

Pressure Pipe and Sewer Rehabilitation

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YOUR BENEFITS

- Family-owned company with more than 80 years of experience in the construction industry
- Experienced and reliable construction company with a completion rate of 100 percent
- Reduced costs for breaking up and restoring surface areas
- Minimum traffic disruptions: no traffic jams and low pollution levels
- Minimum civil engineering works
- Minimum impact on residents (preserving quality of life)
- No or only slight interruption of utility services

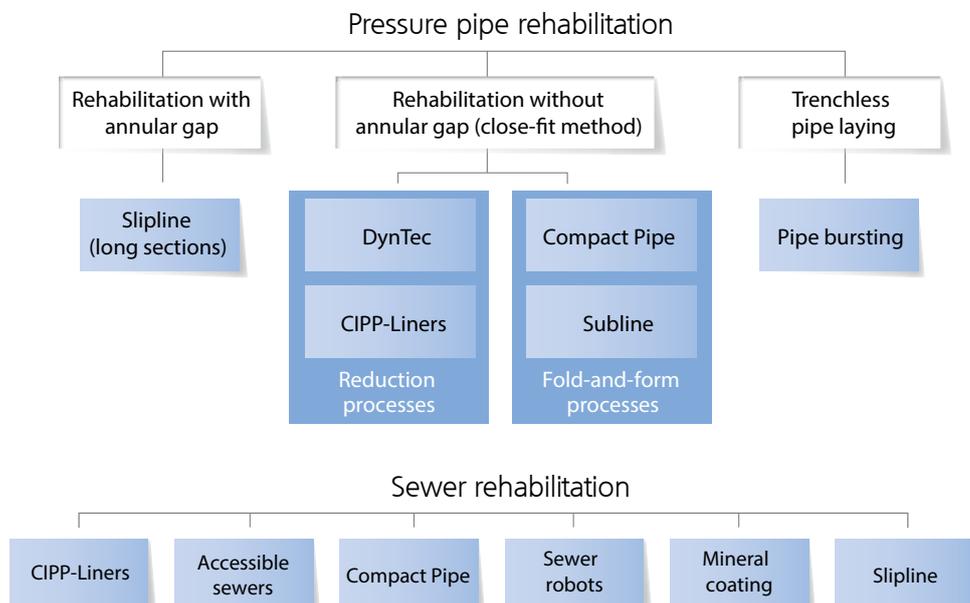
Ludwig Pfeiffer is a German family-owned company, established in 1933 which focused on the new construction of water supply and waste disposal networks. Today, as a full EPC contractor, we operate in more than 30 countries worldwide, adopting the latest technologies both for open cut and trenchless works.

Our activities cover the whole water cycle, from extraction and capture, through transport, treatment and distribution up to collection, treatment and disposal (including outfall). Our activities also include other types of networks such as gas and district heating. We provide turnkey solutions for the construction, extension and improvement of new networks, pumping stations and complete treatment plants. Furthermore, we specialize in repair and rehabilitation of existing networks using our large portfolio of solutions of trenchless technologies.

Regardless of project type or size, we pursue an intelligent approach using state-of-the-art, sustainable technology. Our customers benefit from more than 85 years of experience and know-how. Offering the full range of available methods, we can handle every project – from individual household connections to the construction of whole plants, on any continent.

Diverse and flexible, our solutions will always meet the specific and challenging requirements of your project.

Everything from a single source.





Spotlight on pressure pipe rehabilitation

Trenchless pressure pipe rehabilitation includes a large number of techniques to preserve the underground infrastructure of supply and disposal pipelines. These are necessary to repair age-related damage to pipelines like leaks, cracks, the mechanical wear and tear or corrosion which have led to damage.

The most important techniques for pressure pipe rehabilitation are:

- Reduction processes
- Fold-and-form processes



In reduction processes, reduced-diameter standard-PE liners are pulled into the host pipe. In fold-and-form processes, on the other hand, either factory-folded HDPE liners are used or standard HDPE pipes are folded on site. Which process is used, is determined by the respective infrastructure, the lengths of the existing pipes and their diameters.

When rehabilitating and renewing pressure pipelines like gas and water, we use the entire range of options, materials and methods available. Our aim is to always work flexible and efficiently. Ludwig Pfeiffer is committed to find the most suitable and cost-effective solution from the many options available which will meet your requirements best.

