Stender 2

Exterior wall
created on 17.4.2023

Thermal protection

U = 0,21 W/(m²K)

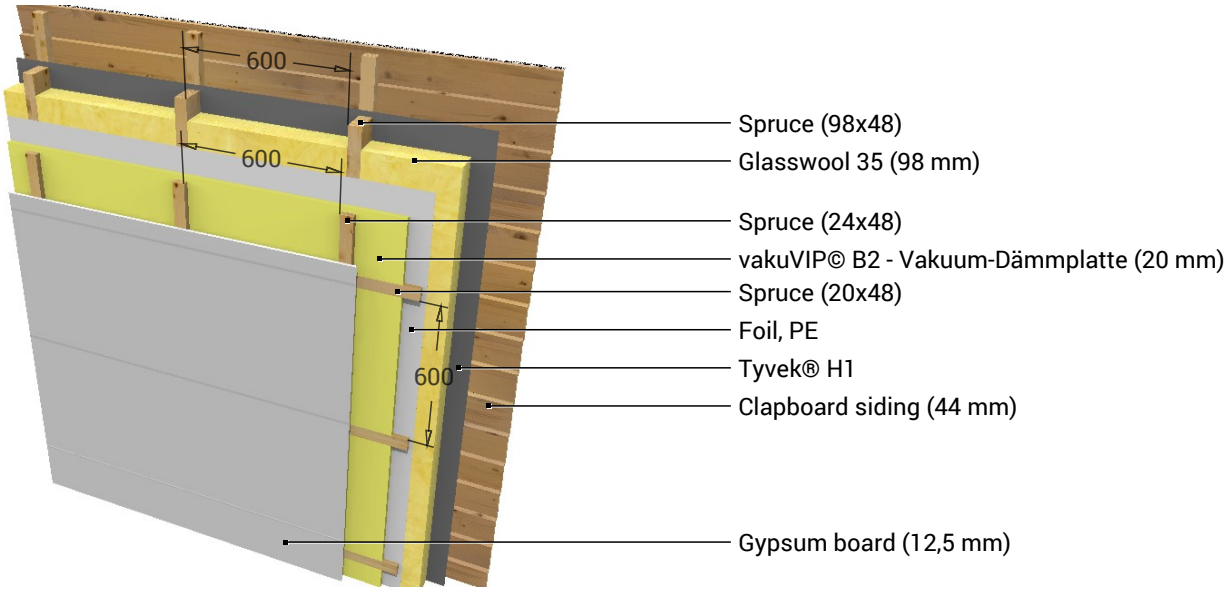
GEG 2020 Bestand*: U<0,24 W/(m²K)

excellent — insufficient

Heat protection

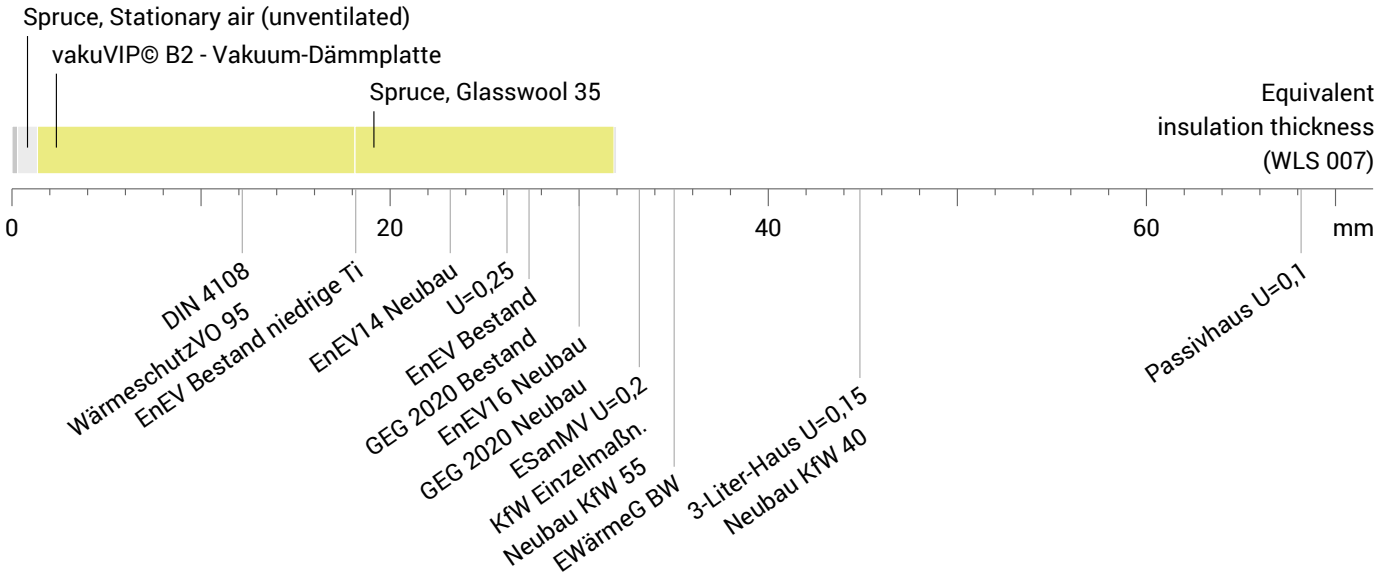
Temperature amplitude damping: 4,7
phase shift: 6,6 h
Thermal capacity inside: 13,2 kJ/m²K

excellent — insufficient



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 0,007 W/mK.



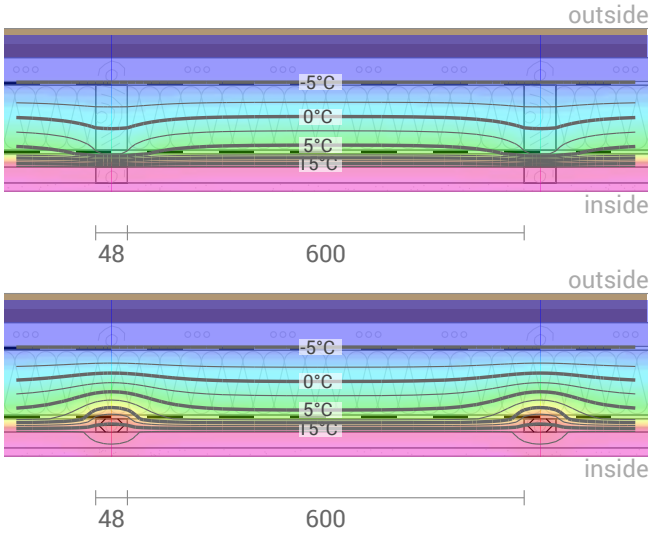
Inside air :	20,0°C / 50%	Thickness:	23,5 cm
Outside air:	-5,0°C / 80%	Weight:	27 kg/m²
Surface temperature.:	18,8°C / -4,8°C	Heat capacity:	20 kJ/m²K

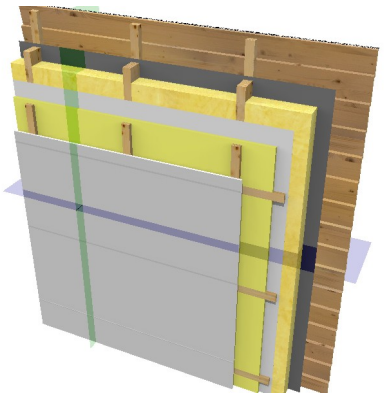
☑ GEG 2020 Bestand ☐ BEG Einzelmaßn. ☑ GEG 2020 Neubau ☑ DIN 4108

*Comparison of the U-value with den Höchstwerten aus GEG 2020 Anlage 7 (GEG 2020 Bestand); den techn. Mindestanforderungen für BEG Einzelmaßnahmen; 80% des U-Werts der Referenzausführung aus GEG 2020 Anlage 1 (GEG20 Neubau); den R-Werten aus DIN 4108-2 Tabelle 3

