

# Energy Wall IS 4000

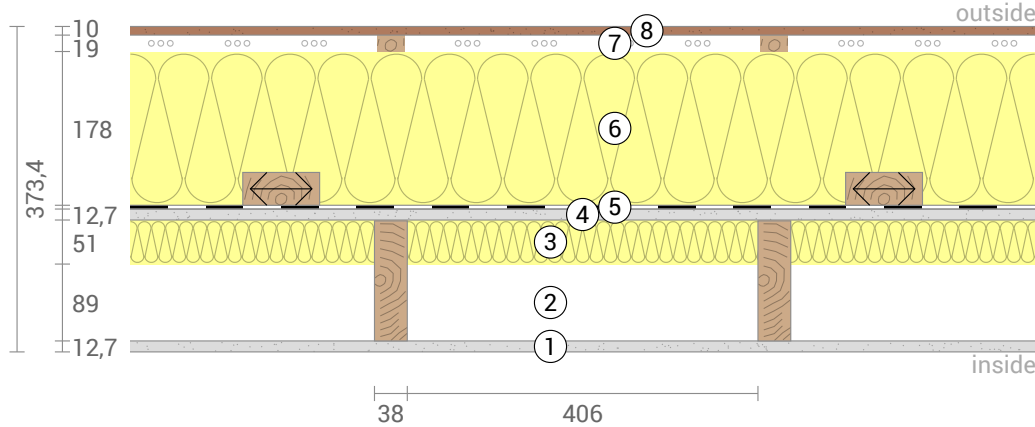
Exterior wall

Thermal protection

**U = 0,15 W/(m²K)/ R38**

Heat protection

Temperature amplitude damping: 10  
phase shift: 8,5 h  
Thermal capacity inside: 27 kJ/m²K

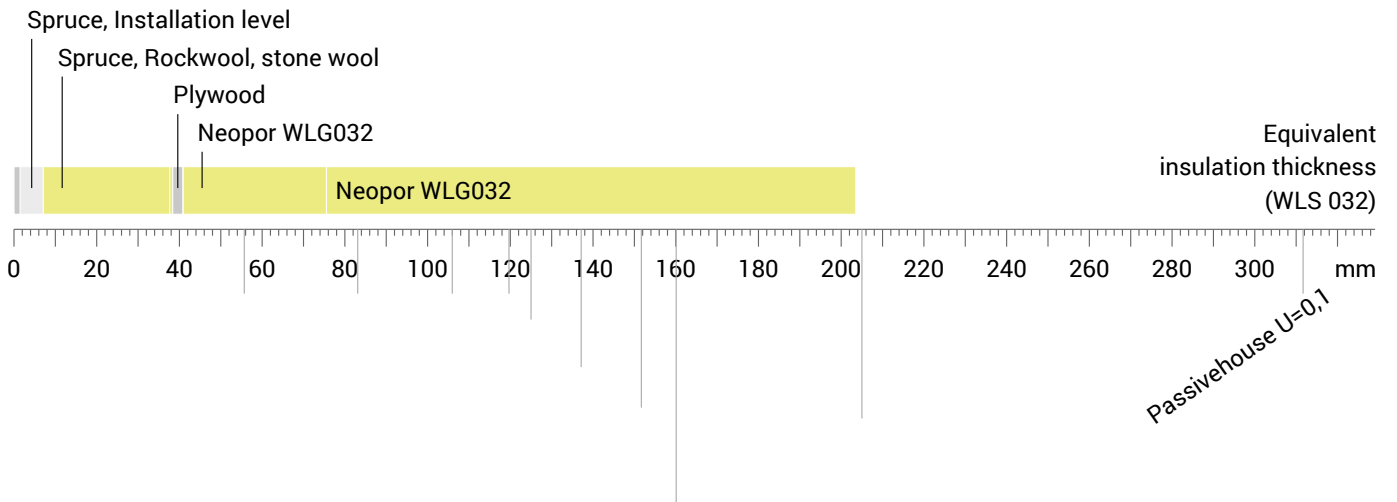


- ① Gypsum board (12,7 mm)
- ② Installation level (89 mm)
- ③ Rockwool, stone wool (51 mm)
- ④ Plywood (12,7 mm)
- ⑤ Foil, PE
- ⑥ Neopor WLG032 (178 mm)
- ⑦ Rear ventilated level (19 mm)
- ⑧ Hardie Plank Siding (10 mm)

<-> Layers marked by arrows are perpendicular to the main axis.

