

MANUFACTURING OF BRICKS

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- ◎ Preparation of brick earth
- ◎ Moulding of bricks
- ◎ Drying of bricks
- ◎ Burning of bricks

PREPARATION OF BRICK EARTH

Removal of loose soil

The top layer of the loose soil about 30 cm depth contains a lot of impurities like organic matter and hence it should be taken out and thrown away.

Digging, spreading and cleaning

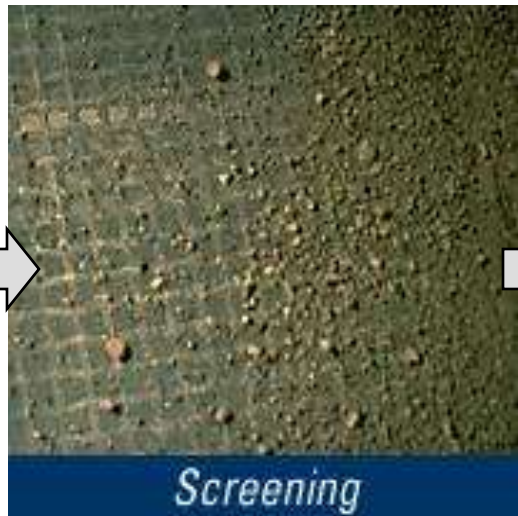
The earth is then dug out from the ground. This earth is spread into heaps about 50 to 150 cm height.

Weathering

The earth is then exposed to atmosphere for softening. The period may be Of few weeks to a season.

Blending and tempering

The clay is then mixed with suitable ingredients. It is carried out by taking a small portion of clay every time and by turning it up and down in vertical direction



MATERIAL PREPARATION

MOULDING

Hand moulding

When moulding is done with hand it is called hand moulding.

A wooden rectangular mould made in the shape of a brick is normally used for this purpose.

Machine moulding

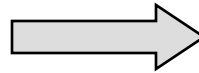
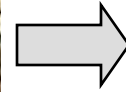
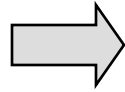
The clay is placed in the machine, it comes out through the opening under pressure.

It is cut to bricks by steel wires fixed into frames.

These bricks are also called wire cut bricks.



**Manufacturing
(HAND MOULDING)**



Manufacturing
(MACHINE MOULDING)

DRYING OF BRICKS

Wet brick from molding or cutting machines contain 7 to 30 percent moisture, depending upon the forming method.

Before the firing process begins, most of this water is evaporated in dryer chambers at temperatures ranging from about 100 °F to 400 °F (38 °C to 204 °C).

The extent of drying time, which varies with different clays, usually is between 24 to 48 hours.

Heat and humidity must be carefully regulated to avoid cracking in the brick.

After Mining, Clay is Extruded Through a Die and Trimmed to Specified Dimension Before Firing



BURNING OF BRICKS

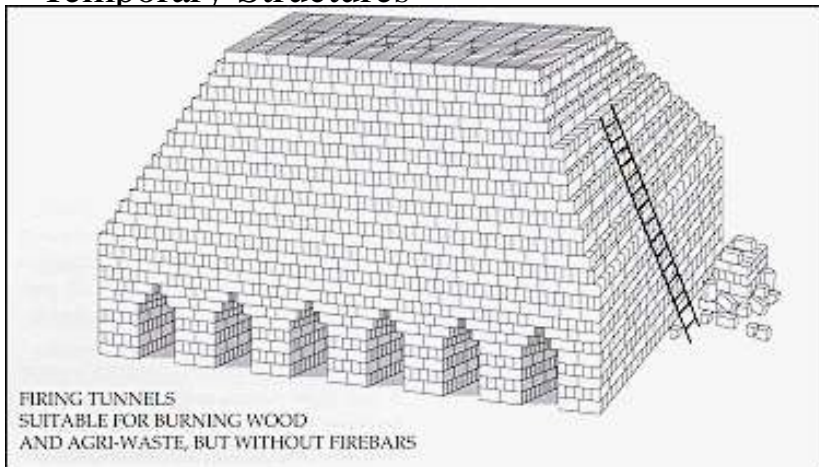
INTERMITTENT KILN - CLAMP , SCOVE & SCOTCH

Highly inefficient & labor-intensive.

