

DESIGN PROBLEMS

6.D1 For this problem the working stress is computed using Equation 6.24 with $N = 2$, as

$$\sigma_w = \frac{\sigma_y}{2} = \frac{860 \text{ MPa}}{2} = 430 \text{ MPa} \quad (62,500 \text{ psi})$$

Since the force is given, the area may be determined from Equation 6.1, and subsequently the original diameter d_0 may be calculated as

$$A_0 = \frac{F}{\sigma_w} = \pi \left(\frac{d_0}{2} \right)^2$$

And

$$\begin{aligned} d_0 &= \sqrt{\frac{4F}{\pi \sigma_w}} = \sqrt{\frac{(4)(13,300 \text{ N})}{\pi (430 \times 10^6 \text{ N/m}^2)}} \\ &= 6.3 \times 10^{-3} \text{ m} = 6.3 \text{ mm} \quad (0.25 \text{ in.}) \end{aligned}$$