International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 08 Issue: 08 | Aug 2021 www.irjet.net p-ISSN: 2395-0072

Study of Properties of Glass Fibre Reinforced Concrete With Alccofine

Haleema P P[1], Dinu Thomas[2]

[1]PG Student Indira Gandhi Institute of Polytechnic and Engineering, Kothamangalam, Kerala
[2]Assistant Professor Indira Gandhi Institute of Polytechnic and Engineering, Kothamangalam, Kerala

---

Abstract – *In the Civil Engineering field most of the Construction works are executed with cement concrete in all over the world. The main advantage of cement concrete is it can be made in various properties and strength according to the need of the structure by mixing cement and aggregate in various proportion and grade. Now a day's technologies are developing and different researches are going on for making concrete with different properties and strength. Only four ingredients are used in the conventional normal concrete. Structural work such as multi storied buildings, bridges having greater span, tunnels, aqueducts etc are requiring high compressive strength good workability concrete. In this situation, site engineers are seeking alternate ways to make high strength good workable concrete in economical way. A thickly reinforced concrete structure and under water construction such as bridge piers etc are difficult to compact properly by using hand vibrator or with mechanical vibrator. Self Compacting Concrete is the solution in these situations .It can be consolidated by self weight of flowing concrete and does not require any external vibration. High strength concrete can be produced by use of Alccofine either by replacing cement to a certain percentage as per the requirement or by using it as an additive to enhance the properties of concrete .The Alccofine is produced through the process of controlled granulation of glass furnace slag with high glass content .Usage of these type of by product in concrete reduce the carbon dioxide emission in the atmosphere thereby reducing the environment pollution to a certain level*.

***Key Words*: Self compacting concrete, Alccofine, Glass fibre, Mineral admixture, Super plasticizer, Mix design, Durability properties, Fresh properties.**

1.INTRODUCTION

The technology of glass fiber reinforced concrete is used in self compacting concrete and it can be placed in formwork by pumping and compaction is achieved by its own weight of flowing concrete and no other vibration required for the work .By this method concrete reached at every corner of the formwork of a thickly reinforced structure and compaction is achieved by its own weight of flowing concrete .As per the EFNARC guid lines the concrete is designed with M40 mix with low water cement ratio ,high grade cement ,good graded aggregate, addition of fixed percentage of glass fiber ,super plasticizer(small quantity) and substituting Alccofine (various percentage as per strength requirement) with cement . Prepare concrete mix for five percentage ,ten percentage, fifteen percentage and twenty percentage of Alccofine replacement with cement and study the properties in both the fresh and hardened stage of concrete.

1.1 Objectives of the work

- Method of construction make easy by pumping concrete to the prepared formwork.
- Labour for placing, leveling, vibrating etc are reduced
- It reaches into every corner of the formwork with heavy reinforcement thereby achieving good bond with reinforcing steel
- The concreting and laying make easy and speedy because of avoiding manual or mechanical vibration.
- It gives good surface finishes with high strength and durability.

1.2 Scope of the work

- Addition of glassfiber and Alccofine enhance the durability properties and strength of concrete.
- Alccofine is act as an admixture so quantity of superplasticizer can be reduced.
- Addition of glassfiber reduce the formation of microcracks and thereby increase the load carrying capacity.
- The filling and passing ability of concrete and segregation resistance can be achieved by the addition of alccofine.
- Structurally important work such as multistoried buildings, long span bridges, under water construction ,tunnel work etc make easy by the use of self compacting concrete.

2. METHOLOGY

For the design of concrete, we make many trail mixes and verify the performance of various concrete mix. For workability and strength of concrete use ordinary Portland cement (53 grade). Partial replacement of alccofine with ordinary portland cement varies from 5, 10, 15 and 20 percentage in M40 mix and examine the fresh properties, chemical properties and durability properties in fresh concrete and after 28 days curing.

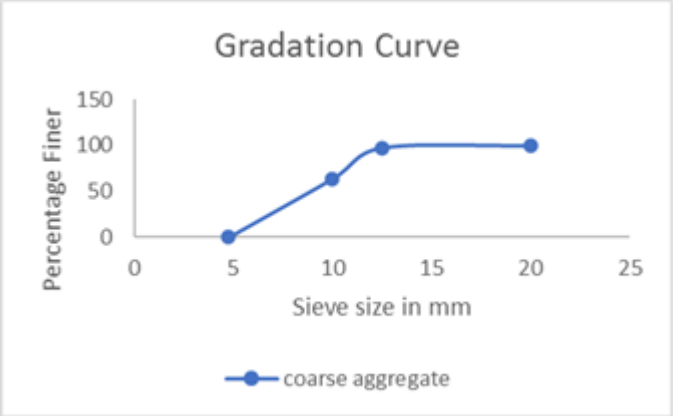
2.1TEST RESULTS

2.1.1 Sieve Analysis

Table 1 – Sieve Analysis of Coarse Aggregate

Sieve No	Weight retained (g)	Percentage weight retained	Percentage Finer
20 mm	0	0	100
12.5 mm	26	2.6	97.4
10 mm	337	33.7	63.7
4.75 mm	637	63.7	0

Figure 1 – Gradation curve of coarse aggregate (correction)

