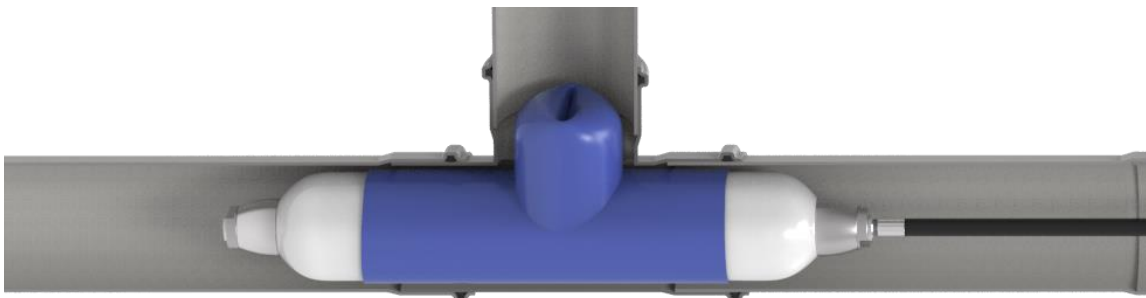




SANIPRO

GLOBAL LEADERS IN PIPE LINING

SANIT & Y PACKER SYSTEM – **IR CURE** INFRARED JUNCTION TECHNOLOGY



Connection sleeves with designated IR COMPATIBLE LINER for the rehabilitation of damage sewage, rainwater & collection lines within building in the nominal size range DN70 to DN200.

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1. INTRODUCTION

The Sani T-Packer system is used to repair the side connections of pipes (40° - 90°). This system has impressive and uncomplicated handling and unbelievable efficiency.

The lateral connection is lined using inversion technology. Comparable to an open-end liner.

Under observation of a camera positioned in the side connection. The packer is moved into position using our specialized air push rods.

SCOPE OF APPLICATION

It is suitable for the rehabilitation of damaged waste water, rainwater and collecting pipes within buildings in the nominal diameter range DN50 to DN200 made of concrete, steel, reinforced concrete, stoneware, fiber cement, the plastics GRP, PVC, PE, PP, & Cast Iron.

The process applies in each case in connection with the two-component epoxy resin system EXRR-2 and EXR-2 (A) RESIN + (B) HARDENER and the connection sleeves (T-Felt Liner) for the diameter DN50 to DN200 with the connection angle 40° - 90°.

DAMAGE ASSESSMENT

For assessment, a camera inspection is essential in the 1st step.

The Damage must be then classified accordingly, and the relevant preparation work needs to be defined (e.g. use milling robots, installation of additional short liners etc.)

DAMAGE PATTERNS

The SANI T-PACKER system is suitable to be used for the following types of damage:

1. Leaks with and with or without groundwater infiltration or exfiltration at pipe connections, pipe walls, connection and transition areas etc.
2. Position Misalignments, cracks, shards & fractures
3. Mechanical wear & tear
4. Corrosion

OPERATING CONDITIONS

The SANI T-PACKER system can be used regardless of the wastewater temperature and sewerage atmosphere. The curing temperatures depend on the reaction resin used.

1. The leak test is carried out in accordance with DIN EN 1610 and thus meets their requirement.
2. Abrasion resistance according to DIN 19545-1
3. For subsequent sewer cleaning, the instructions in ATV worksheet 143-7 must be observed.
4. Minimum cleaning speed: 0.1m/s – 0.02m/s
Inform cleaning team about the rehabilitation work that has been carried out BEFORE starting.

2. WORK PREPARATION

EQUIPMENT / MATERIAL - Components of SANI T-PACKER System

SANIPRO Global offers all the technical components and consumables required for this process, all of which are tailored to the respective area of application, enable the simplest possible handling and an optimal rehabilitation result.

