

VYLON[®] **SLIPLINER PIPE**

Installation Guide



Vylon[®] Pipe

Vylon® Slipliner Pipe Unloading/ Handling and Assembly Checklist

- Count and inspect each pipe shipment upon arrival. Discrepancies and/or damage should be noted on the Shipping Bill of Lading.
- In cases of damage, notify the carrier and file the claim per the carrier's procedures.
- Unload and handle the pipe with care.
- To avoid damage, do not drop the pipe or roll it off the truck.
- Use only nylon slings when handling pipe.
- Do not drag the pipe on the ground.
- Inspect the barrel for damage.
- Use 8 foot long forks spread to a minimum of 6' wide to unload Vylon® Slipliner Pipe. (Note: Maximum fork thickness should not exceed 2".)
- Prior to assembly of the flush design, anti-disengaging PVC coupler clean both ends of the pipe and lubricate the gasket only and not the adjoining coupler.
- Assembly Method: Use a push ring inserted into the female end of the pipe to assemble pipe joints and when pushing pipe. The previously installed pipe joint protruding from the host pipe must be restrained to assemble the following joint. Pipe joints can be restrained with air bags in the annular space at approximately the two o'clock and ten o'clock positions. Contact your Vylon® representative for a source for air bags.
- Follow safe trenching, confined space, and installation practices.
- All Vylon® Pipe products are manufactured with a tolerance of +/-1" on length and no more than 5% of the pipe will have a tolerance of +1" to -3". If an exact run length is required it is recommended that each piece be measured.

Call your local Vylon® Pipe sales representative for further assistance.

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Introduction

This guide is written specifically for installers and those who supervise the unloading, handling, installation, and testing of Vylon® Slipliner Pipe. This guide is based on the experience of Vylon® Pipe on projects that utilized Vylon® Slipliner Pipe. As every project is unique, these instructions DO NOT cover every situation, but should be used as a tool in planning for pipe installation. Careful attention to the project specifications and Vylon® Pipe's installation recommendations will aid the installer in completing a successful project.

1. Inspection When Received

Each pipe shipment should be inspected with care upon arrival by the owner, contractor, or field representative. It is the responsibility of the consignee to make certain that there has been no loss or damage in transit. The shipment should be checked against the Bill of Lading. Any discrepancy or damage should be reported to the carrier with appropriate notations made on the delivery receipt. File a claim with the carrier as Vylon® Pipe is not responsible for damage in transit.

Inspection Checklist

- Upon arrival of each pipe shipment walk around the entire shipment to inspect that it has arrived intact and undamaged.
- If the shipment has shifted check to see that the gaskets have not been damaged. Carefully inspect each piece (interior and exterior) as it is unloaded.
- Check the total quantities of each item delivered against the Bill of Lading (diameter and quantity of pipe, lubricant, etc.)
- **Any damaged or missing items must be noted on the shipping Bill of Lading.**
- **If damage exists, notify the carrier immediately and file the claim in accordance with the carrier's procedures.**
- Retain the damaged material. Please follow the carrier's procedures for replacement.
- Replacement of damaged material and shortages are not automatically shipped. Please order through a local Vylon® Pipe sales representative or distributor.

2. Unloading

Pipe should be removed in units (bundles or crates) using mechanical equipment. Remove restraints that bind the units to the truck. **Do not cut the bands that hold each unit together.** Unload the units by rows using a forklift or front-end-loader equipped with fork extensions long enough (8' is recommended) to reach beyond the last pipe in the unit. 54" pipe should be unloaded as described separately for the 54" pipe unloading instructions. Maximum fork **thickness** should not exceed 2". **Do not roll the pipe off the truck. Do not handle units with cables or chains or attach cables to unit frames for lifting.** Units should be stored on level ground. Vylon® Pipe dimensions, weights, and shipping quantities can be found on the last page of this guide.

