

SPECIFICATION FOR CURED-IN-PLACE-PIPE (CIPP)
(As Provided by National Liner)

PART 1 – GENERAL

It is the intent of this section of these Specifications to provide for the reconstruction of pipelines and conduits by the installation of a resin-impregnated flexible tube that is either inverted or pulled into the original pipeline/conduit and expanded to fit tightly against said pipeline by the use of water or air pressure. The resin system shall then be cured by elevating the temperature of the fluid (water/air) used for the inflation to a sufficient enough level for the initiators in the resin to effect a thermosetting reaction.

PART 2 – REFERENCED DOCUMENTS

This Specification references ASTM D5813 (Standard Specification for Cured-in-Place Thermosetting Resin Sewer Pipe) ASTM F1216 (Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube), and ASTM F1743 (Standard Practice for Rehabilitation of Existing Pipelines and Conduits by Pulled-In-Place Installation of Cured-In-Place Thermosetting Resin Pipe).

PART 3 – QUALIFICATION REQUIREMENTS

The system proposed (materials, methods, workmanship) must be proven through previous successful installations to an extent and nature satisfactory to the Owner and the Engineer that is commensurate with the size of the project being proposed. Since CIPP is intended to have a 50-year design life, only products deemed to have this performance will be accepted. All products and installers must be pre-approved prior to the formal opening of proposals.

Products and Installers seeking approval must meet all of the following criteria to be deemed commercially acceptable:

For a Product to be considered Commercially Proven, a minimum of 250,000 linear feet and/or 1000 line sections must have been successfully installed. The Manufacturer (Licensor) shall have completed sufficient enough testing to document that the materials and the method(s) of installation proposed will produce the desired long-term performance.

For an Installer to be considered Commercially Proven, the Installer must satisfy all insurance, financial, and bonding requirements of the Owner, and must have at least three years active experience in the commercial installation of the product bid. The Installer's key personnel shall have at least 100,000 linear feet and/or 300 line sections of successful experience (included in this experience shall be a sufficient quantity of installations in the sizes proposed for this project). The Installer shall be "ISO" certified or demonstrate that he/she has a similar quality assurance system in place.

Documentation for products and installers seeking pre-approved status must be submitted no less than two weeks prior to the proposal due date to allow time for adequate consideration. The Owner will advise of acceptance (or rejection) a minimum of three days prior to the due date. All required submittals must be satisfactory to the Owner.

PART 4 – SUBMITTALS

The Contractor shall submit the following information:

1. Manufacturer's certification that the materials to be used meet the referenced standards and these specifications.
2. License or certificate verifying Manufacturer's/Licenser's approval of the installer.
3. Proposed equipment and procedures for accomplishing the work.
4. Lining Manufacturer's product data and instructions for resin and catalyst system.
5. Design Calculations for wall thickness designs. To be completed by an engineer proficient in the design of pipeline systems.

PART 5 – MATERIALS

5.1 The Tube. The tube shall consist of one or more layers of a flexible needled felt or an equivalent nonwoven or woven material, or a combination of nonwoven and woven materials, capable of carrying resin and withstanding the installation pressures and curing temperatures. The tube should be compatible with the resin system to be used on this project. The material should be able to stretch to fit irregular pipe sections and negotiate bends.

- 5.1.1. The tube should be fabricated to a size that, when installed, will tightly fit the internal circumference and the length of the original conduit. Allowances should be made for the longitudinal and circumferential stretching that occurs during placement of the tube.
- 5.1.2. The tube shall be uniform in thickness and when subjected to the installation pressures will meet or exceed the designed finish wall thickness.
- 5.1.3. Any plastic film applied to the tube on what will become the interior wall of the finished CIPP shall be compatible with the resin system used, translucent enough that the resin is clearly visible, and shall be firmly bonded to the felt material.
- 5.1.4 The tube shall be marked for distance at regular intervals along its entire length, not to exceed 5 feet. Such markings shall also include the lining manufacturer's name or identifying symbol.

5.2. The Resin System. The resin system shall be a corrosion resistant polyester, vinyl ester, or epoxy and catalyst system that when properly cured meets the minimum requirements given herein or those that are to be utilized in the design of the CIPP for this project.

PART 6 – STRUCTURAL REQUIREMENTS

The design thickness of the liner shall be arrived at using standard engineering methodology. ASTM F1216, Appendix X1, has such an acceptable methodology that may be used where applicable. The long-term flexural modulus to be used in the design shall be verified through testing. The long-term modulus shall not exceed 50% of the short-term value for the resin system unless the tube contains reinforcements. In the event that a reinforced tube is utilized, the long-term flexural modulus shall be the percentage of the short-term modulus as determined by the above referenced testing.

The layers of the finished CIPP shall be uniformly bonded. It shall not be possible to separate any two layers with a probe or point of a knife blade so that the layers separate cleanly or such that the knife blade moves freely between the layers. If separation of the layers occurs during testing of the field samples, new samples will be cut from the work. Any reoccurrence may be cause for rejection of the work.

