HDOT TM 3-00

Standard Test Method for Field Determination of Moisture Content of Soils

1. Scope

1.1 This test method covers the rapid field determination of moisture content of soils, base courses and in general all backfill material by the use of a portable heating system.

2. Definition

2.1 The water or moisture content (mc) of a soil is the ratio, expressed as a percentage, of the mass of water (loss of moisture) in a given mass of soil to the mass of the solid (oven dried) particles.

2.2 The term soil as used in this test method refers to clays as well as crushed aggregates which are used in embankments and pavement base courses.

CAUTION - For soils containing organic matter, the standard laboratory method of oven drying should be used. If in doubt, correlation tests between this method and the standard laboratory method AASHTO T265 should be performed.

3. Apparatus

3.1 Balances

3.1.1 Any balance or scale having a minimum capacity of 300 g readable to 0.01 g.

3.2 Drying Equipment

3.2.1 Any portable stove, oven or other suitable apparatus that will produce and maintain the desired temperature of 135° to 150° C (275° to 300° F) in the heating chamber throughout the length of the test.

3.2.2 The drying equipment shall be able to maintain and distribute the heat evenly throughout the heating chamber. The heating chamber shall be able to accommodate a thermometer.

3.3 Sample Containers - Suitable containers made of material resistant to corrosion and not subject to appreciable change in mass or disintegration on repeated heating and cooling. (The containers shall be provided with close fitting lids to prevent loss of moisture from samples that are not weighed within two (2) minutes from the time of sampling).

3.4 Thermometers - Any suitable general purpose laboratory thermometer to cover the entire temperature range of the test.

4. Procedures

4.1 Weigh a clean, dry sample container (mass of container) which is properly marked for rapid identification.

4.2 Place 30 grams (0.07 pounds) or more of the sample representative of the portion passing the 9.5 *μm* (3/8 inches) sieve in the sample container. Weigh the container and the moist sample (initial mass).

4.3 Regulate the drying equipment to rapidly raise the temperature to 150° C (300° F). The temperature should be maintained between 135° to 150° C (275° to 300° F) throughout the drying period.

4.4 Place the container with the sample in the heating chamber. Caution should be exercised to prevent appreciable loss of heat from the heating chamber.

4.5 Dry the sample for a minimum of twenty (20) minutes at the drying temperature.

4.6 Remove and weigh the container with the sample immediately. Return the container and the sample to the heating chamber immediately.

4.7 Maintain the drying temperature 135° to 150° C (275° to 300° F) for ten (10) minutes and weigh the container and the sample. (Steps 4.6 and 4.7 are repeated until identical masses are obtained on two consecutive trials). This mass is recorded as the final mass.

5. Calculations

5.1 Calculate the moisture content as follows:

$$mc = \frac{W_1 - W_2}{W_2 - W_3} \times 100$$

where:

mc = moisture content in percent
W_1 = mass of container and moist sample (initial mass)
W_2 = mass of container and oven-dried sample (final mass)
W_3 = mass of container

5.2 For convenience, data may be recorded on a format similar to Figure 1 or be entered directly on the format shown on Figure 2, Field Compaction Test Data, also used in Hawaii Test Method, HDOT TM-1, "Standard Test Method for Density of Soil in-Place by the Sand Cone Method".

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

FIELD MOISTURE CONTENT OF SOILS

Sample No. _____ **Type of Sample** _____

Project No. _____ **Project** _____

Test Report No. _____ **Test Performed By** _____

Date Assigned _____ **Completion Date** _____

Sample No.						
Time Sampled						
Truck No.						
1. Mass of Moist Sample + Container						
2. Mass of Dry Sample + Container						
3. Mass of Moisture = (1) − (2)						
4. Mass of Container						
5. Mass of Dry Sample = (2) − (4)						
Moisture Content, % = (3) ÷ (5) X 100						

Figure 1 - Field Moisture Content of Soils

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

FIELD COMPACTION TEST

Sample No. _____ Station No. _____

Project _____ Location _____

Description, Color and Type of Sample _____ Elevation of Lift _____

_____ Finish Elevation _____

Date _____ Test Performed by _____

SURFACE VOIDS DETERMINATION **Apparatus No.** _____

a. Mass of Sand + Container Before Determination ..... _____ grams

b. Mass of Sand + Container After Determination ..... _____ grams

c. Mass of Sand Used for Determination (a - b) ..... _____ grams

IN-PLACE DENSITY **Tare Number** _____ **453.6 GRAMS = 1 LB.**

d. Mass of Sand + Container Before Test ..... _____ grams

e. Mass of Sand + Container After Test ..... _____ grams

f. Mass of Sand Used for Test (d - e) ..... _____ grams

g. Mass of Sand Used for Voids Determination (c) ..... _____ grams

h. Net Mass of Sand Used for Test (f - g) ..... _____ grams _____ lbs.

i. Loose Density of Sand ..... _____ pcf

j. Volume of Hole (h ÷ i) ..... _____ cu . ft.

k. Mass of Wet Sample + Container ..... _____ grams

l. Mass of Container ..... _____ grams

m. Mass of Wet Sample from Hole (k - l) ..... _____ grams _____ lbs.

n. In-Place Density of Wet Sample (m ÷ j) ..... _____ pcf

MOISTURE CONTENT DETERMINATION **Tare Number** _____

o. Soil Sample + Container ..... _____ grams

p. O D Soil + Container ..... _____ grams

q. Mass of Moisture (o - p) ..... _____ grams

r. O D Soil + Container (p) ..... _____ grams

s. Container Weight ..... _____ grams

t. Mass of O D Soil (r - s) ..... _____ grams

u. Moisture Content (q ÷ t) X 100 ..... _____ %

DRY DENSITY AND RELATIVE COMPACTION

v. In-Place Density of Wet Sample (n) ..... _____ pcf

w. Moisture Content (u) ..... _____ %

x. Dry Density v ÷ (100 + w) X 100 ..... _____ pcf

y. Maximum Dry Density (Proctor Results)..... _____ pcf

z. Relative Compaction (x ÷ y) X 100 ..... _____ %

NOTE _____

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Figure 2 - FIELD COMPACTION TEST DATA