

**STATE OF OHIO
DEPARTMENT OF TRANSPORTATION**

**SUPPLEMENTAL SPECIFICATION 888
HIGH FRICTION SURFACE TREATMENT**

October 18, 2019

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888.01 Description. This work consists of pavement preparation and placement of a High Friction Surface Treatment (HFST). The HFST is comprised of a layer of low modulus epoxy Binder Resin System (BRS) and surface applied aggregate

888.02 Materials.

- A. Low Modulus Epoxy BRS.** Provide a BRS that is listed on the QPL for HFST. Provide BRS to the construction site in clearly labeled containers with the manufacturer and product name. Provide BRS that meets the physical properties identified in AASHTO MP41-19, Table 1.
- B. Aggregate.** Provide refractory grade calcined bauxite only. Provide aggregate that is clean, dry, free from foreign matter, and meets the requirements listed in Table 888.02.B. Provide aggregate to the construction site in clearly labeled bags or sacks that show the name of the manufacturer and the location of processing. Submit to the Engineer certified test data no more than 6 months old from an independent laboratory showing the laboratory name, date of testing, and test methods used showing the aggregate meets the requirement of Table 888.02B.

TABLE 888.02.B AGGREGATE REQUIREMENTS		
Aggregate Property	Specification Limits	Test Method
PSV – Polished Stone Value	75.0 mm max. (70 mm)	ASTM E660
AAV – Aggregate Abrasion Value	20 max	AASHTO T96
Gradation	100% min. passing No. 4 (4.75 mm) 95% min. passing No. 6 (3.36 mm) 5% max. passing No.16 (1.18 mm) 0.2% max. passing No. 30 (600 μm)	AASHTO T27

888.03 Construction. Store materials in a clean, dry environment and in accordance with the manufacturer’s recommendations. Do not expose aggregate to rain or moisture.

Provide the Engineer a copy of the SDS, Product Data Sheet, and other information pertaining to the safe practices for the storage, handling, and disposal of the materials.

A. Application Conditions. Apply BRS to dry pavement when the ambient temperature is between 50 °F and 110 °F (10 °C and 43 °C). Do not apply when anticipated weather conditions would prevent proper application and curing of the HFST.

B. Preparation of surfaces. Protect utilities, drainage structures, curbs, and any other structures within or adjacent to treatment location from the surface preparation and installation of the HFST.

Remove all existing pavement markings using an abrasion method conforming to 641.10. Remove all existing raised pavement markers.

Prepare all pavement surfaces immediately prior to the installation of HFST. Wash pavement surfaces contaminated with oils, greases, or other deleterious materials not removed by the surface preparation with a mild detergent solution, rinse with clean potable water, and dry using a hot compressed air lance.

Do not place HFST on asphalt pavement surfaces less than 30 days old. Clean asphalt pavement surfaces using mechanical sweepers and either vacuum sweepers or high pressure air. Mechanically sweep all surfaces to remove dirt, loose aggregate, debris, and deleterious material. Vacuum sweep or air wash all surfaces to remove all dust, debris, and deleterious material. Ensure the air wash provides a minimum of 180 cubic feet per minute (0.085 m³/minute) of clean, dry compressed air and the air compressors are equipped with sufficient oil traps. When air washing, maintain the air lance perpendicular to the surface and the tip of the air lance within 12 inches (25 mm) of the surface.

Clean concrete surfaces by shot blasting and either vacuum sweeping or washing with high pressure air. Shot blast all surfaces to remove all curing compounds, loosely bonded mortar, surface carbonation, and deleterious material. Ensure the prepared surface complies with the International Concrete Repair Institute (ICRI) standard for surface roughness CSP 5. After shot blasting, vacuum sweep or air wash all surfaces to remove all dust, debris, and deleterious material. Ensure the air wash provides a minimum of 180 cubic feet per minute (0.085 m³/minute) of clean, dry compressed air and the air compressors are equipped with sufficient oil traps. When air washing, maintain the air lance perpendicular to the surface and the tip of the air lance within 12 inches (25 mm) of the surface.

C. Application. Pre-treat cracks greater than 1/4 inch (6 mm) with BRS. Once the BRS in the pre-treated areas has gelled, the installation may proceed. If a prime coat is required by BRS manufacturer, apply primer in accordance with the manufacturer's recommended application procedures.

