

BRICKS

Manufacture of bricks:

Manufacture of clay bricks involves the following operation:

1. Preparation of clay:

a. Removal of loose soil:

The top layer of loose disintegrated soil up to about 20 cm depth has to be removed as this contains a lot of impurities.

b. Digging, spreading and cleaning:

Next, the soil has to be dug up. For small quantity, digging may be done manually. For large scale work, it may be done by machine.

c. Weathering: The soil is left to weather for a few weeks, this is necessary to increase the plasticity of soil and improves its quantity.

d. Blending:

This refers to mixing the clay, after making it loose and adding any required ingredients to the top of the heap.

e. Tempering:

This is necessary to make the clay fully consistent, and fit for molding into raw bricks, by adding the required amount of water to make it plastic.

2 Molding:

Molds required for making a brick are made of rectangular blocks slightly large in size (10% larger than the burnt bricks). It is done to allow for the shrinkage of the molded brick on drying and burning. The molding is improved by the following process:

a. Dry press process:

In this method, clay is not made sufficiently plastic, but only small amount of water is mixed with clay as to form a damp powder. With plunger machines, this powder is compressed in the mold, in the form of bricks. Such bricks are directly burned, no drying is needed, but care is to be taken during burning where the temperature should be raised gradually.

b. Stiff mud process:

In this process the clay is only sufficiently moist to process the required coherence under moderate pressure, which results in economy of time in drying and fuel in burning. Such clay is forced to come out of any opening having dimensions equal to length of bricks, by means of a wire. Hence these are also known as wire cut bricks.

c. Soft mud process:

This process is used where the clay is too wet, there for, it must be dried before molding. Bricks are molded under pressure in a soft mud brick machine, which tempers the clay in its pigging chamber, sands or wets the molds, presses the clay into 4 to 9 molds at a time, strikes off the excess clay, bumps the molds uniformly and dumps the bricks into a pallet. The pallets of bricks are carried away to the dryer as fast as made.

3. Drying:

As wet clay bricks come from different brick machine, they contain from 7-50% moisture depend on whether dry press stiff mud or soft mud process has been used moisture in clay may be classified as:

- Equilibrium moisture: is that moisture in the material which exerts a vapor pressure equal to that exerted by the surrounding air of a given temperature and humidity.
- Free moisture: is held strongly in the pore spaces.

Most of the free water is removed in the drying process and the remaining moisture during the burning process. Mechanical dryer, who permit of automatic control of temperature, humidity and air velocity, have come into general use. As the free water of the clay body is removed, the clay particles tend to coalesce causing shrinkage. The general effect of such shrinkage is to increase the resistance to moisture flow in the dried layers. If the drying is carried on too rapidly as by means of hot dry air, the moisture is removed from the surface of the solid more rapidly than the interior of the solid so that the surface harden and cracking occur. It is desirable to dry clay with moist air, reducing the drying rate to the point where diffusion of water to the surface can keep up with the vaporization at the surface. The average time necessary for drying clay brick is about 3 days, and the temperature required is from 38°C to 149°C.

4 Burning:

The burning of clay in a kiln requires an average time of 3 to 4 days. The process of burning may be divided into the following stages:

a. Water smoking:

During this period which remove most of the water in the clay under temperature ranging from 125° C to 175° C.

b. Dehydration:

Dehydration consists of expelling chemically combined water by breaking down the clay molecules.

It begins at about 425° C and complete at about 750° C.

c. Oxidation:

Oxidation begins during the dehydration stage. All combustible matter is consumed, carbon is eliminated, the fluxing materials are changed to oxides, and sulfur is removed.

Classification of clay bricks in accordance with Iraqi standard No. 25 / 1988:

Bricks used in construction works are classified into three grades:

Grade A:

Intended for use in building construction and footing subjected to loads and exposed to sever abrasion by weathering action.

Grade B:

Intended for use in building construction subjected to loads and not exposed to sever abrasion by weathering action, such as exterior walls not exposed to penetration of water.

Grade C:

Intended for use in building construction not subjected to loading such as interior masonry walls and partitions, not exposed to sever abrasion by weathering action.

class	Minimum compressive strength N/mm ²	
	Average of compressive strength 10 bricks	Compressive strength of one brick
Grade A	18	16
Grade B	13	11
Grade C	9	7