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Assessment of Quality of New Building Using Rebound Hammer

Vivekanad[1], M. D. Mata[2]

[1]PG Scholar, M. TECH, SSGBCOET, BHUSAWAL
[2]Asst. Professor, SSGBCOET, BHUSAWAL

ABSTRACT

Compressive strength of concrete depends on age of concrete, moisture content, surface carbonation etc. There are several methods used for this purpose, out of all NDT methods, the Rebound hammer test is easiest check the compressive strength of concrete. This paper is to check the structural compressive strength of concrete structure of building. 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.

Aim To determine compressive strength of a new ongoing construction of new building using Non-Destructive Test using Rebound hammer test

1. Objectives

1) To study about Rebound Hammer Test in brief.

2) To analysis and determine compressive strength of new building using Non-Destructive Test using Rebound hammer test

3) Review results and recommend based on rebound hammer test.

2. Scope

To study compressive strength analysis of various RCC component like column, slab and beam of new building using rebound hammer test and verify its quality of construction. It consists of a spring controlled mass that slides on a plunger within a tubular housing.

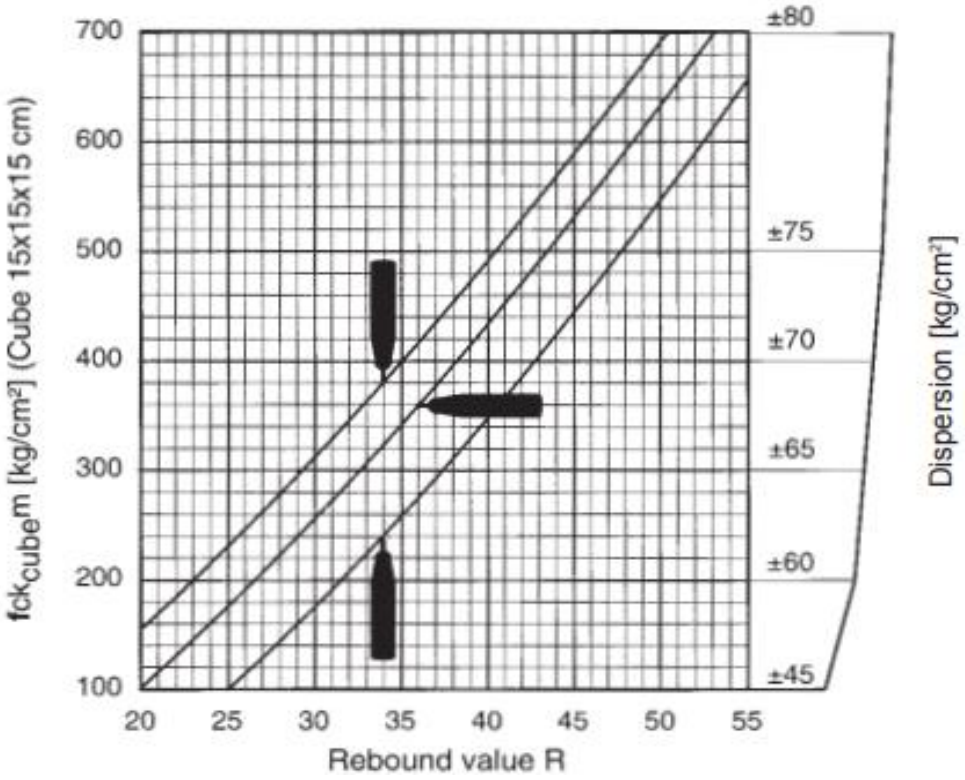
3. Procedure

3.1 Rebound hammer Test

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

Test Procedure

1. 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..
2. The point of impact should be at least 25 mm away from any edge or shape discontinuity.
3. 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.
4. 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)

4. 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.

Table No 1 Rebound Number for GF for Beam

Location	Structural member	Notation	Direction	Rebound Number						Average Rebound No
				1	2	3	4	5	6	
Ground Floor	Beam	B1	V-U	42	42	42	42	43	42	42
		B2	V-U	44	44	44	44	42	44	44
		B3	V-U	43	43	43	43	43	43	43
		B4	V-U	44	44	44	44	44	44	44
		B5	V-U	42	42	42	42	43	42	42
		B6	V-U	46	46	46	46	46	46	46
		B7	V-U	44	44	44	42	44	44	44
		B8	V-U	43	43	43	43	43	43	43
		B9	V-U	44	44	44	44	43	43	44
		B10	V-U	44	42	42	42	42	42	42

Table No 2 Rebound Number for GF for Column

Location	Structural member	Notation	Direction	Rebound Number						Average Rebound No
				1	2	3	4	5	6	
Ground Floor	Column	C1	H	35	36	36	36	36	36	36
		C2	H	34	34	34	34	34	34	34
		C3	H	36	35	36	36	36	36	36
		C4	H	34	34	34	34	34	34	34
		C5	H	35	35	35	35	35	35	35
		C6	H	34	34	34	34	34	34	34
		C7	H	35	35	35	35	35	35	35
		C8	H	36	36	36	36	36	36	36
		C9	H	34	34	34	34	34	34	34
		C10	H	34	35	35	35	35	35	35
		C11	H	35	35	35	35	35	35	35
		C12	H	34	34	34	34	34	34	34
		C13	H	35	35	35	35	35	35	35
		C14	H	28	27	26	25	26	26	26
		C15	H	36	36	36	35	35	35	36

Table No 3 Rebound Number for GF for Slab

Location	Structural member	Notation	Direction	Rebound Number						Average Rebound No
				1	2	3	4	5	6	
Ground Floor	Slab	S1	V-D	33	33	34	34	34	34	34
		S2	V-D	35	35	35	35	35	35	35
		S3	V-D	36	36	36	36	36	36	36
		S4	V-D	35	35	35	35	35	35	35
		S5	V-D	34	34	34	34	34	34	34
		S6	V-D	35	35	35	35	35	35	35
		S7	V-D	34	36	36	36	36	36	36
		S8	V-D	35	35	35	35	35	35	35
		S9	V-D	33	33	34	34	34	34	34
		S10	V-D	35	35	35	35	35	35	35
		S11	V-D	36	36	36	36	36	36	36
		S12	V-D	35	35	35	35	35	35	35
		S13	V-D	34	34	34	34	34	34	34
		S14	V-D	33	33	33	34	34	34	34
		S15	V-D	35	35	35	35	35	35	35
		S16	V-D	36	36	36	36	36	36	36
		S17	V-D	35	35	35	35	35	35	35
		S18	V-D	34	34	34	34	34	34	34
		S19	V-D	34	34	34	34	34	34	34
		S20	V-D	35	35	35	35	35	35	35

5. Conclusions:

Results shows rebound hammer readings lies in range for 42 to 44 for beam which is above 30 N/sq.mm, similar for column and slab. All the results shows uniformity in construction quality, however one column shows lower results where it is recommended for rebar for strenthening.

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