Gas Turbine Output and Heat Rate at Site Ambient and Altitude

Gas turbine output and heat rate at site temperature and altitude from ISO ratings with user temperature coefficients, plus extra inlet pressure loss.

Method: Linear site correction with ISO 2533 pressure

Input parameters

Unit system: SI

Parameter	Value	Unit
ISO rated output	50.000	MW
ISO heat rate (LHV)	10,000	kJ/kWh
Site ambient temperature	35.000	°C
Site altitude	500.00	m
Output loss per kelvin above 15 °C	0.70000	%
Heat rate rise per kelvin above 15 °C	0.18000	%
Extra inlet pressure loss	500.00	Pa
Output loss per 1 kPa inlet loss	1.5000	%

Calculated results

Parameter	Value	Unit
Site atmospheric pressure (ISA)	95.461	kPa
Pressure factor	0.94213	
Temperature factor on output	0.86000	
Site output	40.208	MW
Site heat rate	10,360	kJ/kWh

Notes for this case

• Output scales with air mass flow, so with site pressure (ISA at the altitude) and roughly linearly with temperature (about 0.5–0.9 %/K for heavy-duty units, more for aero-derivatives); heat rate rises about 0.1–0.2 %/K. Altitude barely changes heat rate. Use the maker's correction curves where available; the coefficients here are the user's.

Formula and method

$$P = P_{ISO}\frac{p_a}{101.325}\left[1 - k_P(T_a - 15)\right]\left(1 - k_{in}\Delta p_{in}\right), \quad HR = HR_{ISO}\left[1 + k_{HR}(T_a - 15)\right]$$

Variables

P_{ISO}	ISO rated output	W
HR_{ISO}	ISO heat rate (LHV)	J/J
T_a	Site ambient temperature	K
z	Site altitude	m
k_P	Output loss per kelvin above 15 °C	-
k_{HR}	Heat rate rise per kelvin above 15 °C	-
Δp_{in}	Extra inlet pressure loss	Pa
k_{in}	Output loss per 1 kPa inlet loss	-
p_a	Site atmospheric pressure (ISA)	Pa

f_p	Pressure factor	-
f_T	Temperature factor on output	-
P	Site output	W
HR	Site heat rate	J/J

Method and standards

Site correction.

Assumptions and limits

- Linear corrections near ISO conditions.

References

Linear site correction with ISO 2533 pressure

Report details

Report reference	FCC-TAJ1-CYNB (the same inputs always give the same reference)
Generated	23 November 2026, 17:43 UTC
Calculator	Gas Turbine Output and Heat Rate at Site Ambient and Altitude
Method last reviewed	17 November 2026
Software release	FireCAD Calc, release of 22 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/gas-turbines-combined-cycle/gas-turbine-ambient-correction

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.