Table 27 Ultimate shear stresses v_c (N/mm²) for beams

$\frac{100\ A_s}{b_w d}$	Effective depth, mm						
	150	175	200	225	250	300	≥400
≤0.15	0.46	0.44	0.43	0.41	0.40	0.38	0.36
0.25	0.54	0.52	0.50	0.49	0.48	0.46	0.42
0.50	0.68	0.66	0.64	0.62	0.59	0.57	0.53
0.75	0.76	0.75	0.72	0.70	0.69	0.64	0.61
1.00	0.86	0.83	0.80	0.78	0.75	0.72	0.67
1.50	0.98	0.95	0.91	0.88	0.86	0.83	0.76
2.00	1.08	1.04	1.01	0.97	0.95	0.91	0.85
≥3.00	1.23	1.19	1.15	1.11	1.08	1.04	0.97

Note to Table 27
The tabulated values apply for f_{cu} = 30N/mm²
For f_{cu} = 25N/mm² the tabulated values should be divided by 1.062.
For f_{cu} = 35N/mm² the tabulated values should be multiplied by 1.053.
For f_{cu} = 40N/mm² the tabulated values should be multiplied by 1.10.

The term A_s relates to that area of longitudinal tension reinforcement that continues for a distance d beyond the section being considered. At supports the full area of tension reinforcement at the section may be considered, provided that the normal rules for curtailment and anchorage are met.

Shear reinforcement in the form of vertical links should be provided in accordance with the minimum areas shown in Table 28.

The spacing of links in the direction of the span should not exceed $0.75d$. At right-angles to the span the horizontal spacing should be such that no longitudinal tension bar is more than 150mm from a tension leg of a link; this spacing should in any case not exceed d.

Table 28 Minimum provision of links in beams

value of v N/mm²	Area of shear reinforcement
Less than $0.5v_c$	Grade 250 (mild steel) links equal to 0.18% of the horizontal section throughout the beam, except in members of minor structural importance such as lintels
$0.5v_c < v < (v_c + 0.4)$	Minimum links for whole length of beam $A_{sv} > \frac{0.4\ b_w\ S_v}{0.87\ f_{yv}}$
$(v_c + 0.4) < v$	Links only provided $A_{sv} > b_w \frac{S_v\ (v - v_c)}{0.87\ f_{yv}}$

where b_w is the width in mm of (the web of) the beam
S_v is the spacing of the links in mm
A_{sv} is the total cross-section of the link(s) in mm² (2 legs for a single closed link, 4 legs for double closed links) and
f_{yv} is the characteristic strength of the links in N/mm²

Enhanced shear strength of sections close to supports
For beams carrying a generally uniform load or where the principal load is located further than $2d$ from the face of the support, the shear stress may be calculated at a section a distance d from the face of the support. If the corresponding amount of shear reinforcement is provided at sections closer to the support, then no further check for shear at such sections is required.

Arrangement of links
For compression reinforcement in an outer layer, every corner bar and alternate bar should be supported by a link passing round the bar and having an included angle of not more than 135°. No bar within a compression zone should be further than 150mm from a restrained bar.

Where slabs are supported at the bottom of the beams, the links should be designed to carry the reaction from the slab in tension in addition to any shear forces.

Openings
In locations where the design shear stress is less than the permissible stress, small openings not exceeding $0.25d$ in diameter can be permitted within the middle third of the depths of beams, without detailed calculations. Where these conditions are not met, detailed calculations should be carried out.

4.5 Columns

4.5.1 Introduction
This subsection describes the final design of stocky columns resisting axial loads and bending moments. A method is given for biaxial bending.

The general procedure to be adopted is as follows:

1. check that the column is not slender
2. check that section size and cover comply with requirements for fire resistance
3. check that cover and concrete comply with requirements for durability
4. calculate axial loads and moments according to clause 4.5.3
5. design section and reinforcement.

4.5.2 Slenderness, fire resistance and durability
The size of column, concrete grade and the cover to reinforcement should be determined by taking into account the requirements of slenderness, fire and durability. To facilitate concreting the minimum dimension of a column should not be less than 200mm.

4.5.2.1 Slenderness
The ratio of the effective height of a stocky column to its least cross-sectional dimension should be 15 or less. The effective height should be obtained by multiplying the clear height between the lateral restraints at the two ends of the column by the factor obtained from Table 29.

4.5.2.2 Fire resistance
Minimum dimensions and covers are given in Table 30.