

GULF COAST UNDERGROUND

SECTION 09-90-00 COATINGS SYSTEM

PART 1 - GENERAL

1.1 SUMMARY OF WORK

- A. This section covers all workmanship, equipment, materials and quality requirements for wastewater structure rehabilitation and lining work. Provide and apply lining materials as specified.
- B. WORK AREAS: The work areas will be designated by the Engineer/Owner. The Installer's personnel shall not be permitted in any area other than those expressly designated by the Engineer.
- C. COORDINATION: The Installer shall coordinate with the Engineer regarding availability of work areas, completion times, safety, access and other factors that can impact sewer collection operations.

1.2 RELATED SECTIONS

- A. Section 03-30-00 Cast In Place Concrete
- B. Section 04-21-00 Clay Unit Masonry

1.3 REFERENCES

Referenced publications found within this specification shall be the latest revision unless otherwise specified; and applicable parts of the referenced publications shall become a part of this specification as if fully included.

- A. ASTM
 - 1. ASTM C 920 – Specification for Elastomeric Joint Sealants
 - 2. ASTM D 3960 – Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings
 - 3. ASTM D 4259 – Practice for Abrading Concrete
 - 4. ASTM E 337 – Standard Practice Test Method for Measuring Humidity with a Psychrometer
 - 5. ASTM 4541 – Adhesion
 - 6. ASTM D 412 – Tensile Strength and Elongation
 - 7. ASTM D 2240 – Tear Strength
 - 8. ASTM D 1737 – Hardness
 - 9. ASTM 460 – Taber Abrasion
- B. NACE
 - 1. NACE Pub. 6D-173 – A Manual for Painter Safety
 - 2. NACE Pub. TPC2 – Coatings and Linings for Immersion Service

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3. NACE Pub. 6F-163 – Surface Preparation of Steel or Concrete Tank Interiors
 4. NACE RP0892-92 – Standard Recommended Practice, Lining over Concrete in Immersion Service
 5. NACE RP0288-88 – Standard Recommended Practice, Inspection of Linings on Steel and Concrete
- C. SSPC
1. SSPC-SP12 (Steel Structures Painting Council) – Surface Preparation and Cleaning of Steel and Other Hard Materials by High and Ultrahigh Pressure Water Pressure Prior to Recoating
 2. SSPC-SP13 – Surface Preparation of Concrete
 3. SSPC-PA-3 – “A Guide to Safety in Paint Application”
- D. Federal Standard Colors: F 595B
- E. Federal Standard Colors and International Concrete Restoration Institute: Guideline No. 03732 – Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays
- F. The Published Standards of the National Association of Corrosion Engineers
- G. OSHA 1915.35 – Standards – 29 CFR – Painting
- I. ANSI/ASC Exhaust Systems – Abrasive Blasting Operations – Ventilation and Safe Practice

1.4 SUBMITTALS

A. PRE-APPROVAL SUBMITTALS

1. Products will not be considered by Engineer as an “or-equal” or substitute unless a written request for approval has been submitted by Bidder and has been received by Engineer at least 15 days prior to the date for receipt of Bids. Requests for approval shall include all of the following information:
 - a. A cover sheet stating the name of the proposed product and the name of the currently specified product (with applicable specification section number) which the proposed product is requesting to be approved as an “or-equal.” **Letter shall provide evidence that the installing contractor has a minimum of 10-years of experience installing the proposed “equal” product.**

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- b. A letter from the Installer stating that the proposed product is in compliance with all aspects of the specifications including all physical properties, thicknesses, dimensions, cure-times, and warranty requirements; and the Installer shall also include with the letter complete references (with current contact information) showing exactly how many successful installations of the proposed product that the Installer has completed to date.
 - c. A letter from the Manufacturer stating that the proposed product is in compliance with all aspects of the specifications including all physical properties, thicknesses, dimensions, cure-times, and warranty requirements.
 2. The burden of proof of the merit of the proposed item is upon Bidder. Engineer's decision of approval or disapproval of a proposed item will be final. If Engineer approves any such proposed item, such approval will be set forth in an Addendum issued to all prospective Bidders. Bidders shall not rely upon approvals made in any other manner.

B. PROJECT SUBMITTALS

1. Submit the following prior to commencing with any phase of the work covered by this Section:
 - a. Manufacturer's current printed recommendations and product data sheets for all coating system products supplied under this section including performance criteria, surface preparation and applications, volatile organic compound (V.O.C.) data, and safety requirements.
 - b. Material Safety Data Sheets (MSDS) for any materials brought on-site including all resurfacing system materials, solvents, and abrasive blast media (if applicable).
 - c. Storage requirements including temperature, humidity, and ventilation for resurfacing system materials.
 - d. Manufacturer's requirements, including application procedures for resurfacing materials shall be in writing and shall be followed in detail. All safety precautions recommended by the Manufacturer shall be strictly adhered to at all times when work is in progress.
 - e. Submit daily reports that contain the following information: Substrate conditions, ambient conditions, application procedures, work completed and location thereof.

