



Standard Specification for Extended Life Mortar for Unit Masonry¹

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1. Scope

1.1 This specification covers extended life mortar as delivered for use in construction of non-reinforced or reinforced unit masonry.

1.2 This specification is a property standard.

1.3 Four types of mortar are covered: RM, RS, RN, and RO. These types of mortar can be manufactured by using one of the four mortar formulations with masonry aggregate: portland cement, portland cement-lime, masonry cement, or masonry cement with portland cements. The materials are listed in Section 5.

1.4 Appendix X1 provides a rationale statement and commentary.

2. Referenced Documents

2.1 ASTM Standards:

C 91 Specification for Masonry Cement²

C 144 Specification for Aggregates for Masonry Mortar³

C 150 Specification for Portland Cement²

C 207 Specification for Hydrated Lime for Masonry Purposes²

C 270 Specification for Mortar for Unit Masonry³

C 780 Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry³

C 1072 Test Method for Measurement of Masonry Flexural Bond Strength³

E 447 Test Methods for Compressive Strength of Masonry Prisms³

E 518 Test Methods for Flexural Bond Strength of Masonry³

2.2 Other Document:

National Institute of Standards and Technology, Handbook 44, *Specifications, Tolerances, and Other Technical Requirements for Commercial Weighing and Measuring Devices*⁴

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 All terms in this specification have their conventional meaning, except as follows:

3.1.2 *extended life mortars*—mortar consisting of cementitious materials, aggregate, water and set-control admixtures which are measured and mixed at a central location, using weight-or-volume-control equipment. This mortar, as delivered to a construction site, shall be usable for a period in excess of 2½ h.

4. Ordering Information

4.1 The purchaser shall specify the following:

4.1.1 The mortar type in Table 1,

4.1.2 Length of workability time for the mortar, and

4.1.3 Desired consistency satisfactory for the mason's use when tested by the manufacturer in accordance with 10.2.

4.2 At the request of the purchaser, the producer shall, prior to delivery, furnish laboratory and field performance data satisfactory to the purchaser that the materials to be used will produce mortar of the type specified.

NOTE 1—The purchase order or contract may list the mortar ingredients desired and may state a list of optional data, which are in addition to the performance requirements in Section 7. Examples of such tests are: Test Method C 1072, Test Methods E 518, Test Methods E 447, and test data for mortar that has been retempered.

5. Materials

5.1 Materials used as ingredients in extended life mortar shall conform to the requirements specified in 5.1.1 through 5.1.4.2.

5.1.1 *Cementitious Materials*—Cementitious materials shall conform to the following ASTM specifications.

5.1.1.1 *Portland Cement*—Types I, II or III of Specification C 150.

5.1.1.2 *Masonry Cement*—Types M, S, or N of Specification C 91.

5.1.1.3 *Hydrated Lime*—Specification C 207, Type S.

NOTE 2—Type N limes may be permitted if shown by test or performance record to be not detrimental by the autoclave expansion.

5.1.2 *Aggregates*—The aggregate shall comply with Specification C 144.

5.1.3 *Water*—Water shall be clean and free of oils, acids, alkalis, salts, organic materials or other substances that may be deleterious to mortar or corrosive to metals in the masonry.

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² *Annual Book of ASTM Standards*, Vol 04.01.

³ *Annual Book of ASTM Standards*, Vol 04.05.

⁴ Available from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

TABLE 1 Property Specification Requirements

Mortar Type	Avg ^A Compressive Strength at 28 days, min psi, (MPa)	Water Retention min, %	Air Content, ^B max, %
	Cubes		
RM	2500 (17.2)	75	18
RS	1800 (12.4)	75	18
RN	750 (5.2)	75	18
RO	350 (2.4)	75	18

^A Twenty-eight days old from date of casting. Refer to 10.3.1. The strength values as shown are the standard values. Intermediate values may be specified in accordance with project requirements.

^B When structural reinforcement is incorporated in mortar, the maximum air content shall be 12 %, or bond strength test data shall be provided to justify higher air content.

5.1.4 *Admixtures*—Admixtures are permitted for use only at the production plant.

5.1.4.1 Evidence satisfactory to the purchaser shall be provided to show that the admixtures do not cause nor accelerate corrosion of metal which will be in contact with mortar.

