



Florida Department of Transportation

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GOVERNOR

605 Suwannee Street
Tallahassee, FL 32399-0450

STEPHANIE KOPELOUSOS
SECRETARY

January 19, 2010

Monica Gourdine
Program Operations Engineer
Federal Highway Administration
545 John Knox Road, Suite 200
Tallahassee, Florida 32303

Re: Office of Design, Specifications
Section 337
Proposed Specification: **3370206 Asphalt Concrete Friction Courses.**

Dear Ms. Gourdine:

We are submitting, for your approval, two copies of the above referenced Supplemental Specification.

These changes were proposed by Greg Sholar of the State Materials Office to require the use of liquid anti-strip additives in FC-5 mixtures with limestone aggregate and to clarify the target mix design temperature requirements for different binder types.

Please review and transmit your comments, if any, within two weeks. Comments should be sent via Email to ST986RP or rudy.powell@dot.state.fl.us.

If you have any questions relating to this specification change, please call Rudy Powell, State Specifications Engineer at 414-4280.

Sincerely,

Rudy Powell, Jr., P.E.
State Specifications Engineer

RP/dt

Attachment

cc: Gregory Jones, Chief Civil Litigation
Florida Transportation Builders' Assoc.
State Construction Engineer

ASPHALT CONCRETE FRICTION COURSES.**(REV ~~1-11-10~~11-13-09)**

ARTICLE 337-2 (of the Supplemental Specifications) is deleted and the following substituted:

337-2 Materials.

337-2.1 General Requirements: Meet the requirements specified in Division III as modified herein. The Engineer will base continuing approval of material sources on field performance. Warm mix technologies (additives, foaming techniques, etc.) listed on the Department's website may be used in the production of the mix. The URL for obtaining this information, if available, is:

www.dot.state.fl.us/Specificationsoffice/implemented/URLinSpecs/files/WarmMixAsphalt.pdf .

337-2.2 Asphalt Binder: Meet the requirements of Section 336, and any additional requirements or modifications specified herein for the various mixtures. When called for in the Contract Documents, use a PG 76-22 asphalt binder meeting the requirements of 916-1. For projects with a total quantity of FC-5, FC-9.5, or FC-12.5 less than 500 tons, the Contractor may elect to substitute a PG 76-22 for the ARB-12 or ARB-5, meeting the requirements of 916-1.

337-2.3 Coarse Aggregate: Meet the requirements of Section 901, and any additional requirements or modifications specified herein for the various mixtures.

337-2.4 Fine Aggregate: Meet the requirements of Section 902, and any additional requirements or modifications specified herein for the various mixtures.

337-2.5 Hydrated Lime: Meet the requirements of AASHTO M 303, Type 1.

Provide certified test results for each shipment of hydrated lime indicating compliance with the specifications.

337-2.6 Liquid Anti-strip Additive: *Meet the requirements of ~~FM5508~~916-5 and be listed on the Department's Qualified Products List (QPL).*

337-2.6.7 Fiber Stabilizing Additive (Required for FC-5 only): Use either a mineral or cellulose fiber stabilizing additive. Meet the following requirements:

337-2.6.7.1 Mineral Fibers: Use mineral fibers (made from virgin basalt, diabase, or slag) treated with a cationic sizing agent to enhance the disbursement of the fiber, as well as to increase adhesion of the fiber surface to the bitumen. Meet the following requirements for physical properties:

1. Size Analysis

Average fiber length: 0.25 inch (maximum)

Average fiber thickness: 0.0002 inch (maximum)

2. Shot Content (ASTM C612)

Percent passing No. 60 Sieve: 90 - 100

Percent passing No. 230 Sieve: 65 - 100

Provide certified test results for each batch of fiber material indicating compliance with the above tests.

337-2.6.7.2 Cellulose Fibers: Use cellulose fibers meeting the following requirements:

1. Fiber length: 0.25 inch (maximum)

2. Sieve Analysis

a. Alpine Sieve Method

Percent passing No. 100 sieve: 60-80

b. Ro-Tap Sieve Method

Percent passing No. 20 sieve: 80-95

Percent passing No. 40 sieve: 45-85

Percent passing No. 100 sieve: 5-40

3. Ash Content: 18% non-volatiles ($\pm 5\%$)

4. pH: 7.5 (± 1.0)

5. Oil Absorption: 5.0% (± 1.0) (times fiber weight)

6. Moisture Content: 5.0% by weight (maximum)

Provide certified test results for each batch of fiber material indicating compliance with the above tests.

SUBARTICLE 337-3.2.1 (of the Supplemental Specifications) is deleted and the following substituted:

337-3.2.1 FC-5:

337-3.2.1.1 Aggregates: Use an aggregate blend which consists of either 100% crushed granite, 100% crushed Oolitic limestone or 100% other crushed materials (as approved by the Engineer for friction courses per Rule 14-103.005, Florida Administrative Code).

Crushed limestone from the Oolitic formation may be used if it contains a minimum of 12% silica material as determined by FM 5-510 and the Engineer grants approval of the source prior to its use.

