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# Experimental Study on Brick by Partial Replacement of Sugarcane Bagasse Ash

Krishan Murari<sup>1</sup>, Kuldeep Kumar Meena<sup>2</sup>, Sachin Kataria<sup>3</sup>, Rajesh Kumar Meena<sup>4</sup>, Ashish Meena<sup>5</sup>

Assistant Professor, Department of Civil Engineering, Vivekananda Institute of Technology, Jaipur, India <sup>1</sup>,

Assistant Professor, Department of Civil Engineering, Vivekananda Institute of Technology, Jaipur, India <sup>2-5</sup>

**ABSTRACT:** Bagasse is the fibrous residue left after the extraction of juice from sugarcane. Bagasse ash (BA) is a waste product generated during the combustion of bagasse in boilers. In this research, we investigate the use of bagasse ash for the production of soil bricks. The soil bricks were made using a mix of clay, sand, and bagasse ash. The aim of this study is to assess the effect of bagasse ash on the properties of soil bricks, including compressive strength, water absorption, and density.

The results of the study showed that the addition of bagasse ash to the soil bricks significantly improved their compressive strength. The highest compressive strength of 3.98 MPa was obtained when the soil bricks were made with a mix of 25% bagasse ash, 65% clay, and 10% sand. The water absorption of the soil bricks decreased with an increase in the proportion of bagasse ash. The density of the soil bricks decreased slightly with the addition of bagasse ash.

Overall, the study shows that bagasse ash can be used as a partial replacement for sand in the production of soil bricks. This can lead to a reduction in the demand for sand, which is a scarce and expensive resource in many parts of the world. In addition, the use of bagasse ash in soil bricks can help to reduce waste and improve the sustainability of construction materials.

**KEYWORDS:** sugarcane bagasse ash, soil bricks, compressive strength, water absorption,

## I. INTRODUCTION

The construction industry is one of the largest consumers of natural resources and energy, and is responsible for a significant amount of waste and pollution. Therefore, there is a growing need to develop sustainable construction materials that can reduce the environmental impact of construction activities. In recent years, the use of waste materials in construction has gained attention as a way to reduce waste and improve sustainability.

Bagasse is a fibrous residue left after the extraction of juice from sugarcane. It is used as a fuel in boilers to generate steam for the production of electricity and sugar. Bagasse ash (BA) is a waste product generated during the combustion of bagasse. It is rich in silica, calcium, and potassium, and has been found to have pozzolanic properties.

The colour of power plant-generated Sugar cane bagasse ash (SCBA) is dark black to light black. Dark black indicates a higher carbon content, mainly due to incomplete combustion. Owing to crystallization and decomposition at high temperatures, SCBA appears grey above 800°C recalcination temperature and appears white above 900°C.

Soil bricks are a traditional building material made from a mix of clay, sand, and water. They are inexpensive, durable, and have good thermal properties. However, the demand for sand, which is a key component of soil bricks, has led to environmental problems such as soil erosion and depletion of natural resources. Therefore, there is a need to find alternative materials that can be used to replace sand in soil bricks.

### a. Scope of work :

- ❖ To promote the solid waste from the sugar mills as a useful product
- ❖ To manage the disposal of waste product into construction raw material
- ❖ To dispose the waste safely
- ❖ To encourage the waste products as eco-friendly material
- ❖ To make the bricks which are energy efficient which is the only viable solution to the environmental concerns and natural resources conservation for future generations

### b. Objective of the study :

The objectives of this project are as follows:

- ❖ For determining the possibility of using sugarcane bagasse ash and coconut fibre as a partial filler material in the brick to produce eco friendly brick at low cost.

- ❖ The project mainly focuses on compression test and water absorption test and to compare the result with red clay bricks.
- ❖ Sugarcane bagasse ash is use as a supplementary filler material in the ratio in 25% and to determine the optimal usage of sugarcane bagasse ash in red clay brick.

