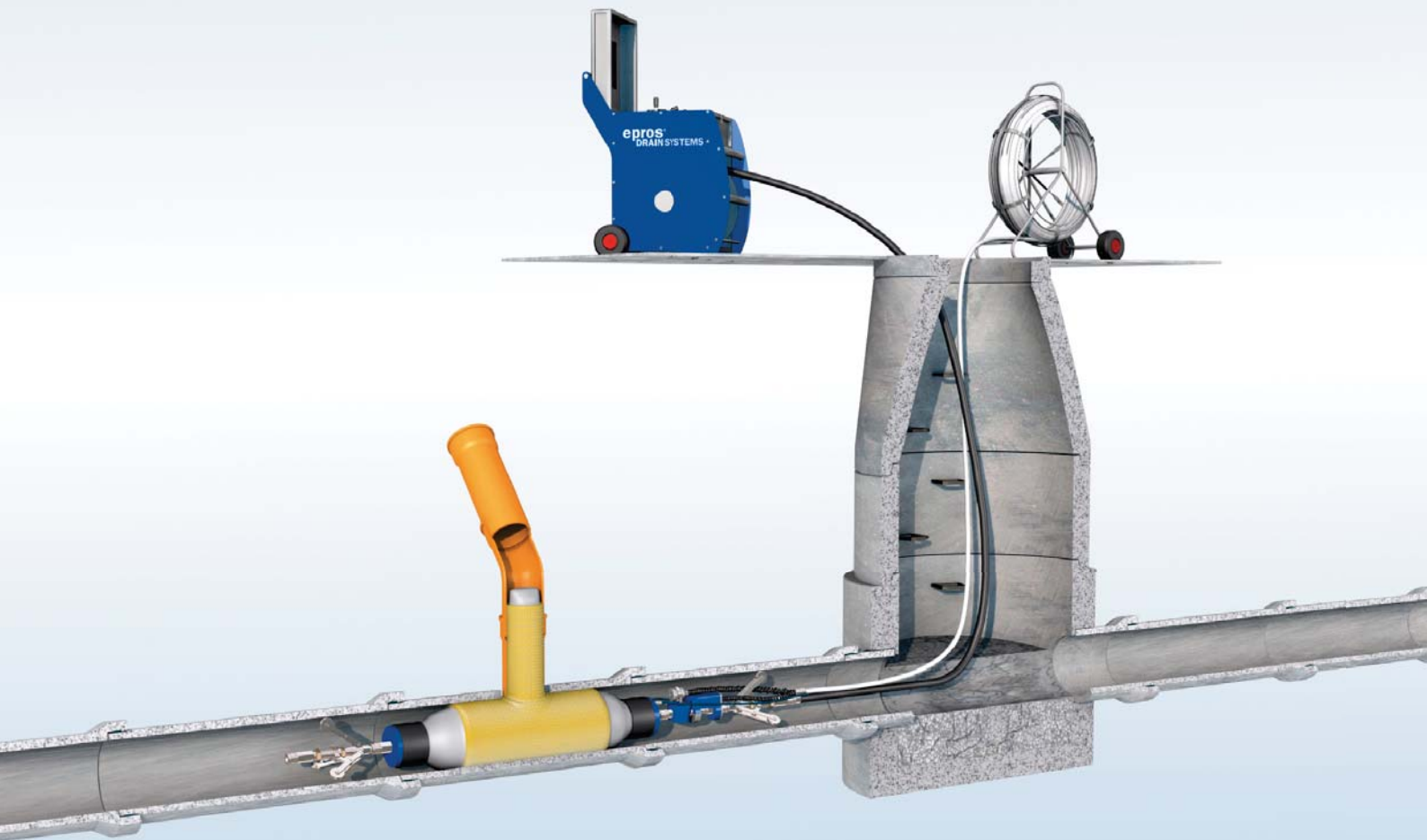


# Lateral Connection Repair

IN MAIN SEWER PIPES



## 1.0 How does the epros® DrainLCR-S work?

Trelleborg Pipe Seals Duisburg is among the leading specialist companies in innovative technologies for the upkeep of sewer systems.

