

SPECIFICATIONS FOR PREMIER-PIPE USA TECH CIPP LINER

PART 1

1.01 QUALITY ASSURANCE

A. Governing Standards:

1. ASTM - All Standards shall be the most recent available
 - F1216 Rehabilitation of pipelines by the inversion and curing of a resin-impregnated tube
 - F1743 Rehabilitation of pipelines by pulled-in-place installation of a cured-in-place thermosetting resin pipe
 - F2019 Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Pulled in Place Installation of Glass Reinforced Plastic (GRP) Cured-in-Place Thermosetting Resin Pipe (CIPP)
 - F2990 Standard Test Methods for Tensile, Compressive, and Flexural Creep and Creep-Rupture of Plastics
 - D790 Test methods for flexural properties of non-reinforced plastics

B. Qualifications

1. The Contractor shall have a minimum of five (5) years experience in the installation of Cured-In-Place Pipe products.
2. The Contractor shall have successfully completed within the last five years at least five (5) project (800 LF or greater) and at least 5,000 feet total using the selected rehabilitation technique and shall provide the name, phone number and contact person of the Owner as a reference.
3. Proprietary rehabilitation techniques shall be installed by a manufacturer's approved licensee.

C. Material Quality Control:

1. Submit manufacturer's certifications that the materials provided are in compliance with these specifications.

1.02 SUBMITTALS

A. The following submittals are required:

1. Traffic Control/Staging Area plan; consisting of a sketch of the surrounding area, the excavation locations and pipe staging areas, and devices used as traffic control.

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2. Rehabilitation technique and all proposed materials; provide manufacturer's technical literature, installation instructions, testing methods and certifications for lining material, resins, tube, cure method, etc. Design calculations for CIPP liner thickness for the parameters specified in Section 2.02 B.
3. Physical property test results from previous installations of the product proposed for this project (see Section 3.05 B., CIPP Field Samples).
4. Pipe Line videos before and after.
5. Installer qualifications.

1.03 WARRANTY

- A. The finished liner shall be warranted against defects in material and installation for a period of 1 year from the date of completion of the installation. The Contractor shall be responsible to repair all installation defects, for the one year warranty period. The Contractor shall be responsible to cover all costs, including materials and labor, associated with these repairs.

PART 2 – PRODUCTS

2.01 GENERAL

- A. All materials shall be commercially available products of reputable Manufacturers acceptable to the Owner.

2.02 PRODUCT, MANUFACTURER/INSTALLER QUALIFICATION REQUIREMENTS

- A. The sewer products specified herein are intended to have a 50-year design life.
- B. Design requirements:
 1. Liner shall be designed in accordance with ASTM F1216 and the following requirements:
 - a. Ground water shall be at 5 feet below grade.
 - b. Soil density equals 120 pounds per cubic feet
 - c. Ovality will be 2% unless video inspections indicate otherwise.
 - d. Live load shall be HS-20.
 - e. All pipes shall be considered fully deteriorated

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2. All calculations shall be submitted to the ENGINEER, in duplicate, for his information and be signed and sealed by a Professional Engineer in the State of the project location...
 3. The net inside diameter of the reconstructed lined sewer shall be as large and smooth as possible to maintain the lined pipe's final capacity as close as possible to its original capacity.
- C. Contractor shall be fully responsible for the design of the CIPP (liner) and shall save and hold harmless the Owner and Engineer from any and all costs or damages directly or indirectly related to the structural design of the CIPP.
- D. Prior to design and ordering of the liner, verify the internal dimensions of the existing sewer mains to insure that the lining utilized will be of appropriate dimension.

2.03 MATERIALS – CURED-IN-PLACE PIPE (CIPP)

- A. Acceptable Tube Materials:
1. Fiberglass reinforced felt
 - a. Liner is composed of one or more layers of fiberglass and polyester strands that are needled into a single mat and one or more needled felt layers. The outer layer shall have a PU coating to seal liner from moisture coming from the heating process and to aid resin impregnation. The coating shall be translucent to insure full resin impregnation of the liner.
 - b. Each mat is made up fiberglass and polyester felt strands. They will be woven in the same manner as standard felt material.
 - c. Additional mats of standard felt can be added to the liner to achieve the desired thickness and the percentage of each material can be changed to achieve the design Flexural Modulus used to design the liner.
 - d. If required by the owner because of infiltration or to segregate resin from ground water, a pre-liner may be installed prior to liner installation.
 - e. All seams of each layer shall be staggered to insure no layer's seam will be near the seam of adjacent layer.
 - f. The liner will be layered such that the fiberglass/felt layers are at the outside and inside of the liner to maximize strength properties.
- B. Acceptable Products

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1. Premier Pipe “Tech” Liner
 2. Approved equals. However these products must be approved before Bid Opening.
- C. Acceptable Resin Systems
1. A corrosion resistant vinyl ester resin system that when properly cured within the tube composite meets the requirements of ASTM F1216 and ASTM F1743, the physical properties herein, and those which are to be utilized in the Design of the CIPP for this project. The resin shall produce CIPP which will comply with the structural and chemical resistance requirements of this specification.
 2. A corrosion resistant Polyester resin system that when properly cured within the tube composite meets the requirements of ASTM F1216 and ASTM F1743, the physical properties herein, and those which are to be utilized in the Design of the CIPP for this project. The resin shall produce CIPP which will comply with the structural and chemical resistance requirements of this specification

