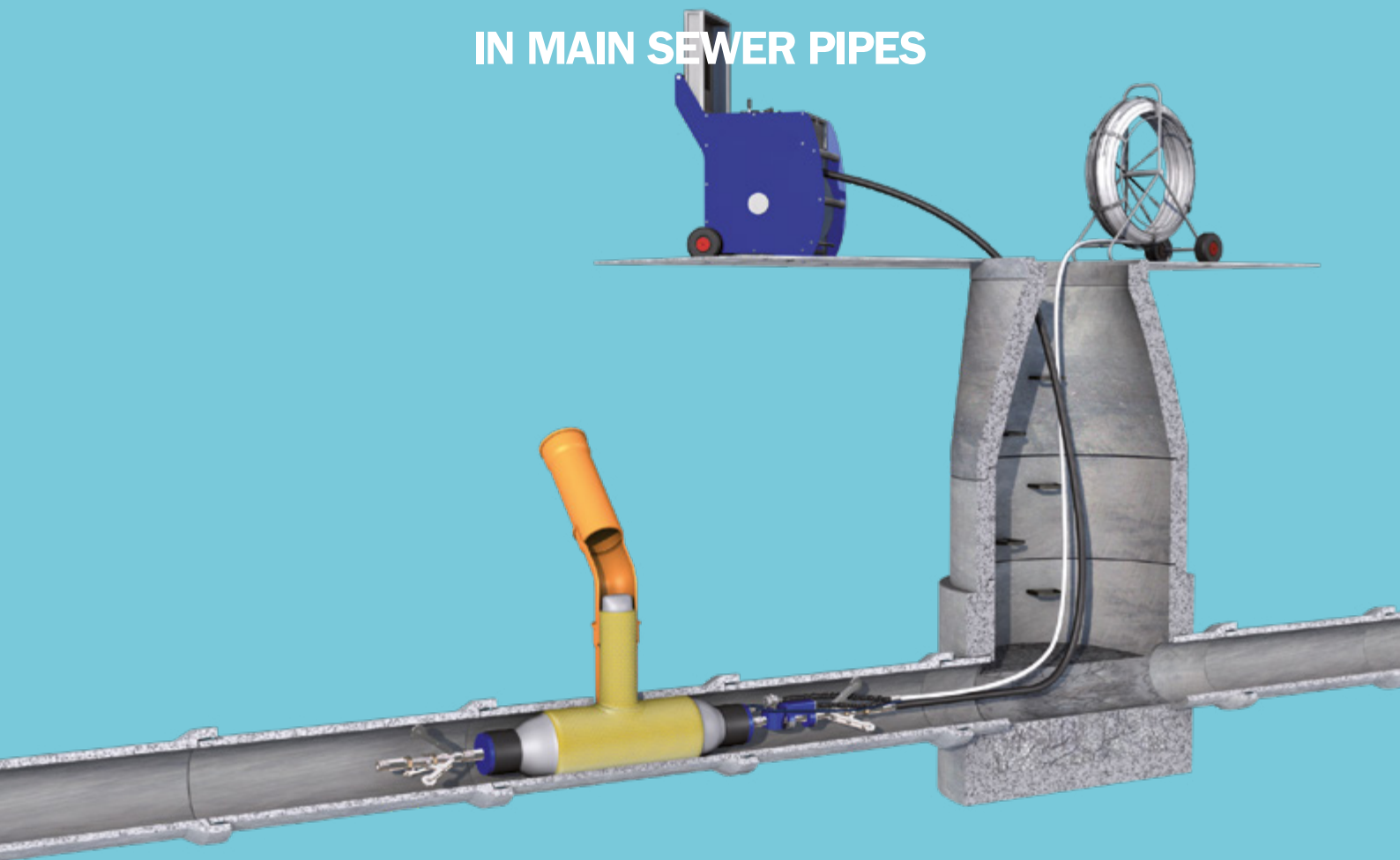


Lateral Connection Repair

IN MAIN SEWER PIPES



Trelleborg LCR-S 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-S What it's used for

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



Trelleborg has more than 25 years of experience, in continuous research and further development into the modern trenchless repair of pipelines in sewer systems, buildings, and industrial facilities.

Part of these systems is the Trelleborg LCR-S system, which repairs and permanently seals both main pipes DN 135 – DN 600 [5.3" – 24"] and house lateral connections DN 100 – DN 200 [4" – 8"] using either an LCR-S Hat Profile or an LCR Liner that is installed from the main pipe.

