Sample Wall

Exterior wall, U=0,0944 W/m²K

thermal protection

U = 0,094 W/m²K

EnEV Bestand*: U<0,24 W/m²K

excellent — insufficient

Moisture proofing

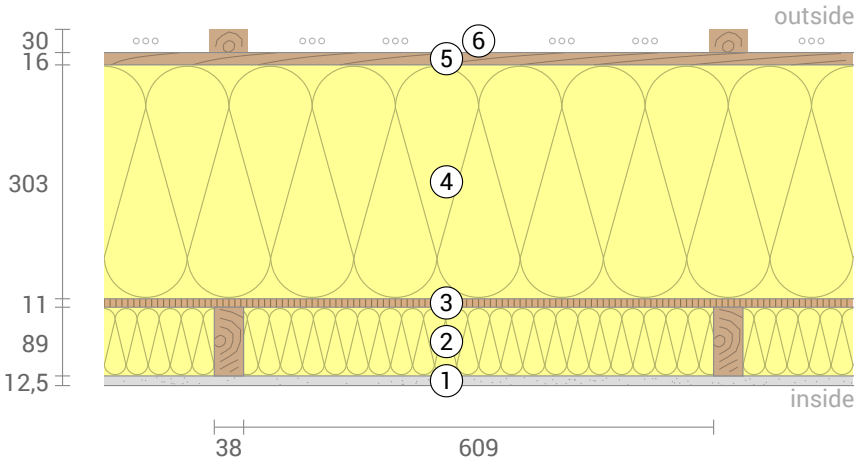
Drying reserve: 1061 g/m²a
No condensate

excellent — insufficient

Heat protection

Temperature amplitude damping: >100
phase shift: non relevant
Thermal capacity inside: 47 kJ/m²K

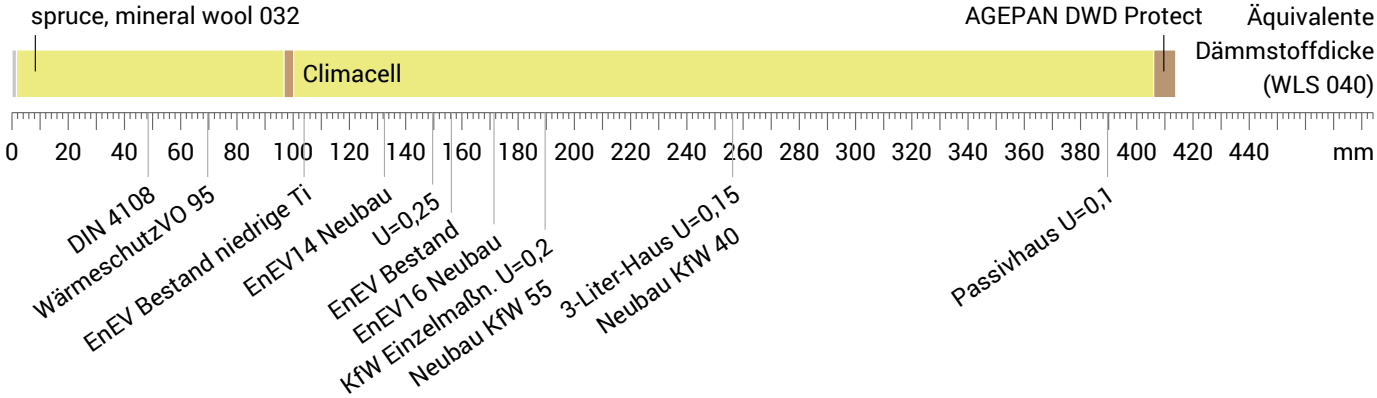
excellent — insufficient



1. Fermacell Gipsfaser-Platte 12,5mm (12,5 mm)
2. mineral wool 032 (89 mm)
3. OSB/3 (11 mm)
4. Climacell (303 mm)
5. AGEPAN DWD Protect (16 mm)
6. Air (30 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.



