



TRENCHLESS REHABILITATION FOR PRESSURE PIPES

European Training Programme





ASOE
Trenchless Pipe Rehabilitation Solutions

Asoe Hose Manufacturing, Inc. has developed a multitude of trenchless pipe rehabilitation solutions for pressure pipes.

Pipe-in Liner is Fabric Reinforced Flexible Plastic Pipes (FRFPP). The basic installation procedure is straightforward: first fold Pipe-in Liner into a U-shape, then pull the liner into the host pipes and lastly expand the liner in the host pipe. The Pipe-in liner will then function as a leakage-free liner inside the host pipes.

Pipe-in Liners are classified into four different series: Pipe-in Liner W Series, Pipe-in Liner O Series, Pipe-in Liner G series, and Pipe-in Liner H series.

Pipe-in Liner W series are used to rehabilitate water main pipes and other types of water pressure pipes at normal temperature. Pipe-in Liner O series are used to rehabilitate oil pipes onshore or offshore. Pipe-in Liner G series are used to rehabilitate gas pipes onshore or

offshore. Pipe-in Liner H series are used to rehabilitate pipes in municipal heat systems, since it can resist temperatures up to 95° C (203° F). Asoe is the first company in the world to develop this type of solution to rehabilitate hot water pipes. In addition to liners, Asoe supplies couplings which connect Pipe-in Liner with pipes and equipment to install the couplings.

The Pipe-in Liner solution is non-structural pipe rehabilitation. There is no connection between the host pipe and the liner so the liner works independently from the host pipe. The liner is somewhat rigid, and it will maintain its round shape inside the host pipes even without inside pressure or with little pressure from outside.

Pipe-in Liner is flexible and can easily be pulled through 45 degree bends or 90 degree bend with a 5D radius. Only coarse pipe cleaning is required before Pipe-in liner installations.



Corrosion-resistant



Quick Installation



Holds High Pressure Internally

NUFLOW EUROPEAN TRAINING PROGRAMME

NuFlow's European Training Programme provides you with training and local on-site support to ensure a successful and profitable pressurized pipe lining project.

TECHNICAL SPECIFICATIONS OF PIPE-IN LINERS

Pipe-in Liner W Series

Rehabilitating water mains and other water pipes with inside pressure

Nominal ID of host pipes: 50mm (2 inches) - 1400mm (55 inches)

Maximum length of each installation: up to 4000m (13,000ft)

Maximum operating pressure: 1.0 - 4.0 Mpa (150psi-600psi)

Maximum bursting pressure: 3.0 - 12.0 Mpa (450psi-1800psi)

Installation mode: Pull in U-shape Liners

Raw materials: High tenacity fabric reinforcement layer, abrasion-resistant PE cover, PE tube (NSF61 certified, Potable Water Safety approved by NHFPC of China)

Abrasion resistance (DIN53516): 10.5 mm³

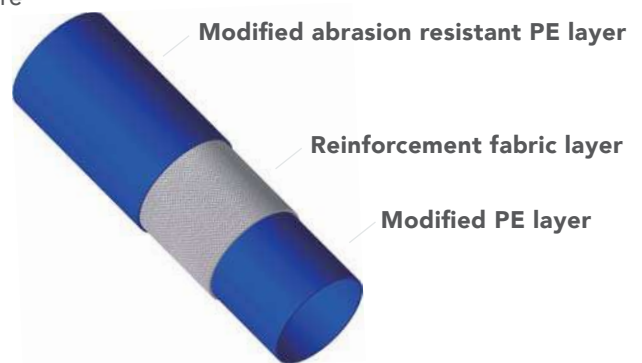
Temperature of media: -40°C to 75°C (-40°F to 167°F)

Wall thickness: 6mm-8mm (0.236-0.315 inch)

Trenchless solution type: Non-structural pipe rehabilitation

Pulling speed: Up to 400m/h

Service life duration: 50 years



Pipe-in Liner O Series

Rehabilitating oil pipes

Nominal ID of host pipes: 50mm (2 inches) - 1400mm (55 inches)

Maximum length of each installation: Up to 4000m (13,000ft)

Maximum operating pressure: 1.0 - 4.0 Mpa (150psi-600psi)

Maximum bursting pressure: 3.0-12.0 Mpa (450psi-1800psi)

Installation mode: Pull in U-shape Liners

Raw Materials: High tenacity fabric reinforcement layer, abrasion resistant PE cover, oil resistant PU tube or oil and heat-resistant PVDF tube (PVDF is relatively expensive)

