

# EXPERIMENTAL AND STRENGTH ANALYSIS ON FOAM CONCRETE BLOCKS

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**Abstract** - Smoldering brick is said to be exigent advanced concrete material especially for our country. In recent years, many are opting for environmentally friendly material to construct. Froth or foam is good thermal properties, audile properties and frost resistant. Foamed concrete is a predominant low thickness concretes used. The foamed concretes are light weight blocks that are very useful in many areas of industries with considering environmental impacts. The foamed concrete is a mixture of concrete, water and fly ash. They are combined together and formed into a stable froth using a blender. In this paper, attempt made to set out mixture prepared for foam concrete block of 4", 6" and 8" and also determines the impact of development of concrete.

**Key Words:** Foamed concrete, Absorption test and Compressive Test.

## 1. INTRODUCTION

Concrete is a phenomenal material amidst widely used construction throughout the world. The concrete is usually made by mixing small stones known as total with sand, Portland bond, water and other bonding materials. They are properly planned and constructed. The solid structure differs certainly regarding economy, strength and effectiveness when using other secondary materials such as lumber and steel. The main benefit for using concrete is that they instantaneously formed in to any kind of shapes. Concrete is preferred material in construction of various buildings, foundations and architectural buildings. Instead of regular concrete; the foamed concrete is a porous, compact, completely low gravity material is present.

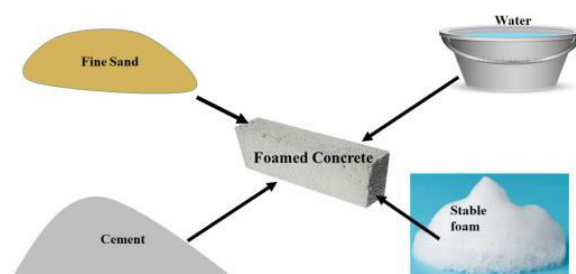


Figure 1: Materials used for foam concrete

## 2. MATERIAL AND METHOD

Three different tests were conducted for the foamed concrete brick. They are block test, absorption test and density test.

**Block test:**

To conduct a block test, a mould is set and a thin layer of lubricant is applied to the inner side of the mould. This process is done mainly to resist any chemical reaction between the mould and the specimen when the specimen is poured to the mould. The specimen is filled inside the mould for three layers. The specimen is then compressed continuously with the help of steel rod with 35 strokes. The same procedure is carried out till third layer. Once this step is completed, using trowel smoothen the outer layer through each block. Now load is built up uniformly on the block.

15 Mpa/min (2200Psi/min) – BIS 1881: Part 4: 1970.

**Absorption test:**

The above specimen is now dried at a temperature of  $105^{\circ}\text{C} \pm 5^{\circ}\text{C}$  for  $72 \pm 2$  hr and it is cooled for  $24 \pm \frac{1}{2}$  hrs in a impervious chamber. On the block, water is mired for  $30 \pm \frac{1}{2}$  minutes.

Following the retrieving the specimens, it is later dried with the help of a cloth and removed.



Figure 2: Water absorption test for specimen

**Density Test:**

The specimen is weighed with the help of weighing scale and the average of the three different sized specimens is taken.



Figure 3: Density Test for specimen

### 3. RESULTS

Design Mix For Foam Concrete Block is as follows Ratio (1:2.5:0.25:1.2)

8" block = Length - 0.5 m, Breath - 0.2 m, Depth - 0.20 m

4" block = Length - 0.5 m, Breath - 0.2 m, Depth - 0.10 m

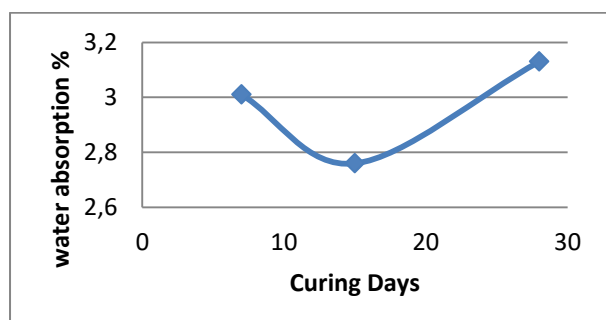
6" block = Length - 0.5 m, Breath - 0.2 m, Depth - 0.15 m

