CODE

Table 14.5.4.1—Combined flexure and axial compression

Location	Interaction equation	
Tension face	$\frac{M_u}{S_m} - \frac{P_u}{A_g} \leq 0.42\phi\lambda\sqrt{f_c'}$	(a)
Compression face	$\frac{M_u}{\phi M_n} + \frac{P_u}{\phi P_n} \leq 1.0$	(b)

14.5.4.2 For walls of solid rectangular cross section where $\boldsymbol{M_u \leq P_u(h/6)}$, $\boldsymbol{M_u}$ need not be considered in design and $\boldsymbol{P_n}$ is calculated by:

$$P_n = 0.45 f_c' A_g \left[1 - \left(\frac{\ell_c}{32h}\right)^2\right] \tag{14.5.4.2}$$

COMMENTARY

R14.5.4.2 If the resultant load falls within the middle third of the wall thickness, plain concrete walls may be designed using the simplified Eq. (14.5.4.2). Eccentric loads and lateral forces are used to determine the total eccentricity of the factored axial force $\boldsymbol{P_u}$. Equation (14.5.4.2) reflects the range of braced and restrained end conditions encountered in wall design. The limitations of 14.2.2.2, 14.3.1.1, and 14.5.1.8 apply whether the wall is proportioned by 14.5.4.1 or by 14.5.4.2.

14.5.5 *Shear*

14.5.5.1 $\boldsymbol{V_n}$ shall be calculated in accordance with Table 14.5.5.1.

Table 14.5.5.1—Nominal shear strength

Shear action	Nominal shear strength V_n		
One-way	$0.11\lambda\sqrt{f_c'}b_w h$		(a)
Two-way	Lesser of:	$0.11\left(1+\frac{2}{\beta}\right)\lambda\sqrt{f_c'}b_o h$ [1]	(b)
		$0.22\lambda\sqrt{f_c'}b_o h$	(c)

[1]β is the ratio of long side to short side of concentrated load or reaction area.

R14.5.5 *Shear*

R14.5.5.1 Proportions of plain concrete members usually are controlled by tensile strength rather than shear strength. Shear stress (as a substitute for principal tensile stress) rarely will control. However, because it is difficult to foresee all possible conditions where shear may have to be investigated, such as shear keys, Committee 318 maintains the investigation of this basic stress condition.

The shear requirements for plain concrete assume an uncracked section. Shear failure in plain concrete will be a diagonal tension failure, occurring when the principal tensile stress near the centroidal axis becomes equal to the tensile strength of the concrete. Because the major portion of the principal tensile stress results from shear, the Code safeguards against tension failure by limiting the permissible shear at the centroidal axis as calculated from the equation for a section of homogeneous material:

$$v = VQ/Ib$$

where $\boldsymbol{v}$ and $\boldsymbol{V}$ are the shear stress and shear force, respectively, at the section considered; $\boldsymbol{Q}$ is the statical moment of the area above or below the centroid of the gross section calculated about the centroidal axis; $\boldsymbol{I}$ is the moment of inertia of the gross section; and $\boldsymbol{b}$ is the section width where shear stress is being calculated.

14.5.6 *Bearing*

14.5.6.1 $\boldsymbol{B_n}$ shall be calculated in accordance with Table 14.5.6.1.