Minor Losses in Fittings and Valves (K Method)

Pressure drop and head loss through pipe fittings and valves from the sum of their K values and the velocity, with the equivalent pipe length for a friction factor.

Method: Resistance coefficient method; Δp = K ρ v²/2 (Textbook fluid mechanics (White, Fluid Mechanics))

Input parameters

Unit system: SI

Parameter	Value	Unit
Volume flow	50.000	m³/h
Pipe inside diameter	102.30	mm
Sum of the K values of the fittings From the fitting maker or a published table for each bend, tee and valve; add them up.	6.5000	
Fluid density	998.00	kg/m³
Darcy friction factor of the pipe (for the equivalent length)	0.019000	

Calculated results

Parameter	Value	Unit
Velocity	1.6898	m/s
Velocity head	0.14558	m
Head loss Σ K v²/2g	0.94627	m
Pressure drop	9.2612	kPa
Equivalent pipe length Σ K d/f	34.997	m

Formula and method

$$h_L = \sum K \frac{v^2}{2g}, \quad \Delta p = \sum K \frac{\rho v^2}{2}, \quad L_e = \frac{\sum K\, d}{f}$$

Variables

Q	Volume flow	m³/s
d	Pipe inside diameter	m
$\sum K$	Sum of the K values of the fittings	-
ρ	Fluid density	kg/m³
f	Darcy friction factor of the pipe (for the equivalent length)	-
v	Velocity	m/s
$v^2/2g$	Velocity head	m
h_L	Head loss Σ K v²/2g	m
Δp	Pressure drop	Pa
L_e	Equivalent pipe length Σ K d/f	m

Method and standards

Losses proportional to the velocity head.

Assumptions and limits

- Turbulent flow, K constant.

References

- Resistance coefficient method
- Δp = K ρ v²/2 (Textbook fluid mechanics (White, Fluid Mechanics))

Report details

Report reference	FCC-X4Q8-6J3X (the same inputs always give the same reference)
Generated	17 November 2026, 19:37 UTC
Calculator	Minor Losses in Fittings and Valves (K Method)
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/minor-losses-fittings

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.