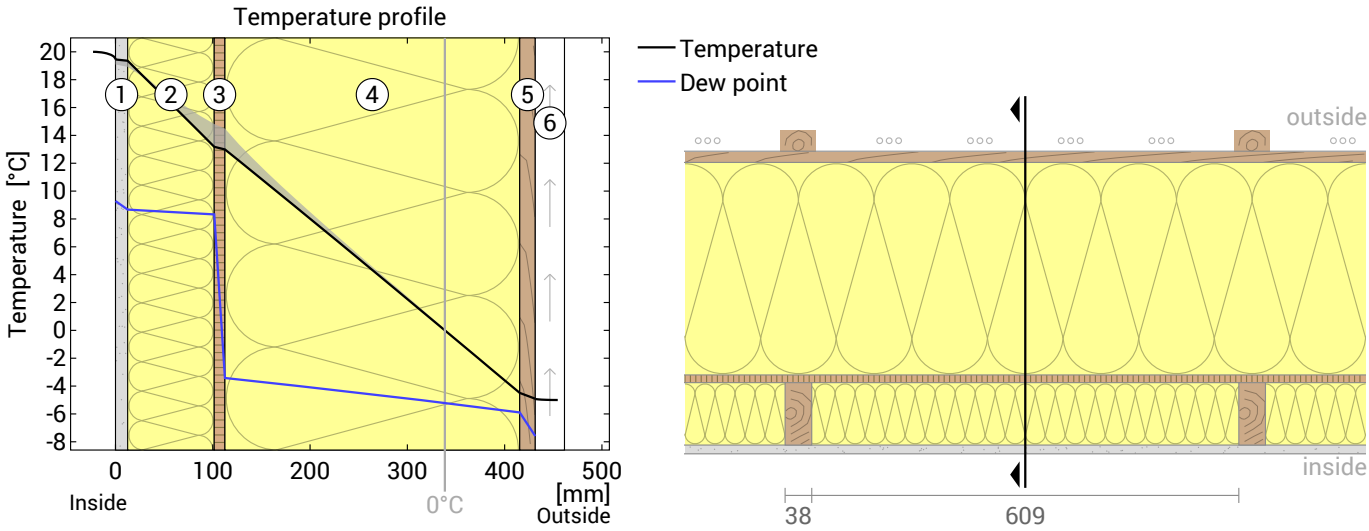
Inside air :	20,0°C / 50%			Thickness:	46,1 cm
Outside air:	-5,0°C / 80%	sd-value:	3,0 m	Weight:	49 kg/m²
Surface temperature.:	19,1°C / -4,9°C	Drying reserve:	1061 g/m²a	Heat capacity:	93 kJ/m²K

☑ EnEV Bestand ☑ EnEV16 Neubau ☑ EnEV14 Neubau ☑ EnEV Bestand (Nichtwohngeb.)

*Vergleich des U-Werts mit den Höchstwerten aus EnEV 2014 Anlage 3 Tabelle 1 (EnEV Bestand); den Höchstwerten aus EnEV 2014 Anlage 3 Tabelle 1 (EnEV Bestand, niedrige InnenTemp.); 80% des U-Werts der Referenzausführung aus EnEV 2014 Anlage 1 Tabelle 1 (EnEV16 Neubau); der Referenzausführung aus EnEV 2014 Anlage 1 Tabelle 1 (EnEV14 Neubau)

Sample Wall, U=0,0944 W/m²K

Temperature profile



① Fermacell Gipsfaser-Platte 12,5mm (1
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④ Climacell (303 mm)
⑤ AGEPAN DWD Protect (16 mm)
⑥ Air (30 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*		0,130	19,1	20,0	
1	1,25 cm	Fermacell Gipsfaser-Platte 12,5mm	0,320	0,039	18,9	19,5	14,4
2	8,9 cm	mineral wool 032	0,032	2,781	13,2	19,4	1,7
	8,9 cm	spruce (5,9%)	0,130	0,685	14,8	19,0	2,4
3	1,1 cm	OSB/3	0,130	0,085	13,0	14,8	6,8
4	30,3 cm	Climacell	0,040	7,575	-4,5	14,5	15,2
5	1,6 cm	AGEPAN DWD Protect	0,090	0,178	-4,9	-4,5	9,0
		Thermal contact resistance*		0,130	-5,0	-4,9	
6	3 cm	Air (ventilated layer)			-5,0	-5,0	0,0
	46,15 cm	Whole component		10,590			49,4

*Wärmeübergangswiderstände gemäß DIN 6946 für die U-Wert-Berechnung. Für Feuchteschutz und Temperaturverlauf wurden Rsi=0,25 und Rse=0,04 gemäß DIN 4108-3 verwendet.

