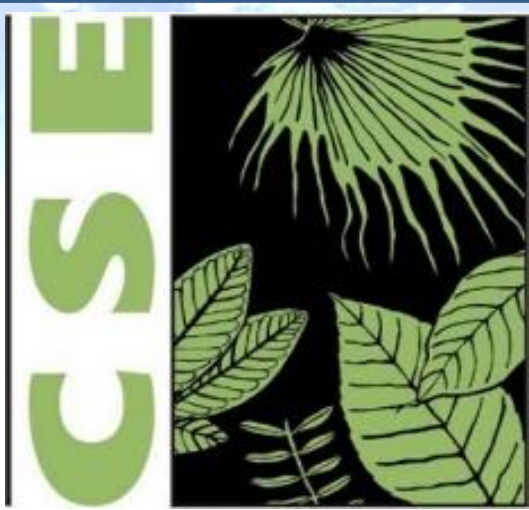




Grey Brick for Green India



Utilization Framework Flyash Products

Centre for Science & Environment

July-2018



Testing of Fly Ash Brick at the site

- **Compressive Strength Test**
- **Drying Shrinkage Test**
- **Efflorescence Test**
- **Water Absorption Test**

There are two most BIS standard (**IS 3495 & IS 10077**) is available for testing the Fly Ash bricks.

❖ The minimum average wet compressive strength of pulverized fuel ash-lime bricks shall not be less than the one specified for each class in 4.1 when tested as described in IS 3495 (Part 1). The wet compressive strength of any individual brick shall not fall below the minimum average wet compressive strength specified for the corresponding class of bricks by more than 20 percent.

❖ Procedure

Place the perforated faces of the brick between two 3-ply plywood sheets each of 3 mm thickness and carefully centered between the plates of the testing machine. Apply the load axially at uniform rate of 14 N/mmsqr (140 kgf/cmsqr) per minute till the failure occurs and note the maximum load at failure. The load at failure shall be the maximum load at which the specimen fails to produce any further increase in the indicator reading on the testing machine.

NOTE - In place of plywood sheets plaster of Paris may be used to ensure a uniform surface for application of load.

Compressive strength in N/mm sqr (kgf/cmsqr) =

Maximum load at failure in N (kgf) / Average net area of the two faces under compression in mmsqr (cmsqr)



Water Absorption

- ❖ The bricks, when tested in accordance with the procedure laid down in IS 3495 (Part 2), after immersion in cold water for 24 h, shall have average water absorption not more than 20 percent by mass up to class 12.5 and 15 percent by mass for higher classes.
- ❖ **Preconditioning:** Dry the specimen in a ventilated oven at a temperature of 105 to 115°C till it attains substantially constant mass. Cool the specimen to room temperature and obtain its weight (M1). Specimen warm to touch shall not be used for the purpose.
- ❖ **Procedure**
 - Immerse completely dried specimen in clean water at a temperature of 27 + - 2°C for 24 hours.
 - Remove the specimen and wipe out any traces of water with a damp cloth and weigh the specimen. Complete the weighing 3 minutes after the specimen has been removed from water (M2).
 - Water absorption, percent by mass, after 24-hour immersion in cold water is given by the following formula:

$$\frac{M_2 - M_1}{M_1} \times 100$$



Efflorescence Test

- ❖ The bricks when tested in accordance with the procedure laid down in IS 3495 (Part 3), shall have the rating of efflorescence not more than moderate up to Class 12.5 and 'slight' for higher classes.
- ❖ GENERAL
 - I. The dimensions shall be measured to the nearest 1 mm.
 - II. All apparatus and testing equipment shall be calibrated at frequent intervals.
 - III. The number of specimens for the test shall be selected according to IS 5454 : 1976.

Drying Shrinkage

The average drying shrinkage of the bricks when tested by the method described in IS 4139, being the average of three units, shall not exceed 0.15 percent.