## Impact of each layer and comparison to reference values

For the following figure, the thermal resistances of the individual layers were converted in millimeters insulation. The scale refers to an insulation of thermal conductivity 0,032 W/mK.



|                       |                  |                |                        |
|-----------------------|------------------|----------------|------------------------|
| Inside air :          | 20,0°C / 45%     | Thickness:     | 37,3 cm                |
| Outside air:          | -30,0°C / 70%    | Weight:        | 47 kg/m <sup>2</sup>   |
| Surface temperature:. | 18,3°C / -29,7°C | Heat capacity: | 32 kJ/m <sup>2</sup> K |

## U-Value calculation according to DIN EN ISO 6946

| # | Material                                 | Dicke [cm] | $\lambda$ [W/mK] | R [m <sup>2</sup> K/W] |
|---|--|------------|------------------|------------------------|
|   | Thermal contact resistance inside (Rsi)  |            |                  | 0,130                  |
| 1 | Gypsum board                             | 1,27       | 0,250            | 0,051                  |
| 2 | Installation level                       | 8,90       | 0,494            | 0,180                  |
|   | Spruce (Width: 3,8 cm)                   | 13,90      | 0,130            | 1,069                  |
| 3 | Rockwool, stone wool                     | 5,10       | 0,040            | 1,275                  |
| 4 | Plywood                                  | 1,27       | 0,150            | 0,085                  |
| 5 | Foil, PE                                 | 0,10       | 0,400            | 0,003                  |
| 6 | Neopor WLG032                            | 17,80      | 0,032            | 5,563                  |
|   | Spruce (Width: 8,9 cm)                   | 3,80       | 0,130            | 0,292                  |
|   | Thermal contact resistance outside (Rse) |            |                  | 0,130                  |

Thermal contact resistances have been taken from DIN 6946 Table 7.

Rsi: heat flow direction horizontally

Rse: heat flow direction horizontally, outside: Ventilation level

Upper limit of thermal resistance  $R_{\text{tot;upper}} = 7,255 \text{ m}^2\text{K}/\text{W}$ .

Lower limit of thermal resistance  $R_{\text{tot;lower}} = 6,892 \text{ m}^2\text{K}/\text{W}$ .

Check applicability:  $R_{\text{tot;upper}} / R_{\text{tot;lower}} = 1,053$  (maximum allowed: 1,5)

The procedure may be used.

Thermal resistance  $R_{\text{tot}} = (R_{\text{tot;upper}} + R_{\text{tot;lower}})/2 = 7,074 \text{ m}^2\text{K}/\text{W}$

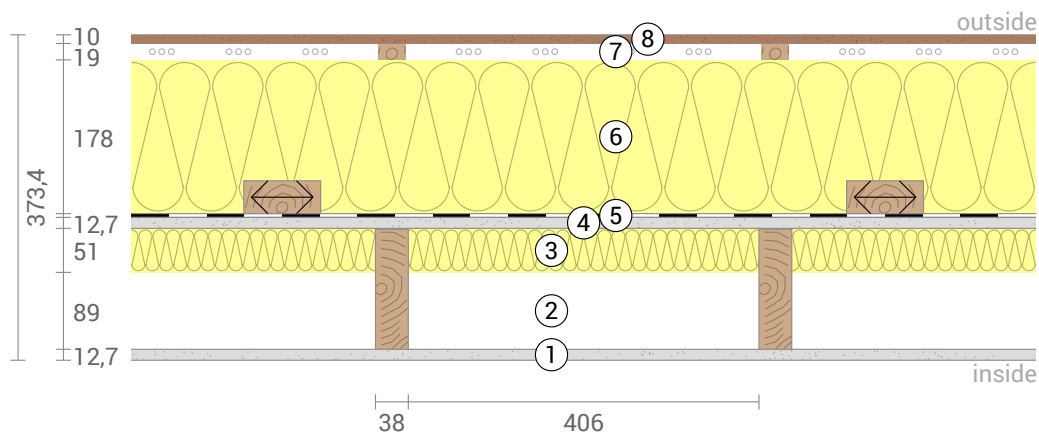
Estimated maximum relative uncertainty according to section 6.7.2.5: 2,6%

Heat transfer coefficient  $U = 1/R_{\text{tot}} = 0,141 \text{ W}/(\text{m}^2\text{K})$

