Bernoulli Equation with Head Loss Between Two Points

Pressure at a second point of a pipe or duct from the pressure, velocities, elevations and head loss between two points, by Bernoulli's equation with losses.

Method: Steady-flow energy equation for incompressible flow (Textbook fluid mechanics (White, Fluid Mechanics))

Input parameters

Unit system: SI

Parameter	Value	Unit
Pressure at point 1 Gauge or absolute, but the same basis for both points.	300.00	kPa
Velocity at point 1	1.5000	m/s
Elevation of point 1	0	m
Velocity at point 2	3.0000	m/s
Elevation of point 2	12.000	m
Head loss between the points	4.0000	m
Fluid density	998.00	kg/m³

Calculated results

Parameter	Value	Unit
Pressure at point 2	140.04	kPa
Total head at point 1	30.768	m
Total head at point 2	26.768	m

Formula and method

$$\frac{p_1}{\rho g} + \frac{v_1^2}{2g} + z_1 = \frac{p_2}{\rho g} + \frac{v_2^2}{2g} + z_2 + h_L$$

Variables

p_1	Pressure at point 1	Pa
v_1	Velocity at point 1	m/s
z_1	Elevation of point 1	m
v_2	Velocity at point 2	m/s
z_2	Elevation of point 2	m
h_L	Head loss between the points	m
ρ	Fluid density	kg/m³
p_2	Pressure at point 2	Pa
H_1	Total head at point 1	m
H_2	Total head at point 2	m

Method and standards

Energy conservation along a streamline.

Assumptions and limits

- Incompressible, steady.
- A negative p_2 is flagged: impossible on an absolute basis, and on a gauge basis the absolute pressure must stay above the vapour pressure.

References

- Steady-flow energy equation for incompressible flow (Textbook fluid mechanics (White, Fluid Mechanics))

Report details

Report reference	FCC-TTJE-JS3Z (the same inputs always give the same reference)
Generated	17 November 2026, 19:48 UTC
Calculator	Bernoulli Equation with Head Loss Between Two Points
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/mechanical/fluid-mechanics/bernoulli-equation

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.