DynTec

The reduction method

The DynTec reduction method is one of the techniques available for trenchless pipeline renewal and is particularly suitable for trenchless rehabilitation of gas and water pipelines and sewers. Using the DynTec method, the pipe is being pulled through a reduction die which temporarily reduces its diameter before it is inserted into the host pipe.

YOUR BENEFITS

- Cost-effective: uses standard PE material
- Diameters from DN 65 to DN 1200
- Fast: up to 1,000 m at a time
- Environmentally friendly: minor construction site set-up
- Energy-saving: pipe deformation without heat input
- Improved hydraulic capability of the new pipeline



Berlin, Germany

Perfect close-fit





Baia Mare, Romania

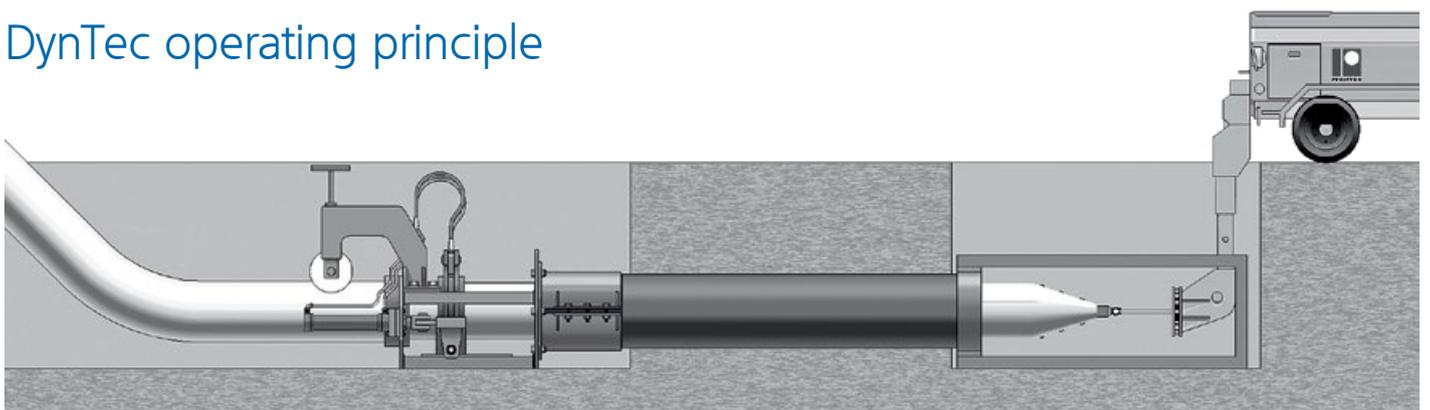
The DynTec method allows pipelines to be rehabilitated with minimal impact on traffic. This method is one of the most established and efficient rehabilitation techniques worldwide, allowing existing pipeline infrastructure of any material to be quickly and easily renewed.

After cleaning the old pipe, it will be inspected by a CCTV-camera and is being calibrated. Before the new pipe is inserted, the diameter of the PE liner is being reduced by a reduction die. During the entire process,

the tensile forces are constantly monitored. When the final position is being reached, the winch is released until the PE liner tightly presses against the inside wall of the host pipe.

A permanent close-fit is assured by reverting the pipe to its original diameter after insertion. By using DynTec, an annular space and labour-intensive insulation processes can be avoided. DynTec is suitable for all standard pressure stages.

DynTec operating principle



Subline

For long distances

Subline is a pipeline relining method perfectly suitable for permanent rehabilitation of very long distances and large diameters. This technique integrates the folding of the inliner into the pulling-in process. It works by using an hydraulic folding and feeding machine on site.

The subline process is characterized by folding the inliner into a U-shape. The subline machine folds the PE liner on site and thus reduces its cross-section. The folding is being executed in the elastic range of the material and the folded inliner is then being fixed with retaining straps which are made of PE. Thus, damages to the outer wall of the inliner can be avoided.



