DATE: CHARLES-AMACHREE PRINCE HI BLOCK FOM

18/ENG04/1024

ELECT - ELECT

Form 214

(1) $V_1 = 5 m/s$ $V_2 = 2 m/s$

P_2 of smaller end = 2.5 m

$$h_f = \frac{(0.35(V_1 - V_2))}{2g}$$

P_1 at the lower end

$L = z_1 - z_2$

$$\frac{P_1}{w} + \frac{V_1^2}{2g} + z_1 = \frac{P_2}{w} + \frac{V_2^2}{2g} + z_2 + h_f$$

$$\frac{P_2}{w} = \frac{P_1}{w} + \frac{1}{2g}(V_1^2 - V_2^2) + (z_1 - z_2) h_f$$

$$= 2.5 + \frac{5^2 - 2^3}{2 \times 9.81} + \frac{-0.35(5-2)^2}{2 \times 9.81}$$

$$= 2.5 + 1.07 + 2 - 0.16055$$

$P_2 = 5.40$ bar

(2) Inlet diameter = 20 cm ; Throat diameter = 10cm

$P_1 = 17.658 N/cm^2 = 1.768 N/mm$

$J = 30cm - 0.3$, $Cd_2 = 0.98$

$A_1 = \frac{\pi d^2}{4} = \frac{3.14 \times 0.2^2}{4} = 0.0314 m^2$

$A_2 = \frac{\pi d^2}{4} = \frac{3.14 \times 0.1^2}{4} = 7.85 \times 10^{-3} m^2$

$\frac{P}{\omega} = 0.3 \times 13.6 = 4.08$ of H_2O

$h = \frac{P_1}{\omega} - \frac{P_2}{\omega} = 10.8 \times 10^{-4} - (-4.08) = 4.08015$

(3) $d_0 = 15cm$ $Area = \frac{d_0^2 \pi}{4} = \frac{\pi(15)}{4} = 176.7 cm^2$

$d_1 = 30 cm$ $Area_2 = \frac{\pi}{4}(30) = 706.85 cm^2$

Pgr $= 0.1 = 0.9$

Reading of diff manometer = 50cm

$h = x\left[\frac{S_1}{S_2} - 1\right] = 50\left[\frac{13.6}{0.9} - 1\right] cm$

$= 50 \times 14.11 = 705.5 cm$

$Cd_2 = 0.64$, the rate of flow

$\Theta = Cd \frac{A_0 A_1}{\sqrt{A_1^2 - A_2^2}} \times \sqrt{2gh} = \frac{0.64 \times 176.7 \times 705.5 \times \sqrt{2 \times 981 \times 705.5}}{\sqrt{(706.85)^2 - (176.7)^2}}$

$= \frac{9040 + 63778}{684.4} = 13744.25 cm^3/s$

DATE:

4) Axis = 15m

170mm of mercury (= 0.17m)

SG of mercury = 13.6

SG of sea water = 1.026

$$h = l\left(\frac{SG\ (m)}{SG\ (water)} - 1\right)$$

$$= 0.17\left(\frac{13.6}{1.026} - 1\right)$$

$$h = 2.083m$$

$$V = \sqrt{2gh} \therefore \sqrt{2 \times 9.81 \times 2.083}$$

$$v = 6.39 m/s$$

(5)

Volumetric flow rate $x = \frac{0.05}{1000}$

Actual flow rate $5 \times 10^{-5} m^3/min$

m^3/m to m^3/sec

60 sec = 1mn

$\frac{5 \times 10^{-5}}{60}$

$Q = 8.33 \times 10^{-7}$

Speed = 1700 rev

$= \frac{1700}{60} = 28.3$ rev/sec

Pressure = 15 bar

1 bar = ~~1x10~~ $1 \times 10^5 N/m^2$

15 bar = 1.5×10^5

$x = 1 \times 10^5 \times 15$

$= 1.5 \times 10^6$