Grate Area from Fuel Burning Rate

Grate area a solid-fuel boiler needs from the fuel burnt per hour and the burning rate per m² of grate, with the grate heat release and the grate length for a width.

Method: Grate loading (textbook)

Input parameters

Unit system: SI

Parameter	Value	Unit
Fuel burnt	1,000.0	kg/h
Burning rate per m² of grate Your figure for the fuel and grate type; it decides the area.	0.041667	kg/(m²·s)
Calorific value of the fuel (GCV or NCV, as your grate limit is quoted)	16,747	kJ/kg
Grate width	2.0000	m

Calculated results

Parameter	Value	Unit
Grate area	6.6667	m²
Grate length for the width	3.3333	m
Heat release per m² of grate	697.80	kW/m²
Heat input of the fuel	4,652.0	kW

Formula and method

$$A_g = \frac{\dot{m}_f}{r_b}, \quad L_g = \frac{A_g}{B}$$

$$q_g = r_b\, GCV, \quad \dot{Q} = \dot{m}_f GCV$$

Variables

$\dot{m}_f$	Fuel burnt	kg/s
r_b	Burning rate per m² of grate	kg/(m²·s)
GCV	Calorific value of the fuel	J/kg
B	Grate width	m
A_g	Grate area	m²
L_g	Grate length for the width	m
q_g	Heat release per m² of grate	W/m²
$\dot{Q}$	Heat input of the fuel	W

Method and standards

Grate area from the fuel to be burnt and the permitted burning rate.

Assumptions and limits

- Burning rate entered by the user.
- Whole grate area active.
- The heat release is on the calorific basis you enter (gross or net); compare it only with limits on the same basis.
- The burning rate is not checked against typical values for the grate type; take it from the grate maker.

References

- Grate loading (textbook)

Report details

Report reference	FCC-XX9F-DECY (the same inputs always give the same reference)
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Calculator	Grate Area from Fuel Burning Rate
Method last reviewed	12 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/grate-area-burning-rate

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.