Floor

Thermal protection

U = 3,67 W/(m²K)

GEG 2020/24 Bestand*: U<0,24 W/(m²K)

excellent insufficient

Moisture proofing

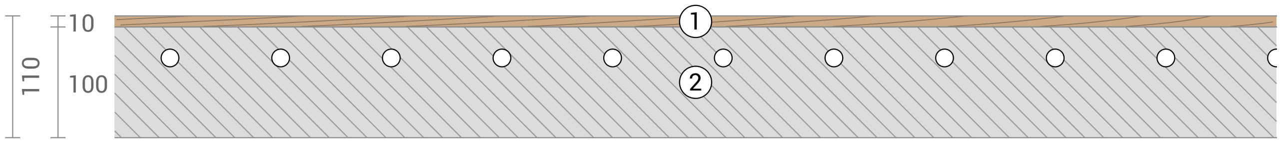
No condensate

excellent insufficient

Heat protection

Temperature amplitude damping: 1,1
phase shift: 2,2 h
Thermal capacity inside: 28138 kJ/m²K

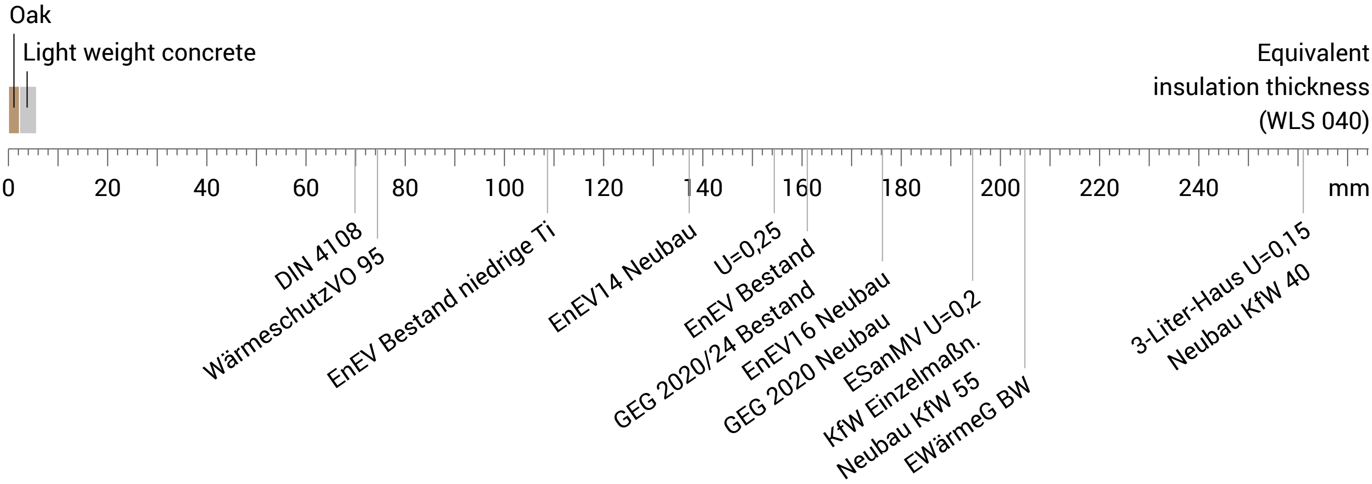
excellent insufficient



① Oak (10 mm) ② Light weight concrete (100 mm)

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 0,040 W/mK.

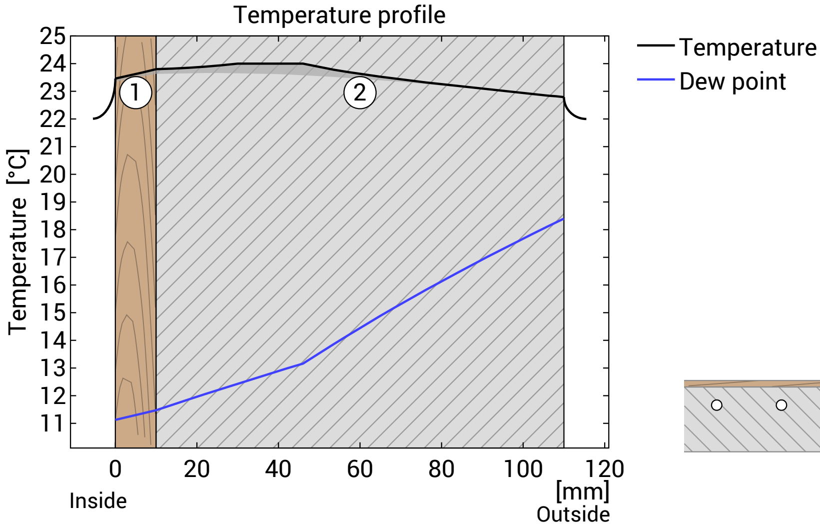


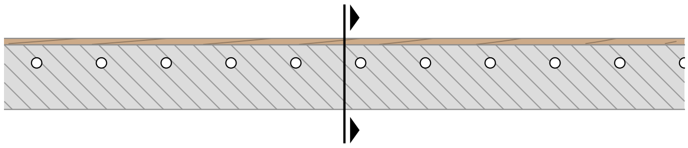
Inside air :	22,0°C / 50%		Thickness:	11,0 cm
Outside air:	22,0°C / 80%	sd-value: 12,6 m	Weight:	187 kg/m²
Surface temperature.:	23,3°C / 22,8°C		Heat capacity:	192 kJ/m²K

