Flat roof

Flat roof
created on 17.4.2023

Thermal protection

U = 0,17 W/(m²K)

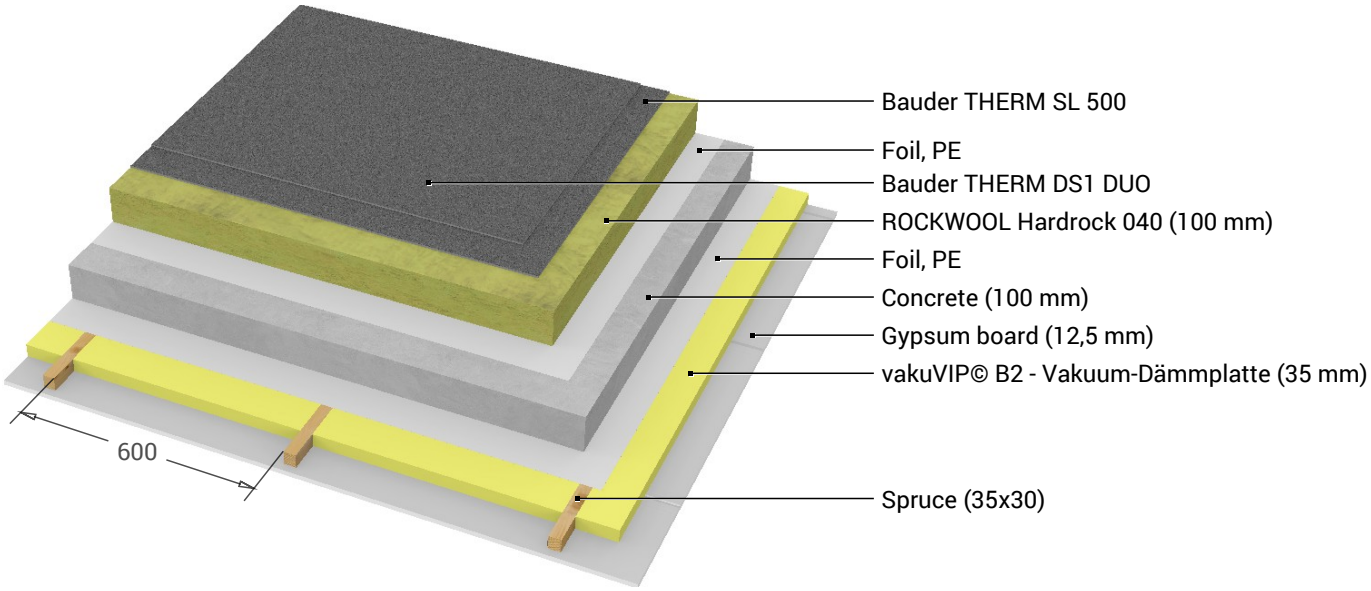
GEG 2020 Bestand*: U<0,2 W/(m²K)

excellent insufficient

Heat protection

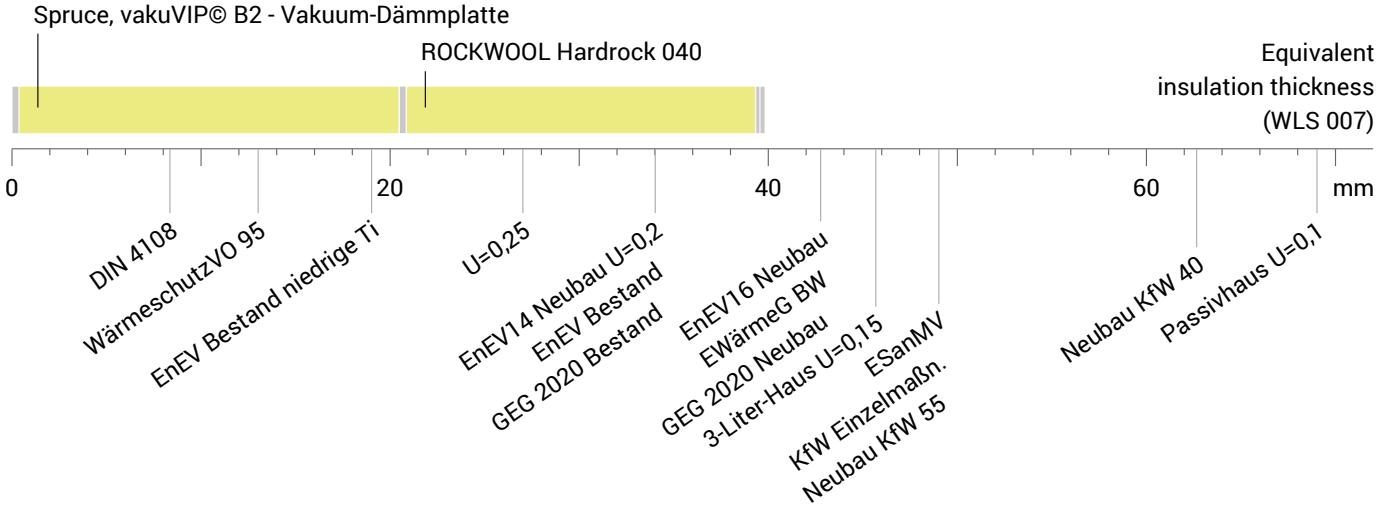
Temperature amplitude damping: >100
phase shift: non relevant
Thermal capacity inside: 116 kJ/m²K

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.



