



Designation: C938 – 19

Standard Practice for Proportioning Grout Mixtures for Preplaced-Aggregate Concrete¹

This standard is issued under the fixed designation C938; 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.

1. Scope*

1.1 This practice describes the laboratory procedure for selecting proportions for grout mixtures required in the production of preplaced-aggregate (PA) concrete.

1.2 The values stated in SI units are to be regarded as standard. The values given in parentheses after SI units are provided for information only and are not considered 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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*²

- C125 Terminology Relating to Concrete and Concrete Aggregates
- C150/C150M Specification for Portland Cement
- C185 Test Method for Air Content of Hydraulic Cement Mortar
- C219 Terminology Relating to Hydraulic Cement
- C618 Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
- C637 Specification for Aggregates for Radiation-Shielding Concrete
- C937 Specification for Grout Fluidifier for Preplaced-Aggregate Concrete

¹ This practice is under the jurisdiction of ASTM Committee C09 on Concrete and Concrete Aggregates and is the direct responsibility of Subcommittee C09.41 on Hydraulic Cement Grouts.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

- C939/C939M Test Method for Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method)
- C940 Test Method for Expansion and Bleeding of Freshly Mixed Grouts for Preplaced-Aggregate Concrete in the Laboratory
- C941 Test Method for Water Retentivity of Grout Mixtures for Preplaced-Aggregate Concrete in the Laboratory
- C942 Test Method for Compressive Strength of Grouts for Preplaced-Aggregate Concrete in the Laboratory
- C943 Practice for Making Test Cylinders and Prisms for Determining Strength and Density of Preplaced-Aggregate Concrete in the Laboratory

3. Terminology

3.1 *Definitions:*

3.1.1 For definitions of terms used in this test method, refer to Terminologies C125 and C219.

4. Summary of Practice

4.1 Grouts at fluid consistency are prepared from one or more mixtures of cement, pozzolan, fine aggregate, grout fluidifier, with or without other chemical admixtures, and water, and tested to determine:

- 4.1.1 The properties of the grout, and
- 4.1.2 The properties of PA concrete made with the grout when the grout is intended for such use.

4.2 The procedure and equipment required for mixing this grout are prescribed in this practice.

5. Significance and Use

5.1 This practice provides a standard procedure for selecting proportions for mixtures of grout to be used at fluid consistency in the production of PA concrete meeting applicable criteria for strength, density, and other properties.

5.2 This practice is also useful for determining the composition of grout mixed at fluid consistency and meeting specified requirements for filling voids, cavities, and spaces in rock, foundations, and concrete structures.

6. Apparatus

6.1 *Mixer*—Use a mixer specified by the manufacturer of the grout. In absence of manufacturer's mixer

*A Summary of Changes section appears at the end of this standard

recommendation, use the following constructed apparatus as shown in Fig. 1 (See Note 1). The three mixer blades shall be made of steel plate, 3-mm ($\frac{1}{8}$ -in.) thick, with a 100- by 125-mm (4- by 5-in.) elliptical shape. Each blade shall have two 25- by 75-mm (1 by 3-in.) slots centered on the major axis, and shall be welded to the shaft at an angle of approximately 23° with the horizontal in such a way as to force grout to the bottom of the mixer during rotation. The mixer blades shall be powered to rotate at approximately 275 r/min under load.

6.2 Scales or Balance, accurate to within 0.3 % of the test mass at any point within range of use.

NOTE 1—The type of mixer used for mixing the grout may affect test results.

6.3 Jaw Caliper, capable of measuring up to 300 mm with a resolution of at least 0.1 mm.

7. Materials

7.1 Materials for test purposes, except mixing water, shall meet the following requirements unless otherwise specified in project documents:

7.1.1 Portland cement, Specification C150/C150M, nonair-entraining,

7.1.2 Pozzolan, if used, Specification C618,

7.1.3 Fluidifier, Specification C937, and

7.1.4 Fine aggregate, Specification C637, Table number 2, Grading 1 for relative density under 3.0 and Grading 2 for specific activity 3.0 or heavier.

7.2 Where grout is being proportioned for use on a specific project, materials for test purposes shall be from and representative of the same source or type and description as will be used or is being considered for use on the project.

7.3 Mixing water, if clean and potable, is acceptable for normal test purposes.

8. Sampling

8.1 Samples of mixed grout for testing shall be representative of the batch from which they are drawn.

8.2 Agitation of the batch shall be continuous until all samples required from that batch have been drawn.

8.3 Grout in the mixer shall not be retempered by the addition of water. If mixing water is added in increments to adjust fluidity, a new batch shall be prepared for testing.

8.4 Samples shall be drawn for testing in the following order: (1) consistency, (2) expansion and bleeding, and (3), other requirements.

9. Conditioning

9.1 Maintain laboratory at and bring all grout materials to $23.0 \pm 2.0^\circ\text{C}$ unless otherwise specified.

10. Procedure

10.1 Prebatch grout ingredients by mass to provide a batch volume after mixing of approximately 0.03 m^3 .

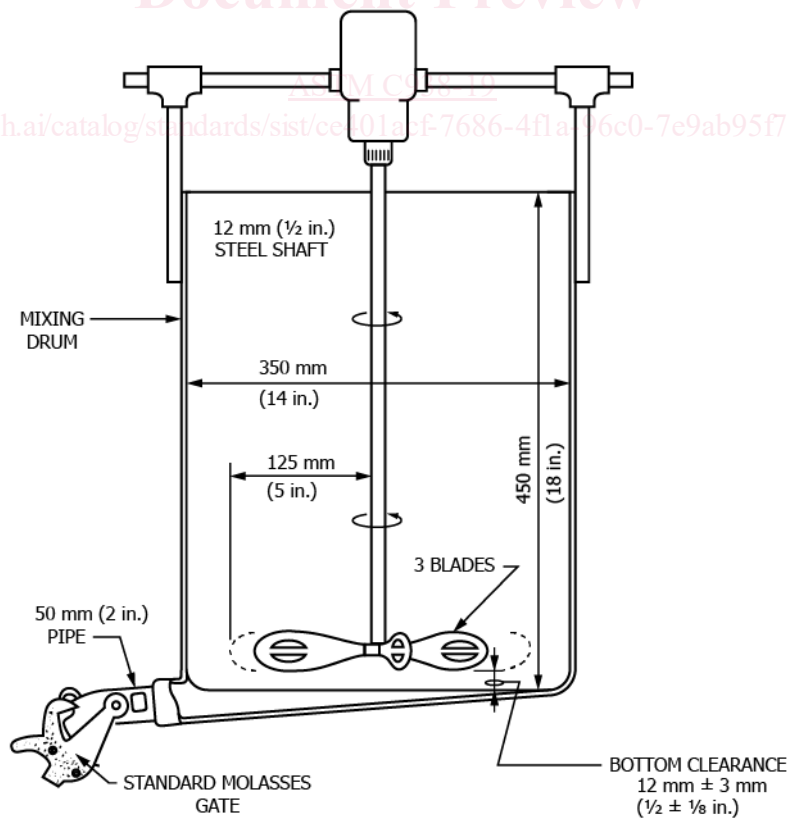


FIG. 1 Grout Mixer