T 305

STANDARD METHOD OF TEST FOR DETERMINATION OF DRAINDOWN CHARACTERISTICS IN UNCOMPACTED ASPHALT MIXTURES

FOP FOR AASHTO T 305

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02 ## Scope and Significance

This test method covers the determination of the amount of draindown of uncompacted asphalt mixture samples when held at elevated temperatures such as those used in plant production, storage, transport and placement. The test method may be used to determine compliance with specified draindown requirements.

03 The test is primarily used for mixtures with high coarse aggregate content such as open-graded friction courses and Stone Matrix Asphalt (SMA).

The test may be used to evaluate draindown characteristics during mixture design and/or plant production.

04 ## Definition

- **Draindown:** That portion of the material that separates itself from the sample during the test. It may consist of either binder or a combination of binder and fine aggregate.

05 ## Apparatus

- **Balance:** Of sufficient capacity for primary sample masses, accurate to 0.1 gram.
- **Forced Draft Oven:** Capable of maintaining temperature from 250 to 350 ±3.6ºF.
- **Plates:** Cake pans or pie tins of appropriate size and durability to withstand oven temperatures.

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- **Standard Basket:** Cylindrical in shape, manufactured of 0.25-inch sieve cloth as specified in M 92. Nominal dimensions of 4.25-inch diameter, 6.5-inch height with the basket bottom 1-inch above the bottom of the assembly.
- **Miscellaneous Tools:** Gloves, trowels, mixer, bowls, etc.

Sample Preparation

07 **Laboratory-Prepared Samples:**

- Temperature: Determine draindown at expected plant production temperature and 27ºF above. (See Note 1)
- Number of Samples: Duplicate samples for each temperature tested.

Note 1: When performing the test as part of mix design, two temperatures are selected to determine the effect of variation in plant production temperatures.

08 - Preparation Steps:

1. Dry aggregate to constant mass, cool, and separate into appropriate size fractions.
2. Determine anticipated plant production temperature or laboratory mixing temperature (whichever is specified to be used).
3. Combine aggregates according to the job-mix formula (JMF) grading sufficient to produce 1200 ± 200 grams of completed mixture for each sample.

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4. Place aggregate samples in the oven and heat to a temperature not exceeding the mixing temperature from step 2 by more than 50ºF.
5. Heat asphalt cement to the temperature established in step 2.
6. Place heated mixing bowl on the balance and zero the balance.

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7. Place heated aggregates in the mixing bowl. Add any stabilizers and mix thoroughly, forming a crater in the aggregate blend. Determine and record mass of material. (See Note 2)

Note 2: Some stabilizers such as fibers or some polymers must be added to the aggregates prior to mixing with asphalt binder. Other types of stabilizers must be added to the asphalt binder prior to mixing with the aggregate.

8. Add the required mass of binder to result in the JMF binder content. (At this point, temperature of the aggregate and binder shall be within the required mixing temperature range).

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9. Mix quickly by mechanical means, or by hand, until the aggregate is thoroughly coated.

10. Remove contents from the bowl, scrape bowl and mixing apparatus clean, and use the prepared material as described below under "Procedure."

12 **Plant-Produced Samples:**

- Number of samples: Duplicate samples should be tested at plant production temperature.
- Temperature: Conduct tests only at plant production temperature. A second, higher temperature is not required.

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- Sampling: Obtain during production at any appropriate location such as trucks prior to mixture leaving the plant. (See Note 3)
- Sample Reduction: Reduce to specified sample size according to the FOP for AASHTO R 47.

Note 3: To avoid occurrence of draindown prior to sampling, it may be preferable to obtain samples prior to storage in surge or storage bins.

14 ## Procedure

1. Preheat the oven to the required test temperature.
2. Make all mass determinations to the nearest 0.1-gram.
3. Determine the mass of a clean, empty wire basket.
4. Transfer the entire hot sample to the wire basket. After placing the material in the basket do not consolidate or otherwise disturb the sample. (See Note 4)
5. Determine the mass of the filled basket.
6. Subtract the mass determined in step 3 from the mass determined in step 5 and record as the mixed sample mass prior to draindown (M_t).
7. Determine and record the mass of a clean plate or other suitable container (M_i).

Note 4: Work quickly to avoid cooling of the sample. If the sample cools more than 45ºF below the required test temperature it is necessary to increase the test duration.

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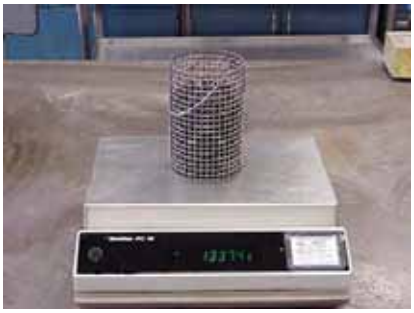

Weighing Filled Basket

Basket in Oven

Draindown Results

8. Place the basket on the plate and place the assembly in the oven at the required temperature for 1-hour ± 5 minutes. If the sample has cooled below the test temperature by more than 45ºF, the test duration must be increased to 70 ± 5 minutes.
9. After the required test duration, remove the basket and plate assembly from the oven.
10. Remove the basket from the plate and determine the mass of the plate plus drained material (M_f).

Calculation

- For each individual test, calculate the percent of the mixture that drained according to the formula presented below.
- Average the duplicate results from each test temperature for the report.

$$\%\,\text{Draindown} = \frac{M_f - M_i}{M_t} \times 100$$

where:

M_t = Mass of mixture prior to draindown

M_i = Mass of clean plate prior to draindown

M_f = Mass of plate and contents after draindown

Report

- Report on standard forms approved by the agency
- Identify whether samples were laboratory-produced or plant-produced
- Test temperature
- Test duration
- Report the average percent drainage at each test temperature as required by the agency
- Other information as required by the agency

Tips! 25

- Laboratory-mixed samples must be tested at two temperatures; plant-produced samples at only the plant production temperature
- Do not compact or otherwise disturb the sample after installing in the basket
- Base test duration on the temperature of the sample after mixing
- Remember to report the average draindown of the duplicate samples as required by the agency

REVIEW QUESTIONS

1. What is the purpose of this procedure? The procedure applies primarily to what types of mixtures?

2. Describe the basket assembly used for this test.

3. How many specimens are tested? At what temperature(s) are they tested?

4. Briefly describe the aggregate preparation steps.

5. Describe the mass of the aggregate prior to mixing with asphalt binder.

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6. How long do samples remain in the oven?

7. How are test results reported?