The basic equipment of the SANI T-PACKER System consists of the following technical components and consumables:

2.1 TECHNICAL COMPONENTS

PACKER BASE for Silicone Bladder – 80cm length



ITEM NUMBER	PACKER SIZE	RECOMMENDED SILICONE BLADDER SIZE
12311	SB Holder DN 30mm Flex	DN 70
12312	SB Holder DN 45mm Flex	DN 100
12313	SB Holder DN 64mm Flex	DN125 – DN150
12543	SB Holder DN 87mm Med Flex	DN 200

SILICONE BLADDER

The Silicone Bladder is a textile-supported silicone with tight elasticity. The T-Packer is used without a release agent as no resin adheres. The packer system is suitable for both cold and steam curing.

The following pipe diameters are available.

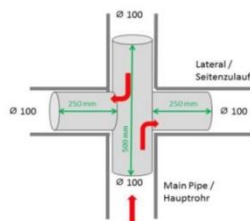
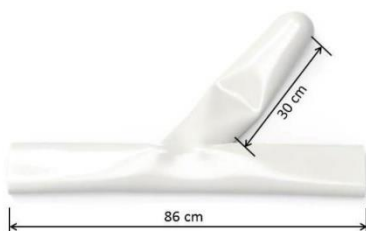
MAINLINE: DN70 – DN200

BRANCH LINE: DN50 – DN200 (90° - 45°)

INSTALLATION & CURING PRESSURE: 0.6 -0.8 BAR **MAXIMUM PRESSURE: 1.0 BAR**

STANDARD SIZE:

SPECIALIZED PROFILES:



CONTROL UNIT

- Compressed Air & Vacuum switches
- Manometer for Pressure Monitoring
- Pressure Regulator (Curing pressure control)
- Compressor Connection (Volume minimum 60 liters/minute)



PUSHROD FOR IR PACKER SYSTEM 1.5 METER LENGTH



TURNING HANDLE FOR IR PACKER SYSTEM



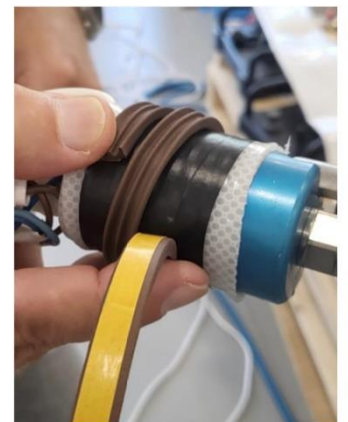
ADDITIONAL COMPONENTS FOR STEAM CURING

- Sani IR Power box
- 25m Cable for IR Packer



MOUNT THE SILICONE BLADDER ON THE PACKER BASE:

We recommend wrapping a layer of silicone bladder material around the aluminum end element to achieve a better seal. You can also use simple window sealing tape.





The Silicone bladder is wrapped in and fixed with insulation tape. Which also serves as a protection for the silicone hose. Then tightened tightly with a hose clamp.

2.2 CONSUMABLES

SANI – IR EPOXY RESIN SYSTEM – INFRARED COMPATIBLE – A (Resin)+ B (Hardener)

EPOXY SYSTEMS IR VLCure SYSTEMS / Epoxy Harz für IR VLCure System				
Resin Harz	Potlife 22°C Verarbeitungszeit 22°C	Curing at 22°C Aushärtezeit 22°C	VLC Curing time VLC Aushärtezeit Shortliner / T-Packer	kg/l
SANI EXRR-2 100:30; 14kg+4,2kg	10-12 min	2-2,5 hour	15 min / 30 min	1,1
SANI EXR-2 100:28; 14kg+3,9Kg	15-18 min	3 hour	20 min / 40 min	1,1
SANI EX1-2 100:25; 14kg+3,5Kg	30-35 min	8 hour	30 min / 45 min	1,1

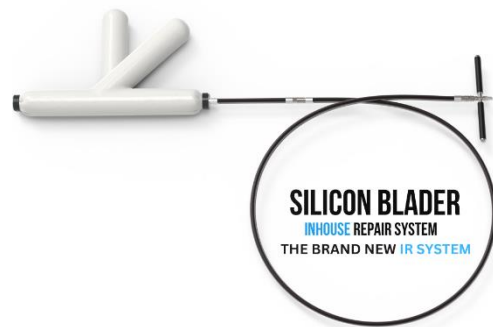


CONNECTION SLEEVES (T-FELT LINER) in suitable nominal widths and connection angles, wall thickness 3.0mm