The process carried out using make foam concrete are that the mould has to be created for forming the shape of the foamed concrete. Three different sizes of moulds are developed. Lubricant or mould releasing substance is applied to the mould for easy removal and to stop reaction between the mould and specimen. In the specimen consisting of concrete and fly ash, air is injected. To immediately set the specimens, the mixture is diluted with the water at a ratio of 1:40 to 50 and it is mixed and with the help of foam generator, foam is introduced in the mixture. Once the foam is introduced, they mixture is mixed through wide mixing vessel for at least 3 to 5 minutes. This mixture is now poured to the respective moulds and they are leveled and smoothened using rubber pad. Once the specimens are dried, they are demoulded and the sheets inside the moulds are removed. Now these blocks are put into testing.



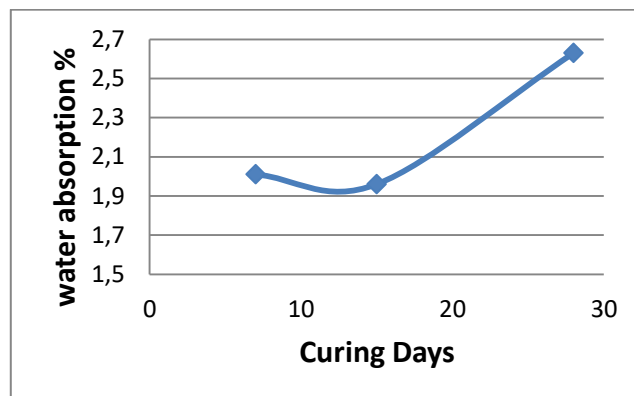
Figure 4: Preparation of foam by the pre-foaming process [2].

#### Water absorption test Results



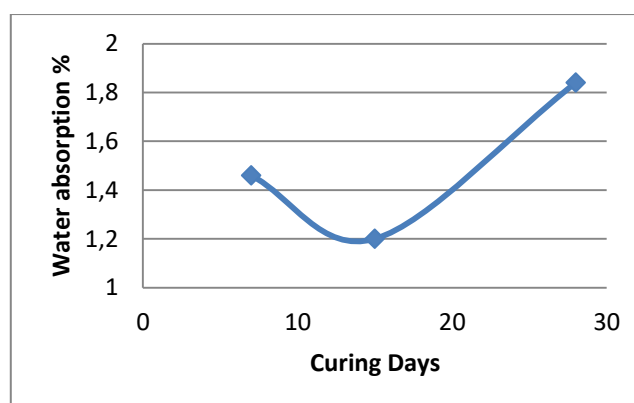
Graph 1: absorption test result for 4" block.

The above graph shown is the absorption test for 4" block. The days for curing and their percentage of absorption are 7 days with absorption rate of 3.01%, 15 days with absorption rate of 2.76% and 28 day with an absorption rate of 3.13 %.



Graph 2: absorption test result for 6" block

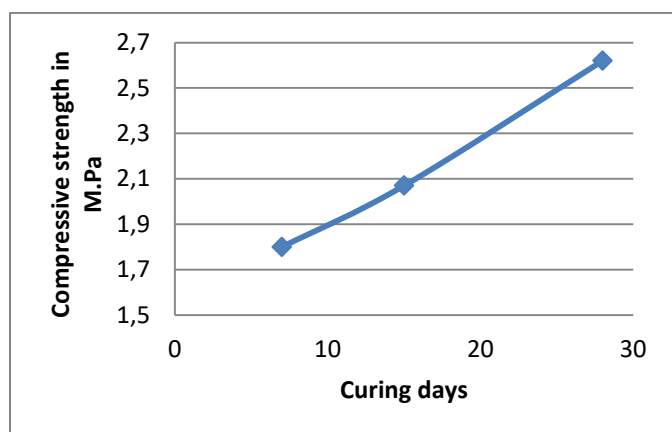
The above graph shown is the absorption test for 6" block. The days for curing and their percentage of absorption are 7 days with absorption rate of 2.01%, 15 days with absorption rate of 1.96% and 28 day with an absorption rate of 2.63 %.



