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EXPERIMENTAL STUDIES ON MORTAR BY USING RECRON FIBER

S.M.SARAVANAN M.E. ASSISTANT PROFESSOR
K.SIVAPRAKASH
N.S.N.COLLEGE OF ENGINEERING & TECHNOLOGY

ABSTRACT

Reinforced mortars have been evaluated for use as a cement mortar pavement material. The brittle behavior of mortar is due to fast growing of a single crack that leads to the uncontrollable failure in section. In order to improve the behaviour of mortar, fiber reinforced mortar is made by adding discrete short fibers into the mortarcomposite. The RecronFiber Reinforced mortar exhibited improved tensile strength and compressive strength over that of plain cement mortar. Due to their non- biodegradability, the uses of recronfibers in cement mortar produce a hygienic material. Behavior of cement-based matrices carrying recronfibers reinforcement of different percentage is studied in this.

Specimens containing fiber of 0.4 %, 0.8%, 1.2%, and 1.6 % are prepared and tested. It demonstrates that certain amount of fibers enhances the compressive as well as flexural capacity of the fiber reinforced cement mortar. Optimum percentage is determined by varying the percentage of addition of fibre to the mortar.

Also adding the silica fume into the mortar for purposes are, Mixing together cementations components either at the mortar mixer or in the cement factory

(including inter- grinding),a binder where the cementitious components are blended in a cement factory. The quantity of silica Fume is adding in the mortar upto 10%.

INTRODUCTION

Mortar is widely used in Civil Engineering construction.

Though mortar is convenient and inexpensive to be made, in brittle behavior upon Flexural loading is one of its adverse properties that lead to the development of fiber reinforced cementitious composites. The brittle behavior of mortar is due to fast growing of a single crack that leads to the uncontrollable failure in section. In order to improve the behavior of mortar, fiber reinforced mortar is made by adding discrete short fibers into the mortar composite.

OBJECTIVE

Investigate the mechanical and deflection characteristics of Mortar

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for various proportions of Recron fiber and comparing the results of conventional cement mortar.To find out the Compressive strength cube and flexural strength of panel and fiber Vs compressive strength cube and flexural strength from panel.

To reduce crack in cement mortar and to increase the flexural strength of the cement mortar and to investigate the deflection of the cement mortar by using panels testing under single point load.

MATERIALS USED

CEMENT

Table 1: Physical Properties of Cement

S.No	Properties	Values
1	Fineness modulus	2%
2	Standard consistency	34.5%
3	Specific gravity	3.15
4	Initial setting time	48 min
5	Final setting time	220 min

Pozzolanic Portland cement (53 grades) is a higher strength cement to meet the needs of the consumer for the higher strength mortar. As per BIS requirements the minimum 28 days compressive strength of 53 Grade PPC should not be less than 53 Mpa. PPC 53 Grade produces higher grade mortar at very economical cement content.

Fig 1-Pozzolanic Portland cement

FINE AGGREGATE

Fig 2- Fine Aggregate

Table 2 Physical Properties of Fine Aggregate

S.No	Properties	Values
1	Specific Gravity	2.45 kg/m³
2	Fineness modulus	2.63
3	Water Absorption	0.40%

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RECRON FIBER

Table 3 Physical Properties of Recron Fiber

S.No	Properties	Values
1	Cut Length	6mm or 12mm
2	Flexural strength	4000 to 6000 kg/cm²
3	Melting point	250° C
4	Product Type	Polyester - CT 2012
5	Cross – Section	Triangular
6	Acid Resistance	Excellent

Fig 3 : Recorn Fiber

Recron fiber was used as a secondary reinforcement material. It arrests shrinkage cracks and increases resistance to water penetration. It makes mortar homogenous and also improves the compressive strength, ductility and flexural strength together with improving the ability to absorb more Silica fume is a material which may be a reason of Air Pollution this is a byproduct of some Industries use of micro-silica with mortar decrease the air pollution. Silica fume also decrease the voids in mortar. Addition of silica fume reduces capillary.

