Standard Practice for

Developing a Quality Assurance Plan for Hot Mix Asphalt (HMA)

AASHTO Designation: R 42-06 (2020)[1]

Tech Subcommittee: 5c, Quality Assurance and Environmental

Release: Group 1 (April)

AASHTO

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

Standard Practice for

Developing a Quality Assurance Plan for Hot Mix Asphalt (HMA)

AASHTO Designation: R 42-06 (2020)[1]

AASHTO

Tech Subcommittee: 5c, Quality Assurance and Environmental

Release: Group 1 (April)

1. INTRODUCTION

1.1. This standard practice presents specific details necessary to effectively control the production and placement of hot mix asphalt (HMA).

1.2. *This standard practice may involve hazardous materials, operations, and equipment. This standard practice does not purport to address all of the safety concerns associated with its use. It is the responsibility of the user of this standard practice to establish appropriate safety and health practices and to determine the applicability of regulatory limitations prior to use.*

2. SCOPE

2.1. This standard practice provides the necessary quality assurance plan for control, verification, and acceptance of HMA pavement. It contains requirements for both quality control and acceptance.

2.1.1. This standard practice provides framework for a quality control plan that establishes minimum requirements and activities for a contractor˘s quality control (QC) system related to HMA production and placement. These requirements include a listing of the inspections and tests necessary to substantiate material and product conformance to the specifications. The primary method of field quality control employs the use of the Superpave gyratory compactor and evaluation of the volumetric properties of the mix.

2.1.2. This standard practice also provides framework for a plan that establishes acceptance requirements for an agency˘s assessment and acceptance of an HMA project.

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

3. REFERENCED DOCUMENTS

3.1. *AASHTO Standards*:

- M 320, Performance-Graded Asphalt Binder
- M 323, Superpave Volumetric Mix Design
- M 332 Performance-Graded Asphalt Binder Using Multiple Stress Creep Recovery (MSCR) Test
- R 9, Acceptance Sampling Plans for Highway Construction

- R 10, Definition of Terms Related to Quality and Statistics as Used in Highway Construction
- R 18, Establishing and Implementing a Quality Management System for Construction Materials Testing Laboratories
- R 26, Certifying Suppliers of Performance-Graded Asphalt Binders
- R 30, Mixture Conditioning of Hot Mix Asphalt (HMA)
- R 35, Superpave Volumetric Design for Asphalt Mixtures
- R 46, Designing Stone Matrix Asphalt (SMA)
- R 66, Sampling Asphalt Materials
- R 76, Reducing Samples of Aggregate to Testing Size
- R 90, Sampling Aggregate Products
- R 97, Sampling Asphalt Mixtures
- T 27, Sieve Analysis of Fine and Coarse Aggregates
- T 30, Mechanical Analysis of Extracted Aggregate
- T 164, Quantitative Extraction of Asphalt Binder from Hot Mix Asphalt (HMA)
- T 166, Bulk Specific Gravity (G_{mb}) of Compacted Asphalt Mixtures Using Saturated Surface-Dry Specimens
- T 176, Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test
- T 209, Theoretical Maximum Specific Gravity (G_{mm}) and Density of Asphalt Mixtures
- T 255, Total Evaporable Moisture Content of Aggregate by Drying
- T 283, Resistance of Compacted Asphalt Mixtures to Moisture-Induced Damage
- T 287, Asphalt Binder Content of Asphalt Mixtures by the Nuclear Method
- 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 Mixtures Specimens by Means of the Superpave Gyratory Compactor
- T 316, Viscosity Determination of Asphalt Binder Using Rotational Viscometer

3.2. *ASTM Standards*:

- C702/C702M, Standard Practice for Reducing Samples of Aggregate to Testing Size
- D8, Standard Terminology Relating to Materials for Roads and Pavements
- D2950/D2950M, Standard Test Method for Density of Bituminous Concrete in Place by Nuclear Methods
- D3665, Standard Practice for Random Sampling of Construction Materials
- D3666, Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials
- D4791, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate (withdrawn 2019)
- D5361/D5361M, Standard Practice for Sampling Compacted Bituminous Mixtures for Laboratory Testing
- D5821, Standard Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate
- E29, Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications
- E105, Standard Practice for Probability Sampling of Materials
- E122, Standard Practice for Calculating Sample Size to Estimate, with Specified Precision, the Average for a Characteristic of a Lot or Process

- E141, Standard Practice for Acceptance of Evidence Based on the Results of Probability Sampling

4. TERMINOLOGY

4.1. The terminology used in this standard is in accordance with R 10 unless otherwise specified.

4.2. *hot mix asphalt (HMA)´* a mixture of aggregate and asphalt binder produced from an HMA plant.

