Assessment Of Quality of Rcc Commercial Complex Structures Of New Building Using Rebound Hammer Verifying By Cube Test On Ctm

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Abstract- *Compressive Strength of Commercial Structure This paper is to check the structural compressive strength of concrete structure of building verifying with concrete cube testing on compressive testing machine. It will be applied on new building on ongoing construction to check the compressive strength along with the progress of work to ensure quality in construction during construction phase itself. This will help to check reliability of rebound hammer test for future aspects. This study is extension of our previous rebound testing.*

Aim *To determine compressive strength of a new ongoing construction of new building using Non-Destructive Test using Rebound hammer test and verifying by compressive testing machine .*

I. OBJECTIVES

1) To study about Rebound Hammer Test in brief and concrete testing on CTM in brief.
2) To analyse Rebound hammer test results and verifying with CTM
3) Review of comparative results.

II. SCOPE

To study compressive strength analysis of various RCC component using rebound hammer and verifying using cube testing on CTM.

III. PROCEDURE

3.1 Rebound hammer Test and Cube testing on CTM

Invented by Ernst O. Schmidt in the 1950s, the Rebound Hammer Test, also called the Schmidt Hammer Test.

Test procedure for CTM

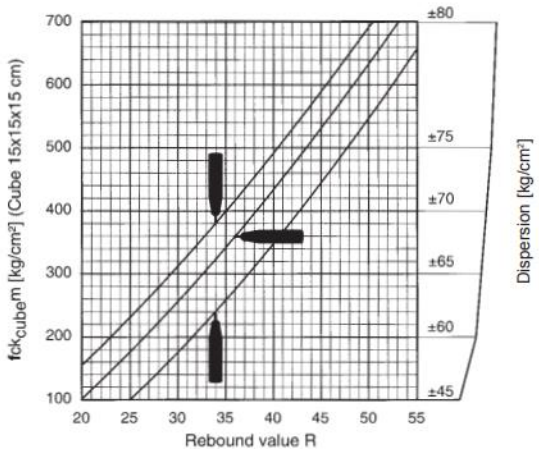
i. Clean the mounds properly and apply oil inside the cube frame
ii. Fill the concrete in the molds in layers approximately 50mm thick
iii. Compact each layer with not less than 35 strokes per layer using a tamping rod (steel bar 16mm diameter and 600 mm long,)
iv. Level the top surface and smoothen it with a trowel
v. The concrete cubes are removed from the moulds between 16 to 72 hours, usually this done after 24 hours. Remove the specimen from water after specified curing time and wipe out excess water from the surface.Take the dimension of the specimen to the nearest 0.2mm And then place the specimen in the machine in such a manner that the load shall be applied to the opposite sides of the cube cast.Align the specimen centrally on the base plate of the machine.Rotate the movable portion gently by hand so that it touches the top surface of the specimen.
vi. Apply the load gradually without shock and continuously at the rate of 140 kg/cm^2/min. till the specimen fails
vii. Record the maximum load and note it

Test Procedure for rebound hammer

i. For testing, smooth, clean and dry surface is to be selected. If loosely adhering scale is present, this should be rubbed of with a grinding wheel or stone. Rough surfaces resulting from incomplete compaction, loss of grout, spalled or tooled surfaces do not give reliable results and should be avoided..
ii. The point of impact should be at least 25 mm away from any edge or shape discontinuity.
iii. For taking a measurement, the rebound hammer should be held at right angles to the surface of the concrete member. The test can thus be conducted horizontally on vertical surfaces or vertically upwards or downwards on horizontal surfaces. If the situation demands, the rebound hammer can be held at intermediate angles also, but in each case, the

rebound number will be different for the same concrete.

iv. Rebound hammer test is conducted around all the points of observation on all accessible faces of the structural element. Concrete surfaces are thoroughly cleaned before taking any measurement. Around each point of observation, six readings of rebound indices are taken and average of these readings after deleting outliers as per IS/ISO 16269 (Part 4)becomes the rebound index for the point of observation.



Rebound hammer Chart (Ref: Proceq Rebound hammer manual Type-N)

IV. REBOUND HAMMER OBSERVATIONS

below are the observations of ground floor , here 'V-U' stands for hammer tested in position vertical up, similarly 'V-D' vertical down and 'H' stands for horizontal.

Average test results for CTM for 3 cube (one set0 for each structural member.

Table No 1 Rebound Number for GF for Beam

Location	**Structural member**	**Notation**	**Average Rebound No**	**Average results for Cube on CTM in N/ Sq Mm**
Ground Floor	Beam(VD)	B1	42	32.65
		B2	44	33.41
		B3	43	31.85
		B4	44	32.28
		B5	42	33.15
		B6	46	32.54
		B7	44	34.73
		B8	43	33.44
		B9	44	31.65
		B10	42	32.76
Average results			**43.4**	**32.85**

V. CONCLUSIONS

Results shows rebound hammer readings lies in range for 42 which stands for 32 n/sq mm to 46 which is 36 N / sq mm as per chart of rebound hammer for CTM test results minimum is recorded as of 32 N/sqmm to 34 N/ Sq mm hence variation is under the range of standards not varying from 15 per hence it is reliable to use rebound hammer for new buildings wherever required.

REFERENCES

[1] Chen, H.J., Yen, T. and Chen, K.H., "Use of Building Rubbles as Recycled Aggregates," Cement and Concrete Research 33, (2003), pp. 125-132.

[2] Eguchi, K., Teranishi, K., Nakagome, A., Kishimoto, H., Shinozaki, K. and Narikawa, M., "Application of Recycled Coarse Aggregate by Mixture to Concrete Construction,", Construction and Building Materials, 2006.

[3] Huang, W.L., Lin, D.H., Chang, N.B., Lin,K.S., "Recycling of Construction and Demolition Wastevia A Mechanical Sorting Process". Resources Conservation & Recycling, Vol. 37, Issue 1, Dec 2002

[4] Dhananjay Mangrulkar, Manoj Chauhan, Shubham Kadam, Saurabh Likhare, "Case Study of RCC Structure with the help of Non Destructive Testing" International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056 Volume: 05 Issue: 03 Mar-2018 www.irjet.net p-ISSN: 2395- 0072.

[5] D. Breysse, "Non-destructive evaluation of concrete strength: An historical review and a new perspective by combining NDT methods", Elsevier – 19th December 2011.

[6] Jibin Babu And Akhilchandran Bs, "Non-Destructive Testing for Building Materials ", Journal of Basic and Applied Engineering ISSN: 2350-0255; Volume 2, Number 15; April - June 2015 Pp. 1251-1254

[7] Dr. George Teodoru, "Romanian Developments in Nondestructive Testing of Concrete Constructions", BULETINUL AGIR NR. 3/2014.

[8] Tarun Gehlot, Dr. S. S. Sankhla, Akash Gupta, "Study of Concrete Quality Assessment of Structural Elements Using Rebound Hammer Test", American Journal of

Engineering Research (Ajer17.) Volume-5, Issue-8, Pp-192-198.

[9] Istvan Zsigovics, Katalin Szilagyi," Rebound Surface Hardness and Related Properties of Concrete ", Budapest, Open Journal of Civil Engineering 2013.

[10] R. Sri ravindrajah, Y. H. Loo, c. T. Tam, "Strength Evaluation of Recycled-Aggregate Concrete by In-Situ Tests", Materials and Structures/ Matoriaux Et Constructions, 1988, 21,289-295.