



SECTION 04100

MORTAR AND MASONRY GROUT

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: Mortar and grout for masonry construction.
- B. Products Furnished But Not Installed Under This Section:
 - 1. Mortar for masonry.
 - 2. Grout for masonry.
- C. Related Sections:
 - 1. Section 04210 - Brick Masonry.
 - 2. Section 04211 - Hollow Clay Masonry Units.
 - 3. Section 04220 - Concrete Masonry Units.
 - 4. Section 04300 - Granular Insulation Wall Fill.
 - 5. Section 04510 - Cleaning and Pointing.

1.02 REFERENCES

- A. ASTM:
 - 1. C 91 - Specification for Masonry Cement.
 - 2. C 144 - Specification for Aggregate for Masonry Mortar.
 - 3. C 150 - Specification for Portland Cement.
 - 4. C 207 - Specification for Hydrated Lime for Masonry Purposes.
 - 5. C 270 - Specification for Mortar for Unit Masonry.
 - 6. C 404 - Specification for Aggregates for Masonry Grout.
 - 7. C 476 - Specification for Grout for Reinforced and Non-reinforced Masonry.
 - 8. C 595 - Specification for Blended Hydraulic Cements.
 - 9. C 618 - Specification for Coal Fly Ash and Raw or Calcified Natural Pozzolans for use as a Mineral Admixture in

- Portland Cement Concrete.
10. C 780 - Test Method for Pre-construction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
 11. C 1019 - Test Method of Sampling and Testing Grout.
 12. E 329 - Specification for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Materials used in Construction.

B. Uniform Building Code Standards (UBC-1994):

1. 19-1 - Portland Cement.
2. 21-11 - Masonry Cement.
3. 21-13 - Hydrated Lime for Masonry Purposes.
4. 21-14 - Mortar Cement.
5. 21-15 - Mortar for Unit Masonry.
6. 21-18 - Sampling and Testing Grout.
7. 21-19 - Grout for Masonry.

C. International Masonry Industry All-Weather Council (IMIAC): Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

1.03 SYSTEM DESCRIPTION

A. Performance Requirements: Admixture provided in both the masonry units and the mortar shall constitute a complete integral water repellent system for exterior above grade walls.

1. Admixture shall leave the finished surfaces water repellent and shall not alter the natural texture or color of the masonry units and mortar.
2. Admixture shall provide wind driven rain resistance as measured by ASTM E514.
3. Bond strength as determined by ASTM E 72 shall not be reduced by the use of the water-repellent admixture.

1.04 SUBMITTALS

A. Submit mix designs and samples to the Architect for approval prior to delivering materials to the site or commencing the work in this section [in accordance with Section 01300].

1. Mortar Mix Design: Furnish in accordance with ASTM C270.

2. Grout Mix Design: Furnished by either the supplier of grout or an independent testing laboratory. [Submit comprehensive strength data with mix design submittals.]
 3. Samples: Mortar color channels for selection by the Architect.
 4. Product Data:
 - a. Submit current instructions stating the actual quantities of water repellent material required to meet the warranty requirements.
 - b. Submit test report data substantiating compliance with specified performance requirements.
- B. Submit warranty for mortar with integral water repellent admixture in accordance with Section 01700.

1.05 QUALITY ASSURANCE

- A. Qualifications:
1. Water Repellent Manufacturer: Engaged in producing materials with a satisfactory performance record for at least 5 years.
- B. Pre-Installation Conference: See Section 04220: Concrete Unit Masonry for information concerning pre-installation conference.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Storage and Protection: Cementitious materials shall be stored off the ground, under cover and shall be kept dry.
- B. Packing and Shipping: Mortar admixture shall be delivered to the job site in manufacturer's original containers with seals unbroken and labeled with manufacturer's batch number.
- C. Storage and Protection:
1. Store materials in original, unopened containers in compliance with manufacturer's printed instructions.
 2. Do not store in areas where temperature will fall below 20 degrees F.

