

# Study Of Plastic Bricks Made From Plastic Waste

**Sejal Tayade<sup>1</sup>**

*PG Student, Department of civil engineering,  
G H Raisonni school of Science and Technology  
Amravati, India*

**Vijay Kosamkar<sup>2</sup>**

*Assistant Professor, Department of civil engineering,  
G H Raisonni school of Science and Technology,  
Amravati, India*

## Abstract

Plastic waste which is increasing day by day becomes eyesore and in turn pollutes the environment, especially in high mountain villages where no garbage collection system exists. A large amount of plastic is being brought into the tourist trekking regions are discarded or burned which leads to the contamination of environment and air. Hence, these waste plastics are to be effectively utilized. Low-density plastic waste is cleaned and added with sand at particular percentages to obtain high strength bricks that possess thermal and sound insulation properties to control pollution and to reduce the overall cost of construction; this is one of the best ways to avoid the accumulation of plastic waste which is a non-degradable pollutant. This alternatively saves the quantity of sand/clay that has to be taken away from the precious river beds/mines. The plastic waste is naturally available in surplus quantity and hence the cost factor comes down. Hence in this study, an attempt is made to study regard the properties of the brick which is manufactured using plastic wastes. The present work deals with the manufacturing and analysis of bricks made with waste plastic and fine aggregates. The bricks are manufactured by heating waste plastic to temperature range of 120 to 150 degree centigrade and mixing sand to the molten plastic. The bricks produced are light weight, have smooth surface and fine edges, do not have cracks and have high crushing strength and very low water absorption.

**Keywords**— *Plastic waste, Bricks, Tests, Material selection*

---

Date of Submission: 07-06-2022

Date of Acceptance: 22-06-2022

---

## 1. INTRODUCTION

Brick is one of the most common masonry units used as building materials. Building materials like bricks, concrete block, tiles are popularly used in construction and these materials are expensive and find it difficult to afford easily. A large demand has been placed on building material industries especially in the last decade owing to the increasing population which causes a chronic shortage of building materials. Recycling of waste plastic in construction work as raw material alternative may contribute in the exhaustion of the natural. Plastic waste is increasing due to increase in population, urbanization and development. Many people throw out plastic after using it. It is not decomposed easily and affect the growth of plants. So, vegetation gets affected. It is also harmful to animals when consumes it. Plastic waste is increasing due to increase in population, urbanization and development. To overcome these defects, we can use the plastic in construction sector as raw materials in different ways. The reuse of plastic waste in building constructions, industries are considered to be the most practicable applications. Plastic can be reused in various sectors like marketing, manufacturing and transportation etc. Plastic is a very common material that is now widely used by everybody in the world. Plastic plays a predominant role in reusable in this era, as it is compact and light in weight. Common plastic items that are used are covers, bottles, and food packages. The great problem with plastic is its decomposition. Plastic is made of polymer chemicals and they are non-biodegradable. This means that plastic will not decompose when it is placed in earth. Though plastic is a very useful material that is flexible, robust and rigid they become waste after their use and they pollute the air and land. Recycling is processing use waste materials into new products to prevent waste of potentially useful materials. The increase in the popularity of using eco-friendly, low cost

and lightweight construction materials in building industry has brought about the need to investigate how this can be achieved by benefiting to the environment as well as maintaining the material requirements and their standards. From the advantages of plastic recycling procedure is used. For the production of plastic bricks is an optimal method for controlling the problem by decomposition of plastic waste and also it costs economical for the production of building materials.

## **2. MATERIALS AND METHODS**

### *A. Manufacturing of Mould*

- Brick mould was prepared with the stainless steel material.
- The brick mould was made with the help of welding process.
- The dimension of bricks was maintained as (19x9x9 CM)



**Fig 1-** Brick Mould

### *B. Sand*

The silica material was utilized as a fine aggregate in concrete and mortars. Natural river sand is the most preferred choice as a fine aggregate material. River silica sand is a product of natural weathering of rocks over a period of millions of years. It is mined from the river beds. River sand is becoming a scarce commodity now. River was the clean water of superior sand is far superior for construction purposes than any other sand used in construction. Quarrying of river sand is an important economic activity in India with river sand forming a crucial raw material to the construction industry.

### *C. Plastic used*

Plastic is material consisting of any of a wide range of synthetic or semi-synthetic organic compounds which can be easily melted, that are malleable and so can be moulded into solid objects.



**Fig 2-**Shredded Plastic

## **D. METHODOLOY**

- Collection of Materials.
- Batching.
- Melting
- Mixing.
- Moulding.

1. Collection of Plastic Materials

The plastic material should be collected from the factories waste and hospital waste and industries waste and also food packages and plastic bottles this will come under the LDPE plastic type

2. Batching of plastic

Measurement of materials for making brick is called batching. After collection of materials we separate the types of plastic and remove any other waste presented in the collected material and check that any water content in in sample collected then proceed for burning.

3. Burning of waste plastic

After completion batching the plastic waste was taken for burning in which the plastic bags are drop one by one into the container and allowed to melt. These would be done in closed vessel because to prevent the toxic gases released into atmosphere. These will be at the temperature of 120-150 degrees centigrade.

4. Mixing

Mixing of materials is essential for the production of uniform and strength for brick. The mixing has to be ensuring that the mass becomes homogeneous, uniform in color and consistency.

