



EXPERIMENTAL STUDY ON PARTIAL REPLACEMENT OF FINE AGGREGATE WITH CERAMIC TILE WASTE IN CONCRETE

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ABSTRACT

Because of the everyday advancements and improvement in development field, the utilization of fine totals is expanded colossally and simultaneously, the creation of strong squanders from the tear-downs of developments is additionally very high. Due to these reasons the reuse of annihilated constructional squanders like fired tile came into the image to diminish the strong waste and to lessen the shortage of normal totals for making concrete. The fired tile squander isn't just happening from the destruction of structures yet in addition from the assembling unit. Studies show that around 20-30% of material arranged in the tile fabricating plants are changing into squander. This waste material ought to must be reused so as to manage the restricted asset of fine total and to decrease the development squanders. Squashed waste fired tiles, squashed waste earthenware tile powder and are utilized as a substitution to the coarse totals and fine total. The earthenware squander squashed tiles were mostly supplanted set up fine totals by 10%, 20%, 30%, 40%. artistic tile powder were supplanted instead of fine total by 10% alongside the clay coarse tile. M25 evaluation of cement was structured and tried. The blend structures for various kinds of blends were set up by supplanting the coarse totals and fine total at various rates of squashed tiles powder. Trial examinations like Compressive quality test, for various cement blends in with various rates of waste squashed and following 7 days and 28 days relieving period have done. It has been seen that the usefulness increments with increment in the level of substitution of squashed tiles increments. The quality of cement likewise increments with the artistic coarse tile total up to 30%percentage.

KEYWORDS : Crushed Tiles, Compressive Quality

INTRODUCTION

In the present construction world, the solid waste is increasing day by day from the demolitions of constructions. There is a huge usage of ceramic tiles in the present constructions is going on and it is increasing in day by day construction field. Ceramic products are part of the essential construction materials used in most buildings. Some common manufactured ceramics include wall tiles, floor tiles, sanitary ware, household ceramics and technical ceramics. They are mostly produced using natural materials that contain high content of clay minerals. However, despite the ornamental benefits of ceramics, its wastes among others cause a lot of nuisance to the environment. And also in other side waste tile is also producing from demolished wastes from construction. Indian tiles production is 100 million ton per year in the ceramic industry, about 15%- 30% waste material generated from the total production. This waste is not recycled in any form at present, however the ceramic waste is durable, hard and highly resistant to biological, chemical and physical degradation forces so, we selected these waste tiles as a replacement material to the basic natural aggregate to reuse them and to decrease the solid waste produced from demolitions of construction. Waste tiles and granite

2 TILE AGGREGATE CONCRETE:

Squashed tiles are supplanted instead of coarse total and rock powder instead of fine total by the level of 10%. The fine and coarse totals were supplanted separately by these squashed tiles and stone powder and furthermore in mixes that is substitution of coarse and fine totals one after another in single blend. For dissecting the appropriateness of these squashed waste tiles and rock powder in the solid blend, usefulness test was directed for various blends having various rates of these materials. Droop cone test is utilized for performing functionality tests on new concrete. Furthermore, compressive quality test is likewise led for 3, 7 and 28 days relieving periods by throwing shapes to dissect the quality variety by various level of this waste materials. This current examination is to comprehend the conduct and execution of fired strong waste in concrete. The waste squashed tiles are utilized to somewhat supplant coarse total by 10%, 20%, 30%, 40% and half. Stone powder is likewise utilized incomplete supplant fine total by 10%

3 MATERIALS AND PROPERTIES

3.1 MATERIALS USED

In this examination, the accompanying materials were utilized:

- Ordinary Portland Cement of 53 Grade concrete complying with IS: 169-1989
- Fine total and coarse total complying with IS: 2386-1963.

- Water.
- Ceramic tile squander

3.2 CEMENT

Ordinary Portland Cement of 53 Grade of brand name Ultra Tech Company, available in the local market was used for the investigation. Care has been taken to see that the procurement was made from single batching in air tight containers to prevent it from being effected by atmospheric conditions. The cement thus procured was tested for physical requirements in accordance with IS: 169-1989 and for chemical requirement in accordance IS: 4032-1988. The physical properties of the cement are listed Basically made out of finely partitioned rough material and mineral particles. The most widely

Table 3.2.1 Properties of cement

S.No	Properties	Test results	IS: 169-1989
1.	Normal consistency	0.32	
2.	Initial setting time	50min	Minimum of 30min
3.	Final setting time	320min	Maximum of 600min
4.	Specific gravity	3.14	
5.	Compressive strength		
	3days strength	29.2 Mpa	Minimum of 27Mpa
	7days strength	44.6 Mpa	Minimum of 40Mpa
	28days strength	56.6 Mpa	Minimum of 53Mpa

3.3 FINE AGGREGATES:

Sand is a characteristic granular material which is recognized constituent of s and is silica (silicon dioxide, or SiO₂), as a rule as quartz, on account of its concoction dormancy and extensive hardness, is the most widely recognized enduring safe mineral. Subsequently, it is utilized as fine total in concrete. Stream sand locally accessible in the market was utilized in the examination. The Total was tried for its physical necessities, for example, degree, fineness modulus, explicit gravity as per IS: 2386-1963. The sand was surface dried before use given in table

