



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

**Effective Date  
May 15, 2007**

**THE STANDARD SPECIFICATIONS, SERIES 2001, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE DEVELOPMENTAL SPECIFICATIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.**

Section 2303 of the Standard Specifications shall apply with the following modifications:

**Replace** Article 2303.04, B, of the Standard Specifications:

**B. Plant Production.**

The Contractor shall perform the sampling and testing to provide the quality control of the mixture during plant production. Certified Plant Inspection as described in Section 2521 will be required on all HMA plant production. All personnel performing production quality control testing shall be certified by the Department.

Easy and safe access shall be provided to the location in the plant where samples are to be taken.

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.

**1. Sampling and Testing.**

Asphalt binder shall be sampled and tested to verify the quality of the binder grade. Asphalt binder samples shall be taken, at random times, as directed ~~and witnessed~~ by the Engineer in accordance with Materials I.M. 204.

Aggregate gradation control shall be based on cold feed gradation.

~~Three~~ Aggregate samples shall be taken ~~per lot~~, at random times, as directed ~~and witnessed~~ by the Engineer in accordance with Materials I.M. 204 ~~and secured in accordance with I.M. 511~~ to determine that materials are being proportioned in accordance with the specifications.

The hot HMA mixture shall be sampled, at random locations, as directed ~~and witnessed~~ by the Engineer, in accordance with Materials I.M. 322 ~~and secured in accordance with Materials I.M. 511~~.

Each day's production of a mix design shall be considered a lot. When the anticipated quantity for the day is 2000 tons (2000 Mg) or more, that day's production shall be divided into four sublots,

the first subplot of each day shall be the first 500 tons (500 Mg) produced. The remaining anticipated quantity for the day shall be divided into three sublots of equal size.

When the anticipated mix design quantity for the day is less than 2000 tons (2000 Mg), the first daily subplot shall be the first 500 tons (500 Mg) produced. Additional daily sublots of 750 tons (750 Mg) each will be established for mix production exceeding the first 500 tons (500 Mg).

The maximum number of paired hot HMA mixture samples required for acceptance of a lot will not exceed four.

Paired samples shall not be taken 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.

The Contractor shall test the quality control sample of each production paired sample as follows:

Two gyratory specimens shall be prepared and compacted in accordance with Materials I.M. 325G and the results averaged to determine sample results.

Density shall be determined for each specimen in accordance with Materials I.M. 321.

The Contractor's field quality control laboratory compaction shall be used 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  $N_{design}$ .

The Theoretical Maximum Specific Gravity of the uncompacted mixture shall be determined in accordance with Materials I.M. 350 or other test methods recognized by AASHTO or ASTM.

The laboratory air voids shall be determined in accordance with Materials I.M. 501.

When liquid anti-strip additives are used, the Contractor shall satisfy one of the following methods to regulate the quantity of additive.

- a. The Contractor shall present Certification that the equipment used to measure and blend the liquid anti-strip additive meets the anti-strip supplier's recommended practice, that the equipment is directly tied to the asphalt binder supply system, and that the equipment has been calibrated to the equipment manufacturer's guidelines.
- b. The Contractor shall test the binder to measure the quantity of liquid anti-strip additive in the binder every 5000 tons (5000 Mg) of HMA production. The supplier's test method shall be approved by the Engineer prior to use of the test.
- c. The Contractor shall run AASHTO T 283 during production. If the Contractor is unable to certify or test for the presence and quality, the Contractor shall run AASHTO T 283 each 10,000 tons (10,000 Mg) of production to measure the effectiveness of the additive. The test results shall satisfy 80% TSR when compared to the dry strength of specimens prepared with asphalt binder containing the anti-strip additive.

## **2. Production Control.**

After the JMF is established, the combined aggregate furnished for the project, the quantity of asphalt binder and laboratory air voids should consistently conform to the JMF, as target values, and shall be controlled within the production tolerances given in Table 2. Plant production must be controlled such that the plant produced HMA mixture will meet mixture design criteria for Air Voids and VMA at  $N_{design}$  gyrations of the gyratory compactor within the test tolerances given in the table. The slope of the gyratory compaction curve of plant produced material shall be

monitored and variations in excess of  $\pm 0.40$  of the mixture design gyratory compaction curve slope may indicate potential problems with uniformity of the mixture.

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

<b>Table 2 - Production Tolerances</b>		
<b>MEASURED CHARACTERISTIC</b>	<b>TARGET VALUE (%)</b>	<b>SPECIFICATION TOLERANCE (%)<sup>(1)</sup></b>
Cold feed gradation No. 4 (4.75 mm) and larger sieves	by JMF	$\pm 7.0$
Cold feed gradation No. 8 (2.36 mm)	by JMF	$\pm 5.0$
Cold feed gradation No. 30 (600 $\mu\text{m}$ )	by JMF	$\pm 4.0$
Cold feed gradation No. 200 (75 $\mu\text{m}$ )	by JMF	$\pm 2.0$ <sup>(2)</sup>
Daily asphalt binder content	by JMF	$\pm 0.3$
Field laboratory air voids	4.0 <sup>(3)</sup>	-0.5/+1.0 <sup>(4)</sup>
VMA <sup>(5)</sup>	by JMF	$\pm 1.0$ <sup>(6)</sup>
<sup>(1)</sup> - Based on single test unless otherwise noted.		
<sup>(2)</sup> - The filler/bitumen ratio of the plant produced mixture will be maintained between 0.6 and 1.4.		
<sup>(3)</sup> - Unless otherwise specified.		
<sup>(4)</sup> - Based on the moving average of four test values.		
<sup>(5)</sup> - Restricted to an asphalt film thickness as specified for the level of HMA mixture.		
<sup>(6)</sup> - Based on the daily lot average.		

