TRELLEBORG

Trenchless Sewer Rehabilitation

USING THE CIPP

epros® DrainLining

Introducing Trelleborg Pipe Seals

Part of the wider Trelleborg Industrial Solutions Business Area of Trelleborg Group, Trelleborg Pipe Seals is a world leader in new seals and rehabilitation sealing solutions for concrete and plastic pipes, manholes, and connectors used for water supply, sewerage and drainage. Drawing on advanced polymer technology, the high performance of our seals ensures the fulfilment of the highest possible reliability standards.

With a global reach and a track record spanning more than half a century, we deliver continuous innovation to customers across the globe with a logistics and sales network spanning Asia Pacific, Europe, Middle East, Africa, North America and South America. Drawing on our engineering expertise and advanced technological solutions, we will see your project through from the beginning to the end.

Whether you need an entirely new system or if your existing one needs rehabilitation, we offer a range of marketleading seals that promise:

High quality

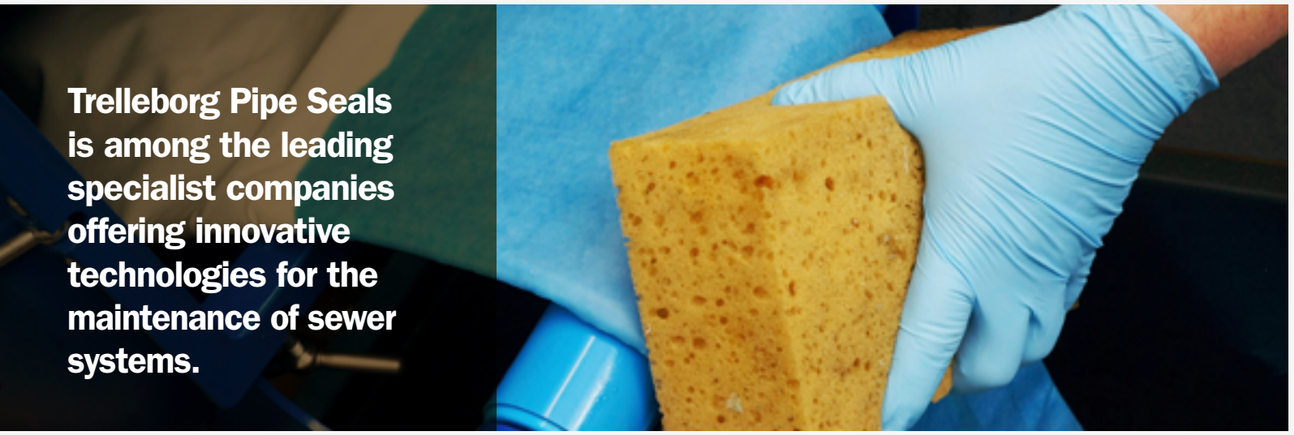
Quick and easy installation

Improved productivity

Zero leakage

Trelleborg Pipe Seals offers the highest reliability and performance standards, providing watertight solutions that protect not only your pipe cycle, but your reputation too.

epros® DrainLining
What it's used for



Trelleborg Pipe Seals is among the leading specialist companies offering innovative technologies for the maintenance of sewer systems.

The Method at a Glance

The epros®DrainLining method is a trenchless sewer rehabilitation ("nodig" applications) that features a flexible, corrosion-proof tube (liner) made up of synthetic and/or fiberglass.

The liner is impregnated with reactive resin and then introduced – with the help of an inversion unit – into the host pipe through a manhole, access pit or inspection chamber. This process, which uses air or water pressure, inverts the liner so that the resin-impregnated side is forced against the pipe wall.

The resin-impregnated liner can then be cured with heat or at ambient temperatures. The cured fiber/resin compound now forms a tight and frictional fit with the host pipe wall. This cured-in-place pipe (CIPP) system is thus integrated with the host pipe and fully meets structural and hydraulic requirements.

A final CCTV inspection is then performed to review and document the result of the rehabilitation process. A final leakage test is performed according to the EN 1610 standard or to similar international standards.

epros®DrainLining – a customized solution

Trelleborg Pipe Seals provides innovative solutions for almost any lining application, with the epros®DrainLining system being perfectly suited to the rehabilitation of the following:

- ***Main pipes of sewerage systems***
- ***House sewers***
- ***Lateral connection pipes***
- ***In-house pipes***

The perfectly matched components of the system guarantee optimal lining results.

