$t_T = .49$ in $\quad$ $W_q = 3$ in $\quad$ ASTM 36 - HR steel

$P = 19400$ lb $\quad$ $S_y = 90$ KPSi $\quad$ fillet welded

$\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad$ E80 XX electrodeand

$\tau_x = \tau_{allow} = P/A$ $\quad\quad\quad\quad\quad$ fail in shear along 45°

$A =$ throat x Length

axial $\to$ $\sigma_x = P/A$ $\quad$ direct $\to \tau = P/A$

$\quad\quad\quad\quad\quad\quad\quad\quad\quad$ shear

$$\tau_{allow} = .3 \, Exx = .3(90,000) = \frac{19400}{A} = 27000$$

$\Rightarrow$ $\quad$ $t = \dfrac{A}{2L} = \dfrac{P}{\tau_{allow} \cdot 2L} = \dfrac{19400}{27000 \cdot 2(3)} = .1198$ in

$\quad\quad\quad W = \sqrt{2} \, t = .1694$