Underfloor Heating: Floor Surface and Water Temperatures

Floor surface temperature for a heat output by the EN 1264 basic curve, with mean and flow water temperatures, loop flow and output at a 29 °C floor.

Method: EN 1264-2 basic characteristic curve q = 8.92(θ_F,m − θ_i)^1.1 W/m²; one-dimensional conduction through the floor layers

Input parameters

Unit system: SI

Parameter	Value	Unit
Required heat output	0.060000	kW/m²
Room temperature	20.000	°C
Thermal resistance above the pipes (screed and covering)	0.10000	m²·K/W
Water temperature drop	5.0000	K
Floor area of the loop	20.000	m²
Floor surface temperature limit EN 1264: 29 °C for occupied zones; higher for bathrooms and perimeter zones.	29.000	°C

Calculated results

Parameter	Value	Unit
Mean floor surface temperature	25.656	°C
Mean water temperature	31.656	°C
Flow (supply) temperature	34.156	°C
Loop water flow	206.40	kg/h
Output at the floor temperature limit	0.10001	kW/m²

Notes for this case

• One-dimensional estimate: the pipe spacing and the downward loss are not modelled; use the system maker's tables for final design.

Formula and method

$$q = 8.92(\theta_F - \theta_i)^{1.1}, \quad \theta_w = \theta_F + qR, \quad \dot{m} = \frac{qA}{c_p \Delta\theta_w}$$

Variables

q	Required heat output	W/m²
θ_i	Room temperature	K
R	Thermal resistance above the pipes (screed and covering)	m²·K/W
$\Delta\theta_w$	Water temperature drop	K
A	Floor area of the loop	m²
θ_F	Mean floor surface temperature	K
θ_w	Mean water temperature	K
θ_V	Flow (supply) temperature	K
$\dot{m}$	Loop water flow	kg/s
$\theta_{F,max}$	Floor surface temperature limit	K
q_{max}	Output at the floor temperature limit	W/m²

Method and standards

EN 1264 basic curve.

Assumptions and limits

- The water temperature is a one-dimensional estimate, θ_w = θ_F + qR: EN 1264's full method also uses the pipe spacing, pipe size and the logarithmic water-to-room temperature difference, so the water temperature can be underestimated, more so for wide pipe spacing.
- The floor temperature limit defaults to 29 °C (occupied zones); EN 1264 allows higher surface temperatures in bathrooms and perimeter zones: enter the limit that applies.
- One-dimensional; uniform floor.

References

- EN 1264-2 basic characteristic curve q = 8.92(θ_F,m − θ_i)^1.1 W/m²; one-dimensional conduction through the floor layers

Report details

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Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/hvac/loads/underfloor-heating-output

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.