Design and Installation of Water Pipeline Renewal

-- by Fabric Reinforced Flexible Plastic Pipe (FRFPP)

Presented by
Houming Ni from Asoe Hose Manufacturing Inc.

Fortezza da Basso • FLORENCE (Italy) 30th September • 2nd October 2019

37TH INTERNATIONAL NO-DIG FLORENCE 2019

Design and Installation of Water Pipeline Renewals

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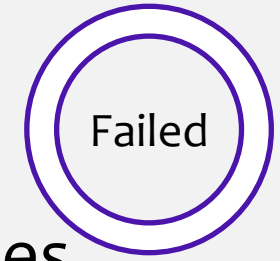
Trenchless Solutions for Pressure pipes and Gravity Pipes

- Oil pipes
- Gas Pipes
- Water Pipes
- Hot water/oil pipes



?

Pipe-in Liner
Sippliner

- Sewage pipes
- Stormwater pipes

?

FFPP Liner
Sippliner

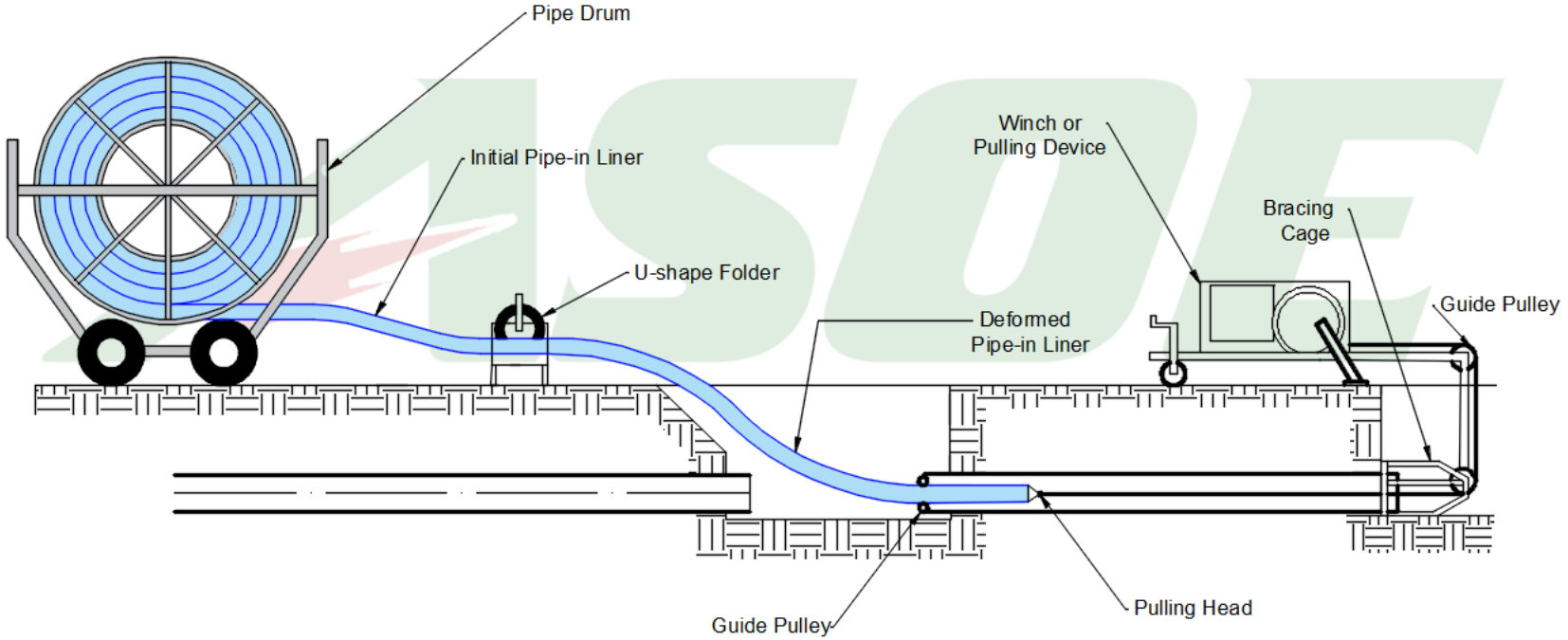
Contents

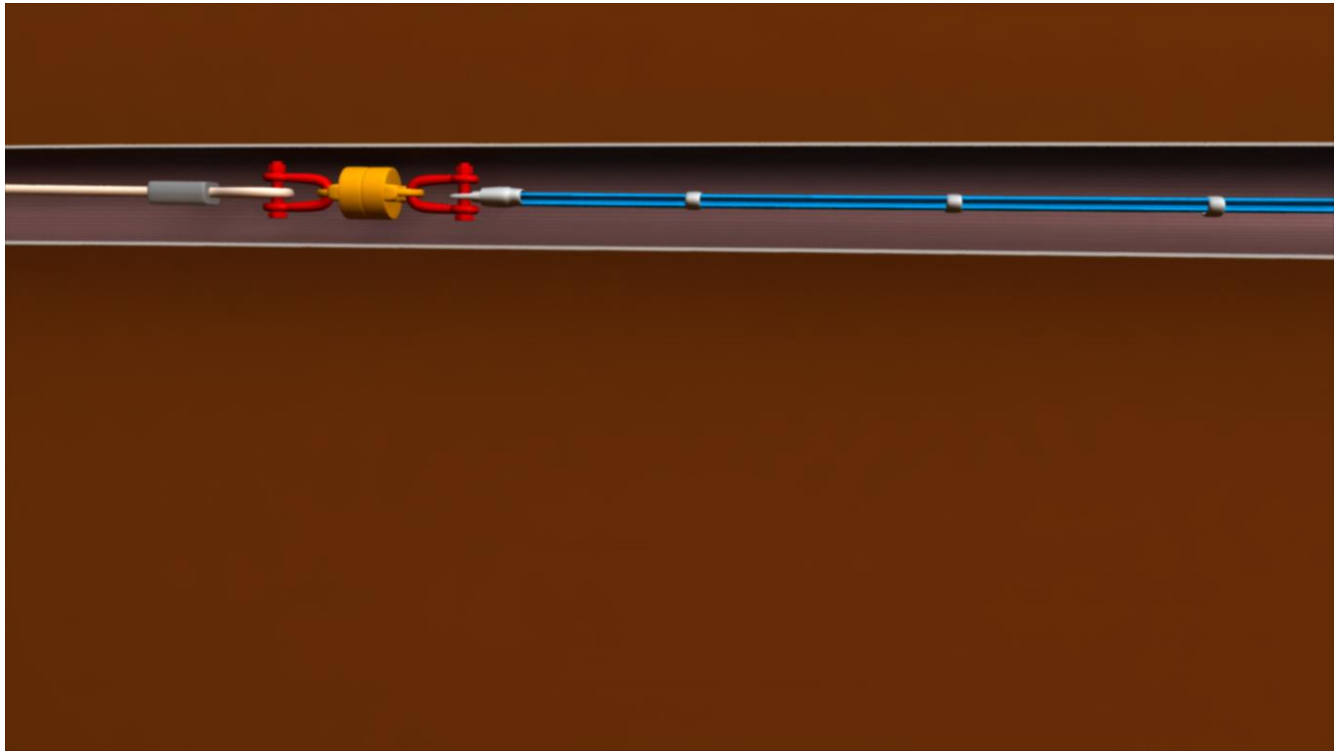
- Trenchless rehabilitation on pressure pipes
  - Pipe-in Liner
    - water pipes, oil pipes, gas pipes, hot water/oil pipes
- Trenchless rehabilitation on gravity pipes
  - Folded and Formed PVC liner

