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Study And Analysis Of The Effect Of Waste Glass Wool Fibre On The Property Of Concrete

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Abstract *– Concrete is widely used construction material in the world. Nowadays the world is witnessing the construction of more and more challenging and difficult Engineering structures. So, the concrete need to possess very high strength and enough workability. In the case of Glass Fiber reinforced Concrete, strength of the concrete is increased, but at higher cost. Hence, research has to be done to provide an alternative use of Glass Wool Fiber. In the present study, Glass Wool Fiber is added to the concrete to increase the strength as compared to the conventional concrete at lower cost. To increase the compressive strength and tensile strength in concrete we use natural or synthetic fibers. Glass wool is obtained as a by-product from manufacturing of glass in industries. This is considered as a waste and mainly burnt by incineration. Glass wool is mainly used for insulation purpose in refrigerators. Glass wool possess the properties of synthetic fibers thus by adding glass wool to conventional concrete glass wool reinforced concrete is obtained. By this method we can reuse the waste as well as increase the properties of conventional concrete. In this project we have produced glass wool FRC by adding wool of 0.5%, 1%, 1.5%, 2%, 2.5% and 3% to the weight of cement. The grade of concrete used for investigation is M25.*

Keywords- Glass fiber, compressive strength, flexural strength, alkali resistant

I-INTRODUCTION

Methodology

The Glass wool fiber reinforced concrete is prepared and investigates by traditional method of preparing conventional concrete.

Manufacture of glass wool reinforced concrete

In the current study the glass wool reinforced concrete is manufactured in traditional method. The materials were batched by weight and mixed using mechanical mixer. Water was added gradually so that concrete attains its plasticity. The concrete is again mixed with trowels before placing in moulds and compact by mechanical vibrator.

Test specimen

In the present study a total of 36 specimens were casted of which, 12 cube of size 150mm x 150mm x150mm for compression test, 12 cylinders of size 150mm X 300mm for split tensile test for flexure strength were prepared for conventional and different percentages of glass wool fibers. The specimens without fibers are considered as control specimens & with fiber are considered as glass wool fiber reinforced concrete. All the specimens were cured and tested for 3, 7 & 28 days.

Fig – Specimens of GWFRC

Compressive strength test

In the pre the compressive strength of concrete is one of the most important and useful properties of concrete. In most structural applications concrete is used primarily to resist compressive stress. The compression test was conducted on cube specimens cured for 7, 14 & 28 days. The test cubes were removed from the moist storage 24 hours before testing. The top and bottom bearing plates of the compression testing machine were wiped and cleaned before the placement of the specimen. After ensuring the connection between, the cube specimen was placed on the lower bearing plate keeping the center alignment by the screwed guides on the bearing plate.

Split tensile strength

The splitting tests are well known indirect tests used for determining the tensile strength of concrete sometimes referred to as split tensile strength of concrete. The test specimens shall consist of concrete cylinder of 150mm diameter and 300mm long. It consists of applying a compressive line load along a concrete cylinder placed with its axis horizontal between the compressive platens using compression testing machine. This test is conducted on specimens cured for 7, 14 and 28 days.

RESULT AND DISCUSSION

Workability

In the present study the workability tests were performed using standard sizes of Slump moulds as per IS: 1199 - 1999 to find out the workability of the glass wool fiber reinforced concrete. It was noticed that mix was stiff with slum ranging from 20cm to no slump, for fiber glass wool percentages of 0.5% to 3% by weight, the workability is determined by slump value. Higher percentages of Glass Wool fiber give no slump. At 3% fiber content balling has occurred and mix was not in a workable condition with a W/C ratio of 0.5.

Table- 2 Effect of glass wool on split tensile strength

Mix	**Compressive strength in N/mm2 when W/C ratio is 0.5**			**Workability of mix**
M 25	**7 Days mean**	**14 Days mean**	**28 Days mean**	**W/C ratio 0.5 (mm)**
GWFRC 0.0%	**28.55**	**29.27**	**31.48**	**32**
GWFRC 0.5%	26.2	27.86	28.51	**19**
GWFRC 1%	27.8	29.98	34.8	15
GWFRC 1.5%	27.3	28.63	31.08	12
GWFRC 2%	25.8	27.66	28.47	8
GWFRC 2.5%	21.8	22.6	23.91	5
GWFRC 3%	19.3	20.8	24.80	0

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CONCLUSION

Based on the current experimental investigation conducted and the examination of test results, the following conclusions are drawn,

Higher percentages of Glass wool fibers greater than 1% affect the workability of concrete and strength, and may need the use of super plasticizers (workability agents) to maintain the workability.

1. It was observed that, the percentage increase in the strength of glass wool
2. fiber reinforced concrete increases with the age of concrete. The maximum value of GWFRC is in 1%.
3. It was observed that compressive strength of GWFRC was increased 10.54% that of conventional concrete at 1% of fiber content.
4. It was observed that flexure strength of GWFRC was increased 31.25% that of conventional concrete at 1% of fiber content.
5. It was observed that compressive strength of GWFRC had achieved the target strength of M25 concrete thus compressive strength parameter is satisfied.

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