WSDOT FOP for AASHTO T 329¹

 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

2.2 WAQTC Standards

T 168 – Sampling Bituminous Paving Mixtures

2.3 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 ± 25°F (163 ± 14°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 ± 25°F (163 ± 14°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.

¹This FOP is based on AASHTO T 329-08 and has been modified per WSDOT standards. To view the redline modifications, contact the WSDOT Quality Systems Manager at 360-709-5412.
5.4 Thermometric Devices – Armored glass, Infrared gun or dial-type thermometers with metal stems for determining the temperature of aggregates, binder, and HMA.

6. Sample

6.1 A sample of HMA shall be obtained in accordance with WSDOT FOP for WAQTC 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 of 325 ± 25°F (163 ± 14°C).

*Note 1:* For repeatability between operators and or laboratories the difference between drying temperatures for samples should not exceed 15°F (9°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:

\[
\text{Moisture Content, } \% = \left( \frac{M_i - M_f}{M_i} \right) \times 100
\]

Where:

\( M_i \) = Mass of the initial, moist test sample
\( M_f \) = Mass of the final, dry test sample

Example:

\( M_i = 1,389.8 \text{ g} \)
\( M_f = 1,388.0 \text{ g} \)

\[
\text{Moisture Content} = \left( \frac{1,389.8 - 1,388.0}{1,389.8} \right) \times 100 = 0.129\% = 0.13\%
\]

9. Report

9.1 Report the moisture content to the nearest 0.01 percent.

9.2 Report the results using one or more of the following:

- Materials Testing System (MATS)
- WSDOT Form 350-092 and 350-157
- Form approved in writing by the State Materials Engineer
Performance Exam Checklist

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

Participant Name _______________________________    Exam Date ____________________

<table>
<thead>
<tr>
<th>Procedure Element</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The tester has a copy of the current procedure on hand?</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>2. All equipment is functioning according to the test procedure, and if required, has the current calibration/verification tags present?</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Test for Moisture</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Representative sample obtained; 1,000 g minimum?</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>2. Mass of sample determined to nearest 0.1 g?</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>3. Initial temperature recorded?</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>4. Sample placed in drying oven for a minimum of 90 minutes?</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>5. Sample dried to a constant weight at 325 ±25° F?</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>6. Samples checked for additional loss?</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>7. Sample and container cooled to approximately the initial temperature before mass determined?</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>8. Calculation of moisture content performed correctly?</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

% Moisture as percent of Wet Mass

\[
\frac{M_i - M_f}{M_i} \times 100
\]

First Attempt: Pass ☐   Fail ☐   Second Attempt: Pass ☐   Fail ☐

Signature of Examiner _______________________________

Comments: