

METHODS OF SAMPLING AND TESTING
MT 227-04
METHOD OF TEST FOR LABORATORY DETERMINATION
OF MOISTURE CONTENT OF SOILS
(MODIFIED AASHTO T 265)

1 Scope:

- 1.1 This method covers the laboratory determination of the moisture content of soils.
- 1.2 The following applies to all specified limits in this standard: For the purposes of determining conformance with these specifications, an observed value or a calculated value shall be rounded off "to the nearest unit" in the last right-hand place of figures used in expressing the limiting value, in accordance with AASHTO R 11.

2 Referenced Documents:

- 2.1 **AASHTO:**
T 265 Laboratory Determination of Moisture Content of Soils

3 Definition:

- 3.1 *Moisture or Water Content of Soil* – The ratio, expressed as a percentage, of the mass of water in a given mass of soil to the mass of the solid particles. Practical application is to determine the mass of water removed by drying the moist soil to a constant mass in a drying oven controlled at $110 \pm 5^\circ\text{C}$ ($230 \pm 9^\circ\text{F}$) and to use this value as the mass of water in the given soil mass. The mass of the soil remaining after oven drying is used as the mass of the solid particles.

4 APPARATUS:

- 4.1 *Drying Oven* – thermostatically controlled, preferably of the forced-draft type, capable of being heated at a temperature of $110 \pm 5^\circ\text{C}$ ($230 \pm 9^\circ\text{F}$).
- 4.2 *Balance* – The balance shall have sufficient capacity, be readable to 0.1 percent of the sample mass, or better, and conform to the requirements of AASHTO M 231.
- 4.3 *Containers* – Suitable containers made of material resistant to corrosion and not subject to change in mass or disintegration on repeated heating and cooling. Containers shall have close fitting-lids to prevent loss of moisture from samples before initial weighing and to prevent absorption of moisture from the atmosphere following drying and before final weighing. One container is needed for each moisture content determination.

5 Test Sample:

- 5.1 Select a representative quantity of moist soil in the amount indicated in the method of test. If no amount is indicated, the minimum mass of the sample shall be in accordance with the following table:

Maximum Particle Size	Minimum Mass of Sample, g
0.425- mm (No. 40 sieve)	10
4.75-mm (No. 4 sieve)	100
12.5-mm (1/2 in.)	300
25.0-mm (1 in.)	500
50-mm (2 in.)	1000

6 Procedure:

- 6.1** Weigh a clean, dry container with its lid, and place the moisture content sample in the container. Replace the lid immediately, and weigh the container, including the lid and moist sample. Remove the lid and place the container with the moist sample in the drying oven maintained at a temperature of $110 \pm 5^\circ\text{C}$ ($230 \pm 9^\circ\text{F}$) and dry to a constant mass (Notes 1 and 2). Immediately upon removal from the oven, place the lid on the container and allow the sample to cool to room temperature. Weigh the container including the lid and the dried sample (Notes 3 and 4).

Note 1 – Checking every moisture content sample to determine that it is dried to a constant mass is impractical. In most cases, drying of a moisture content sample overnight (15 or 16 hours) is sufficient. In cases where there is no doubt concerning the accuracy of overnight drying, drying should be continued until the mass after two successive periods of drying indicates no change in mass. Samples of sand may often be dried to constant mass in a period of several hours. Since dry soil may absorb moisture from wet samples, dried samples should be removed before placing wet samples in the oven.

Note 2 – Oven-drying at $110 \pm 5^\circ\text{C}$ ($230 \pm 9^\circ\text{F}$) does not result in reliable moisture content values for soil containing gypsum or other minerals having loosely bound water from hydration or for soil containing significant amounts of organic material. Reliable moisture content values for these soils can be obtained by drying in an oven at approximately 60°C (140°F), or by vacuum desiccation at a pressure of approximately 10 mm Hg and at a temperature not lower than 23°C (73°F).

Note 3 – A container without a lid may be used provided the moist sample is weighed immediately after being taken and providing the dried sample is weighed immediately after being removed from the oven or after cooling in a desiccator.

Note 4 – Moisture content samples should be discarded and should not be used in any other tests.

7 CALCULATION:

- 7.1** Calculate the moisture content of the soil as follows:

$$w = [(\text{mass of moisture})/(\text{mass of oven-dry soil})] \times 100 = [(W_1 - W_2)/(W_2 - W_c)] \times 100$$

where:

w = moisture content, percent,

W_1 = moisture content and moist soil, g,

W_2 = mass of container and oven-dried soil, g, and

W_c = mass of container, g.

- 7.2** Calculate the percent of moisture content to the nearest 0.1 percent.