Standard Method of Test for

Field Determination of Maximum Dry Density and Optimum Moisture Content of Soils by the One-Point Method

SCDOT Designation: SC-T-29 (8/08)

1. SCOPE

1.1. In this method, the maximum dry density and optimum moisture content of soils is obtained by using the results of one point on a standard proctor curve to enter a family of curves from which the maximum dry density and optimum moisture content can be determined. In most instances, it will be possible and advantageous to use the one-point proctor method, but since this method is not applicable to all soils found in South Carolina, there will be times when it will be necessary to conduct the more detailed test according to SC-T-25. The decision to run either the one-point proctor test or the more detailed test will be left to the Resident Construction Engineer. In general, if the one-point proctor test is conducted with the material at or near optimum moisture content and the point does not fall in the main portion of the family of curves, this is a good indication that SC-T-25 should be used.

1.2. This standard may involve hazardous materials, operations and equipment. This standard does not purport to address all of the safety problems associated with its use. It is the responsibility of the user of this standard to consult and establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

2. REFERENCED DOCUMENT

2.1. SC-T-22, SC-T-25.

3. SUMMARY OF TEST METHOD

3.1. A soil sample is compacted in a mold having a capacity of 1/30 of a cubic foot and having an internal diameter of 4 inches. The soil in the mold is compacted in three layers with 25 blows per layer from a 5.5 pound rammer dropped from a height of 12 inches. The wet density and moisture content of the compacted specimen is plotted on a family of curves and a maximum dry density and optimum moisture content is selected from the family of curves for use in compaction calculations.

4. SIGNIFICANCE AND USE

4.1. The maximum dry density and optimum moisture content of a sample of soil can be obtained quickly in the field.

5. APPARATUS

5.1. Proctor mold and 5.5-pound hammer, No. 4 sieve, balance or electronic scales, metal straightedge.

6. TEST SPECIMENS

6.1. Obtain approximately 2500 grams of material representative of that tested for in-place density and moisture content. Break up this material and sieve through a No. 4 sieve. Discard the material retained on the No. 4 sieve. If more than 5 percent by weight of the total sample, as judged by eye, is retained as aggregate on the No. 4 sieve, note this in the comments on the field work sheet and on Office of Materials and Research Form 932. In the judgment of the operator, the moisture content of the material to be tested should be on the dry side of optimum and within 2 percent of the optimum moisture content. If the moisture content is not within this range, the material should be dried if it is too wet, or water added if it is too dry. If the soil is damp when received, dry it until it becomes friable under a trowel.

7. PROCEDURE

7.1. Determine the weight of a standard proctor mold.

7.2. Place the standard proctor mold (with base plate and collar attached) on a block of concrete of sufficient size to afford a uniform, rigid foundation.

7.3. Mix the 2500-gram sample so that the moisture content is as uniform as possible.

7.4. Place approximately one-third of the sample in the proctor mold.

7.5. Compact the layer using 25 uniformly distributed blows from the 5.5-pound hammer dropping free from a height of 12 inches.

7.6. Repeat Step 7.4 and Step 7.5 for the second and third layers of the specimen.

7.7. Following compaction of the third layer, remove the extension collar and carefully trim the compacted soil even with the top of the mold by means of a straightedge.

7.8. Remove the base plate from the mold and weigh the mold and specimen to the nearest gram.

7.9. Remove the material from the mold and slice vertically through the center. Take a representative sample of the material from one of the cut faces and determine the moisture content using SC-T-22.

7.10. Determine the weight of the specimen by subtracting the weight of the mold, as determined in Step 7.1, from the weight of the mold plus specimen, as determined in Step 7.8.

7.11. Determine the wet density of the soil specimen by multiplying the mold constant, which is stamped on the base plate, by the weight of the soil specimen, as determined in Step 7.10.

7.12. Using the moisture content determined in Step 7.9 and the wet density determined in Step 7.11, plot the one point on the family of curves as shown on Figure SC-T-29A.

7.13. If the point falls on one of the curves, the maximum dry density and optimum moisture content may be read directly from the table shown in the top right-hand corner of Figure SC-T-29A. If the point does not fall on one of the curves, it is necessary to interpolate between the curves and again use the table to determine the maximum dry density and optimum moisture content.

