

SECTION 03600**GROUT****PART 1 GENERAL**

1.01 WORK INCLUDED

- A. The work included in this Section consists of grouting the various items listed hereinafter and indicated on the Drawings.

1.02 RELATED WORK

- A. Section 03300 Cast-In-Place Concrete

1.03 SUBMITTALS

- A. Manufacturer's literature shall be submitted for review on the following items.
 - 1. Nonshrink grout data shall include grout properties, mixing, surface preparation and installation instructions.

1.04 DELIVERY AND STORAGE

- A. Grouting materials shall be delivered and stored in unbroken containers with seals and labels intact as packaged by the manufacturer.

1.05 QUALITY ASSURANCE

- A. If the project includes patching, throughbolt holes, epoxy anchors, and/or blockouts, the manufacturer shall, if necessary, train the CONTRACTOR's employees in the mixing and curing of the epoxy grouts for each of these applications.
- B. Furnish one year warranty. Manufacturer's warranty shall not contain a disclaimer limiting responsibility to the purchase price of products or materials.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Class I Non-Shrink Grout (5000 psi) shall be Masterflow 713 Plus by BASF, Five Star Grout by Five Star Products, Sikagrout 212 by Sika Corporation, Premier by L&M Construction Chemicals; High-Flow Grout by Euclid Chemical Company, CG 200 PC by Hilti, or approved equal.
- B. Class II Non-Shrink Grout (7500 psi) shall be Masterflow 928 by BASF, Five Star Fluid Grout 100 by Five Star Products, Crystex by L&M Construction Chemicals, or approved equal.
- C. Nonshrink Metallic Grout: Master Builders Embeco 636 Grout pre-mixed type,

or equal.

- D. Epoxy Grout: DP Five Star epoxy grout by U.S. Grout Corp., or equal.

2.02 BASE FOR VIBRATING PUMPS AND MACHINERY

- A. The Department requires an expansive, non-shrink epoxy grout to service as a base for pump bases and other machinery. The slab shall be constructed with an epoxy grout that can absorb vibration and provide support for precision machinery. Pump bases shall be constructed to the dimensions and thickness required by the pump or machinery manufacturer for the application.
- B. Pump bases over 100 horsepower shall be constructed with DP Five Star Epoxy Grout. Approved equals to the Five Star Epoxy Grout product shall be considered only a detailed analysis for vibration and harmonic interference are provided for the application.

2.03 EPOXY ANCHOR GROUT

- A. Epoxy anchor grout shall conform to ASTM C 881 - Epoxy-Resin-Base Bonding Systems for Concrete, Type IV, Class A, B and C, Grade 3 with the exception of gel time.
- B. Heat deflection temperature per ASTM D 648 -- Test Method for Deflection Temperature of Plastics Under Flexural Load shall be a minimum 120 degrees.
- C. Manufacturer shall certify that the epoxy anchor grout will maintain 90 percent of its strength up to a temperature of 125 degrees F.
- D. Grout shall come in a 2 chambered cartridge with a metering system that provides the proper ratio of hardener and resin. The grout shall also come with a static mixer nozzle to thoroughly mix the hardener and resin together.
- E. Epoxy anchor grout shall be capable of being used in submersed applications once cured.
- F. Compressive strength per ASTM D 695 - Test Method for Compressive Properties of Rigid Plastics shall be 10,000 psi minimum.
- G. If the average working or operating temperature will be over 100 degrees F or in a high fire risk area, use cement based non-shrink grout and oversized holes.
- H. Overhead anchors and anchors in fire-resistive construction shall be cast-in anchors.
- I. Embedment of adhesive anchors/rebar shall be deep enough to develop the anchor/rebar. Embedment shall not exceed 67 percent of the member depth.
- J. Epoxy anchor grout shall be SET-XP by Simpson Strong-Tie Co., Inc.; Powers PE1000+ by Powers Fasteners, Inc.; RE 500 SD by Hilti, Inc.; or approved equal.

PART 3 EXECUTION**3.01 PREPARATION**

- A. All bonding surfaces shall be clean and dust and oil free. Grout shall be mixed and applied in accordance with manufacturer's recommendations.
- B. Grout Mix proportions (for grout to fill cores in reinforced masonry walls):
 - 1. One part Portland cement, Type I or II.
 - 2. 2-1/4 parts damp, loose sand.
 - 3. Parts shot gravel (3/8" maximum).
 - 4. Mix to conform to ASTM C476-83 with a minimum compressive strength of 2500 psi at 28 days, have an 8" minimum and 10" maximum slump.
- C. Grout shall not be placed until base concrete or masonry has attained its design strength, unless authorized otherwise by the ENGINEER. Surfaces that will be in contact with grout shall be free of dirt, loose rust, oil, wax, grease, curing compounds, laitance, loose concrete, and other deleterious materials.
- D. Mechanical, electrical, and finish WORK shall be completed prior to placement of topping or concrete/grout fill. To ensure bonding to the base slab, the base slab shall be given an exposed aggregate finish. Alternatively where accepted by the ENGINEER, the base slab shall be given a roughened textured surface by a close-spaced rake while the surface is green. After curing, high pressure washing shall expose the aggregates and produce not less than a 3/16-inch amplitude roughness. Jackhammers or chipping hammers shall not be used.

3.02 INSTALLATION

- A. Nonshrink Grout:
 - 1. Nonshrink, nonmetallic grout shall be used for grouting precast concrete wall panel connections, column base plates, anchor bolts, reinforcing bars, pipe sleeves, and machinery supports.
 - 2. Grout shall be mixed as close to the work area as possible and transported quickly to its final position in a manner which will not permit segregation of materials.
 - 3. Nonshrink grout shall be cured with water saturated burlap for at least three days or with an application of Super Rez Seal cure and seal compound applied immediately after grout placement.
 - 4. Machinery set on grout pads shall not be operated until the grout has cured for at least 24 hours.
 - 5. Expansive, non-shrink epoxy grout in the category of the DP Five Star Epoxy Grout shall be used for installation of vibrating machinery such as pumps.
- B. Epoxy Adhesive Anchors: Grout shall be proportioned and mixed with automatic equipment. Unless otherwise indicated, embedment shall be sufficient to

develop the ultimate tensile strength of the anchor or reinforcing bar per the manufacturer's ICC-ES report, but shall not be less than 8 diameters for threaded rod or 12 diameters for reinforcing or smooth bars. Holes shall be dry.

- C. Drilled anchors and reinforcing bars shall be installed in strict accordance with the manufacturer's instructions. Holes shall be roughened with a brush on a power drill, and cleaned. Drilled anchors shall not be installed until the concrete has reached the required 28 Day compressive strength. Anchors shall not be loaded until the grout has reached its indicated strength in accordance with the manufacturer's instructions.

END OF SECTION