

Floating Concrete

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Abstract: Floating concrete is a mixture of less density than water, which is used to build floating structure, reducing land consumption for building. This report explains the preparation of mix of floating concrete, material and various results of compressive strength in seven days and flow acceptance of floating concrete. It also presents that this concrete is use for dugout construction with light weight, strong reinforcement the self-weight of dugout can bear more weight of external loads.

Keywords: Compressive strength, Construction, Curing time, Workability.

1. Introduction

A. What is concrete?

It is use in construction which has compressive strength, it is more durable, it is eco-friendly, it is weather resistant and it is also economical etc.

Concrete are so many types according to their purpose and uses. In the concrete it is a mixture of cement, fine aggregate, course aggregate and water. It is design according to their requirement and specification like technical and aesthetic purpose.

Concrete is workable, non-toxic form-able and it can be easily formed as per the requirement design. During hydration Process, when water reacts with Portland cement it forms crystallized and permanent holding aggregates together. The concrete got its strengths day by day during curing and supervision of experienced and trained worker.

Compressive strength of concrete can be easily increase the strength of naturally occurring rocks compressive strength of concrete can be easily achieve 70MPa in the precast concrete and cast in situ achieve 45MPa or more than that.

B. Floating Concrete Structure

In the floating concrete structure, it is solid made up off reinforced concrete and inner chamber filled with impermeable material and concrete is float by adding aluminium powder by as air entering agent and polypropylene fibers are also includes in the concrete foe good binding, to increase strength we use nano silica, in this CaCl₂ use as a accelerator and Dr. Fixit for water proofing agent.

Aluminum mesh is used instead of steel mesh to protect form corrosion and for the light weight of the structure.

2. Material Used

Cement used similar to ferro cement and aluminium mesh is use instead of steel mesh for light weight and protect form corrosion in the steel mesh and aluminium wire mesh is use for light weight for chicken mesh for making different type of alumini cement.

PPC (Portland Pozzolana cement) with polypropylene for increasing binding particles is used.

3. Physical and Chemical properties

Table 1
Physical properties of PPC and OPC

Properties	Results	
	Ordinary Portland cement	Blended Pozzolanic cement
Compressive Strength(MPa)		
3Days	11	10.6
7Days	13.1	14.2
28Days	16.8	21.1
Setting time (min)		
Initial	120	163
Final	165	202
Specific Gravity	3.1	2.93
Fineness%	85.2	86.1
Soundness%	.4	1.1

Table 2
Chemical Properties of PPC and OPC

Properties	Results	
	Ordinary Portland Cement%	Blended Pozzolanic Cement%
Loss on ignition	2.01	1.02
Total Alkalis	.57	.70
Chloride content	.08	.02
SiO ₂ content	.57	23.1
Al ₂ O ₃ Content	13.4	12.8
CaO Content	53.3	47.2
MgO Content	2.20	1.72
SO ₃ Content	2.7	2.19
Fe ₂ O ₃	2.25	2.01

Here we are using PPC by replacing OPC because of Pozzolanic properties and making economical by using cheaper Pozzolanic material such as flu ash.

Aggregate:

1. Due to local availability of natural sand with 300 microns' maximum size was used for fine aggregate.

Aluminium fine powder is used as a forming admixture. When we added this admixture with mortar mixture reacts chemically with hydroxides presents in the cement and forms minute bubbles of hydrogen gas of size 0.1 to 1 throughout water cement.

To reduce the setting time of the mix we use the accelerator admixture calcium chloride (CaCl_2).

Mineral Additives:

1. We made a light weight concrete with less density than water so it produce a little less strength as compare to the conventional concrete Therefore to overcome the nanotechnology is use as support.
2. Nano- SiO_2 of size less than 100nm is use to improve the strength and workability and increase the resistance to water penetration and to control the leaching of the calcium which is associated with various types of the concrete.

Water proofing agent:

The major requirement of floating concrete is that it should not be leakage through it.

So, Fixit power it used for making water resistant.



Fig. 1. Images of material used

Properties:

Light Weight: Concrete is light weight it is less dense than water. Density of concrete range from 650 Kg/m^3 to 1800 Kg/m^3 as compare 1800 Kg/m^3 to 2400 Kg/m^3 for conventional brick It as leading to supporting structure and Foundation. Compressive strength is 2 to 7 N/mm^2

Good acoustic performance: It can be used as sound insulation, highly suitable for partition wall, floor screen and auditoriums.

Earthquake Resistant: It is lighter than concrete and bricks due to light weight of material it is use as an earthquake resistant.

Insulation: Excellent thermal insulation property as compare to the conventional bricks so reduce the heating and cooling expanses.

Workability: Due to light weight concrete it can easily place with less skilled labor these bricks can be shaped like wood using standard hand tool. It is simpler than bricks and concrete.

Lifespan: Weather proof and fire proof.

Water absorption: Closed cellular structure and lower water adsorption.

Skim coating: There is no need to paint and water repellent paint.

Modulus of elasticity: Modulus of elasticity is lower than that of concrete, 0.5-0.75 to that of normal concrete.

Compressive Strength:

Test:

A cube of $(10 \times 10 \times 10)$ cm of size by taking ratio of 1:3 and adding 0.08% of Aluminium powder by volume of cement, 2% of CaCl_2 by weight of cement 10% of Nano Silica by weight of cement and small quantity of Dr. Fixit powder.



Fig. 2.

The sample was taken by compressive testing machine as shown in the diagram.



Fig. 3.

The given value of compressive strength is $2-7 \text{ N/mm}^2$ And the result was 3.5 N/mm^2 .

Flow test:

This test gives us indication and consistency and cohesiveness.

In this test mix proportion value is same as that of compressive test value.



Fig. 4.

Now concrete is fill in the mould and tamping 25 times with taming rod and remove the mould.



Fig. 5.

Now we measure the diameter of spread concrete in 6 directions and take the average value.

$$\text{Flow percent} = \left\{ \frac{(\text{spread diameter of concrete} - 25) \times 100}{25} \right\}$$

1. The value will be anything between 0-150.
2. Now calculated value of flow is 14%.

4. Conclusion

On the basis of compressive test:

1. Test results shows that floating concrete is not effective in compression as the conventional.
2. Strength can be improved by using nano fibre and silica particles they provide strength.
3. With these results concrete is used can be use at harbor and docks for loading.
4. It can also use for unloading of material from ships.
5. Hollow cube can be made with floating concrete and then filled with Styrofoam for making compact and then it can be used as a floating concrete.

On the basis of flow test:

1. This type of concrete can be used for the marine structure such as slabs and buildings.
2. The durability of floating concrete is high as compare to the conventional concrete.
3. Floating concrete reduced the problem of segregation that's why it can we use for construction of pier in marine area.

Overall Conclusion:

In above results we found that floating concrete can be used for building structure like building slabs and barges. In the world most of the portion is filled with water so floating concrete is most conventional method for construction. this method also used for construction of boats by replacing wood and metal.

References

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