The brand name epros®DrainSystems stands for 20 years of experience, continuous research and further development of technical systems for modern trenchless repair of pipelines in sewer systems, buildings and industries.

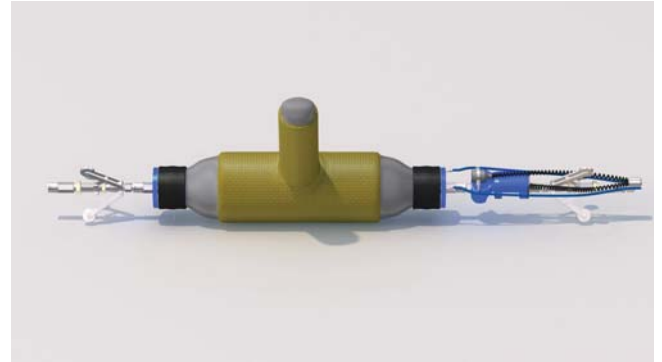
The epros®DrainLCR-S system is both a pipe repair device and a method for the lateral connection repair (house lateral connections) of main pipes in public infrastructure networks.

It repairs and permanently seals main/lateral interfaces and lateral connections (DN 100 – DN 200) by installing either a LCR-S hat profile or an LCR-S liner from the main pipe (DN 135 – DN 600) up to a length of 600 mm.

The LCR-S hat profile seals the main/lateral junction in the main line just with its rim. The LCR-S liner in the main pipe is designed similar to a short liner and will at the same time repair a defined length of the lateral pipe.



In both cases, the forming element is an inflatable pro-formed hose that serves the same function. This inflatable hose in the form of a cylinder (packer hose), is additionally equipped with another cylinder located at the mid-point (the lateral hose) at an angle of 45° or 90° to the axis of the packer.



Prior to installation, this lateral hose together with resin-impregnated LCR-S Liner or LCR-S hat profile is re-inverted into the packer hose.



Sucking out the complete air out of the packer hose and the branch hose generates a sort of vacuum, which allows to defend the repair material inside the packer hose (LCR-S Liner or LCR-S hat profile) from possible dislocation during the insertion into the pipe.

This is usually performed by means of a push rod reel system, and in case of short distances and small pipe diameters – with a pneumatic push-rod attached to the packer.

In case of both applications precise determination of damaged area as well as the correct positioning of the packer are imperative. The following devices are used for these purposes:

First, a camera is mounted on the packer. This camera helps to locate the junction of the house connection pipe to the main pipe.

The packer is equipped with a telescopic wheel system and a rotary drive that enables the user to rotate it axially in the damaged area and so to locate the junction whilst the wheel systems braced inside the pipe maintain the axial position.

The packer rod is featured by a lifting mechanism with a compressed air cylinder (pathfinder) pushing a sort of ring (the packer basket) into the main/lateral junction area. This packer basket is located underneath the packer hose directly at the packer hose/ branch hose link and its lifting mechanism is controlled via an operator panel from outside the pipe.

It is the function of the pathfinder to achieve the correct positioning inside the sewer pipe at the damaged lateral connection and to lift up the basket directly into the junction.

The LCR-S Packer, prepared in this way, is then pushed into the damaged area.

When the packer has reached its final position, the inflation process is started with the packer hose and after a given time delay continued with both, the lateral hose and liner, now inverting into the connection pipe whilst the lifting basket is driven back. The time-delayed inflation is controlled by means of a stiff cable, inserted and braked using a reeling box.



Partially inflated packer after positioning

After the lateral packer hose has been completely inverted, a clear acoustic signal is given to indicate that the inversion process successfully is finalized.

After curing of the liner, the packer is blown off and removed from the repair area.

### Benefits at a glance

- **Application area**

Mainline DN 130 – DN 600  
Lateral DN 100 – DN 200  
30° – 90°

- **Portable modular system:**

Light mobile unit, can be transported also in a small vehicle

- **Value for money:**

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

- **User-friendly handling:**

LCR packers can be converted into other sizes, according to your needs. This allows as much flexibility in application as possible.

