14-5 Vk $m_s = ?$ $\Delta p = 152\ kPa$ $t = 20\,°C$ voda $\varrho_F = 1000$

Doporučení $\tau_F = 1\ hod$

$S_f = 50\ m^2$ $S_f' = 0.1\ m^2$ $\Delta p' = 101\ kPa$

$\tau_{F1}' = 200\ s$ $V_{F1}' = 0.005\ m^3$

$\tau_{F2}' = 1500\ s$ $V_{F2}' = 0.014\ m^3$

$w_s = 0.1$

$1 - w_k = 0.32$

$$q_F^2 + 2 q_F q_m - 2 k_F \tau_F = 0$$

$q_{F1}' = 0.005 / 0.1 = 0.05\ m$

$q_{F2}' = 0.014 / 0.1 = 0.14\ m$

$0.05^2 + 2 \cdot 0.05 \cdot q_m - 2 k_F' \cdot 200 = 0$ / : 200

$0.14^2 + 2 \cdot 0.14\, q_m - 2 k_F' \cdot 1500 = 0$ / : (−1500)

$-0.0000056667 + 0.03133\, q_m = 0$

$q_m = 0.0018086$

$k_F' = 0.000006702 = 6.702 \cdot 10^{-6}\ m^2/s$

$$k_F' = \frac{\Delta p_F'}{\beta \cdot \varrho_F} \qquad k_F = \frac{\Delta p_F}{\beta \varrho_F}$$

$$\frac{k_F'}{k_F} = \frac{\Delta p_F'}{\Delta p_F} \Rightarrow k_F = k_F' \cdot \frac{\Delta p_F}{\Delta p_F'} = 6.702 \cdot 10^{-6} \cdot \frac{152}{101} = 1.0086 \cdot 10^{-5}\ m^2/s.$$

velký ~~kulatý~~ filtr:

$q_F^2 + 2 \cdot 3600\, q_F \cdot 0.0018086 - 2 \cdot 1.0086 \cdot 10^{-5} \cdot 3600 = 0$

$q_F^2 + 0.0036172\, q_F - 0.0726192 = 0$

$D = 6^2 - 4ac \Rightarrow \sqrt{D} = 0.53897$

$$q_F = \frac{-0.0036172 + 0.53897}{2} = 0.26768\ m$$

$V_F = q_F \cdot S_f = 0.26768 \cdot 50 = 13.384\ m^3 \Rightarrow m_F = 13\,384\ kg$

$$\left.\begin{aligned} m_s &= m_f + m_k \\ m_s w_s &= m_k w_k \end{aligned}\right\} m_s = m_f + \frac{m_s w_s}{w_k} \Rightarrow m_s w_k = m_F w_k + m_s w_s \Rightarrow m_s (w_k - w_s) = m_F w_k$$

$$m_s = m_F \cdot \frac{w_k}{w_k - w_s} = 13384 \cdot \frac{0.68}{0.68 - 0.1} = 15\,692\ kg$$