METHOD FOR DETERMINATION OF DRYING SHRINKAGE

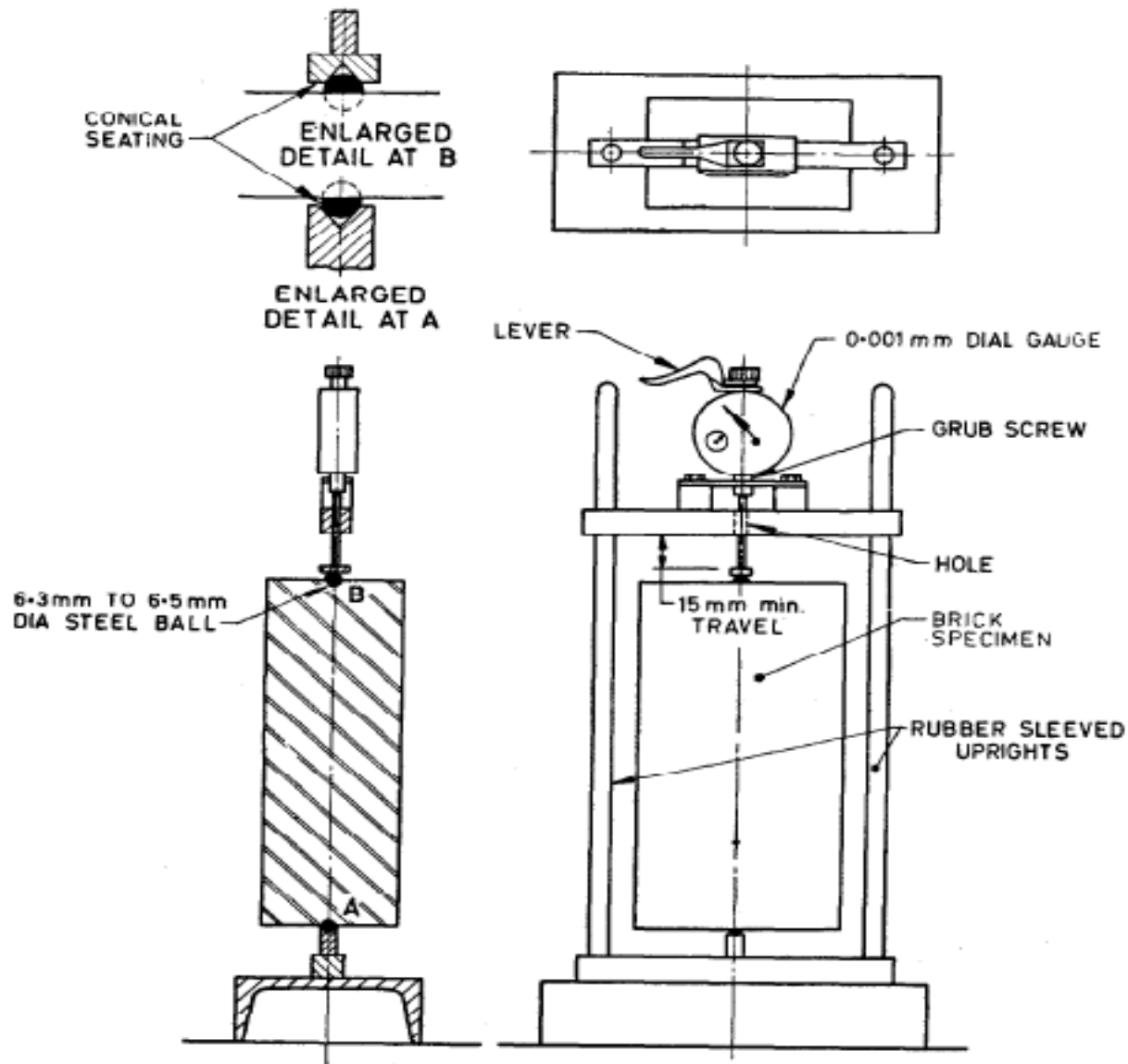
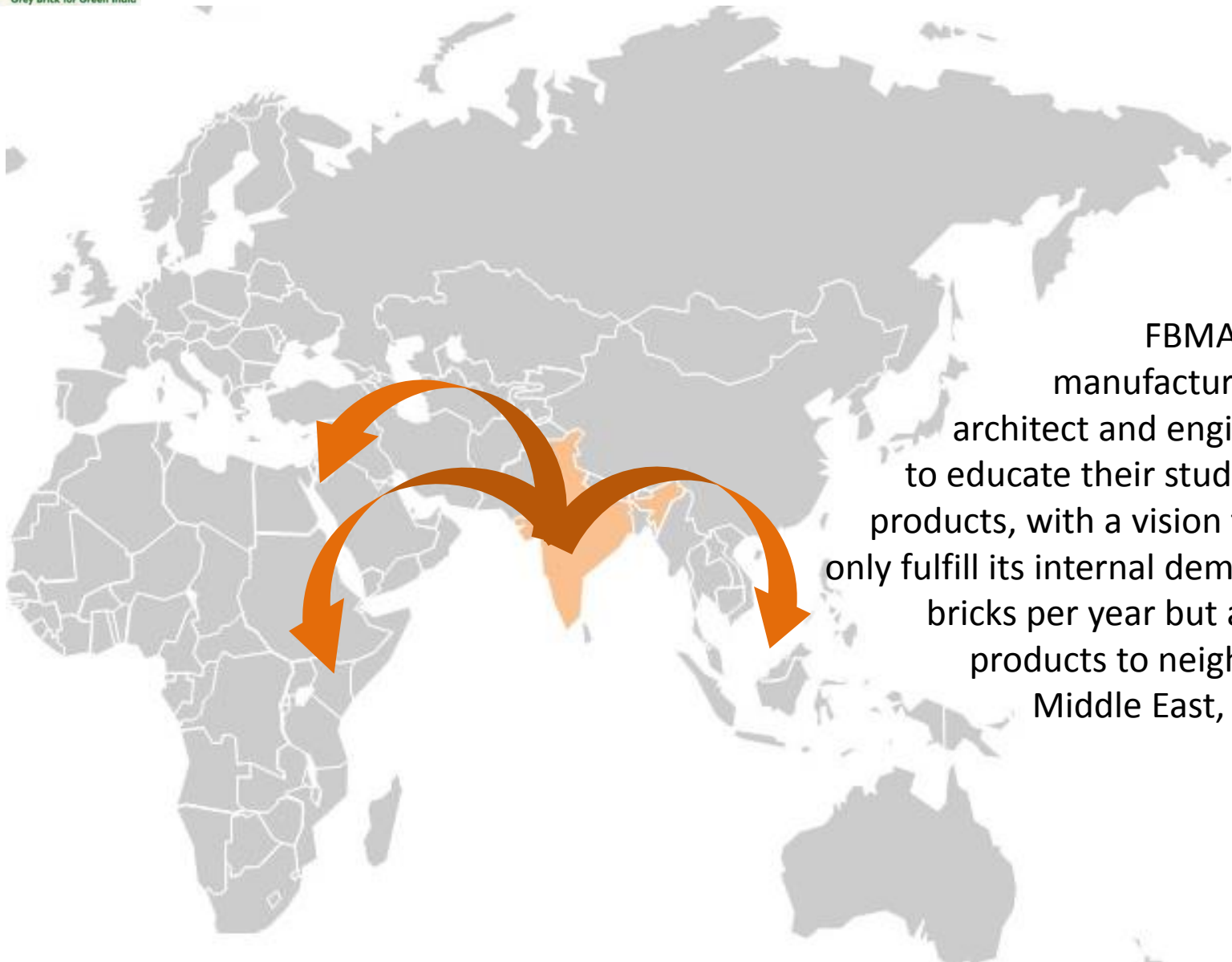


FIG 1 TYPICAL APPARATUS FOR DRYING SHRINKAGE

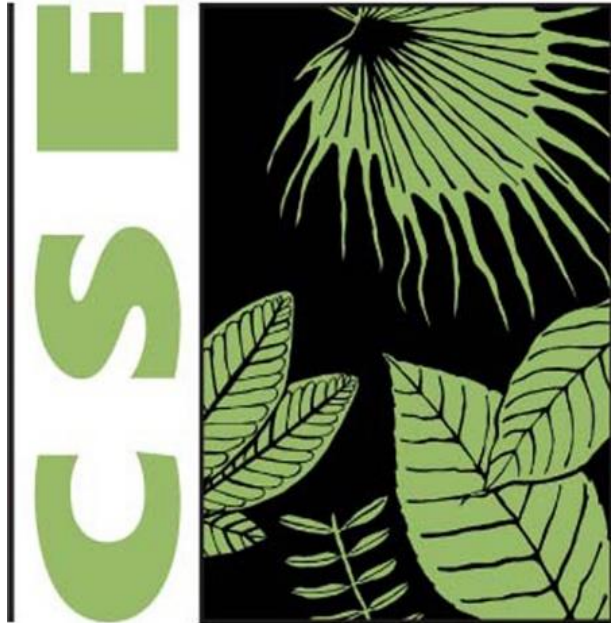
Size	<ul style="list-style-type: none">• Check the dimensions of the product to get the number of FAP required per m^3, with a tolerance of $\pm 2\%$• $1m^3$ of <u>brick work</u> consists of $0.8 m^3$ of bricks and $0.2 m^3$ of mortar
Shape	<ul style="list-style-type: none">• Orthogonal shape with smooth faces and sharp edges, with bonding frogs/ grooves
Colour	<ul style="list-style-type: none">• Whether coloured or not coloured, tone shall be uniform through out the product
Marking	<ul style="list-style-type: none">• Each brick shall be marked in a suitable manner with the manufacturer's identification mark or initials
Strength	<ul style="list-style-type: none">• CTM Test: Fill the frog with cement mortar (1:3) 24 hours before testing<ul style="list-style-type: none">○ Divide maximum load at failure with total area of the bed face to get the FAP strength• Drop Test: FAP should not break when dropped from a height of 4 ft on flat surface

Our Vision



FBMA, with its 20,000+ manufacturers, appeals to all architect and engineering institutes to educate their students about Flyash products, with a vision that India will not only fulfill its internal demand of 250 billion bricks per year but also export Flyash products to neighboring world like Middle East, Africa and ASEAN

Thank You



Knowledge-based Activism



Together We Can and Together We Will...



References

- IS 12894:2002 – Pulverized Fuel Ash-Lime Bricks – Specification
- IS 3115:1992 – Specification for lime based blocks
- IS 10049: 1981 (Reaffirmed 2009) – Code of Practice for Manufacture of Lime Based Blocks
- IS 2541:1991 – Code of practice for preparation and use of lime concrete
- IS 4098:1983 – Specification for lime-pozzolana mixture
- IS 5817:1992 – Code of practice for preparation and use of lime- pozzolana mixture concrete in buildings and roads
- IS 10359:1982 – Code of practice for manufacture and use of lime- pozzolana concrete blocks for paving
- IS 10360:1982 – Specification for lime-pozzolana concrete blocks for paving
- IS 10772:1983 – Specification for quick setting lime pozzolana
- IS 12654:1989 – Code of practice for use of low grade gypsum in building industry
- IS 12679:1989 – Specification for By-product gypsum for use in plaster, blocks and boards
- IS 2212:1991 – Code of practice for Brick Works
- IS 3495:1992 – Compressive Strength of Brick