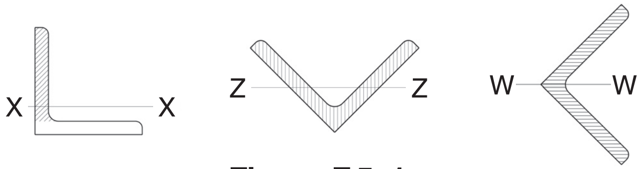

Figure F.5. 1

LIMIT STATE	M_n	b/t
yielding	$1.5F_{cy}S_c$	$b/t \le \lambda_1$
inelastic buckling	$\left[B_{br} - 4.0D_{br}(b/t)\right]S_c$	$\lambda_1 < b/t < \lambda_2$
elastic buckling	$\dfrac{\pi^2 ES_c}{(4.0b/t)^2}$	$b/t \ge \lambda_2$

where

$$\lambda_1 = \frac{B_{br} - 1.5F_{cy}}{4.0D_{br}}$$

$$\lambda_2 = \frac{C_{br}}{4.0}$$

Buckling constants B_{br}, D_{br}, and C_{br} are given in Tables B.4.1and B.4.2.

(2) If a leg is in uniform compression (Figure F.5.2):

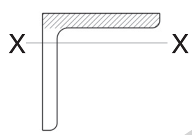

Figure F.5. 2

LIMIT STATE	M_n	b/t
yielding	$F_{cy}S_c$	$b/t \le \lambda_1$
inelastic buckling	$\left[B_p - 5.0D_p(b/t)\right]S_c$	$\lambda_1 < b/t < \lambda_2$
elastic buckling	$\dfrac{\pi^2 ES_c}{(5.0b/t)^2}$	$b/t \ge \lambda_2$

where

$$\lambda_1 = \frac{B_p - F_{cy}}{5.0D_p}$$

$$\lambda_2 = \frac{C_p}{5.0}$$

Buckling constants B_p, D_p, and C_p are given in Tables B.4.1and B.4.2.

b) For the limit state of yielding (Figure F.5.3):

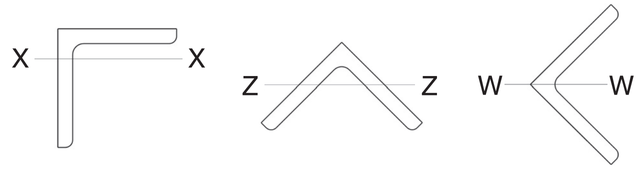

Figure F.5. 3

$$M_n = 1.5M_y \qquad \text{(F.5-1)}$$

where M_y = yield moment about the axis of bending.

c) For the limit state of lateral-torsional buckling:

(1) for $M_e \le M_y$, $M_n = (0.92 - 0.17M_e/M_y)M_e$ (F.5-2)

(2) for $M_e > M_y$, $M_n = (1.92 - 1.17\sqrt{M_y/M_e})M_y \le 1.3M_y$ (F.5-3)

where M_e = elastic lateral-torsional buckling moment from Section F.5.1 or F.5.2.

C_b between brace points shall be determined using Equation F.4-2 but shall not exceed 1.5.

F.5.1 Bending About Geometric Axes

Bending about a geometric axis is shown in Figure F.5.4. For combined axial compression and bending, resolve moments about principal axes and use Section F.5.2.

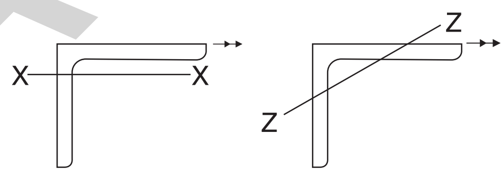

Figure F.5. 4

a) Angles with continuous lateral-torsional restraint: M_n is the lesser of:

(1) local buckling strength determined by Section F.5a.
(2) yield strength determined by Section F.5b.

b) Equal leg angles with lateral-torsional restraint only at the point of maximum moment: Strengths shall be calculated with S_c being the geometric section modulus. M_n is the least of:

(1) local buckling strength determined by Section F.5a.
(2) yield strength determined by Section F.5b.
(3) If the leg tip is in compression, lateral-torsional buckling strength determined by Section F.5c with

$$M_e = \frac{0.82Eb^4tC_b}{L_b^2}\left[\sqrt{1 + 0.78(L_bt/b^2)^2} - 1\right] \qquad \text{(F.5-4)}$$

If the leg tip is in tension, lateral-torsional buckling strength determined by Section F.5c with

$$M_e = \frac{0.82Eb^4tC_b}{L_b^2}\left[\sqrt{1 + 0.78(L_bt/b^2)^2} + 1\right] \qquad \text{(F.5-5)}$$

c) Equal leg angles without lateral-torsional restraint: Strengths shall be calculated with S_c equal to 0.80 of the geometric section modulus.

If the leg tip is in compression, M_n is the lesser of:

(1) local buckling strength determined by Section F.5a(1)

(2) lateral-torsional buckling strength determined by F.5c with

$$M_e = \frac{0.66Eb^4tC_b}{L_b^{\ 2}}\left[\sqrt{1+0.78(L_bt/b^2)^2}-1\right] \qquad \text{(F.5-6)}$$

If the leg tip is in tension, M_n is the lesser of:

(1) yield strength determined by Section F.5b

(2) lateral-torsional buckling strength determined by Section F.5c with

$$M_e = \frac{0.66Eb^4tC_b}{L_b^{\ 2}}\left[\sqrt{1+0.78(L_bt/b^2)^2}+1\right] \qquad \text{(F.5-7)}$$

d) Unequal leg angles without lateral-torsional restraint: moments about the geometric axes shall be resolved into moments about the principal axes and the angle shall be designed as an angle bent about a principal axis (Section F.5.2).

F.5.2 Bending About Principal Axes

Bending about principal axes is shown in Figure F.5.5.

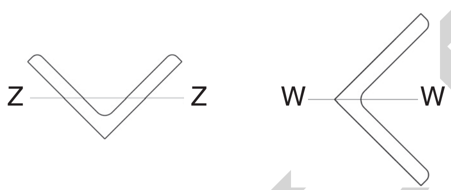

Figure F.5. 5

a) Equal leg angles, major axis bending: M_n is the lesser of:

(1) local buckling strength determined by Section F.5a

(2) lateral-torsional buckling strength determined by Section F.5c, with

$$M_e = C_b\frac{0.46Eb^2t^2}{L_b} \qquad \text{(F.5-8)}$$

b) Unequal leg angles, major axis bending: M_n is the lesser of:

(1) local buckling strength determined by Section F.5a for the leg with its tip in compression

(2) lateral-torsional buckling strength determined by Section F.5c, with

$$M_e = 4.9E\frac{I_z}{L_b^{\ 2}}C_b\left[\sqrt{\beta_w^{\ 2}+0.052(L_bt/r_z)^2}+\beta_w\right] \qquad \text{(F.5-9)}$$

I_z = moment of inertia about the minor principal axis

r_z = radius of gyration about the minor principal axis

$$\beta_w = \left[\frac{1}{I_w}\int z\left(w^2+z^2\right)dA\right]-2z_o \qquad \text{(F.5-10)}$$

β_w is the coefficient of monosymmetry about the major principal axis and is positive when the short leg is in compression and negative when the long leg is in compression. (See the commentary for values for common angle sizes and equations for determining β_w.) If the long leg is in compression anywhere along the unbraced length of the angle, β_w is negative.

z_o = coordinate along the *z*-axis of the shear center with respect to the centroid

I_w = moment of inertia about the major principal axis

c) Equal and unequal leg angles, minor axis bending:

(1) If the leg tips are in compression, M_n is the lesser of the local buckling strength determined by Section F.5a(1) and the yield strength determined by Section F.5b.

(2) If the leg tips are in tension, M_n is the yield strength determined by Section F.5b.