International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 06 Issue: 04 | Apr 2019 www.irjet.net p-ISSN: 2395-0072

A REVIEW ON EXPERIMENTAL ANALYSIS OF MECHANICAL PROPERTIES ON CONCRETE BY USING POLYETHYLENE TEREPHTHALATE FIBRES

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Abstract - *Now days concrete become most important material and it's demand increase day by day. In the day of research innovative material in concrete is plastic waste. After research observed that plastic waste improve the mechanical characteristic of concrete and become durable. PET (polyethylene terepthalate) bottle use as fiber in concrete. The strength is improved by improving percentage of fibers in concrete after 28 days curing. The quality of industrial PET fiber reduce by application of waste PET bottle so that concrete become economical. The researchers want to minimize or solving problems generated by plastic in earth.*

Key Words: Polyethylene Terephthalate (PET), compressive strength, flexural strength

1. INTRODUCTION

concrete have high compressive strength, long life, durable, low cost etc. But it has also many disadvantage like low tensile strength and crack resistance. Many performance done in concrete for improving its weaknesses, one of them is fiber. After research observed that strength increases with increasing percentage of fibers. But fiber concrete is not workable due to its poor bonding with cement paste, for overcome add super plasticizer. PET is thermoplastic resin of polymer family and it consider as most important polymer for its rapid growth in its use. It is used to prepare water bottle, soft drink and cold drink bottle. Generally PET bottle are recycle materials but in India 15342 tons daily generated but only 9342 tons collected, for environment it is a big problem. PET bottles are treated by landfill, burning, thrown in ocean etc. Causes many environmental problems.PET bottle fiber use to improve mechanical properties of concrete.

1.1 LITERATURE REVIEW

Showkat and Sood: In this paper study the effect of PET fiber used 2 to 5 % with M20,M25,M30 grade of concrete. When fiber add 1%,2%,3%,4%,5% in concert grade for 3,7,28 days resulting strength increases with addition of 2% and 3% but strength decrease after 4% and 5% additional fiber.

In these paper result obtained after addition on 3% of west PET fiber the flexural strength is 3.96,4.64,6.26 N/mm^2 also the tensile strength is obtained 3.18,3.18,4.26 N/mm^2.

Dora foti : Used PET fibre in the shape of circular or short strips due to its good sewing effect in post cracking face of concrete the result are obtained for addition of 0.50% and 0.75% fiber compressive strength is 36.9 N/mm^2 and 39.27 N/mm^2 also tensile strength are 3.65 N/mm^2 and 4.55 N/mm^2.

In these paper study other advantages like concrete behave more ductile, reduction of plastic waste and product cost.

Salahaldein alsadey : In this paper use PET bottle fiber in the shape of rope of 18mm in length. The specific gravity of plastic fiber is 0.8. the concrete give slump cone value after addition of 0%,1%,1.5%,2%,2.5%,3% the slump size 130,75,65,60,50,45 also the flow result 505,460,440,390,325,310. So in conclusion slump test not be considered as suitable test for workability of concrete. Similarly the compressive strength of concrete increase with increasing % of fiber. after addition of PET fiber 0%,1%,1.5%,2%,2.5%,3% is 25,28,29,27,27,25 N/mm^2 respectively.

Results Obtained from slum and Flow Test			
Mixture	Plastic bottle fiber contant	Slump (mm)	Flow (mm)
M0	0	130	505
M1	1	75	460
M2	1.5	65	440
M3	2	60	390
M4	2.5	50	325
M5	3	45	310

COMPRESSIVE STRENGTH		
Mixture	Fiber in percentage	Compressive strength(N/mm^2)
M0	0	25
M1	1	28
M2	1.5	29
M3	2	27
M4	2.5	27
M5	3	25

Thakur and kamboj: In these research paper the PET fiber are added in 0% to 0.75%. It improve compressive strength 55.29,56.49,58.22,59.01 N/mm^2 . the tensile strength increases after increasing % of fibers observed 4.13,4.34,4.72,5 N/mm^2. Same as after addition of fiber the flexural strength of concrete also increase 5.67,6.33,6.57,7.67 N/mm^2.

