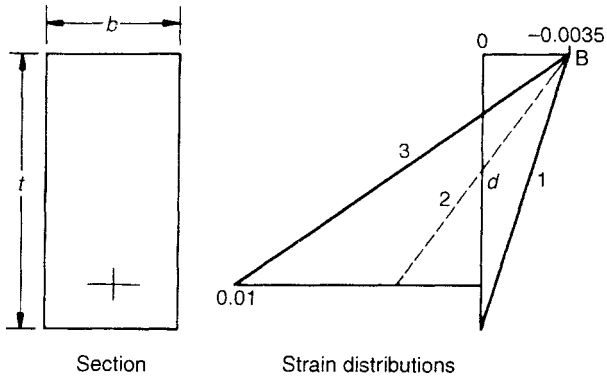

Fig. 10.13 Strain diagrams with masonry at ultimate.

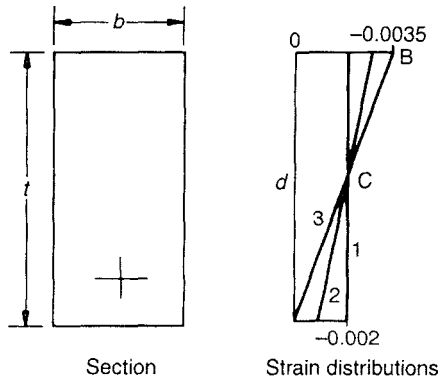

Fig. 10.14 Strain diagrams with pure compression limited to a strain of -0.002.

a level of $3t/7$ from the most compressed face. Line 3 would represent the strain distribution if the ultimate compressive strain was attained in the upper face of the masonry together with no strain in the lower face and line 2 an intermediate stage. Line 1 would represent the strain distribution for pure compression.

All the strain diagrams represented in Figs. 10.12 to 10.14 are combined into a single diagram in the Eurocode to cover various combinations of bending and/or axial loading. For reinforced masonry columns subjected to bending and compression the strain diagrams of Fig. 10.12 would be excluded to avoid the possibility of brittle failure. The strain diagrams shown in Fig. 10.13 are similar to those shown in Fig. 10.10 (a) and (b) using BS 5628.

10.6.2 Comparison between the methods of BS 5628 and ENV 1996–1–1

(a) Strain diagrams

The strain diagrams shown in Fig. 10.14 differ from those used in BS 5628 in the selection of the pivotal point; the Eurocode uses the pivot C whilst BS 5628 uses the pivot B. As a result of this, Eurocode calculations in this range might result in the maximum compressive stress in the masonry being less than the allowable and also the stress in the reinforcement being slightly larger than that calculated by BS 5628; compare line 2 of Fig. 10.14 with Fig. 10.10(c). To determine the strain in the lower reinforcement, using the Eurocode, it would be necessary to know the value of the maximum compressive strain ($\leqslant 0.0035$) and then use the geometry of the figure to calculate the strain at the level of the reinforcement. The calculation can be expressed in the form:

$$\varepsilon_2 = 0.002 - (\varepsilon - 0.002)(7d/3t - 1) \tag{10.17}$$

where ε_2=strain in the reinforcement at depth d and e=strain in the upper face of the masonry.

(b) Stress-strain diagram for the reinforcing steel

In the Eurocode the stress-strain relationship for steel is taken as bilinear as shown in Fig. 10.15 rather than the trilinear relationship used in BS 5628 (see Fig. 10.3).

(c) Conclusion

The main difference between the two codes occurs when the strain distribution is such that the section is in compression throughout. (This is

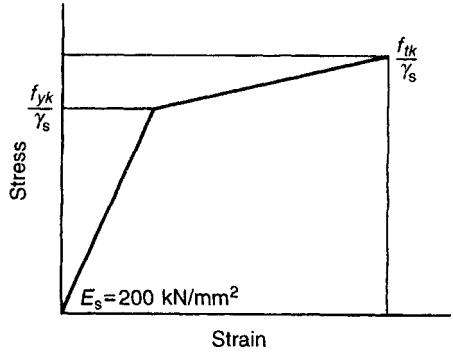

Fig. 10.15 Stress-strain diagram for reinforcement (ENV 1966–1–1).