Trenchless Pipe Rehabilitation Solution ---- Pipe-in Liner

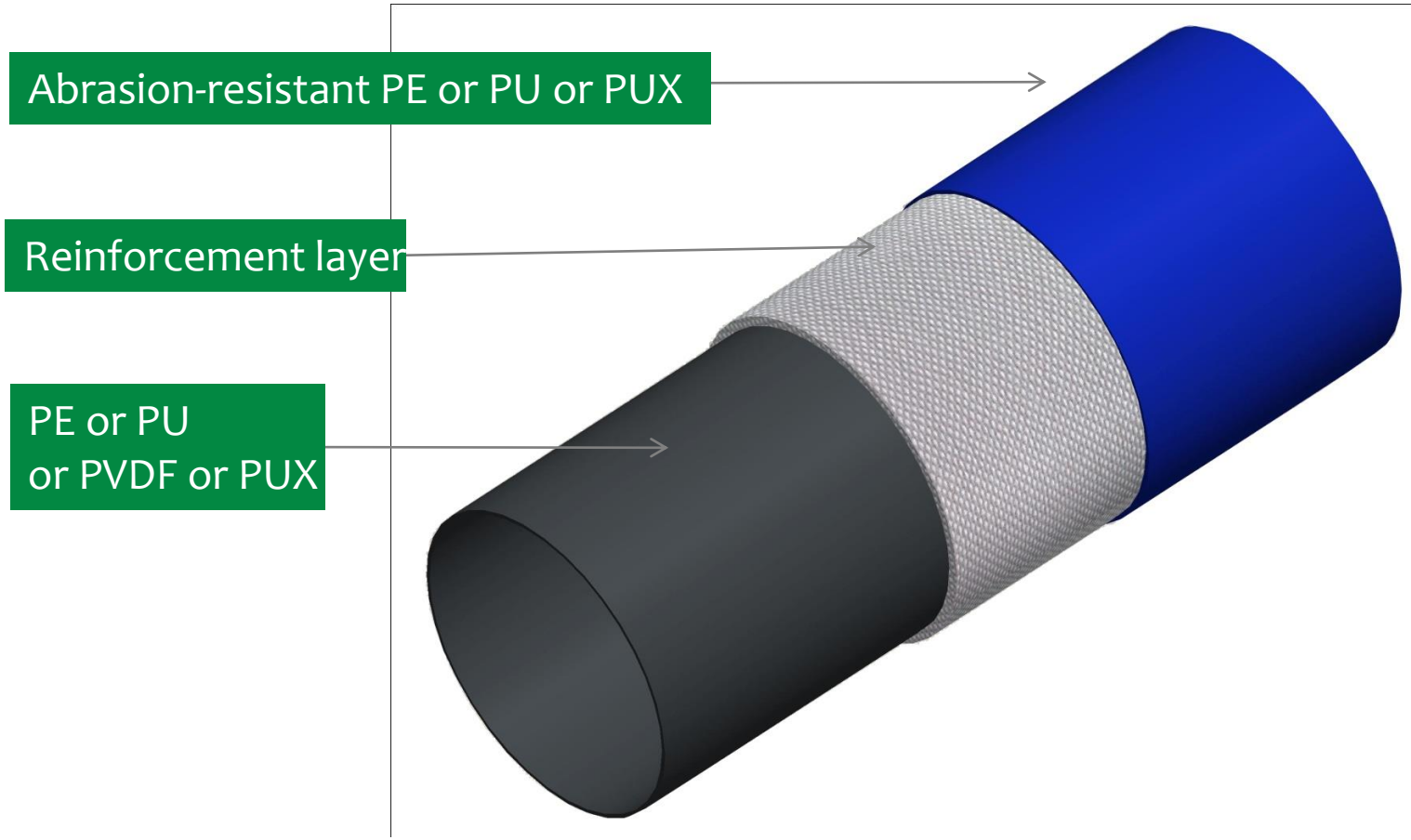
Rehabilitation Logic

Fold Pipe-in Liner into U-shape and then pull the liner into host pipe.
inject water or air to expand the pipe into round shape
Pipe-in liner will stay in the host pipe and keep round shape as a liner





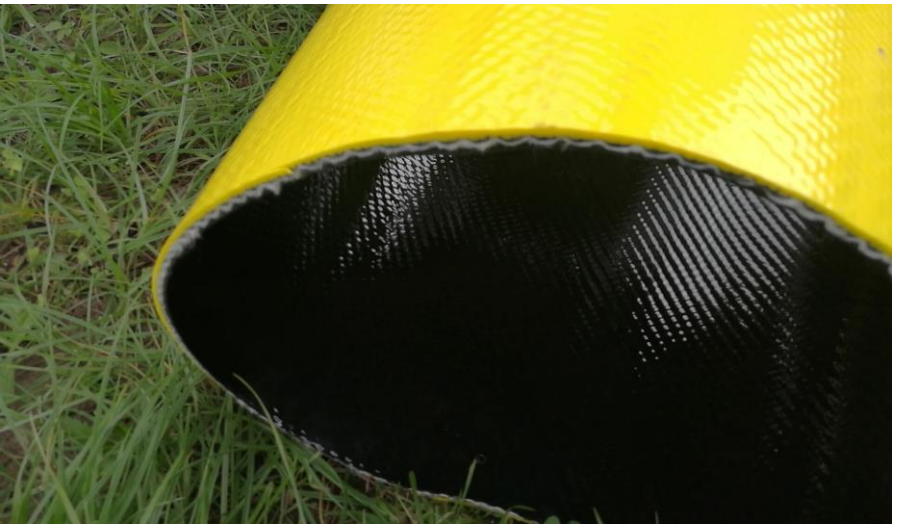
Structure of Pipe-in Liner



The raw materials of Inside layer and outside layers are different according to different fluid through the pipes

