



POLY-TUFF SYSTEMS  
INTERNATIONAL  
HIGHWAY DIVISION

# E-TUFF® HFST

## High Friction Surface Treatment Epoxy

### 1.01 DESCRIPTION

**E-Tuff® HFST** is a 1:1 ratio, 100% solids, low modulus, low viscosity, moisture tolerant, rapid setting epoxy binder and multi-purpose adhesive. Formulated as a Single or Multi-Layer High Friction Surface Treatment overlayment to produce friction "on demand" for vehicular traffic on treated asphalt and concrete substrates. Rapid cure material provides for minimal closure time. Formulated for use in bonding skid resistant materials to hardened concrete and as a binder in epoxy mortars. VOC compliant in all states and provinces in North America.

### 1.02 USES

Use as a neat HFST epoxy binder adhesive to bond calcined bauxite or other approved aggregates to cured asphalt or concrete pavements. Use as an above grade interior or exterior crack filler or surface sealer to prevent the intrusion of water and waterborne contaminants. All aggregates must comply with federal, state and provinces HFST specifications.

### 1.03 FEATURES

- Creates A Below Aggregate Protection Layer To Reduce Water And Water Borne Chemical Intrusion
- Excellent Adhesion
- HFST Reduces Roadway Departure And Saves Lives
- Mix Ratio 1:1 By Volume For Ease Of Use
- Self-Priming
- Use Neat Resin And Hardener Or Aggregate Extended Mortar For Patching And Concrete Repair
- Use Neat Resin And Hardener To Mend Cracks, Broadcast Aggregate

### 1.04 TECHNICAL DATA

Meets: ASTM C881, Type III, Grade 1, Class B & C and AASHTO M 235, Type III, Grade 1, Class B & C

### 1.05 COLOR

Clear to Light Amber

### 1.06 PACKAGING

10-gallon kit: 5 gallon pail of Side-A (18.9 liters) and 5 gallon pail of Side B (18.9 liters)

100-gallon kit: 50 gallon drum of Side-A (189 liters) and 50 gallon tote of Side B (189 liters)

500-gallon kit: 250 gallon tote of Side-A (946 liters) and 250 gallon tote of Side B (946 liters)

### 1.07 COVERAGE

Automated Application Vehicle: Apply the binder resin at a rate of 3-4 gallons (11-15 liters) per 100 sqft (9.3 sqm) or 25-35 sqft per gallon (2.30 sqm). Provide a uniform thickness of 50 to 65 mils (1270 to 1574 microns).

Automated Application Vehicle: Apply calcined bauxite aggregate within 12 +/- 5 seconds of the placement of the epoxy binder on the pavement.

Semi Automated (Lily Pump or Equal): Apply the calcined bauxite aggregate immediately after the placement of the epoxy binder on the pavement. Average: 5 min. or sooner.

The calcined bauxite aggregate shall completely cover the **E-Tuff® HFST** epoxy binder at a rate of 15+/- 2.0 lbs. per sq. yd.

For non-automated application, use **E-Tuff® HFST** (LPL) which has a longer working time.

### 1.08 ESTIMATED COVERAGE

Single and Multi-Layer Coverage:

Course #1: Epoxy rate: 40 sqft/gallon (1 liter/sqm) Aggregate rate: 1-1.5 lb/sqft (4.88-7.32 kg/sqm).

Course #2: Epoxy rate: 20 sqft/gallon (2 liter/sqm) Aggregate rate: 1-1.5lb/sqft (4.88-7.32 kg/sqm).

Epoxy Mortar Coverage:

Epoxy Mortar: 2 gallon (7.6 liter) epoxy mixed with 10 gallon (37.8 liters) of washed, dried and bagged sand yields approximately 1.2 cuft.

### 1.09 SURFACE PREPARATION:

The concrete and asphalt must be a minimum of 30 days old, sound and free of all contaminants, including oil, grease, dust, laitance and other bond breaking materials. Mechanically abrade the concrete surface by grinding, abrasive blasting or shot blasting to an ICRI Guideline No. 310.2R, CSP 3 - 5.

Concrete moisture levels are recommended less than 5%, per ASTM F2659 Standard Guide for Preliminary Evaluation of Comparative Moisture Condition of Concrete, Gypsum Cement and Other Floor Slabs and Screeds Using a Non-Destructive Electronic Moisture Meter, such as TARMEX CME4 or TARMEX CMEX II, or similar devices.

No standing water.

### 1.10 MIXING

Condition material for mixing to 65°F to 85°F (18°C to 29°C) for ease of mixing and optimum flow when using. Condition material for automated mixing per the manufacturer's recommendation or 75°F (23.9°C).

