Calculation Pump

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Design Pump

Pipe Dimeter = 0.25 m.

Pipe Length = 30 m

Fritcion Factor = 0.015

Pile Flow = Q = A x V

$V = Q / A = 0.032\ m^3/s / (3.14 \times 0.25^2/4)$

$= 0.625$ m/s

Re = VD/v = 0.314 x 0.25 / 6 x 10 ^ -4 = 271

Since The Reynolds Number is Less Than 2000 , The flow is Laminar

hf = 32vLV/gD^2

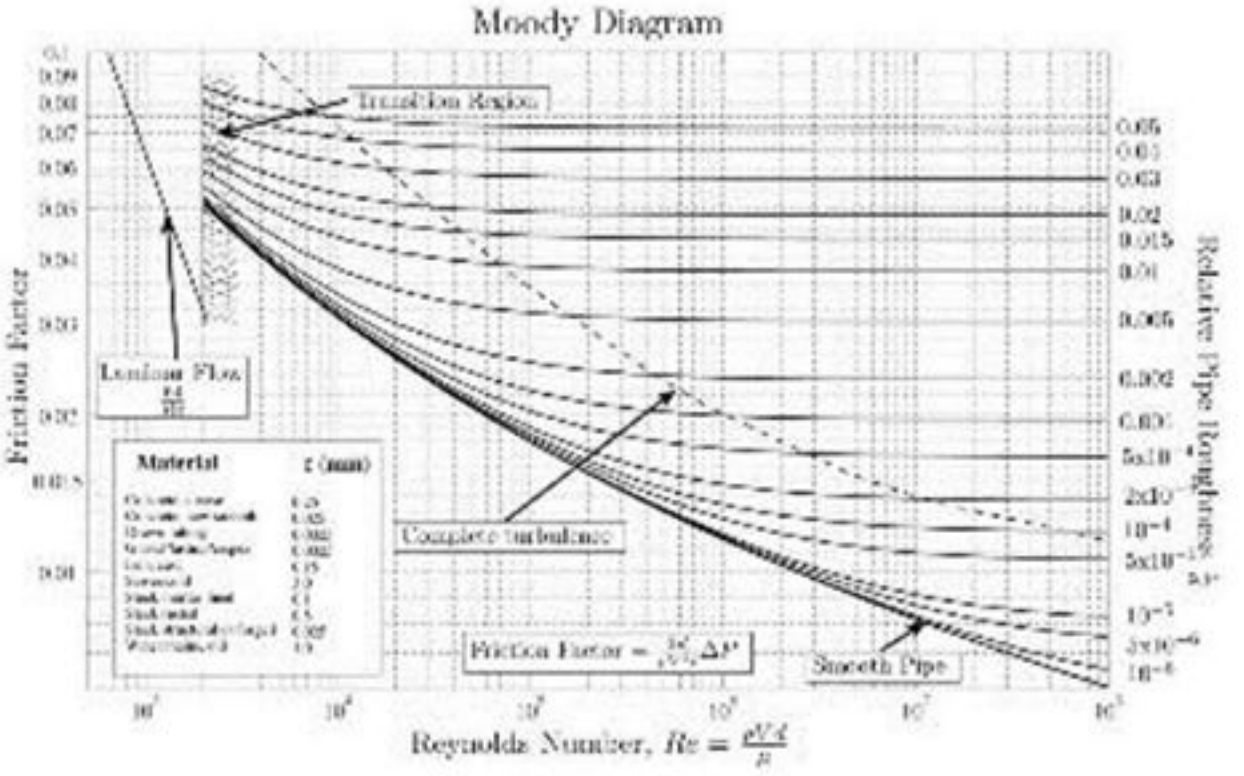
= 0.46

Hf of Ball Valve = KV^2/2g

= 8 x 0.5 x 0314 ^2 / 2 x 9.81 = 0.021 m

Hf of Bend = KV^2/2g

= 35 x 0.35 x 0314 ^2 / 2 x 9.81 = 0.06 m



Friction Factor = 0.015

Hf of Along Pile = fL/D x V^2 / 2g

= 0.014 x 30 / 0.25 x 0.318^2 / 2 x 9.81

= 1 m

Energy Equ.

$$P1/r + V1^2/2g + Z1 = P2/r + V2^2/2g + Z2 + hf$$

P1 = P2 = Pressure

$$Hp = (Z1 - Z2) + Sum(h_L)$$

$$= 3 + 1 + 0.46 + 0.06 + 0.21$$

$$= 4.73 \text{ m}$$

$$\text{Power Pump} = r \times Q \times Hp = 9.806 \times 0.032 \times 4.73$$

$$= 1.48 \text{ kw}$$

Power Moter

$$Pm = Pw = 1.48 / (50/100) = 2.98 \text{ kw}$$

Conclusion

Calculation Pump = 1.48 kw, Power Moter = 2.98 kw