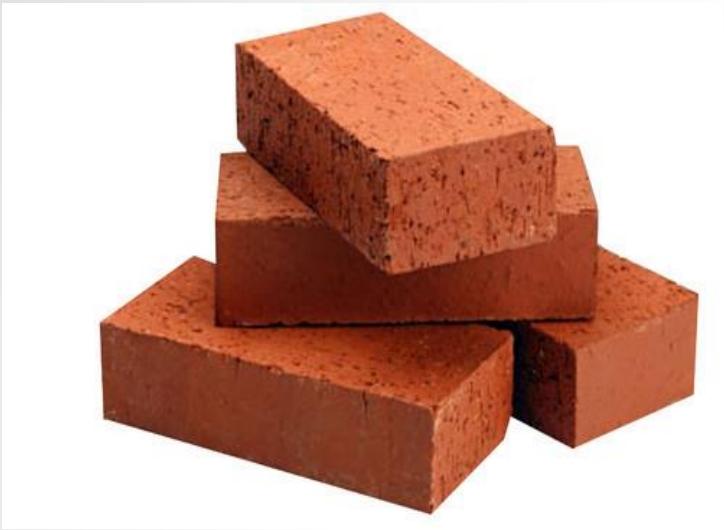

BRICK

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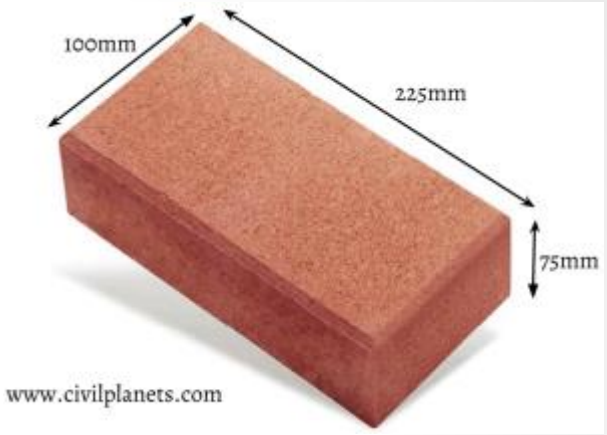
Learning objectives

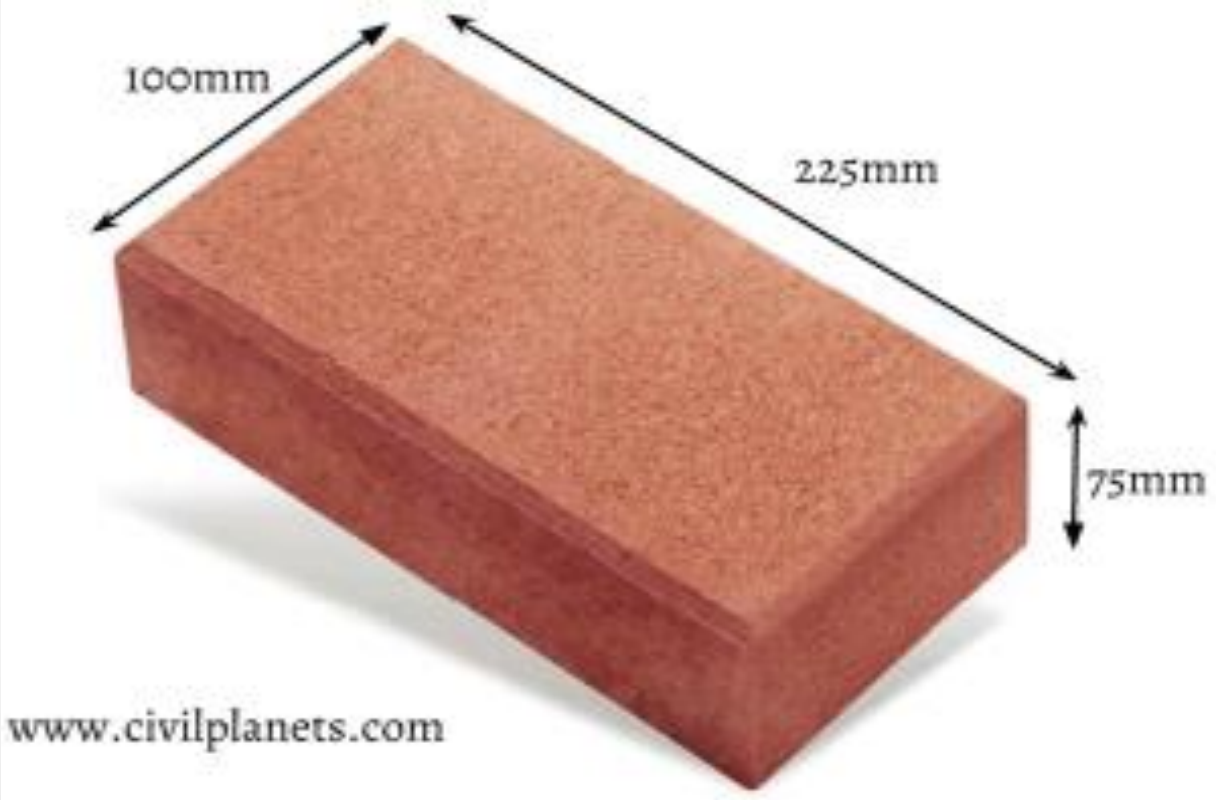
- Classify different types of brick.
- Mix the ratio of cement and sand in proportion.
- Construct different types of brick wall.
- Check the horizontal and vertical alignment by thread or spirit level and plumb bob.

