

SPECIFICATIONS FOR INSTALLING CURED-IN-PLACE-PIPE (CIPP) LATERAL LINING USING THE PULL-IN-PLACE METHOD FOR REHABILITATION OF EXISTING PIPELINES (ASTM F1743-08)

1.00 Intent

The intent of this cured-in-place lateral lining specification is to provide reconstruction of sewer collection laterals without excavating the entire existing pipeline.

2.00 General

The existing pipe reconstruction will be accomplished using a liner tube measured to exact length and inside diameter utilizing a thermosetting resin that meets required physical and chemical resistance properties. The liner will be impregnated with resin then dropped into the pipe opening. A pre-strung cable or winch line will be used to pull the liner and bladder into place. Once in place, an internal rubber bladder will be inflated to allow the liner to hold its shape against the host pipe as the resin cures. At no time during the cure will the bladder lose air pressure and be re-pressurized. Once the liner is fully cured, the bladder is removed. The sewer lateral collection pipe will be immediately televised for the inspector's approval. A copy of the televised inspection must be recorded on VHS or DVD format for future reference.

3.00 Materials

The liner tube will consist of a needled felt. The liner tube will be fabricated together using a butt stitched seam sealing process with a heat welded sealing tape to ensure airtight seal. The liner tube is to be manufactured in the United States by Perma-Liner Industries, LLC. The liner tube will be capable of carrying resin and withstanding installation pressures and curing temperatures. The liner tube will be lined on one side with a translucent impermeable chemically resistant polyurethane (PU) waterproof coating. An internal bladder must come inside of the liner material. This bladder may consist of a rubber or vinyl calibration hose material.

The resin will be a two-part, 100% solids epoxy containing no styrene. No styrene based resin will be accepted due to its change in volume during polymerization. The epoxy resin shall be formulated to have a gel (pot) life of approximately 30 minutes with a set cure time of three (3) hours. The epoxy shall ambient cure by internal exothermic chemical reaction. External heat processes using hot water or steam to lower cure times will be accepted.

The seam stitched / heat welded seam tape / felt liner tube and resin will upon installation meet and/or exceed minimum testing standards as required by ASTM, IAPMO and ANSI/NSF International. All materials must have 3rd party testing provided by an independent a2La accredited laboratory completed within one year of the bid completion date.

3.01	<u>Required Cured-In-Place Lateral Lining Standards</u>	<u>Minimum(ASTM F 1216/ 1743)</u>
	Flexural Strength (ASTM D-790)	4,500 PSI
	Flexural Modulus (ASTM D-790)	250,000 PSI
	Tensile Strength (ASTM D-638)	3,000 PSI
	Tensile Elongation (ASTM D-638)	5 PSI
	Compressive Strength (ASTM D-695)	4,000 PSI
	Chemical Resistance (ASTM D-543)	> 20% loss
	Leakage Test* (NSF Standard 14)	0/gal/in/day

Manufacturer must have United States based manufacturing head quarters. The manufacturer must have at least 5 years of manufacturing / supplying C.I.P.P. Air Inversion or Pull In Place Liner Tube and Materials. The manufacturing plant has a Quality Assurance / Quality Control program in place and audited a minimum of once per year by NSF International, IAPMO R&T Laboratories, and the International Code Council.

4.00 Inversion Process (ASTM F 1743)

Standard Practice for Rehabilitation of Existing Pipelines and Conduits by Pulled-In-Place Installation of Cured-in-Place Thermosetting Resin Pipe (CIPP)

- 4.01** The owner shall be notified 24 hours in advance of project start time. No building utilities, such as toilets, sinks, dishwasher, laundry washer, bath tubs or sump pumps will be used during the installation and curing process. It is up to the contractor to determine if water supply should be temporarily shut down. Generally no by-pass pumping is needed.
- 4.02** Lateral sewer collection pipe must be cleaned thoroughly prior to installation of liner. All sand, rocks, gravel, grease, mud, sludge, and other debris must be removed from the invert to permit proper installation. Roots will need to be removed to the extent necessary to effectively line the entire pipe.
- 4.03** The existing lateral sewer collection pipe will be inspected using a mini-televising color camera system capable of viewing the interior condition of the host pipe by a trained technician. The TV inspection must be performed within 5 hours prior to installation of liner tube. All obstacles should be noted.
- 4.04** The resin and liner material will not be contaminated and/or diluted prior to installation.
- 4.05** Resin impregnation must be performed on site prior to installation into the pipe or conduit. Visual inspection must yield no dry spots in the liner. The volume of resin used should be sufficient to fully saturate all the voids of the fabric tube material at nominal thickness and diameter. The volume should be adjusted by adding 3-15% excess resin to allow for migration through the perforations of the fabric tube out onto the host pipe.
- 4.06** The liner tube will be pulled into place using a pre-strung winch or cable line. The liner tube will be open and not sealed off. The liner tube will be designed to fit tightly against the host pipe annular space and gaps. The bladder tube inside the liner will be inflated to ensure the liner is tight against the host pipe until fully cured. The resin-impregnated liner tube will cure within 4 hours without external heat sources.
- 4.07** External heat sources such as hot water and steam may be used to speed the cure of the liner. If either of these is used, a proper initial cure, post cure, and cool down process must be implemented to the resin manufacturer's specifications.
- 4.08** Once the curing process is finished, the internal bladder is removed and the lateral sewer collection pipe is immediately inspected for final acceptance. The new lined pipe will be free of any foreign objects providing a smooth, seamless and continuous lined pipe from entry point to main sewer connection pipe.
- 4.09** Any liner tube protruding from the lateral sewer collection pipe into the main sewer pipeline will be removed by remote robotic cutting equipment.
- 4.10** A final TV Inspection of the lined lateral collection sewer pipe will be recorded and provided to the owner for final approval.

5.00 Final Acceptance

In addition to any specific acceptance criteria specified in the contract, the following standards shall be satisfied before final acceptance of the liner installation:

5.01 Finish

The finished pipe shall be continuous over the length of a run and be free from defects.

5.02 Defects

Any defects, which will affect the integrity of the installed pipe, will be repaired as directed by the owner.

5.03 Leakage

No visible leakage through the liner will be allowed.

6.00 Payment

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