iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 7 **Issue:** V **Month of publication:** May 2019

DOI: https://doi.org/10.22214/ijraset.2019.5407

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.177
Volume 7 Issue V, May 2019- Available at www.ijraset.com

Steel Fiber Reinforced Concrete

Rakesh Kumar[1], Ajeet Kumar[2], Mr. Manish Kumar Kesharwani[3]
[1,2]UG Student, [3]Asst.Prof. , Department of Civil Engineering, Career Point University, Kota, India

Abstract: ***Concrete is a material which is used in construction work. Its use near about 1800 years ago. Concrete has compression strength and tensile strength. Also, we know about tensile strength in concrete is very low.so increase the tensile strength in concrete we mixed in SFRC if the tensile strength is low in concrete then brittle behavior of concrete is sudden failure without heating or warming. When we mix SFRC in concrete we care about length and diameter of SFRC.it has also different types of cross-sectional area. The diameter of SFRC is near about 0.25 to 0.75mm.***
Keywords: Steel Fiber Reinforced Concrete (SFRC), Tensile Strength,

I. INTRODUCTION

Concrete is a undesirable characteristics which has low tensile strength. But compression strength is so high. So it requires reinforcement to be used as construction material. SFRC is made by cement, water, aggregates and steel fibers.BY using steel fiber in concrete we reduce to cracks in pavements, bridges and other constructions works. Fibers and steel have different roles to played in concrete technology. Steel fiber (SF) which is the most popular type of fiber to use in concrete reinforcement.

Different Types of Fibers

There are many types of fibers, they are given bellow-

Steel Fiber Reinforced Concrete (SFRC).
GFRC Glass Fiber Reinforced Concrete.
Asbestos Fiber.
Carbon Fiber.
Organic Fiber.
Natural Fiber.

A. Steel Fiber Reinforced Concrete (SFRC)

Porter who was the first man suggested to the use of SFs in concrete in 1989.The first research on steel fiber in 1963 by united states. The composite materials of SFRC are cements, fine and coarse aggregates, water, and SFs. The behavior of SFRC can be classified into two groups according to its application. They are given bellow-

Have low volume frication, which is used to control plastic shrinkage.

Have more volume fraction which is improved mechanical property of concrete.

1) Benefits of SFRC:

a) Improve impact resistances.
b) Increase load bearing capacity.
c) Develop durability.
d) Good corrosion resistance.
e) Very good crack control.

2) Disadvantage of SFRC:

a) Disadvantage of SFRC is that decrease workability.
b) To accelerate concretize of concrete to the addition of SFRC.
c) Accelerate concretize so that increase the construction labor & time.

3) Applications of SFRC: Applications of SFRC is given below-

a) SFRC provide rock slope impaction.
b) SFRC support of dig foundation.
c) Channel wadding & protect failure bridge.

4) Usage of SFRC: SFRC used in Indian project, they are also given below-

a) Chamera Hydro Electric Project, Uttara Khand

b) Uri-dam, Jammu and Kashmir
c) Srisailam Project, A.P
d) Tehri Dam Project, Uttara Khand

II. EXPERIMENTAL STUDY:

The materials used and their specifications are as follows

A. Cement

Used Ordinary Portland cement and its specific gravity is 3.16*.
Brand used is the "UltraTech" with P43 grade. The cement was confirming to IS 268-1976*.
Use cement 0.867kg.

B. Fine Aggregate

In this experiment we are used river sand and also test according to IS 2286 (PART I). Specific gravity of fine aggregate is 2.69. Water absorption 0.98% bulk density 1504 Kg/m. Used fine aggregate 1.3kg.

C. Coarse Aggregate

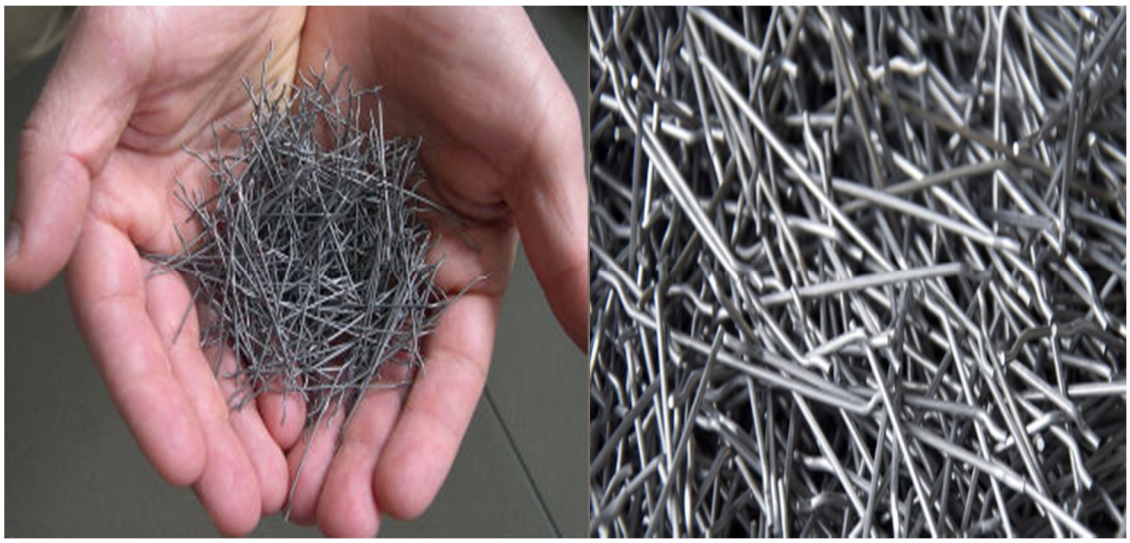
In that experiment we are used Crushed stone aggregates of maximum size of 20 mm and test according to IS 2386 (part II) of 1954.Specific gravity of coarse aggregate is 2.63. Water absorption 0.28% bulk density near about 1502 Kg/m. Used coarse aggregate 1.8kg.

