Method of Test for Compressive Strength of Concrete Using the Rebound Test Hammer

---

1. Scope:

This test is for determining the approximate compressive strength of concrete in-place.

2. Apparatus:

2.1 Test hammer with carborundum stone.

3. Procedure:

3.1 Calibration.

A. The rebound test hammer is calibrated at the Central Laboratory. Send the test hammer to the Central Laboratory when it is malfunctioning or after approximately 2000 impacts.

3.2 Field Checks.

A. Prior to using the test hammer for informational purposes, verify the Central Lab calibration chart by performing the test procedure on concrete with a similar mix design that has a known strength. Compare the known strength to the test hammer result and consider this information in any decisions that will be made based on the test hammer results. Whenever possible, a more accurate field correction factor (G) should be calculated according to 3.2(B) and applied to test results.

B. Field correction factor (G) calculation.

(1) When possible, use a cylinder of the same mix design and age of the in place concrete to be tested. If possible, perform the calibration with the test hammer in the same orientation (Horizontal, vertical up, or down) it will be used in the field. The moisture condition on the surface of the cylinder should be similar to what is going to be tested in the field.

(a) If calibrating in the horizontal position, place the cylinder in a compressive strength-testing machine and apply 10,000 to 15,000 pounds force (Enough to keep the cylinder stationary).

(b) If calibrating in the vertical down position, place the cylinder on a firm surface and secure it from movement.

(2) Perform the test hammer procedure on the cylinder as per 3.3B through 3.3H.

(3) Perform the compressive strength test on the cylinder according to SD 420 and record the cylinder compressive strength (A).

(4) Compare the compressive strength of the cylinder (A) to the orientation corrected compressive strength (F) determined by the test hammer in 3.2B(2). Calculate the field correction factor (G) = (A) / (F).

(5) When possible, apply this correction factor to field tests of the same concrete according to 3.3I.

3.3 Field tests.

A. Operate the test hammer in a horizontal position, whenever feasible.

B. If the concrete surface is rough, grind points to be tested with the carborundum stone.

C. Press the test hammer plunger at exactly right angles to the surface of the concrete being tested. Press the plunger slowly and uniformly until released. Do not jerk or try to anticipate the plunger release.

D. After impact, press the lock button and read the rebound value shown on the rider. Record the reading.

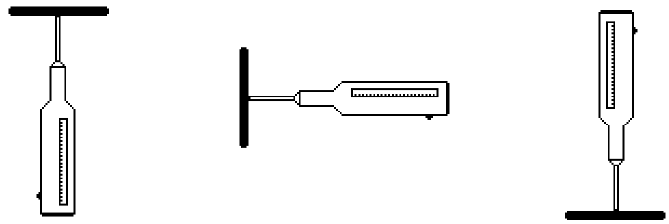
E. Take a minimum of 15 rebound readings. Take only one reading at a given point. Very high readings may be caused by rock or steel near the surface at the point of impact, and very low readings may be caused by trapped air pockets near the surface at the point of impact.

F. Discard the highest reading, the lowest reading, and any that are obviously in error. Calculate the sum of the remaining readings (B) and the average of the remaining readings (C).

G. Convert the average of remaining reading (C) to compressive strength (D) in PSI by using the Central Lab calibration chart for that particular test hammer. (Do not use the calibration curves on the test hammer.)

H. Calculate the orientation corrected compressive strength by adding the appropriate orientation correction factor (E) according to the orientation of the test hammer during the testing. (F) = (D) + (E)

Horizontal:	Correction	–	None
Vertical Up:	Correction	–	Minus 500 PSI
Vertical Down:	Correction	–	Plus 500 PSI



Vertical Up Horizontal Vertical Down

I. Calculate the final compressive strength (H) by multiply the orientation corrected compressive strength (F) by the field correction factor (G) that was calculated in 3.2B(4).

(H) = (F) x (G)

NOTE: During the concrete cylinder comparison calibration test this should equal the initial compressive strength of the cylinder (A) ± 0.5%.

4. Report:

Report final compressive strength (PSI) on a DOT-9.

5. References:

SD 420
DOT-9

Sample ID: 2229731

Rebound Hammer Test Worksheet

DOT-9
3-19

PROJECT PH 0066(00)15 COUNTY Aurora, Ziebach PCN B015

Tested By Tester, One Test Date 06/13/2019

Location Box Culvert located at Sta. 125+30 Age of Concrete 7 days

Description MATERIALS MANUAL

Hammer Identity P-15 Date of Calibration 03/02/2019 Approximate # of impacts since calibration 56

Concrete Cylinder Comparison Calibration	Cylinder ID # 5
(A) Cylinder Compressive Strength 3,920	Date Made 06/06/2019

Location of Test		Calibration	Top Slab	Top Slab	Bottom Slab	East Wall
Position of Hammer Vert. Up - Horiz. - Vert. Down		Horizontal	Vertical Up	Vertical Up	Vertical Down	Horizontal
HAMMER READINGS (strike through highest and lowest reading and any other that is an obvious error)	1	22	21	23	19	20
	2	21	~~26~~	23	20	21
	3	24	~~17~~	22	~~26~~	21
	4	24	23	~~20~~	18	~~17~~
	5	~~19~~	22	21	~~28~~	19
	6	22	22	23	20	18
	7	22	~~29~~	23	17	20
	8	23	24	21	~~14~~	22
	9	21	23	24	17	22
	10	~~27~~	20	22	19	19
	11	24	23	22	20	20
	12	22	22	21	~~13~~	21
	13	21	21	24	21	~~25~~
	14	23	20	23	21	21
	15	23	24	~~31~~	20	23
	16	22	20	24	20	19
	17	22	23	22	19	21
(B) Sum of Remaining Readings		336	308	338	251	307
(C) Average of Remaining Readings		22	22	23	19	20
(D) Compressive Strength (PSI) (from Central Lab Calibration		4,340	4,340	4,370	3,480	3,810
(E) Test Hammer Orientation Correction Factor (PSI)		0	-500	-500	500	0
(F) Orientation Corrected Compressive Strength (PSI) =		4,340	3,840	3,870	3,980	3,810
(G) Field Correction Factor for Cylinder Calibration = A/F		0.90	(G) from calibration column	(G) from calibration column	(G) from calibration column	(G) from calibration column
(H) Final Compressive Strength (PSI) = FxG		3,906	3,456	3,483	3,582	3,429

19

Comments:

Figure 1