

BRICKS

One of the oldest building material brick continues to be a most popular and leading construction material because of being cheap, durable and easy to handle and work with. Clay bricks are used for building-up exterior and interior walls, partitions, piers, footings and other load bearing structures.

A brick is rectangular in shape with smooth, even surfaces, homogeneous, full burning and straight edges and of size that can be conveniently handled with one or two hands. Brick may be made of burnt clay or mixture of sand and lime or of Portland cement concrete. They shall be free from cracks and flows and nodules of free lime .Clay bricks are commonly used since these are economical and easily available.

CHARACTRESTICS OF GOOD BRICK

The essential requirements for building bricks are sufficient strength in crushing, regularity in size, a proper suction rate, and a pleasing appearance when exposed to view.

- ❖ **Size and Shape:** The bricks should have uniform size and plane, rectangular surfaces with parallel sides and sharp straight edges.
- ❖ **Color:** The brick should have a uniform color as indicative of uniformity in chemical composition and attention to detail in the burning of the brick.
- ❖ **Texture and Compactness:** The surfaces should not be too smooth to cause slipping of mortar. The brick should have pre-compact and uniform texture. A fractured surface should not show cracks, holes or lumps of lime.
- ❖ **Hardness and Soundness:** The brick should be so hard that when scratched by a finger nail no impression is made. When two bricks are struck together, a metallic sound should be produced.
- ❖ **Brick should be free from stones, organic matter, saltpeter, etc.**

Classification of bricks according to constituent raw material:

1. Clay bricks
2. Lime – sand bricks
3. Concrete bricks

Clay bricks:

1.1 Raw materials:

Clay is the most important raw material used for making bricks. It is an earthen mineral mass or fragmentary rock capable of mixing with water and forming a plastic viscous mass which has a property of retaining its shape when moulded and dried. When such masses are heated to redness, they acquire hardness and strength. This is a result of micro-structural changes in clay and as such is a chemical property. Purest clays consist mainly of kaolinite ($2\text{SiO}_2 \cdot \text{Al}_2\text{O}_3 \cdot 2\text{H}_2\text{O}$) with small quantities of minerals such as quartz, mica, feldspar, calcite, magnesite, etc. Plasticity, tensile strength, texture, shrinkage, porosity, fusibility and colour after burning are the physical properties which are the most important in determining the value of clay. Knowledge of these properties is of more benefit in judging the quality of the raw material than a chemical analysis.

a. Alumina

Alumina is main constituent of every clay. Loam soil (adhesive soil) form a good clay. In absence of sand, pure clay will develop cracks due to shrinkage on drying and burning. A good clay bricks should contain about 20% of alumina.

b. Silica

Free silica (sand), if added to clay in suitable proportion makes hard and prevents it from warping (twisting) and shrinkage on drying. Silica, if present in greater proportion, makes a brick brittle. Silica present in the combined form (aluminum silicate) does not form good bricks, as it will shrink and develop cracks. Both silica and alumina should be in free form.

c. Lime

This also should be present in small quantities in the brick soil. It should be in a finely produced condition and it should not be in the form lumps (active free lime) or lumps. Lime prevents shrinkage of raw bricks. It helps fusion of sand at the kiln temperature. This fused sand will bind the bricks particles fast.

d. Iron oxide

A small quantity of oxide of iron (5-6%) is desirable. It helps the fusion of sand like lime. It gives red colour to burn bricks. Excess of iron oxide imparts dark blue or blackish colour to brick, while, a lower percentage of iron oxide makes the brick yellow in colour. Iron oxide makes the bricks hard and strong.

e. Magnesia

A small amount of magnesia helps to decrease the shrinkage of bricks. This gives a yellow tint to the bricks. But excess of magnesia is not desirable as it tends to produce the deterioration of bricks.

1.2 Composition of good clay brick:

A good clay brick should contain the following:

1. Clay or alumina – Al_2O_3 – 20%
2. Sand or silica – SiO_2 – 60%
- 3- Remaining ingredients, such as:

- Lime
 - Iron oxide
 - Magnesia
 - Manganese
- } — 20%

Harmful ingredients in clay bricks:

a. Excess of lime:

Excess of lime makes the colour of the brick yellow instead of red. Lumps of limestone remaining in the finished brick are undesirable because, when such a brick comes in contact with water, lime will begin to slake. During slaking, lime expands and also generates heat. Due to this, stresses will be produced, which will result in producing cracks in bricks.

b. Iron pyrites:

These will decompose and oxidize the clay during the burning of bricks. After oxidation a black discoloration will be produced on the bricks, making it look ugly.

c. Pebbles:

The presence of pebbles, grit, gravel etc. will be undesirable because they prevent the clay from being mixed well. They prevent the manufacture of smooth and regular, standard

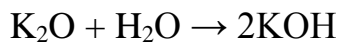
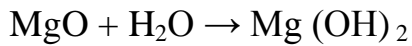
bricks. They also spoil the appearance of the bricks. Pebbles, gravel, grit, etc., should be removed before mixing and pugging of clay are done.

e. Organic matter:

This includes leaves, twigs. Etc. of plants, roots, grass, bones of animals etc. These if prevent and burnt along with bricks, produced empty pockets or pores and will produce porous bricks.

f. Alkalis (MgO, K₂O):

- ✚ It lowers the fusion temperature and molts bricks.
- ✚ Changes the shape of bricks or get twisted.
- ✚ These salts have hygroscopic action, they absorb moisture, present in the atmosphere and keep brick damp which is harmful for health and decays the structure.



g. Salts:

Salts such as sodium sulphate cause efflorescence.