Installation manual

Version 2024-01

Inpipe Liner
Inpipe Flexliner
Inpipe Freeliner

Winch in place liner (WIP)

Thank you for choosing products from Inpipe Sweden AB.

We aim for your installations to be as simple, safe and fast as possible.
We hope that you will be satisfied with the manual, the installation, and the end result. Our system is designed to help you achieve more and better installations, now and in the future.
We are committed to your success.

Nicklas Björnvind
CEO
Inpipe Sweden AB

INPIPE SWEDEN AB

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Winch in place liner (WIP)

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Inpipe Flexliner
Inpipe Freeliner

Winch in place liner (WIP)

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Inpipe Flexliner
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Winch in place liner (WIP)

General Information

Installers should complete the "Inpipe Certified Installer" training before starting installation.

The manual does not cover every situation, nor is it intended to.

Inpipe has quality-assured the method descriptions in the manual and taught them through the installation training "Inpipe Certified Installer."

Inpipe assumes no responsibility for methods or procedures not described in the manual. In order to have any self-developed methods approved by Inpipe Sweden AB, Inpipe must be allowed to evaluate the process. Approval of a technique or procedure must be obtained in writing from Inpipe. Use of methods or procedures not described in the manual or not explicitly approved in writing by Inpipe Sweden AB voids any claims for guarantees or warranty obligations towards Inpipe Sweden AB.

This manual's contents are confidential. It may not be shared with a third party, in part or in full, without the written permission of Inpipe Sweden AB.

Inpipe Sweden AB’s current general delivery terms and conditions apply unless otherwise agreed in writing.

This manual replaces previous editions of Inpipe's installation manual.

Inpipe Liner
Inpipe Flexliner
Inpipe Freeliner

Winch in place liner (WIP)

Warning information and warning symbols

Inpipe Sweden AB is committed to the safety of installers and the environment when handling and installing Inpipe liners. The installation manual highlights risky and sensitive procedures with safety symbols. A summary of these symbols and their descriptions is provided below:

	Wear protective clothing
	Wear safety shoes
	Use a safety harness.
	Wear a respirator
	Wear safety glasses
	General warning sign
	Warning: Optical radiation
	Warning: Oxidizing substance
	Warning: Explosive material
	Environmentally hazardous substances

	Wear a seatbelt
	Wear protective gloves
	Wear head protection
	Wear ear protection
	Important information
	Warning: Hot surface
	Warning: Floor height obstacles
	Warning: Toxic material
	Warning: Crushing hands
	Health Hazardous Substances

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Inpipe Flexliner
Inpipe Freeliner

Winch in place liner (WIP)

Personal Protective Measures

As an installer, your worksite may be hazardous and health-threatening. Vehicle traffic is often present, so personal traffic safety routines and arrangements are essential. Safety measures on and around the installation site should follow local regulations, laws, and requirements. It is the installer's responsibility to ensure compliance. Inpipe assumes no responsibility for ensuring that local regulations, laws, and requirements are followed.

Working in wells can be risky to health.

- Toxic gas may be present.
- Drowning risk may be present.
- Infectious agents may be present.

The installer ensures compliance with local regulations, laws, standards, and safety requirements for work in maintenance holes.

The installer is responsible for using protective equipment and implementing safety measures.

Inpipe liners contain uncured polyester resin, which includes substances that, in high concentrations, may pose risks to health and the environment.

- Always ensure good ventilation.

If the liner is damaged during the installation process

- Avoid inhaling fumes.
- Avoid contact with polyester on the skin and eyes.
- Prevent polyester from leaking into the environment.

NOTE! For more information, see the safety data sheet.

Inpipe Liner
Inpipe Flexliner
Inpipe Freeliner

Winch in place liner (WIP)

The Inpipe Freeliner contains uncured polyester resin, which includes substances that, in high concentrations, may pose risks to health and the environment.

- Always ensure good ventilation.

If the liner is damaged during the installation process

- Avoid inhaling fumes.
- Avoid contact with polyester on the skin and eyes.
- Prevent polyester from leaking into the environment.

NOTE! For more information, see the safety data sheet.

Safety Data Sheet Inpipe Liner

The current Safety Data Sheet is available for download on Inpipe's website:
https://www.inpipe.se/sakerhetsdatablad/

The document can also be ordered by contacting Inpipe.

Phone: +46 940 395 30

E-mail: info@inpipe.se

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Inpipe Flexliner Winch in place liner (WIP)
Inpipe Freeliner

Inpipe Liner WIP – variants

Inpipe Liner WIP is manufactured and delivered in the following variants:

Inpipe Liner WIP / Inpipe Liner WIP Flexliner
- Standard liner sealed at both ends.
- For dimensions and measurements, see the relevant product datasheet.
- Delivered in customised lengths or as cut-to-size liners.

Inpipe Liner WIP / Inpipe Liner WIP Flexliner – Installation Ready
- Pre-expanded at the sending end for easy installation at bends/tees
- Pre-assembled valve holder at receiving end for easy installation.
- Pulled into place on pre-installed glide film, which is not included.
- Dimensions available for installation-prepared liners and their measurements; see relevant product datasheet.
- Delivered in custom lengths.

Inpipe Liner WIP / Inpipe Liner WIP Flexliner with pre-assembled sliding / protective foil
- Standard liner sealed at both ends can also be ordered as installation-prepared; see below.
- Delivered with pre-installed glide/protection film and installation materials.
- Dimensions are available with pre-installed glide/protection film and their measurements; see the relevant product datasheet.
- Delivered in custom lengths or as cut-to-size liners.

Inpipe Liner WIP / Inpipe Liner WIP Flexliner, Installation Prepared with Pre-installed Glide/Protection Film
- Pre-expanded at the sending end for easy installation at bends/tees.
- Pre-assembled valve holder at receiving end for easy installation.
- Delivered with pre-installed glide/protection film and installation materials.
- For dimensions available for installation-prepared liners with pre-installed glide/protection film and their measurements, see the relevant product datasheet.
- Delivered in custom lengths.

For information on the range of **Inpipe Freeliner**, please get in touch with Inpipe.

Inpipe Liner
Inpipe Flexliner
Inpipe Freeliner

Winch in place liner (WIP)

Inspection, Assessment and Documentation Before Installation

Not all pipes are suitable for Inpipe liner installation.
Installation must be preceded by assessing the pipe's suitability and choosing the installation product.
The installer always has the responsibility for gathering accurate facts, inspection, calculations, and assessment. Inpipe may provide advisory support regarding product selection, load calculations, and stiffness requirements.
NOTE! The installer is always responsible for ensuring compliance with local guidelines, rules, laws, and installation-specific design requirements.

Assessment Points Before Installation

Before deciding to install, each pipe should be assessed and documented based on the following criteria:

Control Points	Action and limits
The temperature of the medium in the pipe	Inpipe Liner: up to 60°C. Inpipe Freeliner: up to 40°C
Chemical environment in the pipe	If corrosive or otherwise aggressive chemicals not typically found in household wastewater, such as wastewater from dairies, breweries, or industrial process water, are suspected, contact Inpipe.
Pipe diameter	Measure diameter
Ovality	Check and document
Displacement of pipe segments	Maximum 10% of pipe diameter
Groundwater pressure	The air pressure in the liner must not exceed during installation. (1mGVP = 0.1bar)
Will deformations affect the future maintenance of the pipe?	The remaining space after installation should allow passage with film and flushing equipment.
Diameter differences along the length	Measure and document accurately for possible choice of Flexliner
Directional changes	Are risks/outcomes acceptable to the installer and end customer? See Direction changes.
Liner dimensioning	Must be performed according to current standards or norms.

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Control Points	Action and limits
Inspection of maintenance holes	• Accessibility for vehicles • Is there space for equipment and work inside the maintenance hole? • Are other measures needed to access the pipe?
Need for preliminary work.	See section cleaning of pipe before installation.

Directional Changes

Directional changes in the pipe always pose an increased risk of damage during installation and may cause wrinkles in the liner. All forms of directional changes in pipes should be performed with great caution.

NOTE! Even multiple consecutive small directional changes increase the risk of damage during installation. Exercise extreme caution. Ensure that ropes and cables are fault-free and adequately lubricated to reduce the risk of abrasion damage to the film.

Directional Change (deviation in degrees)	
0-15 degrees	• Minor wrinkling may occur • Gradually increasing size as a function of bend size • Discuss potential wrinkling with the client before installation, as wrinkles may exceed the maximum allowable additional irregularities according to ISO 11296-4.* • Pulling in light trains should be done with great caution, as the installer may damage the inner foil during this step. • Lubrication of the brake line/pulling rope and light train cable is advantageous to reduce friction. • Inpipe assumes no responsibility for any damage that may be attributed to the installation phase.

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Inpipe Freeliner

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Directional Change (deviation in degrees)	
15-30 degrees	• Results in noticeable wrinkling that may affect the flow or self-cleaning capacity. Installation is generally not recommended. • A discussion regarding wrinkles should be held with the client before installation, as wrinkles may exceed the maximum allowable surface irregularities according to ISO 11296-4.* • Increased risk of damage. The UV light train must be pulled in with great caution, as there is a risk that the installer could damage the inner film during this process. • Lubrication of the braking line / pulling rope and UV light train cable is recommended to reduce friction. • Installations under these conditions are high-risk. • Inpipe assumes no responsibility for any damage to pipes with directional changes exceeding 15 degrees.

Directional Change (deviation in degrees)	
>30 degrees	• Causes significant wrinkles. Installation is generally not recommended. • A discussion regarding wrinkles should be held with the client before installation, as wrinkles may exceed the maximum allowable surface irregularities according to ISO 11296-4.* • Significant risk of damage. The UV light train must be pulled in with great caution, as there is a risk that the installer could damage the inner film during this process. • Lubrication of the braking line / pulling rope and UV light train cable is recommended to reduce friction. • Inpipe advises against the installation of liners under these conditions. • Inpipe assumes no responsibility for any damage to pipes with directional changes exceeding 15 degrees.

