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Standard Specification for Packaged, Dry, Combined Materials for Mortar and Concrete[1]

This standard is issued under the fixed designation C387/C387M; 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 specification covers the production, properties, packaging, and testing of packaged, dry, combined materials for concrete and mortars. The classifications of concrete and mortar covered are defined in Section 3.

1.2 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

1.3 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:*[2]

C33 Specification for Concrete Aggregates
C39/C39M Test Method for Compressive Strength of Cylindrical Concrete Specimens
C91 Specification for Masonry Cement
C109/C109M Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens)
C125 Terminology Relating to Concrete and Concrete Aggregates
C138/C138M Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
C143/C143M Test Method for Slump of Hydraulic-Cement Concrete
C144 Specification for Aggregate for Masonry Mortar
C150 Specification for Portland Cement
C173/C173M Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
C185 Test Method for Air Content of Hydraulic Cement Mortar
C192/C192M Practice for Making and Curing Concrete Test Specimens in the Laboratory
C207 Specification for Hydrated Lime for Masonry Purposes
C231 Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
C260 Specification for Air-Entraining Admixtures for Concrete
C270 Specification for Mortar for Unit Masonry
C305 Practice for Mechanical Mixing of Hydraulic Cement Pastes and Mortars of Plastic Consistency
C330 Specification for Lightweight Aggregates for Structural Concrete
C494/C494M Specification for Chemical Admixtures for Concrete
C566 Test Method for Total Evaporable Moisture Content of Aggregate by Drying
C595 Specification for Blended Hydraulic Cements
C618 Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
C702 Practice for Reducing Samples of Aggregate to Testing Size
C989 Specification for Slag Cement for Use in Concrete and Mortars
C1157 Performance Specification for Hydraulic Cement
C1240 Specification for Silica Fume Used in Cementitious Mixtures

[1] 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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[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.

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

C1329 Specification for Mortar Cement
C1437 Test Method for Flow of Hydraulic Cement Mortar
C1438 Specification for Latex and Powder Polymer Modifiers for Hydraulic Cement Concrete and Mortar
C1506 ~~Test Method for Water Retention of Hydraulic Cement-Based Mortars and Plasters~~
E96/E96M~~Test Methods for Water Vapor Transmission of Materials~~ Test Method for Water Retention of Hydraulic Cement-Based Mortars and Plasters

3. Terminology

3.1 *Definitions*—For definitions of terms used in this specification, refer to Terminology C125.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *concrete, high-early strength*, *n*—~~in packaged, dry, combined materials, a product for building and repair requiring a more rapid than normal strength development such as required for the earlier removal of forms.~~ —in packaged, dry, combined materials, a product for building and repair requiring a more rapid than normal strength development.

3.2.1.1 *Discussion*—This product allows for earlier removal of forms and allows concrete projects to be put into service much sooner than with normal strength concrete.

3.2.2 *concrete, normal strength*, *n*—in packaged, dry, combined materials, a product for general building and repair where thickness exceeds 50 mm [2 in.].

3.2.2.1 *Discussion*—Typical uses include building or repairing sidewalks, patios, steps, footings, and for setting posts.

3.2.3 *concrete, normal strength, lightweight*, *n*—in packaged, dry, combined materials, a concrete product for building and repair where the lightest concrete density is desirable.

3.2.3.1 *Discussion*—These mixtures will produce concrete that is about 25 to 35 % lower in density than normal weight concrete.

3.2.4 *concrete, normal strength, lightweight using normal weight sand*, *n*—in packaged, dry, combined materials, a concrete product for building and repair where a lower density is desirable.

3.2.4.1 *Discussion*—These mixtures will produce concrete that is about 15 to 25 % lower in density than normal weight concrete.

3.2.5 *mortar for unit masonry*, *n*—in packaged, dry, combined materials, a packaged mortar for laying brick, block, and stone, and for masonry repairs.

3.2.5.1 *Discussion*—These products are packaged versions of the masonry mortars that are specified in Specification C270.

3.2.6 *mortar, high-strength*, *n*—in packaged, dry, combined materials, a product for building or repair requiring a thickness of less than 50 mm [2 in.], or where a high strength mortar mixture is required.

3.2.6.1 *Discussion*—Typical uses include topping and patching existing concrete structures. Often referred to as "sand mix."

4. Ordering Information

4.1 The purchaser shall specify the material desired as concrete, high strength mortar, or mortar for use with unit masonry, and the respective physical requirements as specified in Table 1 shall govern.

5. Materials

5.1 Materials used as ingredients in packaged, dry, combined materials for mortar and concrete shall conform to at least one of the following requirements:

5.1.1 *Aggregates*, shall conform to Specification C33, Specification C144, or Specification C330.

