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

Scope

This procedure covers the determination of moisture content of asphalt mixtures in accordance with AASHTO T 329-22.

Overview

Moisture content is determined by comparing the wet mass of a sample and the mass of the sample after drying to constant mass. The term constant mass is used to define when a sample is dry.

Constant mass – the state at which a mass does not change more than a given percent, after additional drying for a defined time interval, at a required temperature.

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 50 to 200°C (122 to 392°F) and readable to the nearest 2°C (4°F).

Sample

The test sample shall be obtained in accordance with the FOP for AASHTO R 97 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 the Job Mix Formula (JMF) mixing temperature range. If the mixing temperature is not supplied, a temperature of 163 ±14ºC (325 ±25ºF) is to be used.
2. Determine and record the mass of the ~~sample~~ container, including release media, to the nearest 0.1 g.

   Note 1: When using paper or other absorptive material to line the ~~sample~~ container ensure it is dry before determining initial mass of ~~sample~~ container.
3. Place the ~~test~~wet sample in the ~~sample~~ container.
4. Determine and record the temperature of the ~~test~~ sample~~.~~ to the nearest 2°C (4°F).
5. Determine and record the ~~total~~ mass of the sample and container ~~and test sample~~ to the nearest 0.1 g.

6. ~~Calculate~~Determine and record the ~~initial, moist~~wet mass (M_i) of the ~~test~~ sample by subtracting the ~~mass of the sample~~ container ~~as~~mass determined in Step 2 from the ~~total~~ mass of the sample and container ~~and the test sample as~~ determined in Step 5.
7. ~~The test~~Place the sample ~~shall be initially dried~~and container in the oven and dry for 90 ±5 ~~minutes,~~min.
8. Determine the mass of sample and ~~its~~container.
9. Determine and record the mass of the sample by subtracting the container mass determined~~. Then it shall be dried at~~ in Step 2 from the mass of the sample and container determined in Step 8.
10. Return sample and container to the oven and dry for 30 ±5 ~~minute intervals until further~~min.
11. Determine the mass of sample and container.
12. Determine and record the mass of the sample by subtracting the container mass determined in Step 2 from the mass of the sample and container determined in Step 11.
13. Determine percent change by subtracting the new mass determination (M_n) from the previous mass determination (M_p), dividing by the previous mass determination (M_p), and multiplying by 100.

~~7.~~14. Continue drying~~ does not alter the mass by more~~, performing Steps 10 through 13, until there is less than 0.05 percent change after additional drying time.

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

~~9.~~16. Determine and record the ~~total~~dry mass of the sample and container~~ and test sample~~ to the nearest 0.1 g.

~~10.~~17. ~~Calculate~~Determine and record the ~~final, dry~~ mass ~~(M_f)~~ of ~~the test~~dry sample (M_f) by subtracting the mass of the ~~sample~~ container ~~as~~ determined in Step 2 from the ~~total~~dry mass of the sample and container ~~and the test sample as~~ determined in Step ~~9~~16.

Note 2: 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:

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

Where:

M_p = previous mass measurement

M_n = new mass measurement

Example:

~~Mass of container: 232.6 g~~
Mass of container and release media: 232.6 g
Initial mass of sample and container: 1367.5 g
Initial mass of sample (M_i): 1367.5 g – 232.6 g = 1134.9 g
Mass of sample and 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 sample and container ~~and possibly dry sample~~ after second drying cycle: 1360.4 g
Mass, M_n, of ~~possibly dry~~ sample: 1360.4 g – 232.6 g = 1127.8 g

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

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

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

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

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

Moisture Content:

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

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

Where:

M_i = initial, ~~moist~~wet mass
M_f = final, dry mass

Example:

M_i = 1134.9 g

M_f = 1127.3 g

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

Report

- On forms approved by the agency
- Sample ID
- Moisture content to the nearest 0.01 percent