Both are able to seal the lateral connection for up to 600 mm [2 ft]. The LCR-S Hat Profile seals the main/lateral connection to the main line with its brim. The LCR Liner, on the other hand, is similar to a short liner and can repair a defined length of the main pipe as well as seal the main/lateral connection.

In both cases, the forming element consists of an LCR-S bladder mounted onto a LCR-S Packer. The former 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. Prior to installation, this bladder is fitted with a resin-impregnated LCR Liner or LCR-S Hat Profile and then pushed into the main hose.

A vacuum is then applied, causing the bladder together with the hat profile or liner to deflate. This makes the packer easy to insert and protects the repair material from damage during insertion.

The packer is inserted using a push rod and reel system or, in the case of short distances or small pipe diameters, with a pneumatic push rod. In both cases, what is important is a) determining the exact location of the lateral connection, and b) correctly positioning the packer.

The following devices are used for these purposes:

- A camera, mounted onto the packer, which helps to locate the junction of the house lateral connection to the main pipe.
- A rotary drive which enables the user to rotate the packer in the pipe and locate the junction while a telescopic wheel system braced inside the pipe maintains the position.
- A packer basket (otherwise called a pathfinder) which is located under the lateral hose and which can be lifted or lowered using a compressed air cylinder operated from the control unit. The locking of the basket into the lateral connection signals the correct positioning of the packer.

When the packer has reached its final position, the LCR-S bladder is inflated. As the main calibration hose reaches maximum inflation, the lateral hose inflates, inverting the hat profile or liner into the lateral connection pipe. When this inversion process is successfully completed, the packer will emit a whistle to alert the system operator. The liner should then be left to cure, and following that, the packer can be deflated and removed from the main pipe.

Benefits at a glance

WIDE APPLICATION AREA

Mainline DN 135 – DN 600 [5.3" – 24"]
Lateral DN 100 – DN 200 [4" – 8"]
Angle 30° – 90°

PORTABLE MODULAR SYSTEM

Light mobile unit that can be easily transported in a vehicle such as a van or pickup.

GOOD VALUE FOR MONEY

Low investment costs because only packer sizes that are needed can be purchased. Fast installation allows for multiple installations per day.

USER-FRIENDLY HANDLING

Depending on your needs, our LCR-S Packers can be modified for other sizes and configurations.

Our complementary resin systems provide comfortable pot times and quick curing times – thus reducing time pressure, stabilising the work process, and ensuring successful installations.

SAFE INSTALLATIONS

Starting the inflation process is possible only after the LCR-S basket is locked in place: The locked-in basket guarantees that the packer is correctly positioned for inflation.

The whistle alert emitted by the control unit signals that the inflation and inversion process is successfully completed.

CLEAN TECHNOLOGY

Our trenchless technology is eco-friendly. No volatile organic compounds (VOCs) or styrene are released during installation. No environmental or health issues.

EXCELLENT QUALITY AND SUSTAINABILITY

The installed hat profiles or liner coupled with the resins used ensures no shrinkage. The glass-reinforced hat profiles and liners also promise excellent mechanical properties and good rehabilitative results with a long lifetime.

Trelleborg LCR-S Functional principle*



1 POSITIONING OF THE LCR-S PACKER

The LCR-S system allows lateral connections with angle from 30° to 90° from DN 100 to DN 200 [4" – 8"] to be repaired. An important part of the functional principle of the system is the positioning of the LCR-S Packer. The packer is first pulled slightly beyond the point of repair and rotated with the help of the control unit and a remotely operated camera until the packer basket is aligned with the lateral connection.



2 LIFTING THE LCR-S PACKER BASKET

The packer basket then needs to be lifted until it touches the pipe wall. This can be done by switching the operating lever of the LCR-S Control Unit to its "up" position.



3 BRINGING THE LCR-S PACKER INTO ITS FINAL POSITION

The packer is then gently pulled back until the packer basket locks into place in the lateral connection pipe. This locking into place can be verified remotely using the camera and manually using the push rods. The system operator also needs to ensure that the packer basket is now centred in the lateral pipe.



4 "INVERSION" OF THE LCR-S HAT PROFILE/ LCR LINER INTO THE LATERAL CONNECTION PIPE

The calibration hose is then filled with compressed air until the hat profile brim or liner is pressed against the main pipe. The system operator can then start inverting the hat profile or liner. Once the liner is fully inverted and pressed firmly against the pipe wall, the curing process starts. A whistle will sound, allowing the operator to know the calibration hose is fully inverted.

