



FIVE STAR PRODUCTS, INC.

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DESIGN-A-SPEC™ GUIDELINES FIVE STAR® BONDING ADHESIVE

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PART A - GENERAL CONDITIONS - EPOXY ADHESIVE - BONDING

1.01 SCOPE

The work covered by this document consists of furnishing all equipment, materials, labor and performing all operations required for the installation of anchors in concrete, repair of cracks in concrete or bonding of concrete 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 anchoring, crack repair or bonding shall be on a per anchor basis, linear foot or square foot applied.
- B. Payment for bonding work shall be at the unit price bid per anchor, linear foot or square foot cubic foot applied. 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 - EPOXY ADHESIVE – BONDING**2.01 MATERIALS**

A. The epoxy adhesive shall be a two component, 100% solids, moisture insensitive structural epoxy suitable for bonding of new concrete to existing concrete or steel. The manufacturer shall be ISO 9001 certified and have at least 10 years experience in the manufacture of epoxy systems. 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 epoxy adhesive shall meet all the following typical performance criteria when cured at 70°F (21.1°C):

1.	Viscosity, ASTM D 2393	6,000 cps
2.	Gel Time, ASTM C 881	25 Minutes
3.	Tensile Strength, ASTM D 638	7,000 psi (48.3 MPa)
4.	Water Absorption, ASTM D 570	0.10%
5.	Bond Strength, ASTM C 882, Grade 2	
	2 Days	4,300 psi (29.6 MPa)
	14 Days	5,200 psi (35.8 MPa)
6.	Compressive Strength, ASTM D 695	10,000 psi (68.9 MPa)
7.	Compressive Modulus, ASTM D 695	2.3 x 10 ⁵ psi (1,580 MPa)
8.	Meets ASTM C 881, Types I, II, IV and V Grade 2, Classes B & C	

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® Bonding Adhesive

As manufactured by Five Star Products, Inc., Shelton, CT 06484 (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 - EPOXY ADHESIVE – BONDING**3.01 CONCRETE SURFACES**

- A. Completely remove all loose, delaminated and weak concrete, oil, grease, laitance and other contaminants. For concrete repair applications, follow surface preparation guidelines for repair mortar. Concrete may be prepared using acceptable mechanical means and concrete cleaners and degreasers as necessary to obtain clean, sound and rough surfaces.
- B. Concrete surfaces shall be dry prior to application of bonding adhesive for best results.
- C. All cracks shall be brought to the attention of the engineer. The cracks shall be repaired as directed prior to application of bonding adhesive.

3.02 REINFORCEMENT

- A. All reinforcing steel that has lost bond with the concrete or has more than ½ of its circumference exposed shall be undercut by at least ¾ inch (18 mm) or two times the maximum aggregate size in the repair materials.
- B. All loose reinforcing steel shall be secured and supported as directed.
- 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, rust and other contaminants. Sandblast steel to a SSPC-SP6 finish.

3.03 ENVIRONMENTAL CONDITIONS

- A. Condition and maintain all materials and surfaces that contact bonding adhesive to between 65°F and 85°F (18°C and 29°C).

3.04 EQUIPMENT AND MATERIALS

- A. All necessary tools, equipment and materials shall be as close as possible to the work area.
- B. Appropriate clothing and safety equipment shall be worn to avoid breathing vapors and prevent eye and skin contact with components and mixed material.
- C. An appropriate solvent shall be available for clean up. Refer to data sheet of product specified for appropriate solvent.

3.05 MIXING**Drill and Paddle**

- A. Premix each component thoroughly.
- B. Place premeasured components at proper proportions (1:1 ratio) into clean dry pail. Mix thoroughly for approximately 3 minutes of slow speed (400 – 600 rpm); avoid air entrapment.
- C. Do not mix more material than can be placed within the working time of the specified product.
- D. Do not add solvents.

PART D – APPLICATION - EPOXY ADHESIVES - BONDING

4.01 BONDING

- A. Apply bonding adhesive via spray, brush or roller at an approximate rate of 80 square feet per gallon.
- B. Place fresh concrete while bonding adhesive is still tacky. This may range from 1 to 4 hours, depending upon site conditions. If coating becomes glossy or loses tackiness remove any surface contaminants and recoat with bonding adhesive.

PART F – EXTREME WEATHER CONDITIONS - EPOXY ADHESIVE - BONDING

6.01 COLD WEATHER

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

- A. Materials shall be conditioned so that the mixed epoxy is between 65°F and 85°F (18°C and 29°C). Conditioning for 24 - 48 hours may be required, depending upon quantity of material.
- B. All surfaces in contact with epoxy adhesives shall be preconditioned and maintained at a temperature above 40°F (4°C).

PART F – EXTREME WEATHER CONDITIONS - EPOXY ADHESIVE - BONDING

6.01 HOT WEATHER

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

- A. Materials shall be conditioned as necessary so that the mixed epoxy adhesive is between 60°F and 80°F (15°C and 27°C). Conditioning for 24 - 48 hours may be required.
- B. All surfaces in contact with epoxy adhesives shall be conditioned to below 90°F (32°C).