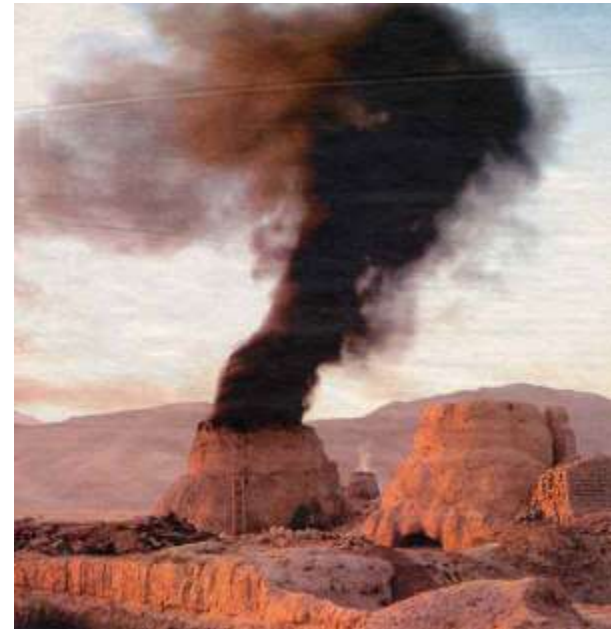
Use coal + scavenged fuels

Most common, most primitive, most polluting

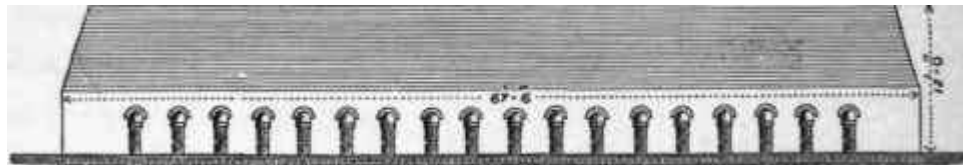
Temporary Structures



A typical clamp kiln.



A typical scove kiln.



A typical scotch kiln.

***CONTINUOUS KILN BURNING – HOFFMAN, BULL'S TRENCH,
VERTICAL SHAFT & HABLA***

These are permanent structures.

Burning is done continuously in kilns.

Bricks from kilns are of correct size, perfect shape and good quality.

Rate of burning is also high in kilns.

But initial investment for kiln is very high.

