



# Standard Test Method for Determining Field VMA based on the Maximum Specific Gravity of the Mix ( $G_{mm}$ )<sup>1</sup>

This standard is issued under the fixed designation D6995; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This test method is intended to be used for a rapid field determination of voids in mineral aggregate (VMA) of hot mix asphalt (HMA). It provides equations for calculating the VMA based on the asphalt content of the mix and its maximum specific gravity ( $G_{mm}$ ). It is intended that this should be used for the rapid “field” determination of VMA during Quality Control (QC) operations at HMA plants, particularly where the specific gravity of the aggregate is highly variable.

1.2 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

## 2. Referenced Documents

### 2.1 ASTM Standards:<sup>2</sup>

- C127 Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate
- C128 Test Method for Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate
- D70 Test Method for Density of Semi-Solid Bituminous Materials (Pycnometer Method)
- D854 Test Methods for Specific Gravity of Soil Solids by Water Pycnometer
- D2041 Test Method for Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures
- D2172 Test Methods for Quantitative Extraction of Bitumen From Bituminous Paving Mixtures
- D2726 Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures
- D6307 Test Method for Asphalt Content of Hot-Mix Asphalt by Ignition Method

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee D04 on Road and Paving Materials and is the direct responsibility of Subcommittee D04.21 on Specific Gravity and Density of Bituminous Mixtures.

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard’s Document Summary page on the ASTM website.

## 3. Summary of Test Method

3.1 The percent of (field) VMA in the mix can be calculated by means of equations in which measured values for the theoretical maximum specific gravity, the asphalt content, the specific gravity of the asphalt, and the average bulk specific gravity of the total aggregate and the compacted mix are known.

## 4. Significance and Use

4.1 Various users desire indication of compliance with VMA specifications for hot mix asphalt (HMA) during production.

4.2 The standard practice for determining VMA requires that the bulk specific gravity of the aggregate components be determined. This is a very time consuming test, which is not suitable for routine QC procedures.

4.3 When an aggregate source used in the mix has a highly variable bulk specific gravity and a reference average bulk specific gravity ( $G_{sb}$ ) (for example, as established in the mix design) is used to calculate VMA during HMA production, erroneous values may occur.

4.4 The test for maximum specific gravity of the mix ( $G_{mm}$ ) is a routine QC test at HMA plants. The effective specific gravity of the aggregate components ( $G_{se}$ ) can be easily calculated from this test. However the  $G_{se}$  does not take into account the amount of asphalt absorbed, which is required for accurate VMA determination. This method provides a means to correct the  $G_{se}$  to account for the average absorbed asphalt. This procedure should not be used if the percent water absorption of the total (combined) aggregates varies between four tests, randomly obtained over a 30 day period, by more than 0.4 %.

## 5. Procedure

5.1 Determine the percent of field VMA in a compacted mix sample by first obtaining the following information and then calculating the value.

### 5.2 Tests Run During the HMA Mix Design Procedure

5.2.1 *Test Method C127, C128, and D854*—Determine the average bulk specific gravity ( $G_{sb}$ ) of the fine and coarse aggregates, and mineral filler if applicable. Once this value is