1. SCOPE

1.1 This test method covers the procedures for making and curing grout cube specimens from representative samples of fresh grout as utilized in Bored-In Piles, Post Tensioning Cable Duct Grouting, and other similar applications for compressive strength testing purposes.

2. REFERENCED DOCUMENTS

2.1 AASHTO Standards

T 106 - Compressive Strength of Hydraulic Cement Mortars (Using 2 in. or [50-mm] Cube Specimens)

2.2 ASTM Standards

C 109 - Compressive Strength of Hydraulic Cement Mortars (Using 2 in. or [50-mm] Cube Specimens)
C 1107 - Packaged Dry, Hydraulic-Cement Grout (Nonshrink)

3. APPARATUS

3.1 Testing apparatus to be used as specified in referenced documents. The following exception is allowed:

3.1.1 A cube mold set assembly fabricated of high density polyethylene with dimensions as specified in ASTM C 109.

3.2 Field equipment kits for making grout cube specimens are available from the Materials Bureau - Cement Laboratory and include the following items:

- (6) cube mold sets (3 cubes per mold set)*
- (1) cube mold rubber tamper
- (1) stainless steel spoon for transfer to mold
- (1) steel trowel for finishing off molds
- (1) can of release agent (WD-40 or equivalent)**
- (1) plastic brush to aid in cleanup
- Plastic bags to cover molds initially and for shipping
- Rubber gloves

* Additional cube mold sets may be necessary to meet project testing requirements.
** Form coatings which appear on NYSDOT Materials Approved List may also be used.
3.2.1 Request to borrow field equipment kits should be directed to the Main Office Materials Bureau a minimum of 7 days prior to grout placement. All equipment must be returned as soon as grout sampling is complete.

4. PROCEDURE

4.1 Prepare molds by applying a thin coat of release agent to interior faces of molds. Wipe mold faces and the base plate with a cloth as necessary to remove excess release agent to achieve a thin coating on interior faces. The use of cube mold inserts is not permitted.

NORMAL GROUT CONSISTENCY:

A) Grout cube molds are filled in 2 equal layers. Fill all three cube compartments approximately 1 in. (25 mm) or half the depth of the mold.

B) Consolidate the grout in each cube compartment in 4 rounds consisting of 8 tamping strokes per round, for a total of 32 strokes in 10 seconds. Each round shall be at right angles to the other, connecting the tamping strokes over the surface of the specimen, as illustrated in Figure 1. The tamping pressure should be just sufficient to ensure uniform consolidation of the grout in the molds. Complete tamping one cube before going to the next.

![Rounds 1 and 3](image1.png) ![Rounds 2 and 4](image2.png)

*Figure 1 - Order of Tamping in Molding of Test Specimens (ASTM C 109)*

C) After the first layer is properly consolidated in all three compartments, slightly overfill the second layer in all three compartments. Consolidate the second layer using the same procedure as the first layer. During tamping of the second layer, use gloved fingers to bring in the grout forced out onto the tops of the molds after each round of tamping.

D) Upon completion of tamping the second layer, the tops of all cubes should extend slightly above the tops of the mold. Using a trowel, bring in the grout that has been forced out onto the top of the molds.

E) Smooth off the top of the cubes by drawing the flat side of the trowel (with the leading edge slightly raised) once across the top of each mold at right angles to the length of the mold.

F) Draw the flat side of the trowel (with leading edge slightly raised) once lightly across the length of the mold.
G) Cut off the grout to a plane surface flush with the top of the mold by drawing the straight edge of the trowel (held perpendicular to the mold) with a sawing motion over the length of the mold.

H) Place filled grout cube molds in a sealed plastic bag and allow to cure on a rigid level surface protected from vibrations or other disturbances and direct sunlight for a minimum of 20 hours. Care should be taken to ensure the plastic bag does not come in contact with the exposed plastic grout surfaces during curing. Contact may cause cube surface irregularities that may contribute to lower compressive strength results.

I) After initial cure, strip cubes from molds and wrap each cube with a moist paper towel. Place cubes in a labeled, sealed plastic bag and coordinate shipment to the Materials Bureau Cement Laboratory as soon as possible for testing.

J) Clean molds with a trowel or plastic brush and spray with release agent.

**FLUID OR FLOWABLE GROUT CONSISTENCY:**

A) Fill the grout cube molds in 2 equal layers as stated in previous section. Continuously re-mix the sample while filling the molds.

B) Consolidate the grout in each layer with a gloved finger (insert finger and withdraw) five times.

C) After the first layer is properly consolidated, slightly overfill the second layer. Use sufficient material so that the mold is slightly overfilled when consolidation is complete.

D) Finish the surface by cutting off the excess grout by drawing the straight edge of the trowel (held perpendicular to the mold) with a sawing motion over the length of the mold.

E) Place filled grout cube molds in a sealed plastic bag and allow to cure on a rigid level surface protected from vibrations or other disturbances and direct sunlight for a minimum of 20 hours. Care should be taken to ensure the plastic bag does not come in contact with the exposed plastic grout surfaces during curing. Contact may cause cube surface irregularities that may contribute to lower compressive strength results.

F) After initial cure, strip cubes from molds and wrap each cube with a moist paper towel. Place cubes in a labeled, sealed plastic bag and coordinate shipment to the Materials Bureau Cement Laboratory as soon as possible for testing.

G) Clean molds with a trowel or plastic brush and spray with release agent.

**5. MONITOR TESTING PROGRAM:**

5.1 The grout cube sets are tested for compressive strength as per project requirements, at the testing intervals indicated on the contract plans or as ordered by the Engineer. The compressive strength at a specified interval is the average compressive strength of the three cubes in a mold set. The Materials Bureau, Field Engineering I Unit should be notified a minimum of 72 hours prior to requesting grout cube compression testing in order to coordinate with the Materials Bureau - Cement Laboratory.
Each set of grout cubes should be consecutively numbered, starting with Set #1 and include the following information on the accompanying BR 240 form:

- Grout Cube Set Number
- Date and Time cast
- Requested Testing Interval
- Grout Sample Represented (i.e. pile or cable duct no., structure location, and/or Stage of construction, as applicable)
- Project Contract “D” Number

5.2 Shipping:

The cubes may be removed from the molds after 20 hrs. Wrap each cube in wet burlap or wet paper towels and place each set in a labeled plastic bag.

Ship to: New York State DOT Laboratories
7 Harriman Campus Road
Albany, NY 12206
Attention: Cement Laboratory

If there are any questions, contact the Materials Bureau, Field Engineering 1 Unit at (518) 457-3240