Designation: C 942 – 99

Standard Test Method for Compressive Strength of Grouts for Preplaced-Aggregate Concrete in the Laboratory[1]

This standard is issued under the fixed designation C 942; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This test method covers the determination of the compressive strength of hydraulic cement grout for preplaced-aggregate (PA) concrete.

1.2 The values stated in SI units are to be regarded as standard.

1.3 *This standard does not purport to address all of the safety concerns, 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.*

2. Referenced Documents

2.1 *ASTM Standards:*

C 31/C 31M Practice for Making and Curing Concrete Test Specimens in the Field[2]

C 109/C 109M Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or 50-mm Cube Specimens)[3]

C 937 Specification for Grout Fluidifier for Preplaced-Aggregate Concrete[2]

C 938 Practice for Proportioning Grout Mixtures for Preplaced-Aggregate Concrete[2]

C 939 Test Method for Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method)[2]

3. Summary of Test Method

3.1 Compressive strength of hardened grout is determined using top-restrained cubes as defined in Test Method C 109/C 109M.

4. Significance and Use

4.1 This test method affords a means for determining the compressive strength of grouts that expand and, in use, harden under conditions of partial to total restraint.

4.2 It is particularly applicable for determining the effect on compressive strength of grout fluidifier to be used with grout for PA concrete. (See Specification C 937.)

5. Apparatus

5.1 *Scales, masses, sieves, glass graduates, and three-gang molds*, for 2-in. (or 50-mm) cube specimens, baseplates, trowel, and testing machine as specified in Test Method C 109/C 109M.

5.2 *Plates*, to cover specimen molds, capable of supporting the weight or being held down by C-clamps, as described in 9.3.

5.3 *Mass of 7 kg (or 15 lb) or C-clamps*, for holding down the cover plates.

6. Temperature and Humidity

6.1 Temperature and humidity conditions for tests performed in the laboratory shall be in accordance with Test Method C 109/C 109M unless otherwise specified.

6.2 Temperature and humidity conditions for tests performed in the field shall be as prescribed for curing cylinders in Practice C 31/C 31M.

7. Sampling

7.1 The test sample shall consist of approximately 1500 mL of grout and shall be representative of the material in the mixer.

7.2 Grout proportioned at the mixer from hydraulic cement(s) with or without other materials shall be mixed in accordance with Specification C 937.

7.3 Packaged grouts requiring only the addition of water or other fluid shall be mixed in accordance with the manufacturer's printed recommendations.

8. Preparation of Specimen Molds

8.1 Prepare the molds as specified in Test Method C 109/C 109M.

9. Procedure

9.1 Determine the consistency of grout as follows:

9.1.1 Use the flow cone, Test Method C 939, for grout to be used for PA concrete or whenever the consistency is less than 35 s.

9.1.2 For grouts at consistencies thicker than above, determine the consistency on the flow table, Test Method C 109/

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[1] This test method is under the jurisdiction of ASTM Committee C-9 on Concrete and Concrete Aggregates and is the direct responsibility of Subcommittee C09.41 on Concrete for Radiation Shielding.

Current edition approved Jan. 10, 1999. Published March 1999. Originally published as C 942 – 81. Last previous edition C 942 – 98a.

[2] *Annual Book of ASTM Standards*, Vol 04.02.

[3] *Annual Book of ASTM Standards*, Vol 04.01.

C 109M, using 5 drops of the table in 3 s. When placing grout in the mold, puddle each layer five times with the gloved finger.

9.2 Measure the temperature of the grout.

9.3 Mold sets of cube specimens for testing in compression.

9.3.1 A three-gang cube mold shall constitute one test set. Provide at least one test set for each age at which the strength is to be determined, but not less than two sets.

9.3.2 Fill each mold in the set halfway. Puddle each with a gloved finger five times to release entrapped air. Fill the mold and puddle again. Bring the excess grout to the center and finish the surface by cutting off the excess with the straight edge of a trowel held vertically and drawn across the top of the mold with a sawing motion.

9.3.3 Place the cover plate over the mold (three-gang), taking care that the grout or loose grains of sand do not prevent seating of the plate.

9.3.4 Place a mass of 7 kg (or 15 lb) on each cover plate or fix the cover plates to the molds with C-clamps, finger tightened.

10. Storage and Curing

10.1 Immediately upon completion of molding:

10.1.1 Place laboratory specimens in the moist room and cure in accordance with the applicable portions of Test Method C 109/C 109M.

10.1.2 Store field specimens and cure in accordance with Curing Cylinders of Practice C 31/ 31M.

10.2 *Stripping*—With grouts that expand prior to hardening, do not strip molds before age 24 h or final set, whichever occurs later.

10.2.1 Do not strip molds from grouts containing expansive-cement systems before age 3 days.

11. Determination of Compressive Strength

11.1 Determine the compressive strength at ages 7 and 28 days, unless otherwise specified, in accordance with Test Method C 109/C 109M.

12. Report

12.1 The report shall include the following:

12.1.1 Identification, date of mixing, and whether laboratory or field tested.

12.1.1.1 If field tested, include description of curing procedure and temperature.

12.1.2 Average compressive strength for each set of grout specimens to nearest 0.1 MPa (or 10 psi) at 7 and 28 days of age, unless otherwise specified.

13. Precision and Bias

13.1 *Precision*—The single-operator coefficient of variation has been found to be 1.6 %. Therefore, results of two properly conducted tests by the same operator on the same sample using proper equipment should not differ from each other by more than 4.5 % of their average.[4]

13.2 *Bias*—No statement on bias has been made since there are no standard reference materials.

[4] The precision data are based on testing results available from ASTM. Request RR: C08-1014.