A list of aggregates approved for use in friction course may be available on the Department's website. The URL for obtaining this information, if available, is:

www.dot.state.fl.us/statematerialsoffice/quality/programs/qualitycontrol/materialslistings/sources/frictioncourse.pdf.

337-3.2.1.2 Asphalt Binder: Use an ARB-12 asphalt rubber binder. If called for in the Contract Documents, use a PG 76-22 asphalt binder.

337-3.2.1.3 Hydrated Lime: Add the lime at a dosage rate of 1.0% by weight of the total dry aggregate to mixes containing granite.

337-3.2.1.4 Liquid Anti-strip Additive: *Use a liquid anti-strip additive at a rate of 0.5% by weight of the asphalt binder for mixtures containing limestone aggregate. Other rates of anti-strip additive may be used upon approval of the Engineer.*

337-3.2.1.4-5 Fiber Stabilizing Additive: Add either mineral fibers at a dosage rate of 0.4% by weight of the total mix, or cellulose fibers at a dosage rate of 0.3% by weight of total mix.

SUBARTICLE 337-6.2.1 (of the Supplemental Specifications) is deleted and the following substituted:

337-6.2.1 Option 1 Mixture Acceptance: For Option 1 Mixture Acceptance, meet the requirements of 334-5.1 with the following exceptions:

1. The mixture will be accepted with respect to gradation ($P_{-3/8}$, P_{-4} , and P_{-8}), and asphalt binder content (P_b) only.

2. Testing in accordance with AASHTO T 312-08 and FM 1-T 209 (and conditioning prior to testing) will not be required as part of 334-5.1.1.1.

3. The standard LOT size of FC-5 will be 2,000 tons, with each LOT subdivided into four equal sublots of 500 tons each.

~~4. Initial production requirements of 334-5.1.3 do not apply.~~

54. The Between-Laboratory Precision Values described in Table 334-6 are modified to include ($P_{-3/8}$, P_{-4} , and P_{-8}) with a maximum difference per FM 1-T 030 (Figure 2).

65. Table 334-5 (Master Production Range) is replaced by Table 337-2.

76. The mixture will be accepted on the roadway with respect to surface tolerance in accordance with 334-5.1.8. No density testing will be required for these mixtures.

Characteristic	Tolerance (1)
Asphalt Binder Content (%)	Target \pm 0.60
Passing 3/8 inch Sieve (%)	Target \pm 7.50
Passing No. 4 Sieve (%)	Target \pm 6.00
Passing No. 8 Sieve (%)	Target \pm 3.50

(1) Tolerances for sample size of $n = 1$ from the verified mix design

337-6.2.1.1 Individual Test Tolerances for FC-5 Production:

Terminate the LOT if any of the following Quality Control failures occur:

1) An individual test result of a subplot for asphalt binder content does not meet the requirements of Table 337-2,

2) Two consecutive test results for gradation on any of the following sieve sizes ($P_{-3/8}$, P_{-4} , and P_{-8}) do not meet the requirements of Table 337-2,

When a LOT is terminated due to a QC failure, stop production of the mixture until the problem is resolved to the satisfaction of the Quality Control Manager(s) and/or Asphalt Plant Level II technician(s) responsible for the decision to resume production after a quality control failure, as identified in 105-8.6.4. In the event that it can be demonstrated that the problem can immediately be or already has been resolved, it will not be necessary to stop production. When a LOT is terminated, make all necessary changes to correct the problem. Do not resume production until appropriate corrections have been made. Inform the Engineer of the problem and corrections made to correct the problem. After resuming production, sample and test the material to verify that the changes have corrected the problem. Summarize this

information and provide it to the Engineer prior to the end of the work shift when production resumes.

In the event that a Quality Control failure is not addressed as defined above, the Engineer's approval will be required prior to resuming production after any future Quality Control failures.

Address any material represented by a failing test result in accordance with 334-5.1.9.5. Any LOT terminated under this Subarticle will be limited to a maximum Pay Factor of 1.00 (as defined in 337-12.3) for each quality characteristic.

SUBARTICLE 337-7.3.2 (of the Supplemental Specifications) is deleted and the following substituted:

337-7.3.2 Temperature of the Mix: Heat and combine the asphalt binder and aggregate in a manner to produce a mix having a temperature, when discharged from the plant, meeting the requirements of 330-6.3. Meet all requirements of 330-9.1.2 at the roadway. The target mixing temperature shall be established at 320°F *for mixtures utilizing ARB-12 asphalt binder. For mixtures utilizing PG 76-22 asphalt binder, the target mixing temperature shall be established by the Contractor.* The target mixing temperature may be reduced when using warm mix technology, ~~if agreed to by the Engineer and the Contractor.~~

ASPHALT CONCRETE FRICTION COURSES.
(REV 1-11-10)

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www.dot.state.fl.us/Specificationsoffice/implemented/URLinSpecs/files/WarmMixAsphalt.pdf .

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337-2.5 Hydrated Lime: Meet the requirements of AASHTO M 303, Type 1.
Provide certified test results for each shipment of hydrated lime indicating compliance with the specifications.

337-2.6 Liquid Anti-strip Additive: Meet the requirements of 916-5 and be listed on the Department's Qualified Products List (QPL).