D. Water

According to IS 466-2000, water was used to mixing of concrete.

E. Steel Fibers

Hooked steel fibers also called as Dramix steel fibers. It is made by Bekaert Corporation which have a length of 31 mm and a diameter of 0.56 mm. So that aspect ratio is near about 56 and its conforms to American standard ASTM A820.The tensile strength of fiber is in the range of 1200 N/mm2*.



Steel fiber

III. TEST

It is a most common test on concrete.it is easily perform. Concrete cube size is 150mm*150mm*150mm.in this type of test we find out workability of concrete. Its apparatus is so simple to use.it is use anywhere like laboratory or site testing.in this apparatus includes mould and tamping rod.

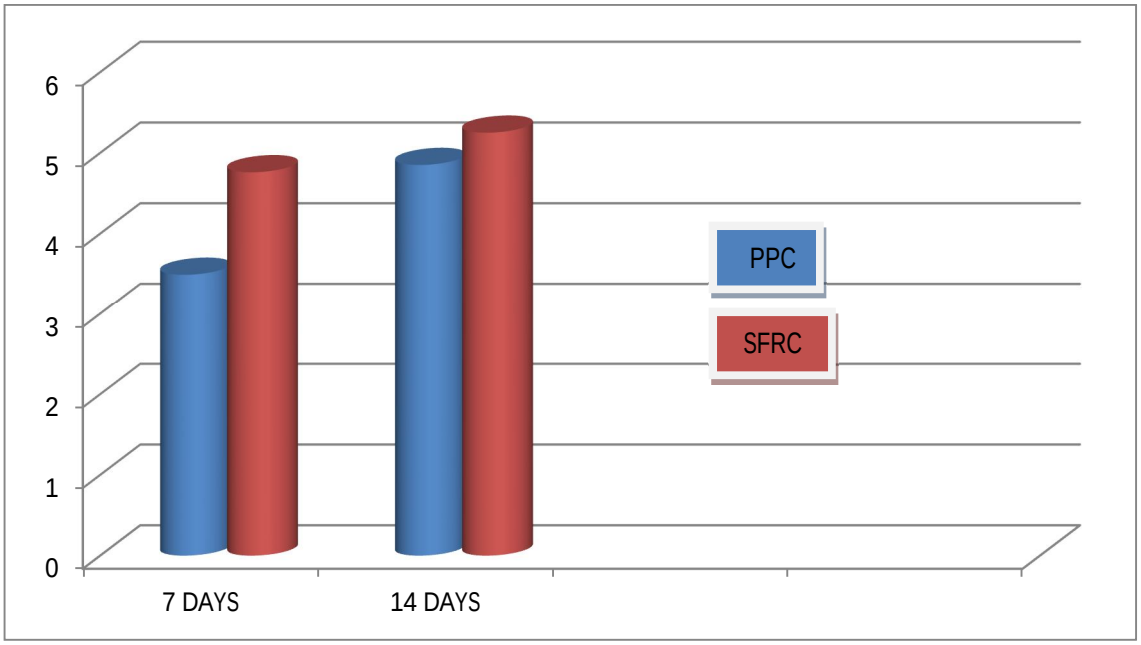
SLUMP TEST RESULT

Adding SFRC (%)	Slump Value
0	16
5	20

TABLE1: TENSILE STRENGTH

AVERAGE TENSILE STRENGTH IN KN/SqMM		
SPECIMEN TYPE	7 DAYS	14 DAYS
PCC	3.49,3.54	4.81,4.85
SFRC	4.76,4.78	5.19,5.25

CHART FOR TENSILE STRENGTH

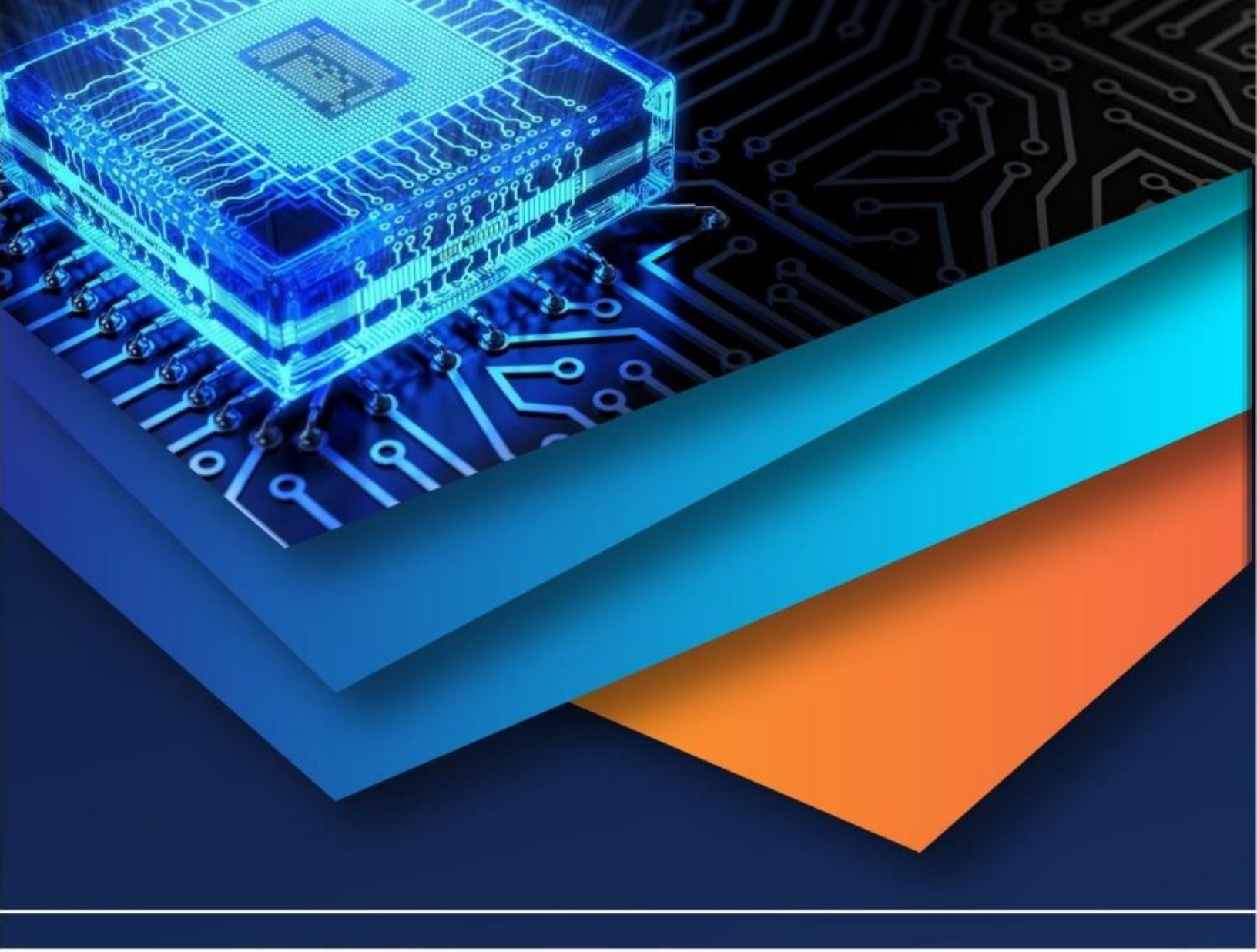


IV. CONCLUSION

When we testing of plain concrete cement after 7 & 14 days its tensile strenght is 3.49 & 4.81KG/sqMM.After the mixing of SFRC in PPC its tensile strength is 4.76 & 5.19KN/sqMM. So that tensile strenght for SFRC is increased. Strength at 14 days is batter then 7 days.

REFERENCES

