For ASD:

$$f_c/(F_c/\Omega) + [f_b/(F_b/\Omega)]^2 + [f_s/(F_s/\Omega)]^2 \leq 1.0 \qquad \text{(H.3-2)}$$

where

f_c = uniform compressive stress due to axial compression
f_b = compressive stress due to flexure
f_s = shear stress due to shear and torsion
F_c = axial compression stress corresponding to the nominal axial compression strength
F_b = bending stress corresponding to the nominal flexural compression strength
F_s = shear stress corresponding to the nominal shear strength

H.3.2 Curved Elements

Stresses in curved elements subject to torsion, flexure, shear, and/or axial compression shall satisfy the following:

For LRFD:

$$f_c/(\phi F_c) + f_b/(\phi F_b) + [f_s/(\phi F_s)]^2 \leq 1.0 \qquad \text{(H.3-3)}$$

For ASD:

$$f_c/(F_c/\Omega) + f_b/(F_b/\Omega) + [f_s/(F_s/\Omega)]^2 \leq 1.0 \qquad \text{(H.3-4)}$$

where

f_c = compressive stress due to axial compression
f_b = compressive stress due to flexure
f_s = shear stress due to shear and torsion
F_c = axial compression stress corresponding to the nominal axial compression strength
F_b = bending stress corresponding to the nominal flexural compression strength
F_s = shear stress corresponding to the nominal shear strength

This chapter addresses connecting elements and connectors.

J.1 General Provisions

J.1.1 Design Basis

The design strength and the allowable strength of connections shall be determined in accordance with the provisions of this chapter and Chapter B.

If the longitudinal centroidal axes of connected axially loaded members do not intersect at one point, the connection and members shall be designed for the effects of eccentricity.

J.1.2 Fasteners in Combination with Welds

Fasteners shall not be considered to share load in combination with welds.

J.1.3 Maximum Spacing of Fasteners

The pitch and gage of fasteners joining components of tension members shall not exceed $(3 + 20t)$ in. [$(75 + 20t)$ mm] where t is the thickness of the outside component.

In outside components of compression members:

a) The component's strength shall satisfy the requirements of Section E.3 with an effective length $kL = s/2$, where s is the pitch, and
b) If multiple rows of fasteners are used, the component's strength shall satisfy the requirements of Section B.5.4.2 with a width $b = 0.8g$ where g is the gage. If only one line of fasteners is used, the component's strength shall satisfy the requirements of Section B.5.4.1 with a width b = the edge distance of the fastener.

J.2 Welds

The design strength ϕR_n and allowable strength R_n/Ω of welds shall be determined from Sections J.2.1 through J.2.4 where

$\phi = 0.75$ (LRFD)
$\Omega = 1.95$ (ASD building-type structures)
$\Omega = 2.20$ (ASD bridge-type structures)

J.2.1 Groove Welds

J.2.1.1 Complete Penetration and Partial Penetration Groove Welds

The following types of groove welds are complete penetration welds:

a) Welds welded from both sides with the root of the first weld backgouged to sound metal before welding the second side.
b) Welds welded from one side using permanent or temporary backing.
c) Welds welded from one side using AC-GTAW root pass without backing
d) Welds welded from one side using PAW-VP in the keyhole mode.

All other groove welds are partial penetration welds.

J.2.1.2 Effective Area

a) Size: The size S_w of a complete joint penetration groove weld is the thickness of the thinner part joined. The size S_w of a partial joint penetration groove weld is the depth of preparation (see Figure J.2.1) for all V and bevel groove welds with an included angle greater than 45°, and the depth of preparation of all J and U groove welds.
b) Length: The effective weld length L_{we} for tension and compression is the length of the weld perpendicular to the direction of tensile or compressive stress. The effective weld length for shear is the length of the weld parallel to the direction of shear stress.
c) Area: The effective area A_{we} of a groove weld is the effective weld length times the weld size.

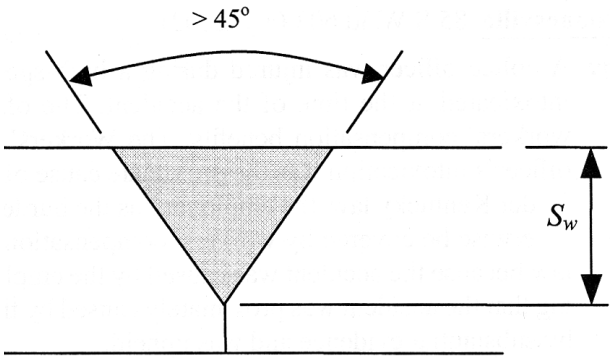

Figure J.2.1
PARTIAL JOINT PENETRATION GROOVE WELD

J.2.1.3 Strength

The nominal tensile or compressive strength R_n of a groove weld is:

$$R_n = F_{tuw} A_{we} \quad \text{(J.2-1)}$$

where

F_{tuw} = least of the welded tensile ultimate strengths of the base metals and the filler. Welded tensile ultimate strengths of base metals shall be taken from Table A.3.5 or Table A.3.5M and tensile ultimate strengths of fillers from Table J.2.1 or Table J.2.1M.