DEFINITION:



A brick is an artificial kind of stone made of clay whose chief characteristics are a plasticity when wet and stone like hardness after being heated to high temperature.

STANDARD SIZE OF A BRICK



FACTORS THAT AFFECT THE QUALITY OF BRICK :

- Chemical properties of the clay used.
- Preparation of the clay.
- Process of drying
- Different degrees of burning.

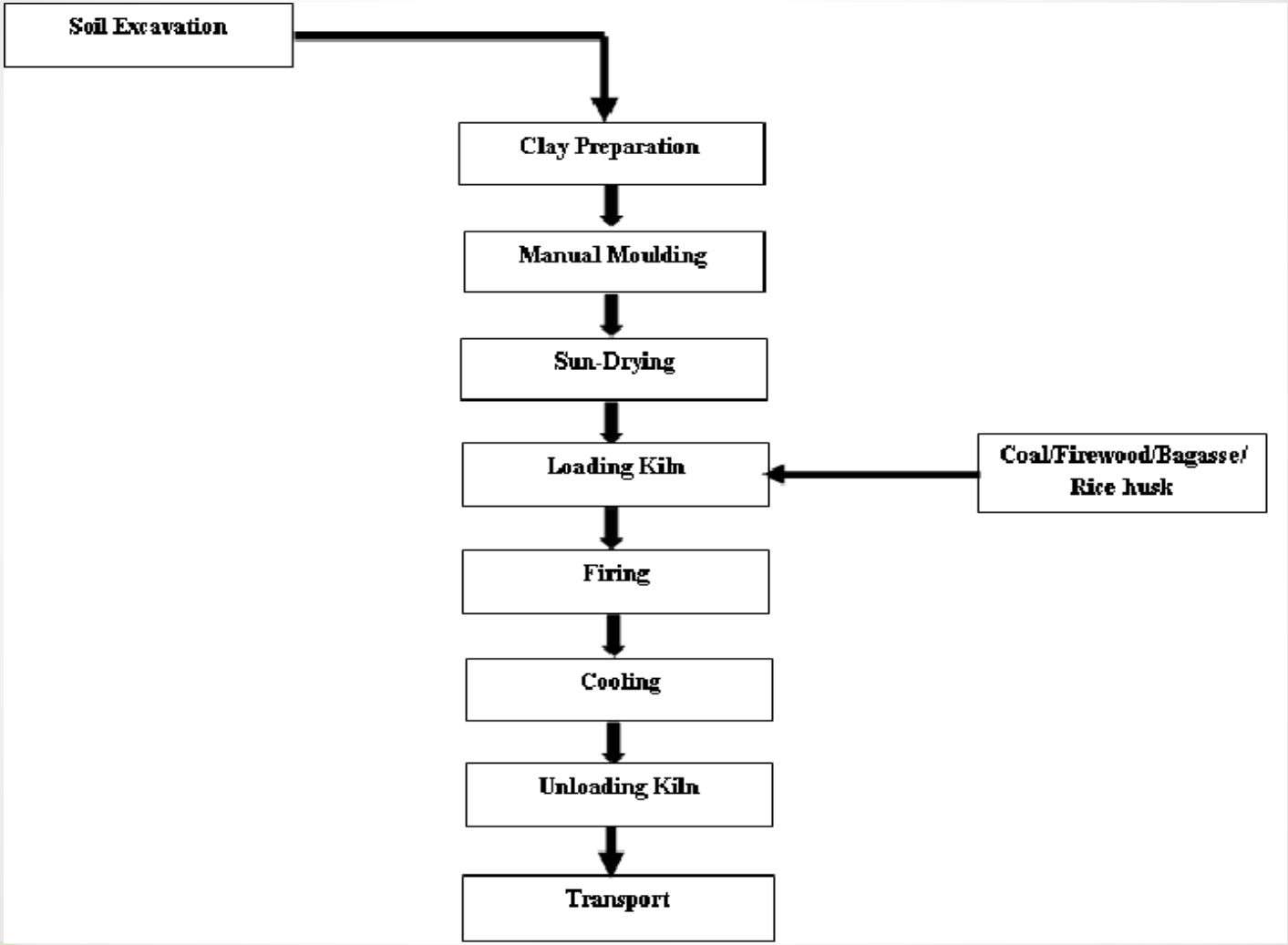
CONSTITUENTS OF BRICK CLAY :

