

An Experimental Investigation of Recycling Of Bricks

Ramkumar S*, Rubini S

Department of Civil Engineering, M. Kumarasamy College of Engineering, Karur-639 113, India.

*Corresponding author: E-Mail: ramkumars.civil@mkce.ac.in

ABSTRACT

This paper deals with the manufacture of bricks from the construction wastes, especially bricks. The clay bricks are manufactured by burning the clay which causes release of CO₂. The bricks which are wasted during construction activity are thrown away as such. It is non-bio degradable and is harm to agricultural lands. Hence these brick debris were collected and are turned into a useful product. The debris is crushed manually and various grain sizes are made by using IS sieves. These wastes are added as one of the ingredient in the manufacture of the bricks with cement as the binding material. The manufacture of bricks from debris can be carried out and it would help the construction industry to manufacture bricks at low cost. It includes partial replacement with quarry dust and the results are tabulated. The raw materials used for this project is construction debris, quarry dust and cement. The quarry dust is used to optimize the common mix, to attain the target strength by replacing the debris with 5, 10, 15 and 20 % of quarry dust. The mix ratio is proportioned for strength and the test results are tabulated and are compared with the conventional clay bricks.

KEY WORDS: Bricks, Quarry dust, debris, recycled bricks.

1. INTRODUCTION

As infrastructural developments are the ground for any country to tread in growth, the demand for building materials is also consistent on its hike. The storage or dumping of the construction debris is the merging problem in the solid waste management. The earth or soil available for the manufacture of the bricks is present in very less quantity over the earth's crust. At the same time the agriculture depends on the quantity and quality of the soil for any of its products. If the soil is burnt for the manufacture of the bricks, it cannot be reused for agriculture. The burnt soil would become non bio-degradable material as plastics. So an alternative material has to be found. The construction waste which is called as solid waste may be used for the production of the bricks. This project attends to reuse the construction wastes in the construction industry.

2. METHODS & MATERIALS

Materials used:

- Debris – Waste bricks collected from the demolished buildings and structures.
- Cement – OPC grade 53 is used.
- Quarry dust - Quarry dust is a powdery material which is obtained during the crushing of the rock strata during the production of coarse aggregate and other construction materials.
- Water – portable water is used.

Experimental Programme: The brick debris were collected and crushed and sieved manually. The crushed grains of size 600 μ , 850 μ , 1.18 mm, 2.36mm and 4.75mm are taken as base material. The project includes optimization of the mix, addition of the quarry dust with the optimized mix and then tested for compressive strength, water absorption and weight.

The debris is collected from the various locations and is segregated from the other debris. Then the segregated bricks are crushed manually and the required grain sizes are obtained. Then the blocks are casted in the moulds for the decided mix proportion and are tested. From the results obtained the mix is proportioned to get the required target strength. The grain size and the mix are also determined from the results obtained.



Figure.1. Manufactured recycled bricks



Figure.2. Weighing of the dried sample

3. TEST RESULTS

Table.1. Test result of the phase I specimens

Phase I	4.75 mm	2.36 mm	1.18 mm	850 microns	600 microns
Compressive strength(N/mm ²)	1.635	2.289	2.616	4.905	6.867
Water absorption %	12	11.89	11.10	11.07	10.8
Unit weight kg/m ³	1636	1615	1613	1609	1608

Table.2. Efflorescence test results

Grain size					
Test	4.75 mm	2.36 mm	1.18 mm	850 micron	600 micron
Efflorescence	Nil	Nil	Nil	Slight	Slight

**Figure.3. Bricks with replacement of quarry dust****Table.3. Phase II test results (crushed bricks + quarry dust)**

Phase II	600 micron mix with 5% replacement to debris	600 micron mix with 10% replacement to debris	600 micron mix with 15% replacement to debris	600 micron mix with 20% replacement to debris
Compressive strength	6.95	7.103	7.236	7.352
Water absorption	10.8	11.12	11.63	12.06
Unit weight	1634	1648	1659	1672

Table.4. Efflorescence test results

Grain size				
Test	5% replacement	10% replacement	15% replacement	20% replacement
Efflorescence	Nil	Slight	Slight	Slight

Comparative study:**Table.5. Comparison between various bricks**

Contents	Re-bricks	Fly ash bricks	Clay bricks 2 nd class
Cost	Rs 3.4 appx	Rs.4.50	Rs.5.25
Strength (comp)	7.352 N/mm ²	7 – 12 N/mm ²	> 7 N/mm ²
Shape & size	Uniform	Uniform	Non uniform
Density Kg/m ³	1600 – 1700	1200 - 1350	1500 - 1700
Water absorption	20 – 25 %	10 – 15 %	10 – 13%
Fuel consumption	No	Yes	Yes
Environmental pollution	No	Less	More
Wastage	3 – 4%	3 – 4 %	8 – 10 %
Mortar consumption	Less	Less	High

4. CONCLUSION

- These bricks are eco-friendly one, since there is no usage of fuel.
- The heating is not required and so it finds advantage in consumption of the fuel.
- The finishing is good and hence there is a less wastage in finishing works.
- The edges are strong enough that it won't get damaged while travelling and handling, since the clay bricks are prone to edge damages.
- The work process is simple and requires less time for their manufacture.
- These bricks satisfy the norms and requirements of a normal brick as per IS codal provisions.
- Since the brick comprises of technical and economic feasibility, it can be implemented presently.
- Solid waste management being the major issue in India, it can be implemented in India as an effective measure against the problem.
- Nowadays every nation is trying to "go green" and so this is going to be one of the efficient method for going green.

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