## II. LITERATURE REVIEW

### Bricks Development and Feasibility Analysis Bagasse ash.

- The main aim of this project was to compare the compressive strength of the bricks. So for the purpose of different percentage of materials were separately added 6% 8% 16% & 20 % by the weight and the compressive strength were established. Bagasse ash with alumina sulphate was also verified. After that bricks were made & sundried and some bricks were burnt strength were calculated & then with help of compression testing machine. Finally the compressive strength was calculated from test in this project work it was concluded that the bagasse ash was the waste material which give the acceptable compressive strength. The effects of sbca and alumina sulphate by the percent of clay mix are also investigated.
- Huge quantity of ash which is the waste product available at negligible rate. It causes chronic conditions. In this paper, bagasse ash can be utilized by replacing it with fly ash and lime in fly ash brick. Trial bricks of size 230×100×75mm were tested with different proportion of 10%-60% with there placement of fly ash. 0%-20% with the replacement of lime. The main aim of this is to maintain environmental balance and avoid problem of ash disposal.
- experimental study on partial replacement of sugar cane bagasse ash in brick manufacturing. The standard size of brick is 19×9×9cm. This project is mainly based on making use of industrial products. Sugar cane bagasse ash is partially replaced of 10 % 20% 30% by the weight in clay brick. Lime is used as a binding material. Mix proportions of brick are clay 80%, sugar cane bagasse ash and lime 10% tests are conducted from this investigation they have observed and reported that increased strength by 20%.

### Utilization of Bagasse Ash as a Brick Material, A Review

As we all know that the waste from the industries is very harmful for the environment as well as to our health, if not disposed in proper manner. The fibrous residue of sugarcane after crushing and extraction of its juice, known as “bagasse” I some of the largest agriculture residues in the world. The bagasse is however used as a biomass fuel for boilers, but after burning the by-product left is of no use and generally disposed into the rivers which affects the health of human being, environment, fertile land, sources of water bodies etc. .

### Bagasse Ash as an Effective Replacement in Fly Ash Bricks

Utilization of industrial and agricultural waste products in the industry has been the focus of research for economic, environmental, and technical reasons. Sugarcane bagasse is a fibrous waste-product of the sugar refining industry, along with ethanol vapor. Huge quantity of ash which is a waste product, available at very negligible rate. It causes the chronic lung condition pulmonary fibrosis more specifically referred to ambages silos. In this paper, Bagasse ash can be utilized by replacing it with fly ash and lime in fly ash bricks. Trial bricks of size (230x100x75) mm were tested with different proportions of 0%, 10%, 20%, 30%, 40%, 50% and 60% with replacement of fly ash and 0%, 5%, 10%, 15% and 20% with replacement of lime. These bricks were tested in Compression test and Water absorption test as per Indian Standards. The aim of this research was to make economical and green bricks to maintain environmental balance, and avoid problem of ash disposal.

### Experimental Investigation on Replacement of Bagasse Ash in Bricks

This paper carried out partial replacement of fly ash by bagasse ash in order to reduce industrial waste. The effective use of these waste products is challenging task for researcher through environmental impact. Bagasse is often used as a primary fuel source for sugar mills. When burned in quantity, it produces sufficient heat energy to supply all the needs of a typical sugar mill, with energy to spare.

This sugar manufacturing industries produces a lot of sugarcane bagasse ash which is disposed off in an open land. Huge quantity of ash which is a waste product, available at very negligible rate. This sugarcane bagasse ash is a fibrous waste product and has pozzolanic properties which can be made use in construction industry. Pozzolanic materials can be used as a partial replacement in the production of low cost fly ash bricks. The aim of this research was to make economical and green bricks to maintain environmental balance, and avoid problem of ash disposal. It is very essential

to dispose these wastes safely without affecting health of human being and environment. So, there is a great need for its reuse, also it is found that bagasse ash in high in silica and found to have pozzolanic property. So it can be used as substitute to construction material.

#### **Review Paper on Replacement of clay with Bagasse Ash**

Demand and consumption of cement is increasing day by day which has led researchers and scientists to search for locally available alternate binders that can replace cement partially and are eco-friendly and contribute towards waste management. In this direction the industrial & agricultural waste play vital role. The agricultural waste product like Sugar Cane Bagasse Ash (SBCA) is used as alternate binding material in the present study.

