

Method of Test For  
**DETERMINATION OF SPECIFIC GRAVITY AND DENSITY CHARACTERISTICS  
OF COMPRESSED ASPHALT MIXTURES**

DOTD Designation: TR 304

This method of test describes the procedures to be used to determine the bulk specific gravity ( $G_{mb}$ ) and density characteristics of specimens of asphaltic mixtures made with low absorptive aggregates. Density characteristics include theoretical maximum specific gravity ( $G_{mm}$ ), % voids, % VMA, and %VFA.

DOTD TR 304 is identical to AASHTO T 166, Method A, except for the following provisions:

A. Section 1, Scope is amended as follows:

Section 1.2 is modified to read – “This method should not be used with samples that contain greater than 10% air voids such as open-graded friction course (OGFC) or absorb more than 2.0 percent of water by volume, as determined in Section 7.2 herein. If the sample contains more than 10% air voids or absorbs more than 2.0 percent of water by volume, then physical volume as described in ASTM D3203 and/or the Quality Assurance Manual should be used.”

B. Section 2, Referenced Documents is amended to include:

AASHTO T 312 – Preparing and Determining the Density of Asphalt Mixture Specimens by Means of the Superpave Gyrotory Compactor

ASTM D3203 – Percent Air Voids in Compacted Asphalt Mixtures

DOTD TR 327 – Theoretical Maximum Specific Gravity of Asphalt Concrete Mixtures

C. Section 5, Apparatus, is amended as follows:

5.2, Suspension Apparatus is amended to include: The suspension apparatus container shall be a No. 4 mesh basket or other approved, non-corrosive device for holding the specimen.

5.3, Water Bath is amended to include: Water bath shall be a minimum of 10 gallons.

D. Section 6, Procedure, is amended as follows:

6.2, Insert the following after the second sentence: “Do not manipulate the briquette or container during the immersed time prior to recording the mass.”

E. Section 7, Calculation, is amended as follows:

7.3 is replaced with the following: If the sample contains more than 10% air voids or absorbs more than 2.0 percent of water by volume, use the physical volume as described in ASTM D3203 and/or the Quality Assurance Manual to determine the bulk specific gravity ( $G_{mb}$ ).

7.4 Calculate the percent of theoretical maximum specific gravity of the briquette or pavement core to the nearest 0.1% as follows:

$$\%G_{mm} = 100 * \frac{G_{mb}}{G_{mm}}$$

Where

$G_{mm}$  = maximum specific gravity of mixture

$G_{mb}$  = bulk specific gravity of the briquette or core

7.5 Calculate the percent air voids ( $P_a$ ) of the briquette to the nearest 0.1% as follows:

$$P_a = 100 * \left( \frac{G_{mm} - G_{mb}}{G_{mm}} \right)$$

Where

$P_a$  = air-voids in compacted mixture, percent of total volume

$G_{mm}$  = maximum specific gravity of paving mixture

$G_{mb}$  = bulk specific gravity of compacted mixture

7.6 Calculate the percent voids in the mineral aggregate (% VMA) to the nearest 0.1% as follows:

$$VMA = 100 - \left( \frac{G_{mb}P_s}{G_{sb}} \right)$$

Where

VMA = voids in mineral aggregate (percent of bulk volume)

$G_{sb}$  = bulk specific gravity of aggregate

$G_{mb}$  = bulk specific gravity of compacted mixture

$P_s$  = aggregate, percent by total weight of mixture

7.7 Calculate the percent voids filled with asphalt (% VFA) to the nearest 0.1% as follows:

$$VFA = 100 * \left( \frac{VMA - P_a}{VMA} \right)$$

Where

VFA = voids filled with asphalt, percent of VMA

VMA = voids in the mineral aggregate, percent of bulk volume

$P_a$  = air-voids in compacted mixture, percent

Normal Test Reporting Time is 2 days.