

CERTIFICATE

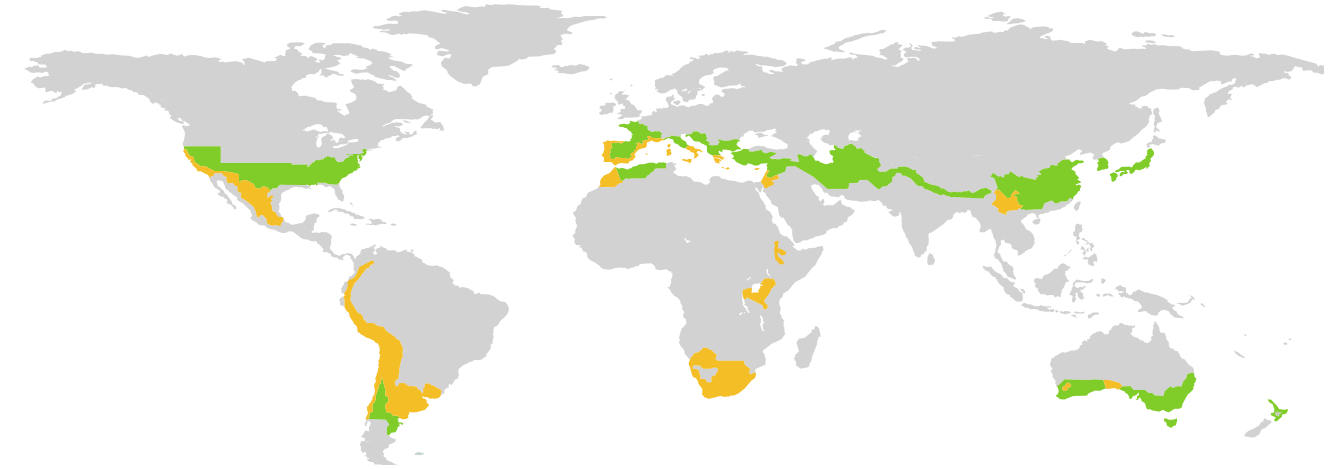
Certified Passive House Component

ID: 1236cs04 valid until 31. December 2018

Passive House Institute
Dr. Wolfgang Feist
64342 Darmstadt
GERMANY

Additional 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 $U_{W,i} \leq 1,05 \text{ W}/(\text{m}^2\text{K})$

Efficiency criteria

Heat transfer coefficient of building envelope $U \cdot f_{PHI} \leq 0,25 \text{ W}/(\text{m}^2\text{K})$

Temperature factor of opaque junctions $f_{Rsi=0,25m^2K/W} \geq 0,82$

Thermal bridge-free design for key connection details $\Psi \leq 0,01 \text{ W}/(\text{m}^2\text{K})$

An airtightness concept for all components and connection details was provided

warm, temperate climate



**CERTIFIED
COMPONENT**

Passive House Institute

Opaque building envelope

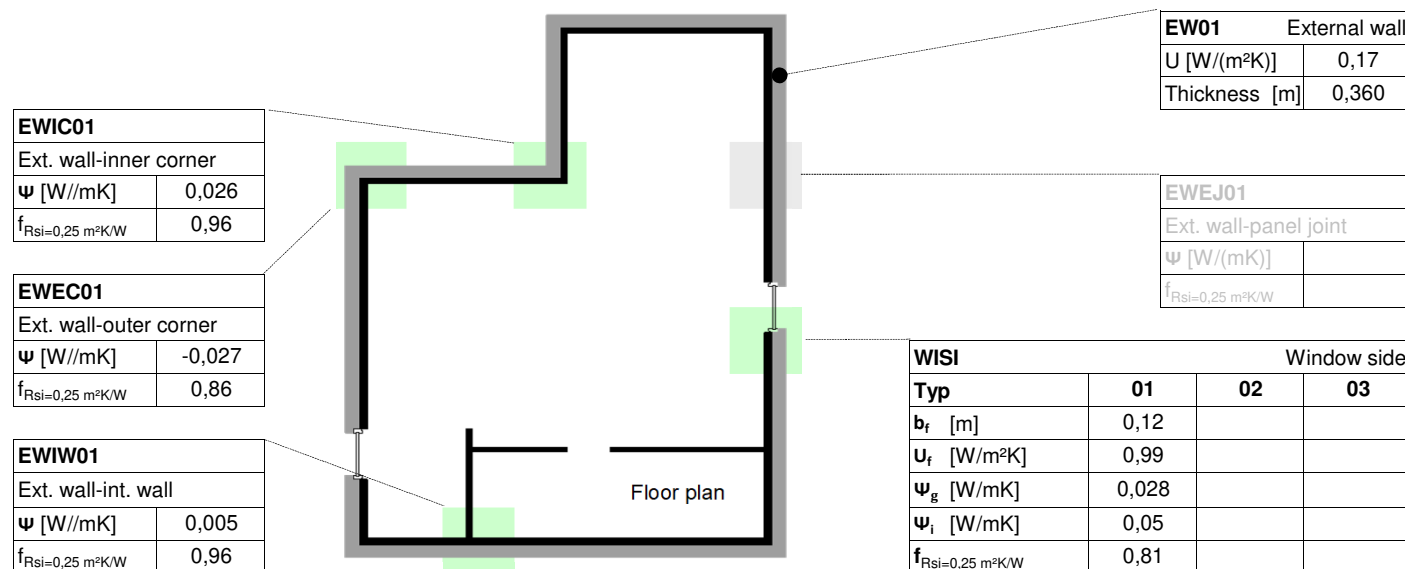
The Passivhaus External Wall System is a lightweight steel system, designed by Knauf GmbH Sucursal en España, Knauf Insulation S.L., and SIGA, comprising Knauf 100/50 mm steel C-sections and Knauf 48/35 mm steel C-sections filled with Knauf Insulation Ultracoustic 035 (0,035 W/mK) and closed with Knauf 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

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

Efficiency criteria not achieved
Hygiene or comfort criterion not achieved



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 interior 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.

