Plant Load Factor, Availability, Auxiliary Power and Heat Rate

Plant load factor, availability factor, auxiliary power share, net generation, gross and net heat rate and specific fuel consumption of a power plant over a period.

Method: Central Electricity Authority (India); Review of Performance of Thermal Power Stations: definitions of PLF; ...

Input parameters

Unit system: SI

Parameter	Value	Unit
Rated (installed) capacity	30.000	MW
Length of the period	8,760.0	h
Hours the unit was available to run	8,300.0	h
Gross generation in the period	200,000	MWh
Auxiliary consumption in the period	18,000	MWh
Fuel burnt in the period	180,000	t
Gross calorific value of the fuel	15,000	kJ/kg

Calculated results

Parameter	Value	Unit
Plant load factor	76.104	%
Availability factor	94.749	%
Auxiliary power, share of gross generation	9.0000	%
Net generation	182,000	MWh
Gross heat rate	13,500	kJ/kWh
Net heat rate	14,835	kJ/kWh
Gross efficiency	26.667	%
Net efficiency	24.267	%
Specific fuel consumption (gross)	0.90000	kg/kWh

Formula and method

$$PLF = \frac{E_g}{P_r\, t_p}, \quad PAF = \frac{t_a}{t_p}, \quad APC = \frac{E_{aux}}{E_g}$$

$$HR_g = \frac{m_F GCV}{E_g}, \quad HR_n = \frac{m_F GCV}{E_g - E_{aux}}, \quad SFC = \frac{m_F}{E_g}$$

Variables

P_r	Rated (installed) capacity	W
t_p	Length of the period	s
t_a	Hours the unit was available to run	s
E_g	Gross generation in the period	J
E_{aux}	Auxiliary consumption in the period	J
m_F	Fuel burnt in the period	kg
GCV	Gross calorific value of the fuel	J/kg
PLF	Plant load factor	-

PAF	Availability factor	-
APC	Auxiliary power, share of gross generation	-
E_n	Net generation	J
HR_g	Gross heat rate	J/J
HR_n	Net heat rate	J/J
η_g	Gross efficiency	-
η_n	Net efficiency	-
SFC	Specific fuel consumption (gross)	kg/J

Method and standards

The standard performance definitions: plant load factor on rated capacity, availability on time, auxiliary consumption on gross generation, heat rate on gross calorific value of the fuel. Efficiency is the inverse of heat rate.

Assumptions and limits

- One unit or a plant treated as one unit.
- Fuel weighed and analysed on the same basis.

References

- Central Electricity Authority (India)
- Review of Performance of Thermal Power Stations: definitions of PLF
- availability and auxiliary consumption

Report details

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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/plant-performance/plant-load-factor-availability

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Reopens the calculator with the inputs of this report.