



FIVE STAR PRODUCTS, INC.

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DESIGN-A-SPEC™ GUIDELINES FIVE STAR® RAPID SURFACE REPAIR PF-60

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This document is provided for informational purposes only and as a general guideline for consideration by contractors and engineers. While every reasonable effort has been made to ensure that this information is accurate and authoritative, Five Star Products does not warrant the accuracy or completeness of this information, or for its appropriateness for any particular purpose. The user of this document remains solely responsible for the specification of all methods, materials and practices.

PART A - GENERAL CONDITIONS – POLYMER REPAIR SYSTEM

1.01 SCOPE

The work covered by this document consists of furnishing all equipment, materials, labor and performing operations required for concrete pavement and bridge joint header repairs as directed by the engineer or DOT.

1.02 QUALITY ASSURANCE

- A. The manufacturer shall have been in the business of manufacturing polymer products for over fifteen (15) years, maintain a strict quality assurance program, offer technical services and provide a representative at the jobsite for product training, prior to product installation, upon written request.
- B. The contractor shall submit to the engineer, or DOT, at least three job references where the contractor has successfully completed similar applications.
- C. Where applicable, product shall be listed on an appropriate DOT qualified products list or have a fifteen (15) year history of use on any DOT projects.

1.03 DELIVERY, STORAGE AND HANDLING

- A. All materials shall be delivered to the jobsite in their original, unopened packages, clearly labeled with the manufacturer's identification, printed instructions and batch code.
- B. Store and condition the specified product as per the manufacturer's recommendations.
- C. For handling instructions, refer to the Safety Data Sheet.

1.04 PROJECT/SITE CONDITIONS

Refer to PART C - PREPARATION, ENVIRONMENTAL CONDITIONS, or contact the manufacturer directly for any physical or environmental limitations required by the product.

PART B - MATERIAL SPECIFICATIONS - POLYMER REPAIR SYSTEM

2.01 MATERIALS

- A. The urethane hybrid polymer (UHP) repair system material shall be a blended, pre-packaged, ultra low viscosity polymer system consisting of a semi-flexible polyurethane hybrid binder and dried crushed aggregate. Cure time at 70°F for traffic is 10-20 minutes. An additional catalyst will be available for colder weather placements. The manufacturer shall have at least fifteen years experience in the manufacture of concrete repair materials. The manufacturer shall offer technical services and provide a representative for product training prior to and during product installation.

B. The urethane hybrid polymer (UHP) repair system material shall meet all the following typical performance criteria when cured at 73°F (23°C):

- | | |
|---------------------------------------|--------------------------------|
| 1. Mix Ratio | 1 : 1 |
| 2. Viscosity: | Part A: 80 cps Part B: 100 cps |
| 3. Specific Gravity, ASTM D 792 | Part A: 1.07 Part B: 0.95 |
| 4. Hardness, A Durometer, ASTM D 2240 | 60 |
| 5. Elongation at Break D 412 | 160% |
| 6. Traffic Ready | 10 – 20 minutes |
| 7. Tensile Strength, ASTM D 412 | 2,000 psi |

C. An acceptable product which meets these criteria is:

Five Star® Rapid Surface Repair PF-60

As manufactured by Five Star Products, Inc., Shelton, CT 06484 (203) 336-7900.

2.02 AGGREGATE GRADATION

A. The aggregate for the bulk of the repair shall be 100 percent fractured, thoroughly washed and kiln dried. A 3/8 inch crushed, dry, uniformly graded aggregate is typically preplaced as the bulk-fill material and the polymer liquids are dispensed through the aggregate. A topping aggregate may be used and broadcast as a runny surface to the repair where necessary.

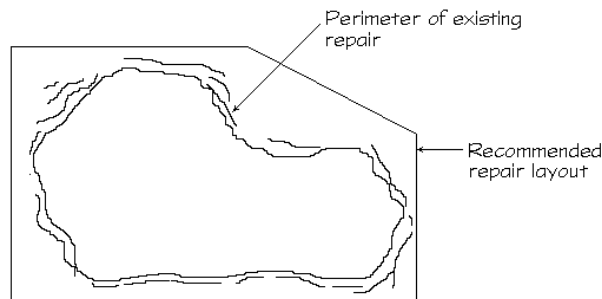
B. An example of a topping aggregate is derived from crushed gravel with a 2.7 specific gravity commonly referred to as Bridge Topping 6 x 10. A typical sieve for a topping aggregate is:

Aggregate Grading/US Sieve #	% Retained
6	0-30
10	65-90
20	10-30
20 minus	0-3

PART C – PREPARATION - POLYMER REPAIR SYSTEM

3.01 CONCRETE SURFACES

- A. Completely remove all loose, delaminated and weak concrete, oil, grease, laitance and other contaminants. Prepare concrete using acceptable mechanical means to obtain an ICRI Concrete Surface Profile (CSP) of 5 or greater. Coarse aggregate shall be exposed. All horizontal and vertical concrete surfaces shall be completely dry prior to placement. Use a propane torch to dry surfaces, if necessary as minor amounts of moisture can cause an adverse reaction. A moisture meter should be used when moisture levels or conditions are unknown.
- B. The edges of the repair shall be vertical and have a rough profile. Avoid abrupt changes in depth. All saw cut surfaces shall be blasted to a roughened profile to ensure bond.
- C. The perimeter of the repair shall be kept to a simple shape. Avoid reentrant corners. See below:



- D. All cracks shall be brought to the attention of the engineer and filled with Five Star[®] Rapid Surface Repair PF-60 or other suitable material. Cracks shall be completely dry and blasted clean to remove all contaminants, prior to remedy.
- E. All existing joints shall be maintained. New joints, if any, shall be installed as detailed on the drawings.
- F. For bridge header repairs, place joint spacer board (such as Styrofoam) wrapped in plastic to create space for later installation of joint sealant.

3.02 ENVIRONMENTAL CONDITIONS

- A. Condition and maintain product to between 50°F and 80°F (10°C and 27°C). Shade from direct sunlight as necessary. Surfaces shall be 20 to 90°F (-7 to 32°C). Catalyst may be required for colder surfaces. Contact Five Star Products for catalyst use and recommendation.

3.03 EQUIPMENT AND MATERIALS

- A. Equipment recommended for application of Five Star[®] Rapid Surface Repair PF-60 liquids must be capable of siphoning low viscosity liquids from containers, typically 55 gallon drums. Both “A” and “B” liquids must be pumped in equal

volumes at 1:1 ratio. Liquids will remain separate through a static mixing nozzle connected at the end of the dispensing gun. Equipment from companies such as Graco and Lily may be suitable. Contact Five Star Products for specific equipment recommendations.

3.04 MIXING

- A. Mix ratio of Component A to Component B is always 1:1.
- B. Large repairs should be accomplished via automated mixing and dispensing equipment only.
- C. Small repairs may be accomplished by hand mixing using drill and paddle. Add equal measured parts by volume of Components A and B into a clean and dry measuring container. Mix for 30 – 45 seconds and place immediately.
- D. For sanded mortar mixes, add dried graded #16 sand after thoroughly mixing Components A and B. Mix approximately 30 to 40 pounds of dried #16 sand per gallon of liquids. Mix only until sand is completely wetted with liquids.

3.05 AUTOMATED MIXING/DISPENSING

- A. The equipment used for mixing/dispensing utilizes a low-pressure plural component pump to draw Components A and B from their containers. “A” and “B” liquids remain separate through pump until they combine in a plastic mixing nozzle attached to the end of the dispensing gun. The mixed liquid is dispensed into the repair area, solidifying in one (1) to two (2) minutes, depending on width and depth of crack, and is ready for traffic in ten minutes, @ 70°F (21°C). Typical brands or manufacturers of automated mixing/dispensing include FastCat, Graco and Lily. Contact Five Star Products for further details on automated mixing/dispensing equipment.

3.06 HAND MIXING

- A. Measure out each parts by volume of Components A and B. Pour into separate container and mix for 30 – 45 seconds with drill and paddle. Pour immediately after mixing.

PART D – APPLICATION - POLYMER REPAIR SYSTEM

4.01 EXPANSION JOINT HEADER MATERIAL PLACEMENT

- A. Pre-place crushed, clean and dry aggregate into joint header or repair area. Aggregate to be placed approximately 1/4 inch to 1/8 inch below grade of surrounding pavement. Once aggregate is placed, dispense Five Star® Rapid Surface Repair PF-60 into rock to thoroughly saturate aggregate. Once aggregate is saturated immediately broadcast topping sand into wet liquids. Once the polymer

has set and cured (approximately 10-15 minutes), remove excess topping sand. Then cut plastic on top of joint spacer board, pull spacer board from joint, pull plastic from joint header, sandblast joint header sidewalls in preparation for joint sealant or compression seal.

- B. For deep repairs, pre-place aggregate and dispense liquids in 2 to 3 inch lifts to reduce exotherm.

4.02 SPALL REPAIRS

- A. Pre-place crushed, clean, dried aggregate into repair area.
- B. Dispense liquids into aggregate ensuring full penetration and saturation.
- C. For deep repairs, pre-place aggregate and dispense liquids in 2 to 3 inch lifts to reduce exotherm.

PART E - FINISHING - POLYMER REPAIR SYSTEM

5.01 CLEAN UP

- A. Clean tools immediately after use with xylene or MEK.

