

Section 2330

Cured-In-Place Lateral Lining

PART 1: General

- 1.1 *Summary* – It is the intent of this portion of the specification to provide for the re-construction of a service lateral and connection in 8-inch through 24-inch mainline pipes, normally without excavation, by the installation of a one piece resin impregnated, flexible, non-woven felt tube installed into the existing lateral connection utilizing a pressure apparatus positioned in the mainline pipe. Curing shall be accomplished by use of ambient cure resin or other approved method to cure the resin into a hard impermeable cured-in-place (CIPP) pipe liner. When cured, the liner shall have a watertight connection seal at the mainline and extend over the length of the service lateral in a continuous one piece structural pipe- within-a-pipe.
- 1.2 *Qualifications of Contractor* – The Contractor or Subcontractor performing the work of this section shall be employees of the company manufacturing the CIPP Lateral Lining system components, or shall be licensed by the system Manufacturer. The Manufactured System must have a minimum of a five (5) year history of satisfactory performance with a minimum of 10,000 CIPP lateral installations. The Contractor or Subcontractor shall have a minimum of two (2) years of service continuous experience installing CIPP Lateral Lining in pipe of similar size, length and configuration as proposed in this project. In addition, the Contractor or Subcontractor shall have successfully installed 5,000 CIPP laterals in a wastewater collection system application. The onsite Superintendent must have installed over 2,500 CIPP laterals of like condition for this geographic area and have a minimum of 5 years of CIPP industry experience.
- 1.3 *References* – This specification references ASTM test methods which are made a part hereof by such reference and shall be the latest edition and revision thereof.

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

- 1.4 *Submittals* –
- 1.4.1 *Product Data* –
- 1.4.1.1 *Resin* –
- 1.4.1.1.1 Long term test creep data confirming the resin system's 50 year design life in accordance with ASTM D2990.
- 1.4.1.1.2 Chemical Resistance per ASTM F1216
- 1.4.1.1.3 Certificate of Compliance with ASTM 1216

1.4.1.2 *Tube –*

1.4.1.2.1 Certificate of Compliance with ASTM F1216

1.4.1.2.2 If glass fiber reinforcement is used, CIPP strain Corrosion testing data in accordance with ASTM D3681

1.4.2 CIPP wall thickness design calculations (for lateral liner) in accordance with ASTM F1216.

PART 2: Products

2.1 *Materials –*

2.1.1 *General Requirements –*

2.1.1.1 Tube and resin will meet the requirements of ASTM F1216, F1743 and D5813.

2.1.1.2 In industrial areas subject to possible flows other than domestic sewage, the Owner shall obtain samples of the dry weather sewage flow to be analyzed for chemical content. This analysis shall be supplied to the Installer for his information.

2.1.2 *CIPP Lateral Materials –*

2.1.2.1 The liner shall be fabricated to a size that when installed will neatly fit the internal circumference of the conduit specified by the Owner. Allowance shall be made for circumferential stretching during insertion. The liner shall be a one piece joint-less polyester felt tube that will create a watertight seal at the mainline interface.

2.1.2.2 The minimum length shall be 36 inches (3 feet) to effectively span the distance from the lateral connection at the main or to the desired termination location in the service lateral pipe. The lateral liner must provide a watertight seal at the mainline and a structural repair of the lateral over the specified length. The Installer shall verify the lengths in the field before impregnation of the resin.

2.1.2.3 Unless otherwise specified, the Installer shall furnish a specially designed, unsaturated, Polyester or Vinylester resin catalyst system compatible with the cured-in-place process that provides cured physical strengths specified herein.

2.1.3 *Physical Strength –*

2.1.3.1 The structural performance of the finished pipe must be adequate to accommodate all anticipated loads throughout its design life. No cured-in-place pipe reconstruction technology will be allowed that requires bonding to the existing pipe for any part of its structural strength. Only resin vacuum impregnation will be allowed. If reinforcing materials (fiberglass, etc.) are used, the reinforcing material must be fully encapsulated within the resin to assure that the reinforcement is not exposed, either to the inside of the pipe or at the interface of the CIPP and the existing pipe.

