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DESIGN-A-SPEC™ GUIDELINES

FIVE STAR MP EPOXY PATCH

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PART A - GENERAL CONDITIONS - CONCRETE REPAIR

1.01 SCOPE

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

1.02 QUALITY ASSURANCE

A. The manufacturer shall have been in the business of manufacturing similar products for over ten 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 owner, at least three job references where the contractor has successfully completed similar applications.

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 appropriate product data sheet.
C. For handling instructions, refer to the Material 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.

1.05 MEASUREMENT AND PAYMENT

A. Measurement for concrete repairs shall be on a cubic foot/square foot (liter/square meter) basis of material in place.
B. Payment for concrete repairs shall be at the unit price bid on a cubic foot/square foot (liter/square meter) basis. This payment shall constitute full compensation for all labor, materials, tools, equipment and other items as necessary to complete the work as described in the contract documents. Progress payments will be made on the percentage of the work satisfactorily completed during each payment period in accordance with the provisions of the contract documents.

PART B - MATERIAL SPECIFICATION - CONCRETE REPAIR

2.01 MATERIALS

A. The concrete repair material shall be a blended, pre-packaged epoxy based mortar consisting of thermosetting resin and inert fillers. The manufacturer shall be ISO 9001 certified and have at least ten years experience in the manufacture of concrete repair materials. The manufacturer shall offer technical services and provide a representative at the jobsite for product training prior to product installation upon five days advance notice.

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

1. Compressive Strength, ASTM C 109

1 Day	6,000 psi (41.3 MPa)
7 Days	6,500 psi (44.9 MPa)

2. Bond Strength, ASTM C 882

7 Days	1,800 psi (12.4 MPa)

3. Tensile Strength, ASTM C 307 — 1,300 psi (8.9 MPa)

4. Shrinkage, ASTM C 883 — Pass

5. Thermal Compatibility, ASTM C 884 — Pass

The data shown above reflect typical results based on laboratory testing under controlled conditions. Reasonable variations from the data shown above may result in the field. Test methods are modified where applicable.

C. An acceptable product which meets these criteria is:

Five Star MP Epoxy Patch

As manufactured by Five Star Products, Inc., Fairfield, CT 06824 (203) 336-7900.

D. Subject to meeting the performance criteria stated above, other products may be formally submitted to the engineer for approval up to three days prior to the bid date. All requests for approval shall contain certified test data verifying conformance with this specification. Three references of successfully completed projects of similar nature and scope of the work detailed in this specification shall be provided, as well as a minimum ten year history of use in the industry. The testing laboratory shall certify to any modifications made to the tests performed and provide details of modifications.

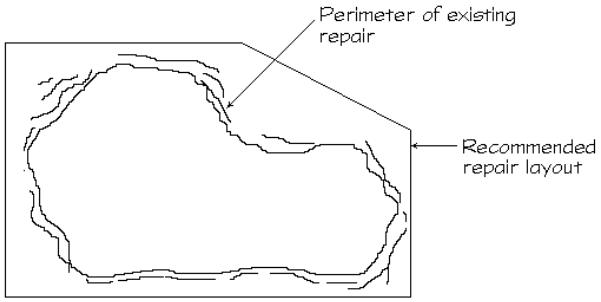
PART C – PREPARATION - CONCRETE REPAIR

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 and concrete cleaners and degreasers as necessary to obtain clean, sound and rough surfaces. Coarse aggregate shall be exposed. All concrete surfaces shall be completely dry prior to placement.

B. The edges of the repair shall be vertical and have a rough profile. Avoid abrupt changes in depth.
[The minimum repair depth specified should be determined by the product selected, the maximum size of aggregate, and the nature of the repair.]

C. The perimeter of the repair shall be kept to a simple shape. Avoid reentrant corners.

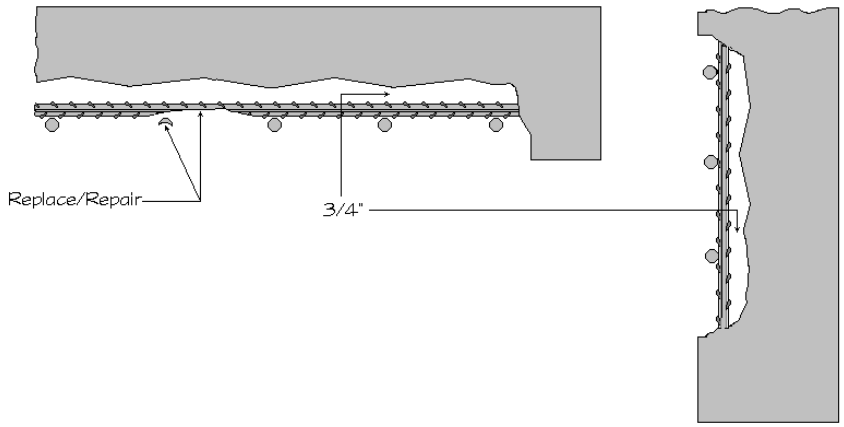


E. All cracks shall be brought to the attention of the engineer and a determination made of whether the cracks are subject to movement. The cracks shall be repaired as directed prior to application of the repair material.