1. Silica	55%
2. Alumina	30%
3. Iron Oxide	08%
4. Magnesia	05%
5. Lime	01%
6. Organic matters	01%
	100%

HARMFUL CONSTITUENTS OF BRICK CLAY :

- Iron Pyrites
- Alkalis
- Stone Particles
- Vegetation and Organic Matter
- Lime

DIAGRAM OF MANUFACTURE OF BRICKS FROM CLAY



MANUFACTURING OF BRICKS FROM CLAY

- Selection of Brick Clay
- Preparation of Brick Clay
- Brick Moulding
- Brick Drying
- Brick Burning

❑ Selection of Brick Clay

Bricks

- have greater fire resistance than stone or concrete masonry . Its size enables easy handling and placement in walls; it can be easily adapted to small-scale and large-scale structures to give pleasing appearance and texture

- Brick clay should be free from harmful constituents. The sedimentary deposits of clay are generally quite suitable for the manufacture of bricks

❑ PREPARATION OF BRICK CLAY

Brick clays are produced by blending together various clays (surface clays, shale's, and fire clays) to produce the desired chemical composition and physical properties. Clays can be divided into calcareous clays (containing 15% Calcium Carbonate, which gives yellow color when burnt) or no calcareous clays (containing silicate of alumina, feldspar, and iron oxide). Iron oxide gives buff, red or salmon color, when burnt

