

Study of Floating Concrete Blocks

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Abstract: - The traditional bricks are the main structural component that are used considerably in the construction and structure assiduity. The floating block is manufactured by mixing cover ash with cement, lime, aggregate, rice husk and water. The floating block is substantially produced as blockish block and remanufactured panels. The Floating block is a type of concrete that is manufactured to contain lots of unrestricted air spaces. The Floating blocks are energy effective, durable, less thick, and feather light. It is produced by adding a raging cumulative to concrete in variety of sizes of moulds according to demand. This process is called as Autoclaving. It has been found that this material is an eco-friendly structure material that's being produced from artificial waste and is contains of harmless constituents. In this research paper, an overview of Floating blocks with reference to its implicit and viability as a new structure material has been generated. The paper shows a relative cost analysis of Floating blocks with the red complexion bricks and its felicity and implicit use in the construction in the structure assiduity.

Key words: - Floating blocks, Performance, Potential, Sustainability

1. Introduction: -

The classical bricks are the main structural components which are used considerably in the construction and structure diligence in India [3,4]. Due to the rapid-fire urbanization and expanding interest for development accoutrements, block furnaces have rapidly evolved which have caused a modernisation of environmental and medical issues [5,6]. At a worldwide position, ecological impurity from block making conditioning adds to the increase in the temperature and environmental changes [7,8]. The different kinds of blocks can be employed as an option in discrepancy to the dark red blocks, to decrease natural impurity and Global warming.

Floating blocks might be one of the answers for block negotiation. Like head concrete, Floating block is one of the verified green structure accoutrements, which employed for business, ultramodern and private construction [9,10]. It has the introductory parcels needed for use as a structured member. Because of the feather light and high ratio of air through solid particulars, their application brings about a shocking frugality in the supplementary individualities, and along these lines spare concrete and sword support [11]. It is structural material which is eco-accommodating which originates from ultramodern waste and is developed by using non-poisonous and non-toxic constituents. With floating block, the production procedure can be around 20% hastily. Floating block weighs around 50 % of a standard red brick and has high warm protection and is acoustics accommodating[12,13]. It has also preferable imperviousness to fire over cover debris and is no inflammable. It is not hypersensitive and hereafter the air inside a structure is kept without changing its parcels after some hours. With floating block, the construction procedure can be around 20% fastly. It weighs just around 50% of a standard red block and has high thermal blockade and auricular parcels. It is unfavourably susceptible and accordingly the air inside a structure is kept without changing its parcels after some hour [14, 15, 16]. The application of Floating block can reduce the construction costs by about 2.5% for structures, for illustration, seminaries and medical conventions, and decrease the handling charges of lodging and places related to business by 30 to 40% after some time [17, 18].

2. Raw Materials: -

In comparison with utmost other concrete structure operations in the construction assiduity, Aerated Autoclaved Concrete(floating block) is created exercising no aggregate bigger than beach. Quartz beach, calcined gypsum, lime (mineral) as well as water and concrete are employed as a specialist in the group. In certain area, analogous to China region and Indian region, fly particles generate from power plants shops and having 50- 65 silica contents is used as a total. Fly ash or beach is the primary component of the Aerated Autoclaved Concrete. Fly ash has a chance ratio of 65-70, while coarse beach has a chance ratio of 55-65. The percent extent of concrete 53 GRADE OPC with fly debris is 6-15 and with ocean side is 10-20, The percent extent of Lime with Fly debris is 18-25 and with ocean side - 30, The percent extent of Gypsum with fly debris is 3-5 and with ocean side is 2-3. Depending on the specified consistency, the percentage of aluminium grease paint paste (600 kg/m³) is 8 or 0.05–0.08 by volume. With fly ash, the water percent is 0.6, and with beach, it is 0.65[19, 20].

3. Specification and Performance of Floating blocks: -

3.1. Appearance: -

The Drifting block is light-weighted and contains incalculable little voids that can be seen when investigated barely. Hydrogen is the gas that is used to join the solid during the manufacturing process because of the chemical reaction between the aluminium paste and the alkaline factors in the cement concrete. The material's protective properties are enhanced by these air pockets. In contrast to stonework, the material is inaccessible to water immediately; however, it can odor due to moisture, and a suitable cover is required to prevent water infiltration [21, 22].

3.2. Size and Density:-

The floating block blocks have a height of 250 millimetres and a length of 625 millimetres. They have a resistance of less than 1.5 millimetres and a variety of densities—100, 125, 150, 200, 225, 250, 300 millimetres. The block has a consistence of between 600 and 650 kg/cum, but the blocks have a consistence of between 1750 and 2000 kg/cum. Wet blocks have a viscosity of around 800 kg/cum, whereas red complexion bricks have a viscosity of 2400 kg/cum).

