

Ignore of here please Victor  
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Civil Engineering

\*  $D_1 = 150 \text{ mm} = 0.15 \text{ m}$      $D_2 = 75 \text{ mm} = 0.075 \text{ m}$   
 $Z_2 - Z_1 = 150 \text{ mm} = 0.15 \text{ m}$      $Q = 40 \text{ l/s} = 0.04 \text{ m}^3/\text{s}$

$A_1 = \frac{\pi D_1^2}{4} = \frac{\pi \times 0.15^2}{4} = 0.01767 \text{ m}^2$

$A_2 = \frac{\pi D_2^2}{4} = \frac{\pi \times 0.075^2}{4} = 0.0042 \text{ m}^2$

$Q = C_d \times A_1 A_2 \times \sqrt{2gH}$   
 $\sqrt{A_1^2 + A_2^2}$

$0.04 = \frac{0.96 \times 0.01767 \times 0.0042 \times \sqrt{2 \times 9.81 \times H}}{\sqrt{0.01767^2 + 0.0042^2}}$

$H = \left( \frac{0.04}{0.96 \times 0.004565 \times \sqrt{4.429}} \right)^2 = 4.29 \text{ m}$

$h = \left( \frac{P_1}{\rho g} + z_1 \right) - \left( \frac{P_2}{\rho g} + z_2 \right)$

$h = \left( \frac{P_1}{\rho g} - \frac{P_2}{\rho g} \right) + (z_1 - z_2)$

$4.247 = \left( \frac{P_1 - P_2}{\rho g} \right) - 0.15$   
 $4.247 + 0.15 = \frac{P_1 - P_2}{\rho g}$

$P_1 - P_2 = (0.8 \times 1000 \times 9.81) (4.429 + 0.15)$   
 $P_1 - P_2 = 34.514 \text{ N/m}^2$

2) Diameter of  $D_1 = 300 \text{ mm} = 0.3 \text{ m}$   
 Area of inlet  $A_1 = \frac{\pi \times D_1^2}{4} = \frac{\pi \times 0.3^2}{4} = 0.07068 \text{ m}^2$

Diameter of throat  $D_2 = 150 \text{ mm} = 0.15 \text{ m}$   
 Area of inlet  $A_2 = \frac{\pi D_2^2}{4} = \frac{\pi \times 0.15^2}{4} = 0.01767 \text{ m}^2$

\*  $h = \left( \frac{P_1}{\rho g} + z_1 \right) - \left( \frac{P_2}{\rho g} + z_2 \right)$

$y \left[ \frac{54.1}{9.81} - 1 \right] = 0.25 \left[ \frac{13.6}{0.8} - 1 \right]$   
 $= 3.55 \text{ of } y_1$



Discharge of Q

using the relation

$$Q = \frac{Cd \times A_1 A_2 \sqrt{2gh}}{\sqrt{A_1^2 - A_2^2}}$$

$$Q = \frac{0.98 \times 0.07 \times 0.07767 \times \sqrt{2 \times 9.81 \times 3.53}}{\sqrt{0.07^2 - 0.017767^2}}$$

$$Q = 0.148 \text{ m}^3/\text{s}$$

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Pressure diff

$$h = \left( \frac{P_1}{\rho} + z_1 \right) - \left( \frac{P_2}{\rho} + z_2 \right) = 3.53$$

$$h = \left( \frac{P_1}{\rho} - \frac{P_2}{\rho} \right) - (z_1 - z_2) = 3.53$$

$$z_2 - z_1 = 300 \text{ mm} = 0.3 \text{ m}$$

$$\left( \frac{P_1 - P_2}{\rho} \right) - 0.3 = 3.53$$

$$\frac{P_1 - P_2}{\rho} = 3.53 + 0.3$$

$$\frac{P_1 - P_2}{\rho} = 3.83 \quad \Rightarrow \quad P_1 - P_2 = 3.83 \rho$$

$$P_1 - P_2 = 3.83 \times 9810 \times 0.9 = 3.38 \text{ kN/m}^2$$