Travelling Grate Speed and Residence Time

Speed of a travelling or chain grate stoker from the fuel feed, bulk density, grate width and fuel bed depth, with the fuel's residence time on the grate.

Method: Continuity of the fuel bed on the grate

Input parameters

Unit system: SI

Parameter	Value	Unit
Fuel feed rate	4,000.0	kg/h
Bulk density of the fuel on the grate	800.00	kg/m³
Effective grate width	3.0000	m
Fuel bed depth at the gate	150.00	mm
Active grate length	6.0000	m

Calculated results

Parameter	Value	Unit
Grate speed	0.18519	m/min
Residence time on the grate	32.400	min

Notes for this case

- The fuel must burn out within the residence time; the time needed depends on the fuel and is set by the stoker maker.

Formula and method

$$v = \frac{\dot{m}_f}{\rho_b W \delta} \qquad t = \frac{L}{v}$$

Variables

$\dot{m}_f$	fuel feed	kg/s
ρ_b	fuel bulk density	kg/m³
W	grate width	m
δ	bed depth	m
L	active grate length	m
v	grate speed	m/s
t	residence time	s

Method and standards

Continuity: the fuel volume fed equals bed cross-section times grate speed.

Assumptions and limits

- Uniform bed depth across the width; no slip of the bed on the grate.

References

- Continuity of the fuel bed on the grate

Report details

Report reference	FCC-VCKK-Q1D3 (the same inputs always give the same reference)
Generated	17 November 2026, 19:50 UTC
Calculator	Travelling Grate Speed and Residence Time
Method last reviewed	11 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/combustion/travelling-grate-speed

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.