5. Moulding

After completion of proper mixing we place mix into required mould. In these projects we use the normal brick sizes (19x9x9 cm). After 2 days remove the brick from the mould.

Table 1.1 -Mixed Proportion of plastic bricks

S.No	Mix Ratio	Sand (kg)	Plastic(kg)	Weight Of Bricks (kg)
1	1:2	2.22	0.91	3.238
2	1:3	2.47	0.71	3.184
3	1:4	2.62	0.52	3.13



Fig 3-Casted Plastic sand brick

3. TESTS CONDUCTED ON PLASTIC SAND BRICKS

- Compressive strength
- Water absorption
- Efflorescence test
- Soundness test
- Crushing test.

A. COMPRESSIVE STRENGTH

The tests on Compressive strength of the specimen brick shall be calculated for 3 aspects after 7, 14 & 28 days of curing The UTM was using the tests. The compressive strength of bricks. After the curing period gets over bricks are kept for testing. To test the specimens, the bricks are placed in the calibrated compression testing machine of capacity 3000 KN (Kilo Newton) and applied a load uniform at the rate of 2.9 kN/min. By obtaining the maximum load shall be taken as failure of load with specimen fails to produce any further increase in indicator reading on testing machine it is calculated as applied maximum load divided by cross sectional area multiplied by thousand.

**B. WATER ABSORPTION**

Bricks should not absorb water more than 12% by its weight. The bricks to be tested should be dried in an oven at a temperature of 105oC to 115oC till attains constant weight cool the bricks to room temperature and weight (W1). Immerse completely dried and weighed (W1) brick in clean water for 24 hrs. at a temperature of 27±20oC. Remove the bricks and wipe out any traces of water and weigh immediately (W2). It is calculated as  $\frac{W2 - W1}{W1} \times 100$ .

**C. EFFLORESCENCE TEST**

For this test, brick has to be placed vertically in water with one end immersed. The depth of immersion in water being 2.5 cm, then the whole arrangement should be kept in a warm-well-ventilated room temperature of 20-30oC until all evaporates. When the water in the dish is absorbed by the brick and surplus water evaporates. When the water is completely absorbed and evaporated place similar quantity of water in dish and allows it to absorb and evaporate as before. The determination of the brickwork after the experiment shall find out to be % of white spots to the surface area of brick. If any difference is observed because of presence of any salt deposit, then the rating is reported as ‘effloresced’. If no difference is noted, the rating is reported as not ‘effloresced’.

**D. SOUNDNESS TEST**

This sound is carried out to find out that a clear ringing sound is produced or not when the two bricks are with each other without breaking any of the two bricks. If the two bricks are not broken after striking with each other and a clear ringing sound is produced, then it means that the bricks are sufficiently.

**4. TEST RESULTS**

SR.No	Mix Ratio	Compressive Strength(N/mm <sup>2</sup> )
1	1:2	11.70
2	1:3	13.06
3	1:4	18.13

Table 2.1- Compressive strength test

SR.No	Mix Ratio	Water absorption (%)
1	1:2	1.10
2	1:3	0.31
3	1:4	0.27

Table 2.2- Water absorption test

**5. FUTURE WORK**

Plastic sand bricks give us hope and a way to work on innovative things related to the plastic and to try to invent some new civil engineering materials which shows some remarkable response in future industry and changes the thoughts of the researchers, users and industries. Such as, in going for

- Plastic sand wall in framed structures as a partition wall
- Plastic sand benches in the parks
- Plastic sand tracks for running and jogging in place of concrete or stone tracks.
- Research on Composition of plastic with fly ash, Quarry dust etc.

**6. CONCLUSION**

- Waste plastic, which is available everywhere, may be put to an effective use in brick.
- Plastic bricks can help reduce the environmental pollution, thereby making the environment clean and healthy.
- Plastic sand bricks reduce the usage of clay in making of bricks.
- Plastic sand bricks give an alternative option of bricks to the customers on affordable rates.
- Water absorption of plastic sand brick is zero percent.

- Compressive strength of plastic sand brick is 18.13 N/mm<sup>2</sup> at the compressive load of 96KN.
- We conclude that the plastic sand bricks are useful for the construction industry when we compare with Fly Ash bricks and 3rd class clay bricks.

## **7. RERERENCES**

- [1]. Dinesh S; Dinesh A; and Kirubhakaran k., "Utilisation of Waste Plastic in Manufacturing of Bricks and Paver Blocks" *International Journal of Applied Engineering Research*, Vol.2 (4), pp. 364-368.
- [2]. Shikhar Shrimali, "Bricks from waste plastic", IJAR, 3079, 2017.
- [3]. Nitin Goyal ; Manisha., "Constructing structures using eco-bricks", *International Journal of Recent Trends in Engineering & Research* . Vol.2 (4), pp. 159-164.
- [4]. Shanmugavalli., Gowtham., P. Jeba Nalwin., B. Eswara Moorthy., (2017) "Reuse of Plastic Waste in Paver Blocks" *International Journal of Engineering Research & Technology*, ISSN: 2278-0181.
- [5]. Sachin Anant Kamble., Dnyandevkarad., (2017) "Plastic Brick" *International Journal of Advance Research in Science and Engineering*, ISSN 23198354.