Slurry Systems Quality Assurance Guide

Description: Slurry Systems

Slurry systems are pavement preservation surface treatments that encompass micro surfacing, slurry seal, and polymer modified slurry seal. Each treatment type is designed to extend the life of asphalt pavements in good condition by providing skid resistance, restricting moisture intrusion, and protecting the pavement surface from oxidation and raveling. Micro surfacing is a quick-traffic system that allows traffic to return typically less than one hour after placement. Slurry seal is a designed mixture, which may be polymer-modified, that allows traffic to return from one to four hours after placement.

Description: Quality Assurance (QA)

QA is defined as all those planned and systematic actions taken by the Agency and Contractor to provide the necessary confidence that the procured material and workmanship will satisfy the quality requirements of the contract.

QA includes Quality Control (QC), Acceptance and Independent Assurance (IA).

QC is the system used by the Contractor to monitor, assess and adjust production and placement processes to ensure that the material and workmanship will meet the specified quality. QC is the responsibility of the Contractor.

Acceptance is the system used by the Agency/Engineer to measure the degree of compliance of the quality of the materials and workmanship with the Contract requirements. Acceptance is the responsibility of the Agency/Engineer and will be conducted in accordance with these Specifications.

IA is an unbiased and independent system used to assess all sampling, testing and inspection procedures used for QA. IA is the responsibility of the Agency/Engineer and is conducted in accordance with these Specifications.

I. Quality Control (QC)

1. **General.** The slurry systems contractor (the Contractor) shall establish, implement and maintain a QC program to control all equipment, materials, production, workmanship, and associated processes during construction. The Contractor's QC program shall include but is not limited to sampling, testing, inspection, monitoring, documentation, and corrective action procedures during transport, stockpiling, and placement operations.

A written Quality Control Plan shall be developed which details the Contractor's QC program that meets the requirements of these specifications. The QC Plan shall be contract specific and signed by the Contractor. Slurry system construction shall not proceed without Agency approval of the QC Plan and QC personnel present on the job. Failure to comply with the provisions of this provision will result in shutdown of the operation until such time as the Contractor's operations are in compliance with these requirements.

2. Reference Documents.

a. AASHTO R 18 Standard Recommended Practice for Establishing and Implementing a Quality Management System for Construction Materials Testing Laboratories
b. AASHTO R 38 Standard Practice for Quality Assurance of Standard Manufactured Materials
c. AASHTO R77 Standard Practice for Certifying Suppliers of Emulsified Asphalt
d. AASHTO M 208 Standard Specification for Cationic Emulsified Asphalt
e. AASHTO T 2 Standard Method of Test for Sampling of Aggregates
f. AASHTO T 11 Standard Method of Test for Materials Finer Than 75-micro m (No. 200) Sieve in Mineral Aggregates by Washing
g. AASHTO T 27 Standard Method of Test for Sieve Analysis of Fine and Coarse Aggregates
h. AASHTO T 40 Standard Method of Test for Sampling Bituminous Materials
i. AASHTO T 49 Standard Method of Test for Penetration of Bituminous Materials
j. AASHTO T 53 Standard Method of Test for Softening Point of Bitumen
k. AASHTO T 59 Standard Method of Test for Emulsified Asphalts
l. AASHTO T 96 Standard Method of Test for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
m. AASHTO T 104 Standard Method of Test for Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate
n. AASHTO T 176 Standard Method of Test for Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test
o. AASHTO MP 28-17 Standard Specification for Materials for Micro Surfacing
p. AASHTO MP 32-17 Standard Specification for Materials for Slurry Seal
q. AASHTO PP 83-16 Provisional Standard Practice for Micro Surfacing Design
r. AASHTO PP 87-17 Provisional Standard Practice for Slurry Seal Design
s. ISSA A143 Recommended Performance Guideline for Micro Surfacing
t. ISSA A105 Recommended Performance Guideline for Emulsified Asphalt Slurry Seal
u. ISSA A115 Recommended Performance Guideline for Polymer Modified Slurry Seal
v. Title 23 CFR Part 637 Construction Inspection and Approval

3. **Definitions.**
    a. Agency – a state highway agency, other agency or owner responsible for the final acceptance of the project.
    b. Calibration – any calibration, standardization, check or verification as required by the test method standard or production equipment.
    c. Contractor – the prime contractor who has ultimate control of the project.
    d. Supplier – one who produces the materials (i.e. aggregates, asphalt emulsion, additives, and mineral filler) used on the project.
    e. Standard – any standard, specification, test method, practice, etc. utilized to achieve compliance with the contract.
    f. Testing Lab – the laboratory conducting quality control tests (contractor or supplier) and acceptance tests (agency).