Automated and Mechanical Plural Mixing - Dispensing Equipment: Check to make sure that volume is dispensed at the correct ratio and that the material is thoroughly mixed, before putting the equipment

into service. Follow the manufacturer's recommendations.

**Hand Mixing:** Premix each side for thirty seconds, then place 1 part by volume Side-A and 1 part by volume Side-B into a clean pail and mix for three minutes at a low speed using a PSI Rapid Pail Mixer or a ½ hp heavy duty drill with a Jiffy type paddle utilizing the PSI 1 Man Stand. Mix only what can be used within its pot life.

## APPLICATION

Surface and ambient temperature must be a minimum of 50°F (10°C). Utilize one of the following methods for the application of **E-Tuff® HFST** and calcines bauxite aggregate wearing coarse.

### 2.01 AUTOMATED CONTINUOUS APPLICATION

Continuous application requires a vehicle capable of storing a minimum of 1000 gallons of resin polymer binder and 30,000 lbs. of calcined bauxite. The vehicle shall have the ability to heat, meter, monitor and continuously place resin polymer binder and calcined aggregate in a uniform layer.

Approximate application rate of automated application is 1500 - 2000 sq. yards per hour.

### 2.02 MECHANICAL MIXING and APPLICATION

**E-Tuff® HFST** can be applied by a truck mounted dispensing equipment onto the pavement section to be treated in varying widths at a uniform thickness. Operations shall proceed in such a manner that will not allow the material to separate in the mixing lines, cure, dry, or otherwise impair retention bonding of the high friction surfacing aggregate. The mixed sides shall be applied mechanically onto the prepared pavement surface at a minimum rate of 3-4 gallons per 100 sqft (1.21-1.63 liter/sqm) or 25-32 sqft/gallon for a one coat system. Immediately broadcast the high friction surface aggregate onto the epoxy binder at a minimum rate of 1-1 ½ lbs/sqft (0.45-0.68 kg/sqft).

### 2.03 HAND MIXING AND APPLICATION

The **E-Tuff® HFST** Side-A and Side-B, shall be premixed and proportioned to the correct ratio, 1:1. Mix material using a low speed, high torque drill fitted with a Jiffy type paddle mixer or a helical paddle. This method shall be used where truck mounted application equipment is not available because of logistics or restrictions. The mixed sides shall be hand applied onto the prepared pavement surface at a coverage rate of 2 ½ gallons per 100 sqft (1 liter/sqm) or 40 sqft/gallon. Hand applied binder shall be uniformly spread onto the substrate surface by means of a 3/16" (4.8 mm) notched squeegee. Immediately, spread the high friction surfacing aggregate onto the epoxy at a minimum rate of 10 lbs/sqyd. If required by specification, after the initial cure of the first course, remove the excess aggregate and apply coarse #2, spreading the neat **E-Tuff® HFST** at a coverage rate of 5 gallon per 100 sqft (2.0 liter/sqm.) or 20 sqft/gallon and broadcast aggregate to rejection. After allowing the system to cure – 2.5 hours for coarse #1 and 4 hours for coarse #2 at 70°F (22°C) and after all the excessive aggregate has been removed, open to traffic.

Manual applications are allowable for locations of less than 500 square yards.

PHYSICAL PROPERTIES AT 77°F ( 25°C) RESIN AND HARDENER	
Viscosity	1,300 cps
Gel Time (60 gr. Mass)	20 minutes
Tack Free Time	3-5 hours
Adhesion, ASTM D7234	300 psi (2 MPa)
Compression Strength, ASTM D695	6,000 psi (41.36 MPa)
Compressive Modulus, ASTM D695	125,800 psi (867 MPa)
Tensile Strength, ASTM D638	2,100 psi (14.47 MPa)
Tensile Elongation, ASTM D638	30%
Flexural Strength, D790	3,000 psi (21 MPa)
Shrinkage on Cure, ASTM D2566	0.2%
Water Absorption (24 Hr.), ASTM D570	0.2%
Slant Shear (2 Day), ASTM C882	2,000 psi (14 MPa)
Slant Shear (7 Day), ASTM C882	2,800 psi (19 MPa)
Thermal Compatibility, ASTM C884	Pass
Chloride Ion Permeability, AASHTO T277	0.0 Coulomb

PHYSICAL PROPERTIES AT 77°F ( 25°C) RESIN AND HARDENER AND AGGREGATE		
Compressive Strength, ASTM C579	3 Hours	2,000 psi (13.8 MPa)
	24 Hours	5,500 psi (37.9 MPa)
	7 Days	7,500 psi (51.7 MPa)
Tensile Strength, ASTM C307		2,900 psi (20 MPa)
Tensile Strength, ASTM C307		<1%

### 2.04 CURING

Cold Temperature Formula Available Upon Request.