Graph 3: absorption test result for 8" block

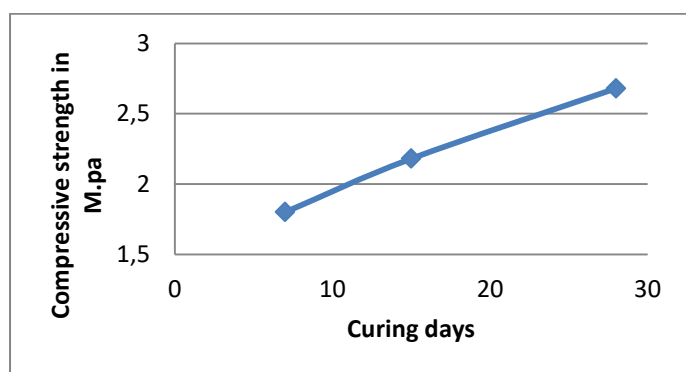
The above graph shown is the absorption test for 8" block. The days for curing and their percentage of absorption are 7 days with absorption rate of 1.46%, 15 days with absorption rate of 1.2 % and 28 day with an absorption rate of 1.84 %.

## Compressive Test Results



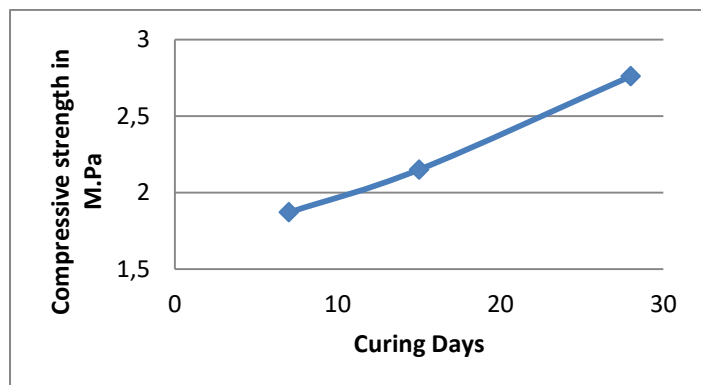
Graph 4: compressive strength result for 4" block

The above graph shown is the compressive strength for 4" block. The days for curing and their compressive strength are 7 days with compressive strength of 1.8 N/m<sup>2</sup>, 15 days with compressive strength of 2.07 N/m<sup>2</sup> and 28 day with an compressive strength of 2.62 N/m<sup>2</sup>.



Graph 5: compressive strength result for 6" block

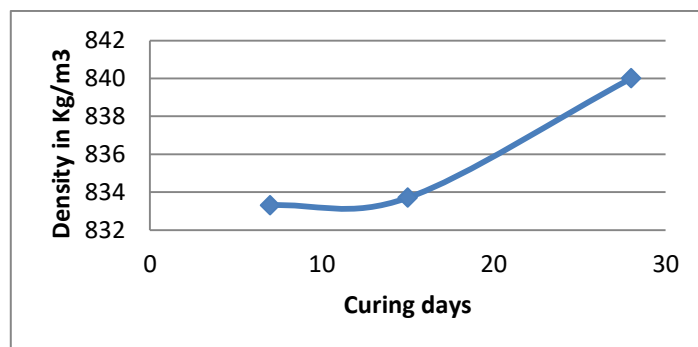
The above graph shown is the compressive strength for 6" block. The days for curing and their compressive strength are 7 days with compressive strength of 1.8 N/m<sup>2</sup>, 15 days with compressive strength of 2.18 N/m<sup>2</sup> and 28 day with an compressive strength of 2.68 N/m<sup>2</sup>.



