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## **Product Guide Specification**

### **SECTION 03935**

#### **CALCIUM ALUMINATE RESTORATION MORTAR (MAINSTAY ML-CA PURE CALCIUM ALUMINATE CEMENT MORTAR)**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Calcium aluminate restoration mortar for concrete and brick structures.

##### **1.02 RELATED SECTIONS**

- A. Section 02500 - Utility Services
- B. Section 02955 - Restoration of Underground Piping and Utility Units
- C. Section 03300 - Cast-in-Place Concrete
- D. Section 03370 - Shotcrete
- E. Section 03400 - Precast Concrete
- F. Section 03900 - Concrete Restoration and Cleaning

##### **1.03 REFERENCES**

- A. ACI 305R - Hot Weather Concreting
- B. ASTM C 109 - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or 50-mm Cube Specimens)
- C. ASTM C 293 - Standard Test Method for Flexural Strength of Concrete (Using Simple Beam With Center-Point Loading)
- D. ASTM C 496 - Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens
- E. ASTM C 596 - Standard Test Method for Drying Shrinkage of Mortar Containing Hydraulic Cement
- F. ASTM C 1042 - Bond Strength of Latex Systems Used With Concrete By Slant Shear
- G. International Concrete Repair Institute (ICRI) Technical Guideline No. 03730 - Surface Preparation Guidelines for the Repair of Deteriorated Concrete Resulting From Reinforcing Steel Corrosion

##### **1.04 SUBMITTALS**

- A. Comply with Section 01330 - Submittal Procedures.
  - 1. Product substitutions to be submitted by Contractor and approved by Engineer at least ten (10) days before bid date

- B. Product Data: Submit manufacturer's product data, including physical properties, surface preparation, and application and curing procedures.
- C. List of three (3) calcium aluminate restoration mortar projects with at least three (3) years of successful service history, including project name and location, name of owner and engineer, and a description of the products used, substrate conditions, and application procedures.
- D. Applicator Qualifications: Submit qualifications of applicator.
  - 1. CURRENT certification is to be submitted by the manufacturer stating that the applicator is trained and approved in the application of the specified products.

### **1.05 QUALITY ASSURANCE**

- A. Applicator Qualifications:
  - 1. Trained and approved by the manufacturer in the application of the specified products.
  - 2. Employs persons trained for the application of the specified products.
- B. Pre-Application Meeting: Convene a pre-application meeting two (2) weeks before the start of the application of the calcium aluminate restoration mortar. Require attendance of parties directly affecting work of this section, including the Contractor, Engineer, applicator, and manufacturer's representative. Review surface preparation, application, curing, field quality control, and coordination with other work.

### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Delivery: Deliver materials to the site in the manufacturer's original, unopened containers and packaging with labels clearly identifying product name and manufacturer.
- B. Storage:
  - 1. Store materials in accordance with manufacturer's instructions.
  - 2. Keep containers sealed until ready for use.
  - 3. Store materials in a cool, dry environment.
- C. Handling: Protect materials during handling and application to prevent damage.

### **1.07 ENVIRONMENTAL CONDITIONS**

- A. Do not apply materials under the following conditions:
  - 1. Temperatures above or below the manufacturer's recommended maximum or minimum allowable.
  - 2. Overflowing water

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURER**

- A. Madewell Products Corporation 7561 Industrial Court, Alpharetta, Georgia 30004. Phone (770) 475-8199. Fax (770) 475-8167. Internet: www.madewell.net

## **2.02 CALCIUM ALUMINATE RESTORATION MORTAR**

- A. General Requirements:
1. Material is compatible with the substrate.
  2. A minimum of three (3) years of successful service history in aggressive sewer environments where the calcium aluminate restoration mortar was applied.
- B. Hydraulic Cement Mortar: Mainstay ML-10 Hydraulic Cement Mortar. Fast-setting mortar used to stop leaks through cracks and holes.
1. Composition: Blend of hydraulic cements and fillers
  2. Working Time: 45 to 90 seconds at 77 degrees Fahrenheit (F)
  3. Color: Dark gray
- C. Restoration Mortar: Mainstay ML-CA Pure Calcium Aluminate Cement Mortar. Low shrinkage, high strength, polymer modified, sprayable microsilica mortar.
1. Composition: Blend of cements, microsilica, thermoplastic fibers, densifiers, polymer admixtures, and modifiers. Mortar does not contain calcium aluminate cements or aggregates.
  2. Compressive Strength, ASTM C 109:
    - a. 24 hours: 5,500 psi
    - b. 28 days: 10,000 psi
  3. Flexural Strength, ASTM C 293:
    - a. 24 hours: 900psi
    - b. 28 days: 1,450psi
  4. Tensile Strength, ASTM C 496:
    - a. 28 days: 820psi
  5. Shrinkage, ASTM C 596, Modified:
    - a. 28 days: 0 percent
  6. Bond Strength, ASTM C 1042:
    - a. 28 days: 3,100 psi
  7. Color: dark gray

