

SECTION 03 61 11
NON-SHRINK GROUT

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Cementitious Grout.
- B. Epoxy Grout.
- C. Epoxy Adhesive.

1.02 RELATED SECTIONS

- A. Grout for prestressed concrete is specified in Section 03 05 18, Prestressed Concrete.
- B. Masonry grout for filling cells of unit masonry is specified in Section 04 22 00, Concrete Unit Masonry.
- C. Grout for filling and finishing joints of ceramic tile and cut stone is specified in applicable sections under Division 9 – Finishes.
- D. Grout for concrete repair and finishing materials is specified in Section 03 35 00, Concrete Finishing.
- E. Grout for metal railings is specified in Section 05 52 00, Metal Railings.

1.03 MEASUREMENT AND PAYMENT

- A. Measurement: Grout work will not be measured separately for payment.
- B. Payment: Grout work will be paid for as part of the indicated Contract price for the work or structure in which the grout is used.

1.04 DEFINITION:

- A. For the purpose of these Specifications, “non-shrink grout” shall be defined as a high-strength mortar or grout which does not shrink in the plastic state, is dimensionally stable in the hardened state, and bonds permanently to clean metal surfaces and concrete substrate.

1.05 REFERENCES

- A. American Concrete Institute (ACI):
 - 1. ACI 503.2 Standard Specification for Bonding Plastic Concrete to Hardened Concrete with a Multi-Component Epoxy Adhesive

- B. American Society for Testing and Materials (ASTM):
1. ASTM C109/
C109M Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or 50-mm Cube Specimens)
 2. ASTM C157/
C157M Standard Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete
 3. ASTM C579 Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing and Polymer Concretes
 4. ASTM C827/
C827M Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures
 5. ASTM C881/
C881M Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete
 6. ASTM C1090/
C1090M Standard Test Method for Measuring Changes in Height of Cylindrical Specimens of Hydraulic-Cement Grout
 7. ASTM C1107/
C1107M Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
- C. U. S. Army Corps of Engineers, Concrete Research Division (CRD):
1. CRD-C620 Standard Method of Sampling Fresh Grout
 2. CRD C621 Corps of Engineers Specification for Non-shrink Grout

1.06 SUBMITTALS

- A. General: Refer to Section 01 33 00, Submittal Procedures, and Section 01 33 23, Shop Drawings, Product Data, and Samples, for submittal requirements and procedures.
- B. Product Data: Submit manufacturer's product data and installation instructions.
- C. Certification: Submit certificates of compliance or laboratory test reports which indicate the following:
1. Materials used in the grout are free from metallic components and corrosion-producing elements.
 2. Materials meet specified shrinkage and compressive strength requirements.

1.07 ENVIRONMENTAL REQUIREMENTS

- A. Handle grout the same as concrete with regard to temperature and curing, as specified in Section 03 30 00, Cast-In-Place Concrete, Section 03 05 18, Prestressed Concrete, and Section 03 35 00, Concrete Finishing.

PART 2 – PRODUCTS**2.01 MATERIALS**

- A. Cementitious Grout: Provide non-shrink, non-metallic, non-corrosive cement-based grout conforming to the following requirements:
1. Applicable Standards: ASTM C1107/C1107M and CRD-C621.
 2. Grout shall be manufactured specifically for use in supporting heavy loads (loads in excess of 300 pounds per square foot concentrated load or 100 pounds per square foot uniform load). Grout: ASTM C1107/C1107M, Grade A, B, or C, as appropriate for the condition or circumstance.
 3. Shrinkage at 28 Days: No shrinkage before hardening (0.00 shrinkage when tested in accordance with ASTM C827/C827M); no shrinkage after hardening (0.00 shrinkage when tested in accordance with CRD-C621).
 4. Compressive strength, minimum as specified in ASTM C1107/C1107M, Table 1:
 - a. At one Day: 1000 psi
 - b. At three Days: 2500 psi
 - c. At seven Days: 3500 psi
 - d. At 28 Days: 5000 psi
 5. Initial setting time, after addition of water: approximately one hour at 70 degrees Fahrenheit.
 6. Provide nonsag trowelability or flowability as necessary for the particular application.
- B. Water: Clean and potable, free of impurities detrimental to grout.
- C. Epoxy Grout: Provide non-shrink, non-metallic, non-corrosive epoxy grout conforming to the following requirements:
1. Grout shall be manufactured specifically for use in supporting heavy loads.
 2. Shrinkage at 28 Days: None (0.00 shrinkage when tested in accordance with ASTM C827/C827M modified procedure) with a minimum effective bearing area (EBA) of 95 percent coverage of the tested base plate.
 3. Compressive strength, minimum: 10,000 psi at seven Days, when tested in accordance with ASTM C579.
 4. Initial setting time: Approximately one hour at 70 degrees Fahrenheit.
 5. Provide flowable consistency as necessary for the particular application.