- 2.1.3.2 Design methods are to be derived from traditionally accepted pipe formulas for various loading parameters and modes of failure. All equations will be modified to include ovality as a design parameter. The design method shall be submitted to the Engineer for approval prior to the pre-bid conference.
- 2.1.3.3 The CIPP lateral pipe shall conform to the minimum structural standards as listed in the table below:

Structural Standards for CIPP Lateral Pipe		
Property	ASTM Standard	Results
Flexural Stress	ASTM D 790	4,500 psi
Flexural Modulus	ASTM D 790	250,000 psi

2.2 *Approved Manufacturers/Products –*

- 2.2.1 BLD “Service Connection Seal + Lateral” of BLD Services, LLC
- 2.2.2 LMK Enterprises
- 2.2.3 or pre-approved equal

PART 3: Execution

3.1 *Installation Preparations –*

- 3.1.1 *Access* – If the Contractor requires access through a cleanout or access pit to complete the lateral lining, the costs associated with the cleanout or access pit will be the responsibility of the Contractor. If a cleanout already exists or is required by the Owner, it shall be constructed of materials which provide a four inch (4”) minimum diameter circular opening, if service lateral is six inch (6”) than a six inch minimum diameter opening is required. Any cleanouts must be 2-way wye connections (Tee connection will not be permitted) to allow video inspection, cleaning and lining access.
- 3.1.2 *Safety* – The Installer shall carry out his operations in strict accordance with all applicable OSHA standards. Particular attention is drawn to those safety requirements involving entering confined spaces.
- 3.1.3 *Cleaning of Sewer Line* – The intent of this specification is for cleaning of the lateral to be accomplished from the mainline pipes via lateral launching equipment. If the lateral cannot be cleaned using industry standard cleaning heads that can be launched from the mainline then a cleanout will be required and considered changed conditions. The laterals shall be cleaned a sufficient length to ensure the specified length of sewer is ready for lining. It shall be the responsibility of the Installer to verify, prior to installation, that all internal debris has been removed from the sewer line. Internal debris consists of broken pipe sections, roots, loose gravel, etc.
- 3.1.4 *Inspection of Pipelines* – It is the intent of this specification for inspection of the lateral to be accomplished from the mainline pipes via lateral launching equipment. If the lateral cannot be inspected using industry standard inspection equipment that can be launched from the mainline then a cleanout will be required and considered changed conditions. Inspection of pipelines shall be performed by experienced personnel trained in locating

breaks and obstacles by closed circuit television. The interior of the pipeline shall be carefully inspected to determine the location of any conditions which may prevent proper installation of the lateral liner into the pipelines, and it shall be noted so that these conditions can be corrected. A DVD and suitable log shall be kept for later reference by the Owner.

- 3.1.5 *Bypassing Sewage* – The Installer, when required, shall provide for the flow of sewage around the section or sections of mainline pipe where the service lateral designated for lining is located. The bypass shall be made by plugging the line at an 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 flow. It is assumed that flows in the lateral specified for lining will not require bypass pumping.
- 3.1.6 *Service Lateral Deactivation* – It is required that the service lateral be inactive during the time of installation. This is normally accomplished by turning off the Homeowner's services or requesting that the Homeowner relinquish using his services during the period of installation. Notification will be distributed to impacted residents 24 hours in advance of the lateral liner installation.
- 3.1.7 *Line Obstructions* – If inspection reveals an obstruction that cannot be removed by conventional sewer cleaning equipment, as in solids, dropped joints or collapsed pipe then the Installer 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.
- 3.1.8 *Lined Mainlines* – In the case of lined mainline pipes, the lateral connection specified for rehabilitation shall be reinstated to 100 percent of its original size to accept the CIPP lateral.

3.2 *Installation Of Lateral Lining* –

- 3.2.1 *General* – The Installer shall designate a location where the liner will be vacuum impregnated prior to installation. The Installer shall allow the Owner to inspect the materials and "wet-out" procedure. A catalyst system compatible with the resin and liner shall be used.
- 3.2.2 *Wet-Out Liner* – The wet-out liner shall be loaded inside a pressure apparatus above ground and utilizing a hydrophilic sealant (or equivalent) on the backside of the connection to enhance a watertight seal. Also, a two-part 100 percent solid epoxy (reference ASTM C-881) or a Silicate Resin shall be applied to the lateral interface to enhance adhesion against the host pipe. The pressure apparatus, with an end attached to a robotic device, shall be winched through the mainline pipe to the service connection. The robotic device, together with a television camera, will be used to position the pressure apparatus' inversion elbow at the service connection opening. Air pressure, supplied to the pressure apparatus through an inversion hose, shall be used to invert the wet-out liner through the lateral pipe to the cleanout/access point or "Right of Way" point. The inversion head will be adjusted to be of sufficient pressure to cause the impregnated liner to invert completely in the lateral pipe and hold the tube tight to the pipe wall. Care shall be taken during the curing process so as not to overstress the tube.
- 3.2.3 *Curing* – In most circumstances, an accelerated ambient-temperature curing resin system will be utilized, however if a heat cure is required, the Installer shall supply a suitable heat

source and recirculation equipment. The equipment shall be capable of delivering the approved heating medium throughout the section to the temperature required to affect a cure of the resin. This temperature shall be determined by the resin/catalyst system employed.