This will result in saving in cement production equivalent to the alternative binding material used in concrete. The bagasse ash used for the research work is obtained from Vignahar Sugar Factory which is grinded and sieved through sieve of size 150 micron and passing out fraction is used in concrete as a partial replacement of cement in the ratio of 2% 4%, 6%, 8% & 10% by weight of the cement. Ordinary Portland Cement 53 grade cement is used in the study. The effect of replacement of cement by bagasse ash on properties like workability for fresh concrete are tested and for hardened concrete compressive strength at the age of 7 days and 28 days are determined.

#### **Use of Sugarcane Bagasse Ash as Brick Material**

Application of bio-fuel by-product sugarcane bagasse ash (SBA) as a principal raw material for the manufacturing of bricks was studied. The bricks were developed using the quarry dust (QD) as a replacement to natural river sand and lime (L) as a binder. SBA as a principal raw material was characterized using X-ray fluorescence (XRF), thermogravimetric analysis (TGA), X-ray diffraction and scanning electron microscopy (SEM). XRF confirms SBA as a cementitious material.

SEM monograph shows individual ash with a rough surface and numerous fine pores. Elemental analysis of quarry dust and lime was also carried out using XRF and classic wet test. The physical properties of quarry dust and lime were determined using the laboratory test methods. SBA-QD-L combination bricks were designed and developed in different mix proportions. Physio-mechanical properties of the developed bricks were studied according to recommended standards. The results of the SBA-QD-L bricks were compared with physio-mechanical properties of commercially available burnt clay-and-fly ash bricks.

#### **Silica Extraction and Incineration Process of Sugarcane Bagasse Ash (SCBA) as Pozzolanic Materials:**

Conventional extraction and incineration process of sugarcane bagasse to extract its reactive silica content has confronted several critical issues, particularly in terms of the amount of reactive silica extracted, energy efficiency, and safety precautions. Based on this evaluation, pre-treatment of sugarcane bagasse using acid solution is beneficial, particularly in the removal of alkali metals and increasing the amount of reactive SiO<sub>2</sub>.

Amorphous SiO<sub>2</sub> from the ashes by the hydration product of calcium hydrate (C-S-H) is completely beneficial in improving performance and durability of concrete. These papers attempt to bridge a review of current literature on the extensive studies that have been undertaken to explore suitable method and pre-treatment to increase the level of silica extraction from SCB with Eco-Friendly approach.

### **III. MATERIAL**

There are the following material which is used in making of bagasse ash brick are as follows :-

#### **A. Bagasse Ash :-**

Bagasse ash is the residue generated after the combustion of bagasse, which is a fibrous residue that remains after sugarcane juice extraction. Bagasse is burned to generate steam, which is then used to produce electricity, among other things.

Bagasse ash is a byproduct of this process and is typically collected from the bottom of boilers.

Bagasse ash is composed mainly of oxides of calcium, silicon, magnesium, and potassium, along with smaller amounts of other elements such as iron, sulphur, and chlorine. The composition of bagasse ash varies depending on the type of sugarcane used, the combustion conditions, and the post-combustion treatment.

Bagasse ash has several potential applications. It can be used as a soil amendment to improve soil fertility as it contains a high concentration of plant nutrients such as potassium, calcium, and magnesium.



Fig No 1: Bagasse ash

Additionally, it has been found to have potential in wastewater treatment, as it can remove heavy metals and other pollutants from water.

Table 1: Chemical properties of sugarcane bagasse ash:

S.no.	Component	Mass %
1.	Silica (SiO <sub>2</sub> )	66.89
2.	Alumina (Al <sub>2</sub> O <sub>3</sub> ) Ferric oxide(Fe <sub>2</sub> O <sub>3</sub> )	29.18
3.	Calcium oxide (CaO)	1.92
4.	Magnesium oxide (MgO)	0.83
5.	Sulphur tri oxide (SO <sub>3</sub> )	0.56
6.	Loss of Ignition	0.72
7.	Chloride	-

Table 2: Physical properties bagasse ash



## B. Clay :-



Fig No 2: Clay

Clay is a type of fine-grained soil or sediment that is composed primarily of tiny particles of minerals such as aluminium, silicon, and oxygen. These minerals are typically found in rock formations and are weathered and eroded over time by wind, water, and other natural forces, eventually forming clay. Clay is a versatile material that has been used for a variety of purposes throughout history.