Halzhausen, Germany



Halzhausen, Germany



YOUR BENEFITS

- Close-fit process for rehabilitation without annular space
- Pressure stages from SDR 26 to SDR 80
- Diameters from DN 150 to DN 1600
- Improved hydraulic capability of new pipeline



Compact Pipe

For long distances and minimum space requirements

Compact Pipe is applied for trenchless rehabilitation of broken potable water, sewage, gas and industrial pipelines made of conventional materials such as cast iron, steel, vitrified clay or asbestos cement. Due to its minimum space requirements, this form-and-fold method can perfectly be used in inner-city areas. Depending on diameter, up to 600 m at a time can be rehabilitated using the Compact Pipe method, known as close-fit process.

THE PROCESS

After the old pipe is being cleaned with high pressure or mechanically, it is being inspected with a CCTV camera. The new pipe is supplied factory-folded and wounded in continuous length on a steel drum. The C-shaped pipe is placed into the rehabilitation section. Axial flexibility allows a direct insertion via small sized access points. Once pulled in, the ends are sealed and a purposely built installation unit is activated to supply steam and compressed air. Steam is fed into the pipe to trigger off the so-called memory effect of the plastic which allows the pipe to expand to its original O-shape. Subsequently, pressurized air is led in to make the pipe close fitting with the inside bore of the existing pipeline. The result is a new structurally self-supporting pipeline inside the old deteriorated pipe.



Prague, Czech Republic

YOUR BENEFITS

- Minimum costs and time expenses
- Pipe diameters from DN 100 to DN 500
- Quality and expected service life time of rehabilitated pipes equivalent to new pipes
- Application possible for pipelines which are no longer viable
- Due to the minimal space requirements, ideal for rehabilitation in inner-city areas



Subic, Philippines



Munich, Germany

SLIPLINE TECHNIQUE

The classic lining process is the slipline technique with annular gap. This rehabilitation method uses standard PE-pipes already welded to form pipelines and is especially suitable for the rehabilitation of very long distances. A PE-Liner is reduced in diameter relative to the host pipe and then it is being pulled into the host pipe by a winch.

At the end, the annular gap between PE-Liner and host pipe is filled with a special filling material.

CLOSE-FIT-LINING

Close-fit lining processes are differentiated between reduction processes (DynTec) and fold-and-form processes (Compact Pipe and Subline). The advantages of methods without annular gap is that no insulation is required following the relining.

What is common to all pipe rehabilitation methods (no matter if with or without annular gap) is that the diameter of the host pipe is being reduced, albeit only slightly.

BURSTLINING

Pipe bursting – or burstlining – is unique compared to the two methods mentioned above. It is not categorised as a rehabilitation method but rather a pipe laying technique. The old pipe is being destroyed, the remaining fragments are pressed into the surrounding ground and the new pipe is fed into the channel that has been created. Old pipes made of vitreous clay, concrete, cast iron, steel or fiber cement can be rehabilitated using this method. The advantage of pipe bursting is that the diameter of the old pipe can be maintained or even enlarged.

It is important for pipeline rehabilitation methods to meet the challenges of preserving, maintaining and modernising underground pipelines in a cost-efficient, fast, safe and ecologically friendly way. The focus is on trenchless rehabilitation methods.

The choice of the most suitable rehabilitation method depends on a number of technical, commercial, ecological and even social factors. In trenchless rehabilitation, a distinction is being made between different lining technologies:

- with annular gap (slipline technology)
- without annular gap (close-fit lining)
- burstlining (pipe bursting)