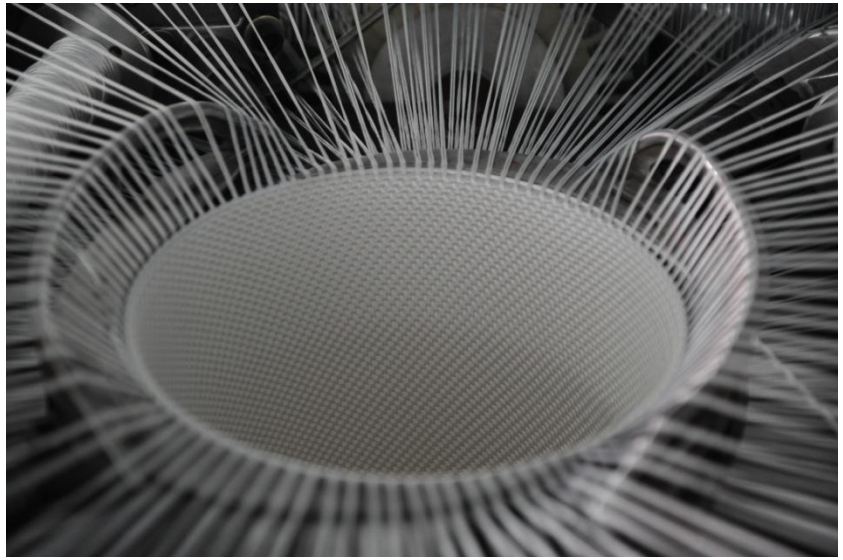
Water main pipe: PE Outside, PE inside
Hot Water main pipe: PUX insdie and outside
Natural gas pipe： PE or PU outside，PU indide
Oil pipe： PE or PU outside， PU inside

Outstanding Performance



- **High Adhesion Strength:** Inside layer, outside layer and reinforcement layer are combined completely as one layer structure
- **Extremely Low elongation rate** (independly test result <0.2% under operating pressure)
- **No stop rings** on the cover or inside tube
- Pipe-in Liner keeps round shape even without pressure inside
- **Minimum reduction** in inside diameter after rehabilitation. **No gap between liner under pressure and host pipe.** Gap equal to risk!

- The inside diameters of repairable host pipe： 2inches to 32 inches, (50mm to 800mm)
- Wall thickness: 4mm- 8mm **Flexible**
- Maximu unit length： 4000m
- Maximum operating pressure： 600psi (4.2 Mpa) **Holding Positive Pressure**
- Installation method： Pull in
- Raw materials: reinforcement layer, Polyester or aramid; Outside layer, PE or PU or PUX; Inside layer, PE or PU, PUX or PVDF (for hot oil)
- Pulling speed： 300-500m/h, depends on pulling equipment
- Theoretical elongating the period of host pipe: 50 years (for water pipes)



Reinforcement layer are seamlessly woven with polyester or aramid yarn. Different types of jackets are tailored according to different pressure equirement.

PILC Couplings
Three segments Push-in flange fitting

three parts：

Outside flange pipe

Inside Push tube

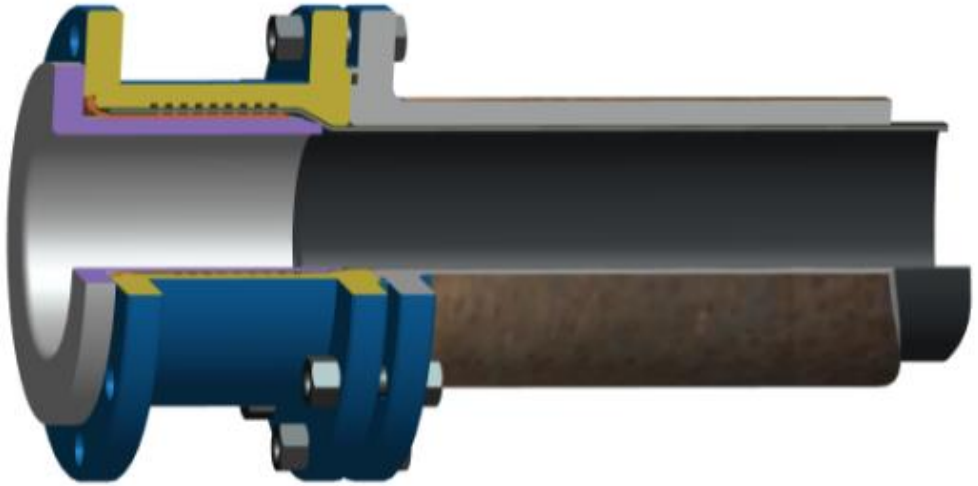
Middle expansion tube

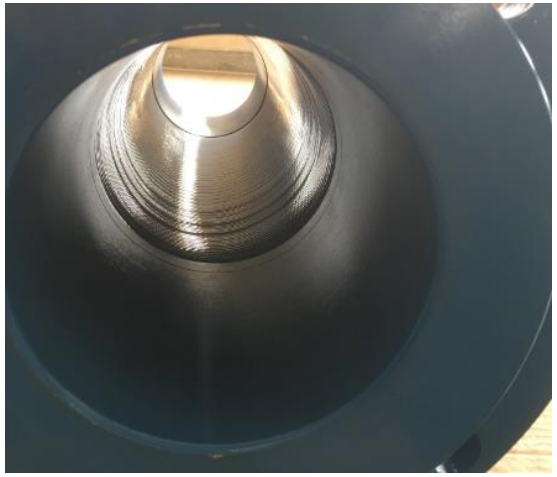
Materials

carbon steel anti-crosion

processed

PILC three segments push-in flange fittings were patented by Asoe Hose Manufacturing Inc.





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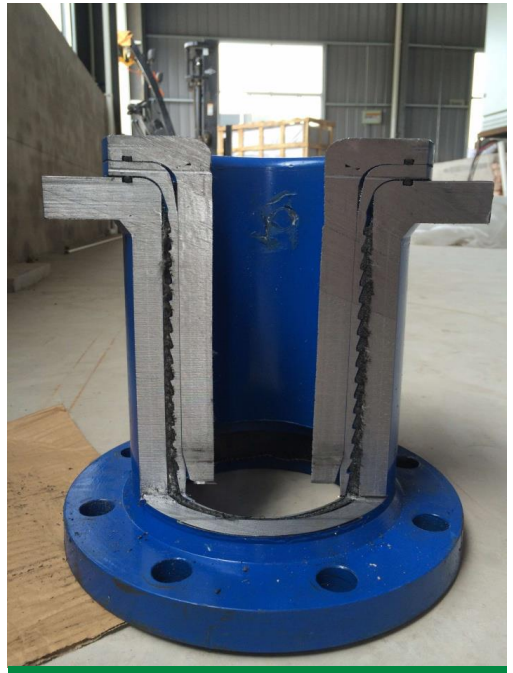
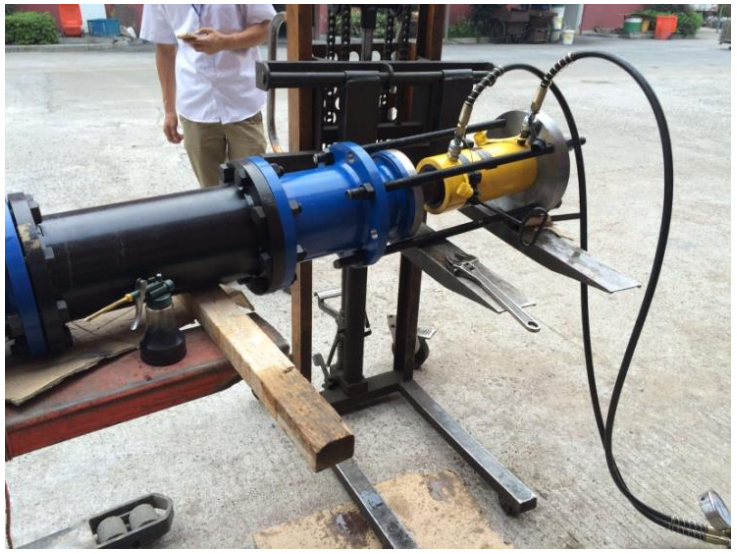
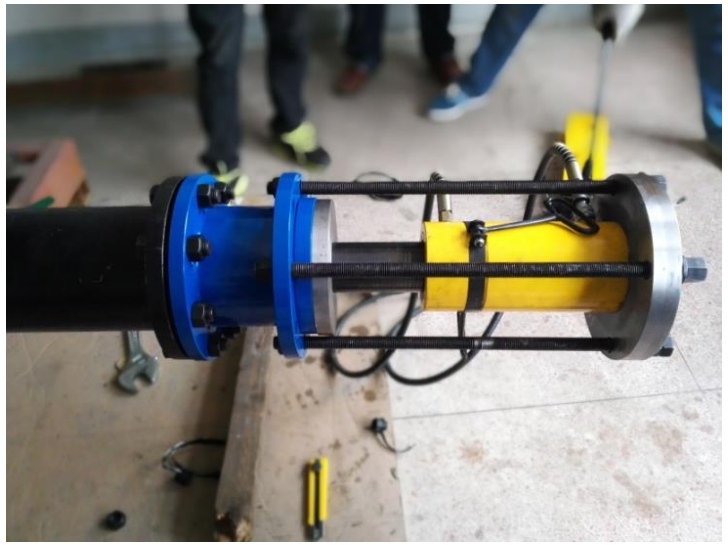


traditional fitting



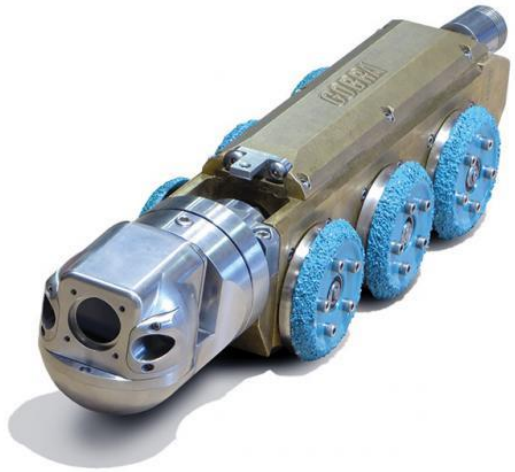


Installation

- choose the section of host pipes which are supposed to rehabilitated
- install bypass hose or pipes if necessary
- dig construction pits at both ends of host pipes

Installation

- Cut host pipes at both pits
- Sectional pipe inspection by mobile CCTV and subsequent analysis of video records.



Installation

- Insertion of auxiliary rope via TV camera
- Positioning pulling machine at the destination pit
- Mechanical coarse cleaning of pipe interior using scraper pigs




Installation

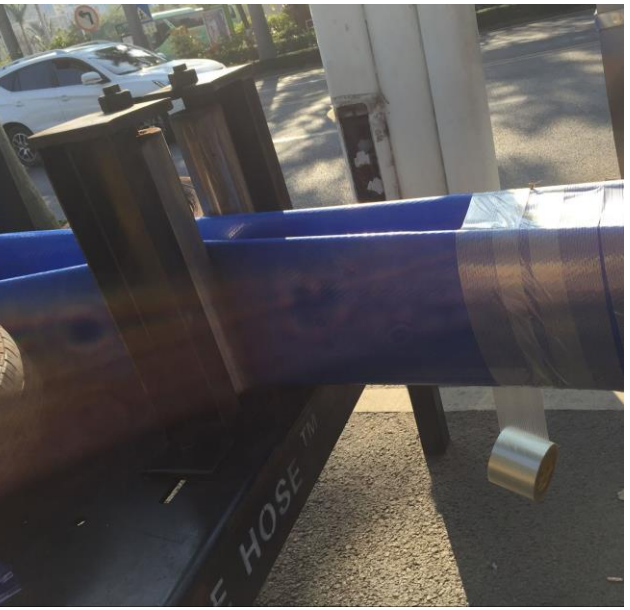
- Water jetting and CCTV reinspection
- Positioning of Pipe-in Liner coiled hose at the start pit

Installation

- Installation of pulling head, hose guides and cable feeder

Installation

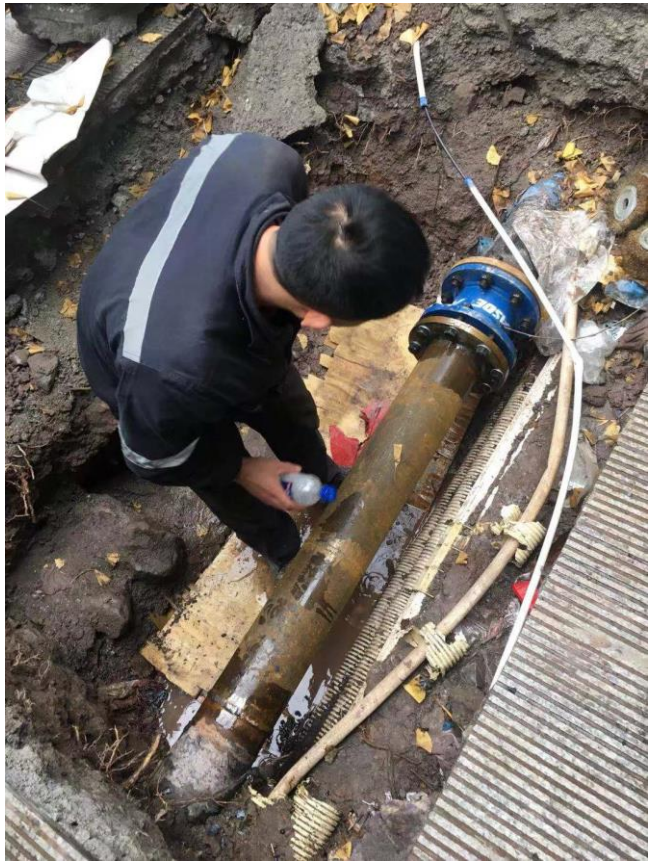
- Fold Pipe-in liner into U-shape and pull liner into host pipes
- Assembling couplings fixed to host pipes




Installation

- Install adaptor pipes and flanges
- Static water pressure test
- pit closure
- move by-pass hose or pipes


ASOE

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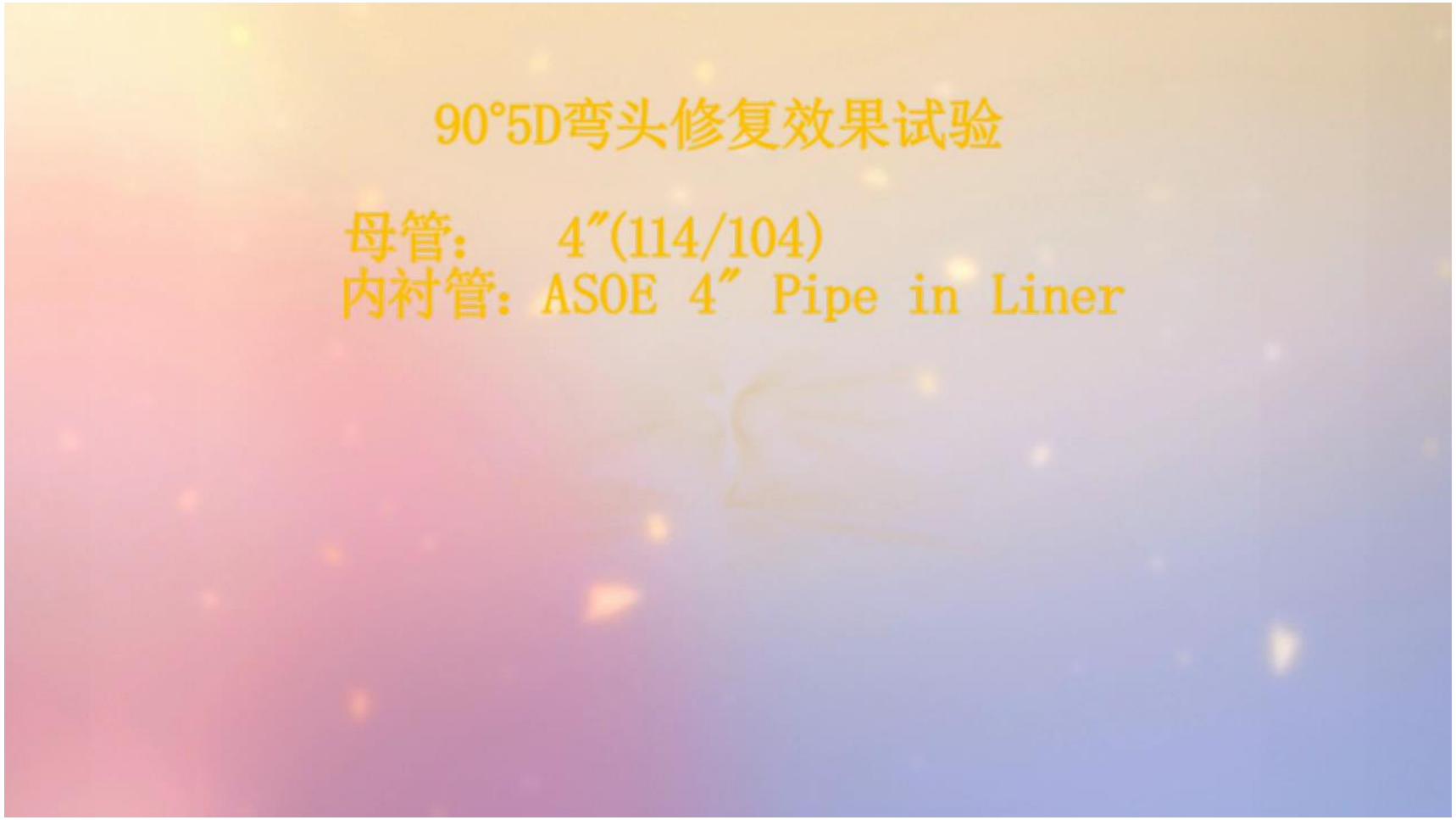
Advantages