Abrasion resistance (DIN53516): 10.5 mm³

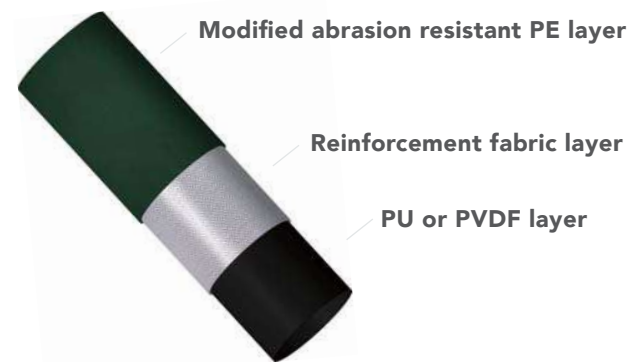
Temperature of media: -40°C to 75°C (-40°F to 167°F)

Wall thickness: 6mm-8mm (0.236-0.315 inch)

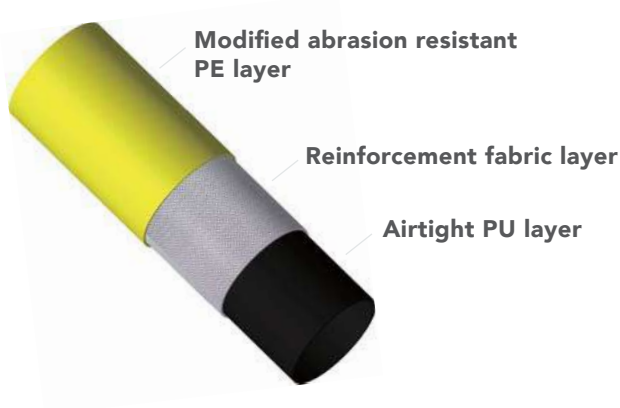
Trenchless solution type: Non-structural pipe rehabilitation

Pulling speed: Up to 400m/h

Service life duration: 40 years



Technical Specifications of Pipe-in Liners (continued)



Pipe-in Liner G Series

Rehabilitating gas pipes

Nominal ID of host pipes: 50mm (2 inches) - 1400mm (55 inches)

Maximum length of each installation: Up to 4000m (13,000ft)

Maximum operating pressure: 1.0 - 4.0 Mpa (150psi-600psi)

Maximum bursting pressure: 3.0-12.0 Mpa

Installation mode: Pull in U-shape Liners

Raw Materials: High tenacity fabric reinforcement layer, abrasion resistant PE cover, airtight PU tube

Abrasion resistance (DIN53516): 10.5 mm³

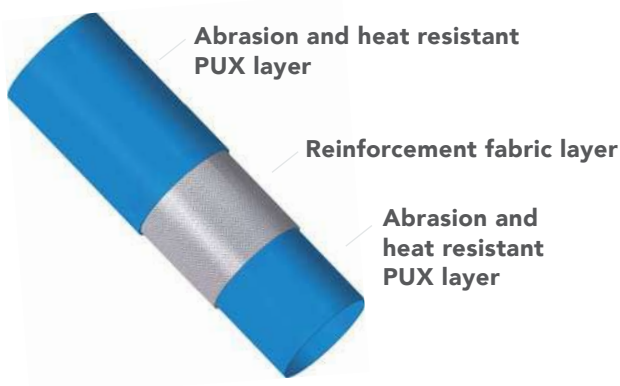
Temperature of media: -40°C to 75°C (-40°F to 167°F)

Wall thickness: 6mm-8mm (0.236-0.315 inch)

Trenchless solution type: Non-structural pipe rehabilitation

Pulling speed: Up to 400m/h

Service life duration: 40 years



Pipe-in Liner H Series

Rehabilitating hot water pipes

Nominal ID of host pipes: 50mm (2 inches) - 1400mm (55 inches)

Maximum length of each installation: Up to 4000m (13,000ft)

Maximum operating pressure: 1.0 - 4.0 Mpa (150psi-600psi)

Maximum bursting pressure: 3.0-12.0 Mpa (450psi-1800psi)

Installation mode: Pull in U-shape Liners

Raw Materials: High tenacity fabric reinforcement layer, heat resistant PUX cover, heat-resistant PUX tube

Abrasion resistance (DIN53516): 10.5 mm³

Temperature of media: -40°C to 95°C (-40°F to 203°F)

Wall thickness: 6mm-8mm (0.236-0.315 inch)

Trenchless solution type: Non-structural pipe rehabilitation

Pulling speed: Up to 400m/h

Service life duration: 40 years

Select the correct liner based on host pipe characteristics.

To purchase correct liners to rehabilitate host pipes, the following information is required:

- 1. Normal operating pressure and temperature**
- 2. Media transferred inside the host pipes, such as water, oil, gas, hot water, chemicals, etc.**
- 3. Materials and ID of host pipes, number of bends, degrees of bends, etc.**
- 4. The length of each section of host pipe which is to be rehabilitated. Pipe-in Liners hold the pressure from inside but not from outside. The host pipes must be able to hold the pressure from outside. If the host pipes collapse, a Pipe-in Liner solution is not recommended.**

PILC COUPLINGS

PILC Couplings for Trenchless Pipe Rehabilitation

PILC couplings contain three parts: outer flange tube, expansion ferrule, and inner pushing tube.

