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Product Guide Specification

SECTION 03935

RESTORATION MORTAR AND EPOXY COAL TAR CORROSION BARRIER COMPOSITE LINER (MAINSTAY COMPOSITE LINER)

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Restoration mortar and epoxy coal tar corrosion barrier composite liner 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
G. Section 09960 - High-Performance Coatings
H. Section 09980 - Coatings for Concrete and Masonry

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 882 - Standard Test Method for Bond Strength of Epoxy-Resin 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

H. National Association of Corrosion Engineers International, NACE RP 0188 - Discontinuity (Holiday) Testing of Protective Coatings

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) restoration mortar and epoxy corrosion barrier composite liner 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. Written certification that both the restoration mortar and epoxy coal tar corrosion barrier were applied consecutively (essentially simultaneously) on each of the three (3) projects submitted.
E. Certification that all products (restoration mortar and epoxy coal tar corrosion barrier) are from a single source. "Single source" is defined as a single entity (person or company) that owns all rights to both the restoration mortar and epoxy corrosion barrier formulations and testing data.
F. 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 restoration mortar and epoxy coal tar corrosion barrier composite liner. 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. Dusty or smoke-laden atmosphere.
3. 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 RESTORATION MORTAR AND EPOXY COAL TAR CORROSION BARRER COMPOSITE LINER

A. General Requirements:
1. Restoration mortar and epoxy coal tar corrosion barrier are from single manufacturer
2. Materials are compatible with substrate and with each other.
3. A minimum of three years of successful service history in aggressive sewer environments where the restoration mortar and epoxy coal tar corrosion barrier were applied simultaneously (the same day).

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-72 Sprayable Microsilica Restoration 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: 3,000 psi
    b. 28 days: 10,000 psi
3. Flexural Strength, ASTM C 293:
    a. 24 hours: 535 psi

        b. 28 days: 1,400 psi
    4. Tensile Strength, ASTM C 496:
        a. 24 hours: 330 psi
        b. 28 days: 790 psi
    5. Shrinkage, ASTM C 596, Modified:
        a. 28 days: 0 percent
    6. Bond Strength, ASTM C 882:
        a. 28 days: 3,440 psi
    7. Color: dark gray
D. OPTIONAL Penetrating Epoxy Primer: Madewell 927 Penetrating Epoxy Primer.
    1. Composition: 100% solids epoxy primer
    2. Thickness: Typically 8 mils in a single coat
    3. Number of Components: 2
    4. Color: Clear
E. Corrosion Barrier Coating: Mainstay DS-4 Ultra High Build Epoxy Coal Tar Coating. 100 percent solids, high build, epoxy coal tar corrosion barrier coating
    1. Composition: 100 percent solids, modified epoxy coating
    2. Thickness: Minimum of 50 mils in 1 coat
    3. Number of Components: 2
    4. Finish: Gloss
    5. Color: Black

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine surfaces to receive 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 RESTORATION MORTAR

A. Apply Mainstay ML-72 Sprayable Microsilica Restoration 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® Cure N'

Seal) is advised under such conditions and should be applied as soon as possible after placing Mainstay ML-72 Sprayable Microsilica Restoration Mortar to prevent cracking.

H. Cold Weather Application:
    1. Place Mainstay ML-72 Sprayable Microsilica Restoration Mortar at a minimum temperature of 55 degrees F and protect mortar from freezing for a minimum period of three (3) days.

3.04 OPTIONAL APPLICATION OF PENETRATING EPOXY PRIMER

A. When it is not possible to apply the final epoxy corrosion barrier before the restoration mortar has set, it may be useful to apply Madewell 927 Penetrating Epoxy Primer to the uncured mortar. Madewell 927 Primer should be topcoated with the epoxy corrosion barrier within one (1) week.
B. Do not allow surface contamination of the Madewell 927 Primer before application of the epoxy corrosion barrier.

3.05 APPLICATION OF EPOXY COAL TAR CORROSION BARRIER

A. Apply Mainstay DS-4 Ultra High Build Epoxy Coal Tar Coating in accordance with the manufacturer's instructions.
B. Apply the epoxy coal tar corrosion barrier as soon as possible after finishing the restoration mortar.
C. Do not allow surface contamination of the finished restoration mortar before application of the epoxy coal tar corrosion barrier.
D. Apply Mainstay DS-4 Ultra High Build Epoxy Coal Tar Coating at a minimum thickness of 50 mils.

3.06 CURING OF EPOXY CORROSION BARRIER

A. Curing Conditions:
    1. Continue to protect the restoration mortar and epoxy coal tar corrosion barrier composite liner from freezing throughout protection periods specified for cold weather application.
    2. Protect restoration mortar and epoxy coal tar corrosion barrier composite liner from flowing water for a period of one (1) to three (3) hours after application of the epoxy coal tar corrosion barrier coating, depending on substrate temperature.
B. Immersion Service: Reach a tack-free condition prior to immersion.

3.07 FIELD QUALITY CONTROL

A. Visual and Electrical Inspection for Holidays in Epoxy Corrosion Barrier Coating:
    1. Visual Inspection: Perform visual inspection for holidays in the epoxy corrosion barrier. Mark areas identified for repair and reapplication of epoxy corrosion barrier.
    2. Electrical Inspection: High voltage holiday detection may be performed in accordance with NACE RP 0188 or as recommended

by the manufacturer. Note: Extreme caution should be used when performing high voltage holiday detection in damp and/or potentially explosive environments.

END OF SECTION