Standard Method of Test for

Theoretical Maximum Specific Gravity (G_{mm}) and Density of Asphalt Mixtures

AASHTO Designation: T 209-19

Technical Subcommittee: 2c, Asphalt–Aggregate Mixtures

Release: Group 3 (July)

AASHTO

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1. SCOPE

1.1. This test method covers the determination of the theoretical maximum specific gravity/gravity mix maximum (G_{mm}) and density of uncompacted asphalt mixture at 25°C (77°F).

Note 1—The precision of the method is best when the procedure is performed on samples that contain aggregates that are completely coated. In order to assure complete coating, it is desirable to perform the method on samples that are close to the optimum asphalt binder content.

1.2. The values stated in SI units are to be regarded as the standard.

1.3. *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.*

2. REFERENCED DOCUMENTS

2.1. *AASHTO Standards*:

- M 231, Weighing Devices Used in the Testing of Materials
- R 18, Establishing and Implementing a Quality Management System for Construction Materials Testing Laboratories
- R 30, Mixture Conditioning of Hot Mix Asphalt (HMA)
- R 47, Reducing Samples of Asphalt Mixtures to Testing Size
- R 61, Establishing Requirements for Equipment Calibrations, Standardizations, and Checks
- R 97, Sampling Asphalt Mixtures

2.2. *ASTM Standard*:

- C670, Standard Practice for Preparing Precision and Bias Statements for Test Methods for Construction Materials

3. TERMINOLOGY

3.1. *Definitions*:

3.1.1. *density, as determined by this test method*—the mass of a cubic meter of the material at 25°C (77°F) in SI units, or the mass of a cubic foot of the material at 25°C (77°F) in inch-pound units.

3.1.2. *residual pressure, as employed by this test method*—the pressure in a vacuum vessel when vacuum is applied.

3.1.3. *specific gravity, as determined by this test method*—the ratio of a given mass of material at 25°C (77°F) to the mass of an equal volume of water at the same temperature.

4. SIGNIFICANCE AND USE

4.1. The theoretical maximum specific gravity (G_{mm}) and density of asphalt mixture are intrinsic properties whose values are influenced by the composition of the mixtures in terms of types and amounts of aggregates and asphalt materials.

4.1.1. These properties are used to calculate percent air voids in compacted asphalt mixture.

4.1.2. These properties provide target values for the compaction of asphalt mixture.

4.1.3. These properties are essential when calculating the amount of asphalt binder absorbed by the internal porosity of the individual aggregate particles in asphalt mixture.

5. APPARATUS

5.1. Follow the procedures for performing equipment calibrations, standardizations, and checks that conform to R 18 and R 61.

5.2. *Vacuum Container*:

5.2.1. The vacuum containers described must be capable of withstanding the full vacuum applied, and each must be equipped with the fittings and other accessories required by the test procedure being employed. The opening in the container leading to the vacuum pump shall be covered by a piece of 0.075-mm (No. 200) wire mesh to minimize the loss of fine material.

5.2.2. The capacity of the vacuum container should be between 2000 and 10 000 mL and depends on the minimum sample size requirements given in Section 6.3. Avoid using a small sample in a large container.

5.2.3. *Bowl for Mass Determination in Water Only (Section 11.1)*—Either a metal or plastic bowl with a diameter of approximately 180 to 260 mm (7 to 10 in.) and a bowl height of at least 160 mm (6.3 in.) equipped with a transparent cover fitted with a rubber gasket and a connection for the vacuum line.

5.2.4. *Flask for Mass Determination in Air Only (Section 11.2)*—A thick-walled volumetric glass flask with a factory-inscribed line and a rubber stopper with a connection for the vacuum line.

5.2.5. *Pycnometer for Mass Determination in Air Only (Section 11.2)*—A glass, metal, or plastic pycnometer with a volume defined by means of a glass capillary stopper, capillary lid, or glass plate.

5.3. *Balance*—A balance conforming to the requirements of M 231, Class G 2. The balance shall be standardized at least every 12 months.