

# Climate ceiling panel surface vs. active surface area

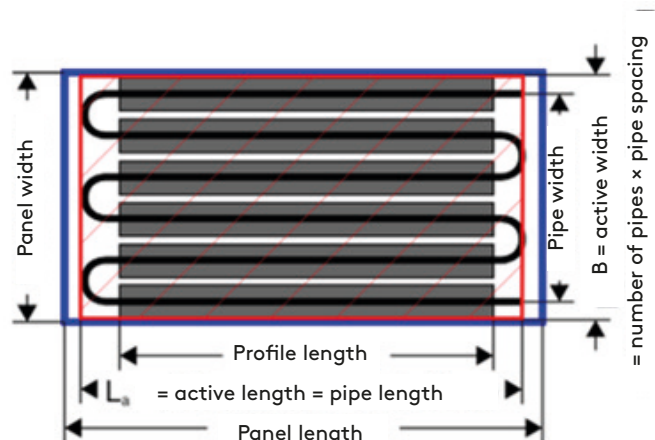
The performance of climate ceilings is specified according to EN 14240 based on the active surface area. However, this is not the same as the total panel surface.

- **Active area ratio** (Aar) = length of heat exchanger × pipe spacing × number of pipes
- **Panel surface area** (PA) = panel length × panel width Platte

## This example illustrates the following:

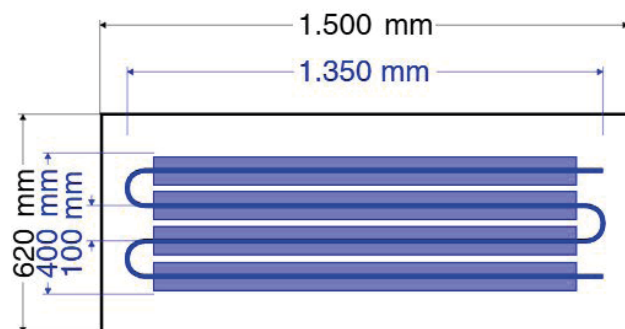
If a test institute states the performance based on the **active area ratio**, the output per **panel surface area** is almost always lower – often by 10 to 20 %.

**Important:** If the active area is small compared to the total panel size, lateral heat conduction can significantly increase the output per active area!



## Measurement

Impact of the active area ratio on cooling capacity in accordance with DIN EN 14240



**Panel surface area:**  
 $1.50 \text{ m} \times 0.62 \text{ m} = 0.93 \text{ m}^2 \text{ PA}$

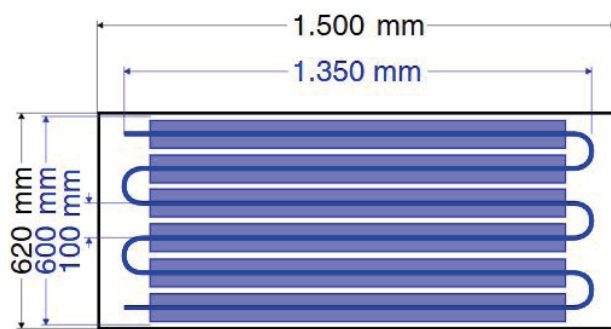
**Active area:**  
 $1.35 \text{ m} \times 4 \times 0.10 \text{ m} = 0.54 \text{ m}^2 \text{ Aar}$

**Active area ratio:**  
 $0.54 \text{ m}^2 \text{ Aar} / 0.93 \text{ m}^2 \text{ PA} \times 100\% = 58.1 \%$

**Cooling capacity per panel: 45.6 W**

Based on panel surface area:  
 $45.6 \text{ W} / 0.93 \text{ m}^2 \text{ PA} = 49.0 \text{ W/m}^2 \text{ PA}$

Based on active area:  
 $45.6 \text{ W} / 0.54 \text{ m}^2 \text{ Aar} = 84.4 \text{ W/m}^2 \text{ Aar}$



**Panel surface area:**  
 $1.50 \text{ m} \times 0.62 \text{ m} = 0.93 \text{ m}^2 \text{ PA}$

**aktive Fläche:**  
 $1.35 \text{ m} \times 6 \times 0.10 \text{ m} = 0.81 \text{ m}^2 \text{ Aar}$

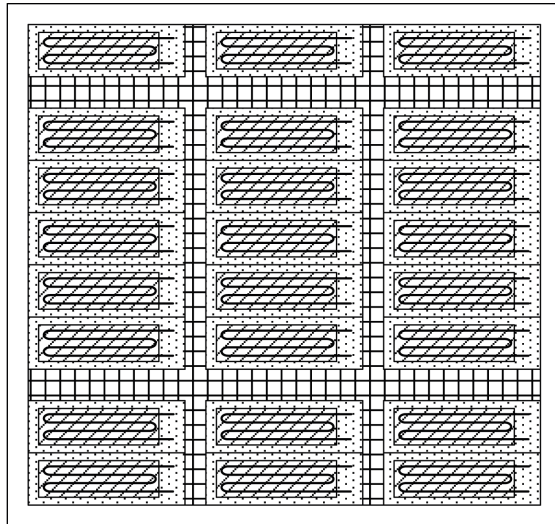
**Active area ratio:**  
 $0.81 \text{ m}^2 \text{ Aar} / 0.93 \text{ m}^2 \text{ PA} \times 100\% = 87.1 \%$

**Cooling capacity per panel: 62.9 W**

Based on panel surface area (PA):  
 $62.9 \text{ W} / 0.93 \text{ m}^2 \text{ PA} = 67.6 \text{ W/m}^2 \text{ PA}$

