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Standard Specification for Admixtures for Masonry Mortars[1]

This standard is issued under the fixed designation C1384; 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 pertains to admixtures for masonry mortars. Admixtures are substances other than Specification C270 prescribed materials of water, aggregate, and cementitious materials that are used to improve one or more of the recognized desirable properties of conventional masonry mortar.

1.2 This specification does not cover coloring pigments.

NOTE 1—Information on coloring pigments can be found in Specification C979.

1.3 This specification does not cover additives that are added to the cementitious materials during the manufacture of the cementitious materials.

1.4 Acceptance of an admixture is based on its performance in an admixed mortar. Acceptance of the admixed masonry mortar is based on attainment of performance either equivalent to that required for conventional mortar or improved performance of one or more indicated properties, while maintaining required performance levels for other properties.

1.5 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

NOTE 2—The testing laboratory performing the test methods referenced in this specification should be evaluated in accordance with Practice C1093.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

C91 Specification for Masonry Cement
C144 Specification for Aggregate for Masonry Mortar
C150 Specification for Portland Cement
C207 Specification for Hydrated Lime for Masonry Purposes
C270 Specification for Mortar for Unit Masonry
C305 Practice for Mechanical Mixing of Hydraulic Cement Pastes and Mortars of Plastic Consistency
C403/C403M Test Method for Time of Setting of Concrete Mixtures by Penetration Resistance
C595 Specification for Blended Hydraulic Cements
C723 Practice for Chemical-Resistant Resin Grouts for Brick or Tile
C778 Specification for Sand
C780 Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry
C979 Specification for Pigments for Integrally Colored Concrete
C1072 Test Methods for Measurement of Masonry Flexural Bond Strength
C1093 Practice for Accreditation of Testing Agencies for Masonry
C1152/C1152M Test Method for Acid-Soluble Chloride in Mortar and Concrete
C1157 Performance Specification for Hydraulic Cement
C1218/C1218M Test Method for Water-Soluble Chloride in Mortar and Concrete
C1329 Specification for Mortar Cement
~~C1357 Test Methods for Evaluating Masonry Bond Strength~~
C1403 Test Method for Rate of Water Absorption of Masonry Mortars
C1437 Test Method for Flow of Hydraulic Cement Mortar

[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 C12.03 on Specifications for Mortars.

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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**

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *admixed mortar, n*—masonry mortar that deviates from those combinations of materials recognized by Specification C270 in that it also contains an admixture.

3.1.2 *admixture, n*—substance other than the Specification C270 prescribed materials of water, aggregate, and cementitious materials that is added to a masonry mortar to modify one or more properties of the conventional masonry mortar.

3.1.3 *bond enhancer, n*—admixture used to increase the bond strength between the masonry mortar and the masonry unit.

3.1.4 *reference mortar, n*—mortar of the same composition as an admixed mortar except that the reference mortar does not include the admixture and may contain a different amount of water to obtain an equivalent flow or penetration as the admixed mortar.

3.1.5 *set accelerator, n*—admixture used to shorten the time of setting of a masonry mortar.

3.1.6 *set retarder, n*—admixture used to lengthen the time of setting of a masonry mortar.

3.1.7 *water repellent, n*—admixture used to decrease the rate of water absorption of the hardened masonry mortar.

3.1.8 *workability enhancer, n*—admixture used in a masonry mortar to increase the ease of being worked and used.

3.1.8.1 *Discussion*—

Workability is a combination of several properties, including: plasticity, consistency, cohesion, adhesion, water retentivity, setting characteristics, and its capacity to remain satisfactory under the influence of masonry unit suction and ambient environmental conditions. Many of these properties have defied exact laboratory measurement. The mason can best assess workability by observing the response of the mortar to the trowel and the masonry unit. For further discussion on workability, see the Appendix of Specification C270.

4. Classification

4.1 Admixtures are classified by their effect on the performance characteristics of conventional masonry mortars. Admixed mortars are classified by their modified properties, as compared to a reference mortar. The following classifications are recognized:

4.1.1 Bond Enhancer.

4.1.2 Workability Enhancer.

4.1.3 Set Accelerator.

4.1.4 Set Retarder.

4.1.5 Water Repellent.

5. Materials

5.1 *Cements*—The cement used in the evaluation of the admixture shall conform to applicable requirements specified in 5.1.1-5.1.5.

5.1.1 *Cement, Portland*—When the admixture is evaluated in a mortar containing portland cement, the portland cement shall conform to the requirements for Type I, IA, II, IIA, III, or IIIA of Specification C150.

5.1.2 *Cement, Blended Hydraulic*—When the admixture is evaluated in a mortar containing blended hydraulic cement, the blended hydraulic cement shall conform to the requirements for Type IS, IS-A, IP, IP-A, I(PM) or I(PM)-A of Specification C595.

