

Russell R. McMurry, P.E., Commissioner



GEORGIA DEPARTMENT OF TRANSPORTATION

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Atlanta, Georgia 30308
Telephone: (404) 631-1000

December 8, 2015

Mr. David J. Moellering, Executive Director
Georgia Highway Contractors Association, Inc.
2160 Satellite Blvd., NW, Suite 100
Duluth, GA 30097

RE: GPTQ Specification Review Process
Review No. 291
Supplemental Specification 419
Section 419—HIGH FRICTION SURFACE TREATMENT

SENT VIA E-MAIL ONLY

Dear Mr. Moellering:

The proposed New Supplemental Specification is attached and is also located at <http://www.dot.ga.gov/PS/Business/Source> for review.

Detailed comments with supporting information and suggested modifications to the proposed new Specification 419 need to be received from the Stakeholders by the GHCA no later than December 29, 2015 such that the GHCA will have faxed all comments to each of the GPTQ Specification Review Team Members no later than December 30, 2015.

If a meeting with the Stakeholders needs to be scheduled, I will notify you. If you need any additional information, you may call me at 404-631-1499.

Sincerely,

A handwritten signature in blue ink, appearing to read "Chet Welch".

Chet Welch
GPTQ Specification Review Team Leader

Attachment

Copy: Jeff Baker, GDOT, Director of Construction
Julio Nunez, FHWA, GPTQ Specification Review Team Member
Jeff Shropshire, C.W. Matthews, GPTQ Specification Review Team Member
Brad Young, GDOT, GPTQ Specification Review Team Member
Steven Davis, Georgia Concrete Paving Association, Executive Director
Jeff Wansley, Georgia Construction Aggregate Association, Executive Director
Peter Finsen, Georgia/Carolina Precast Concrete Institute
Scott Jordan, PE, American Concrete Pipe Association
Will Rogers, Georgia Asphalt Pavement Association

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA
STANDARD SPECIFICATION
Section 419—HIGH FRICTION SURFACE TREATMENT

419.1 General Description

This work includes furnishing and installing a textured, high friction surface treatment (HFST) system in accordance with this Section and in conformity with the lines and details shown on the plans.

Ensure the color of the high friction surface treatment is similar to the surface on which it will be applied.

Ensure that a manufacturer's representative is available on site to provide technical assistance during the start up operations and as necessary during the surface preparation, material placement and during any necessary remedial work.

419.1.01 Definitions

General Provision 101 through 150.

Continuous Section – section of HFST that is placed in one continuous pass, whether by hand or with a machine. Any stoppages of the installation process resulting in a cold joint, or as described in Section 419.3.05 B-1 below, will constitute the beginning of another continuous placement.

Dynamic Friction Tester (DFT) – ASTM E 1911 friction testing device which reports pavement coefficient of friction versus speed for test speeds up to 90 km/hr (80 km/hr typical).

419.1.02 Related References

A. Standard Specifications

General Provision 101 through 150.

B. Referenced Documents

AASHTO T27

AASHTO T96

AASHTO T104

ASTM E 274

ASTM D 570

ASTM D 638

ASTM D 665

ASTM D 2240

ASTM D 2471

ASTM E 1911

419.1.03 Submittals

Submit independent laboratory reports documenting that the resin binder and aggregate meets the requirements of this specification. Submit documentation of pre-installation friction characteristics of the existing pavement. Submit documentation of the in-placed friction characteristics of the high friction surface treatment within 5 days after placement. Ensure a minimum of 0.90 using a DFT at 60 km/h in accordance with ASTM E 1911 is achieved. Submit documentation of the in-place friction

= New Spec. 419

characteristics of the high friction surface treatment 90 days after the initial testing. Ensure a minimum of 0.80 using a DFT at 60 km/h in accordance with ASTM E 1911 is achieved.

419.2 Materials

Use a two part cold applied modified resin binder treatment containing a binder capable of retaining a highly skid-resistant bauxite aggregate topping under vehicular traffic conditions.

A. Resin Binder: Ensure the binder is a two-part cold applied modified exothermic resin treatment. Use a binder consisting of a thermosetting compound which holds aggregate firmly in position. Ensure the binder has the following physical properties:

TEST	REQUIREMENTS	TEST METHOD
Ultimate Tensile Strength	2,650 psi min.	ASTM D-638
Tensile Elongation	30 – 70%	ASTM D-638
Compressive Strength	1,600 psi min.	ASTM D-695
Gel Time	10 minutes min	ASTM D-2471
Cure Rate	3 hours max (thin film @ 75° F)	ASTM D-1640
Water Absorption	1 % max	ASTM D-570
Hardness, Shore D	60 – 75	ASTM D-2240

Two part resin binder materials which are not exothermic in curing will not be allowed.

B. Aggregate: Use high friction bauxite for the topping. Ensure the aggregate is clean, dry, and free from foreign matter. Use aggregate that has the properties:

TEST	REQUIREMENTS	TEST METHOD
Percent Wear	10% max	AASHTO T-96
Soundness	15% max	AASHTO T104

AGGREGATE GRADATION

SIEVE SIZE	% PASSING BY WEIGHT
No. 6	95-100
No. 16	0-5

419.2.01 Delivery, Storage and Handling

Deliver aggregate to construction site in clearly labeled bags or sacks

419.3 Construction Requirements

419.3.01 Personnel

= New Spec. 419

General Provision 101 through 150.

419.3.02 Equipment

General Provisions 101 through 150.

419.3.03 Preparation

Ensure surfaces are clean, dry and free of all dust, oil, debris, crack sealant and any other material that might interfere with the bond between the resin binder material and existing surfaces. Clean existing surfaces by use of mechanical sweepers, high pressure air, or other methods approved by the Engineer prior to the installation. Adequate cleaning of all surfaces will be determined and approved by the Engineer based on the recommendation of the manufacturer's representative.

Protect utilities, drainage structures, curbs and other structures within or adjacent to the application location of the high friction surface treatment materials. Cover and protect all existing pavement markings that are adjacent to the application surfaces as directed by the Engineer. Remove pavement markings that conflict with the surface application by grinding. Sweep the surface clean prior to binder application.

Clean and fill all inadequately sealed joints and cracks greater than ¼ inch in width and depth with resin binder specified herein. Once the resin binder in the pretreated areas has gelled, proceed with the installation of the high friction surface treatment.

For applications on new pavements, install the high friction surface treatment a minimum of 30 days after the placement of the underlying and adjacent asphalt pavement to reduce the likelihood of tracking or raveling.

419.3.04 Fabrication

General Provisions 101 through 150.

419.3.05 Construction

A. General

Do not apply the two part modified resin binder on a wet surface, when the ambient and/or surface temperature is below 40°F or above 105°F, or when the anticipated weather conditions would prevent the proper application of the surface treatment as determined by the manufacturer's representative.

B. Application of Resin Binder

Place the resin binder in accordance with the manufacturer's recommended methods. Ensure the in-place thickness of the mixed resin binder is approximately 60 mils above the pavement surface. For irregular surfaces, the application rate may be adjusted, as determined by the manufacturer's representative. Proportion the two part modified resin binder components to the correct ratio, and mix using a low speed, high-torque drill fitted with a helical stirrer at a rate recommended by the manufacturer. The Contractor may choose to mix the resin binder using a plural component pump system of a type approved by and in accordance with the resin binder manufacturer.

Uniformly distribute the homogenously mixed resin binder over the pavement section to be treated within the temperature range specified. Proceed in such a manner that operations will not allow the resin binder material to chill, set up, or otherwise impair retention of the aggregate. Resin binder may be uniformly spread onto irregular surfaces by means of a hand-applied, serrated-edged squeegee.

C. Application of Aggregate

Place the dry aggregate at a rate not less than 13 pounds per square yard onto the applied binder prior to the binder reaching its gel time. Do not use vibratory or impact type compaction on the aggregate after placement. Use only lightweight rollers to seat the aggregate topping. Complete coverage of the "wet" resin binder with aggregate is necessary to achieve a uniform surface. Ensure no exposed wet spots are visible once the aggregate is placed.

D. Curing

Allow the aggregate topped binder to cure in accordance with manufacturer recommendations for approximately 3 hours. Protect treated surfaces from traffic and environmental effects until the area has cured.

Remove the excess aggregate by hand brooms, mechanical sweeping, or suction sweeping before opening to traffic. Excess aggregate can be reused on the following day's installation, provided the aggregate is clean, uncontaminated, and dry. Ensure the coverage rate of the retained aggregate on the binder is at least 12 pounds per square yard.

Additional mechanical or vacuum sweeping may be necessary after the system fully cures and the treated surface is open to traffic as directed by the Engineer.



= New Spec. 419

= New Spec. 419

419.3.05 Quality Acceptance

A. Pre-installation Testing

At no additional cost to the Department, the contractor will use a DFT to measure the friction characteristics of the existing pavement to be treated in accordance with ASTM E 1911. Pre-installation testing can be conducted prior to or on the same day as HFST installation. If conducted prior to the installation, the pre-installation testing shall be done within each installation section limits and noted on the shoulder so that the post-installation testing can take place in the same location. If pre-installation testing is to be conducted on the same day as HFST installation, it should be conducted on a section of adjacent pavement (e.g., just beyond the limits of the HFST), as long as the pavement appears to be similar in nature (e.g., constructed at the same time) to the pavement being treated. If there is a change in the pavement surface within the limits of the treated section, pre-installation testing should be conducted on each apparently different pavement. Whenever possible, pre-installation testing should be conducted not more than 20 LF beyond the limits of the HFST. Pre-installation testing should be conducted in one of the wheel paths where friction values are generally lower, but can also be conducted in the center of the lane as approved by the Engineer.

B. Post-installation Testing

At no additional cost to the Department, the Contractor will use DFT to measure the friction characteristics of the high friction surface treatment in accordance with ASTM E 1911 within five days after the placement (once the surface is deemed cured) of each continuous section and again 90 days after the initial test of each continuous section. The contractor may conduct the initial test of the surface as early as the same day and as late as the 5th day. The earliest the contractor can conduct the second round of testing on each continuous section shall be a minimum of 90 days after the initial testing. Using a DFT ensure a minimum of 0.90 is achieved within 5 days after placement of the high friction surface treatment and ensure a minimum of 0.80 is achieved 90 after completion of the high friction surface treatment.

1. Contractor Testing

- a. The Contractor shall conduct DFT testing on each continuous section as stated below.
- b. The first test location should be within the first 25 LF of the continuous section, and the second test should be at least 200 LF beyond the first test, unless the continuous section is less than 225 LF, in which case it should be located at the approximate midpoint of the continuous section. Each subsequent test should be conducted 200 LF beyond the last test for each continuous section. If the first four DFT testing results are satisfactory, the frequency of testing may be decreased to one DFT test for every 1000 LF
- c. Testing should be conducted in right or left wheel path of a lane, approximately 3 LF from the centerline or shoulder stripe or in the apparent wheel path.
- d. Conduct an additional DFT tests at the location of any anomalies, as directed by the Engineer.
- e. Report the DFT values for 20, 40, and 60 kph
- f. Note the location of any continuous sections where any friction values fall below the specification limit of 0.90 at 60 kph.
- g. Note any continuous sections where the friction values from the two DFT tests differ by more than 20 percent, regardless of whether the friction value was above the specification limit. Note any continuous sections with a single DFT test where the friction value differs by more than 20 percent from the previous continuous section.

2. A new continuous section of HFST placement shall be delineated whenever the following occur:

- a. Installation process stops for a period of time exceeding the curing time of the resin binder, resulting in a cold joint in the HFST.
- b. Installation vehicle (including fully automated trucks and trucks which just mix binder materials) stops for refilling of material (binder or aggregate), regardless of whether or not a cold joint is formed in the HFST.
- c. Any time there is a change in the installation process, such as a switch from machine applied to hand applied or hand applied to machine applied.
- d. Any time there is a change in material source (e.g., aggregate source or resin binder type)

3. Anomalies which may require an additional test from the agency include but are not limited to:

- a. Locations where the resin shows through the aggregate.
- b. Locations of surface defects/impressions from construction operations (e.g., wheel and foot tracks).
- c. Locations of manual patching after completion of installation.
- d. Test locations where the friction values as described in Item 419.03.05 B-1(7) above.

4. Agency Verification Testing:

- a. Conduct a single DFT test within each continuous section of HFST placement, as designated during the installation. Testing will be conducted in the same wheel path as the contractor's test.
- b. Compare friction testing results at 20, 40, and 60 kph to the contractor QA test results.
- c. If friction values vary more than 20 percent from the contractor's test results at any test speed, a second test at the same location will be conducted to verify results.
- d. If friction values still vary more than 20 percent from the contractor's test results, additional testing by the contractor at the same location will be required.
- e. If contractor's new test results agree with agency results, and the friction value at 60 kph is below the specification threshold, conduct additional testing upstream and downstream from this test location to identify the limits for removal and replacement of the HFST.

C. Removal and Replacement

At no additional cost to the Department, the Contractor will remove and replace high friction surface treatment placed that the Engineer determines has unacceptable blemishes from raveling, delamination, streaking, other deficient characteristics or fails to meet specified friction requirements. Replace with acceptable high friction surface treatment at the Contractor's expense.

419.4 Measurement

The area to be measured is the number of square yards (meters) of high friction surface treatment completed and accepted.

419.4.01 Limits

The length is measured along the surface. The width is specified on the Plans, plus or minus any authorized changes. Irregular areas are measured by the surface square yard (meter) within the lines shown on the Plans or authorized changes.

419.5 Payment

The accepted area of high friction surface treatment will be paid for at the Contract Unit Price per square yard (meter) complete.

Payment will be made under:

Item No. 419	High friction surface treatment	Per square yard (meter)
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Office of Traffic Operations