

PREPARATION OF AAC AND CLC BLOCK BY ADDING POLYMERIC FOAM

Shivam Pandey¹, Tabrez Patel ², Darshan Patel and Kaish Timol^{3,4}

¹Shivam Pandey(student)

²Tabrez Patel (student), Kaish Timol (student) & darshan patel(student) Bhagwan Mahavir College of Engineering and Technology

Professor Shyam Doshi, Dep of Civil Engineering, Bhagwan Mahavir College of Engineering and Technology
Surat, Gujarat, India

Abstract - As in today's day to day life there is much amount of carbon generated in the atmosphere and as to overcome it so that it does not affect the structure blocks used in the structure and to overcome the adverse effect of it to replicate it we are experimenting the light weight concrete to infuse polymeric foam which is polymeric plastic component possess carbon to inculcate good durability and optimum strength. Here we have in this project we perform an experiment in order to introduce polymeric foam and in light weight concrete. Which also comes in two type's 1.cellular light weight 2. Autoclave aerated concrete In cellular light weight we infuse polymeric foam instead of protein based foam and to also use it in autoclave aerated foam in order to replace it with other materials to check the aftermath strength of the block and its properties change in it .to check whether it works properly or not. And to check whether it works sufficiently and its good workable or not. To create a new thing for to obtain and check the product that is built.

Key Words: Polymeric Foam, cement, sand , flyash, strength, cost effective.

1. INTRODUCTION

It is a LWC which is made up of cement, sand, lime, gypsum, water and small quantity Al powder. • It's also known as air Crete because it entrains air into it. It contains nearly about 50-60% of air voids. It is a porous material and containing uniform air pockets which make it light in weight therefore it is termed as aerated concrete. In the manufacturing of AAC, the raw materials are thoroughly mixed with water in definite proportion as per the required density and after that expansion agent like Al powder is added to the mixture so that volume is increased about 2-5 times of its original volume. This Al powder reacts with calcium hydroxide which is the product of cement-water reaction. The reaction between Al powder and calcium hydroxide generates uniform micro air bubbles which results in increasing concrete volume.

Foam concrete is a mixture of cement, fly ash, sand, water and foaming agent. When the foaming agent is diluted with water and air, further it is mixed into the cement slurry. the water-cement slurry sets around the foam bubbles and this paste have sufficient strength to maintain its shape around the foam bubbles, it entrains 30-35% of air by volume into the concrete, as results the low density Foam Concrete is obtained. It can be categorized as cellular material because it

contains higher amount of pores. Further quality of foam concrete is depending upon the quality and type of foam is used. As mostly no coarse aggregate is used in the production of the foam concrete or cellular concrete, the correct terms would be called mortar instead of concrete. The density of foam concrete generally varies from 400kg/m³ to 600kg/m³ and codal provision IS.2185.4.2008. There are two types of Foaming agent used as a construction material.

1.1 LITERATURE REVIEW

Strength Properties Of Lightweight Concrete Made With Basaltic Pumice And Fly Ash. Materials Letters 57 (2003) 2267–2270. Yasar Et.Al(1) Yasar et.al. have performed a study on the design of structural lightweight concrete (SLWC) made • with basaltic pumice (scoria) as aggregate and fly ash as mineral admixtures that will provide an advantage of reduction in dead weight of a structure, and to obtain a more economical and greener mixture with the use of fly ash. The compressive and flexural tensile strengths of hardened concrete, the properties of fresh concrete including density, and slump workability were measured. Laboratory compressive and tensile strength tests results showed that SLWC can be produced by the use of scoria. However, the use of fly ash seems to be necessary for the production of cheaper and environment-friendly SLWC with the compressive and tensile strengths similar to control SLWC containing only NPC. Results showed that SLWC has an advantage of the reduction of the dead weight of the structure at an average of 20% since the dry weight unit of NWC is about 2300 kg/m³ 2.2.2 Effect Of Initial Curing On Early strength And Physical Properties Of A Lightweight Concrete.

1.2 Site Study: -

We construct the all structure and blocks of CLC in our Concrete technology lab under the guidance of prof. Shyam Doshi and lab incharge Gaurang Jariwala. This is the sufficient and best places for complete our project work.

2. Methodology

2.1 Experimental Details:- The experiment which we are performing in this is dealing with key element of foamed concrete • or CLC blocks key material which is foam itself. In this we are replacing protein based foam by polymeric foam

and which intern we think might is useful for increasing the strength and decreasing the water absorption of concrete or blocks whichever is to be produced.

2.2 Application of foam in the AAC blocks:-

We utilized polymeric foam to set up the AAC obstruct as we realize that froth isn't the material of the AAC squares however is a piece of the lightweight cement or foamed concrete. We attempted to implant the material and make it lighter using any and all means so it could be worked out appropriately. We conversed with our guide and counsel him about it as he proposed we ought to have a short information about it we ought to counsel some other sources to for a concise learning about it. We chose to go to and get together with the AAC squares maker MAGICRETE Association and there we met the specialized sub leader of the research and development division.. We counsel him and got some information about it and inquired as to whether we set up the squares at the magicrete workshop and exceed our work there in regards to the examination. We than supplanted the foam with the aluminum powder proportion with the pu foam and arranged the square as the square was readied we injected 10% of all out volume of the material in to it and we keep it on setting following a day and subsequent to setting we recognize a portion of the properties that were obvious were Expansion, Plastic solidness. After that the second procedure which we went for was the autoclave warming or the steam restoring as we state it there we put the solid shape in the machines at temperature 121 degree celcius for around 5 to 6 hours and thereafter with the clump we take it out. With respect to 5-6 hours the steam was Passing we examined the pores which were there and framed would be stopped up or bolted. After the clump was out we saw that it bombed by solid shape being split and couldn't kept up the thickness of the both the materials. In this way the aftereffects of that trial were that the blending of foam doesn't get settles. The substitution of foam from the aluminum powder fizzled and doesn't shaped a proper block of the blend.