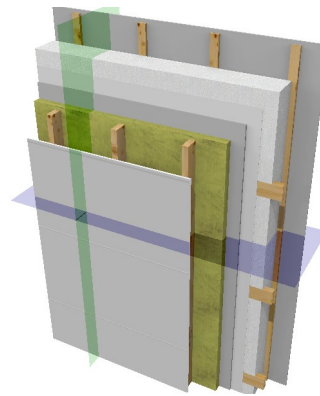
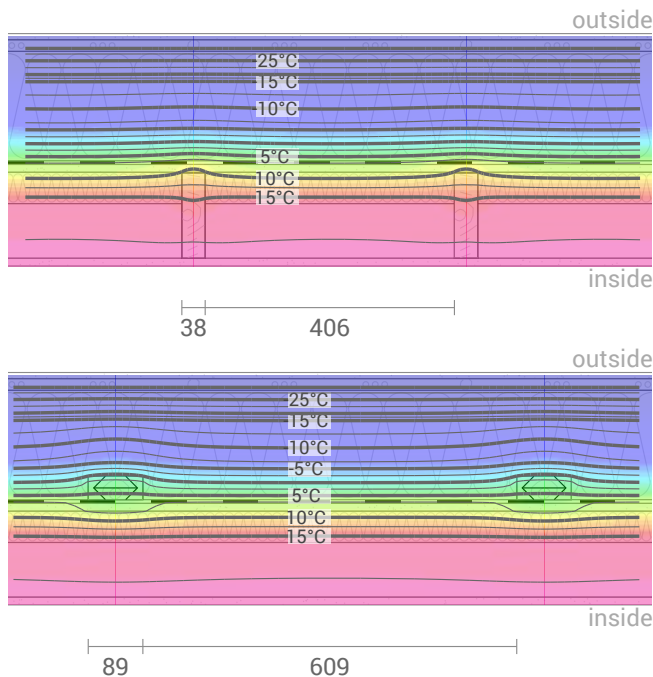
### Corrections for air gaps / mechanical fastening elements

Anchorage of layer 6.1 (Neopor WLG032)  $\Delta U = 0,010 \text{ W}/(\text{m}^2\text{K})$

Corrected heat transfer coefficient  $U_c = 0,15 \text{ W}/(\text{m}^2\text{K})$



## Temperature profile



Top left: Temperature profile in the blue section (see right illustration). Bottom left: Temperature profile in the green section.

## Layers (from inside to outside)

| # | Material                                   | λ<br>[W/mK] | R<br>[m <sup>2</sup> K/W] | Temperatur [°C] |       | Weight<br>[kg/m <sup>2</sup> ] |
|---|--|-------------|---------------------------|-----------------|-------|--------------------------------|
|   |  |             |                           | min             | max   |                                |
|   | Thermal contact resistance*                |             | 0,250                     | 18,3            | 20,0  |                                |
| 1 | 1,27 cm Gypsum board                       | 0,250       | 0,051                     | 17,9            | 18,5  | 8,6                            |
| 2 | 8,9 cm Installation level                  | 0,494       | 0,180                     | 16,1            | 18,0  | 0,1                            |
|   | 13,9 cm Spruce (Width: 3,8 cm)             | 0,130       | 1,069                     | 10,6            | 18,2  | 5,4                            |
| 3 | 5,1 cm Rockwool, stone wool                | 0,040       | 1,275                     | 8,4             | 16,7  | 2,8                            |
| 4 | 1,27 cm Plywood                            | 0,150       | 0,085                     | 7,8             | 10,4  | 7,6                            |
| 5 | 0,1 cm Foil, PE                            | 0,400       | 0,003                     | 7,8             | 9,5   | 0,9                            |
| 6 | 17,8 cm Neopor WLG032                      | 0,032       | 5,563                     | -29,7           | 9,5   | 2,6                            |
|   | 3,8 cm Spruce (Width: 8,9 cm)              | 0,130       | 0,292                     |                 |       | 2,2                            |
|   | Thermal contact resistance*                |             | 0,040                     | -30,0           | -29,7 |                                |
| 7 | 1,9 cm Rear ventilated level (outside air) |             |                           | -30,0           | -30,0 | 0,0                            |
| 8 | 1 cm Hardie Plank Siding                   |             |                           | -30,0           | -30,0 | 16,5                           |
|   | 37,34 cm Whole component                   |             | 6,607                     |                 |       | 46,7                           |

\*Thermal contact resistances according to DIN 4108-3 for moisture protection and temperature profile. The values for the U-value calculation can be found on the page 'U-value calculation'.

## Thermal bridges

The U-value includes the following surcharges for air gaps and / or mechanical fasteners in accordance with DIN 6946:

Anchorage of layer 6.1 (Neopor WLG032) 0,010 W/(m<sup>2</sup>K)

Surface temperature inside (min / average / max): 18,3°C 18,3°C 18,5°C  
Surface temperature outside (min / average / max): -29,7°C -29,7°C -29,7°C