

# SIFCON Experimental Sediment- Related Sand Analysis

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**ABSTRACT:** Slurry-infiltrated fibrous concrete(SIFCON) is a material that does not have coarse aggregate but have a high cement content. But in our research, we are using coarse aggregate in addition to the fiber and by replacing the river sand with manufacture sand that will help in ecological construction. In this study we will differentiate the compressive strength and split tensile strength one-by-one with river sand and with manufacture sand by using 10% and 20% steel fiber in addition to coarse aggregate. Values were calculated as the average of three specimens, when the specimen fails under the Universal Testing Machine (UTM) or crack starts appearing. Volume of fiber that is used in our research is high.

**KEYWORDS:** SIFCON, Coarse aggregate, Compressive Strength, Split Tensile Strength, Ecological, UTM, Crack, Fiber.

## INTRODUCTION:

SIFCON is one of the strongest concrete available for construction today, researches are going on different materials to be used in it for increasing its strength. Here in this research, we have used cement, fine aggregate, coarse aggregate and fiber without any admixture.

In this project we use SIFCON in which coarse aggregate is added with high Cementous content. SIFCON is having high fiber content and which gives it a high strength and it possess high toughness as well as they are good for impact resistance structure. SIFCON is also a very good option for the earthquake prone areas, because of its property the structure can withstand huge

damages. SIFCON is a type of concrete which is rich in fibrous content as well as in cement content which consequently removing the coarse fraction. If we remove coarser fraction and include a large volume of fiber which will make a major difference between SIFCON and Fiber Reinforced Concrete (FRC). The amount of fiber which is required in FRC should be less than 2% while the amount of fiber which is required in SIFCON ranges from 6%-20%. In this project we will check that which one is having more strength R Sand or M Sand both will be made with SIFCON and it will be tested in two ways that are Compressive strength test and Split Tensile test for that we made 36 Cube and 36 cylinder of Dimension 150mmX150mmX150mm, Cylinder is 150mmX300mm. The coarse aggregate which is used in this project is of size 10mm and the steel fiber is placed in three layers. The amount of fiber which is used in this project is 10% and 20% (i.e., 150g and 300g for cube, 240g and 480g for cylinder) in addition with coarse aggregate. Here the weight of the fiber is calculated as 10% and 20% weight of the cement. After casting it is been placed in water for curing and the tests are conducted in 3 intervals (7,14 and 28 days). For Compressive strength the cubes were tested on different days (i.e., 7,14,28 days) under the Universal Testing Machine and for the Split Tensile Strength cylinder is tested for different days (7,14,28 days) under Universal Testing Machine. For Split Tensile Strength the cylinder should be placed horizontally. All the readings were noted after the crackdown of the material and the strength is calculated in Mpa.

## II. EXPERIMENTATION:



First, we completed the mix design of M25 grade concrete that we are adopting for SIFCON, all the calculations done were in accordance with the IS Specification code books, and after completing the design we got the ratio of M25 grade concrete as (cement:F.A.: C.A.)1:1.5: 2.66.

After this we conducted various experiments (i.e., Bulk Density, Fineness Modulus, Specific Gravity) on our material so that we can find out the necessary details required for the completion of project and the values are shown below.

MATERIAL		BULK DENSITY	FINENESS MODULUS	SPECIFIC GRAVITY
Fine Aggregate(R-Sand)		1754.25	2.45	2.65
Coarse Aggregate		1913	6.125	2.70
Fine Aggregate(M-Sand)		1800	2.7	2.7