[1] ACI 544.1R (1996). State-of-the-Art Report on Fiber Reinforced Concrete, American Concrete Institute, Farmington Hills, Michigan.
[2] Aufmuth, R.E, Naus, D.G , Williamson, G.R. (1974). Effect of Aggressive Environment on Steel Fibre Reinforced Concrete, Letter Report M-113.US Army Corps of Engineers. Construction, Engineering Research Laboratory, Chaimpaign, IL.
[3] Barr, B. (1987). Fracture Characteristics of FRC Materials in Shear. Fiber Reinforced Concrete Properties and Applications, ACI SP-105, American Concrete Institute, Farmington Hills, Michigan.
[4] Chen, Y.Y. and Hwang, C.L. (2001). Study on Electrical Resistivity and Chloride Ion Penetrability Behavior of Concrete Material. Journal of the Chinese Civil and Hydraulic Engineering.13(2), pp. 293–302 (In Chinese).
[5] Altun et al. (2006) “Effects of steel fiber addition on mechanical properties of concrete and RC beams” *Construction and Building Materials* **21**: 654–661.
[6] Gambhir, M.L. (1995). Concrete Technology. (2nd Eddition).,NEW DELHI.Tata McGraw-Hill.
[7] Grzybowski, M. (1989). Determination of Crack Arresting Properties of Fiber Reinforced Cementitious Composites. Chapter 12, Royal Institute of Technology, Stockholm, Sweden.
[8] Hamid Pesaran Behbahani & Behzad Nematollahi & Majid Farasatpour ICSECM 2011,Kandy-SriLanka.



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY