



By CTS Cement Manufacturing Corp.

**CSI SECTION 03 60 00 – GROUTING**  
**03 62 00 – NON-SHRINK GROUTING**  
**03 62 13 – NON-METALLIC NON-SHRINK GROUTING**

*High Flow, Non-Metallic, Multi-Purpose, Cementitious, Non-Shrink Grout*

*EDITOR NOTE: The following guideline specification has been prepared to assist architects and design professionals in the preparation of project master specifications. It is intended for use by qualified design professionals and is not intended to be used verbatim. Appropriate modifications to meet specific project requirements are required. Make appropriate [selections] where options are provided and delete items that are not applicable to the project. Contact CTS Cement Technical Service for additional information or project specification assistance.*

**PART 1 - GENERAL**

**1.1 SECTION INCLUDES**

- A. Supply and installation of a high flow, non-shrink, non-metallic high strength cementitious grout for anchoring, patching, casting and repairing concrete substrates in structural and non-structural applications.

**1.2 RELATED SECTIONS**

- A. Section 03 01 00 - Maintenance of Concrete
- B. Section 03 01 40 - Maintenance of Precast Concrete
- C. Section 03 01 50 - Maintenance of Cast Decks and Underlayment
- D. Section 03 01 60 - Maintenance of Grouting
- E. Section 03 01 80 - Maintenance of Concrete Cutting and Boring
- F. Section 03 30 00 - Cast-in-Place Concrete
- G. Section 03 40 00 - Precast Concrete
- H. Section 03 50 00 - Cast Decks and Underlayment
- I. Section 03 54 16 - Hydraulic Cement Underlayment
- J. Section 03 70 00 - Mass Concrete
- K. Section 04 01 00 - Maintenance of Masonry
- L. Section 04 20 00 - Unit Masonry
- M. Section 05 05 19 - Post-Installed Concrete Anchors

**1.3 REFERENCES**

- A. ASTM C78 Test Method for Flexural Strength of Concrete
- B. ASTM C109 Standard Test Method for Compressive Strength of Hydraulic Cement Mortars
- C. ASTM C191 Test Method for Time of Setting of Hydraulic Cement by Vicat Needle
- D. ASTM C266 Standard Test Method for Time of Setting of Hydraulic-Cement Paste by Gillmore Needles
- E. ASTM C348 Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars



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- G. ASTM C666 Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing
- H. ASTM C827 Test Method for Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures
- I. ASTM C882 Standard Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear
- J. ASTM C939 Test Method for Flow of Grout for Preplaced Aggregate Concrete (Flow Cone Method)
- K. ASTM C1090 Standard Test Method for Measuring Changes in Height of Cylindrical Specimens of Hydraulic-Cement Grout
- L. ASTM C1107 Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-Shrink)
- M. ACI 301 Specification for Structural Concrete
- N. ACI 318 Building Code Requirements for Structural Concrete
- O. CRD-C 621 Corps of Engineers Specification for Non-Shrink Grout

#### 1.4 SUBMITTALS

- A. General: Submit samples and manufacturer's product data sheets, installation instructions, etc. in accordance with Division 01 General Requirements Submittal Section.
- B. Test Data: Submit qualified testing data that confirms compliance with specified performance requirements.

#### 1.5 QUALITY ASSURANCE

- A. Qualifications:
  - 1. Manufacturer:
    - a. Must have marketed non-shrink grouting materials in the United States for at least five years and must have completed projects of the same general scope and complexity.
    - b. Grout and complementary admixture materials must be manufactured by or approved for use by CTS Cement Manufacturing Corp. (800-929-3030, [www.CTScement.com](http://www.CTScement.com)) and distributed by the same or an authorized CTS Cement dealer.
  - 2. Applicator:
    - a. Must be experienced and competent in installation of rapid hardening, non-shrink grouting materials and provide evidence of a minimum of five years experience in work similar in size and scope to that required by this section.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver products in original, unopened, undamaged packaging with manufacturer's identification (i.e., brand logo, product name, weight of packaged unit, lot number).
- B. Storage: Store products in a dry location, covered, out of direct sunlight, off the ground, and protected from moisture. Maintain storage temperature required by the manufacturer. Keep materials dry until used. Store bulk sand in a well-drained area on a clean, solid surface. Cover sand to prevent contamination.
- C. Handling: Handle products in accordance with manufacturer's published recommendations.