The finished CIPP shall fit tightly to the host pipeline at all observable points and shall meet or exceed the minimum thickness established by the design process. The materials properties of the finished CIPP shall meet or exceed the following structural standards:

MINIMUM PHYSICAL PROPERTIES

Property	ASTM Test Method	Polyester System	Filled Polyester System	Vinyl Ester System
Flexural Strength	D790	4,500psi	4,500psi	5,000psi
Flexural Modulus (Initial)	D790	250,000psi	400,000psi	300,000psi
Flexural Modulus (50 Yr)	D790	125,000psi	200,000psi	150,000psi
Tensile Strength	D638	3,000psi	3,000psi	4,000psi

PART 7 – INSTALLATION

The CIPP shall be installed in accordance with the practices given in ASTM F1216 (for direct inversion installations) or ASTM F1743 (for pulled-in-place installations). The quantity of resin used for the tube’s impregnation shall be sufficient to fill the volume of air voids in the tube with additional allowances being made for polymerization shrinkage and the anticipated loss of any resin through cracks and irregularities in the original pipe wall. A vacuum impregnation process shall be used in conjunction with a roller system to achieve a uniform distribution of the resin throughout the tube.

Temperature gauges shall be placed at the upstream and downstream ends of the reach being lined to monitor the pressurized fluid’s (air or water) temperature. In addition to

monitoring the temperature inside the tube, temperature gauges shall be placed between the host pipe and the liner at as many points as is practical to record the heating that takes place on the outside of the liner.

Curing of the resin system shall be as per the Manufacturer (Licensor) of the CIPP product. The temperatures achieved and the duration of holding the pressurized fluid at those temperatures shall be per the Manufacturer's (Licensor's) established procedures.

PART 8 – INSTALLATION RESPONSIBILITIES FOR INCIDENTAL ITEMS

It shall be the responsibility of the Owner to locate and designate all manhole access points open and accessible for the work, and to provide rights of access to these points. If a street must be closed to traffic because of the orientation of the pipeline, the Owner shall institute the actions necessary to do this for the mutually agreed time period. The Owner shall also provide free access to water hydrants for cleaning, installation of the tube, and other work items requiring water.

The Contractor, when required, shall remove all internal debris out of the pipeline that will interfere with the installation of the CIPP. The Owner shall provide a dumpsite for all debris removed during the cleaning operations. Unless stated otherwise, it is assumed that this site will be at or near the sewage treatment facility to which the debris would have arrived in absence of the cleaning operation. Any hazardous waste encountered during this project will be considered as a changed condition.

The Contractor, when required, shall provide for the flow of sewage around the section, or sections, of pipe designated for rehabilitation. The bypass shall be made by plugging the line at the existing upstream manhole and pumping the flow into a downstream manhole or adjacent system. The pump and bypass lines shall be of adequate capacity and size to handle the anticipated flow. The Owner may require a detail of the bypass plan to be submitted.

Experienced personnel trained in locating breaks, obstacles, and service connections by close circuit television shall perform inspection of the pipelines. The interior of the pipeline shall be carefully inspected to determine the location of any conditions that may prevent proper installation of the CIPP into the pipelines, and it shall be noted so that these conditions may be corrected. A videotape and suitable log shall be kept for later reference by the Owner.

It shall be the responsibility of the Contractor to clear the line of obstructions such as solids and roots that will prevent the insertion of CIPP. If pre-installation inspection reveals an obstruction such as a protruding service connection, dropped joint, or a collapse that will prevent the installation process, and it cannot be removed by conventional sewer cleaning equipment, then the Contractor shall 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 commencement of the work and shall be considered as a separate pay item.

The Contractor shall make every effort to maintain service usage throughout the duration of the project. In the event that a service will be temporarily out of service, the maximum amount of time of no service shall be 16 hours for any property served by the sewer. The Contractor shall be required to notify the City and all affected properties whose service laterals will be out of commission and to advise against water usage until the sewer main is back in service. Such notification shall be provided to the Utility Department at least one week prior to service disconnecting.

A public notification program shall be implemented, and shall as a minimum, require the Contractor to be responsible for contacting each home or business connected to the sanitary sewer and informing them of the work to be conducted, and when the sewer will be off-line. The Contractor shall also provide the following:

- A. Written notice to be delivered to each home or business describing the work, schedule, how it affects them, and a local telephone number of the Contractor they can call to discuss the project or any problems that could arise.
- B. Personal contact and attempted written notice the day prior to the beginning of work being conducted on the section relative to the residents affected.
- C. Personal contact with any home or business that cannot be reconnected within the time stated in the written notice.

PART 9 – QUALITY ASSURANCE PROCEDURES

The Contractor shall prepare a sample for each installation of CIPP. The samples shall be restrained samples for diameters of CIPP less than 18”; and flat plate samples for diameters of CIPP 18” and larger. The flat plate samples shall be taken directly from the wet out tube, clamped between flat plates, and cured in the downtube. The restrained samples shall be tested for thickness and initial physical properties; flat plate samples shall be tested for initial physical properties only.

In addition to physically sampling the finished CIPP, the Contractor shall post-TV the completed work. The television inspection should be used to confirm tightness of the fit of the CIPP to the host pipe and to identify any imperfections. The finished liner shall be continuous over its entire length and be free from visual defects such as foreign inclusions, dry spots, pinholes, and delamination.

PART 10 – PAYMENT

Payment for the work included in this section will be in accordance with the unit prices set forth in the proposal for the quantity of work performed. Progress payments will be made on the work performed during that period.