3. Cold Weather Handling

As the temperature approaches and drops below freezing the flexibility and impact resistance of any plastic pipe is reduced. **Extra care should be used in handling Vylon® Slipliner Pipe during cold weather.** Regardless of the temperature, handle Vylon® Slipliner Pipe with nylon slings.



4. Storage

Pipe should be stored in units on a flat base. Pipe that has been stored for extended periods of time may have reduced impact strength. Other physical properties such as tensile and flexural strength are unaffected by prolonged storage. If the pipe is to be stored exposed to sunlight for more than twelve months it should be covered with canvas or other material opaque to ultraviolet light. The cover should be light colored to limit heat build-up. Prior to using pipe that has been stored outdoors for extended periods the rubber gaskets at the end of the pipe should be inspected for cracking. Surface crazing is cosmetic and does not impair the performance of the gaskets.

5. Recommendations

1. The recommended maximum pushing load is 25,000 lbs. based on a 2 to 1 factor of safety. Applying too much load can damage the pipe. Curves, debris in the invert and offset joints can cause the force required for pipe insertion to increase.
2. A safety cable should be attached to the pipe at all times until the entire sliplining process is completed and the pipe has been anchored. This should be used on both upstream and downstream pushes. This will allow the entire length of the line being inserted to be pulled back should an obstruction be encountered.
3. Handle the pipe with care. Although the pipe is made of PVC, it can be broken and damaged. Care should be used when lowering pipe into the pit.
4. Depending on the level of flow Vylon® Slipliner Pipe can be neutrally buoyant. When placing the pipe in a cradle with flow the pipe must be sunk. The best method is to place the upstream end of the pipe down first allowing the flow to sink the pipe.
5. Use care when aligning the pipe and homing the joint. A smooth, consistent mechanical force against the push ring will yield the best results. Severe angles or offsets in the cradle area will make liner pipe assembly more difficult. Vylon® Slipliner Pipe has a flush design, anti-disengaging PVC coupler with an internal restraining ring. An audible locking sound will be heard when the coupler is properly engaged. Some lateral movement within the joint is to be expected and desired because that allows movement around small obstructions or slightly misaligned areas.



6. Immediately upon completing installation of the pipe it should be anchored to prevent movement. This is accomplished by pulling back on the safety cable into the pit and securing but not moving the installed pipe string. Block the downstream and upstream ends of the pipe ends with wood wedges. Air bags may be used on a temporary basis until the wood wedges are securely in place. NOTE: At no time after installation of the liner pipe in live flow shall the liner pipe be left unrestrained.

6. Prior to Sliplining

1. **Field verify** the size of the existing pipe, ovality, alignment, or other dimensional constraints. Projects with severely deflected pipe or tight curves may not be suitable for sliplining. However, short lengths are available from Vylon® that may allow some curves to be passed successfully through annular deflection in each joint.
2. Inspect the line using remote controlled television or other inspection equipment. Watch closely for offset joints, articulated joints, and protruding laterals, etc. It is best to perform this inspection at times of lowest flow or control the flow to get the maximum amount of information about pipe condition. Cleaning the line just prior to videotaping will also aid in assessment.
3. Review the as-built drawing and compare to the video tapes verifying condition of the pipe, location of laterals, curves, offset joints, etc.

Also use the drawings and video to select locations for insertion pits. Check the alignment of manholes if the project will allow for pushes through the manholes. If manholes were cast in place, make sure the channel or invert will not restrict the passage of the slipliner.

4. Monitor and make provisions to control the flow in the line as necessary for an optimum and efficient sliplining or conduct the sliplining operation during optimum flow periods. Ideal conditions are when the flow is at a depth of one-third full flow in the host pipe.
5. **Clean the existing line thoroughly.** Not cleaning the host pipe can lead to debris collecting under the slipliner pipe causing the joints to become lodged. This may lead to additional insertion pits being required.
6. Typical push lengths are 1,000 feet from each pit, but longer pushes are possible if conditions allow. The cable insertion method works well in that forces are evenly distributed on the pipe as it is inserted. See Figure 1.

