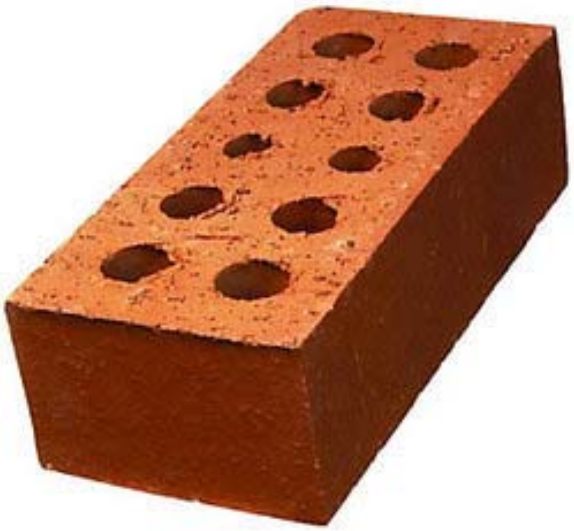
A. Lecturer:

Sherzad Qadir Majid

Clay Bricks:

Clay bricks are small, rectangular blocks made of fired clays. Clays that used for bricks making is vary widely in composition from one place to another. Clays are composed mainly of silica, alumina, lime, iron, manganese, sulfur, and phosphates, with different proportions. Bricks are manufactured by grinding or crushing the clay in mill-sand machine, then mixing it with water to make it paste. The clay paste is then molded, textured, dried, and finally fired. Bricks are manufactured with different colors, such as dark red, purple, brown, gray, pink or dull brown, depending on the firing temperature of the clay during manufacturing and color admixtures. The firing temperature for brick manufacturing varies from 900 to 1200 ºC. Clay bricks have an average density of 2000 kg/m^3.



Bricks are used for different purpose including building, facing and aesthetics, floor making, and paving:

1- **Building bricks** (common bricks) are used as a structural material and typically are strong and durable.

2- **Facing bricks** are used for facing and aesthetics purpose and are available in different size, colors, and texture.

3- **Floor bricks** are used on finished floor surfaces and generally smooth and dense and have high resistance to abrasion.

4- **Paving bricks** are used as a paving material for roads, sidewalks, patios, drive ways, and interior floors. Paving bricks available in different colors such as red, gray, or brown and typically they are abrasion resistance and could be vitrified.

Advantages of clay bricks:

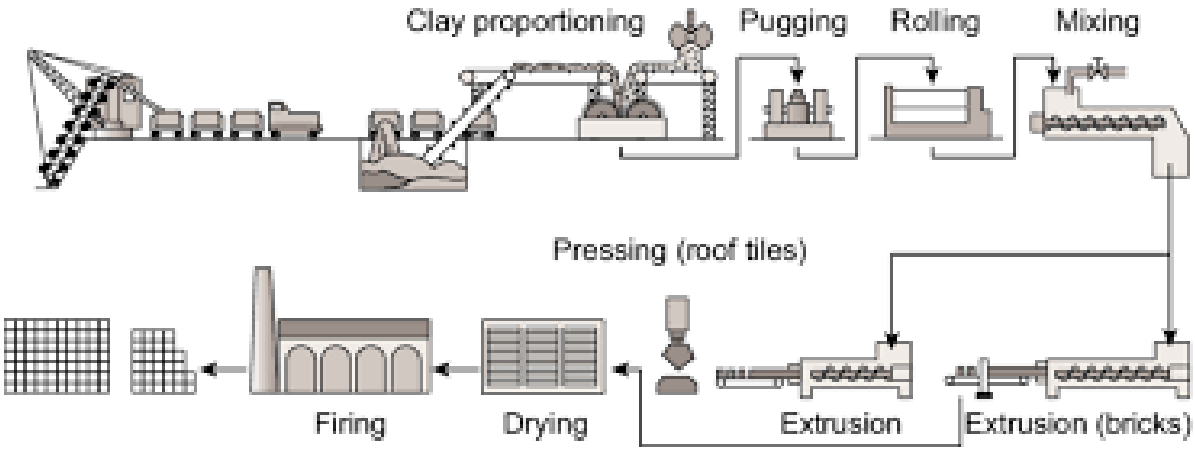
1- Very durable.
2- Fire resistant.
3- Require very little maintenance.
4- They have moderate insulating properties, which make brick houses cooler in summer and warmer in winter, compared with houses built with other construction materials.