### MIX DESIGN OF M25:

MIX PROPORTION FOR 1M3 OF CONCRETE					
Materials	kg	Ratio			
Cement	450	1			
Water	192	0.4			
Fine Aggregate	680	1.51			
Coarse Aggregate	1197	2.66			
<b>Total</b>	<b>2518</b>				
Water cement ratio	0.4				
CA/Cement	2.66				
FA/Cement	1.51				
TEST SPECIMEN					
Size :150mm x 150mm	0.0034	m3	Ratio	10% (g)	20% (g)
	0.0034m3	Kilogram	Gram		
Cement	1.5101	15100	1.51		
Water	0.6498	646	0.4		
Fine Aggregate	2.302	2302	1.51		
Coarse Aggregate	4.0498	4045	2.66		
Fiber				150	300
Size : 150mm x 300mm	0.0053	m3	Ratio	10 % (g)	20% (g)
	0.0053 m3	Kilogram	Gram		
Cement	2.385	2385	1.51		
Water	1.017	1017	0.4		
Fine Aggregate	3.604	3610	1.51		
Coarse Aggregate	6.344	6344	2.66		
Fiber				240	480

### III. CASTING OF THE MATERIAL:



For casting we used 150X150X150mm cubes and 150 mm diameter and 300 mm height cylinders. Both the cubes and cylinder were cleaned properly with the help of brush and after this oil is applied to the cubes and cylinder so that the specimen does not stick to the mould and comes out properly.

After this we made the slurry of SIFCON by mixing it in concrete mixer for 5 minutes and the materials used are coarse aggregate (10 mm), fine aggregate (R-Sand / M-Sand), cement (OPC 53) and

water. The slurry in the cube and cylinder is placed in 3 layers and after each layer we added the fiber (Crimped steel fiber 35mm length and 1.0mm diameter) manually with our hands after weighing the exact quantity (i.e., 10%, 20% to the weight of cement).

After this the mould is kept for 24 hours so that the paste becomes solid and after this the specimen is kept in water for the testing of compressive and split tensile strength for different days (7, 14, 28 daystest) so the specimen attain its desired strength.



### IV. RESULTS :

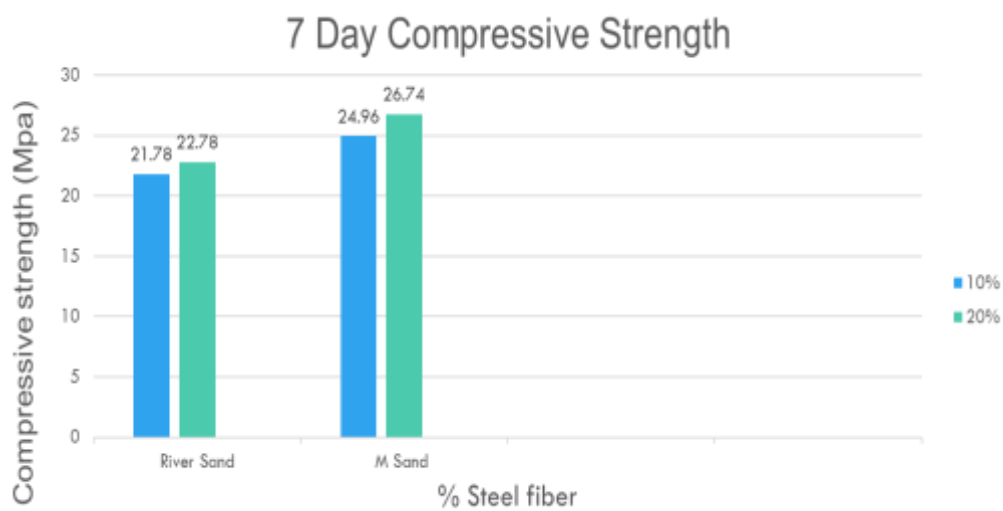
We conducted Compressive and Split Tensile Strength test on cubes and cylinders in Universal Testing Machine for 7, 14, 28 days.