Category	Sliplining	CIPP	Close-fit (Pipe-in Liner)
Supplies As	PVC/Polyethylene Plastic Pipe	Epoxy resins or similar	Fabric ReinforcedFlexible Plastic Pipes (FRFPP)
Liner Length	Limited for long pipe segments due to weight of lining material	Limited for large size pipe segments	Up to 13,000 ft length can be done due to light weight lining material
Cross Section Reduction	Cross-sectional area is typically reduced 10% or more in sliplining method (Robinson et al, 2009)	Minimum impact	Minimum impact
Curing Process	No curing process is required	Curing process may take 1- 5 hrs	No curing process is required
Lining Thickness	Uniform thickness along the pipe length	Variations and non-uniformity of liner thickness along the pipe length (Das, 2016)	Uniform thickness along the pipe length
Annular Gap/Adhesion	Water flow can develop along annular gaps. Sometimes grouting of annular space is required	No annular gap and no need to grout the annular space	No annular gap and no need to grout the annular space
ID of host pipes	4-48 inches	6-60 inches	2-32 inches

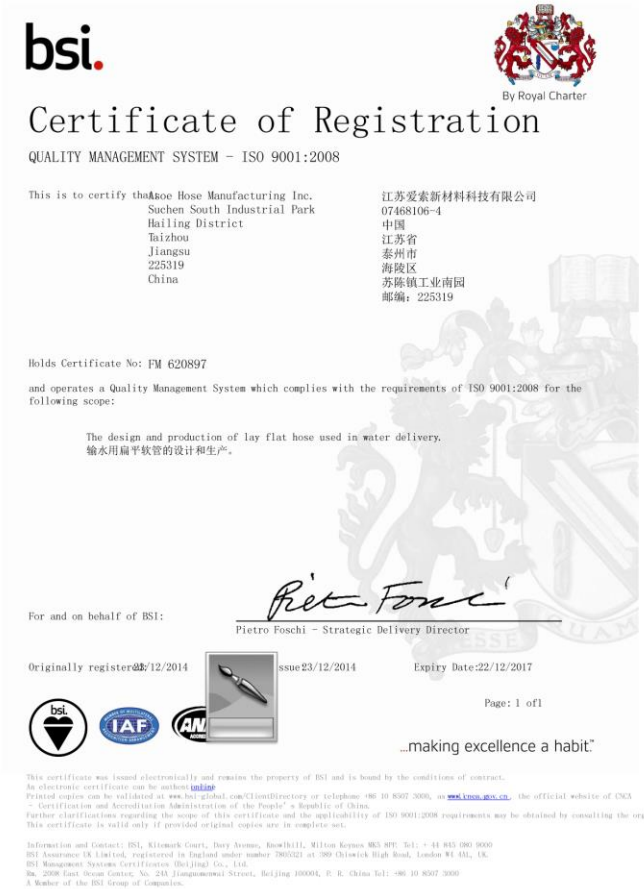
Bent test

90 Degree 5D bent



Certificates

ISO 9001: 2015



bsi.

By Royal Charter

Certificate of Registration

QUALITY MANAGEMENT SYSTEM - ISO 9001:2008

This is to certify that:

Asoe Hose Manufacturing Inc.
Suchen South Industrial Park
Hailing District
Taizhou
Jiangsu
225319
China

江苏爱索新材料科技有限公司
07468106-4
中国
江苏省
泰州市
海陵区
苏陈镇工业南园
邮编：225319

Holds Certificate No: FM 620897

and operates a Quality Management System which complies with the requirements of ISO 9001:2008 for the following scope:

The design and production of lay flat hose used in water delivery.
输水用扁平软管的设计和生产。

For and on behalf of BSI:

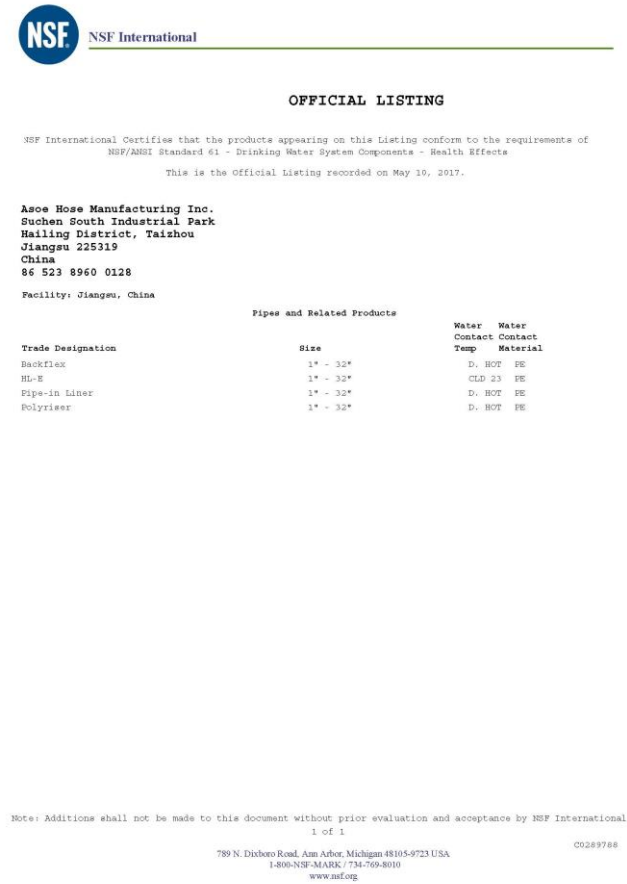
Pietro Foschi - Strategic Delivery Director

Originally registered: 22/12/2014 Issue: 23/12/2014 Expiry Date: 22/12/2017

Page: 1 of 1

...making excellence a habit.

Certificates



NSF International

OFFICIAL LISTING

NSF International Certifies that the products appearing on this Listing conform to the requirements of NSF/ANSI Standard 61 - Drinking Water System Components - Health Effects

This is the Official Listing recorded on May 10, 2017.