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Examine surfaces to receive the calcium aluminate restoration mortar. Notify the Engineer in writing if surfaces are not acceptable. Do not begin surface preparation or application until unacceptable conditions have been corrected.

### **3.02 SURFACE PREPARTION**

- A. Prepare surfaces in accordance with manufacturer's instructions.

- B. Cleaning: Clean surfaces by Low Pressure Water Cleaning (LP WC, 4,000 psi minimum), abrasive blasting, by hand, or with power tools as required to remove all unsound concrete, contaminants, dirt, debris, and deteriorated reinforcing steel. Prepared surfaces should have a minimum ICRI Concrete Surface Profile (CSP) #4 (preferably with aggregate exposed).
- C. Inspection: Inspect cleaned surfaces to identify and mark corroded reinforcing steel and locate cracks, leaks, and joints.
- D. Replace or treat corroded reinforcing steel, repair cracks and leaks, and treat joints in accordance with manufacturer's instructions and as approved by the Engineer.
- E. Refer to ICRI Technical Guideline No. 03730 - *Surface Preparation Guidelines for the Repair of Deteriorated Concrete Resulting From Reinforcing Steel Corrosion*.
- F. Madewell 1312P Epoxy Putty may be used to coat prepared exposed reinforcing steel to reduce the likelihood of the formation of galvanic corrosion.
- G. Inspect surfaces for soundness.
- H. Saturate all surfaces thoroughly with clean water.
- I. Apply restoration mortar to prepared substrate as soon as water sheen is no longer visible (saturated surface dry).
- J. Hydrostatic Leak Correction:
  - 1. Stop visible hydrostatic leaks by application of Mainstay ML-10 Hydraulic Cement Mortar after completion of surface preparation.
    - a. Mix only one (1) to two (2) pounds of Mainstay ML-10 at a time.
    - b. Add water to form a viscous mass with consistency of modeling clay.
    - c. Apply by hand or trowel.
    - d. Press mixed material firmly into place, starting at the top of the leak and working downward.
  - 2. Inject flowing leaks or cracks using a suitable polymer gel or foam. Remove excess or spilled material from concrete surface before application of restoration mortar.

### **3.03 APPLICATION OF CALCIUM ALUMINATE RESTORATION MORTAR**

- A. Apply Mainstay ML-CA Pure Calcium Aluminate Cement Mortar in accordance with manufacturer's instructions.
- B. Apply using one of the following methods:
  - 1. Low to medium velocity wet mix shotcrete application
  - 2. Hand trowel into place
  - 3. Centrifugal application by use of the Mainstay Mortar Spinner
- C. Apply uniformly to the substrate to the specified thickness. Do not apply to the manhole frame.
- D. Do not trap air in corners, behind exposed reinforcing steel, or between lifts.

- E. Mortar Thickness: Apply a minimum thickness of 1/2 inch above peaks of existing surface profile after surface preparation.
- F. Finishing: Smooth the mortar using a steel trowel with rounded ends (a "pool trowel") and finish with a sponge or brush to produce a smooth, lightly textured surface upon which to apply the corrosion barrier coating.
- G. Hot Weather Application:
  - 1. Reduce evaporation rate of surface moisture. If applying the restoration mortar under conditions such as high temperatures, wind, or low humidity (alone or in combination), rapid evaporation of surface moisture can occur, which may cause plastic shrinkage cracking. Use of a curing compound (such as Sakrete<sup>®</sup> Cure N' Seal) is advised under such conditions and should be applied as soon as possible after placing Mainstay ML-CA Calcium Aluminate Mortar to prevent cracking.
- H. Cold Weather Application:
  - 1. Place Mainstay ML-CA Calcium Aluminate Mortar at a minimum temperature of 55 degrees F and protect mortar from freezing for a minimum period of three (3) days.

**END OF SECTION**