

WSDOT FOP for AASHTO T 166¹

Bulk Specific Gravity of Compacted Hot Mix Asphalt Using Saturated Surface-Dry Specimens

1. Scope

1.1 This method of test covers the determination of bulk specific gravity of specimens of compacted hot mix asphalt.

1.2 Definition:

1.2.1 Bulk specific gravity (of solids) – The ratio of the mass in air of a unit volume of a permeable material (including both permeable and impermeable voids normal to the material) at a stated temperature to the weight in air of equal density of an equal volume of gas-free distilled water at a stated temperature. The form of the expression shall be:

$$\text{Bulk specific gravity } x/y \text{ } ^\circ\text{C}$$

Where:

x = temperature of the material, and

y = temperature of the water

1.3 The bulk specific gravity of the compacted hot mix asphalt may be used in calculating the unit mass of the mixture.

1.4 The values stated in English units are to be regarded as the standard.

Note: Method A shall be used for laboratory compacted specimens, and field specimens compacted using gyratory compactor.

Method C shall be used for asphalt pavement cores.

2. Referenced Documents

2.1 AASHTO Standards

M 231 – Weighing Devices Used in the Testing of Materials

PP 75 – Standard Practice for Vacuum Drying Compacted Asphalt Specimens

T 331 – Bulk Specific Gravity (Gmb) and Density of Compacted Hot Mix Asphalt (HMA) Using Automatic Vacuum Sealing Method

3. Test Specimens

3.1 Test specimens may be either laboratory-molded HMA mixtures or from HMA pavements. The mixtures may be surface, wearing, leveling or base course materials.

3.2 Size of Specimens – It is recommended that: (1) the diameter of cylindrically molded or cored specimens, or the length of the sides of sawed specimens, be at least equal to four times the maximum size of the aggregate; and (2) the thickness of specimens be at least one-and-one-half times the maximum size of the aggregate.

¹This Test Method is based on AASHTO T 166-10.

- 3.3 Specimens shall be taken from pavements with core drill, diamond or carborundum saw, or by other suitable means.
- 3.4 Care shall be taken to avoid distortion, bending, or cracking of specimens during and after the removal from pavement or mold. Specimens shall be stored in a safe, cool place.
- 3.5 Specimens shall be free from foreign materials such as seal coat, tack coat, foundation material, soil, paper, or foil.
- 3.6 If desired, specimens may be separated from other pavement layers by sawing or other suitable means. Care should be exercised to ensure sawing does not damage the specimens.

Method A

4. Apparatus

- 4.1 Weighing Device – The weighing device shall have sufficient capacity, be readable to 0.1 percent of the specimen mass, or better, and conform to the requirements of AASHTO M 231. The weighing device shall be equipped with suitable suspension apparatus and holder to permit weighing the specimen while suspended from the center of scale pan of the weighing device.
- 4.2 Suspension Apparatus – The wire suspending the container shall be the smallest practical size to minimize any possible effects of a variable immersed length. The suspension apparatus shall be constructed to enable the container to be immersed to a depth sufficient to cover it and the specimen during weighing. Care should be exercised to ensure no trapped air bubbles exist under the specimen.
- 4.3 Water Bath – For immersing the specimen in water while suspended under the weighing device, equipped with an overflow outlet for maintaining a constant water level.
- 4.4 Thermometric Device – Liquid-in-glass thermometers or other suitable thermometric device, accurate to 1°F (0.5° C).

5. Procedure

- 5.1 Dry the specimen to a constant mass (Note 1) at a temperature of 125 ± 5°F (52 ± 3°C). As an alternative to oven drying to constant mass, drying the sample according to PP 75 may be used.
- 5.2 Cool the specimen to room temperature for a minimum of 15 hours and a maximum of 24 hours at 77 ± 9°F (25 ± 5°C) per SOP 731 and record the dry mass as A (Note 2). Immerse each specimen in water at 77 ± 1.8°F (25 ± 1°C) for 4 ± 1 minute and record the immersed mass as C. Remove the specimen from the water, damp dry the specimen by blotting with a damp towel as quickly as possible (blotting not to exceed 10s), and determine the surface-dry mass as, B (Note 3). Any water that seeps from the specimen during the weighing operation is considered part of the saturated specimen. Each specimen shall be immersed and weighed individually.

Note 1: Constant mass shall be defined as the mass at which further drying does not alter the mass by more than 0.05 percent when weighed at 2-hour intervals when using oven drying or by more than 0.05 percent when weighed after at least two drying cycles of the vacuum-drying apparatus required in AASHTO PP 75. Recently molded laboratory specimens which have not been exposed to moisture do not require drying.