



Designation: C 1329 – 04

Standard Specification for Mortar Cement¹

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1. Scope

1.1 This specification covers three types of mortar cement for use where mortar for masonry is required.

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

1.3 The text of this standard refers to notes and footnotes which provide explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of the standard.

1.4 The following safety hazards caveat pertains only to Section 16. *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. (Warning—Fresh hydraulic cementitious mixtures are caustic and may cause chemical burns to skin and tissue upon prolonged exposure.)*²

2. Referenced Documents

2.1 ASTM Standards:³

- C 91 Specification for Masonry Cement
- C 109/C 109M Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or 50-mm Cube Specimens)
- C 128 Test Method for Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate
- C 140 Test Methods for Sampling and Testing Concrete Masonry Units and Related Units

- C 151 Test Method for Autoclave Expansion of Portland Cement
- C 183 Practice for Sampling and the Amount of Testing of Hydraulic Cement
- C 185 Test Method for Air Content of Hydraulic Cement Mortar
- C 187 Test Method for Normal Consistency of Hydraulic Cement
- C 188 Test Method for Density of Hydraulic Cement
- C 219 Terminology Relating to Hydraulic Cement
- C 230/C 230M Specification for Flow Table for Use in Tests of Hydraulic Cement
- C 266 Test Method for Time of Setting of Hydraulic-Cement Paste by Gillmore Needles
- C 305 Practice for Mechanical Mixing of Hydraulic Cement Pastes and Mortars of Plastic Consistency
- C 430 Test Method for Fineness of Hydraulic Cement by the 45- μ m (No. 325) Sieve
- C 511 Specification for Mixing Rooms, Moist Cabinets, Moist Rooms, and Water Storage Tanks Used in the Testing of Hydraulic Cements and Concretes
- C 778 Specification for Standard Sand
- C 780 Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry
- C 1072 Test Method for Measurement of Masonry Flexural Bond Strength
- C 1357 Test Methods for Evaluating Masonry Bond Strength
- C 1506 Test Method for Water Retention of Hydraulic Cement-Based Mortars and Plasters
- IEEE/ASTM SI 10 Standard for Use of the International System of Units (SI): The Modern Metric System

3. Terminology

3.1 *Definitions*—Terms used in this specification are defined in Terminology C 219.

3.2 Definition of Term Specific to This Standard:

3.2.1 *mortar cement*—a hydraulic cement, primarily used in masonry construction, consisting of a mixture of portland or blended hydraulic cement and plasticizing materials (such as limestone or hydrated or hydraulic lime), together with other

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² *Annual Book of ASTM Standards*, Vol 04.01. See the section on Safety Precautions in the Manual of Cement Testing.

³ 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.

materials introduced to enhance one or more properties such as setting time, workability, water retention, and durability.

3.2.1.1 *Discussion*—Mortar cement is similar to masonry cement in use and function (See Specification C 91). However, this specification requires lower air contents and includes a flexural bond strength requirement.

4. Classification

4.1 Mortar cements are classified as Type N, S, or M, according to the physical requirements prescribed in Table 1.

5. Physical Properties

5.1 Mortar cement shall conform to the applicable requirements prescribed in Table 1 for its classification.

6. Sampling

6.1 At the option of the purchaser, the cement shall be sampled and tested to verify compliance with this specification, sampling and testing shall be performed in accordance with Practice C 183.

6.2 Practice C 183 is not designed for manufacturing quality control and is not required for manufacturer's certification.

7. Temperature and Humidity

7.1 The temperature and relative humidity of the air in the vicinity of the mixing slab and dry materials, molds, base plates, and mixing bowl shall conform to the requirements of Test Method C 109/C 109M.

7.2 The moist cabinet or moist room shall conform to the requirements of Specification C 511.

8. Fineness

8.1 Determine the residue on the 45- μ m (No. 325) sieve in accordance with Test Method C 430.

9. Normal Consistency

9.1 Determine the normal consistency by the Vicat apparatus in accordance with Test Method C 187.

10. Autoclave Expansion

10.1 Determine the autoclave expansion in accordance with Test Method C 151. After molding, store the bars in the moist

cabinet or room for 48 h \pm 30 min before removal from the molds for measurement and testing in the autoclave. Calculate the difference in length of the test specimen before and after autoclaving to the nearest 0.01 % of the effective gage length, and report as the autoclave expansion of the mortar cement.

11. Time of Setting

11.1 Determine the time of setting by the Gillmore needle method in accordance with Test Method C 266.

12. Density

12.1 Determine the density of the mortar cement in accordance with Test Method C 188, using kerosine as the liquid. Use the density so determined in the calculation of the air content of the mortars.

13. Blended Sand

13.1 The sand shall be a blend of equal parts by weight of graded standard sand and 20–30 standard sand conforming to Specification C 778.

14. Preparation of Mortar

14.1 *Proportions for Mortar*—Mortar for air entrainment, compressive strength, and water retention tests shall be proportioned to contain 1620 g of sand and a mass of cement, in grams, as indicated in Table 2. The sand shall consist of 810 g of graded standard sand and 810 g of 20-30 standard sand (Note 1). The quantity of water, measured in millilitres, shall be such as to produce a flow of 110 \pm 5 as determined by Test Method C 109/C 109M.

NOTE 1—Historically, field-mixed mortar has been proportioned by volume measured in increments or fractions of 1 ft³. The comparable whole SI-unit volume to 1 ft³ is 28 L. The specified mortar proportions approximate the 1:3 nominal proportions by volume, commonly specified for construction, on the basis of the following assumed mass and volume relationships:

- The mass of dry sand in 28 L of loose damp sand is 36 kg.
- 28 L of Type N mortar cement has a mass of 32 kg.
- 28 L of Type S mortar cement has a mass of 34 kg.
- 28 L of Type M mortar cement has a mass of 36 kg.

For example, the amount of cement needed to provide a 1:3 volume proportion of cement to sand using a Type N mortar cement is calculated as follows:

TABLE 1 Physical Requirements

Mortar Cement Type	N	S	M
Fineness, residue on a 45- μ m (No. 325) sieve, max, %	24	24	24
Autoclave expansion, max, %	1.0	1.0	1.0
Time of setting, Gillmore method:			
Initial set, min, not less than	120	90	90
Final set, min, not more than	1440	1440	1440
Compressive strength (average of three cubes):			
The compressive strength of mortar cubes, composed of 1 part cement and 3 parts blended sand (half graded standard sand and half standard 20–30 sand) by volume, prepared and tested in accordance with this specification, shall be equal to or higher than the values specified for the ages indicated below:			
7 days, MPa (psi)	3.5 (500)	9.0 (1300)	12.4 (1800)
28 days, MPa (psi)	6.2 (900)	14.5 (2100)	20.0 (2900)
Flexural bond strength			
28 days, min, MPa (psi)	0.5 (70)	0.7 (100)	0.8 (115)
Air content of mortar:			
Min, volume %	8	8	8
Max, volume %	17	15	15
Water retention value, min, %, of original flow	70	70	70