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Devolpment of Composite Materials on Cellular Light Weight Concrete Block

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Abstract: *Global warming and environmental pollution is now a global concern. Cellular Light Weight technology blocks can be used as an alternative to the red bricks, to reduce Environmental pollution and global warming CLC blocks are environmental friendly. It is produced by initially making slurry of cement + fly ash + water, which is further mixed with the addition of pre-formed stable foam in an ordinary concrete mixer under ambinate conditions.In this paper focused onDevelopment of composite materials on Cellular Light weight Concrete block has been done with partial replacement (5%, 10% and 15%)of Burned Low Density Poly Ethylene bags (BLDPE) with Fly ash has been done. Result shows that strength & durability Properties of CLC blocks are good.*

Keywords: *cement, fly ash, poly ethylene bags,foaming agent*

I. Introduction

Foamed concrete is not a practically new material, its first patent and recorded use dates back to the early 1920s. According to such and Seifert (1999), limited scale production began in 1923 and. According to Arasteh (1988), in 1924 Linde described its production, properties and applications. The application of foamed concrete for construction works was not recognized until the late 1970s, when it began to be used in the Netherlands for filling voids and for ground engineering applications.

The most basic definition of foamed concrete is that it is mortar with air bubbles in it. The air content of foamed concrete may be up to 75% air by volume. In general terms foamed concrete can be described as a light weight, free flowing material which is ideal for a wide range of applications. It can have a range of dry densities from 400kg/m^3 to 1600 kg/m^3.Foamed concrete can be placed easily by pumping if necessary and does not require compaction, vibrating or leveling. It has excellent resistance to water and frost and provides a high level of both sound and thermal insulation. It is very versatile since it can be tailored for optimum performance and minimum cost by choice of a suitable mix design the fact that foamed concrete can be made using different mix designs means that it is not a single product. With the exception of pre-cast units, foamed concrete cannot be bought off the shelf foamed concrete is nearly always made on site and it is made using a mix design specifically selected for each application or job.

II. Materials

A. Cement:

Cement is the important binding material for the production of concrete. For using cement in important and major works it is incumbent on the part of the user to test the cement to confirm the requirements of the Indian Standard specifications with respect to its physical and chemical properties. In our project we had used Ordinary Portland Cement 43grade confirming to IS 8112:1989. The specific gravity and the fitness modulus of cement are 3.15 and 1.1% respectively.

B. Burned LowDensity Poly Ethylene (BLDPE):

LDPE is defined by a density range of 0.910–0.940 g/cm^3. It is not reactive at room temperatures, except by strong oxidizing agents, and some solvents cause swelling.

C. Fly ash:

Fly ash is a fine gray powder consisting mostly of spherical, glassy particles that are produced as a byproduct in coal-fired power stations. Fly ash has pozzolanic properties, meaning that it reacts with lime to form cementitious compounds. It is commonly known as a supplementary cementitious material.

D. Foaming Agent:

The containments holding foaming agent must be kept airtight and under temperatures not exceeding 25°C. Once diluted in 20 parts of potable water, the emulsion must be used soonest. The weight of the foam should be minimum 50 g/l. Under no circumstances must the foaming agent be brought in contact with any oil, fat, chemical or other material that might harm its function (Oil has an influence on the surface-tension of water).

III. Experimental Programme

COMPRESSIVE STRENGTH TEST

Specimen shall be placed with flat faces horizontal and mortar filled face upward between three plywood sheets each of thickness 3mm and carefully centered between plates of the testing machine. Plaster of Paris can also be used in place of plywood sheets to ensure a uniform surface. Load shall be applied carefully axially at uniform rate of 14 N/mm2 per minute till the failure of the specimen occurs. (As per IS 2185 (Part 4) .The compressive strength of each specimen shall be calculated in N/mm2 as under:

$$\text{Compressive strength} = \frac{\text{Maximum load at failure (in N)}}{\text{Area of specimen (in Sq.mm)}}$$