5.1.3 *Cement, Hydraulic*—When the admixture is evaluated in a mortar containing a hydraulic cement, the hydraulic cement shall conform to the requirements for Type GU, HE, MS, HS, MH, or LH of Specification C1157.

5.1.4 *Cement, Masonry*—When the admixture is evaluated in a mortar containing a masonry cement, the masonry cement shall conform to the requirements of Specification C91.

5.1.5 *Cement, Mortar*—When the admixture is evaluated in a mortar containing a mortar cement, the mortar cement shall conform to the requirements of Specification C1329.

5.2 *Lime*—When the admixture is evaluated in a cement-lime mortar, the hydrated lime shall conform to Specification C207.

5.3 *Sand*—The fine aggregate used in the tests will vary dependent on the test procedure.

5.3.1 Sands used for soluble chloride, flexural bond strength and rate of water absorption tests shall be a blend of equal parts by weight of graded standard sand and standard 20-30 sand conforming with Specification C778.

5.3.2 Sands used for compressive strength, water retention, determination of air content of plastic mortar, board life, and time of setting tests shall conform to the requirements of Specification C144.

6. Chemical Composition

6.1 The admixture shall not react adversely with embedded or attached materials common to masonry.

NOTE 3—Currently, there is no standard test method for determining the corrosion potential of masonry mortars toward embedded and attached materials. Nonetheless, the admixture shall not be offered for sale if the manufacturer has evidence that the admixture does react adversely with embedded or attached materials common to masonry.

6.2 At the maximum recommended dosage, the mortar admixture shall add not more than 65 ppm (0.0065 %) water-soluble chloride, or 90 ppm (0.0090 %) acid-soluble chloride to the mortar's overall chloride content as determined by testing of the reference and admixed mortars in accordance with 9.1.1.

7. Physical Properties

7.1 All modified masonry mortars shall comply with the property specification requirements of Specification C270. In addition, the admixed mortars shall conform to all of the specific classification requirements in Table 1 for which the admixture is obtaining qualification. Unless more specimens are required by a specific test method, a minimum of three specimens shall be tested and the results averaged. These result averages shall meet the requirements of this section.

7.2 Admixture compliance tests shall be the responsibility of the manufacturer of the admixture. These compliance tests shall be completed within the past five (5) years and prior to any admixture composition change.

8. Mortar Types and Proportions

8.1 Design the reference mortar to be a specific type of cement/lime, mortar cement, or masonry cement mortar in conformance with the proportion specification of Specification C270 except that the aggregate ratio shall be fixed at three times the sum of the separate volumes of cementitious materials. In addition, the aggregate shall meet the requirements in 5.3.

8.2 The corresponding admixed mortars shall have the same composition as the reference mortars but also shall include the admixture, and the water content shall be adjusted to yield the flow or penetration appropriate for each test method. The admixture dosage rate, time of addition, and mixing sequence shall follow the manufacturer's recommendations.

8.3 A complete set of tests shall be run for all applicable cement/lime, mortar cement, and masonry cement types for which the admixture is to be qualified.

TABLE 1 Physical Requirements[A]

	Bond Enhancer	Workability Enhancer	Set Accelerator	Set Retarder	Water Repellent
Compressive strength, min % of reference:					
7 day	80	80	80	70	80
28 day	80	80	80	80	80
Water retention, min % of reference:	report	100	report	report	report
Air content of plastic mortar, %	report	report	report	report	report
Board life, min % of reference	report	120	report	120	report
Time of setting[B], allowable deviation from reference, h: min:					
Initial: at least	. . .	. . .	1:00 earlier	1:00[C] later	. . .
not more than	1:00 earlier nor 1:30 later	1:00 earlier nor 3:30 later	3:30 earlier	8:00[C] later	1:00 earlier nor 1:30 later
Final: at least	. . .	. . .	1:00 earlier	. . .	. . .
not more than	1:00 earlier nor 1:30 later	1:00 earlier nor 3:30 later	. . .	8:00[C] later	1:00 earlier nor 1:30 later
Flexural bond strength, min % of reference	110	. . .	. . .	. . .	. . .
Rate of water absorption max % of reference 24 h	. . .	. . .	. . .	. . .	50

[A] The values in the table include allowance for normal variation in test results. In addition to meeting the requirements in this table, all admixed mortars must meet the property requirements of Specification C270.
[B] All time of setting tests shall be performed at 23 ± 3°C (73.4 ± 5.4°F), except those for set accelerators, which shall be performed at 5 ± 2°C (41 ± 3.6°F) as specified in 9.1.5.
[C] The manufacturer's maximum recommended dosage rate shall be used when testing the initial and final set times for a set retarder.