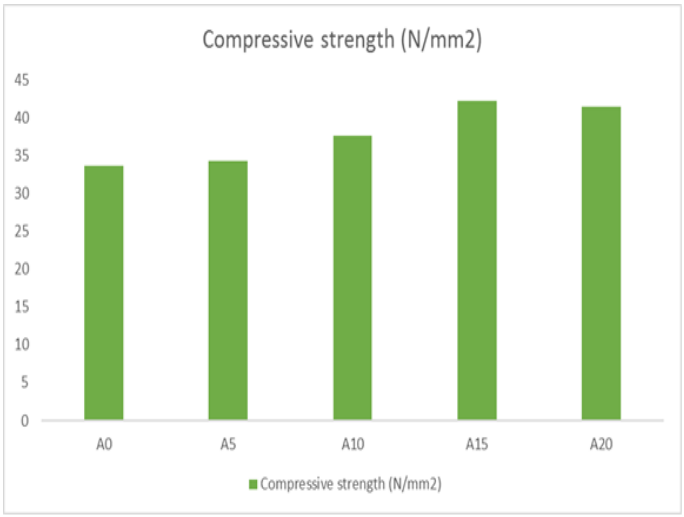


2.1.2 Compressive Strength

Table 2 **:** Compressive strength of concrete cube for different percentage of alccofine after 28 days curing

SI NO	% of alccofine	Compressive strength in N/mm2
1	0	33.60
2	5	34.27
3	10	37.63
4	15	42.16
5	20	41.49

Figure 2- Compressive strength of concrete cube for different percentage of alccofine (correction)

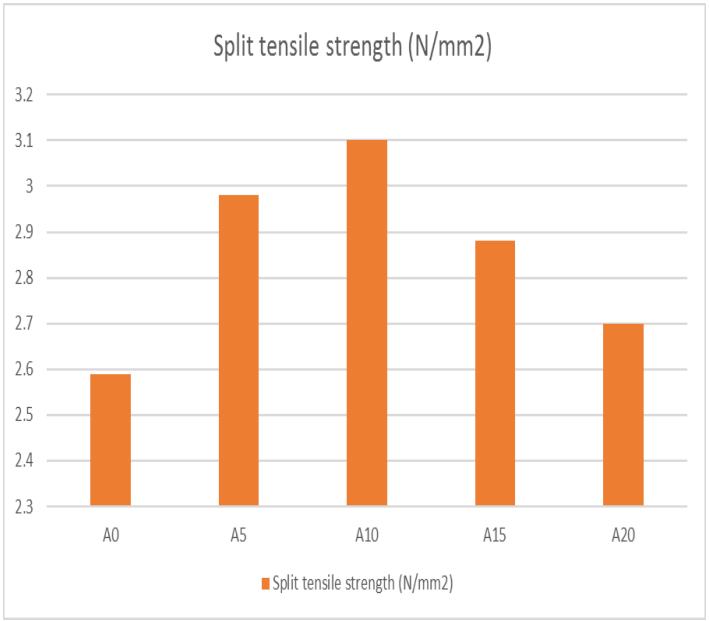


2.1.3 Split Tensile Strength

Table 3 – Split tensile strength

SI NO	% of alccofine M40	Split tensile strength (N/mm2)
1	0	2.59
2	5	2.98
3	10	3.10
4	15	2.88
5	20	2.70

Figure 3 – Split tensile strength for different percentage of alccofine (correction)

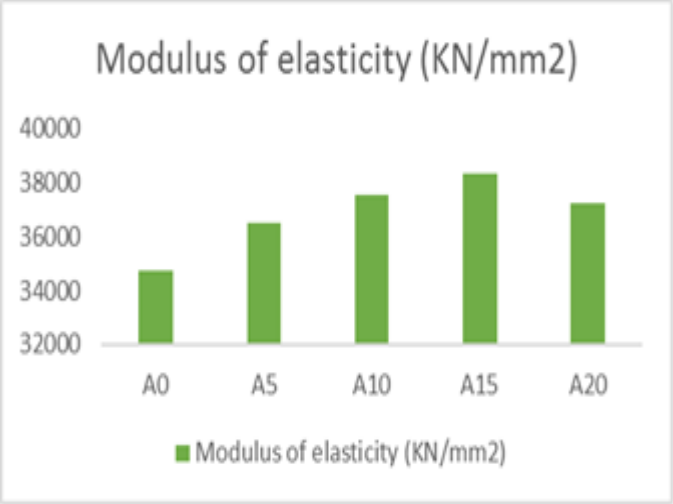


2.1.4 Modulus of Elasticity

Table -4 Modulus of elasticity for different percentage of alccofine

Sl No	% of alccofine	Modulus of elasticity(N/mm2) $E=5000\sqrt{fck}$
1	0	3.47×10^4
2	5	3.65×10^4
3	10	3.75×10^4
4	15	3.83×10^4
5	20	3.72×10^4

Figure-4 Compressive strength of concrete cube for different percentage of alccofine



CONCLUSION

The effect of Alccofine in M40 mix for glass fiber reinforced concrete was studied by conducting experiments in concrete by replacing cement with Alccofine of different percentage such as 5,10,15and 20 percentage .The test results shows that these mixes with Alccofine in certain percentages enhance the properties of concrete .Maximum compressive strength, Flexural strength and modulus of elasticity etc are achieved at 15% replacement of Alccofine and Split tensile strength at 10% replacement . Also M40 mix of 15percentage Alccofine replacement with cement resist the sulphate and chloride attack than any other mix .So it is found that M40 mix with15 percentage Alccofine replacement gives better results

REFERENCES

[1] International Journal of Engineering 2020:Analytical study of Alccofine based high strength concrete by B Sagar & MNV Sivakumar

[2] Cement replacement with Alccofine in concrete,strength and durability study by S.Shah&Tomar2018

[3] Strength and durability index properties of green concrete by the addition of Alccofine by Narasimha Reddy&Javed Ahmad Naqash-june 2019

[4] Effect of Alccofine and Metakaoline on the strength of self compacting concrete by Thushar Bansal, Shilpa Pal &Jaya Maitra 2018.

[5] Performance of concrete by partial reinforcement of alccofine with cement-Mahim Mathur 2018.