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Standard Specification for Plastic (Stucco) Cement¹

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1. Scope

1.1 This specification covers two types of plastic cement for use in portland cement-based plasters for exterior (stucco) and interior application.

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 that 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 Sections 14 and 15. *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:

- C 91 Specification for Masonry Cement³
- C 109/C 109M Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens)³
- C 151 Test Method for Autoclave Expansion of Portland Cement³
- C 183 Practice for Sampling and the Amount of Testing of Hydraulic Cement³
- C 185 Test Method for Air Content of Hydraulic Cement Mortar³

¹ This specification is under the jurisdiction of ASTM Committee C01 on Cement and is the direct responsibility of Subcommittee C01.11 on Masonry Cement.

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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 *Annual Book of ASTM Standards*, Vol 04.01.

- C 187 Test Method for Normal Consistency of Hydraulic Cement³
- C 188 Test Method for Density of Hydraulic Cement³
- C 219 Terminology Relating to Hydraulic Cement³
- C 230/C 230M Specification for Flow Table for Use in Tests of Hydraulic Cement³
- C 266 Test Method for Time of Setting of Hydraulic-Cement Paste by Gillmore Needles³
- C 305 Practice for Mechanical Mixing of Hydraulic Cement Pastes and Mortars of Plastic Consistency³
- C 430 Test Method for Fineness of Hydraulic Cement by the 45- μm (No. 325) Sieve³
- C 511 Specification for Moist Cabinets, Moist Rooms, and Water Storage Tanks Used in the Testing of Hydraulic Cements and Concretes³
- C 778 Specification for Standard Sand³
- C 926 Specification for Application of Portland Cement-Based Plaster³
- C 1506 Test Method for Water Retention of Hydraulic Cement-Based Mortars and Plasters³
- IEEE/ASTM SI 10 Standard for Use of the International System of Units (SI) (the Modernized Metric System)⁴

3. Terminology

3.1 *Definitions*—Terms used in this specification are defined in Terminology C 219 and Specification C 926.

3.2 Definition of Term Specific to This Standard:

3.2.1 *plastic cement*—a hydraulic cement, primarily used in portland cement-based plastering 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 materials introduced to enhance one or more properties such as setting time, workability, water retention, and durability.

3.2.1.1 *Discussion*—The term “plastic” does not refer to the inclusion of one or more organic components in the cement. The cement is predominantly inorganic in chemical composition. The term “plastic” refers to the ability of the cement to impart to the plaster a high degree of workability, and for the plaster to remain workable or plastic for a period of time so

⁴ *Annual Book of ASTM Standards*, Vol 14.04.

that, after initial application and floating on the wall, it can be reworked to obtain both densification and desired texture.

4. Physical Properties

4.1 Plastic cement shall conform to the applicable requirements prescribed in Table 1.

5. Sampling

5.1 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.

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

6. Temperature and Humidity

6.1 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.

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

7. Fineness

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

8. Normal Consistency

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

9. Autoclave Expansion

9.1 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 plastic cement.

10. Time of Setting

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

11. Density

11.1 Determine the density of the plastic 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 plaster.

12. Blended Sand

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

13. Preparation of Plaster

13.1 *Proportions for Plaster*—Plaster 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 ± 5 , as determined by Test Method C 109/C 109M.

NOTE 1—Historically, field-mixed plaster 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 plaster 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 k.

28 L of Type S Plastic (Stucco) cement has a mass of 35 kg.

28 L of Type M Plastic (Stucco) cement has a mass of 42 kg.

For example, the amount of cement needed to provide a 1:3 volume proportion of cement to sand using a Type S Plastic (Stucco) cement is:

$$A = 1620 \times (C/B) = 1620 \times (35/108) = 525 \quad (1)$$

where:

A = number of grams of cement to be used in the mortar with 1620 g of sand,

B = $3 \times 36 = 108$ kg, the mass of dry sand in 84 (or 3×28) L of loose damp sand, and

C = mass of Type S Plastic (Stucco) cement per 28 L.

13.2 *Mixing of Plasters*—Mix the plaster in accordance with Practice C 305.

13.3 *Determination of Flow*—Determine the flow in accordance with Test Method C 109/C 109M.

TABLE 1 Physical Requirements

Plastic Cement Type	S	M
Fineness, residue on a 45- μ m (No. 325) sieve, max, %	24	24
Autoclave expansion, max, %	1.0	1.0
Time of setting, Gillmore method:		
Initial set, min, not less than	90	90
Final set, min, not more than	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)	9.0 (1300)	12.4 (1800)
28 days, MPa (psi)	14.5 (2100)	20.0 (2900)
Air content of mortar:		
Min, volume%	8	8
Max, volume %	20	20
Water retention value, min, %, of original flow	70	70