Chilled Water Flow Rate from Cooling Load

Chilled or condenser water flow for a cooling load and temperature difference, in m³/h, L/s and US gpm, with water properties from IAPWS-IF97.

Method: IAPWS-IF97

Input parameters

Unit system: SI

Parameter	Value	Unit
Cooling load	500.00	TR
Supply water temperature	7.0000	°C
Return water temperature	12.000	°C
Water pressure (absolute)	4.0000	bar

Calculated results

Parameter	Value	Unit
Water mass flow	301,788	kg/h
Water volume flow	301.77	m³/h
Water volume flow, US gpm	1,328.7	US gal/min
Mean specific heat (enthalpy difference over ΔT)	4.1952	kJ/(kg·K)

Notes for this case

- Volume flow is at the supply temperature.

Formula and method

$$\dot{m} = \frac{\dot{Q}}{h(T_r) - h(T_s)} \qquad \dot{V} = \frac{\dot{m}}{\rho(T_s)} \qquad \bar{c}_p = \frac{h(T_r) - h(T_s)}{T_r - T_s}$$

Variables

$\dot{Q}$	cooling load	W
T_s	supply temperature	K
T_r	return temperature	K
p	water pressure	Pa
$\dot{m}$	mass flow	kg/s
$\dot{V}$	volume flow	m³/s
$\dot{V}_{gpm}$	volume flow in US gpm	m³/s
$\bar{c}_p$	mean specific heat	J/(kg·K)
h, ρ	IF97 enthalpy and density	J/kg, kg/m³

Method and standards

Energy balance with IAPWS-IF97 liquid enthalpies; the volume flow is at the supply temperature.

Assumptions and limits

- Plain water; for glycol mixtures use the maker's specific heat.

References

- IAPWS-IF97

Report details

Report reference	FCC-MBKR-4DAC (the same inputs always give the same reference)
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Calculator	Chilled Water Flow Rate from Cooling Load
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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/hvac/chillers/chilled-water-flow

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.