Our appropriate resin systems are designed to have both comfortable pot times and quick cure times as soon as the chemical reaction has been started. This helps to reduce time pressure, increases work security and leads to better product quality.

- **Safe installation:**

1. Starting the inflation process is possible only after the LCR basket is locked in place.
2. Only a complete finalized inflation process triggers the acoustic signal.

- **Clean Technology:**

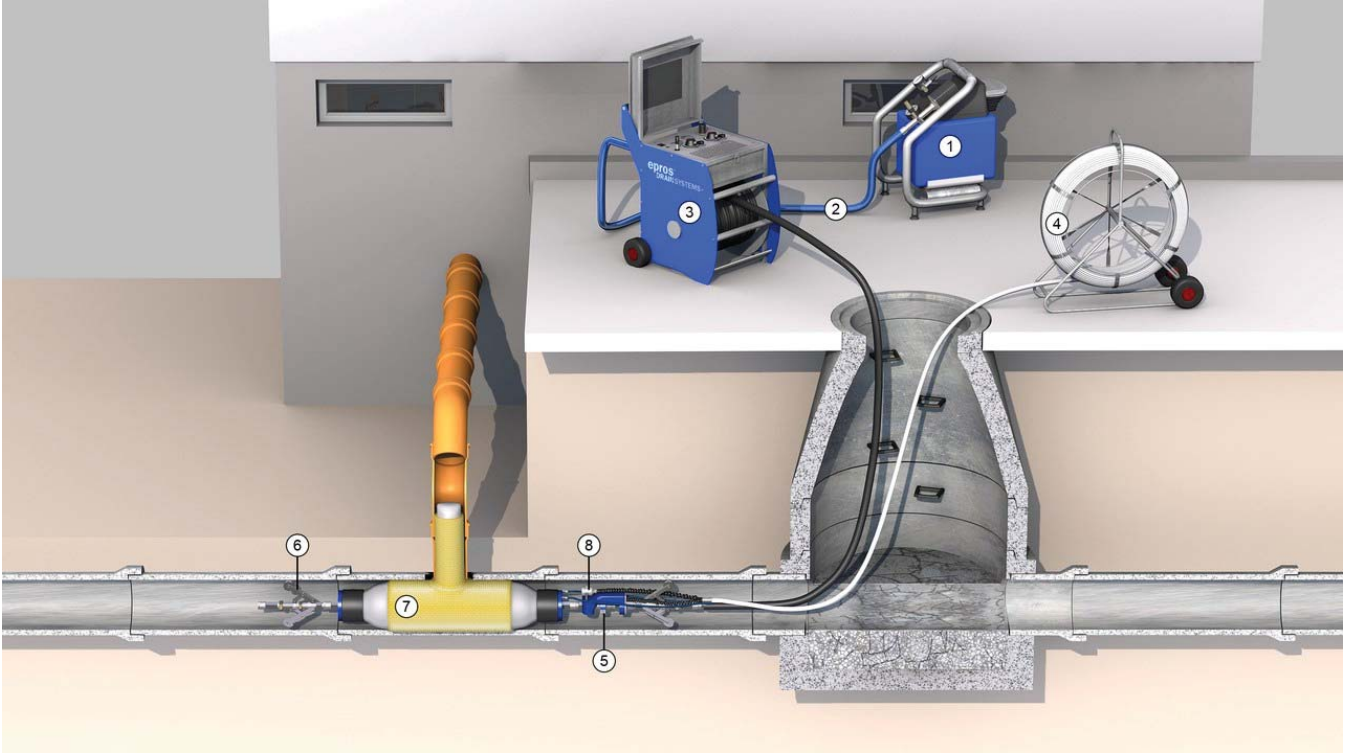
Trenchless technology. No voc's, no styrene, no environmental or health issues

- **Quality and Sustainability:**

No shrinkage. Glass reinforced hat profiles and liners ensure excellent mechanical properties and a good rehabilitation result with a long lifetime.