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Directional Change (deviation in degrees)	
The pipeline deviates over a longer distance.	• Wrinkling is uncommon. • There may be a risk of damage to the liner when the UV light train is pulled in. • Under these conditions, the UV light train must be pulled in with great caution, as there is a risk that the installer could damage the inner film during this process. • Lubrication of the braking line / pulling rope and UV light train cable is recommended to reduce friction. • Inpipe assumes no responsibility for any damage that may occur during the installation phase.

*ISO 11296-4 section 8.2: In straight pipe sections with a constant internal circumference, the CIPP liner must not cause surface irregularities beyond those in the existing pipe that exceed 2% of the nominal diameter or 6mm, whichever is greater.

NOTE! Inpipe assumes no responsibility for results and damages caused by directional changes and pipeline deviations as described above.
The installer is responsible for ensuring proper measurements and assessment of conditions are made and documented.

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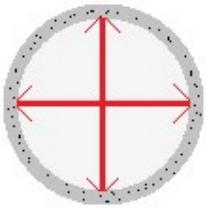
Winch in place liner (WIP)

Inspection of the Pipeline

To achieve optimal results, the pipeline must be measured accurately and its condition inspected before installation is decided.

Pipeline inspection and measurement

1. *Inspection:* The pipeline should be inspected and documented with adequate equipment to determine its condition and what measures are necessary. Save videos and any other assessment documentation for final documentation.
2. *Diameter:* The pipe diameter must be measured and documented. The client is responsible for using adequate equipment for accurate measurement. The diameter of the pipeline should be measured horizontally and vertically.



NOTE! If dimensional changes are present, these should be measured to select the correct Flexliner.
NOTE! The internal circumference should be measured carefully if the pipeline has a different shape.

3. *Length:* The installation length of the pipeline should be measured. The installation length is the length of the pipeline that will be re-lined, i.e., from maintenance hole to maintenance hole or equivalent. The client is responsible for using adequate equipment for accurate measurement.

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Winch in place liner (WIP)

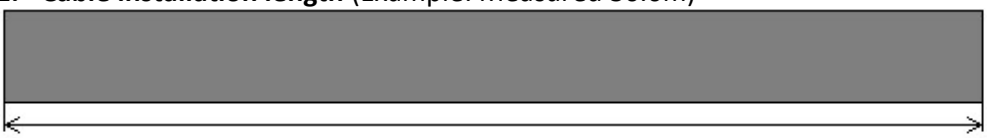
Before ordering

1. Determine the type of liner to be installed. See current product data sheets
2. Determine which SN class is required. See current product data sheets
3. Ordering Length of Inpipe Liner:
   An additional length of liner is required to mount the installation equipment and allow the liner to expand to the correct pipe diameter (tapering).
   a) Ø150 - Ø600mm, Order length liner = measured length + surcharge 1.2m
   b) >Ø600 - Ø1000mm, Order length liner = measured length + surcharge 2.0m.
   c) > Ø1000 - Ø1800mm, Order length liner = measured length + surcharge 3.0m.
   The client is always responsible for ordering the correct length.
   NOTE! Depending on the liner, studs, bends, etc., installation of an egg-shaped liner may require additional length additions. Contact Inpipe for consultation.

The additional length is required to secure the liner to the installation equipment.
It also allows the liner to expand to the total diameter before connecting to the pipeline.

Example: Your Ø225mm pipe is measured at 50.0m installation length. Your order length = 50+1.2 = 51.2m

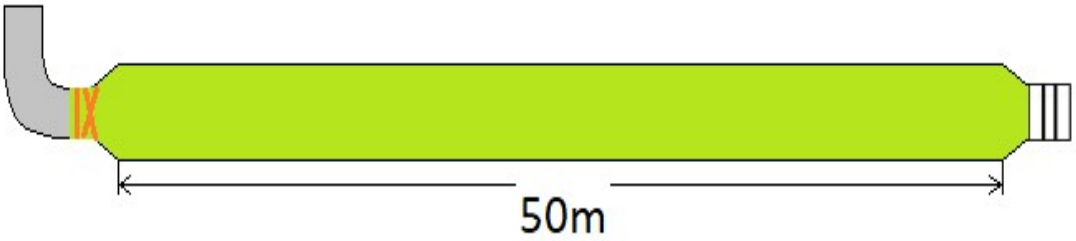
1. **Cable installation length** (Example: Measured 50.0m)



2. Ordered liner (Example: 50m + 1.2= 51.2m)

3. **Delivered WIP liner** (Example 51.2m)

4. **Installed WIP liner** (Example 51.2m liner becomes 50m installed liner)



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Winch in place liner (WIP)

Ordering Inpipe liner

When ordering an Inpipe liner, all relevant information about the project must be stated. Missing or incorrect information can lead to complications in the installation procedure. Inpipe has developed a template for ordering that can be used to advantage.

Use Appendix 7 Ordering Inpipe liner or equivalent document.

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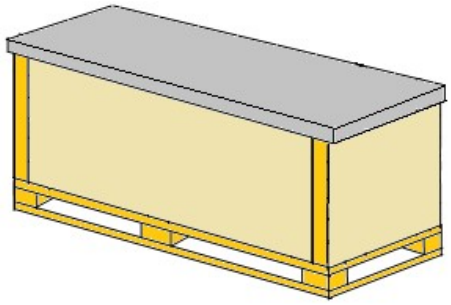
Inpipe Freeliner

Winch in place liner (WIP)

Receiving Inspection Upon Delivery

Reception inspection, as described, must take place immediately when your Inpipe Liner arrives. Inpipe liners are delivered packed in a box on a pallet, as sketched below.



Check the lid, box and pallet.

- If any part is damaged, this must be noted on the delivery note and acknowledged by the driver upon receipt.
  A transport claim should be filed with Inpipe.

Verify that the delivery is correct.

Check that the right products have been delivered compared to your order. The delivery note and the product certificate provide information about the contents of the shipment. The following must be checked:

- Production number (T-number) on product certificate against Production number (T-number) on box/pallet.
- Liner diameter
- SN class
- Length
- Markings, if applicable, e.g. project name, section
- Ensure that the ordered pree-liner, glide foil and other accessories are included in the delivery.

NOTE! Inpipe should be contacted immediately if something is missing or incorrect.

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Inpipe Flexliner
Inpipe Freeliner

Winch in place liner (WIP)

Storage and transport

Storage

- The box with liner should be stored on a flat, horizontal surface.
- Box and liner should not come into contact with water.
- Storage must take place at the correct temperature
- Inpipe Liner WIP is equipped with UV-protective outer foil, which protects the liner from hardening for a limited time.

NOTE! Storing the liner in its packaging under sunlight can cause it to become hot. Make sure that the liner is stored in a cool and shaded place.

Transport

- Liner should always be transported in its transport box.
- The appropriate method of transport shall be used.

Storage time/shelf life

Liner type	Storage temperature	Maximum durability of liner
Inpipe Liner Inpipe Freeliner	5 to 30 °C	Six months from the date of production

NOTE! Improper storage, temperature, or installation after expiration will void all warranties.

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Inpipe Flexliner
Inpipe Freeliner

Winch in place liner (WIP)

Preparation of worksite and equipment

Recommended installation direction

If possible, Inpipe recommends installing the liner in the direction of the slope to reduce pulling stress on the liner and minimize water accumulation in dips.

Waterproofing the installation site

Incoming water flows can complicate installation and affect staff's work environment and personal safety.
An Inpipe liner with inner and outer tube foil can be installed in pipes with incoming water flow and pipe depressions with water, provided the installer ensures that the foil is not damaged during installation and retraction/expansion. The groundwater pressure must not exceed the air pressure in the liner during installation.
Maintenance holes must be waterproofed before the installation starts, considering the installation process, personal safety, and working environment.

NOTE! The installer is responsible for compliance with local regulations, laws and requirements regarding personal safety.
NOTE! Inpipe assumes no responsibility for quality defects, damage or problems that may have arisen due to inadequate water protection at the installation site.

Waterproofing may involve plugging pipes, over-pumping, diversion or other suitable measures.
The installer is responsible for choosing the method and material.
Inpipe takes no responsibility regarding the choice of method for water protection.

Liner and ambient temperature during installation

The liner must have a temperature of 15 - 30°C when installed.
If the liner has been stored below 15°C, the liner must be heated so that the entire liner has a temperature of 15 - 30°C before installation.
In case of uncertainty, the temperature in the liner must be measured and documented in direct connection with the installation.

At ambient temperatures below 15°C, measures should be taken to maintain the correct liner temperature during transport and installation.

- A suitable transport method is used so that the liner's cooling does not occur.
- Liner must be stored so that cooling does not occur before installation.
- Liner should be calibrated and cured immediately after it has been pulled in place.
- Installation air must have a temperature of +7°C - +40°C

NOTE! The outdoor air temperature and installation air must be logged automatically during installation and attached to the installation report.

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Inpipe Flexliner
Inpipe Freeliner

Winch in place liner (WIP)

NOTE! During installation, the installer is responsible for ensuring that the liner and installation air are at the correct temperature. Inpipe Sweden AB takes no responsibility for damage and problems during installation due to incorrect temperatures.

Cleaning the pipeline before installation

When installing the liner, the pipe must always be free of, for example, grease, soil, sand, gravel, roots, dirt and more. All protruding/protruding objects, such as service lines, fittings or other things that can damage the liner, e.g. damaged/heavily frayed pipes, must be removed before installation. Alternatively, measures must be taken to protect the liner, e.g. installation in a pree-liner or installing a liner with pre-mounted gliding/protective foil.

Immediately before installation of the liner, you should:

- Ensure that protruding/sticking objects are removed.
- Clean the pipe with high water jetting.

