

Comparative Study of Polymer Concrete to find the Modulus of Elasticity and Poisson's Ratio

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Abstract— In this paper to study out effect of lokfix construction polymer. On different. M 20 grad of cement with changing the percentages. To analysis result in static modulus of elasticity and passion ratio. The result are collected on both way according to ASTM 469 and Indian slandered method. From above got more strength of concrete due to use of polymer in concrete polymer have good property to achieve more strength than regular concrete. In retrofitting and rehabilitation modulus of elasticity and poison ratio are consider for structural design. Portland cement concrete has been successful in many applications. However, since the 1960s technological investigation concerning modification of concrete by polymer material have been conducted. The polymer concrete has better mechanical properties as compare to the ordinary Portland cement concrete. This test method covers determination of young's modulus of elasticity and Poisson ratio of molded concrete cylinder and diamond drill concrete cores when under the longitudinal compressive stress.

Keywords— *Locofix Polymer, Compressive Strength, Modulus of Elasticity, Passion's Ratio, Strain, Stress. Etc...*

I. INTRODUCTION

Concrete is most windy used construction material has several mechanical properties like high compressive strength, stiffness and flexibility under the usual environmental factors. At the same time concrete is brittle and weak in tension. Plan concrete has to deficiencies, low tensile strength and low strain at the future. Concrete is a material used in building construction, consisting of hard chemically inert at particulate substances. Concrete has high compressive strength but is relatively weak in tension, adhesion and its porosity which lead to physical and chemical determination. Polymer in other hand are weaker in compression but have higher tensile capacities and provide the good adhesion to other materials as well as resistance to physical and chemical attack. The main study of this paper is that to get optimum value of polymer concrete by using lokofix polymer o get best result as compare to the Indian standard.

II. EXPREMENTAL SETUP

The main purpose comparison between theoretical formula of Indian standard and experimental procedure of ASTM 469. According to Indian standard method prepared several sample of cylindrical concrete mould in M 20 grad of concrete the size of sample diameter 75mm, 150mm height according to Indian slandered the proportion is follow,

Table no-1

Cement	F.A.	C.A.	Water
383.2	546	1343.7	191.6
1	1.425	3.5	0.5

The properties of lokfix construction polymer are follows
Table no-2

Typical results Gel time				
Temperature °C	:	10	20	30
Minutes	:	100	40	15
Compressive strength (N/mm ²) BS 6319 part 2 1983				
1 hour	:	70		
3 hours	:	85		
24 hours	:	100		
7 days	:	115		
Tensile strength (N/mm ²) BS 6319 part 2 & 3 1985				
3 days	:	12		
7 days	:	14		
Flexural strength (N/mm ²) BS 6319 part 3 1990				
3 days	:	26		
7 days	:	30		
Shear strength (N/mm ²) BS 2782 part 2				36

In the above proportion we added 5, 7 and 10 percentages of polymer by weight of cement every set of cylindrical concert sample respectively.

III. APPRATAUS

1. Testing machine- Use the compression testing machine (CTM/UTM) I has capacity range from 60 to 100 tones.
2. Compressometer – For the determining the modulus of elasticity use bonded or unbounded sensing devise. That measures to the nearest 5 millionths the average deformation

of two diametrically opposite gages lines, each parallel of axis. And each centered about mid height of the specimen.

3.Extensometer- If the Poisson ratio is desired, the transverse strain shall be determined of unbounded extensometer capable in diameter of measuring to nearest 0.635 μ m the change in diameter at the mid height of the specimen.

VI. PROCEDURE

The ASTM 469-94 prepared the experimental setup for the compressive test performed by UTM at the constant rate of loading. The strain gauge are fixed to the cylindrical concrete block. One strain gauge is attached to the longitudinal direction to the sample and second stain gauge is fixed to perpendicular to the longitudinal direction to the sample the gauges is fixed to mid height of the gauges has two slot to attached wire and fix to stain indicator. When loading is increases the strain is varying with respective stress. This theory is represent the excremental procedure of the poison ratio and the modulus of elasticity and this result is find out by using following equation.