*Vergleich mit dem Höchstwert gemäß GEG 2020-2024 für erstmaligen Einbau, Ersatz oder Erneuerung von Decken nach unten an Außenluft (Anlage 7, Zeile 6d,6e).

Floor, U=3,67 W/(m²K)

Temperature profile





① Oak (10 mm) ② Light weight concrete (100 mm)

Left: Temperature and dew-point temperature at the place marked in the right figure. 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, no condensation occurs. If the curves have contact, condensation occurs at the corresponding position.
Right: The component, drawn to scale.

Layers (from inside to outside)

#		Material	λ [W/mK]	R [m²K/W]	Temperatur [°C] min	max	Weight [kg/m²]
		Thermal contact resistance*		0,100	22,0	23,5	
1	1 cm	Oak	0,180	0,056	23,3	23,8	6,9
2	10 cm	Light weight concrete	1,300	0,077	23,6	24,0	180,0
		Thermal contact resistance*		0,040	22,0	22,8	
	11 cm	Whole component		0,273			186,9

*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):	23,3°C	23,4°C	23,5°C
Surface temperature outside (min / average / max):	22,8°C	22,8°C	22,8°C

Moisture proofing

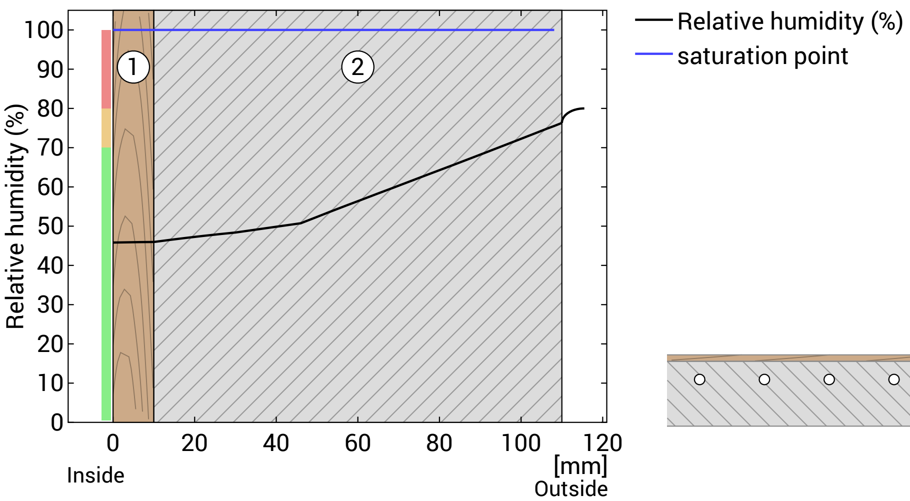
For the calculation of the amount of condensation water, the component was exposed to the following constant climate for 90 days: inside: 22.01°C und 50% Humidity; outside: 22°C und 80% Humidity (Climate according to user input).

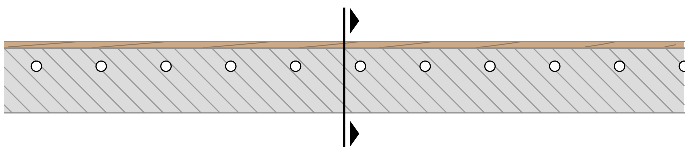
This component is free of condensate under the given climate conditions.

#		Material	sd-value [m]	Condensate [kg/m²]	Condensate [Gew.-%]	Weight [kg/m²]
1	1 cm	Oak	0,50	-	-	6,9
2	10 cm	Light weight concrete	1,40	-		180,0
	11 cm	Whole component	12,62	0		186,9

Humidity

The temperature of the inside surface is 22,0 °C leading to a relative humidity on the surface of 46%.Mould formation is not expected under these conditions.
The following figure shows the relative humidity inside the component.





① Oak (10 mm) ② Light weight concrete (100 mm)

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.

Floor, U=3,67 W/(m²K)

heating level

Heat output into the interior (heating output): approx. 5 W/m².