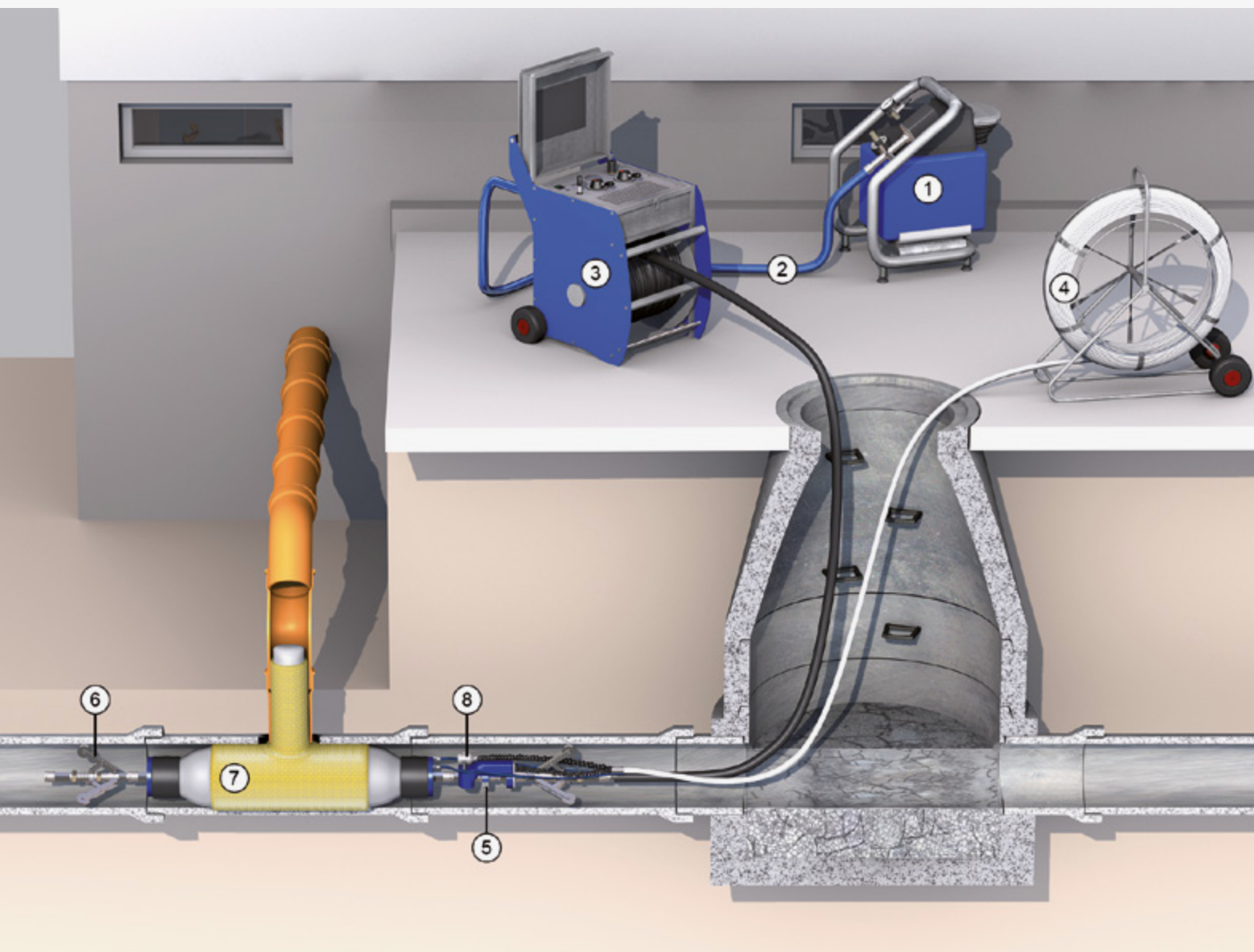


5 REMOVING THE LCR-S PACKER

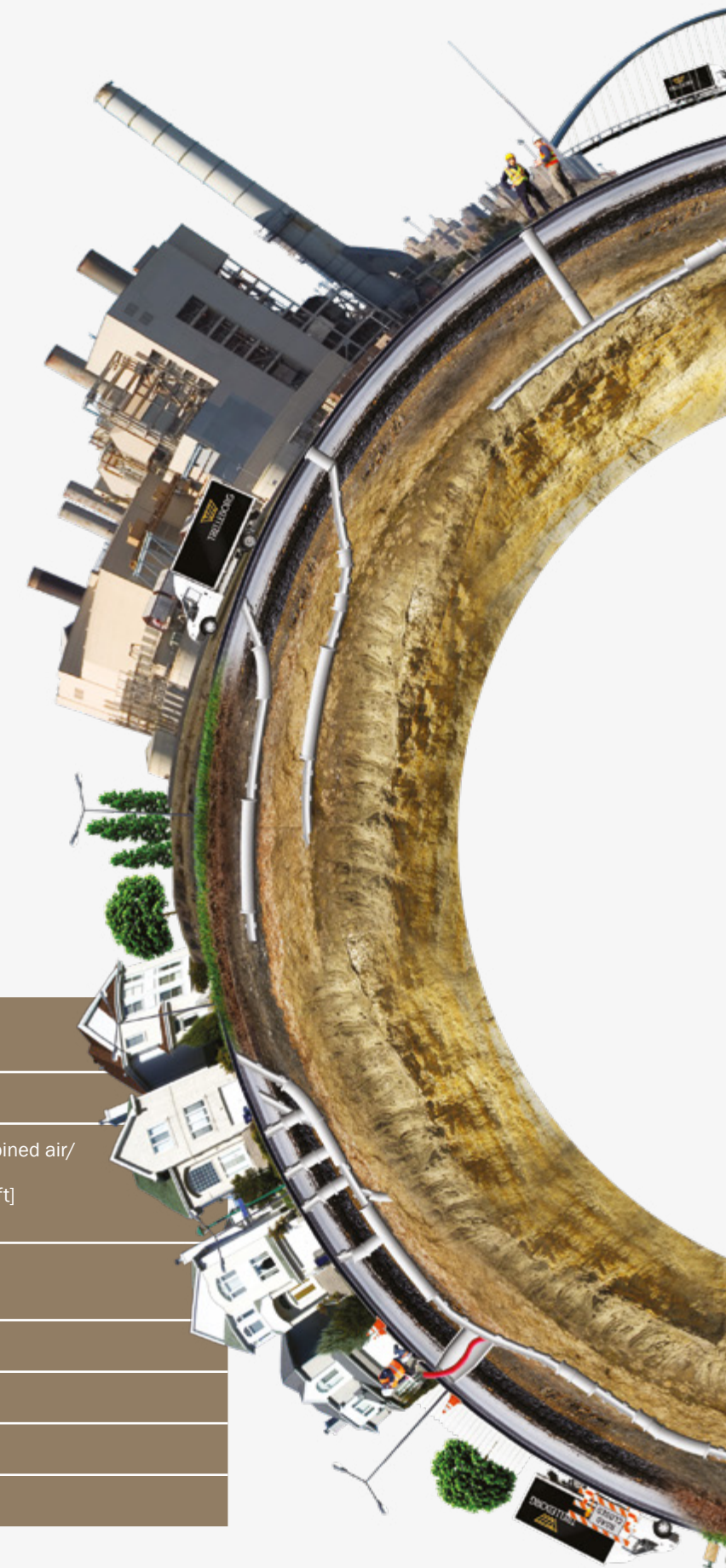
At the end of the curing process, a vacuum should be applied to deflate the calibration hose. After it is fully deflated, the packer can then be removed from the pipe.

*) This is merely an introduction to the system. Full details on the method and correct application of the LCR-S system are available in our method statement and technical data sheets.

Trelleborg LCR-S Technical components






- | | |
|---|--|
| 1 | Compressor – recommended capacity:
300 l/min, 8 bar [80 gpm, 116 psi] |
| 2 | Compressed air hose, 10 m [approx. 33 ft] |
| 3 | Trelleborg LCR-S Control Unit with Monitor and combined air/
electricity/videohose package and camera,
60 m, 100 m or 150 m [approx. 197 ft, 328 ft, 492 ft]
Required power supply 120/240 V, 50/60 Hz, 2.5 A |
| 4 | LCR-S Push Rod & Reel system,
100 m [328 ft] with flex adapter |
| 5 | LCR-S Rotary drive |
| 6 | LCR-S Wheel set |
| 7 | LCR-S Packer |
| 8 | LCR-S Camera |