5.1.2 *Air-Entraining Admixtures*, shall conform to Specification C260.

TABLE 1 Physical Requirements

Kind of Material	Compressive Strength, MPa [psi] min		
	3 days	7 days	28 days
Concrete:			
High-early strength	17.0 [2500]	24.0 [3500]	. . .
Normal strength:			
Normal weight	. . .	17.0 [2500]	24.0 [3500]
Lightweight using normal weight sand[A]	. . .	17.0 [2500]	24.0 [3500]
Lightweight	. . .	17.0 [2500]	24.0 [3500]
Mortar:			
High-strength mortar		20.0 [3000]	35.0 [5000]
Mortar for unit masonry:			
Type M		Shall comply with property requirements of Specification C270[B]	
Type S			
Type N			

[A] Lightweight concrete using normal weight sand may contain some portion of lightweight fines.

[B] The performance requirements for 28-day compressive strength, water retention, and air content are those for mortars made from masonry cement unless otherwise specified. Manufacturers wishing to comply with the air content requirements for mortar-cement mortar or cement-lime mortar must specify the ingredients used and comply with the applicable portions of Specification C270.

5.1.3 *Blended Cement*, shall conform to Specification C595 or Performance Specification C1157.
5.1.4 *Chemical Admixtures*, shall conform to Specification C494/C494M.
5.1.5 *Flyash*, shall conform to Specification C618.
5.1.6 *Ground Granulated Blast-Furnace Slag*, shall conform to Specification C989.
5.1.7 *Hydrated Lime*, shall conform to Type S or Type SA of Specification C207.
5.1.8 *Latex and Powder Polymer Modifiers*, shall conform to Specification C1438.

NOTE 1—Type II latex polymers should not be used in applications that may be more than superficially wet in service.

5.1.9 *Masonry Cement*, shall conform to Specification C91.
5.1.10 *Mortar Cement*, shall conform to Specification C1329.
5.1.11 *Portland Cement*, shall conform to Type I, IA, II, IIA, III or IIIA of Specification C150.
5.1.12 *Silica Fume*, shall conform to Specification C1240.

6. Preparation of Aggregate

6.1 All aggregates prepared in the laboratory for the purpose of establishing the correct proportions for the product shall be dried, without disintegration, to a moisture content of less than 0.1 % by mass. Verify moisture content using a ventilated oven in accordance with Test Method C566.

7. Proportioning

7.1 The proportions of cementitious material and aggregate shall be such that the strength requirements will be met when an amount of mixing water is used that produces for concrete the slump specified in ~~13.3~~ 14.3 and for mortar the flow specified in ~~15.2~~16.2.

8. Physical Properties

8.1 Packaged, dry, combined materials for concrete, high strength mortar, and mortar for use with unit masonry shall conform to the respective physical requirements as given in Table 1 for the material specified when the prescribed amount of water is added.

9. Packaging and Package Marking

9.1 All packages shall be identified as conforming to Specification C387, and as to kind and type of material listed in Table 1 and the net mass in each bag printed thereon.

9.2 The yield in liters (or cubic feet), and the amount of water recommended for mixing shall be marked on the package.

NOTE 2—The amount of water recommended should be the amount required to produce a slump of 50 to 75 mm [2 to 3 in.].

9.3 *Container Construction*—~~The material from which the containers are made shall have water vapor transmission not greater than 100 g/m^2 in 24 h as determined in accordance with Procedure B of Test Methods E96/E96M. The strength of the container shall be adequate for the mass of concrete or mortar it is intended to contain.~~ —The strength of the container shall be adequate for the mass of concrete or mortar it is intended to contain.

10. Rejection

10.1 The purchaser has the right to reject material that fails to conform to the requirements of this specification. Rejection shall be reported to the Producer or supplier promptly and in writing.

10.2 The purchaser has the right to reject product in damaged or dampened containers.

11. Storage

11.1 Product must be stored in a dry area and shall not be stored in direct contact with the ground or floor.

SAMPLING AND TESTING

~~11.~~

12. Accuracy of Measurement

~~11.1Use~~12.1 Use scales conforming to the applicable sections of *Handbook 44*.[3] New and reconditioned scales shall be accurate to ±0.1 % of the total capacity of the scale. When scales have been in use, they shall be accurate to ±0.4 % of the total capacity of the scale.

1~~1~~2.2 Record the mass of concrete in kilograms (pounds) to a minimum accuracy of 0.05 kg [0.1 lb.]. Record the mass of mortar in grams to an accuracy of within 1 g or 0.1 %, whichever is greater.

[3] *Specifications, Tolerances, and Other Technical Requirements of Weighing and Measuring Devices, Handbook 44,* National Bureau of Standards.