To avoid diagonal compression failure of the concrete when shear reinforcement is present, v must never exceed the lesser of $0.8\sqrt{f_{cu}}$ or 5 N/mm^2. If the calculated value of v did exceed these limits then the size of beam would need to be increased.

The next step is to determine the form and area of the shear reinforcement needed by comparing the calculated value of v with the guidance given in BS 8110 Part 1 Table 3.8, and the design shear stress capacity of concrete v_c given in BS 8110 Table 3.9. These tables are reproduced here as Tables 3.11 and 3.12 respectively.

Table 3.11 Form and area of shear reinforcement in beams (BS 8110 Part 1 1985 Table 3.8)

Value of v (N/mm^2)	Form of shear reinforcement to be provided	Area of shear reinforcement to be provided
Less than $0.5v_c$ throughout the beam	See note 1	
$0.5v_c < v < (v_c + 0.4)$	Minimum links for whole length of beam	$A_{sv} \geqslant 0.4b_v s_v/0.87f_{yv}$ (see Note 2)
$(v_c + 0.4) < v < 0.8\sqrt{f_{cu}}$ or 5 N/mm^2	Links or links combined with bent-up bars. Not more than 50% of the shear resistance provided by the steel may be in the form of bent-up bars (see Note 3)	Where links only provided: $A_{sv} \geqslant b_v s_v(v - v_c)/0.87f_{yv}$ Where links and bent-up bars provided: see clause 3.4.5.6 of BS 8110

Note 1: While minimum links should be provided in all beams of structural importance, it will be satisfactory to omit them in members of minor structural importance such as lintels or where the maximum design shear stress is less than $0.5v_c$.

Note 2: Minimum links provide a design shear resistance of 0.4 N/mm^2.

Note 3: See clause 3.4.5.5 of BS 8110 for guidance on spacing of links and bent-up bars.

Table 3.12 Values of design concrete shear stress v_c (N/mm^2) (BS 8110 Part 1 1985 Table 3.9)

$100A_s/b_v d$	Effective depth (mm)							
	125	150	175	200	225	250	300	$\geqslant$400
$\leqslant$0.15	0.45	0.43	0.41	0.40	0.39	0.38	0.36	0.34
0.25	0.53	0.51	0.49	0.47	0.46	0.45	0.43	0.40
0.50	0.67	0.64	0.62	0.60	0.58	0.56	0.54	0.50
0.75	0.77	0.73	0.71	0.68	0.66	0.65	0.62	0.57
1.00	0.84	0.81	0.78	0.75	0.73	0.71	0.68	0.63
1.50	0.97	0.92	0.89	0.86	0.83	0.81	0.78	0.72
2.00	1.06	1.02	0.98	0.95	0.92	0.89	0.86	0.80
$\geqslant$3.00	1.22	1.16	1.12	1.08	1.05	1.02	0.98	0.91

Note 1: Allowance has been made in these figures for a γ_m of 1.25.

Note 2: The values in the table are derived from the expression

$$0.79[100A_s/(b_v d)]^{1/3}(400/d)^{1/4}/\gamma_m$$

where $100A_s/b_v d$ should not be taken as greater than 3, and $400/d$ should not be taken as less than 1. For characteristic concrete strengths greater than 25 N/mm^2, the values in the table may be multiplied by $(f_{cu}/25)^{1/3}$. The value of f_{cu} should not be taken as greater than 40.

Two points need to be appreciated with respect to the use of Table 3.12. First, the tabulated values of v_c only apply to grade 25 concrete. For higher characteristic strengths up to a limiting f_{cu} of 40 N/mm^2, the values may be increased by multiplying them by $(f_{cu}/25)^{1/3}$.

Second, the percentage of main tensile reinforcement in the member under consideration should not be taken, for the purpose of the shear calculations, as greater than 3 per cent. Nor, again for the purpose of the shear calculations, should its effective depth be taken as greater than 400 mm.

The guidance given in Table 3.11 will establish whether and in what form shear reinforcement is required, according to three values of the shear stress v:

(a) $v < 0.5v_c$

Theoretically no shear reinforcement is necessary throughout the length of the beam. However, with the exception of simple lintels, nominal reinforcement in the form of minimum links should be provided in all beams of structural importance.

(b) $0.5v_c < v < (v_c + 0.4)$

Only minimum links are required.

(c) $(v_c + 0.4) < v < 0.8\sqrt{f_{cu}}$ or 5 N/mm^2

Designed links, or a combination of designed links and bent-up bars, are necessary.

The procedures for (b) and (c) are described in the following sections.

In certain circumstances, near to supports, advantage may be taken of an enhanced shear strength, for which guidance is given in clause 3.4.5.8 of BS 8110 Part 1.

Minimum links

When minimum links are to be provided as shown in Figure 3.14, their area should be determined from the following expression:

$$A_{sv} \geqslant \frac{0.4 b_v s_v}{0.87 f_{yv}}$$

where

A_{sv} total cross-section of links at the neutral axis, at a section
b_v breadth of section
f_{yv} characteristic strength of links (that is 250 N/mm^2 or 460 N/mm^2)
s_v spacing of links along the member

BS 8110 states that the spacing of links should not exceed $0.75d$. Hence,