

Slab

Floor
created on 24.10.2024

Thermal protection

$U = 0,27 \text{ W/(m}^2\text{K)}$

GEG 2020/24 Bestand*: $U < 0,3 \text{ W/(m}^2\text{K)}$



Moisture proofing

Dries 3 days

Condensate: $2,3 \text{ g/m}^2$

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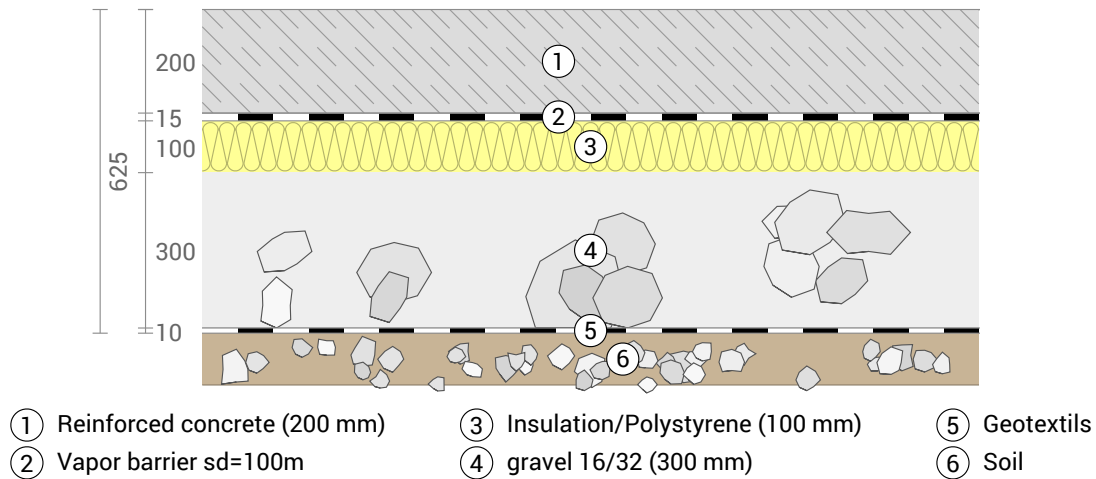


Heat protection

Component is adjacent to earth:

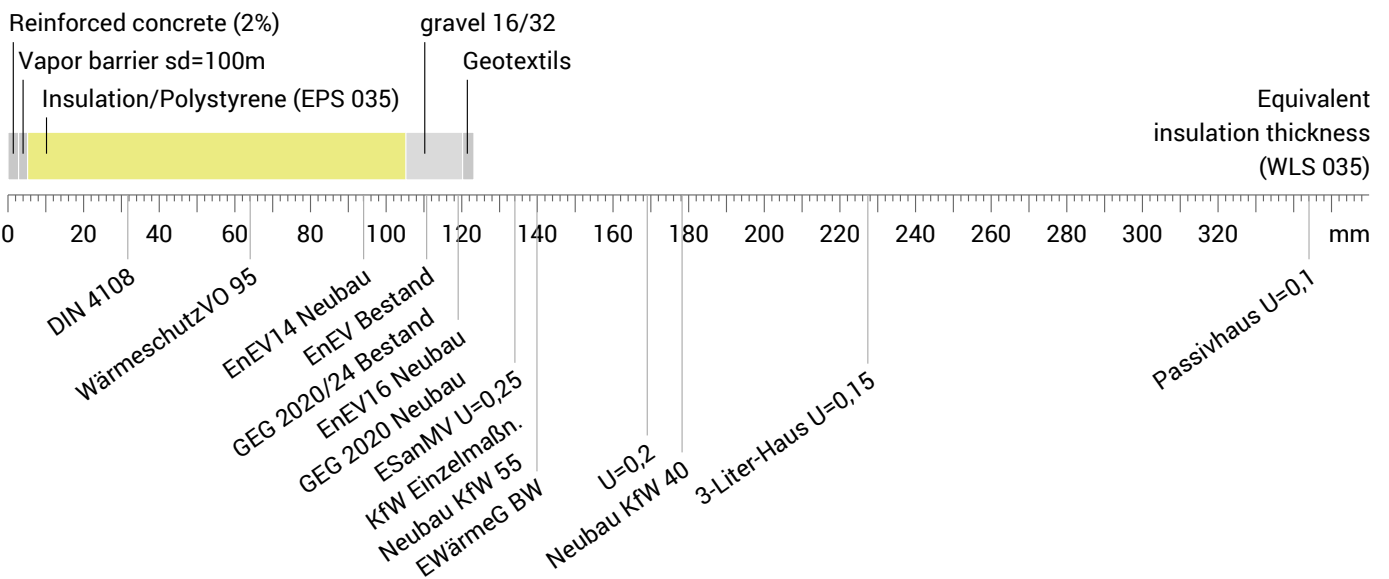
TAV and phase non relevant

Thermal capacity inside: $448 \text{ kJ/m}^2\text{K}$



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 $0,035 \text{ W/mK}$.



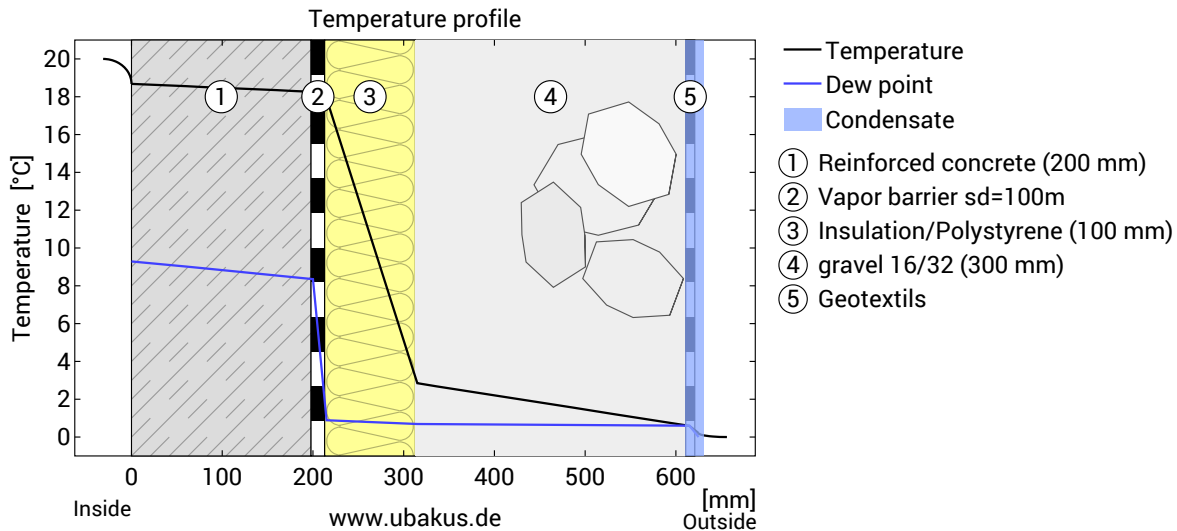
Inside air : $20,0^\circ\text{C} / 50\%$
Ground: $0,0^\circ\text{C} / 100\%$
Surface temperature.: $18,7^\circ\text{C} / 0,2^\circ\text{C}$

sd-value: 127,9 m

Thickness: 62,5 cm
Weight: 1028 kg/m^2
Heat capacity: $974 \text{ kJ/m}^2\text{K}$

Slab, $U=0,27 \text{ W}/(\text{m}^2\text{K})$

Temperature profile



Temperature and dew-point temperature in the component. The dew-point indicates the temperature, at which water vapour condensates. As long as the temperature of the component is everywhere above the dew-point temperature, no condensation occurs. If the curves have contact, condensation occurs at the corresponding position.

