PART 1 GENERAL

1.1 SECTION INCLUDES

   A. Section includes an assembly of water-repellent concrete masonry units (CMU), water-repellent mortar and grouts.

1.2 RELATED SECTIONS

   A. Section 04 05 19 Masonry Anchorage and Reinforcing
   B. Section 04 05 23 Masonry Accessories
   C. Section 07 92 00 Joint Sealants
1.3 DEFINITIONS

A. Self-Consolidating Grout (SCG): A highly fluid and stable grout typically with admixtures, that remains homogeneous when placed and does not require puddling or vibration for consolidation.

B. Slump Flow: The circular spread of plastic self-consolidating grout, which is evaluated in accordance with ASTM C 1611/C 1611M.


1.4 REFERENCES

A. Standards referenced shall be the most current versions.

B. ASTM International (ASTM):

1. ASTM C 55 - Standard Specification for Concrete Brick
2. ASTM C 90 - Standard Specification for Load-bearing Concrete Masonry Units
3. ASTM C 91 - Standard Specification for Masonry Cement
5. ASTM C 129 - Standard Specification for Non-load-bearing Concrete Masonry Units
6. ASTM C 143/C 143M - Standard Test Method for the Slump of Hydraulic-Cement Concrete
7. ASTM C 144 - Standard Specification for Aggregate for Masonry Mortar
10. ASTM C 260 - Standard Specification for Air-Entraining Admixtures for Concrete
11. ASTM C 270 - Standard Specification for Mortar for Unit Masonry
12. ASTM C 404 - Standard Specification for Aggregates for Masonry Grout
13. ASTM C 426 - Standard Test Method for Linear Drying Shrinkage of Concrete Masonry Units
15. ASTM C 494/C 494M - Standard Specification for Chemical Admixtures for Concrete
17. ASTM C 618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
18. ASTM C 780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry
19. ASTM C 989 - Standard Specification for Slag Cement for Use in Concrete and Mortars
22. ASTM C 1148 - Standard Test Method for Measuring the Drying Shrinkage of Masonry Mortar
24. ASTM C 1611/C 1611M - Standard Test method for Slump Flow of Self-Consolidating Concrete
25. ASTM E 514 - Standard Test Method for Water Penetration and Leakage through Masonry

C. American Concrete Institute (ACI):
   1. TMS 402/ACI 530/ASCE 5 - Building Code Requirements for Masonry Structures and Commentary
   2. TMS 602/ACI 530.1/ASCE 6 - Specification for Masonry Structures and Commentary

D. National Concrete Masonry Association (NCMA):
   1. TEK 8-2A - Removal of Stains from Concrete Masonry
   2. TEK 9-2B - Self-Consolidating Grout for Concrete Masonry
   3. TEK 9-4A - Grouts for Concrete Masonry
   4. TEK 19-7 - Characteristics of Concrete Masonry Units with Integral Water Repellent

1.5 SYSTEM DESCRIPTION

B. Performance Requirements: Masonry units and mortar shall meet the following requirements:


2. Flexural Bond Strength: ASTM C 1072.


4. Drying Shrinkage of Concrete Masonry Units: ASTM C 426.


1.6 SUBMITTALS

A. Submit under provisions of Section 01 33 00 Submittal Procedures.

B. Product Data: Manufacturer’s data sheets of admixtures, masonry units and, grout and mortar mixtures to be used.

C. Test Reports: Submit test reports showing compliance with performance requirements based on the following test methods:

1. ASTM C 426

2. ASTM C 1072

3. ASTM C 1148

4. ASTM C 1314

5. ASTM E 514

D. Selection Samples: For each masonry product specified, submit two samples, minimum size 6 in. (150 mm) square, representing actual product, color, and texture.

E. Samples: Submit samples of mortar representing actual mortar color and color range.

F. Manufacturer’s Certificate: Certificate showing the conformance of concrete masonry, grout and mortar mixture to specified performance requirements.

