

# Rainwater going astray

EPROPOX FC30 epoxy resin system – to be prepared for a rainy day





*Inversion 7 metres up into the vertical pipe with the epros®Drum type „Mini“*

### **Moisture damage in the Savings Bank Branch of Pfalzgrafweiler**

The Savings Bank of Freudenstadt (Baden-Württemberg) has a wide network of local branches, one of which is Pfalzgrafweiler south-west of Stuttgart. After heavy rainfalls early 2008, the bank property managers detected first signs of moisture damage, which then re-occurred periodically, mainly in spring and autumn. Each time the concrete ceiling slab of the underground car park got wet. Also, the tenants of a flat belonging to the building complained about water penetration into the exterior walls.

Although the property management was soon aware that the water probably came from a drainage pipe leading the rainwater away from a line of windows located on the second floor, the Savings Bank (SPK) as the building owner shied away from the idea of demolishing part of the building's front section to get access to the drainage pipe obviously in need of repair. Klaus Finkbeiner, who is responsible for the construction sites of SPK Freudenstadt: „Wherever possible, we wished to avoid major construction work being a nuisance for our customers.“ Considering the rather great extent of demolition work normally required for such a repair (while continuing normal business) and considering the fact that, surprisingly enough, the defective pipe showed no problems during summer and winter, the responsible team was looking for a reasonable solution over a period of almost 18 months with the aim to avoid excessive construction work.

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## Architect finds the solution to the problem

Then the architect Martin Gunkel from Pfalzgrafweiler, who was consulted to look into the project, remembered having heard about the cured-in-place pipe lining process offered by Trelleborg Pipe Seals Duisburg for the renovation of house sewers, lateral pipes and main lines in sewer systems and buildings as a process that might enable the rehabilitation of the defective drainage pipe without part demolition of the building front as would be required otherwise. Since the company R+M Umweltservice GmbH in Sindelfingen had been using the Trelleborg technology for several years, the Savings Bank of Freudenstadt commissioned them to assess the situation in Pfalzgrafweiler.

*The express service team*



### **The express service team**

On the 25th of June, the R+M Umweltservice team from Sindelfingen, headed by the site manager Ralf Nölscher, drove up in front of the building – in order to clear the site on the following day already, after successful repair, and without the demolition work initially feared.

In a first step, the specialist team sent a camera down the drainage pipe. The transmitted pictures revealed very soon a damage in the transition zone between the concrete slab of the underground car park and the building. The camera inspection also showed that the drainage pipe route would really be a great challenge for the installers, because the pipe run from the rainwater inlet at the windows of the second floor down into the underground car park included two 45-degree bends and further two 90-degree bends over a length of altogether 13 metres, of which 7.5 metres were vertical. The pictures from the camera finally enabled the team to make a detailed assessment of the damage. To be on the safe side, the team performed an additional pressure test immediately following camera inspection.

On the basis of the inspection results, R+M Umweltservice GmbH gave the savings bank the recommendation to renovate the drainage line in closed construction according to the DIBt-approved lining method offered by Trelleborg. It was on the same day, at midsummer temperatures, that the specialist installers carried out the work they had found to be necessary.



*Careful and uniform bubble-free resin impregnation is critical for sustainable results.*

### **The new epoxy resin system tried and tested**

The epros®DrainPlusLiner was the ideal solution for the required pipe diameter of 100 millimetres and the various bends of up to 90 degrees. This flexible liner tube negotiates bends up to 90 degrees with very low wrinkling and can cope with a maximum of two size changes. This project was the very first application of the rapid ambient-cure epoxy resin system known as epros®EPROPOX FC30, which was the most recent development at the time. This epoxy resin system with short cure times at normal ambient temperatures, i.e. without the otherwise required additional heat input, offered the chance to do the job within shortest time and with a comfortable pot time of 35 minutes – despite the warm temperatures prevailing in the underground car park on that day.

The installer team used the smallest inversion drum type (mini), which is best manageable for local conditions like this, to invert the resin-wetted liner tube in upstream direction into the host pipe - from the car park upwards towards the drain inlet at the window line on the second floor, covering a height difference of about seven metres. "Normally quite a challenge for many inversion systems, but no problem for the smallest epros® DrainSystems inversion drum", as the European Sales Manager of Trelleborg, at that time Stefan Mühlhlin, explains. „Vertical inversion up to 32 metres high has been done this way before."

By way of precaution, to provide permanent protection against possible future damages or defects, the full drainage pipe length was relined according to this Trelleborg method.

The new epoxy resin system was an excellent choice for this application. At a prevailing ambient temperature of about 22 degrees Celsius in the underground car park, the liner could be wetted out within the specified resin pot time of about 30 minutes and inverted into the pipe in a smooth and convenient operation. After approximately four hours only, the epoxy resin mixture had hardened and the previously defective pipe was leak-tight. At the end of the intervention in Pfalzgrafweiler, the R+M specialists sealed the liner ends flush with the pipe termination and then reconnected the entire drainage system.



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## **Non-disruptive and sustainable**

The Pfalzgrafweiler branch of the Savings Bank continued its normal business without any disruption or impairment. Customers and employees did not even notice there was any repair or renovation work going on. This would, of course, have been completely different if the damage had been repaired by conventional means involving part demolition of the front building section surrounding the drainage pipe.