## 2.0 Functional principle



1	Compressor, minimum 300 L / 8 bar / power generator 250 V / 50 Hz / 2,5 A
2	Compressed air hose 10 m
3	LCR-S control unit with monitor, incl. 60 m hose package and camera
4	LCR-S Cobra reel system, 100 m with flex adapter
5	LCR-S rotary drive
6	LCR-S wheel set
7	LCR-S packer
8	LCR-S camera



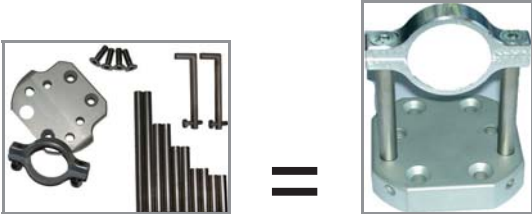


### 3.0 Basic equipment for rehabilitation

Description	Product illustration (actual appearance may vary)
<p><b>LCR-S control unit (German)</b> The LCR control unit controls the compressed air and the vacuum for the LCR packer, the pathfinder and the motor.</p> <p>The unit includes a high-quality monitor and a keyboard for data input as well as a video output (keyboard and programming in the German language)</p> <p><b>LCR-S control unit (English)</b> as above, but the keyboard and programming in the English language</p> <p><b>Other languages available on request</b></p>	
<p><b>LCR-S Hose Reel with rotary feedthrough incl. camera cable and all supply lines</b> Equipment:</p> <ul style="list-style-type: none"> <li>• combined Air/electricity/video-hose package (60 m, 100 m or 150 m)</li> <li>• multi-function plug for packer connection</li> <li>• colour camera (PAL) with LED lights</li> <li>• sapphire crystal camera head for LCR packer</li> <li>• fill and release valve for nitrogen</li> </ul> <p>with hose package 60 m with hose package 100 m with hose package 150 m Components are sold separately on request (see Spare Part Catalogue)</p>	 <p>Hose package with camera</p>
<p><b>Optionally (instead of Y manifold):</b> LCR-S connection adapter for direct connection to the LCR-S packer: The adapter is equipped with following connections:</p> <ul style="list-style-type: none"> <li>• 2 air connection 10 mm for compressed air 6 mm for packer basket control</li> <li>• rotary drive (2 contacts)</li> <li>• camera drive (4 contacts)</li> <li>• inserted nipple and SVS coupling for air push-rod</li> </ul> <p>The stress relief is not necessary in case of direct assembly to the hose package</p>	

### 3.0 Basic equipment for rehabilitation







Description	Product illustration (actual appearance may vary)
Allen Key with T-Handle 8 mm	
LCR-S Tripod stand set ( two tripod stands, height-adjustable and demountable, galvanized)	
<p>LCR-S Packer – Type 300 (Standard) Lateral connection repair length 280 mm</p> <p>LCR-S Packer – Type 500 or Type 600 Lateral connection repair length 500 / 600 mm</p> <p>Data required for the packer:</p> <ol style="list-style-type: none"> <li>Lateral connection length</li> <li>Main pipe diameter (DN 135 – DN 600)</li> <li>Lateral connection pipe diameter (DN100 – DN 200)</li> <li>Connection angle (45° or 90°)</li> </ol>	
<p>The LCR packer must be equipped with the proper wheel set according to pipe dimensions. Wheel sets can be adjusted to various pipe dimensions.</p> <p>A wheel set is equipped with 2 wheel supports. If two or more LCR packers are used simultaneously, then more wheel sets must be used accordingly.</p> <p>The wheel sets are also necessary when used with a trolley.</p> <p>LCR-S wheel set DN 135 – DN 250 incl. 40, 60, and 80 mm wheels</p> <p>LCR-S wheel set DN 300 – DN 450 incl. 80 and 120 mm wheels</p> <p>LCR-S wheel set replacement unit (from DN 450 to DN 500/DN 600)</p>	

### 3.0 Basic equipment for rehabilitation

Description	Product illustration (actual appearance may vary)
<p>LCR-Rotary Drive for exact long distance positioning, Also mountable on the LCR-Packer. With the Control-Unit the LCR-packer can be turned to the left and the right with a rotation of 360°.</p>	
<p>LCR-S camera bracket set for camera assembly, incl. assembly plate, camera assembly bracket and screws (DN 200 – 450).</p> <p>Fixing rods 40, 60, 80, 110 and 170 mm as well as extra assembly bracket for small diameters (DN 135 – DN 150)</p>	
<p>LCR-S camera bracket for the opposite side</p> <p>Necessary for the 45° LCR packer for application in directional flow</p>	
<p>Whistle set</p> <p>ref. Art. No. 000047400 (camera bracket for the opposite side)</p>	
<p>Eye bolt for cable leading (optionally)</p>	
<p>Punching tool</p>	




### 3.0 Basic equipment for rehabilitation

Description	Product illustration (actual appearance may vary)
<p>LCR- Flexible fibre glass push rod (L 100 m / ø 11 mm ) on reel system (ø 0.90 m)</p> <p>equipped with a flexible plug for the packer connection</p>	
<p>Alternatively– instead of LCR-S reel system</p> <p>LCR-Air push-rods (red) with safety coupling and locking device</p> <p>0.7 m 1.5 m 3.0 m</p>	
<p>LCR-Flex Adapter with Locking Device for LCR- Air Push Rods (red) and LCR-Fibre Glass Push Rod</p>	
<p>Compressed air hose 10 m with SVS coupling</p>	
<p>LCR-S rubber bands, e.g. for fixing the hat profile, 100 pcs. in bag</p>	
<p>Special binding wire Ø 0.65 mm on spindle</p>	



To prevent the lack of an important item at the repair site at a crucial moment, we recommend a basic toolbox or a basic integration box for both the epros® LCR systems. This will guarantee that you are always equipped with top-quality tools, materials and the proper accessories set, so you always everything you need on hand. All components can be purchased separately. More information on page 15 and the following pages.


## 4.0 Tool boxes for repairs and Packer conversion

<b>4.1</b>	<b>LCR basic toolbox</b>	
	<p><b>LCR Basic Tool Box compl.</b></p> <p>Basic equipment for rehabilitation with epros®LCR-S or epros®LCR-B system used in connection with a particular supplementary kit</p> <p>Plastic box (Systainer type IV) Dimensions approx. 600 x 400 x 240 mm</p>	
<b>4.1.1</b>	<b>LCR-S supplementary kit for the LCR basic toolbox</b>	
	<p>This kit contains LCR-S specific small spare parts, e.g. couplings, screws, seals, air hoses and a combination wrench set.</p>	<p>For details and article numbers pl. refer to system catalogue</p>

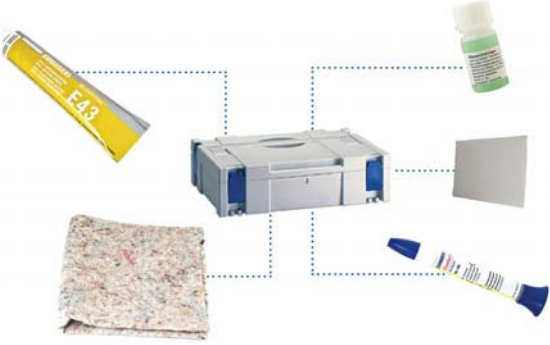

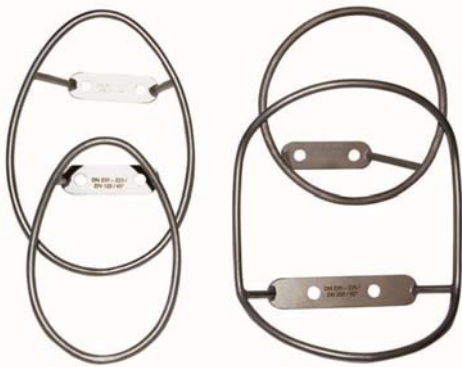



### Easy Service for you!

Now even easier: With only one basic toolbox or a basic integration box for both epros® LCR systems you have the best equipment and the right supplementary system set. You can have on hand everything you need on the work site!


