$f_{Rsi=0,25\ m^2K/W}$	

BWFS01	Bsmnt w.-fl. slab
Ψ [W//mK]	
$f_{Rsi=0,25\ m^2K/W}$	

FSBW01	Fl. slab-bsmnt w.
Ψ [W//mK]	
$f_{Rsi=0,25\ m^2K/W}$	

ROEA01	Eaves
Ψ [W//mK]	
$f_{Rsi=0,25\ m^2K/W}$	

RWBO01	Roof window bttm
Ψ [W//mK]	
$f_{Rsi=0,25\ m^2K/W}$	

RWTO01	Roof window top
Ψ [W//mK]	
$f_{Rsi=0,25\ m^2K/W}$	

RORI01	Ridge
Ψ [W//mK]	
$f_{Rsi=0,25\ m^2K/W}$	

FRAW01	
Flat roof-asc. wall	
Ψ [W//mK]	
$f_{Rsi=0,25\ m^2K/W}$	

TC01	Cold roof
U [W/(m²K)]	
Thickness [m]	

ROJU01	Junction
Ψ [W//mK]	
$f_{Rsi=0,25\ m^2K/W}$	

TCEA01	Cold roof-eaves
Ψ [W//mK]	
$f_{Rsi=0,25\ m^2K/W}$	

FR01	Flat roof
U [W/(m²K)]	
Thickness [m]	

EO01	Overhang
U [W/(m²K)]	
Thickness [m]	

EWEO01	Ext. wall-overhang
Ψ [W//mK]	
$f_{Rsi=0,25\ m^2K/W}$	

EWEO02	Ext. wall-overhang
Ψ [W//mK]	
$f_{Rsi=0,25\ m^2K/W}$	

BC01	Basement ceiling
U [W/(m²K)]	
Thickness [m]	

BCEW01	Bsmnt clg-ext. wall
Ψ [W//mK]	
$f_{Rsi=0,25\ m^2K/W}$	

BCIW01	Bsmnt clg-int. wall
Ψ [W//mK]	
$f_{Rsi=0,25\ m^2K/W}$	

FRRP01	Roof parapet
Ψ [W//mK]	0,003
$f_{Rsi=0,25\ m^2K/W}$	0,87

FSEW01	Fl. slab-ext. wall
Ψ [W//mK]	-0,015
$f_{Rsi=0,25\ m^2K/W}$	0,82

FSBW02	Fl. slab-bsmnt w.
Ψ [W//mK]	
$f_{Rsi=0,25\ m^2K/W}$	