RS CityLiner®

Cured-in-place pipe (CIPP) system for the rehabilitation of collection pipes

Fields of application	Sewer gravity systems, industrial applications
Dimension	Ø 150 mm to 800 mm (6” to 32”)
Resin	Epoxy resin system (EP) MaxPox® 15 / 180 and 8 / 480 Based on bisphenol A/F, amine curing, solvent-free, filler-free
Liner	RS PU-Liner: single- or multi-layer polyester needled felt hose with polyurethane coating (PU)
Impregnation	On-site impregnation under vacuum (mobile impregnation unit)
Curing	Hot water or steam curing

1. Description

The RS CityLiner® system is a technique (pipe-in-pipe relining) for the trenchless rehabilitation of municipal and industrial wastewater collection systems pipelines. A flexible liner is impregnated with the two-component epoxy resin system and placed inside of the deteriorated pipe through existing manholes or access points. A new pipe is formed as the liner is cured within the host pipe.

The RS CityLiner® system combines two installation and curing options:

- the inversion of the impregnated liner by means of compressed air (pressure drum) and steam curing
- the inversion of the impregnated liner by means of hydrostatic water column and hot water curing

The ratioing and mixing of resin and hardener and the impregnation under vacuum of the liner take place on-site using the mobile mixing and impregnation unit RS CCM®.

The RS CityLiner® system assumes all functions of the host pipe depending on the design of the liner. The pipe-in-pipe solution is solely sustainable and may bear all external loads without the support of the host pipe. The hydraulic efficiency of the pipe may be marginally reduced depending on the wall thickness/diameter, very often it is not reduced but improved due to the smooth finish of the installed liner.

Figure 1: Sewer before and after rehabilitation

2. Field of application

- RS CityLiner® may be used for all pipe materials
- Sealing of leaking pipe connections and internal corrosion
- Prevention of future internal corrosion and sedimentation
- Sealing of cracks and splintering
- Remediation of mechanical abrasion
- The average installation length is 100 m. Extended installation lengths are possible depending on the system and working time of the resin.
- Bend of up to 45 degrees (> 45° results in formation of wrinkles),
  radius greater than 5 x diameter results in an almost wrinkle-free surface
- Joint deflections of up to 10 % may be renovated
- Industrial sewers dependent upon the medium transported and operating temperature

3. Technical data

For the detailed structure and mechanical parameters, please refer to our product datasheets.

- The liner is soft and flexible before curing and allows for changes of diameters up to 10%
- The wall thickness is 3 to 24 mm depending on the structural design
- Operating temperatures up to 40 degrees C are acceptable with the standard resin and coating system. Higher temperatures are considered on a case by case basis.

4. Installation

The host pipe must be cleaned prior to the installation of the liner, generally using high pressure water. The cleaning is important to remove loose particles and obstructions. The surface must be smooth to ensure the appropriately even surface finish of the installed liner. Protruding obstructions, such as improperly installed taps or root penetrations, must be removed flush with the pipe surface.

The RS PU-Liner is impregnated on-site using the two-component epoxy resin system MaxPox®. This involves the use of the automated ratioing and mixing unit. The components are mixed in a static mixer in order to achieve a homogenous and air-free result. Prior to impregnation, the liner is set under a vacuum to remove any air contained in the felt. The homogeneous distribution of the resin system in the needled felt material is controlled by calibration (calibration roller distance and speed, Figure 2).

The impregnated liner is inverted into the host pipe by means of a water column or pressure drum (Figure 3, 4).

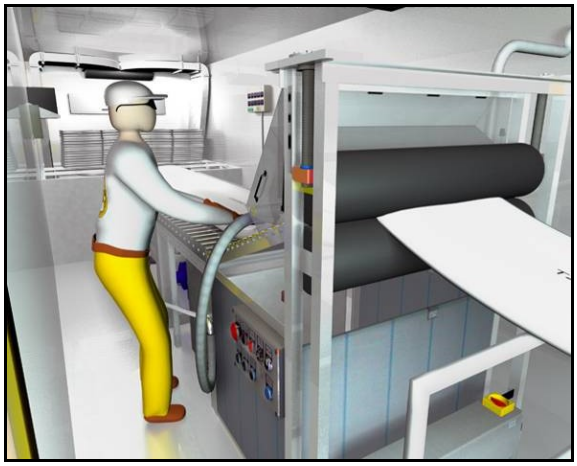

Figure 2: Liner calibration

Figure 3: Inversion by means of hydrostatic water column

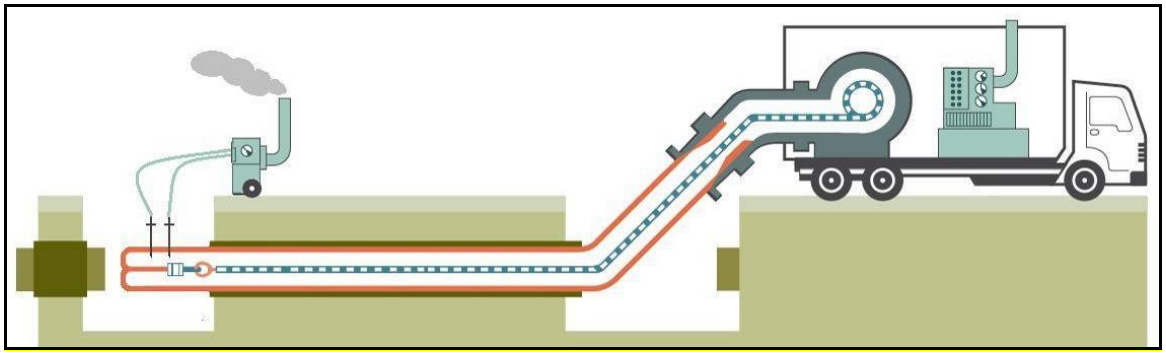

Figure 4: Inversion by means of the pressure drum

The resin system is cured by using heat. Depending on the installation technique, circulation of hot water or steam takes place in the installed liner.

5. Connection techniques

After completing cure and cool down, the service connections and manhole or shaft areas need to be opened. If required, a leak free connection may be produced using, for example, an injected polyurethane mortar further sealing the liner and the host pipe.

6. Classification

- All resin components comply with REACH. REACH means the **R**egistration, **E**valuation, **A**uthorisation and Restriction of **Ch**emicals (Regulation (EG) No. 1907/2006).
- The system is generally approved by building authorities: DIBt approval no. Z-42.3-377
- RAL quality mark S27.16

7. Features

- Highly flexible application by mobile impregnation with MaxPox® epoxy resin system
- Automated ratioing and mixing unit ensures air-free mixing and consistent results by SPS (programmable logic control) controlled process
- Extensive measuring and documentation technology
- Two installation and curing options: hot water and steam
- Very good adhesion
- Very good chemical resistance
- Styrene-free
- Reliable and long-term structural strength

8. Equipment

- Fully automated mixing unit and calibration roller table
- ADR-conform tanks for resin and hardener
- Pressure drum
- Steam heating unit RS Steam
- Robot system RS HydroCut incl. grouting unit
- Tool kit and safety at work items
- The RS CityLiner® equipment is mounted on a completely equipped vehicle

9. Materials

- RS PU-Liner:
  Single- or multi-layered polyester needled felt liner with polyurethane coating
- Preliner:
  PE foil with welded joint
- Jeans cap:
  Low elongation fabric liner for protecting the liner against free expansion
- MaxPox® 15, 8 epoxy resin
- MaxPox® 180, 480 hardener
- RS Robotics Epoxy Filler

RS Technik offers its customers a comprehensive training and education program that is related to both theory and practice.