

ALDOT-130-75
MOISTURE CONTENT OF HOT-MIX ASPHALT BY DRYING

1. Scope

- 1.1. This method provides two procedures for determining the moisture content of hot-mix asphalt.
- 1.2. Section 4 describes the method for drying in an oven, which may be used for hot-mix asphalt containing any type of aggregate material including slag aggregate or metal.
- 1.3. Section 5 describes the method for drying in a microwave oven, which is not to be used for hot-mix asphalt that contains slag aggregate or metal.
- 1.4. This standard may involve hazardous materials, operations, and equipment.
- 1.5. It is the responsibility of users of this standard to consult and establish appropriate safety and health practices, and determine the applicability of regulatory limitations prior to use.

2. Referenced Documents

- 2.1. AASHTO T 168 - Sampling Hot-Mix Asphalt Paving Mixtures.

3. Sample

- 3.1. Obtain a sample according to Section 4.3.3 (oven procedure) or 5.4.2 (microwave procedure) below.

4. Drying in Conventional or Convection Oven

4.1 Significance and Use.

4.1.1. This procedure describes the method for determining the moisture content of hot-mix asphalt containing any type of aggregate material including slag aggregate or metal by drying in a conventional or convection oven.

4.2 Apparatus

4.2.1 A calibrated balance with sufficient capacity to determine the mass of the combined sample, pan, and cover, with a readability and sensitivity of at least 0.1 g

4.2.2 A thermostatically controlled calibrated conventional or convection oven capable of maintaining the temperature at $230 \pm 9^{\circ}\text{F}$ ($110 \pm 5^{\circ}\text{C}$).

4.2.3 A pan with a tight-fitting cover of sufficient size for the test sample to be spread out to a maximum depth of 1.5 in (40 mm) preferably an aluminum pan 11 x 7 x 1.5 in (275 x 175 x 40 mm).

4.2.4 A scoop and heat resistant gloves.

4.3 Procedure

4.3.1 Determine the tare mass of a clean drying pan and cover, and record the mass to the nearest 0.1 g.

4.3.2 Obtain a test sample of approximately 2.65 lbs (1200 g) per AASHTO T 168. Take the sample as soon after the truck is loaded as possible.

4.3.3 Immediately place the test sample in the drying pan and cover. Determine and record the mass of the pan, cover, and sample to the nearest 0.1 g. Any moisture condensing on the cover shall be included in the moisture determination. This mass must be taken as soon as possible, but no longer than 10 minutes after the test sample is obtained. The drying pan should be covered during handling and determining the mass of the sample, but uncovered during drying.

4.3.4 Spread the sample of hot-mix asphalt to a uniform depth, assuring there is no loss of the sample.

4.3.5 Place the pan and sample in the oven. After drying for 90 minutes, determine the mass and record the mass of the pan, cover, and sample to the nearest 0.1g.

4.3.6 Return the pan and sample to the oven and dry for an additional 20 minutes. Determine the mass of the pan, cover, and sample, and record the mass to the nearest 0.1 g. Determine and record the mass of the test sample to the nearest 0.1 g until constant mass (See Note 1 in Section 5) has been attained

4.3.7 Calculate and record the percent moisture according to Section 6.

5. Drying in Microwave Oven

5.1. Significance and Use

5.1.1. This procedure describes the method for determining the moisture content of hot-mix asphalt by drying in a microwave oven. It is not to be used for hot-mix asphalt containing slag aggregate or metal.

5.2. Apparatus

5.2.1. A calibrated balance with sufficient capacity to determine the mass of the combined sample, Pyrex container, and cover with a readability and sensitivity of at least 0.1 g.

5.2.2. Microwave oven with variable power control and 1 cubic foot (0.03 cubic meter) minimum capacity.

- 5.2.3. Covered Pyrex container capable of holding a minimum 1.1 lbs (500 g) of hot-mix test sample.
- 5.2.4. Thermometer traceable to NIST capable of measuring to 350°F (180°C).
- 5.2.5. Scoop and a pair of heat resistant gloves.

5.3. **Determination of Power Control Setting**

- 5.3.1. Determine the power control setting of the microwave oven which will be used to dry the test sample to constant mass by the following:
- 5.3.2. Set variable power control of microwave to approximately 50% power.
- 5.3.3. Place 500 mL (or 500 g) of tap water in the Pyrex container. Record temperature of water as "T1." Heat the 500 mL of water for 5 minutes. Record temperature of water as "T2." The difference between temperature "T1" and "T2" should be $77 \pm 1^{\circ}\text{F}$ ($25 \pm 0.5^{\circ}\text{C}$).
- 5.3.4. If the difference between temperature "T1" and "T2" is too low (or high), increase (or decrease) the variable power control and repeat section 5.3.3.

5.4. **Procedure**

- 5.4.1. Determine the tare mass of the Pyrex container and cover, and record the mass to the nearest 0.1 g.
- 5.4.2. A minimum test sample of approximately 1.1 lb (500 g) (for normal mixtures, i.e., nominal maximum aggregate size of one inch) is needed. Obtain the sample from a loaded truck as soon as possible. Immediately place the test sample in the Pyrex container and cover.
- 5.4.3. Determine and record the mass of the container, cover, and sample to the nearest 0.1 g. This mass must be taken as soon as possible, but no longer than 10 minutes after the test sample is obtained. The drying container shall be covered during handling and weighing of the sample, but uncovered during drying.
- 5.4.4. Determine the mass of the test sample to the nearest 0.1 g and record as the original test sample mass. Spread the sample of hot-mix asphalt to a uniform depth, assuring there is no loss of the sample.
- 5.4.5. Place the Pyrex container and sample in the microwave oven and dry using the power setting determined in Section 5.3. After 30 minutes, determine the mass and record the mass of the Pyrex container, cover, and sample to the nearest 0.1 g. Determine the mass of test sample and record to the nearest 0.1 g.
- 5.4.6. Return the Pyrex container and sample to the microwave and dry for an additional 5 minutes. Determine the mass of the Pyrex container, cover, and sample and record

the mass to the nearest 0.1 g. Determine and record the mass of the test sample to the nearest 0.1 g and check to see if constant mass (Note 1) has been attained. If the sample has not attained constant mass, continue the 5 minute heating and mass determination cycles until constant mass is attained. Care should be taken to avoid overheating the sample. The appearance of blue smoke is an indication of overheating. If overheating does occur, the test should be repeated at a lower power control setting.

5.4.7. Calculate and record the percent moisture according to Section 6.

Note 1. Constant mass shall be defined as the mass at which further drying at $230 \pm 9^{\circ}\text{F}$ ($110 \pm 5^{\circ}\text{C}$) does not alter the mass more than 0.05 percent of the original test sample mass in a 5 to 20 minutes heating cycle.

6. Calculation and Reporting

6.1. Determine the percent moisture as follows, and report to the nearest 0.1 percent.

$$\text{Percent Moisture} = \left(\frac{A - B}{B} \right) \times 100$$

Where:

A = Original Wet mass of test sample.

B = Constant Dry mass of test sample