The installer is responsible for executing, cleaning, removing protruding objects, and selecting methods.

NOTE! Inpipe Sweden AB assumes no responsibility for damage or substandard results due to the pipe not being cleaned and protruding objects not being removed.

Pre-installation inspection

After any protruding objects are removed and the pipe is cleaned, the pipeline must be inspected and documented using CCTV inspection with adequate equipment and expertise.

- Documentation must be carried out in direct connection with the start of the installation.
- Documentation will form the basis for decisions on whether the pipeline is suitable for re-lining.
- Documentation must be saved for possible follow-up.

Measurement of connections and service pipes

Branches, connections, and service lines operating after the liner is installed must be measured and documented before installation.

The installer is responsible for choosing the measurement and documentation methods and for ensuring that they are carried out.

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Winch in place liner (WIP)

Pre-installation equipment check

Before installation, make sure that:

- Maintenance of installation equipment has been carried out according to the supplier's instructions. See the installation equipment manuals.
- Equipment and other things, e.g. light train legs and bends, which can come into contact with the liner, do not have damage or sharp edges and are free of dirt (e.g. gravel, sand, clay, polyester residue and others).
- The installation equipment's automatic logging and recording system works, is switched on and logs the requested parameters.
- The Light Train's lamps work and give the proper UV effects; see the manual for the current Light Train.
- Light trains and light train cables do not have protruding or sharp deviations that can damage the liner.
- The surface of the tow/brake line is free from damage.
- The tow/brake line must be clean. It must be free of mud, sand, gravel, polyester residue, or anything else that can rub on the inner foil of the liner.
- The correct light train legs are used. See the product sheet for the correct light train legs with Inpipe installation equipment.
- The following parameters are automatically logged throughout the process:
  - System pressure air
  - Air pressure in liner
  - Temperature of air entering the liner
  - UV Lamps on/off
  - Power UV Lamps
  - Curing speed
  - Temperature of liner inner surface during curing
  - Film from the light train's camera(s) must be stored and saved

Hint!
It is recommended that the customer draw up a checklist of checkpoints to aid in daily maintenance. It is a good idea to start with Appendix 9 Maintenance Checklist and supplement it with the points relevant to your installation equipment and procedure.

Protect the liner from damage.
The liner should always be protected from damage during all parts of the process.

- The installer is responsible for taking adequate measures to ensure that the liner is not damaged during transportation to the installation site, preparation, and installation process.

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Winch in place liner (WIP)

NOTE! Inpipe accepts no liability for damage that may have occurred due to failure to protect the liner from damage.

Sealing against extraneous water

According to ISO 11296-4, a liner must be sealed at well entrances and exits to stop the infiltration of extraneous water. Inpipe recommends using a bubble rubber seal type SikaSwell A or Quicklock. The installer is responsible for choosing the method and design.

Pree-liner – over-expansion protection / liner protection

Pree-liner (accessory) protects the liner from overexpanding and reduces the risk of damage during installation. If the liner is accessible from the pipeline during installation or is at risk of overexpanding for some other reason, a Pree-liner of the correct length and dimension must always be used.

NOTE! Installation in Pree-liner does not replace the requirement that all protruding objects, such as service pipes, pipe fittings, or other things that can damage the liner, e.g., damaged/heavily frayed pipes, must be removed before installation.

NOTE! An Inpipe liner with pre-assembled slip/protective foil does not replace the need for a Pree-liner. Pre-assembled slip/guard foil does not prevent the liner from over-expansion.

When installing a liner exceeding 500mm in diameter, tension straps adjusted to the corresponding liner size must be mounted cc 50cm around the Pree-liner / liner in the start, middle, and end as an extra safety measure.

Pree-liner should be used in:

- Installation maintenance hole between bend/shaft and pipeline
- Intermediate maintenance hole
- Receiver maintenance hole
- Shafts or other open fittings
- Large service connections or other connections that may pose a risk of overexpansion
- Other passages where the liner is free or there is a risk of overexpansion are considered to exist

NOTE! Inpipe takes no responsibility for damage to the liner due to overexpansion.

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Inpipe Flexliner
Inpipe Freeliner

Winch in place liner (WIP)

Installer's adjustment of liner length

Too long liner

- Inpipe Liner WIP Ø150 – Ø1000: If the liner is too long for any reason, it can be shortened or cut. This is done at the installer's own risk.
- Inpipe Liner WIP >Ø1100 – Ø1800: contact Inpipe for consultation.

NOTE! When cutting the liner, ensure air does not get trapped between the foils and laminates, which can cause air damage during installation.
Check the measurement procedure to avoid liners that are too long in the future.

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Winch in place liner (WIP)

Inpipe Liner WIP

(Inpipe Liner WIP with pre-mounted gliding/protective foil; see heading below)

Installation according to manual

Installation must be done following the current installation manual.
The installer should have quality assurance systems ISO9001 or equivalent.
The installer should comply with the applicable quality assurance standards for installations according to ISO 11296-4, an equivalent or national standard.

NOTE! Ensure you have the current manual version for the current liner.

Before starting the installation

Ensure:

- That the correct liner for the route is used, diameter, length and SN class.
- That the correct measurement of the bend/fitting is used. See the product sheet.
- The correct size of light train legs must be mounted on the light train. See product sheet
- Correct values for calibration pressure, curing pressure and curing speed for the current liner are used. See Appendices 2, 3 and 4.

Image: Example of WIP bend and packer

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Winch in place liner (WIP)

Inpipe Liner WIP - Preparation

The liner must be protected from damage throughout the installation process.

NOTE! According to ISO 11296-4 point 9.4.2, the temperature between the laminate and the existing pipe must be logged during installation. This is not a requirement from Inpipe but can be a requirement in procurements.

Before winching the Inpipe liner WIP into the pipe without pre-assembled protective/sliding foil, glide foil should be fitted at the bottom of the pipe to protect the liner from damage and to reduce friction.

HINT! To facilitate retraction and reduce friction in heavy liners (Ø500 – Ø600) and longliners (+100m), sliding foil mounted at the bottom of the line can be used.

NOTE! Install the Pree-liner before winching the sliding foil, as the sliding foil must be in the pre-liner, e.g. in intermediate wells.

- The sliding foil should be retracted before the liner and cover the surface that the liner may come into contact with during retraction. Use a swivel between the retraction line and the sliding foil when retracting to reduce the risk of the sliding foil spinning in the liner.
- The sliding foil should be attached appropriately so it is not pulled with the liner.
- Sliding foil can be lubricated with soapy water or cooking oil to facilitate retraction.
- The sliding foil must be free of sand, gravel, soil, and other substances that can damage the liner.
- To select the appropriate sliding foil width, see the table.

Table Sliding Foils

Diameter Liner (mm)	Foil width (mm)
150	250
225	350
300	450
400	600
450	700

Diameter Liner (mm)	Foil width (mm)
500	800
600	1000
700	1150
800-1300	1300
1400-1800	1550

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Winch in place liner (WIP)

Liner handling

The liner must be protected from damage.

NOTE! The Inpipe Liner WIP and Inpipe Flexliner WIP are Fitted with black protective foil at the ends for light protection. This should not be removed but only opened; see Appendix 8.

NOTE! Ensure that the ends of the liner are not exposed to UV light, as this can cause the liner to harden unintentionally.

- The installer is responsible for taking adequate measures to ensure that the liner cannot be damaged during transportation to the installation site, preparation, and installation process.
- In the case of manhole edges, sharp edge bends, and pipe openings, appropriate protective devices shall be used to protect the liner from chafing and abrasion during retraction. The installer is responsible for the most suitable choice of protection

Inpipe Liner WIP - Retraction in general

Please refer to the manuals for each piece of towing equipment for instructions on handling it when retracting the liner.

The maximum specified tensile force according to the applicable product data sheet for liner should not be exceeded.
Always use a swivel when retracting to prevent the liner from folding due to twists in the conduit.

Inpipe Liner WIP - Drawstring Installation

Please refer to the manual for each piece of towing equipment for instructions on operating it to retract the liner.

1. Place the liner on a flat and clean surface, needed from 0.5 to 2m, depending on the dimension

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2. Fold in the edges of the liner and place the soft pull strap, about 1.5 x liner Ø, onto the liner as shown.

3. Fold the liner end over the pull strap as shown.

4. Liner Ø150: Lock the liner end over the pull strap by mounting two hose clamps as shown. Excess hose clamp straps are cut off. Liner Ø200: Lock the liner end over the pull strap by mounting at least two lashing straps as shown >Ø200: Lock the liner end over the pull strap by installing the required number of lashing straps.
(Ø600, 120m, at least six straps)

5. When retracting, use a swivel between the liner and drag wire to reduce the risk of the liner spinning.

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Winch in place liner (WIP)

6. During the retraction process, the edges of the liner should be folded in, as shown in the picture

7. Ensure controlled laying of the entire liner to the bottom of the transmitter well.
8. Pull the liner through the wire. Maximum retraction speed 6 meters/min.

Inpipe Liner
Inpipe Flexliner
Inpipe Freeliner

Winch in place liner (WIP)

Inpipe Liner WIP - Mounting pull rope for light trains

Inpipe Liner WIP comes with a thin line in the liner. NOTE! This rope should only be used to pull in the pull rope for light trains.

Before using the pull rope for light trains, check:

- That the surface layer of the pull line is free from damage.
- That the pull rope is clean. It should be free of mud, sand, gravel, polyester residue or anything else that can rub on the inner foil of the liner.

Inpipe Liner WIP, Standard – pull rope Installation

1. The pull rope must be threaded through the intended hole on the pull plug.
2. The pull rope must be attached to the liner line.

Inpipe Liner WIP, Installation Ready - Installation of pull rope

The constant flow valve must be mounted in the valve holder with the pull rope for light trains.

