

Material and Methods of Construction

Lecture # 2 Bricks

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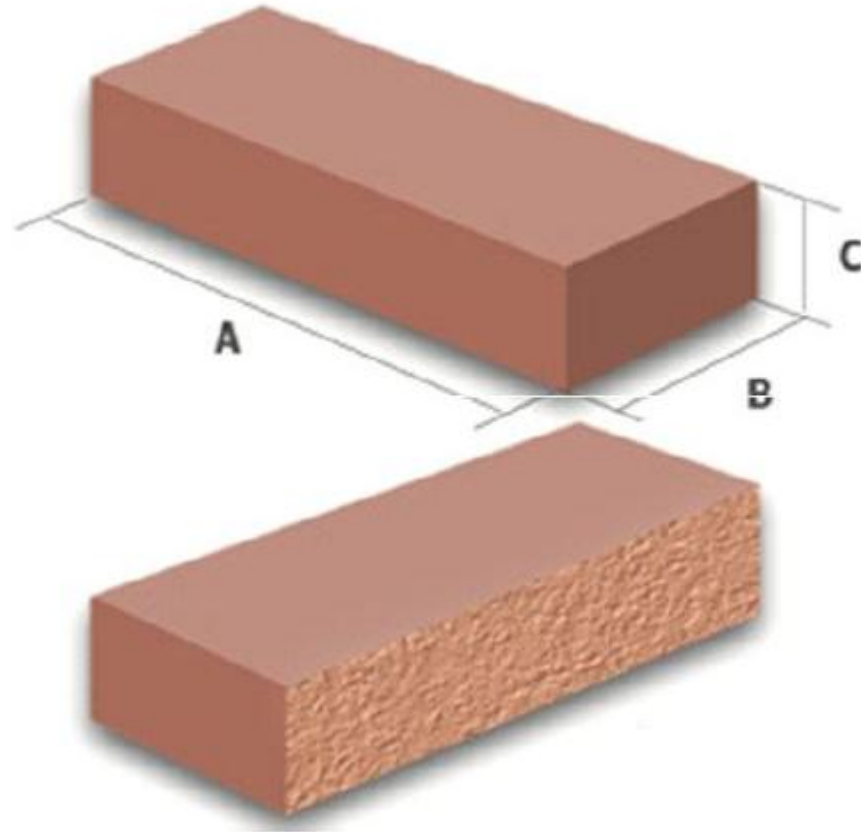
Bricks

6.4 Bricks

The brick is the most commonly used building material and used for constructing walls, columns, roofs, paving floors etc. A good brick clay contains 20 to 30 percent of alumina, 50 to 60 percent of silica and the remaining constituents are lime, magnesia, sodium, potassium, manganese and iron oxide. It may be noted that

1. The excess of alumina in the clay makes the brick crack and warp on drying.
2. The excess of silica in the clay makes the brick brittle and weak.
3. The excess of lime in the clay causes the bricks to melt and distort during burning.
4. The alkaline salt present in the bricks, absorb moisture from air which on drying leaves powder deposit on the brick. This effect is known as *efflorescence*. It is also caused if the clay used for making bricks contain pyrite and the water used for pugging the clay contain gypsum.

Bricks



Bricks

•Standard modular bricks						
Brick		Actual size/Specified Size (Real dimension of each brick)	Nominal size (Actual size plus the width of the mortar joint)			
Standard modular brick		19cmx9cmx9cm 7.48"x3.54"x3.54"	20cmx10cmx10cm 7.87"x3.93"x3.93"			
Standard modular brick tile		19cmx9cmx4cm 7.48"x3.54"x 1.57"	20cmx10cmx5cm 7.87"x3.93"x1.96"			
Wall	½ brick	1 brick	1 ½ brick	2 bricks	2 ½ bricks	3 bricks
Thickness	10 cm	20 cm	30 cm	40 cm	50 cm	60 cm
8						

Bricks

• Traditional bricks						
Brick		Actual size/Specified Size (Real dimension of each brick)		Nominal size (Actual size plus the width of the mortar joint)		
Traditional brick		22.9cmx11.2cmx7.0cm 9"x4 ³ / ₈ "x2 ³ / ₄ "		22.9cmx11.4cmx7.6cm 9"x4 ¹ / ₂ "x3"		
Wall	$\frac{1}{2}$ brick	1 brick	1 $\frac{1}{2}$ brick	2 bricks	2 $\frac{1}{2}$ bricks	3 bricks
Thickness	4 $\frac{1}{2}$ "	9"	13 $\frac{1}{2}$ "	18"	22 $\frac{1}{2}$ "	27"

Manufacture of Bricks

6.5 Manufacture of Bricks

The manufacture of bricks consist of the following four major operations :

1. *Preparation of brick clay.* First of all, the earth is dug out in clear weather and cleaned off stones, pebbles, grits, vegetable matter etc. The earth after digging out is left to atmospheric action for few weeks. This process is known as *weathering*. It is found that 1.5 to 2.5 cum of earth is required for moulding 1000 bricks. The clay is then tempered in pug-mills.