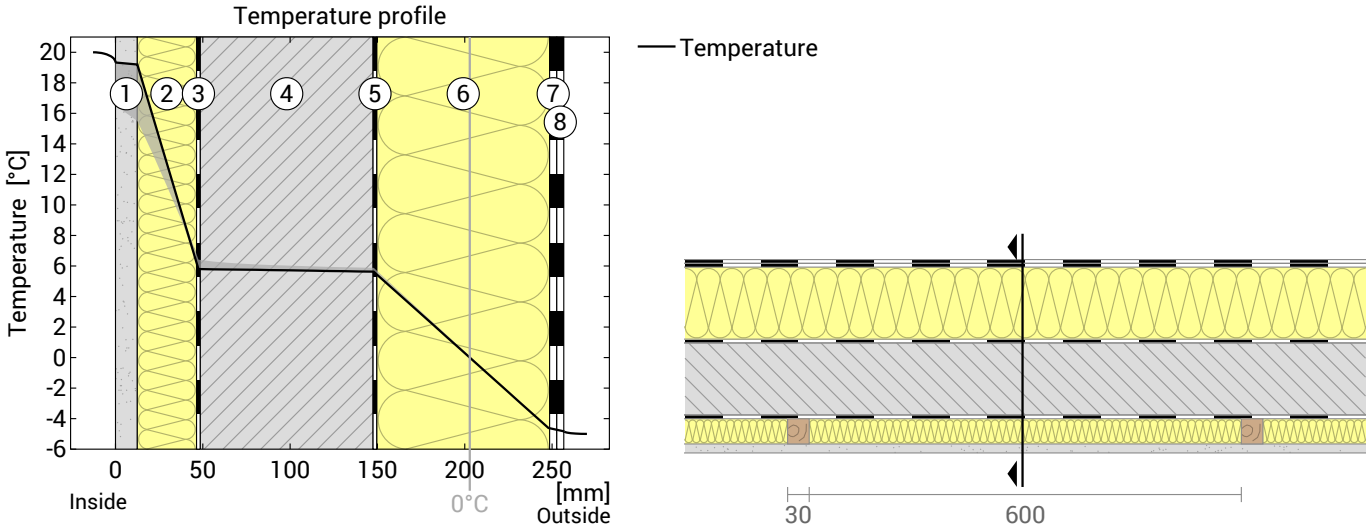
Inside air :	20,0°C / 50%	Thickness:	25,7 cm
Outside air:	-5,0°C / 80%	Weight:	282 kg/m²
Surface temperature.:	16,5°C / -4,8°C	Heat capacity:	275 kJ/m²K

☑ 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

Flat roof, U=0,17 W/(m²K)

Temperature profile



① Gypsum board (12,5 mm)
② vakuVIP© B2 - Vakuum-Dämmplatt...
③ Foil, PE
④ Concrete (100 mm)
⑤ Foil, PE
⑥ ROCKWOOL Hardrock 040 (100 mm)
⑦ Bauder THERM SL 500
⑧ Bauder THERM DS1 DUO

Left: Temperature profile at the location marked in the right figure.
Right: Scale drawing of the component.

Layers (from inside to outside)

#		Material	λ [W/mK]	R [m²K/W]	Temperatur [°C] min	Temperatur [°C] max	Weight [kg/m²]
		Thermal contact resistance*		0,100	16,5	20,0	
1	1,25 cm	Gypsum board	0,250	0,050	15,5	19,3	8,5
2	3,5 cm	vakuVIP© B2 - Vakuum-Dämmplatte	0,007	5,000	5,8	19,2	7,0
	3,5 cm	Spruce (4,8%)	0,130	0,269	6,4	16,1	0,8
3	0,02 cm	Foil, PE	0,400	0,001	5,8	6,4	0,2
4	10 cm	Concrete	2,000	0,050	5,6	6,4	240,0
5	0,02 cm	Foil, PE	0,400	0,001	5,6	5,9	0,2
6	10 cm	ROCKWOOL Hardrock 040	0,040	2,500	-4,6	5,9	15,5
7	0,52 cm	Bauder THERM SL 500	0,170	0,031	-4,7	-4,6	5,7
8	0,4 cm	Bauder THERM DS1 DUO	0,170	0,024	-4,8	-4,7	4,4
		Thermal contact resistance*		0,040	-5,0	-4,8	
	25,71 cm	Whole component		5,816			282,2