Efficient and potentially clean –

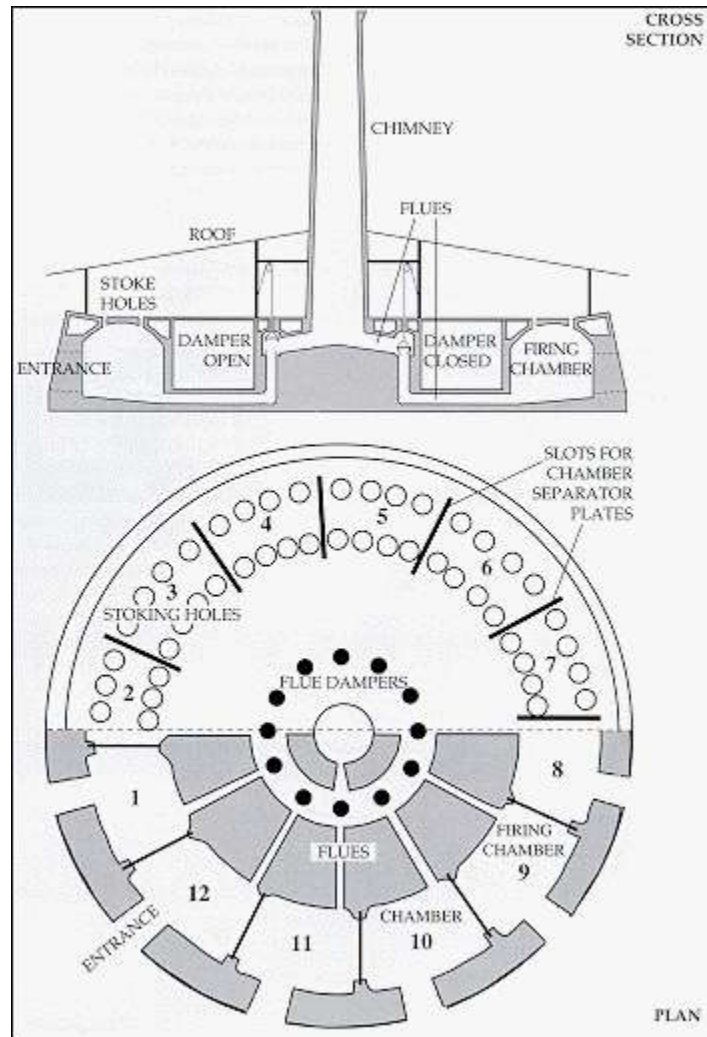
Hybrid Hoffman

VSBK

Habla

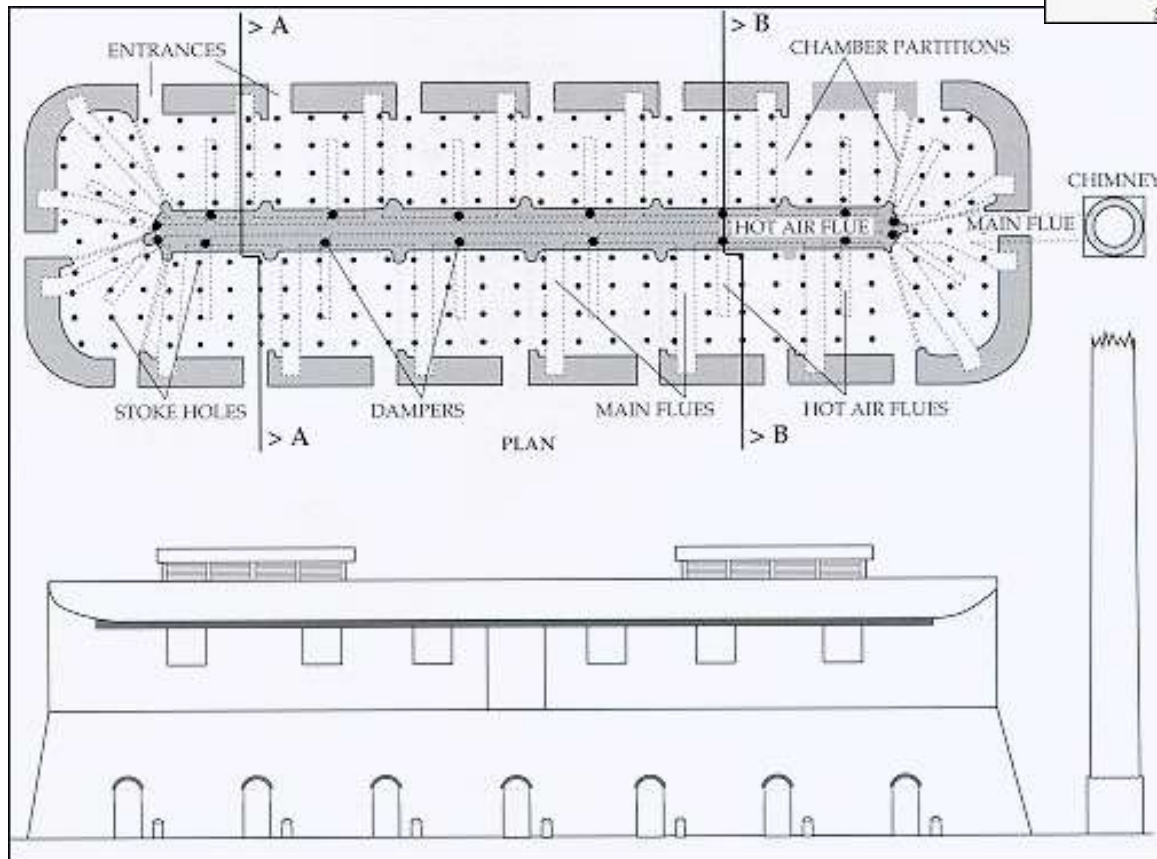
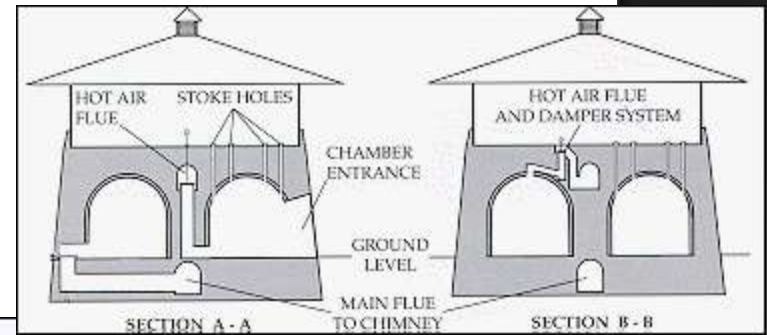
Tunnel (modern – several variations)

