

WAQTC Standard Practice for

Field Sampling and Fabrication of 50-mm (2-in) Cube Specimens using Grout (Non-Shrink) and or Mortar

WAQTC TM 12 - 08

1 Scope

- 1.1 This method covers field sampling and fabrication and initial curing of 50-mm (2-in) cube specimens of non-shrink grout and/or mortar materials.
- 1.2 The values stated in either SI or inch-pound units shall be regarded separately as standard. The inch-pound units are shown in brackets. The values stated might not be exact equivalents; therefore, each system must be used independently of the other.

Note 1—Unit weight was the previous terminology used to describe the property determined by this test method, which is mass per unit volume.

- 1.3 The text of this test method references notes and footnotes that provide explanatory information. These notes and footnotes (excluding those in tables) shall not be considered as requirements of this test method.
 - 1.4 *This standard does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use. Warning—Fresh hydraulic cementitious mixtures are caustic and may cause chemical burns to skin and tissue upon prolonged exposure.*
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2 Referenced Documents

2.1 AASHTO / ASTM

- C 1107 Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-shrink)
 - T 106 / C 109 Test method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or 50-mm Cube Specimens.)
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3 Terminology

3.1 Definitions

- 3.1.1 – *Plastic mix* – material viscous enough that an indentation will be left in the surface of the grout after tamping.
 - 3.1.2 – *Fluid mix* – material fluid enough that little or no indentation will be left in the surface after puddling.
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4 Apparatus

- 4.1 Specimen Molds including cover plate (s): The 2 in. (50 mm) cube specimen molds shall be tight fitting and made of brass or other suitable material. This material shall not be susceptible to attack by the cement mortar. The molds shall have not more than three (3) cube compartments and shall be separable into not more than two (2) parts. The parts of the molds, when assembled, shall be positively held together. The cover plate(s) working surface shall be plane and shall be positively attached to the side walls of the mold. The interior faces of the molds shall conform to the tolerances of table 1.

Table 1

Permissible Variations of Specimen Molds				
	2 in. Cube Molds		50-mm Cube Molds	
Parameter	New	In Use	New	In Use
Planeness of Sides	<0.001 in.	<0.002 in.	<0.025 mm	<0.05 mm
Distance Between Opposite Sides	2 in. \pm 0.005 in.	2 in. \pm 0.02 in.	50 mm \pm 0.13 mm	50 mm \pm 0.50 mm
Height of Each Compartment	2 in. \pm 0.001 in. to -0.005 in.	2 in. \pm 0.01 in. to -0.015 in.	50 mm \pm 0.25 mm to -0.013 mm	50 mm \pm 0.25 mm to -0.38 mm
Angle Between Adjacent Faces^A	90 \pm 0.5°	90 \pm 0.5°	90 \pm 0.5°	90 \pm 0.5°

^AMeasured at points slightly removed from the intersection. Measured separately for each compartment between all the interior faces and the adjacent face and between interior faces and top and bottom planes of the mold.

- 4.2 Tamper: A non-absorptive, nonabrasive, non-brittle material such as a hard rubber compound having a Shore A durometer hardness of 80 ± 10 . The tamper shall have a cross section of about 1/2 in. x 1 in. (13 mm x 25 mm) and a length of 5 in. to 6 in. (125 mm to 150 mm). The tamping face shall be flat and at right angles to the length of the tamper.
- 4.3 Trowel: Steel bladed 100 to 150 mm (4" to 6") in length, with straight edges.
- 4.4 Water tight container: a 6 in. x 12 in. (150 mm x 300 mm) concrete cylinder mold with lid
- 4.5 Other Equipment: Rubber gloves, scoop, clamps to secure the cover plate, light release oil for oiling the molds, small brush or lint-free cloth for applying and removing excess release oil, burlap or wrapping cloth capable of retaining moisture.

5 Sampling

- 5.1 Samples shall be obtained in accordance with WAQTC TM 2 when the batch equals or exceeds 1 m³ (1 cy). When the batch is less than 1 m³ (1 cy) sample from the batch after discharge. If remixing is required sample after remixing. Begin molding the specimens within an elapsed time of not more than 2 1/2 minutes from completion of the mixing.

