DIVISION 3 – CONCRETE

Section 03600 - Grouts

Part 1 – General

1.01 Summary

A. This specification describes horizontal, vertical and repair grouting of post-tensioned structures.

1.02 Quality Assurance

A. Manufacturing qualifications: The manufacturer of the specified product shall be ISO 9001 certified and have in existence a recognized ongoing quality assurance program independently audited on a regular basis.

B. Contractor qualifications: Contractor shall be qualified in the field of concrete repair and protection with a successful track record of 5 years or more. Contractor shall maintain qualified personnel who have received product training by a manufacturer's representative

C. Install materials in accordance with all safety and weather conditions required by manufacturer or as modified by applicable rules and regulations of local, state and federal authorities having jurisdiction. Consult Material Safety Data Sheets for complete handling recommendations.

1.03 Delivery, Storage, and Handling

A. All materials must be delivered in original, unopened containers with the manufacturer’s name, labels, product identification, and batch numbers. Damaged material must be removed from the site immediately.

B. Store all materials off the ground and protect from rain, freezing or excessive heat until ready for use.

C. Condition the specified product as recommended by the manufacturer.

1.04 Job Conditions

A. Environmental Conditions: Do not apply material if it is raining or snowing or if such conditions appear to be imminent. Minimum application temperature 40ºF (4ºC) and rising, or reference PTI Grout Specification for guidelines under necessary precautions in colder temperatures.

B. Protection: Precautions should be taken to avoid damage to any surface near the work zone due to mixing and handling of the specified material.

1.05 Submittals

A. Submit two copies of manufacturer’s literature, to include: Product Data Sheets, and appropriate Material Safety Data Sheets (MSDS).

1.06 Warranty

A. Provide a written warranty from the manufacturer against defects of materials for a period of one (1) year, beginning with date of substantial completion of the project.

Part 2 - Products

2.01 Manufacturer

A. **SikaGrout 300 PT**, as manufactured by Sika Corporation, is considered to conform to the requirements of this specification.

2.02 Materials

A. General
   1. The material shall be a blend of selected portland cements, admixtures for controlling setting time, water reducers for workability, and an organic accelerator.
   2. The materials shall be non-combustible, both before and after cure.
   3. The materials shall be supplied in a factory-blended bag.
   4. The cable grout shall be appropriate for use in horizontal applications.
   5. This material shall not contain sand and comply with section 2.03A.4 with respect to sieve analysis.

2.03 Performance Criteria

A. Typical Properties of the fresh material:

   1. Color: concrete gray
   2. Working Time: Approximately 60 minutes
   3. Initial Set (ASTM C-953): Approximately 3-12 hours
   4. Fine Aggregate (ASTM C-33)
      100% pass #30 Sieve
      99% pass #50 Sieve
      95 % pass #100 Sieve
      90% pass #170 sieve
   5. Wet density (ASTMC-138) approximately 125 lbs. per cf.
   6. Expansion (ASTM C-940)
      3 Hours Between 0.0 and +2.0%
   7. Fluidity Test (ASTM C-939 Modified per FL DOT section 938 & PTI section 4.4.5.2)
      Immediately after mixing 7-20 seconds
      30 minutes after mixing 7-20 seconds
   8. Bleeding (ASTM C-940 Modified per FL DOT Wick Induced Bleed Test)
      4 hours : 0.0%
   9. Gelmen Pressure Induced Bleed Test (PTI Specification section 4.4.6.2 & Table 4-1 Grout Type C)
      0.0% bleed at 100 psi for 5 minutes
   10. Simulated Field High Temperature Fluidity Test (Reference FL DOT Specification Section 938-5 & modified flow test per section 938-5)
      Initial flow: 7-20 seconds per FLDOT modified flow test
      1 Hour flow: Less than 30 seconds
   11. Total Chloride Ions (ASTM C-1152)
      Less than 0.04% by weight of cemetitious material

B. Typical Properties of the cured material:

1. Compressive Strength (ASTM C-942)
    a. 1 day: 3,000 psi (20.0 MPa)
    b. 3 days: 5,000 psi (33.3 MPa)
    c. 7 days: 7,000 psi (46.7 MPa)
    d. 28 days: 8,000 psi (53.3 MPa)

2. Volume change (ASTM C-1090)
    a. 24 hours 0.0% shrinkage
    b. 28 Days Between 0 and +0.2% expansion

3. W/C: Less than 0.40

4. Permeability (ASTM C-1202 modified per FL DOT section 938 and PTI Section 4.4.3)

    a. 28 Days Less than 2,500 Coulombs

5. Accelerated Corrosion Test (Reference FL DOT Specification Section 938-6)
    Time To Corrosion
    a. Control 344 hours
    b. SikaGrout 300 PT greater than 1,000 hours

Note: Tests above were performed using 10.5 pints of water per 50 lbs. bag with the material and curing conditions @ 71°F – 75°F and 45-55% relative humidity.