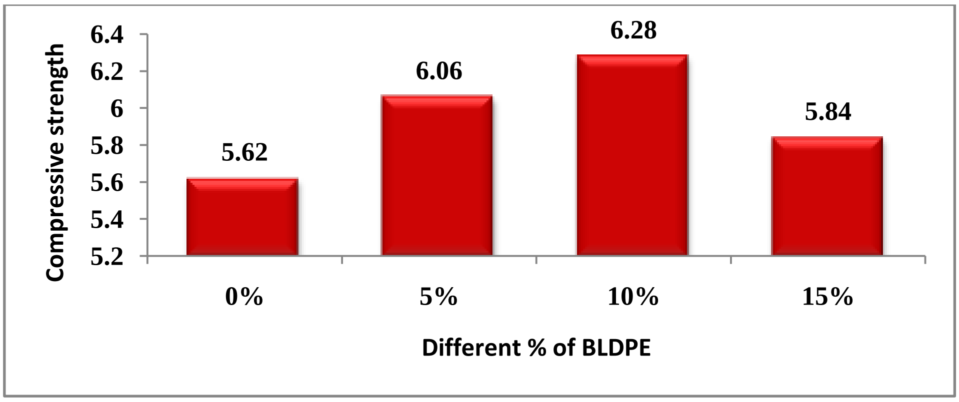

Fig: 1 compressive strength test

CHLORIDE DIFFUSION TEST

For the durability test the oven dried specimens having known volume will be weighted on the digital weighing machine and calculated to the mass of specimen per unit volume. To investigate the effect of sodium chloride solution the specimens will be tested for percentage change in weight after 28 days immersion in sodium chloride solution. Percentage change in weight determination will be carried out in the same manner as of in the water absorption test. The schedule for casting and testing are as shown in fig. The mix proportions for preparing a pervious concrete mixture, the planning for casting the numbers of blocks and scheduling for casting and testing of pervious concrete blocks are as follows.