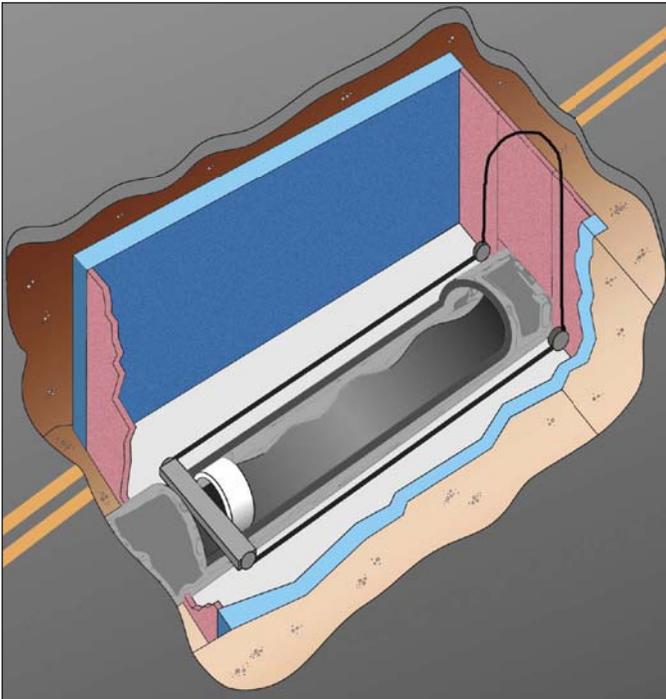
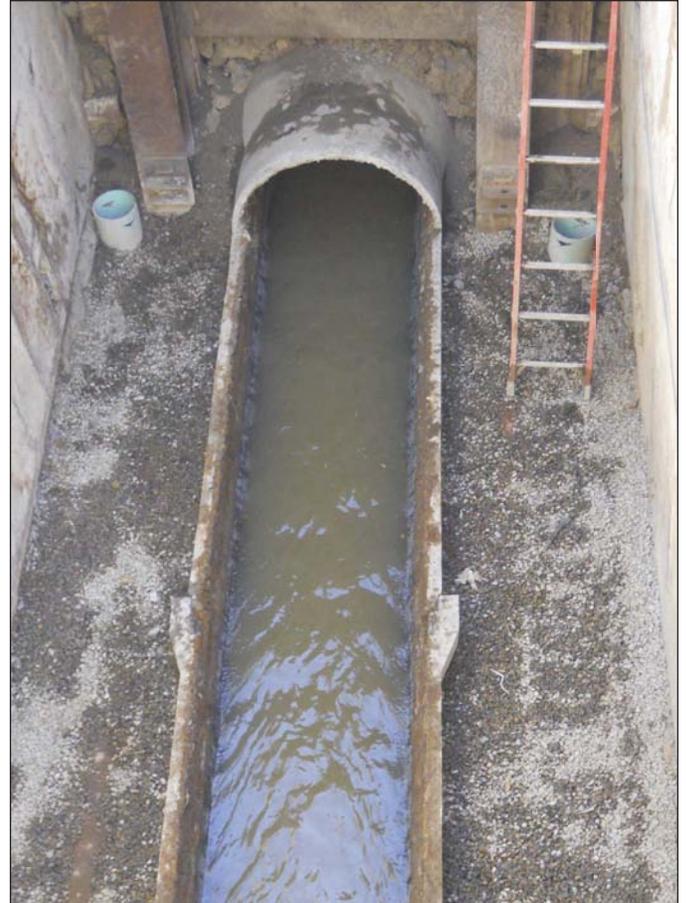