It is used in the construction industry to make bricks, tiles, and ceramics, and is also used in agriculture as a soil amendment to improve soil quality and water retention.

The properties of clay can vary depending on the type of clay and the conditions in which it was formed. Some common types of clay include kaolin, bentonite, and montmorillonite, each with its own unique properties and characteristics.

Clay has a high level of plasticity, meaning it can be easily moulded and shaped when wet, and it also has a high level of cohesion, which means that the particles stick together strongly. These properties make it an ideal material for sculpting and modelling.

The clay serves as a binding agent, helping to hold the Bagasse Ash particles together and providing the necessary strength for the brick. The Bagasse Ash itself contains a high concentration of plant nutrients such as potassium, calcium, and magnesium, which can also be beneficial for the soil when the bricks are eventually disposed of.

## C. Sand :-

Sand is often added to Bagasse Ash soil bricks to improve their structural integrity and prevent cracking during the drying and firing process. Sand is a coarse-grained material made up of small rock fragments and minerals, typically composed of silica, which is chemically stable and does not react with other materials.

When added to Bagasse Ash soil, sand acts as a filler, helping to improve the overall density and consistency of the soil mixture. It also helps to increase the porosity of the soil, allowing air and water to flow more easily through the soil and promoting healthy plant growth.

In addition to its structural benefits, sand can also help to reduce the overall cost of Bagasse Ash soil bricks. By adding sand to the soil mixture, less clay is needed, which can be expensive and difficult to source in some regions.

## D. Water :-

Water plays a critical role in the process of making Bagasse Ash soil brick. The bagasse ash and soil are first mixed together to create a homogenous mixture. Water is then added to the mixture to form a paste or slurry.

The water in the mixture serves several purposes. First, it helps to bind the bagasse ash and soil together to form a solid structure when the mixture is compacted into a brick mold. Second, it helps to hydrate the cementing materials that are present in the bagasse ash, which further helps to bind the mixture together.

## IV. METHODOLOGY

Bagasse Ash soil brick is a type of brick made by mixing bagasse ash with soil, sand, water, and then compressing the mixture into a brick shape. The following is a general methodology for making Bagasse Ash soil brick:

### I. Collection of raw materials :-

❖ **Collect the bagasse ash:** Bagasse is burned to generate steam, which is then used to produce electricity, among other things. Bagasse ash is a byproduct of this process and is typically collected from the bottom of boilers.

#### ❖ **Collect the clay :**

To collect clay for making Bagasse Ash soil bricks, you will need to follow these steps:

- Find a suitable location: Look for an area that has a good source of clay. Clay can be found in areas that are rich in sedimentary rocks, such as river banks or areas with exposed clay beds.
- Gather tools: You will need a shovel, a pickaxe, a wheelbarrow, and buckets to collect and transport the clay.
- Dig up the clay: Use the shovel and pickaxe to dig up the clay from the ground. Be sure to dig deep enough to collect a sufficient amount of clay.
- Remove any debris: Remove any stones, twigs, or roots from the clay using your hands or a sieve. This will help to ensure that the clay is free from impurities.
- Mix the clay: Once you have collected enough clay, mix it thoroughly with water to create a smooth, pliable consistency.

#### ❖ **Collect the sand :**

- Identify a source of sand: You can collect sand from a nearby riverbed, beach, or quarry. Make sure to obtain permission from the relevant authorities before collecting sand from any natural resource.
- Screen the sand: Use a fine mesh screen to remove any debris or large particles from the sand.

### II. Sieve process:-

The purpose of sieving the bagasse ash is to remove any large particles or impurities from it. Bagasse ash is usually available in large quantities, but it may contain unwanted materials such as stones, sticks, or other debris. These impurities can weaken the bricks or cause them to crack, so it's important to remove them before mixing the bagasse ash with soil.

