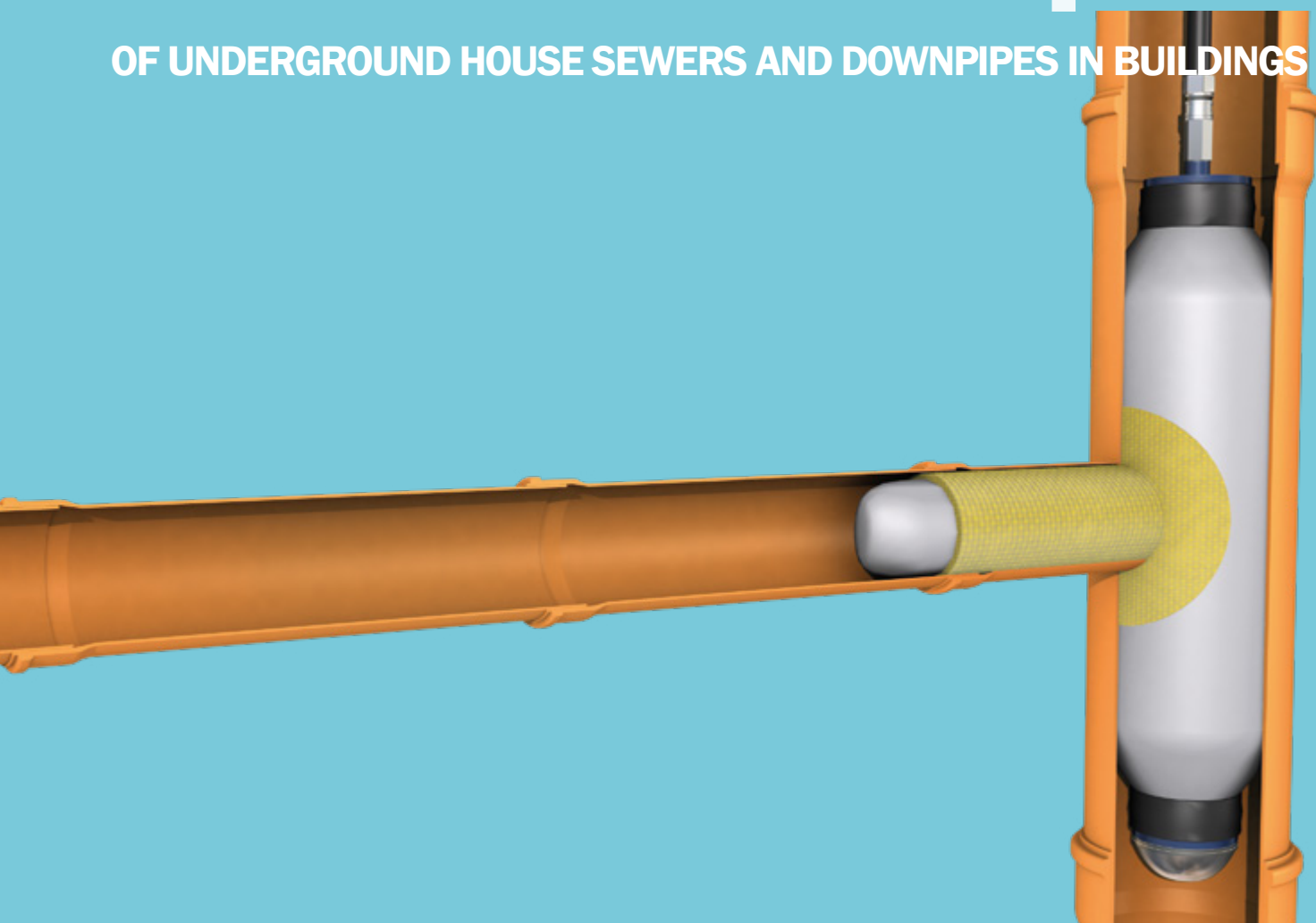


Lateral Connection Repair

OF UNDERGROUND HOUSE SEWERS AND DOWNPIPES IN BUILDINGS



Trelleborg LCR-B System



Introducing Trelleborg Seals & Profiles

Part of the wider Trelleborg Industrial Solutions Business Area of Trelleborg Group, Trelleborg Seals & Profiles 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 market-leading seals that promise:

High quality

Quick and easy installation

Improved productivity

Zero leakage

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

Trelleborg LCR-B What it's used for

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



Leaking downpipes and sewers in buildings are never welcome. They can leave residents plagued by bad smells, moist walls, mold and, in worst case scenarios, structural damage.

