



FIVE STAR PRODUCTS, INC.

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DESIGN-A-SPEC™ GUIDELINES FIVE STAR® HP ANCHOR GEL

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PART A - GENERAL CONDITIONS - EPOXY ADHESIVE

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 shall be on a per anchor basis, linear foot or square foot applied.
- B. Payment for anchoring 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

2.01 MATERIALS

A. The epoxy adhesive shall be a rapid setting, two component, 100% solids, moisture insensitive structural epoxy acrylate for anchoring bolts, dowels and pins. 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 acrylate adhesive shall meet all the following typical performance criteria when cured at 73°F (23°C):

1.	Viscosity	Gel
2.	Gel Time, ASTM C 881	10-15 Minutes
3.	Bond Strength, ASTM C 882	
	2 Days	2,800 psi (19.3 MPa)
	14 Days	3,200 psi (22 MPa)
4.	Compressive Strength, ASTM D 695	10,000 psi (68.9 MPa)
5.	Compressive Modulus, ASTM D 695	2.65 x 10 ⁵ psi (1.83 GPa)
6.	Absorption, ASTM D 570	0.08%
7.	Elongation at Break ASTM D 648	1.3%
8.	Heat Deflection Temperature, ASTM D 648	144°F (63°C)
9.	Meets ASTM C 881, Types I, II*, IV and V* Grade 3, Classes A, B & C	

** Except gel time*

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® HP Anchor Gel

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

3.01 ANCHOR HOLES

- A. All anchor holes shall be free of dust, debris, drilling slurries and other contaminants. Prepare concrete using acceptable mechanical means and concrete cleaners as necessary to obtain clean sound surfaces. Sides of anchor holes may have a rough finish to optimize bond development. Remove all loose material with a stiff nylon brush. Blow out hole with oil-free compressed air.
- B. Holes may be wet, damp or dry. For best results holes may be blown free of standing water.

3.02 ANCHOR SURFACES

- A. All bolts, reinforcing steel, dowels and pins shall be free of oil, grease, rust and other contaminants. Use acceptable mechanical and chemical means as necessary to clean anchor surfaces.
- B. Where no bond to anchor is required to allow free length stretching during torquing, apply a bond breaker such as duct tape or other suitable material.
- C. When centered in holes prior to anchoring, all anchors shall be adequately secured to resist movement from forces developed during grouting.

3.03 HOLE DIAMETER

[Clearances are dependent on specified product, environmental conditions and embedment length. Hole dimensions, type of anchors, embedment length, spacing, and edge distances must be specified and approved by the engineer. The engineer should incorporate an appropriate safety factor. Select one or more of the following.]

Epoxy Anchoring

Length of Embedment

- A. Embedment length for anchors shall be as shown on drawings or as specified by the Engineer.

Hole Diameter

- A. Whole diameter shall be a maximum of the anchor diameter plus 1/4 inch (6 mm).
- B. Do not exceed a glue line of 1/8 inch.

3.04 ENVIRONMENTAL CONDITIONS

Epoxy Anchoring

- A. Condition and maintain anchoring material to between 40°F and 80°F (5°C and 27°C). Shade from direct sunlight as necessary.

3.05 EQUIPMENT AND MATERIALS

Epoxy Anchoring

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

3.06 MIXING

Epoxy Anchoring (Dual Cartridge System)

- A. Remove cap and plugs.
- B. Slide retaining nut over static mixer. Secure static mixer to cartridge by screwing retaining nut onto cartridge.
- C. Place cartridge into manual or pneumatic dispensing gun (10:1 ratio gun). For placement temperatures of 20°F or lower a pneumatic gun must be used.
- D. Dispense and discard material until a uniform color is discharged.

PART D – APPLICATION - EPOXY ADHESIVES - ANCHORING

5.01 PLACEMENT PROCEDURES

Epoxy Anchoring (Two-Component System)

- A. Insert static mixer nozzle, or extension tube, to rear of hole. Evenly dispense material into hole while slowly withdrawing mixer nozzle, or extension tube, as hole fills to prevent air pockets.
- B. Fill hole to desired level while pulling static mixing tube out. Coat anchor with adhesive.
- C. Insert anchor and rotate clockwise slowly in hole.
- D. Anchor shall be properly seated in bottom of hole. Align or center anchor as specified.

PART E – FINISHING AND CURING - EPOXY ADHESIVES - ANCHORING

6.01 FINISHING

- A. All excess material shall be removed from around hole and anchor before it hardens.

6.02 CURING

- A. Protect from temperature extremes, rain and water after placement. Do not wet cure epoxy acrylate adhesive.
- B. In-service operation may begin immediately after minimum strength and modulus have been achieved.

PART F – EXTREME WEATHER CONDITIONS - EPOXY ADHESIVES

7.01 COLD WEATHER

[Low temperatures decrease flow, delay set and strength development of epoxy products]

- A. Epoxy acrylate adhesive will gun sufficiently at temperatures down to -15°F when using proper gun. Pre-conditioning epoxy acrylate adhesive to a minimum temperature of 40°F prior to use will make application and gunning easier in cold weather.

PART F – EXTREME WEATHER CONDITIONS - EPOXY ADHESIVES

7.01 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 acrylate adhesive is between 40°F and 80°F (5°C and 27°C).
- B. All surfaces in contact with epoxy acrylate adhesive shall be conditioned to below 90°F (32°C).