To sieve the bagasse ash, a fine mesh sieve can be used. The sieve should be small enough to catch any large particles or debris but large enough to allow the fine ash particles to pass through. The bagasse ash can be poured into the sieve, and then shaken gently to allow the fine ash particles to pass through while the larger particles remain in the sieve. The sieving process can be repeated as many times as necessary to ensure that all large particles and impurities have been removed.

### III. Mixing of materials:-

Fig No:3 Mixing of materials



The materials such as sugarcane bagasse ash, clay, sand are mixed with water based on the mix design. The mixing of the materials is a critical step in the process of making bagasse ash soil bricks. The mixing percentage should be 25% bagasse ash, 65% clay, and 10% sand. to ensure that the final product has good structural integrity.

The bagasse ash should be thoroughly mixed with the soil to ensure that it is evenly distributed throughout the mixture. Bagasse ash is a pozzolanic material, which means that it reacts with calcium hydroxide to form a strong cement-like compound called calcium silicate hydrate. The CSH contributes to the strength and durability of the bricks.

The mixing process can be done manually using shovels or with a mechanical mixer. It's important to ensure that the mixing is done uniformly, so that the bagasse ash is evenly distributed throughout the soil. This will help to ensure that the final product is consistent in quality and strength.

#### IV. Moulding of bricks:-



Fig No:4 Moulding of brick

It is a process of giving a required shape to the brick from the prepared brick earth. Moulding may be carried out by hand or by machines.

If manufacturing of bricks is on a small scale and manpower is also cheap then we can go for hand moulding. The moulds are in rectangular shape made of wood or steel which are opened at the top and bottom. The longer sides of moulds are projected out of the box to serve it as handles. If we take durability in consideration steel moulds are better than wooden moulds.

The bricks required are in large quantity, then machine moulding is economical and also saves more time.

#### V. Drying of bricks :-

- After moulding process the bricks contain some amount of moisture in it. So, drying is to be done otherwise they may cracked while burning. The drying of raw bricks is done by natural process.
- The bricks are laid in stacks. A stack consists 8 to 10 stairs. The bricks in these stacks should be arranged in such a way that circulation of air in between the bricks is free.
- The period of drying may be 3 to 10 days. It also depends upon the weather conditions.
- Burning the bagasse ash soil bricks is a crucial step in the production process because it helps to remove any remaining moisture and bind the particles together, making the bricks stronger and more durable. The firing temperature and duration will depend on the composition of the mixture and the desired properties of the final product.
- The temperature required for burning bagasse ash soil bricks can vary depending on the specific composition of the mixture and the desired properties of the final product. Generally, the temperature range for firing soil bricks made with bagasse ash is between 800°C to 1000°C (1472°F to 1832°F).

Fig No:5 Drying of bricks

#### 1. TEST

There are several tests that can be performed on bagasse ash soil bricks to ensure that they meet the desired quality standards. Some common tests for bagasse ash soil bricks include:-

##### a) Water Absorption test :-

Water absorption test on bagasse ash bricks are conducted to determine durability property of bricks such as degree of burning, quality and behaviour of bricks in weathering. A brick with water absorption of less than 7% provides better resistance to damage by freezing. The degree of compactness of bricks can be obtained by water absorption test, as water is absorbed by pores in bricks. The water absorption by bricks increase with increase in pores. This test provides the percentage of water absorption of bricks and procedure of the same is discussed below.

**Apparatus :** A sensitive balance capable of weighing within 0.1% of the mass of the specimen and ventilated oven.

**Specimen :** Seven numbers of whole bagasse ash bricks from samples collected for testing should be taken.

**Procedure of Water Absorption Test**



The procedure for the absorption test on bagasse ash brick includes the following series of steps:

Fig No.6: The bagasse ash brick specimen is first dried in the ventilated oven

i. The bagasse ash brick specimen is first dried in the ventilated oven at a temperature ranging from 105 Degrees



Celsius to 115 Degrees Celsius until the specimen attains a constant mass.

ii. The heated specimen is then allowed to cool at room temperature.

iii. The specimen is weighed and its mass is recorded as (W1).