8. CALCULATIONS

8.1. Weight of Mold and Soil = 4006 grams

8.2. Weight of Mold = 2074 grams

8.3. Weight of Soil (Step 8.1 – Step 8.2) = 4006 grams – 2074 grams = 1932 grams

8.4. Wet Density of Soil = (Mold k) x (Step 8.3) = (0.06638) x (1932 grams) = 128.2 pcf

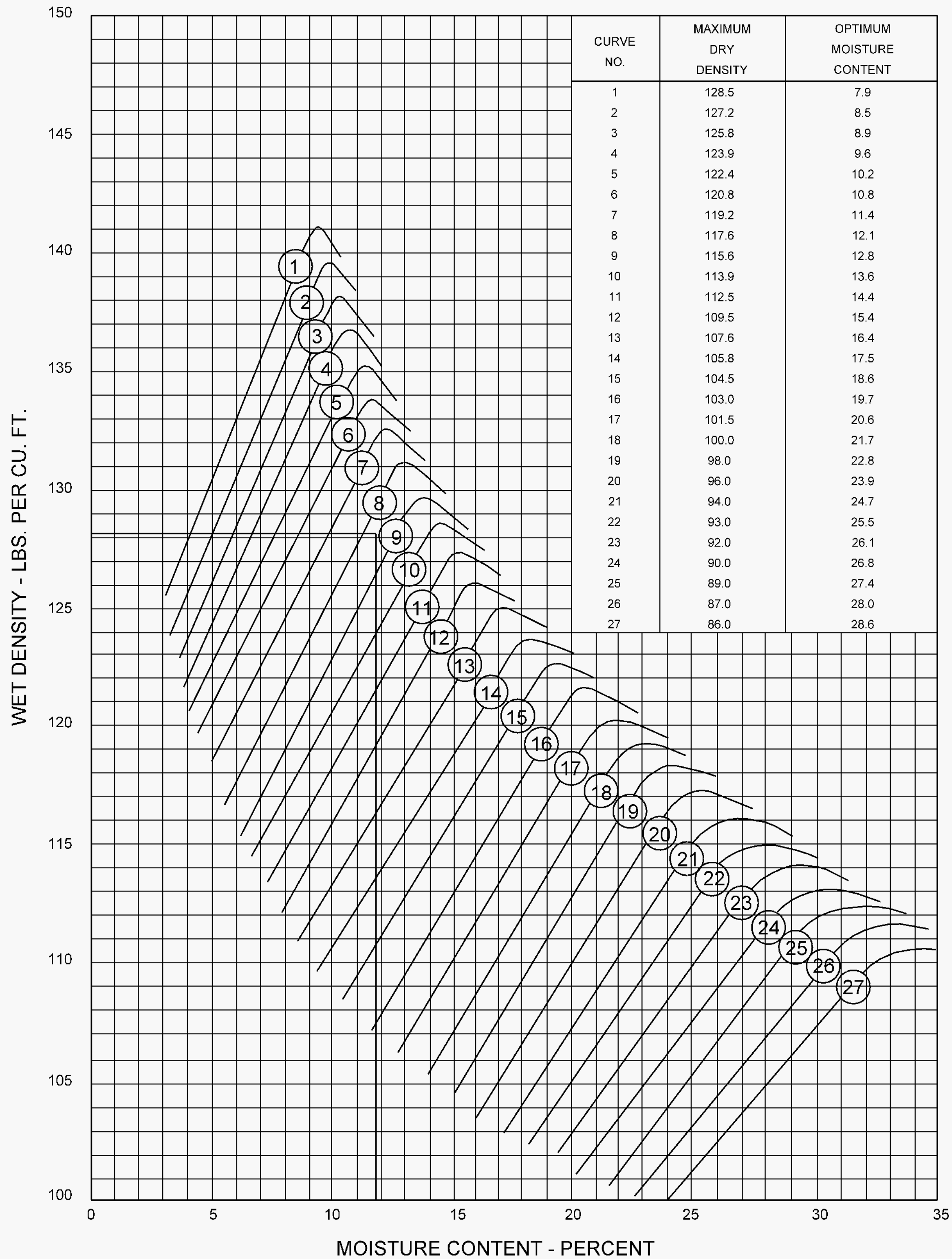
8.5. Percent Moisture (Speedy Moisture Tester) = 11.7%

8.6. Maximum Dry Density (taken from Figure SC-T-29A) = 116.6 pcf

8.7. Optimum Moisture Content (taken from Figure SC-T-29A) = 12.4%

9. REPORT

9.1. Report the optimum moisture content of the soil to the nearest 0.1 percent and the maximum dry density to the nearest 0.1 pound per cubic foot. Use SCDOT Form 200.01 – Field Density Test Report (Nuclear Gauge), SCDOT Form 200.02 – Percent Compaction by Nuclear Gauge, and SCDOT Form 200.03 – Percent Compaction by Nuclear Gauge-Direct Read Gauge.



CURVE NO.	MAXIMUM DRY DENSITY	OPTIMUM MOISTURE CONTENT
1	128.5	7.9
2	127.2	8.5
3	125.8	8.9
4	123.9	9.6
5	122.4	10.2
6	120.8	10.8
7	119.2	11.4
8	117.6	12.1
9	115.6	12.8
10	113.9	13.6
11	112.5	14.4
12	109.5	15.4
13	107.6	16.4
14	105.8	17.5
15	104.5	18.6
16	103.0	19.7
17	101.5	20.6
18	100.0	21.7
19	98.0	22.8
20	96.0	23.9
21	94.0	24.7
22	93.0	25.5
23	92.0	26.1
24	90.0	26.8
25	89.0	27.4
26	87.0	28.0
27	86.0	28.6

FAMILY OF CURVES FOR TYPICAL SOILS IN SOUTH CAROLINA

Figure SC-T-29A