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1.5 QUALITY ASSURANCE

- A. Do not use or retain contaminated, outdated, or diluted materials for resurfacing. Do not use materials from previously opened containers.
- B. Use only products meeting the design included in this specification and those that are applied by the prior approved Installer. Use products of one manufacturer in any one resurfacing system with compatible materials. Provide same material product for touch-up as for original material.
- C. If any requirements of this specification conflict with a referenced standard, the more stringent requirement shall apply.
- D. Make available all locations and phases of the work for access by the Engineer or other personnel designated by the Engineer. The Installer shall provide ventilation and egress to safely access the coating work areas for inspection.
- E. Conduct work so that the resurfacing system is installed as specified herein and according to manufacturer's recommendation. Inspect work continually to ensure that the resurfacing system is installed as specified herein. The Installer shall inspect the work to determine conformance with the specifications and referenced documents. The Installer shall inform the Engineer of the progress and the quality of the work through daily reports as specified below. Any nonconforming coating system work shall be corrected as specified herein or as recommended by the Manufacturer.
- F. The methods of construction shall be in accordance with all requirements of this specification.
- G. Employ only tradespeople who have completed at least ten similar projects within the last 2 years using similar materials. This experience shall be strictly limited to lining wastewater structures as specified in this Section with only products approved prior to bid. Lining projects with products not approved for use on this project will not be considered for record of experience.

1.6 DELIVERY AND STORAGE

- A. Materials shall be stored in accordance with Manufacturer's recommendations in enclosed structures and shall be protected

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from weather and adverse temperature conditions. Flammable materials shall be stored in accordance with state and local codes. Materials exceeding storage life recommended by the manufacturer shall be removed from the site.

- B. If applicable, store all materials only in area or areas designated by the Engineer solely for this purpose. Confine mixing, thinning, clean-up and associated operations, and storage of materials-related debris before authorized disposal, to these areas. If material is delivered in buckets or bags, all materials are to be stored on pallets or similar storage/handling skids off the ground in sheltered areas in which the temperature is maintained between 50F and 90F.
- C. If applicable, mix all resurfacing materials in an enclosed mixing area designated by the Engineer. This enclosed area must protect the mixing operation and materials from direct sunlight, inclement weather, freezing, or other means of damage or contamination. Protect all other concrete and metallic surfaces and finishes from any spillage of material(s) within the mixing area.
- D. Do not use floor drains, dikes or storm drains for disposal of resurfacing system materials.
- E. If applicable, the Installer shall take all precautions and implement all measures necessary to avert potential hazards associated with the resurfacing system materials as described on the pertinent Material Safety Data Sheets or container labels.
- F. If applicable to manufacturer's packaging standards, deliver all materials to the job site in their original, unopened containers. Each container shall bear the Manufacturer's name and label.
 - 1. Labels on all material containers must show the following information:
 - a. Name or title of product
 - b. Federal Specification Number if applicable
 - c. Manufacturer's batch number and date of manufacture
 - d. Manufacturer's name
 - e. Generic type of material
 - f. Application and mixing instructions
 - g. Hazardous material identification label
 - h. Shelf life date
 - i. Storage requirements
 - 2. All containers shall be clearly marked indicating any personnel safety hazards associated with the use of or exposure to the materials.

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3. All materials shall be handled and stored to prevent damage or loss of label.
4. Resurfacing material storage and mixing areas shall be designated by the Engineer.
5. Do not use or retain contaminated, outdated, prematurely opened, diluted materials, or materials which have

1.7 JOB CONDITIONS:

- A. Environmental:
1. Air and Surface Temperatures: If epoxy based products are used, prepare surfaces and apply and cure coatings within air and surface temperature range in accordance with Manufacturer's instructions.
 2. Relative Humidity: If epoxy based products are used, prepare surfaces and apply and cure coatings within relative humidity range in accordance with Manufacturer's instructions.
 3. Precipitation: Do not prepare surfaces or apply coatings in rain, snow, fog, or mist.
 4. Wind: Do not spray coatings if wind velocity causes overspray of the coating materials.

1.8 WARRANTY

- A. To be specified by Consulting Engineer

PART 2 - PRODUCTS

2.1 PRE-APPROVED INSTALLERS

- A. Gulf Coast Underground, LLC (Multi-Component Lining System with AnchorShield)
- B. Pre-approved Installers and their proposed systems
- C. As part of the proof of equality, the Engineer will require at the cost of the Installer, certified test reports from a nationally known, reputable and independent testing laboratory conducting comparative tests as directed by the Engineer between the product specified and the requested substitution.
- D. Requests for substitution shall meet all requirements of Section 1.4 Submittals, found in this specification section.