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## 1.7 SITE / ENVIRONMENTAL CONDITIONS

- A. Temperature: Maintain ambient and surface temperatures between 45°F (7°C) to 90°F (32°C). Do not apply grout materials if ambient temperature falls below 45°F (7°C) within 24 hours of application. Protect grout from uneven and excessive evaporation during dry weather, windy conditions and strong blasts of dry air.
- B. Inclement Weather: Do not apply grout materials during inclement weather unless appropriate protection is employed.
- C. Sunlight Exposure: Avoid, whenever possible, installation of grout materials in direct sunlight which could adversely affect aesthetics.
- D. Substrate: Prior to installation, the substrates must be inspected for surface contamination or other conditions that may adversely affect the performance of the grouting materials and be free of residual moisture.

## 1.8 COORDINATION AND SCHEDULING

- A. Coordinate installation of grout materials with all other trades to avoid impeding other construction.
- B. Sufficient manpower must be provided to ensure continuous application and timely finishing.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Basis of Design: CTS Cement Manufacturing Corp., 12442 Knott Street, Garden Grove, CA 92841 (800-929-3030, [www.CTScement.com](http://www.CTScement.com)).
- B. Components: Obtain grout and complementary admixture materials manufactured by CTS Cement from authorized distributors. No substitutions or additions of other materials are permitted without prior written permission from the manufacturer for this project.

### 2.2 MATERIALS

- A. High Flow, Non-Shrink, Cementitious Grout
  - 1. UltraFlow™ 4000/8: a highly fluid, precision, non-shrink cementitious grout that achieves 4,000 psi in 8 hours and provides extended working time for large placements. Consistency can be adjusted to provide on-site versatility for fluid, flowable, plastic, and damp pack applications.
  - 2. Additives and admixture materials must be approved for use by CTS Cement Manufacturing Corp. prior to use. (800-929-3030, [www.CTScement.com](http://www.CTScement.com))
- B. Water: Clean, potable water free of deleterious amounts of silt and dissolved salts.

### 2.3 MATERIAL PROPERTIES

- A. High Flow, Non-Shrink, Cementitious Grout
  - 1. Compliance with: ASTM C1107, Grades A, B, C, ASTM C1090, ASTM C827, Corps of Engineers CRD-C 621



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2. Minimum performance requirements:

Set Time (ASTM C191*)	<u>Consistency</u> Initial Set Final Set	<u>Fluid</u> 95 minutes 150 minutes
Compressive Strength (ASTM C109 Modified*)	<u>Compressive</u> 8 Hour 1 Day 3 Day 7 Day 28 Day	<u>Fluid</u> 4,000 psi 6,500 psi 7,500 psi 8,000 psi 8,500 psi
Bond Strength (ASTM C882*)	<u>Splitting Tensile Strength</u>	2,000 psi @ 28 Days
Freeze/Thaw (ASTM C666)		99% @ 300 cycles
Effective Bearing Area		98%

*\*Data obtained at 70°F (21°C)*

**2.4 RELATED MATERIALS**

- A. Admixtures: Do not add additional dry materials such as cement, sand, additives or admixtures. Mix only with water. All additives and admixture materials must be approved for use by CTS Cement Manufacturing Corp. prior to use. (800-929-3030, www.CTScement.com)
- B. Consult with a qualified CTS Cement Technical Representative prior to the project if grout will be pumped, mixed in a ready-mix truck, used with pea gravel, used at temperature extremes, installed less than 1/2 inch thick or over 6 inches thick, or when unusual job site conditions are anticipated. (800-929-3030, www.CTScement.com)
- C. Concrete Cleaner: Citrus-based concrete cleaner to clean and strip dirt, grease and laitance from surfaces to receive grout.
- D. Curing: Prevent rapid water loss from grout during the first 48 hours by use of
  - 1. Wet Burlap Method
  - 2. Curing Compound compliant with ASTM C309 Type I, Class B.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Verify project site conditions under provisions of Section 01 00 00.
- B. Compliance: Comply with manufacturer's instructions for installation of grouting materials.
- C. Coordinate installation with adjacent work to ensure proper sequencing of construction.
- D. Protect adjacent and surrounding surfaces not specified to receive grout with necessary means to ensure protection against overspray, water or other harmful debris.
- E. Advise Contractor of discrepancies preventing proper installation of grouting materials. Do not proceed with the work until unsatisfactory conditions are corrected.