The process of manufacturing

1. **Preparation of clay**: after removal of vegetation, then the clay process. The processing of clay depends on type of bricks to be made, the ordinary bricks need very little preparation, while for superior bricks the clay washed and processed before molding it into bricks.
2. **Molding of Bricks:** may be carry out by hands or by machines. The process of molding bricks may be by hand molding (soft-mud is used) this type used for bearing walls, or by machine molding (stiff-mud is used) also used for bearing walls, roofing, flooring, or by dry-press processing (molding using max. 10% water and forming bricks at higher pressure) like wall tiles or decorative works.



3- **Burning of Bricks:** burning of bricks is carried out in temporary clamps or in permanent kilns. It is then fired slowly to intense (very high) heat which may take many days.

Chemical Changes in Burning of Bricks:

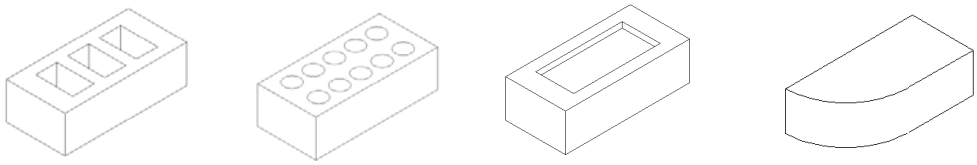
Heating clay up to about 640 ºC produce some physical changes only, here the moisture is driven out and organic matter is burnt out. In this stage the brick is crumble down like chalk when immersed in water. Then by increasing the heating of clay up to 700 to 1000 ºC, chemical changes take place by which alumina and silica in the clay fuse together resulting in a new compound which is strong and

stable, here the brick is not crumble down like clay when immersed in water. The product is different from the original clay.

If we heat the clay beyond 1300 ^{o}C, the above materials get vitrified; the bricks began to lose their shape. Vitrified tiles are nowadays extensively used as floor tiles.

Dimensions:

There are several shapes and dimensions for bricks changes from country to another, the normal size of the building bricks is 230x110x70 mm, allowing for 10 mm mortar joints. Conventional and specially shaped bricks:



Hollow Brick Perforated Brick with Frog Bull nose Brick

The purpose of providing frog is to form a key for holding the mortar.

Light Weight Clay Bricks:

Light Weight Clay Bricks are used in tall building, to reduce the dead weight of walls, such us partition walls, this reduce the load on the foundation. They are available in many sizes. A hollow brick in which the brick contains hollow with ribs. The weight of this type as one-third the weight of the solid (ordinary brick). The hollow also reduce the transmission of heat, sound, and dampness.

Sampling:

For testing of bricks selecting 10 bricks from lot size not less than 1000000 bricks, and 5 for each additional 500000 bricks. 10 bricks for compressive strength, water absorption, efflorescence, dimensional test, hardness, and soundness.

Test of Bricks:

a. Compressive strength.
b. Water absorption.
c. Efflorescence (soluble salt content).
d. Hardness: a Scratch is made on the surface of the brick with finger nail. No impression will be left on the surface.
e. Soundness: two bricks are taken, one in each hand, and they are struck with each other lightly. A clear ring sound should be produced and the brick should not get break.

f. Dimensional tolerance, these dimensions are to be measured in one or two bricks of ten each. Allowable within 3% for length and width. 4% for thickness.