F. All existing joints shall be maintained. New joints, if any, shall be installed as detailed on the drawings.
[For more detailed information, refer to the following source: "Surface Preparation Guidelines For The Repair of Deteriorated Concrete Resulting From Reinforcing Steel Oxidation", Report of International Concrete Repair Institute, March 1995.]

3.02 REINFORCEMENT

A. All reinforcing steel that has lost bond with the concrete or has more than one-half of its circumference exposed shall be undercut by at least 3/4 inch (18 mm) or two times the maximum aggregate size.



B. All reinforcement shall be rigidly secured and supported.
C. If more than 20% of the diameter of a reinforcing bar has been deteriorated, the bar will require replacement or will need to be spliced as directed by the engineer.
D. All exposed reinforcing steel shall be free of all loose scale and rust, and other contaminants.
E. The minimum cover over reinforcement shall be in accordance with job specifications or 3/4 inch (18 mm), whichever is greater.

3.03 FORMWORK (Where Required)

A. Formwork shall be constructed of rigid nonabsorbent materials, securely anchored, watertight and strong enough to resist forces developed during placement.
B. Formwork shall be coated with a form release agent.
Caution: Care should be taken not to contaminate concrete surfaces where bond is required.
C. Provide air relief holes as necessary.

3.04 ENVIRONMENTAL CONDITIONS

A. Condition and maintain all materials and surfaces that contact repair material to between 50°F and 90°F (10°C and 32°C). Shade from direct sunlight as necessary. *[When faster strength gain is required at low temperatures, or longer working time is required at high temperatures, revise the temperature range above as appropriate and refer to detailed conditioning procedures for Cold Weather or Hot Weather Repairs, PART F – EXTREME WEATHER CONDITIONS.]*

3.05 EQUIPMENT AND MATERIALS

A. All necessary tools, equipment and materials shall be in good condition and as close as possible to area being repaired.
B. Appropriate clothing and safety equipment shall be worn to avoid breathing dust and prevent eye and skin contact with both dry and mixed repair materials.

3.06 MIXING

[Select one of the following types of mixers, as appropriate.]

Mortar Mixer (Stationary Barrel with Moving Paddles)

A. Provide an adequate number of mortar mixers in good operating condition for uninterrupted placement. Do not exceed one-half the maximum capacity of the mortar mixer.
B. Pre-mix Component A (resin) and Component B (hardener).
C. Pour all of Component B into pail containing Component A and mix thoroughly with slow speed drill and paddle for 3 – 4 minutes. Avoid air entrapment. Pour mixed liquids into mortar mixer and slowly add Component C (aggregate) with mixer running. Mix until aggregate is completely wetted.
D. Do not mix more material than can be placed within the working time of the repair material.

Drill and Paddle Mixer (Single Unit Mixes)

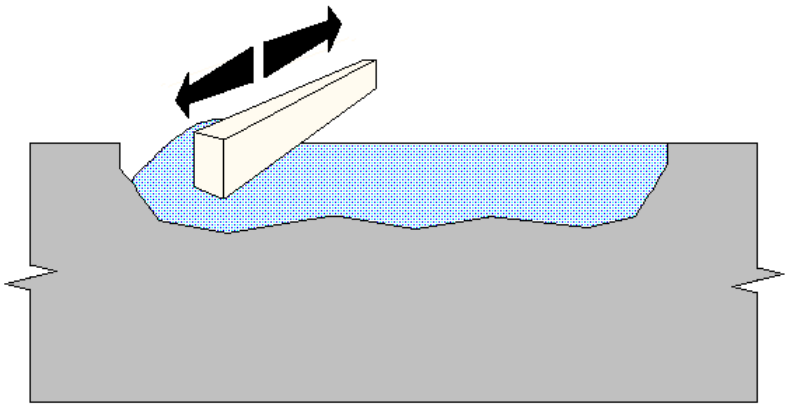
A. Pre-mix Component A (resin) and Component B (hardener).
B. Pour pre-mixed liquids into larger mixing container and mix with slow speed drill and paddle for 3 - 4 minutes. Avoid air entrapment. While mixing, slowly add Component C (aggregate) and mix until aggregate is completely wetted.
C. Do not mix more material than can be placed within the working time of the repair material.