(I)- FOR COMPRESSIVE STRENGTH:

a)- For 7 days,

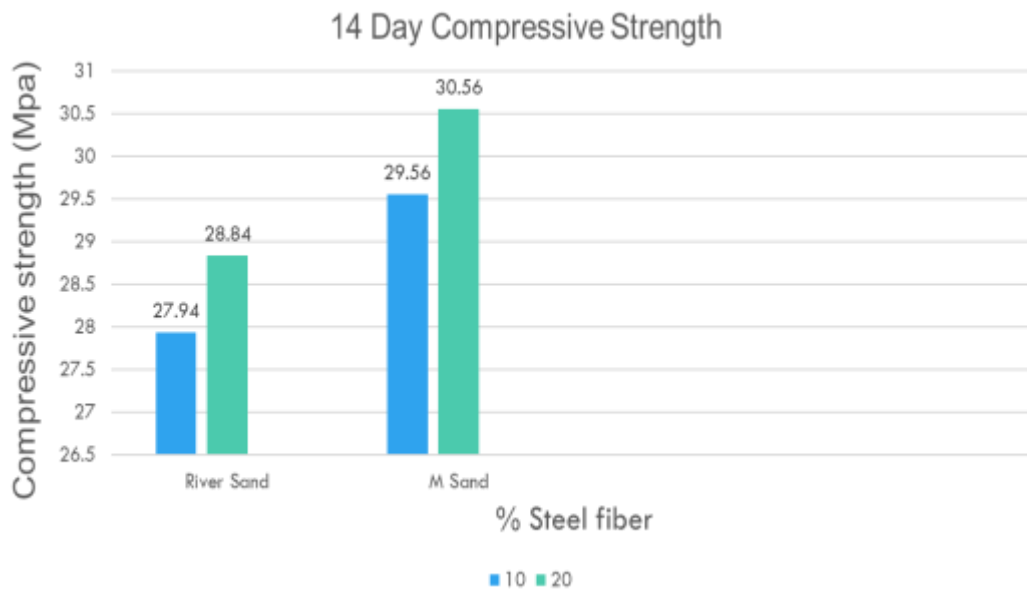
The compressive strength test is done for 7, 14 and 28 days curing period. For each specimen three cubes were casted and tested and the average values for different days are given below in the tables.

S.No.	Steel fiber(%)	River sand(Mpa)	M-Sand(Mpa)
1	10	21.78	24.96
2	20	22.78	26.74



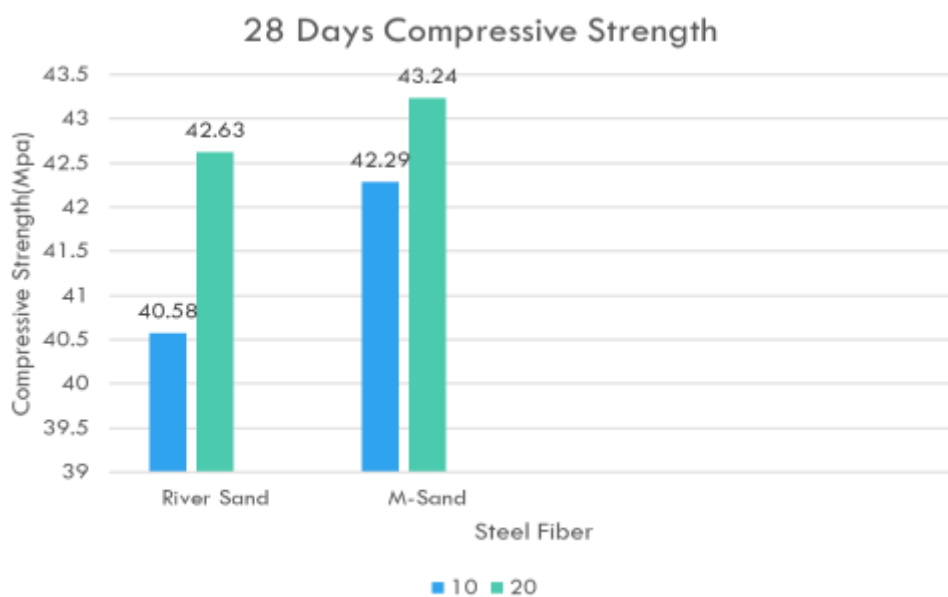
b)- For 14 days,

S.No.	Steel fiber(%)	River sand(Mpa)	M-Sand(Mpa)
1	10	27.94	29.56
2	20	28.84	30.56



