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Standard Specification for Preblended Dry Mortar Mix for Unit Masonry¹

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1. Scope*

1.1 This specification covers masonry mortars whose materials and design requirements are governed by Specification C270 but are preblended dry in a factory instead of produced from individual raw materials delivered to the job-site.

1.2 The field-sampling, testing, directly comparable test results, packaging, and the traceability of ingredients of preblended dry mortar mix differ from job site mixed mortars and this standard specifically addresses these issues. The tight control of ingredient ratios possible with preblended dry mortar is also covered.

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

1.4 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.

1.5 *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, health, and environmental 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.)*

1.6 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

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. Referenced Documents

2.1 ASTM Standards:²

- C144 Specification for Aggregate for Masonry Mortar
- C260/C260M 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
- C780 Test Methods for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry
- C979/C979M Specification for Pigments for Integrally Colored Concrete
- C1180 Terminology of Mortar and Grout for Unit Masonry
- C1384 Specification for Admixtures for Masonry Mortars
- C1403 Test Method for Rate of Water Absorption of Masonry Mortars
- C1437 Test Method for Flow of Hydraulic Cement Mortar
- C1586 Guide for Quality Assurance of Mortars

3. Terminology

3.1 For definition of terms used in this specification, refer to Terminology C1180.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *preblended dry mortar mix, n*—a mix of dry aggregate; portland cement and hydrated lime, blended hydraulic cement, masonry cement, hydraulic cement, or mortar cement; and may contain additives used to enhance one or more properties such as setting time, workability, water retention, bond and durability or color pigment; and are thoroughly blended together at the factory without the addition of water.

3.2.2 *additive, n*—a dry mortar material other than the Specification C270 prescribed materials of aggregate and cementitious materials that is added to a dry mortar mix at the batch plant to modify one or more properties of the conventional masonry mortar.

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

4. Classification

4.1 The classifications of mortars in this specification are as described in Specification **C270**. Mortar type selected shall be a Type M, S, N, or O meeting the requirements of either the Property Specification or the Proportion Specifications.

5. Specifying Mortar

5.1 Specify type of mortar desired.

5.2 Preblended dry mortar mix shall be a mortar meeting both the requirements of Specification **C270** and the requirements of this specification.

5.2.1 The property specification requirements of Specification **C270** shall govern unless the proportion specification requirements are specified.

6. Materials

6.1 Materials shall conform to Specification **C270** except as follows:

6.1.1 *Additives*—Shall comply with the admixture requirements of Specification **C1384**, except as follows:

6.1.1.1 The Specification **C1384** reference mortar shall be this mortar without the additives and the Specification **C1384** admixed mortar shall be this mortar with the additives.

6.1.1.2 When more than one additive meeting the requirements of Specification **C1384** is used, the chloride limits of Specification **C1384** shall apply to the sum of all of these additives.

6.1.1.3 Air entraining additives shall comply with the admixture requirements of Specification **C260/C260M**.

6.1.2 Additives used as coloring pigments shall comply with the requirements of **C979/C979M**.

6.2 As required by Specification **C270**, mortar mixes conforming to the Proportion Specification requirements shall not contain more than one air entraining material.

7. Manufacture and Use

7.1 All of the mortar mix materials shall be dry and measured by weight. The batch scales shall be calibrated at least annually and shall be capable of consistently measuring each ingredient to within 1 % of the total batch weight for each ingredient that is added at a rate of at least 20 % of total batch weight, and to within 5 % of the individual ingredients weight for each ingredient that is added at a rate of less than 20 % of total batch weight.

7.2 Each ingredient shall be added within a tolerance of $\pm 10\%$ of the individual ingredients' target weight.

7.3 The weight of each mortar mix ingredient of the final batch shall be recorded and archived for every batch.

NOTE 1—This batch information is commonly referred to as a batch ticket.