It is highly recommended that all sides be conditioned in advance of use to 75°F (26.8°C). This may take 48 hours. It is to the contractor's benefit to maintain the sides at elevated temperatures. Lower temperatures increase the binder's viscosity and increase curing time.

MINIMUM CURING TIME FOR EPOXY BINDER AND AGGREGATE	
60°F (15.6°C)	6 Hours
65°F (18.3°C)	5 Hours
70°F (21.1°C)	4 Hours
75°F (23.9°C)	3 Hours
80°F (26.7°C)	2.5 Hours



## 2.05 CLEAN UP

Clean tools before the epoxy binder sets up using acetone or PSI's **EnviroClean™**.

## 2.06 STORAGE AND SELF LIFE

The material should be stored between 40°F to 95°F (5°C to 35°C), in a dry and out of direct sunlight. The shelf life of properly stored and unopen containers is 24 months. Excessive temperature differential and/or high humidity can shorten the self-life.

## 2.07 LIMITATIONS

- Minimum substrate temperature is 50°F (10°C)
- Maximum substrate temperature is 150°F (65.6°C) for automated applications. Mechanical and hand apply will be at a lower temperature.
- Do not thin with solvent. Solvent will prevent proper cure.
- Do not use wet aggregate. Aggregate must be clean, dry and bagged.
- Do not place on magnesium phosphate cement concrete.
- Do not place the high friction surface treatment if placed material cannot be adequately cured within 2.5 hours of traffic opening.

## 2.08 SAFETY

- Eyes: Hold eyelids apart and flush thoroughly with water for 15 minutes.
- Skin: Remove contaminated clothing. Wash skin thoroughly for 15 minutes with soap and water.
- Inhalation: Remove person to fresh air.
- Ingestion: Do not induce vomiting. In all cases, contact a physician immediately if symptoms persist.
- SDS: Obtain, read and understand the Safety Data Sheet before use of this or any other Poly-Tuff System International products.

## 2.09 CAUTION

- Side A - Irritant
- Side B - Corrosive
- Product is a strong sensitizer
- Use with adequate ventilation
- Wear protective clothing, gloves and appropriate eye protection (safety glasses, goggles or face shield).
- Do not take internally

**READ SDS PRIOR TO USING PRODUCT. FOR PROFESSIONAL USE ONLY. KEEP OUT OF REACH OF CHILDREN. MADE IN THE USA.**

Please read all information in the General & Safety Guidelines, Technical Data Sheets, Guide Specifications and Safety Data Sheets (SDS) before applying material. PSI Products are for "Professional Use Only" and preferably applied by professionals who have prior experience with the PSI Products or have undergone training in application of PSI Products. Published technical data and instructions are subject to change without notice. Contact your local PSI representative or visit our website for current technical data, instructions, and project specific recommendations.

### LIMITED WARRANTY

PSI warrants its products to be free of manufacturing defects and that they will meet PSI current published physical and chemical properties. Seller's sole responsibility shall be to replace that portion of the product which proves to be defective. There are no other warranties by PSI of any nature whatsoever expressed or implied, including any warranty of merchantability or fitness for a particular purpose in connection with this product. PSI shall not be liable for damages of any sort, including remote or consequential damages resulting from any claimed breach of any warranty whether expressed or implied. PSI shall not be responsible for use of this product in a manner to infringe on any patent held by others. In addition, no warranty or guarantee is being issued with respect to appearance, color, fading, chalking, staining, shrinkage, peeling, normal wear and tear or improper application by the applicator. Damage caused by abuse, neglect and lack of proper maintenance, acts of nature and/or physical movement of the substrate or structural defects are also excluded from the limited warranty. PSI reserves the right to conduct performance tests on any material claimed to be defective prior to any repairs by owner, general contractor, or applicator.

### DISCLAIMER

All guidelines, recommendations, statements, and technical data contained herein are based on information and tests we believe to be reliable and correct, but accuracy and completeness of said tests are not guaranteed and are not to be construed as a warranty, either expressed or implied. It is the user's responsibility to satisfy himself, by his own information and test, to determine suitability of the product for his own intended use, application and job situation and user assumes all risk and liability resulting from his use of the product. We do not suggest or guarantee that any hazard listed herein are the only ones which may exist. Neither seller nor manufacturer shall be liable to the buyer or any third person for any injury, loss or damage directly or indirectly resulting from use of, or inability to use, the product. Recommendations or statements, whether in writing or oral, other than those contained herein shall not be binding upon the manufacturer, unless in writing and signed by a corporate officer of the manufacturer. Technical and application information is provided for the purpose of establishing a general profile of the material and proper application procedures. Test performance results were obtained in a controlled environment and PSI makes no claim that these tests or any other tests, accurately represent all environments.

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