In the past, repairs to such damaged downpipes and sewers were limited to either patch repairs or to the installation of full-length liners. To repair a lateral connection, one would need to hack into a wall or excavate the ground – causing inconvenience to residents in the form of noise pollution, dirt and service disruptions. In fact, most current conventional repair methods still require the need for hacking or excavation.

Trelleborg solves this problem with the innovative Trelleborg LCR-B system for the rehabilitation of underground house sewers and downpipes in buildings with lateral connections.

This revolutionary pipe repair system allows lateral connections to be repaired in the same step as the main pipe without the need to hack into walls or excavate the grounds – thus reducing major inconvenience to the residents.

In this system, the LCR-B Packer can be introduced into the main pipe via existing access holes, inspection chambers or cleaning eyes, and pushed to the point of repair by means of compressed-air push rods.

As the LCR-B Packer is exceptionally compact and flexible, it is able to smoothly negotiate 45° bends in a main pipe of DN 100 [4"] and 90° bends in a main pipe of DN 125 [approx. 5"] or bigger.

A remote-controlled inspection camera which has been inserted into the lateral pipe and pushed up to

the lateral connection helps with this packer positioning process. The packer, once it has reached the main/lateral connection to be repaired, needs to be rotated using the air push rods until the LCR-B Hat Profile or LCR Liner (which is mounted onto the packer) is aligned with the connection.

When this final position has been achieved, the LCR-B Packer can be inflated. This is a cylindrical inflatable pro-formed hose that is equipped at mid-point with another cylindrical hose (bladder), at an angle of either 45° or 90°, for the lateral pipe. As the packer reaches maximum inflation, the lateral bladder inflates, inverting the hat profile or liner into the lateral connection pipe.

The system operator uses the camera to monitor the process and determine when the inversion is complete.

The curing process can then begin.

After curing, the system operator can use the LCR-B Control Box to apply a vacuum to deflate the LCR-B Packer. The deflated packer can then be removed with the help of the air push rods.

Benefits at a glance

FLEXIBLE AND COMPACT

This ultra flexible and compact system is able to negotiate 45° or 90° bends in downpipes and sewers as well as can be bent to fit into access holes and inspection chambers – allowing for great accessibility!

STREAMLINED SETUP & COST EFFECTIVE

With a streamlined list of equipment that goes with this system, you'll be able to cut your investment costs. For example, you simply need to purchase the packers that you actually require. What's more, the job can be completed by just using air push rods – no remote-controlled crawler is needed.

EASILY TRANSPORTABLE

The compact and lightweight mobile unit can even be transported in a small car.

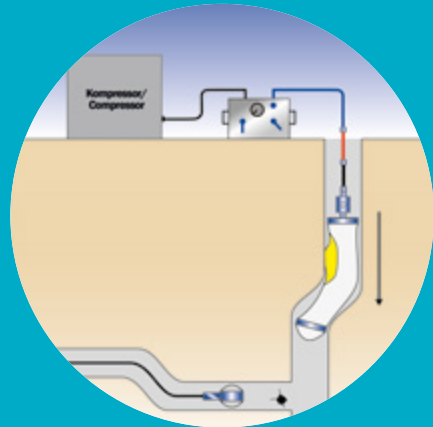
THERMAL RESISTANT

The cured epoxy resin systems used with the LCR-B Hat Profile and LCR Liner boast high thermal resistant properties. Of these, the silicate resins are also fire resistant as they are self-extinguishing.