4. **Personnel.**
    a. Responsibilities and Requirements of QC Staff - at a minimum, provide the name of the person responsible for each position listed below, including their telephone number and their qualifications/certifications.
        i. QC Plan Administrator. The person responsible for the overall administration of the QC Plan.
        ii. QC Plan Manager. The person responsible for the execution of the QC Plan and liaison with the Agency. This person shall be on the job, and have the authority to stop, suspend, or make changes to the construction operation.
        iii. QC Technicians. The person(s) responsible for conducting QC tests and inspection to implement the QC Plan. QC Technicians shall have Level 2 Aggregate Testing certification from the American Concrete Institute (ACI), or other certification program approved by the agency.
    b. Certified Contractor Staff - at a minimum, the contractor's superintendent, project foreman and placement machine operator shall possess a valid AASHTO TSP·2 slurry systems certification. The foreman and placement machine operator shall be on the job at all times the slurry system is being constructed. The superintendent may oversee the construction operation of up to 3 projects at any one time.

5. **QC Testing Facilities and Equipment.**
    a. Testing Equipment - the Contractor shall provide the name of the lab that will be conducting the required QC testing. This lab shall maintain accreditation by the AASHTO Accreditation Program (AAP) or other accrediting body approved by the agency for all tests within the relevant scope of testing. Sampling, testing, and measuring devices shall meet the requirements of the specified standards and test methods. The lab shall maintain records of the calibration and maintenance of all sampling, testing and measuring equipment, and all documents required by the accreditation program.

b. Production Equipment Calibration – prior to the commencement of work, the production equipment shall be calibrated in the presence of the Agency representative utilizing the materials to be used on the project.

6. **QC Activities.** QC activities shall include monitoring, inspection, sampling and testing. The Contractor's QC activities shall cover all aspects that affect the quality of the materials and workmanship of the slurry system. The minimum QC activities and frequencies required are listed as follows:

Property	Test Procedure	Lot Size	Min. Test Frequency	Point of Sampling	Sampling Method
Emulsion Properties	AASHTO M208	Per Batch (max. 30,000 gal)	1 per Lot	Plant	AASHTO T40
Distillation of Emulsified Asphalt	AASHTO T59	Per Batch (max. 30,000 gal)	1 per Lot	Plant	AASHTO T40
Settlement and Storage Stability of Emulsified Asphalts, 24-hr	AASHTO T59	Per Batch (max. 30,000 gal)	1 per Lot	Plant	AASHTO T40

Property	Test Procedure	Lot Size	Min. Test Frequency	Point of Sampling	Sampling Method
Residue Properties of Emulsified Asphalt					
Softening Point of Bitumen (Ring-and-Ball Apparatus)	AASHTO T53	Per Batch (max. 30,000 gal)	1 per Lot	Plant	AASHTO T40
Penetration of Bituminous Materials at 77°F (25°C)	AASHTO T49	Per Batch (max. 30,000 gal)	1 per Lot	Plant	AASHTO T40
Aggregate					
Gradation	AASHTO T27 or T11	1,000 tons	1 per Lot	Stockpile	AASHTO T2
Sand Equivalency	AASHTO T 176	Source	1 per Lot	Source	AASHTO T2
Soundness	AASHTO T 104	Source	1 per Lot	Source	AASHTO T2
Hardness (LA Abrasion)	AASHTO T 96	Source	1 per Lot	Source	AASHTO T2

7. **Contractor's Quality Control Plan.** The Contractor shall submit a written, signed QC Plan to the Agency for approval at least 15 days prior to placement. The QC Plan shall

detail the Contractor's plans, policies, procedures and organization deemed necessary to measure and control materials, equipment, and slurry system placement.

