Steam Velocity in a Pipe

Velocity of saturated or superheated steam in an existing pipe from flow, pressure, temperature and inside diameter, with specific volume from IAPWS-IF97.

Method: IAPWS-IF97

Input parameters

Unit system: SI

Parameter	Value	Unit
Steam flow	10,000	kg/h
Steam pressure (shown as gauge)	10.000	bar g
Steam condition	Dry saturated	
Steam temperature (superheated only)	250.00	°C
Pipe inside diameter DN150 schedule 40 is 154.1 mm inside; DN100 schedule 40 is 102.3 mm.	154.10	mm

Calculated results

Parameter	Value	Unit
Steam velocity	26.396	m/s
Volume flow	1,772.3	m³/h
Specific volume	0.17723	m³/kg
Density	5.6423	kg/m³

Formula and method

$$\dot{V} = \dot{m}\, v_s \qquad v = \frac{\dot{V}}{\pi D_i^2/4} \qquad \rho = \frac{1}{v_s}$$

Variables

$\dot{m}$	steam flow	kg/s
p	steam pressure	Pa
state	saturated or superheated	–
T_s	steam temperature	K
D_i	inside diameter	m
v	velocity	m/s
$\dot{V}$	volume flow	m³/s
v_s	specific volume	m³/kg
ρ	density	kg/m³

Method and standards

Continuity with IAPWS-IF97 specific volume.

Assumptions and limits

- Dry steam; velocity at the stated pressure only. Wet steam cannot be entered.
- The 60 m/s warning is a screening level of this page, not a cited limit, and applies to both states; saturated mains are usually kept lower.
- The pressure is shown as gauge in every unit system (bar g, kg/cm² g, psig).

References

- IAPWS-IF97

Report details

Report reference	FCC-14BT-1VE8 (the same inputs always give the same reference)
Generated	17 November 2026, 19:36 UTC
Calculator	Steam Velocity in a Pipe
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/steam/steam-velocity-check

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.