1. The pull rope should be threaded through the constant flow valve. Note the direction; see Figure 1 below
2. The pull rope must be attached to the liner line that is inside the liner; see picture 2
3. The constant flow valve must be mounted in the valve holder and locked in with two pins; see Figures 3 and 4.
4. The pins to the constant flow valve must be taped so they cannot come loose; see Figure 5.


Figure 1


Figure 2


Figure 3


Figure 4


Figure 5

Inpipe Liner
Inpipe Flexliner
Inpipe Freeliner

Winch in place liner (WIP)

NOTE! When using Inpipe installation equipment

- When the light train tube is connected directly to the connection nozzle (Figure 1 below), the pull line must be laid inside the liner and attached to the light train before the liner is expanded.

NOTE! Ensure the line can run in without the risk of knots and tangles.

- In the case of a light train tube connection via a step feeder, the liner line must be extended and run up through the bend, blow hose and step feeder.

When using other installation equipment, refer to the manual for equipment.

Inpipe Liner WIP with pre-assembled slip / protective foil, Standard – Mounting bend/packer

1. Any cardboard sleeve should be removed from the liner.
2. The correct size of the packer and bend should be used; see product data sheet

NOTE! Ensure that the packer and bend are free of damage and dirt that can damage liner foil.

3. The pull rope must be threaded through the intended hole on the pull plug.
4. The pull rope must be attached to the liner line.
5. Open the liner and insert the packer/bend into the liner. NOTE! The liner foils should be protected from damage.
6. The liner can be advantageously protected during the installation of the packer / bend by placing the sliding foil between the round packer/bend. See picture.

Inpipe Liner
Inpipe Flexliner
Inpipe Freeliner

Winch in place liner (WIP)

7. Open up the pre-assembled slide/protective foil approx. 0.5 m.
8. Install the Pree liner on the liner. **NOTE: The Protection liner must NOT be used as a Pree-liner**
9. The liner should be secured on the bend/packer with at least two straps, as shown below.
   Exercise caution when tightening the straps; the foil must not be damaged.
10. Mounting of straps on WIP liner

11. The bend/packer assembly must be documented with photos, partly a photo of the current bend/packer before installation and partly a photo when the liner is mounted and clamped to the bend/packer.
12. Connect equipment for expansion and hardening. See the manual for installation equipment.

When using Inpipe installation equipment, see the manual for installation equipment.

- In the case of light train tube connection via a step feeder or similar, the liner line and pull rope must be pulled through the liner, installation bend, blow hose and step feeder after the liner has been expanded and then attached to the light train.

When using other installation equipment, refer to the manual for equipment.

Inpipe Liner WIP - Mounting on a bend

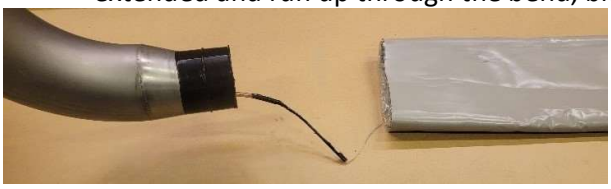
NOTE! Inpipe Liner WIP Ø150 Standard is not compatible with Inpipe bend Yellow Ø137. The liner must be expanded at the end before assembly.

1. Any cardboard sleeve should be removed from the liner.
2. See the product sheet to select the correct bend size.

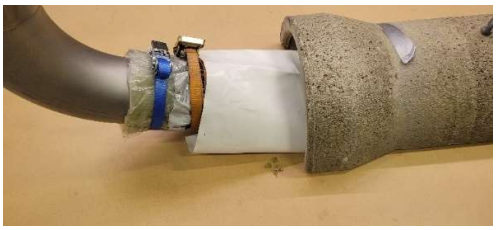
Inpipe Liner
Inpipe Flexliner
Inpipe Freeliner

Winch in place liner (WIP)

3. Mount the pre-liner on the liner.
4. In the case of a light train tube connection via a step feeder, the liner line must be extended and run up through the bend, blow hose and step feeder.



5. Open the liner and mount the liner on the bend. The foils must be protected from damage.
   As above, the liner must be secured on the bend with at least two straps. Exercise caution when tightening the straps; the foil must not be damaged.
   NOTE: the sliding foil should NOT be clamped to the bent mounting



6. Pull back the Pree-liner over the bend assembly.

Inpipe Liner WIP - Retraction

Please refer to the manuals for each piece of towing equipment for instructions on handling it when retracting the liner.

The maximum specified tensile force according to the applicable product data sheet for liner should not be exceeded.
Always use a swivel when retracting to prevent the liner from folding due to twists in the conduit.

The wire should be pulled through the wire after the sliding foil is mounted in the wire.
NOTE! Make sure that the wire is on top of the sliding foil.
The installer chooses the method and is responsible for executing the step.

1. The liner should be attached to the pull rope by folding it over a soft pull strap and securing the overfold with a tension strap of at least 30 kN (see picture 1 below). The installer determines the required lashing straps, considering the liner's weight, length, and environmental factors.

Inpipe Liner
Inpipe Flexliner
Inpipe Freeliner

Winch in place liner (WIP)

2. When retracting, use a swivel between the liner and drag wire to reduce the risk of the liner spinning.
3. the liner should be folded during retraction, as shown in Figure 2 below.
4. Ensure controlled laying of the entire liner to the bottom of the transmitter well.
5. Pull the liner through the wire. Maximum retraction speed 6 meters/min.

Figure 1

Figure 2

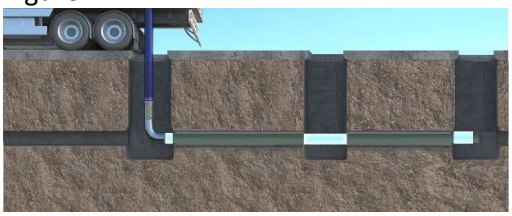


Figure 3

Inpipe Liner WIP – Mounting Pull Rope for Light Train
Inpipe Liner WIP comes with a thin line in the liner. NOTE! This rope should only be used to pull in the pull rope for light trains.

Before using the pull rope for light trains, check:

- That the surface layer of the pull rope is free from damage.
- That the pull rope is clean. It should be free of mud, sand, gravel, polyester residue or anything else that can rub on the inner foil of the liner.

Inpipe Liner WIP Standard – Installation of the tow line

1. The pull rope must be threaded through the intended hole on the pull plug.
2. The pull rope must be attached to the liner line.

Inpipe Liner WIP Installation Ready - Pull Line Assembly

NOTE! An Inpipe standard constant flow valve with two vent holes should be used. Modifying the continuous flow valve entails changes in the hardening properties. Inpipe accepts no responsibility for problems that may have arisen from the use of an incorrect constant flow valve.

The constant flow valve must be mounted in the valve holder with the pull rope for light trains.

Inpipe Liner
Inpipe Flexliner
Inpipe Freeliner

Winch in place liner (WIP)

1. The pull rope should be threaded through the constant flow valve. Note the direction; see Figure 1 below
2. The pull rope must be attached to the liner line that is inside the liner; see picture 2
3. The constant flow valve should be mounted in the valve holder and locked in the valve holder with two pins; see Figures 3 and 4.
4. The pins of the constant flow valve must be taped to prevent them from coming loose; see Figure 5.


Figure 1


Figure 2


Figure 3


Figure 4


Figure 5

NOTE! When using Inpipe installation equipment

- When connecting the light train tube directly to the connection nozzle (Figure 1 below), the pull line must be laid inside the liner and attached to the light train before the liner is expanded.

NOTE! Ensure the line can run in without the risk of knots and tangles.

- In the case of a light train tube connection via a step feeder, the liner line must be extended and run up through the bend, blow hose and step feeder.

Inpipe Liner
Inpipe Flexliner
Inpipe Freeliner

Winch in place liner (WIP)

When using other installation equipment, refer to the manual for equipment.

Inpipe Liner WIP Standard – Mounting Shaft / Hook

1. Any cardboard sleeve should be removed from the liner.
2. The correct size of the bend/packer should be used; see product data sheet

NOTE! Inpipe Liner WIP Ø150 Standard is not compatible with Inpipe bend Yellow Ø137. The liner must be expanded at the end before assembly.
NOTE! Ensure that the bend/packer is free of damage and dirt that can damage liner foil.

3. The pull rope must be threaded through the intended hole on the pull plug.
4. The pull rope should be attached to the liner line.
5. Open the liner and insert the bend/packer into the liner. NOTE! The liner foils must be protected from damage.
6. The liner can be advantageously protected during the installation of the bend/packer by placing the sliding foil between the round bend/packer. See picture.

7. The liner should be secured on the bend/packer with at least two straps, as shown below. Exercise caution when tightening the straps; the foil should not be damaged.
8. Mounting of straps on WIP liner

Inpipe Liner
Inpipe Flexliner
Inpipe Freeliner

Winch in place liner (WIP)

Suitable type of straps

9. The bend/packer assembly must be documented with photos, partly photos of the current bend/packer before installation and partly when the liner is mounted and clamped to the bend/packer.
10. Connect equipment for expansion and hardening. See the manual for installation equipment.

When using Inpipe installation equipment, see the manual for installation equipment.

- In the case of light train tube connection via a step feeder or similar, the liner line and pull rope must be pulled through the liner, installation bend, blow hose and step feeder after the liner has been expanded and then attached to the light train.

When using other installation equipment, refer to the manual for equipment.

Continue under Installation under continuous pressure.

Inpipe Liner
Inpipe Flexliner
Inpipe Freeliner

Winch in place liner (WIP)

Inpipe Liner WIP with pre-assembled glide/protective foil

Inpipe's WIP Liner with pre-assembled gliding/protective foil must be installed by pulling the liner into the pipe with a winch or similar equipment.

Pre-assembled gliding/protective foil can be ordered to:

Inpipe Liner WIP	**Ø150 – Ø600**
Inpipe Flexliner WIP	**Ø225 – Ø600**

When ordering a liner with pre-assembled gliding/protective foil, delivery includes:
One Protection liner, length 1m
One hose clamp is needed to mount the protection liner.
(Ø150 comes with two hose clamps for installation as below.)

Installation according to manual

Installation must be done following the current installation manual.
The installer should have quality assurance systems ISO9001 or equivalent. The installer must comply with the applicable quality assurance of installations according to ISO 11296-4, equivalent standard or national standard.

NOTE! Ensure you have the current manual version for the current liner.

Before starting the installation

Ensure:

- That the correct liner for the route is used, diameter, length and SN class.
- That the correct measurement of the bend/packer is used. See the product sheet for the bends and light train legs.
- The correct size of light train legs must be mounted on the light train. Product sheet
- Correct values for calibration pressure, curing pressure and curing speed for the current liner are used. See Appendices 2, 3 and 4.

Inpipe Liner
Inpipe Flexliner
Inpipe Freeliner

Winch in place liner (WIP)

Inpipe Liner WIP with pre-assembled gliding / protective foil - Preparation

The liner must be protected from damage throughout the installation process.

NOTE! According to ISO 11296-4 point 9.4.2, the temperature between the laminate and the existing pipe must be logged during installation. This is not a requirement from Inpipe but can be a requirement in procurements.

NOTE! Install the Pree-liner before retracting it, as the liner must be in the Pree-liner, e.g., in intermediate wells.

Liner handling

The liner should be protected from damage.

- The installer is responsible for taking adequate measures to ensure that the liner cannot be damaged during transportation to the installation site, preparation, and installation process.
- In the case of manhole edges, sharp edge bends, and pipe openings, appropriate protective devices shall be used to protect the liner from chafing and abrasion during retraction. The installer is responsible for the most suitable choice of protection

Inpipe Liner WIP with pre-assembled gliding / protective foil - Retraction general

Please refer to the manuals for each piece of towing equipment for instructions on handling it when retracting the liner.

The maximum specified tensile force according to the applicable product data sheet for liner should not be exceeded.
Always use a swivel when retracting to prevent the liner from folding due to twists in the conduit.

Inpipe Liner WIP with pre-assembled slip/protective foil - Tension strap installation

Please refer to the manual for each piece of towing equipment for instructions on operating it to retract the liner.

9. Place the liner on a flat and clean surface, needed from 0.5 to 2m, depending on the dimension

Inpipe Liner
Inpipe Flexliner
Inpipe Freeliner

Winch in place liner (WIP)

10. Fold in the edges of the liner and place the soft pull strap, about 1.5 x liner Ø, onto the liner as shown.

11. Fold the liner end over the pull strap as shown.

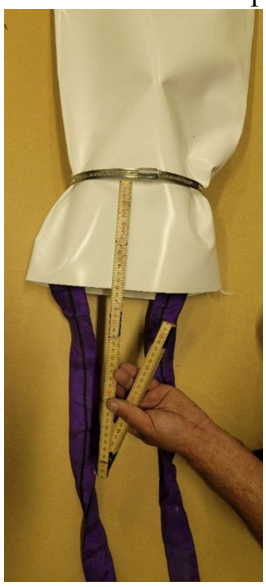
12. Liner Ø150:
    Mount 2 hose clamps to lock the liner end over the pull strap. Cut off excess hose clamp straps.
    Liner Ø200:
    Lock the liner end over the pull strap by mounting at least two straps, as shown.
    Liner >Ø200:
    Lock the liner end over the pull strap by installing the required number of straps as shown.

Inpipe Liner
Inpipe Flexliner
Inpipe Freeliner

Winch in place liner (WIP)

13. To protect the "tow head," a Protection liner is installed and passed over the clamping strap/hose clamp, approximately 100 mm from the folded line channel.

14. Install the included hose clamp about 150 mm from the edge of the protection liner and cut off the excess tape on the hose clamp.



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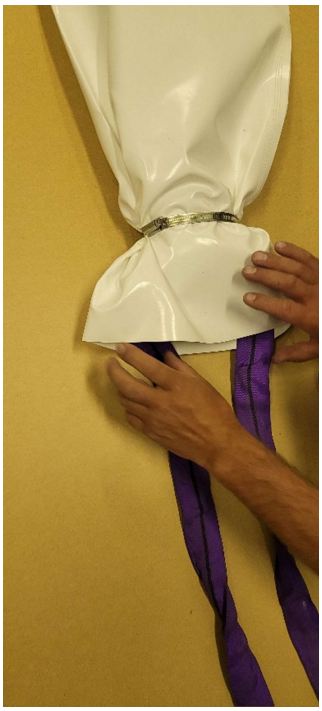
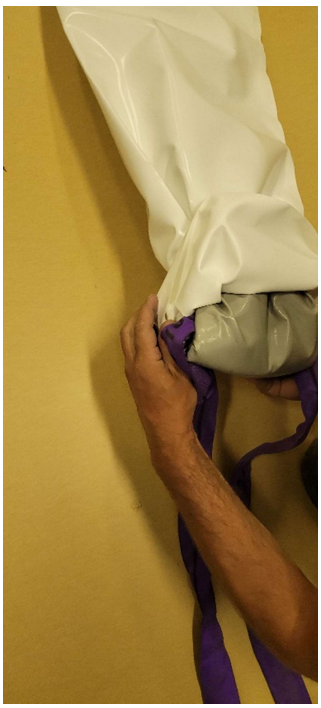
Winch in place liner (WIP)

15. Fold back the Protection liner over the mounted hose clamp


16. Use a swivel between the liner and drag wire when retracting to reduce the risk of the liner spinning.
17. During the retraction process, the edges of the liner should be folded in, as shown in the

18. Ensure controlled laying of the entire liner to the bottom of the transmitter well.
19. Pull the liner through the wire. Maximum retraction speed 6 meters/min.

Inpipe Liner
Inpipe Flexliner
Inpipe Freeliner

Winch in place liner (WIP)

Inpipe Liner WIP with pre-assembled skid / protective foil - Mounting pull rope for light trains

Inpipe Liner WIP comes with a thin line in the liner line. NOTE! This rope should only be used to pull in the pull rope for light trains.

Before using the pull rope for light trains, check:

- That the surface layer of the pull line is free from damage.
- That the pull rope is clean. It should be free of mud, sand, gravel, polyester residue or anything else that can rub on the inner foil of the liner.

Inpipe Liner WIP with pre-assembled skid / protective foil, Standard – Pull line mounting

3. The pull rope must be threaded through the intended hole on the pull plug.
4. The pull rope should be attached to the liner line.

Inpipe Liner WIP with pre-assembled skid / protective foil, Installation prepared - Installation of pull rope.

The constant flow valve must be mounted in the valve holder with the pull rope for light trains.

5. The pull rope should be threaded through the constant flow valve. Note the direction; see Figure 1 below
6. The pull rope must be attached to the liner line that is inside the liner; see picture 2
7. The constant flow valve should be mounted in the valve holder and locked in with two pins; see Figures 3 and 4.
8. The pins to the constant flow valve must be taped so they cannot come loose; see Figure 5.

Figure 1

Figure 2

Figure 3

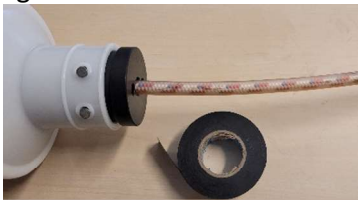


Figure 4

Figure 5

Inpipe Liner
Inpipe Flexliner
Inpipe Freeliner

Winch in place liner (WIP)

NOTE! When using Inpipe installation equipment

- When connecting the light train tube directly to the connection nozzle (Figure 1 below), the pull line must be laid inside the liner and attached to the light train before the liner is expanded.

NOTE! Ensure the line can run in without the risk of knots and tangles.

- In the case of a light train tube connection via a step feeder, the liner line must be extended and run up through the bend, blow hose and step feeder.

When using other installation equipment, refer to the manual for equipment.

Inpipe Liner WIP with pre-assembled slip / protective foil, Standard – Mounting bend/packer

1. Any cardboard sleeve should be removed from the liner.
2. The correct size of the shaft and bend should be used; see product data sheet

NOTE! Ensure that the bend/packer is free of damage and dirt that can damage liner foil.

3. The pull cord must be threaded through the intended hole on the pull plug.
4. The pull cord should be attached to the liner line.
5. Open the liner and insert the bend/packer into the liner. NOTE! The liner foils should be protected from damage.
6. The liner can be advantageously protected during the installation of the bend/packer by placing the sliding foil between the round bend/packer. See picture.

Inpipe Liner
Inpipe Flexliner
Inpipe Freeliner

Winch in place liner (WIP)

7. Open up the pre-assembled slide/protective foil approx. 0.5 m.
8. Install the Pree liner on the liner.
   NOTE: The Protection liner must NOT be used as a Pree-liner
9. The liner should be secured on the bend/packer with at least two straps, as shown below.
   Exercise caution when tightening the straps; the foil should not be damaged.
10. Mounting of straps on WIP liner

11. The bend/packer assembly must be documented with photos, partly a photo of the current bend/packer before installation and partly a photo of when the liner is mounted and clamped to the bend/packer.
12. Connect equipment for expansion and hardening. See the manual for installation equipment.

When using Inpipe installation equipment, see the manual for installation equipment.

- In the case of light train tube connection via a step feeder or similar, the liner line and pull rope must be pulled through the liner, installation bend, blow hose and step feeder after the liner has been expanded and then attached to the light train.

When using other installation equipment, refer to the manual for equipment.