3.3.1 Properties of fine aggregate

S.No	DescriptionTest	Result
1	Sandzone	Zone-III
2	Specific gravity	2.59
3	FreeMoisture	1%
4	Bulk density of fine aggregate (poured density)	1385.16kg/m ³
	Bulk density of fine aggregate (tapped density)	1606.23kg/m ³

WATER:

Water assumes an imperative job in accomplishing the quality of cement. For complete hydration it requires around 3/10th of its weight of water. It is for all intents and purposes demonstrated that base water-concrete proportion 0.35 is required for ordinary cement. Water partakes in compound response with concrete and concrete glue is shaped and ties with coarse total and fine totals. On the off chance that more water is utilized, isolation and draining happens, with the goal that the solid gets frail, yet a large portion of the water will retain by the strands. Subsequently it might abstain from drying. On the off chance that water content surpasses allowable cutoff points it might cause drying. On the off chance that less water is utilized, the necessary functionality isn't accomplished. Consumable water fit for drinking is required to be utilized in the solid and it ought to have pH esteem runs between 6 to 9.

CERAMIC TILE AGGREGATE:



Figure 3.5.1 ceramic tile aggregate

Broken tiles were gathered from the strong misuse of artistic assembling unit and from wrecked structure. The waste tiles were squashed into little pieces by physically and by utilizing smasher. The necessary size of squashed tile total was isolated to utilize them as incomplete substitution to the regular coarse total. The tile squander which is lesser than 4.75 mm size was disregarded. The squashed tile total going through 16.5mm strainer and held on 12mm sifter are utilized. Squashed tiles were in part supplanted instead of coarse total by the rates of 10%, 20% and 30%, 40% and half independently and alongside supplanting of fine total with stone powder also.

Compressive strength:

A total of 12 cubes of size 150 x 150 x 150mm were casted and tested for 7 days, days and 28 days testing each of after conducting. The results are tabulated below:

Compressive Strength Results:

S.NO	Replacement Details	7days(N/mm ²)	28days(N/mm ²)
1	Nominal Mix	34.65	42.14
2	10%CTW+90%FA	33.52	33.84
3	20%CTW+80%FA	36.68	39.50
4	30%CTW+70%FA	38.80	52.50
5	40%CTW+60%FA	23.46	39.50

RESULTS AND CONCLUSION

General:

The essential target of the investigation is to set up a solid significantly more steady and strong than the traditional by supplanting totals both coarse and fine. Blend plans for all the substitutions of materials has done and a sum of 14 3D squares arranged and tried in the part of solidarity figuring and further more examinations has done.

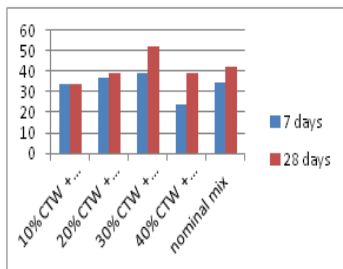


Fig: Analysis Of Strength For 7 And 28 Days

CONCLUSIONS

The accompanying ends are made dependent on the trialexaminations on compressive quality, considering the environmental perspectives

too: The functionality of solid increments with the expansion in tile total substitution. The usefulness is additionally expanded with the option of rock powder which goes about as admixture because of its chemical properties.

The properties of cement expanded straightly with the expansion in artistic total up to 30% substitution later it is decreased linearly.

M3 blend of cement delivered a superior cement as far as compressive than the different blends. Be that as it may, the stirs up to half of fired coarse total can be used.

The utilization of clay fine total has some impact on the properties of cement in decrement way.

The expansion of alongside the clay coarse total improves the mechanical properties of cement somewhat since mineral and compound properties of tiles.

The quality of fired tile total is especially in a straighter way evaluation of cement.

FUTURE SCOPE OF WORK

There is a huge extent of research in the reused total use in concrete particularly earthenware tile squanders later on. The conceivable research examinations that should be possible are referenced beneath:

The use of marble floor tiles can be concentrated as it is like that of tile squander age and furthermore it is very hard contrasted with the characteristic squashed stones utilizing in ordinary cement.

The use of stone powder in concrete as an admixture to improve the usefulness of cement and the quality parameters can likewise be learned at different rates.

A blend of various tiles (in light of their utilization) in various extents in concrete and their impacts on solid properties like quality, usefulness and so on can be resolved.

By the utilization of clay tile total in concrete, the physical properties like toughness, penetrability and so forth., can be broke down to set up a solid with more favorable than customary cement.

A concentrate on properties of cement made with mix of reused total and tile total in various extents can be examined to improve the solid properties and furthermore to decrease the contamination or waste age from development industry.

A further examination on the utilization of stone powder alone as a substitution to fine total can be completed the chance of utilizing such waste age from enterprises.

The mechanical properties of cement with marble total (squander) either from assembling units or from development destruction can be researched to improve the properties like penetrability; protection from sound can likewise be studied.

Ceramic tile total in high quality cement can be concentrated further to check the chance of its utilization in elevated structures.

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