Hong Kong, Peoples Republic of China



Sewer rehabilitation

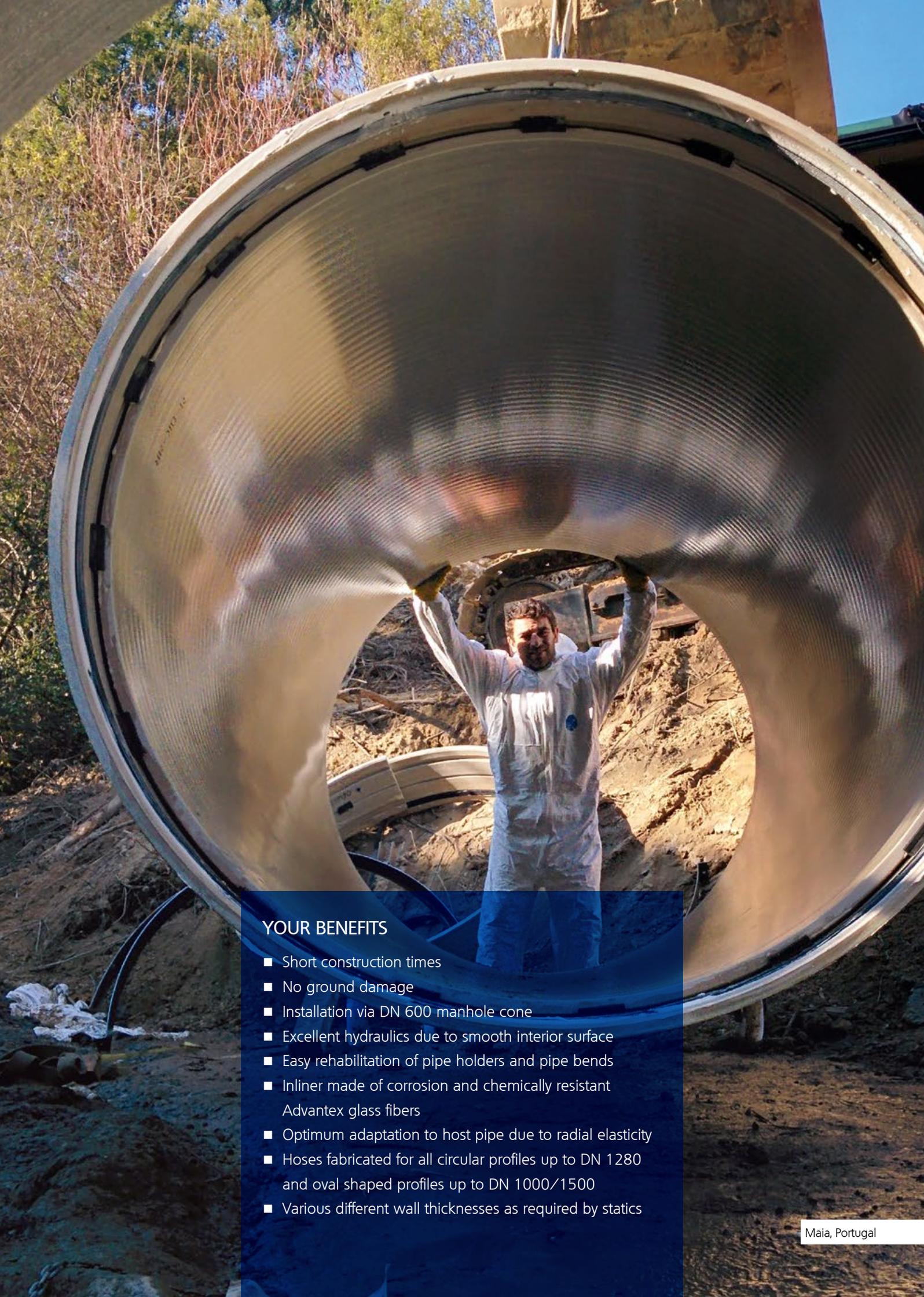
All dimensions





Sewer rehabilitation eliminates damage, defects, deposits and obstacles within the wastewater system.

The repair or rehabilitation method to be used is defined by the damage identified on site. A trenchless rehabilitation of sewers is the preferred method – as it saves costs and time and has minimum impact on the surrounding infrastructure.



YOUR BENEFITS

- Short construction times
- No ground damage
- Installation via DN 600 manhole cone
- Excellent hydraulics due to smooth interior surface
- Easy rehabilitation of pipe holders and pipe bends
- Inliner made of corrosion and chemically resistant Advantex glass fibers
- Optimum adaptation to host pipe due to radial elasticity
- Hoses fabricated for all circular profiles up to DN 1280 and oval shaped profiles up to DN 1000/1500
- Various different wall thicknesses as required by statics