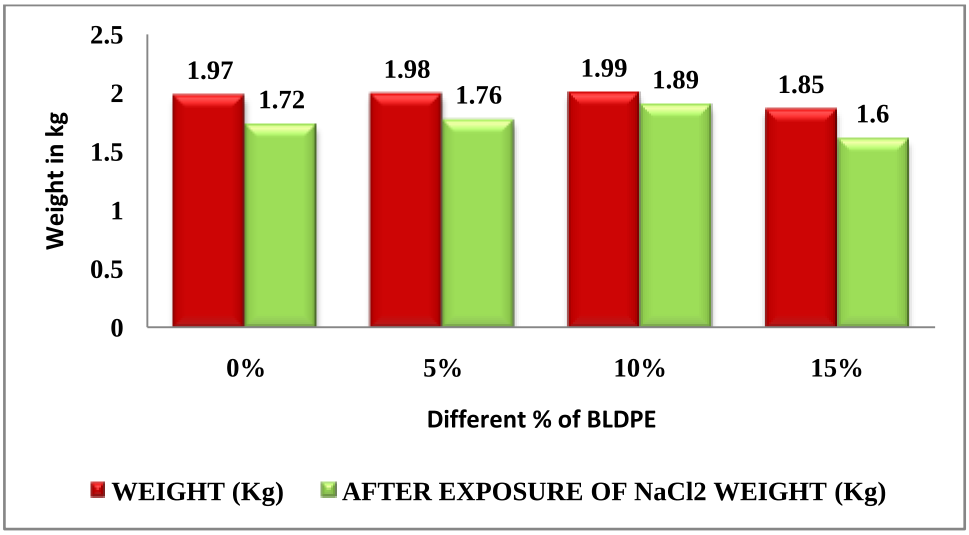

Fig: 2 Block weight in Exposure of NaCl2

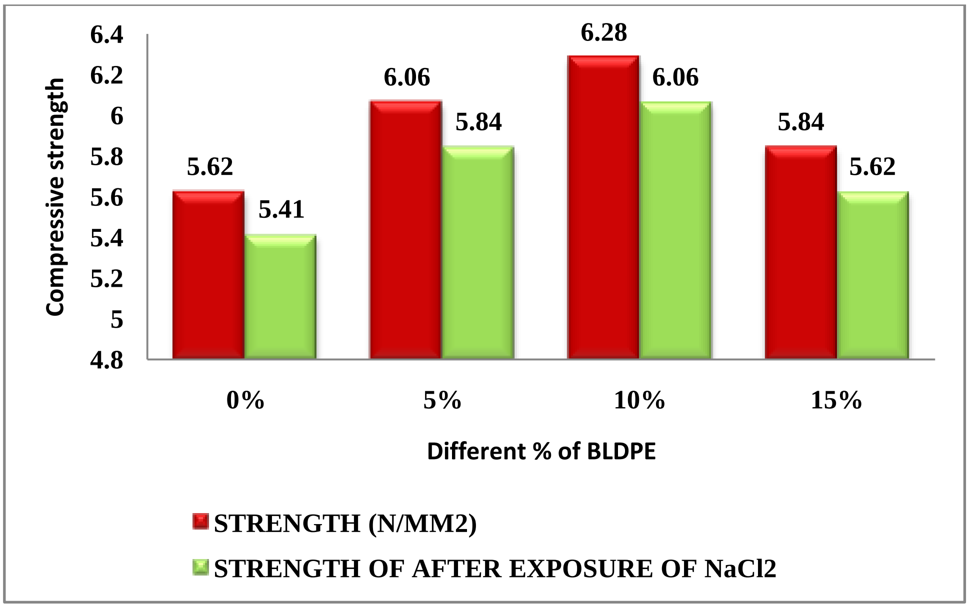

Fig: 3 Compressive strength in chloride diffusion in 60 days

SULPHATE ATTACK TEST

Sulphate resistant is an important durability parameter of concrete. Magnesium sulphate attack is more severe on concrete. In the absence of hydroxyl ions in solution, C-S-H is no longer stable and it is attacked by sulphates. The test procedure involves, casting cubes, curing it for 28days and the cubes are immersed in $mgso_4$ solution for 60days, then again the cubes are taken away and tested in compression testing machine. The reduction in strength indicates the attack of sulphates and durability character of concrete.