Note : The process of mixing clay, water and other ingredients to make bricks is known as *kneading*.

2. *Moulding bricks.* After preparing the clay, the moulding of bricks is carried out either by hand or by machine. In hand moulding, the bricks are moulded by hand *i.e.* manually. It is preferred where *manpower* is cheap and readily available. The hand moulding may be done either on ground or

Manufacture of Bricks

on table and accordingly these are termed as ground moulding or table moulding.

The bricks are moulded in machine, when large number of bricks are to be manufactured in a short time. The machine moulding may be performed either by plastic method or dry process method.

Note : The hand made bricks are superior to machine made bricks for facing purposes.

3. *Drying of bricks.* After the bricks are moulded, they are dried. The drying of bricks may be natural or artificial. In natural drying, the moulded bricks are kept in the sun for a day or two so that they become sufficiently hard to be handled safely. These bricks are now arranged in rows on their edges on a slightly raised ground called *hacks*. A little space for free circulation of air is kept for each brick. The air and sun dried bricks are adequately strong and durable. If the bricks are not properly dried before they are burnt, they may get cracked and distorted during the burning process.

The artificial drying is used when bricks are required on a large scale and at a rapid rate.

4. *Burning of bricks.* The burning of dry bricks is done either in a clamp or in a kiln. In India, both clamp and kiln burning are practised. It may be noted that the average out-turn of first class bricks in clamp burning is about 60% whereas for kiln burning it is about 80 to 90%.

Notes : 1. The burning of bricks in kilns is complete within 24 hours.

2. The bricks should be burnt at a temperature from 1000°C to 1200°C.

3. The bricks after burning in kilns require about 12 days to cool down for unloading.

Classification of Bricks

6.6 Classification of Bricks

The bricks are classified as under :

1. *First class bricks.* These bricks are well burnt having smooth and even surface with perfect rectangular shape and uniform reddish colour. These bricks should not absorb water more than 20 percent of its own dry weight after 24 hours immersion in water. It should have a minimum crushing strength of 10.5 MN/m^2 .

2. *Second class bricks.* These bricks are slightly over burnt having rough surface and not perfectly rectangular in shape. These bricks should not absorb water more than 22 percent of its own dry weight after 24 hours immersion in water.

3. *Third class bricks.* These bricks are not properly burnt (under burnt) in the kiln and hence these are soft and can be easily broken. These bricks should not absorb water more than 25 percent of its own dry weight after 24 hours immersion in water.

4. *Jhama bricks.* These bricks are over burnt with irregular shape. These bricks are dark bluish in colour.

Notes : 1. The standard size of bricks are $19 \text{ cm} \times 9 \text{ cm} \times 4 \text{ cm}$ or $19 \text{ cm} \times 9 \text{ cm} \times 9 \text{ cm}$

2. The specific gravity of bricks is about 2.

3. The number of bricks required for one cubic metre of brick masonry are 550.

Special Bricks

6.7 Special Bricks

The special bricks differ from the commonly used building bricks with respect to their shape, specifications and special purpose for which they are made. Following are some of the special bricks :

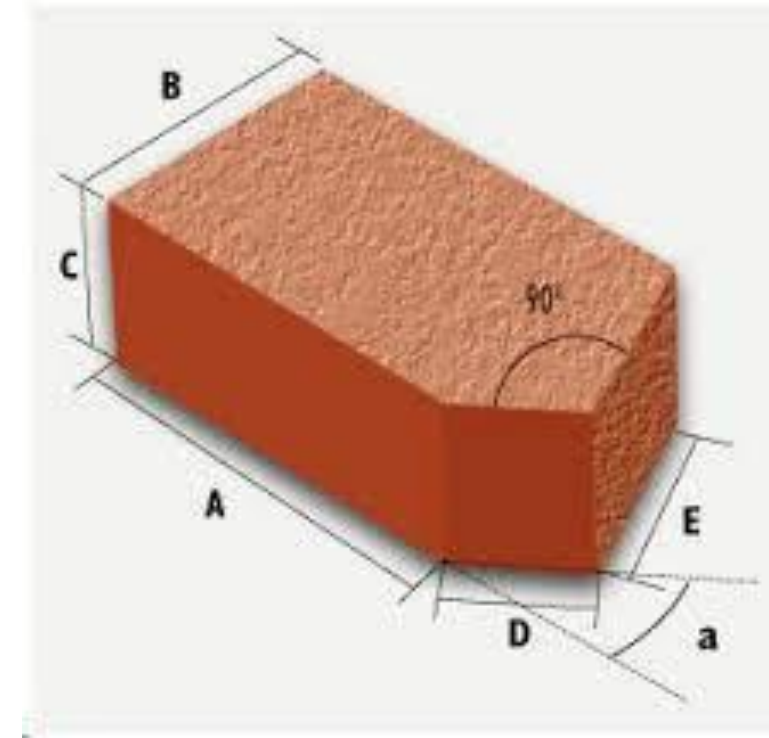
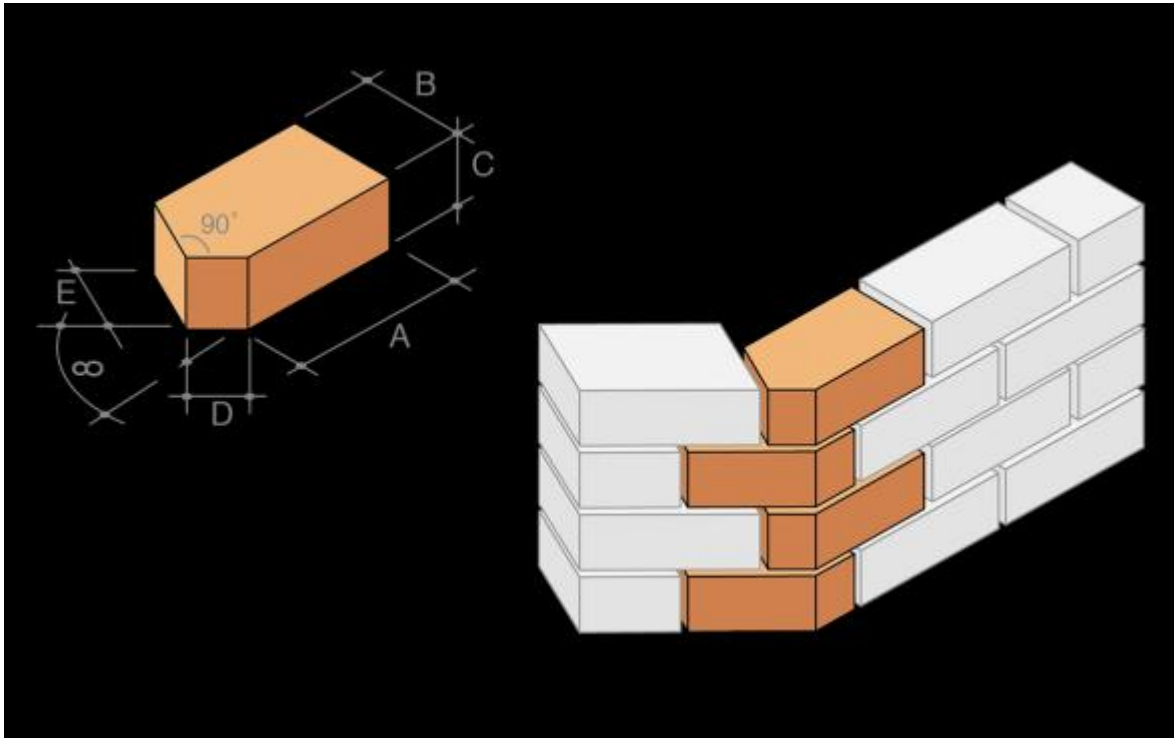
1. *Squint bricks.* These bricks are used in construction of acute and obtuse squint quoins.
2. *Paving bricks.* These bricks are extensively used for street pavements, stable floors, garden walls etc.
3. *Round bricks.* These bricks are used for circular pillars.
4. *Perforated and Hollow bricks.* These bricks are used for partition walls or panel walls in multi-storeyed buildings.
5. *Refractory bricks.* A good refractory brick should have the capability of withstanding high temperature and low coefficient of expansion and contraction. Following are the three types of

refractory bricks :

- (a) Acid bricks (Fire bricks and silica bricks),
- (b) Basic bricks (Magnesite bricks, dolomite bricks and bauxite bricks), and
- (c) Neutral bricks (Chrome bricks, chrome-magnesite bricks and spinel bricks).

6.8 Building Tiles

Special Bricks



Squint Brick

Special Bricks



Paving Brick

Special Bricks



Rounded Brick