HOFFMANN KILN – ORIGINAL



HOFFMANN KILN – MODERN & HYBRID

- Widely used in China
- = 90% of bricks
- Can use coal or natural gas



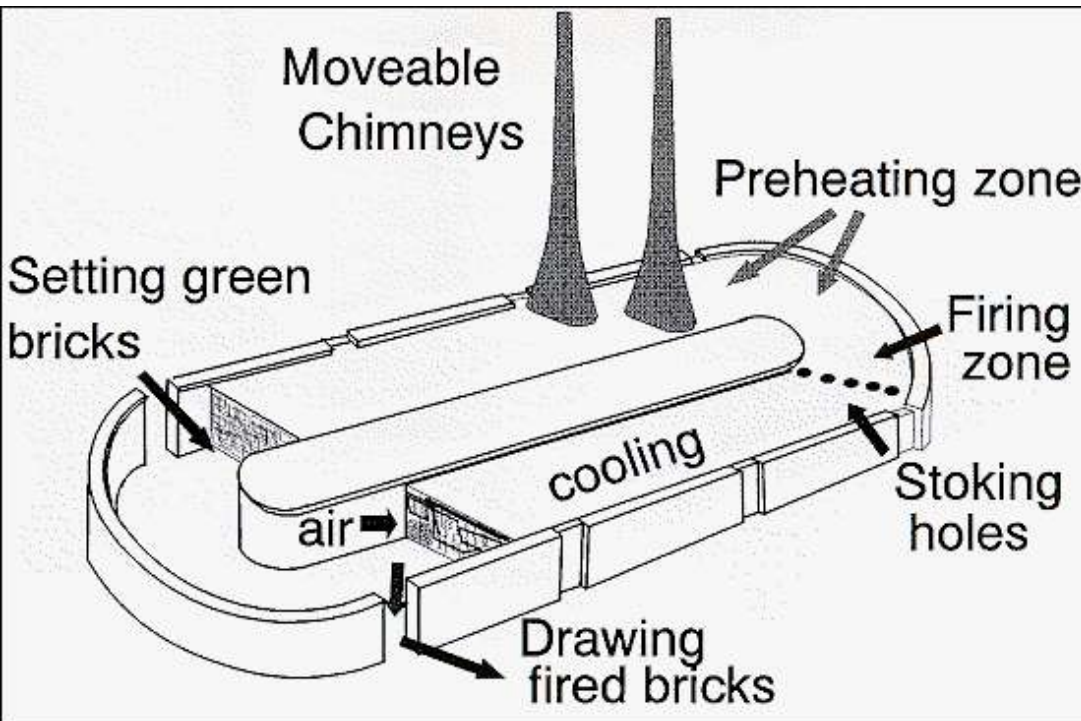
BULL'S TRENCH KILN

Used in India, Pakistan, Nepal, Bangladesh