1.07 PROJECT/SITE CONDITIONS

- A. Environmental Requirements:
 - 1. Cold Weather Requirements: In accordance with "Recommended Practices and Guide Specifications for Cold Weather Masonry Construction" by IMIAC; provide adequate equipment for heating the mortar and grout materials, when air temperature is below 40 degrees F. Temperatures of the separate materials, including water, shall not exceed 140 degrees F. when placed in the mixer. When air temperature is below 32 degrees F., maintain mortar temperature on boards above freezing.
 - 2. Hot Weather Requirements: Wet mortarboard before loading and cover mortar to retard drying when not being used.

1.08 WARRANTY

- A. Manufacturer shall provide a written warranty for the integral water-repellent admixtures.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. The following products as distributed by

Basalite	Basalite
650 Industrial Way	355 Greg Street
Dixon, CA 95620	Sparks, NV 89431
707/678-1901	775/358-1200
Fax: 707/678-6268	Fax: 775/359-5997

2.02 MATERIALS

- A. Portland Cement: ASTM C 150, Type II, low alkali.
- B. Blended Cements: ASTM C 595, Type IP MS, low alkali, Pozzolans.
- C. Masonry Cement: ASTM C 91, Type as applicable for mortar type specified.
- D. Mortar Cement: UBC 21-14, Type applicable for mortar type selected.
- E. Hydrated Lime: ASTM C 207, Type S.

- F. Aggregates for Mortar: ASTM C 144.
- G. Aggregates for Grouts: ASTM C 404.
- H. Mortar Color:
 - 1. Color to be : _____
 - 2. Provide lime-proof, inorganic compounds, which shall not exceed 15% by weight of the cement, unless otherwise directed by manufacturer.
 - 3. Carbon black shall not exceed 3% by weight of the cement.
 - 4. Color to be factory blended for full color saturation of mortar joint and to be factory packaged for unitized jobsite mixing at a ratio of one unit of color per sack of cementitious material (portland cement, lime, or masonry cement).
- I. Water: Clean and free from deleterious amounts of acid, alkalis or organic materials.
- J. Admixtures:
 - 1. Mineral: Pozzolans must conform to ASTM C 618, Type C or F.
 - 2. Water Repellent Admixture: For use in concrete masonry units and mortar. Mortar for exterior concrete masonry units shall contain the recommended amount of integral water repellent admixture and shall meet the following minimum requirements:
 - a. Mortar shall be ASTM C 270, Type M or S.
 - b. Provide mortar water-repellent admixture in accordance with manufacturer's printed instructions.
 - c. No other admixtures shall be used in conjunction with the water-repellent admixture unless approved in writing by the water repellent admixture manufacturer.

2.03 MIXES

Select the TYPE based upon the following:

<i>TYPE</i>	<i>RECOMMENDED USE</i>
-------------	------------------------

- M Recommended where maximum compressive strength is required, or for masonry below grade, or when in contact with earth.*
- S Suitable for general use and recommended where high lateral strength of masonry is desired. This is the predominate type used for reinforced masonry.*
- N Suitable for general use in exposed masonry above grade and recommended where high compressive and/or lateral masonry strengths are not required. Used for non-reinforced and veneer masonry.*

The arbitrary selection of higher strength mortar is NOT recommended. Higher compressive strengths can reduce the flexibility. The proper basis for selection is the end use requirement. The Appendix to ASTM C 270 provides data and descriptions of the types of mortar. It is recommended reading before selecting a mortar type.

- A. Mortar: ASTM C 270, Type [N] [S] [M].
 - a. The property method requires the Contractor to submit a mortar mix design meeting the specified material properties listed in ASTM C270, Table 2. These properties are confirmed by laboratory testing of prepared specimens.
 - b. The proportion method requires specified quantities of mortar ingredients according to Table 1, ASTM C 270. Quality control is achieved by inspecting the proportions and materials used in the field.

Sacked materials are usually packaged in one cubic foot bags. The approximate weight of one cubic foot of each material is as follows:

- Portland Cement: 94 lbs.
- Blended Cement: 94 lbs.
- Masonry Cement: Printed weight on bag.
- Mortar Cement: Printed weight on bag.
- Hydrated Lime: 40 lbs.
- Sand: 80 lbs. (dry) with 6 to 8 No. 2 square point shovelfuls of damp loose sand equaling one cubic foot.

