4.4 Materials

The fundamental properties of the individual materials that comprise a masonry wall are well understood and documented. Sadly, however, a designer's intentions may sometimes be frustrated by a lack of understanding of their combined behaviour. To use masonry successfully the designer must select bricks or blocks of appropriate quality, choose suitable mortar, specify their use correctly and devise appropriate details.

It is pointed out in Part 1 of the code that wall thicknesses derived from strength considerations may be insufficient to satisfy other performance requirements. Reference should therefore be made to BS 5628 Part 3 for guidance on such matters as durability, fire resistance, thermal insulation, sound insulation, resistance to damp penetration and provision for thermal movement, together with material, component and workmanship specification matters.

The main constituent materials and components used in the construction of masonry walls are as follows:

(a) Bricks
(b) Blocks
(c) Mortar
(d) Wall ties
(e) Damp proof courses.

Each will now be discussed in more detail.

4.4.1 Bricks

Bricks are walling units not exceeding 337.5 mm in length, 225 mm in width and 112.5 mm in height. They are produced from a range of materials, such as clay, concrete and sometimes a mixture of lime and sand or crushed stone. The mixture types are referred to as either calcium silicate bricks or sand lime bricks.

The standard format of clay bricks is given in BS 3921 'Specification for clay bricks' as $225 \times 112.5 \times 75$ mm. This includes an allowance for a 10 mm mortar joint; thus the work size of the actual brick is $215 \times 102.5 \times 65$ mm.

Concrete bricks in accordance with BS 6073 Part 2 'Precast concrete masonry units' may be within any of the format ranges indicated in Table 4.1, which is based on BS 6073 Table 2.

Calcium silicate bricks in accordance with BS 187 'Specification for calcium silicate (sand lime and flint lime) bricks' have the same standard format as clay bricks.

Bricks can be classified in a number of ways with respect to their variety, type, quality and so on. However, for the purpose of this manual it will suffice to divide them into the following three general categories:

Facing bricks These are clay or concrete bricks manufactured to satisfy aesthetic requirements. They are available in a wide range of strengths, colours and textures.

Table 4.1 Format range of concrete bricks (based on BS 6073 Part 2 1981 Table 2)

Work size of concrete bricks Length × thickness × height	Coordinating size of concrete bricks (including 10 mm mortar joints) Length × thickness × height
290 × 90 × 90	300 × 100 × 100
215 × 103 × 65	225 × 113 × 75
190 × 90 × 90	200 × 100 × 100
190 × 90 × 65	200 × 100 × 75

Common bricks These are clay or concrete bricks produced for general building work and not to provide an attractive appearance. The term 'common' covers a wide variety of bricks and is not a guide to structural quality. Many common bricks have excellent strength properties.

Engineering bricks These are clay bricks produced with defined compressive strength qualities. They are available in two classes: engineering A and engineering B.

4.4.2 Blocks

Blocks are walling units that exceed in length, width or height the sizes specified for bricks. They are generally produced from concrete.

In accordance with BS 6073 'Precast concrete masonry units' the purchaser of the blocks should specify their size from Table 1 in Part 2 of that standard, reproduced here as Table 4.2. To obtain the coordinating size of blockwork the nominal mortar joint, usually 10 mm, should be added to the length and height dimensions given in the table; the thickness remains unchanged. It should be noted that not every manufacturer will produce the complete range of work sizes given in the table.

Table 4.2 Work sizes of blocks (BS 6073 Part 2 1981 Table 1)

Length (mm)	Height (mm)	Thickness (mm)														
		60	75	90	100	115	125	140	150	175	190	200	215	220	225	250
390	190	×	×	×	×	×		×	×		×	×				
440	140	×	×	×	×			×	×		×	×			×	
440	190	×	×	×	×			×	×		×		×	×		
440	215	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
440	290	×	×	×	×			×	×		×	×	×			
590	140		×	×	×			×	×		×	×	×			
590	190		×	×	×			×	×		×	×	×			
590	215		×	×	×		×	×	×	×		×	×		×	×