

$$1\text{bar} = \frac{10^5 N}{m^2} = 10^5 Pa = 100 kPa$$

$$A1 = \pi r1^2 = 502,65 \cdot 10^{-3}$$

$$A2 = \frac{1}{4} \pi d2^2 = 0,0113 m^2$$

$$v2 = \frac{375}{3,6} = 104,17 \text{ m/s}$$

$$v1 = v2 \left( \frac{d2}{d1} \right)^2 = 2,344 \text{ m/s}$$

$$P = 1250(9,8)(312) = 3,82 \text{ MW} = (p2 A2 - G) v2 = (0,0113 p2 - 1250(9,81)) 104,17$$

$$p2 = 43,3 \text{ bar}$$

$$p2 - p1 = 1 \text{ bar} = 10^5 \text{ N/m}^2$$

$$\frac{\eta P}{A1 v1} + \rho g h1 + \frac{1}{2} \rho v1^2 = (p2 - p1) + \rho g h2 + \frac{1}{2} \rho v2^2$$

$$\frac{\eta P}{A1 v1} = p2 - p1 + \rho g h2 + \frac{1}{2} \rho v2^2 - \left( + \rho g h1 + \frac{1}{2} \rho v1^2 \right)$$

$$\frac{\eta P}{A1 v1} = (p2 - p1) + \rho g (h2 - h1) + \frac{1}{2} \rho (v2^2 - v1^2)$$

$$\frac{\eta P}{A1 v1} = 10^5 + 1000(9,81)(30) + 500(104,17^2 - 2,344^2)$$

$$\frac{\eta P}{A1 v1} = 58,17 \cdot 10^5 \text{ N/m}^2$$

$$P_{elektrisch} = \frac{A1 v1 (58,17 \cdot 10^5)}{\eta} = \frac{502,65 \cdot 10^{-3} (2,344) (58,17 \cdot 10^5)}{0,7} = 9,8 \text{ MW}$$

Hydraulisch vermogen 6,86 MW (2 pompen van 3,5 MW elk, 3<sup>e</sup> pomp reserve)

$$p2 - p1 = 1 \text{ bar}$$

$$p1 = p2 - 10^5 = 42,3 \text{ bar}$$

druk aan de ingang

$$\frac{\eta P}{A1 v1} + p1 = 58,17 + 42,3 = 100,5 \text{ bar}$$