Trelleborg LCR-S Basic equipment

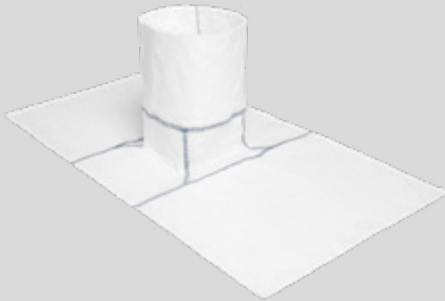

BASIC EQUIPMENT	
<p>Trelleborg LCR-S Control Unit</p> <p>The LCR-S Control Unit supports the handling of the compressed air and the vacuum for the packer, the packer basket, and the rotary drive. The unit comes with a high-quality monitor and a keyboard for data input as well as video output.</p> <p>* English is the default language for the control unit keyboard and OS. Other languages are available upon request.</p>	
<p>Trelleborg LCR-S Hose Reel with Camera</p> <ul style="list-style-type: none">• Combined air/electricity/video-hose package, 60 m, 100 m or 150 m [approx. 197 ft, 328 ft, 492 ft]• Rotary feedthrough• Multi-function plug for packer connection• Color Camera<ul style="list-style-type: none">– PAL format– LED lights– Sapphire crystal lens– Fill and release valve for nitrogen <p>*) Components are also available separately upon request. Please refer to our spare parts catalogue.</p>	 <p>Hose package</p>

BASIC EQUIPMENT	
<p>LCR-S Tripod Stand set</p> <p>Includes two connected tripod stands which are galvanised, height-adjustable and easily disassembled</p>	
<p>Trelleborg LCR-S Packer S</p> <p>Lateral connection repair length: up to 300 mm [1 ft]</p> <p>Trelleborg LCR-S Packer M</p> <p>Lateral connection repair length: up to 600 mm [2 ft]</p> <p>Data required for packer configuration:</p> <ul style="list-style-type: none">• Main pipe diameter size DN 135 – DN 600 [5.3" – 24"]• Lateral connection pipe diameter DN 100 – DN 200 [4" – 8"]• Lateral connection angle 45° or 90°	
<p>LCR-S Wheel Set</p> <p>The LCR-S packer must be equipped with the proper wheel sets depending on the size of the main pipe. These LCR-S Wheel Sets can be adjusted according to various pipe dimensions.</p> <p>Each wheel set is equipped with two wheel supports. If two or more LCR-S Packers are used simultaneously, then more wheel sets must be used accordingly.</p> <p>These wheel sets are also necessary when using a remote-controlled crawler.</p> <ul style="list-style-type: none">• LCR-S Wheel Set DN 135 – DN 250 [5.3" – 10"] with 25, 40, 60 and 80 mm wheels• LCR-S Wheel Set DN 300 – DN 450 [12" – 18"] with 80 and 120 mm wheels• LCRS Wheel Set replacement unit DN 450 → DN 600 [18" – 24"]	

Trelleborg LCR-S Basic equipment

BASIC EQUIPMENT	
<p>LCR-S Push Rod & Reel</p> <ul style="list-style-type: none">• Made from flexible fiberglass• Length: 100 m [328 ft] Diameter: 11 mm [0.4"] Reel system diameter: 0.9 m [3 ft]• Equipped with a flexible adaptor for packer connection	
<p>LCR Air Push Rods (red)</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 coupling and locking device	
<p>LCR Flex Adapter</p> <p>To be used together with the LCR Air Push Rods or LCR-S Push Rod & Reel. Equipped with locking device.</p>	
<p>Compressed Air hose</p> <p>10 m [approx. 33 ft] with SVS quick coupling.</p>	
<div><div></div><div></div></div>	<p>To avoid situations in which you find yourself missing crucial equipment on site during an installation, we recommend the following LCR-S toolboxes and kits:</p> <ul style="list-style-type: none">• Basic Tool Box• LCR-S Supplementary Kit For Basic Tool Box• Packer Conversion Tool Box• LCR-S Supplementary Kit For Packer Conversion Tool Box• Repair Set For Calibration Hoses <p>This will guarantee that you are equipped with all the tools, materials and accessories you need. All components can be purchased separately. For more information, please refer to page 17.</p>

