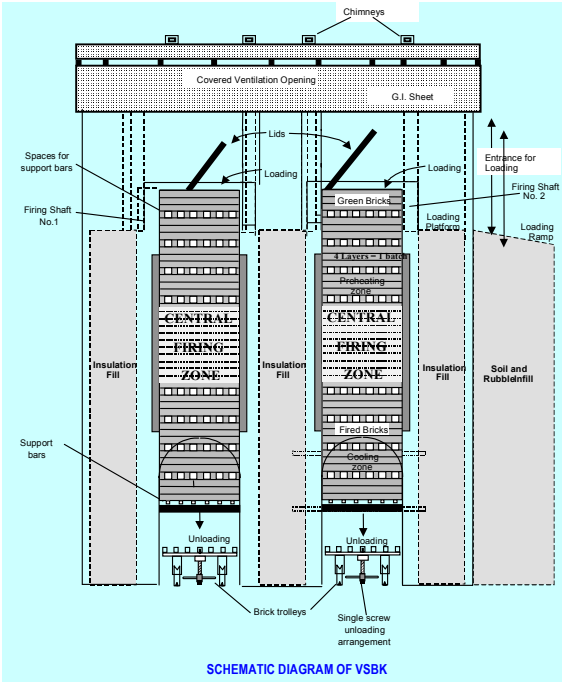
Vertical shaft brick kiln (VSBK) for brick production

Vertical shaft brick kiln (VSBK) consists of one or more shafts. Though the shafts can be constructed of various sizes, the optimum cross-section of the shaft is 1 meter x 2 meter having a production capacity of 1,35,000 bricks per month. This is equivalent to a production of 380 bricks per batch and assuming 12 batches of unloading per day.



SCHEMATIC DIAGRAM OF VSBK

The inside surface of the shaft is generally lined with refractory bricks which ensures long life of furnace wall and minimum maintenance. The gap between the shaft wall and outer kiln wall is filled with insulating materials - clay and rice husk, etc. For monitoring the position of fire and the temperature, peepholes are provided.

Bricks are taken to the loading platform either manually using ramp or through winch system. The loading platform is generally provided with a storage capacity of 1-2 days of bricks and provided with good ventilation system. Each batch of brick loading typically consists of 4 layers of bricks set in a predetermined pattern. The column of bricks rest on square support bars (which can be removed or inserted) resting on a pair of horizontal beams across the arches in the unloading tunnel.

How VSBK operates?

Dry bricks are loaded from top of the kiln. Bricks may be taken to the loading platform in a number of ways:- (1) use of ramp structure and bricks are carried manuaaly or using animals (2) use of winch and hoist system. One batch of well-dried green bricks is loaded in layers at the top at a time. A pre-measured (weighed) quantity of crushed coal specific to coal and soil properties (5-20 mm size) is spread on each layer uniformly to fill the gaps between the bricks.

- Residence time of a batch in the kiln typically varies from 26 to 30 hours.
- Frequency of unloading/ loading varies from (1½ to 2½ hours).

Unloading of fired bricks is done from the bottom. A trolley is used for this purpose which is moved on rails along the length of the unloading tunnel. Lifting and lowering of the trolley is done using a screw jack mechanism. During unloading, the trolley is lifted so that the entire stack of bricks in the shaft rests on it. The support bars are taken out, when released during the lifting of the bricks along with trolley. On lowering, the load of the brick stack is taken back by the support bars, and the rest of the bricks are taken out along the trolley. The trolley is pulled out, cooled fired bricks are unloaded and sorted out for dispatch. Space is created for one batch at the top which is now ready for loading another batch of dry bricks.

Moisture content of bricks loaded in VSBK is important as higher levels of moisture would lead to more breakage of fired bricks. Recommended moisture level in dry brick is 5 – 7% maximum

Investment requirements

Investment includes construction of VSBK structure, cost towards procurement of one winch system for lifting bricks to loading platform, two screw jack systems for unloading in each shaft and four trolleys.

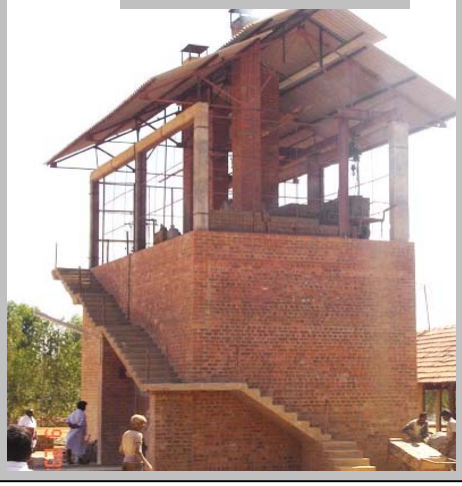
For a 2-shaft VSBK:

- Production capacity : 2,70,000 bricks per month
- Investments : Rs 8 – 9 lakh
- Construction period : 2 months

VSBKs in India

There are about 50 VSBKs which are in operation in different parts of the country such as Madhya Pradesh, Maharashtra, Orissa, Uttar Pradesh, Jharkhand, Chattisgarh, Tamil Nadu and Karnataka. 3 VSBKs were constructed in Kolar–Malur area during 2004.

VSBK - Malur



Advantages

- Fast production of bricks; bricks can be sold after firing within two days of loading of dry bricks
- Higher energy savings (20-40%)
- Lower emissions
- Requires less space for kiln structure
- Possible to operate throughout the year with enough storage of green bricks
- Flexibility in production; number of shafts operated can be linked to market demands
- Close control over brick quality is possible
- Minimum maintenance requirements

For further details, please contact

N Vasudevan
TERI
India Habitat Centre, Lodi Road
New Delhi – 110 003

Tel : 011-24682100, 24682111
Fax : 011-24682144, 24682145
Email :nvasu@teri.res.in

Mr Yabatti Nagaraju
TERI
4th Main, Domlur II Stage
Bangalore – 560 071

Tel: 080 25356590 – 97
Email: nagaraju@teri.res.in

Mr H S Satyanarayana Rao
Resource person
Bangalore.

Tel : 080-26720978

Mr Anand Damle
Damle Clay Structurals (P) Ltd
Aanat, Plot No 98, Lane 5
Natraj Society, Karve Nagar
Pune – 411 052

Tel: 020-25446127, 09822063075