<b>4.2</b>	<b>Integration box for LCR packer conversion</b>	
	<p>LCR Basic Integration Box compl.</p> <p>(Basic equipment for packer conversion from epros®LCR-S and epros®LCR-B system used in connection with respective supplementary kit)</p> <p>Plastic box (Systainer type IV) Dimensions approx. 600 x 400 x 240 mm</p>	
<b>4.2.1</b>	<b>LCR-S supplementary kit for LCR integration box</b>	
	<p>Spare parts especially for the LCR-S Packer conversion requirements</p>	<p>For details and article numbers pl. refer to system catalogue</p>

## 5.0 Packer – conversion articles

Art. No.:	Description	Product illustration (actual appearance may vary)
154200	<p>LCR repair set for calibration hose (in plastic systainer):</p> <ul style="list-style-type: none"> <li>• Super glue (tube)</li> <li>• All-purpose cleaner (bottle)</li> <li>• LCR silicone patches (190 x 280 mm)</li> <li>• Silicone glue</li> <li>• (Tube with roll-up enhancing agent and spray tip)</li> <li>• Cleaning rag (380 x 380 mm)</li> </ul>	
For Article numbers pl. refer to (price) catalogue	<p><b>LCR-S “DrainCali 300” (calibration hose)</b> Lateral connection length 280 mm (Standard) DN 135/100 ... 600/200 mm; 45° or 90°</p> <p>LCR-S calibration hose “DrainCali 500” LCR-S calibration hose “DrainCali 600” (Packer retrofitting necessary)</p>	
For Article numbers pl. refer to (price) catalogue	<p>LCR-S packer baskets</p> <p>Necessary information:</p> <p>a) Main pipe diameter (DN 135 – DN 600)</p> <p>b) Secondary pipe diameter (DN 100 – DN 200)</p> <p>c) Connection angle (45° or 90°)</p>	
146401 146402 146403 146404 146405 146406 146407	<p>LCR-S lifting rods</p> <p>DN 135 DN 150 DN 200/225 DN 250 DN 300 / 350 DN 400/450 DN 500 / 550 / 600</p> <p>DN dimensions refer to the main pipe diameter</p>	

## 6.0 Appropriate Resin Systems for the LCR-S method

### 6.1 epros® Resin Systems (ambient cure)






**Silicate Resin Systems**

Comp. A (Hardener) + B (Resin)  
Mixing ratio 1:2 (Litre)

epros®SilicateResin Type W1  
Pot life 15 min. (20 °C) | Cure time 115 min. (15 °C)

epros®SilicateResin Type S1  
Pot life 32 min (20 °C) | Cure time 260 min (15 °C)

Art. No.:	Description	Product illustration (actual appearance may vary)
116901 116903  116700	<p><b>Can Sizes:</b></p> <p>epros®SilicateResin type W1 epros®SilicateResin type S1 <b>26 kg (=Comp. B)</b></p> <p>epros®Hardener <b>16 kg (=Comp. A)</b></p>	
116801 116803  116600	<p><b>Drum Sizes</b></p> <p>epros®SilicateResin type W1 epros®SilicateResin type S1 <b>250 kg (=Comp. B)</b></p> <p>epros®Hardener <b>300 kg (=Comp. A)</b></p>	



**Epoxy Resin Systems**

Comp. A (Resin) + B (Hardener)  
Mixing ratio 100:33 (Litre)

EPROPOX FC15  
Pot life 15 min. (25 °C) | Cure time 120 min. (20 °C)

EPROPOX FC30  
Pot life 30 min (25 °C) | Cure time 240 min (20 °C)

1. For more technical details pl. refer to Technical Data Sheet
2. For Package sizes and Art. Numbers or prices pl. refer to price catalogue

