Shashank Shubham, et. al. International Journal of Engineering Research and Applications
www.ijera.com
ISSN: 2248-9622, Vol. 10, Issue 6, (Series-VI) June 2020, pp. 44-46

RESEARCH ARTICLE OPEN ACCESS

Experimental StudyOn Steel FibreEnriched Reinforced Concrete.

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ABSTRACT:
This paper is on the basis of some studies on the M20 grade concrete having mix proportion 1:1.5:2 with water cement ratio 0.46 for finding the compressive strength of steel fibre reinforced concrete containing fibres of 0%, 0.47%, 0.97%, 1.47% and 1.97% amount of fraction of hook end steel fibre are used. And the result of this data studied, analysed, review and compare with a specimen of 0% fibre. The comparison of compressive strength with day-to-day represented with the help of tables. The percentage increase of compressive strength of result data for M20 grade of concrete in 12 hours, 24 hours, 7 days, 14 days and 28 days with respect to the difference in percentage addition of steel fibres. The purpose of this research is to determine and compare the properties of concrete with steel fibre and without steel fibre concrete. This research is mainly on the the enhancing of mechanical properties of concrete.
Keywords: Strength, Fiber reinforced concrete, Steel Fibers, Cement, Toughness, Ductility.

Date of Submission: 07-06-2020 Date of Acceptance: 23-06-2020

I. INTRODUCTION

Concrete is used for construction of structures and because it is brittle material in the impact loads and normal stresses but when it is mixed with reinforcement of steel its strength is increases but due to brittleness it is very weak in tension because of this there crack propagation occurs in concrete. So to increase the mechanical properties of concrete (such as flexural strength, tensile strength, compressive strength) and to avoid the cracks different type of fibres like glass, synthetic or natural and steel are added to concrete. Because the concrete is most common material used in construction after the water. So we can change and enhance the strength and durability of the concrete by some changes in concrete mix like adding some special gradients but concrete have some deficiencies like lower strength, limited fatigue life, low ductility, low tensile strength etc. So in my opinion after many experiment the steel fibre are most reliable type of fibre because the steel fibre can be e increase the tensile strength of the concrete and we used for long durability. And because the steel fibre are added in concrete so it can be say that it is steel fibre reinforced concrete. That's why the steel fibre concrete can be used in many construction like tunnel, taxiways, road pavement, buildings etc because it can be spray easily and having the high tensile strength and stress resistance.

II. MATERIAL USED

Some raw materials are used in this study and experiment like steel fibre, aggregate, cement, sand etc.

a) Steel fibres:-

The steel fibres used in this have many properties which are given here. The the formation of these was hooked at both end, tensile strength 100 MPa, elastic modulus 205, average aspect ratio 70, length 30mm, diameter 0.5 mm, specific gravity 7.80.

b) Water:-

Portable water was used in this.

c) Coarse aggregate:-

Crushed stone of 20 mm size having specific gravity confirming to IS:393-1970.

d) Cement:-

Ordinary Portland cement 42.5 N/R DIN EN 197 was used.

e) Fine aggregate:-

Locally available well send with specific gravity 2.46, water absorption 2% and fineness modulus 2.90.

III. METHOD USED IN THIS EXPERIMENT

Concrete it was prepared for M20 as per IS:10262:2009. For this experiment comes into existence for m20 grade with mix ratio 1:1.5:2 and water cement ratio 0.46 to get a huge strength of m20 grade for this experiment. In terms of workability strength and duration the mix proportion of of steel fibre reinforced concrete depend upon the requirements as for a particular work. Now the steel fibre mixed with cement content and fine aggregate. We added 0.47%, 0.97%, 1.47% and 1.97% steel fibre with hook ends.

A. Concrete Slump Test:-

The slump test is used for or knowing the consistency or to find the wetness of the concrete. It is basically used following the behaviour of the wet concrete under the action of gravitational force of the earth. The mould of concrete slump test is in the shape of cone having 300 mm of height and the bass was 200 mm in diameter and the top opening of the slum was 100 mm. The slum was put on a plane surface and the mould is filled with concrete in three layers and it's workability is to be tested each layer is tempted 26 x with a standard of 16 mm diameter steel rod rounded the end. After filling the world with concrete completely the top surface off the mould truck off by the screening or rod. The core was lifted slowly upward and now the unsupported concrete of slum will not remain. The decreasing of height of the centre of the slump concrete is taken as slump. The minimum height of the concrete off the mould is noted with scale usually it is measure 5mm full stop there are 3 types of slump can be used first one is collapse slump and the second one is true slump and last one is shear slump.

B. Compressive strength test:-

The compression test generally conducted on cube specimens so we also be conduct it and cure for 24 hours, 7, 14 and 28 days. The test cube take off from the mould which is in most storage before 24 hours of testing after clearing the top and bottom bearing plates of the machine for compression testing and placed the specimen between them. The size of mould of cube was 150×150×150 mm. This cubes were put in curing tank for 28 days. The cubes were tested at 24 hours, 7 days, 14 days and 28 days in compression testing machine. The formula of calculating this is given below-

Compressive strength (MPa) = cellular load/cross sectional area.

IV. RESULTS

The compressive strength of the specimen with fibre content 0%, 0.47%, 0.97%, 1.47% and 1.97% for strength after 24 hours 9.22,10.1,11.25,11.7 and 13.77 to 28 days strength was 25.11, 35.2, 34.9, 39.7 and 35.11.

After studied and analysed these data then it is found that and here we found that by increasing the steel fibre there are the incremental increase in compressive strength of the concrete.

V. CONCLUSION

a) This is study apps to know the properties of steel fibre reinforced concrete and also the behaviour of it.
b) By increasing of steel fibre we find the workability of concrete produced.
c) The simple cement concrete specimen have a typical crack propagation but in the steel fibre reinforced concrete crack stops due to the ductile behaviour of steel fibre reinforced concrete.
d) It is found that the strength and durability of steel fibre reinforced concrete depends upon the fibre content and due to this incremental increase in strength to be find.
e) Compressive strength of the concrete get increasing with increase of steel fibre content.

ACKNOWLEDGEMENT

I sincerely thank to all the scholars whose article are seated and form that give a valuable help for us to completing this review paper. I also thanks the others, editors and publishers of those journals or articles from where the literature for this article has been reviewed and discussed.

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