International Journal of Technical Research and Applications e-ISSN: 2320-8163,
www.ijtra.com Volume 4, Issue 3 (May-June, 2016), PP. 135-137

INVESTIGATION ON FLEXURAL BEHAVIOUR AND EMI SHIELDING EFFECT IN STAINLESS STEEL FIBER REINFORCEMENT CONCRETE

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Abstract— **Every construction is incomplete with the presence of concrete because it is the major material which provides strength. Since concrete is very good in compression and in case of tension it fails. Electromagnetic interference is an undesirable and uncontrollable off-shot of explosive growth of electronics and widespread use of transient power sources.EMI pollutes environment and people who have been exposed to these EMI will leads to suffer from diseases like leukemia and brain tumours.Hence to overcome these problems stainless steel fiber is used in concrete.**

Index terms- ***stainless steel fiber, EMI, compressive , flexural strength.***

I. INTRODUCTION

Development of a nation not only depends upon the technology but also depends upon the infrastructure. Without concrete infrastructure is not possible. Thus concrete is indispensible material in every construction.Since concrete is very good in compression and poor in tension, reinforcement is provided. This reinforcement prevents tension failure but fails due to corrosion. This failure is in the form of cracks. To overcome these cracks stainless steel fiber is used in this paper. This paper deals with the effect of addition of various percentage of stainless steel fiber (0.8%, 1.0%, 1.2%)in addition withM_{25} grade of concrete..

I. StainlessSteel Fiber

A. General

Stainless steel are the steel which does not corrode under any chemical reaction due to the presence of alloys containing chromium. The stainless steel comprise of carbon, silicon, manganese, phosphorous, sulphur and other elements.

B. Properties

The properties of stainless fiber are,

1.Oxidation withstanding
2.Electrical conductivity
3.Thermal resistance

C. Uses

The most common uses for stainless steel fiberis in the field of the electrical and textile industry such as anti-radiation cloth, thermal resistant fabric and anti-static brushes.It is also used in weaving, radiation protection, carpets.

D. Electromagnetic Interference

Electromagnetic interference is a disturbance generated by an external source that affects the human body and creates the pollution. Electromagnetic radiation can be difficult to diagnose, as EMI can often manifest itself in the way that are hard to detect. Shielding is particularly needed for underground vaults containing transformers and other electronics that are relevant to the electric power and telecommunication.

E. Electromagnetic Interference Shielding

EMI shield is essentially a barrier to regulate the transmission of the electromagnetic EM wave across its bulk. In power electronics, term shield usually refers to an enclosure that completely encloses an electronic product or a portion of that product and prevents the EM emission from an outside source to deteriorate its electronic performance. Conversely, it may also be used to prevent an external susceptible (electronic items or living organisms) from internal emissions of an instrument's electronic circuitry

II. DESIGN AND TESTS

F. Mix Proportion

This paper is proposed of M25 grade of concrete and the mix design was based on IS 10262-1982 and IS 383 -1970 codal provisions. The mix proportion arrived was 1:1.139:2.6(cement : fine aggregate : coarse aggregate).

G. Compressive strength Test

The compressive strength were tested for concrete cubes of dimension 150 x 150 x 150 mm. The test was carried in compressive test machine of capacity 100KN. In compressive strength test the loading rate was 2.5KN/s. The compressive test was conducted on 150m cube specimens on 28th day.

H. Flexural Strength

Flexural strength tests were carried out on 100mmx100mmx700mm beams at the age of 28days curing. The test was conducted in two different types of loading applied at two points.

I. EMI test

A rotary mixer with a flat beater was used for mixing Cement, water, fibers, and sand were mixed for 5 min. After pouring into oiled moulds, with the size of (15x12x5 cm) an external electrical vibrator was used to facilitate compaction and decrease the amount of air bubbles. The samples were demoulded after 1 day and cured in air at room temperature for 28 days. The attenuations upon reflection and transmission were measured using the coaxial cable method .

III. Results And Discussion

A. Tables

Chemical Composition Of SSF

S.NO	CONSTITUENTS	PERCENTAGE
1	C	0.40
2	Si	3.5
3	Mn	2.0
4	P	0.050
5	S	0.10
6	Cr	23 -27
7	Ni	0
8	Others	-

Specification Of SSF

Type	Ferritic
Length	30 mm
Diameter	0.57

Compressive Strength

Headings, or heads, are organizational devices that guide

S.NO	AGE OF TEST	% OF FIBER	COMPRESSIVE STRENGTH N/mm^2
1	28	0	32.45
2	28	0.8	34.03
3	28	1.0	35.60
4	28	1.2	33.92

Flexural Strength

S.NO	AGE OF TEST	% OF FIBER	FLEXURAL STRENGTH N/mm^2
1	28	0	3.16
2	28	0.8	4.93
3	28	1.0	5.27
4	28	1.2	3.86

EMI test

Shielding effectiveness for various percentage of fiber concrete (60cm distance)

S.NO	0 %	0.8 %	1.0 %	1.2 %
1	-	-	-	-
	8.08E+00	8.10E+00	8.10E+00	8.10E+00
2	- 8.09E+00	- 8.10E+00	- 8.11E+00	- 8.11E+00
3	- 8.10E+00	- 8.11E+00	- 8.12E+00	- 8.16E+00
4	- 8.11E+00	- 8.11E+00	- 8.15E+00	- 8.21E+00
5	- 8.12E+00	- 8.13E+00	- 8.15E+00	- 8.17E+00

J. Figures

Compressive Strength

Flexural Strength

EMI Measurement

IV. CONCLUSION

The results which came after carrying out all tests found successful which indicates that addition of stainless steel fiber in concrete is found effective than conventional concrete. From the results it is proved that addition of stainless steel fiber of about 1.0% is effective and when we increasing further the percentage of fiber the compressive and flexuralstrength decreases

V. ACKNOWLEDGMENT

I would like to thank my guide Mr.T.Santhosh Kumar for valuable advises and guidance without which I would not have completed this project in a successful manner.I am grateful to friends who helped me to complete this project.

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