MOISTURE CONTENT OF HOT MIX ASPHALT (HMA) BY OVEN METHOD FOP FOR AASHTO T 329 (09)

Scope

This procedure covers the determination of moisture content of HMA in accordance with AASHTO T 329.

Summary

A test specimen of HMA is dried in a forced-air ventilated or convection oven to constant mass.

Apparatus

- Balance or scale: 2 kg capacity, readable to 0.1 g and conforming to AASHTO M 231.
- Forced draft, ventilated, or convection oven: Capable of maintaining the temperature surrounding the sample at 163 ±14°C (325 ±25°F).
- Sample Container: Clean, dry, not affected by heat and of sufficient size to contain a test sample without danger of spilling.
- Thermometer or other suitable device with a temperature range of 10-260°C (50-500°F).

Sample

The test sample shall be obtained in accordance with the FOP for AASHTO T 168, and reduced in accordance with the FOP for AASHTO R 47. The size of the test sample shall be a minimum of 1000 g.

Procedure

1. Preheat the oven to a minimum of 105°C (221°F), but do not exceed the Job Mix Formula (JMF) mixing temperature. If the mixing temperature is not supplied, a temperature of 163 ± 14ºC (325 ± 25ºF) is to be used.

   Note 1: For repeatability between laboratories, the preferred practice is to dry the sample at no less than 9° C (15° F) below the JMF mixing temperature.

2. Determine and record the mass of the sample container, including release media, to the nearest 0.1 g.
3. Place the test sample in the sample container.
4. Determine and record the temperature of the test sample.
5. Determine and record the total mass of the sample container and test sample to the nearest 0.1 g.
6. Calculate the initial, moist mass (M_i) of the test sample by subtracting the mass of the sample container as determined in Step 2 from the total mass of the sample container and the test sample as determined in Step 5.

7. The test sample shall be initially dried for 90 ± 5 minutes, and its mass determined. Then it shall be dried at 30 ± 5 min intervals until constant mass is achieved.

   Note 2: Constant mass shall be defined as the mass at which further drying does not alter the mass by more than 0.05 percent.

8. Cool the sample container and test sample to ±9°C (15°F) of the temperature determined in Step 4.

9. Determine and record the total mass of the sample container and 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 mass.

10. Calculate the final, dry mass (M_f) of the test sample by subtracting the mass of the sample container as determined in Step 2 from the total mass of the sample container and the test sample as determined in Step 9.

    Note 4: Moisture content and the number of samples in the oven will affect the rate of drying at any given time. Placing wet samples in the oven with nearly dry samples could affect the drying process.

Calculations

Constant Mass:

Calculate constant mass using the following formula:

$$\%\text{Change} = \frac{M_p - M_n}{M_p} \times 100$$

Where: M_p = previous mass measurement
M_n = new mass measurement

Example:

Mass of container: 232.6 g

Mass of container after first drying cycle: 1361.8 g

Mass, M_p, of possibly dry sample: 1361.8 g – 232.6 g = 1129.2 g

Mass of container and dry sample after second drying cycle: 1360.4 g

Mass, M_n, of dry sample: 1360.4 g – 232.6 g = 1127.8 g

$$\frac{1129.2 - 1127.8}{1129.2} \times 100 = 0.12\%$$

0.12% is not less than 0.05%, so continue drying the sample.

Mass of container and dry sample after third drying cycle: 1359.9 g
Mass, M_n, of dry sample: 1359.9g – 232.6g = 1127.3g

$$\frac{1127.8 - 1127.3}{1127.8} \times 100 = 0.04\%$$

0.04% is less than 0.05%, so constant mass has been reached.

Moisture Content:

Calculate the moisture content, as a percent, using the following formula.

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

Where: M_i = initial, moist mass
M_f = final, dry mass

Example:

M_i = 1134.9 g
M_f = 1127.3 g

$$\text{Moisture Content} = \frac{1134.9\text{g} - 1127.3\text{g}}{1127.3\text{g}} \times 100 = 0.674, \text{ say } 0.67\%$$

Report

Results shall be reported on standard forms approved for use by the agency. Report the moisture content to 0.01 percent.

PERFORMANCE EXAM CHECKLIST

MOISTURE CONTENT OF HOT MIX ASPHALT BY OVEN METHOD FOP FOR AASHTO T 329

Participant Name _____ Exam Date _____

Record the symbols "P" for passing or "F" for failing on each step of the checklist.

Procedure Element	**Trial 1**	**Trial 2**
1. Mass of clean dry container including release media determined to 0.1 g?	_____	_____
2. Representative sample obtained; 1000 g minimum?	_____	_____
3. Initial temperature taken and recorded?	_____	_____
4. Mass of sample determined to 0.1 g?	_____	_____
5. Sample placed in drying oven for 90 ± 5 minutes?	_____	_____
6. Sample dried at a temperature not to exceed the JMF mixing temp?	_____	_____
7. Constant mass checked at 30 ± 5 minute intervals and reached?	_____	_____
8. Sample and container cooled to ±9°C (15°F) of the initial temperature before final mass determined to 0.1 g?	_____	_____
9. Calculation of moisture content performed correctly to 0.01%?	_____	_____

% Moisture as percent of Dry Mass

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

Comments: First attempt: Pass ☐ Fail ☐ Second attempt: Pass ☐ Fail ☐

_____

_____

_____

_____

_____

_____

_____

_____

Examiner Signature _____WAQTC #:_____