Stender 2, U=0,21 W/(m²K)

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 [W/mK]	R [m²K/W]	Temperatur [°C] min	max	Weight [kg/m²]
		Thermal contact resistance*		0,130	18,8	20,0	
1	1,25 cm	Gypsum board	0,250	0,050	18,6	19,0	8,5
2	2,4 cm	Stationary air (unventilated)	0,134	0,179	17,7	18,8	0,0
	2,4 cm	Spruce (7,4%)	0,130	0,185	17,6	18,6	0,8
3	2 cm	vakuVIP© B2 - Vakuum-Dämmplatte	0,007	2,857	2,3	18,1	3,9
	2 cm	Spruce (7,4%)	0,130	0,154			0,7
4	0,02 cm	Foil, PE	0,400	0,001	2,3	6,5	0,2
5	9,8 cm	Glasswool 35	0,035	2,800	-4,9	6,5	1,8
	9,8 cm	Spruce (7,4%)	0,130	0,754	-4,6	2,8	3,3
6	0,015 cm	Tyvek® H1	0,230	0,001	-4,9	-4,6	0,1
		Thermal contact resistance*		0,130	-5,0	-4,6	
7	3,6 cm	Rear ventilated level (outside air)			-5,0	-5,0	0,0
8	4,4 cm	Clapboard siding			-5,0	-5,0	7,7
	23,485 cm	Whole component		4,810			26,9

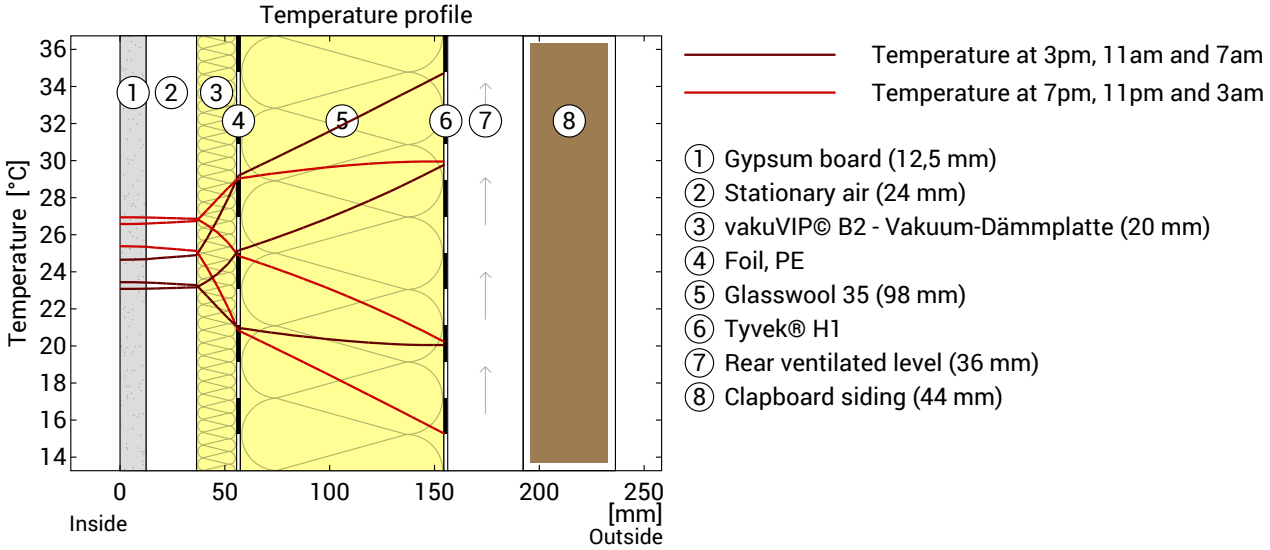
*Thermal contact resistances according to DIN 6946 for the U-value calculation. Rsi=0,25 and Rse=0,04 according to DIN 4108-3 were used for moisture proofing and temperature profile.