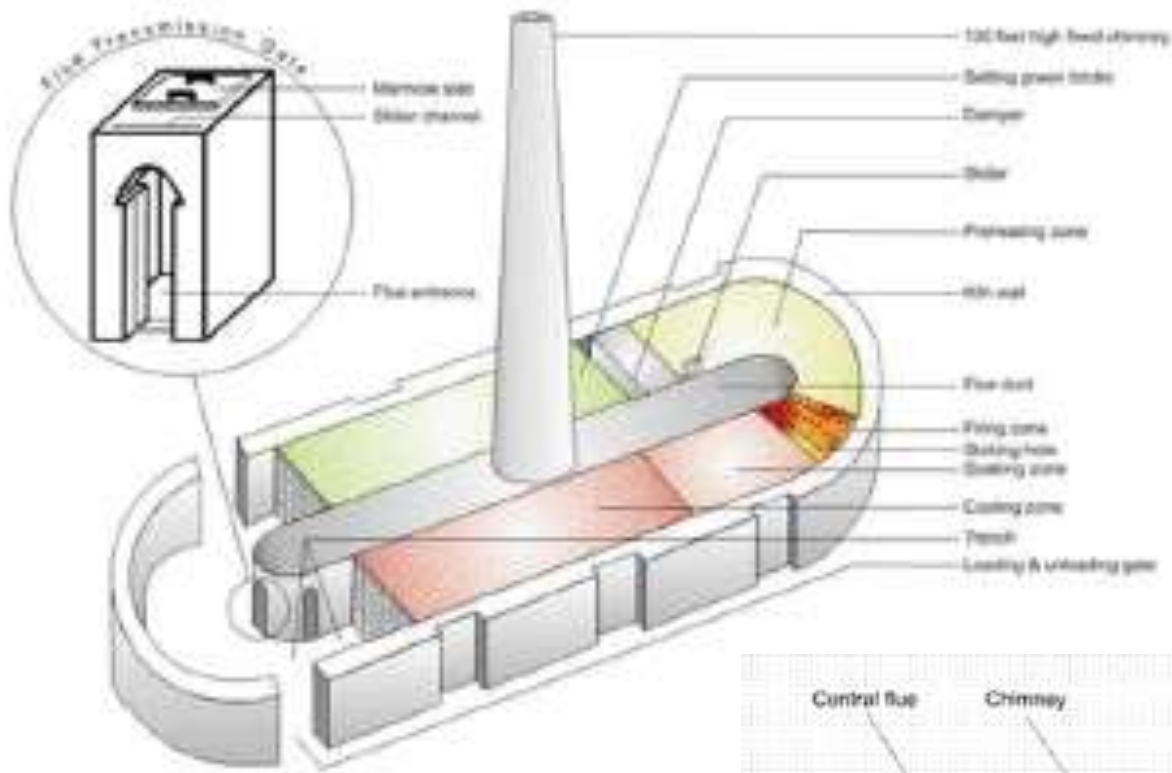
Uses coal and scavenged fuels

“Movable chimney” (MC) and “Fixed” Fixed (FC)

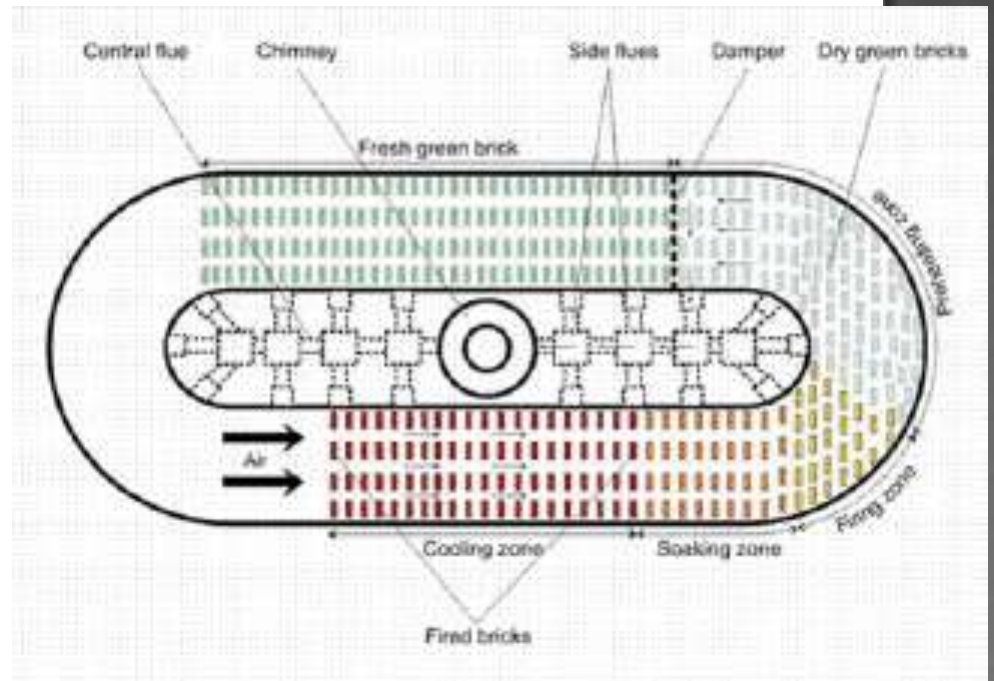
MCBTK banned (but still used) in India, parts of Nepal & Pakistan due to very high emissions



