26. The mass of the cylinder is $m = \rho(\pi d_1^2/4)H$, where $d_1$ is the diameter of the cylinder. Since it is in equilibrium

$$F_{\text{net}} = mg - F_r = \frac{\pi H d_1^2 g\rho}{4} - \left(\frac{\pi d_1^2}{4}\right)\left(\frac{2I}{c}\right) = 0 \ .$$

We solve for $H$:

$$\begin{aligned} H &= \frac{2I}{gc\rho} = \left(\frac{2P}{\pi d^2/4}\right)\frac{1}{gc\rho} \\ &= \frac{8(4.60\,\text{W})}{\pi(2.60\times10^{-3}\,\text{m})^2(9.8\,\text{m/s}^2)(3.0\times10^8\,\text{m/s})(1.20\times10^3\,\text{kg/m}^3)} \\ &= 4.91\times10^{-7}\ \text{m} \ . \end{aligned}$$