Surface temperature inside (min / average / max):	19,1°C	19,4°C	19,5°C
Oberflächentemperatur außen (min / mittel / max):	-4,9°C	-4,9°C	-4,9°C

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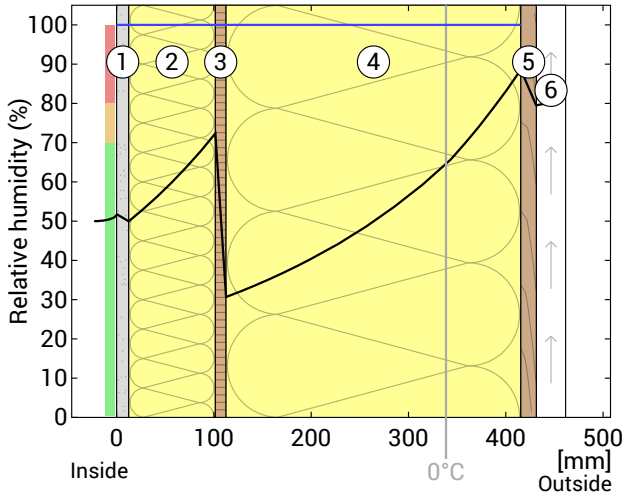
Moisture proofing

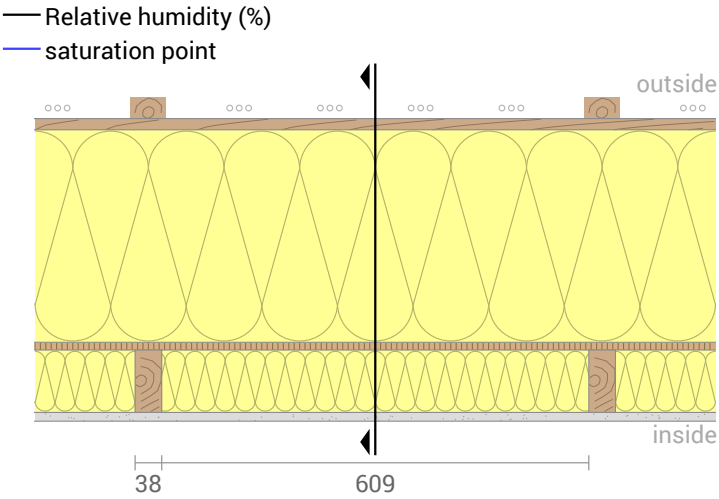
This component is free of condensate under the given climate conditions.

#		Material	sd-value [m]	Condensate [kg/m²]	[Gew.-%]	Weight [kg/m²]
1	1,25 cm	Fermacell Gipsfaser-Platte 12,5mm	0,16	-		14,4
2	8,9 cm	mineral wool 032	0,09	-		1,7
	8,9 cm	spruce (5,9%)	1,78	-	-	2,4
3	1,1 cm	OSB/3	2,20	-	-	6,8
4	30,3 cm	Climacell	0,30	-		15,2
5	1,6 cm	AGEPAN DWD Protect	0,18	-	-	9,0
	46,15 cm	Whole component	2,97			49,4

Humidity

The temperature of the inside surface is 19,1 °C leading to a relative humidity on the surface of 53%.Mould formation is not expected under these conditions.
The following figure show the relative humidity inside the component.





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To calculate the diffusion currents a two-dimensional finite element method was used. More information on the section 'humidity' on the input form.

