



ONE FOR ALL All With Just One Liner.

Introducing Trelleborg's DrainPlusLiner 2.0: A Case Study

“Change Is Progress”

It's time for a revolution – and Trelleborg Pipe Seals has just the liner for it. Specially developed for the rehabilitation of lateral connection pipes, the **DrainPlusLiner 2.0 (DPL 2.0)** is a revolutionary new liner featuring an **innovative silicone coating**.

Designed for the rehabilitation of pipelines and sewers with **nominal diameters ranging from DN 70 to DN 250**, the DPL 2.0 has undergone extensive tests as well as many on-site trials. The feedback from these tests and trials is unequivocal: Trelleborg's new liner is a major success say site installers, engineers and municipality officials.

With its many features, the DPL 2.0 combines the abilities of several different liners into one revolutionary product. It is easy to use, saves on storage and logistics, and produces consistently good results.

Pioneering Technology

Silicone is a polymer that features a unique set of properties that no other material has: it is resistant to heat and cold, it is watertight, and it is extremely soft and flexible.

In a world first, Trelleborg has now succeeded in developing a liner that draws on these exceptional properties of silicone to perfect trenchless pipe rehabilitation.

The perfect combination of state-of-the-art textile production and a specially formulated silicone coating results in a high-tech product that meets new standards in quality and versatility.



Benefits at a glance

The epros® DrainPlusLiner 2.0

One liner for every application, perfect for lateral connections and in-building pipes

- For pipes and sewers ranging from DN 70 to DN 250
- Revolutionary new silicone coating that is extremely flexible and heat-resistant (up to 100 °C)
- Allows for dimension changes of up to 2 nominal widths
- Able to navigate bends of up to 90°
- Minimal wrinkling
- Calculable longitudinal expansion = precise rehabilitation
- Excellent impregnation properties
- Keeps form under pressure during inversion
- Designed for ambient, hot water and steam curing
- Able to withstand high pressure cleaning (in accordance with DIN 19523)



Introducing the DPL 2.0

Easier to purchase, stock and store – simplicity is the name of the game when it comes to this innovative second generation liner. Yet, the benefits of the **DPL 2.0** become even more evident when in use: the multifunctional system not only minimises errors but also significantly reduces time and material needed for installation.

Drawing on the latest developments in advanced polymer technology, the DPL 2.0 is able to navigate bends of up to 90 degrees and adapt to dimension changes in the pipe run without problem, regardless of whether the pipe run is horizontal or vertical. The liner is also able to reliably achieve a minimum wall thickness of three millimeters even within bends and across dimensional changes.

Whether it's a particularly complex installation or a job with variable conditions in the pipe run, the

DPL 2.0 is able to adapt to the situation and provide users with considerably more scope for action and success.

Problems faced with other liners are also a thing of the past. The problem of incalculable elongation, for example, is dispensed with since the DPL 2.0's expansion properties are very easy to calculate.

Flexible and yet robust, the DPL 2.0's excellent material properties and wide range of possible applications make it a product like no other in the field of sewer and lateral connection rehabilitation. In the case of open-end installations, the DPL 2.0 used together with Trelleborg's LinerEndCap technology renders the use of an additional calibration hose unnecessary – thus saving more time, material, and ultimately, money

The Resin

The new DrainPlusLiner 2.0's innovative silicone coating makes it especially flexible and temperature resistant, and thus, suitable for both hot water as well as steam curing. Specially developed to work with the DPL 2.0 for outstanding results is Trelleborg's **epoxy resin system – the EPROPOX HC120+.**

Used in combination with steam curing, the EPROPOX HC120+ is able to provide an ample processing time as well as a very short curing time. The impregnation of the liner with the resin is also an uncomplicated process. This makes it possible to install the DPL 2.0 without any time pressure – even in pipes with larger repair lengths and/or nominal widths with a higher wall thickness.

The overall result? Significantly more efficient work processes and improved project reliability.

Tests have also verified that using the EPROPOX HC120+ in combination with the DPL 2.0 results in very good mechanical short and long-term values* as well as a heat distortion temperature of over 90 degrees celsius.

The constant and dense resin matrix also ensures a reliably uniform wall thickness of at least three millimeters, even in bends and across dimension changes.

The resin also boasts of a proven reliability. The resin system has received multiple DIBt approvals within the framework of the DrainLining process. Approval has been given for the rehabilitation of buried damaged sewer lines (DN 100 – DN 600) in combination with six types of liners as well as for the rehabilitation of defective sanitary pipes, rain-water downpipes and house drains inside building structures (DN 50 – DN 200) in combination with four liners.

* Short term flexural modulus $\geq 2,800$ N/mm²,
long term flexural modulus (50 years) $\geq 1,129$ N/mm².



The Challenge

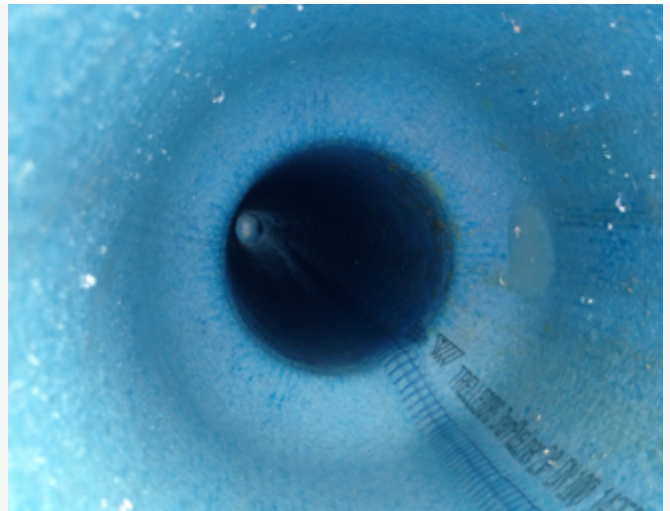
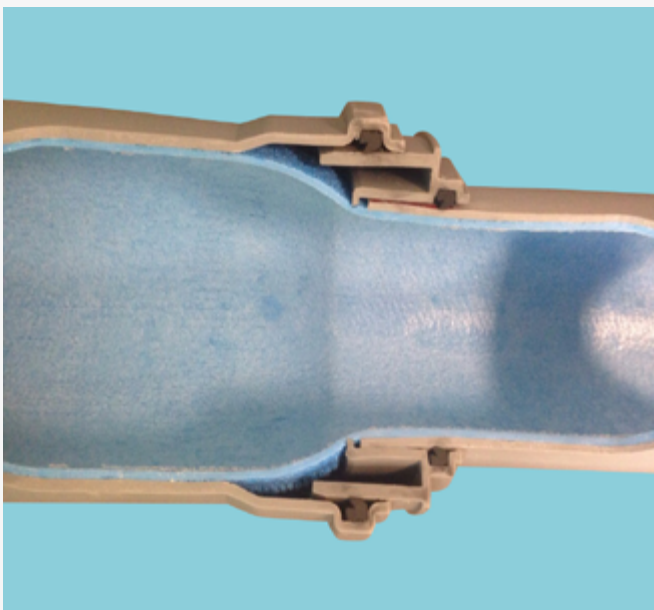
Traditionally, liners are designed for specific applications and several different types of liners must be used in combination for a single project. What's more, in the DN 150 to DN 300 range, further additional resin-liner systems are required in order to obtain the necessary structural design values. Many products available on the market reach their limits in this context.

This dependence on different liners and components, which are not exactly coordinated, thus frequently leads to technical problems.

What's more, the impregnation process is also traditionally complex: several attempts were often required and the liner sometimes needed to be re-worked by hand. Certain types of installations also used to be only possible using a calibration hose.

In worst case scenarios, these challenges resulted in higher material and time costs as well as limitations on what could be achieved.

The new DrainPlusLiner 2.0 from Trelleborg makes challenges such as these a thing of the past. The multi-functional, revolutionary new liner able to do the work of many different liners – even in the most complex of sewer rehabilitation projects.



Perfectly Versatile

A true all-rounder, the DPL 2.0's flexibility and functionality makes savings of up to 40 percent possible by significantly reducing material and time costs. The liner is especially effective when it comes to rehabilitating ground pipes and vertical in-building pipes. The DPL 2.0 is also universally applicable for both vertical and horizontal pipelines, even around bends and/or over dimensional changes.

Installers also appreciate the new liner's above-average impregnation characteristics as well as its excellent material properties. When used in combination with the recommended EPROPOX HC120+ resin, the DPL 2.0 makes it easy for installers with an extremely ample pot life and a short curing time to optimize workflow on construction sites.

Lastly, the DPL 2.0 also makes problems with incalculable elongation and achieving the minimum required structural wall thickness a thing of the past.

The bottom line? You only need one liner, even for complicated installations – a liner that saves times and money as well as reduces cost through reduced risk.



The Advantage For Project Planners

This reduction in the need for several different types of liners and resin systems is a boon for project planners. Prior to the revolution that is the DPL 2.0, rehabilitation projects needed careful long-term planning to ensure that the right materials were on hand for any particular installation.

With the DrainPlusLiner 2.0, project planners can be more flexible and reactive. They will be able to react faster to incoming orders as well as distribute materials to sites easily and without delay. Due to the lining system's reduced storage space requirement, a permanent storage facility with constant stock availability is also feasible.

As a service provider, this means that sewer rehabilitation companies will be able to not only count on better results and increased savings but also respond to last-minute job requests without delay – thus increasing client satisfaction and strengthening the company's reputation.



The Advantage In Logistics

The many advantages of the DrainPlusLiner 2.0 is not limited to the construction site – the all-rounder is also the clear choice when it comes to smart logistics.

This is because the new Trelleborg system reduces materials required for rehabilitation to just one resin system (the EPROPOX HC120+) and one liner (the DPL 2.0) in a maximum of five sizes (ranging from DN 70 to DN 250).

This ultimately results in a drastic reduction in storage costs as one would no longer have to make space for several different types of liners, their corresponding resin systems and additional calibration hoses.



The Advantage Of Ease

When it comes to stress-free installations, Trelleborg's new DrainPlusLiner 2.0 beats all other products hands-down.

For a start: no additional calibration hose is required when installing the DPL 2.0, thanks to the Trelleborg's revolutionary LinerEndCap technology and especially with the "open-end" installation method. The liner impregnation process is also extremely simple. Only one resin system – the EPROPOX HC120+ – is required. This resin system is compatible with three curing methods: ambient, hot water and steam curing.

And finally, thanks to the fine calibration between the resin system and the liner, the fully-cured DrainPlusLiner 2.0 achieves above-average mechanical properties. Structural design requirements are fully met or even exceeded. The water-tightness requirements set by the APS Guidelines are also easily achieved.



Quality At The Highest Level

Since 2012, Trelleborg has been manufacturing the carrier materials (liners) for trenchless rehabilitation solutions – including the DrainPlusLiner 2.0 – under state-of-the-art production standards.

Trelleborg's products and quality management processes have attained ISO 9001 and ISO 14001 certifications as well as undergone tests by/ received certification from international organisations such as the DIBt (the German Centre of Competence for Construction), ASTM International and IAPMO (The International Association of Plumbing and Mechanical Officials). These independent tests and certifications prove that our quality promises are kept.

This quality promise also applies to the DrainPlusLiner 2.0 – a vital component of our trenchless rehabilitation system and which is subject to DIBt Approvals Z-42.3-468 and Z-42.3-488. The latter approval applies to the rehabilitation of pipes inside building structures.

The new DrainPlusLiner 2.0 is also the only flexible liner (that is able to negotiate bends of up to 90 degrees and up to two changes in nominal diameter) to have passed a high pressure cleaning test. Such tests, conducted in accordance to the DIN 19523, are compulsory when introducing new products into the German market. These tests are also increasingly recognized internationally and are seen as extremely important by sewer rehabilitation companies and civil authorities.

However, since such high pressure cleaning tests are usually designed to simulate straight pipes runs, a special test setup was created in cooperation with the Institute for Pipeline Construction in Oldenburg to simulate a pipe run with multiple bends.

The DrainPlusLiner 2.0 passed this test successfully and the necessary certification was issued. The exceptional test results also showed that the DrainPlusLiner 2.0 was far more resistant to high pressure cleaning than had been previously calculated.

References

Since its introduction to the market, Trelleborg's DrainPlusLiner 2.0 has put on a convincing performance at training sessions, workshops and demonstrations. Customer satisfaction is high and the feedback is consistently positive – mainly because of its easy handling.

The new product has also already built up a good track record from several positive installations on site during the testing phase. Participating in this field testing phase was installation company, Stingl GmbH, from Munich. A specialist company in the field and a member of Germany's Güteschutz Kanalbau, a self-regulatory organisation for the industry, Stingl submits itself to both internal and external quality monitoring procedures.

Trelleborg chose to work with Stingl for its field testing phase due to Stingl's proven competence in the field of pipe and sewer rehabilitation. The company is also known for its use of modern rehabilitation equipment and technology as well as its highly qualified and experienced staff.

In 2016, Stingl installed a total of eight kilometers of liner – mostly Trelleborg's DrainFlexLiner and the new DrainPlusLiner 2.0 – using two trucks with in-built automated mixing and impregnation units. Both trucks were also equipped with steam curing equipment, in the form of a SteamGen M50 Steam Engine from Trelleborg, as well as hot water curing equipment.

Residenztheater, Munich

In 2016, pipe rehabilitations were carried out at the Residenztheater in Munich. The installation proved to be a particularly challenging due to the theater's location in the inner city as well its status as a protected monument – leaving no room for mistakes.

Making things more complicated was the fact that the pipe runs in the heritage building featured many bends and changes in nominal width.

The installation team thus turned to Trelleborg's DPL 2.0 for the more challenging pipe runs and used Trelleborg's DrainFlexLiner for less challenging lines under the building. The high-quality material of both liners as well as their ease of handling guaranteed a successful installation with excellent results.

Bayerische Landesbank, Munich

Trelleborg's pipe rehab products were also successfully deployed in a project at the Bayerische Landesbank in Munich. The job included the cleaning and rehabilitation of heavily corroded cast iron pipes and their connections in the bank's underground garage.

One challenge faced was that the pipe runs to be rehabilitated were short with numerous 90 degree bends. Another challenge was the location of the pipe runs within the garage. The pipes thus faced a high chemical load caused by road salt during winter.

The choice of material was therefore critical. The DPL 2.0, used in combination with the EPROPOX HC120+ resin system, was able to address these challenges easily: the liner is able to navigate multiple 90 degree bends, and, when cured, can withstand high chemical loads easily.

The use of the DPL 2.0 in size DN 80 also achieved a wall thickness that fully met structural design requirements in pipes ranging from 90 – 100 mm in size.

Fürstenrieder Straße Residential Area, Munich

2016 also saw Stingl GmbH rolling out the DPL 2.0 for a large scale project within a residential area in Munich's Fürstenrieder Straße. Pipe rehabilitation solutions from Trelleborg were used for the entire project.

The DPL 2.0 was used to rehabilitate both in-house pipes and lateral connection pipes as there were many bends and changes in pipe diameter to be navigated. Trelleborg's DrainFlexLiner was used to rehabilitate external main pipes (up to 50 meters long and with nominal diameters of DN 200/DN 300).

What made this project especially challenging were the bigger pipe diameters, thicker wall thicknesses and longer runs needing rehabilitation. This meant that the project team needed resin quantities of up to 400kg for one single installation! Under such conditions, the ample pot life of the EPROPOX HC120+ kept the installation process stress-free.

The Augustiner Brewery, Munich

There was beer being brewed – and for that reason, this project needed to be completed quickly and without breaks so as to not disrupt the brewery's beer production process.

The age of the building also posed additional difficulties with complicated pipe runs and many transitions in pipe material and size. The location of the installation within the brewery and away from the street also meant that it was necessary to transport the resin-impregnated liner over a long distance. In this regard, the ample pot life of the EPROPOX HC120+ proved vital to the success of the project.

A combination of two liners – Trelleborg's DPL 2.0 and DrainFlexLiner in sizes ranging from DN 70 to DN 250 – was used. The choice of materials used in this project mastered the challenges of this project while achieving the minimum wall thickness required with ease and simplifying work on site for the crew.

Testimonials

Thomas Bittermann

Manager, Sewer Rehabilitation,
Stingl GmbH:



„With the conversion of both our CIPP trucks to one system, we were able to significantly reduce our inventory of resins and liners. Our warehouse management has also become much more efficient since Trelleborg, as a manufacturer, can deliver the liners we use and corresponding resin systems quickly and adequately. Our work crews are now able to handle all rehabilitation projects without problems. Planning and executing a project has also become faster and easier, which has a positive effect on costs. We are also able to respond to last-minute inquiries from our customers without problems and achieve a high level of customer satisfaction.“

Benjamin Schwarz

Master for Pipe and Sewer
Rehabilitation, Project Manager,
Stingl GmbH:



„I am particularly impressed by the ample processing time of the EPROPOX HC120+ resin system. This gives us the possibility to install even longer liners in pipes with larger diameters and requiring a thicker wall thickness without problems and without time pressure. There is sufficient time even for complex installations in pipe runs with many bends. With the DrainPlusLiner 2.0, I have to particularly highlight the resulting wall thickness. The liner always reaches a wall thickness of at least three millimeters, even in bends and after transitioning to larger nominal widths. The specimens we submit display no problems in regards to wall thickness or water-tightness. The short term flexural modulus is never a problem with a value of around 3,000 Newton per square millimeter.“

Nico Kirch

Project Manager, Stingl GmbH:



„The need for only one resin – the EPROPOX HC120+ – results in an unbelievable simplification of our work and has considerably reduced the error rate on site. Thanks to the resin’s extremely ample pot life, we are able to take on and execute any CIPP project without problem.

The use of this resin has also made the planning and logistics work much easier. Our two CIPP trucks are always stocked with the EPROPOX HC120+ and ready for use. This gives me a lot of room for project planning, especially when construction sites or crews have to be rescheduled and deployed at the last minute. The short curing time, especially in the case of steam curing, gives us the chance to carry out up to three installations per day if the project allows.

Even in cases where material tests are required, I am no longer worried because the EPROPOX HC120+, used in combination with the DrainPlusLiner 2.0 or the DrainFlexLiner, produces results that more than meets minimum requirements for wall thickness, flexural modulus and water-tightness – even under real-life site conditions.“



About Trelleborg Pipe Seals

Part of the wider Trelleborg Industrial Solutions Business Area of Trelleborg Group, Trelleborg Pipe Seals is a world leading supplier of new and rehabilitation sealing solutions for concrete and plastic pipes, manholes and connectors used for water, sewerage and drainage.

Trelleborg's Pipe Rehabilitation operation is among the leading specialist companies in innovative technologies for the upkeep of sewer systems.

Thanks to highly qualified engineering services, the company has become a successful global player in its industry. The brand name epros® DrainSystems stands for 20 years of experience. The continuous research and further development of the technical systems is aimed at state-of-the-art trenchless non-demolition maintenance of pipe lines in sewage systems, buildings and industries.

The sophisticated and custom-tailored system solutions from Trelleborg are not only an economically attractive decision for installers, but most of all safe and reliable. The pipe rehabilitation solutions from Trelleborg Pipe Seals were tested and approved by the German Institute for Construction Engineering. The epros® DrainSystems, whether for patch repairs or manhole-to-manhole relining, whether for laterals or junctions, meet all stringent requirements and quality criteria for construction products.

The brand name epros® DrainSystems stands for products of world-renowned quality standards with a long service life. They help promote sustainability and save the environment.





Als Teil des zur Trelleborg Gruppe gehörenden Geschäftsbereichs „Industrial Solutions“ zählt Trelleborg Pipe Seals zu den weltweit führenden Anbietern von Dichtungs- und Instandhaltungssystemen für sämtliche Arten von Rohrleitungen in Wasser-, Abwasser und Kanalisationsanlagen.

Mit einem kontinental übergreifenden Netzwerk an Logistik- und Vertriebspartnern in Europa, Asien und Afrika, im mittleren Osten sowie in Nord- und Südamerika bieten wir unsere Kunden konstant innovative Lösungen rund um den Erdball.

Die hochgradige Leistungsfähigkeit unserer Dichtungen, basierend auf modernster Polymer Technologie, gewährleisten die Erfüllung höchstmöglicher Sicherheitsstandards.

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