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TESTING AND ANALYSIS OF EXISTING COMMERCIAL BRICKS BY CHANGING PROPORTION OF MATERIALS

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Abstract:A brick is a block or a single unit of a clay-bearing soil, sand and lime, or concrete material, fire hardened or air-dried, used in masonry construction. Brick are produced in numerous types, materials, and sizes, which vary with region and time period, and are produced in bulk quantities. The testes, which we will be performing that are following. 1:-Compressive strength of bricks, 2:-Water absorption of bricks, 3:-Efflorescence of bricks, 4:-Size, shape colour test, 5:-Hardness test

Keywords:*Bricks, Tests on Bricks, Building Materials, Brick Content, Proportion of brick*

1. INTRODUCTION

1.1 General

The bricks are obtained by moulding clay in rectangular blocks of uniform shape and then by drying and burning these blocks. As bricks are of uniform size, they can be properly arranged and further, as they are light in weight, no lifting appliance is required for them. The bricks do not require dressing and the art of laying bricks is so simple that the brickwork can be carried out even with the help of unskilled labours. Thus, at places where stones are not easily available, but there is plenty of clay suitable for the manufacture of bricks, the stones are replaced by bricks. The bricks are prepared in various size. The custom in the locality is the governing factor deciding the size of a brick. If bricks are large, it is difficult to burn them properly and they become too heavy to be placed with a single hand. So BIS has recommended the bricks of uniform size which Standard brick size is 190 mm x 90 mm x 90 mm with mortar thickness, the dimension of the brick becomes 200 mm x 100 mm x 100 mm the nominal size of the modular brick. It is found that the weight of 1m3 of brick earth is about 1800 kg. Hence the average weight of a brick will be about 3 to 3.5 kg. It is found that the bricks are not seriously affected until very high temperature of 1200 C to 1300 C are reached. If the type of mortar and quality of workmanship are good, the brick masonry generally offers god resistance to a fire. However, a brick has its own structural limitations for use in the buildings. The common brick is one of the oldest building materials and it is extensively used at present as a leading material of construction because of its durability, strength, reliability, low cost, easy availability, etc. In our Project Testing and analysis of existing commercial bricks by changing proportion of materials we can study about the brick materials which can increase the brick's quality also we identify some good brick's proportion which can increase the brick quality.

1.2 Objectives of study

- To check the effect of better composition of brick materials in the brick masonry.
- To check the economy of bricks made with better composition of materials as compare to standard bricks at nominal sites.
- To assess the properties of bricks made with better composition of materials in terms of compressive strength test, size, shape, colour test, water absorption test and efflorescence test.

1.3 Need of study

- Standard bricks has certain limitations.
- Necessary to find an effective alternative to reduce the overall cost of bricks without affecting the properties.
- To eliminate pollutions caused by standard brick at site.
- For usage of industrial waste very effectively.

1.4 Scope of the system

- It is more reliable and user friendly and it have a more facility about the needs of user so on that base user will like it to use.
- Easy modification
- Nature of moulding adopted
- Composition brick making material
- Preparation of clay and blending of ingredients

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2. LITERATURE REVIEW

"Process for producing bricks from Alumina, Silica, Fly ash, Lime, Oxide of iron and Magnesia" under this title we have researched about the following. Further, the invention provides a solution to the long-term safe storage and disposal of oil and chemical process industry wastes. These solid bricks have a relatively low porosity, high compressive strength, and low thermal conductivity so that they are suitable for use in construction activities. The invention provides bricks produced by an invention process that compresses Fly ash, Lime, Oxide of iron and Magnesia. The bricks should not break into pieces when dropped flat on hard ground from a height of about 1 meter. The bricks should have low thermal conductivity and they should be sound-proof. The bricks, when soaked in water for whole day should not show deposits of white salts when allowed to dry in shade.The invention process includes several steps, including a step of compressing a mixture of Fly ash, Lime, Oxide of iron and Magnesia to produce a solid brick. Further, for the waste disposal embodiment, the process requires that the waste be added to the Fly ash Silica, Lime, and Oxide of iron and Magnesia before compression. The bricks should be uniform in shape and should be of standard size. The bricks should give a clear metallic ringing sound when struck with each other. The bricks when broken or fractured should show uniform compact structure free from voids.Idea to do anything around the said invention is Alumina material which is the chief constituent of every kind of clay. A good brick should contain 20% to 30% of alumina. A small quantity of oxide of iron to the extent of about 5 to 6 percent is desirable in better brick material which also imparts red colour to the bricks.

3. BRICK'S TEST METHOD

Tests for the Bricks for Building Construction before accepting the bricks for building construction, the following tests are generally performed.

