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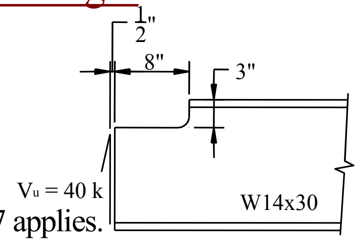
Coped Beam Flexural Strength Example

Local Web Nominal Flexural Strength

$$\lambda_p = (0.475)\sqrt{k_1 E / F_y}$$
$$= (0.475)\sqrt{(4.19)(29{,}000/50)}$$
$$= 23.4$$



$\lambda = 40 < 2\lambda_p = 46.8$ so *Manual* Eqn. 9-7 applies.

$$M_p = F_y Z_{net} = (50)(15.1) = 755 \text{ kip-in.}$$

$$M_y = F_y S_{net} = (50)(8.37) = 419 \text{ kip-in.}$$

$M_n = M_p - (M_p - M_y)(\lambda/\lambda_p - 1)$ ~~$\leq 1.6M_y$~~ (*Manual* Eqn. 9-7)

$= 755 - (755-419)(40/24.8 - 1)$

$= 549$ kip-in.

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Bolted/Welded Double Angles

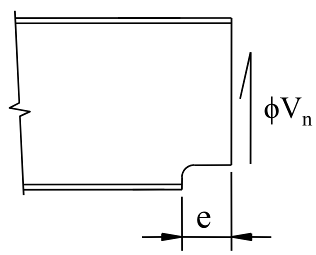
Coped Beam Web Strength at Tension Flange

$\phi_b = 0.9$

$V_n =$ ~~$F_y S_{net} / e$~~ M_n/e

where

$$M_n = \min \left| \begin{array}{l} M_p = F_y Z_{net} \\ 1.6M_y = 1.6F_y S_{net} \end{array} \right.$$



S_{net} = elastic section modulus from *Manual* Table 9-2

Z_{net} = plastic section modulus from AISC Design Ex.

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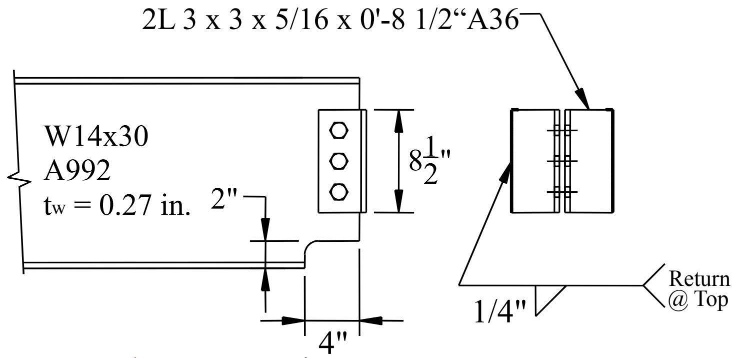
Bolted/Welded Double Angles Example

Example: Calculate the weld design rupture strength at OSLs, ϕV_n.



$e = 3 + 0.27/2$
$= 3.14$ in.

L= 8.5 in.

3/4" A325-N Bolts
E70XX

Bolted/Welded Double Angles Example

Weld design rupture strength at OSLs:

$$\phi V_n = \frac{2 L^2 (1.392 D)}{\sqrt{L^2 + 12.96 e^2}}$$

$$= \frac{2 (8.5)^2 (1.392 \times 4)}{\sqrt{8.5^2 + 12.96 \times (3.14)^2}}$$

$$= 56.9 \text{ k}$$

Note: Weld returns ($2t_w$) at top of angles have been neglected.

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