

A Study on Choosing Bricks on Site During Construction

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Abstract:

Large numbers of bricks are required to meet the needs of increasing population for both residential and commercial sectors. The overall development and industrial development lead to the use of the traditional bricks at a very hefty rate. The traditional bricks are commonly made up of clay as its main component as a result it is on the verge of exhaustion. To standardize its broad, utilize and discovering its auxiliary one is the need of the hour. In this study, bricks were made by using different proportions of alternative materials like fly ash(FA), sand, lime and plaster of Paris . The size of sample 220×130×900 mm was manufactured and quality constraints like compressive strength and water absorption were tested at different curing ages. The cost-effective mix design of the bricks for optimum compressive strength and rate analysis was also the part of this study. It was detected from the observation of results that the compressive strength decreases with increasing percentage in fly ash and increases with increasing percentage of sand and lime in fly ash-based bricks. Increment in water absorption was observed as fly ash content is increased and decrement of water absorption is seen with increasing percentage of sand and lime in fly ash-based bricks.

Keywords: Fly Ash, Water Absorption, Lime, Rate Analysis

Introduction:

Brick is one of the most extensively used building material in the world of construction all over the world. It is the oldest building materials and still very popular and is widely used in construction as it is cheap, durable and easy to handle. About 25% of construction of building or houses is done by either brick masonry . The bricks have been manufactured since the dawn of civilization all over the universe. In the beginning periods mud bricks were formed with the help of hands rather than the moulds of wood or metal, belong to the late Neolithic period and were found in Jericho. The examples include one of the major structures of the period was the Neolithic long house. The world largest Great Wall of China was constructed by using both sundried and fired bricks. The Ramesseum at Thebes, Egypt provides the finest example of mud bricks construction. Qutab Miner is one of the tallest bricks constructed structure minaret in the world. Furthermore, India is at the second number as producer of brick after China at number one in the world. The clay brick has the advantages that it has good compressive strength, absorbs less water and are most popularly used in construction now a days. But while manufacturing these bricks, we are disturbing the environment by using the valuable soil or top most layer of soil which is useful for farmers

to grow crops due to its fertility. Secondly during manufacturing of these bricks air get polluted during burning process of these bricks. Moreover, boost in construction activities prove deficiency of conventional building materials and abundantly available industrial waste have endorsed the development of innovative building materials. So, to overcome these problems an economical alternative is to manufacture bricks by using fly ash as a raw material mixed with sand, lime or cement. Due to speedy upsurge in the capacity of thermal power generation in India, production of massive quantity of fly ash arises, which is almost 50 million tons per year. Fly ash is basically a fine graded material obtained from the combustion of coal, transported by flue gases and collected by electrostatic precipitators. It comprises of insignificant amount of un-burnt carbon which is acidic in nature. Its key ingredients are silica, aluminium oxide and ferrous oxide. These bricks have many advantages like proper utilization of fly ash, good strength, less water absorption and cheaper than clay bricks. These bricks are also called Eco friendly bricks because these bricks are manufactured without burning process and hence cause no air pollution. Fly ash bricks are manufactured using fly ash as a raw material mixed either with sand, lime or cement. Fly ash-cement bricks as the name indicate these bricks are manufactured by mixing fly ash as a raw material with sand and cement. Fly Ash Lime Gypsum Bricks abbreviated are manufactured by mixing fly ash with sand, lime and gypsum with desire quantity.

Material Used:

The different samples collected were manufactured using fly ash as a raw material mixed with sand, lime, POP and cement with different ratios of materials.

Fly ash:

Fly ash as a raw material used in manufacturing fly ash bricks. Class C fly ash was taken from the nearby thermal Power Plant The various ingredients present in this ash are listed below in

S. No	Ingredients	Percentage (%)
1	Silica	57-60
2	Alumina	24-25
3	Iron Oxide	6-7
4	Lime	8

Results and Discussions:

The test results of various samples Compressive strength, water absorption and density collected from site were tested for different parameters like compressive strength, water absorption and dry density. It is detected from the result that the highest strength brick (power fly ash brick) having compressive strength

of 24 N/mm^2 , where the ratio of fly ash, sand, lime and POP were 58%, 28%, 29% and 9% respectively.

The least compressive strength was observed as 3.28 N/mm^2 , where the percentage of fly ash, sand, lime and POP was 60, 10, 25,

and 5. Furthermore, the highest water absorption rate was observed as 15.87% and the lowest water absorption rate was observed as 10.39%. Moreover, the dry density was found maximum for 15

N/mm^2 compressive strength sample whereas lowest value of dry density was observed in 4.28 N/mm^2 compressive strength sample. The cost of per unit brick varies from 1.33 rupees to 3.00 rupees.

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doi:10.1088/1755-1315/889/1/0120496. However, the cost of high strength brick was only 1.47 rupees and Table 5 presents all the result of

Results of different collected samples

Sample No.	Name of Unit	Water absorption (%)	Dry density (Kg/m ³)	Compressive strength (N/mm ²)	Material cost per brick (Rs.)
1.	MJ Bricks	17.40	1460.19	10.87	1.33
2.	Paras Bricks	15.87	1533.59	24.00	1.47
3.	Power FA Bricks	12.39	1330.69	18.00	1.59
4.	Vivek Bricks	15.32	1442.99	3.28	1.83
5.	Garg Bricks Plant	14.89	1593.14	11.74	3.00
6.	Ritika FA Bricks	10.39	1449.15	13.80	2.5
8.	Tyagi Bricks	14.89	1749.00	12.32	1.91

Conclusion:

This investigation was done in two different stages, in first stage the strength parameters like compressive strength, water absorption rate and dry density of 8 ready-made brick samples were conducted and in second stage different sample of mix were made to find the optimum sample of design mix. The self-made brick samples were prepared in three different stages with change in content of fly ash, sand and lime content. It was observed that with increase in content of lime in mix, compressive strength of mix increases and compressive strength decreases with increasing percentage of fly ash in the mix. Furthermore, rate analysis was performed in which it was observed that the brick having maximum strength need only proper proportion of mix content. The rate per piece of brick of high strength was only 1.47 rupees.

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