Condenser Water Flow and Heat Rejection of a Chiller

Heat rejected by a water-cooled chiller and the condenser water flow for a cooling tower range, from cooling capacity and COP, with water from IF97.

Method: Energy balance Q_r = Q_e(1 + 1/COP); water enthalpies from IAPWS-IF97

Input parameters

Unit system: SI

Parameter	Value	Unit
Cooling capacity	500.00	TR
Chiller COP	5.6000	
Condenser water in (from the tower)	29.000	°C
Condenser water out (to the tower)	34.500	°C

Calculated results

Parameter	Value	Unit
Heat rejected	2,072.4	kW
Condenser water mass flow	324.59	t/h
Volume flow (at the inlet)	325.89	m³/h
Flow per TR	0.18105	L/s

Notes for this case

- Heat rejected is cooling plus compressor input; motor losses of an open-drive machine stay in the plant room.

Formula and method

$$\dot{Q}_r = \dot{Q}_e \left(1 + \frac{1}{COP}\right), \quad \dot{m} = \frac{\dot{Q}_r}{h_{out} - h_{in}}$$

Variables

$\dot{Q}_e$	Cooling capacity	W
COP	Chiller COP	-
T_{in}	Condenser water in (from the tower)	K
T_{out}	Condenser water out (to the tower)	K
$\dot{Q}_r$	Heat rejected	W
$\dot{m}$	Condenser water mass flow	kg/s
$\dot{V}$	Volume flow (at the inlet)	m³/s
$\dot{V}/TR$	Flow per TR	m³/s

Method and standards

Energy balance.

Assumptions and limits

- Steady state.
- Water enthalpy and density from IAPWS-IF97 at 3 bar(a), a typical condenser-water pressure; the effect of pressure on liquid water is negligible here.

References

- Energy balance Q_r = Q_e(1 + 1/COP); water enthalpies from IAPWS-IF97

Report details

Report reference	FCC-EMDK-HH6W (the same inputs always give the same reference)
Generated	17 November 2026, 19:49 UTC
Calculator	Condenser Water Flow and Heat Rejection of a Chiller
Method last reviewed	12 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/hvac/chillers/condenser-water-flow

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.