Asoe Hose Manufacturing Inc.
Suchen South Industrial Park
Hailing District, Taizhou
Jiangsu 225319
China
86 523 8960 0128

Facility: Jiangsu, China

Pipes and Related Products

Trade Designation	Size	Water Contact Temp	Water Contact Material
Backflex	1" - 32"	D. HOT	PE
HL-E	1" - 32"	CLD 23	PE
Pipe-in Liner	1" - 32"	D. HOT	PE
Polyriser	1" - 32"	D. HOT	PE

Note: Additions shall not be made to this document without prior evaluation and acceptance by NSF International.
1 of 1
C0289788

789 N. Dixboro Road, Ann Arbor, Michigan 48105-9723 USA
1-800-NSF-MARK / 734-769-8010
www.nsf.org

NSF International
789 N. Dixboro Road, Ann Arbor, MI 48105 USA

RECOGNIZES

Asoe Hose Manufacturing Inc.
China

AS COMPLYING WITH NSF/ANSI 61 AND ALL APPLICABLE REQUIREMENTS.
PRODUCTS APPEARING IN THE NSF OFFICIAL LISTING ARE
AUTHORIZED TO BEAR THE NSF MARK.

Certification Program Accredited by the American National Standards Institute

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This certificate is the property of NSF International and must be returned upon request. This certificate remains valid as long as this client has products in Listing for the referenced standards. For the most current and complete Listing information, please access NSF's website (www.nsf.org).

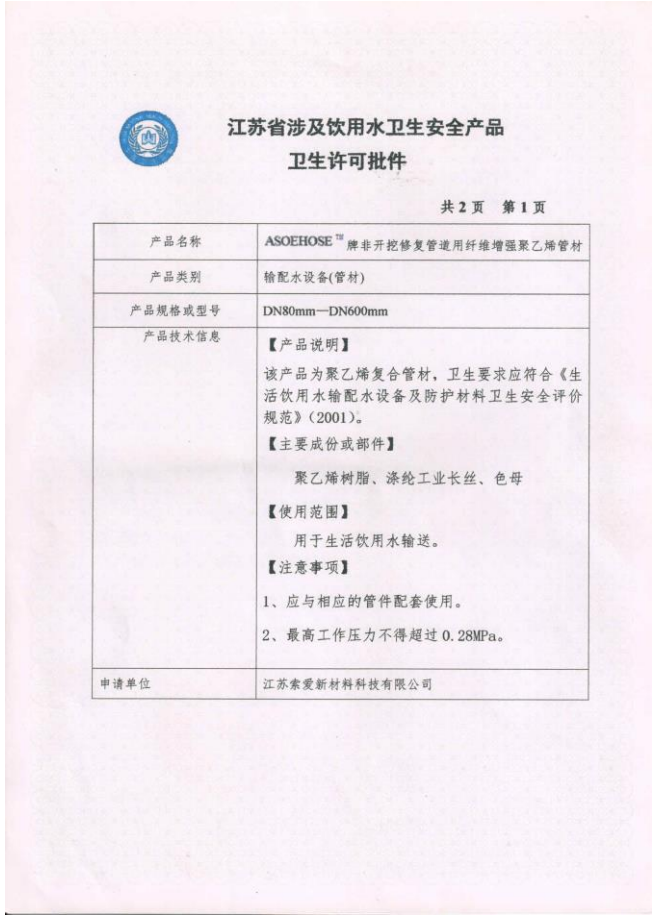
May 10, 2017
Certificate# C0289788 - 01

David Purkiss
General Manager, Plumbing

NSF 61 Approval

Certificates

National Potable water approval by Ministry of Health, China



江苏省涉及饮用水卫生安全产品
卫生许可批件

共 2 页　第 1 页

产品名称	ASOEHOSE™牌非开挖修复管道用纤维增强聚乙烯管材
产品类别	输配水设备(管材)
产品规格或型号	DN80mm—DN600mm
产品技术信息	【产品说明】 该产品为聚乙烯复合管材，卫生要求应符合《生活饮用水输配水设备及防护材料卫生安全评价规范》(2001)。 【主要成份或部件】 聚乙烯树脂、涤纶工业长丝、色母 【使用范围】 用于生活饮用水输送。 【注意事项】 1、应与相应的管件配套使用。 2、最高工作压力不得超过 0.28MPa。
申请单位	江苏索爱新材料科技有限公司

共 2 页　第 2 页

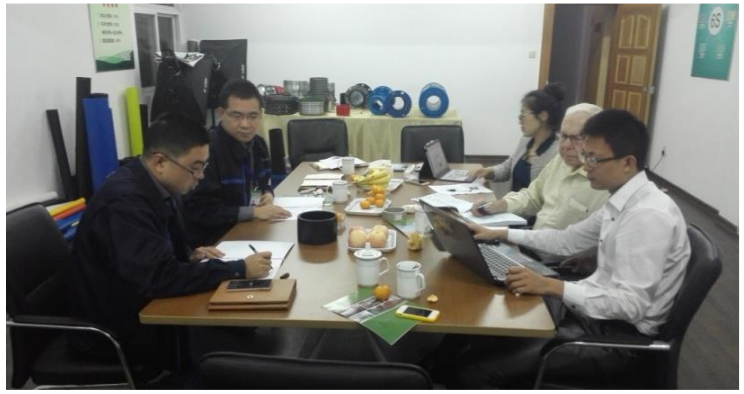
申请单位地址	江苏省泰州市海陵区苏陈镇苏陈工业南园
实际生产企业	江苏索爱新材料科技有限公司
实际生产企业地址	江苏省泰州市海陵区苏陈镇苏陈工业南园
审批结论	根据《省政府关于不再保留非行政审批事项和取消下放转移一批行政审批项目的通知》(苏政发〔2014〕98号)，经审核，该产品符合《生活饮用水卫生监督管理办法》的有关规定，现予批准。
批准文号	(苏)卫水字(2016)第 3212—0002 号
批准日期	2016 年 02 月 05 日
批件有效期	截至 2020 年 02 月 04 日
备注	1. 如果存在多个生产企业的，应分别注明每个实际生产企业的名称和地址。 2. 本批件只对与所载明内容(包括名称、类别、规格、申请单位、企业、附件内容等)一致的产品有效，且必须在本批件注明的实际生产企业生产。 3. 批准时仅对其所申报材料对应产品的卫生安全性进行了审核，未对其所宣传的功能和其他质量问题进行评价。 4、需要备注的其他内容。

请于批件有效期届满前 30 日之前提出延续申请。

泰州市卫生和计划生育委员会(盖章)

