



Standard Specification for Grout for Masonry¹

This standard is issued under the fixed designation C 476; 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 reappraisal. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reappraisal.

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.

1.3 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

2. Referenced Documents

2.1 ASTM Standards:²

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

¹ This specification is under the jurisdiction of ASTM Committee C12 on Mortars and Grouts for Unit Masonry and is the direct responsibility of Subcommittee C12.05 on Grout & Grout Admixtures for Masonry.

Current edition approved Aug. 1, 2008. Published September 2008. Originally approved in 1961. Last previous edition approved in 2007 as C 476 – 07.

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.

C 1157 Performance Specification for Hydraulic Cement

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 (4.2.2).

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 (4.2.2).

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.

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

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

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.

NOTE 1—If the grout is to be used to bond masonry units to reinforcing bars, the use of air-entraining materials or air-entraining admixtures is not recommended.

4. Grout Type and Proportions

4.1 *Type*—Grout type shall be specified as fine or coarse.

4.1.1 Fine grout shall be manufactured with fine aggregates.

4.1.2 Coarse grout shall be manufactured with a combination of coarse and fine aggregates.

NOTE 2—Building code provisions and grout space dimensions should be reviewed when selecting grout type or types.

4.2 *Proportions of Ingredients*—Grout proportions shall be determined by one of the following methods:

4.2.1 Requirements of **Table 1**.

4.2.2 *Specified Compressive Strength*—Proportions established by 28-day compressive strength tests in accordance with Test Method **C 1019** that obtain the specified compressive strength. 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.

NOTE 3—Building code provisions should be reviewed when selecting the specified compressive strength of grout.

5. Measurement and Production

5.1 *Measurement of Materials*—Measure materials for grout such that the required proportions of the grout materials are controlled and accurately measured.

NOTE 4—When converting volume proportions to batch weights, use the following material bulk densities:

Material	Weight, lb/ft ³ (kg/m ³)
Portland cement	94 (1505)
Blended cement	Obtain from bag or supplier

Other cementitious materials	Obtain from bag or supplier
Hydrated lime	40 (640)
Lime putty ^A	80 (1280)
Sand, damp and loose	80 (1280) of dry sand
Coarse aggregate	Refer to C 404 to determine weight per cubic foot.

^A 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- μ 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/ft³ (281 kg/m³). Putty that weighs less than this may be used in the proportions specifications if the required quantity of extra putty is added to meet the minimum weight requirements.

5.2 *Production Methods*—Grout shall be produced using one of the following procedures:

5.2.1 *Grout Materials Mixed with Water at the Job Site:*

5.2.1.1 Individual cementitious materials and aggregates stored at the job site shall be mixed in a mechanical mixer for a minimum of 5 min with sufficient water to achieve the desired consistency.

5.2.1.2 Individual ingredients transported to the job site in suitable compartments shall be mixed with water at the job site using continuous volumetric proportioning equipment to achieve the desired consistency. Mix with an auger of appropriate length to provide adequate mixing.

5.2.1.3 Factory pre-blended grout materials delivered to the job site shall be mixed in a mechanical batch mixer for a minimum of 5 min or in a continuous mixer following mixer manufacturer's recommendation with sufficient water to achieve the desired consistency.

NOTE 5—Grout may be hand-mixed on small jobs with written approval of the mixing procedure by the specifier.

5.2.2 *Ready-Mixed Grout Transported to the Job Site:*

5.2.2.1 Ready-mixed grout shall arrive at the job site in a ready-mixed condition. Slump shall be adjusted as necessary, and grout shall be re-mixed at mixing speed for at least 1 min before discharging to achieve the desired consistency.

6. Keywords

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

SUMMARY OF CHANGES

Committee C12 has identified the location of selected changes to this standard since the last issue (C 476 – 07) that may impact the use of this standard. (Approved Aug. 1, 2008.)

(I) Subsection 5.2.1.3 was modified to allow the use of a continuous mixer.

Committee C12 has identified the location of selected changes to this standard since the last issue (C 476 – 02) that may impact the use of this standard. (Approved Aug. 1, 2007.)

(I) Section 5.2 was modified and reorganized to delineate those production methods in which water is added at the job site from those methods in which the water is added at another location.

ASTM International takes no position respecting the validity of any patent rights asserted in connection with any item mentioned in this standard. Users of this standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, are entirely their own responsibility.

This standard is subject to revision at any time by the responsible technical committee and must be reviewed every five years and if not revised, either reapproved or withdrawn. Your comments are invited either for revision of this standard or for additional standards and should be addressed to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend. If you feel that your comments have not received a fair hearing you should make your views known to the ASTM Committee on Standards, at the address shown below.

This standard is copyrighted by ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, United States. Individual reprints (single or multiple copies) of this standard may be obtained by contacting ASTM at the above address or at 610-832-9585 (phone), 610-832-9555 (fax), or service@astm.org (e-mail); or through the ASTM website (www.astm.org).