

Strength Stability of Brick Oasis by Admixtures in Aandimadam

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ABSTRACT

In this research we have discussed the behavior of clay brick which contain red soil, clay, water under various admixtures such as silica and alumina. The advantages of clay brick include its low-cost and great thermal behavior. Although clay brick is considered one of the oldest construction materials, engineers and builders. Also there is no accurate design code to follow before construction. This study is faithful to increase the low compressive strength of clay brick without sacrificing its low thermal conductivity properties. The experimental program in this research includes the use of different admixtures such as silica(0%, 5%, 10%, 15%, 20% and 25%) and alumina(0%, 5%, 10%, 15%, 20% and 25%) to increase the compressive strength of the basic clay mix. While adding 10% silica as an admixture this experimental results, can lead to an optimum compressive strength of the brick.

Keywords – silica powder, alumina powder, compressive strength and water absorption.

INTRODUCTION

Brick is a building material which is widely used in the world. It will not cause any pollution. Silica is added to increase the strength and may prevent the brick from cracking. If crack is appeared during drying process the ash can be spread over the brick it will not allow the crack to grow. Also the crack may occur due to over burnt so we should be careful during burning process. Because of common material the brick is the cheapest one. With the simple material the experts will make the building in different types for long time. The clay brick can be called as heavy clay product which is made from a clay with small amount of raw material. There are many types of bricks are available in which different types can have many name over the world.

Mostly in olden days the brick will be made by using hand but after some years the brick also be done by using machines. For making the brick hard it will be kept in sunlight for nearly 1 week but now a days for larger production they

are burning in kiln. The kiln industry can provide employment for more people during the non production session of agriculture. For small scale the brick can be burnt using fire in pit. The manufacturing of brick is very simple and easiest method.

In aandimadam area the brick have less strength. We have tested the soil, in the soil silica and alumina percentage is very low. So we are doing this project to rectify the problem. The distance from Thanjavur to aandimadam is 120km. After this research the strength will be gained by adding some admixtures. Due to this results we are going to suggest the particular admixture.

MATERIALS USED

The ingredients of brick consist of soil and water. The ingredients are used in proper proportion. Also the soil is replaced at 5%, 10%,15%,20% and25% by silica powder. They are described in details with their properties are as follows:

- Soil
- Silica powder
- Alumina powder

SOIL

The soil is naturally available material. It contain silica and alumina in rich quantity. The material made up of organic matter and clay particle.



Fig-1 Soil

ALUMINA POWDER

The alumina powder is in white color. It is majorly composed of many rocks especially clay and is found in crystalline rocks. It is extracted from bauxite. The alumina powder contain nearly 95% of alumina.



Fig-2 Alumina powder

Table 1 Chemical Composition of alumina Powder

SL.NO	CHEMICAL COMPOSITION	ALUMINA POWDER (%)
1	Silica	00.83
2	Alumina	95.66
3	Lime	02.66
4	Iron Oxide	00.56
5	Manganese Oxide (MnO)	00.29

SILICA POWDER

A hard, unreactive, color less compound which occurs as the mineral quartz and as a principal constituent of sandstone and other rocks. It having good compressive strength.



Fig - 3 Silica powder

Table 2 Chemical Composition of silica Powder

SL.NO	CHEMICAL COMPOSITION	SILICA POWDER (%)
1	Silica	98.0
2	Alumina	0.09
3	Lime	0.03
4	Iron Oxide	0.37
5	Manganese Oxide (MnO)	0.43

EXPERIMENTAL WORK

GENERAL

The aim of this work is to predict the mould preparation, preparation of brick and test on brick.

PREPARATION OF BRICK

The soil is taken and mixed with water with proper proportion and let it be for 24 hours for setting. In this research silica and alumina are used to replacement of soil in various proportion such as 5%, 10%, 15%, 20% and 25% . And the brick is made by using the mould. The brick is then dried for nearly 10 days. After the drying process the bricks are arranged for burning. The burning will be done about 2 nights. The bricks are tested for compression test and water absorption .The quantity of water chosen as per IS 456 : 1978 for an exposure condition of severe for brick.

Production of quality brick requires accurate care exercised at every stage of manufacture of brick. If accurate care is not good and good rules are not obeyed the resultant brick is going to be of bad quality, it is necessary to know what should be followed in each stage of manufacture of brick for producing good quality brick.



Fig – 4 Brick

RESULTS AND DISCUSSION

GENERAL

To prepare specimens of bricks are subjected to static loading and also testing to find the compressive strength and water absorption of brick. Analyze the test results and repeat the preparation.

The test results are the compressive strength(12.3 MPa) for 10 % replacement of silica and water absorption (7.9 MPa) for 10 % replacement of silica.

COMPRESSIVE STRENGTH FOR CONVENTIONAL BRICK AND SILICA AND ALUMINA POWDER REPLACED BRICK:

Table-3 compressive strength of conventional brick and silica powder replaced brick

S.No	Percentage of mix (%)	compressive strength (N/mm ²)
		Silica
1	0	6.5
2	5	9.4
3	10	12.3
4	15	10.8
5	20	6.7
6	25	4.1

Table-4 compressive strength of conventional brick and alumina powder replaced brick

S.No	Percentage of mix (%)	compressive strength (N/mm ²)
		Alumina
1	0	6.5
2	5	7.2
3	10	8.3
4	15	7.1
5	20	5.3
6	25	3.2

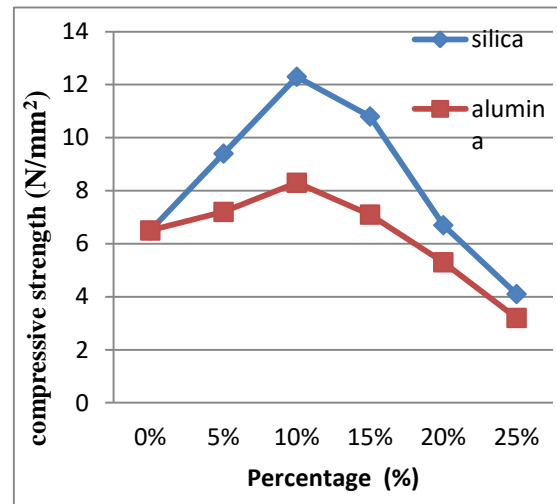


Fig-5 compressive strength of different mix of brick.

WATER ABSORPTION FOR CONVENTIONAL BRICK AND SILICA AND ALUMINA POWDER REPLACED BRICK :

Table-5 water absorption of conventional brick and silica powder replaced brick

S.No	Percentage of mix (%)	water absorption
		Silica
1	0	6.8
2	5	7.4
3	10	7.9
4	15	8.3
5	20	8.6
6	25	8.9

Table-6 water absorption of conventional brick and alumina powder replaced brick

S.No	Percentage of mix (%)	water absorption
		Alumina
1	0	6.8
2	5	7.1
3	10	7.6
4	15	7.7
5	20	7.9
6	25	8.1

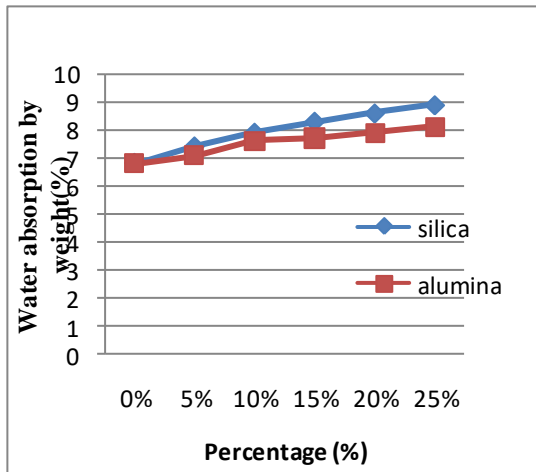


Fig-6 water absorption of different mix of brick.

SOUNDNESS TEST FOR BRICK

In this test, the two bricks are taken and they are struck with each other. The bricks should not break and a clear ringing sound should be produced.



Fig – 7 Brick Knock

APPEARANCE

- Before adding admixtures the color of the brick was so dull.
- While adding 10% of silica the appearance is brighter than conventional brick.

CONCLUSION

- By this research we have proved that the use of silica in part of soil can improve the compressive strength and water absorption of brick.
- The maximum strength achieved at 10 percentage mix which is mentioned above.
- The soundness and hardness of the brick is good.
- And finally brick produced by replacing 10% of silica mix shows 12.3Mpa

strength which is maximum when compare with Alumina 10% mix of 8.3Mpa achieved strength.

- While the percentage of silica is high in brick by adding each proportion then the appearance is bright as such silica content.

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