1. Dimensions test
2. Compressive strength test
3. Water absorption test
4. Efflorescence test.

A. **Dimensions test: - This test is performed to know the accuracy of the dimensions of the bricks.**

Procedure Proceed as under:-

1. Take twenty bricks out of the given samples.
2. Arrange them on a level surface in contact with each other and in a straight line.
3. Measure the overall length
4. The dimensions of 20 bricks should be within the following limits:-

Class	Length	Width	Height
Class A	368 to 392 cm	174 to 186 cm	174 to 186 cm
Class B	350 to 410 cm	165 to 195 cm	165 to 195 cm

B. **Compressive strength test:-This test is performed to determine the crushing strength of bricks.**

Procedure Proceed as under:-

1. Take live bricks out of the sample at random.
2. Fill the frogs and ail voids in the bed and face with cement mortar 1:1(1 cement. 1 clean sand).
3. Take out the bricks from water, wipe off dry. Place the bricks with flat surfaces horizontal and mortar filled frog face upward between two or three thin ply sheets and center them between the plates of a compression testing machine.
4. Apply the load till the brick fails.
5. Take the average value of the compressive strengths of the five bricks.

Compressive Strength	- Minimum average compressive strength shall not be less than 3.5 N/mm^2. - When tested for any paricular brick, shall not fall below the minimum average compressive strength by more than 20%.

C. **Water absorption test:- This test is performed to determine water absorption of the bricks. If the water absorption capacity of a brick is more, its strength will be comparatively low.**

Procedure Proceed as under:

1. Select five bricks at random out of the given sample.
2. Dry them in a ventilated oven at 105° to 110° till they attain practically constant weight.
3. Remove the bricks from the oven and cool them to room temperature.
4. Weight the bricks in a balance. Let it be W1 kg.
5. Immerse the live bricks in water completely for 24 hours.
6. Weight the brick within three minutes after its removal from water. Let its weight be W2 kg.
7. Water absorption capacity = (W2-W1)/W1 x100
8. Take the average value of the water absorption capacities of the five bricks.

RESULTS:-For 1st Class bricks, the water absorption capacity should not be more than 20% by weight.

D. **Efflorescence test:- This test is performed to know the presence of any alkaline matter in the bricks.**

Procedure Proceed as under :

1. Take five bricks at random from the given sample.
2. Place each brick on end in a dish containing distilled water ensuring depth immersion at least 2.5 cm.
3. Keep the dish in a ventilated room (Temp. 20° to 30°C) till the whole of distilled water in the dish evaporates.
4. Again pour 2.5 cm depth of distilled water in the dish and keep it, till the all of water gets evaporated.

Sr no	Observation	Result
1	No perceptible deposit	Nil-efflorescence
2	10% area covered with thin deposit of salts	Slight-efflorescence
3	50% area covered with deposit of salts without any powdering or flaking surface	Moderate-efflorescence
4	50% area covered with deposit of salts accompanied by flaking of surface.	Heavy-efflorescence
5	Heavy deposits of salts accompanied by flaking of the surface.	Serious-efflorescence

4. IMPLEMENTATIONS

4.1 Results:-

4.1.1 Dimension Test:-

Sr No	Brick Name	Length	Breadth	Height	Class
1	Brick 1	395 cm	186 cm	189 cm	Class B
2	Brick 2	390 cm	180 cm	178 cm	Class A
3	Brick 3	410 cm	190 cm	190 cm	Class B

4.1.2 Compressive strength test:-

Observations

Sr No	Brick Name	Dimension of brick (cm)	Area (cm2)	Compressive strength Test (N/mm)
1	Brick 1	22.2*10.7*7	237.54	4.49
2	Brick 2	22.2*10.6*7.5	235.32	4.88
3	Brick 3	22.7*10.8*7.5	245.16	4.7