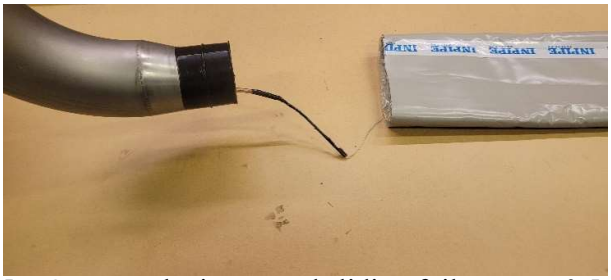
Inpipe Liner
Inpipe Flexliner
Inpipe Freeliner

Winch in place liner (WIP)

Inpipe Liner WIP with pre-assembled glide/protective foil - Bracket mounting

NOTE! Inpipe Liner WIP Ø150 Standard is not compatible with Inpipe bend Yellow Ø137. The liner must be expanded at the end before assembly.

1. Any cardboard sleeve should be removed from the liner.
2. See the product sheet to select the correct bend size.
3. Mount the pre-liner on the liner.
   NOTE: The Protection liner must NOT be used as a preliner.
4. In the case of a light train tube connection via a step feeder, the liner line must be extended and run up through the bend, blow hose and step feeder.



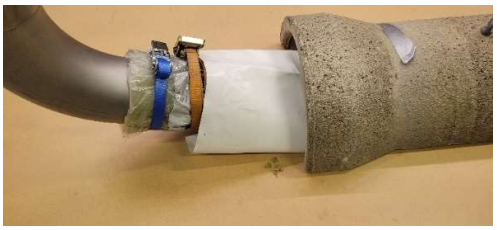
5. Open up the integrated sliding foil approx. 0.5 m.

6. Open the liner and mount the liner on the bend. The foils must be protected from damage.

Inpipe Liner
Inpipe Flexliner
Inpipe Freeliner

Winch in place liner (WIP)

7. As above, the liner must be secured on the bend with at least two straps. Exercise caution when tightening the straps; the foil should not be damaged.
   NOTE: the slip/protective foil must NOT be clamped at the bend mounting



8. Pull back the Pree-liner over the bend assembly.

Inpipe Liner
Inpipe Flexliner
Inpipe Freeliner

Winch in place liner (WIP)

Installation under continuous pressure

The compressed air system must be pressurised according to specification throughout the installation phase (see manual for equipment). The pressure in the system and liner must never be released. Pressure loss can result in substandard or failed installation.

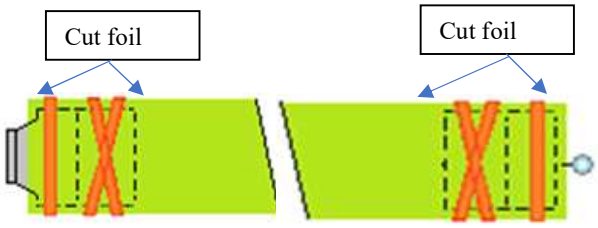
The installation equipment must automatically log the pressure in the system and liner during all process phases.

NOTE! Inpipe is not responsible for problems that may have occurred due to any pressure loss during installation.

Inpipe Liner WIP – Expansion and Calibration

The Inpipe Liner WIP should be expanded and calibrated with compressed air with the correct pressure, see Appendix 2.
The air pressure must be checked and logged automatically. NOTE! Ensure that automatic logging equipment is turned on and that logging occurs throughout the installation procedure.
The manual for your compressed air equipment provides information on the operation and how to set it up.

1. Expand the liner.
2. After the liner has been pressurised, the outer foil shall be cut into the transmitter, intermediate, and receiver well so that air in the laminate / between the inner and outer foil can escape. See picture below. NOTE! Make sure that water cannot get into the laminate as this can cause the polyester not to be able to harden



3. Calibrate the liner.
4. Ensure the liner is fully expanded by checking that the minimum distance has been reached between the liner and the pipe wall in maintenance holes.

Inpipe Liner
Inpipe Flexliner
Inpipe Freeliner

Winch in place liner (WIP)

Inpipe Liner WIP - Pulling Pull/Brake Line Through Liner

The liner must be expanded, and the draw/brake line must be attached to the light train before it is pulled through the liner.
NOTE! Before retraction, ensure that the tow/brake line is free of damage, slips, and other things that can damage liner foil. The pull/brake line can be advantageously lubricated with silicone oil before retraction.

Inpipe WIP Liner - Retracting Light Train to Starting Point for Curing

The retraction of light trains must be done following the manual for installation equipment.

- The light train must be retracted with the help of a tow/brake line.
- Light train cables can be lubricated with silicone oil before retraction.
- Before and during the retraction of the light train, a check via the light train camera must be made to ensure that the liner is not damaged and ready to be cured. In the event of damage or signs of damage, the installer, at his own risk, decides whether to harden or interrupt the installation. Care should be taken when withdrawing the light train. The inner foil must not be damaged.
  NOTE! When retracting and curing the liner, a film from the light train camera must be saved.
- **Starting point:** The light train should be pulled into the liner 10 – 15 cm from the drawbar / constant flow valve.
  NOTE! Safety rack that the liner meets the desired properties and is ready for curing.

Inpipe Liner WIP - Curing

In direct connection with the liner being correctly calibrated, it must be hardened. Inpipe WIP liner should be cured with ultraviolet light.

For the operation of hardening equipment, see the manual.

Inpipe Liner WIP - Curing

For the settings and operation of your installation equipment, see the manual.

Avoid staying in maintenance holes where the liner is being cured due to the fire risk.

Inpipe Liner
Inpipe Flexliner
Inpipe Freeliner

Winch in place liner (WIP)

When lit, the light train's lamps emit intense UV radiation, which can damage the eyes. Avoid looking at the lights and wear adequate safety glasses.

Execution of curing

1. Check that your curing equipment is set correctly regarding the start-up sequence and curing speed.
2. Start the curing process; refer to the manual for equipment installation.
3. The curing process should be logged and data saved.
4. The operator must supervise the curing process.
5. The curing process will be monitored via the light train's camera system.
6. The curing process is complete when the light train reaches the installation bend/connection nozzle.
7. The light train must be turned off according to the end sequence; see manual installation equipment.

NOTE! Ensure installation parameters and videos are saved before the system is shut down.

Inpipe WIP Liner - Removal of the inner foil

After curing, the foil on the liner's inside must be permanently removed. The foil can/should be pulled out by twisting using the pull/brake line for the light train.

Hint! If the foil cools appropriately, pulling out of the liner will be easier. If possible, please wait 30 minutes before starting to extract the foil.

1. In the receiver well: A gap is cut in the upper part of the pipe, or the end is cut off from the liner.
2. The inner foil is detached from the inside liner via the door/end and securely attached to, e.g. the draw/brake line.

Completion and commissioning of installed liner

After removing the inner foil, the liner should be completed for operation.
This may include:

- Opening of branches, connections and service lines
- Cutting off liner parts in intermediate wells
- Sealing of service connections
- Sealing of liner connection in wells

The installer is responsible for selecting equipment and methods for the completion and commissioning of the liner.

Inpipe Liner
Inpipe Flexliner
Inpipe Freeliner

Winch in place liner (WIP)

Problem-solving

Inner foil stuck in liner

- Allow the liner to cool completely. Then, try to pull out the foil.
- If possible, pull out the foil after about 12 hours
- The foil should not be left behind! It will come loose and then create significant problems for the line owner.

The foil has fallen from the liner and gets stuck in connection with the extraction.

If the foil can be pulled out a piece, it gradually sticks. Please do not continue to pull, or it will stick harder. The reason is probably that the foil may have detached from the liner, fallen, and, when pulled out, formed a plug of foil that gradually locked the foil into the line.

- If possible, pressurise the foil using your installation equipment to attempt to blow it out toward the receiver well.
- If possible, continue extracting the foil under low air pressure after the foil has been blown out.
- If this is not successful, high-pressure flushing can be used.

HINT! The liner can be routinely pressurised during the foil extraction to avoid the foil coming off spontaneously and causing problems. Use pressure so low that it is possible to pull out the foil.

Inpipe Liner
Inpipe Flexliner
Inpipe Freeliner

Winch in place liner (WIP)

Inspection and Installation Report

Control

After installation and completion, the wire CCTV should be checked for length. This must be done directly after the installation is completed. Soiled liners can be difficult to check and assess. If possible, flush the liner before filming.

- Control must be carried out by filming with appropriate equipment.
- Film from the inspection must be documented and stored.

Installation report

An installation report must be prepared for documentation and reporting of the installation. The report must contain at least a written report, preferably following Appendix 1, Installation Report.

Inpipe Liner
Inpipe Flexliner
Inpipe Freeliner

Winch in place liner (WIP)

If something goes wrong – Warranty and complaints

Warranty and complaint matters must always be made in writing and sent to claims@inpipe.se

Warranty or complaint matters

- The matter must always be reported in writing by filling in and submitting Appendix 5.
- The notification must be received by Inpipe Sweden AB immediately or no later than within four days of the incident.
- Requested material, according to Appendix 5, must be delivered to Inpipe
- The product must be stored following the current installation manual.
- The product must be installed following the current installation manual.
- The product must be installed before the specified "installed by" date on the product certificate.
- Deviations from the installation manual must be approved in writing by Inpipe Sweden AB before being used.

In the event of a warranty or complaint, the requested material in Appendix 5 must always be saved and can be referred to by Inpipe Sweden AB:

To handle large film files, please get in touch with the claims manager at Inpipe for instructions.

Inpipe Liner
Inpipe Flexliner
Inpipe Freeliner

Winch in place liner (WIP)

Appendix 1: Installation Report WIP

Product data

Production number (T-no): ..... Dimension:..... SN Class: .....

Order length: ..... Order No.: ..... Pos No: .....

Installation Report Inpipe Liner WIP

Customer:..... Entrepreneur:.....
Contact person:..... Responsible operator:.....
Street:..... Bilreg.nr: .....
Place:..... Brunn no.: .....

Maintenance control equipment for installation: Yes ☐ No ☐
Flushing before retraction: Yes ☐ No ☐
Video before retraction: Yes ☐ No ☐

Wire Type: Wastewater ☐ Stormwater ☐ Mixed water ☐
Other, specify: .....

