

ALDOT-386-95
**DETERMINATION OF DRAINDOWN CHARACTERISTICS IN UNCOMPACTED
BITUMINOUS MIXTURES**

1. Scope

- 1.1. This test method covers the determination of the amount of draindown in an uncompacted bituminous mixture sample when the sample is held at elevated temperatures comparable to those encountered during the production, storage, transport, and placement of the mixture. The test is particularly applicable to mixtures such as porous asphalt (open-graded friction course) and Stone Matrix Asphalt (SMA).
- 1.2. The values stated in the gram-millimeter 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 problems associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

2. Referenced Documents

- 2.1. AASHTO Standards:
 - 2.1.1. T 245, Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus.
 - 2.1.2. M 92, Standard Specification for Wire-Cloth Sieves for Testing Purposes.

3. Definitions

- 3.1. Draindown - For the purpose of this test method, draindown is considered to be that portion of material, which separates itself from the sample as a whole and is deposited outside the wire basket during the test. The material, which drains, may be composed of either asphalt cement or a combination of asphalt cement and fine aggregate.

4. Summary of Method

- 4.1. A sample of the bituminous mixture to be tested is pre-pared in the laboratory or obtained from field production. The sample is placed in a wire basket, which is positioned on a pre-weighted dry plate. The sample, basket, and plate are placed in a forced air oven for one hour at a pre-selected temperature. At the end of one hour, the basket containing the sample is removed from the oven along with the plate and the plate is weighed to determine the amount of draindown that occurred.

5. Significance and Use

- 5.1. This test method can be used to determine whether the amount of draindown measured for a given bituminous mixture is within acceptable levels. The test also provides an evaluation of the draindown potential of an asphalt mixture produced in the field.

6. Apparatus

- 6.1. Oven, capable of maintaining the temperature in a range from 250 to 350°F (120 to 175°C). The oven should maintain the set temperature to within $\pm 4^\circ\text{F}$ (2°C).
- 6.2. Plates of appropriate size. The plates used should be of appropriate durability to withstand the oven temperatures. Paper or metal plates (disposable or otherwise) are acceptable.
- 6.3. Standard basket meeting the dimensions shown in Figure 1. The basket shall be constructed using $\frac{1}{4}$ in (6.3mm) square openings.
- 6.4. Spatulas, trowels, mixer, and bowls as needed.
- 6.5. Balance accurate to 0.1 gram.

7. Sample Preparation

- 7.1. Laboratory Prepared Samples.
 - 7.1.1. Number of Samples - For each mixture tested, the draindown characteristics shall be determined at three different temperatures. The three temperatures are the anticipated plant production temperature and 27°F (15°C) above and below. For each temperature, duplicate samples should be tested. Thus for one bituminous mixture, a minimum of six samples will be tested.
 - 7.1.2. Dry the aggregate to constant mass and sieve it into appropriate size fractions as indicated in AASHTO T 245, section 3.2.
 - 7.1.3. Determine the anticipated plant production temperature or select a mixing temperature in accordance with AASHTO T 245, section 3.3.1.
 - 7.1.4. Weigh into separate pans for each test sample the amount of each size fraction required to produce completed mixture samples having a mass of 1200 grams. The aggregate fractions shall be combined such that the resulting aggregate blend has the same gradations as the job-mix-formula. Place the samples in an oven and heat to a temperature not to exceed the mixing temperature established in 7.1.3 by more than approximately 80°F (28°C).
 - 7.1.5. Heat the asphalt cement to the temperature established in 7.1.3.
 - 7.1.6. Place the heated aggregate in the mixing bowl. Add any stabilizers (Note 1) and thoroughly mix the dry components. Form a crater in the aggregate blend and add the required amount of asphalt. The amount of asphalt shall be that established in the job-mix-formula. At this point, the temperature of the aggregate and asphalt cement shall be within the limits of the mixing temperature established in 7.1.3. Mix the aggregate (and stabilizer if any) and asphalt cement quickly until the aggregate is thoroughly coated.

7.2. Plant Produced Samples.

7.2.1. Number of Samples - For plant produced samples, duplicate samples should be tested at the plant production temperature. Samples may be obtained during plant production by sampling the mixture at any appropriate location such as the trucks prior to the mixture leaving the plant or at the paver.

7.2.2. Samples obtained during actual production should be reduced to the proper test sample size by the quartering method.

8. Procedure

8.1. Transfer the laboratory produced or plant produced uncompacted mixture sample to a tared wire basket described in 6.3. Any aggregate that falls through the basket and onto the plate during the transfer should be removed and wasted. Place the entire sample in the wire basket. Do not consolidate or otherwise disturb the sample after transfer to the basket. Determine the mass of the sample to the nearest 0.1 gram.

8.2. Dry a plate, at the temperature listed below, for a minimum of 10 minutes. Immediately determine and record the mass of the plate to the nearest 0.1-gram. Place the basket on the paper plate and place the assembly into the oven at the temperature as determined in 7.1.1 or 7.2.1 for 1-hour \pm 1 minute.

8.3. After the sample has been in the oven for 1-hour \pm 1 minute, remove the basket and paper plate. Remove any pieces of aggregate, which may have passed through the sieve and onto the plate. Determine and record the mass of the plate plus drained asphalt cement to the nearest 0.1-gram.

9. Calculations

9.1. Calculate the percent of mixture which drained by subtracting the initial paper plate mass from the final paper plate mass and divide this by the initial total sample mass. Multiply the result by 100 to obtain a percentage.

10. Reporting

10.1. Report the average percent draindown at each of the test temperatures.

Note 1: Some types of stabilizers such as fibers or some polymers must be added directly to the aggregate prior to mixing with the asphalt cement. Other types must be added directly to the asphalt cement prior to blending with the aggregate. Also, some modifiers are preblended with asphalt cement.

Figure 1 - Wire Basket Assembly

