8-17 **a**) Grip, $l = 2(2 + 0.095) = 4.19$ in. $L \geq 4.19 + 7/16 = 4.628$ in.
Rounding up, $L = 4.75$ in *Ans.*

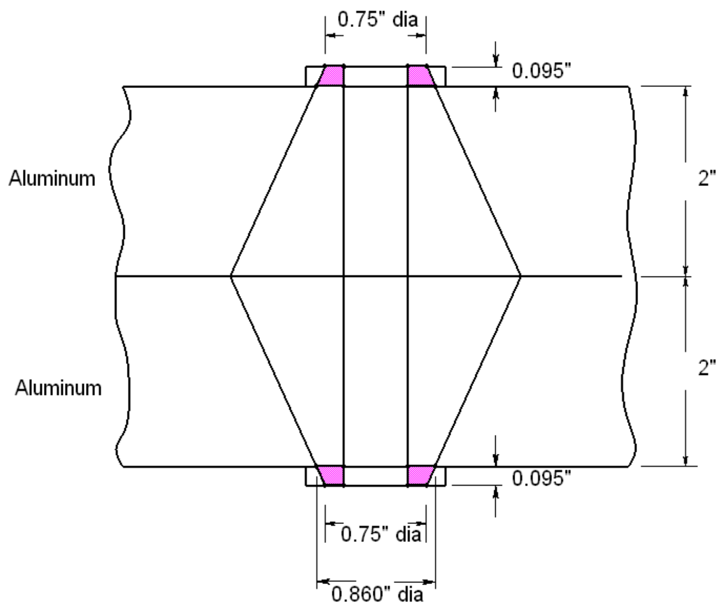
(**b**) From Eq. (8-13), $L_T = 2d + 1/4 = 2(0.5) + 0.25 = 1.25$ in

From Table 8-7, $l_d = L - L_T = 4.75 - 1.25 = 3.5$ in, $l_t = l - l_d = 4.19 - 3.5 = 0.69$ in

$A_d = \pi(0.5^2)/4 = 0.1963$ in^2. From Table 8-2, $A_t = 0.1419$ in^2. From Eq. (8-17)

$$k_b = \frac{A_d A_t E}{A_d l_t + A_t l_d} = \frac{0.1963(0.1419)30}{0.1963(0.69) + 0.1419(3.5)} = 1.322 \text{ Mlbf/in} \qquad Ans.$$

(**c**)



Upper and lower halves are the same. For the upper half,
Steel frustum: $t = 0.095$ in, $d = 0.531$ in, $D = 0.75$ in, and $E = 30$ Mpsi. From Eq. (8-20)

$$k_1 = \frac{0.5774\pi(30)0.531}{\ln \dfrac{[1.155(0.095) + 0.75 - 0.531](0.75 + 0.531)}{[1.155(0.095) + 0.75 + 0.531](0.75 - 0.531)}} = 89.20 \text{ Mlbf/in}$$

Aluminum: $t = 2$ in, $d = 0.5$ in, $D = 0.75 + 2(0.095)\tan 30° = 0.860$ in, and $E = 10.3$ Mpsi. Eq. (8-20) $\Rightarrow$ $k_2 = 9.24$ Mlbf/in
For the top half, $k'_m = (1/k_1 + 1/k_2)^{-1} = (1/89.20 + 1/9.24)^{-1} = 8.373$ Mlbf/in
Since the bottom half is the same, the overall stiffness is given by

$$k_m = (1/k'_m + 1/k'_m)^{-1} = k'_m/2 = 8.373/2 = 4.19 \text{ Mlbf/in} \qquad Ans$$