Experimental Investigation of Blunderness Testing In Concrete Cubes

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Abstract- **This paper presents the experimental study on blunder mistakes in testing concrete cubes of grades M25 and M30. Thirty cubes were casted to test the concrete cubes by placing the cubes in compression testing machine as per IS516 - 1959, Cube placed at casted side, Cube placed at outside the circle, Cube placed Diagonally, Cube Misplacement. From this, the test result the misplacement of concrete cube in CTM was given huge difference in strength. More than 8% of strength was decreased when it is misplaced. From this, testing of concrete cubes strength varies from misplacing the cubes in compression testing machine during the application of load. It is suggested to refer the code book before the testing.**

Index Terms- **compression, IS516-1959, misplacement, diagnolly**

I. INTRODUCTION

Concrete is the most important material used for construction. In the modern world, the use of concrete has been increasing and it is being widely used for the construction of most of the buildings, bridges etc. Hence, it has been properly labelled as the backbone to the infrastructure development of a nation. Currently, our country is taking major initiatives to improve and develop its infrastructure by constructing express highways, power projects and industrial structures to emerge as a major economic power. To meet out this rapid infrastructure development a huge quantity of concrete is required. Ordinary Portland cement (OPC) is by far the most important type of cement. Generally use of high grade cements offer many advantages for making stronger concrete. One of the most important benefits is the faster rate of development of strength. The manufacture of OPC is decreasing all over the world in view of the popularity of blended cement on account of lower energy consumption, environmental pollution, economic and other technical reasons. Unfortunately, India is not self-sufficient in the production of cement, the main ingredient of concrete and the demand far exceeds the supply and makes the construction activities very costlier.

II. NEED FOR PROJECT

1. To get accurate compressive strength result of the concrete.
2. To reduce the errors in the concrete cube testing.
3. Identification of strength difference by blunder mistakes in concrete testing.
4. Effective use of compression testing machine.

III. SCOPE FOR THE PROJECT

1. To reduce the blunder mistakes in concrete testing by using CTM.
2. To obtain strength difference in different orientation of concrete cube testing.

IV. EXPERIMENTAL INVESTIGATION

The procedure for determining the compressive strength of concrete specimens as per IS 516-1959.
Apparatus: 1 Testing Machine - The testing machine may be of any reliable type, of sufficient capacity for the tests and capable of applying the load at the rate specified in 5.5. The permissible error shall be not greater than ± 2 percent of the maximum load. The testing machine shall be equipped with two steel bearing platens with hardened faces. One of the platens (preferably the one that normally will bear on the upper surface of the specimen) shall be fitted with a ball seating in the form of a portion of a sphere, the centre of which coincides with the central point of the

face of the platen. The other compression platen shall be plain rigid bearing block. The bearing faces of both platens shall be at least as large as, and preferably larger than the nominal size of the specimen to which the load is applied. The bearing surface of the platens. when new, shall not depart from a plane by more than 0·01 rom at any point, and they &ban be maintained with a permissible variation limit of 0·02 mm. The movable portion of the spherically seated compression platen shall be held OD the spherical seat, but the design shall be such that the bearing face CUI be rotated freely and tilted through small angles in any direction. Ate at Teat - Tests shall be made at recognized ages of the test specimens, the most usual being 7 and 28 days. Ages of 13 weeks and one year are recommended if tests at greater ages are required. Where it may be necessary to obtain the early strengths. tests may be made at the ages of 24 hours ± 1 hour and 72 hours ± 2 hours. The ages shall be calculated from the time of the addition of water to the dry ingredients. Number of Specimen - At least three specimens, preferably from different batches, shall be made for testing at each selected age.

NOTE - When a full investigation is being carried out. It 15 advisable for three separate batches to be made for each given variable. An equal number of specimens for each variable should he made.

Procedure - Specimens stored in water shall be tested immediately on removal from the water and while they are still in the wet condition. Surface water and grit shall be wiped off the specimens and any projecting fins removed. Specimens when received dry shall be kept in water for 24 hours before they are taken for testing. The dimensions of the specimen the nearest 0-2 mm and their weight shall be noted before testing. The bearing surfaces of the testing machine shall be wiped clean and any loose sand or other material removed from the surfaces of the specimen which are to be in contact with the compression platens. In the case of cubes, the specimen shall be placed in the machine In such a manner that the load shall be applied to opposite sides of the cubes as cast, that IS. Not to the top and bottom of the specimen shall be carefully aligned with the center of thrust of the spherically seated platen No packing shall be used between the faces of the test specimen and the steel platen of the testing machine As the spherically seated block is brought to bear on the specimen. the movable portion shall be rotated gently by hand so that uniform seating may be obtained. The load shall be applied without shock and Increased continuously at a rate of approximately 140 kg/ sq cm/min until the resistance of the specimen to the Increasing load breaks down and no greater load can be sustained. The maximum load applied to the specimen shall then be recorded and the appearance of the concrete and any unusual features In the type of {allure shall be noted. Calculation - The measured compressive strength of the specimen shall be calculated by dividing the maximum load applied to the specimen during the test by the cross-sectional area. calculated from the mean dimensions of the section (see also 4.5.1 of IS· 1199-1959) and shall be expressed to the nearest kg per sq cm, Average of three values shall be taken as the representative of the batch provided the Individual variation is not more than ± 1S percent of the average. Otherwise repeat tests shall be made.

