2013 DATA (night): \( h_1 = 51.4 \text{ mm} \quad h_2 = 74.1 \text{ mm} \quad h_3 = 80 \text{ mm} \)

\( g \) (Australia Sydney) = 9.7979 m/s\(^2\)

**Density of air at 23C**: 1.2041

**Velocity reading**: 3.8 (1000 ft/min)

**Dynamic viscosity (23 deg C)**

**Kinematic viscosity**: \( 1.5387 \times 10^{-5} \text{ m}^2/\text{s} \)

Diam 1 = 253 mm (square)

Diam 2 = 160 mm (square)

Diam (outlet) = 281 mm (circular)

Diam (inlet) = 3612 mm (square)

Outlet obstruction = diam 85 mm

**2012 results:**

Full speed (no obstructions): zero height = 57.5 mm, max height = 84 mm

Pressure difference between atmosphere and Diam 1 = 5 mm fluid height.

\[
\frac{p_1}{\rho g} + \frac{v_1^2}{2g} + h_1 = \frac{p_2}{\rho g} + \frac{v_2^2}{2g} + h_2
\]

\( p_2 - p_1 = \rho gh \)

\[ = 826 \times 9.7979 \times (0.0741 - 0.0514) \]

\[ = 183.7126 \text{ Pa} \]

From Bernoulli,

\[
\frac{p_1}{\rho g} + \frac{v_1^2}{2g} + h_1 = \frac{p_2}{\rho g} + \frac{v_2^2}{2g} + h_2
\]

We still have 2 unknown velocities!

Try Bernoulli Point 3 vs Point 2…

\[
\frac{p_1}{\rho g} + \frac{v_1^2}{2g} + h_1 = \frac{p_2}{\rho g} + \frac{v_2^2}{2g} + h_2
\]

\[ p_2 = \rho gh = 826 \times 9.7979 \times (0.080 - 0.0514) \]

\[ = 231.4617 \text{ Pa} \]

\[ h_2 = \frac{p_2}{\rho g} = 231.4617 / (1.2041 \times 9.7979) = 19.6193 \text{ m} \]

\[ v_2^2 = h_2 \times 2g = 19.6193 \times 2 \times 9.7979 = 384.4559 \]

\[ v_2 = 384.4559 ^{0.5} = 19.6075 \text{ m/s} \]

Compare to reading from "Dwyer Mark II" of 3800 ft/min:

3800*0.3048 = 1158.24 m/min
1158.24/60 = 19.304 m/s

Yippee!! That's less than 2% out!