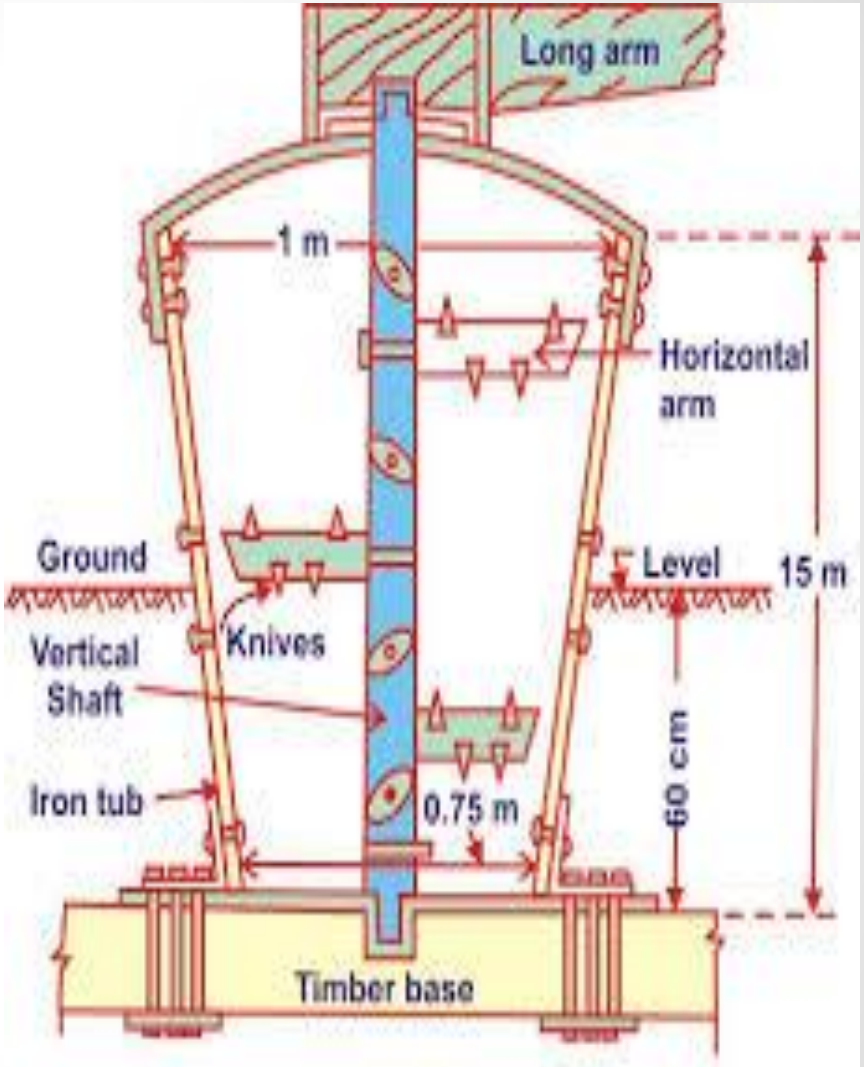


FIG. 2.1. Pug Mill.

❑ BRICK MOULDING

Moulding of Brick:

The raw material is dug from pits, crushed, ground, and screened to reduce it to a fine constituency . Then it is tempered with water to produce a plastic clay for forming into brick.

There are two Methods of Moulding of Brick :

- **Hand Moulding**
- **Machine Moulding**

❑ BRICK MOULDING

- **Hand Moulding :** It is divided into two methods
  - Ground Moulding
  - Table Moulding

- **Ground Moulding :** In ground moulding the bricks are made on the ground usually in wooden moulds.

❑ BRICK MOULDING

➢ Table Moulding of Brick:

Table Moulding: In case of table moulding the bricks are made on the table usually with metal moulds. Table moulded bricks are superior to ground moulded bricks because of the regularity of the level and shape and also because sharp corners are obtained in table moulded bricks .

❑ BRICK MOULDING

➢ **Machine Moulding :**

It is divided into two methods

- The Plastic Clay Machine
- The Dry Clay Machine

MANUFACTURE OF BRICKS FROM CLAY (Cont'd)

- **Methods of forming :** Three different processes are used for brick forming

- (i) **Soft Mud Process:** A relatively moist clay (containing 20% to 30% of water) is pressed into molds, either by hand or machine - The mold may be dipped in water (water-struck bricks) or dusted with fine sand (sand-struck bricks) before filling it with clay .

- (ii) **Dry press bricks** are formed with clays that shrink excessively during drying - Is mixed with minimum amount of water(10%).

- (iii) **Stiff mud Process**: Most widely used process nowadays - contains 12 % to 15% of water - passed through vacuum to remove any pocket of air, and then extruded through a rectangular die to form bricks.

❑ BRICK DRYING

The rectangular column of moist clay extruded through the die is cut by automatic wire cutters to form individual bricks . After molding and cutting, the bricks are dried for one or two days in low-temperature kilns . Then they are ready for firing or burning.

