DS-09015
(New)

Iowa Department of Transportation

DEVELOPMENTAL SPECIFICATIONS
FOR
REDUCTION OF HMA QC/QA CRITERIA FOR LOCAL AGENCIES

Effective Date
October 20, 2009

THE STANDARD SPECIFICATIONS, SERIES 2009, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE DEVELOPMENTAL SPECIFICATIONS AND THEY PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

Apply Section 2303 of the Standard Specifications with the following modifications:

Replace Article 2303.03, D, 3, of the Standard Specifications:

3. Plant Production.

a. General.

1) Perform sampling and testing to provide the quality control of the mixture during plant production. Certified Plant Inspection according to Section 2521 is required.

2) Personnel performing production quality control testing are required to be Iowa DOT certified for the duties performed.

3) Provide easy and safe access for the Engineer to the location in the plant where samples are taken.

4) A "significant mix change" is defined as a single occurrence of an aggregate interchange of greater than 5%, a single occurrence of an asphalt content change greater than 0.2%, or any deletion or introduction of a new material into the mix.

b. Sampling and Testing.

1) Sample and test asphalt binder to verify the quality of the binder grade. Take asphalt binder samples at random times as directed and witnessed by the Engineer according to Materials I.M. 204.

2) Use cold feed gradation for aggregate gradation control to assure materials are being proportioned according to the specifications. Take three aggregate samples per lot at random times as directed by the Engineer according to Materials I.M. 204.

3) Randomly sample the hot HMA mixture at locations as directed and witnessed by the Engineer according to Materials I.M. 322.

4) Assist the Engineer with material sampling for verification testing. When the Engineer provides notification that a sample is to be taken, obtain the sample within 15 minutes.

5) Each day’s production of a mix design will be considered a lot.

a) When the anticipated quantity for the day is 2000 tons (2000 Mg) or more, divide that day’s production into four sublots, with the first sublot being the first 500 tons (500 Mg) produced. Divide the remaining anticipated quantity for the day into three equally sized sublots.

b) When the anticipated quantity for the day is less than 2000 tons (2000 Mg), use the first 500 tons (500 Mg) produced for the first daily sublot. The Engineer will

establish 750 ton (750 Mg) daily sublots for mix production exceeding the first 500 tons (500 Mg).

6) No more than four paired hot HMA mixture samples will be required for acceptance of a lot.

7) Do not take paired samples from the first 100 tons (100 Mg) of mix produced each day, or the first 100 tons (100 Mg) of mix following a significant mix change.

8) Test the quality control sample of each production paired sample as follows:

a) Prepare and compact two gyratory samples according to Materials I.M. 325G.

b) Determine the density for each specimen according to Materials I.M. 321. Average the results to determine sample results.

c) Use the field quality control laboratory compaction for field density control. The laboratory density for field control will be the bulk specific gravity of compacted mixture (G_{mb}) at N_{design}. Bulk specific gravity at N_{design} will be determined by compacting specimens to N_{max} and back calculating the bulk specific gravity at N_{design}.

d) Determine the Theoretical Maximum Specific Gravity of the uncompacted mixture according to Materials I.M. 350 or other test methods recognized by AASHTO or ASTM.

e) Determine laboratory air voids according to Materials I.M. 501.

9) When liquid anti-strip additives are used, satisfy one of the following methods to regulate the quantity of additive:

a) Present certification that the equipment used to measure and blend the liquid anti-strip additive:

- Meets the anti-strip supplier's recommended practice,
- Is directly tied to the asphalt binder supply system, and
- Has been calibrated to the equipment manufacturer's guidelines.

b) Test the binder to measure the quantity of liquid anti-strip additive in the binder every 5000 tons (5000Mg) of HMA production. Obtain the Engineer's approval for the supplier's test method is approved by the Engineer prior to use of the test.

c) Run AASHTO T 283 during production. If unable to certify or test for the presence and quality, run AASHTO T 283 each 10,000 tons (10,000 Mg) of production to measure the effectiveness of the additive. Ensure test results satisfy 80% TSR when compared to the dry strength of specimens prepared with asphalt binder containing the additive.

c. Production Control.

1) After the JMF is established, the combined aggregate furnished for the project, the quantity of asphalt binder, and the laboratory air voids should consistently comply with the JMF, as target values. Control them within the production tolerance given in Table 2303.03-5.

Table 2303.03-4: Production Tolerances.

Measured Characteristic	Target Value (%)	Specification Tolerance [a]
Cold feed gradation No. 4 (4.75 mm) and larger sieves	by JMF	± 7.0
Cold feed gradation No. 8 (2.36 mm)	by JMF	± 5.0
Cold feed gradation No. 30 (600 µm)	by JMF	± 4.0
Cold feed gradation No. 200 (75 µm)	by JMF	± 2.0[b]
Daily asphalt binder content	by JMF	± 0.3
Field laboratory air voids	4.0[c]	-0.5/+1.0[d]
VMA[e]	by JMF	± 1.0[f]

[a] Based on single test unless noted otherwise.

(b)	The filler/bitumen ratio of the plant produced mixture will be maintained between 0.6 and 1.4.
(c)	Unless otherwise specified.
(d)	Based on the moving average of four test values.
(e)	Restricted to an asphalt film thickness as specified for the level of HMA mixture.
(f)	Based on the daily lot average.

2) Control plant production so that the plant produced HMA mixture will meet mixture design criteria (within the test tolerances given in Table 2303.03-5) for Air Voids and VMA at N_{design} gyrations of the gyratory compactor. Monitor the slope of the gyratory compaction curve of plant produced material. Slope variations in excess of ±0.40 of the mixture design gyratory compaction curve slope may indicate potential problems with uniformity of the mixture.