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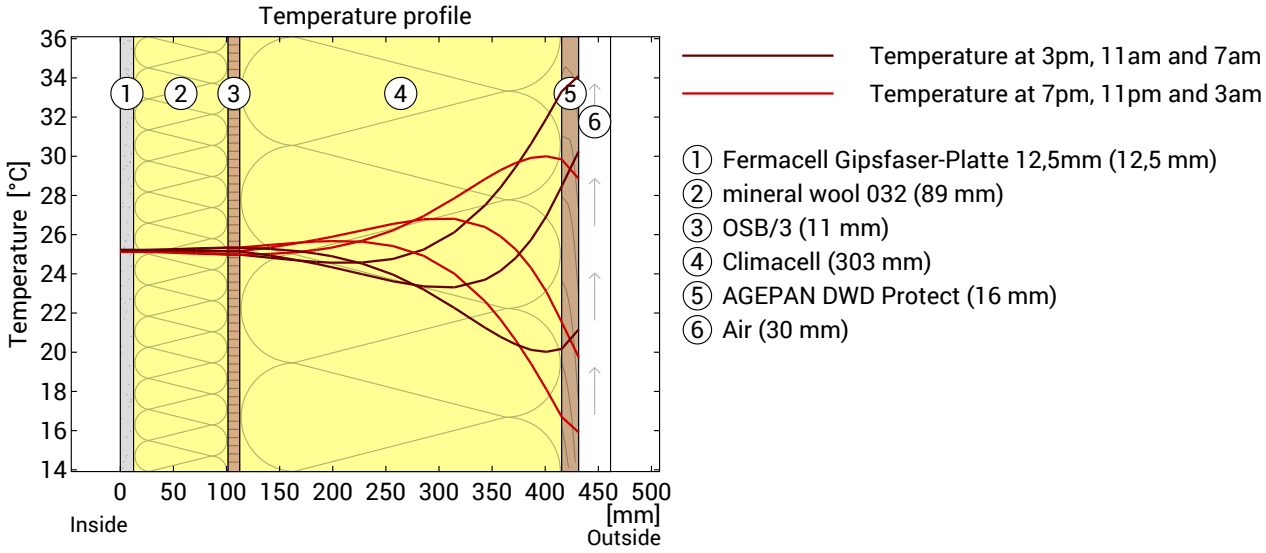
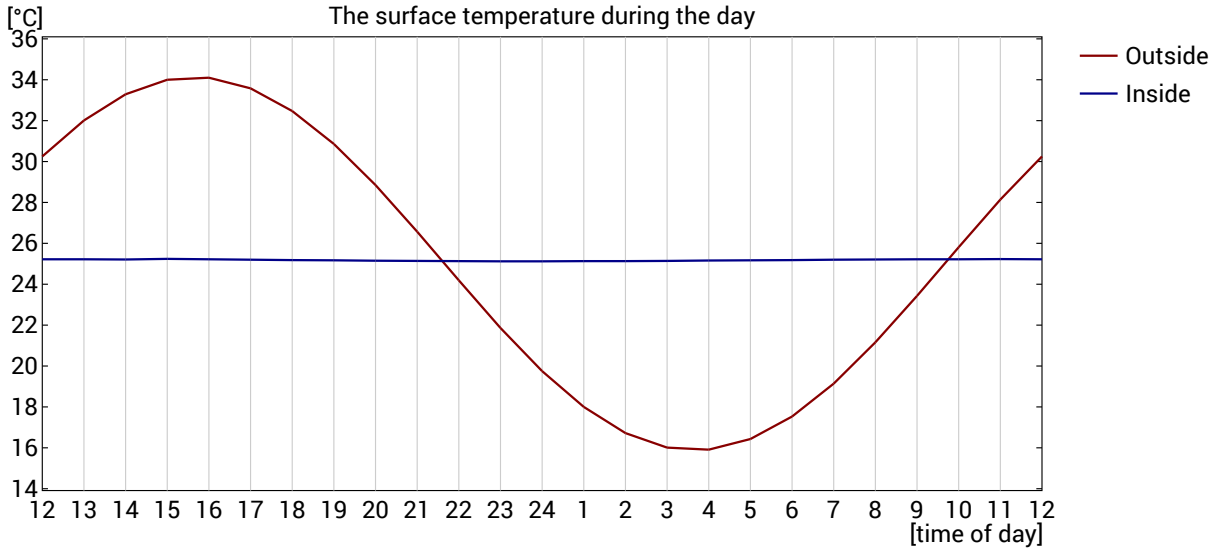
Heat protection

For the analysis of the heat protection, the temperature changes within the component were simulated during a hot summer day:





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		
Amplitude attenuation **	>100	Thermal fluctuation on exterior surface:	18,3°C
TAV***	0,006	Temperature fluctuation on interior surface	0,1°C

* 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

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