❑ BRICK BURNING

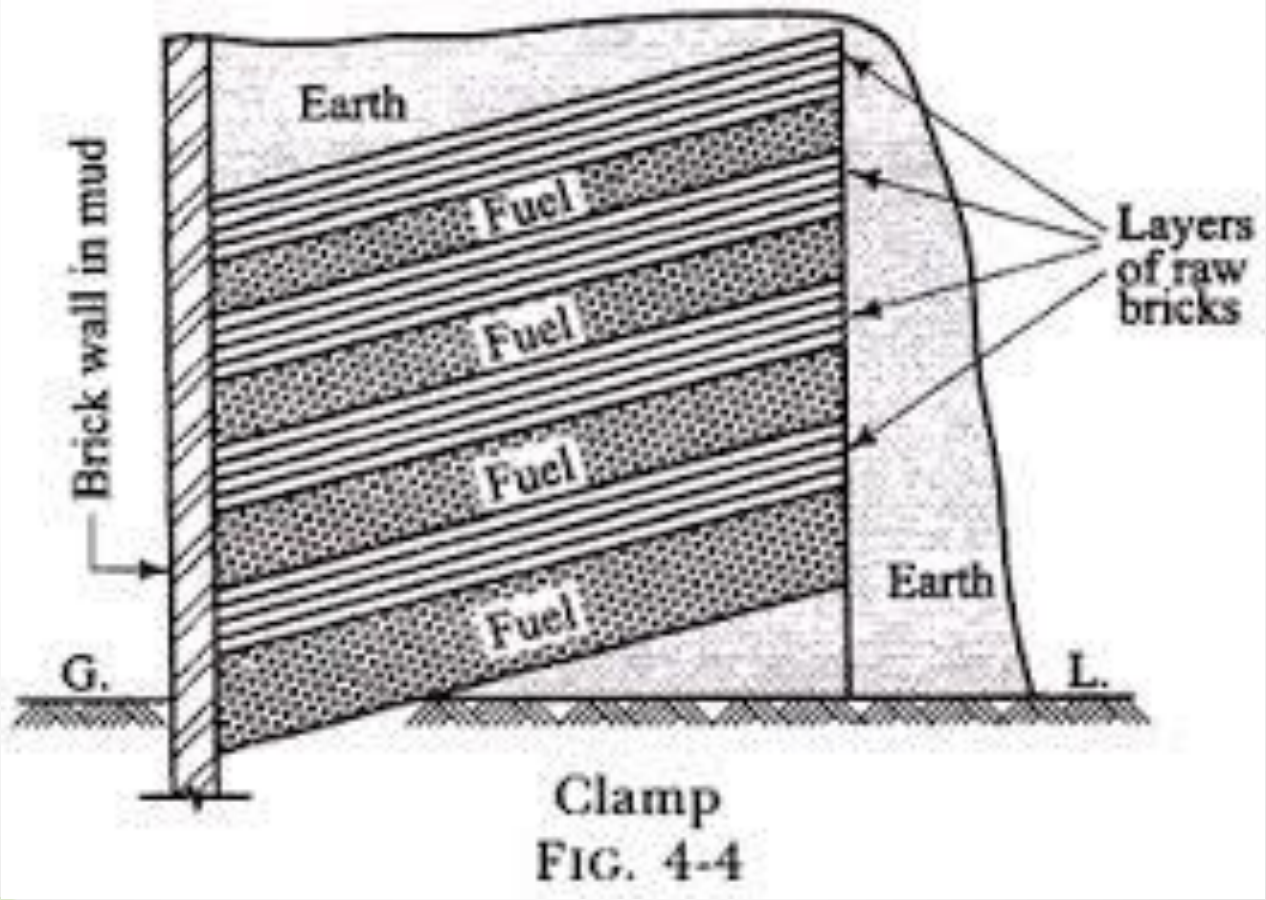
- **Firing of Bricks:** Bricks are burnt either in a periodic kiln or a continuous tunnel kiln

- **In a periodic kiln** bricks are loaded in after initial drying, fired, cooled, and unloaded; and the process is repeated after a certain period (say a month)

- **In a continuous tunnel kiln** the bricks are loaded onto special railcars that pass continuously through various processes to emerge at the other end fully burned

