
BAB VI

TUGAS KHUSUS

VI.1 Cooling Water Pump memiliki data dan spesifikasi sebagai berikut :

1. Pump item : Cooling Water Pump
2. Sp. GR : $\rho \text{ zat} / \rho \text{ air} = \frac{997 \text{ Kg/m}^3}{997 \text{ Kg/m}^3} = 1$
3. Kapasitas rata-rata : $116 \text{ m}^3/\text{h}$
4. Suction Pressure : $1 \text{ atm} = 1,0332 \text{ kg/cm}^2 \text{ A} = 0,332 \text{ kg/cm}^2$
5. Discharge Pressure : 6 kg/cm^2
6. Putaran motor : 1480 rpm
7. Tegangan motor : 380 V
8. Kuat arus motor : 67,3 A

1) Head

$$P_d = 6 \text{ kg/cm}^2$$

$$= 588399 \text{ N/m}^2$$

$$P_s = 0,332 \text{ kg/cm}^2$$

$$= 3258,7497 \text{ N/m}^2$$

$$P_{\text{fluida}} = \text{Sp. GR} \times \rho \text{ air}$$

$$= 1 \times 997 \text{ kg/m}^3$$

$$= 997 \text{ kg/m}^3$$

$$g \text{ (gravitasi)} = 9,81 \text{ m/s}^2$$

$$H = \frac{P_d - P_s}{\rho_{\text{fluida}} \cdot g}$$

$$= 52,5527 \text{ m} \times \frac{1 \text{ ft}}{0,304 \text{ m}}$$

$$= 172,8708 \text{ ft}$$

2) Daya fluida

$$Q = \text{kapasitas pompa}$$

$$= 116 \text{ m}^3/\text{hr} \times \frac{35,31 \text{ ft}^3/\text{s}}{3600 \text{ m}^3/\text{hr}}$$

$$= 1,13792 \text{ ft}^3/\text{s} \times 448,86 \frac{\text{Gallon}/\text{menit}}{\text{ft}^3/\text{s}}$$

$$= 510,7667 \text{ Gallon/menit}$$

$$\begin{aligned} P_{\text{fluida}} &= \frac{H.Q.SG}{3960} \\ &= \frac{172,8708 \times 510,7667 \times 1}{3960} \\ &= 22,2971 \end{aligned}$$

3) Daya Motor

$$A = 67,3 \text{ Ampere}$$

$$V = 380 \text{ Volt}$$

$$\cos \phi = 0,77$$

$$N = 3$$

$$\begin{aligned} P_{\text{motor}} &= \frac{A.V.\cos \phi.n^{0,5}}{746} \\ &= 45,7205 \text{ HP} \end{aligned}$$

4) Efisiensi pompa

$$\begin{aligned} \eta &= \frac{p_{\text{fluida}}}{p_{\text{motor}}} \times 100\% \\ &= \frac{22,2971}{45,7205} \times 100\% \\ &= 48,7682 \% \end{aligned}$$

VI.2 Menghitung daya kompresor dan daya poros kompresor oksigen jenis kompresor reciprocating compressor multi stage dengan efisiensi 80%

$$Q_s : 3.500 \text{ m}^3/\text{jam} = 0,97 \text{ m}^3/\text{detik}$$

$$P_s (\text{Tekanan awal}) : 1 \text{ atm} = 101.325 \text{ pa}$$

$$P_d (\text{Tekanan akhir}) : 30 \text{ kg/cm}^2 = 29,0352 \text{ atm} = 294.199 \text{ pa}$$

$$N = 1,4$$

$$\text{Efisiensi} = 80\%$$

$$P_{ad} = \frac{P_s Q}{6000} \frac{mn}{n-1} \left[\left[\frac{P_d}{P_s} \right]^{\frac{n-1}{mn}} - 1 \right] \text{kw}$$

$$P_{ad} = \frac{10130 \times 2}{6000} \times \frac{1,4}{1,4-1} \left[\left[\frac{294199}{10130} \right]^{\frac{1,4-1}{1,4}} - 1 \right] = 19,4207 \text{ KW}$$

$$P_{\text{poros}} = \frac{P_{ad}}{\eta_{\text{komp}}} = \frac{19,4207}{0,8} = 24,2758 \text{ KW}$$