3.2.3.1 If a heat cure is required, the heat source shall be fitted with suitable monitors to gauge the temperature of the incoming and outgoing air/steam or water supply. Fluid temperature in the line during the cure period shall be recommended by the resin Manufacturer. NOTE: No UV cure systems will be allowed.

3.2.3.2 Initial cure shall be deemed to be completed when inspection of the exposed portions of the CIPP appears to be hard and sound and/or the temperature gauge indicates that the temperature is of a magnitude to realize an exotherm. The cure period shall be of a duration recommended by the resin Manufacturer, as modified for the installation process.

3.2.4 *Cool-down* – The Installer shall cool the hardened CIPP to a temperature below 100°F before relieving the pressure in the pressure apparatus. Cool-down may be accomplished by the introduction of cool air into the pressure apparatus to replace water being forced out of the pressure apparatus. Care shall be taken to maintain proper pressure throughout the cure and cool-down period.

3.2.5 *Finish* – The finished CIPP shall be a watertight connection seal at the mainline and extend continuous over the entire length of the service lateral and be free of dry spots, lifts, and delamination. This continuous one piece structural pipe-within-a-pipe shall not inhibit the closed circuit television post video inspection of the mainline or service lateral pipes.

3.2.6 *Testing* – For every 50 laterals, one flat plate sample shall be taken and sent to a 3rd party test laboratory for confirmation of short term flexural modulus and strength properties in accordance with ASTM F1216. The test results shall meet or exceed the values used in the design of the CIPP lateral liner.

3.2.7 *Close-out* – After the work is completed, the Installer will provide the Owner with a CD or DVD showing the completed work including the restored conditions.

3.3 *Clean-Up* – Upon acceptance of the installation work, the Installer shall reinstate the project area affected by his operations.

3.4 *Measurement And Payment* –

3.4.1 Measurement for the work included in this section will be in accordance with the units set forth in the proposal. Unit prices shall include all labor, materials and equipment required to complete the work as specified. The unit prices shall also include CCTV prior to and after lining, lateral cleaning, bypass pumping of mainline flow, installation of cleanouts (if required by the lateral lining process) and traffic control (standard cones and signs).

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

3.5 Warranty –

- 3.5.1 Contractor warrants to Owner that all products and work provided by Contractor to Owner under this Agreement will be free from material defects in workmanship and materials for a period of five years from the earlier of the date on which Contractor's work is accepted by Owner or the date on which the Contractor completes performance and leaves the worksite. In the event that a material defect in workmanship or materials supplied by Contractor is found during the five year period following acceptance of the work, then such defect shall be repaired, replaced or adjusted by Contractor at no additional cost to Owner. Owner's exclusive remedy in the event of any warranty claim hereunder is limited to correction of such defect, adjustment, repair or replacement as the Contractor shall at its sole option elect. The foregoing warranty is the exclusive warranty provided by Contractor and is given in lieu of all other warranties, whether express, implied or statutory, including but not limited to, any implied warranties of merchantability or fitness or suitability for a particular purpose or use; and all other warranties are hereby expressly disclaimed.
- 3.5.2 In no event shall Contractor's liability for warranties hereunder exceed the purchase price paid by the Owner for Contractor's work and materials.
- 3.5.3 The warranty set out above shall be void and of no effect in the event that
- 3.5.3.1 Contractor is not notified of claim of defect within the five year period provided above;
 - 3.5.3.2 Contractor is not provided timely and unrestricted access to the site at which the claimed defect is located in order to investigate and/or repair, adjust or replace the work or materials claimed to be defective or Contractor is not provided suitable working conditions to perform such investigation, repair, adjustment or replacement;
 - 3.5.3.3 Any materials or work is exposed to chemicals or substances other than those listed in the Specifications to this Agreement as accepted by Contractor;
 - 3.5.3.4 Site conditions or pipeline, conduit or access way conditions are other than those disclosed to and accepted by Contractor;
 - 3.5.3.5 Owner's site, pipeline, conduit or access ways are cleaned or modified in a manner not disclosed in writing to and accepted in writing by Contractor in advance of commencement of Contractor's work or tampered with prior to, during or after completion of Contractor's work;
 - 3.5.3.6 Or the work, the site at which the work is performed or the materials provided by Contractor are otherwise abused or misused.