CODE

10.7.6.1.2 Details of transverse reinforcement shall be in accordance with 25.7.2 for ties, 25.7.3 for spirals, or 25.7.4 for hoops.

10.7.6.1.3 For prestressed columns with average $f_{pe} \geq$ **1.6 MPa**, transverse ties or hoops need not satisfy the $16d_b$ spacing requirement of 25.7.2.1.

10.7.6.1.4 Longitudinal reinforcement shall be laterally supported using ties or hoops in accordance with 10.7.6.2 or spirals in accordance with 10.7.6.3, unless tests and structural analyses demonstrate adequate strength and feasibility of construction.

10.7.6.1.5 If anchor bolts are placed in the top of a column or pedestal, the bolts shall be enclosed by transverse reinforcement that also surrounds at least four longitudinal bars within the column or pedestal. The transverse reinforcement shall be distributed within 125 mm of the top of the column or pedestal and shall consist of at least two No. 13 or three No. 10 ties or hoops.

10.7.6.1.6 If mechanical couplers or extended bars for connection to a precast element are placed in the ends of columns or pedestals, the mechanical couplers or extended bars shall be enclosed by transverse reinforcement. The transverse reinforcement shall be distributed within 125 mm of the ends of the column or pedestal and shall consist of at least two No. 13 or three No. 10 ties or hoops.

10.7.6.2 *Lateral support of longitudinal bars using ties or hoops*

10.7.6.2.1 In any story, the bottom tie or hoop shall be located not more than one-half the tie or hoop spacing above the top of footing or slab.

10.7.6.2.2 In any story, the top tie or hoop shall be located not more than one-half the tie or hoop spacing below the lowest horizontal reinforcement in the slab, drop panel, or shear cap. If beams or brackets frame into all sides of the column, the top tie or hoop shall be located not more than 75 mm below the lowest horizontal reinforcement in the shallowest beam or bracket.

COMMENTARY

R10.7.6.1.4 All longitudinal bars in compression should be enclosed within transverse reinforcement. Where longitudinal bars are arranged in a circular pattern, only one circular tie per specified spacing is required. This requirement can be satisfied by a continuous circular tie (helix), with the maximum pitch being equal to the required tie spacing.

It is prudent to provide a set of ties at each end of lap spliced bars, above and below end-bearing splices, and at minimum spacings immediately below sloping regions of offset bent bars.

Precast columns with cover less than 40 mm, prestressed columns without longitudinal bars, columns of concrete with small size coarse aggregate, wall-like columns, and other unusual columns may require special designs for transverse reinforcement.

R10.7.6.1.5 and **R10.7.6.1.6** Confinement improves load transfer from the anchor bolts and mechanical couplers to the column or pedestal where concrete may crack in the vicinity of the bolts and mechanical couplers. Such cracking can occur due to unanticipated forces caused by temperature, restrained shrinkage, accidental impact during construction, and similar effects.

R10.7.6.2 *Lateral support of longitudinal bars using ties or hoops*

R10.7.6.2.2 For rectangular columns, beams or brackets framing into all four sides at the same elevation are considered to provide restraint over a joint depth equal to that of the shallowest beam or bracket. For columns with other shapes, four beams framing into the column from two orthogonal directions are considered to provide equivalent restraint.