2016 年 02 月 05 日

Recommendation from Tom Iseley from TTC of Louisana Technology University

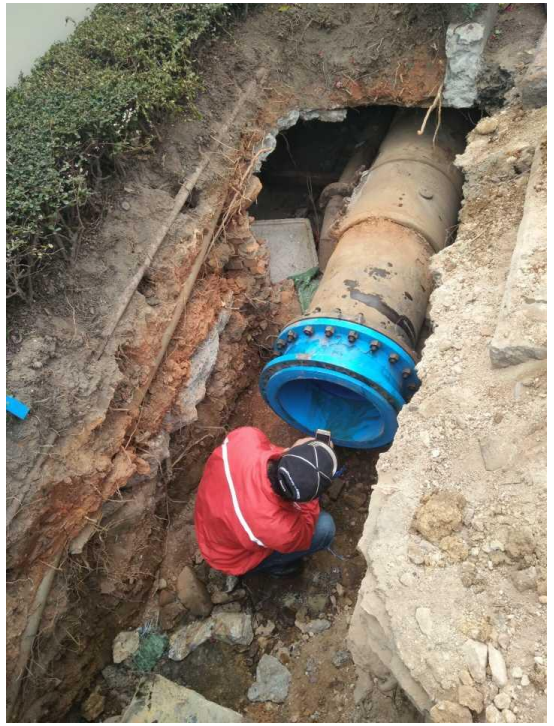


Recommendation from Professor Ma Baosong, China-US Joint Center for Trenchless R&D, China University of Geosciences

Joint research programs with the University of Texas at Arlington

Installation cases

- Water main pipe rehabilitation in Bailuzhou Park, Xiamen, DN500, 600meters



Installation in
Xiamen, China

Installation cases

Installation in
Tianjin, China
DN350/DN400

Application of Pipe-in Liner in China

- Gas pipe rehabilitation in Fushun, DN400, 380m
- Gas pipe rehabilitation in Jinan, DN400, 600m, 2.0Mpa OP




Natural gas pipe rehabilitation in Mianyang, DN200 (8 inches), 500meters

Gas Pipe Rehabilitation DN 150 in Chongqing

Gas Pipe Rehabilitation DN 150 in Huludao

Oil Pipe Rehabilitation

Oil Pipe DN76, 20km, Daqing Oilfield

Oil Pipe DN76, 2km, Changqing Oilfield

Application of Pipe-in Liner overseas

- Offshore oil pipe rehabilitation in Mexico Gulf, DN100 660m Demo project
- More offshore projects will be installed including water pipes, oil pipes, and gas pipes
- Russia, USA etc.



Welcome to visit China

More projects in China in October

DN200, DN600, DN700

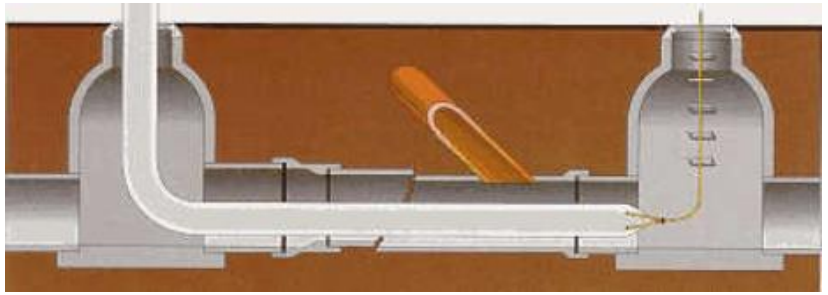
FFPP Liner for trenchless rehabilitating gravity pipes

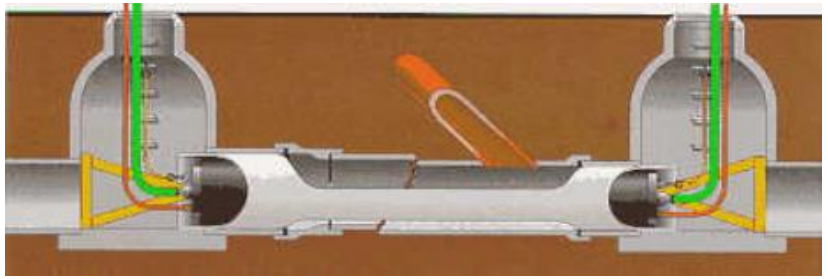
ASOE

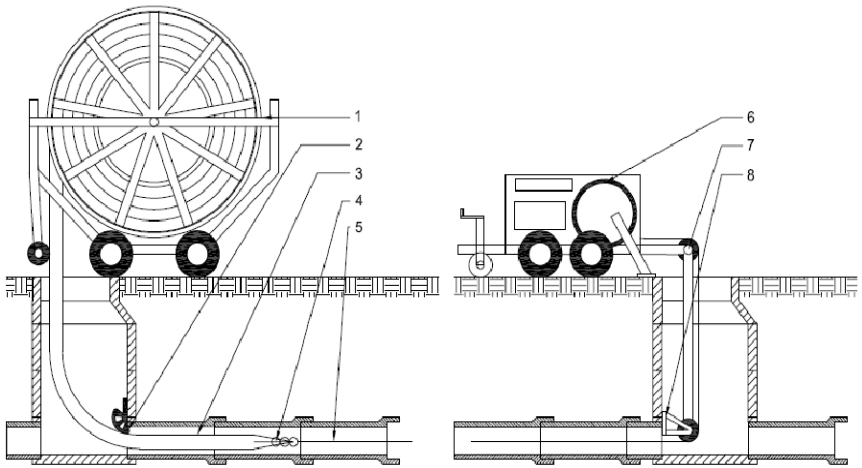

适用于污水管、雨水管等
重力管道的结构性修复


SHOT ON MI NOTE 3
MI DUAL CAMERA

- Pre Heating and Pulling Liner into host pipes
- Steam heating and forming liner
- Cooling and trimming



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Before rehabilitation

After rehabilitation

Technical Specification

- The installed pipe liner shall provide the following minimum physical properties as listed below:
-

PhysicalCharacteristics	**TestProcedures**	**Pipe MaterialPVC**
Tensile Strength	ASTM D-638	3,600 psi
Tensile Modulus	ASTM D-638	155,000 psi
Flexural Strength	ASTM D-790	4,100 psi
Flexural Modulus	ASTM D-790	145,000 psi

Trenchless Pipe Rehabilitation

Trenchless Pipe Rehabilitation

THANK YOU!

www.asoehose.com