337-2.7 Fiber Stabilizing Additive (Required for FC-5 only): Use either a mineral or cellulose fiber stabilizing additive. Meet the following requirements:

337-2.7.1 Mineral Fibers: Use mineral fibers (made from virgin basalt, diabase, or slag) treated with a cationic sizing agent to enhance the disbursement of the fiber, as well as to increase adhesion of the fiber surface to the bitumen. Meet the following requirements for physical properties:

1. Size Analysis
 - Average fiber length: 0.25 inch (maximum)
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2. Shot Content (ASTM C612)
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337-2.7.2 Cellulose Fibers: Use cellulose fibers meeting the following requirements:

1. Fiber length: 0.25 inch (maximum)

2. Sieve Analysis

a. Alpine Sieve Method

Percent passing No. 100 sieve: 60-80

b. Ro-Tap Sieve Method

Percent passing No. 20 sieve: 80-95

Percent passing No. 40 sieve: 45-85

Percent passing No. 100 sieve: 5-40

3. Ash Content: 18% non-volatiles ($\pm 5\%$)

4. pH: 7.5 (± 1.0)

5. Oil Absorption: 5.0% (± 1.0) (times fiber weight)

6. Moisture Content: 5.0% by weight (maximum)

Provide certified test results for each batch of fiber material indicating compliance with the above tests.

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337-3.2.1 FC-5:

337-3.2.1.1 Aggregates: Use an aggregate blend which consists of either 100% crushed granite, 100% crushed Oolitic limestone or 100% other crushed materials (as approved by the Engineer for friction courses per Rule 14-103.005, Florida Administrative Code).

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337-3.2.1.2 Asphalt Binder: Use an ARB-12 asphalt rubber binder. If called for in the Contract Documents, use a PG 76-22 asphalt binder.

337-3.2.1.3 Hydrated Lime: Add the lime at a dosage rate of 1.0% by weight of the total dry aggregate to mixes containing granite.

337-3.2.1.4 Liquid Anti-strip Additive: Use a liquid anti-strip additive at a rate of 0.5% by weight of the asphalt binder for mixtures containing limestone aggregate. Other rates of anti-strip additive may be used upon approval of the Engineer.

337-3.2.1.5 Fiber Stabilizing Additive: Add either mineral fibers at a dosage rate of 0.4% by weight of the total mix, or cellulose fibers at a dosage rate of 0.3% by weight of total mix.

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1. The mixture will be accepted with respect to gradation ($P_{-3/8}$, P_{-4} , and P_{-8}), and asphalt binder content (P_b) only.

2. Testing in accordance with AASHTO T 312-08 and FM 1-T 209 (and conditioning prior to testing) will not be required as part of 334-5.1.1.1.

3. The standard LOT size of FC-5 will be 2,000 tons, with each LOT subdivided into four equal sublots of 500 tons each.

4. The Between-Laboratory Precision Values described in Table 334-6 are modified to include ($P_{-3/8}$, P_{-4} , and P_{-8}) with a maximum difference per FM 1-T 030 (Figure 2).

5. Table 334-5 (Master Production Range) is replaced by Table 337-2.

6. The mixture will be accepted on the roadway with respect to surface tolerance in accordance with 334-5.1.8. No density testing will be required for these mixtures.

Table 337-2 FC-5 Master Production Range	
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(1) Tolerances for sample size of $n = 1$ from the verified mix design	

337-6.2.1.1 Individual Test Tolerances for FC-5 Production:

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2) Two consecutive test results for gradation on any of the following sieve sizes ($P_{-3/8}$, P_{-4} , and P_{-8}) do not meet the requirements of Table 337-2,

When a LOT is terminated due to a QC failure, stop production of the mixture until the problem is resolved to the satisfaction of the Quality Control Manager(s) and/or Asphalt Plant Level II technician(s) responsible for the decision to resume production after a quality control failure, as identified in 105-8.6.4. In the event that it can be demonstrated that the problem can immediately be or already has been resolved, it will not be necessary to stop production. When a LOT is terminated, make all necessary changes to correct the problem. Do not resume production until appropriate corrections have been made. Inform the Engineer of the problem and corrections made to correct the problem. After resuming production, sample and test the material to verify that the changes have corrected the problem. Summarize this

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Address any material represented by a failing test result in accordance with 334-5.1.9.5. Any LOT terminated under this Subarticle will be limited to a maximum Pay Factor of 1.00 (as defined in 337-12.3) for each quality characteristic.

SUBARTICLE 337-7.3.2 (of the Supplemental Specifications) is deleted and the following substituted:

337-7.3.2 Temperature of the Mix: Heat and combine the asphalt binder and aggregate in a manner to produce a mix having a temperature, when discharged from the plant, meeting the requirements of 330-6.3. Meet all requirements of 330-9.1.2 at the roadway. The target mixing temperature shall be established at 320°F for mixtures utilizing ARB-12 asphalt binder. For mixtures utilizing PG 76-22 asphalt binder, the target mixing temperature shall be established by the Contractor. The target mixing temperature may be reduced when using warm mix technology.