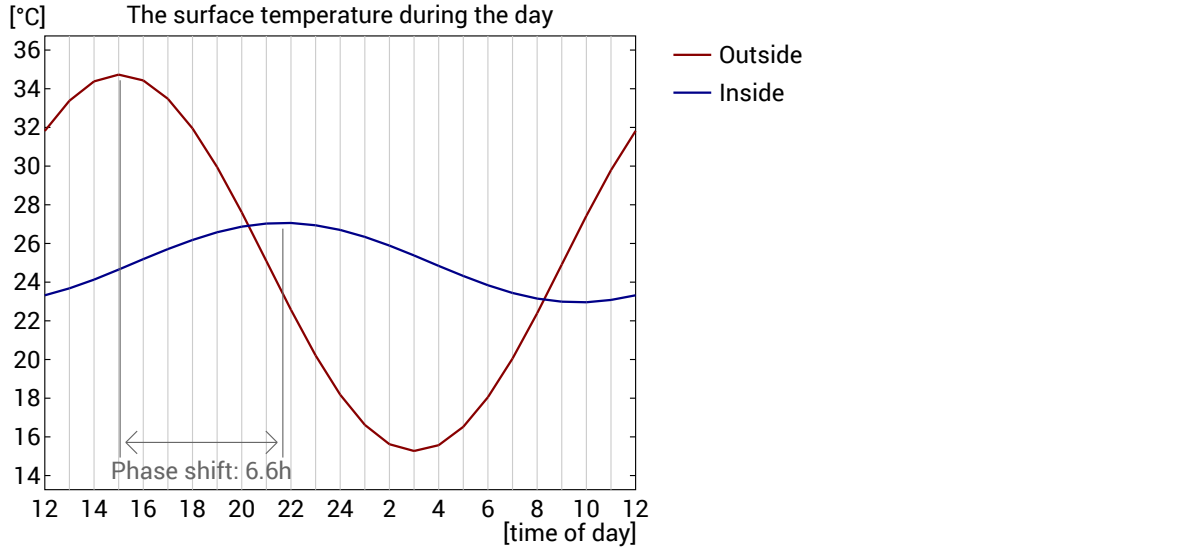
Surface temperature inside (min / average / max):	18,8°C	18,9°C	19,0°C
Surface temperature outside (min / average / max):	-4,9°C	-4,8°C	-4,6°C

Stender 2, U=0,21 W/(m²K)

Heat protection

The following results are properties of the tested component alone and do not make any statement about the heat protection of the entire room:





Top: Temperature profile within the component at different times. From top to bottom, brown lines: at 3 pm, 11 am and 7 am and red lines at 7 pm , 11 pm and 3 am.
Bottom: Temperature on the outer (red) and inner (blue) surface in the course of a day. The arrows indicate the location of the temperature maximum values . The maximum of the inner surface temperature should preferably occur during the second half of the night.

Phase shift*	6,6 h	Heat storage capacity (whole component):	20 kJ/m²K
Amplitude attenuation **	4,7	Thermal capacity of inner layers:	13.2 kJ/m²K
TAV ***	0,211		

* The phase shift is the time in hours after which the temperature peak of the afternoon reaches the component interior.
** The amplitude attenuation describes the attenuation of the temperature wave when passing through the component. A value of 10 means that the temperature on the outside varies 10x stronger than on the inside, e.g. outside 15-35 °C, inside 24-26 °C.
*** The temperature amplitude ratio TAV is the reciprocal of the attenuation: TAV = 1 / amplitude attenuation

Note: The heat protection of a room is influenced by several factors, but essentially by the direct solar radiation through windows and the total amount of heat storage capacity (including floor, interior walls and furniture). A single component usually has only a very small influence on the heat protection of the room.

The calculations presented above have been created for a 1-dimensional cross-section of the component.