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CONSTRUCTION AND PROPERTIES OF FOAMED CONCRETE WITH FLYASH

Abhishek Verma[1], Amit Kumar[1], Ashish Choudhary[1], Hardik Anand

[1]*UG Students (Civil Engineering), Department of Civil Engineering, Dr. Akhilesh Das Gupta Institute of Technology and Management, Affiliated to IP University, Shastri Park, New Delhi-110053*

Abstract - *Lightweight Foamed Concrete is one of the recent innovations of concrete technology in civil engineering which can be used as environmentally friendly material. Foamed concrete contains fine sand, cement, water and foam without using coarse aggregate. Froth (foam) has great warm and acoustic properties and is additionally ice safe. Foamed Cement is the most well-known of all low thickness cements in creating nations. The utilization of light weight concrete squares gives an appropriate answer for development industry alongside natural conservation. It is created by at first making slurry of cement + Fly ash+ Water, which is further blende with the expansion of pre-frothed stable froth in a customary solid blender under surrounding conditions.*

Key Words: light weight concrete, Fly ash, Foam, foamed concrete, aerated concrete

1. INTRODUCTION

Light weight concrete is one of the technological innovations of concrete that has been widely examined. This is because when compared to conventional concrete, lightweight concrete has a density that is smaller so that it can provide a reduction in load on buildings is made. One of a kind of light weight concrete is foamed concrete with density between 300 – 1850 kg/m^3. It can be divided into two main types according to the method of production. They are foamed concrete (non-autoclaved aerated concrete (NAAC)) and autoclaved aerated concrete (AAC).ix of cement paste or mortar (cement + water or cement + sand+ water)

1.1 METHODOLOGY

Foamed concrete is produced in the laboratory using a standard inclined rotating drum mixer by the addition of pre-formed foam to a mortar (i.e. mix with sand fine aggregate) or paste (i.e. mix with no sand, just FA coarse fine aggregate) 'base' mix and mixing until uniform consistency was achieved. The plastic density was measured by weighing a foamed concrete sample in a pre-weighed container of a known volume. A tolerance on plastic density was set at ± 50 kg/m3 of the target value, which is typical of industry practice for foamed concrete production. The specimens were then cast in steel moulds lined with domestic plastic 'cling' film, as foamed concrete was found to adhere strongly to the mould surface, irrespective of the type and quantity of release agent used.

After de-moulding at 24 hrs, the specimens were sealed-cured (i.e. wrapped in 'cling' film) and stored at 20°C until testing.

2. LITERATURE REVIEW

In the past few years many researchers and development engineers have experimented with foamed concrete. Their studies are concluded below: -

- **Mahesh and Thakreke (2014):** studied the formation of foam concrete by two concrete
- mixtures produced with or without sand. They found that their compressive strength increases.
- **Chandey and Janagan (2018):** studied the properties of light weight foam concrete with addition to flyash, micro silica, SiO_2 powder, clay and rice husk ash. They found that it has some major setbacks such as low strength and increased shrinkage at later ages.
- **Kavitha and Mallikajunrao (2018):** formed foam concrete with water/cement ratio of foam concrete in range of 0.4 - 1.25 to attain maximum strength of 1900 kg/m^3 through design mix and found that compressive strength and density of foam concrete increases with age.
- **Lee et al. (2014):** formed structural light weight concrete and showed that the density of SLWC decreases as the dosage of foaming agent increases up to a dosage of 0.6 % as well as proofed that new structural light weight concrete using normal coarse aggregate and foaming agent can be developed successfully.
- **Hilal et al. (2015):** performed enhancement of pre-foamed foamed concrete by utilizing two types of additives, silica fumes and flyash and found that foamed concrete mixes with high flowability and strength has more 28-day compressive strength than normal foamed concrete mixes.
- **Deborah and Kotteeswarah (2011):** studied formation of foamed concrete using various fibers like glass, polyesters, polypropylene, rice husk ash, cocnut coit ash in properties of 0.15 %, 0.3 % and 0.45 % an found use of polyester is completely a failure and it is pointless to try working further with polyester on foam concrete.

- **Balamurugah et al. (2017):** studied the formation of foamed concrete by using three different filler such as river sand, se and quarry dust with cement and found that sea sand as well as quarry dust can be used as alternate filler material for natural river sand in foam concrete.

3. RESULTS

- The table no 1 shows the material used for making the blocks of desired density.
- The Table no 2 shows the compressive strength of the blocks at different densities.
- The Table no 3 shows the water absorption by the blocks at different densities.

MATERIAL USED

DENSITY (kg/m³)	1200	1400	1600	1800
CEMENT (g)	143	157	161	195
FLYASH (g)	95	87	80	70
W/(C+FA)	0.55	0.50	0.45	0.40
SAND (g)	310	305	322	334
WATER (g)	131	122	108	111
Foam	60%by volume	50% by volume	40% by volume	30% by volume

TABLE-1: Material used

COMPRESSIVE STRENGTH

DENSITY (Kg/m³)	COMPRESSIVE STRENGTH(MPa)
1200	4
1400	8
1600	10
1800	14

TABLE-2: Compressive strength

WATER ABSORPTION

DENSITY (Kg/m³)	WATER ABSORPTION (%)
1200	11.30
1400	10.75
1600	10
1800	14

TABLE-3: Water Absorption

4. CONCLUSIONS

- The density of foamed concrete is inversely proportional to the percentage of foam that is added to the slurry/mortar.
- The compressive strength of foamed concrete increases with increase in the density and age.
- De-moulding of higher density foamed concrete panels is possible after 24 hours but it requires minimum 3 days for lower density foamed concrete panels.
- The starting of strength gain for foamed concrete is on higher side than that of Conventional concrete and strength gain beyond 28 days is faster than Conventional concrete.
- This study has shown that the use of flay ash in foam concrete, can be greatly improves its properties.
- The mixed proportion for foamed concrete used in this research report can only be used for making partition walls in buildings as 28 days compressive strength is less than 17 MPa.
- Improved structural efficiency in terms of strength to density ratio resulting load reduction on the structure and substructure.

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