Abstract: Glass Fibre Reinforced Concrete (GFRC) is recent introduction in the field of concrete Technology. Concrete being the most important and widely used material is called upon to possess very high strength and sufficient workability properties. At the same time concrete is brittle and weak in tension. To improve the concrete Properties, Alkaline Resistance Glass Fibre Reinforced Concrete is used. ARGFC has many advantages over conventional concrete such as bleeding of concrete, which improves the surface integrity and reduces the probability of cracks. ARGFC resists rust and corrosion and hence contributes to the durability of the concrete. In this project, an attempt has been made to study the Characteristic strength properties of Alkaline Resistant Glass Fibre is added to M30 Grade of concrete mix as reinforced in various proportions of 0.5%, 0.6%, 1% and 2% by volume of cement. Addition of 0.6% of AR glass Fibre in ARGFRC has maximum compressive strength, split tensile strength and flexural proportions. ARGFC can be used for structural applications.

Keywords: Glass Fibre, Reinforced concrete, Alkaline resistant, Rust and Corrosion, ARGFC.

1. INTRODUCTION

Concrete is the most widely used manmade construction in the world. Concrete is the most widely used construction material several desirable properties like high compressive strength, stiffness and durability under usual environmental factors. At the same time concrete is brittle and weak in tension. The strength, durability and other characteristics of concrete depend upon the properties of its ingredients, the proportion of mix, the method of compaction and other controls during placing, compaction and curing. Concrete possess high compressive strength and usually more economical than steel and is non-corrosive which can be made with locally than steel and non-corrosive which can be made locally available materials. Reinforced concrete has various disadvantages such as shrinkage which cause crack, very low tensile strength to compressive strength ratio, expensive, low ductility. Efforts are made to develop a conventional concrete by using fibres and other chemical admixtures. Glass fibre reinforced concrete (GFRC) is a material which has abilities to overcome all these deficiency and make construction faster, resistant to corrosion, durable and can increase the tensile strength of the concrete.

2. METHODOLOGY

In this project, we are using M30 Grade of Concrete. River sand is used as fine aggregate and 20mm Coarse Aggregate is used. Materials are collected and tested in the laboratory. Proper dry mix and wet mix gives the clear workability of the concrete. Adding various percentage of glass fibre to the concrete and compare the conventional concrete. Proper curing helps to improve the strength of the concrete. Collection of materials is the first step of the construction work. The fine, coarse aggregate, cement, water, super plasticizer, glass fibres are to be collected. The collected materials are to be tested in the laboratory. Sieve analysis and specific gravity are the tests conducted for fine aggregate and coarse aggregate. Specific gravity and consistency tests are conducted for cement. In concrete, slump cone test is conducted for determining the workability of the concrete. Mix design calculations are calculated for determining the mix proportion. The specimens are casted and the curing process is done. After 7 days and 28 days, compressive, split tensile, flexural strength tests are conducted.

3. ALKALINE RESISTANT FIBRE

AR glass fibre is essential for GFRC because of its resistance to the high alkalinity levels in cement. It gives strength and flexibility to the concrete resulting in a strength yet light weight end product.

4. SUPER PLASTICIZER

Super plasticizer ADHERE MIX - 700 in the form of sulphonated naphthalene polymer confirms to IS: 9103-1999 was used to improve the workability of concrete.
5. TEST FOR AR GLASS FIBRE

1. The compressive strength values has gradually increased and suddenly decreased at both 7 days and 28 days. Adding 0.6% percentage of AR glass fibre gives the higher compressive strength than the other percentages. Adding 1%, 2% Glass fibre gives lesser compressive strength of the concrete.

![Figure 2. Compression Test Result on Cube](image)

2. The split tensile strength values has gradually increased and suddenly decreased at both 7 days and 28 days. Adding 0.6% percentage of AR glass fibre gives the higher tensile strength than the other percentages. Adding 1%, 2% Glass fibre the split tensile strength of the concrete gives lesser split tensile strength.

![Figure 3. Split Tensile Test Result on Cylinder](image)

3. The Flexural strength values has gradually increased and adding suddenly decreased at both 7 days and 28 days. Adding 0.6% percentage of AR glass fibre gives the maximum Flexural strength than the other percentages. Adding 1%, 2% Glass fibre the Flexural strength of the concrete gives lesser Flexural strength.

![Figure 4. Flexural Test Result on Beam](image)

6. RESULT AND DISCUSSION

In this project, alkaline resistant glass fibre reinforced concrete was investigated through compressive, split tensile and flexural strength for various proportions of AR glass fibre. The study clearly indicates that 0.5% of alkaline resistant glass fibre and 0.6% of alkaline resistant glass fibre by the weight of cement is encouraging and the compressive strength is higher than the conventional concrete.

The compressive strength of the AR glass fibre reinforced concrete is 25 to 30% higher than the conventional concrete. The flexural and tensile strength is 15 to 20% higher than the conventional concrete. Adding only small amount gives us more tensile strength. If the glass fibre is added in excess amount it may result in failure of the structure. According to the AR glass fibre it gives maximum strength when added about 70-100 per gram of cement.

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<th>S. NO</th>
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<td>1</td>
<td>The performance of Alkali Resistant Glass Fibres were used in the concrete mix</td>
<td>INTERNATIONAL JOURNAL OF ENGINEERING RESEARCH (IJER)</td>
<td>Alam</td>
<td>2015</td>
<td>The tensile strength of concrete also shows an increasing trend. For M 20 &amp; M 30 grade of concrete increased tensile strength were observed to be 24.7% and 26.10%.</td>
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<td>2</td>
<td>The performance of Fire Resistance Concrete</td>
<td>INTERNATIONAL JOURNAL OF RESEARCH AND REVISE IN APPLIED SCIENCE</td>
<td>Arunakanthi</td>
<td>2016</td>
<td>The result show that concluded the strength is increasing while increasing the percentage of steel fibre. But in the case of glass fibres, the strength is increasing up to 1%. After 1% the strength is reducing.</td>
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<td>3</td>
<td>Study about the mechanical properties of glass fibre geopolymer concrete</td>
<td>INTERNATIONAL JOURNAL OF RESEARCH AND REVISE IN APPLIED SCIENCE &amp; ENGINEERING TECHNOLOGY (IJRASET)</td>
<td>Balamurugan</td>
<td>2017</td>
<td>The compressive strength is found to be much more for the normal concrete with the addition of glass fibres as compared to the geopolymer concrete with the addition of glass fibre.</td>
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### 7. REFERENCE


