
Standard Specification for Superpave Volumetric Mix Design

AASHTO Designation: M 323-17 (2021)¹

Technically Revised: 2017

Reviewed but Not Updated: 2021

**Technical Subcommittee: 2d, Proportioning
of Asphalt–Aggregate Mixtures**



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1. SCOPE

- 1.1. This specification for Superpave volumetric mix design uses aggregate and mixture properties to produce job-mix formulas for asphalt mixtures.
- 1.2. This standard specifies minimum quality requirements for binder, aggregate, and asphalt mixtures for Superpave volumetric mix designs.
- 1.3. *This standard may involve hazardous materials, operations, and equipment. This standard does not purport to address all of the safety concerns associated with its use. It is the responsibility of the user of this procedure to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*
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2. REFERENCED DOCUMENTS

- 2.1. *AASHTO Standards:*
- M 320, Performance-Graded Asphalt Binder
 - R 28, Accelerated Aging of Asphalt Binder Using a Pressurized Aging Vessel (PAV)
 - R 35, Superpave Volumetric Design for Asphalt Mixtures
 - R 59, Recovery of Asphalt Binder from Solution by Abson Method
 - T 11, Materials Finer Than 75- μ m (No. 200) Sieve in Mineral Aggregates by Washing
 - T 27, Sieve Analysis of Fine and Coarse Aggregates
 - T 164, Quantitative Extraction of Asphalt Binder from Hot Mix Asphalt (HMA)
 - T 176, Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test
 - T 240, Effect of Heat and Air on a Moving Film of Asphalt Binder (Rolling Thin-Film Oven Test)
 - T 283, Resistance of Compacted Asphalt Mixtures to Moisture-Induced Damage
 - T 304, Uncompacted Void Content of Fine Aggregate
 - T 308, Determining the Asphalt Binder Content of Asphalt Mixtures by the Ignition Method
 - T 312, Preparing and Determining the Density of Asphalt Mixture Specimens by Means of the Superpave Gyratory Compactor
 - T 313, Determining the Flexural Creep Stiffness of Asphalt Binder Using the Bending Beam Rheometer (BBR)
 - T 315, Determining the Rheological Properties of Asphalt Binder Using a Dynamic Shear Rheometer (DSR)
 - T 319, Quantitative Extraction and Recovery of Asphalt Binder from Asphalt Mixtures
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- T 335, Determining the Percentage of Fracture in Coarse Aggregate

2.2. *ASTM Standard:*

- D4791, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate

2.3. *Asphalt Institute Publication:*

- MS-2, *Asphalt Mix Design Methods*

2.4. *National Asphalt Pavement Association Publication:*

- IS 128, HMA Pavement Mix Type Selection Guide

2.5. *Other References:*

- *LTPP Seasonal Asphalt Concrete Pavement Temperature Models*. LTPPBind 3.1, <http://ltp-products.com/OtherProducts.asp>
- *NCHRP Report 452: Recommended Use of Reclaimed Asphalt Pavement in the Superpave Mix Design Method: Technician's Manual*. National Cooperative Highway Research Program Project D9-12, TRB, National Research Council, Washington, DC, 2001.

3. TERMINOLOGY

- 3.1. *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.
- 3.2. *asphalt mixtures*—includes hot mix and warm mix asphalt.
- 3.3. *design ESALs*—design equivalent (80-kN) single-axle loads.
- 3.3.1. *discussion*—design ESALs are the anticipated project traffic level expected on the design lane over a 20-yr period. For pavements designed for more or less than 20 yr, determine the design ESALs for 20 yr when using this standard.
- 3.4. *dust-to-binder ratio ($P_{0.075}/P_{be}$)*—by mass, the ratio between the percent of aggregate passing the 75- μm (No. 200) sieve ($P_{0.075}$) and the effective binder content (P_{be}).
- 3.5. *maximum aggregate size*—one size larger than the nominal maximum aggregate size (Note 1).
Note 1—The definitions given in Sections 3.6 and 3.7 apply to Superpave mixtures only and differ from the definitions published in other AASHTO standards.
- 3.6. *nominal maximum aggregate size*—one size larger than the first sieve that retains more than 10 percent aggregate (Note 1).
- 3.7. *primary control sieve (PCS)*—the sieve defining the break point between fine- and coarse-graded mixtures for each nominal maximum aggregate size.
- 3.8. *reagent-grade solvent*—a solvent meeting the level of chemical purity as to conform to the specifications for “reagent grade” as established by the *Committee on Analytical Reagents of the American Chemical Society* and used to extract the asphalt binder from the mixture. When asphalt binder is intended to be extracted and then tested for additional properties, a reagent-grade solvent must be used. Non-reagent-grade solvents may contain epoxy resins that may affect the properties of the recovered binder. In particular, certain acid-modified binders may be affected by non-reagent grade solvents.