❑ BRICK BURNING : In a periodic kiln

Clamp Burning



Clamp

FIG. 4-4

❑ BRICK BURNING : In a continuous kiln

Hoffman's Kiln Burning

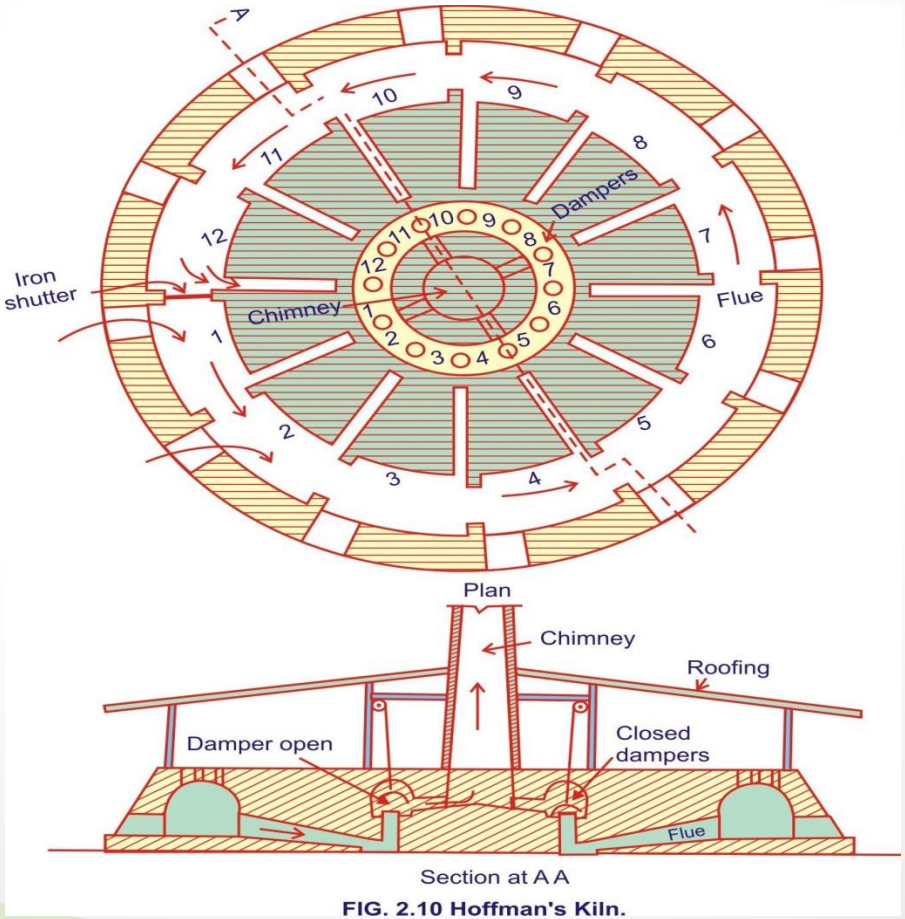
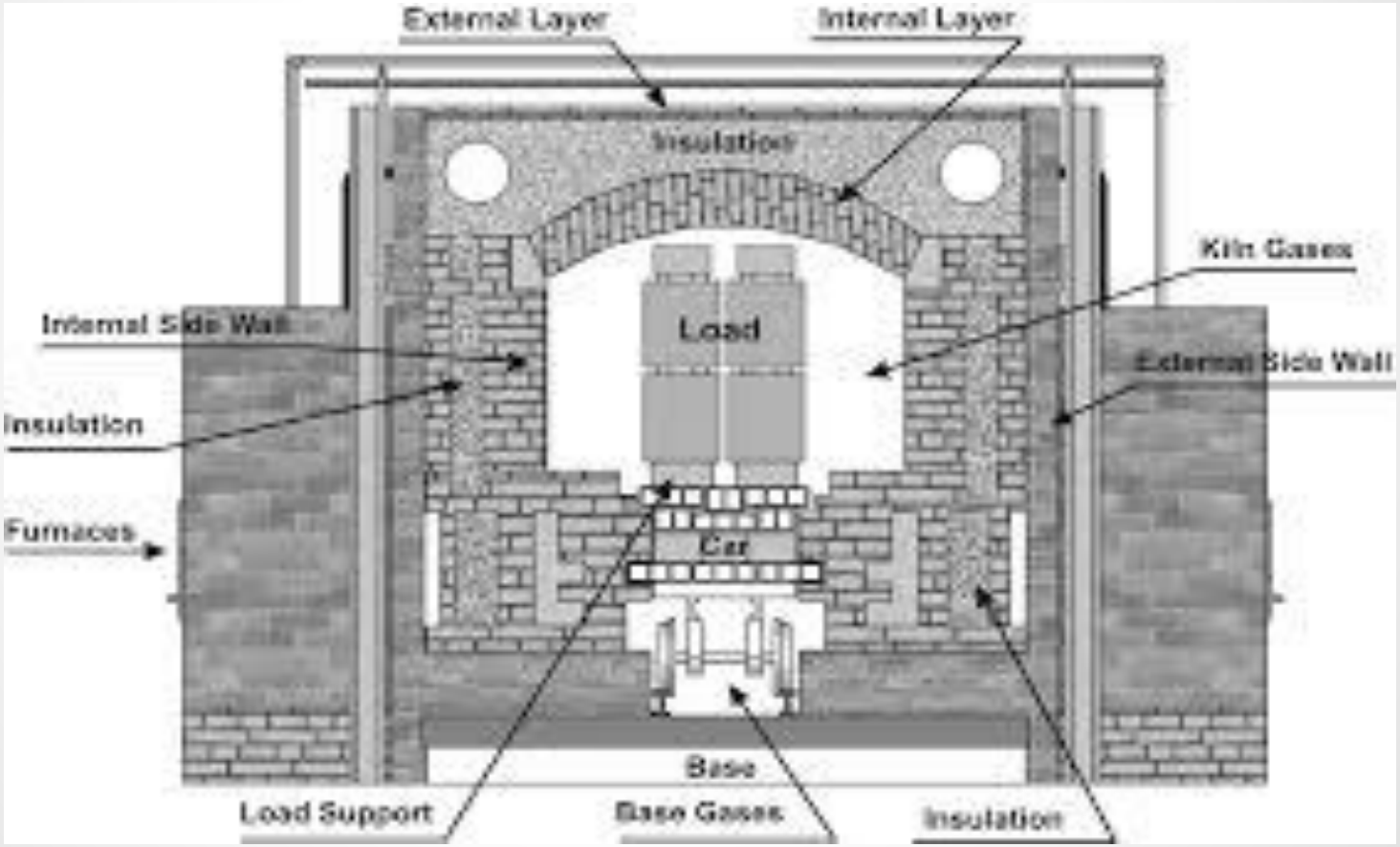