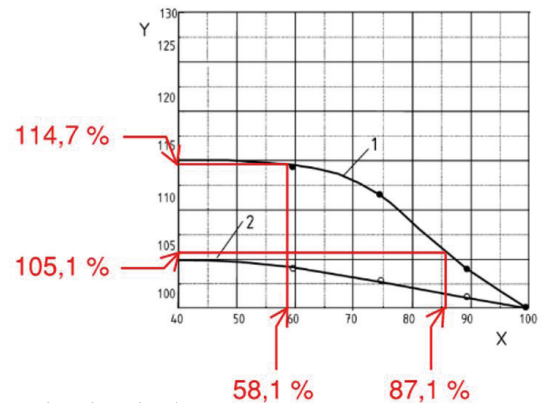
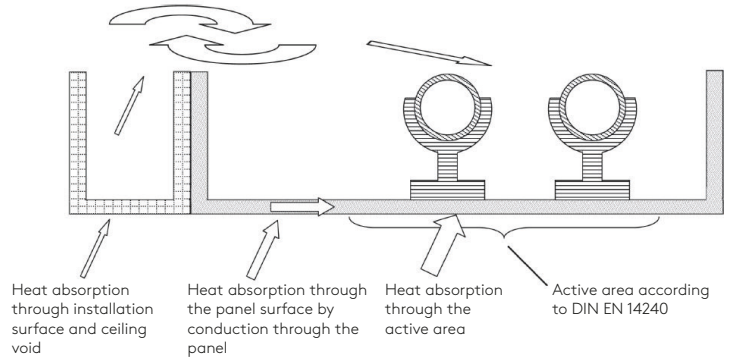
Based on active area (Aar):  
 $62.9 \text{ W} / 0.81 \text{ m}^2 \text{ Aar} = 77.7 \text{ W/m}^2 \text{ Aar}$

This fact is also reflected in the relevant guidelines VDI 6034 and DIN EN 14240.



aktive Fläche $A_a$ / active surface area, $A_a$	
Plattenfläche $A_p$ / panel surface area, $A_p$	
Installationsfläche $A_i$ / installation surface area, $A_i$	
Raumfläche $A_r$ / room surface area, $A_r$	

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Legend

- 1 Climate ceiling without thermal insulation
- 2 Climate ceiling with thermal insulation

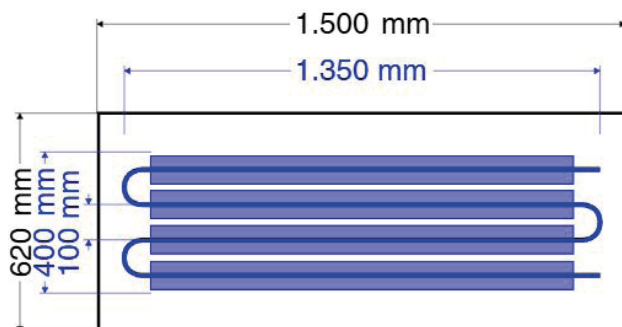
y Relative performance in %  
x Active area ratio ( $A_{ar}$ ) in %

## This should be taken into account when comparing offers:

- Which surface area was the performance based on?
- Was the conversion from active area to panel surface done correctly?
- Was the performance measurement carried out with the same active area ratio as planned for the installation?

Results from the measurement according to DIN EN 14240:

Specific cooling capacity:  $84.4 \text{ W/m}^2 A_{ar}$  ( $\Delta T: 8K$ )  
Active area ratio: 58%



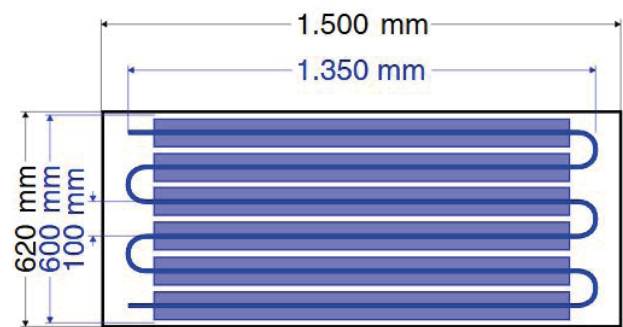
Cooling capacity:

Based on panel surface area ( $P_A$ ):  
 $45.6 \text{ W} / 0.93 \text{ m}^2 P_A = 49.0 \text{ W/m}^2 P_A$

Based on active area ( $A_{ar}$ ):  
 $45.6 \text{ W} / 0.54 \text{ m}^2 A_{ar} = 84.4 \text{ W/m}^2 A_{ar}$

Specification according to performance description:  $84.4 \text{ W/m}^2$

=> However, the planned installation:



Panel surface area:

$1.50 \text{ m} \times 0.62 \text{ m} = 0.93 \text{ m}^2 P_A$

Active area:

$1.35 \text{ m} \times 6 \times 0.10 \text{ m} = 0.81 \text{ m}^2 A_{ar}$

**Incorrect calculation of cooling capacity:**

$84.4 \text{ W/m}^2 A_{ar} \times 0.81 \text{ m}^2 A_{ar} = 68.4 \text{ W}$   
or even:  $84.4 \text{ W/m}^2 P_A \times 0.93 \text{ m}^2 P_A = 78.5 \text{ W}$

**too high**

8.7 %

24.8 %

**Correct calculation:**  $77.7 \text{ W/m}^2 A_{ar} \times 0.81 \text{ m}^2 A_{ar} = 62.9 \text{ W}$