Now, almost two years later, the responsible team within the savings bank of Freudenstadt confirms that the relining operation with the epros®DrainPlusLiner in conjunction with the new ambient-cure resin system EPROPOX FC30 has „once and for all“ done away with rainwater problems in the Pfalzgrafweiler branch. There has been no further occurrence of water damage since the intervention of the R+M service team. Klaus Finkbeiner: „Considering the quick and lasting repair without disruptive demolition, we cannot but be happy and grateful that our architect brought forward this Trelleborg method as the ideal solution to our problems.“

### **All's well that ends well**

The epros®DrainLiner process is a method for the full-length renovation of entire (manhole-to-manhole) pipe runs in sewer systems. This process uses a flexible tube (liner), which is wetted with reaction resins and introduced into the host pipe run through a manhole, access pit or access eye with the help of an inversion unit. Air or water is used to transport the liner down to the point of repair. The resin-impregnated liner in the pipe section can be cured with heat or at ambient temperatures. The optimal cure of each liner is recorded and guaranteed. After final cure of the reaction resin, the liners provide a tight positive and frictional fit with the host pipe wall. The pipe-in-pipe system so obtained then forms an integral system with the host pipe and fully meets the hydraulic requirements.

The epros®DrainLiner method, which has general technical approval of the German Institute for Construction Engineering (DIBt) and is listed by the German Sewer Construction Quality Protection Association (Güteschutz Kanalbau e.V.), is made up of thoroughly matched components thereby offering a reliable solution that has proven its worth in many applications.

Ralf Nölscher from R+M Umweltservice GmbH: „In Pfalzgrafweiler we decided to use the DrainLiner system from Trelleborg, because we gained our best experience with the system in the past. Considering the complicated route of the drainage pipe in Pfalzgrafweiler, the epros®DrainLiner process enabled to us to master the problem with a high degree of flexibility and within shortest time. Again, we have made our best experience with the system and service from Trelleborg.“

## About Trelleborg

Trelleborg is a world leader in engineered polymer solutions that seal, damp and protect critical applications in demanding environments. Its innovative engineered solutions accelerate performance for customers in a sustainable way.

Trelleborg Pipe Seals Duisburg 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 Duisburg 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.

**The advantages of the epros®DrainLiner process** (additional information)

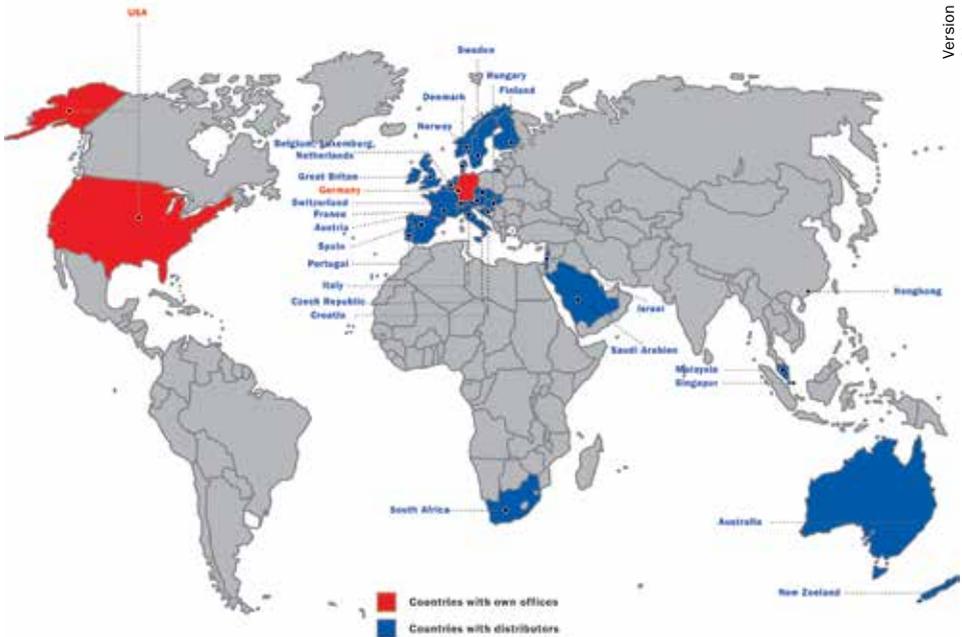
*The epros®DrainLiner process is certified by DIBt (German Institute for Construction Engineering).*

epros®DrainLiners from Trelleborg Pipe Seals are available in different material qualities and wall thicknesses and allow bends of up to 90 degrees to be relined. The material remains flexible even at lower temperatures and is very user-friendly in terms of wetting and handling.

The liner system can rely on a broad range of specifically designed resins for custom-tailored application. Depending on the type or cure method, they offer time savings of up to 50% in comparison with many other resin systems in the market. All resin systems offered under the brand name of epros® are easy to handle on moist supports due to their viscosities and compatibilities. They show virtually no shrinkage and stand out for their good mechanical properties and chemical resistance after final cure. Long pot times and short cure times make them even more user-friendly and economical.

Trelleborg offers 15 DIBt-approved liner/resin combinations and seems to be the supplier with the currently widest product range in the field of trenchless rehabilitation by cured-in place pipe liners.

epros®DrainSystems from Trelleborg Pipe Seals are an environment-friendly alternative to conventional pipe line rehabilitation involving digging up the grounds, because they contribute a lot to energy savings and climate protection by avoiding dust from open construction and carbon dioxide emissions from traffic disruption. And they do away with the need for interference with existing infrastructures. This saves the client time and money and reduces equipment needs to a strict minimum.



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