Allowable Stress Design For Shear in Buildings

The AISC specification for ASD specifies the following allowable shear stresses F_v, ksi (ksiX6.894=MPa)

$$F_v = 0.40F_y \qquad \frac{h}{t_w} \le \frac{380}{\sqrt{F_y}}$$

$$F_v = \frac{C_v F_y}{289} \le 0.40F_y \qquad \frac{h}{t_w} > \frac{380}{\sqrt{F_y}}$$

where
$$C_v = 45{,}000k_v/F_y(h/t_w)^2 \qquad \text{for } C_v < 0.8$$
$$= \sqrt{36{,}000k_v/F_y(h/t_w)^2} \qquad \text{for } C_v > 0.8$$
$$k_v = 4.00 + 5.34/(a/h)^2 \qquad \text{for } a/h < 1.0$$
$$= 5.34 + 4.00/(a/h)^2 \qquad \text{for } a/h > 1.0$$

a = clear distance between transverse stiffeners

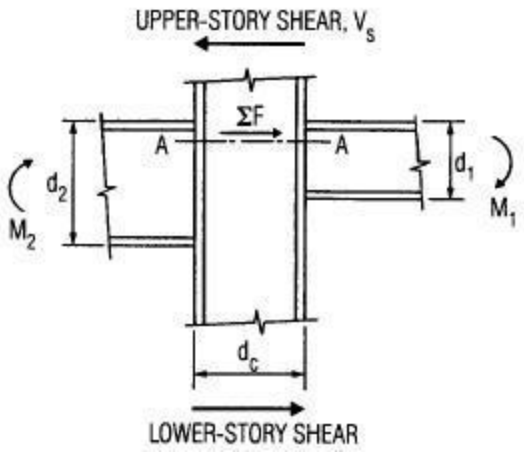
The allowable shear stress with tension-field action is

$$F_v = \frac{F_y}{289}\left[C_v + \frac{1 - C_v}{1.15\sqrt{1 + (a/h)^2}}\right] \le 0.40F_y$$

where $C_v \le 1$

When the shear in the web exceeds F_v, stiffeners are required.

Within the boundaries of a rigid connection of two or more members with webs lying in a common plane, shear stresses in the webs generally are high. The commentary on the AISC specification for buildings states that such webs should be reinforced when the calculated shear stresses,



such as those along plane AA in Fig. exceed F_v, that is, when SF is larger than $d_c t_w F_v$, where d_c is the depth and t_w is the web thickness of the member resisting S F. The shear may be calculated from

S F= $M_1/0.95d_1+M_2/0.95d_2-V_s$

where V_s= shear on the section

$M_1= M_{1L}+M_{1G}$

M_{1L}=moment due to the gravity load on the leeward side of the connection

M_{1G}=moment due to the lateral load on the leeward side of the connection

$M_2= M_{2L}-M_{2G}$

M_{2L}=moment due to the lateral load on the windward side of the connection

M_{2G}=moment due to the gravity load on the windward side of the connection

Source: http://www.engineeringcivil.com/allowable-stress-design-for-shear-in-buildings.html