

**METHODS OF SAMPLING AND TESTING**  
**MT 338-10**  
**DRAINDOWN CHARACTERISTICS IN UNCOMPACTED ASPHALT MIXTURES**  
**(Modified ASTM D6390)**

**1 Scope**

- 1.1 This method covers the determination of the amount of draindown in an uncompacted asphalt mixture sample when the sample is held at elevated temperatures comparable to those encountered during the production, storage, transport, and placement of the mixture.

**2 Referenced Documents**

**ASTM**

D6390 Determination of Draindown Characteristics in Uncompacted Asphalt Mixtures

**MT Materials Manual**

MT 303 Sampling Bituminous Paving Mixtures

MT 306 Marshall Method for Bituminous Mix Design

**3 Terminology**

- 3.1 *Draindown* – 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 binder or a combination of asphalt binder, additives, or fine aggregate.

**4 Summary of Test Method**

- 4.1 A sample of the asphalt mixture to be tested is prepared in the laboratory or obtained from field production. The sample is placed in a wire basket which is positioned on a plate or other suitable container of known mass. The sample, basket, and plate or container is placed in a forced draft oven for one hour at a pre-selected temperature. At the end of one hour, the basket containing the sample or container is removed from the oven along with the plate or container and the mass of the plate or container containing the drained material, if any, is determined. The percent of draindown is then calculated.

**5 Significance and Use**

- 5.1 This test method can be used to determine whether the amount of draindown measured for a given asphalt mixture is within specified acceptable levels. The test provides an evaluation of the draindown potential of an asphalt mixture during mixture design and/or during field production. This test is primarily used for mixtures with high coarse aggregate content such as porous asphalt (open graded friction coarse) and stone matrix asphalt (SMA).

**6 Apparatus**

- 6.1 *Forced Draft Oven* – capable of maintaining a set temperature in a range from 120°C to 175°C to within  $\pm 2^\circ\text{C}$ .
- 6.2 *Plates* - or other suitable containers of appropriate size. The plates or containers used shall be of appropriate durability to withstand the oven temperatures. Cake pans or pie tins are examples of suitable types of containers.
- 6.3 *Standard basket* – A basket constructed of standard 1/4 inch sieve cloth, 4 1/4  $\pm$  3/8 inches in diameter, 5 1/2  $\pm$  3/8 inches in height with a wire sieve cloth bottom installed inside the basket 1  $\pm$  1/4 inches from the bottom of the basket.
- 6.4 *Balance* – A balance accurate to 0.1 g.

## 7 Sample Preparation

### 7.1 Laboratory Prepared Samples

- 7.1.1 Number of Samples –Determine the draindown characteristics for each mixture tested at two different temperatures. The temperatures shall be the anticipated plant production temperature as well as 10°C above (see Note 1). Test duplicate samples for each temperature. Thus for one asphalt mixture, a minimum of four samples will be tested.

*Note 1 – When using the test as part of the mixture design procedure, the test should be performed at two temperatures in order to determine the potential effect that plant temperature variation may have on the mixture during production. When the test is used in the field during production, it should be necessary to perform the test at the plant production temperature only.*

- 7.1.2 Dry the aggregate to a constant mass and sieve it into appropriate size fractions as indicated in MT 306.
- 7.1.3 Determine the anticipated plant production temperature for the specific mix to be tested based on the specifications, mix design, or recommendations of the binder supplier.
- 7.1.4 Place the amount of each size fraction required to produce completed mixture samples of  $1200 \pm 200$  g into separate pans. Combine the aggregate fractions to produce the same gradation as the job-mix formula. Place the aggregate samples in an oven and heat to a temperature not to exceed the temperatures established in 7.1.1.
- 7.1.5 Heat the asphalt binder to the temperatures established in 7.1.1.
- 7.1.6 Place the heated aggregate in the mixing bowl. Add any stabilizers (see Note 2) and thoroughly mix the dry components. Form a crater in the aggregate blend and add the required amount of asphalt binder. Add the asphalt binder so that the final sample has the same asphalt content as the job-mix formula. At this point, the temperature of the aggregate and asphalt binder shall be at the temperature determined in 7.1.1. Mix the aggregate (and stabilizer if any) and asphalt binder quickly until the aggregate is thoroughly coated.

*Note 2 – Some types of stabilizers such as fiber or some polymers are added directly to the aggregate prior to mixing with the asphalt binder. Other types of stabilizers are added directly to the asphalt binder prior to blending with the aggregate.*

### 7.2 Plant Produced Samples

- 7.2.1 Number of samples – Test triplicate samples at the plant production temperature.
- 7.2.2 Obtain the samples in accordance with [MT 303](#) during plant production by sampling the mixture at any appropriate location prior to the mixture leaving the plant. Reduce the samples obtained during actual production to the proper test size.

## 8 Procedure

- 8.1 Weigh the empty wire basket described in Section 6.3 and designate as A. Transfer the uncompacted mixture sample to the wire basket as soon as possible. Place the entire sample into the basket. Do not consolidate or otherwise disturb the sample after transfer to the basket. Determine the mass of the sample and the basket and designate as B.
- 8.2 Determine and record the mass of a plate or other suitable container to the nearest 0.1 g at ambient temperature and designate as C. Place the basket on the plate or container and place the assembly into the oven at a temperature as determined in 7.1.1 or 7.2.1 for  $1 \text{ hr} \pm 5 \text{ min}$ .
- 8.3 After the sample has been in the oven for  $1 \text{ hr} \pm 5 \text{ min}$ , remove the basket and the plate or container from the oven and cool to room temperature. Determine and record the mass of the plate or container plus the drained material to the nearest 0.1g and designate as D.

**9 Calculation**

- 9.1 Calculate the percent of mixture which drained to the nearest 0.1% as follows:

$$\text{Draindown \%} = (D - C) / (B - A) \times 100$$

Where:

A = mass of empty wire basket,

B = mass of wire basket and sample,

C = mass of empty catch plate or container, and

D = mass of catch plate or container plus drained material.

**10 Report**

- 10.1 Report the average percent of draindown at each of the test temperatures to the nearest 0.1%.

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## ASPHALT DRAINDOWN WORKSHEET

Project Number \_\_\_\_\_

Project Name \_\_\_\_\_

Tester Name \_\_\_\_\_ Date \_\_\_\_

Plant Production Temperature \_\_\_\_\_

**Laboratory Prepared Samples**  
*(minimum of 4 samples tested)*

	<i>D</i>	<i>C</i>	<i>B</i>	<i>A</i>	
Sample # 1	_____	-	_____ ÷ _____	-	_____ x 100 = _____
Sample # 2	_____	-	_____ ÷ _____	-	_____ x 100 = _____
					Average = _____
Sample # 3	_____	-	_____ ÷ _____	-	_____ x 100 = _____
Sample # 4	_____	-	_____ ÷ _____	-	_____ x 100 = _____
					Average = _____

**Plant Produced Samples**  
*(minimum of 3 samples tested)*

	<i>D</i>	<i>C</i>	<i>B</i>	<i>A</i>	
Sample # 1	_____	-	_____ ÷ _____	-	_____ x 100 = _____
Sample # 2	_____	-	_____ ÷ _____	-	_____ x 100 = _____
Sample # 3	_____	-	_____ ÷ _____	-	_____ x 100 = _____
					Average = _____

Comments:

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