2.04 STRUCTURAL REQUIREMENTS

- A. Unless otherwise specified, the Contractor shall furnish a CIPP system that provides cured physical strengths specified herein.
1. Design. Detailed design calculations for all external loading conditions shall be submitted for review and approval. The CIPP shall be designed as per ASTM F1216, Appendix X1.3.1 for the Fully Deteriorated Pressure Pipe condition. These detailed calculations shall provide the input data as well as the actual calculations for Eqs X1.1, X1.3, and X1.4 of Appendix X1. of ASTM F1216. The design submittal shall also clearly identify the physical properties used for design.
 2. The physical properties used in the design submittal shall be clearly identified. These physical properties shall be the basis for the acceptance of submittals of field samples and the acceptance of the final product. At a minimum, the pipe lining shall have the following physical properties:

| | |
|--|-------------|
| Initial Flexural Modulus of Elasticity ASTM D790 | 800,000 PSI |
| Initial Flexural Strength ASTM D790 | 18,000 PSI |

*Value is for design conditions @ 75°F (25°C)
 3. Retention factor for design shall be 50% or a factor calculated from ASTM D2990 testing data.

PART 3 – EXECUTION

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3.01 INSTALLATION – GENERAL

- A. All materials shall be installed in accordance with manufacturer's written instructions and recommendations.
- B. All work shall be completed by workmen skilled in their trade.

3.02 INSTALLATION RESPONSIBILITIES

- A. It shall be the responsibility of the Contractor to field locate and designate all access points open and accessible for the work based on the contract drawings. The Contractor shall arrange for access to water hydrants for cleaning, inversion, and other work related items requiring water.
- B. Bypassing Sewage –The contractor shall provide all sewage bypass required for the proper installation of liner.

3.03 PREPARATION

- A. Cleaning and Inspection:
 - 1. Cleaning of Pipeline – All internal debris shall be removed from the original pipeline. Pipeline shall be cleaned with hydraulically powered equipment, high velocity jet cleaners, or mechanically powered equipment (see NASSC Recommended Specifications for Sewer Collection System Rehabilitation) as required for the CIPP lining operation.
 - 2. Inspection of Pipelines – Inspection of pipelines shall be performed by experienced personnel trained in locating breaks, obstacles, and service connections by closed-circuit television. The interior of the pipeline shall be carefully inspected to determine the location of any conditions that may prevent proper installation of the proposed pipe lining operation, such as protruding areas of, collapsed or crushed pipe, and reductions in the cross-sectional area. These conditions shall be noted and brought to the Engineer's attention immediately. The pre-installation video (copy) shall be turned over to the Engineer prior to pipe lining.
 - 3. Line Obstructions – The original pipeline shall be clear of obstructions such as solids, dropped joints, protruding areas, crushed or collapsed pipe, and reductions in the cross-sectional area that will prevent the insertion of the liner system. If pre-installation inspection reveals an obstruction such as a dropped joint, or a collapse that will prevent the lining installation process, and that cannot be removed by conventional sewer cleaning or pipe or root cutting equipment, then the Contractor may be required to make a point repair excavation to uncover and remove or repair the obstruction. Such excavation shall be approved in writing by the owner's representative prior to the

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commencement of the work and shall be considered as a separate pay item.

B. Existing Dimensions:

1. After cleaning, the Contractor shall measure the I.D. of the existing pipe at the two (2) locations. Prior to ordering of the liner, verify the internal dimensions of the existing sewer mains to insure that the lining utilized will be of appropriate dimension.

3.04 CIPP INSTALLATION

A. CIPP installation by the pulled in place method or inversion by use of hydrostatic head or air pressure, followed by steam or hot water curing shall be in accordance with ASTM F1216, Section 7, or ASTM F1743, Section 6, with the following modifications:

1. If the liner is pulled into place, a calibration' tube shall be inserted to protect the resin from any wash out caused by curing water or steam.

B. Resin Impregnation

1. Resin Quantity The quantity of resin used for tube impregnation shall be sufficient to fill the volume of air voids in the tube with additional allowances for polymerization shrinkage and the loss of resin through cracks and irregularities in the original pipe wall. A vacuum impregnation process or resin bath shall be used.
2. Vacuum impregnation process: To insure thorough resin saturation throughout the length of the felt tube, the point of vacuum shall be no further than 25 feet from the point of initial resin introduction.

After vacuum in the tube is established, a vacuum point shall be no further than 75 feet from the leading edge of the resin. The leading edge of the resin slug shall be as near to perpendicular as possible. A roller system shall be used to uniformly distribute the resin throughout the tube. If the Installer uses an alternate method of resin impregnation, the method must produce the same results. Any alternate resin impregnation method must be approved.

3. Temperature gauges shall be placed inside the existing pipe at the invert level of each end to monitor the temperatures during the cure cycle.
4. Curing shall be accomplished by utilizing hot water or steam under pressure in accordance with the manufacturer's recommended cure schedule.

3.05 TESTING AND INSPECTION

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- A. CIPP samples shall be prepared and physical properties tested in accordance with ASTM F1216 or ASTM F1743, Section 8. The flexural properties must meet or exceed the values listed in Table 1 of the applicable ASTM and the values used for design.
 - B. Thickness of samples shall be determined as described in paragraph 8.1.6 of ASTM F1743. The minimum wall thickness at any point shall not be less than 87½% of the design thickness as calculated in Section 2.04, Structural Requirements.
 - C. Visual inspection of the CIPP shall be in accordance with ASTM F1743, section 8.6. Two (2) sets of post installation videos labeled and audio keyed to the contract drawings and associated logs shall be submitted to the Owner **within 24 hours of the inspection.**
- 3.06 CLEAN-UP
- A. Upon acceptance of the installation work, the Contractor shall restore the project area affected by the operations to a condition at least equal to that existing prior to the work in accordance with the Site Restoration section of this specification.