



## Standard Specification for Grout for Masonry<sup>1</sup>

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

### 1. Scope

1.1 This specification covers two types of grout, fine and coarse grout, for use in the construction of masonry structures. Grout is specified by: (1) proportions or (2) strength requirements.

1.2 The text of this specification references notes and footnotes that provide explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of this specification.

### 2. Referenced Documents

#### 2.1 ASTM Standards:

- C 5 Specification for Quicklime for Structural Purposes<sup>2</sup>
- C 143/C 143M Test Method for Slump of Hydraulic-Cement Concrete<sup>3</sup>
- C 150 Specification for Portland Cement<sup>2</sup>
- C 207 Specification for Hydrated Lime for Masonry Purposes<sup>2</sup>
- C 260 Specification for Air-Entraining Admixtures for Concrete<sup>3</sup>
- C 404 Specification for Aggregates for Masonry Grout<sup>4</sup>
- C 595 Specification for Blended Hydraulic Cements<sup>2</sup>
- C 618 Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete<sup>2</sup>
- C 989 Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars<sup>3</sup>
- C 1019 Test Method for Sampling and Testing Grout<sup>4</sup>
- C 1157 Performance Specification for Hydraulic Cement<sup>2</sup>

### 3. Materials

3.1 Materials used as ingredients in grout shall conform to the requirements specified in 3.1.1-3.1.8.

3.1.1 *Cementitious Materials*—Cementitious materials shall conform to one of the following specifications:

3.1.1.1 *Portland Cement*—Type I, IA, II, IIA, III, and IIIA of Specification C 150.

3.1.1.2 *Blended Cements*—Type IS, IS(MS), IS-A, IS-A(MS), IP, or IP-A of Specification C 595 or types GU, HE, MS, or HS of Specification C 1157.

3.1.1.3 *Quicklime*—Specification C 5.

3.1.1.4 *Hydrated Lime*—Type S of Specification C 207.

3.1.1.5 *Coal Fly Ash or Raw Calcined Natural Pozzolan*—Specification C 618. Addition rates shall be in an amount governed by the portland-pozzolan cement category of Specification C 595. The grout produced with blends of portland cement and fly ash or raw calcined natural pozzolan shall have the compressive strength specified (5.2).

3.1.1.6 *Granulated Blast Furnace Slag*—Specification C 989. Addition rates shall be as governed by the portland blast furnace slag cement category of Specification C 595. Grouts produced with blends of portland cement and granulated blast furnace slag shall have the compressive strength specified (5.2).

3.1.2 *Air-Entraining Admixtures*—Air-entraining admixtures shall conform to Specification C 260.

3.1.3 *Aggregates*—Aggregates shall conform to Specification C 404.

3.1.4 *Water*—Water shall be clean and potable.

3.1.5 *Admixtures*—Integral waterproofing compounds, accelerators, or other admixtures not mentioned definitely in the specification shall not be used in grout for use in reinforced masonry without approval from the purchaser.

3.1.6 *Pumping Aids*—Pumping aids are permitted to be used in cases where the brand, quality, and quantity are approved in writing by the purchaser or are definitely stipulated in the specification.

3.1.7 *Antifreeze Compounds*—No antifreeze liquids, salts, or other substances shall be used in grout to lower the freezing point.

3.1.8 *Storage of Materials*—Cementitious materials and aggregates shall be stored in such a manner as to prevent deterioration or intrusion of foreign material or moisture. Any material that has become unsuitable for good construction shall not be used.

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 04.01.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 04.02.

<sup>4</sup> *Annual Book of ASTM Standards*, Vol 04.05.

NOTE 1—If the grout is to be used to bond masonry units to reinforcing

**TABLE 1 Grout Proportions by Volume**

Type	Parts by Volume of Portland Cement or Blended Cement	Parts by Volume of Hydrated Lime or Lime Putty	Aggregate, Measured in a Damp, Loose Condition	
			Fine	Coarse
Fine grout	1	0– $\frac{1}{10}$	$2\frac{1}{4}$ –3 times the sum of the volumes of the cementitious materials	...
Coarse grout	1	0– $\frac{1}{10}$	$2\frac{1}{4}$ –3 times the sum of the volumes of the cementitious materials	1–2 times the sum of the volumes of the cementitious materials

bars, the use of air-entraining materials or air-entraining admixtures is not recommended.

#### 4. Measurement and Mixing

4.1 *Measurement of Materials*—The method of measuring materials for the grout used in construction shall be such that the specified proportions of the grout materials can be controlled and accurately maintained.

NOTE 2—The weights per cubic foot of the materials are as follows:

Material	Weight, lb/ft <sup>3</sup> (kg/m <sup>3</sup> )
Portland cement	94 (1504)
Blended cement	weight printed on bag
Hydrated lime	40 (640)
Lime putty <sup>A</sup>	80 (1281)
Sand, damp and loose	80 (1281) of dry sand

<sup>A</sup> All quicklime should be slaked in accordance with the manufacturer's directions. All quicklime putty, except pulverized quicklime putty, should be sieved through a No. 20 (850- $\mu$ m) sieve and allowed to cool until it has reached a temperature of 80°F (26.7°C). Quicklime putty should weigh at least 80 lb/ft<sup>3</sup>. Putty that weighs less than this may be used in the proportion specifications if the required quantity of extra is added to meet the minimum weight requirements.

4.2 *Mixing of Materials*—Grout shall consist of cementitious material and aggregate (conforming to the requirements specified in Section 2) that have been mixed thoroughly for a minimum of 5 min in a mechanical mixer (Note 3) with sufficient water to bring the mixture to the desired consistency.

NOTE 3—Hand mixing of the grout may be permitted on small jobs,

with the written approval of the purchaser outlining the hand mixing procedure.

#### 5. Grout

5.1 Grout type shall be specified and shall meet one of the following:

5.1.1 Fine grout shall be manufactured with fine aggregates (Specification C 404).

5.1.2 Course grout shall be manufactured with a combination of coarse and fine aggregates (Specification C 404).

NOTE 4—Building Code provisions and grout space dimensions should be reviewed in selecting grout type or types.

5.2 The grout shall be either proportioned in accordance with the requirements of Table 1 or the compressive strength of grout shall be specified. When compressive strength is specified, the grout shall be mixed to a slump of 8 to 11 in. (200 to 280 mm) as determined by Test Method C 143/C 143M and shall have a minimum compressive strength of 2000 psi (14 MPa) at 28 days when sampled and tested in accordance with Test Method C 1019.

NOTE 5—Building Code provisions should be reviewed in selecting the specified compressive strength of grout.

#### 6. Keywords

6.1 aggregates; cement; compressive strength; grout; masonry; portland cement; proportions

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