

# WSDOT FOP for AASHTO T 329<sup>1</sup>

## Moisture Content of Asphalt (HMA) by Oven Method

### 1. SCOPE

- 1.1. This method is intended for the determination of moisture content of hot mix asphalt (HMA) by drying in an oven.
- 1.2. The values stated in SI units are to be regarded as the standard.
- 1.3. *This standard may involve hazardous materials, operations, and equipment. This standard does not purport to address all of the safety concerns 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 DOCUMENTS

#### 2.1. AASHTO Standards:

- M 231, Weighing Devices Used in the Testing of Materials
- T 168, Sampling Bituminous Paving Mixtures
- T 248, Reducing Samples of Aggregate to Testing Size

#### WSDOT Standards:

- T 712 Standard Method of Reducing Hot Mix Asphalt Paving Mixtures

### 3. TERMINOLOGY

- 3.1 Constant mass shall be defined as the mass at which further drying at  $325 \pm 25^{\circ}\text{F}$  ( $163 \pm 14^{\circ}\text{C}$ ) does not alter the mass by more than 0.1 percent.

### 4. SUMMARY OF TEST METHOD

- 4.1. A sample of HMA is dried in a forced-air, ventilated, or convection oven to a constant mass.

### 5. APPARATUS

- 5.1. *Balance or Scale*—4.4-lb (2-kg) capacity, readable to at least 0.1 g and conforming to the requirements of M 231.
- 5.2. *Forced-Air, Ventilated, or Convection Oven*—capable of maintaining the temperature surrounding the sample at  $325 \pm 25^{\circ}\text{F}$  ( $163 \pm 14^{\circ}\text{C}$ ).
- 5.3. *Sample Container*—the container in which the sample is dried shall be of sufficient size to contain the sample without danger of spilling and to allow the sample to be evenly distributed in a manner that will allow completion of the test in an expeditious manner.
- 5.4. Thermometers-Armored glass, Infrared gun or dial-type thermometers with metal stems for determining the temperature of aggregates, binder, and HMA.

<sup>1</sup> This FOP is based on AASHTO T 329-08 and has been modified per WSDOT standards. To view the redline modifications, contact WSDOT Quality Systems Manager at (360) 709-5412.

## 6. SAMPLE

- 6.1 A sample of HMA shall be obtained in accordance with WAQTC FOP for AASHTO T 168.
- 6.2 The sample shall be reduced in size in accordance with WSDOT T 712. The size of the test sample shall be a minimum of 1,000 g.

## 7. PROCEDURE

- 7.1 Determine and record the mass of the sample container to the nearest 0.1 g.
- 7.2 Place the test sample in the sample container. Determine and record the temperature of the test sample. To facilitate drying, evenly distribute the test sample in the sample container.
- 7.3 Determine and record the total mass of the sample container and moist test sample to the nearest 0.1 g.
- 7.4 Preheat the oven to drying temperature. The drying temperature shall fall within the Job Mix Formula mixing temperature range. If a mixing temperature range is not supplied, a temperature of  $325 \pm 25^{\circ}\text{F}$  ( $163 \pm 14^{\circ}\text{C}$ ) will be used.

**Note 1**—For repeatability between operators and or laboratories the difference between drying temperatures for samples should not exceed  $15^{\circ}\text{F}$  ( $9^{\circ}\text{C}$ ).

- 7.5 Calculate the mass of the initial, moist test sample by subtracting the mass of the sample container determined in Section 7.1 from the total mass of the sample container and moist test sample determined in Section 7.3.
- 7.6 The test sample shall be initially dried for a minimum of 90 minutes, and its mass determined. Then, at 30 min intervals until constant mass is achieved.

**Note 2**—The moisture content of test samples and the number of test samples in the oven will affect the rate of drying at any given time. Placing wet test samples in the oven with nearly dry test samples could affect the drying process.

- 7.7 Cool the sample container and test sample to approximately the same temperature as determined in Section 7.2.
- 7.8 Determine and record the total mass of the sample container and dry test sample to the nearest 0.1 g.

**Note 3**—Do not attempt to remove the test sample from the sample container for the purposes of determining the dry mass of the test sample.

- 7.9 Calculate the mass of the final, dry test sample by subtracting the mass of the sample container determined in Section 7.1 from the total mass of the sample container and dry test sample determined in Section 7.8.

## 8. CALCULATIONS

8.1. WSDOT uses the following formula to calculate moisture content:

8.1.1

$$\text{Moisture Content, \%} = \frac{M_i - M_f}{M_i} \times 100$$

where:

$M_i$  = mass of the initial, moist test sample; and

$M_f$  = mass of the final, dry test sample.

Example:  $M_i = 541.2$  g

$M_f = 536.0$  g

$$\text{Moisture Content} = \frac{541.2 \text{ g} - 536.0 \text{ g}}{541.2} \times 100 = 0.96\%$$

## 9. REPORT

9.1. Report the moisture content to the nearest 0.01 percent.

9.2. Results shall be reported on standard forms approved for use by the agency.



## Performance Exam Checklist

### **Moisture Content of Asphalt (HMA) by Oven Method WSDOT FOP for AASHTO T 329**

Participant Name \_\_\_\_\_ Exam Date \_\_\_\_\_

#### **Procedure Element**

- |                                                                                                                                          | Yes                      | No                       |
|------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------------|
| 1. The tester has a copy of the current procedure on hand?                                                                               | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. All equipment is functioning according to the test procedure, and if required, has the current calibration/verification tags present? | <input type="checkbox"/> | <input type="checkbox"/> |

#### **Test for Moisture**

- |                                                                                                           |                          |                          |  |
|-----------------------------------------------------------------------------------------------------------|--------------------------|--------------------------|--|
| 1. Representative sample obtained; <u>1,000 g</u> minimum?                                                | <input type="checkbox"/> | <input type="checkbox"/> |  |
| 2. Mass of sample determined to nearest 0.1 g?                                                            | <input type="checkbox"/> | <input type="checkbox"/> |  |
| 3. Initial temperature recorded?                                                                          | <input type="checkbox"/> | <input type="checkbox"/> |  |
| 4. Sample placed in drying oven for a minimum of 90 minutes?                                              | <input type="checkbox"/> | <input type="checkbox"/> |  |
| 5. Sample dried to a constant weight <u>within the mixing temperature range if known or at 325 ±25°F?</u> | <input type="checkbox"/> | <input type="checkbox"/> |  |
| 6. Samples checked for additional loss?                                                                   | <input type="checkbox"/> | <input type="checkbox"/> |  |
| 7. Sample and container cooled to approximately the initial temperature before mass determined?           | <input type="checkbox"/> | <input type="checkbox"/> |  |
| 8. Calculation of moisture content performed correctly?<br>% Moisture as percent of Wet Mass              | <input type="checkbox"/> | <input type="checkbox"/> |  |

$$\frac{M_i - M_f}{M_i} \times 100$$

First attempt: Pass  Fail

Second attempt: Pass  Fail

Signature of Examiner \_\_\_\_\_

Comments:

