

CODE

COMMENTARY

8.7.5.6.3 Slabs with tendons not satisfying 8.7.5.6.1 shall be permitted if bonded bottom deformed reinforcement is provided in each direction in accordance with 8.7.5.6.3.1 through 8.7.5.6.3.3.

8.7.5.6.3.1 Minimum bottom deformed reinforcement A_s in each direction shall be the larger of (a) and (b). The value of f_y shall be limited to a maximum of 550 MPa:

$$(a) \ A_s = \frac{0.37\sqrt{f'_c}c_2d}{f_y} \quad (8.7.5.6.3.1a)$$

$$(b) \ A_s = \frac{2.1c_2d}{f_y} \quad (8.7.5.6.3.1b)$$

where c_2 is measured at the column faces through which the reinforcement passes.

8.7.5.6.3.2 Bottom deformed reinforcement calculated in 8.7.5.6.3.1 shall pass within the region bounded by the longitudinal reinforcement of the column and shall be anchored at exterior supports.

8.7.5.6.3.3 Bottom deformed reinforcement shall be anchored to develop f_y beyond the column or shear cap face.

8.7.6 Shear reinforcement – stirrups

8.7.6.1 Single-leg, simple-U, multiple-U, and closed stirrups shall be permitted as shear reinforcement.

8.7.6.2 Stirrup anchorage and geometry shall be in accordance with 25.7.1.

8.7.6.3 If stirrups are provided, location and spacing shall be in accordance with Table 8.7.6.3.

Table 8.7.6.3—First stirrup location and spacing limits

Direction of measurement	Description of measurement	Maximum distance or spacing, mm
Perpendicular to column face	Distance from column face to first stirrup	$d/2$
	Spacing between stirrups	$d/2$
Parallel to column face	Spacing between vertical legs of stirrups	$2d$

distributed in both directions, weaving of tendons is necessary and use of 8.7.5.6.3 may be an easier approach.

R8.7.5.6.3 In some prestressed slabs, tendon layout constraints make it difficult to provide the structural integrity tendons required by 8.7.5.6.1. In such situations, the structural integrity tendons can be replaced by deformed bar bottom reinforcement (ACI 352.1R).

R8.7.6 Shear reinforcement – stirrups

Research (Hawkins 1974; Broms 1990; Yamada et al. 1991; Hawkins et al. 1975; ACI 421.1R) has shown that shear reinforcement consisting of properly anchored bars or wires and single- or multiple-leg stirrups, or closed stirrups, can increase the punching shear resistance of slabs. The spacing limits given in 8.7.6.3 correspond to slab shear reinforcement details that have been shown to be effective. Section 25.7.1 gives anchorage requirements for stirrup-type shear reinforcement that should also be applied for bars or wires used as slab shear reinforcement. It is essential that this shear reinforcement engage longitudinal reinforcement at both the top and bottom of the slab, as shown for typical details in Fig. R8.7.6(a) to (c). Anchorage of shear reinforcement according to the requirements of 25.7.1 is difficult in slabs thinner than 250 mm. Shear reinforcement consisting of vertical bars mechanically anchored at each end by a plate or head capable of developing the yield strength of the bars has been used successfully (ACI 421.1R).

In a slab-column connection for which moment transfer is negligible, the shear reinforcement should be symmetrical about the centroid of the critical section (Fig. R8.7.6(d)).