Part 3 – Execution

3.01 Surface Preparation

A. Ducts: Ensure that ducts, openings, inlet, and outlets are clean and free of debris fuel, oils, other contaminants, and site trash at all times.

B. Remove al dirt, oil, grease, and other bond-inhibiting materials by mechanical means. Anchor bolts to be grouted must be degreased with suitable solvent. Concrete must be sound and roughened to promote mechanical adhesion. Prior to pouring surface should be brought to a saturated surface-dry condition.

3.02 Mixing and Application

A. For best results use a colloidal mixer similar to ChemGrout CG-600 series at approximately 1,800 rpm. Alternately, mechanically mix with high-speed drill (2500 rpm) and Sika jiffy paddle. Mix for approximately 3 minutes after the addition of the last bag or until a homogeneours mix is achieved. Continue to agitate material in the holding hopper to achieve best flow. Method of mixing may significantly affect the material properties, particularly flow. At higher temperatures and/or with higher water amounts, the grout will behave more non-thixotropically. Therefore, it may be more appropriate to measure the flow using the standard flow cone test (ASTMC-939). The expected efflux time is between 11-30 seconds under these conditions. Project specific testing by the engineer is recommended to ensure that the mixing and placement methods result in the specified requirements.

B. Add appropriate quantity of clean water. Add bag of material to mixing vessel. Start by using 11.5 pints of water per 50lb. bag of material. Add additional water as needed (up to a total maximum of 13 pints per 50lb. bag) in order to achieve the flow specified on the technical data sheet. Ambient and material temperature should be as close as possible to 70F. If higher, use cold water, if colder use warm water.

C. Make sure all forming, mixing, placing, and clean-up materials are on hand. The grout shall be used within 60 minutes from the start of mixing. The method of pumping grout shall ensure complete filling of the ducts and complete surrounding of the strand or bar as well as complete filling of a void or otherwise tight space. A mock-up should be completed on-site and inspected by the engineer to ensure that the placement means and methods yield the specified results. When grouting ducts or critical elements, it is highly recommended that experienced, American Segmental Bridge Institute certified technicians complete the work.

D. Adhere to all procedures, limitations and cautions for this product in the manufacturers current printed technical data sheet and literature.

3.05 Cleaning

A. The uncured material can be cleaned from tools with water. The cured cement grout can only be removed mechanically.

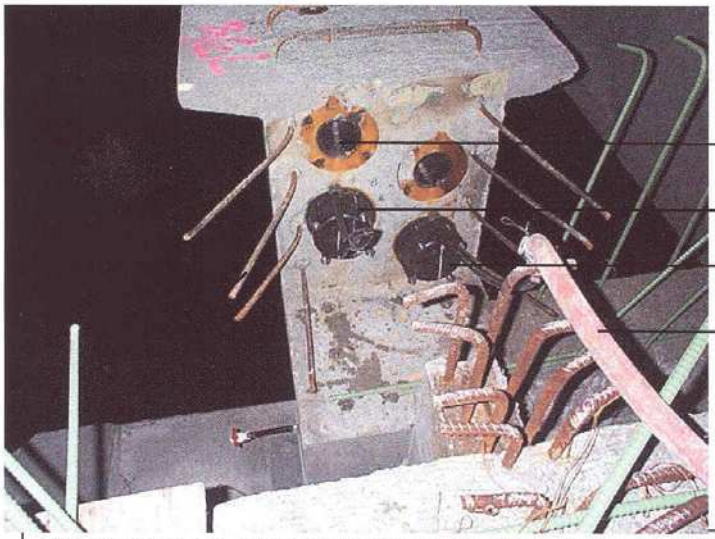
B. Leave finished work and work area in a neat, clean condition without evidence of spillovers onto adjacent areas.

SC-051 Sika Grout 300 PT Application

COLLOIDAL GROUT PLANT

1. Water Reservoir
2. Bridge breaker
3. Mix tank
4. Transfer line
5. Recirculation line
6. Holding Tank
7. Colloidal Mixer
8. Agitator
9. Grout Pump
10. Air inlet

Horizontal Application



1. Empty Duct
2. Tensioned strands and grouted duct
3. Duct being grouted
4. Hose conveying grout

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