

**SECTION 04 10 00
MORTAR AND GROUT**

PART 1 - GENERAL

1.1 DESCRIPTION

A. Section specifies mortar and grout materials and mixes.

1.2 RELATED WORK

A. Mortar used in Section:

1. Section 04 23 00, REINFORCED UNIT MASONRY.
2. Section 04 72 00, CAST STONE.

B. Mortar Color: Section 09 05 00, INTERIOR/EXTERIOR FINISHES, MATERIALS, AND FINISH SCHEDULE.

1.3 TESTING LABORATORY-CONTRACTOR RETAINED

- A. Engage a commercial testing laboratory approved by Resident Engineer to perform tests specified below.
- B. Submit information regarding testing laboratory's facilities and qualifications of technical personnel to Resident Engineer.

1.4 TESTS

- A. Test mortar, grout, and materials specified.
- B. Certified test reports.
- C. Identify materials by type, brand name and manufacturer or by origin.
- D. Do not use materials until laboratory test reports are approved by Resident Engineer.
- E. After tests have been made and materials approved, do not change without additional test and approval of Resident Engineer.
- F. Testing:
 1. Test materials proposed for use for compliance with specifications in accordance with test methods contained in referenced specifications and as follows:
 2. Mortar:
 - a. Test for compressive strength and water retention; ASTM C780.
 - b. Mortar compressive strengths 28 days as follows:
 - Type M: Minimum 17230 kPa (2500 psi) at 28 days. (precast concrete, waterproof parging)
 - Type S: Minimum 12400 kPa (1800 psi) at 28 days. (vertical reinforced in cells)
 - Type N: Minimum 5170 kPa (750 psi) at 28 days (tuckpointing, other masonry)
 3. Grout:
 - a. Test for compressive strength; ASTM C1019.

- b. Grout compressive strength of 13790 kPa (2000 psi) at 28 days.
- 4. Cement:
 - a. Test for water soluble alkali (nonstaining) when nonstaining cement is specified.
 - b. Nonstaining cement shall contain not more than 0.03 percent water soluble alkali.
- 5. Sand: Test for deleterious substances, organic impurities, soundness and grading.
- 6. High Bond Mortar: Test for compressive strength, tensile strength, flexural strength, and brick bond strength.
- G. During progress of work, testing laboratory specified in Section TESTING LABORATORY SERVICES, takes and tests samples as specified in that section. Testing procedures and test methods in ASTM C780.

1.5 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Certificates:
 - 1. Testing laboratory's facilities and qualifications of its technical personnel.
 - 2. Indicating that following items meet specifications:
 - a. Portland cement
 - b. Masonry cement
 - c. Mortar cement
 - d. Hydrated lime
 - e. Fine aggregate (sand).
 - f. Coarse aggregate for grout.
 - g. Color admixture
- C. Laboratory Test Reports:
 - 1. Mortar, each type.
 - 2. Grout, each type.
 - 3. Admixtures.
- D. Manufacturer's Literature and Data:
 - 1. Cement, each kind.
 - 2. Hydrated lime.
 - 3. Admixtures.
 - 4. Liquid acrylic resin.
 - 5. Grout, each type.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver masonry materials in original sealed containers marked with name of manufacturer and identification of contents.

- B. Store masonry materials under waterproof covers on planking clear of ground, and protect damage from handling, dirt, stain, water and wind.

1.7 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of specification to extent referenced. Publications are referenced in text by basic designation only.
- B. American Society for Testing and Materials (ASTM):
 - C91-03.....Masonry Cement
 - C144-03.....Aggregate for Masonry Mortar
 - C150-04.....Portland Cement
 - C207-04.....Hydrated Lime for Masonry Purposes
 - C270-03.....Mortar for Unit Masonry
 - C404-03.....Aggregate for Masonry Grout
 - C476-02.....Grout for Masonry
 - C780-02.....Preconstruction and Construction Evaluation of
Mortars for Plain and Reinforced Unit Masonry
 - C979-99.....Pigments for Integrally Colored Concrete
 - C1019-03.....Sampling and Testing Grout
 - C1329-04.....Mortar Cement

PART 2 - PRODUCTS

2.1 HYDRATED LIME

- A. ASTM C207, Type S.

2.2 AGGREGATE FOR MASONRY MORTAR

- A. ASTM C144 and as follows:
 - 1. Light colored sand for mortar for laying face brick.
- B. Test sand for color value in accordance with ASTM C40. Sand producing color darker than specified standard is unacceptable.