7.4 A run number or batch number or some other marking used to ensure traceability of the batch shall be assigned to each batch and retained as part of the batch archive.

7.5 The batch information of 7.3 and 7.4 shall be archived for a minimum of twelve months from date of manufacture.

7.6 All of the dry mortar mix ingredients shall be thoroughly blended.

7.7 The preblended dry mortar mix shall be stored and covered in such a manner as to prevent hardening, deterioration, contamination, and segregation.

7.8 Except for water, no mortar materials, wet or dry, shall be added to the mortar mix or the resulting masonry mortar after the initial blending of the dry mortar materials in the batch plant unless otherwise specified and approved by the manufacturer of the preblended mortar mix.

8. Sampling

8.1 For mortars produced to property specifications, all samples for determining compliance with this specification shall be both uncontaminated and sampled prior to the addition of water.

8.2 Samples shall be of sufficient size to conduct all of the desired testing. At a minimum, take three random samples of at least 2.3 kg [5 lb] each and combine them to form a single sample.

8.2.1 For mortars sold in packages up to 45 kg [100 lb], select whole packages as necessary for required testing.

8.2.1.1 Mix the entire contents of the package or packages before selecting random samples in accordance with 8.2.

8.3 Field samples taken from the original containers shall be marked with the package markings as described in Section 14. The date of sampling shall also be included.

8.3.1 Samples taken from job site silos shall be marked with silo number or location and the sample date. If possible, the samples shall also be marked with the package markings from the original containers.

NOTE 2—Silos are typically filled from large bulk bags or super sacks, these large bags will have the product identification markings from Section 14 and may still be available on the job-site.

8.3.2 Samples taken at the job site from a mobile batch plant shall be marked in accordance with Section 14.1.2.

9. Testing

9.1 Testing shall be conducted in accordance with Specification **C270** with the following exceptions:

9.1.1 For mortar mixes meeting the proportion specifications of **C270**, testing shall be performed by using verification of ingredient proportions (batch tickets) archived from 7.3. In addition, the aggregate shall be tested for compliance with the requirements of Specification **C144**.

9.1.2 *Mixing*—Mix 3000 ± 3 g [6.61 ± 0.01 lb] of preblended dry mortar mix in accordance with Practice **C305** with the exception that the combined material is added at the time of cement addition in Practice **C305**. Additional water may be added in the final mix period to adjust the flow. Determine the flow in accordance with Test Method **C1437**. Use sufficient water to produce a flow of $110 \pm 5\%$.

9.1.3 *Air Content*—If the mixture proportions and densities of all constituent materials are known, calculate the air content in accordance with Specification **C270**, otherwise use the density of the preblended dry mortar mix as supplied by the preblended dry mortar mix producer using the following

equations (D shall be calculated by the manufacturer using the procedures in Specification **C270**):

$$D = (W_1 + V_w)/(W_1/D_1 + V_w) \quad (1)$$

$$A = 100 - (W_m/4D) \quad (2)$$

where:

- D = density of air-free mortar, g/cm³,
- W_1 = weight of preblended dry mortar mix, g,
- V_w = mL of water used,
- D_1 = density of preblended dry mortar mix (see **13.1.9**), g/cm³,
- A = volume of air, %, and
- W_m = weight of 400 mL of mortar, g.

9.2 Preblended dry mortar mix shall be tested for compliance with Specification **C270** initially and at least annually.

9.2.1 Preblended dry mortar mix with additives shall comply with the property requirements of Specification **C270** and the admixture requirements of Specification **C1384**. Compliance shall be verified at the intervals required by Specification **C1384**. The Specification **C1384** reference mortar shall be this mortar without the additives and the Specification **C1384** admixed mortar shall be this mortar with the additives.

9.2.2 Both the reference mortar and the admixed mortar shall be made from the same delivery of materials.

NOTE 3—The intent of this requirement is that the only difference between the two mortars is one has the additive and the other does not.