## 6.2

## epros<sup>®</sup> Epoxy Resin Systems (Hot cure)

DIBT

Deutsches  
Institut  
für  
Bautechnik

### EPROPOX HC60

Pot life 60 min. (25 °C)  
Cure time 60 min. (60 °C hot water)

### EPROPOX HC120

Pot life 120 min (25 °C)  
Cure time 90 min (60 °C hot water)




### EPROPOX HC2640

Pot life 2640 min = 44 hrs. (25 °C)  
Cure time 300 min = 5 hrs (80 °C hot water)



1. For more technical details pl. refer to Technical Data Sheet
2. For Package sizes and Art. Numbers or prices pl. refer to price catalogue

## 7.0 LCR self-sealing hat profiles and LCR- liner

Art. No.:	Description	Product illustration (actual appearance may vary)
<p>pl. refer to (price) catalogue</p>	<p>LCR-S hat profile 300* LCR-S hat profile 500* LCR-S hat profile 600*</p> <p>The material of the hat profile consists of a mixture of <b>glass fibre (85%)</b> and plastic fibre mat (15%).</p> <p>LCR-hat profiles are covered with PVC foil, the brim is reinforced.</p> <p>DN 100, 125, 150, 200, 225, 250 45° or 90°</p> <p>Wall thickness 3 – 5 mm according to version</p> <p>*) Lateral length 280 mm (type 300) For types 500 or type 600 (lateral length 500 resp. 600 mm) packer retrofitting is necessary</p>	
<p><b>Save storage space and money.</b></p> <p>For Article numbers pl. refer to (price) catalogue</p>	<p><b>LCR-Liner - multidimensional!</b></p> <p>Only 3 sizes for main sewer diameter (DN 100/200 – DN 100/300 – DN 350/600) Lateral connection DN 50 – DN 250 /45° or 90°.</p> <p>High quality material as described above.</p>	
	<p>Why not to use your existing LCR control unit for high-quality impregnation of LCR-liner and LCR hat profiles?</p> <p>Please use the vacuum function of the LCR control unit for this purpose!</p> <p>We supply prepared LCR hat profiles and liners, packed in vacuum bag for quick, bubble-free and high-quality impregnation.</p>	



## Further Information available :

- ✓ **DIBt Approval No. Z-42.3-375**  
**epros®DrainLiner Method DN 100 – DN 400**  
**with epoxy resin system EPROPOX HC60**  
  
Including the LCR-S Method  
with epoxy resin system EPROPOX HC60  
and Silicate Resin Systems S1, W1, W01  
  
Valid until 30. April 2015
  
- ✓ **DIBt Approval No. Z-42.3-466**  
**epros®DrainLiner Method DN 100 – DN 250**  
**with epoxy resin systems EPROPOX FC15 / FC30**  
  
Including the LCR-S Method  
with epoxy resin systems EPROPOX FC15 / FC30  
and Silicate Resin System S1, W1, W01  
  
Valid until 30. April 2016
  
- ✓ **DIBt Approval No. Z-42.3-468**  
**epros®DrainLiner Method DN 100 – DN 600 mit**  
**with epoxy resin system EPROPOX HC120**  
  
Including the LCR-S Method  
with epoxy resin systems EPROPOX FC15 / FC30  
and Silicate Resin System S1, W1, W01  
  
Valid until 31. May 2016
  
- ✓ **DIBt Approval No. Z-42.3-483**  
**epros®DrainLiner Method DN 100 – DN 1000 mit**  
**with epoxy resin system EPROPOX HC2640**  
  
Including the LCR-S Method  
with epoxy resin systems EPROPOX FC15 / FC30  
with epoxy resin system EPROPOX HC60  
and Silicate Resin System S1, W1, W01  
  
Valid until 31. May 2017
  
- ✓ **Video Link:** <http://www.trelleborg.com/en/Epros/Produkte/epros-Drain-LCR-S/>
  
- ✓ **LCR-S System Catalogue**
- ✓ **Price Catalogue**
- ✓ **Technical Data Sheets**
- ✓ **Method Statement**