WATER:

Water fit for drinking is generally considered fit for making mortar. Water should be free from acids, oils, alkalis, vegetables or other organic Impurities. Soft waters also produce weaker mortar. Water has two functions in a mortar mix. In our proposed method, we are using recron fiber in mortar of about 0.4%, 0.8%, 1.2%, 1.6%, in mortar cubes. We also add micro silica fume 10% in our project. The size of the mortar cube is 70.6mm X 70.6mm X 70.6mm. From the optimum compressive strength of the mortar cube we are going to cast panel in those panels. We are expecting for good results. The size of the mortar panel is 40cm X 20cm X 2cm to be casting.

CASTING DETAILS OF SPECIMEN

MORTAR CUBES

For determining compressive strength of mortar, cubes were casted. Addition of fiber will be varying by 0.4% onwards. With the intervals of 0.4%.The details of mix proportion of material are given below.

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PLACING, CASTING AND COMPACTING OF MORTAR CUBES

Before placing of mortar, the cube mould must be oiled for the ease of mortar specimens stripping. The oil used is a mixture of diesel & kerosene. Special care was taken during the oiling of the moulds, so that there are no stains left on the moulds.

Figure – Casting of Mortar Cubes

CURING OF MORTAR CUBES

mortar. Curing is an important process to prevent the mortar specimens from losing of moisture while it is gaining its required strength. Lack of curing will lead to improper gain in the strength.

After 7 days, 14 days, 28 days of curing, the mortar specimens were removed from the curing tank to conduct compressive test of mortar cubes.

TESTING OF MORTAR CUBES

Compression test is the most common test used to test the hardened mortar specimens because the testing is easy to make. The specimens used in compression test were the cube of 70.6 mm x70.6 mm x70.6 mm. Apparatus and test Procedure of compression test the apparatus and equipment's used in compression test were according to IS: 509-1959.

PANELS

The mortar panel cast by the optimum percentage achieved from compressive strength of mortar. Here addition of fiber various 0.1% from the optimum percentage of fiber. The recron fiber adding to the mortar in 0.3%, 0.4%, 0.5% of the weight of the cement and the silica fume 10% replaced by weight of the fine aggregate. The detailed mix proportions are given below in Table

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Adding of Fiber	Cement	Fine Aggregate	W/C Ratio	Fiber in Volume (%)	Silica Fume in %
0.3% Added	1	3	0.45	0.3	10
0.4% Added	1	3	0.45	0.4	10
0.5% Added	1	3	0.45	0.5	10

Figure – Casting of Mortar Cubes.

PLACING, CASTING AND COMPACTING OF MORTAR PANELS

Before placing of mortar panel, the panel mould must be oiled for the ease of mortar specimens stripping. The oil used is a mixture of diesel & kerosene. Special care was taken during the oiling of the moulds, so that there are no mortar stains left on the moulds.

CURING OF MORTAR PANELS

After leaving the fresh mortar in the moulds to set overnight, the mortar specimens in the moulds were stripping. The identification of mortar specimens was done. After 24 hours, all the mortar specimens were placed into the curing tank with a controlled temperature of 25° C in further for 7 days, 14 days, and 28 days for the hardened properties test of mortar. Curing is an important process to prevent the mortar specimens from losing of moisture while it is gaining its required strength. Lack of curing will lead to improper gain in the strength. After 7 days, 14 days, 28 days of curing, the mortar specimens were removed from the curing tank to conduct Flexural test of mortar panels.

Fig Casting of Mortar Panel

Fig :Curing of Mortar Panel

CONCLUSION

From the experimental investigation it was noted that, In results conclude that fiber with silica fume to cement mortar at lower volume fraction (0.4%), increase the

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compressive strength of mortar which is higher than normal cement mortar.Performance and bending of panel specimen shown noticeable improvement. Bending performance of panel shows the Ductility factor which is the ability of material to with stand high load with small deformation without failure.