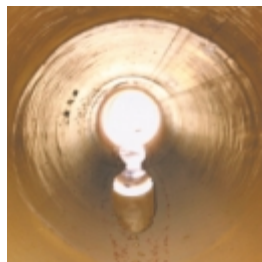
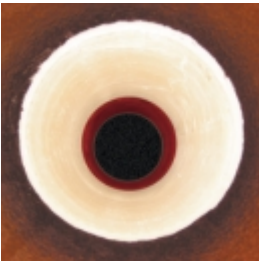




Konudur Liner Systems

Repair systems for pipe sections with
diameters of 100 – 800



Konudur Home-Liner – The Repair System

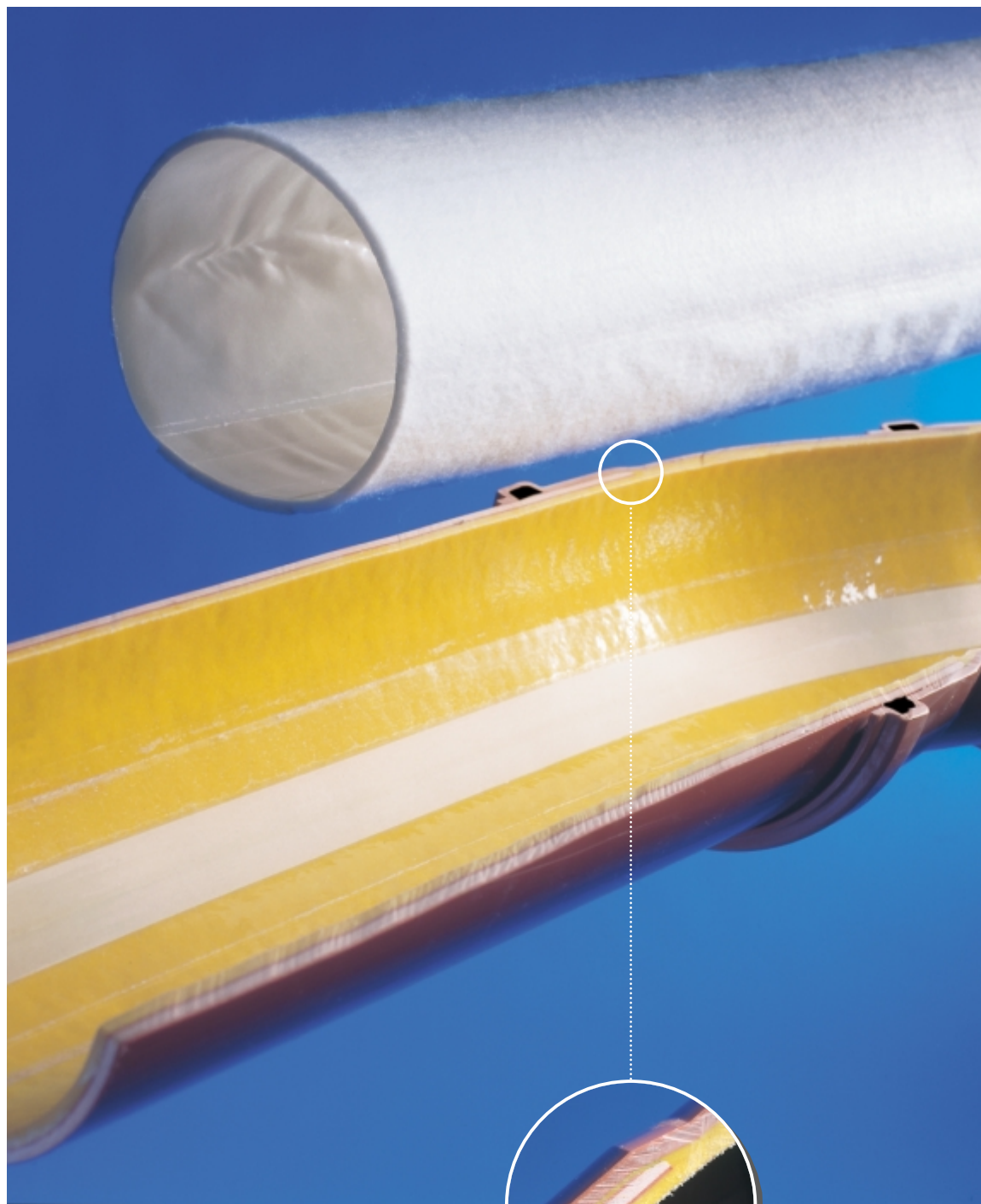
for domestic connecting pipelines in reliable MC quality

Ingrown roots, leaking pipe couplings, pipe coupling offsets, cracking and fragmenting are typical damages occurring to such drainage systems. Resulting ex- and infiltration endanger our ground water and reduce the efficiency of sewage treatment plants. Therefore a leak-proof waste water system is prescribed by law.

Due to the constructional situation it is usually difficult or impossible to repair domestic drainage pipes without digging.

The Konudur Home-Liner system is the economic and rapid solution as it is specifically used for repair of domestic drainage pipes and other non-accessible ducts. A synthetic-fibre felt hose is impregnated with resin, inserted into the duct, pressurised and then hardened.

The result is a new, pipe coupling free, leak-free and durable pipe – the Konudur Home-Liner.



*Detail:
physical grouting*

System Application

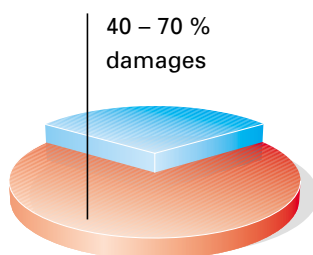
After removing of all obstacles and high pressure water cleaning the precise length of the domestic sewage pipe is determined. The liner is then cut to size, impregnated under vacuum and afterwards inserted by means of the Konudur inversion drum.

The liner is usually inserted from the buildings manhole where the impregnation process is carried out manual or by means of vacuum impregnation machinery.

Mixing of the resin components is ideally carried out by means of a Konudur 2-component mixer to guarantee an economical resin application.

The liner is usually inserted from the revision duct of the house (see picture on page 4). The application of the liner is followed by video facility positioned in the main duct to achieve a

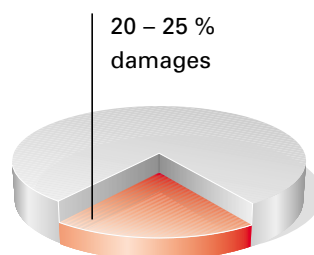
Damage distribution in the sewage networks



private sewage network

flush fitting of the Home-Liner with the old pipe, especially for the "open end" version. Inversion is completed when the liner protrudes into the duct. The liner is filled with compressed air up to max. 0.9 bar depending on diameter and type of application.

The liner is undersized compared to the old pipe; the pressure load effects a tight fit of the liner to the walls of the sewage pipe. Existing cracks and pipe coupling clefts can also be filled with the resin whereby not only a durable sealing of the cracks is achieved but also, partially, an additional physical adhesion to the host pipe.



public sewage network

Depending on the used resin and the hardening process the pipe is ready for use again after only a few hours.

A subsequent compression test confirms that the inserted liner will provide a suitable impermeable lining to the host pipe.



*Konudur Impregnation Table
200 MANU*

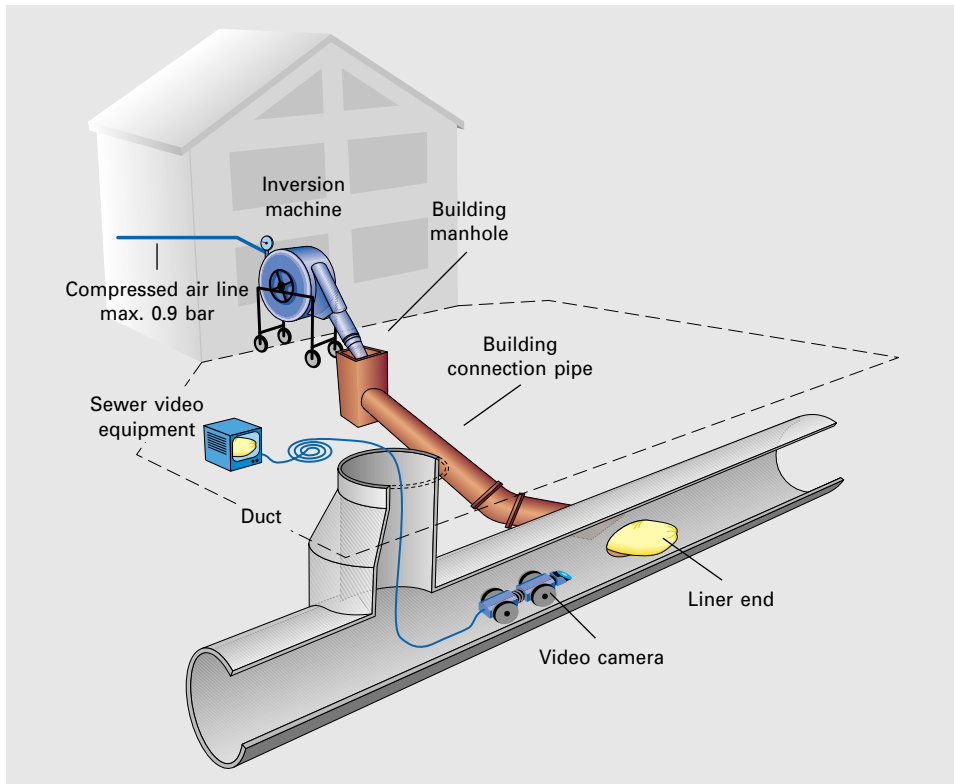


*Konudur
Inversion Drum
200 PLUS*

How to repair domestic/industrial sewage pipes

Quickly, cleanly and conveniently

Insertion by means of an inversion-drum



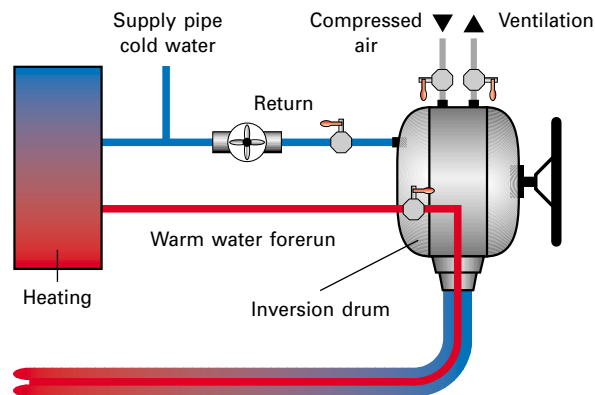
Due to systematic advantages most liners are inserted by means of inversion technique, whereby insertion is usually carried out by means of compressed air.

Due to the optional use of heaters this technique is also suitable during the winter months.

Function Scheme Heating



Konudur Thermobox



Performance

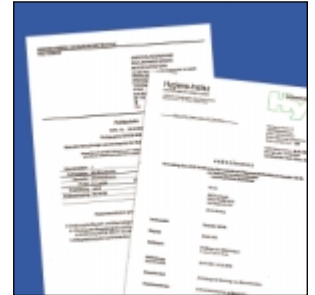
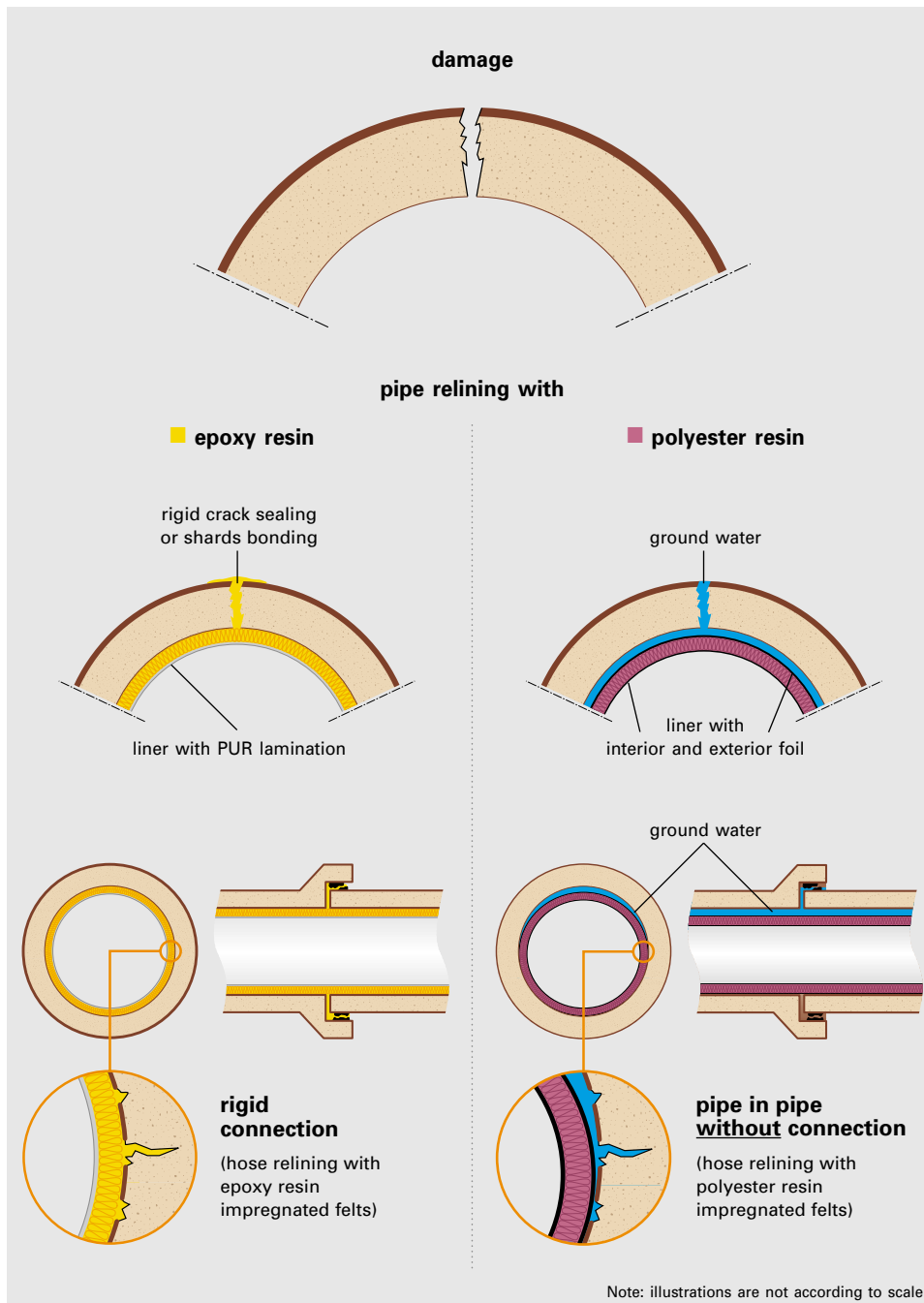
The cold hardening resin Konudur 160 PL is available in three reaction time types to match different nominal widths (usually 100 – 250), liner lengths or temperatures.

The system is not suitable for pipes with large deformations or manifold fragments or pipes in danger of collapse.

Experiences with the Konudur Home-Liner system of 9 years as well as more than 100,000 running meters of insertion have established this repair system to an economically interesting and technically sophisticated alternative to other techniques.

The success of an insertion always depends on the expert knowledge of the company and last but not least on the craftsmanship of the applying staff.

System comparison hose relining with epoxy- and polyester-resin



Test Certificates Konudur Home-Liner / Thermo-Liner:

- Static in accordance with ATV-M 127-2
- Static with compound
- Hygienic Institute Gelsenkirchen
- Water impermeability in accordance with DIN EN 1610
- Abraison test "Darmstädter Kipp-rinne"
- „Hamburger Spülversuch“

Konudur Thermo-Liner – The repair system for large non-accessible sewage pipes

The Konudur Thermo-Liner consists of a PU-laminated polyester needle felt hose, impregnated with the thermo-reactive two-component epoxy resin Konudur 170 TL-NV and inserted by means of inversion technique.

This low-viscous epoxy resin, highly resistant to acids and lyes, is also suitable for moist substrates and achieves an excellent adhesion to concrete pipes.



*Konudur Thermo-Liner
during the inversion process*

Areas of application

The Konudur Thermo-Liner can be used wherever the cold-hardening Konudur Home-Liner system, which can be applied with relatively low technical equipment, gets to its limits.

Due to the supply of heat both the hardening begin and the hardening process can be controlled specifically and therefore also larger liner insertions can be carried out without problems. Furthermore the strength of the Konudur Thermo-Liner is much higher compared to the strength of the Konudur Home-Liner enabling extraordinary high bearing capacities, even on relatively thin walls.



The advantages of the Konudur liner-systems:

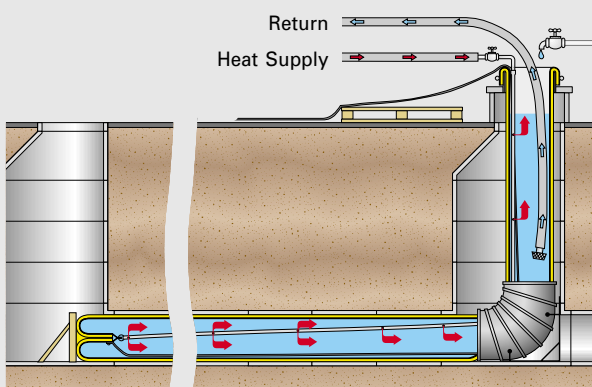
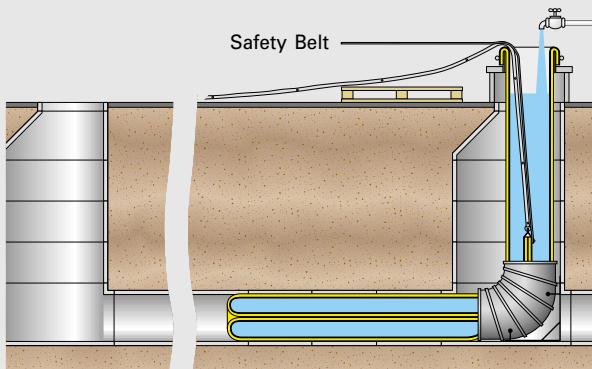
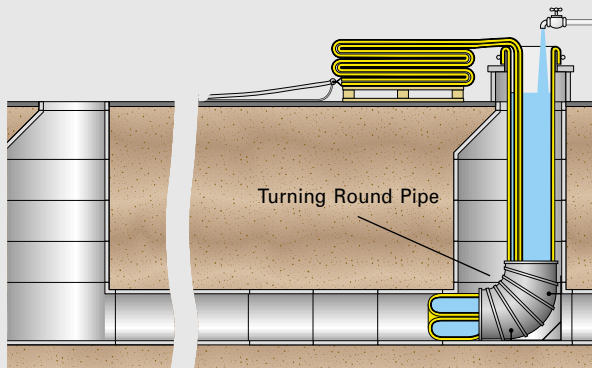
- time-saving, reliable and cost-saving
- flexible – nearly unwrinkled application on bends up to 30°
- 3 pigmented, cold-hardening resin types for lower diameters, lower lengths and temperatures
- 1 pigmented, thermo-reactive resin for larger diameters and lengths
- physiologically harmless
- certified static
- impermeable to min. 5 m water columns
- practically non-shrinking
- the Konudur Home-Liner / Thermo-Liner fits close to the original pipe
- easy mounting of branches and shafts
- additional bonding of cracks and shards
- chemical resistance tested in detail
- abrasion resistance tested in accordance with DIN 19565

References Konudur Home-Liner / Thermo-Liner (extract):

- Nestlé
- Daimler-Chrysler
- BMW
- Bosch
- Schering (Kamen)
- Krauss-Maffei
- DSK Deutsche Steinkohle
- Knorr (Bremen)
- Thyssen (Munich)
- Schoeller Edelstahlwerk
- Hella (headlight)
- ESAG (Heidenau)
- PESAG (Paderborn)
- Goldschmidt (Essen)
- Procter & Gamble
- Stangl
- BASF-Schwarzheide
- Walter Bau
- Knorr Bremse (Bremen)
- VTG-Lehnkering
- Schering (Berlin)
- Bundespräsidialamt Berlin
- Siemens (Berlin)
- Bundeswehr Strausberg
- Bundesbahnausbesserungswerk München-Pasing
- Charité Universitätsklinikum Berlin

Konudur Thermo-Liner – fast and economical application

Inversion by means of water column



Application

1st step

Konudur 170 TL-NV is applied by means of vacuum-impregnation technique or saturation technique. We recommend a resin temperature of + 20 °C during impregnation. The impregnated liner hose is inverted with the calculated hydrostatic water pressure.

2nd step

The end of the liner is fixed with a belt to guarantee a controlled inversion.

3rd step

Due to controlled supply of heat of min. + 60 °C to max. + 80 °C (usually by means of hot water) the hardening process is effected at a defined time.

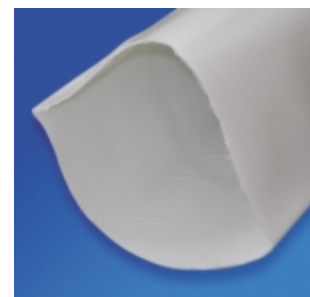


Special area of application Potable Water

Konudur 170 TL-NV fulfils the requirements according to KTW (German standard) for various potable water areas of application, e. g. B, C, D2 and D2 (cold water).

Repair of drinking water pipes > DN 250 (class B) with Konudur 170 TL-NV is also possible in combination with a polyethylene-hose with polyester-/polyamid-felt. This is also certified by the relevant test reports.

*Drinking water liner hose
Konudur TWL*



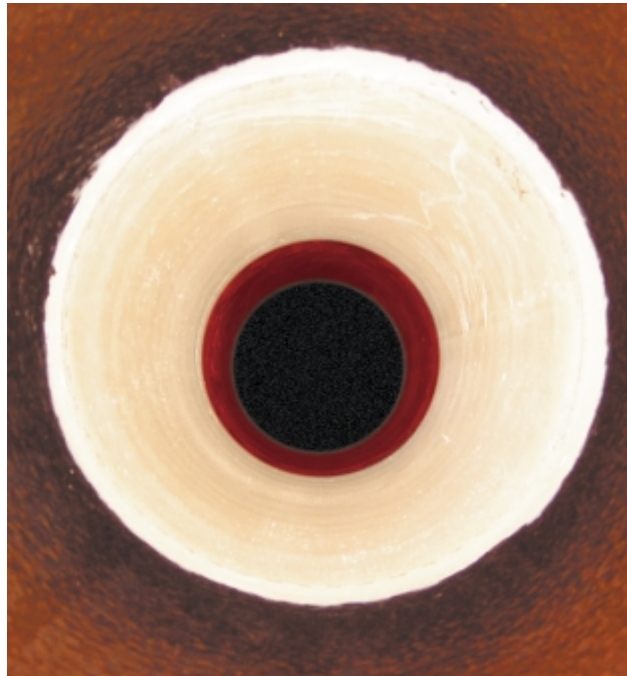
Konudur LM-Liner – The short liner for repair of partial pipe damages

The Konudur LM-Liner was developed for partial damages in non-accessible pipe sections. Water ex- and infiltration, cracks, shards formation and ingrown roots are typical damages.

This short liner is a E/ECR glass matt impregnated with Konudur 250 OM-PL. Due to the different product types

- summer resin
- winter resin
- accelerator

this system can ideally be adjusted to the existing conditions on site.



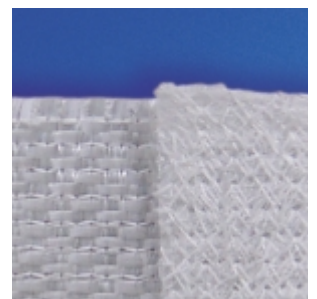
Konudur LM-Liner in a clay pipe



Product properties of Konudur 250 OM-PL:

- low-viscous, highly resistant, two-component organo-mineral resin with high resistance to acids and lyes
- also suitable for moist and mineral substrates, e. g. sewage pipes
- good adhesion to various substrates
- physiologically harmless
- tested in accordance with KTW guidelines for potable water areas by the Hygienic Institute Gelsenkirchen, Germany

Glass-Composit-Mat 975



Konudur LM-Liner

Konudur 250 OM-PL



Picture 1



Picture 2



Picture 3

System Application

Within nominal widths of 100 – 800 mm both cross sections and also oval profiles made of concrete, reinforced concrete, fibre cement, cast steel, glass-fibre reinforced plastic and stoneware can be repaired.

In advance, the damaged area must exactly be determined and thoroughly prepared by means of high pressure cleaning. For even-walled pipes, e. g. stoneware, mechanic cleaning (milling, sanding) is required before high pressure cleaning.

The Konudur-Glass-Composit-Mat 975 is tailored (picture 1) according to the inner diameter of the pipe and the relevant requirements.

Konudur 250 OM-PL must be mixed free from air-bubbles to a homogeneous mass and can then be applied onto the glass-fibre matt (picture 2 + 3).

The impregnated glass-fibre matt is then fixed to a prepared packer

(pre-dimensioned and furnished with separating foil and mould release agent) in 2 – 4 layers to a minimum wall thickness of 3 mm (picture 4).

Afterwards the packer is placed at the damaged area and expanded by compressed air to press the impregnated glass-fibre matt closely to the inner walls of the damaged pipe. Hereby, excessive resin is pressed into the damage area; due to this the Konudur LM-Liner usually gets additional adhesion to the pipe.



Picture 4



*Liner usually ending
"in zero"*

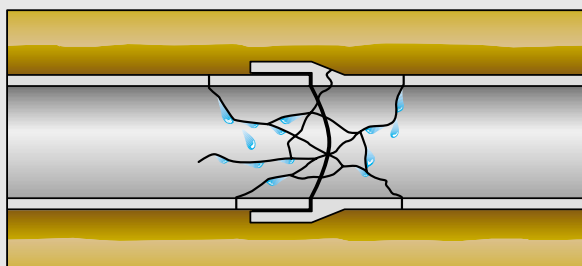
If flow packers are used cost consuming overpumping or water containment is not necessary.

Due to different types of resins and different additives reaction times are accomplished according to site conditions.

A subsequent compression test confirms that the inserted liner will provide a suitable impermeable lining to the host pipe.

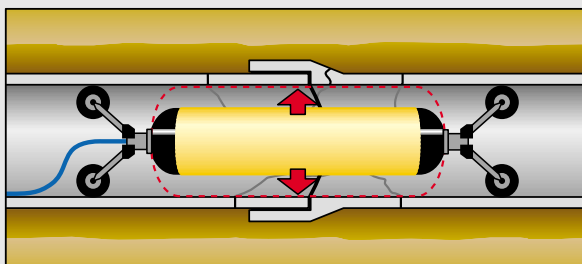
Installation scheme of the Konudur LM-Liner

1st step



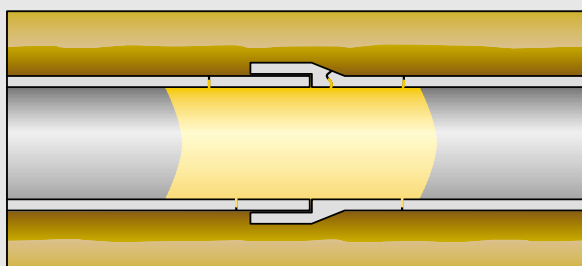
Damaged pipe coupling

2nd step



*Application of the Konudur LM-Liner
through packers*

3rd step



Damaged coupling after repair

MC international

In recent decades MC has introduced many production and service centres throughout the world. Our aim is to supply you with the highest quality products and services as fast as possible.

This approach is two-fold, to meet a demanding delivery schedule, including a "just in time" service, and to provide technical support at site level. Ease of use for the customer is the MC company philosophy. We are not only available via e-mail and our web-site, but of course at site level, **where it matters – world-wide.**

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