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Introduction

The pink painted variables are DATA The blu painted text is COMMENT

PROBLEM DATA

$DN := 6in$

fluid: WATER

$\rho := 1000 \cdot kg \cdot m^{-3}$ density

$G_f := 1$ specific density

$P1 := 35 \cdot 10^5 \cdot Pa$ upstream absolute pressure

$P2 := 22.9 \cdot 10^5 \cdot Pa$ downstream pressure

$P_v := 0.0386 \cdot 10^5 \cdot Pa$ vapor pressure

$m\_punto := 300 \cdot kg\,s^{-1}$ mass flow rate

$N1 := \left[0.0007598 \cdot \left(kg \cdot s^{-1}\right) \cdot \left(gal^{-1} \cdot min\right) \cdot Pa^{-0.5} \cdot psi^{0.5}\right]$ dimensional conversion coefficient

DESIGN CALCULATIONS

$$Cv := \frac{m\_punto}{N1 \cdot \sqrt{(P1 - P2) \cdot G_f}} \qquad Cv = 358.946\, gal\, min^{-1} \cdot psi^{-0.5}$$

Valve Flow Coefficient

CHECK FOR NO CAVITATION ---> $\Delta P - \Delta P_{max} < 0$

$\Delta P := P1 - P2$ $\Delta P = 1.21 \times 10^6\, Pa$

1st choice:

$F_L := \sqrt{0.3}$ $F_L = 0.548$ regulating ball valve

$\Delta P_{max} := F_L^{\,2}\left(P1 - 0.956 \cdot P_v\right)$ $\Delta P_{max} = 1.049 \times 10^6\, Pa$

$\Delta P - \Delta P_{max} = 1.611 \times 10^5\, Pa$

La scelta di una "regulating ball valve" produce cavitazione

2nd choice:

$F_L := \sqrt{0.6}$ $F_L = 0.775$ globe valve

$\Delta P_{max} := F_L^{\,2}\left(P1 - 0.956 \cdot P_v\right)$ $\Delta P_{max} = 2.098 \times 10^6\, Pa$

$\Delta P - \Delta P_{max} = -8.878 \times 10^5\, Pa$

La scelta di una "globe valve" con un coefficiente di recupero più elevato evita la cavitazione