

A2 | compression load acting on the column at the level being considered, or 20 % of the shear force induced by the seismic design actions in the column in the storey below the level being considered.

**10.3.7 Strength of columns and piers in torsion, shear and flexure**

The design of columns and piers for torsion, shear and flexure at the ultimate limit state shall be in accordance with 7.5 and 10.3.1, 10.3.4 and 10.3.10.2.

**10.3.8 Longitudinal reinforcement in columns and piers**

**10.3.8.1 Limits for area of longitudinal reinforcement**

The area of longitudinal reinforcement for columns and piers shall be greater than 0.008, times the gross area,  $A_g$  of the section or at any location including lap splices, and less than 0.08 times the gross area,  $A_g$ .

**10.3.8.2 Minimum number of longitudinal bars**

A2 | The minimum number of longitudinal bars in a column or pier shall be 8, except that this number may be reduced to 4 or 6 where the clear spacing between adjacent bars on the same side of the section is less than 150 mm and the axial load  $N^* \leq 0.1\phi f'_c A_g$ .

**10.3.8.3 Spacing of longitudinal reinforcement**

The centre-to-centre spacing of longitudinal bars in a circular column shall be less than or equal to the larger of one-quarter of the diameter of the section, or 200 mm.

In rectangular sections the maximum permissible centre-to-centre spacing of longitudinal bars, which are cross linked across the cross section, shall depend on the ratio of the longer side,  $h$ , to the shorter side,  $b$ , as set out in (a) and (b) below.

- (a) Where the ratio of  $h/b < 2.0$  the maximum permissible spacing shall be the larger of  $b/3$  or 200mm.
- (b) Where the ratio of  $h/b > 2.0$  the maximum spacing shall be as for (a) except in the mid regions of the longer side. In the mid region lying between lines drawn at a distance of the larger of  $b$  or 1.5 times the depth to the neutral axis from the extreme fibres, the spacing may be increased to the smaller of  $h/4$  or 300 mm.

**10.3.8.4 Cranking of longitudinal bars**

Where longitudinal bars are offset, the slope of the inclined portion of the bar with the axis of the column shall be less than or equal to 1 in 6, and the portions of the bar above and below the offset shall be parallel to the face of the column. Adequate horizontal support at the offset bends shall be provided by ties, spirals, other means of restraints or parts of the floor construction. These shall be placed so that the resultant force, providing the horizontal support for the bursting forces, acts through the centre of the bend. The horizontal thrust to be resisted shall be assumed as 1.5 times the horizontal component of the nominal force in the inclined portion of the bar, assumed to be stressed to  $f_y$ .

APPLIES TO BEAMS ALSO

**10.3.9 Splices of longitudinal reinforcement**

**10.3.9.1 General**

Splices in the longitudinal reinforcement of columns and piers shall comply with 8.7.

**10.3.9.2 Offset column faces**

Where column faces are offset 75 mm or more, splices of vertical bars adjacent to the offset face shall be made by separate reinforcing bars lapped as required herein.

**10.3.9.3 Laps designed for full yield stress when stress exceeds 0.5  $f_y$ .**

Where the stress in the longitudinal bars in a column calculated for any loading condition exceeds 0.5  $f_y$  in tension, either lap splices designed for full yield stress in tension shall be used, or full strength welded splices in accordance with 8.7.4.1(a), high strength welded splices, or high strength mechanical connections in accordance with 8.7.4.1(b) and 8.7.5.2 respectively shall be provided.