6. Epoxy grouts which are volatile and which give off noxious fumes are not acceptable.

D. Epoxy Adhesive: ASTM C881/C881M, Type V, epoxy-based bonding agent.

2.02 MIXING

A. Mix grout ingredients for both cementitious grout and epoxy grout in accordance with the respective manufacturer's mixing instructions and recommendations. Mix grout materials in proper mechanical mixers.

B. Mix grout as close to work area as possible.

2.03 SOURCE QUALITY CONTROL

A. Inspections and Tests: Perform visual inspections and shrinkage tests using an appropriate independent testing laboratory, and strength tests as necessary to verify performance requirements of grout. Sampling and testing of grout shall conform with applicable ASTM or CRD-C620 requirements. The independent testing laboratory shall perform sampling, testing, and inspection in accordance with the provisions herein. The Contractor shall cooperate with and notify District at least 48 hours in advance of sampling, tests, and inspections being performed by the independent testing laboratory. District may elect to observe these procedures.

B. Visual Inspections: Perform visual inspection of the grout mixing and placement to determine and verify that grout consistency, slump, and stiffness are appropriate and proper for the location and type of installation.

C. Shrinkage Tests:

1. Cementitious Grout: Grout shall meet the following performance requirements:

- a. Expansion: 0.4 percent maximum at three, 14, and 28 Days. Grout shall exhibit no displacement when tested in accordance with ASTM C157/C157M.
- b. Shrinkage: None (0.00 shrinkage at 28 Days when tested in accordance with ASTM C827/C827M and ASTM C1090/1090M). There shall be no vertical volume shrinkage of grout in the plastic or hardened stage at any time.

2. Epoxy Grout: Grout shall meet the following performance requirements:

- a. Expansion: Grout shall exhibit no displacement when tested in accordance with ASTM C827/C827M and ASTM C157/C157M, modified procedures.
- b. Shrinkage: None (0.00 shrinkage when tested in accordance with ASTM C827/C827M, modified procedure; specific gravity of indicator ball will be changed to approximately 1.0).
- c. Effective Bearing Area: 95 percent minimum coverage of the tested base plate.

- D. Strength Tests: Compressive strength of grout shall meet the following requirements:
1. Cementitious Grout: 5,000 psi minimum at 28 Days when tested in accordance with ASTM C109/C109M.
 2. Epoxy Grout: 10,000 psi minimum at seven Days when tested in accordance with ASTM C579.

PART 3 – EXECUTION

3.01 SURFACE PREPARATION

- A. Concrete surfaces to receive grout shall be prepared by chipping, sandblasting, water blasting, or other accepted methods to remove defective concrete, laitance, dirt, oil, grease, and other foreign matter to achieve sound, clean concrete surfaces. Lightly roughen concrete for bond, but not enough to interfere with proper placement of grout.
- B. Cover concrete areas with protective waterproof covering until ready to place grout.
- C. Remove foreign matter from steel surfaces to be in contact with grout. Clean contact steel surfaces as necessary by wire brushing and wiping dust clean.
- D. Align and level components to be grouted, and maintain in final position until grout placement is complete and accepted.
- E. Install forms for grout around the column base plates and other spaces to be grouted. The tops of such forms shall be one inch above the surfaces to be grouted.
- F. Remove protective waterproof covering and clean contaminated surfaces immediately before grouting.
- G. Provide air-relief holes in large baseplates and in baseplates where underneath obstructions may cause air entrapment.
- H. Saturate concrete surfaces with clean water, and remove excess water immediately before grouting.
- I. Where necessary or appropriate for better bond, epoxy adhesive may be applied to clean, dry substrate surfaces in accordance with applicable requirements of ACI 503.2.

3.02 PLACING GROUT

- A. Place grout in accordance with the respective manufacturer's installation instructions and recommendations. Pour grout from one side only until grout rises at least one inch above the plate on opposite side of said plate. Strapping and plunging or other recommended method may be used to force grout to flow under the entire area.

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- B. Neatly trowel edges of grout base, tapered at an angle of 60 degrees when measured from the horizontal, or as indicated. Provide dry-pack cementitious grout where additional grout is required for shoulders.
- C. Do not remove leveling shims for at least 48 hours after grout has been placed.
- D. After shims have been removed, if used, fill voids with grout, packing the material with a suitable tool.
- E. Do not use grout which has begun to set or if more than one hour has elapsed after initial mixing.

3.03 CURING

- A. Cementitious grout shall be cured the same as specified for concrete in Section 03 35 00, Concrete Finishing.
- B. Epoxy grout shall be cured as recommended by the grout manufacturer.

END OF SECTION 03 61 11