4.3. *design mix formula (DMF)´* the single point target value for percent passing designated sieve sizes and volumetric properties developed in the laboratory before the start of production.

4.4. *job mix formula (JMF)´* the single point target value for percent passing designated sieve sizes and volumetric properties established after the initial production process to be used by the contractor for production quality control.

4.5. *performance-graded asphalt binder (PGAB)´* an asphalt-based cement that is produced from petroleum residue either with or without the addition of nonparticulate organic modifiers graded to temperature regimes and performance.

4.6. *quality assurance (QA)´* planned and systematic actions necessary to provide confidence that a product is in conformance with agency plans and specifications. It contains both QC and acceptance as two separate functions.

4.7. *quality control (QC)´* planned and systematic actions and considerations to control the level of quality being produced.

4.8. *QC plan´* project-specific plan that identifies methods of sampling, testing, calibration, QC monitoring, construction controls, paving plans, process balancing, and overall operations.

4.9. *acceptance´* sampling, testing, and assessment of test results to determine whether produced material and construction operation are in conformance with agency plans and specifications.

4.10. *independent assurance program (IAP)´* program developed by the agency to evaluate personnel and equipment used in the acceptance process on a project or system-wide basis.

4.11. *agency´* state highway agency or owner of the roadway.

4.12. Definitions of many common terms relating to HMA are contained in ASTM D8.

4.13. Definitions of terms used in reference to other Standards are as defined therein.

4.14. Definitions of terms used in mathematical expressions are as generally used in standard practice. Unique terms are defined in the section containing the first presentation of such terms.

5. SUMMARY

5.1. This standard presents a procedure containing minimum requirements for QC and QA plans applicable to the production, placement, and acceptance of HMA. It incorporates the use of other available standards, which are appropriate to the accomplishment of this task. The requirements allow tailoring to accommodate the needs of an individual agency.

6. SIGNIFICANCE AND USE

6.1. Quality cannot be tested nor inspected into an HMA pavement. It must be built in through the implementation of properly designed QC and acceptance plans. The contractor should have a properly designed quality control plan and the agency should have a properly designed acceptance plan. The design and use of the plans is a critical step toward the successful manufacture, placement, and performance of HMA pavements.

6.2. This standard is used to aid in the completion of tasks noted in Sections 6.2.1 and 6.2.2.

6.2.1. Implementation of a QC plan for a contractor(s).

6.2.2. Implementation of an acceptance plan for an agency.

6.3. QC and acceptance plans conforming to this standard practice are applicable to HMA pavement construction projects. If an inconsistency exists between the contract documents and either plan, the contract documents should govern.

7. APPARATUS

7.1. *Laboratory Requirements*:

7.1.1. Personal safety equipment required by the laboratory or OSHA for work in the HMA design and testing areas.

7.1.2. Apparatus as required by referenced standards for this standard practice.

7.1.3. All other laboratory apparatus needed to control the quality of HMA production and placement in accordance with project specifications.

7.2. *Field Requirements*:

7.2.1. Personal safety equipment required by the field organization or OSHA.

7.2.2. Field apparatus listed in standards referenced as requirements in this standard practice.

7.2.3. All other field apparatus needed to control the quality of HMA production and placement in accordance with project specifications.

7.3. Apparatus required in Sections 7.1 and 7.2 should be furnished in the quantity necessary to assure that the materials and products used can be shown to conform to the HMA specification requirements without undue delay of the production and placement process.

7.4. Additional apparatus required for use by agency representatives for verification and acceptance activities should be provided by the agency unless otherwise specified.

8. STANDARDIZATION

8.1. Agency and contractor laboratories conducting work should satisfactorily participate in the AASHTO Materials Reference Laboratory (AMRL) proficiency sample program and should also be AMRL inspected. Alternately, a non-AASHTO laboratory qualification program that meets the same requirements could be used. Inspections or tests not covered by AMRL should comply with the applicable requirements of R 18 and ASTM D3666.