State of Nevada
Department of Transportation
Materials Division

METHOD OF TEST FOR BULK SPECIFIC GRAVITY AND DENSITY OF COMPACTED BITUMINOUS MIXTURES (FIELD METHOD)

SCOPE

This test method covers a rapid determination of bulk specific gravity and density of specimens of compacted bituminous mixtures. It will be used for drilled cores obtained from the field.

APPARATUS

1. Balance, 2000 g minimum capacity, sensitive to 0.1 g. Equipped with suitable suspension rod and holder to permit weighing of a specimen while suspended from the center of the balance pan into a water container.

2. Water container, for immersing the specimen in water while suspended under the balance. A 500 mm (20 in.) diameter watertight (plastic) garbage can, approximately 600 mm (24 in.) high is recommended.

3. Thermometer, for monitoring water and specimen temperatures, accurate to 1°C (2°F).

4. Oven, capable of maintaining a temperature of 110 ± 5°C (230 ± 9°F).

5. Microwave oven.

6. Water Bath, minimum 20 L (5 gal) maintained at 25 ± 3°C (77 ± 5°F).

7. Bench or table to support balance over water bath.

8. Wire basket with handle.

9. Towel

TEST SPECIMENS

1. Test specimens are to be drilled cores taken from the bituminous pavement mat.

2. Size of specimens – Core size shall be 100 mm (4 in.) in diameter. Thickness shall be as close to plan as possible or greater.

3. Pavement specimens shall be taken from bituminous pavement with a core drill taking care to avoid distortion, bending or cracking of specimens during and after removal from the pavement.

4. Specimens shall be free from foreign materials such as tack coat, seal coat, soil, etc.

5. Specimens may be separated from other pavement layers by sawing, chiseling, or other suitable means.

PROCEDURE

1. Maintain the water temperature at 25 ± 3°C (77 ± 5°F). While the wire basket is immersed in the water, adjust the water level until water flows from the overflow spout, allow water and basket to stabilize and tare the immersed basket. Place specimen in the wire basket, leave immersed in the water container for four minutes and record the immersed in water weight, "C" on NDOT form 040-017B.

2. Remove specimen from the water and bring it to a saturated surface dry condition by blotting the sample with a damp towel, determine the weight of the sample and record it as "B" on NDOT form 040-017B.

3. Place specimen in a large flat bottom drying pan (conventional oven); may also use paper plate, glass dish or ceramic dish (microwave oven). For microwave oven use, refer to Test Method Nev. T306. For conventional oven drying use, refer to Test Method Nev. T112. Place the specimen in conventional oven or microwave oven. Leave the specimen in the conventional oven or heat in microwave oven until it can be easily broken down. Place the separated specimen in the conventional oven or microwave oven and dry to a constant weight. When a constant dry weight is obtained, allow the sample to cool to 25 ± 3°C (77 ± 5°F), weigh and record the oven-dry condition weight, "A" on NDOT form 040-017B.

CALCULATIONS

1. Calculate the Bulk Specific Gravity as follows:

$$\text{Bulk S.G.} = \frac{A}{B - C}$$

where A = Weight in grams in air (oven-dry condition)
B = Weight in grams (saturated surface-dry)
C = Weight in grams (immersed in water)

2. Core Density (lb/ft^3) = Bulk Specific Gravity x 62.4 lbs/ft^3. Round to the nearest 0.1.

3. Nuclear density obtained from the Average Density of the four (4) density readings from NDOT form 040-017.

4. Subtract the core density from the nuclear density to determine the difference of the two.
Discard the two cores with the biggest difference between the core density and the nuclear density.
Use five cores that are the most uniform, to obtain the "AVERAGE OF THE FIVE (5) CORES", report the bulk specific gravity, core density, and nuclear density on NDOT form 040-017A.

PRECAUTIONS

1. Maintain a constant water level for all weights obtained in the water bath
2. Do not overheat or burn samples. Note: If the sample is smoking the specimen has been burned.
3. To obtain the SSD condition, do not use paper towels to blot the specimen dry, paper towels will absorb too much moisture, affecting the SSD weight
4. Use the same scale for all weight measurements
5. Make sure the suspension apparatus is not in contact with the hole in the counter nor any other obstructions exist

REPORT

Bulk Specific Gravity to nearest 0.001

Core Density to the nearest 0.001 Mg/m^3 (0.1 lb/ft^3)

Nuclear Density to the nearest 0.001 Mg/m^3 (0.1 lb/ft^3)