

SPECIAL SPECIFICATION

Item 3189

High Friction Surface Treatment

- 1. **Description.** Furnish and apply a high friction surfacing system in accordance with this Specification and the lines and details shown on the plans.

Ensure the manufacturer’s representative is present at the construction site to train Department and Contractor personnel before placing the surface treatment and remains available during application as necessary.

- 2. **Materials.**

- A. **General.** Furnish a high friction surface treatment containing epoxy binder capable of retaining a bauxite aggregate topping under vehicular traffic conditions.

- B. **Epoxy Binder.** Provide a two-part exothermic epoxy resin binder which holds the aggregate firmly in position, and meets the requirements of Table 1.

Table 1
Epoxy Binder Requirements

Property	Requirement	Test Method
Ultimate Tensile Strength, psi	2,800 Min	ASTM D638
Compressive Strength, psi	1,600 Min	Tex-614-J, Part 3
Gel Time, min	10 Min	Tex-614-J, Part 7
Peak Exothermic Temperature, °F	150 Min	Tex-614-J, Part 7 ¹
Water Absorption, %	0.25 Max	Tex-614-J, Part 19
Shore Hardness	70 Min	ASTM D2240
Viscosity, cP	3,000 Min	Tex-614-J, Part 4
Bleed Test	Trace	ASTM D 969
Dry-to-touch time, hours	3 Max	ASTM D 1640, 5 mil thickness
Mixing Ratio	As recommended by manufacturer	n/a

¹ Addition to Tex-614-J, Paragraph 7.1.2.4: Insert a temperature probe into the center of the sample and record the temperature changes through the end of the test. Paragraph 7.1.2.6: Record the highest temperature reached as the Peak Exothermic Temperature.

- C. **Aggregate Topping.** Furnish an aggregate topping that is a bauxite consisting of a 1-3mm gradation. Ensure the aggregate is delivered to the construction site in clearly labeled 55 lb. bags or 2200 lb. super sacks. Provide aggregate that is clean, dry, and free from foreign matter. Provide aggregate that meets the requirements of Table 2.

Table 2
Aggregate Requirements

Property	Requirement	Test Methods
Aggregate Abrasion Value	10% max	LA Abrasion Test ASTM C131
Aggregate grading	No. 6 Sieve Size No. 16 Sieve Size	Grading D 95% min Passing 5% max Passing
Aggregate Acid Insolubility	Greater than 90%	Tex-612-J
Aggregate Magnesium Soundness	30% max	Tex-411-A (Stockpile gradation)

D. Certification. Provide an independent laboratory report showing that the epoxy binder meets the requirements of this section. Submit certification from the manufacturer that the aggregate topping meets the above requirements. Submit documentation of the in-place friction characteristics (minimum 65 FN40R in accordance with ASTM E274) of aggregate bonded to a vehicular bearing surface using the modified epoxy binder. Submit a list of projects with owner’s contact information on which a minimum of 3,000 sq. yd. of high friction aggregate and epoxy binder was placed within the past three years.

3. Construction.

- A. General.** Do not apply the two-part modified epoxy binder on a wet surface, when the ambient 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. Preparation.** Ensure surfaces are clean, dry, and free of dust, oil, debris, and any other material that might interfere with the bond between the epoxy binder material and existing surfaces. Adequate cleaning of surfaces will be determined by the manufacturer’s representative.

Protect utilities, drainage structures, curbs, and any other structure within or adjacent to the treatment location against the application of the surface treatment materials. Cover and protect existing pavement markings that are adjacent to the application surfaces as directed. Remove existing or temporary pavement markings that conflict with the surface application in accordance with Item 677, “Eliminating Existing Pavement Markings and Markers,” except for Measurement and Payment, and sweep the surface clean before applying to the epoxy binder.

Pre-treat joints and cracks greater than 1/4 in. in width and depth with the mixed epoxy specified in this specification. Once the epoxy in the pre-treated areas has gelled, the high friction epoxy binder and aggregate topping installation may proceed.

For applications on new pavements, install the high friction epoxy binder and aggregate topping a minimum of 30 days after placing the underlying and adjacent asphalt pavement to reduce the likelihood of “tracking.”

C. Mixing and Application of Epoxy Binder and Aggregate Wearing Course. Utilize one of the following methods to apply the epoxy binder and aggregate wearing course, as shown in plans.

- 1. Hand Mixing and Application.** Proportion the two-part modified epoxy base binder components, Part A and Part B, to the correct ratio, as recommended by the manufacturer, and mix using a low speed, high torque drill fitted with a helical stirrer. Use this method for low volume application areas, such as intersections, areas less than 250 feet in length, or where truck-mounted application machines are not applicable to the specified locations because of logistical restrictions. Hand-apply the mixed components onto a prepared pavement surface at an application coverage rate of 20-30 sf. ft. per gallon. Uniformly spread the hand applied base binder onto the substrate surface using a serrated edge squeegee. Immediately spread the high friction surfacing aggregate onto the two-part modified epoxy base binder, at a minimum rate of 13 lbs./sq. yd.
- 2. Mechanical Mixing and Application.** Apply the two-part modified epoxy base binder, by using a truck-mounted application machine, onto the pavement section to be treated in varying widths of up to 8 ft. wide at a uniform application thickness. Conduct operations in such a manner that will not allow the epoxy base binder material to separate in the mixing lines, cure, dry, or otherwise impair retention bonding of the high friction surfacing aggregate. Apply the mixed components mechanically onto the prepared pavement surface at a minimum coverage rate of 15 gal./min. with a uniform thickness of 60 mils onto the pavement surface. Immediately spread the high friction surfacing aggregate onto the installed two-part modified epoxy base binder, at a minimum rate of 13 lbs./sq. yd. coverage. Mechanically apply the high friction surfacing aggregate to varying widths of up to 8 ft. wide in a uniform, continuous application.

For either method 1 or 2, 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” epoxy binder with aggregate is necessary to achieve a uniform surface. No exposed visible wet spots are allowed once the aggregate is placed.

- D. Curing.** Allow the high friction aggregate-topped epoxy binder to cure in accordance with the manufacturer’s recommendations for approximately 2 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 may be reused on the following day’s installation, provided the aggregate is clean, uncontaminated, and dry. The Engineer may require additional mechanical or vacuum sweeping, as necessary, after the system fully cures and the treated surface is open to traffic.
- 4. Measurement.** High Friction Surface Course will be measured by the square yard of completed and accepted work. No deduction will be made for the areas occupied by manholes, inlets, drainage structures, pavement markings, or by any public utility appurtenances within the area.

This is a plans quantity Item. The quantity to be paid is the quantity shown in the proposal, unless modified by Article 9.2, "Plans Quantity Measurement." Additional measurements or calculations will be made if adjustments of quantities are required.

- 5. Payment.** The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "High Friction Surface Course." This price is full compensation for surface preparation, furnishing, preparing, hauling and placing materials including epoxy binder, removing existing pavement markings and excess aggregate as needed, and for labor, tools, equipment, and incidentals.