G. Sample Panel: Construct sample panel at location indicated or directed, and as follows:

1. Minimum Size: 4 ft by 4 ft (1.2 m by 1.2 m).

2. Include all unit types and sizes to be used, mortar joint treatment and grouts. Clean the sample panel using the same materials and tools as planned for the final masonry construction.
3. Obtain Architect’s acceptance of sample panel before beginning construction activities of this section.

4. Do not remove sample panel until construction activities of this section have been accepted by the Architect.

1.7 QUALITY ASSURANCE


B. Preconstruction Meetings: Conduct preconstruction meetings including the Architect, Contractor, masonry subcontractor, flashing subcontractor, and the CMU producer to verify project requirements, substrate conditions, manufacturer’s installation instructions and other requirements. Comply with Division 01 requirements.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store products under cover in manufacturer’s unopened packaging until ready for installation.

B. Store integral water-repellent mortar admixture in an area where temperature is maintained between 40 degrees F (4 degrees C) and 105 degrees F (40 degrees C).

C. Do not allow integral water-repellent mortar admixture to freeze; discard any frozen admixture.

D. Store all other admixtures in accordance with manufacturer’s instructions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS OF CMU AND ADMIXTURES

A. Acceptable CMU Manufacturer: Unit Masonry shall be produced by a BASF Corporation - Admixture Systems Certified CMU Producer using a “Rheopel®” Series admixture as manufactured by BASF Corporation - Admixture Systems. For a list of Certified CMU Producers contact BASF Corporation - Admixture Systems, 23700 Chagrin Blvd., Cleveland, OH, 44122. Telephone: (800) 628-9990. Fax: (216) 839-8821. Email: admixtures@basf.com.


C. Acceptable Chemical Admixture Manufacturer: Chemical admixtures for grout shall be manufactured by BASF Corporation - Admixture Systems.
D. Acceptable Chemical Admixtures:

1. Air-Entraining Admixture:
   a. Shall conform to ASTM C 260.

2. Mid-Range Water-Reducing Admixture:
   a. Shall conform to ASTM C 494/C 494M Type A.

3. High-Range Water-Reducing Admixture:
   a. Shall conform to ASTM C 494/C 494M Type F.

4. Accelerating Admixture:
   a. Shall conform to ASTM C 494/C 494M Type C or E.
   b. Products and Manufacturers: “Pozzolith® NC 534” or “Pozzutec® 20+” by BASF Corporation - Admixture Systems.

5. Retarding Admixture:
   a. Shall conform to ASTM C 494/C 494M Type B or D.

   a. Shall conform to ASTM C 494/C 494M Type S.

7. Workability-Retaining Admixture:
   a. Shall retain grout workability without affecting time of setting or early-age strength development.
   b. Shall conform to ASTM C 494/C 494M Type S.

E. Substitutions: Not permitted.

2.2 UNIT MASONRY

A. Concrete masonry units shall contain a “Rheopel” Series admixture added at the time of manufacture.

B. Concrete masonry units shall comply with the performance criteria of NCMA TEK 19-7 and Item 1.5B.

C. Density Classification Requirements (ASTM C 90/ASTM C 129):
   1. Normal weight
   2. Medium weight
   3. Light weight
D. Hollow Load-Bearing Concrete Masonry Units: Conforming to ASTM C 90.

E. Solid Load-Bearing Concrete Masonry Units: Conforming to ASTM C 90.

F. Hollow Non-Loadbearing Concrete Masonry Units: Conforming to ASTM C 129.

G. Solid Non-Loadbearing Concrete Masonry Units: Conforming to ASTM C 129.

H. Decorative Concrete Masonry Units: Conforming to ASTM C 90, color as selected, and including a “Rheopel” Series admixture, added at the time of manufacture. Decorative CMU shall be of the following design:
   1. Single scored vertically.
   2. Double scored vertically.
   3. Triple scored vertically.
   4. Ribbed.
   5. Ribbed and split face with ___ vertical ribs.
   6. Ground face.
   7. Other

2.3 MORTAR

A. Masonry Cement: Conforming to ASTM C 91:
   1. Type M.
   2. Type S.
   3. Color, gray.
   4. Color, white.
   5. Color _______.