FIG. 2.10 Hoffman's Kiln.

❑ BRICK BURNING : In a continuous

Tunnel Kiln Burning



MANUFACTURE OF BRICKS FROM CLAY (Cont'd)

- **Stages of burning:** Water-smoking and dehydration (drives off the remaining water from clay at 40^{o} to 150^{o} C)

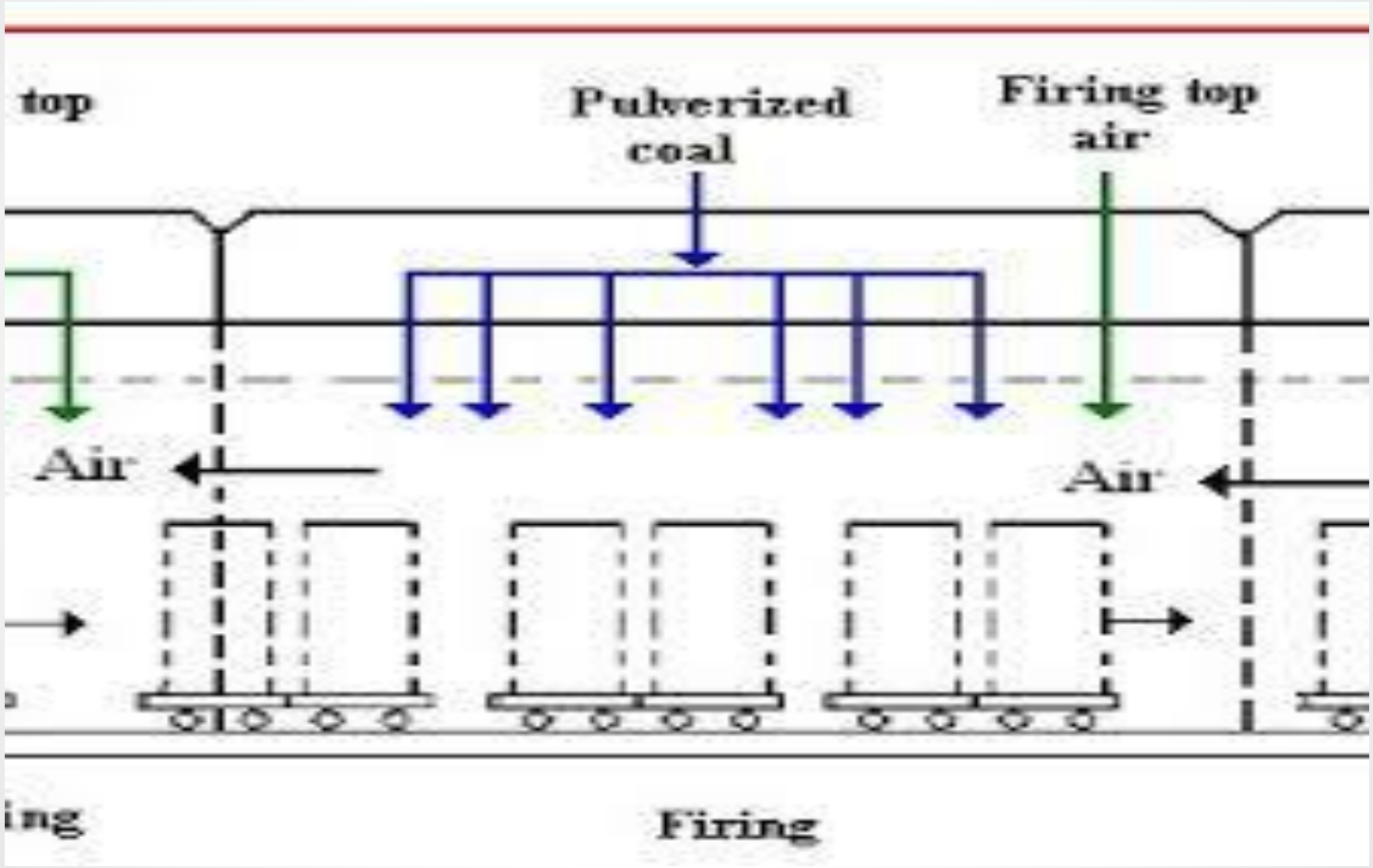
Oxidation and Vitrification: Temperature of furnace rises to 1000^{o} to 1300^{o} C - Clay transformed to a ceramic material

Flashing: Fire is regulated to create a reducing atmosphere in the kiln that develops a color variation in the bricks

Cooling: **Bricks** are cooled under controlled conditions to achieve the desired color and to avoid any thermal cracking - The entire process of firing takes from 40 to 150 hours

Color of a brick: Depends on the chemical composition of clay, temperature, and chemistry of fire - Iron in clay turns to red in oxidizing fire and to purple in reducing fire - Calcium oxides gives creamy/white color - For bright colors, all faces of bricks can be glazed like pottery during normal firing or during subsequent firing

❑ STAGES OF BURNING



CLASSIFICATION OF BRICKS

1st class brick

2nd class brick

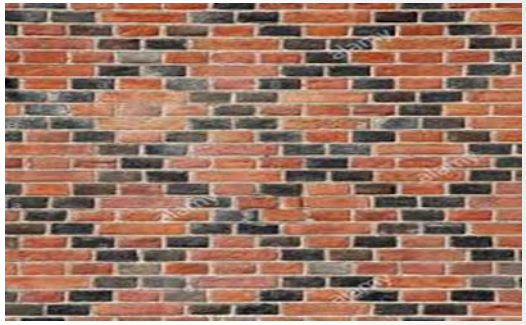
3rd class brick

Picked jhama

SPECIAL TYPES OF BRICKS

USES OF BRICKS

- Construction of walls of any size.



- Construction of floors.

USES OF BRICKS

- Construction of arches and cornices.
- Making khoa to use as aggregate in concrete.
- Manufacture of surki to be used in lime plaster and lime concrete.


Thank
you