

**SPECIFICATIONS
FOR THE LINING OF PRESSURE SEWERS AND
WATER MAINS WITH
POLYESTER REINFORCED POLYETHYLENE
(As Provided by Insituform)**

Part 1. GENERAL

1.1 Scope

Provision and installation of Polyester Reinforced Polyethylene (PRP) for the rehabilitation of pressure sewers and water mains.

1.2 Unit Prices

A. PRP: Measurement for furnishing and installing as specified herein is on a linear foot basis for each size of water main rehabilitated, measures along the centerline of the pipe, between the beginning and ending points as determined from drawings and field measurement.

B. Price includes PRP liner, service reconnections and end seals

1.3 References

A. ANSI/NSF 61 - Drinking Water System Components - Health Effects

1.4 Performance Requirements

A. Rehabilitate deteriorated pressure sewers and water mains by installation of a tight fitting lining within the existing pipeline.

B. The lining is formed by the insertion of a folded, flexible PRP into the host pipe. The PRP is re-rounded using steam and pressure. The finished product is a jointless liner that is formed to the existing pipe.

C. The PRP is designed to withstand internal pressure of at least 170psi, independent of the structural capacity of the host pipe.

1.5 Quality Assurance

A. Installation to be performed by PRP manufacturer's authorized installer.

Part 2. PRODUCTS

2.1 Suppliers

Approved suppliers of PRP: Thermopipe™ or approved equal. The PRP system must have been used for a minimum of 5 years in the lining of at least 100,000 feet of potable water pipes or other pipes operating at similar pressures.

2.2 Materials

A. PRP Tube

1. Manufactured and fabricated under quality control conditions set by the manufacturer.
2. Consisting of a jacket made from polyester fiber woven into a cylindrical form and encapsulated in polyethylene.
3. Size PRP to provide a snug fit against the internal circumference of the existing water main, span the actual field distance between the beginning and ending points with extra allowances as needed for stretching and shrinkage due to installation, pressure or expansion.

B. PRP Properties

When installed in water lines, the PRP system shall be suitable for the conveyance of potable water and shall comply with the requirements of ANSI/NSF Standard 61 as evidenced by Certification from NSF International or other body approved by the USEPA or the relevant state EPA.

Part 3. EXECUTION

3.1 Preparation

- A. Inform Clients Representative of work schedules for PRP installation.
- B. Conduct operations in accordance with applicable OSHA standards, including safety requirements involving work in excavations and confined spaces. Make suitable precautions to eliminate hazards to personnel near construction activities when pressurized air and / or steam is being used.

3.2 Pre-installation cleaning and inspection

- A. Internal corrosion products, debris, and other obstructions revealed by inspection shall be removed from the pressure sewer or water main to the extent necessary for PRP installation. Pipes may be cleaned, as needed, with high-pressure water jet cleaners, mechanically powered equipment, and winch cable attached devices or fluid-propelled pig devices.
- B. Perform inspection of the pipe immediately before installation of the PRP. Experienced personnel trained in locating obstructions by use of a proving pig or CCTV survey shall perform inspection.
- C. If inspection reveals an obstruction that cannot be removed by conventional cleaning equipment or a branch or tee connection, an access pit shall be provided to uncover and remove the suspect section of pipe to facilitate installation of the PRP and / or reinstatement of the branch or tee connection.

3.3 Access Pits

- A. The contractor shall designate the location of access pits for entry into the existing pipeline.
- B. The Contractor shall be responsible for the removal of all valves, branches, fire hydrant connections and other fittings and their replacement / renewal as designated in the contract.

3.4 Installation Procedures

- A. Installation of PRP
 - 1. The existing pipe shall be dewatered and reasonably free of incoming water. If water is present, measures shall be taken to minimize the possibility of trapping water between the PRP and the existing pipe.
 - 2. The PRP shall be installed through an appropriate pipe opening by means of hand or powered pulling device.
- B. Inflation and Steam Forming
 - 1. The PRP shall be inflated using breathing air-quality compressed air or medical grade nitrogen.
 - 2. The PRP shall be formed by softening with steam. Forming shall apply sufficient heat and pressure to completely erase the folded memory of the PRP and create a tight fit to the host pipe.

C. Cooling

Adequate air or nitrogen pressure shall be maintained continuously during the cooling process to ensure a tight fit between the PRP and the host pipe when pressure is removed.

D. Finished PRP

The finished PRP shall be continuous and as free as commercially possible from visual defects such as foreign inclusions, pinholes, twists and blistering. The Contractor shall correct defects that will cause operational problems in a mutually acceptable manner and without cost to the Client.

3.5 End Seals

- A. After installation, the PRP shall be cut to appropriate length to allow fitting of End Seals. End Seals shall be Redman or Wask Transgrip[®] "pipe end coupler", or approved equal. For water projects, End Seals, or the water contact materials of the End Seals, shall also comply with the requirements of ANSI/NSF Standard 61 as evidenced by Certification from NSF International or other body approved by the USEPA or relevant state EPA.
- B. End Seals shall be capable of maintaining a leak proof seal at 170psi.
- C. End Seals shall be designed to prevent the migration of debris between the host pipe and the PRP but allow any water in the annular space between the host pipe and PRP to be expelled by system or hydrostatic pressure.

3.6 Service Connections (Water Projects)

Service reconnections up to 1" diameter shall be made to the lined pipe by remote internal connection of a mechanical sealing apparatus (Insituform iTAP[™] or approved equal). If internal reconnection is not possible or not feasible, local excavation and fitting of an external adapter (Angus "Ferrule Adapter", or approved equal) may be used for reconnection. For external adapters, 3/4in service connections adapters are typically available for 3" - thru 12" PRP, and 1-1/2in service connection adapters are typically available for 6" thru 12"PRP.