Wall Superheat in Boiling Water (Jens–Lottes and Thom)

Wall superheat above saturation for nucleate boiling of water in tubes from the heat flux and pressure by the Jens–Lottes and Thom correlations.

Method: Jens and Lottes (1951) ΔT = 25 q^¼ e^{−p/62}; Thom et al. (1965) ΔT = 22.65 q^½ e^{−p/87} (q in MW/m², p in bar; Collier and Thome)

Input parameters

Unit system: SI

Parameter	Value	Unit
Heat flux	300.00	kW/m²
Pressure (absolute)	70.000	bar

Calculated results

Parameter	Value	Unit
Wall superheat, Jens–Lottes	5.9826	K
Wall superheat, Thom	5.5488	K
Saturation temperature	285.83	°C

Notes for this case

- Both correlations are dimensional: q in MW/m², p in bar. The tube inner wall runs at T_sat plus this superheat.

Formula and method

$$\Delta T_{JL} = 25\, q^{1/4} e^{-p/62}, \quad \Delta T_{Th} = 22.65\, q^{1/2} e^{-p/87}$$

Variables

q	Heat flux	W/m²
p	Pressure (absolute)	Pa
ΔT_{JL}	Wall superheat, Jens–Lottes	K
ΔT_{Th}	Wall superheat, Thom	K
T_{sat}	Saturation temperature	K

Method and standards

Jens–Lottes; Thom.

Assumptions and limits

- Water; nucleate boiling.
- Data ranges: Jens–Lottes about 7–172 bar, Thom about 52–138 bar (Collier and Thome). The calculator warns outside them.

References

• Jens and Lottes (1951) ΔT = 25 q^¼ e^{−p/62}; Thom et al. (1965) ΔT = 22.65 q^½ e^{−p/87} (q in MW/m², p in bar; Collier and Thome)

Report details

Report reference	FCC-VEP8-ZY6J (the same inputs always give the same reference)
Generated	17 November 2026, 19:46 UTC
Calculator	Wall Superheat in Boiling Water (Jens–Lottes and Thom)
Method last reviewed	13 November 2026
Software release	FireCAD Calc, release of 17 November 2026
Release checks	2 reference cases of this calculator, computed independently, are checked on every release

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

This calculator online

https://calc.firecad.com/mechanical/heat-transfer/subcooled-boiling-wall-superheat

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.