Provide mechanical equipment approved by the BRS manufacturer to apply the HFST

Blend and mix the BRS at the manufacturer's specified ratio (+/- 2% by volume) and apply once blended. Apply each lift of BRS uniformly at a rate of 0.37 – 0.43 gallons per square yard (1.68 – 1.95 L/m²). Do not allow the mixed material to separate, cure, dry, or otherwise harden in such a way as to impair retention and bonding of the aggregate.

Do not contact or contaminate the wet uncured BRS prior to application of the aggregate. If required to walk on the uncured BRS, use spiked shoes to minimize the disturbance to the binder layer. Remove and replace any contaminated areas of BRS.

Apply aggregate at a rate of 12 -15 pounds per square yard (6.5 – 8.1 kg/m²), onto the BRS. Ensure full embedment of the aggregate. Cover any wet spots with aggregate prior to the gelling of the BRS.

Repeat the application of BRS and aggregate after the first lift has cured when a double lift is specified. If required by the Engineer, prepare the surface of the first lift in accordance with 888.03.B prior to placing the second lift.

Provide neat seams at all joints in the finished HFST. Correct joints where the surface deviates more than 1/4 inch (6 mm) from a 6 foot (1.8 m) straightedge. Construct longitudinal joints in the HFST surface at the edge of lanes.

Remove all excess aggregate before opening to traffic. Do not reuse any reclaimed aggregate. Do not permit construction equipment or traffic on the HFST during curing period. Perform additional sweeping three days after completion of the initial installation, as directed by the Engineer.

The Department may allow hand application for small or irregular areas where the Engineer determines the use of mechanical equipment is not practical. Apply hand-mixed BRS in accordance with the manufacturer's recommendations for these areas.

888.04 Acceptance. Inspect the HFST daily for deficiencies resulting from poor workmanship, tracking from equipment, surface patterns, loss of stone, and sweeping. Inspect workmanship for untreated areas, non-uniform treatment, longitudinal joints, and construction joints.

Verify the following daily for acceptance:

- A. Finished surface has no more than four tears or untreated areas greater than 1 inch (25 mm) wide and 4 inches (100 mm) long in any 120-square yard (100 m²) area.
- B. Joints appear neat and uniform without buildup, uncovered areas, or unsightly appearance.
- C. Longitudinal joints have less than a 2-inch (50 mm) overlap on the adjacent passes.
- D. Construction joints have no more than 1/4-inch (6 mm) difference in elevation across the joint as measured with a 6-foot (2 m) straightedge.
- E. HFST is neat and uniform over the entire mat, especially at edge locations.
- F. Stone chip embedment is 2/3 of typical stone chip height.

The Contractor and Engineer will review the completed work 25 to 35 days after placement. Ensure the finished work meets the following requirements:

TABLE 888.04 ACCEPTANCE REQUIREMENTS

Defect ^[1]	Description
Surface patterns	Alternate lean and heavy lines (Ridges or streaking over the surface)
Untreated Areas	Distinctive appearance (Lack of aggregate on the surface)
Loss of cover aggregate Patches or lines of aggregate lost from surface	

^[1] No more than 20% of any 120 square yard (100 m²) area can contain any defect. The measurement of the 120 square yard (100 m²) area begins at the start of the defect.

Perform corrective work on all areas not meeting the requirements of Table 888.04. Perform all corrective work to the satisfaction the Engineer. Reinstall raised pavement markers in accordance with Item 621 after the review and any required corrective work.

888.05 Method of Measurement. The Department will measure HFST by the number of square yards (square meters) completed and accepted in place. The Department will determine the width by measuring the actual width of the HFST. The Department will measure the length along the centerline of each roadway or ramp.

The Department will measure the number of raised pavement markers removed.

888.06 Basis of Payment. The Department will pay for removal of existing pavement markings according to Items 642, 643, 644, 645, 646, 647, and 648 as specified.

The Department will pay for removal of existing raised pavement markers according to Item 621 Raised Pavement Markers Removed.

The Department will pay for accepted quantities at the contract price as follows:

Item	Unit	Description
888	Square Yard (Square Meter)	High Friction Surface Treatment, Single Lift
888	Square Yard (Square Meter)	High Friction Surface Treatment, Double Lift

Designer Notes

This specification is intended for use in improving short sections of low pavement friction in accordance with the friction management program. Do not use this specification without prior concurrence from the Office of Pavement Engineering

Use a single lift on pavement surfaces. Use a double lift on concrete bridge decks.

Plans must include payment for removal of pavement markings and raised pavement markers.