Cooling Tower L/G Ratio, Heat Rejection and Fan Power

Liquid-to-gas ratio, heat rejected, air volume and fan shaft and motor power of a mechanical-draught cooling tower from water and air flows.

Method: Cooling tower definitions; fan power P = V̇Δp/η

Input parameters

Unit system: SI

Parameter	Value	Unit
Circulating water flow	3,000.0	t/h
Range (hot − cold water)	10.000	K
Dry air flow	2,700.0	t/h
Density of the moist air at the fan	1.1000	kg/m³
Fan static pressure	150.00	Pa
Fan static efficiency	70.000	%
Motor and drive efficiency	90.000	%

Calculated results

Parameter	Value	Unit
Liquid-to-gas ratio	1.1111	kg/kg
Heat rejected	34.883	MW
Air volume at the fan	2,454,545	m³/h
Fan shaft power	146.10	kW
Motor input power	162.34	kW
Fan motor power as a share of heat rejected (1 % = 10 kW per MW)	0.46537	%

Notes for this case

• Typical L/G for counterflow towers is 0.8–1.5; fan power is usually 0.5–1 % of the heat rejected. The tower's capability against L/G comes from the Merkel calculator or the supplier's curve.

Formula and method

$$L/G = \frac{\dot{m}_w}{\dot{m}_a}, \quad Q = \dot{m}_w c_p R, \quad P_f = \frac{\dot{m}_a}{\rho_a}\frac{\Delta p_s}{\eta_f}$$

Variables

$\dot{m}_w$	Circulating water flow	kg/s
R	Range (hot − cold water)	K
$\dot{m}_a$	Dry air flow	kg/s
ρ_a	Air density at the fan	kg/m³
Δp_s	Fan static pressure	Pa
η_f	Fan static efficiency	-
η_m	Motor and drive efficiency	-
L/G	Liquid-to-gas ratio	kg/kg
Q	Heat rejected	W
$\dot{V}_a$	Air volume at the fan	m³/s
P_f	Fan shaft power	W

P_m	Motor input power	W
P_m/Q	Fan motor power as a share of heat rejected	-
c_p	specific heat of water, 4186	J/(kg·K)

Method and standards

Heat and mass balance definitions.

Assumptions and limits

- Static pressure and efficiency on the same basis.
- Water c_p constant at 4.186 kJ/(kg·K).
- The air volume is the dry-air mass over the moist-air density at the fan. For an induced-draught fan the air is warm and saturated, and its water vapour adds a few per cent to the volume, so the fan volume and power are slightly understated.

References

- Cooling tower definitions; fan power P = V̇Δp/η

Report details

Report reference	FCC-ZSPJ-EAH0 (the same inputs always give the same reference)
Generated	17 November 2026, 19:50 UTC
Calculator	Cooling Tower L/G Ratio, Heat Rejection and Fan Power
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/boilers-power-plant/condensers-cooling/cooling-tower-lg-fan-power

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.