

Orifice sizing calculations

For air at 21°C

$$C_d := 0.82$$

$$Q := 10 \frac{l}{min}$$

$$\rho := 1.2 \frac{kg}{m^3}$$

$$\Delta P := 1 \text{ bar}$$

$$A := \frac{Q}{C_d \cdot \sqrt{\Delta P} \cdot \sqrt{\frac{2}{\rho}}} = 0.498 \text{ mm}^2$$

$$D := \sqrt{\frac{A}{\pi}} \cdot 2 = 0.796 \text{ mm}$$

$$TOL := 5\%$$

$$A_{lower} := \frac{(Q - Q \cdot TOL)}{C_d \cdot \sqrt{\Delta P} \cdot \sqrt{\frac{2}{\rho}}} = 0.473 \text{ mm}^2$$

$$D_{lower} := \sqrt{\frac{A_{lower}}{\pi}} \cdot 2 = 0.776 \text{ mm}$$

$$A_{upper} := \frac{(Q + Q \cdot TOL)}{C_d \cdot \sqrt{\Delta P} \cdot \sqrt{\frac{2}{\rho}}} = 0.523 \text{ mm}^2$$

$$D_{upper} := \sqrt{\frac{A_{upper}}{\pi}} \cdot 2 = 0.816 \text{ mm}$$

$$D_{TOL} := \frac{D_{upper} - D_{lower}}{2} = 0.02 \text{ mm}$$