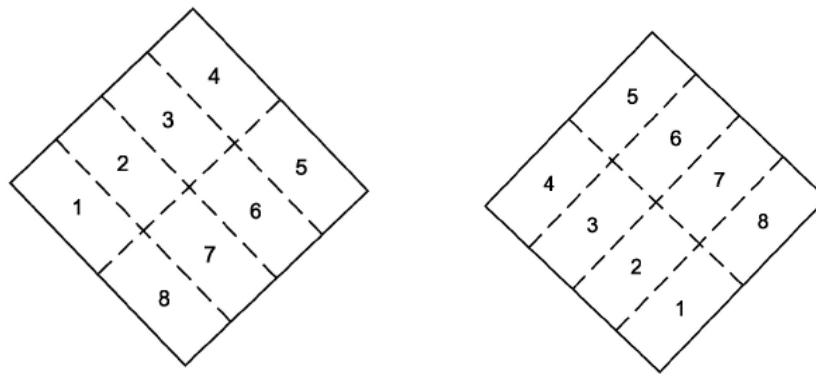
- 5.2 Obtain a representative sample of the mix. Samples shall be a minimum size of 2000 g (4 lb) for each set of three (3) cubes to be fabricated.

6 Procedure

- 5.1 Assemble both portions of the mold and the bottom cover plate. All joints shall be water tight. If not water tight, seal the surfaces where the halves of the mold join by applying a coating of light cup grease (non water soluble). The amount should be sufficient to extrude slightly when the halves are tightened together. Repeat this process for attaching the mold to the bottom cover plate. Remove any excess grease. Apply a thin coating of release agent to the interior faces of the mold and the bottom cover plate. Wipe the mold faces and base plate as necessary to remove any excess release agent and to achieve a thin, even coating on the interior surfaces. Adequate coating is that which is just sufficient to allow a distinct fingerprint to remain following light finger pressure.
- 5.2 Place a layer of grout about 25 mm (1") (approximately one-half of the depth of the mold) in all of the cube compartments. Consolidated according to the consistency (plastic or fluid) of the mix.
- 5.2.1. For plastic mixes, tamp the lift in four rounds of 8 tamps for a total of 32 tamps with the rubber tamper in 10 seconds. See [Figure 1](#) for tamping sequence of each round. Rounds 1 and 3; and 2 and 4 shall be the same.
- 5.2.2. For fluid mixes, puddle the lift 5 times with a gloved finger. See [Figure 2](#) for tamping sequence.
- 5.3 Place the second lift in each of the cube compartments, slightly over-filling each compartment. Consolidate the material in the same fashion as the first lift with the additional requirement that during consolidation of the second lift any grout forced out onto the top of the mold after each round will be pushed back onto the compartment by means of the tamper and/or gloved fingers before the next consolidation round. When consolidation of the grout is completed, material should extend slightly above the top of the mold. Push any grout forced out onto the top of the mold after the last round back onto the compartment with the trowel.
- 5.4 Smooth off the cubes by drawing the flat side of the trowel (with the leading edge slightly raised) once across the top of each cube at right angles to the length of the mold. Then, for the purpose of leveling the mortar and making the mortar that protrudes above the top of the mold of more uniform thickness, draw the flat trailing edge of the trowel (with leading edge slightly raised) once lightly along the length of the mold. Cut off the mortar to a plane surface flush with the top of the mold by drawing the straight edge of the trowel (held nearly perpendicular to the mold) with a sawing motion over the length of the mold. The material shall be flush with the top of the mold.
- 5.5 Immediately secure the top cover plate to the cube mold.
- 5.6 Place the molds in a secure location away from vibration and as close as possible to the structure for initial curing. Cover with wet burlap, towels, or rags, seal it in a plastic sack in a level location out of direct sunlight, and record the time. These samples shall remain undisturbed and protected from freezing or overheating for a period of 24 ± 4 hours.
- 5.7 At the end of the initial curing period as required by the agency either;

- 5.7.1. Place the sealed plastic sack into a water tight container. Transport the cube samples immediately to the location of final curing. During transport, the cube samples shall be protected from jarring, freezing, and moisture loss.
- 5.7.2. Disassemble the mold and carefully remove the cube samples. Using a permanent marker, identify the cube samples. Handling the cube samples very carefully, wrap them in wet burlap or wet towels and place them into a water tight container. Transport the cube samples immediately to the location of final curing. During transport, the cube samples shall be protected from jarring, freezing, and moisture loss.
- 5.8 Final curing shall consist of immersing the cube samples in a lime-saturated water storage tank. They are to remain in the storage tank until time of test. (Curing cube samples of material other than hydraulic cement shall be in conformance with the manufacturer's recommendations.) The storage tank shall be made of non-corroding materials.

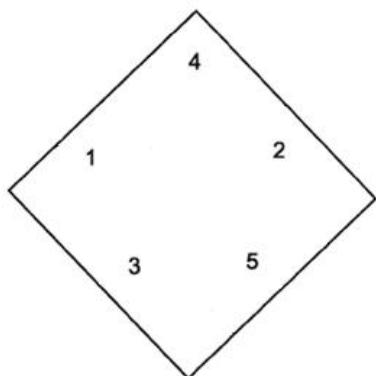
FIGURE # 1



Rounds 1 and 3

Rounds 2 and 4

FIGURE # 2



Puddling sequence