Boiler Rating Conversion (kg/h, kW, BHP, F&A)

Converts a boiler's steam output into heat output (kW, kcal/h, Btu/h), equivalent evaporation from and at 100 °C, and boiler horsepower.

Method: ASME definition of boiler horsepower (34.5 lb/h from and at 212 °F); IAPWS R7-97(2012) IF97

Input parameters

Unit system: SI

Parameter	Value	Unit
Steam output	10,000	kg/h
Steam pressure (absolute)	10.500	bar
Steam condition	Dry saturated	
Steam temperature (superheated only)	250.00	°C
Feedwater temperature	105.00	°C

Calculated results

Parameter	Value	Unit
Heat output	6,494.6	kW
Equivalent evaporation from and at 100 °C	10,362	kg/h
Boiler horsepower	662.12	
Factor of evaporation	1.0362	

Formula and method

$$\dot{Q} = \dot{m}_s\,(h_s - h_{fw}) \qquad F = \frac{h_s - h_{fw}}{h_{fg,100}} \qquad \dot{m}_e = \frac{\dot{Q}}{h_{fg,100}}$$

$$BHP = \frac{\dot{m}_e}{34.5\ \mathrm{lb/h}}$$

Variables

$\dot{m}_s$	steam output	kg/s
p	steam pressure, absolute	Pa
state	saturated or superheated steam	–
T_s	steam temperature (superheated)	K
T_{fw}	feedwater temperature	K
$\dot{Q}$	heat output	W
$\dot{m}_e$	equivalent evaporation from and at 100 °C	kg/s
BHP	boiler horsepower	–
F	factor of evaporation	–
h_s	steam enthalpy	J/kg
h_{fw}	feedwater enthalpy	J/kg
$h_{fg,100}$	latent heat at 100 °C, computed from IF97 (about 2256.5 kJ/kg)	J/kg

Method and standards

Heat output from IAPWS-IF97 enthalpies; equivalent evaporation from and at 100 °C with the IF97 latent heat at 100 °C; boiler horsepower as 34.5 lb/h of water evaporated from and at 212 °F (the ASME and ABMA definition).

Assumptions and limits

- Steam dry saturated or at the given superheat; no blowdown.

References

• ASME definition of boiler horsepower (34.5 lb/h from and at 212 °F)
• IAPWS R7-97(2012) IF97

Report details

Report reference	FCC-8PV2-XM09 (the same inputs always give the same reference)
Generated	17 November 2026, 19:46 UTC
Calculator	Boiler Rating Conversion (kg/h, kW, BHP, F&A)
Method last reviewed	10 November 2026
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/boilers-power-plant/boilers/boiler-rating-conversion

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Reopens the calculator with the inputs of this report.