Fig No.7:specimen is weighed

iv. Then, the specimen is immersed in water at a temperature of about 27 Degrees Celsius for 24 hours.

v. The bagasse ash brick specimen is taken out from the water and wiped with a clean cloth to remove the traces of water that may be present

Fig No. 8 : specimen is immersed in water

vi. The specimen thus obtained is then weighed as (W2).



Observation table no : 3

S.no.	Dry Weight (W1)	After Immersion (W2)	$\frac{w_2 - w_1}{w_1} \times 100$	Average
1	2834	3182	12.27	
2	2762	3098	12.16	
3	2802	3189	13.81	12.71
4	2981	3388	13.65	
5	2929	3281	12.01	
6	2677	3009	12.40	

**Calculation of Water Absorption of Bagasse Ash Bricks**



Water absorption, % by mass, after 24 hours immersion in cold water in given by the formula,

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

The average of result shall be reported.

Water absorption of the given bagasse ash bricks = **12.71%**

**Water Absorption Values for Bricks**

When tested as above, the average water absorption shall not be more than 20% by weight up to class 12.5 and 15% by weight for higher class.

**b) Crushing Strength Test**

Compressive strength test on bagasse ash bricks are carried out to determine the load carrying capacity of bagasse ash bricks under compression with the help of compression testing machine.

Bricks are generally used for construction of load bearing masonry walls, columns and footings. These load bearing masonry structures experiences mostly the compressive loads. Thus, it is important to know the compressive strength of bricks to check for its suitability for construction.

**Apparatus:** Compressive testing machine [CTM], Seven samples of bagasse ashbricks. Cement mortar of ratio 1:1 (1 Part of cement and 1 part of sand), Plywood sheets and trowel to fill the mortar in the brick frog is required.

**Procedure:**

- a) Seven bagasse ash bricks are picked from the brick pouch and the unevenness on the brick faces are removed by grinding.
- b) Immerse the bagasse ash brick samples in the water for 24 hours at the temperature of 23-degree centigrade.
- c) Prepare the mortar by mixing the cement and sand at the ratio of 1:1.

Fig.No. 9: Fill the frog with the mortar paste

- d) Fill the frog with the mortar paste and allow to set the bricks in jute bags for the period of 24hrs.
- e) Also, check for the voids on the brick surface. If there any fill the voids by flushing the mortar on them.
- f) Take out the bagasse ash bricks from bags and immerse them back in the water for 3 days to complete the hardening of mortar on brick.
- g) Allow the bagasse ash bricks to dry, before placing it on the compressive testing machine.
- h) Place the specimen flat-wise on the base of CTM, with mortar filled face upwards between the plates.
- i) Plates are used to hold the bagasse ash brick in the correct position while testing.
- j) Start the CTM and apply the load axially on the specimen at the rate of  $14 \text{ N/mm}^2$  ( $140 \text{ kg/cm}^2$ ) per minute till the bagasse ash brick starts breaking.
- k) Repeat the same procedure with the leftover bricks
- l) Note down the reading of each brick from CTM once the bagasse ash brick starts tearing.



Fig. No. 10: compression testing machine

**Observation table no: 4**

S.no.	Size of bricks (mm)	Area (mm <sup>2</sup> )	Load (KN)	Com. Strength (N/mm <sup>2</sup> )	Average comp. strength (N/mm <sup>2</sup> )

1.	230×105×75	24.15× 10 <sup>3</sup>	350	14.49	
2.	220×105×75	23.1× 10 <sup>3</sup>	177	7.66	
3.	230×105×75	24.15× 10 <sup>3</sup>	209	8.68	10.6
4.	225×105×75	23.62× 10 <sup>3</sup>	175	7.4	
5.	225×105×75	23.62× 10 <sup>3</sup>	350	14.8	

**Calculation of compressive strength of Bagasse Ash Bricks:-**The compressive strength of a brick is calculated by dividing the maximum load at failure by the cross-sectional area of the brick. The cross-sectional area of the brick is calculated by multiplying the length of the brick by the width of the brick.  
The formula for calculating the compressive strength of a brick is:

$$\text{Compressive strength} = \text{Maximum load at failure} / \text{Cross-sectional area}$$

**Result:-**

The average compressive strength was obtained when the soil bricks were made with a mix of 25% bagasse ash, 65% clay, and 10% sand is 10.6 N/mm<sup>2</sup>.