V. TEST RESULTS AND DISCUSSION

Table 1 Compressive strength result of concrete after 28 days

Type of concrete	Crushing load KN	Average Compressive strength N/mm2	Difference in compressive Strength N/sq.mm
M25 as per code	648	28.8	
M25 With out of round dia	546	24.11	1.16 times lower
M25 with misplacement	596	26.22	1.08 times lower
M25 with loading at diagonal	684	30.09	1.04 times higher
Test on Casted side	724	31.94	1.10 times higher

Graph 1 compressive strength of M25 grade concrete

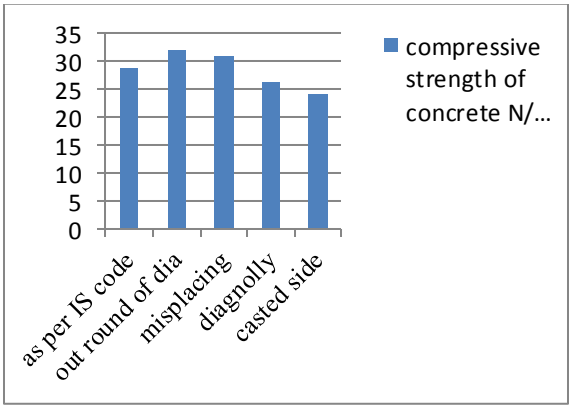
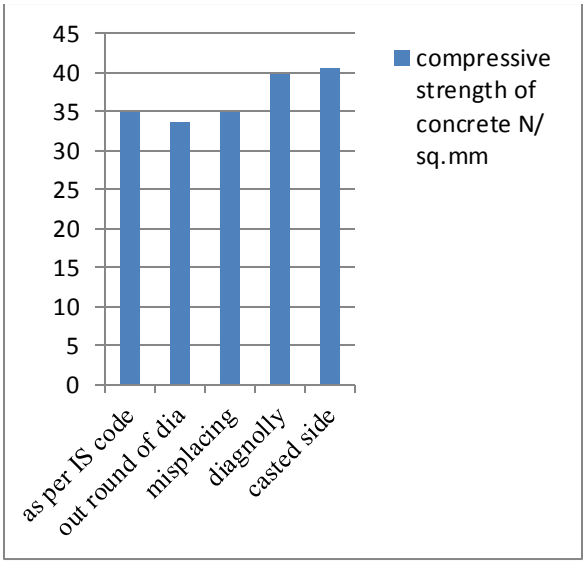


Table 2 Compressive strength result of concrete after 28 days

Type of concrete	Crushing load KN	Average Compressive strength N/mm2	Difference in compressive Strength N/sq.mm
M30 as per code	796	35.02	
M30 With out of round dia	764	33.61	1.04 times lower
M30 with misplacement	788	34.91	1.003 times lower
M30 with loading at diagonal	908	39.952	1.14 times higher
Test on Casted side	924	40.65	1.16 times higher

Graph 1 compressive strength of M30 grade concrete



DISCUSSION FOR M25 GRADE CONCRETE

- The case is misplaced in the CTM, the change in compression strength value were decreased by 1.08 times when compared to the case tested as per IS:516-1959
- The compressive strength value is increased by 1.04 times and 1.10 times where case is placed diagonally and casted side
- The compressive strength value will not have much difference when case is placed diagonally
- The compressive strength value must will change more than 10% where case placed at casted side.

DISCUSSION FOR M30 GRADE CONCRETE

- The misplacement of concrete cube in CTM will not change in compressive strength value when compared with cube tested as per IS:516-1959
- 14% compressive value gets increased where it is tested diagonally in CTM
- The compressive strength value will change 1.16 times higher than the standard concrete cube

VI. CONCLUSION

1. The concrete cube placed at diagonally will gives huge difference in strength when compared with the concrete cubes tested as per IS:516-1959
2. The strength value gets increased more than 10% when concrete cube placed at the casted side
3. The misplacement of concrete cube in CTM was given huge difference in strength. More than 8% of strength was decreased when it is misplaced.
4. When concrete cubes will not tested as per IS 516-1959. The results in strength value were highly changed and this improper result was not suited for construction.
5. The results obtained due to misplacement cannot be processed further.

REFERENCE

[1] IS: 516 : 1959 “Methods of test for strength of concrete”

[2] IS: 456: 2000 “Code of practice for plain and reinforcement concrete”, Bureau of Indian Standards, New Delhi.

[3] IS: 10262: 2007 “Specification for strength of concrete”, Bureau of Indian Standards, New Delhi.

[4] IS: 383: 1970 “Specification for coarse and fine aggregate from source for concrete” Bureau of Indian Standards, New Delhi.

[5] Shetty. M. S. “Concrete Technology”, S. Chand & Company Ltd., New Delhi.

[6] IS: 14858: 2000 “requirements for compression testing machine used for testing of concrete”.

[7] Kishore kaushal paper on “concrete cube testing”

[8] Raffaele pucinotti article deals with the in situ concrete strength assessment influence of the aggregate hardness on the Windsor probe test results.