For 28 days,

S.No	Steel Fiber(%)	River Sand (Mpa)	M-Sand(Mpa)
1	10	40.58	42.63
2	20	42.29	43.24



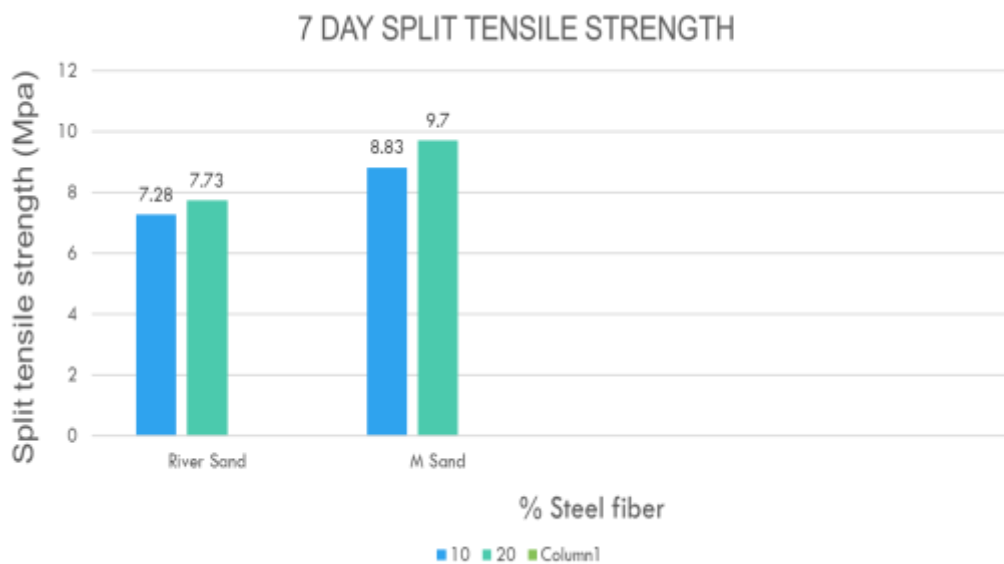
(II)- FOR SPLIT TENSILE STRENGTH:

For Split Tensile Strength test is done after the curing period i.e. 7, 14, 28 days. For each value written down in the table three cylinders are tested

and the average of three is the final reading. Here the cylinders are placed horizontally and values are given below in the tables.

a)- For 7 days,

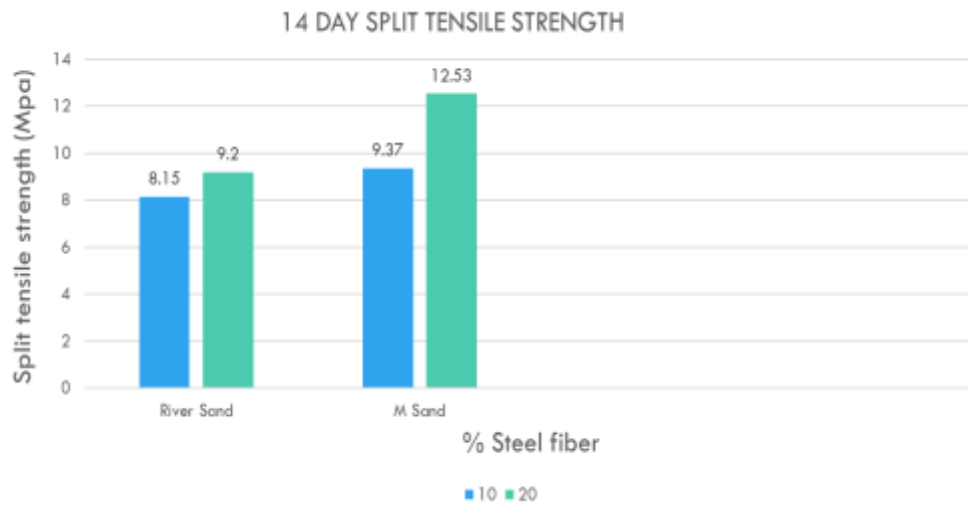
S.No.	Steel fiber(%)	River sand(Mpa)	M-Sand(Mpa)
1	10	7.28	8.83
2	20	7.73	9.70