APPLICATIONS

The epros®DrainLining method is suitable for use in circular-, egg-, or special-shaped pipes made out of common pipe materials such as concrete, asbestos cement, plastic (PVC, GRP, PP, HDPE), cast iron, reinforced concrete or vitrified clay.

DAMAGE TYPES

- *Leaks (with or without groundwater infiltration or exfiltration) in pipe walls, at pipe joints and lateral connections, etc.*
- *Offset pipes, ruptures, cracks, and pipe debris*
- *Closing of lateral connections which are no longer needed*
- *Mechanical wear*
- *Corrosion*

epros® DrainLining – Components at a glance

This fullscale solution from Trelleborg Pipe Seals is able to rehabilitate pipes in diameters ranging from DN 30 to DN 1600 [1¼" – 63"] and includes the following:

- **INVERSION DRUMS**
  for various applications up to DN 800 [31.5"]
- **IMPREGNATION UNITS**
- **RESIN MIXING UNITS**
- **RESIN SYSTEMS**
- **LINERS, PRELINERS** and **CALIBRATION HOSES**
- **VACUUM SYSTEMS**
- **CURING UNITS** (hot water, steam)

epros® DrainLining
Functional principle

1

The epros®DrainLining method uses a flexible tube (liner) made up of corrosion-proof synthetic and/or fiberglass and coated with flexible plastic on the outside. The fiber is then impregnated with reactive resin and the liner is introduced into the host pipe section through a manhole, access pit or inspection chamber with the help of an inversion unit.