5.1.4.2 Any admixture to be used shall be subject to written certification from the manufacturer, supported by evidence that the admixture will have no adverse effect on the long-term strength, durability, or appearance of the mortar nor on any material or component in contact with the mortar, nor any assemblage of which the mortar forms a part.

6. Manufacture and Delivery

6.1 *Storage of Materials*—Cementitious materials and aggregates shall be stored in such a manner as to prevent deterioration and contamination.

6.2 *Measurement of Materials*—Measure materials in accordance with 6.2.1 through 6.2.4.

6.2.1 Cementitious materials and the aggregate shall be measured by weight or by volume. Volumetric measurement shall be calibrated by weight.

6.2.2 Scales for batching mortar ingredients shall conform to the applicable sections of the current edition of the National Institute of Standards and Technology, Handbook 44.

6.2.3 Measure water by weight or by volume.

6.2.4 Measure admixtures by weight or by volume.

6.3 *Mixing*—Mix extended life mortar ingredients at a central location using either truck mixers or stationary mixers.

6.3.1 Agitation, not mixing, is allowed during transport.

6.4 *Delivery*—Unless otherwise specified, a delivery of the mortar shall conform to 6.4.1 and 6.4.2.

6.4.1 Thoroughly mix and deliver to the construction site mortar with a satisfactory degree of workability and without segregation of ingredients.

6.4.2 Temperature of the mortar at time of delivery shall be 40 to 120°F (4 to 49°C).

7. Property Requirements

7.1 When sampled and tested in accordance with Sections 9 and 10 respectively, the mortar shall comply with the appropriate sections of Table 1.

7.2 A test for compressive strength is the average of at least three specimens from one batch.

7.3 Mortar of known higher strength shall not be indiscriminately substituted when a mortar type of anticipated lower strength is specified.

7.4 Do not change the established proportions for extended life mortar designed for a particular job, nor utilize materials with different physical characteristics in the mix unless compliance with the requirements of this specification are reestablished.

7.4.1 Alter the dosage of the admixture which controls the setting time when needed to maintain a similar time of set during seasonal temperature changes.

NOTE 3—Consistency of the mortar should be correlated with the particular masonry unit to be used because certain mortars are more compatible with certain masonry units. The specifier should consult the admixture manufacturer to evaluate the interaction of the mortar type and masonry unit specified. Masonry units having a high initial rate of absorption will have greater compatibility with mortar of high-water retentivity. Refer to the Related Items That Have an Effect on Properties section in Appendix X1 of Specification C 270.

8. Field Practice

8.1 *Tempering Mortars*—Mortars that have stiffened due to loss of water by evaporation shall be re-tempered not more than one time during the working life of the mortar by adding water to restore the required consistency.

8.1.1 Do not use mortar beyond the period of time established by the manufacturer. This time period shall be documented with test data.

NOTE 4—Extended life mortar is usually designed to have a workability period between 24 to 36 h.

8.2 *Storage at the Site*—The mortar shall be protected from freezing and evaporation.

9. Sampling

9.1 *Sampling Materials*—The mortar materials for laboratory tests shall be sampled at the plant where the mortar is manufactured. Water, aggregate and cementitious material shall be sampled in accordance with Test Method C 780.

9.2 *Sampling Plastic Mortar at the Plant*—Discharge from the mixer a thoroughly mixed sample of mortar not less than 4 gal (15 L) into a nonabsorptive container, from which the quantity of mortar required for a specific quality control test can be taken.

9.3 *Sampling Plastic Mortar at the Site*—Obtain a composite sample by combining at least three equal portions from separate mortar containers, producing a quantity not less than 4 gal (15 L) in a nonabsorptive container, from which the quantity of mortar required for a specific test can be taken.

9.4 Record sampling procedures to include the date, time, place, method of sampling, and weather conditions.

10. Testing

10.1 Test field and laboratory prepared trial mixtures of plastic mortar in accordance with 10.2 through 10.6.1.

10.2 *Consistency*—Determine the consistency of the mortar by the cone penetration method, according to Test Method C 780.

10.2.1 Specimens for compressive strength testing shall have a cone penetration of 55 ± 5 mm (unless the purchaser specifies otherwise).