3) The gyratory mix design gradation control points for the size mixture designated in the project plans will not apply to plant production control.

4) Strive for the target value of the percent air void and asphalt binder by adjusting gradation and asphalt binder content.

5) Produce a uniform composition mixture complying with the JMF.

6) Adjustments to the JMF target gradation and asphalt binder content values may be made.

- **a)** The Contractor determines from quality control testing that adjustments are necessary to achieve the specified properties.
- **b)** Consult with the Engineer regarding adjustments to the JMF.
- **c)** The Contractor's adjustment recommendations prevail, provided all specifications and established mix criteria are being met for plant production.

7) Measure estimated film thickness and voids in the mineral aggregate (VMA) for specification compliance every day of HMA production.

8) Prepare quality control charts according to Materials I.M. 511. Keep the charts current and available showing both individual sample results and moving average values. Base moving average values on four consecutive test results. Moving averages may restart only in the event of a mandatory plant shutdown for failure to maintain the average within the production tolerance. Include the target value and specification tolerances on control charts.

9) Calculate laboratory voids for individual samples according to Materials I.M. 501. Use the individual density and individual maximum specific gravity determined for each sample. To determine the moving average of laboratory voids, use the average of the last four individual laboratory voids.

10) Monitor the test results and make mix adjustments, when appropriate, to keep the mixture near the target values. Notify the Engineer whenever the process approaches a specification tolerance limit. Cease operations when the moving average point for laboratory air voids is outside the specification tolerance limit. Assume responsibility to cease operations, including not incorporating material which has not been placed. Do not start the process again until notifying the Engineer of the corrective action proposed.

Replace Article 2303.03, D, 5, of the Standard Specifications:

5. Sampling and Testing.

a. General.

1) Maintain and calibrate the quality control testing equipment using prescribed procedures. Sample and test according to the specified procedures as listed in the applicable Materials I.M. and Specifications. When the results from a Contractor's quality control lab are used as part of product acceptance, the Contractor's quality control lab is required to be qualified.

2) Identify, store, and retain all quality control samples and field lab gyratory specimens used for acceptance until the lot is accepted. The Contracting Authority will prescribe the method of identifying the verification samples according to Materials I.M. 511. Store all verification samples for the Contracting Authority until delivery to the Contracting Authority's lab.

3) Identify all samples using a system the Engineer approves.

b. Individual Materials and Loose Mixture.

1) Complete the following as designated by the Engineer:

- Identify all samples of asphalt binder, aggregate, and tack coat material.
- Promptly deliver samples to the appropriate laboratory.

2) Take paired samples of loose HMA mixture (each box of the pair weighing at least 30 pounds (14 kg)) according to Materials I.M. 322.

3) Conduct quality control tests for mixture properties using representative portions of the mix from the quality control sample of each sublot.

4) Split samples for specimen preparation according to Materials I.M. 357.

5) Paired sampling may also be accomplished by taking a bulk sample and immediately splitting the sample according to Materials I.M. 322 on the grade.

6) Record and document all test results and calculations on data sheets approved by the Contracting Authority. Record specific test results on the Daily Plant Report the Contracting Authority provides. Also include a description of the quality control actions taken (adjustment of cold feet percentages, changes in JMF, and so forth) on the Daily Plant Report.

7) FAX, or deliver by other methods the Engineer approves, the Daily Plant Report to the Engineer and the designated laboratory daily. At project completion, provide the Engineer a copy of the electronic file containing project information generated during the progress of the work.

8) When sampling for AASHTO T 283, obtain a 50 pound (25 kg) sample according to Materials I.M. 322. The Engineer will select, at random, the sample location. Split the sample and deliver half to the Central Materials Laboratory.

c. Compacted Pavement Cores.

1) Cut and trim samples under the direction of and witnessed by the Engineer for tests of density, thickness, or composition by using a power driven masonry saw or by drilling a minimum 4 inch nominal diameter core.

2) Restore the surfaces the same day. Dry, fill with the same material, and properly compact core holes.

3) Pavement core samples will be identified, taken possession of by the Engineer, and delivered to the Contractor's quality control field laboratory.

4) The Engineer may either:

- Transport the cores directly to the lab, or
- Secure the cores and allow the Contractor to transport the cores to the lab.

5) Test the compacted HMA pavement in a timely manner using personnel who are Iowa DOT Certified to perform the test.

6) Prepare and test the cores according to Materials I.M. 320, 321, and 337.

d. Verification and Independent Assurance Testing.

1) The Contractor's quality control test results from paired samples will be validated by the Engineer's verification test results on a regular basis using guidelines and tolerances set forth in Materials I.M. 216 and 511.

2) If the Engineer's verification test results validate the Contractor's test results, the Contractor's results will be used for material acceptance. Disputes between the Contractor's and Engineer's test results will be resolved according to Materials I.M. 511.

3) The Engineer will select, at random, one or more of the daily hot mix production verification samples. Some or all of the samples selected will be tested in the materials laboratory designated by the Engineer. The Engineer will use the verification test results to determine if the Contractor's test results can be used for acceptance.

4) The Engineer will select one daily set of cores at random each week. These will be tested at the materials laboratory designated by the Engineer. Cores from the first day of production will be tested by the Contractor and the Engineer for validation of the Contractor's results.

5) All personnel and laboratories performing tests used in the acceptance of material are required to have participated in the statewide Independent Assurance Program according to Materials I.M. 208.