

An Overview of Glass Fibre Reinforced Concrete

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Abstract - Glass Fibre is used as an admixture in concrete for strengthening purpose. The usage of glass fiber in concrete is found from last two decades in the industry. By using glass fiber in concrete, various properties of concrete are improved like compressive strength and tensile strength. Many types of research have been carried out in concrete using glass fiber by various in the proposition and in a different grade. In this paper strength of concrete is reviewed.

Key Words: Glass Fibre, Fibre Concrete, GFRP, Compressive strength and Tensile Strength

1. INTRODUCTION

The usage of glass fiber in concrete is increased in last decade for the purpose of the strengthening of concrete. Various studies have been carried over in last decade in all aspect of the strength. Usually concrete has the good compressive strength and bad in tension. This problem is overcome by using the glass fiber in concrete. The strength condition is based on the proposition of the fiber used in the concrete and the aspect ratio of the fiber. The aspect ratio of the fiber is depended on the diameter and length of the fibre.

2. Literature Review

- Md.Abid Alam et al. (2015) experimented on glass fiber reinforced concrete to study the properties of the concrete, For experiment Cem-Fil Anti-Crack, HD 12mm, Alkali Resistant glass fiber were used for the work. The specific gravity of the fiber is 2.68 mm and the length 12 mm. For the experimentation, M20 and M30 Grade concrete is used under the proportioning procedure mentioned under IS 10262-2009. For M20 grade of concrete 0.50 W/C Ratio is used and for M30 Grade of Concrete 0.42, W/C Ratio is used. Fibre is added in an increment of 0.02% from 0% to 0.06%. (0%, 0.02%, 0.04%, 0.06%). And according to the test result concrete attain higher strength that the target strength. An M20 grade of concrete attains 41.28 Mpa of Compressive Strength and 5.76Mpa of Tensile Strength when 0.06% of fiber is added in concrete. And M30 grade of concrete attain 62.29Mpa of Compressive strength and 7.17Mpa of Tensile Strength. Almost concrete attain 1 times of the target strength of the concrete.
- S.Hemalatha et al. (2016) study experiment were done with the Cem-FIL Fibre with the length of 12mm, which has resistance with alkali resistant. The fiber was added in concrete with an increment of 0.33% and added up to 2%. In this experiment ConPlast admixture (Super Plasticizer) is used at a rate of 1% to the weight of cement. In this work, M40 grade of concrete is used. The compressive strength of the concrete increases until 1% of glass fiber is added to the concrete after that strength decline gradually. The compressive strength of the concrete increased by (48.88Mpa) 1.22 time of the target means strength of the concrete. M40 Grade of concrete attains a flexural strength of 6.86 Mpa and Tensile strength of 7.96 Mpa when 1% of glass fiber is added to the concrete.
- J.D.Chaitanya Kumar et al. (2016) study where carried out using an M20 grade of concrete and glass fiber is added as 0.5%, 1%, 2%, 3%. And the specimens are cast for a compressive and tensile test of the concrete. In this experiment, concrete attains strength when 2% of the fiber is added to the concrete and when 3% fiber is added to the concrete the strength of concrete declines. When the fiber is added 2% the strength of the concrete attains 26.98Mpa of compressive strength, 2.94Mpa of Flexural Strength and 3.57Mpa of the Tensile strength of the concrete after 28 days of curing. In this experiment, the author mentioned that the workability of the concrete is increased and thus the glass fiber reduces the crack under different loading.
- T.Sai Kiran et al (2016) have made an experiment on concrete which is added with glass fiber in it. Glass Fibre used in this project is an Alkali Resistance Glass Fibre, which has a specific gravity of 2.68 and in 14 microns diameter. For the experimentation M30 grade of concrete is used in this work with 0.45 W/C Ratio. Glass fiber is added with the concrete in 5%, 6%, 7%, and controlled concrete are also cast. In this work, the author has tested the concrete for compression and flexural test. In this work, the concrete is tested for different ages from 1 to 56 days (1 day, 3 days, 7 days, 28 days, 56 days). After curing for 28 days the concrete

attains the higher strength than the control concrete. Concrete gains ultimate strength when the fiber is added 7% of the cement weight and concrete attains 48.40Mpa of compressive strength but the flexural strength of the concrete attains when the fiber is added in 6% of the cement weight. When 6% added in concrete attains 8.47Mpa of flexural strength. And the even tensile strength of concrete attains higher strength when the fiber is added at 6%.

- Yogesh Iyer Murthy et al (2012), have studied the performance of the concrete when glass fiber is added with an M30 grade of concrete. In this process, the author has undergone compression and flexural strength of the concrete. Thus after curing the concrete for 28 days concrete attains a compressive strength of 40.44Mpa strength when the fiber is added with 1.5 percentages and attains 5.3Mpa of flexural strength of concrete. Thus the experiment shows that the concrete attains almost 30% increase in strength when the fiber is added with concrete at 1.5 percentage weight of the cement.
- C.Selin Ravikumar et al (2013), have investigates the strength and fire resistance parameter of the glass fiber concrete. In this work M25 grade of concrete is used. Glass fibre is added with increment of 0.5% (0%, 0.5%, 1%). The concrete is subject for testing at two different ages they are 7 days and 28 days, after the curing the concrete for 28 days in compression test the concrete attains 42.87 Mpa strength when fibre is added for 1% of weight of the cement, in flexural test concrete attains 12.67Mpa and in split tensile test concrete attains 12.67Mpa when compared with the controlled concrete the contemporary concrete attain 72% percentage of more strength the controlled concrete in compression test.

3. CONCLUSIONS

Thus all works are stated that adding glass fiber in concrete will gain sufficient strength in all aspect of concrete like compression, flexural and tension. In most of the work optimized strength is attained fiber is added 1% weight of the cement to the concrete. And almost 33% of strength is gained than the target compression strength. Then the workability of concrete is increased when the fiber is added to the concrete. In most of the work superplasticizer is not used and in all the work W/C ratio is used between 0.4 to 0.5. and all the base materials are tested according to with the relevant IS Codes.

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