4.1.3 Water absorption test:-

Observation

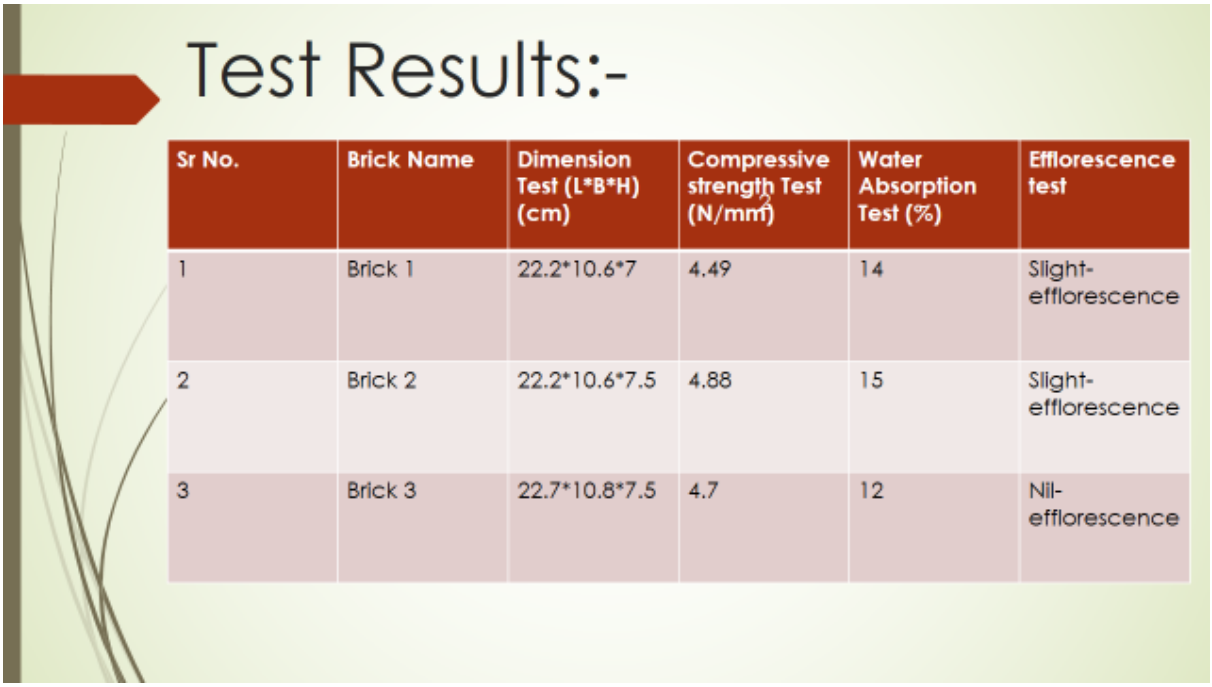
Sr No	Brick Name	W1(M1) gm	W2(M2) gm	Water Absorption Test (%)
1	Brick 1	2820	3256	14
2	Brick 2	2750	3137	15
3	Brick 3	2840	3202	12

4.1.4 Efflorescence test:-

Observation

Sr No	Brick Name	Efflorescence test
1	Brick 1	Slight-efflorescence
2	Brick 2	Nil-efflorescence
3	Brick 3	Nil-efflorescence

4.2 Test Results:-



5. SUMMARY:-

5.1 Advantages:-

- The colour of bricks should be bright and uniform.
- They should be well burned and having smooth surfaces and sharp edges.
- Thermal conductivity of bricks should be less and they should be sound proof.
- They should not absorb more than 20% by weight when we placed it in water.
- When we struck two bricks together, ringing sound should be delivered.
- Structure of bricks should be homogeneous and uniform.
- The bricks should not break when we dropped it form 1m height.
- There should not be any scratch left on the brick when we scratched with fingernail.

4.2 Problem:-

- Variation in the size of the unit
- The product is bowed
- Surface defects
- Drag marks on the surface of the brick
- Cracking in the bricks
- Edge chipping
- Colour variation
- Different batch numbers
- Erosion or fretting of the brick face
- Calcium salts of surface – 'efflorescence'
- Sulphate attack

4.3 Features:-

- Uniform size and shape
- Brick strength is increasing
- Water absorption is less
- Cracking of brick is less
- Effloresce of brick is Nil
- Shrinkage on drying

4.4 Limitation:-

- poor sound insulation, there is no sound isolation
- environmental damage due to large clay soil excavation
- No brick should have the crushing strength below 5.5 N/mm^2.
- The bricks should have low thermal conductivity.

5. CONCLUSION

With the help of better composition brick material we can said that the color of our bricks should be bright and uniform. They should be well burned and having smooth surfaces and sharp edges should not absorb more than 20% by weight when we placed it in water. We identify some better proportion of brick for the preparation of bricks, clay or other suitable earth is moulded to the desired shape after subjectecting to several processes. After drying, it should not shrink and no crake should develop. Following are some Ingredients, which increases the strength of bricks.

Sr.No	Ingredients	Proportions	Functions
1	Alumina	20-30%	Absorbs water and renders the clay plastics.
2	Silica	50-60%	Add Durability, prevents shrinkage and warping.
3	Lime	10%	Reduces Shrinkage, helps in binding of clay and silica.
4	Oxide of Iron	5-6%	Imparts red colour to the bricks.
5	Magnesia	<1%	Give colour(yellow) and reduces warping

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