

CIVE 3205
Example AC10-4
Axially Loaded Columns
Using Factored Compressive Resistance Tables

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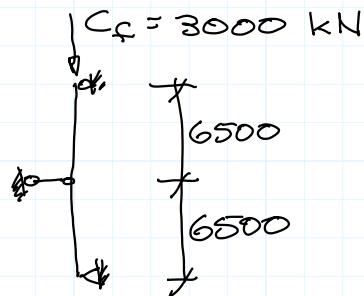
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Revisions:

- Feb 28/20: new posting

Example AC10-4

2/3



Select a W section
ASTM A992 steel

Pin ends, both
direction

Mid point brace
one direction

Use

Note: Factored Axial
Compressive Resistance
Tables

1. C_r values are computed using L_y - length associated with weak axis buckling.
i.e. using $\frac{k_y L_y}{r_y}$ as the slenderness ratio

2. Sometimes, as perhaps in this case, buckling about the strong axis will govern

$$\frac{k_x L_x}{r_x} > \frac{k_y L_y}{r_y}$$

3. Find a section of length such that strength wrt weak axis is the same

4. Do that by equating slenderness ratios

$$\frac{k_y L_y}{r_y} = \frac{k_x L_x}{r_x}$$

$$\text{or } L_y = \left(\frac{k_x}{k_y} \right) \frac{L_x}{(r_x/r_y)}$$

if $k_x = k_y$, then

$$L_y = \frac{L_x}{(r_x/r_y)}$$

1st estimate: (Page 4-23)

Use $L_y = 6500 \text{ mm}$ & $C_F = 3000$ to
get 1st trial.

W310 x 143 has $C_r = 3070$ for $L_y = 6500$

for that section $r_x/r_y = 1.76$

\therefore Find a section with $L_y = \frac{13000}{1.76} = 7390 \text{ mm}$

Look at row for $L = 7500$

try: $W310 \times 179$ $\frac{r_x}{r_y} = 1.76$ $L_y = 7390$ (Page 4-22)

$$3560 > C_r > 3270$$

or $W360 \times 162$ $\frac{r_x}{r_y} = 1.66$ $L_y = 7831$

$3650 > C_r > 3400$ will work
(but not readily available)

$W360 \times 134$ $\frac{r_x}{r_y} = 1.66$ $L_y = 7831$

$$2990 > C_r > 2780 \quad \text{N.G.}$$

$W360 \times 122$ $\frac{r_x}{r_y} = 2.44$ $L_y = \frac{13000}{2.44} = 5330 \text{ mm}$

$$2730 > C_r > 2450 \quad \text{N.G.}$$

Use $W310 \times 179$ 