Graph 6: compressive strength result for 8" block

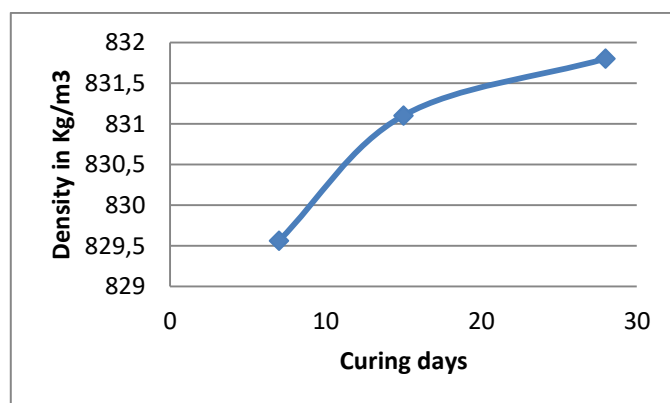
The above graph shown is the compressive strength for 8" block. The days for curing and their compressive strength are 7 days with compressive strength of 1.87 N/m<sup>2</sup>, 15 days with compressive strength of 2.15 N/m<sup>2</sup> and 28 day with an compressive strength of 2.76 N/m<sup>2</sup>.

## Density Test Results



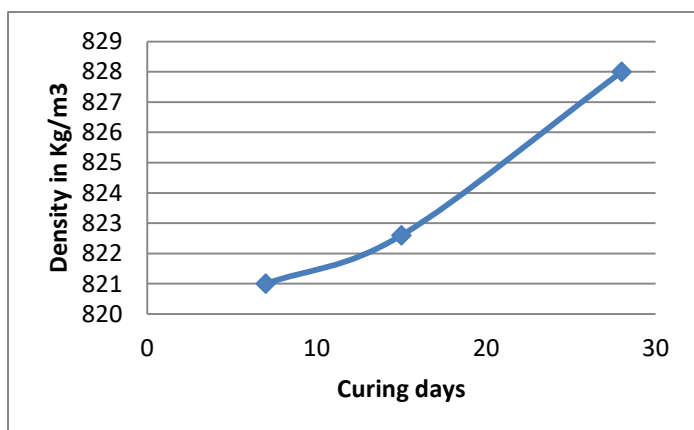
Graph 7: density test result for 4" block

The above graph shown is the density test for 4" block. The x axis represents number of days for curing and y axis represents density test in Kg/m<sup>3</sup>. The days for curing and their density are 7 days with density of 833.3Kg/m<sup>3</sup>, 15 days with density of 833.7 Kg/m<sup>3</sup> and 28 day with an density of 840 Kg/m<sup>3</sup>.



Graph 8: density test result for 6" block

The above graph shown is the density test for 6" block. The days for curing and their density are 7 days with density of 829.56Kg/m<sup>3</sup>, 15 days with density of 831.1 Kg/m<sup>3</sup> and 28 day with an density of 831.8 Kg/m<sup>3</sup>.



Graph 9: density test result for 8'' block

The above graph shown is the density test for 6'' block. The days for curing and their density are 7 days with density of 821 Kg/m<sup>3</sup>, 15 days with density of 822.6 Kg/m<sup>3</sup> and 28 day with an density of 828 Kg/m<sup>3</sup>.

For each sized foamed concrete, the density differs. From the experimental result of block density for 4', 6' and 8' are 8.33 kg, 12.44 kg and 16.42 kg respectively. The foam needed for the three densities of concrete are 800, 1250 and 1500 kg/m<sup>3</sup>. The load given to the concrete is 2.5 N/m. Thus, the compressive strength of concrete will rely on size as well load of the foamed blocks. The loads substantiate the strength of the foamed concrete block with the help of block area. At the ideal dampness present in the foamed block is generally less than 5%. The level of dampness differs from different sizes of the blocks. The curing days of the block are 7, 15 and 28 respectively. For the particular density, increase in fly ash will result in increase in strength.

#### 4. CONCLUSION

With the increase in curing days, the strength of the foam increases gradually and thus providing better thermal insulation. The preparation of the foamed concrete required very less labors and thus cost of making foamed concrete increase. From the experimental results, it is found that foamed concrete has less density and this advantage will help to reduce dead loads which help in reducing the transport and handling costs. Hence, foamed concrete is environmentally friendly than other concrete blocks.

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