**KILN with
Movable chimney**



KILN with Fixed Chimney

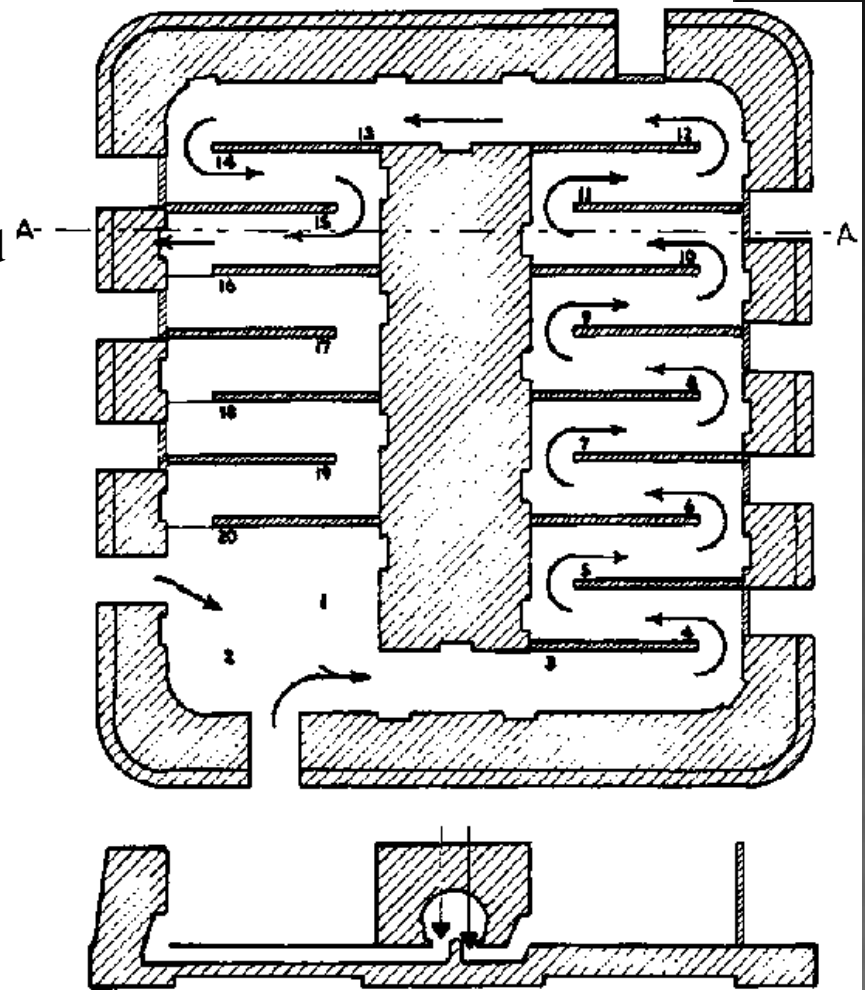


HABLA ZIGZAG KILN

Effective tunnel length of Hoffmann increased with “zigzags” made of green bricks