The QC Plan shall be maintained to reflect the current status of the operations. Changes must be approved by the agency prior to implementation.

At a minimum, the QC Plan shall detail the following:

a. **Scope and Reference Documents.** Reference all applicable standards, guidelines, technical bulletins, standard specifications, and project special provisions.
b. **Definitions.** Making terms used in the QC Plan clear and distinct.
c. **Quality Control Personnel.** Company personnel, subcontractors responsible for QC testing. Material suppliers reporting test results.
d. **Quality Control Testing Facilities and Equipment.** Accredited laboratories used for mix designs. Facilities and equipment used for material sampling and testing.
e. **Materials Control.** Identify all materials and sources used in the treatment, plus storage requirements and stockpiling provisions.
f. **Quality Control Sampling and Testing.** Lot size defined for sampling, sampling identification system, sampling methods, test procedures, test frequency, storage and retention procedures.
g. **Production Equipment.** Identify all equipment to be used for construction and provide specification sheets for major equipment.
h. **Pre-Production Activities.** Equipment calibration procedure, equipment checks and inspection frequencies, pavement surface preparation procedures, and related production activities (e.g., traffic control, tack coat, etc.)
i. **Placement and Workmanship.** Identify protocols for proper workmanship, production QC activities, test frequencies, inspection methods, yield checks to verify application rates, and cleanup responsibilities (e.g., daily and end of project)
j. **Documentation.** Examples of reporting forms, production QC test results, daily production records, non-conformance reports, and document retention details.
k. **Non-Conformance and Corrective Action.** Corrective actions described for materials not meeting specifications or defects in workmanship.

Supporting documentation should be included in Appendices.

II. Agency Acceptance (QA)

1. **General.** As the owner of the final micro surface, slurry seal, or polymer modified slurry seal, the Agency must ensure the contractor has constructed the project in accordance with the specifications. The Agency will conduct acceptance sampling, testing, and inspections to ensure material quality, correct application rates, workmanship techniques.

2. **Acceptance Activities**
    a. Assure the Contractor has followed the approved QC Plan.
    b. Materials – Monitor the Contractor QC testing.
    c. Agency to sample and test:
        i. Aggregate – Gradation and deleterious materials, once per day or at the discretion of the Agency.
        ii. Asphalt Emulsion – Once per project or at the discretion of the Agency.

    Note: Actual frequency and lot size will be per each Agency's Frequency Guide Schedules for Verification, Sampling and Testing.

    d. Surface Preparation – Monitor pre-treatment activities, verify surface is been swept clean, pavement is dry, utility castings are protected, and drainage inlets are covered.
    e. Placement Machine(s) Calibration – Witness the calibration of equipment.
    f. Production Inspection:
        i. Monitor and verify correct application rates of material placed.
        ii. Monitor workmanship for even joints, straight lines, and uniform texture free of drag marks or unsightly appearance.

III. Independent Assurance Program (IA)

1. **Responsibility:** The IA program shall be the sole responsibility of the Agency or owner, performed to ensure an independent verification of the reliability of Acceptance data obtained by the Agency and the QC data obtained by the contractor. The results of the IA testing are not to be used as a basis for material acceptance.

2. **Evaluation:** The IA program shall evaluate the qualified sampling and testing personnel and the testing equipment. The program shall cover sampling procedures, testing procedures, inspection and testing equipment. Each IA program shall include a schedule of frequency for IA evaluation, and in accordance with the Agency or owner's master schedule of sampling and testing. The schedule may be established based on either a project basis or a system basis. The frequency can be based on either a unit of production or on a unit of time.
    a. The testing equipment shall be evaluated by using one or more of the following: Calibration checks, split samples, or proficiency samples.
    b. Testing personnel shall be evaluated by observations and split samples or proficiency samples.
    c. A prompt comparison and documentation shall be made of test results obtained by the tester being evaluated and the IA tester. The Agency shall develop guidelines including tolerance limits for the comparison of test results.