Material management: Concrete ☐ Earthenware ☐ Cast iron ☐
Plastic/PVC ☐ Other ☐

Measured: Dimension..... mm Installation Length ..... m
Tableware: Number:..... Big

Product temperature before retraction .....° C

Calibration pressure: My..... naked Max..... naked
Curing pressure: My..... naked Max..... naked

Lights in operation, number: .....Big
Watt Lights: .....w
Curing rate: ..... m/hr
Curing temperature .....° C

Extraction of foil: Easy ☐ , Normally ☐ Heavily ☐

Selection sample Yes ☐ No ☐

Approved installation Yes ☐ No ☐ Cause.....

Place and date:

Signature responsible operator:

Name clarification:

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Winch in place liner (WIP)

Appendix 2:
Air Pressure Table Inpipe Liner WIP / Inpipe Freeliner WIP

Ø	Calibration	Hardening pressure
mm	bar	bar
150	0,50 - 1,00	0,50
200	0,50 - 0,85	0,50
225	0,50 - 0,80	0,50
230	0,50 - 0,80	0,50
250	0,40 - 0,80	0,40
300	0,40 - 0,60	0,40
350	0,40 - 0,50	0,40
375	0,40 - 0,50	0,40
400	0,30 - 0,50	0,30

Ø	Calibration	Hardening pressure
mm	bar	bar
500	0,25 - 0,40	0,25
600	0,20 - 0,35	0,20
700	0,15 - 0,35	0,15
800	0,15 - 0,35	0,15
900	0,15 - 0,30	0,15
1000	0,15 - 0,25	0,15
1100 - 1300	0,13 - 0,22	0,13
1400 - 1600	0,13 - 0,22	0,13
1700 - 1800	0,12 - 0,20	0,12

Air Pressure Table Inpipe Flexliner WIP / Inpipe Freeliner WIP

Ø	Calibration	Hardening pressure
mm	bar	bar
225	0,50 - 0,90	0,50
230	0,50 - 0,90	0,50
250	0,40 - 0,80	0,40
300	0,40 - 0,80	0,40
350	0,40 - 0,60	0,40
400	0,30 - 0,50	0,30
500	0,25 - 0,45	0,25
600	0,20 - 0,40	0,25

Ø	Calibration	Hardening pressure
mm	bar	bar
700	0,15 - 0,35	0,18
800	0,15 - 0,35	0,15
900	0,15 - 0,35	0,15
1000	0,15 - 0,35	0,15
1100	0,13 - 0,25	0,15
1300	0,13 - 0,22	0,13
1600	0,13 - 0,22	0,13
1800	0,12 - 0,20	0,12

For air pressure tables for Egg profiles, contact Inpipe.

Inpipe Liner
Inpipe Flexliner
Inpipe Freeliner

Winch in place liner (WIP)

Appendix 3: Curing timetable for Inpipe liner

Tabell 1

Curing schedule for Inpipe Liner, standard polyester, with Inpipe Light Train

2024-02-16

Number of Lamps		9	9	9	8	6	6	6	5	4	3	3	3	2	2
Power per lamp (W)		1000	800	600	400	1000	800	600	400	400	1000	800	600	400	150
	Thickness	9000 W	7200 W	5400 W	3200 W	6000 W	4800 W	3600 W	2000 W	1600 W	3000 W	2400 W	1800 W	800 W	300 W
Liner Ø	min -max	m/h	m/h	m/h	m/h	m/h	m/h	m/h	m/h	m/h	m/h	m/h	m/h	m/h	m/h
150	3,0-3,5				45		65	50	28	22		33	25	10	3
200	3,0-3,9		67	56	33	63	50	37	21	17		25	19	7	
225	3,0-4,0	78	64	50	30	55	45	33	18	15	28	23	17	6	
250	3,0-4,4	75	60	45	26	50	40	30			25	20	15		
300	3,0-4,5	62	50	37	22	41	33	25			20	17	13		
350	3,5-6,0	53	42	32	19	35	28	22			18	14	11		
375	3,5-6,0	50	38	29		34	26				17	13			
400	3,5-5,7	46	37	28		31	25				15	12			
450	4,0-6,5	42	33	25		28	22				14	11			
500	4,3-7,0	37	30	22		25	20				12	10			
600	5,0-8,5	31	25	18		20	16				10				
700	5,5-9,0	26	20	15		17	13								
800	6,2-10,0	23	21	13		15	12								
900	6,5-10,5	21	19	12		13	11				The temperature during curing must be between 70 and 120 degrees Celcius. The temperature can be regulated via air flow in the liner or that the curing speed is regulated.				
1000	7,5-11,0	18	16	11		12	10								
1100-1300		10													
1400-1700		8													
1800		6													

Tabell 2

Curing schedule for Inpipe Liner, standard polyester, with Inpipe Light Train

2024-02-16

Number of Lamps		9	9	9	8	6	6	6	5	4	3	3	3	2	2
Power per lamp (W)		1000	800	600	400	1000	800	600	400	400	1000	800	600	400	150
	Thickness	9000 W	7200 W	5400 W	3200 W	6000 W	4800 W	3600 W	2000 W	1600 W	3000 W	2400 W	1800 W	800 W	300 W
Liner Ø	min -max	m/h	m/h	m/h	m/h	m/h	m/h	m/h	m/h	m/h	m/h	m/h	m/h	m/h	m/h
150	3,6-7,0				42		60	46	26	20		31	23	9	3
200	4,0-7,0		62	52	31	58	46	34	19	16		23	18	6	
225	4,5-8,0	72	59	46	28	51	42	31	17	14	26	21	16	6	
250	4,5-8,0	63	51	38	22	42	34	25			21	17	13		
300	4,6-9,0	55	44	33	19	36	29	22			18	15	11		
350	6,1-10,0	47	37	28	17	31	25	19			16	12	10		
375	6,5-11,0	42	32	24		29	22				14	11			
400	7,0-11,0	37	30	22		25	20				12	10			
450	7,9-11,0	31	24	18		20	16				10	8			
500	9,0-11,0	24	20	14		16	13				8	7			
600	11,0-11,0	21	17	12		13	11				7				
700	9,1-12,0	17	13	10		11	8								
800	10,1-13,0	18	17	10		12	9								
900	10,6-13,0	16	15	9		10	8				The temperature during curing must be between 70 and 120 degrees Celcius. The temperature can be regulated via air flow in the liner or that the curing speed is regulated.				
1000	11,5-14,0	14	12	8		9	8								
1100-1300		10													
1400-1700		8													
1800		6													

Inpipe Liner
Inpipe Flexliner
Inpipe Freeliner

Winch in place liner (WIP)

Appendix 4: Curing Timetable for Inpipe Flexliner

Curing timetable for Inpipe Flexliner, standard polyester, with Inpipe Light Train 2024-02-16

Number of Lamps		9	9	9	8	6	6	6	5	4	3	3	3	2	2
Power per lamp (W)		1000	800	600	400	1000	800	600	400	400	1000	800	600	400	150
	Outer Ø	9000 W	7200 W	5400 W	3200 W	6000 W	4800 W	3600 W	2000 W	1600 W	3000 W	2400 W	1800 W	800 W	300 W
Name	min -max	m/h	m/h	m/h	m/h	m/h	m/h	m/h	m/h	m/h	m/h	m/h	m/h	m/h	m/h
FX 230	185-230				45-30		65-45	80-33	28-18	22-15		33-23	25-17	10-6	
FX 250	220-250		65-60	51-45	31-26	57-50	47-40	35-30			29-25	24-20	18-15		
FX 300	238-300	76-62	61-50	47-37	28-22	52-41	42-33	32-25			27-20	21-17	16-13		
FX 350	290-350	62-53	50-42	37-32	22-19	41-35	33-28	25-22			20-18	17-14	13-11		
FX 400	340-400	54-46	43-37	33-28		36-31	29-25				19-15	15-12			
FX 450	367-450	51-42	39-33	30-25		35-28	27-22				18-14	14-12			
FX 500	436-500	44-37	35-30	27-22		29-25	23-20				13-12	11-10			
FX 600	480-600	40-31	31-25	23-18		26-20	21-16				13-12				
FX 700	585-700	32-26	26-20	19-15		21-17	17-13		The temp during hardening must be 70 to 120 degrees Celcius.						
FX 800	676-800	27-23	23-19	16-13		18-15	14-12		The temperature can be regulated via air flow in the liner or						
FX 900	749-900	24-21	21-18	13-12		15-13	12-11		that the curing speed is regulated.						
FX 1000	796-1000	23-18	21-16	13-11		15-12	12-10		The first value of the hardening speed refers to the smaller diameter						
FX 1300	920-1300	10							in the dimension span.						

Inpipe Liner
Inpipe Flexliner
Inpipe Freeliner

Winch in place liner (WIP)

Appendix 5: Warranty Matters and Complaints

The completed complaint form and the requested material described below must be submitted in case of complaints.

