



**BULLET LINER**  
**SYSTEM™**  
BY ASOE

# Installation Guide



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## Introduction

The purpose of this guide is to provide an overview of the installation of **BulletLiner System™**, a Flexible Fabric Reinforced Pipe (FFRP) for potable water and wastewater pipe renewal. This liner is classified as a semi-structural solution for water pipe renewal, according to the AWWA M-28 manual. This installation guide is intended to be used by licensed contractors, installers, consulting and design engineers, utility and pipeline owners and managers, municipalities, and other industry professionals. Download the **BulletLiner System™** spec sheet for information regarding properties and use of **BulletLiner System™** in a renewal project:

[https://cpmpipelines.com/wp-content/uploads/2022/09/CPMBulletLiner\\_SPECS-3.pdf](https://cpmpipelines.com/wp-content/uploads/2022/09/CPMBulletLiner_SPECS-3.pdf)

## BulletLiner System™ Applications and Benefits

**BulletLiner System™** is a product in the field of pipeline renewal for potable water distribution and sewer force main applications. **BulletLiner System™** renewal temporarily reduce the cross-

sectional area of the new pipe before it is installed, then expands it to its original size and shape after placement to provide a close-fit with the existing pipe. This product is more common for pressure pipeline and sewer force main applications and can be used for semi-structural purposes. **BulletLiner System™** produces a durable and smooth lining for potable water pipes of 2-inches to 48-inches, internal diameter (ID). It can be inserted in existing pipes with bends up to 45° (subject to project conditions) and provide a uniform thickness along the pipe.

**BulletLiner System™** provides corrosion resistance, flow and pressure improvement and semi-structural enhancement to existing pipes, thus increasing their design life. **BulletLiner System™** can improve water quality delivery through pipes by addressing a number of problems, such as:

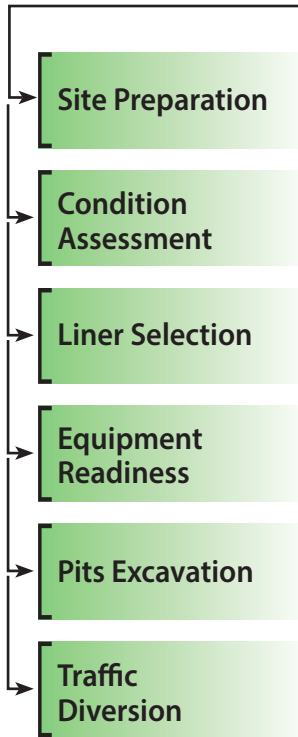
- Pipeline internal corrosion problems.
- Water quality problems associated with pipeline internal corrosion and mineral deposits.
- Flow capacity problems arising from pipe tuberculation.
- Minimizing disruption during installation through a rapid return to service process.

FEATURES	BENEFITS
<b>Continuous Barrier Lining</b>	Stops and prevents internal corrosion of existing pipe. Prevents leakage from pipe joints and holes.
<b>Thin-Walled Lining</b>	Maximize inside diameter of the relined pipe and maximizes flow capacity. No grouting required.
<b>Ambient Temperature Installation</b>	No process heating requirements.
<b>Trenchless Installation</b>	Minimum disturbance to adjacent services, surface and subsurface, and structures. Less environmental and social disruption compared with open-cut pipe construction.
<b>Trenchless Pipeline Renewal Technology</b>	Utilizing the existing pipeline, it enhances construction productivity, cost effectiveness and provides a new pipe with a 50-year design life within the old pipe.  Applicable to pipe diameters from 2-inches to 48-inches.  Liners can be used in up to 45° bend or 90° bend with a 5D radius. Rehabilitates up to 20,000-feet of existing pipe in one pull.
<b>Environmentally Friendly</b>	Less influence on surrounding environment during installation and no chemical epoxy resin needed.
<b>Return to Service</b>	Same day return to service.

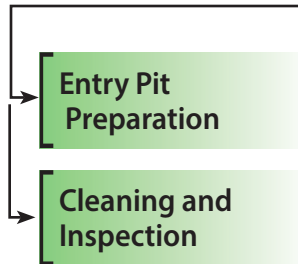
## Installation Phases

A successful installation of **BulletLiner System™** depends on several factors such as: material transportation from shop to the site, cleanliness of the internal surface of the old pipe, old pipe conditions, geometry, alignment and defects. Among these parameters, one very important factor is that the proper installation technique is followed.