Figure 1

7. Dig the insertion pit and remove the top half of the existing pipe. The pipe assembly area of the insertion pit is called the cradle. **The cradle must be straight, level and smooth for easy joint assembly and insertion into the host pipe.** The length should be at least 7' longer than the individual slipliner pipe length. The pit width should be 2' wider than the existing pipe on each side. If working from inside an existing structure, check the cradle area. Remove any invert, bench or other obstruction that may interfere with the sliplining process.
8. Pull a test mandrel or proof piece through the pipe to verify that the liner pipe is properly sized and that the line is clean. **It is recommended that a mandrel made from steel be used and that it be the same length as an individual length of slipliner and about 0.50" larger in OD than the maximum OD shown for the pipe.** Please refer to the dimensional information found on the last page of this guide.
9. A push ring is required for pipe installation. A lightweight push ring can be purchased from Vylon® Pipe. These rings are highly recommended over push rings made of steel or other materials. Metal rings tend to be both heavy and difficult to handle.



7. Sliplining

1. Always lead with the gasketed end of the pipe.
2. Always clean and lubricate the gasket prior to insertion or joint assembly. Use subaqueous lubricant supplied by Vylon® Pipe.
3. A safety/restraining cable should be used and installed on the outside of the first piece of pipe. The cable will be continuously installed along with the section of pipe being lined running in the annular space (the space between the liner pipe and host pipe). A safety cable should be used for both upstream and downstream pushes.
4. Insert the first piece of pipe into the existing host pipe leaving approximately 2-3 feet protruding into the pit area.
5. To assemble the joints the previously installed pipe must be restrained or anchored. An inflatable air bag system is generally used and is fast and easy.
6. The air bag is used by placing the bag between the outside of the slipliner and the inside diameter of existing host pipe at the ten and two o'clock positions, see Figure 2. After placement, inflate the bag with enough air pressure to prevent the previously installed slipliner pipe from moving during joint assembly. Do not over inflate as this can cause the pipe to become oval and make assembly difficult. Air bags shall be operated using a single controller (deadman controller) which inflates both air bags at the same time. This will insure that the liner pipe remains centered and down in the invert during the joint assembly. Contact a Vylon® Pipe representative for air bag sources.
7. Vylon® Slipliner Pipe has a flush design, anti-disengaging PVC coupler with an internal restraining ring. An audible locking sound will be heard when the coupler is properly engaged. Some lateral movement within the joint is to be expected and desired because that allows movement around small obstructions or slightly misaligned areas.
8. Release the pipe restraint and push the liner pipe into the host pipe leaving approximately 2-3 feet protruding into the pit.
9. Place the next piece of pipe in the cradle and continue steps 3–5, until the entire segment to be sliplined is completed.
10. When pushing upstream against the flow the slipliner pipe may be lifted off the invert by hydrodynamic forces. To prevent this weight may need to be added to the front end of the first piece of slipliner pipe.



Figure 2



Figure 3

8. Bulkheads

The order of constructing the bulkheads and reconnecting the laterals may vary depending on job conditions.

Bulkheads are constructed at the manholes or the ends of the slipliner pipe. The bulkhead stops the flow from entering the annulus between the host pipe and the slipliner pipe and isolates the annular space for grouting. The bulkhead also creates a seal to allow for annular space grouting. **The upstream bulkhead is built first, then the downstream bulkheads are constructed.**

A proper bulkhead will be watertight and will allow for grouting of the annular space as per project specifications.



9. Lateral Reconnections

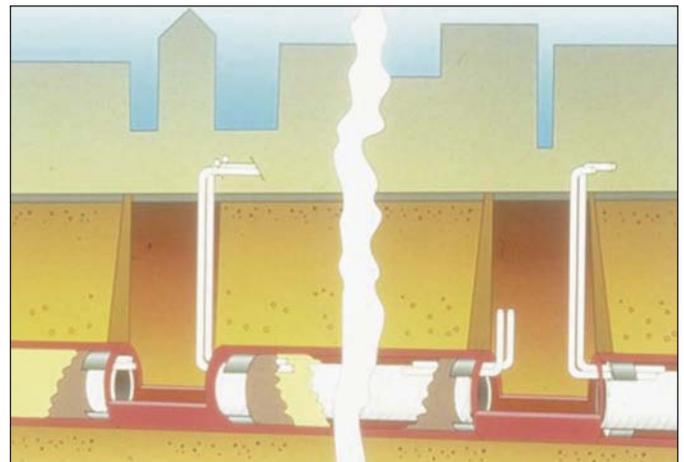
Lateral reconnections can be performed for all pipe diameters by using an Inserta-Tee® after digging down to each lateral.

