

$$1.) b = 800 \text{ mm} = 0,8 \text{ m}$$

$$\alpha = 14^\circ$$

$$\gamma = 18^\circ$$

$$\rho = 0,75 \text{ kg/dm}^3 \cdot \frac{10^{-3}}{10^{-3}} = \text{t/m}^3$$

$$\psi = 0,9$$

$$H = 14,52 \text{ m}$$

$$G_p = 0,45 \text{ kN/m} = 450 \text{ N/m}$$

$$W_u = 0,045$$

$$F_o = W_u \cdot l \cdot (G_p + G_m) + G_m \cdot H$$

$$\text{tg } 14^\circ = \frac{H}{l} \Rightarrow l = \frac{14,52}{\text{tg } 14^\circ} = 58,23 \text{ m}$$

$$A = \frac{b^2}{4} \text{tg } \gamma = \frac{0,64}{4} \text{tg } 18^\circ = 0,0364 \text{ m}^2$$

$$b_1 = 0,95 - 0,05 = 0,67$$

$$L = \frac{H}{\sin \alpha} = 14,52$$

$$V = A \cdot L = \frac{0,0364 \cdot 60}{\sin 14^\circ} = 60 \text{ m}^3$$

$$m = V \cdot \rho = 2,184 \cdot 0,75 = 1,638 \text{ t}$$

$$G_m = 1,638 \cdot 9,81 = 16,068 \text{ kN}$$

$$G_m = \frac{m \cdot g}{l} = \frac{1,638 \cdot 9,81}{58,23} = 0,267 \text{ kN/m}$$

$$F_o = 0,045 \cdot 58,23 \cdot (450 + 267) + 267 \cdot 14,52 = 5755,63 \text{ N}$$

$$3) Q_k = 6250 \text{ km}^3/\text{h} = 2180,875 \text{ t/h}$$

$$G_p = 0,65 \text{ kN/m}$$

$$\alpha = 18^\circ$$

$$\eta = 0,35$$

$$\rho = 0,736 \text{ t/m}^3$$

$$l = 13314 \text{ cm} = 133,14 \text{ m}$$

$$N = 348$$

$$V_k = 47800 \text{ cm}^3 = 0,0478 \text{ m}^3$$

$$W_u = 0,045$$

$$m_k = V_k \cdot \rho = 0,0478 \cdot 0,736 = 0,0351 \text{ t}$$

$$G_m = \frac{m_k \cdot N \cdot g}{l} = \frac{0,0351 \cdot 348 \cdot 9,81}{133,14} = 0,8508 \text{ N/m}$$

$$(l = \frac{L}{\cos 18^\circ}) L = \frac{l}{\cos 18^\circ} = 140 \text{ m}$$

$$v = \frac{Q_g}{G_m \cdot 3,6} = \frac{2180,875 \cdot 9,81}{0,8508 \cdot 3,6} = 6,98 \text{ m/s}$$

$$F_0 = K_v \cdot l \cdot (G_p + G_m) + G_m \cdot H = 0,045 \cdot 133,14 \cdot (650 + 850,8) + 850,8 \cdot 43,28$$

$$H = \sqrt{L^2 - l^2} = \sqrt{140^2 - 133,14^2} = 43,28 \text{ m}$$

$$F_0 = 45814,367 \text{ N}$$

$$P_m = \frac{F_0 \cdot v}{\eta} = \frac{F_0 \cdot v}{1000 \eta} = 376,486 \text{ kW}$$

2) $Q_v = 90 \text{ m}^3/\text{h}$
 $A = 314 \text{ cm}^2 = 0,0314 \text{ m}^2$
 $v_z = 0,625 \text{ kg/s}$
 $\rho_m = 715 \text{ kg/m}^3$
 $H = 8 \text{ m}$
 $B = 0,0000012$
 $P_v = 0,25$
 $a = 1,2$
 $\sum L_v + \sum L_o = 115 \text{ m}$
 $\sum L_{ek} = 16 \text{ m}$
 $\rho_z = 1,6 \text{ kg/m}^3$
 $P_k = ?$

$$v_{z2} = \frac{v_z}{\rho_z} = \frac{0,625}{1,6} = 0,3906 \text{ m}^3/\text{s}$$

$$A = r^2 \pi \Rightarrow r = \sqrt{\frac{A}{\pi}} = \sqrt{\frac{0,0314}{\pi}} = 0,1$$

$$D = 0,2$$

$$v_2 = \frac{4 v_{z2}}{D^2 \pi} = \frac{4 \cdot 0,3906}{0,2^2 \cdot 3,14} = 12,439 \text{ m/s}$$
~~$$P_h = H \cdot \rho_z \cdot \psi$$~~

$$\psi = \frac{Q_m}{3,632 \cdot v_{z2}} = \frac{64,35}{3,6 \cdot 1,6 \cdot 0,3906} = 28,6$$

$$Q_m = Q_v \cdot \rho_m = 90 \cdot 715 = 64,35 \text{ t/h}$$

$$P_h = \frac{H \cdot \rho_z \cdot \psi \cdot g}{10^5} = \frac{8 \cdot 1,6 \cdot 28,6 \cdot 9,81}{10^5} = 0,359$$

$$P_p = \sqrt{1 + \frac{B \cdot \psi \cdot L_v \cdot v_z^2}{D}} \pm P_h =$$

$$= \sqrt{1 + \frac{0,0000012 \cdot 28,6 \cdot 115 \cdot 12,439^2}{0,2}} + P_h =$$

$$= 2,01334 + 0,0359 = 2,0492 \text{ [bara]}$$

$$P_k = P_p \cdot a + P_v = 2,0492 \cdot 1,2 + 0,25 =$$

$$= 2,709 \text{ [bara]}$$