The Contractor shall strive for the target value of the percent air void and asphalt binder by adjusting gradation and asphalt binder content.

The Contractor shall produce a mixture of uniform composition conforming to the JMF. If, during production, the Contractor determines from quality control testing that adjustments are necessary to the JMF to achieve the specified properties, adjustments to the JMF target gradation and asphalt binder content values may be made.

Adjustments to the JMF aggregate proportions and asphalt binder content shall be made as a result of the interactive process between the Contractor and the Engineer. The Contractor's adjustment recommendations shall prevail, provided all specifications and established mix design criteria are being met for plant production.

The voids in the mineral aggregate (VMA) and estimated film thickness shall be measured for specification compliance every day of HMA production.

Quality control charts in accordance with Materials I.M. 511 shall be available and kept current showing both individual test results and moving average values. Moving averages shall be based on four consecutive test results. Moving averages may only restart in the event of a mandatory plant shutdown for failure to maintain the average within the production tolerance. Control charts shall include a target value and specification tolerances.

Laboratory voids for individual tests shall be calculated according to Materials I.M. 501, using the individual density and individual maximum specific gravity determined for each sample. The moving average of laboratory voids shall be the average of the last four individual laboratory voids.

The Contractor shall monitor the test results and to make mix adjustments, when appropriate, to keep the mixture near the target values. The Contractor shall notify the Engineer whenever the process approaches a specification tolerance limit. One moving average point for laboratory air voids outside the specification tolerance limit shall be cause to cease operations. The Contractor shall assume the responsibility to cease operations, including not incorporating produced material which has not been placed. The process shall not be started again until the Contractor notifies the Engineer of the corrective action proposed.

**Replace** Article 2303.04, D, of the Standard Specifications:

**D. Sampling and Testing.**

The Contractor shall maintain and calibrate the quality control testing equipment with prescribed procedures. Sampling and testing shall conform to 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 lab shall be qualified.

All quality control samples and field lab gyratory specimens used for acceptance shall be identified, stored, and retained by the Contractor until the lot is accepted. The Contracting Authority will prescribe the method of ~~securing the identity and integrity of~~ identifying the verification samples in accordance with Materials I.M. 511. All verification samples shall be stored by the Contractor for the Contracting Authority until delivery to the Contracting Authority's lab.

All samples shall be identified by a system approved by the Engineer.

**1. Individual Materials and Loose Mixture.**

All samples of asphalt binder, aggregate, and tack coat material, shall be identified, ~~secured,~~ and promptly delivered to the appropriate laboratory, as designated by the Engineer.

Paired samples of loose HMA mixture shall be taken in accordance with Materials I.M. 322, each box of the pair weighing at least 30 pounds (14 kg). The Contractor's quality control tests for mixture properties shall be conducted on representative portions of the mix from the quality control sample of each subplot.

Samples shall be split for specimen preparation in accordance with Materials I.M. 357.

All test results and calculations shall be recorded and documented on data sheets approved by the Contracting Authority. Specific test results shall be recorded on the Daily Plant Report provided by the Contracting Authority. The Daily Plant Report shall also include a description of quality control actions taken (adjustment of cold feed percentages, changes in JMF, etc.). The Contractor shall FAX, or deliver by other method approved by the Engineer, the Daily Plant Report to the Engineer and designated laboratory daily. A copy of the electronic file containing project information generated during the progress of the work shall be furnished to the Engineer at project completion.

When sampling for AASHTO T 283, the Contractor shall obtain a 50 pound (25 kg) sample in accordance with Materials I.M. 322. The Engineer will select, at random, the sample location. The Contractor shall split the sample and deliver half to the Central Materials Laboratory.

**2. Compacted Pavement Cores.**

The Contractor shall cut and trim samples under the direction of and witnessed by the Engineer for tests of density, thickness, or composition, by sawing with a power driven masonry saw or by drilling a minimum 4 inch nominal diameter core. The surfaces shall be restored by the Contractor the same day. The core holes shall be dried, filled with the same type of material, and the material properly compacted. Pavement core samples will be identified, taken possession of by the Engineer, and delivered to the Contractor's quality control field laboratory.

The compacted HMA pavement shall will be tested in a timely manner by the Engineer's Contractor's personnel who are Iowa DOT Certified perform the test.

The minimum number of cores taken shall be in accordance with Materials I.M. 204, Appendix F.

The core locations will be determined by the Engineer.

The cores shall be prepared and tested in accordance with Materials I.M. 320, 321, and 337.

### **3. Verification and Independent Assurance Testing.**

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.

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 in accordance with Materials I.M. 511.

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.

The Engineer will ~~test each lot~~ select one daily set of cores at random each week. These will be tested at the ~~Contractor's field quality control laboratory~~ 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. ~~Cores may also be tested by the Contractor, but the Contractor's test results will not be used for material acceptance.~~

All personnel and laboratories performing tests used in the acceptance of material shall participate in the statewide Independent Assurance Program in accordance with Materials I.M. 208.