Inserta-Tee is a three piece service connection compression fitted into the cored wall of the pipe. Inserta-Tee consists of a PVC hub, rubber sleeve, and stainless steel band. Inserta-Tee connections are available for 4", 6", 8", 10", 12", and 15" lateral sizes. The rubber sleeve has a self-fitting/sealing insert ring that aligns with the specified pipe. A sharp hole saw should be used to obtain the hole size specified by Inserta-Tee (operating the hole saw in reverse allows for an easier operation on Vylon Pipe). An improperly sized hole will not seal. After the hole is cored, the exposed interior channels of the pipe do not have to be sealed. Follow the recommended Inserta-Tee installation instructions for all other aspects of the installation.

10. Grouting

Annular space grouting should be completed per the project specifications and a qualified grouting contractor should be consulted in regards to how best meet these specifications. The following are just a few general characteristics of a typical grouting operation and also some comments as they pertain specifically to Vylon® Slipliner Pipe.

1. Engineered annular grout should consist of Portland cement, pozzolanic flyash and additives. Sand or other aggregate should be avoided.
2. The recommended minimum 28 day compressive strength of the grout should be 300 psi per ASTM C495.
3. The grout mix should be designed to completely fill the annulus between the slipliner pipe and the existing host pipe.
4. To allow for a minimum 2 to 1 factor of safety against unconstrained buckling, the total grout pressure should not exceed 10 psi. Gauges used for grouting should be certified per ANSI B40, Grade 2A and calibrated annually. Grouting pressure should be continuously monitored and recorded.
5. The grade of the slipliner pipe should match the grade of the existing host pipe. It is recommended that the slipliner pipe be filled with water to aid in preventing flotation as well as reducing any possible effects from the heat of hydration. In live sewers, a temporary weir may be used to partially back-up flow. The weight of the pipe plus the sewage or water inside the pipe must be more than the buoyant forces generated by the grout.



11. Tables of Dimensions

Table 1
Vylon® Pipe Diameter Dimensions

Size	Maximum O.D.	Nominal I.D.	Min. Inner Wall Thickness	Y Min. Profile Ht.
21"	22.290	20.75	0.080	0.680
24"	25.430	23.50	0.100	0.770
27"	28.430	26.50	0.115	0.866
30"	31.430	29.50	0.125	0.965
32"	34.130	31.50	0.150	1.150
36"	38.130	35.50	0.150	1.150
38"	40.200	37.50	0.180	1.350
42"	44.580	41.50	0.180	1.350
48"	51.020	47.50	0.210	1.535
54"	57.470	53.50	0.225	1.730

Table 2
Vylon® Pipe Weights and Shipping Quantities

Size	Weight Per Ft.	Weight Per 16' Joint	Feet/Truckload # Joints/ Footage (LF)	# Joints Per Bundle	# Bundles Per Truck
21"	15	240	48 / 768	4	12
24"	20	320	42 / 672	7	6
27"	23	368	36 / 432	3	9
30"	29	464	27 / 432	3	9
32"	36	576	24 / 384	3/5	6
36"	46	736	15 / 240	2/3	6
38"	57	912	12 / 192	2	6
42"	60	960	12 / 192	2	6
48"	81	1296	9 / 144	3	3
54"	114	1824	6 / 96	2	3

Note 1 – Maximum fork thickness should not exceed 2"

Note 2 – Fork Lengths should be at least 8' long for safe unloading