

---

## Standard Specification for

# Stone Matrix Asphalt (SMA)

**AASHTO Designation: MP 8-07<sup>1</sup>**



---

## 1. SCOPE

- 1.1. This specification covers the design of Stone Matrix Asphalt (SMA) using the Superpave Gyratory Compactor (SGC). The SMA design is based on the volumetric properties of the SMA in terms of air voids ( $V_a$ ), the voids in mineral aggregate (VMA), and the presence of stone-on-stone contact.
- 1.2. This standard specifies minimum quality requirements for asphalt binder, aggregate, mineral filler, and stabilizing additives for SMA mixture designs.
- 1.3. The values stated in SI units are to be regarded as the standard. The U.S. Customary units in parentheses are for information only.
- 1.4. *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 320, Performance-Graded Asphalt Binder
  - M 323, Superpave Volumetric Mix Design
  - PP 41, Designing Stone Matrix Asphalt (SMA)
  - T 27, Sieve Analysis of Fine and Coarse Aggregates
  - T 85, Specific Gravity and Absorption of Coarse Aggregate
  - T 89, Determining the Liquid Limit of Soils
  - T 90, Determining the Plastic Limit and Plasticity Index of Soils
  - T 96, Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
  - T 104, Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate
  - T 283, Resistance of Compacted Hot-Mix Asphalt (HMA) to Moisture-Induced Damage
  - T 305, Determination of Draindown Characteristics in Uncompacted Asphalt Mixtures
  - T 312, Preparing and Determining the Density of Hot-Mix Asphalt (HMA) Specimens by Means of the Superpave Gyratory Compactor
- 2.2. *ASTM Standards:*
- D 4791, Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate
  - D 5821, Determining the Percentage of Fractured Particles in Coarse Aggregate

- 2.3. *Asphalt Institute:*  
■ MS-2, *Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types*
- 2.4. *National Asphalt Pavement Association:*  
■ IS 127, *Evaluation of Baghouse Fines for Hot Mix Asphalt*

---

### 3. TERMINOLOGY

- 3.1. *stone matrix asphalt (SMA)*—a hot-mix asphalt (HMA) consisting of two parts, a coarse aggregate skeleton and a rich asphalt binder mortar. The mixture must have an aggregate skeleton with coarse aggregate-on-coarse aggregate contact (generally referred to as stone-on-stone contact). The coarse aggregate is generally considered to be that fraction of the aggregate retained on the 4.75-mm (No. 4) sieve but may be designated as other sizes.
- 3.2. *air voids ( $V_a$ )*—the total volume of the small pockets of air between the coated aggregate particles throughout a compacted paving mixture, expressed as a percent of the bulk volume of the compacted paving mixture (Note 1).  
**Note 1**—Term defined in the Asphalt Institute Manual MS-2.
- 3.3. *voids in the mineral aggregate (VMA)*—the volume of the intergranular void space between the aggregate particles of a compacted paving mixture that includes the air voids and the effective binder content, expressed as a percent of the total volume of the specimen (Note 1).
- 3.4. *voids in the coarse aggregate (VCA)*—the volume between the coarse aggregate particles. This volume includes filler, fine aggregate, air voids, asphalt binder, and stabilizing additive (if used).
- 3.5. *SMA mortar*—a mixture of asphalt binder, filler [material passing the 0.075-mm (No. 200) sieve], and stabilizing additive.
- 3.6. *stabilizing additive*—either cellulose or mineral fiber.

---

### 4. SIGNIFICANCE AND USE

- 4.1. This standard may be used for designing and evaluating material and mixture properties for SMA.

---

### 5. ASPHALT BINDER REQUIREMENTS

- 5.1. The asphalt binder shall be a performance grade meeting the requirements of M 320, which is appropriate for the climate and traffic-loading conditions at the site of the paving project. Guidance for the selection of the appropriate asphalt binder is provided in M 323.