CIPP-Liners

Fast and cost-effective

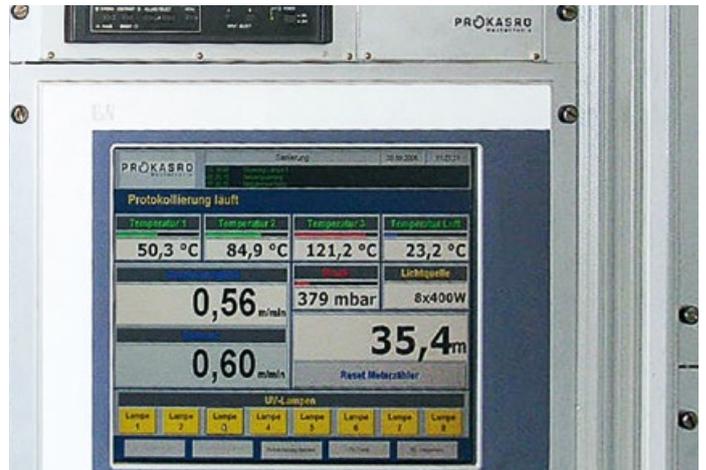
CIPP-lining is a hose rehabilitation method which uses a seamless glass fibre fabric hose as the inliner. CIPP-Liners (made of glass fiber reinforced plastics) can be used to rehabilitate sewage pipelines with damages such as root penetration, deposits, socket offsets, cracks and fractures.

Once the host pipe has been cleaned and inspected by a CCTV-camera, it is prepared for rehabilitation by milling and smoothing robots. The folded CIPP-Liner hose is being pulled into the host pipe by a winch. Compressed air unfolds the inliner host and is thus being expanded against the inside wall of the host pipe.

The hardening of the hose is depending on the respective on-site conditions, either using UV light or by using an air/steam mixture. Depending on the level of chemical stresses, unsaturated polyester resins or vinyl ester resins are used. The hardening process is automatically monitored and constantly documented.



