

Comparative study of conventional bricks with hyposludge and fly ash bricks

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Abstract- With the growth of industrialization, the generation of waste material also increases which is the main concern for the environment. Hypo plant in the paper industry generates a large volume of waste in the form of a slurry, disposal of which causes environmental pollution and the production of cement also accounts for the global warming by releasing carbon dioxide in the atmosphere. Hypo sludge has a very good content of CaO, and silica that's why it can be used as binding material in bricks and use as a partial replacement of lime or cement in fly ash bricks thus in this paper.

Key words- - Hypo-sludge, Fly ash, Compressive Strength, Hardness Test, Soundness Test, and Initial Rate of Absorption.

1.INTRODUCTION

1.1 General- brick is a composition of clay earth mass. With the advancement of the time, its generalized definition and process of manufacturing got changed. Basically, on basis of manufacturing, it can be characterized in two way either it could be a fired or non-fired one. Fired bricks are the conventional brick of clay mass which is burnt at high temperature to let the fusion of constituents.

1.2 hyposludge- Hypo sludge is a recent arrival among cementations materials. It was originally introduced as artificial pozzolana while producing paper the various wastes come out from the various processes in paper industries. From the preliminary waste named as hypo sludge due to its high calcium is taken out for our project to replace the cement utilization in concrete. Paper making industries generally produce a large amount of solid waste. Paper fibers can be recycled only a limited number of time before they become too short or weak to make high-quality paper. From paper manufacturing process three types of sludge are obtained namely lime sludge (Hypo sludge), ETP sludge and De-Inking sludge. The shiny finish on glossy magazine-type paper is produced using a fine kaolin clay coating, which also becomes solid waste during recycling.

2. OBEJECTIVE OF WORK

There are following significant objectives of experimental work-

1. To study the physical properties of bricks and the hyposludge material using the percentage increase and graph change .
2. To analysis the engineering property and comparative study of conventional brick & hyposludge brick.

3 . To study percentage values variation and the using as future construction material.

3.LITERATURE REVIEW

1. **Rushad (2011)**, investigated the strength and water absorption characteristic of fly ash bricks made of lime (L), local soil (S), and fly ash (FA). He performed the experiment on hand moulding and also pressure moulding fly ash bricks. After the all experiment it was observed that none of the combination used for bricks is not satisfy the required standard codes. He observed that L-FA (40:60) bricks satisfy the strength standard as well as water absorption according to Indian Standard Codes.

2. **Kulkarni, S Raje (2013)**, Researcher experimented on fly ash bricks by partial replacement of hypo sludge by weight with lime with a permutation of 5%, 10%, 15% and 20% and performing their experiments to determine compressive strength and to make economical and green bricks to avoid a problem such as ash disposal and unbalanced environment. In this research work sample bricks are tested their physical properties by testing them for different test (compressive strength, water absorption test, hardness test and soundness test). Research observed by the test result that hypo-sludge behave like a cementing material and all physical properties of bricks enhance till 15% but after that strength of bricks reduce and water absorption increases.

3. **Yadav, and Agnihotri (2014)**, experimentally described the recycling of waste product that is STP sludge (also known as hypo-sludge) and fly ash by adding in them to bricks. In their experimental study, they used different composition of hypo-sludge and fly ash in the proportions of 20:80, 30:70, 50:50, 80:20 and 100:0. For their comparative study crushing strength, initial water absorption, water absorption, and hardness test are conducted on the sample and found that 80:20 proportions had adequate crushing strength and water absorption as per specification.

4. **Mahendran, and Sivaram (2016)**, comparison has been conducted between clay bricks, fly ash bricks, AAC blocks, CLC blocks and porous therm blocks based on their engineering properties and economic aspects. He conducted some major test that like bulk density, direct compressive strength test, water absorption test, thermal conductivity test. Cost benefits analysis is made for each building blocks and their values discussed for their economic benefits. After experiment it was observed that AAC blocks have minimum bulk density and fly ash bricks have maximum compressive strength. Results of water absorption test show that AAC blocks have maximum water absorption value and CLC blocks have minimum water absorption value.

4.METHODOLOGY AND MATERIAL USED

4.1 Material used - fly ash ,hypo sludge ,cement

4.2 Mainly test -dimension test ,water absorption test ,compressive strength test ,hardness test

4.3 Procedure- In this experimental we firstly take the percentage of material of hypo sludge is 10%, 15%,20%,25%,30% and prepare the five sample and add some of remaining percentage material added to fly ash and surkhi and cement etc.in the hypo sludge material as cementitious material so its work as a cement . and we followed the different test

then we seen that the hyposludge and flyash is gives the higher strength as compared to the conventional brick.



fig. dimension test

5.RESULTS AND DISCUSSION

5.1 MEASUREMENT OF DIMENSIONS OF BRICKS:

Based on Clause 5.2.1, IS 12894:2002. The bricks were placed in contact with each other in a straight line upon a level surface. The method of arranging the bricks depended on which dimension to be measured; length, width or height. The dimension result obtain from dimension test present in table 5.1

Table 5.1 Dimensions value of different composition bricks

Sample Name	Dimensions(centimeter)			Average Value of dimensions (centimeter)		
	Length	Width	Height	Length	Width	Height
S-1	20	10	10	20	10	10
	20	10	10			
	20	10	10			
S-2	20	10	10	20	10	10
	20	10	10			
	20	10	10			
S-3	20	10	10	20	10	10
	20	10	10			
	20	10	10			
S-4	20	10	10	20	10	10
	20	10	10			
	20	10	10			
S-5	20	10	10	20	10	10
	20	10	10			
	20	10	10			

5.2 Water Absorption Test

Table 5.2 shows the amount of water absorbed corresponding to different Fly-Ash and Hypo- Sludge composition. The water absorption values of Fly-Ash and Hypo-Sludge composites lies in the range of 14.5%

to 16.25%. It can be seen that all the composition met the absorption criteria set by IS code specification. IS code permits the maximum of 20 % water absorption when compacts are immersed for 24 hours.

Table 5.2 Percentage (%) water absorbed by various samples

Mix Proportion (Wt. %)	Weight (gm.)		Water Absorption (%)	Average Water Absorption Value (%)
	Dry	Wet		
S-1	3.28	3.77	15	14.5
	3.28	3.74	14	
S-2	3.28	3.89	16	15.75
	3.28	3.79	15.5	
S-3	3.28	3.82	16.5	16.25
	3.28	3.81	16.1	
S-4	3.29	3.79	15.2	15.45
	3.29	3.81	15.7	
S-5	3.31	3.84	16.2	15.8
	3.33	3.84	15.4	

5.3 Hardness Measurement

Hardness test for all the Fly-Ash and Hypo-Sludge bricks should be done with the help of steel knife.

Table 5.3 Hardness values of various samples

S. No	Sample Name	Observations
1.	S1	Little Impresion on surface
2.	S-2	No Impresion on surface
3.	S-3	No Impresion on surface
4.	S-4	Little Impresion on surface
5.	S-5	Little Impresion on surface

5.4 Determination of Compressive Strength

The compressive strength measurement of the cylindrical samples was done as per standard practiced. The test was conducted on the three samples of each composition and the average value of all is evaluated. Table 5.4 shows the strength values of different compositions of Fly- Ash and Hypo-Sludge, both in the dry and wet state. For dry composites, the Compressive strength value lies in the range of 5.43 to 7.10 MPa. 10 to 30 wt.% Hypo-Sludge compositions have got the highest strength value while the average strength value of 7.10 MPa was gained by 30wt. % Fly-Ash and Hypo-Sludge composition.

Table 5.4 Compressive strength values for 7 Days Sample

S. No.	Mix Composition (Wt. %)	Compressive Strength (MPa) (7 days sample)
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1.	S-1	1.20
2.	S-2	1.35
3.	S-3	1.78
4.	S-4	1.67
5.	S-5	1.66

Table 5.5 Compressive strength values for 14 Days Sample

S. No.	Name of the Sample	Compressive Strength (MPa) (14 days sample)
1.	S-1	2.23
2.	S-2	3.00
3.	S-3	3.61
4.	S-4	3.54
5.	S-5	3.74

Table 5.6 Compressive strength values for 21 Days Sample

S. No.	Name of the Sample	Compressive Strength (MPa) (21 days sample)
1.	S-1	5.34
2.	S-2	5.76
3.	S-3	6.45
4.	S-4	6.12
5.	S-5	7.22

5.7 Soundness Test Results

Samples S3, S4 and S5 showed good metallic ringing sound without breaking as they must have high percentage of cement in them. All of them have good hardness and strength. They have comparatively more dense and compact texture.

table 5.7 Soundness test results in sample

S.No.	Specimen	Observations
1	S1	Unsatisfactory Sound & Breaking
2	S2	Slightly Metallic Sound without Breaking
3	S3	Slightly Metallic Sound without Breaking
4	S4	Good Metallic Sound without Breaking
5	S5	Good Metallic Sound without Breaking

6.CONCLUSION

these are following major significant conclusion are that-

- 1.on the analysis of the study is the hyposludge brick gives the proper dimesion according to the provision is 20cmx10cmx10cm.
2. IS code permits the maximum of 20 % water absorption when compacts are immersed for 24 hours.so the values lies in 14.5 to 15.8%.
- 3.on the study we shows that the hardness test is provided the little and no impression on the surface.
4. on the analysis of study in the compressive strength test in bricks in 7days ,14days ,21days is given that the value lies is 5.34 to 7.22mpa as sample and higher strength fullfill the creteria as according IS code.
- 5.on the comparative study in soundness test its gives the good mettalic sound without breaking.

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