Balancing Valve Kv and Pressure Drop

Kv a balancing valve needs to pass a design flow at a set pressure drop, and the pressure drop across a valve of chosen Kvs at that flow.

Method: K_v = Q√(SG/Δp); Q in m³/h and Δp in bar (IEC 60534 definition of K_v)

Input parameters

Unit system: SI

Parameter	Value	Unit
Design flow	2.5000	m³/h
Pressure drop to absorb	10.000	kPa
Specific gravity	1.0000	
Kvs of the selected valve (fully open), metric Metric Kv (m³/h at 1 bar) in every unit system. A US Cv converts as Kv = Cv/1.156.	4.0000	

Calculated results

Parameter	Value	Unit
Kv required	7.9057	
Pressure drop of the selected valve fully open	39.062	kPa
Kv fraction to set	197.64	%

Notes for this case

- The selected valve is too small: even fully open it drops more than the target.
- Read the handwheel setting for this Kv from the maker's chart. Aim for at least 3 kPa across the valve at design flow so the measurement is accurate.

Formula and method

$$K_v = \dot{V}\sqrt{\frac{SG}{\Delta p}}, \quad \Delta p_{open} = SG\left(\frac{\dot{V}}{K_{vs}}\right)^2 \quad (\mathrm{m^3/h},\ \mathrm{bar})$$

Variables

$\dot{V}$	Design flow	m³/s
Δp	Pressure drop to absorb	Pa
SG	Specific gravity	-
K_{vs}	Kvs of the selected valve (fully open), metric	-
K_v	Kv required	-
Δp_{open}	Pressure drop of the selected valve fully open	Pa
K_v/K_{vs}	Kv fraction to set	-

Method and standards

K_v definition.

Assumptions and limits

- Turbulent, non-flashing liquid.
- Kv and Kvs are metric (m³/h at 1 bar) in every unit system; convert a US Cv by Kv = Cv/1.156.

References

- K_v = Q√(SG/Δp)
- Q in m³/h and Δp in bar (IEC 60534 definition of K_v)

Report details

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Release checks	2 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/hvac/chillers/balancing-valve-kv

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.