Section Design Values, continued

Unbraced length of leg $Ll := 23.25$ inch

Slenderness ratio of leg $K := 1.0$ $KLr := \frac{K \cdot Ll}{r}$ $KLr = 20.946$

Leg yield stress $Fy := 50$ ksi

Steel modulus of elasticity $E := 29000$ ksi

Column slenderness ration seperation value $Cc := \sqrt{\frac{2 \cdot \pi^2 \cdot E}{Fy}}$ $Cc = 106.999$

Allowable leg stress $Fa := \frac{\left(1 - \frac{KLr^2}{2 \cdot Cc^2}\right) \cdot Fy}{\frac{5}{3} + \frac{3 \cdot KLr}{8 \cdot Cc} - \frac{KLr^3}{8 \cdot Cc^3}}$ $Fa = 28.199$ ksi

Calculate the KL/r for the gin pole

K value $Kp := 2.8$

L value $Lp := La \cdot 12$ $Lp = 738$ inch

KL/r value $KLrp := \frac{Kp \cdot Lp}{rp}$ $KLrp = 153.067$

KL/r is greater than Cc so $Fap := \frac{12 \cdot \pi^2 \cdot E}{23 \cdot KLrp^2}$ $Fap = 6.374$ ksi

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PS27 Gin Pole Design Lift Conditions

Assume that a 1000 foot tower is being erected, the load is at the bridle support elevation, 2 part load line is in use, tag line is attached at 60 degree angle, load line is 3/4" IWRC.

Find the headache ball weight required

Weight of line $Lw := 1.04$ lbs/ft

Weight of line to overhaul $Lh := 2000 \cdot Lw \cdot 0.001$ $Lh = 2.08$ kips

Assume that headache ball weighs $Ball := 2.100$ kips

Weight of line when at top of tower $Lh := 2 \cdot Lw \cdot 0.001 \cdot La$ $Lh = 0.128$ kips

Weight of rooster head $Wr := 0.6$ kips