			Page 1 (2)
Enterprise			
Installer			
Phone installer			
Email installer			
Project Name			
Name of the installation route			
Date of installation			
Date of inspection/inspection			
Production number (T-no)			
Liner Dimension			
Dimension of pipes that were lined	Fixed Ø:		Dim. diversive Ø:
Length of ordered liner			
Length of real/installed liner			
Was the liner cut before the installation	□ No	□ Yes	Length:
Number of tableware			
Number of intermediate wells			
How was the liner stored before installation?			Storage temperature:
Weather conditions at the installation	□ Sun □ Rain □ Snow		Outdoor temperature:
Were there changes in the direction of the management	□ No	□ Yes Quantity: Angle:	
The liner was installed as	□ Wip □ Wip Flex	□ Egg Profile	
Installation Direction	□ With a fall	□ Against falls	
How was the liner experienced	□ Soft □ Medium	□ Hard □ Dry	□ Supersaturated
Was the liner lubricated during the installation	□ Silicone Oil □ Not Lubricated		Other:
What was it like to mount the liner on the bend	□ Lightweight	□ Medium	□Difficult"
Was the foil cut at the bend/packer mount	□ Yes	□ No	
How was the calibration experienced?	□ Lightweight Pressure:	□ Medium	□Difficult" Time:
The liner was hardened with	□ UV □ LED		Speed: Effect:
When did the problem occur	□ Expansion □ Calibration □ Withdrawal of light trains □ Other:		
How was the extraction of the inner foil	□ Lightweight		□Difficult
Description of problems and consequences			
Do you / the installer have any theory about what caused the deviation?			
Other observations and information			

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Winch in place liner (WIP)

Warranty Cases and Complaints				**Page 2 (2)**
In the event of a fault/complaint, the following material must be marked with T-no and sent to Inpipe	□ Inner foil (croquet marked at 12 noon)	□ sending end closure	□ End with valve holder	□ Sample
	□ Inspection film on flushed liner after installation □ Installation Report			
Available inspection film before installation	□ Yes = To be attached to the file: □ With case □ Against falls □ No = Reason:			
There is film from the light train camera	□ Yes = To be attached to the file: □ With case □ Against falls □ No = Reason:			
Is there inspection film on the flushed liner after installation	□ Yes = To be attached to the file: □ With case □ Against falls □ No = Reason:			
Are there inspection protocols with changes of direction according to Swedish Water P91	□ Yes = To be attached □ No = Reason:			
There is a photo of the liner mounting on bend/packer	□ Yes = To be attached □ No = Reason:			
Installation log file available	□ Yes = To be attached □ No = Reason:			
Has film/s from the installation been filmed in the same direction as the installation	□ Yes □ No			
Pree-liners were mounted in	□ Transmitter well □ Medium well/s □ End well			
What width of the sliding foil was used				
How was the sliding foil secured?				
Was the slide foil lubricated before retracting the liner	□ Yes □ No			
What size of the sow was used for the installation				
What was it like to mount the liner on the stem	□ Lightweight □ Medium □Difficult"			
With the end customer, a written agreement on measures due to deviations	□ Yes Attached: □ No Reason:			

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Winch in place liner (WIP)

Appendix 6: Sample of installed liner

If the customer requires it, sampling of the installed liner shall be done following the customer specifications of ISO 11296-4 2018 or complying with local laws, regulations, and guidelines.

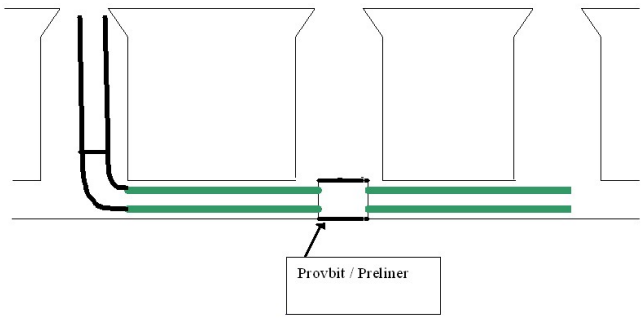
THE HARDENED LINER SHOULD BE SAMPLED to ensure the result and quality. The test result should be saved as part of the installation's final documentation.

According to the ISO standard, three tests can be performed to determine a product's characteristics. The choice of method depends on availability and the possibility of extracting suitable samples.

1. Ring stiffness measured on a circular sample, ISO 7685:1998
2. 3-point bend measured on rectangular pieces, ISO 178:2019
3. Residue Styrene Laminate Hardened Laminate, ISO 4901:2011-08

Sample selection
Samples should be taken as far as possible in the intermediate descent well rather than at one or the other end of the installation.
NOTE! Samples taken outside the line, for example, where the liner has been hardened in Pree-liner, often have slightly lower ring stiffness during tests. The reason is that the diameter becomes somewhat larger in a Pree-liner because it has some flexibility and expands slightly during the installation and curing.

Circular sample. (Diameter less than 500mm)
Cut a ring of whole liner where possible.



NOTE! The sample piece should be completely circular, fully expanded towards the Pree-liner and straight.

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Winch in place liner (WIP)

The length of the piece is essential; see the table below!

Wire diameter(mm)	150	200	225	250	300	400	450	500
Length of sample piece (mm)	190	240	265	290	340	340	340	340

Samples with more than 300 mm diameter must always be 340 mm. The test laboratory cuts the sample piece to the correct length.

Rectangular sample
If taking a complete ring is impossible, a rectangular sample piece for 3-point bending testing is cut out. See procedure below

2) Sample bit for the 3-point bending test. If possible, place a test piece in between maintenance holes. Cut a rectangular piece out of the liner, at least 150x150 mm.
Cut out the liner part without overlapping fabrics; see the picture below.

Figure 2, Suggestion for the socket for 3-point bend Figure 3, the overlap of fabrics in the finished liner

Packaging and labelling of sample pieces

Immediately after the sample has been cut out, the piece must be marked with the following:

- Production number (T-no)
- Installation Date

Before it is sent to the laboratory, the sample must be protected, for example, with UV-light-proof plastic foil.
Check with your laboratory to learn how sample pieces should be labelled and packed and what other information is required.

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Winch in place liner (WIP)

Appendix 7: Ordering Inpipe Liner

Order INPIPE LINER

"Place for logotype"

Project: Order date:

Delivery address: Requested delivery date

Order no:

Markings:

Contact: Customer:

Phone:

Stretch / brand	Standard max out. Ø	Flex* max out. Ø	SN-Class Short	SN-Class Long	Length	Type of liner INV	Type of liner WIP	Blind-Shot	Integrated protectionfoil**	Installation prepared***	Number of Pree-liner	Pree-liner Ø	Sliding foil**** width	Sliding foil**** length	Not. no.

When ordering Freeliner or liner with vinyl ester, state this under notes.

Orders are emailed to: order@inpipe.se

* See product datasheet Inpipe Felxliner for dimension range

* Inpipe WIP liner Ø150 up to Ø600 can be ordered with pre-assembled sliding / protective film. For more information, see the current installation manual/product data sheet

** Inpipe INV Ø150 up to Ø500 and WIP liner Ø150 up to Ø450 can be ordered ready for installation. For more information, see the current installation manual/product data sheet.

*** For recommended Glidfoil width, see installation manual.

Notes:

NOTE! For an electronic copy of the order form, contact Inpipe.

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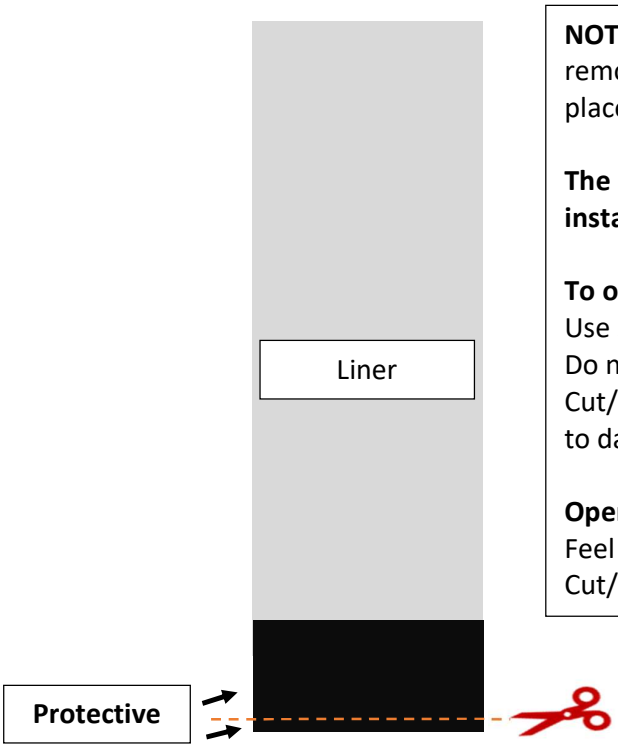
Winch in place liner (WIP)

Appendix 8: Opening of Black Protective Foil Inpipe WIP Liner

Inpipe Liner WIP and Inpipe Flexliner WIP are equipped with black protective foil at the ends as light protection. This should not be removed but only opened,
If the foil is removed or the protective foil is damaged, the liner end may harden and become impossible to attach to the bend/stud. Inpipe takes no responsibility for improper handling of black protective foil.



NOTE! The black protective foil should not be removed! The protective foil should remain in place throughout the installation process!

The protective foil should be opened prior to installation.

To open the protective foil
Use scissors or a sharp knife**.**
Do not damage the liner or its foils!
Cut/cut damage to the liner's foils can contribute to damage to the liner.

Opening the protective foil
Feel carefully where the liner itself ends.
Cut/cut with a good margin for liner.

Cut or cut gently!

Do not damage liner foils!

Inpipe Liner
Inpipe Flexliner
Inpipe Freeliner

Winch in place liner (WIP)

Appendix 9: Example Maintenance Checklist

Logotype

Checklist periodic check

Month: _____

For more information, see the installation equipment manual	Dag	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Light train: Legs, whole, correct size																																
Light train: Lamp housing, screws, IR																																
Light train: Light rail routes																																
Light train cable: Whole and clean																																
Light train tube: Seal rear cover																																
Step feeder: Clean inside, sharp edges																																
Step feeder: Lubrication system function																																
Step feeder; Bellows																																
Blue hose: Whole and clean																																
Bends / stos: Whole and clean																																
Brake line: Whole and clean																																
Straps: Whole and clean																																
Compressor: Fuel and function																																
Generator: Fuel and function																																

Månad	Jan	Feb	Mar	Apr	Maj	Jun	Jul	Aug	Sep	Okt	Nov	Dec
Light train puller: Speed control												
UV Lamps: UV effect												
Light train tube: Inside												
Pressure gauge: Calibration												
Step feeder: Attachment points												

År	2025
Installation Unit: Inspection by Inpipe	