Outer flange tube is made of carbon steel coated with epoxy powder coating and fixes PILC couplings onto host pipes.

Expansion ferrule is made of carbon steel and prevents the lining from slipping and abrasion.

Inner pushing tube is made of carbon steel or stainless steel according to media transferred. It fastens the liners onto the flange tube.

Size of couplings: DN50 - 1400mm (2 - 55 inches).

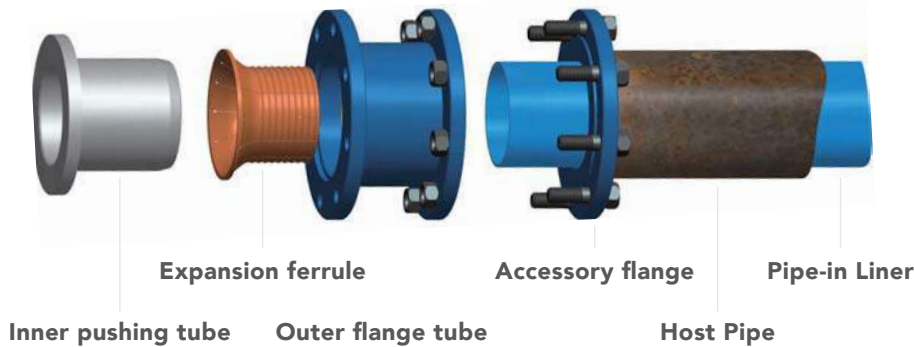
Features

Reliable design ensures the liner will be locked tightly onto PILC couplings with no leaking.

There is no loss in water flow because the inside diameter of inner pushing tubes are the same as that of the liners.

No friction loss at the connecting point of liners and inner pushing tube.

Easy to install. Hydraulic equipment is needed to install couplings.



PILC installation

Flanges are recommended to connect the host pipes with PILC couplings although it is possible to weld the PILC directly onto host pipe. Flanges are recommended between PILC couplings and transition tubes. Flanges are recommended to be used between host pipes and transition tubes, although it is possible to weld the PILC directly onto host pipe.



INSTALLATION

- Choose section of host pipes to be rehabilitated
- Install by-pass hoses in order to keep transferring flow during rehabilitation
- Dig construction pits at two ends
- Inspect pipes with a mobile TV camera and analysis of video recordings
- Mechanical coarse cleaning of host pipes with scraper pigs
- Clean host pipes by water jetting
- Position Pipe-in Liners at the start pit and the pulling winch at destination pit
- Install pulling head onto liner
- Install hose guides
- Fold Pipe-in Liner into U-shape and bind the liner with tape
- Pull liner into the host pipes
- Install PILC couplings onto the host pipes
- Hydrostatic pressure test or air pressure test
- Install transition pipes
- Recover transferring fluid
- Remove by-pass and close pit



TECHNICAL ADVANTAGES



- Rehabilitating host pipes which cannot be repaired by digging
- Free of maintenance after installation
- Liners can be used in up to 45° bend or 90° bend with a 5D radius
- Resists higher pressure from inside
- Small working zone and limited requirement on the conditions of host pipes
- Less influence on surrounding environment during installation
- No chemical epoxy resin needed and no air pollution
- Quick installation
- Super long-distance installation at one time



APPLICATIONS

- Rehabilitation of water main pipe or other water pressure pipes
- Rehabilitation of onshore and offshore oil or gas pipes
- Rehabilitation of chemical pipes
- Rehabilitation of central water heating system pipes

PROJECT REFERENCE

- 1.Rehabilitating gas pipes. The ID of gas pipes is 200mm. Two sections of gas pipes were rehabilitated and the total length was 450 meters. Pipe-in Liner G series were installed.
- 2.Rehabilitating water drainage pipes in a water plant. The ID of water pipe is 300mm. Three sections of water pipes were rehabilitated and the total length was 120 meters. Pipe-in Liner W series were installed.
- 3.Rehabilitating gas pipes. The ID of gas pipe is 400mm. Two sections of gas pipes were rehabilitated and the total length was 280 meters. Pipe-in Liner G series were installed.
- 4.Rehabilitating water main pipes. Four sections of water pipes were rehabilitated and the total length was 600 meters. Pipe-in Liner W Series were installed.
- 5.Rehabilitating oil pipes. The ID of oil pipes is 100mm. One section of oil pipes were rehabilitated and the total length was 660m. Pipe-in Liner O series were installed.
- 6.Rehabilitating water pipes in a nuclear plant. The ID of water pipes is 300mm. Ten sections of water pipes were rehabilitated and the total length was about 1600m. Pipe-in Liner W series were installed.



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WE FIX PIPES

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