Larger capacity and more efficient than other kilns

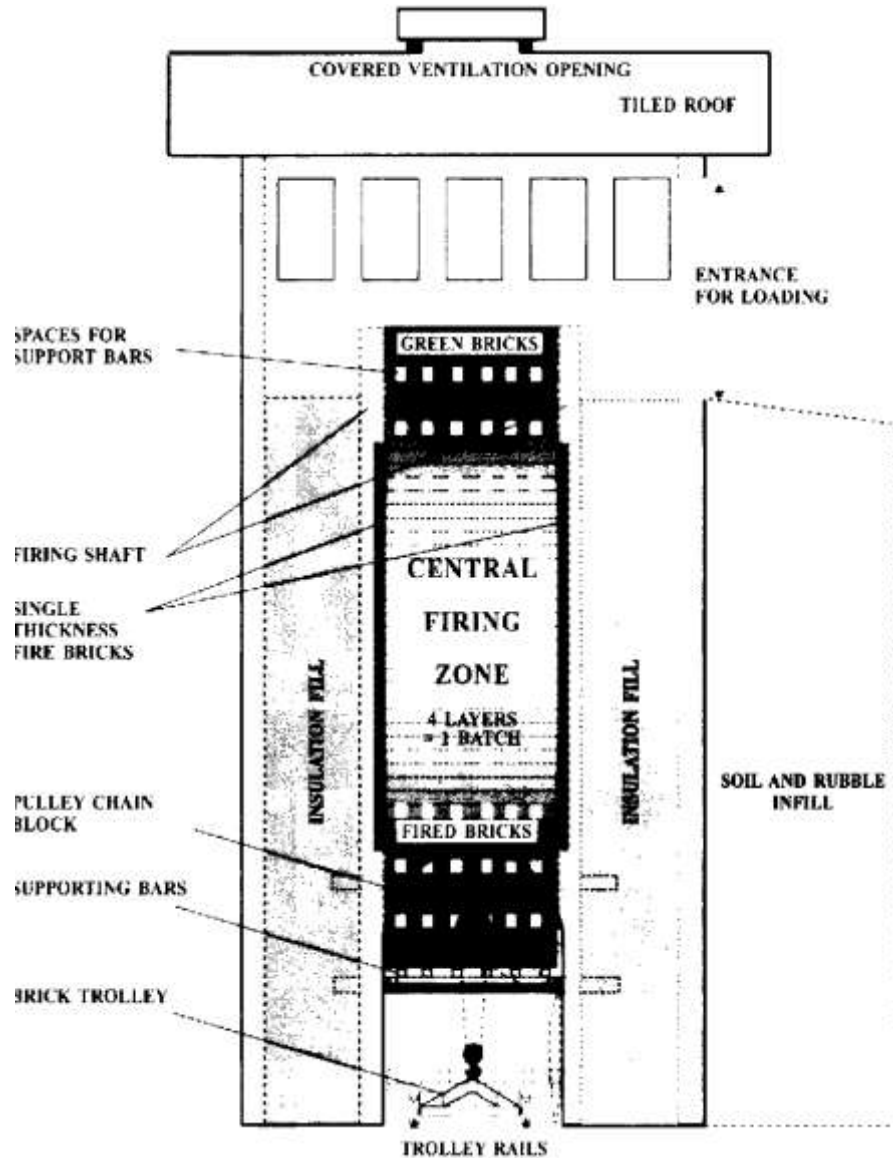
Needs fan to draw air through = needs source of electricity



Section at A-A

1 m.

VERTICAL SHAFT BRICK KILN (VSBK)



Loaded at top, bricks removed from bottom

- High efficiency, low emissions
- Kiln of choice for aid agencies India, Nepal, Pakistan, Vietnam



CLASSIFICATION OF BRICKS

Unburnt or sun dried bricks

These are dried under sunlight.

These are used for temporary and cheap construction.

It is also used for filling works.

Burnt bricks

- First class bricks
- Second class bricks
- Third class bricks
- Fourth class bricks

FIRST CLASS BRICKS

Made of good earth which is free from saline deposits and are sand molded.

Burnt thoroughly without being vitrified and have deep red, cherry and copper color.

Regular and uniform in shape and size with sharp and square edges and parallel faces.

Must be homogeneous in texture and emit a clear ringing sound on being struck together.

Free from flaws, cracks, chops, stones and lime.

Have a minimum crushing strength of 105 kg per sq. cm when tested according to the test



