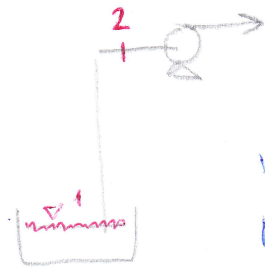


14-2 (3-11)

III. vsed.



$$\frac{v_1^2}{2} + \frac{p_1}{\rho} + h_1 g = \frac{v_2^2}{2} + \frac{p_2}{\rho} + h_2 g + e_{dis}$$

$$v_1 \approx 0$$

$$p_2 \geq p^0$$

$$h_1 = 0$$

$$h_2 = h$$

$$\frac{p_1}{\rho} = \frac{v^2}{2} + \frac{p^0}{\rho} + h g + \lambda \frac{h}{d} \frac{v^2}{2}$$

$$\frac{p_1 - p^0}{\rho} - \frac{v^2}{2} = \left(g + \lambda \frac{v^2}{2d} \right) h$$

$$\dot{V} = 200 \text{ l/min}$$

metanol

$$\rho = 778,8 \text{ kg/m}^3$$

$$\gamma = 0,515 \cdot 10^{-3} \text{ Pa}\cdot\text{s}$$

$$p^0 = 21843 \text{ Pa}$$

sklo

$$d = 60 \text{ mm}$$

$$p_1 = 9,5 \cdot 10^6 \text{ Pa}$$

$$v = \frac{\dot{V}}{A} = \frac{200 \cdot 10^{-3} / 60 \cdot 4}{\pi \cdot 0,06^2} = 1,179 \text{ m/s}$$

$$E_A = 0,01 \text{ mm}$$

$$Re = \frac{v \cdot d \cdot \rho}{\gamma} = \frac{1,179 \cdot 0,06 \cdot 778,8}{0,515 \cdot 10^{-3}} = 106575$$

$$\lambda = \frac{0,25}{\left\{ \log \left[\left(\frac{6,81}{106575} \right)^{0,9} + \frac{0,01/60}{3,7} \right] \right\}^2} = 0,01853$$

$$\frac{95000 - 21843}{778,8} - \frac{1,179^2}{2} = \left(9,81 + 0,01853 \frac{1,179^2}{2 \cdot 0,06} \right) h$$

$$93,936 - 0,6950 = (9,81 + 0,2146) h$$

$$h = 9,301 \text{ m}$$

Pro zajímavost etky v Bernoulliho rovnici:

$$\frac{\Delta p}{\rho} = 93,94 \text{ J/kg}$$

$$\frac{v^2}{2} = 0,695 \text{ J/kg}$$

$$g \cdot h = 93,24 \text{ J/kg}$$

$$e_{dis} = 1,9964 \text{ J/kg}$$

přínestek kin. energie	+	přínestek potenciální energie	+	disipovaná energie	=	potles tlakové energie
0,7	+	93,2	+	2,0	=	93,9 J/kg