2.3 AGGREGATE FOR MASONRY GROUT

ASTM C404, Size 8.

2.4 MASONRY CEMENT

- A. ASTM C91. Type N, S, or M.

2.5 MORTAR CEMENT

ASTM C1329, Type N, S or M.

2.6 PORTLAND CEMENT

- A. ASTM C150, Type I.
- B. Use white Portland cement wherever white mortar is specified.

2.7 LIQUID ACRYLIC RESIN

- A. A formulation of acrylic polymers and modifiers in liquid form designed for use as an additive for mortar to improve physical properties.

2.8 WATER

- A. Potable, free of substances that are detrimental to mortar, masonry, and metal.

2.9 POINTING MORTAR

- A. For Cast Stone or Precast Concrete: Proportion by volume; One part white Portland cement, two parts white sand, and 1/5 part hydrated lime.

2.10 MASONRY MORTAR

- A. Conform to ASTM C270.

B. Admixtures:

1. Do not use mortar admixtures, unless approved by Resident Engineer.
2. Submit laboratory test report showing effect of proposed admixture on strength, water retention, and water repellency of mortar.
3. Do not use antifreeze compounds.

C. Colored Mortar:

1. Maintain uniform mortar color for exposed work throughout.
2. Match mortar color at existing Administration Building and/or approved mock-up.
3. Color of mortar for exposed work in alteration work to match color of existing mortar unless specified otherwise in section INTERIOR/EXTERIOR FINISHES, MATERIALS, AND FINISH SCHEDULE.

D. Color Admixtures:

1. Proportion as specified by manufacturer.
2. For color, see Section INTERIOR/EXTERIOR FINISHES, MATERIALS, AND FINISH SCHEDULE.

2.11 GROUT

- A. Conform to ASTM C476 except as specified.

B. Grout type proportioned by volume as follows:

1. Fine Grout:

- a. Portland cement or blended hydraulic cement: one part.
- b. Hydrated lime: 0 to 1/10 part.
- c. Fine aggregate: 2-1/4 to three times sum of volumes of cement and lime used.

2. Coarse Grout:

- a. Portland cement or blended hydraulic cement: one part.
- b. Hydrated lime: 0 to 1/10 part.
- c. Fine aggregate: 2-1/4 to three times sum of volumes of cement and lime used.
- d. Coarse aggregate: one to two times sum of volumes of cement and lime used.

3. Sum of volumes of fine and coarse aggregates: Do not exceed four times sum of volumes of cement and lime used.

2.12 COLOR ADMIXTURE

- A. Pigments: ASTM C979.
- B. Use mineral pigments only. Organic pigments are not acceptable.
- C. Pigments inert, stable to atmospheric conditions, nonfading, alkali resistant and water insoluble.

PART 3 - EXECUTION

3.1 MIXING

- A. Mix in a mechanically operated mortar mixer.
 1. Mix mortar for at least three minutes but not more than five minutes.
 2. Mix grout for at least five minutes.
- B. Measure ingredients by volume. Measure by the use of a container of known capacity.
- C. Mix water with dry ingredients in sufficient amount to provide a workable mixture which will adhere to vertical surfaces of masonry units.
- D. Mix water with grout dry ingredients in sufficient amount to bring grout mixture to a pouring consistency.
- E. Mortar that has stiffened because of loss of water through evaporations:
 1. Re-tempered by adding water to restore to proper consistency and workability.
 2. Discard mortar that has reached its initial set or has not been used within two hours.
- F. Pointing Mortar:
 1. Mix dry ingredients with enough water to produce a damp mixture of workable consistency which will retain its shape when formed into a ball.
 2. Allow mortar to stand in dampened condition for one to 1-1/2 hours.
 3. Add water to bring mortar to a workable consistency prior to application.

3.2 MORTAR USE LOCATION

- A. Use Type M mortar for precast concrete panels, and waterproof parging below grade, and engineered reinforced unit masonry work.
- B. Use Type S mortar for masonry containing vertical reinforcing bars (non-engineered) masonry below grade and setting cast stone.
- C. Use Type N mortar for other masonry work, except as otherwise specified.
- D. Use Type N mortar for tuck pointing work.

3.3 GROUT USE LOCATIONS

- A. Use fine grout for filling wall cavities and cells of concrete masonry units where the smallest dimension is 50 mm (2 inches) or less.
- B. Use either fine grout or coarse grout for filling wall cavities and cells of concrete masonry units where the smallest dimension is greater than 50 mm (2 inches).
- C. Do not use grout for filling bond beam or lintel units.

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