PART D – APPLICATION - CONCRETE REPAIR

4.01 PLACEMENT PROCEDURES

TROWEL - HORIZONTAL

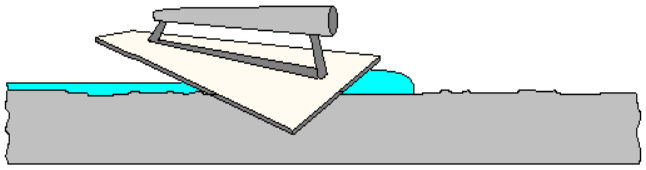
A. Substrate shall be completely dry prior to application.
B. Pour material into repair area.
C. Once desired level is achieved, screed repair material and finish to desired texture using steel trowel.

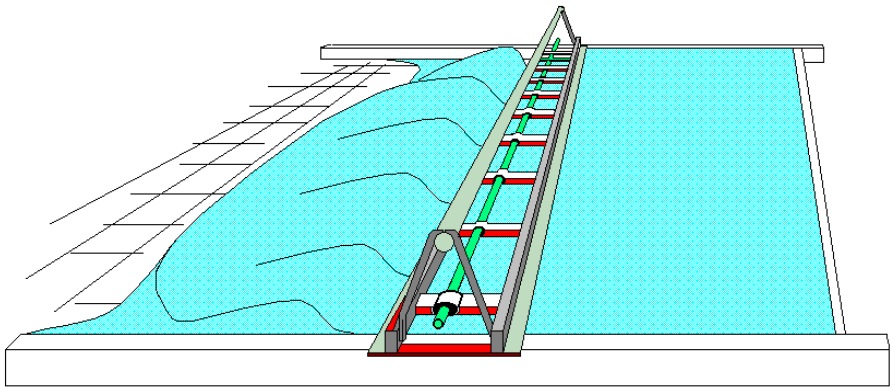


PART D – APPLICATION - CONCRETE REPAIR

4.01 PLACEMENT PROCEDURES
OVERLAYS

A. Substrate shall be completely dry prior to application.
B. Pour material into repair area. Uniformly place overlay material in front of screed to a slightly overfilled elevation. Level and consolidate by screeding.
C. Placement shall be continuous to prevent cold joints. Finish with steel trowel.





PART E - FINISHING AND CURING - CONCRETE REPAIR

5.01 FINISHING

A. Finish repair material to desired texture when it offers stiff resistance. A steel trowel may be used for finishing.

5.02 CURING

A. Repair material shall be cured as recommended by the manufacturer. Do not wet cure repair material.

B. Repair material shall be protected from excessive evaporation prior to set, freezing, rain, hydrostatic pressure, vibration and traffic as recommended by the manufacturer.

PART F – EXTREME WEATHER CONDITIONS – CONCRETE REPAIR

6.01 COLD WEATHER REPAIRS

[Low temperatures decrease flow, delay set and strength development of epoxy products. The procedures below may compensate for these conditions.]

A. All epoxy grout components (resin, hardener and aggregate) shall be pre-conditioned so that placed grout is between 70°F and 90°F (21°C and 32°C). Due to the mass of palletized material (aggregate component), up to 72 hours of pre-conditioning may be required. Store epoxy grout components in an enclosed, warm or heated area where necessary.

B. Indirect heating of surfaces (steel, concrete) will also help compensate for cold temperatures. During mixing, the barrel of the mortar mixer may be heated using an appropriate heater to keep the grout mix temperature within an acceptable range.

C. When necessary, heating shall be accomplished by indirect exposure. Heated enclosures must be windproof and weatherproof. Heaters shall not be permitted to unevenly heat concrete. *Caution: Exhaust gases of unvented heaters may contaminate or cause carbonation of concrete within the enclosed environment.*

D. Grout temperature shall be maintained above 50°F (16°C) until grout reaches required strength.
[Specify minimum required strength.]

E. Gradually allow grout temperature to cool to ambient to avoid thermal shock.

PART F – EXTREME WEATHER CONDITIONS - EPOXY GROUTING

6.01 HOT WEATHER REPAIRS

[High temperatures accelerate set, decrease working time, and accelerate strength gain of epoxy products. The procedures below may compensate for these conditions.]

A. All epoxy grout components (resin, hardener and aggregate) should be pre-conditioned so that the mixed material is between 60°F and 90°F (16°C and 32°C). Due to the mass of palletized material (aggregate) up to 72 hours of pre-conditioning may be required. Store all epoxy grout components in a cool, shaded area out of direct sunlight.
B. All surfaces, equipment and tools in contact with epoxy grout should be shaded and kept at temperatures between 60°F and 90°F (16°C and 32°C). **Do not** use water to cool surfaces or equipment in contact with epoxy grout.
C. Shade application area from direct sunlight and where feasible, place epoxy grout when temperatures are decreasing, at night or during early morning.
D. Place epoxy grout immediately after mixing, do not allow epoxy grout to sit for extended periods of time in buckets or wheelbarrows.
E. Maintain shading of application area for 24 hours after placement.