SECOND CLASS BRICKS

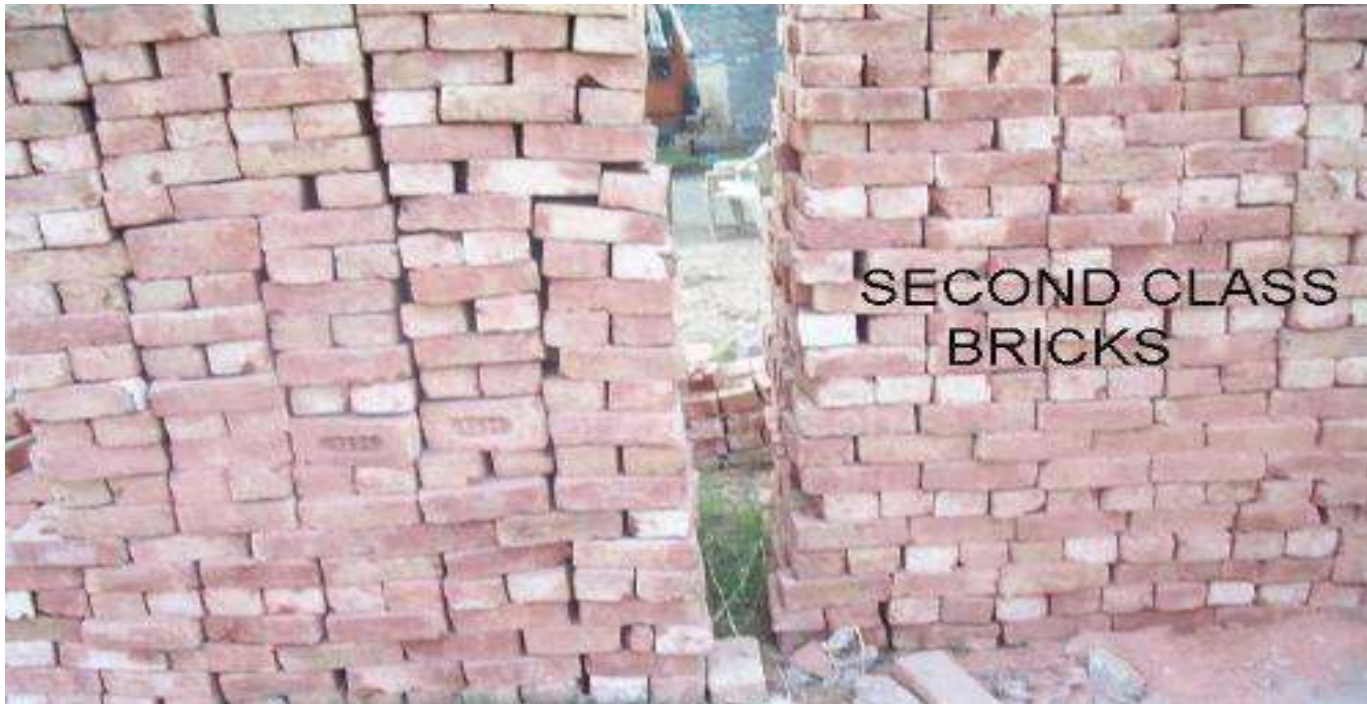
They shall be well burnt or slightly over burnt.

They must give clear ringing sound when struck.

They may have slight irregularities in size, shape and color.

They may have slight chips, flaws or surface crack but must be free from lime or kankar.

The minimum crushing strength of second class brick should be 70 kg per sq cm.



THIRD CLASS BRICKS

These bricks are slightly under burnt or over burnt.

They are not uniform in shape, size and edges.

They shall not absorb water more than 25% of their own dry weight after 24 hours, immersion in cold water.

They have some signs of efflorescence

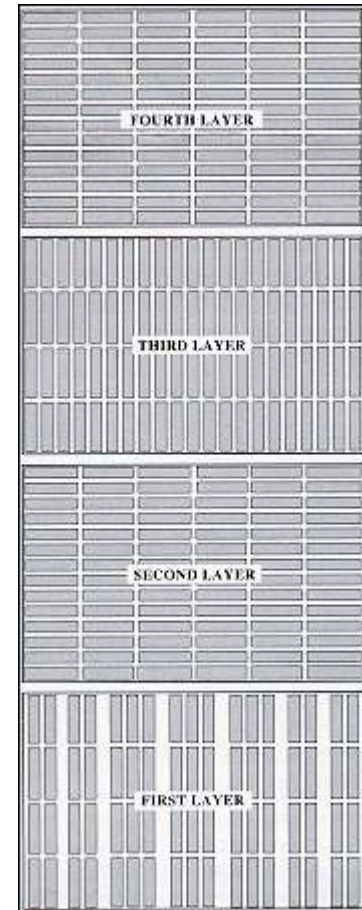


FOURTH CLASS BRICKS

These are over burnt bricks which are dark in colour and are irregular in size and shape.

These are used as aggregate in concrete and for flooring.

Over burnt bricks are not used for building construction.



Thank you