DETERMINATION OF MOISTURE IN SOILS BY MEANS OF CALCIUM CARBIDE GAS PRESSURE MOISTURE TESTER

FOP FOR AASHTO T 217

Scope

This procedure uses a calcium carbide gas pressure moisture tester to determine the moisture content of materials passing the No. 4 sieve in accordance with AASHTO T 217-14. This FOP does not apply to the Super 200 D tester (see AASHTO 217).

CAUTION: This procedure involves a potentially dangerous chemical reaction. When calcium carbide reacts with water, acetylene gas is produced. Breathing the acetylene gas and running the test where the potential for sparks or other ignition may cause a fire must be avoided.

Apparatus

- Calcium carbide gas pressure moisture tester.
- Balance or scale, conforming to the requirements for AASHTO M 231 and having a capacity of 2 kg and sensitive to 0.1 g. Most testers include a balance built into the transportation container.
- Cleaning brush and cloth.
- Scoop (or cap built into unit) for putting the soil sample into the pressure chamber. Some testers include a cap built into the unit.
- Steel balls, 31.75 mm (1.25 inch)

Material

- Calcium carbide reagent meeting the requirements of AASHTO T 217.

Note 1: Check the manufacturer's recommendations for storage requirements and the maximum shelf life for the calcium carbide reagent.

Procedure

1. Place three scoops, approximately 24 g, of calcium carbide, into the body of the moisture tester.
2. To prevent damage to the pressure gauge, place the moisture tester in a horizontal position and insert the two steel balls into the vessel.
3. Obtain a representative wet mass sample of soil specified by the manufacturer, using the built-in balance or external scale. Transfer the soil mass to the moisture tester cap or scoop without loss of material.

Note 2: This method shall not be used on granular material retained on the No. 4 sieve where larger particles may affect the accuracy of the test.

Note 3: If the anticipated moisture content of the wet mass exceeds the capacity of the instrument being used, then one-half of the specified soil mass should be placed into the unit, and the resulting gauge reading multiplied by two.

4. With the instrument still in a horizontal position, so that calcium carbide does not come into contact with the soil, seat the cap on the body and tighten down on the clamp, thereby sealing the tester.
5. Carefully raise the unit to a vertical orientation and gently tap the cap to allow the soil to fall into the pressure vessel, taking care to prevent the steel balls from striking the bottom of the pressure vessel.
6. After the soil mass is introduced to the calcium carbide, return the vessel to a horizontal position. With a circular rotating motion vigorously roll the steel balls around the interior perimeter of the vessel to break up lumps of soil. Do not allow the steel balls to hit the cap or the bottom of the pressure vessel.
7. Continue this motion for 60 seconds. Allow time for the dissipation of the heat generated by the chemical reaction. Repeat motion and resting cycles until no further reaction occurs.
8. When the gauge needle stops moving, take a reading while holding the unit in a horizontal position at eye level.
9. Record the sample mass and the gauge reading. If the initial soil mass was reduced in half, multiply gauge reading by two.
10. Position the unit so that the cap is away from the user and slowly loosen the clamp to release the gas from the pressure chamber. Inspect the sample inside the pressure chamber. If it is not completely pulverized, a new sample must be obtained and tested after the instrument has been thoroughly cleaned.

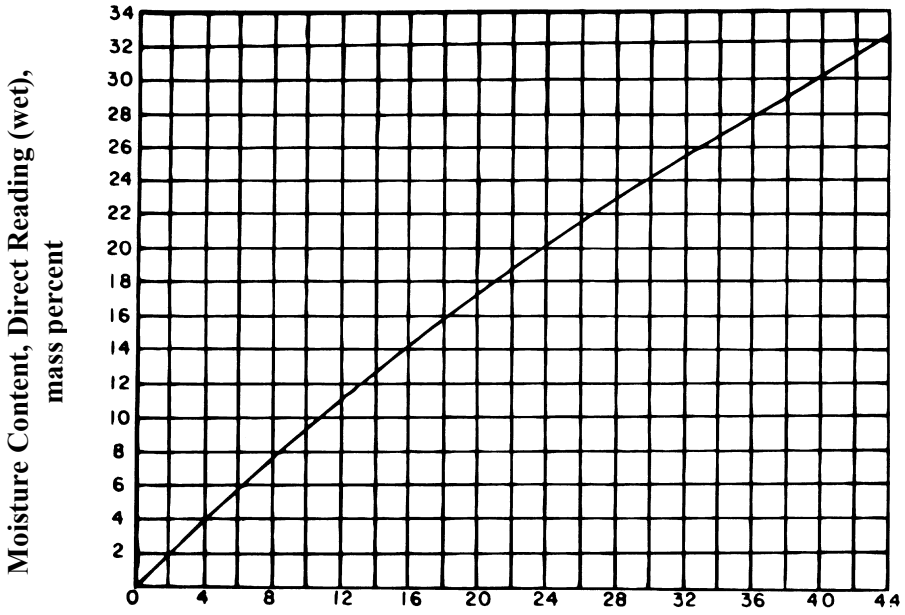
Moisture Determination

1. The tester determines moisture content based on the wet mass of the soil. Moisture content based on the dry mass of soil is obtained from a conversion chart or curve supplied with each tester. See Figure 1 for curve from AASHTO T 217.

Note 4: Check the accuracy of the gauge and the conversion chart or curve periodically, in accordance with agency requirements, by testing samples of known moisture content. Develop correction factors, if necessary.

Figure 1

Conversion Curve for Moisture Tester Reading



Example:

Gauge reading:	18.5
Conversion from chart:	22.1
Recorded percent moisture:	22%

Report

- On forms approved by the agency
- Sample ID
- Moisture content to the nearest 0.1 percent