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2.2 MATERIALS

A. MULTI-COMPONENT STRESS PANEL LINER SYSTEM

The following list specifies the material property requirements for the multi component stress panel liner system:

1. Modified polymer shall be sprayable, solvent free, two component polymeric, moisture/chemical barrier specifically developed for the corrosive wastewater environment.
2. AnchorShield Mechanical anchoring system shall be imbedded and sprayed into the liner at all Infiltration locations and at the wall/floor termination.
3. Typical Chemical Analysis of Polyurea:

“A” Component

Viscosity, 77° F, cps., ASTM D-1638	300-400
Physical State	Liquid
Color	Clear to amber
Hygroscopicity	Reacts with water

“B” Component

Viscosity, 160° F, cps., ASTM D-1638	400-600
Physical State	Liquid
Non-Volatile	100%

Reaction Profile (100 grams, 175° F sample)

Gel Time, seconds	1-2
Tack Free Time, seconds	15
Cure Time, seconds	30

Processing

A System / B System, volume ratio	1.00 / 1.00
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4. Typical Physical Properties of Polyurea

Tensile Strength (PSI)	ASTM D412	2670
Elongation (%)	ASTM D412	430
100% Modulus	ASTM D412	2200
300 % Modulus	ASTM D412	2600
Tear Strength (PLI)	ASTM D624	280
Hardness (shore D)	ASTM D2240	42D
Flexibility (1/ 8 “Mandrel)	ASTM D522	Pass
Flashpoint (°F)	ASTM D93	>200

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Taber Abrasion (mg loss) ASTM D4060 25

5. Typical Chemical Analysis of Polyurethane Rigid Structure, low viscosity two-component, containing flame retardants.

“A” Component

Viscosity, 77° F, cps., ASTM D-1638 200
Physical State Liquid
Color Dark Brown
Hygroscopicity Reacts with water and evolves CO₂ gas

“B” Component

Viscosity, 77° F, cps., ASTM D-1638 600-1000
Physical State Liquid
Color Tan
Hygroscopicity Absorbs water rapidly thus changing ratio

Reaction Profile (100 grams, 77° F sample)

Cream Time, seconds 1-4
Tack Free time, seconds 5-8
Rise Time, seconds 6-10

Processing

A System / B System, volume ratio 1.00 / 1.00

C. OTHER MATERIALS

1. Active infiltration must be stopped prior to application of the multi-component stress panel liner system. The following products are pre-approved to assist in leak stopping:
 - a. Injectable Grouts as manufactured by:
 - 1) Avanti International (acrylamide or hydrophilic)
 - 2) Alchemy Polymers (acrylamide or hydrophilic)
 - 3) Pre-approved Equal
 - b. Rapid Setting Cements as manufactured by:
 - 1) Quadex
 - 2) Strong Seal
 - 3) Pre-approved Equal

PART 3 – EXECUTION

3.1 SAFETY

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1. The Installer's work forces should comply with the provisions outlined in the following documents: SSPC-PA-3 "A Guide to Safety in Paint Application" NACE Pub. "A Manual for Painter Safety"
2. The Installer shall provide personnel with all safety equipment necessary to protect them during any phase of the work. This shall include, but not be limited to safety glasses, goggles, earplugs, hard hats, steel toed work shoes, appropriate personal protective clothing, gloves, and approved escape respirators (where required).
3. No work shall be performed until the appropriate Work Requests and lock-outs are approved by the Engineer/Owner. The Lockout system is a safety procedure to prevent unintended equipment activation.
4. Keep any flammable materials such as cleaning solvents, thinners, or resurfacing materials away from open flames, sparks or temperatures higher than 150F. Drums containing flammable materials will be grounded. No solvent in any quantity shall be allowed inside containment enclosures or permitted confined spaces at any time during resurfacing work.
5. Power tools are to be in good working order to avoid open sparking. No spark producing tools shall be utilized in restricted areas as indicated herein.
6. The Installer shall fireproof all work areas by maintaining a clean work area and having Underwriter's Laboratories approved fire extinguishers on-hand. The Installer shall furnish these fire extinguishers.
7. If applicable, workers doing abrasive blasting or chemical coating operations shall wear a fresh air supplied protective helmet and hood and personal protective clothing acceptable to industry standards and all government regulations.
8. Dispose of rags used for wiping up resurfacing materials, solvents, and thinners by drenching them with water and placing in a metal container with a tight fitting metal cover. Complete this disposal process at the end of each day. Final disposal of these materials is the Installer's responsibility.

3.2 EXAMINATIONS

1. Comply with the Manufacturer's recommendations as to environmental conditions under which materials can be applied.
 - A. It is the responsibility of the Installer to inspect and report unacceptable concrete substrate surface conditions to the Engineer prior to the commencement of surface preparation activities.
 - B. All specified surface preparation shall be performed in

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accordance with the latest version of the SSPC, NACE, ICRI and other standards referenced in this section.

