Condenser Surface Area from LMTD

Tube surface area of a steam surface condenser from the heat load, overall heat transfer coefficient, condenser pressure and cooling water temperatures (LMTD).

Method: IAPWS R7-97(2012) IF97; LMTD method for a condensing stream

Input parameters

Unit system: SI

Parameter	Value	Unit
Condenser heat load	25.000	MW
Overall heat transfer coefficient (clean × cleanliness) From the tube maker, the HEI standard or plant data; typical 2500–3500 W/(m²·K) for clean admiralty or stainless tubes at 2 m/s, times a cleanliness factor of about 0.85.	3,000.0	W/(m²·K)
Condenser pressure (absolute)	10.000	kPa
Cooling water inlet temperature	32.000	°C
Cooling water outlet temperature	41.000	°C

Calculated results

Parameter	Value	Unit
Tube surface area (on the basis of U, usually outside)	976.88	m²
Log mean temperature difference	8.5306	K
Terminal temperature difference	4.8075	K
Initial temperature difference	13.808	K
Saturation temperature	45.808	°C

Formula and method

$$LMTD = \frac{T_{cw,2} - T_{cw,1}}{\ln\left(ITD/TTD\right)} \qquad ITD = T_{sat} - T_{cw,1} \qquad TTD = T_{sat} - T_{cw,2} \qquad A = \frac{\dot{Q}}{U \cdot LMTD} \qquad T_{sat} = T_{sat}(p_c)\ \left(\mathrm{IAPWS-IF97}\right)$$

Variables

$\dot{Q}$	condenser heat load	W
U	overall heat transfer coefficient	W/(m²·K)
p_c	condenser pressure, absolute	Pa
$T_{cw,1}$	cooling water inlet temperature	K
$T_{cw,2}$	cooling water outlet temperature	K
A	tube surface area	m²
$LMTD$	log mean temperature difference	K
TTD	terminal temperature difference	K
ITD	initial temperature difference	K
T_{sat}	saturation temperature at p_c	K

Method and standards

LMTD method with the steam side at constant saturation temperature (FireCAD IAPWS-IF97); U entered by you.

Assumptions and limits

- Uniform U; steam at saturation over the whole surface; no subcooling zone.
- The area is on the same basis as U: the outside tube surface, as HEI uses, when U is referred to the outside.
- The heat load is entered directly and not checked against the cooling water flow and range; use the condenser heat load calculator for that.

References

- IAPWS R7-97(2012) IF97
- LMTD method for a condensing stream

Report details

Report reference	FCC-264J-BYPZ (the same inputs always give the same reference)
Generated	17 November 2026, 19:35 UTC
Calculator	Condenser Surface Area from LMTD
Method last reviewed	11 November 2026
Software release	FireCAD Calc, release of 17 November 2026
Release checks	3 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/boilers-power-plant/condensers-cooling/condenser-surface-area

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.