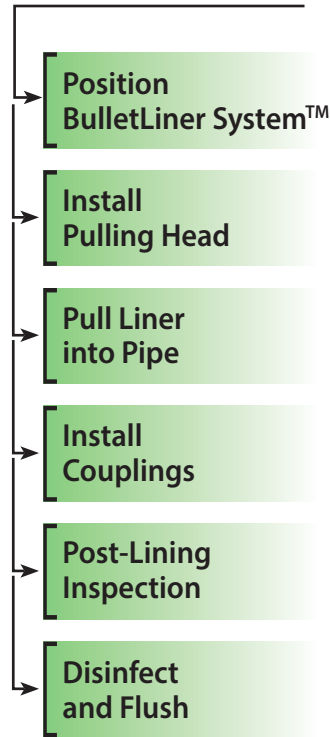
### PLANNING



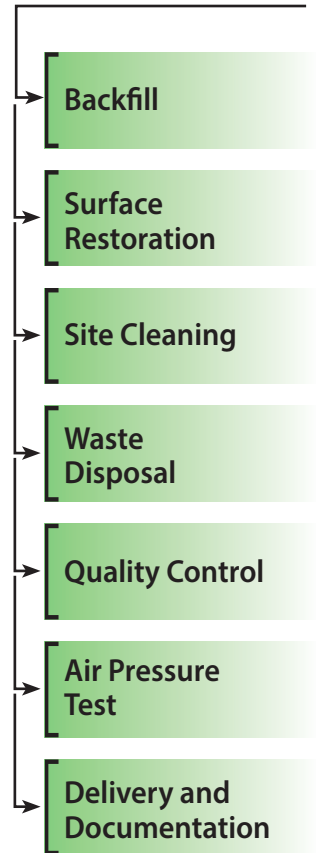
### PREP



### INSTALLATION



### CLOSEOUT



## Water Pipe Cleaning Methods

In most of potable water pipes, sediment accumulates and biofilms develop, increasing the risk of color, taste, and odor problems, along with the chance of coliform re-growth. Effective cleaning must be performed for the areas to be lined to mitigate these problems. Before isolating and cleaning a section of pipeline, water flow must be stopped or bypassed. The section of pipe will then be emptied



and cleaned. An adequate cleaning technique will be chosen based on pipe material, degree of tuberculation, previous coating and entry point locations. It should be noted that if the structural condition of the old pipe is poor, and the pipe wall is thin, then some cleaning methods may result in damage to the pipe section being cleaned. The table on page 3 shows a summary of pipe cleaning methods.

## Pipe Cleaning Methods

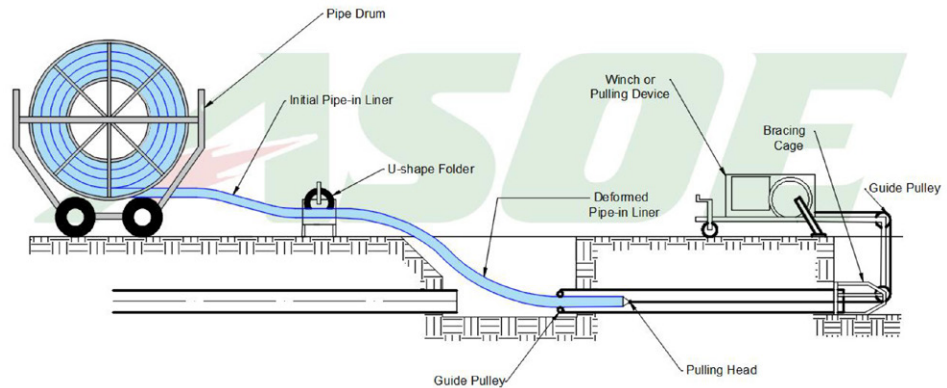
CLEANING METHOD	PROCEDURE
<b>Drag Scrapers</b>	Designed to remove hard deposits and nodules. This apparatus is made up a number of spring steel scrapers mounted on a central shaft. These scrapers remove deposits as they are winched through the pipe. The central shaft is fitted with a towing eye at each end to allow the scraper to be pulled back if necessary. These are available for all pipe sizes ranging from 4-inches to 12-inches.
<b>Power Boring</b>	Hydraulically powered device utilized to remove tuberculation and encrustation from the water pipes. The device is a rack feed boring machine, a compact, diesel-powered unit using hydraulic pressure to rotate steel rods and flails through the pipe.
<b>High Pressure Water Jetting</b>	High-velocity water blasts deposits and films from the pipe surface.
<b>Plunging</b>	For softer scales or residues, the pig's contact point is covered with plastic.
<b>Air Scouring</b>	Volumes of air and water are alternately introduced to the pipe through fire hydrants, creating turbulence that scours film, and lifts and transports sediment.
<b>Balling</b>	A threaded rubber cleaning ball that spins and scrubs the interior of the pipe as flow increases in the pipelines.
<b>Flushing</b>	High flow rate of water into the pipes, removing floatables and sands and grids.



## Equipment Requirements

As for any renewal projects, installation is an important phase of **BulletLiner System™** renewal method. Figure 3.1 illustrates the required equipment to install **BulletLiner System™**

- After inserting **BulletLiner System™** into the existing pipe, air compressor is needed for reforming process.
- Common tools such as cutters, wrench, drills and etc. are needed to perform installation process.
- Hydraulic jack is needed to fix the flange, expansion ferrule and inner pushing tube.



## Installation Procedure

The following steps presents the **BulletLiner System™** installation procedure:

1. Select the section of existing pipes to be rehabilitated.
2. Install by-pass hoses to keep transferring flow during rehabilitation.
3. Excavate entry and exit pits at the start and end point of the project.
4. Inspect existing pipe and analyze the condition and defects.
5. Clean the existing pipe.
6. Set up **BulletLiner System™** at the entry pit and winch at the exit pit.
7. Install pulling head to **BulletLiner System™**.
8. Install hose guides and cable pulley wheel.
9. Pull **BulletLiner System™** into the existing pipe.
10. Install **BulletLiner System™** into the special burst coupling, fix tight with flange and seal both ends.
11. Apply compressed air to expand the deformed liner to normal size. The lining will fit tight to the host pipe after this process.
12. Bolt the outer flange tube to prevent any movement.
13. Trim the liner according to manufacturer's recommended length.
14. Install the middle expansion ferrule inside the lining.
15. Mount hydraulic jack to inner pushing tube using all threads.
16. Verify hydraulic jack and pushing tube are level with the outer flange tube.
17. Press the fittings together using the hydraulic jack and press.
18. Seal two ends of the pipe, flush the liner, and perform hydrostatic pressure or air pressure test.
19. Install transition pipes.
20. Weld or secure transition pipe.
21. Recover transferring fluid.
22. Remove by-pass and backfill the shafts.