2.3 Application of foam in the CLC blocks:-

Polymeric foam which is our material which we had replaced it by the protein based foam or normal foaming. So as for the cellular light weight we decided to cast it in the cube of 15 cm by the mix of the polymeric or pu foam instead of the normal protein based foam. As the polymeric foam consist of polymer plastic material we have to infuse the ratio to balance the density of the material. And to prepare a good mix of the materials which are infused for the mix to be prepared. So on an account on that we prepared a mix of cement sand and flyash with the ratio of cement opc 53 grade, sand, and flyash according on the ratio of the volume we used it 30%, 40% and 50%. We first mix the dry sand, cement and flyash and after that when it obtain a good color after mixing we poured the water and mix the mould with the trowel and mixer we used both even manual and machine mixer so as to prepare a good mould and after that

before the placing we added the condensed foam or pre generated foam into the mix and mix it thoroughly until the mix was fully generated and becomes homogeneous. After the mix was prepared the foam mixed in it thoroughly started expanding and started coming up in the form of bubbles as we put it on to the vibrator the more expansion takes place and after when it is finally expanded and being placed in the cube. We keep it for the settlement of the cube and after a day later when we uncased it we keep it for curing and we weight the cube and the results were that it was 36% lighter than the normal cubes. As the cube was prepared and it was set for the curing process we cured it for 7 days as expected that 65% of the result should be obtained after seven days. And after the interval of seven days we took out the cube and we keep the cube outside for a while to make it bit dry and there after we performed the test and the result was which we obtained was 19.04 N/mm²

3. RESULT ANALYSIS

Test with polymeric foam on mix A:-

Samples	Density (kg/m ³)	Compressive strength (N/mm ²)
Sample 1	796	18.74
Sample 2	799	18.99
Sample 3	800	19.04
Average above all three	798.34	18.92

(Test with Polymeric Foam on Mix A)

Test with polymeric foam on mix B:-

Samples	Density (kg/m ³)	Compressive strength (N/mm ²)
Sample 1	1036	19.58
Sample 2	1033	19.89
Sample 3	1034	20.2
Average above all three	1034.33	19.89

(Test with Polymeric Foam on Mix B)

3. CONCLUSIONS

This experiment which we are performing is to determine the workable and durable properties of CLC (Cellular Light Weight Concrete) and AAC (Autoclave Aerated Concrete) with using polymeric foam and to check the variation of the compressive strength in both the terms of the areas. As we first did the experiment by replacing the aluminum powder to polymeric foam in AAC there was drastic split up of the prepared sample because misfit stabilize of density and the result for that failed but for the CLC we performed with the mix proportion by replacing the protein based foam with polymeric foam the sample prepared by it give out an enormous result it turned out the material of sample is bit heavier that of normal CLC block slight heavier but gives out an enormous strength of the sample in comparison of it. The

preparation by two mix has been completed and now for third proportion the results are to be waited and for conducting test of the durability be continued the strength obtained is enormous but the water absorption is not much either. The results which were obtained is quite high in compare to the blocks made by using protein based foam in terms of strength

REFERENCES

1. IS 456-2000, IS 3812.1.2003, IS 383-1970
2. Leas Chemistry of Cement Concrete by F M Lea
3. Properties of Concrete by A M Neville
4. Concrete Technology by D F Orchard
5. Ergul Yasar, Cengiz Duran Atis, Alaettin Kilic, Hasan Gulsen. Strength Properties Of Lightweight Concrete Made With Basaltic Pumice And Fly Ash. Materials Letters 57 (2003) 2267–2270. Yasar Et.Al(1)
6. . H. Al-Khaiat and M.N. Haque. Effect of Initial Curing On Early strength and Physical Properties of A Lightweight Concrete. Cement and Concrete Research, Vol. 28, No. 6, Pp. 859–866, 1998. Al-Khaiat(1) M.N. Haque(2)
7. Khandaker M. Anwar Hossain. Properties of volcanic pumice based cement and lightweight concrete. Cement and Concrete Research 34 (2004) 283–291. T. Parhizkar Et.Al(1)
8. N.Arunachalam, V.Mahesh, Development of Economical and Durable Solid Building Blocks- AICTE sponsored research project, April-2012. Arunachalam Et.Al(1)
9. Maheshkumar H. Thakrele, Experimental Study on Foam Concrete, International Journal of Civil, Structural, Environmental and Infrastructure Engineering Research and Development (IJCSEIERD), ISSN (P): 2249-6866; ISSN(E): 2249-7978, Vol. 4, Issue 1, Feb 2014, 145-158.
10. . P.S.Bhandari, Dr. K.M.Tajne, Cellular Lightweight Concrete Using Fly Ash, International Journal of Innovative Research in Science, Engineering and Technology, Vol. 3, Issue 11, November 2014