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### 3.2 PREPARATION

- A. Mechanically roughen surfaces and remove all loose, unsound, contaminated material.
- B. Bonding surfaces must be clean, sound, and free from any materials that may inhibit bond such as oil, dirt, asphalt, sealing compounds, acids, wax and loose dust and debris.
- C. Reinforcing steel must be free from rust and all other materials that may inhibit bond.

*EDITOR NOTE: Add special requirements related to the replacement of reinforcement that has lost too much cross sectional area.*

- D. Thoroughly saturate the area to receive grout with water for a minimum of 4 hours, preferably 24 hours, before grout placement. Remove any standing water before material placement.
- E. Minimum substrate temperature must be 45°F (7°C) and maximum substrate temperature 90°F (32°C).
- F. For formed grouting applications, construct watertight, non-absorbent forms. Build forms 1 inch higher than the bottom of the plate and 1 to 3 inches between the side of the plate and the form.
- G. Joints must be sealed with foam, caulk or putty.
- H. Provide vent holes to avoid air entrapment.
- I. Provide a head placement of a 45 degree angle to facilitate placement for grout pour.

### 3.3 MIXING

- A. UltraFlow™ 4000/8: Comply with manufacturer's printed instructions and the following:
  - 1. Organize installation personnel and equipment before mixing begins.
  - 2. Mix with water starting with 4.5 quarts (4.3L) per 55 lb. bag. Do not exceed 5 quarts (4.7L) of water per bag.
  - 3. Add water to the mixing container. While mixing in a power driven mechanical mixer, such as a mechanical mortar mixer or drill mounted mixer, add UltraFlow™ 4000/8. Mix thoroughly for 5 minutes to achieve a uniform consistency. Use enough water to achieve a consistency not less than 24 seconds through a flow cone per ASTM C939 Flow Cone Method. Temperature, efficiency of mixing, and desired consistency will affect the amount of water needed.
    - a. Additives: To extend working time, use Rapid Set® SET Control retarding admixture or cold mix water. Any other additives or admixture materials must be approved for use by CTS Cement Manufacturing Corp. prior to use. (800-929-3030, [www.CTScement.com](http://www.CTScement.com))
  - 4. Adjust water temperature to maintain mixed grout temperature from 45°F (7°C) to 90°F (32°C).
  - 5. Never mix by hand. Do not re-temper, add water, or remix after the grout stiffens. Grout that stiffens before use must be discarded.

### 3.4 APPLICATION

- A. UltraFlow™ 4000/8: Comply with manufacturer's printed instructions and the following:
  - 1. Verify that all substrates and ambient temperatures are between 45°F (7°C) to 90°F (32°C) and will remain within range until the grout has reached final set.



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2. Have all required tools, equipment and materials organized and as close to the grouting area as possible.
3. Place grout continuously by pump or pouring from one side of the application area across the shortest dimension. Pour the grout onto a 45° incline to minimize air entrapment.
4. Use multiple mixers as required to ensure continuous placement. Once placement begins and the grout is in contact with the plate, the grout must remain in contact with the plate. The grout must extend at least 1/2 inch up onto the edges of the plate to provide small head pressure that will keep the grout in contact with the plate base.
5. Do not vibrate the grout. Steel straps may be inserted prior to placement on large pours and agitated lightly if required.
6. Immediately after placement, cover exposed grout surfaces with clean, wet rags until it is time to cut back or finish. Shoulders may be cut back approximately 2 hours after placement when the grout is hard enough to keep its shape without sagging from the plate. Immediately after cut back, cover with clean, wet rags until time for finishing.

### **3.5 CURING**

- A. Apply curing compound in accordance with ASTM C309 immediately after finishing or upon final set. Apply curing compound to all exposed grout surfaces after forms are removed.

OPTION: Wet cure grout placement with clean, potable water for a minimum of 8 hours.

### **3.6 CLEAN-UP**

- A. Remove and legally dispose of grouting debris material from job site.
- B. Clean excess material from surrounding areas and all tools immediately, before material cures. If materials have cured, remove using mechanical methods that will not damage the substrate.
- C. Clean adjacent surfaces as needed using materials and methods recommended by the manufacturer of the material being cleaned. Remove and replace work that cannot be cleaned to the satisfaction of the Project Designer/Owner.

END OF SECTION

Rev. March 2020

*This sample guideline specification is intended for use by a qualified design professional. The sample guideline specification is not intended to be used verbatim as an actual specification without appropriate modifications for the specific project requirements.*