B. Portland Cement: Conforming to ASTM C 150:
   1. Type I.
   2. Type ___.
   3. Color, gray.
   4. Color, white.
   5. Color _______.

C. Mortar Aggregate: Conforming to ASTM C 144, standard masonry type.

D. Hydrated Lime: Conforming to ASTM C 207:
   1. Type S.
   2. Type SA.

E. Mortar Cement: Conforming to ASTM C 91:
   1. Type M.
   2. Type S.

F. Water: Clean and potable.

2.4 GROUT

A. Portland Cement: Conforming to ASTM C 150:
   1. Type I.
   2. Type _.

B. Fly Ash or Raw Calcined Natural Pozzolan: Conforming to ASTM C 618. Addition rates shall be in an amount governed by the portland-pozzolan cement category of ASTM C 595/C 595M. Grout produced with blends of portland cement and fly ash or raw calcined natural pozzolan shall have the compressive strength specified.

C. Slag Cement: Conforming to ASTM C 989. Addition rates shall be as governed by the portland blast-furnace slag cement category of ASTM C 595/C 595M. Grouts produced with blends of portland cement and slag cement shall have the compressive strength specified.

D. Aggregate: Conforming to ASTM C 404.

E. Water: Clean and potable.

F. Admixtures: As specified in Item 2.1D.

2.5 MIXTURES

A. Mortar Mixtures:
      a. Type M.
      b. Type S.
      a. Type M.
      b. Type S.
      c. Type N.
   4. Mortar Mixing:
      a. Mix mortar ingredients in accordance with ASTM C 270. Mix only in quantities needed for immediate use.
      b. Add mortar color.
      c. Add Rheopel Plus Mortar Admixture or Rheopel Plus D powdered masonry water-repellent admixture.
      d. Do not use anti-freeze compounds to lower freezing point of the mortar.
B. Grout Mixtures:

1. Conventional grout:
   a. Shall conform to ASTM C 476 and the recommendations of NCMA TEK 9-4A, except that the water content shall be reduced because of the lower water absorption of the water-repellent masonry units.
   b. Grout shall be proportioned to provide a slump of 8 to 11 in. (200 to 275 mm) as measured by ASTM C 143/C 143M. The higher end of the slump range shall be obtained by using a mid-range or high-range water-reducing admixture.

2. Self-consolidating grout:
   b. Job-site proportioning of self-consolidating grout is not permitted. Do not add water at the job site except in accordance with self-consolidating grout manufacturer’s instructions.
   c. Shall have a slump flow of 24 to 30 in. (600 to 750 mm), as measured by ASTM C 1611/C 1611M.
   d. Shall have a Visual Stability Index (VSI) of less than or equal to 1 as determined in accordance with ASTM C 1611/C 1611M, Appendix X.1.

3. Compressive Strength: Minimum compressive strength of grout at 28 days when tested in accordance with ASTM C 1019 shall be:
   a. 2000 psi (13.8 MPa).
   b. _____ psi (____MPa).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of any unsatisfactory preparation before proceeding.

C. Verify built-in items are in proper location, and ready for roughing into masonry.

3.2 PREPARATION

A. Coordinate placement of reinforcement, anchors and accessories, flashings and weep holes and other moisture control products specified in other sections.

B. Provide temporary bracing during installation of masonry work. Maintain bracing in place until building structure provides permanent support.