9.3 If one or more of the mortar materials change in type or physical characteristic or the proportions of the original batch change, the resulting preblended dry mortar mix shall be re-tested for compliance with both this specification and Specification **C270**.

10. Field Testing

10.1 When field testing is required, the preblended dry mortar mix shall be sampled in accordance with Section 8.

10.2 Mortars produced to meet the property requirements of Specification **C270** shall meet those requirements when tested in the lab.

10.2.1 When an additive permitted in **6.1** is used in the mortar, the requirements for that additive in **9.2.1** shall also be met.

10.2.1.1 Mortar containing a Water Repellent additive shall have a relative water absorption in percent of total saturation at 24 h value (%A₂₄) of not greater than 60 % when tested in accordance with Test Method **C1403**, Annex A1. Prepare mortar cube specimens in accordance with Section 6, Specimen Preparation, of Test Method **C1403** except that the mortar shall be mixed in accordance with **9.1.2**. See **Note 4**.

NOTE 4—The purpose of this testing is to demonstrate that the preblended dry mortar mix delivered to the job site has sufficient water repellent properties. Test Method **C1403**, Annex A1 measures the relative water absorption of a mortar and can be used when the reference mortar material (without the water repellent additive) is not available. Testing has shown that the value determined using Test Method **C1403**, Annex A1 typically averages about 10 percentage points above the value determined during Specification **C1384** compliance testing, which compares the water uptake of mortar containing the water repellent additive with a reference mortar material without the water repellent additive and requires the mortar containing the water repellent additive to have a water uptake value

expressed in g/100 cm of not greater than 50 % of the value for the reference mortar material without the water repellent additive. See Test Method **C1403**, Annex A1 for further discussion.

10.3 Mortar produced to meet the proportion requirement of **C270** shall be verified by using the proportions reported on the batch ticket. In the absence of a batch ticket, the mortar composition shall be verified using the batched ingredient proportions from **7.3** corresponding to the run number or batch number from **7.4** and **14.2**.

10.4 The performance values of preblended mortars tested after water is added in the field are not comparable to the performance values obtained in the laboratory because the test methods are different. Field prepared mortar shall not be used to determine compliance with the requirements of **10.2**. Refer to Test Method **C780** and Guide **C1586** for guidance on proper ways of evaluating mortars after water has been added in the field.

NOTE 5—The performance values of an as-delivered preblended dry mortar mix sampled at the job site are directly comparable to the performance values of a preblended dry mortar mix sampled at the point of manufacture, because they can both be tested in the laboratory using the same test method.

11. Reporting

11.1 A report containing both the results from the testing in Section 9 and the corresponding batch information from Section 7 shall be archived for at least 12 months.

12. Certification

12.1 *Certification to **C270** Property Specifications:*

12.1.1 Preblended dry mortar mix shall be tested for compliance with Specification **C270** initially and at least annually.

12.1.2 Preblended dry mortar mix with additives shall comply with the property requirements of Specification **C270** and the admixture requirements of Specification **C1384**. Compliance shall be verified at the intervals required by Specification **C1384**. The Specification **C1384** reference mortar shall be this mortar without the additives and the Specification **C1384** admixed mortar shall be this mortar with the additives.

12.1.3 If one or more of the mortar materials change in type or physical characteristic or the proportions of the original batch change, the resulting preblended dry mortar mix shall be re-tested for compliance with both this specification and Specification **C270**.

12.2 *Certification to **C270** Proportion Specifications:*

12.2.1 Batch ticket and aggregate gradation information shall be provided upon request.

12.2.2 Documentation shall show that the aggregate gradations comply with the gradation specifications of Specification **C144**.

13. Delivery Ticket Information

13.1 The manufacturer of the mortar shall furnish to the purchaser a delivery ticket that shows the following information:

13.1.1 Serial number of ticket.

13.1.2 Truck or vehicle delivery number for unpackage mortar.