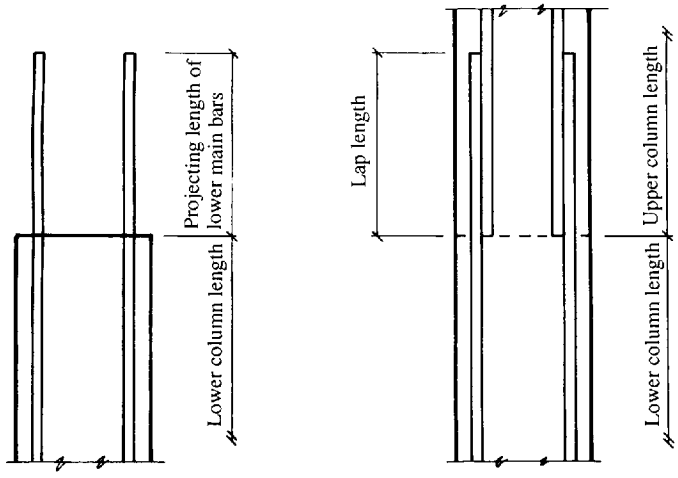
A vertical load bearing member whose breadth exceeds four times its thickness is classified as a wall and should be designed in accordance with the provisions for reinforced concrete walls.

Initially the cross-sectional dimensions may be determined by taking into account the durability, fire resistance and slenderness requirements. It is suggested for practical reasons appertaining to the *in situ* casting of columns that the minimum lateral dimension should not be less than 200 mm.

3.11.2 Main reinforcement areas

Sufficient reinforcement must be provided in order to control cracking of the concrete. Therefore the minimum area of compression reinforcement in a column should not be less than 0.4 per cent of the total concrete area, irrespective of the type of steel.

A maximum steel content is also specified to ensure proper placing and compaction of concrete around reinforcement. Therefore the maximum area of compression reinforcement in a vertically cast column should not exceed 6 per cent of the gross cross-sectional area. If it is necessary to lap the compression bars in a column, as shown in Figure 3.37, the maximum area limit may be increased to 10 per cent at lap positions.



(a) Elevation showing lower length only cast

(b) Elevation showing upper and lower lengths casts

Figure 3.37 *Lapped compression bars in a column*

For practical reasons the minimum number of longitudinal bars should be four in a square or rectangular column and six in a circular column. Their minimum size should be 12 mm diameter. The areas of round bar reinforcement have already been given in Table 3.8 in connection with the design of beams.

The general requirements relating to the main reinforcement in columns are illustrated and summarized in Figure 3.38, to which the following symbols apply:

A_g gross cross-sectional area of the column
A_{sc} area of main longitudinal reinforcement
A_c net cross-sectional area of concrete: $A_c = A_g - A_{sc}$

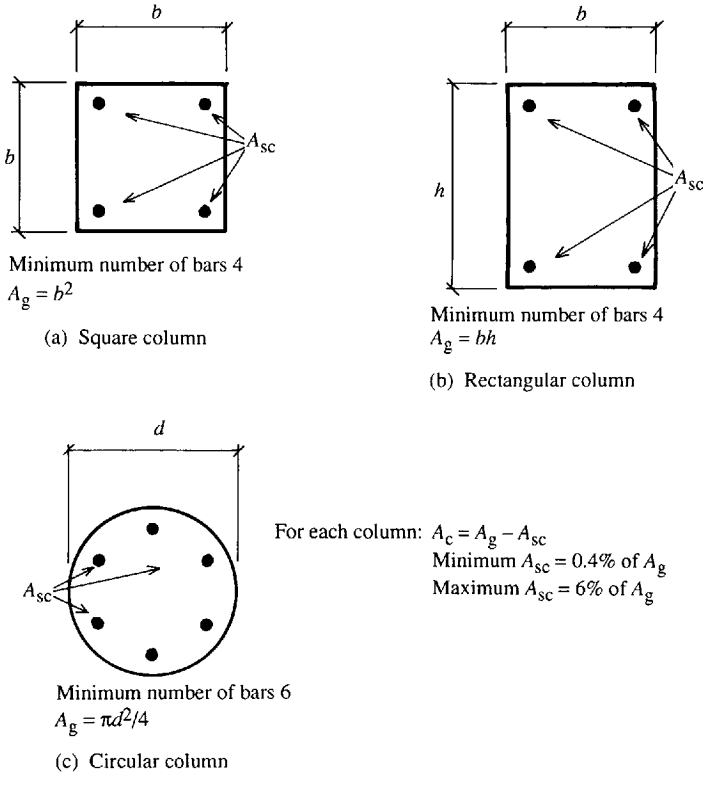


Figure 3.38 *Reinforcement requirements for columns*

In this context it is possible that confusion could arise with respect to the symbol A_c when reading BS 8110. It is defined in clause 3.8.1.1 as the net cross-sectional area of concrete in a column, whereas in clause 3.12.5.2, relating to minimum reinforcement areas, A_c is defined as the total area of concrete. Therefore to avoid confusion here A_c has been taken to be the net cross-sectional area of concrete, and the symbol A_g has been adopted for the gross or total cross-sectional area of the column.

3.11.3 Minimum spacing of reinforcement

The minimum spacing of main reinforcement in a column is the same as that given for beams in Section 3.9.5.