Pardubice, Czech Republic

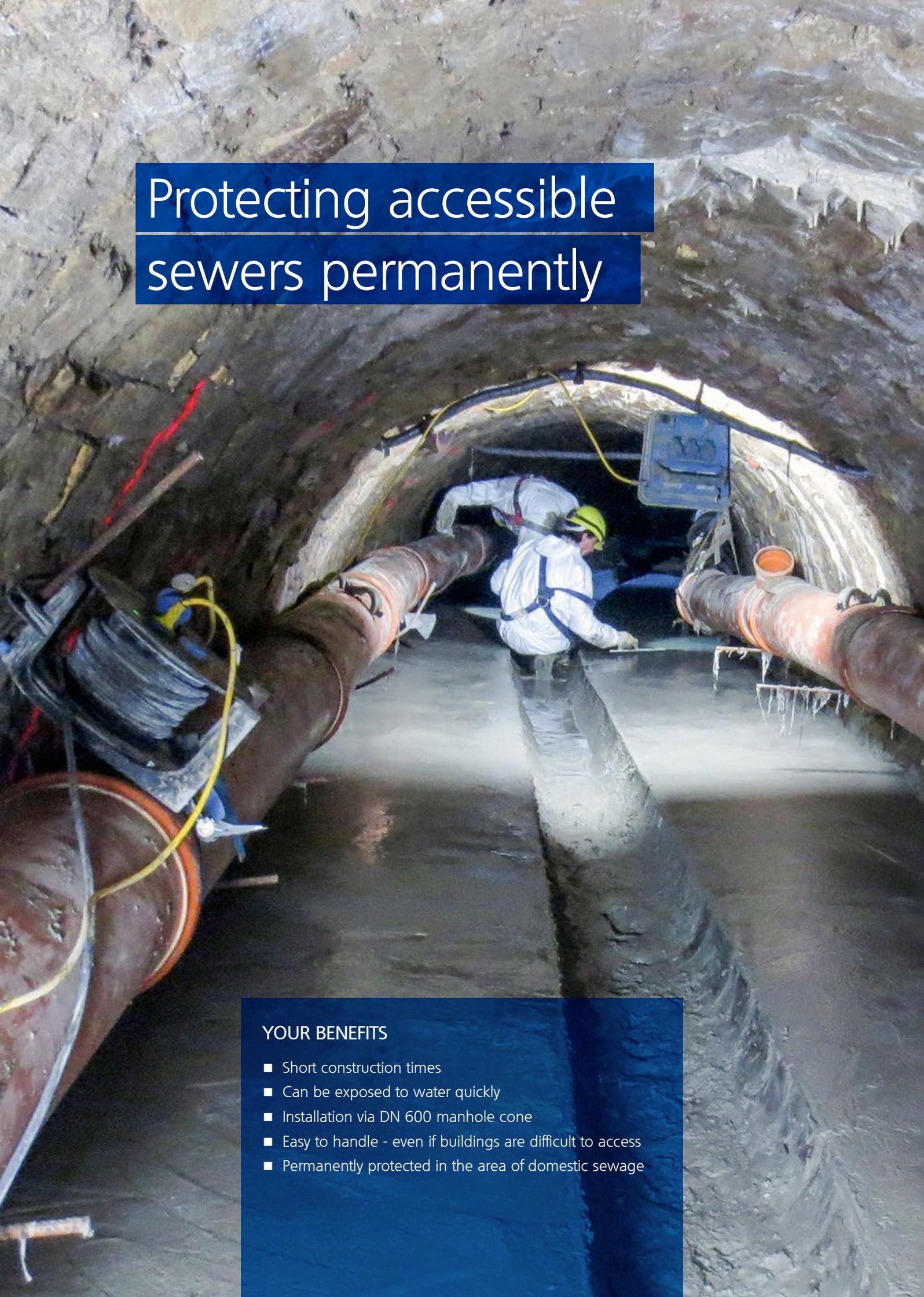


Luanda, Angola



Chabarovice, Czech Republic





Protecting accessible sewers permanently

YOUR BENEFITS

- Short construction times
- Can be exposed to water quickly
- Installation via DN 600 manhole cone
- Easy to handle - even if buildings are difficult to access
- Permanently protected in the area of domestic sewage

Manual rehabilitation

With mineral coating

Mineral coating is a technique for renovating sewer manholes, sewers and sewer structures. Mortar coatings are applied to seal, re-profile and coat masonry and concrete components.

After an intensive cleaning using high-pressure grit blasting, the structures are sealed with mineral systems and/or reactive resins before starting re-profiling works. The re-profiling process produces a surface suitable for coating. Existing irregularities are offset. The concrete or masonry substance that has become detached will be replaced. In the following coating step, a cohesive layer of mortar is applied to the inner wall of the sewer manholes, pipes and other structures either manually or using mechanical means.



All pictures taken from rehabilitation project of a combined sewer system in Gera, Germany





Dhaka, Bangladesh

For every task

The optimal process

The most cost-effective and efficient method for rehabilitation is using trenchless technology. This method focuses on project costs as well as additional charges which have to be borne by third parties, e.g. traffic disruptions.

We offer an extensive service portfolio for trenchless rehabilitation:

- CIPP-Liners
- Accessible sewers
- Robot-assisted methods
- DynTec method
- Subline method
- Compact Pipe method
- Manual rehabilitation
- Slipline processes

Complete rehabilitation systems from one single source.

General contractor for rehabilitation projects





Yaounde, Cameroon

Certified Expertise

We understand quality as the best possible fulfillment of the performance promises we have given to our customers. Realizing top quality is a result of our continuous efforts and experience and by no means a routine job. We handle your entire project for you – planning, coordination, technology and construction – whether for water, gas, energy or district heating supply or the disposal of wastewater.

A wide range of certificates and licenses is ensuring our engineering and construction excellence. Company compliance with international standards and regulations is ensured by the application of our Quality, Environmental and Occupational Health and Safety Management Systems as received in:

- DIN EN ISO 9001:2008
- DIN EN ISO 14001:2004
- OHSAS 18001:2007





Ludwig Pfeiffer

At your service across the world.



In more than 30 countries worldwide.



Since many years, Ludwig Pfeiffer enjoys an excellent reputation as the reliable partner in the construction industry. We build water and wastewater treatment plants (WTP & WWTP) as well as re-construct, upgrade or extend existing facilities applying energy saving solutions choosing the best available technologies (BAT). Our vast experience ranges from small modular pre-assembled skid mounted units to large centralized treatment plants.

As one of the few full-service providers, our customers profit from our experience to implement projects on a turn-key basis. As an innovative company, we constantly make every effort to apply solutions and technologies our customers benefit most of.



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