

USE OF BLACK COTTON SOIL IN BRICK INSTEAD OF CLAY

¹Hiren J Patel, ²Hiral H Patel, ³Ronak I Khurana

(¹Student of Bachelor of Civil engineering, ²Student of Bachelor civil Engineering, ³Assistant Professor.)

(Department of Civil Engineering)

S. N. Patel Institute of Technology & nonresearched Centre, (Formerly Vidyabharti Trust Institute of Tech. & Research Centre), Umrah, Bardoli, Surat 395009.

Abstract: Nowadays the use of various alternatives materials like lime and rice husk in construction field is popular. These techniques improved its engineering properties of material in various terms. In current market there are num of material used as a raw material in brick like cement, plastic, waste concrete, etc. In this study we are utilize black cotton soil in brick instead of clay in brick. we use black cotton soil in manufacture of brick with use of adhesive material like salt, lime, sugarcane baggase, rice husk.

Keywords: Adhesive Material, Brick, Black Cotton Soil, Rice Husk, Salt, lime.

INTRODUCTION:

The brick is one of the oldest building materials and is being extensively used even today as a leading construction material because of its strength, durability and low cost. Demand for this brick of India is increasing day-by-day because of the aforesaid favorable characteristics and brick construction activities

Very few researches are on brick made from black cotton soil among the world, though black cotton soil is easily available in Indian context. The black cotton soil is found in major portion of Maharashtra, west M.P., Gujarat, and Tamilnadu. The black cotton soil is easily available in India. The black cotton soil possesses a volumetric change with the changing in the moisture content, but it provides a good strength with additives.

Material used in this Brick

- **Lime**

Lime is a made by grinding limestone, a naturally occurring type of rock that is very high in calcium. It is also the name of the natural mineral CaO.

- **Salt**

Salt is an inorganic compound, meaning it doesn't come from living matter. It is made when Na (sodium) and Cl (chloride) come together to form white, crystalline cubes.

Sodium chloride is best known as table salt and is used widely use in the food industry for flavoring and preservation.

- **Rice husk**

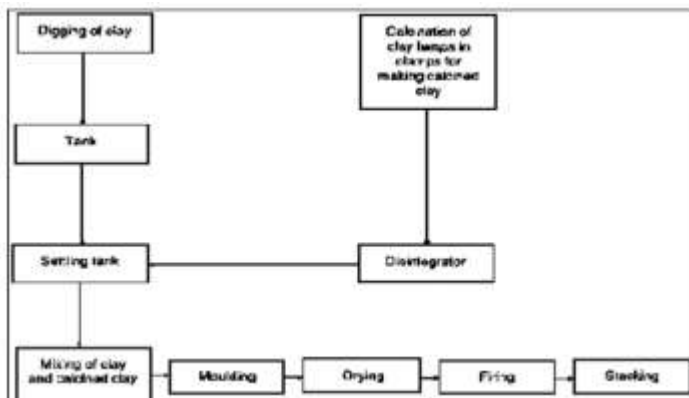
Rice milling generates a byproduct know as husk. This surrounds a paddy grain. During milling of paddy about 78 % of weight is received as rice, broken rice and bran. Rest 22 % of the weight of paddy is received as husk.

- **Sugar cane bagasse**

Sugar cane bagasse is an industrial waste which is used as fuel in the same sugar-cane industry. The combustion yields ashes containing high amounts of unburned matter, silicon and aluminum oxides as main component.

Manufacturing of black cotton soil brick

- Preparation of brick soil material.
- Molding of bricks
- Drying of bricks
- Burning of bricks



✚ Preparation of brick soil material:

- Removal of loose soil:
upper Layer of the soil contains lots of impurities, waste- material, organic matter, etc.so it should need to take out this type of material from the soil.
- Digging and spreading:
the soil which is free from impurities is dug out and spread into heaps about 50 to 100 cm.
- Weathering:
the soil is then exposed to atmosphere for softening. The period require for weathering is few weeks.
- Blending and tempering:
the soil is the mixed with different suitable ingredients. The material is properly mixed with soil then it became used soil.

✚ Molding of brick:

There are two types of molding

- 1) Hand molding
- 2) Machine molding

- **Hand molding:**

When molding is done by hand it is called the hand molding. A wooden or steel with standard dimensional mold in the shape of bricks is used for the molding.

- **Machine molding:**

The prepared soil is placed into the machine and it comes out through the pressure, and it cuts the bricks by steel wires fixed into frames so this type of bricks is also called as the wire cut bricks.

✚ Drying of brick

The prepared bricks from the molding contain 7 to 30 percentage moisture content so the process of drying of bricks is required. Most of drying of bricks is done by heat of sun at atmospheric temperature. The drying of bricks are contently supervised by labor or supervisor.

✚ Burning of brick

It is a very important step in manufacturing of bricks, it removes water from the earth completely and provides hardness and strength to bricks.

- The bricks are burnt by two methods:
 1. Clamp burning
 2. Kiln burning
- **Clamp burning:**

In this type of burning bricks the fuel (coal) are arranged layer in open air. It is also called as vitbhatti, it is cheap and economical.

- **Kiln burning:**

In this type the bricks are stacked without fuel and fuel is placed below then stacked of bricks. It is not economical but it produces better quality bricks.

✚ Result of test which perform on soil & brick

Test	Result
Soil test	
Atterberg's limits	40.34
Liquid limit	
Plastic limit	21.12
Plasticity index	19.22
Shrinkage limit	11.09

Brick test	
Compressive	7.92 KN/mm ²

✚ Conclusion:

From the compressive strength test we found the black cotton soil brick compressive strength is 7.92 KN/mm².

Standard proctor test	OMC	19.96 %
MDD		1.66
UCS test	stress	1.306 Kn/mm ²

from the water absorption tests, we find the water absorption of black cotton soil brick is 11.90%. By use of black cotton soil instead of clay in brick we reduce cost of brick. Black cotton soil brick may be proved one of the economical solutions for the construction where soil locality is basically black cotton. The use of black cotton soil in making of brick production can generate better employments in local areas and play an important role for the development of local area.

References

- Dr T. Sekar , Utilization of industrial wastes for production of black cotton soil bricks, Prof. of civil engineering, university college of engineering, ramanathapuram-623 513, Tamil nadu, India.)
International research journal of engineering & tech.(IRJET)
- Kavish S. Mehta, Rutvij J. Sonecha, Parth D. Daxini, Parth B. Ratanpara, Analysis of Engineering Properties of Black Cotton Soil & Stabilization Using By Lime.
(Student, Department of Civil Engineering, L.T.I.E.T, Gujarat Technological University, Rajkot-05)