3.3. Structural Capability: -

The compressive properties of floating block blocks are outstanding. As indicated by IS 2185, the compressive quality reaches from 35 to 50 kg/cm². Drifting block work can be utilized to securely raise load-bearing designs up to three stories high, notwithstanding the way that it has only one-fifth the consistency of standard strong. Because it is three to four times lighter than regular bricks, the floating block is easier to transport and costs less. Procedure makes it possible to build tall structures because it reduces a structure's overall dead freight. The walls, floors, roof, and lintels of a building can all be built with floating block [23,24].

3.4. Durability and Moisture Resistance:-

The Floating Block is susceptible to damage from impacts due to its intentionally feather-light nature. It is unaffected by harsh climates and does not degrade under typical atmospheric conditions due to the face's defence against humidity penetration. Depending on the finish used, the material requires a different conservation position [25, 26].

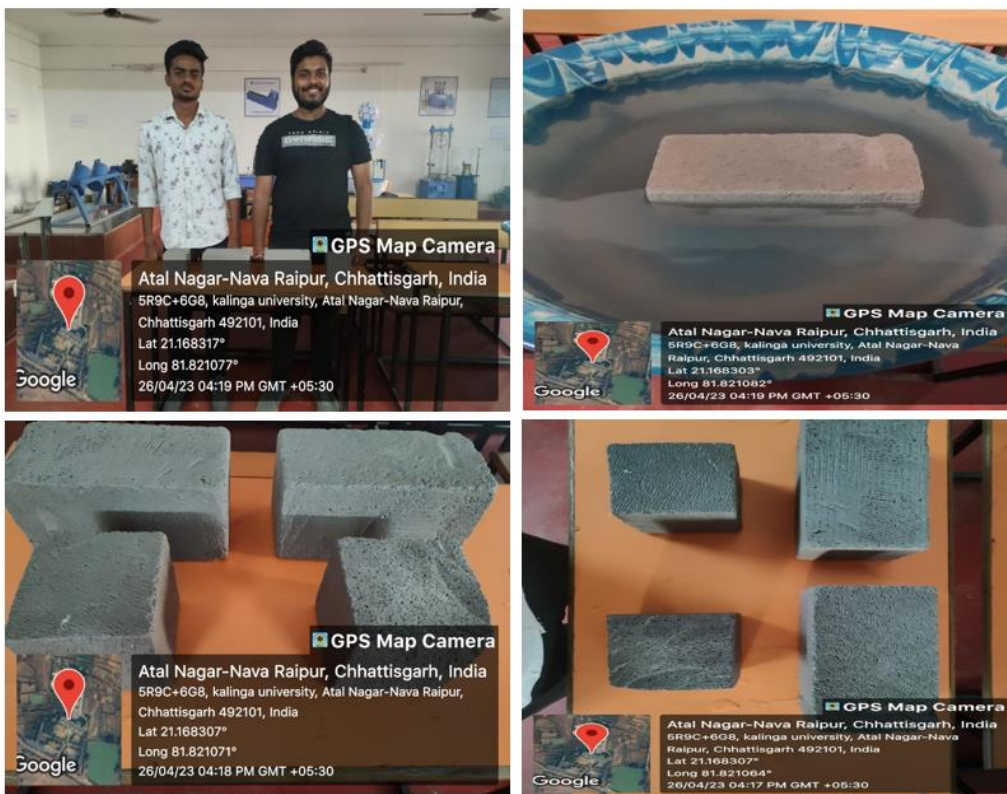
The applicable design, which includes damp evidence course layers and applicable coating systems, prevents humidity from passing through the floating block's pervious nature. When exposed to humidity, floating blocks does not significantly deteriorate structurally, but its thermal performance may suffer. Floating block work and panels are coated with a variety of personal hot stretches, including acrylic polymer-based texture coatings that provide water resistance and durability [27,28]. They should be dealt with additionally with acrylic polymer-grounded coatings prior to tiling in wet regions comparative as showers [35].

3.5. Water Absorption:-

When we place a Floating block in water, it do not get immersed due to its light weight and it starts floating on water surface although a little bit of part is immersed in water. Even if water is exerted under high pressure inside the Floating block, it does not holds the water for too long.

3.6. Constructability, Availability and Cost:-

Floating blocks are relatively easy to work with, weigh one-fifth as much as concrete, come in a variety of sizes, and can be easily molded, cut, and carved—all while requiring precise and accurate placement. Good supervision and skilled tradespeople are required [33, 34]. Blocks of different sizes decrease the quantity of joints in stone work walls. With lighter blocks, construction can move more quickly and easily. It cuts the length of development by 20. They are simple to set up. Floating block hardens and sets quickly. Blocks can be easily chopped, drilled, fastened, mulled, and grooved to meet specific requirements. Thick bed mortar is more forgiving, despite the fact that it is unusual and is not always chosen. Electrical and hydro-aseptic installations are also made simpler because they can be built without difficulty after the primary structure is built [29, 30].



4. Tests of Floating block:-

4.1. Compressive Strength:-

According to IS 6441(5), 4 point for compressive strength test of Floating block are as follows:-

- Conduct the test on instance size 15 cm × 15 cm × 15 cm.
- Humidity content at the time of testing should be 10, 2.
- If block consistence is lower than 15cm, make two slice of 7.5 cm and make up the 15 cm side.
- Direction of lading should be vertical to the direction of rising along the length.

Result:-

Compressive strength is calculated by CTM machine whose CTM plate Area = $200 \times 230 \text{ mm}^2 = 46000 \text{ mm}^2$ and load applied is 172 KN, so compressive strength of Floating block = $\text{load}/\text{Area} = 172 \times 1000 \text{ N}/46000 \text{ mm}^2 = 3.739 \text{ N/mm}^2$, so 3.739N/mm² is compressive strength of Floating block.

4.2. Dry Density Test:-

Length, width and height shall be measured at 100 mm x 200 mm x 50 mm or 150 mm x 150 mm x 150 mm before drying at 105 degrees Celsius with an delicacy of 0.1 mm using a suitable calliper. The instance shall be placed, after measuring, in a drying roaster at 105/- 5 degree Celsius until all humidity has been removed and a constant weight is attained[31,32].

Result:-

Dry Density: $g = W / V \text{ Kg/m}^3$.

Where,

W= dry weight

V = Volume in cube

Hence, $g = 0.7/0.003375$

Therefore, $g = 207.40 \text{ Kg/m}^3$

4.3. Water Absorption Test:-

Water absorption test is performed to calculate the absorption rate using formula:

$$W = [(M2 - M1) / M1] \times 100$$

M1 - Dry weight,

M2 - Weight after being soaked for 24hrs in water

Hence, $W = \{(750-700)/700\} \times 100$

Therefore $W = 7.14\%$

5. Advantages of Floating blocks:-

1. The floating block facilitates rapid construction, which results in shorter construction times and lower construction costs. With simple tools, floating block can be easily cut or drilled.
2. The average compressive strength of floating blocks is between 3 and 4.5 N/mm³, which is higher than that of most feathery weight blocks. Additionally, it is one-fourth as effective as other products with the same viscosity.
3. Between a certain time periods, floating blocks have better thermal resistance. It has a time limit of two to six hours.
4. The floating blocks are resistant to pests and insects.
5. Blocks that move on water can withstand earthquakes. The natural substance from which it is made is extremely light. As a result, the structures' stability is improved.
6. Because floating blocks save a lot of money, they help construction sites save money and lessen their capital requirements.
7. The floating blocks are in nature harmless. They cannot be hurt from the contamination made by smokestacks and businesses.
8. They are portable and simple to transport during construction work.
9. The floating blocks' rates of separation are due to thermal sequestration. The warm room temperature is maintained by the floating block's heat conductivity. It's pleasant and cool in the summer. As a result, it alleviates the burden of airborne cargo, resulting in lower electricity costs.
10. The nature of floating blocks makes them soundproof. It rivets sounds to certain rattle situations due to their persistent nature.

6. Disadvantages of Floating blocks:-

Disadvantages of Floating block are as follows:-

1. The item cost per unit for drifting block is progressed than other traditional cement.
2. Due to the limited number of constructors, the cost rises significantly in locations far from the constructor and where extensive travel is required.
3. It doesn't work as well as traditional concrete.

7. Conclusion:-

The floating block is a novel and one of the most suitable and long-lasting building materials in the current construction process. Since recycled artificial waste, such as fly ash, is used to make floating blocks, this material can be considered a sustainable building material. The fundamental pieces of floating blocks move quickly and effectively during construction. Consequently the Drifting block has come a compelling design development material which is being utilized in a great many home-grown, attractive and fake designs and it has been utilized in the Bay nations for the last multiple times and in Europe for since multiple times, and in Australia and South America for the once multiple times. According to a report (Andrews, 2019), floating blocks are used for more than 60% of construction in Germany and 40% of construction in England. Since the Drifting blocks utilize promptly accessible crude accessories in the assembling system, have great progression, are energy powerful, are savvy, and furthermore can be recovered, consequently drifting block can be supposed to be a green and economical design material.

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