Trelleborg LCR-B

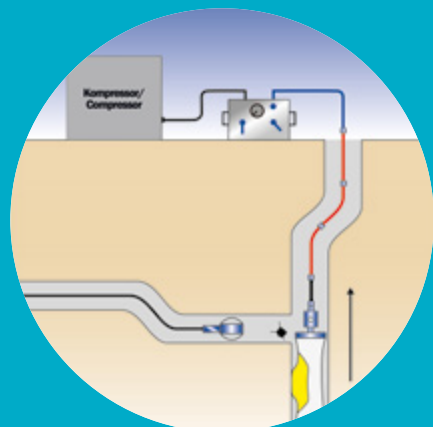
Functional principle



1 INTRODUCING THE LCR-B PACKER INTO THE DOWNPIPE

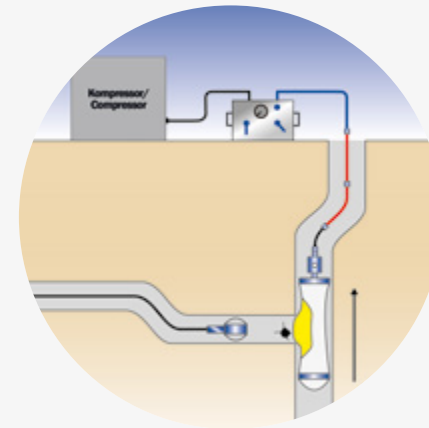
The LCR-B Packer can be introduced into downpipes or house sewers via existing access holes, inspection chambers or cleaning eyes. It is then pushed to the point of repair by means of compressed-air push rods.

Due to its exceptional flexibility, the LCR-B is able to smoothly negotiate 45° bends in a downpipe of DN 100 [4"] and 90° bends in a downpipe of DN 125 [approx. 5"] or bigger.



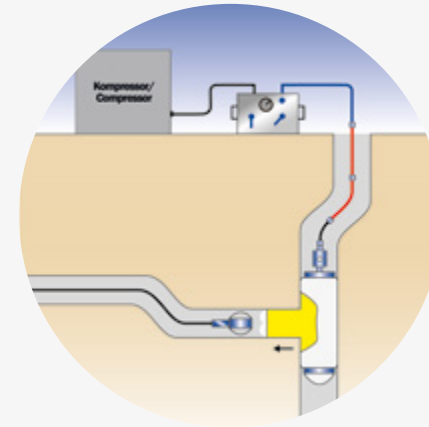
2 POSITIONING OF THE LCR-B PACKER

The system operator then needs to push the LCR-B Packer beyond the lateral connection while aligning the LCR-B Hat Profile or LCR Liner with the lateral. A remote-controlled inspection camera which is inserted into the lateral pipe and pushed up to the lateral connection helps with this packer positioning process.



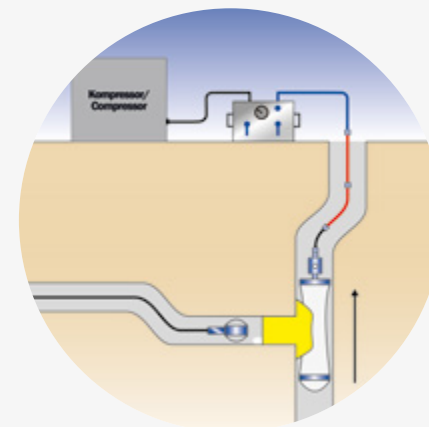
3 BRINGING THE LCR-B PACKER INTO ITS FINAL POSITION

The LCR-B Packer is then rotated, using the air push rods, until the LCR-B Hat Profile or LCR Liner is centred to the lateral connection pipe.



4 INSTALLING THE LCR-B HAT PROFILE/LCR LINER





When the packer has reached its final position, the LCR-B Bladder is inflated. As the packer reaches maximum inflation, the lateral bladder inflates, thus inverting the hat profile or liner into the lateral connection pipe. The curing process can now begin.






5 REMOVING THE LCR-B PACKER

At the end of the curing process, a vacuum is to be applied using the LCR-B Control Unit to deflate the bladder of the LCR-B Packer. This deflation process separates the packer from the hat profile or liner. After the packer is fully deflated, it can be removed safely from the pipe.

Trelleborg LCR-B Basic equipment




BASIC EQUIPMENT	
<p>LCR-B Control Box</p> <p>The LCR-B Control Box supports the handling of the compressed air and the vacuum for the LCR-B Packer. Comes equipped with a Hexagon adapter and nipple fitting for connecting to LCR Air Push Rods as well as a 10 mm T-handle Allen Key [4"] for operating the LCR-B Winding Box.</p>	
<p>Trelleborg LCR-B Packer S Trelleborg LCR-B Packer L</p> <p>Compatible with both ambient or steam curing methods. Data required for packer configuration:</p> <ul style="list-style-type: none"> • Main pipe diameter size • Lateral pipe diameter size • Lateral connection angle 	
<p>LCR-B Flex Adapter for Packer</p> <p>For ambient curing method only and to be used together with the LCR Air Push Rods. Equipped with locking device. ¼" external thread.</p>	
<p>LCR-B Tripod Stand Set</p> <p>Includes two connected tripod stands which are galvanised, height-adjustable and demountable. Includes holding rail for LCR-B Packer.</p>	

