

Bricks must be free from deep and extensive cracks, from damage to edges and corners and also from expansive particles of lime.

Bricks are also classified according to their resistance to frost and the maximum soluble salt content.

*(a) Designation according to frost resistance*

- *Frost resistant (F)*: These bricks are durable in extreme conditions of exposure to water and freezing and thawing. These bricks can be used in all building situations.
- *Moderately frost resistant (M)*: These bricks are durable in the normal condition of exposure except in a saturated condition and subjected to repeated freezing and thawing.
- *Not frost resistant (O)*: These bricks are suitable for internal use. They are liable to be damaged by freezing and thawing unless protected by an impermeable cladding during construction and afterwards.

*(b) Designation according to maximum soluble salt content*

- *Low (L)*: These clay bricks must conform to the limit prescribed by BS 3921 for maximum soluble salt content given in Table 2.1. All engineering and some facing or common bricks may come under this category.
- *Normal (N)*: There is no special requirement or limit for soluble salt content.

**2.2.2 Varieties**

Bricks may be wire cut, with or without perforations, or pressed with single or double frogs or cellular. Perforated bricks contain holes; the cross-sectional area of any one hole should not exceed 10% and the volume of perforations 25% of the total volume of bricks. Cellular bricks will have cavities or frogs exceeding 20% of the gross volume of the brick. In bricks having frogs the total volume of depression should be

**Table 2.1** Maximum salt content of low (L) brick (BS 3921)

<i>Soluble radicals</i>	<i>Maximum content as tested on 10 brick samples (wt%)</i>
Sulphate	0.50
Calcium	0.30
Magnesium	0.03
Potassium	0.03
Sodium	0.03

less than or equal to 20%. In the United Kingdom, calcium silicate or concrete bricks are also used, covered by BS 187 and BS 6073.

Bricks of shapes other than rectangular prisms are referred to as 'standard special' and covered by BS 4729.

Concrete blocks may be solid, cellular or hollow.

Different varieties of bricks and blocks are shown in [Figs. 2.1](#) and [2.2](#).

### 2.2.3 Compressive strength

From the structural point of view, the compressive strength of the unit is the controlling factor. Bricks of various strengths are available to suit a wide range of architectural and engineering requirements. [Table 2.2](#) gives a classification of bricks according to the compressive strength. For low-rise buildings, bricks of 5.2 N/mm<sup>2</sup> should be sufficient. For dampproof courses, low-absorption engineering bricks are usually required. For reinforced and prestressed brickwork, it is highly unlikely that brick strength lower than 20 N/mm<sup>2</sup> will be used in the UK.

Calcium silicate bricks of various strengths are also available. [Table 2.3](#) gives the class and strength of these bricks available.

Concrete bricks of minimum average strength of 21 to 50 N/mm<sup>2</sup> are available. Solid, cellular and hollow concrete blocks of various thicknesses and strengths are manufactured to suit the design requirements. Both the thickness and the compressive strength of concrete blocks are given in [Table 2.4](#).

### 2.2.4 Absorption

Bricks contain pores; some may be 'through' pores, others are 'cul-de-sac' or even sealed and inaccessible. The 'through' pores allow air to escape in the 24 h absorption test (BS 3921) and permit free passage of water. However, others in a simple immersion test or vacuum test do not allow the passage of water, hence the requirement for a 5 h boiling or vacuum test. The absorption is the amount of water which is taken up to fill these pores in a brick by displacing the air. The saturation coefficient is the ratio of 24 h cold absorption to maximum absorption in vacuum or boiling. The absorption of clay bricks varies from 4.5 to 21% by weight and those of calcium silicate from 7 to 21% and concrete units 7 to 10% by weight. The saturation coefficient of bricks may range approximately from 0.2 to 0.88. Neither the absorption nor the saturation coefficient necessarily indicates the liability of bricks to decay by frost or chemical action. Likewise, absorption is not a mandatory requirement for concrete bricks or blocks as there is no relationship between absorption and durability.