- 1. Measurement: Materials shall be accurately measured by ASTM

C 270 by [the Property Method per Table 2] [the Proportions Method per Table 1].

2. All cementitious materials and aggregates shall be mixed at least three minutes, but not more than ten minutes in a mechanical mixer. [Small amounts of mortar may be mixed by hand.] The consistency of the mortar shall be adjusted depending on the absorptive quality of the units being laid, and to the satisfaction of the mason.
3. If mortar begins to stiffen, it may be re-tempered by adding water within a basin formed by the mortar, and re-mixing.
4. Use within 2-1/2 hours of initial mixing and no mortar shall be used after it has begun to set or after it has become harsh or non-plastic.
5. Tuck Pointing Mortar: Same mortar used in laying the masonry units, which has been allowed to hydrate for at least 30 minutes before using, re-tempered to the desired consistency.
6. Mortar Wash Mortar: Same mortar used in laying the masonry units to which additional water may be added for workability.

B. Grout:

1. Job-Site Mixed: In accordance with ASTM C 476.
2. Transit-Mixed:
 - a. Designed by the supplier or an independent testing laboratory with a minimum compressive strength of 2000 psi in 28 days.
 - b. Slump: shall be eight to ten inches.
 - c. Use within 1-1/2 hours after the addition of the mixing water.
3. Mix after all ingredients are added and for at least five minutes, and until a uniform mix has been attained. Grout shall have sufficient water added to produce a consistency for pouring without segregation (8 inch to 10-inch slump).
4. Course grout may be used in cavity walls with a horizontal dimension of 2 inches or more, and in hollow cell construction 4 inches or more in both horizontal directions.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Installation of mortar and grout shall be as specified under each of the following sections:
1. Section 04210 - Brick Masonry
 2. Section 04211 - Hollow Clay Masonry Units

3. Section 04220 - Concrete Masonry Units
 4. Section 04510 - Cleaning and Pointing
-
- B. Colored Mortar: Consistency of appearance shall be maintained throughout the project.
 - C. Temperature: Mortar and grout shall have a temperature between 50 degrees F and 90 degrees F while being used.
 - D. Tuck Pointing: As specified in Section 04510.
 - E. Mortar Wash: Apply as an integral part of the masonry work where indicated. Additional water may be applied to the wall for workability. Finish texture shall be as indicated.

3.02 FIELD QUALITY CONTROL

- A. Tests:
 1. Frequency: As determined by the Architect based upon total time for construction of masonry with not less than two tests per each level of masonry construction, foundation to roof or floors.
 2. Testing Laboratory: Independent of the Owner, Architect and Contractor; the testing laboratory, in addition to meeting requirements of ASTM E-329, must be an DOT approved laboratory competent to perform cement physical testing. All tests must be performed in strict accordance with the applicable ASTM standard.
 3. Distribution of Results of Tests: Within 24 hours of results of tests, copies of the results shall be submitted to the Architect, Contractor, masonry contractor, and the grout supplier if applicable.
 4. Mortar:
 - a. Testing per ASTM C 780 when the property specification is specified.
 - b. When the proportion specification is specified, field quality control shall be performed by inspection only.
 - c. For determining hardened mortar properties, prepare three test specimens for each test age and property. A strength test shall be the average of the strengths of the specimens at the age specified.
 - d. Specimens shall be tested at 7 and 28 days.
 - e. In case of dispute, the mortar proportions must be tested in accordance with the property specification of ASTM C 270.

5. Grout:
 - a. Testing per ASTM C 1019.
 - b. Three test specimens shall constitute one sample. A strength test shall be the average of the strengths of the specimen tested at the age specified.
 - c. Specimens shall be tested at 7 and 28 days.
 - d. The compression strength will be considered satisfactory if the average of three consecutive tests of the grout is equal to or greater than the specified strength and no individual strength test falls below the specified strength by more than 500 psi.

END OF SECTION