



Useful Formulas

Symbols

		International Standard SI -units
K_v	Kv-value or flow coefficient	
P	Pressure	Pa
P_d	Dynamic pressure	Pa
Δp	Pressure loss or differential pressure	Pa
Δp_p	Pump pressure	Pa
Δp_v	Pressure drop valve	Pa
q_v	Flow	M ³ /sec.
R	Resistance	Pa/(kg/s) ⁿ
R_v	Resistance for valve	Pa/(kg/s) ⁿ
ξ	Loss coefficient	-
ℓ	Density	kg/m ³
ℓ_r	Density relative to water	-
c	Velocity	m/sec
A	Area of the tube	M ²
n	Exponent	-

Formulas

Dynamic pressure:

$$P_d = 1/2 * \xi * C^2 \quad \text{where } c = q_v/A$$

Pressure drop (single resistance)

$$\Delta p = \zeta \cdot P_d$$

Resistance of valve

$$R_v = 1.27 \cdot 10^{12} \cdot \ell_r \cdot \ell^{-n} \cdot q_v^{2-n} \cdot (1/K_v^2)$$

Pressure drop valve

$$\Delta p_v = 1.27 \cdot 10^{12} \cdot \ell_r \cdot \ell^{-n} \cdot q_v^{2-n} \cdot (q_v/K_v)^2$$

$$\Delta p_v = R_v \cdot (q_v \cdot \ell)^n$$

Flow Rate - Pipe Resistance

$$q_v^n = \Delta p / (R \cdot \ell^n)$$

Flow Equation

$$q_v = K_v \sqrt{\Delta p}$$



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