

# Mechanical Properties of Fibre Reinforced Concrete

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**Abstract** - The paper deals with the effects of addition of various proportions of polypropylene fibers on the properties of High strength concrete (M30 mix). The main aim of the investigation program is to study the effect of Recron 3S Polypropylene fibre mix by varying content such as 0%, 0.1%, 0.2%, 0.3% & 0.4% and finding the optimum Polypropylene fibre content. The concrete specimens were tested at different age level for mechanical properties of concrete, namely, compressive strength, split tensile strength, flexural strength. For each percentage of concrete specimen is cured in curing tank and remaining is done by the alternate wet and dry method. Initially the concrete specimen's shows appreciable strength for irregular curing but as the days advances the curing specimens gave satisfactory strength. However, further investigations were highly recommended and should be carried out to understand more mechanical properties of fibre reinforced concrete.

**Key Words:** Different curing condition, High strength concrete, mechanical properties of concrete, polypropylene fibers

## 1. INTRODUCTION

Now a days the construction industry are using natural resources in the background of rapid development of infrastructure of producing aggregates for preparation of concrete. Present trend demands a concrete which is to be highly workable and durable called to be versatile concrete Similarly to the conventional concrete FRC is also having brittle characteristic this property of brittleness can be improved by adding fibres to the concrete mix. Due to which initiation, propagation or coalescence of cracks can be improved. This meliorated property by adding fibres depend on the type of fibre, and property of concrete. Some of the properties of fibre are fibre concentration, fibre geometry, fibre orientation and fibre distribution.

## 2. OBJECTIVES

The objectives of the present study are as follows;

1. To determine Compressive, Flexural, Tensile strength of Conventional Concrete
2. To determine Compressive, Flexural, Tensile strength for F R C
3. To determine Optimum fibre content in terms of percentage by volume of cement content

4. To determine the difference between strength of conventional curing and alternate wet and dry curing process

## 3. Materials Used

### 3.1 Cement

In the present research work, ordinary Portland cement of 43 grades is used .the tests on cement were conducted in accordance with Indian standard confirming to is 12269-1987

Table - 1: Cement Properties

Properties	Results
Grades	43
Initial Setting Time	33min
Final Setting Time	7:45hours
Normal Consistency	30%
Specific Gravity	3.03

### 3.2 FINE AGGREGATES

M sand is a substitute of the river sand for construction produced from hard granite stone by crushing.

Table -2: Fine Aggregate Properties

Properties	Results
Grading of sand	Zone 3
Specific gravity	2.52
Water absorption	0.5%

### 3.3 Coarse aggregates

Locally available crushed granite course aggregate having the maximum size Of 20mm are used in this study. The aggregate are tested as per is: 2386-1963

Table -3: Coarse Aggregate Properties

Properties	Results
SPECIFIC GRAVITY	2.55
WATER ABSORPTION	1%

### 3.4 RECRON 3S FIBRE

Recron 3s polypropylene fibres are used in the study this fibres greatly improve certain properties of hardened concrete such as split tensile strength and flexural strength.

### 3.5 WATER

This experiment work, portable water is used.

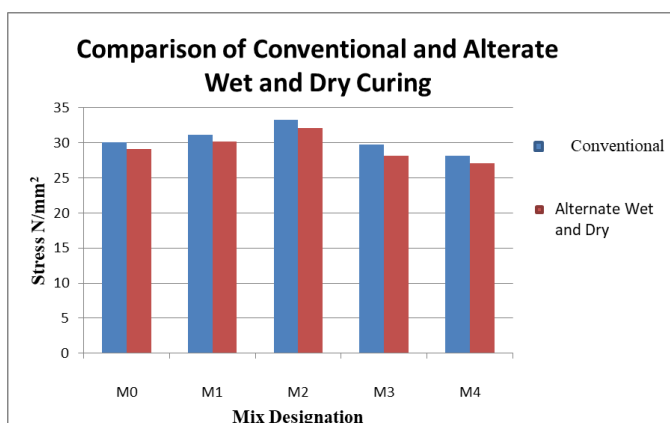
### 4 Experimental Procedures:

**M30** concrete designed in accordance with guidelines code book IS:10262:2009 with the addition of Recron 3s by volume. the mix proportion arrived is 1:1.3:2.55 (C:FA:CA) with water cement ratio of 0.45 and Recron 3s fibre is added at varying percentage of 0.1%,0.2%,0.3% and 0.4% by volume of concrete the specimen is cast for compression strength split tensile strength and flexural strength the specimen is cured in water for 28 days with both conventional and alternate wet and dry process .then they are tested for respective strengths.

