



Experimental Investigation on Concrete Floor Tiles with Plastic Fibers

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Abstract : In many industries flooring is done by concrete tiles. Damping materials such as rubber is provided between machines and floor to avoid damages due to vibration from machines to floors. Solid waste management is becoming as an emerging area by the impact of plastic wastes. The used PET bottles are also one of the major solid wastes. The concept of reduce, recycle & reuse is used now a day for better solid waste management. The fibers from the PET bottle wastes taken to improve the flexural capacity of the concrete can be proven by many of the researchers. Our project is about to make compare the results of normal concrete tile to the concrete tile with addition of waste plastic fibers. These are easy to manufacture and install. These kinds of tiles reduce cost and waste, easily recycle the wastes and reuse them in innovative way by modern techniques.

Keywords : Cement, Aggregate, Tile, Plastic Fiber.

Introduction

We are in the fast growing infrastructure and the need of the industries and residential buildings. The need of building materials also plays a role development of infra with minimum cost. In many industries flooring is done by concrete tiles, in order to reduce cost, easy manufacturing & installation. The materials provided between machines and floor to avoid damages due to vibration from machines to floors becoming important one. This paper is about to adding dampers such as waste plastic bottles directly with concrete tiles to increase its flexural strength which minimally acts in a concrete tile.

Mix Ratio

Mix design of normal concrete tile is 1:2:2 Mix design of concrete tile with plastic fiber is 1:2:2 having 5%, 10%, and 15% of plastic fiber with respect to weight of cement.

DIMENSIONS OF TILES		
LENGTH (mm)	BREADTH (mm)	DEPTH (mm)
457	457	10

Tile Size:

Materials Used:

Ordinary Portland Cement 33 grade were used to make concrete tile to compare with fiber added concrete tile. The river sand and 10mm coarse aggregate were to be taken for specimen casing.

Properties of Materials

Initial setting time = 30 minutes for sample cement
 Final setting time = 10 hours
 Fines modulus = 1.754
 Specific gravity of cement = 3.10 g/cc
 Specific gravity of fine aggregate (G) = 2.44
 Percentage of water absorbed = 5.21 %
 Specific gravity of coarse aggregate (G) = 2.58
 Percentage of water absorbed = 1.71 %

Experimental Investigation

Preparation of mould: 300mm*300mm*10mm size mould were prepared for casting of tile specimens. The tiles were casted with manually.

Testing

IS 1237: 2012 annex A to annex G test procedures.

1. Flatness of tile surface (annex B): the flatness has been checked by using the ruler which is greater than the diagonal of the specimen.
2. Perpendicularity (annex C): The gap between the arm of the square and the edge of the tile shall be 4mm
3. Straightness (annex D): The tile will be straight in all four edges.
4. Water absorption test (annex E): water absorption should be within 3% - 6%.
5. Compressive strength: the tile specimen with 150mm* 150m,m *10mm were taken for the test.

Result

Flatness of Tile Surface: Tile is 10 mm concavity & 3mm convexity.
 Perpendicularity: The gap between the arm of the square and the edge of the tile is 4mm.
 Straightness: The tile is straight in all four edges.
 Water Absorption:

Table 1: Water absorption test:

Sample	Percentage water absorption (%)
Normal mix (1:2:2)	1.431
5% of fiber added mix	2.555
10% of fiber added mix	2.807
15% of fiber added mix	1.533

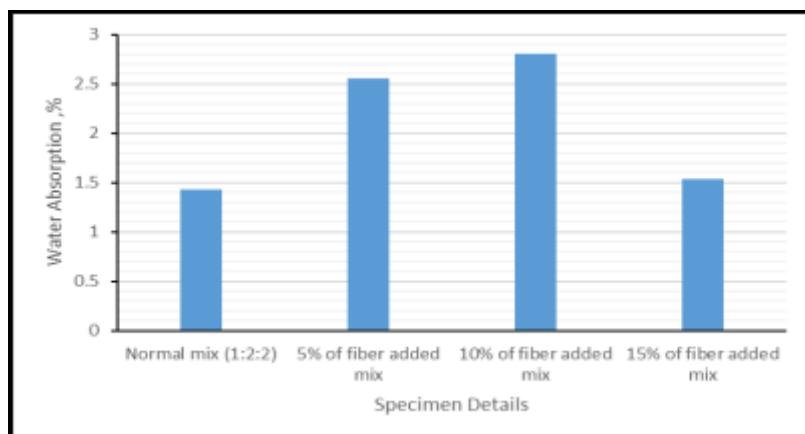


Fig. 1 Water absorption

Wet transverse strength

Table 2 Wet transvers strength:

Sample	Wet Transverse Strength (N/mm2)
Normal Mix (1:2:2)	108.5
5% of fiber added mix	115.5
10% of fiber added mix	123.55
15% of fiber added mix	120.05
Ceramic tiles	0

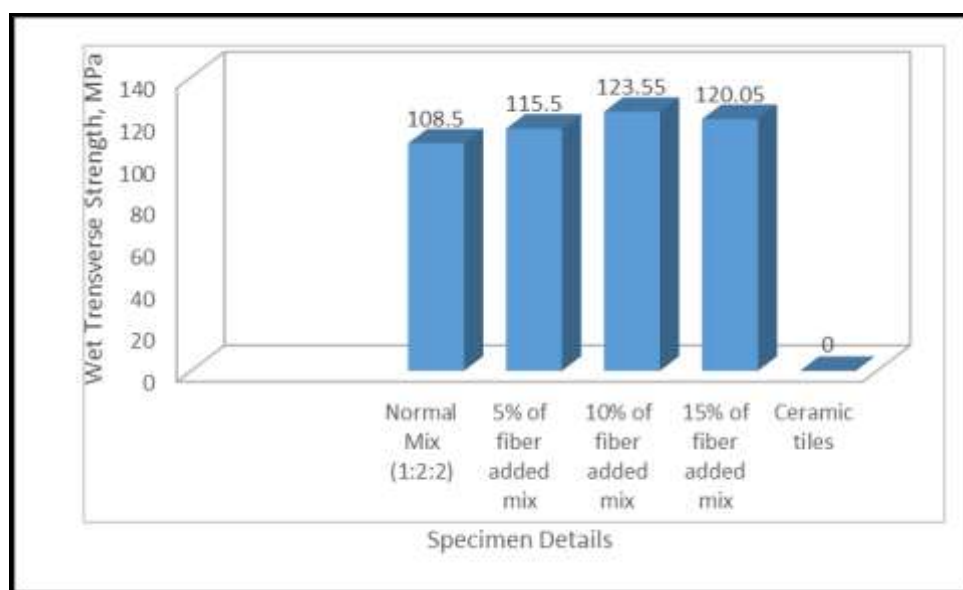


Fig 2 – Wet Transverse Strength, Mpa

Compressive Strength:

Table – 3 Compressive strength of tiles:

Sample	Stress (N/mm2)
Normal Mix (1:2:2)	41.05
5% of fiber added mix	43.42
10% of fiber added mix	44.89
15% of fiber added mix	44.84

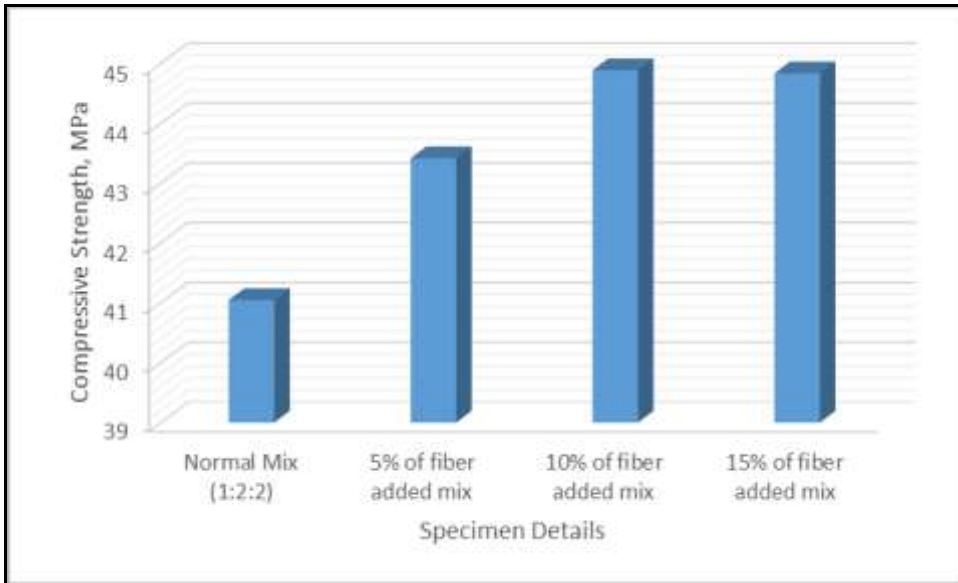


Fig 3 - Compressive Strength Test

Conclusion

Thus the tested property of concrete tile with 10% & 15 % of plastic fiber added has more values than normal concrete tile while the depth is 10 mm. This kind of tiles are easy to manufacture and easy to install & replace in industries for flooring. These tiles are used to avoid providing dampers in industries between machines and floor while the plastic fiber strength is directly provided to tile.

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