SANI-T Liner & SANI-Y Felt Liner – 3.0 mm – PU coating

Resin Consumption

Part number <i>Art. Nr.</i>	DN mainpipe - DN lateral - connection angle <i>DN Hauptrohr - DN Anschluss - Anschlußwinkel</i>	Resin Amount Harz Verbrauch		
		Volume	EXRR	EXR-2
120741	TFL 70 / 50 / 45°	0,6 Liter	A 0,55 kg B 0,17 kg	A 0,56 kg B 0,16 kg
120731	TFL 70 / 50 / 90°			
120721	TFL 70 / 70 / 45°			
120711	TFL 70 / 70 / 90°			
120701	TFL 100 / 50 / 45°	0,9 Liter	A 0,79 kg B 0,24 kg	A 0,80 kg B 0,22 kg
120691	TFL 100 / 50 / 90°			
120681	TFL 100 / 70 / 45°			
120671	TFL 100 / 70 / 90°			
120661	TFL 100 / 100 / 45°			
120651	TFL 100 / 100 / 90°			
1210311	TFL 125 / 70 / 45°	1,0 Liter	A 0,99 kg B 0,30 kg	A 1,00 kg B 0,28 kg
1210211	TFL 125 / 70 / 90°			
1210111	TFL 125 / 100 / 45°			
1209911	TFL 125 / 125 / 45°			
1209811	TFL 125 / 125 / 90°			
120641	TFL 150 / 70 / 45°	1,2 Liter	A 1,18 kg B 0,36 kg	A 1,20 kg B 0,34 kg
120631	TFL 150 / 70 / 90°			
120621	TFL 150 / 100 / 45°			
120611	TFL 150 / 100 / 90°			
120601	TFL 150 / 150 / 45°			
120591	TFL 150 / 150 / 90°			
	TFL 200 / 200 / 90°	1,5 Liter	A 1,58 kg B 0,47 kg	A 1,60 kg B 0,45 kg



ADDITIONAL EQUIPMENT REQUIRED – PROVIDED BY THE EQUIPMENT USER

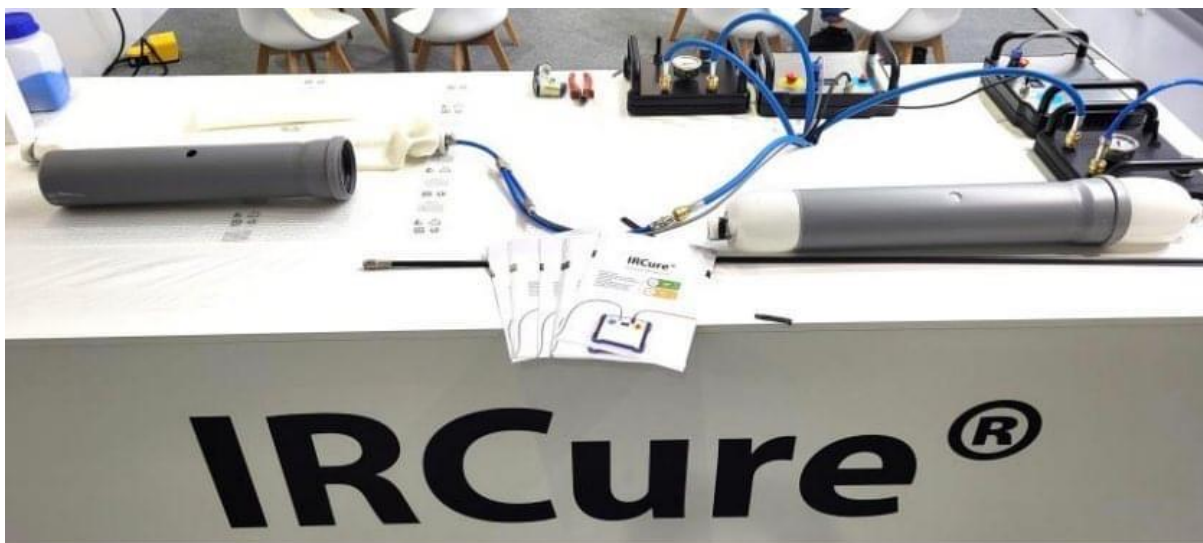
- Vehicle to move equipment from job to job.
- Power Supply (power generator)
- Compressor (Volume about 60 liters/minute)
- Scale for weighing resin.
- Mixer for resin
- Dewatering equipment E.g., SANI shut off plugs or discs)
- Sewer Inspection devices (CCTV Camera)
- Sewer cleaning accessories E.g., Milling robot or mechanical pipe cleaning device.
- Personal protective equipment
- Usual hand tools
- Drill & mixing tip for resin.
- Waste bins
- Sanitary rooms for staff
- Hand washing facilities
- Spill Kit for environmental protection in the event of a resin spill



WORK PREPARATION – JOB SITE SAFETY

JOB SITE PREPARATION

1. Take a CCTV recording of the damaged area of pipe that you are required to repair:
 - Clean the pipe to remove any debris, grease, residue located inside the pipeline.
 - Measure the pipe diameter in the pipeline at all accessible points.
 - Take into consideration any existing repair inside the pipe that may reduce diameter.
 - Measure the pipe diameter of the connection/branch line.
 - CCTV inspection (ensure there are NO deposits, no protruding sharp edges, check levels of ground water infiltration, any possible changes to diameter or original shape.
 - Make note of ALL lateral connections/branch lines found in the pipe being repaired.
 - Measure the distance from the entry of the pipe to the connection being repaired (make all your measurements on the CCTV cable using colored electrical tape – DO NOT trust camera measurements – CHECK TWICE, CUT ONCE)
 - Also mark the position of the Connection line on the Push Rod using colored tape.
 - Check the accessible to the pipe to be able to position the packer.
2. Determination of the rehabilitation period. During this period, NO wastewater may be discharged into the rehabilitation section. Take preparatory measures.
3. Review and test all technical equipment.
4. Mill away any sharp edges, or obstacles that could damage the packer during installation.
5. In order to ensure permanent bonding with the old host pipe, the walls of the pipeline need to be cleaned immediately before the pipe is installed. The surface of the pipe must be free of grease and any other residue.
6. BEFORE starting the installation double check the pipe has been sufficiently cleaned.
7. Determine the correct packer size required for the job at hand.
8. Determined the required T-Felt liner size and curing method.



PREPARATION OF INSTALLATION – RESIN SELECTION

Criteria influencing the choice of resin

- Air Temperature
- Pipe Temperature
- Resin Temperature
- Distance to the Connection / Branch line
- Locate a cool or shaded area to set up your Portable Resin Wet out Table.
- Impregnation of the T-Felt Liner or Top Hat must be conducted in a cool shaded area.
- Temperature control areas are ideal for consistency – but are not required.
- Temperature and sunlight have a major impact on the pot life of the resin.
- Calculate the time you need to impregnate and install the T-Liner

PLEASE NOTE:

The processing time of the resins was determined at a temperature of 22°C.

+10°C (32°C) means a 50% reduction in processing time.

-10°C (12°C) means a 50% increase in processing time.

With the information that you have collected above – select your appropriate resin.



CHECK LIST BEFORE INSTALLATION

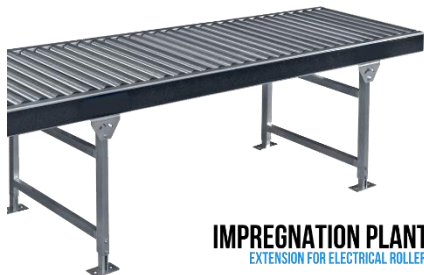
Prepare your equipment before you install your SANI T-Liner.

- Apply 2 layers of disposable gloves.
- Ensure you have clean rags handy in case of spills and to wipe your hands.
- Prepare working area in shaded area for extra working time.
- Cover your wet out table with a disposable clear sheet.
- Ensure Control Unit is in position.
- Ensure Power Box in position.
- Ensure Power cable for packer in position.
- Ensure Push rods are in position.
- Ensure Drill & mixing tip are in position to mix your Part A & B resins.
- Mark the position of the T-Liner Material and the seams with a black permanent marker.
- Position the CCTV camera in the lateral connection for a clear view of the T-Packer.
- IF required, pull the pull-in cable or rope into the pipe.
- Check fuel levels on your air compressor if required.
- Connect the compressed air hoses and carry out a compressor test run.
- Access your packer is it slippery inside? Apply oil or Talc powder for easy install & removal.

5. T-FELT LINER INSTALLATION – IMPREGNATION

Prepare your T-Liner material for Impregnation.

- Mix your PART A & PART B resin in a cool area in preparation for T-Liner Impregnation.
- The Part A & B resin MUST be mixed in the correct ratio in order to adhere to the host pipe.
- Mix resin for 3 minutes to ensure it is mixed evenly all the way through.
- Pour ½ of the thoroughly mixed resin onto the T-Felt liner and massage deep into the structure of the material.
- Flip the material over, and apply the remaining resin. Ensuring there are NO dry areas and that the resin is completely saturated. Squeeze off any large excess of resin.
- Double check material to ensure complete saturation of resin with NO WHITE SPOTS.



EQUIP PACKER WITH T-LINER

- Push the silicone packer side connection into the packer.
- Place the packer under the vacuum.
- Pull the T-Liner material over the packer (positioning via the inverted side connection).
- Invert the Port side of the packer with light air pressure.
- Reduce packer pressure in order to turn the side connection including the T-Liner into the packer (without folding).
- Put the packer under the vacuum.
- Fix the T-Liner material to the packer using Electrical tape.

Please note

The side connection should be pushed into the packer against the installation direction



With a 45° connection, it must always be as shown in the picture



PACKER POSITIONING

- Push the packer through the pipe.
- To easily pass bends, push the packer with a slight twist/rotation.
- The rotation of the packer must always be combined with a forward or backward movement to prevent twisting of the pushrods.



- After positioning the packer, increase the air pressure in the packer with slight bursts of air pressure.
- Take your time – Don't add extra stress to yourself at this time.
- Once the T-Liner is fully installed, set the curing pressure on the pressure regulator.
- Hold the pressure during the entire curing process.
- After hardening – turn vacuum on from the control box to deflate packer for quicker removal.
- Take the packer out with a slight twist, using gentle back and forward movements.

6. RESIN POT TIME – WORKING TIME

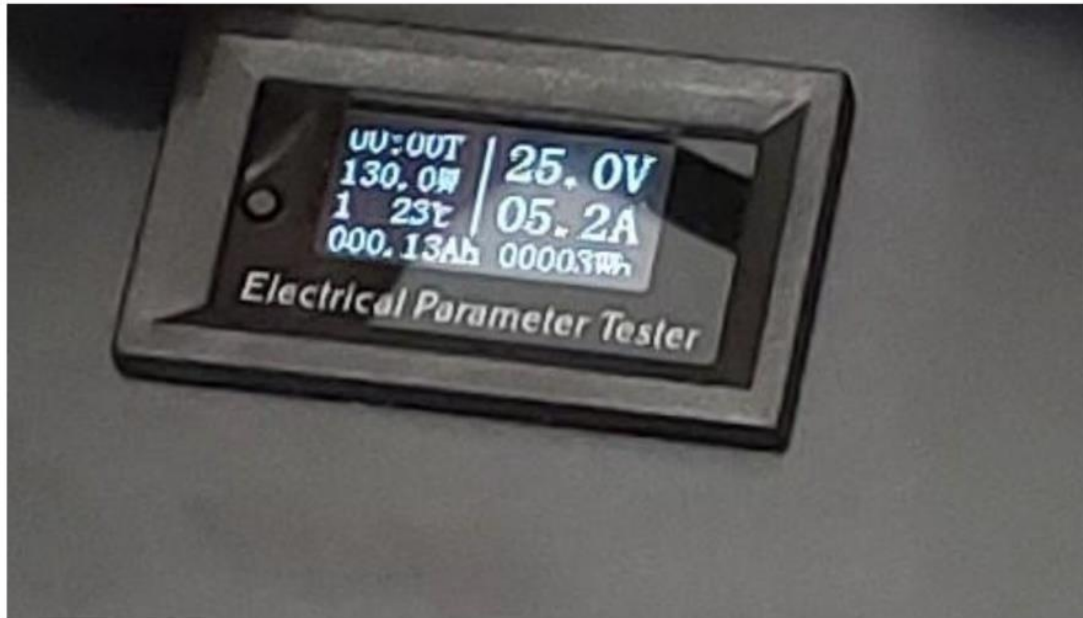
Table 9: Resin mixing (pot) times

<i>Hardener comp. B</i>	<i>Processing Time 20°C</i>
SANI EXRR-2 100:30; 4,2 kg	10-12 min
SANI EXR-2 100:28; 3,92 Kg	15-18 min
SANI EX1-2 100:25; 3,5 kg	30-35 min
SANI EX2-2 100:25; 3,5 kg	60-70 min
SANI EX4-2 100:25; 3,5 kg	2,5-3 h/Std
Resin vertical IR Base comp. A 14 kg IR Harz vertical Komp. A 14 kg	

7. CURING TIME

The following information refers to the time after switching on the Power Box.

Please note that the volt and Ampere values remain unchanged. IF the values change, the IR light source may be damaged, and the curing time will need to be extended accordingly.



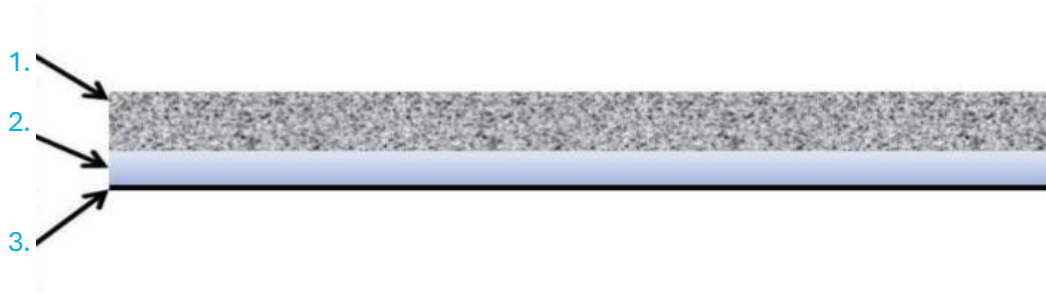
<i>Hardener comp. B</i>	<i>Curing at 20°C</i>	<i>IR curing time T-Packer</i>	<i>IR cooling time</i>
SANI EXRR-2 100:30; 4,2 kg	2-2,5 h/Std	30 min	15 min
SANI EXR-2 100:28; 3,92 Kg	3 h/Std	40 min	
SANI EX1-2 100:25; 3,5 kg	8 h/Std	50 min	
SANI EX2-2 100:25; 3,5 kg	17 h/Std	60 min	
SANI EX4-2 100:25; 3,5 kg	24 h/Std	1h/Std 20 min	
Resin vertical IR Base comp. A 14 kg IR Harz vertical Komp. A 14 kg			

Table 10: Cure times

8. WALL CONSTRUCTION OF THE SANI T-FELT LINER

1. Existing host pipe
2. Cured with resin impregnated polyester mash hose, SANI T-Liner (3mm)
3. PU Coating of SANI T-Felt Liner (0.3mm)

GRAPH BELOW:



9. FINAL WORK & TESTS

After completion of the work, the rehabilitated pipe section must be clean, visually inspected and the rehabilitation measures documented.

It must be determined whether any material residue has been removed or if there are any hydraulically disadvantageous folds.

After connection sleeve has hardened, the tightness must be checked, if necessary, include the connected pipes. This can also be done in sections.

The tightness of the rehabilitated pipes is to be checked using water method "W" or air method "L" according to DIN EN 1610.

