Values of the material partial safety factor γ_m were established by the Code Drafting Committee. In theory this could have been done by statistical calculations—if the relevant parameters for loads and materials had been known and the desired level of safety (i.e. acceptable probability of failure) had been specified. However, these quantities were not known and the first approach to the problem was to try to arrive at a situation whereby the new code would, in a given case, give walls of the same thickness and material strength as in the old one. The most obvious procedure was therefore to split the global safety factor of about 5 implied in the permissible state code into partial safety factors relating to loads (γ_f) and material strength (γ_m). As the γ_f values were taken from CP 110 this would seem to be a fairly straightforward procedure. However, the situation is more complicated than this—for example, there are different partial safety factors for different categories of load effect; and in limit state design, partial safety factors are applied to characteristic strengths which do not exist in the permissible stress code. Thus more detailed consideration was necessary, and reference was made to the theoretical evaluation of safety factors by statistical analysis. These calculations did not lead directly to the values given in the code but they provided a reference framework whereby the γ_m values selected could be checked. Thus, it was verified that the proposed values were consistent with realistic estimates of variability of materials and that the highest and lowest values of γ_m applying, respectively, to unsupervised and closely supervised work should result in about the same level of safety. It should be emphasized that, although a considerable degree of judgement went into the selection of the γ_m values, they are not entirely arbitrary and reflect what is known from literally thousands of tests on masonry walls.

The values arrived at are set out in Table 4 of the code and are shown in Table 4.1. There are other partial safety factors for *shear* and for *ties*. For *accidental damage* the relevant γ_m values are halved.

It was considered reasonable that the principal partial safety factors for materials in compression should be graded to take into account differences in manufacturing control of bricks and of site supervision. There is therefore a benefit of about 10% for using bricks satisfying the requirement of 'special' category of manufacture and of about 20% for meeting this category of construction control. The effect of adopting both measures is to reduce γ_m by approximately 30%, i.e. from 3.5 to 2.5.

The requirements for 'special' category of manufacturing control are quite specific and are set out in the code. The definition of 'special' category of construction control is rather more difficult to define, but it is stated in Section 1 of the code that 'the execution of the work is carried out under the direction of appropriately qualified supervisors', and in Section 2 that '…workmanship used in the construction of loadbearing walls should comply with the appropriate clause in BS 5628: Part 3…'. Taken together these provisions must be met for 'normal category' of construction control. 'Special category' includes these requirements and in addition requires that the designer should ensure that the work in fact conforms to them and to any additional requirements which may be prescribed.

The code also calls for compressive strength tests on the mortar to be used in order to meet the requirements of 'special' category of construction control.

Characteristic strength is again defined statistically as the strength to be expected in 95% of tests on samples of the material being used. There are greater possibilities of determining characteristic strengths on a statistical basis as compared with loads, but again, for convenience, conventional values for characteristic compressive strength are adopted in BS 5628, in terms of brick strength and mortar strength. This information is presented graphically in Fig. 4.1. Similarly, characteristic flexural and shear strengths are from test results but not on a strictly statistical basis. These are shown in Table 4.2.

A very important paragraph at the beginning of Section 3 of BS 5628 draws attention to the responsibility of the designer to ensure overall stability of the structure, as discussed in Chapter 1 of this book. General considerations of stability are reinforced by the requirement that the structure should be able to resist at any level a horizontal force equal to 1.5% of the characteristic dead load of the structure above the level considered. The danger of divided responsibility for stability is pointed out. Accidents very often result from divided design responsibilities: in one well known case, a large steel building structure collapsed as a result of the main frames having been designed by a consulting engineer and the connections by the steelwork contractor concerned—neither gave proper consideration to the overall stability. Something similar could conceivably happen in a masonry structure if design responsibility for the floors and walls was divided.

The possible effect of accidental damage must also be taken into account in a general way at this stage, although more detailed consideration must be given to this matter as a check on the final design.

Finally, attention is directed to the possible need for temporary supports to walls during construction.

Section 4 is the longest part of the code and provides the data necessary for the design of walls and columns in addition to characteristic strength of materials and partial safety factors.

The basic design of compression members is carried out by calculating their design strength from the formula

$$\frac{\beta b t f_k}{\gamma_m} \tag{4.1}$$

where β is the capacity reduction factor for slenderness and eccentricity, b