BASIC EQUIPMENT	
<p>Compressed Air Hose</p> <p>10 m [approx. 33 ft] with SVS quick coupling.</p>	
<p>LCR-B Turning Handle</p> <p>For air push rods.</p>	
<p>LCR Air Push rods</p> <ul style="list-style-type: none"> • Robust and stable • Available lengths: 0.7 m/1.5 m/3 m [27.5"/59"/118"] • Equipped with safety hexagonal couplings and locking device 	






Trelleborg LCR-B Packer Conversion articles

PACKER CONVERSION ARTICLES	
<p>Small repair set for bladders</p> <p>Comes in a plastic tool box and includes:</p> <ul style="list-style-type: none">• Super glue• Silicone glue• All-purpose cleaner (bottle)• Silicone patches, 190 x 280 mm [7½" x 11"]• Cleaning rag, 380 x 380 mm [15" x 15"]	
<p>Trelleborg LCR-B Bladder S Trelleborg LCR-B Bladder L</p> <ul style="list-style-type: none">• Lateral connection repair length: 280 mm up to 1200 mm [0.92 ft up to 3.94 ft]• Main pipe diameter: DN 100 – DN 200 [4" – 8"]• Lateral connection pipe diameter: DN 50 – DN 200 [2" – 8"]• Lateral connection angle: 45° or 90° <p><small>* For DrainCali 1200, packer retrofitting is necessary.</small></p>	
<p>LCR-B Packer Baskets</p> <p>Compatible with both 45° or 90° lateral connection angles. Comes in sizes corresponding to these lateral connection diameters:</p> <ul style="list-style-type: none">• DN 50/75/100 [2"/3"/4"]• DN 125 [5"]• DN 150/200 [6"/8"]	
<p>LCR-B Spacer Bushings</p> <ul style="list-style-type: none">• Bushing Length: 22.5 mm for DN 100 [4"]/Screw M4 x 40 mm• Bushing Length: 35.0 mm for DN 125 [5"]/Screw M4 x 60 mm• Bushing Length: 47.5 mm for DN 150 [6"]/Screw M4 x 80 mm	
<p>LCR-B Fixing Plate</p> <p>Set of two pieces.</p>	

Packer conversion and repair tool boxes

BASIC TOOLBOX	For details and article numbers, please refer to system catalogue
<p>Basic equipment for rehabilitation. Can be used with the following systems in combination with the corresponding supplementary kit:</p> <ul style="list-style-type: none">• Trelleborg LCR-B• Trelleborg LCR-S• Trelleborg Mth <p><small>* For details and article numbers, please contact our customer sales support team.</small></p>	
LCR-B SUPPLEMENTARY KIT FOR THE BASIC TOOLBOX	
<p>Contains LCR-B specific small spare parts such as couplings, screws, seals, air hoses and a combination wrench set.</p>	
	<p>It's now even easier! All you need is one basic toolbox and one packer conversion tool box for all three systems – Trelleborg LCR-S, Trelleborg LCR-B and Trelleborg Mth – plus the corresponding supplementary kit(s) to have everything you might need on the work site!</p>
PACKER CONVERSION TOOL BOX	
<ul style="list-style-type: none">• Basic equipment for packer conversion• Compatible with the Trelleborg LCR-S, Trelleborg LCR-B and Trelleborg Mth systems• To be used in combination with the corresponding supplementary kit	
LCR-B SUPPLEMENTARY KIT FOR PACKER CONVERSION	
<p>Contains the required spare parts for LCR-B Packer conversion.</p>	