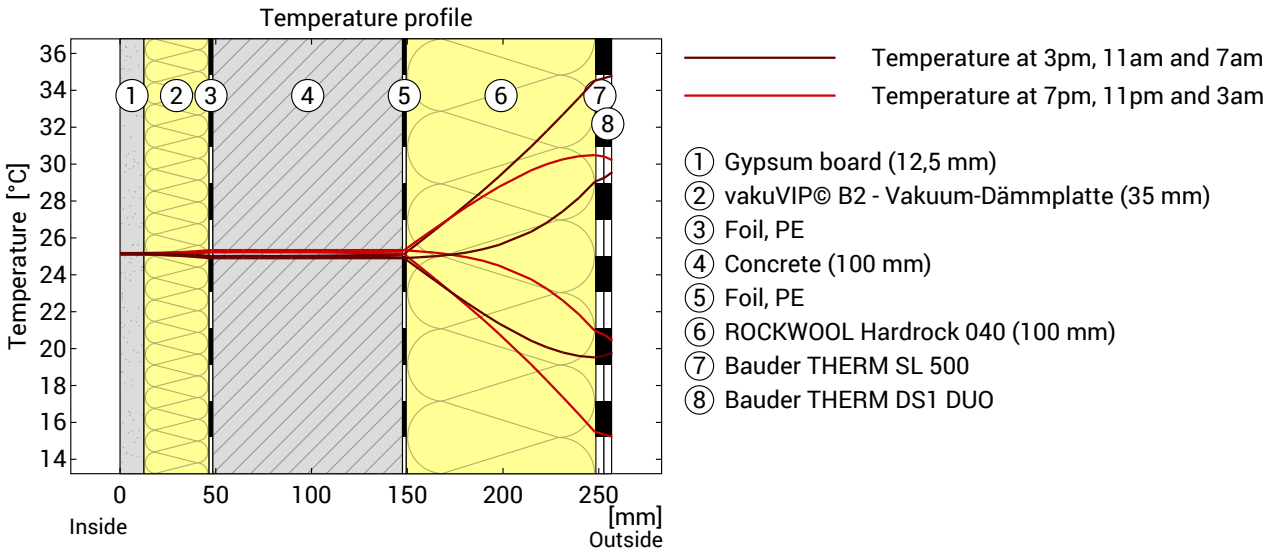
*Thermal contact resistances according to DIN 6946 for the U-value calculation. Rsi=0,25 and Rse=0,04 according to DIN 4108-3 were used for moisture proofing and temperature profile.

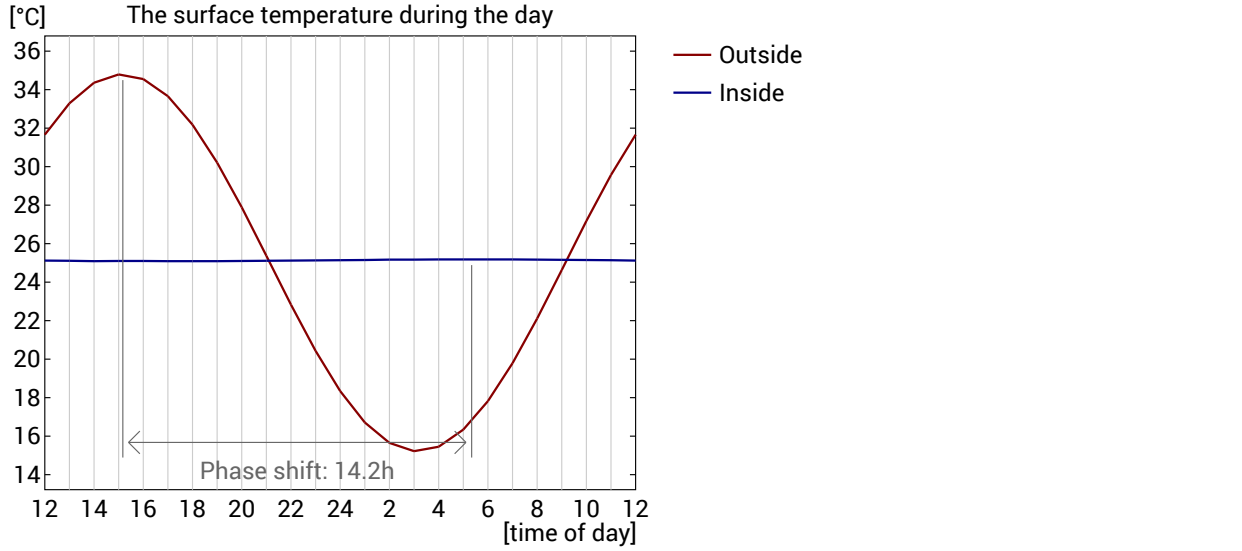
Surface temperature inside (min / average / max):	16,5°C	19,0°C	19,3°C
Surface temperature outside (min / average / max):	-4,8°C	-4,8°C	-4,8°C

Flat roof, U=0,17 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*	non relevant	Heat storage capacity (whole component):	275 kJ/m²K
Amplitude attenuation **	>100	Thermal capacity of inner layers:	116 kJ/m²K
TAV ***	0,005		

* 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.