Trelleborg LCR-Liner

LCR-LINER	
<p>Trelleborg LCR-Liner – multidimensional</p> <ul style="list-style-type: none">• Comes in the same highquality material as the hat profiles• Available sizes (main pipe): DN 100/300 or DN 350/600 [4"/12" or 14"/24"]• Available sizes (lateral pipe): DN 100/DN 125/DN 150/DN 200/DN 225/DN 250 [4"/5"/6"/8"/9"/10"]• Lateral connection angle: 45° or 90°• Application range 30° – 90°• Wall thickness: 3 – 4 mm• Lateral length: 600 mm [2 ft]	
<p>Did you know you could use your existing LCR Control Unit to resin impregnate your LCR Liner and LCR-S Hat Profiles?</p> <p>Just ask and we will supply you with details on how you can achieve a quick, bubble-free and highquality impregnation by simply using the vacuum function on your control unit!</p>	

Approved Resin Systems for the LCR-S 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 Trelleborg Silicate Resin type S 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 Trelleborg Silicate Resin type S 250 kg (=Comp. B)</p> <p>Trelleborg Resin Hardener 300 kg (=Comp. A)</p>	
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> <p>1. For further technical details, please refer to the corresponding technical data sheets. 2. For package sizes, article numbers and prices, please refer to our price list.</p> <p>*) no DIBt approval</p>	

It's now even easier!

Use the **Trelleborg SiteGuide App**, which features a resin calculator and downloads for quality management on the building site.






Site
Guide



Trelleborg LCR-S Packer Conversion articles

CONVERSION ARTICLES	
<p>Small repair set for LCR-S 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>LCR-S Bladder</p> <ul style="list-style-type: none">• Lateral connection repair length: up to 600 mm [24"]• Main pipe diameter: DN 135 – DN 600 [5.3" – 24"]• Lateral connection pipe size: 100 mm – 200 mm [4" – 8"]• Lateral connection angle: 45° or 90°	
<p>LCR-S packer baskets</p> <p>Necessary information:</p> <p>a) Main pipe diameter DN 135 – DN 600 [5.3" – 24"]</p> <p>b) Secondary pipe diameter DN 100 – DN 200 [4" – 8"]</p> <p>c) Connection angle 45° or 90°</p>	
<p>LCR-S Lifting Rods</p> <p>DN 135 [5.3"] DN 150 [6"] DN 200/225 [8"/9"] DN 250 [10"] DN 300/350 [12"/14"] DN 400/450 [16"/18"]</p> <p>(DN dimensions refer to the main pipe diameter)</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-S• Trelleborg LCR-B• Trelleborg MtH <p>For details and article numbers, please contact our customer sales support team.</p>	
LCR-S SUPPLEMENTARY KIT FOR THE BASIC TOOLBOX	
<p>Contains LCR-S 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-S SUPPLEMENTARY KIT FOR PACKER CONVERSION	
<p>Contains the required spare parts for LCR-S Packer conversion.</p>	

Trelleborg Seals & Profiles 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

Trelleborg DrainLiner Method (previously known as epros® DrainLiner Method) DN 100 – DN 400 with Trelleborg Epoxy Resin System (EPROPOX) HC60 including the Trelleborg LCR-S Method with Trelleborg Epoxy Resin System (EPROPOX) HC60 and Trelleborg Silicate Resin Systems S, W, A (W01)

No. Z-42.3-466

Trelleborg DrainLiner Method (previously known as epros® DrainLiner Method) DN 100 – DN 250 with Trelleborg Epoxy Resin System (EPROPOX) FC15/FC30 including the Trelleborg LCR-S Method with Trelleborg Epoxy Resin System (EPROPOX) FC15/FC30 and Trelleborg Silicate Resin Systems S, W, A (W01)

No. Z-42.3-468

Trelleborg DrainLiner Method (previously known as epros® DrainLiner Method) DN 100 – DN 600 with Trelleborg Epoxy Resin System (EPROPOX) HC120 including the Trelleborg LCR-S Method with Trelleborg Epoxy Resin System (EPROPOX) FC15/FC30 and Trelleborg Silicate Resin Systems S, W, A (W01)

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

Video <http://www.youtube.com/trelleborgpipes seals>

LCR-S System Catalogue

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.

WWW.TRELLEBORG.COM/PIPE-SEALS



facebook.com/pages/Trelleborg-Pipe-Seals-Duisburg
twitter.com/PipeSeals
youtube.com/c/TrelleborgPipeSeals
www.linkedin.com/company/trelleborg-pipe-seals