$$\sigma_c = \frac{P}{A}$$

where, σ_c is the compressive strength; P is the maximum load recorded; and A is the cross- section area of cylinder specimens

$$E = \frac{s_2 - s_1}{\epsilon_2 - 0.00005}$$

Where E is the chord elasticity modulus; s2 is the stress corresponding to 40% of maximum load; s1 is the corresponding to a longitudinal strain of 50 millionths; and ϵ_2 is the longitudinal strain produced by s2.

$$V = \frac{\epsilon t_2 - \epsilon t_1}{\epsilon_2 - 0.00005}$$

Where V is the Poisson's ratio and ϵt_2 and ϵt_1 are the transverse strains at mid height of the specimen produced strain at mid height of the specimen produced respectively by s2 and s1. The Indian standard theoretical formula for calculated the modulus of elasticity are follow,

$$E = 5000\sqrt{f_{ck}}$$

Where f_{ck} is the compressive strength of concrete this result in N/mm^2 . This value is 20 percent less or more according to the Indian stranded .

V. .RESULT & CONCLUSION

The all specimen are tested with proper mixing , compaction is done and all sample are proper carried at 28 days under water as method of Indian standard codes. The result are follow

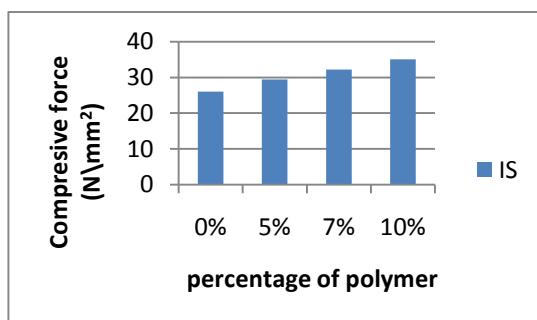


Fig 1- M30 Compressive strength result.

In that sample the mix three level of percentage of polymer by weight of cement and its gives the modulus of elasticity in theoretical IS method and ASTM experimental procedure

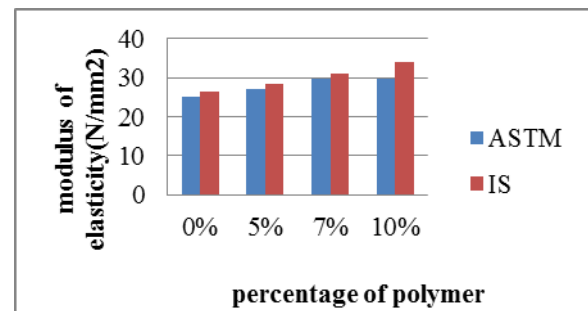


Fig 2- modulus of elasticity of M30 grad of concrete.

According to procedure the use of extensometer the longitudinal and lateral strain are calculated. This strain helps to calculate the passion ratio are follows.

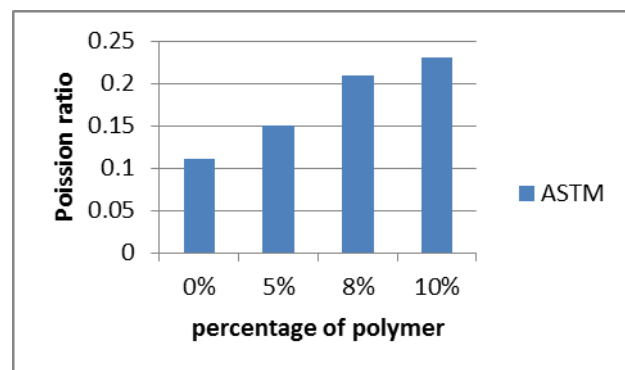


Fig 3- Poisson ratio of M 30 grad of concrete.

VI. CONCLUSIONS

The following conclusion can be drawn from the experimental result of this study:

- Compressing fresh concrete remarkable increases the compressive strength and modulus of elasticity of the concrete.
- The increases in the compressive strength of concrete. Then it increases the value of modulus of elasticity. Fig shows that the 10 percent polymer is add in the concrete the modulus of elasticity value is more.
- Comparison of ASTM and IS that the, Indian standard code shows the high value of modulus of elasticity as well as Poisson ratio. but the experimental work are gives the accurate result.
- The objective of this result has been to describe the special characteristics of polymer concrete and percentage of polymer that affects the some parameter of the concrete.
- This polymer and grad of concrete can be use the construction field, the properties and application need that structure.]

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