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DETERMINE BUCKLING LOAD (P_{cr}), BASED ON THE EULER EQUATION FOR AN 8' LONG WOOD 2x4" (USE FULL DIMENSIONS) ENDS PINNED $\therefore K=1.00$, $E=1500$ KSI IF $F_y=6$ KSI, WHAT IS MINIMUM LENGTH FOR WHICH THE EULER EQUATION IS VALID?

EULER EQUATION:

$$P_{cr} = \frac{\pi^2 EA}{(KL/r)^2}$$

$$P_{cr} = \frac{\pi^2 (1500) 8}{(96/0.577)^2}$$

$$P_{cr} = \underline{4.28^k}$$

$$E = 1500 \text{ KSI}$$

$$A = 2 \times 4 = 8 \text{ in}^2$$

$$K = 1.0$$

$$L = 8' = 96''$$

$$I = \frac{4(2)^3}{12} = 2.67 \text{ in}^4$$

$$r = \sqrt{I/A} = 0.577$$

MIN. VALID LENGTH:

$$F_{cr} = \frac{\pi^2 E}{(KL/r)^2}$$

$$6 = \frac{\pi^2 (1500)}{(L/0.577)^2}$$

$$\sqrt{6} = \frac{\sqrt{\pi^2 (1500)}}{L/0.577}$$

$$L = \frac{\sqrt{\pi^2 (1500)}}{\sqrt{6}/0.577} = \underline{28.66''} \text{ (minimum)}$$