Layers (from inside to outside)

#	Material	λ [W/mK]	R [m ² K/W]	Temperatur [°C]		Weight [kg/m ²]
				min	max	
	Thermal contact resistance*		0,170	18,7	20,0	
1	20 cm Reinforced concrete (2%)	2,500	0,080	18,3	18,7	480,0
2	1,5 cm Vapor barrier $s_d=100\text{m}$	0,220	0,068	17,9	18,3	3,9
3	10 cm Insulation/Polystyrene (EPS 035)	0,035	2,857	2,8	17,9	3,0
4	30 cm gravel 16/32	0,700	0,429	0,6	2,8	540,0
5	1 cm Geotextils	0,140	0,071	0,2	0,6	1,6
	Thermal contact resistance*		0,000	0,0	0,2	
6	Soil			0,0	0,0	106,3
	62,5 cm Whole component		3,676			1.028,5

*Thermal contact resistances according to DIN 6946 for the U-value calculation. $R_{si}=0,25$ and $R_{se}=0,04$ according to DIN 4108-3 were used for moisture proofing and temperature profile.

Surface temperature inside (min / average / max): 18,7°C 18,7°C 18,7°C
Surface temperature outside (min / average / max): 0,2°C 0,2°C 0,2°C

Slab, $U=0,27 \text{ W}/(\text{m}^2\text{K})$

Moisture proofing

For the calculation of the amount of condensation water, the component was exposed to the following constant climate for 90 days: inside: 20°C und 50% Humidity; outside: 0°C und 100% Humidity (Climate according to user input).

Under these conditions, a total of 0,0023 kg of condensation water per square meter is accumulated. This quantity dries in summer in 3 days (Drying season according to DIN 4108-3:2018-10).

#	Material	sd-value [m]	Condensate [kg/m ²] [Gew.-%]	Weight [kg/m ²]
1	20 cm Reinforced concrete (2%)	16,00	-	480,0
2	1,5 cm Vapor barrier sd=100m	100,00	-	3,9
3	10 cm Insulation/Polystyrene (EPS 035)	2,00	-	3,0
4	30 cm gravel 16/32	0,90	0,0023	540,0
5	1 cm Geotextils	9,00	0,0023	1,6
	62,5 cm Whole component	127,90	0,0023	1.028,5

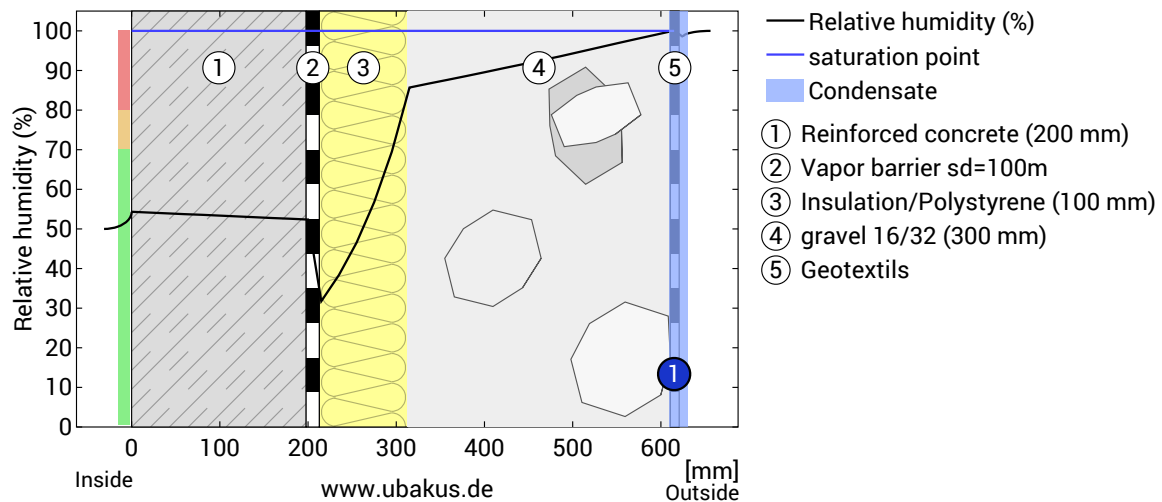
Condensation areas

- ① Condensate: 0,002 kg/m² Affected layers: Geotextils, gravel 16/32

Humidity

The temperature of the inside surface is $18,7^\circ\text{C}$ leading to a relative humidity on the surface of 54%. Mould formation is not expected under these conditions.

The following figure shows the relative humidity inside the component.



Notes: Calculation using the Ubakus 2D-FE method. Convection and the capillarity of the building materials were not considered. The drying time may take longer under unfavorable conditions (shading, damp / cool summers) than calculated here.