



**INDIANA DEPARTMENT OF TRANSPORTATION
DIVISION OF MATERIALS AND TESTS**

**DRYING HMA MIXTURES
ITM No. 572-15**

1.0 SCOPE.

- 1.1 This method of test covers the procedure for drying samples of HMA mixtures. Samples obtained in an oven bag require a moisture content determination. Samples, not requiring a moisture content determination shall be dried to a constant weight (mass).
- 1.2 This ITM may involve hazardous materials, operations, and equipment and may not address all of the safety problems associated with the use of the test method. The user of the ITM is responsible for establishing appropriate safety and health practices and determining the applicability of regulatory limitations prior to use.

2.0 REFERENCES.

2.1 AASHTO Standards.

M 231 Weighing Devices Used in the Testing of Materials

2.2 ASTM Standards.

D7227 Rapid Drying of Compacted Asphalt Specimens using Vacuum Drying Apparatus

2.3 ITM Standards.

580 Sampling HMA

3.0 TERMINOLOGY. Definitions for terms and abbreviations shall be in accordance with the Department's Standard Specifications, Section 101.

4.0 SIGNIFICANCE AND USE. This ITM shall be used to dry HMA samples to constant weight. The moisture content of the HMA may also be determined, if required.

5.0 APPARATUS.

- 5.1 Oven, capable of maintaining the temperature at $221 \pm 9^{\circ}\text{F}$
- 5.2 Electric skillet, with a thermostatic heat control capable of heating to 221°F
- 5.3 Spatulas and trowels as needed

- 5.4** Pans and containers as needed
- 5.5** Balance, a Class G2, in accordance with AASHTO M 231
- 5.6** Vacuum chamber, with pump capable of evacuating a sealed and enclosed chamber to a pressure of 6 mm Hg (6 torr) or less. The device shall have an automatic vacuum, airflow control, and temperature control features to ensure proper drying of the sample at close to room temperature. The vacuum chamber shall have a water removable plate and electronic cold trap with an airflow divider plate.
- 5.7** Infrared temperature sensor, handheld, accurate to a minimum of $\pm 9^{\circ}\text{F}$
- 5.8** Paper towel or absorptive cloth
- 6.0 SAMPLING.** Sampling shall conform to the requirements of ITM 580.
- 7.0 WEIGHING.** All measurements for one test shall be done on the same balance.
- 8.0 PREPARATION OF SAMPLE.**
- 8.1** For samples not requiring determination of the moisture content, separate the samples as uniformly as possible, using care not to fracture the mineral particles.
- 8.2** The approximate minimum size of the sample for truck and plate samples shall be in accordance with the following:

Mixture Designation	Minimum Weight of Sample, g
4.75 mm	1000
9.5 mm	1500
12.5 mm	2000
19.0 mm, OG19.0 mm	3000
25.0 mm, OG25.0 mm	4000

9.0 PROCEDURES.

9.1 Plate Samples.

- 9.1.1** Determine the weight of a round, bowl type, metal pan and a spatula at $221 \pm 9^{\circ}\text{F}$

- 9.1.2** Place the sample contained in the sealed oven bag (Note 1) in the tared metal pan with the spatula, and place in the oven at $221 \pm 9^{\circ}\text{F}$

Note 1 - The weight of the oven bag shall be determined and recorded on the bag prior to obtaining the sample. A constant weight of the bag may be used for a particular type of oven bag.

- 9.1.3** Weigh the sample, bowl, and spatula after 1 h and record the weight

- 9.1.4** Open the oven bag and place the sample, metal pan, and spatula in the oven

- 9.1.5** Weigh the sample, metal pan, and spatula at 15 minute intervals until constant weight (Note 2) is achieved. Stir the sample after each weighing if the sample has not reached constant weight.

Note 2 - Constant weight is defined as the weight at which further drying at the required drying temperature does not alter the weight by more than 0.05 percent.

9.2 Truck Samples.

- 9.2.1** Determine the weight of a round, bowl type, metal pan and a spatula at $221 \pm 9^{\circ}\text{F}$

- 9.2.2** Immediately place the sample contained in the sealed oven bag in the tared metal pan with the spatula, and weigh and record the weight

- 9.2.3** Open the bag and place the sample, metal pan, and spatula into the oven at $221 \pm 9^{\circ}\text{F}$

- 9.2.4** Weigh the sample, metal pan, and spatula at 15 minute intervals until a constant weight (Note 2) is achieved. Stir the sample after each weighing if the sample has not reached constant weight.

9.3 Plate and Truck Samples -- No Moisture Content Determination.

9.3.1 Place the sample, sample container, and spatula in the oven at $221 \pm 9^\circ\text{F}$. If a skillet is used, the sample shall be heated to approximately 221°F .

9.3.2 Weigh the sample, sample container or skillet, and spatula at 15 minute intervals until a constant weight (Note 2) is achieved. Stir the sample after each weighing if the sample has not reached constant weight (mass).

9.4 Cores.

9.4.1 Vacuum Drying.

- a)** Follow manufacturers recommendations for warm up and self test procedures
- b)** Conduct a daily test to include drying the cold trap and sample chamber. Run the apparatus without any core to verify that the pressure reading on the display is 6 mm Hg (6 torr) or less.
- c)** Using the handheld infrared thermometer, verify that the surface temperature of the core is 60 - 90°F . Cores not within this temperature range shall be placed in a room temperature environment until the required test temperature is obtained.
- d)** Remove any standing water from the surface of the core with a paper towel or an absorptive cloth
- e)** Place the core on top of the sample support plate inside the vacuum chamber
- f)** Place the lid on the vacuum chamber and press the lid down to ensure secure contact between the lid and vacuum chamber
- g)** Begin the drying process. When the unit completely stops, weigh the core.
- h)** Repeat steps e, f and g. If the core has not reached constant weight (Note 3), repeat steps e, f and g until constant weight is obtained.

Note 3 - Constant weight is defined as the weight at which further drying does not alter the weight by more than 0.05 percent when weighed after at least two drying cycles of the vacuum-drying apparatus.

9.4.2 Oven Drying.

- a) Dry the core overnight at $125 \pm 5^\circ\text{F}$
- b) Weigh the core and record the weight
- c) Dry the core at $125 \pm 5^\circ\text{F}$ for 2 h
- d) Weigh the core and record the weight. If the core has not reached constant weight (Note 2), the core is dried and weighed at 2 h intervals until constant weight is obtained.

10.0 CALCULATIONS. The moisture content is calculated by the following formula:

$$\text{Moisture Content, \%} = \frac{W_1 - W_2}{W_2} \times 100$$

where:

W_1 = original weight of sample, g

W_2 = constant weight of sample, g

11.0 REPORT. The moisture content is reported to the nearest 0.01%.