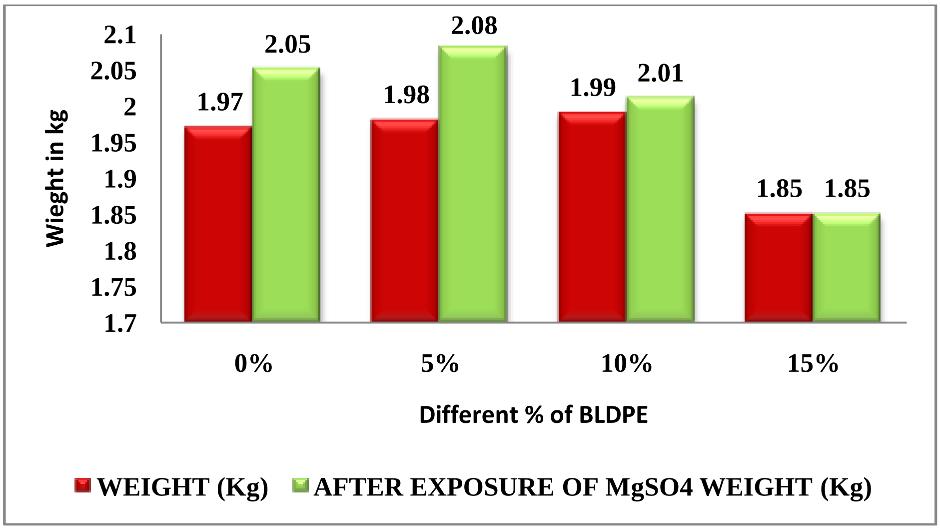

Fig: 4 Block weight in Exposure of MgSO4

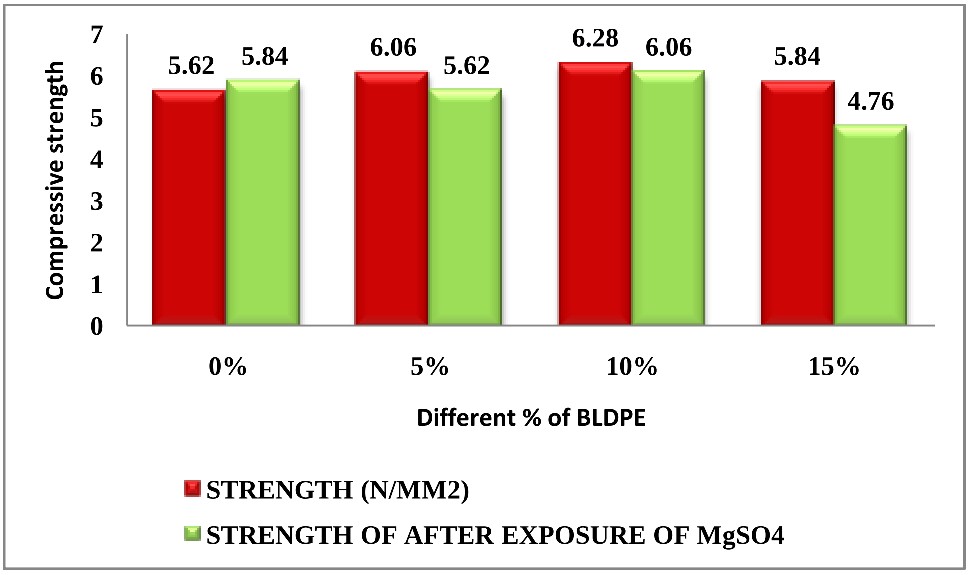

Fig: 4 Compressive strength in Sulphate attack in 60 days

IV. Conclusion

The following conclusions can be drawn from the present investigation

- The density of brick decreased with the increase in the poly ethylene bags content .when 10% of the fine aggregate was replaced with the poly ethylene bags. The density was reduced from 3300 to 1980Kg/m3. This corresponds to a reduction of 40% in density.
- Compressive strength increased by 25% with replacement of fine aggregate by poly ethylene bags.
- Moisture content and Efflorescence Nil
- After exposure to NaCl2 solution the average percentage strength and weight reduction of normal brick is found to be more than that of the poly ethylene bricks. The maximum percentagereduction in strength and weight obtain for brick is 2.4% for 60days & 0.25Kg for 60days respective
- After exposure to MgSo4 solution the average percentage strength and weight reduction of normal brick is found to be more than that of the poly ethylene bricks. The maximum percentagereduction in strength and weight obtain for brick is 1.0% for 60days & 0.35Kg for 60days respective

Reference

[1]. Cellular Light-Weight Concrete Blocks as a Replacement of Burnt Clay Bricks - K.KrishnaBhavaniSiram (ISSN: 2249 – 8958, Volume-2, Issue-2, December 2012)

[2]. Waste Plastic in the Production of Light Weight Concrete - M. Muzafar Ahmed , Dr. S. SiddiRaju (ISSN No: 2348-4845 Volume No: 2 (2015), Issue No: 4 (April)

[3]. Experimental Investigation on Cellular Lightweight Concrete Blocks for Varying Grades of Density Nagesh. Mustapure1, H.Eramma2 1M.Tech (Cads), University BDT College of Engineering, Davangere(India) 2M-Tech (I.S), Associate Professor, Volume No.02, Issue No. 08, August 2014 ISSN (online): 2348 – 7550

[4]. “Concrete + Green = Foam Concrete” K.Krishna Bhavani Siram1, K.Arjun Raj2 1(Asst.Professor, Civil Engg. Dept., Mahatma Gandhi Institute of Technology, Hyderabad, Andhra Pradesh, India) 2(4/4 B.Tech, Civil Engg. Dept., ISSN 0976 – 6308 (Print) ISSN 0976 – 6316(Online) Volume 4, Issue 4, July-August (2013), pp. 179-184

[5]. “Performance of Light-Weight Concrete with Plastic Aggregate” Anju Ramesan*, Shemy S. Babu**, Aswathy Lal*** (P.G. Scholar, Civil Engineering,) ** (Assistant Director, Kerala Highway Research Institute, Thiruvananthapuram, Kerala, India) *** (Assistant Professor, Civil Engineering,) ISSN: 2248-9622, Vol. 5, Issue 8, (Part - 5) August 2015, pp.105-110

[6]. “An Experimental Study On Durability And Water Absorption Properties Of Pervious Concrete” Darshan S. Shah 1, Jayeshkumar Pitroda2 1Student of final year M.E. (C.E M), B.V.M Engineering College, Vallabh Vidyanagar 2Assistant Professor and Research Scholar, Civil Engineering Department, eISSN: 2319-1163 | pISSN: 2321-7308, Volume: 03 Issue: 03 | Mar-2014