

8-39 This analysis is important should the initial bolt tension fail. Members: $S_y = 71$ kpsi, $S_{sy} = 0.577(71) = 41.0$ kpsi. Bolts: SAE grade 8, $S_y = 130$ kpsi, $S_{sy} = 0.577(130) = 75.01$ kpsi

Shear in bolts

$$A_s = 2 \left[\frac{\pi(0.375^2)}{4} \right] = 0.221 \text{ in}^2$$

$$F_s = \frac{A_s S_{sy}}{n} = \frac{0.221(75.01)}{3} = 5.53 \text{ kip}$$

Bearing on bolts

$$A_b = 2(0.375)(0.25) = 0.188 \text{ in}^2$$

$$F_b = \frac{A_b S_{yc}}{n} = \frac{0.188(130)}{2} = 12.2 \text{ kip}$$

Bearing on member

$$F_b = \frac{0.188(71)}{2.5} = 5.34 \text{ kip}$$

Tension of members

$$A_t = (1.25 - 0.375)(0.25) = 0.219 \text{ in}^2$$

$$F_t = \frac{0.219(71)}{3} = 5.18 \text{ kip}$$

$$F = \min(5.53, 12.2, 5.34, 5.18) = 5.18 \text{ kip} \quad \text{Ans.}$$

The tension in the members controls the design.