Table 2.4 Compressive strength and thickness of concrete blocks

	Face size 440 × 215 mm	
Type	*Thickness* (mm)	*Minimum average compressive strength of unit* (N/mm^2)
Solid	75	
	100	
Solid	140	7.0–21.0
or	150	
Cellular	190	
or	200	
Hollow	215	

2.2.5 Frost resistance

The resistance of bricks to frost is very variable and depends on the degree of exposure to driving rain and temperature. Engineering bricks with high compressive strength and low absorption are expected to be frost resistant. However, some bricks of low strength and high absorption may be resistant to frost compared to low-absorption and highstrength brick.

Bricks can only be damaged provided 90% of the available pore space is filled with water about freezing temperature, since water expands onetenth on freezing. Hence, low or high absorption of water by a brick does not signify that all the available pores will become filled with water. Calcium silicate bricks of 14 N/mm^2 or above are weather resistant.

In the United Kingdom, frost damage is not very common as brickwork is seldom sufficiently saturated by rain, except in unprotected cornices, parapets, free-standing and retaining walls. However, bricks and mortar must be carefully selected to avoid damage due to frost. Table 2.7 shows the minimum qualities of clay and calcium silicate bricks to be used for various positions in walls.

Precast concrete masonry units are frost resistant.

2.2.6 Dimensional changes

(a) Thermal movement

All building materials expand or contract with the rise and fall of temperature. The effect of this movement is dealt with in Chapter 13.

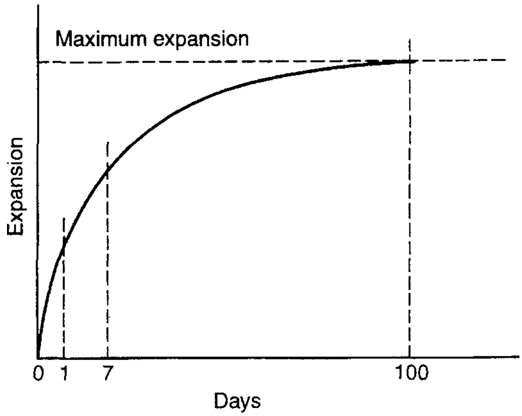

Fig. 2.3 Expansion of kiln-fresh bricks due to absorption of moisture from atmosphere.

(b) Moisture movement

One of the common causes of cracking and decay of building materials is moisture movement, which may be wholly or partly reversible or, in some circumstances, irreversible. The designer should be aware of the magnitude of this movement.

Clay bricks being taken from the kiln expand owing to absorption of water from the atmosphere. The magnitude of this expansion depends on the type of brick and its firing temperature and is wholly irreversible. A large part of this irreversible movement takes place within a few days, as shown in Fig. 2.3, and the rest takes place over a period of about six months. Because of this moisture movement, bricks coming fresh from the kiln should never be delivered straight to the site. Generally, the accepted time lag is a fortnight. Subsequent moisture movement is unlikely to exceed 0.02%.

In addition to this, bricks also undergo partly or wholly reversible expansion or contraction due to wetting or drying. This is not very significant except in the case of the calcium silicate bricks. Hence, the designer should incorporate 'expansion' joints in all walls of any considerable length as a precaution against cracking. Normally, movement joints in calcium silicate brickwork may be provided at intervals of 7.5 to 9.0 m depending upon the moisture content of bricks at the time of laying. In clay brickwork expansion joints at intervals of 12.2 to 18.3 m may be provided to accommodate thermal or other movements.

The drying shrinkage of concrete brick/blockwork should not exceed 0.06%. In concrete masonry, the movement joint should be provided at 6