Supplements for steam curing

STEAM CURING	
<p>Trelleborg Steam Gen 3 Trelleborg Steam Gen 6</p> <p>Electrically driven steam generators for portable use. Provides continuous steam of 3 kg/h [0.9 gal/h] (120 V or 240 V) and 6 kg/h [1.8 gal/h] (400 V) respectively. Made of stainless steel. Features:</p> <ul style="list-style-type: none">• Detachable water tank with water level sensor• Temperature and pressure gauges• Over pressure safety valve• Safety thermostat• Automatic safety shut-off <p>For further details, please refer to the technical data sheet.</p>	
<p>LCR-B SteamPacker Adaptor</p>	
<p>Safety Relief Valve</p> <p>Includes a double-sided spanner/wrench [1.0 bar and 1.5 bar].</p>	
<p>Steam Hose Trellvast DN 9,5</p> <p>10 m [approx. 33 ft]</p>	
<p>Trelleborg Epoxy Resins (Steam Curing)</p> <p>Two-component epoxy resin systems. Pot Life: 60 or 120 min. Cure Time: approx. 30 or 45 min. at 80 °C [176 °F]</p> <p>For more details, please refer to our "Approved Resin Systems" on page 14!</p>	

Trelleborg LCR-B Hat profiles

HAT PROFILES	
<p>Trelleborg LCR-B Hat profiles</p> <p>LCR-B Hat Profile 300 & LCR-B Hat Profile 1200</p> <ul style="list-style-type: none">• Available sizes: DN 50/DN 70/DN 100/DN 125/DN 150 [2"/3"/4"/5"/6"]• Lateral connection angle: 45° or 90°• Wall thickness: 2 – 3 mm• Lateral rehabilitation length: LCR-B Hat Profile 300: 280 mm [0.92 ft] LCR-B Hat Profile 1200: up to 1200 mm [3.94 ft]	
<p>Did you know you could use your existing LCR Control Unit to resin impregnate your LCR-B Hat Profiles?</p> <p>Just ask and we will supply you with details on how you can achieve a quick, bubble-free and high-quality impregnation by simply using the vacuum function on your control unit!</p>	

Approved Resin Systems for the LCR-B method

TRELLEBORG SILICATE RESINS (AMBIENT CURE)	
<p>Comp. A (Hardener) + Comp. B (Resin) Mixing ratio 1:2 (Litre)</p> <p>Trelleborg Silicate Resin Type W Pot life: 17±2 min., 20 °C [68 °F] Cure time: 170±20 min., 20 °C [68 °F]</p> <p>Trelleborg Silicate Resin Type S Pot life: 32±2 min., 20 °C [68 °F] Cure time: 260±20 min., 20 °C [68 °F]</p> <p>Trelleborg Silicate Resin Type A Pot life: 8±1 min., 20 °C [68 °F] Cure time: 55±10 min., 20 °C [68 °F]</p>	
SIZES	
<p>Can Sizes</p> <p>Trelleborg Silicate Resin Type W, Type S and Type A 2 x 13 kg (=Comp. B)</p> <p>Trelleborg Resin Hardener 16 kg (=Comp. A)</p>	
<p>Drum Sizes</p> <p>Trelleborg Silicate Resin Type W, Type S and Type A 250 kg (=Comp. B)</p> <p>Trelleborg Resin Hardener 300 kg (=Comp. A)</p>	
<div><div><p>It's now even easier!</p><p>Use the Trelleborg SiteGuide App, which features a resin calculator and downloads for quality management on the building site.</p><div><div><p>Site Guide</p></div></div></div><div></div></div>	

TRELLEBORG EPOXY RESINS (FAST CURE)	
<p>Comp. A (Resin) + Comp. B (Hardener) Mixing ratio: in weight 100:33, in volume 100:35</p> <p>Trelleborg Epoxy FC15* Pot life: 15 min., 25 °C [77 °F] Cure time: 120 min., 20 °C [68 °F]</p> <p>Trelleborg Epoxy FC30* Pot life: 30 min., 25 °C [77 °F] Cure time: 240 min., 20 °C [68 °F]</p> <ol style="list-style-type: none">For further technical details, please refer to the corresponding technical data sheets.For package sizes, article numbers and prices, please refer to our price list. <p>*) no DIBt approval</p>	
TRELLEBORG EPOXY RESINS (HOT CURE) FOR STEAM CURING ONLY!	
<p>Trelleborg Epoxy HC60</p> <p>Pot life: 60 min., 25 °C [77 °F] Cure time: 30 min., 80 °C [176 °F] steam</p> <p>Trelleborg Epoxy HC 60 A (Resin) Trelleborg Epoxy HC 60 B (Hardener)</p> <ul style="list-style-type: none">Cans: 15 kg (resin)/4.95 kg (hardener)*Drums: 220 kg (resin)/190 kg (hardener) <p>Trelleborg Epoxy HC120/HC120+</p> <p>Pot life: 120 min., 25 °C [77 °F] Cure time: 45 min., 80 °C [176 °F] steam</p> <p>Trelleborg Epoxy HC 120/120+ A (Resin) Trelleborg Epoxy HC 120/120+ B (Hardener)</p> <ul style="list-style-type: none">Cans: 15 kg (resin)/4.95 kg (hardener)*Drums: 220 kg (resin)/200 kg (hardener) <p>For further details, please refer to the technical data sheets.</p> <p>* Cans are conveniently sized for mixing in the right ratio.</p>	