3.3 INSTALLATION

A. Place masonry, mortar and grout in accordance with TMS 602/ACI 530.1/ASCE 6.

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
C. Concrete Masonry Units:

1. Coursing:
   a. Running.
   b. Stacked.

2. Mortar Joints:
   a. Concave.
   b. V-profile.

D. Decorative Concrete Masonry Units:

1. Coursing:
   a. Running.
   b. Stacked.

2. Mortar Joints:
   a. Concave.
   b. V-profile.

E. Concrete Brick Units:

1. Coursing:
   a. Running.
   b. Stacked.

2. Mortar Joints:
   a. Concave.
   b. V-profile.

F. Mortar:

1. Use only mortar containing integral water-repellent mortar admixture at the manufacturer’s recommended addition rate and mixed according to the manufacturer’s recommendations.

2. Use faceshell bedding to provide maximum resistance to water penetration.

3. Tool mortar joints when they are thumbprint hard to provide maximum resistance to water penetration and to help minimize hairline cracks between the mortar and the CMU.

G. Grout:

1. Placing time: Place grout within 1 1/2 hours from introducing water in the mixture and prior to initial set.

2. Grout pour height: Do not exceed the maximum grout pour height specified in TMS 602/ACI 530.1/ASCE 6.
3. Grout lift height: Normal grout:
   a. Where the following conditions are met, place grout in lifts not exceeding 12.67 ft (3.86 m):
      i. Masonry has cured for at least 4 hours.
      ii. Grout slump is maintained between 10 and 11 in. (250 and 275 mm).
      iii. No intermediate reinforced bond beams are placed between the top and the bottom of the pour height.
   b. When conditions of Articles i and ii above are met but there are intermediate bond beams within the grout pour, limit grout lift height to the bottom of the lowest bond beam that is more than 5 ft (1.52 m) above the bottom of lift, but do not exceed a grout lift height of 12.67 ft (3.86 m).
   c. When conditions of Articles i or ii above are not met, place grout in lifts not exceeding 5 ft (1.52 m).

4. Grout lift height: Self-Consolidating Grout:
   a. When placed in masonry that has cured for at least 4 hours, place in lifts not exceeding the grout pour height.
   b. When placed in masonry that has not cured for at least 4 hours, place in lifts not exceeding 5 ft (1.52 m).

5. Consolidation:
   a. Consolidate conventional grout at the time of placement.
      i. Consolidate grout pours 12 in. (300 mm) or less in height by mechanical vibration or by puddling.
      ii. Consolidate pours exceeding 12 in. (300 mm) in height by mechanical vibration, and reconsolidate by mechanical vibration after initial water loss and settlement has occurred.
   b. Consolidation or re-consolidation is not required for self-consolidating grout.

H. Control and Expansion Joints: Do not continue horizontal joint reinforcement through control and expansion joints. Form expansion joints as detailed. Coordinate control joints in accordance with Section 04 05 23 for sealant performance.

I. Built-In Work: As work progresses, install masonry flashings and weep holes and other built-in work specified in other sections.

J. Cutting and Fitting: Cut and fit for chases, pipes, conduit, sleeves, grounds, and other penetrations and adjacent materials. Coordinate with other sections of work to provide correct size, shape, and location.

3.4 FIELD QUALITY CONTROL

1. Test mortar and grout in accordance with Section 01 45 00 Quality Control

2. Testing of Mortar Mixture: In accordance with ASTM C 780, Annex A4, for mortar aggregate ratio and ASTM C 780, Annex A5, for mortar water content.

3.5 PROTECTION

1. Protect installed products until the completion of the project.
2. Cover the top of unfinished masonry work to protect it from the weather and to prevent accumulation of water in the cores of the CMU.
3. Touch-up, repair or replace damaged products before Substantial Completion.

3.6 CLEANING

1. Promptly remove excess wet mortar containing integral water-repellent mortar admixture from the face of the masonry as work progresses. Do not use strong acids, over-aggressive sandblasting or high-pressure cleaning methods.
2. Clean soiled surfaces with cleaning solution in accordance with the manufacturer’s recommendations and NCMA TEK 8-2A.

END OF SECTION