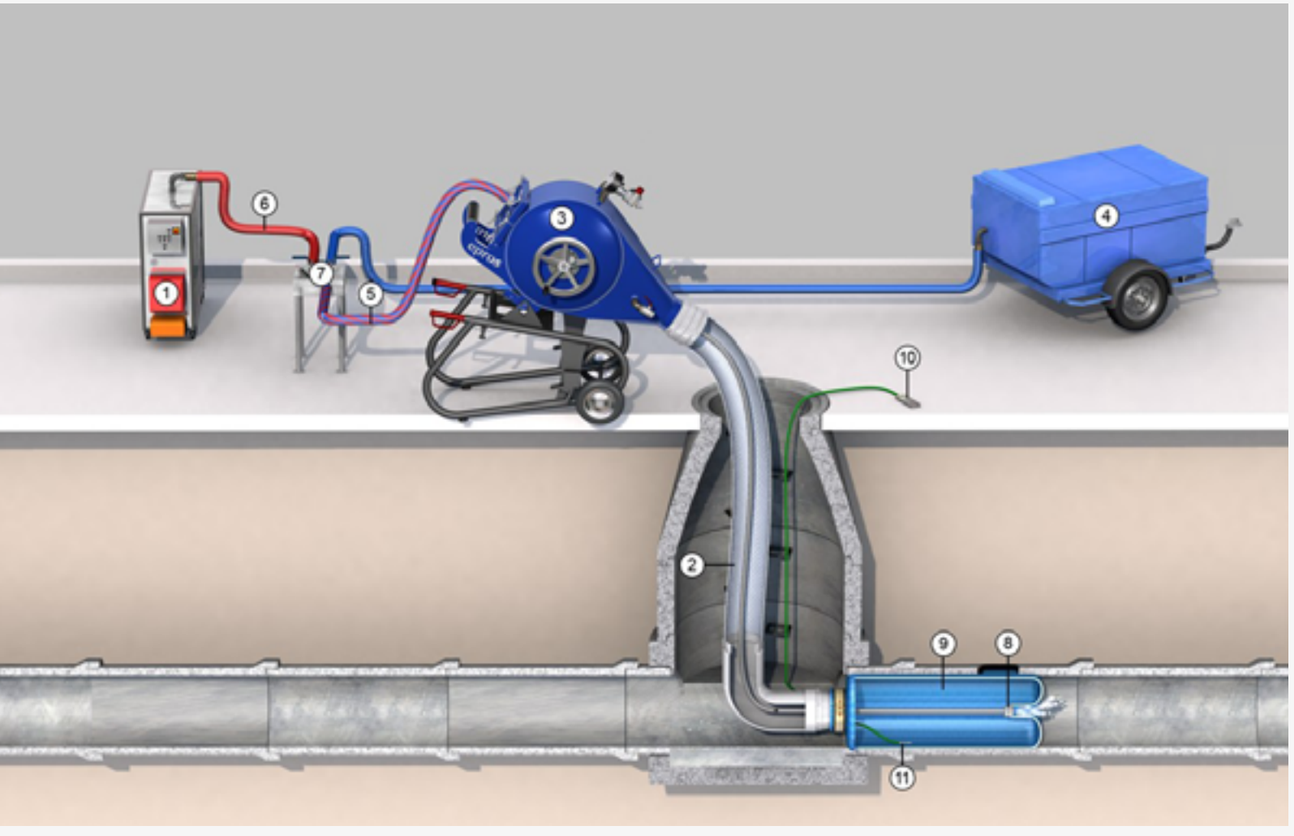
2

During this process, which uses air or water pressure, the liner is inverted so that the resin-impregnated side is forced against the pipe wall. The plastic coating is now on the inside and helps keep the liner pressurized until the resin is cured.

3

The resin-impregnated liner in the pipe section can be cured with hot water, steam or at ambient temperatures depending on the resin system used. After the fiber/resin compound is fully cured, the liner forms a tight and frictional fit with the host pipe wall. This cured-in-place pipe (CIPP) system is thus integrated with the host pipe and fully meets structural and hydraulic requirements.

epros® DrainLining
Technical components



1	epros®SteamGen
2	epros®ControlRope
3	epros®Inversion unit
4	Air supply/compressor
5	Steam/air feed line
6	Steam line
7	epros®Steam mixing table
8	Steam outlet valve
9	epros®DrainLiner
10	Temperature sensor
11	Temperature measuring point at pipe invert

epros® DrainLiner Various types

Trelleborg Pipe Seals provides perfect liner solutions for the rehabilitation and repair of main lines, laterals, lateral connections, horizontal and vertical pipes with bends and in differing diameters:

- **epros®DrainPlusLiner 2.0** (silicone coating)
- **epros®DrainPlusLiner** (PUR coating)
- **epros®DrainFlexLiner** (Flex PP coating)
- **epros®DrainLiner** (PP coating)
- **epros®DrainHybridLiner** (PP coating/fiberglass comp.)
  Type S (gravity sewer) | **Type P** (pressurized pipes)

epros®DrainPlusLiner 2.0

Trelleborg Pipe Seals' most recent development, the **epros®DrainPlusLiner 2.0** represents a new generation in liner material.

It is an all-encompassing solution **for practically every single kind of condition or challenge** faced when rehabilitating house connection and building pipes ranging from DN 70 to DN 250 [2¾" to 10"].

What's outstanding about this new liner is that we are able to precisely calculate its longitudinal expansion and consistently achieve a minimum wall thickness of 3 mm [⅛"] – even in overstretched areas such as elbows or where the pipe dimension changes.

Universally compatible with both vertical and horizontal pipelines, the epros®DrainPlusLiner 2.0 is able negotiate bends of up to 90° and dimension changes of up to two nominal widths. Its **unique silicone coating** is extremely flexible and temperature resistant, making it suitable for hot water and steam curing methods when paired with the EPROPOX HC120+ Resin System, and promises excellent mechanical properties. The fact that it is able to be steam-cured leads to faster and better rehabilitation results.

Unlike previous versions of this liner, the new epros®DrainPlusLiner 2.0 no longer requires the use of a calibration hose for installation – one of the many ways it **helps you save time, material and money** on-site in the long run.

epros®DrainPlusLiner

The popular predecessor to epros®DrainPlusLiner 2.0, the **epros®DrainPlusLiner** is still the unbeatable choice when it comes to **rehabilitating vertical and horizontal pipes in buildings with small diameters** ranging from DN 30 to DN 70 [1¼" to 2¾"].

The liner is also available for the rehabilitation of larger pipes and sewers in sizes up to DN 250 [10"]. Made from an ultra-flexible liner material, the epros®DrainPlusLiner is able to negotiate multiple 90° bends and is specially designed for the rehabilitation of pipe sections with multiple diameter changes.

The PUR coating of the liner is also compatible with ambient curing in buildings, so you can forget about lugging additional equipment for curing (such as a steam generator or hot water boiler) into areas where space is often restricted.

epros®DrainFlexLiner

The **epros®DrainFlexLiner** is recommended for all standard installations in house connection sewers and building pipes with diameters ranging from DN 100 to DN 300 [4" to 12"] (DIBt approved and available on request up to DN 600 [24"]).

It can negotiate bends of up to 45° and is suitable for steam curing. What makes this liner truly outstanding – in comparison to competing products – is the special formula of its flexible PP coating, which makes the liner very elastic and very easy to handle.

The epros®DrainFlexLiner also boasts excellent impregnation characteristics as well as ensures hassle-free installations with high quality results – all at a very attractive price/performance ratio.

epros®DrainLiner

Trelleborg's epros®DrainLiner is a robust liner with a different coating from the previous model. Coated with polypropylene, it is recommended for use in pipelines without remarkable bends (up to 30°) and in diameters ranging from DN 300 to DN 1600 [12" to 63"]. It is also available upon request in sizes from DN 150 [6"].

Featuring excellent impregnation characteristics, the epros®DrainLiner is suitable for steam curing and promises easy, hassle-free handling thanks to the elasticity of the PP-coating. This coating varies according to the pipe diameter, from flexible to robust, and is available in single- or multi-layer configurations depending on the required wall thicknesses (3 – 32 mm [⅛" – 1¼"]).

The epros®DrainLiner comes customized to your specific requirements. A minimum order quantity of 500 m is required with an advance notice of six weeks before delivery. Annual or long-term contracts in which the minimum order quantity is delivered in batches, as and when needed, are available.

epros®DrainHybridLiner

The **epros®DrainHybridLiner** comes in two types ranging from DN 150 to DN 600 [8" to 24"]. Due to the high proportion of ECR glass fiber in its composition, this liner is able to deliver outstanding mechanical properties when paired with Trelleborg's EPROPOX resins.

The high flexural modulus of the resulting cured liner results in a wall thickness of only 4.5 mm [0.18"] and saves a considerable amount of resin. This pays off when undertaking bigger pipe rehabilitation projects in which the Type S of this liner has been recommended.

Type S is a cost-effective solution for **gravity pipes,** especially in pipe diameters ranging from DN 400 to DN 600 [16" to 24"]. The **Type P** features a thicker PP-coating and is therefore suitable for **pressurized pipes.**

Various types of **epros®calibration hoses** and **pre-liners**

epros® ResinSystems for liner inversion

Trelleborg Pipe Seals supplies a wide range of hot-cure and ambient-cure epoxy and silicate resins for pipe rehabilitation. All have been tested by independent inspection bodies to meet **ASTM, WIS, DIN EN and other international standards,** and:

- Feature consistent pot and comfortable cure times
- Are easy to use and environmentally friendly
- Able to cure in the presence of water
- Are approved by the German DIBt (Deutsches Institut für Bautechnik – German Institute for Construction Engineering)

Coming under this range of epros®ResinSystems are Trelleborg's epoxy resins – specifically designed to work with epros®DrainLiners to guarantee successful installations. These resins are very easy to use due to their ample pot time and short cure time, are able to withstand high temperatures without distortion, and are resistant to chemicals ranging in pH value from 1 to 12.

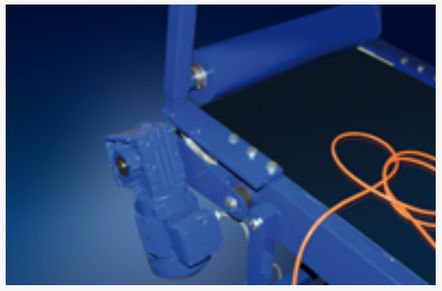
epros® InversionUnits & Impregnation

BENEFITS

- Suitable for both horizontal and vertical applications
- Appropriate with water or air inversion methods and heat or ambient curing processes
- Provides constant pressure during the entire installation process, without any pressure loss
- Drum can be turned vertically by 45 degrees (Type I/II/III)
- Drum types II and III feature a new ergonomic design that is 60 % lighter and smaller than previous models
- All drums are equipped with wheels or mounted on trailers for easy transportation
- Large service window for the smooth and quick handling of liner
- All types come with hot water circulation ports

APPLICATION RANGE

Liner wall thickness mm	Type Mini DN 150 m/ft	Type I DN 225 m/ft	Type II DN 300 m/ft	Type III DN 400 m/ft	Type VIII DN 800 m/ft
3.0	16 / 52	26 / 85	75 / 246	103 / 388	287 / 942
4.5	12 / 39	19 / 62	55 / 180	75 / 246	208 / 682
6.0	9 / 30	15 / 49	43 / 141	59 / 194	164 / 538
7.5	–	–	36 / 118	48 / 157	135 / 443
9.0	–	–	30 / 98	41 / 135	115 / 377
10.5	–	–	26 / 85	36 / 118	100 / 328
12.0	–	–	23 / 75	32 / 105	88 / 289
15.0	–	–	–	–	72 / 236
18.0	–	–	–	–	60 / 197
21.0	–	–	–	–	52 / 171



- Stable and professional impregnation tables
- Provides rapid and homogeneous impregnation in compliance with global quality standards set by engineers, specifiers, municipalities, authorities, industrial companies, etc.
- Available as manual or electric mobile impregnation units (that can be mounted onto trailers, trucks or containers) or standalone units.
- Application range of up to DN 800 [31.5”]/width of ~1350 mm [53”], larger sizes available on request
- Continuously variable conveyor belt speed
- Convenient forward-reverse operation via foot pedal

epros® Curing Units VacuumUnits

epros®SteamGen units for steam curing

- Steam capacity ranging from 3 kg/h [6.6 lbs/h] to 1000 kg/h [2205 lbs/h]. Smaller units with stream production of up to 6 kg/h [13.2 lbs/h] can only be used for the rehabilitation of lateral connections in house sewer pipes
- Electric or oil-operated
- Available as mobile units or fitted to trailers, trucks or containers
- Ensures that curing temperatures can be reached quickly and – as a result – rapid and homogenous curing
- Can be delivered in compliance with national standards

epros®HWB – hot water boiler units in various designs

- Output ranging from 90 kWh to 1000 kWh
- Depending on the size, can be delivered as mobile units or fitted to trailers, trucks or containers
- Featuring integrated high-power pumps with optimal input and throughput so that water can be rapidly heated and thus, ensuring rapid and homogenous curing

epros®VacuumUnits, by providing a constant and adjustable vacuum source, are key in the rapid and homogeneous impregnation of the liner felt – a crucial factor in complying with global quality standards set by engineers, specifiers, municipalities, authorities, industrial companies, etc.

- Mobile units can be used on job sites both outdoors and indoor
- Available in two different models: electric and air-operated

Trelleborg around the world

COUNTRIES WITH OWN OFFICES

- USA
- Germany

COUNTRIES WITH DISTRIBUTORS

- Australia
- Belgium
- China
- Croatia
- Czech Republic
- Denmark
- Finland
- France
- Great Britain
- Hong Kong
- Ireland
- Malaysia
- Mexico
- Netherlands
- New Zealand
- Norway
- Poland
- Portugal
- Russia
- Spain
- Sweden

FURTHER INFORMATION

DIBt Approvals

No. Z-42.3-375
epros®DrainLiner Method DN 100 – DN 400
with epoxy resin system EPROPOX HC60

No. Z-42.3-466
epros®DrainLiner Method DN 100 – DN 250
with epoxy resin systems EPROPOX FC15 / FC30

No. Z-42.3-468
epros®DrainLiner Method DN 100 – DN 600
with epoxy resin system EPROPOX HC120
with epoxy resin systems EPROPOX FC15 / FC30

No. Z-42.3-483
epros®DrainLiner Method DN 100 – DN 1000
with epoxy resin system EPROPOX HC2640

DIBt Approval No. Z-42.3-488
epros®DrainLiner Method / epros®DrainLCR-B method
(rehabilitation of defective sanitary pipes, rainwater downpipes and house drains inside the building structure)
DN 100 – DN 250
with epoxy resin systems EPROPOX HC60/HC120

http://www.trelleborg.com/pipe-seals

Video http://www.youtube/c/trelleborgpipeseals

Technical Data Sheets

Method Statement

Version 1.1_2016

TRELLEBORG

Trelleborg is a world leader in engineered polymer solutions that seal, damp and protect critical applications in demanding environments. Our innovative engineered solutions accelerate performance for customers in a sustainable way. The Trelleborg Group has local presence in over 40 countries around the world.
Trelleborg Pipe Seals is a world leading supplier of new and rehabilitation sealing solutions for concrete and plastic pipes and manholes used for water, sewerage and drainage.
We deliver continuous innovation to customers across the globe, with a logistics and sales network. Comprising the most advanced polymer technology, our high performance seals ensure fulfillment of the highest possible reliability standards.

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