- C. Unacceptable concrete surface conditions are defined as the presence of water infiltration/inflow, cracked surfaces or concrete deteriorated to a depth of greater than 1 1/2" or otherwise unable to withstand surface preparation as specified herein.

3.3 MULTI-COMPONENT STRESS PANEL LINING SYSTEM

1. SUBSTRATE PREPARATION REQUIREMENTS

- A. Hydro blasting equipment shall remove all corrosion from structure. Final product shall be a cleaned, mostly dry surface ready for liner application. Structures 6' diameter or greater, and those with large flat walls shall use a 40,000 psi hydro-blaster to achieve the desired anchoring profile.
- B. After completion of surface preparation, blasting phase, perform the seven point check list, which is the inspection for:
 - 1. Leaks
 - 2. Cracks
 - 3. Holes
 - 4. Exposed Rebar
 - 5. Ring and Cover condition
 - 6. Invert Condition
 - 7. Inlet and Outlet Pipe Condition
- C. After the defects in the structure are identified, repair all leaks with a chemical or hydraulic sealant designed for use in field sealing of ground water. Severe cracks shall be "repaired with a urethane based chemical" sealant. Product to be utilized shall be as approved by owner/engineer prior to installation. Repairs to exposed rebar, defective pipe penetrations or inverts, etc. shall be repaired utilizing non-shrink grout or approved alternative method.

2. APPLICATION REQUIREMENTS

- A. The limits of the corrosion protection system shall be all exposed concrete/brick surfaces including walls, tap sections, risers, etc., unless otherwise directed by the owner/engineer.
- B. AnchorShield Mechanical anchoring system shall be

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imbedded and sprayed into the liner at infiltration locations and at the wall/floor termination.

- C. Application of multi-component system shall be in strict accordance with manufacturer's recommendation and must be performed by an Installer licensed and trained by the Manufacturer. A permanent identification number and date of work performed shall be affixed to the structure in a readily visible location.
 - D. Provide final written report to owner/engineer detailing the location, date of report, and description of repair.
3. INSTALLATION OF MULTI-COMPONENT STRESS PANEL LINER SYSTEM

- A. Apply Moisture Barrier. This layer of polyurea shall be spray applied to all surfaces to achieve a minimum DFT of 30-100mils
- B. Install AnchorShield Mechanical anchoring system where required.
- C. Apply Surfacer. This layer of polyurethane rigid structure foam shall be spray applied to all surfaces previously lined with the moisture barrier to achieve a minimum DFT of 300-370mils. Layer thickness may vary depending on the condition of the substrate and the level of deterioration. Mechanical anchoring system shall be embedded in this layer.
- D. Apply Final Corrosion Barrier to all surfaces lined with the Surfacing layer. This layer of polyurea shall be spray applied to achieve a minimum DFT of 60-100mils.
- E. TOTAL MULTI-COMPONENT, INERT, POLYMER LINING THICKNESS SHALL BE A MINIMUM OF 500 MILS.

3.6 FIELD QUALITY CONTROL INSPECTION AND TESTING

- A. Inspection by the Engineer or others does not limit the Installer's responsibilities for quality control inspection and testing as specified herein or as required by the Manufacturer's instructions. Tests specifically required for epoxy lining systems may not necessarily be applicable to polyureas such as those used in the multi-component system specified.

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- B. Perform the quality control procedures listed below in conjunction with the requirements of this Section.
- C. Inspect all materials upon receipt to ensure that all are supplied by the Manufacturer.
- D. Provide specified storage conditions for the resurfacing system materials (if applicable), solvents, and abrasives.
- E. Inspect and record that the "pot life" of resurfacing materials are not exceeded during installation.
- F. Verify curing of the resurfacing materials in accordance with the Manufacturer's instructions.
- G. Upon full cure, the installed lining system shall be checked by high voltage spark detection in accordance with NACE RP0188-90 to verify a pinhole-free surface. Voltage shall be set at 11,000+ volts. Areas which do not pass the spark detection test shall be corrected at no cost to the Owner and rechecked.
- H. Upon completion of the lining system installation the lined area shall be cleaned and prepared to permit close visual inspection by the Engineer or the Engineer's Representative. Any and all deficiencies or defective work (not in compliance with this section or related sections) will be marked for repair or removal/replacement by the Installer at no additional cost to the Owner.

3.7 CLEANUP

- A. Upon completion of work, the Installer shall remove surplus materials, equipment, protective coverings, and accumulated rubbish, and thoroughly clean all surfaces and repair any work-related damage. The surrounding surface areas including roadways and all other surfaces shall be restored to their pre-project condition.

END OF SECTION