

GDT 39

A. Scope

For a complete list of GDTs see the Table of Contents.

Use this test method to determine bulk specific gravity of specimens of compacted bituminous mixtures. These procedures are described:

Uncoated Specimens, Dense Graded Mixtures Only

Paraffin Coated Specimens

AASHTO T 331 is an approved alternative method to Paraffin Coating method.

B. Apparatus

The apparatus consists of the following:

1. **Balance:** Use a balance having a capacity of 10 lb (4.5 kg) or more and sensitive to 0.0002 lbs (0.1 g) or less.
2. **Apparatus:** The suspension apparatus shall be constructed to enable the unit (wire basket or container) and the specimen to be immersed in water suspended by wire from the center of a weighing device to a depth sufficient to cover it and the test specimen during weighing.
3. **Water bath or Container:** for immersing specimens in water while suspended under a weighing device. The water bath or container shall be equipped with an overflow outlet to maintaining a constant water level.

C. Sample Size and Preparation

1. Make test specimens from either laboratory-molded bituminous mixtures or cut or cored compacted pavements. Do not distort, bend, or crack specimens during and after removal from pavement or mold.
2. Store specimens in a safe, cool place.
3. Ensure specimens are free from foreign materials such as seal coat, tack coat, foundation material, soil, or paper. Separate specimens from other pavement layers by sawing.

D. Procedures

1. Uncoated Specimens

Note: When roadway cores are saturated with water, conduct the following steps in this order: 4, 5, 1, 2, 3, and 6.

1. Dry the specimen to a constant weight. Constant weight is attained when further drying at 110 °, ± 9 °F (43.5 °, ± 5 °C) will not alter the weight 0.0002 lbs (0.1 g).
2. Cool the specimen to room temperature.
3. **Weigh the uncoated specimen.**
 - a) Determine the dry weight of the specimen to the nearest 0.0002 lbs (0.1 g).
 - b) Designate this weight as "A".
4. **Weigh the specimen in water.**
 - a) Place the specimen on an immersed ~~in~~ suspension device, in water, at room temperature for 1 to 4 minutes or until a constant weight is obtained.
 - b) Leave the specimen in the water and weigh to the nearest 0.0002 lbs (0.1 g).
 - c) Designate this weight as "C".
5. **Weigh the surface-dry specimen.**
 - a) Remove the specimen from the water.

- b) Dry the surface by blotting with a damp cloth (*damp is when no water can be wrung out*).
 - c) Weigh the specimen to determine the surface-dry weight.
 - d) Designate this weight as “B”.
6. **Calculate the bulk specific gravity of the uncoated test specimen as follows:**

$$\text{Bulk Specific Gravity} = \frac{A}{B-C} \text{ where}$$

A = weight of dry sample in air in grams

B = weight of surface-dry sample in air in grams

C = weight of sample in water in grams

7. **Calculate the percent of water absorbed by the specimen (on a volume basis) as follows:**

$$\text{Percent of Water Absorbed by Volume} = \left[\frac{(B - A)}{(B - C)} \right] * 100$$

If the percent of water absorbed by the specimen as calculated exceeds 2.0 percent, use the Paraffin Coating Method to determine Bulk Specific Gravity. AASHTO T 331 is the recommended alternative to the Paraffin Coating Method for specimens with water absorbed results that exceeds 2.0 percent of water by volume.

2. Paraffin Coating

1. Dry the specimen to a constant weight. Constant weight is attained when further drying at 110°, ± 9° F (43.5 °, ± 5 °C) will not alter the weight 0.0002 (0.1 g).
2. Cool the specimen to room temperature.
3. Weigh the uncoated specimen.
 - a) Determine the dry weight of the specimen to the nearest 0.0002 (0.1 g).
 - b) Designate this weight as “A”.
4. Weigh the coated specimen.
 - a) Preheat the paraffin to 130 ° to 150 °F (54 ° to 66 °C).
 - b) Coat the test specimen on all surfaces with paraffin thick enough to seal all surface voids. Apply the coat in one of two ways: either use a paint brush to apply the hot paraffin or dip the specimen in the heated paraffin and brush more on to seal all pin-point holes.
 - c) Determine the dry weight of the test specimen at room temperature. Weigh to the nearest 0.0002 lbs (0.1 g).
 - d) Designate this weight as “D”.

Note: If you want to use the specimen for further tests that require removing the paraffin coating, dust the specimen with talc before applying the paraffin.

5. Weigh the coated specimen in water.
 - a) Place the paraffin-coated specimen in the wire basket.
 - b) Immerse the basket in water at room temperature.
 - c) Weigh to the nearest 0.0002 (0.1 g).
 - d) Designate this weight as “C”.
6. Calculate the bulk specific gravity of the test specimen as follows:

$$\text{Bulk Specific Gravity} = \frac{A}{\left[(D - C) - \left[\frac{(D - A)}{0.90} \right] \right]}$$

A = Weight in grams of the specimen before paraffin coating in air

D = Weight in grams of the paraffin-coated specimen in air

C = Weight in grams of the paraffin-coated specimen in water

0.90 = Bulk specific gravity of the paraffin

E. Calculations

Determine the density of a specimen taken from compacted mixture as follows:

Roadway Core Density = Bulk Specific Gravity of Specimen * Specific Gravity of Water (62.4)

Determine the in-place air voids of a specimen taken from compacted mixture as follows:

{(100) – [(Density of Specimen ÷ Theoretical density) * (100)]}

NOTE: Target Specific Gravity is the Actual Specific Gravity as shown on the job mix formula or the Specific Gravity obtained on the project control strip.

F. Report

1. Calculate the specific gravity to the nearest 0.001.
2. Report density to the nearest 0.1 on form OMR-TM-150 and 159-5
3. Report voids to the nearest 0.1 on Form OMR-TM-150 and 159-5.