b)- For 14 Days,

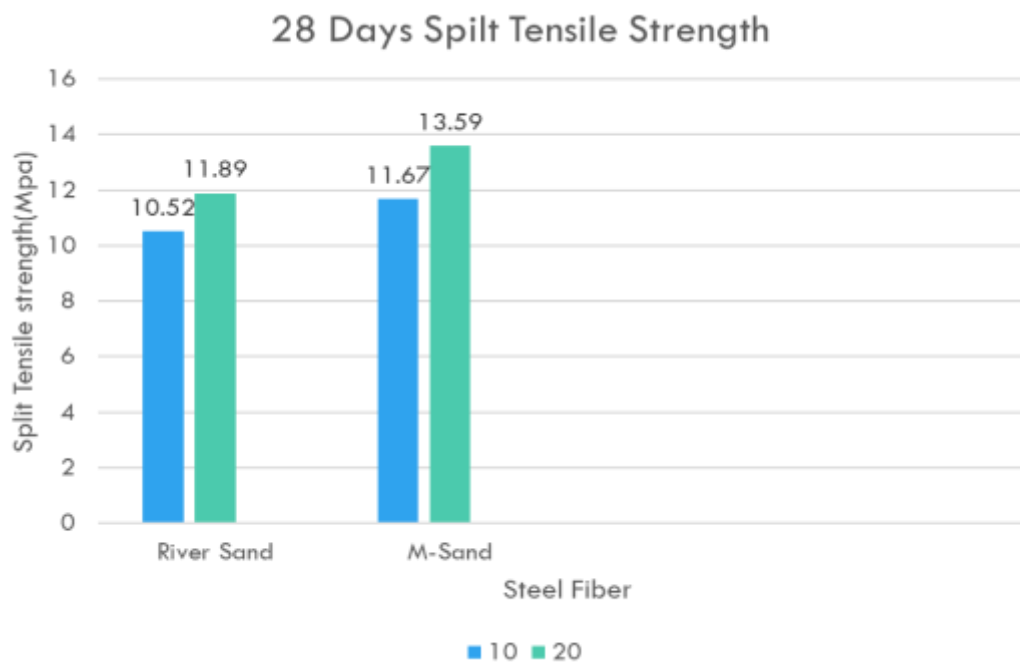
S.No.	Steel fiber(%)	River sand(Mpa)	M-Sand(Mpa)
1	10	8.15	9.37
2	20	9.20	12.53





c)- For 28 Days,

S.No	Steel Fiber(%)	River Sand(Mpa)	M-Sand(Mpa)
1	10	10.52	11.83
2	20	11.67	13.59



### CONCLUSION:

It is observed that that application of high fiber content in SIFCON is accepted because of its high strength properties. The strength is increasing steadily when river sand gets replaced by m-sand. After observing the results of 7,14,28 days for 10% and 20% fiber the compressive strength of river sand is less than m-sand. After observing the results of 7,14,28 days for 10% and 20% fiber the split tensile strength of river sand is less than m-sand. due to less impurities in m-sand, we can produce a better quality SIFCON. M-sand is ecofriendly as compared to river sand as the river sand is lifted from river bed and M-sand is man-made. Thereupon, m-sand with high fiber content is a better solution to river sand with high fiber content.

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