

Aspen Hollow Hydro Model

$$d := \frac{11}{32} \cdot \text{in.} + \frac{3}{8} \cdot \text{in.} - \frac{1}{2} \cdot \text{in.}$$

$$\rho := 62.4 \cdot \frac{\text{lb}}{\text{ft}^3}$$

$$h := 92 \cdot \text{ft}$$

$$v := \sqrt{2 \cdot g \cdot h}$$

$$d_{\text{wheel}} := 4 \cdot \text{in}$$

$$Q(d) := \pi \cdot \frac{d^2}{4} \cdot v \quad \text{jets} := 2$$

$$\eta_{\text{runner}} := 0.75$$

$$\eta_{\text{gen}} := 0.78$$

$$P(d) := \eta_{\text{runner}} \cdot \text{jets} \cdot \rho \cdot g \cdot h \cdot Q(d)$$

$$\eta_{\text{lcb}} := 0.92 \quad V_{\text{op}} := 160 \cdot \text{volt}$$

$$\eta_{\text{wire}}(d) := \left(1.0 - 0.0124 \cdot \frac{P(d)}{V_{\text{op}} \cdot \text{amp}} \right)$$

$$\text{pressure} := \rho \cdot g \cdot h$$

$$\text{pressure} = 39.867 \text{ psi}$$

$$v = 76.942 \cdot \frac{\text{ft}}{\text{sec}}$$

$$\text{rpm} := \frac{\frac{v}{2}}{\pi \cdot d_{\text{wheel}}}$$

$$\text{rpm} = 2204 \text{ min}^{-1}$$

$\frac{d}{\text{in}}$	$\frac{Q(d) \cdot \text{jets}}{\left(\frac{\text{gal}}{\text{min}}\right)}$
0.34375	44.5
0.37500	53
0.40625	62.2
0.43750	72.1
0.46875	82.8
0.50000	94.2

$\frac{d}{\text{in}}$	$\frac{P(d)}{\text{hp}}$	$\frac{P(d)}{\text{watt}}$	$\frac{P(d) \cdot \eta_{\text{gen}} \cdot \eta_{\text{wire}}(d) \cdot \eta_{\text{lcb}}}{\text{watt}}$	$\frac{\eta_{\text{wire}}(d)}{1}$	$\frac{\eta_{\text{runner}} \cdot \eta_{\text{gen}} \cdot \eta_{\text{wire}}(d) \cdot \eta_{\text{lcb}}}{1}$
0.34375	0.776	579	397	0.955	0.51
0.37500	0.924	689	468	0.947	0.51
0.40625	1.084	809	544	0.937	0.5
0.43750	1.258	938	624	0.927	0.5
0.46875	1.444	1077	708	0.917	0.49
0.50000	1.643	1225	796	0.905	0.49