
Standard Method of Test for

Bulk Specific Gravity (G_{mb}) and Density of Compacted Asphalt Mixtures Using Automatic Vacuum Sealing Method

AASHTO Designation: T 331-23^{1,2}

Technically Revised: 2023

Editorially Revised: 2023

Technical Subcommittee: 2c, Asphalt–Aggregate Mixtures

ASTM Designation: D6752/D6752M-18



American Association of State Highway and Transportation Officials
555 12th Street NW, Suite 1000
Washington, D.C. 20004

Standard Method of Test for

Bulk Specific Gravity (G_{mb}) and Density of Compacted Asphalt Mixtures Using Automatic Vacuum Sealing Method

AASHTO Designation: T 331-23^{1,2}

AASHTO

Technically Revised: 2023

Editorially Revised: 2023

Technical Subcommittee: 2c, Asphalt–Aggregate Mixtures

ASTM Designation: D6752/D6752M-18

1. SCOPE

- 1.1. This method covers the determination of bulk specific gravity (G_{mb}) of specimens of compacted asphalt mixtures.
- 1.2. This method should be used with samples that contain open or interconnecting voids and/or absorb more than 2.0 percent of water by volume, as determined by T 166. An agency may specify this method as an alternative to T 275.
- 1.3. The bulk specific gravity (G_{mb}) of the compacted asphalt mixture may be used in calculating the unit mass of the mixture.
- 1.4. The values stated in SI units are to be regarded as the standard.
- 1.5. *This standard may involve hazardous materials, operations, and equipment. 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.*
- 1.6. *The quality of the results produced by this standard are dependent on the competence of the personnel performing the procedure and the capability, calibration, and maintenance of the equipment used. Agencies that meet the criteria of R 18 are generally considered capable of competent and objective testing/sampling/inspection/etc. Users of this standard are cautioned that compliance with R 18 alone does not completely assure reliable results. Reliable results depend on many factors; following the suggestions of R 18 or some similar acceptable guideline provides a means of evaluating and controlling some of those factors.*

2. REFERENCED DOCUMENTS

- 2.1. *AASHTO Standards:*
 - < M 231, Weighing Devices Used in the Testing of Materials
 - < M 339M/M 339, Thermometers Used in the Testing of Construction Materials
 - < R 18, Establishing and Implementing a Quality Management System for Construction Materials Testing Laboratories

- < R 79, Vacuum Drying Compacted Asphalt Specimens
- < T 166, Bulk Specific Gravity (G_{mb}) of Compacted Asphalt Mixtures Using Saturated Surface-Dry Specimens
- < T 245, Resistance to Plastic Flow of Asphalt Mixtures Using Marshall Apparatus
- < T 275, Bulk Specific Gravity (G_{mb}) of Compacted Asphalt Mixtures Using Paraffin-Coated Specimens
- < T 312, Preparing and Determining the Density of Asphalt Mixture Specimens by Means of the Superpave Gyratory Compactor

2.2. *ASTM Standards:*

- < E1, Standard Specification for ASTM Liquid-in-Glass Thermometers
- < E230/E230M, Standard Specification for Temperature-Electromotive Force (emf) Tables for Standardized Thermocouples
- < E879, Standard Specification for Thermistor Sensors for General Purpose and Laboratory Temperature Measurements
- < E1137/E1137M, Standard Specification for Industrial Platinum Resistance Thermometers
- < E2877, Standard Guide for Digital Contact Thermometers

2.3. *International Electrotechnical Commission Standards:*

- < IEC 60584-1: 2013 Thermocouples - Part 1: EMF Specifications and Tolerances
- < IEC 60751: 2008 Industrial Platinum Resistance Thermometers and Platinum Temperature Sensors

2.4. *Other Document:*

- < FHWA-IF-02-044, NCAT Report No. 02-11, Bulk Specific Gravity Round-Robin Using the CoreLok™ Vacuum Sealing Device

3. TERMINOLOGY

3.1. *Definitions:*

- 3.1.1. *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 mass 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:

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

where:

x = temperature of the material; and

y = temperature of the water.

- 3.1.2. *constant mass*—shall be defined as the mass at which further drying does not alter the mass by more than 0.05 percent when the mass is determined at 2-h intervals.

4. TEST SPECIMENS

- 4.1. Test specimens may be either laboratory-compacted asphalt mixtures or sampled from asphalt pavements. The mixtures may be surface or wearing course, binder or leveling course, or hot mix base.