Reddy and Kumar : In these paper the study of mechanical properties of concrete observed after addition of PET bottle fiber in 0.25%,0.50%,0.75%. The fiber is cut in circular shape with width 5mm to 7mm and diameter 6mm and thickness is 0.6mm.The result of PET fiber after addition of 0%,0.25%,0.50%,0.75% resulting compressive strength is 55.29,56.49,58.28,59.01 N/mm^2 , tensile strength calculate 4.13,4.34,4.72,5 N/mm^2 also flexural strength is 5.67,6.33,6.57,7.67 after 28 days curing.

COMPRESSIVE STRENGTH			
PET	7 days	14 days	28 days
0	39.11	47.9	55.29
0.25	40.31	49.5	56.49
0.50	41.79	50.5	58.22
0.75	42.59	51.75	59.01
SPLIT STRENGTH			
PET	7 days	14 days	28 days
0	2.7	3.32	4.13
0.25	2.87	3.54	4.347
0.50	3.07	3.81	4.72
0.75	3.14	4.01	5
FLEXURAL STRENGTH			
PET	7 days	14 days	28 days
0	3.17	3.83	5.67
0.25	3.33	4.17	6.33
0.50	3.83	4.5	6.57
0.75	4.33	5.33	7.67

Lukowski,wilinski etal : In these paper pet fibre cut in 50-70 mm in length,2-3 mm in width and 0.20-0.25 mm in thickness. Fiber have density 1.38 $g.cm^3$. Fiber added 0%,0.1% and 0.3%. the slump cone value obtained 100,50,10. The compressive

strength obtained after 28 days curing 34.6,35.2,33.8 MPa and flexural strength is 3.7,3.6,3.6 Mpa. The result of strength increases with 0.1% of fibers addition and after decrease.

2. CONCLUSION

The conclusion obtained by previous research paper the PET fiber used to improve mechanical properties of concrete.The various percentage of fibers affect or improve characteristic of concrete in green and hard state.Mainly PET fiber improve the compressive strength, tensile strength and flexural strength of concrete.PET fibre concrete not give good workability due to poor bonding of cement past as fiber.Concrete become economical and durable also reduce plastic waste problems and environmental safe.

REFERENCES

[1] Showkat Maqbool , HemantSood "Effect of PET fibers on the performance of concrete", volume-4,issue 12,December2016.

[2] Aditya Krishna Reddy .K, ArunKumar.c "Study of Mechanical Properties of Concrete using waste Pet bottles Fibers for the Reinforcement" volume -4, issue 2,April 2014 .

[3] Manhal A Jibrael and Farah Peter "Strenght and Behavior of Concrete Contains Waste Plastic" issue 31,May,2016. Salahaldein "Utilization of Plastic Bottle Waste in Concrete" volume -1 issue27,July 2016.

[4] B.Harini& K.V Ramana "Use of Recycled Plastic Waste as Partial Replacement for Fine Aggregates in Concrete" vol-4, issue 9,September 2015

[5] Ms. K.Ramadevi, Ms.R.Manju "Experimental Investigation on the Properties of Concrete With Plastic PET (bottles) Fibers as fine Aggregates" vol-2, issue 6,June 2012.

[6] SwaptikChowdhury , Aastha Tashkant Maniar, Om. Suganya "Polyethylene Terephthalate (PET) Waste as Building Solution" (IJCEBS) vol-1, issue 2(2013).

[7] MastanVali N "PET Bottles Waste as a Supplement To Concrete Fine aggregates"(IJCIET) vol-8,issue 1,January2017.

[8] Sawsan D.A Shubbar and AqeelS.Al-Shadeedi "Utilization of Plastic Bottles as Fine Aggregate in Concrete" vol-8, issue 2, June 2017.

[9] T.SenthilVadivel "An Experimental Study of Mechanical Properties of Waste Plastic Fibers Reinforced Concrete" International journal of Emerging Trends in Engineering and Development, vol-2 issue 3 March 2013.

[10] IS: 10262:2009, recommended guidelines for concrete mix design, bureau of Indian standers New Delhi.