Summary conclusion

Description

The Trelleborg LCR-B system allows lateral connections to be repaired in the same step as the main pipe – without the need to hack into walls or excavate the grounds – thus reducing inconvenience to the residents.

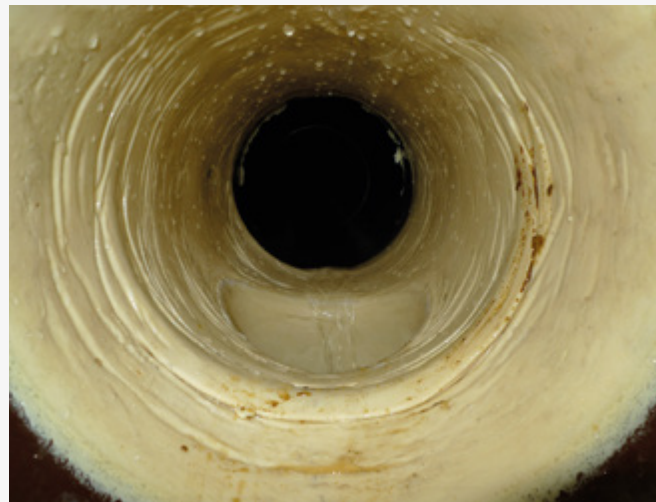
The system uses an ultraflexible LCR-B Packer combined with either an LCR-B Hat Profile or LCR Liner. The LCR-B Hat Profile is installed in the main pipe and seals the connection between the two pipes with its brim only, while the LCR Liner is designed to be a part liner in the downpipe or house sewer.

Accompanying the LCR-B system are resin systems specially designed to meet your individual on-site needs. For example, the Trelleborg Epoxy Resins (steam cure) promise excellent results coupled with an ample pot life. The self-extinguishing Trelleborg Silicate Resins (ambient cure), on the other hand, is fire resistant.

Below: DN 100 LCR-B Hat Profile installed in a DN 125 [5"] clay pipe with a 45° lateral connection angle.



Before



After

Application

- Main pipe diameters:
DN 100 to DN 200 [4" to 8"]
- Lateral connection diameters:
DN 50 to DN 200 [2" to 8"]
- Lateral connection angle: 30° to 90°

Behaviour in Bends*

- Main pipe:
45° for DN 100 [4"]
90° for DN 125 [5"]
- Wall thickness: 2 to 3 mm

* These values are dependent on the actual host pipe configuration and/or wrinkles formed on the currently-existing liner.



A world leader in engineered
polymer solutions

Trelleborg Seals & Profiles around the world

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USA

Germany

● COUNTRIES WITH DISTRIBUTORS

Australia

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China

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Denmark

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Poland

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Sweden

FURTHER INFORMATION

DIBt Approval No. Z-42.3-488

Trelleborg DrainLiner/Trelleborg LCR-B (previously known as epros® DrainLiner Method/epros® DrainLCR-B method) [rehabilitation of defective sanitary pipes, rainwater downpipes and house drains inside the building structure] DN 50 – DN 200 with Trelleborg Epoxy Resins HC60/HC120 (previously known as epoxy resin systems EPROPOX HC60/HC120)

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

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

Technical Data Sheets

Method Statement



Trelleborg is a world leader in engineered polymer solutions that seal, damp and protect critical applications in demanding environments. Its innovative solutions accelerate performance for customers in a sustainable way. The Trelleborg Group has annual sales of about SEK 34 billion (EUR 3.32 billion, USD 3.92 billion) and operations in about 50 countries. The Group comprises three business areas: Trelleborg Industrial Solutions, Trelleborg Sealing Solutions and Trelleborg Wheel Systems, and a reporting segment, Businesses under development. The Trelleborg share has been listed on the Stock Exchange since 1964 and is listed on Nasdaq Stockholm, Large Cap.

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