The heating plane leads to increased heat losses to the outside and can be taken into account with an effective U-value (Ueff):

Effective u-value:	1953 W/m²K	(Energy loss of the heated component)
U-value:	3,667 W/m²K	(Energy loss of the un-heated component)
Thermal transmission to the outside:	19,5 W/m²	(At an outside temperature of 22°C)

At the assumed temperatures of room air, outside air and heating plane, the heat loss to the outside corresponds to an identical but unheated component with an U-value of Ueff =1953 W/m²K.

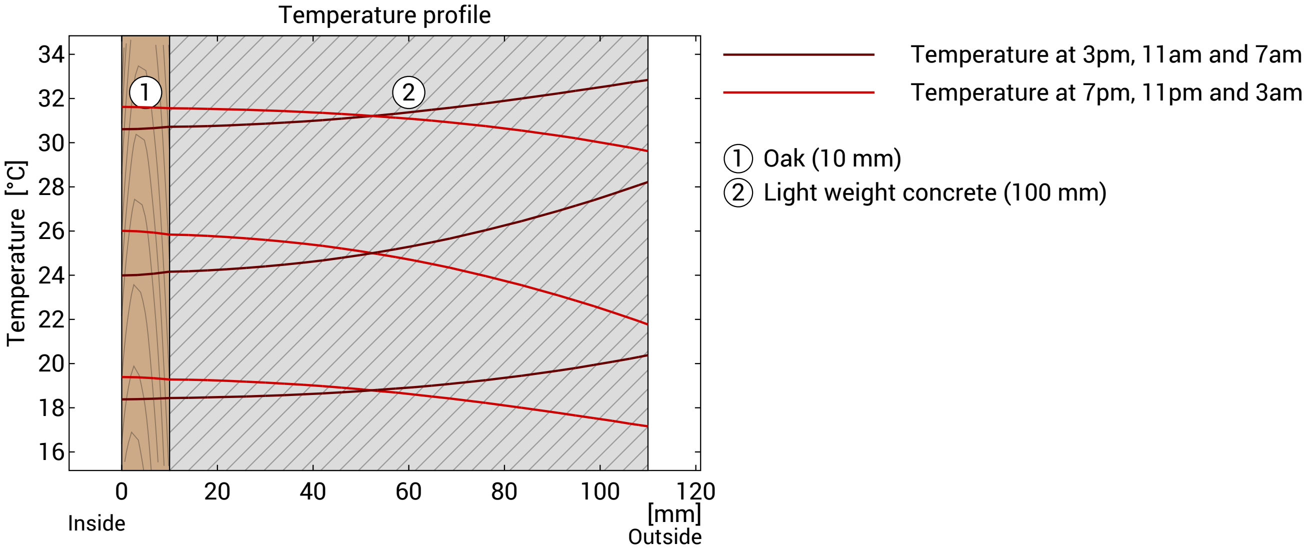
Temperature of the inside surface (min/average/max): 23,3 / 23,4 / 23,5 °C

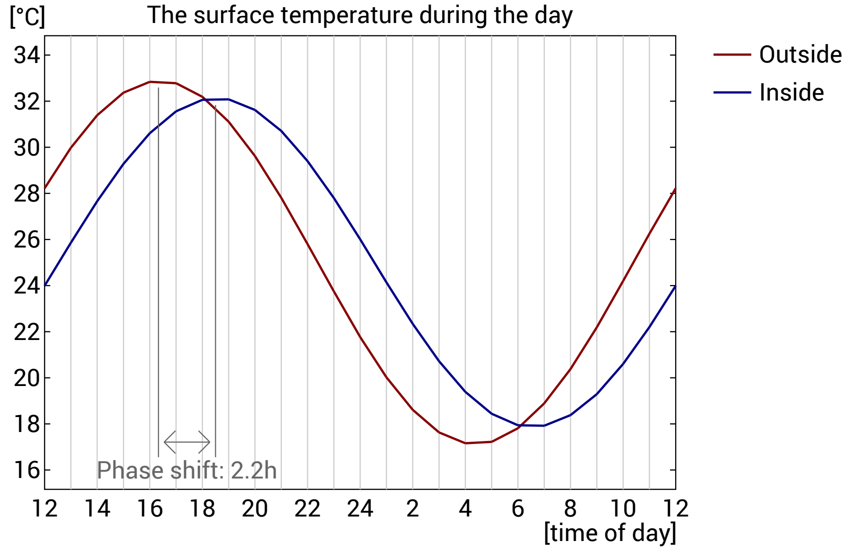
These values are based on a room temperature of 22,01°C, an outside temperature of 22°C and the following tempered layer: Light weight concrete [Water temperature: 24°C]

Floor, U=3,67 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*	2,2 h	Heat storage capacity (whole component):	192 kJ/m²K
Amplitude attenuation **	1,1	Thermal capacity of inner layers:	28138 kJ/m²K
TAV ***	0,905		

* 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.