**Table no.: 5 (Compressive strength for different classes of brick)**

Bricks	Desirable Limit	Brick No.
First class bricks	>10.5 N/mm <sup>2</sup>	1 and 5
Second class bricks	7 <10.5 N/mm <sup>2</sup>	2, 3 and 4
Third class bricks	>5.5 <7 N/mm <sup>2</sup>	-

**c) Hardness Test**

A good brick should resist scratches against sharp things. So, for this test a sharp tool or finger nail is used to make scratch on brick. If there is no scratch impression on brick then it is said to be hard brick. After making scratches on the surface of the bricks, if there is any impression is left on the brick, then the brick is not sufficiently hard to wear. There should not be any impression left on the brick after scratching .

Fig No. 11 : Hardness Test

**d) Soundness Test On Brick.**

The soundness test is also one of the most important tests which are commonly used to check the quality of the bricks on the construction site. The soundness test is one of the simple and easy tests which anyone can do on the site.



In the soundness test, the two bricks are struck with each other. The brick should not break while it was struck with each other but it should you a **metallic ringing sound**. The metallic ringing sound of the bricks indicates the good quality of the bricks.

Fig. No. 12 : Soundness Test On Brick

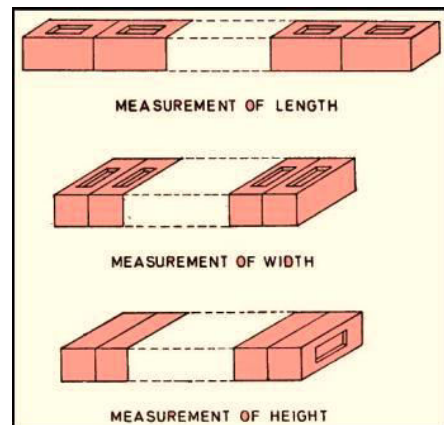
e) **Shape and Size Test on Bricks**

Shape and size of bricks are very important consideration. All bricks used for construction should be of same size. The shape of bricks should be purely rectangular with sharp edges. Standard brick size consists length x breadth x height as 19cm x 9cm x 9cm. To perform this test, select 20 bricks randomly from brick group and stack them along its length ,



breadth and height and compare. So, if all bricks similar size then they are qualified for construction work.

Fig. No. 13 : Shape and Size Test on Bricks



## V. CONCLUSION

The present research replicate the effect of waste product Bagasse ash, on compressive strength of brick and following results were obtained: - The clay bricks gave the compressive strength of 6.3 N/mm<sup>2</sup>. While Bagasse ash 25 % was added by weight in the clay, the compressive strength of bricks increased. Thus from above study; this project concluded that, with the addition of waste material Bagasse ash, the compressive strength of bricks increases, and workability , absorption is preferably good while compare to any other replacements of materials. And conclude with the following salient points.

1. In this study replacement of Bagasse ash and the basic test were carried out in order to identify the compressive strength and water absorption test
2. From this we have observed the water absorption capacity of Bagasse ash brick is averagely low when compared with normal bricks and various replacement materials in brick .

**a. Summary of Findings**

The study's findings summarize the effect of partial replacement of soil with bagasse ash on the mechanical and physical properties of soil bricks. The conclusions highlight the improvements achieved in terms of compressive strength, water absorption, and density compared to conventional soil bricks.

**b. Significance of the Study**

The significance of the experimental study lies in its contribution to the knowledge and understanding of utilizing bagasse ash as a supplementary material for soil brick production. The study demonstrates the potential for enhancing the performance of soil bricks while utilizing a waste byproduct, leading to sustainable and eco-friendly construction practices.

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