### 5 Experimental results

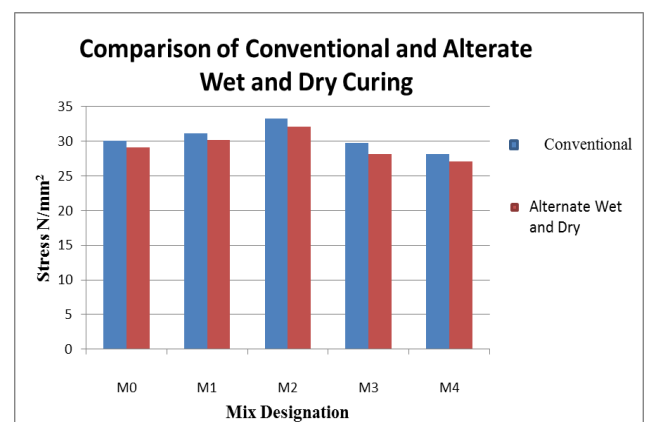
#### Compressive strength

Sl no	% of fibre used	Conventional curing	Alternate wet and dry curing
1	0.0%	30.12	29.15
2	0.1%	31.17	30.15
3	0.2%	33.23	32.13
4	0.3%	29.8	28.1
5	0.4%	28.12	27.05



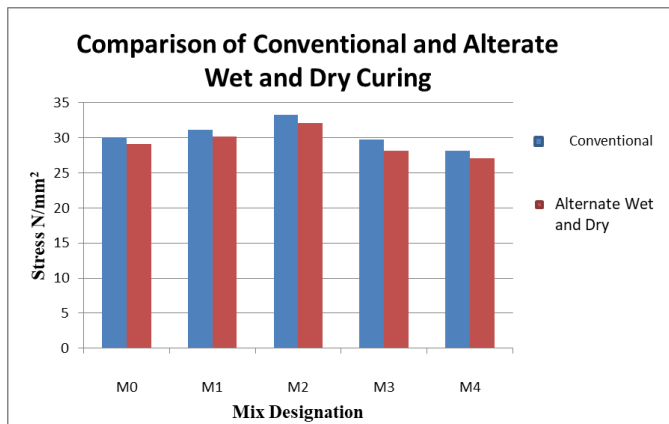
#### Split tensile strength

Sl no	% of fibre used	Conventional curing	Alternate wet and dry curing
1	0.0%	2.63	1.65
2	0.1%	3.46	3.05
3	0.2%	3.3	2.77
4	0.3%	2.72	2.63
5	0.4%	3.6	3.05



#### Flexural Strength

Sl no	% of fibre used	Conventional curing	Alternate wet and dry curing
1	0.0%	2.95	2.95
2	0.1%	4.45	4.41
3	0.2%	3.52	3.2
4	0.3%	2.9	2.7
5	0.4%	2.8	2.6



## 5. Conclusion

1. Compressive strength obtained in laboratory test indicates that the strength goes on increasing up to 0.3% Of Recron3s fibre dosage beyond that percentage decreases.
2. Split tensile *strength of the concrete obtained in laboratory test indicates that the strength* increase at 0.2 % beyond that percentage slightly decreases and then increases.
3. Flexural strength of the concrete obtained in laboratory test indicates that the strength goes on increasing in percentage of Recron3s Fibre dosage. There is a considerable increase in flexural.
4. If % of fibre by weight of cement are mixed in concrete. It is usually noticed that fibers are protruding out of concrete faces which may reduce the aesthetic appearance of the finished concrete elements.
5. From the designs made for various % of FRC it is cleared that residual strength and factor of strength and factor of safety increases as % of fibre increases.
6. From the above results and discussion we come to know the conclusion that fiber can be added upto 0.4% in the concrete to modify its properties in economical and conventional curing gives more strength than alternate wet and dry curing.

## 6. REFERENCES

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