



Designation: C 1107 – 05

## Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)<sup>1</sup>

This standard is issued under the fixed designation C 1107; 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 ( $\epsilon$ ) 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 specification covers packaged dry, hydraulic cement grout (nonshrink) intended for use under applied load (such as to support a structure, a machine, and the like) where a change in height below initial placement height is to be avoided.

1.2 Grouts covered are composed of hydraulic cement, fine aggregate, and other ingredients. They require only the addition of mixing water for use.

1.3 The values stated in SI units are to be regarded as the standard. The inch-pound units in parenthesis are for information only. Values in SI units shall be obtained by measurement in SI units or by appropriate conversion of measurements made in other units, using the Rules of Conversion and Rounding given in IEEE/ASTM SI-10.

1.4 The following safety hazards caveat pertains only to the test method portion of this specification: *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*:<sup>2</sup>

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

**C 125** Terminology Relating to Concrete and Concrete Aggregates

**C 138/C 138M** Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete

**C 157/C 157M** Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete

**C 185** Test Method for Air Content of Hydraulic Cement Mortar

**C 305** Practice for Mechanical Mixing of Hydraulic Cement Pastes and Mortars of Plastic Consistency

**C 702** Practice for Reducing Samples of Aggregate to Testing Size

**C 827** Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures

**C 939** Test Method for Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method)

**C 1090** Test Method for Measuring Change in Height of Cylindrical Specimens for Hydraulic-Cement Grout

**C 1437** Test Method for Flow of Hydraulic Cement Mortar

**IEEE/ASTM SI-10** Standard for Use of the International System of Units (SI): The Modern Metric System

### 3. Terminology

3.1 *Definitions of Terms Specific to This Standard*:

3.1.1 *Consistency*:

3.1.2 *flowable, adj*—a grout consistency having a flow of 125 to 145 by the flow test in accordance with the applicable provisions of Test Method **C 1437**; the flow after 5 drops of the flow table in 3 s.

3.1.3 *fluid, adj*—a grout consistency having a time of efflux of 10 to 30 s when tested by the flow cone procedure of Test Method **C 939**.

3.1.4 *plastic, adj*—a grout consistency having a flow of 100 to 125 by the flow test in accordance with the applicable provisions of Test Method **C 1437**; the flow after 5 drops of the flow table in 3 s.

3.2 *Description of Terms Found in Terminology C 125*:

3.2.1 *grout (nonshrink), hydraulic-cement, n*—a hydraulic-cement grout that produces a volume that, when hardened under stipulated test conditions, is greater than or equal to the original installed volume; often used as a transfer medium between load-bearing members.

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee C09 on Concrete and Concrete Aggregates and is the direct responsibility of Subcommittee C09.43 on Packaged Dry Combined Materials.

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

#### 4. Ordering Information

4.1 When the purchaser specifies that properties of the packaged, dry grout meet the requirements of this specification, also specify which, if any, of the optional requirements apply.

4.2 When the grout is to be used in contact with stressed tendons or other corrosion-sensitive, load-bearing structural members, the purchaser shall supply this information to the manufacturer and obtain assurances that the material meets relevant chloride, nitrite, nitrate, sulfide, and sulfate requirements, and any other material limitations imposed by the applicable codes and standards (Note 1).

4.3 When the grout is to be used in abnormal or aggressive environments, the purchaser shall supply this information to the manufacturer and obtain assurance that the grout has a successful history of performance in the same or similar exposures.

NOTE 1—Since all conditions of use cannot be anticipated, this specification requires nonshrink grout to exhibit no shrinkage when tested in a laboratory-controlled, moist-cured environment, and requires only the reporting of the observed height change, usually shrinkage, when test specimens are subjected to some degree of drying. It is suggested that users consult with manufacturers on specific applications to determine the applicability of specific test results.

#### 5. Materials

5.1 The materials used as ingredients in packaged, dry, grout include hydraulic cement, fine aggregate, and other ingredients.

#### 6. Performance Requirements

6.1 Specimens shall be made from freshly mixed grout and from grout that has been retained in the mixer for the maximum usable working time allowed by the manufacturer. Specimens from both conditions shall meet the requirements prescribed in Table 1.

6.2 Specimens shall be prepared using materials and equipment at temperatures representing the maximum and minimum usable temperatures specified by the manufacturer for his product. Specimens from both conditions shall meet the requirements prescribed in Table 1, except that the compressive-strength requirements do not have to be met at minimum usable temperature.

6.3 Specimens for testing shall be prepared by combining the use of grout retained in the mixer as in 6.1 with the

minimum and maximum as mixed and curing temperatures used in 6.2. Specimens from these combinations of conditions shall meet the requirements of Table 1, except that the compressive-strength requirements do not have to be met at minimum usable temperature.

6.4 All test specimens for performance evaluation shall be prepared using the highest water to solids ratio suggested by the manufacturer for his product.

#### 7. Sampling

7.1 Use whole packages of grout selected at random from the lot of grout to be examined.

7.2 Where lesser quantities of grout will serve the purpose, select 3000 g (7 lb) of dry grout from a whole package in accordance with the mechanical-splitter method in Practice C 702. For high-density grouts, adjust the mass to provide an equivalent volume.

#### 8. Batching

8.1 Grout mixtures shall be produced in the following conditions:

8.1.1 Batch grout mixtures at temperature conditions corresponding to the maximum recommended temperature limit and at a temperature corresponding to the minimum temperature stated by the manufacturer.

8.1.2 For standard temperature testing, maintain the grout mixture and the testing equipment at a temperature of  $23 \pm 3$  °C ( $73 \pm 5$  °F).

8.2 Bring all materials and equipment to be used in preparing test specimens to the specified test temperature,  $\pm 3$  °C ( $\pm 5$  °F) prior to use.

8.2.1 When the controlled-environment test room is too small to accommodate large equipment, immediately prior to use, bring the mixer to the desired testing temperature by filling it with water at the appropriate temperature and agitating it by turning the mixer on. When this water has stabilized at the desired temperature, discard it and start preparing the batch immediately.

8.3 The manufacturer is not prohibited from including, in the package instructions, procedures for adjusting the mixing water temperature to achieve limitations imposed on the grout use temperatures. Use of this technique shall not abrogate the extended mixing time requirement of this specification.

#### 9. Proportioning

9.1 The minimum and maximum amount of water recommended by the manufacturer on the package shall be used to determine conformance with the requirements of this specification. If the manufacturer provides maximum flow (thinnest consistency) information on the package, conduct consistency tests to an accuracy of  $\pm 5$  % to determine the amount of water to be added for testing. In either case, express the weight of water so determined as a ratio of water to dry grout material by weight. If both are given, make tests at whichever involves the larger amount of water by ratio of dry grout mixture.

#### 10. Mixing

10.1 Apparatus:

**TABLE 1 Performance Requirements**

Compressive Strength, min	MPa	(psi)
1 day <sup>A</sup>	7.0	(1000)
3 day	17.0	(2500)
7 day	24.0	(3500)
28 day	34.0	(5000)
Early Age Height Change Max % @ Final Set		+ 4.0
Height Change of Moist Cured Hardened Grout at 1, 3, 14 and 28 Days		
Maximum, %		+ 0.3
Minimum, %		0.0

<sup>A</sup> When required, the purchaser must so specify in the purchase contract.