Specifications

For the Rehabilitative Lining of Pressure Water Lines for Potable Water Transmission and Distribution using Cured-In-Place Liners

CIPP, CORPORATION (Feb/2015)

Part 1: GENERAL

SEC. 1.1 SCOPE

The pipe lining is intended for use in transporting potable water in existing host water pipes. Each application is designed as needed for the specific pressure conditions, but not to exceed 300 psi.

SEC. 1.2 PURPOSE

The purpose of this standard is to provide purchasers, manufactures, suppliers, and installers with the minimum requirements for Cured-In-Place pressure pipe linings for water distribution and transmission. Also in the case of pressure force mains for wastewater and process water.

SEC. 1.3 APPLICATION

This standard can be referenced in documents for Cured-In-Place pressure pipe linings for water transmission and distribution. The stipulation of this standard is that it only applies to pressure pipe Cured-In-Place linings.

SEC. 1.4 REFERENCES

This standard references the latest edition of the following documents. In the case of a conflict, the requirements of this document shall prevail.

ASTM F1216: Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube.

ASTM F1743: Rehabilitation of Existing Pipelines and Conduits by Pulled-in-Place Installation of Cured-in-Place Thermosetting Resin Pipe

ASTM D790: Test Methods for Flexural Properties of Un-reinforced Plastics and Electrical Insulating Materials

ASTM D2990: Tensile, Compressive, and Flexural Creep and Creep-Rupture of Plastics

AWWA C651: Disinfection Potable Water Mains
SEC. 1.5 SUBMITTALS

The following submittals for installation shall be made as part of the project requirements.

1.5.1 Calculations: Dimensions of the pressure pipe lining shall be calculated and submitted to the engineer in accordance with ASTM F1216 or the appropriate thickness calculation for pressure pipe as selected by the engineer.

1.5.2 Manufacturer’s Certification: A certification from the manufacturer on the composition of the liner materials, and that the liner meets the proposed application as appropriate. A copy of the NSF Certificate for NSF/61 and the BNQ Certificate where needed must be provided.

1.5.3 A description of the method of cleaning the water line, the method of installing the liner, and the quality control measures that will be taken to assure that the pipe meets these specifications and the intended purpose.

1.5.4 The methods for providing temporary water service to users including temporary hoses and connections to each service during the period of construction.

Part 2: Materials

2.1 MATERIAL:

Materials shall comply with the Safe Drinking Water Act and other federal requirements.

SEC. 2.2 RESIN:

Resin shall be an epoxy resin capable of curing in the presence of water and meeting NSF/ANSI Standard 61- Drinking Water System Components. Supplier shall provide a certificate that the product meets the appropriate certification. The mix ratio of resin to catalyst shall be as recommended by the manufacturer. The resin must have a delayed curing agent system after having been mixed into the resin be capable of remaining in a refrigerated state without hardening for over 36 hours.

SEC. 2.3 FELT:

Felt shall be glass reinforced polyester felt in the form of a mat having a coupling agent that bonds the resin to the felt.
SEC. 2.4 LINER REQUIREMENTS:

Resin is mixed and applied to felt side of liner while liner is under vacuum, inverted into the pipeline to be rehabilitated, and then cured by steam or hot water for a minimum of 2 hours at 65 degrees C. After the steam cure, lined pipes must be subject to a minimum ambient cure of 48 hours.

The resin/felt matrix must have the following minimum initial structural properties testing in the hoop stress orientation for pressure pipe;

<table>
<thead>
<tr>
<th>Property</th>
<th>Standard</th>
<th>Minimum Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexural Strength</td>
<td>ASTM D790</td>
<td>15,000 PSI</td>
</tr>
<tr>
<td>Flexural Modulus</td>
<td>ASTM D790</td>
<td>700,000 PSI</td>
</tr>
<tr>
<td>Tensile Strength</td>
<td>ASTM D638</td>
<td>12,000 PSI</td>
</tr>
</tbody>
</table>

Part 3 Installation Requirements and Sequencing

The following sequence describes the typical method of installing a cured-in-place liner for pressure pipe for potable water.

1) Determine the size and composition of the pipe, and locate all valves, hydrants, and services on the water line.
2) Notify residents and provide temporary service to users as required
3) Excavate access pits at each end of the pipe to be lined
4) Clean the pipe to original surface using appropriate pipe cleaning methods
5) Inspect the pipe using CCTV to determine the condition and location of services and fittings and to verify cleanliness.
6) Insert plugs in service connections from inside the pipe using robotic equipment
7) Inject epoxy into the liner and insert liner into place.
8) The liner must be inverted in a controlled manner, meaning by use of a pressure chamber for 6” through 12”, with control of speed of inversion or in the case of larger liners with water inversion, 15” diameter and larger, hold back provided so that the speed of inversion is controlled.
9) Form the liner through air inflation or hydrostatic head as per the Manual of Practice.
10) Cure the liner using hot water or steam as per the Manual of Practice for pressure pipes.
11) Test the liner for pressure and leaks
12) Reinstate service connections by drilling through the plugs If not feasible to do internally, excavate and reinstate services using approved service connection adaptors.
13) Disinfect the potable water line
14) Connect the lined pipe to the existing mains using appropriate pressure connections
15) Place the line into service and remove the temporary water services.
16) Restore the site to the original condition.
Part 4: Pre-installation Cleaning and Inspection

SEC. 4.1 CLEANING

Pipes shall be cleaned as needed with high-pressure water jet cleaners, mechanically powered equipment, and winch cable attached scraper devices, or water-propelled “pigs”. Internal corrosion, debris, and other obstructions in the pipe shall be removed and the pipe flushed clean.

SEC. 4.2 INSPECTION

The pipe shall be inspected immediately before installation of the cured-in-place liner with a CCTV camera and a permanent record provided to the owner.

SEC 4.3 OBSTRUCTION REMOVAL

In a case where an obstruction cannot be removed by cleaning equipment, an access pit will be dug and the obstruction removed prior to installing the liner.

SEC 4.4 SWABBING PRIOR TO INVERSION OF LINER

In all cases, just prior to inversion of the pressure liner, several dry swabs must be propelled through the pipeline to be rehabilitated, with air, to remove standing water and any additional deleterious matter that were to remain from the cleaning operation.
Part 5: Pressure and Leak Testing, Disinfection

SEC. 5.1 PRESSURE AND LEAK TESTING

Hydrostatic and leakage testing shall be in accordance with AWWA C600. After the pressure liner has been installed, the liner shall be tested for at least 2 hours to a hydrostatic pressure of at least 1.5 times the normal operating pressure.

Pressure and leakage testing shall be done concurrently. Leakage is defined as the quantity of water supplied into the pipe necessary to maintain pressure within 5 PSI of the pressure test after the pipe and been filled and purged of air. The leakage shall not exceed the amount determined by the following formula:

\[ L = \frac{SD(P1/2)}{133,200} \]

Where \( L \) equals the allowable leakage in gallons per hour, \( S \) is the length of liner tested in feet, \( D \) is the nominal diameter of the pipe in inches, and \( P \) is the average test pressure during the leakage test in pounds per square inch.

SEC. 5.2: DISINFECTION:

The lined potable water main shall be disinfected in accordance with AWWA C651 “Disinfecting Water Mains” before placing the main in service.