

**PWEagle**

**Easy-Liner™ Slipliner**  
Segmental Sliplining Pipe in  
24-, 27-, 30- and 36-inch Diameters



A Trenchless  
Technology for  
Rehabilitation  
of Live Sanitary  
Sewers, Storm  
Sewers and  
Culverts. A Great  
Carrier Pipe for  
New Casings.

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# Easy-Liner™ Slipliner

Easy-Liner™ is made from Ultra-Corr® PVC Pipe, a proven direct-bury sewer pipe product with a long-term history of success. Ultra-Corr® has a seamless uniform cross-sectional wall, radial corrugations that are perpendicular to the axis of the pipe and a smooth interior for excellent flow characteristics.

- Easy to assemble in sewer flow
- Constant O.D. and I.D.
- Gasketed joining system assures zero leakage
- Restrained joints
- Up to 5° articulation
- Sections are easily restrained during assembly
- Will handle up to 20,000 lbs of pushing force



Radial corrugations are perpendicular to the axis of the pipe. A smooth interior provides excellent flow characteristics.



Integrated Quick Link snap hooks allow joints to articulate up to 5° and ensures a sound connection.

## Exceeds All Rehabilitation Objectives | Full-strength

### Easy-Liner™ in Casing Pipes

Casing pipes can be reduced in diameter when low profile Easy-Liner™ is used as a carrier pipe. Direct-bury projects that have jack-and-bore casing sections under railroads, interstates or other structures can use Ultra-Corr® direct bury and Easy-Liner™ Slipliner on the same job because both interface well. Casing spacers can be used to center Easy-Liner™ in the casing pipe.

### Culvert Sliplining

The lightweight design and easy joint assembly make Easy-Liner™ an ideal pipe for culvert rehabilitation. A come-along for pipe assembly and a small backhoe for lifting and pushing the pipe is normally all that is needed. The Easy-Liner™ should be braced for alignment prior to joint assembly and during installation. Most short pushes can be made by hand. Grouting is recommended to stabilize and strengthen the system. When doing multiple culverts, use the piece of pipe left over from cutting the pipe to fit on the first culvert as a starter piece for the next culvert and so on. This procedure will eliminate the need to order special lengths for each culvert.

### Sewer Sliplining

Easy-Liner™ can be used to rehabilitate concrete, clay tile or brick sewer lines that have deteriorated over time due to corrosion, or

have experienced joint infiltration. These sewer lines can be sliplined using Easy-Liner™ with minimal equipment and without by-pass pumping of the sewer main. Easy-Liner™ Slipliner's shorter lengths (12') enables a sewer line to be sliplined with smaller entry pits, decreasing property damage and traffic obstructions. Once the existing sewer main has been prepared for lining, Easy-Liner™ Slipliner's light weight enables the construction crew to use live sewer flow to float the liner pipe downstream to the manhole. As the joints are assembled in the pit, Easy-Liner™ Slipliner's restraining cable system will keep the joints together while being pushed into the host sewer pipe. Existing service connection can be made externally using the Inserta-Tee, and then the liner can be grouted in place. The new sewer line is now corrosion resistant, has improved flow characteristics and has no joint infiltration problems. (See Easy-Liner™ installation section for more detailed construction requirements).

### Hydraulic Improvement

Easy-Liner™ has an ultra-smooth, glossy interior with a Manning's "n" of 0.009, which provides a significant hydraulic improvement when sliplining concrete or clay pipes. A deteriorated concrete host pipe (RCP) will have a Manning's "n" of about 0.015 to 0.018, and corrugated metal pipe (CMP) has a Manning's "n" of about 0.018.

#### Hydraulic Improvement

Host Pipe Nominal ID (inches)	Easy-Liner™ Nominal ID n = .009 (inches)	Percent Comparison RCP n = .015	Percent Comparison CMP n = .018
27	24	115%	135%
30	27	120%	145%
36	30	100%	115%
42	36	105%	125%

#### Formula used to calculate improved flow:

$$\% \text{ of Improved Flow} = \left[ \frac{\text{"n" Host Pipe}}{\text{"n" Easy-Liner™}} \right] \times \left[ \frac{\text{ID Easy-Liner™}}{\text{ID Host Pipe}} \right] 2.67$$

## Restrained Joint

A 1/8" steel cable (2,000 lb. test) is attached to each end of Easy-Liner™ at the factory. After field joint assembly, the two cable loops from both sides of the joint are connected with a Quick Link. The resulting restrained joint will articulate up to 5 degrees.

## Host Pipe Preparation and Easy-Liner™ Installation

Prior to ordering sliplining materials, the contractor should measure the inside diameter of the host pipe and then TV the line. The host pipe should be cleared of any obstructions, solids, offset joints, protruding taps, collapsed pipe, etc. **This is not an option!** Pit locations are often considered based on this data.

Insertion pits should be located considering conditions of the existing pipe, directional changes, surface conditions or pushing distances. The number of insertion pits may be reduced by sliplining in both directions from a single insertion point.

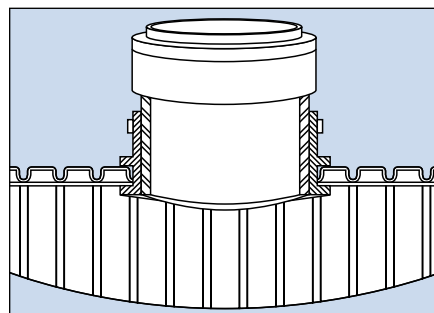
The insertion pit should be long enough to accommodate a complete length of sliplining pipe plus at least five feet. The width of the insertion pit should be sufficient to allow workers enough room to remove the crown of the existing pipe and to install the sliplining pipe (usually a minimum of two to three feet on each side of the existing pipe with a 12" layer of clean crushed rock as a working surface). A trench box or sheeting must be used to provide a safe working environment.

A steel cylinder slightly larger than the outside diameter of the Easy-Liner™ Sliplining pipe (at least 1/4") and approximately six feet long must be pulled through the host pipe prior to any insertion attempts. If there are sags, depressions or slight bends in the line, a longer steel cylinder should be pulled through the line to verify that Easy-Liner™ will fit. A baffle can be placed in the middle of the cylinder to catch any material left over from the original cleaning.

By-pass pumping is not required for the installation of Easy-Liner™ Sliplining pipe. The bell end of the lead pipe should be removed at the first whole corrugation to create a natural bevel to ride over small imperfections in the host pipe. This piece should be inserted into the host pipe with enough of the pipe exposed so that it can be restrained by one of the following methods:

- A "horseshoe" cut from a piece of 1/4" steel plate or 3/4" plywood can be slipped between the exposed corrugations and pressed against the cut edge of the top half of the host pipe.
- A chain can be wrapped around the profile and anchored to the trench box.

The spigot is then lubed (use a subaqueous lubricant when water is present) and the next piece of Easy-Liner™ is inserted, spigot into bell. The horseshoe or chain is then removed, and force is applied (using a wide, thick board across the bell end of the pipe) to slide the Easy-Liner™ into the host pipe. If large forces are needed, a push ring should be used to press against the circumference of the Easy-Liner™ uniformly to prevent damage. This procedure is repeated until the entire line is sliplined. Sliplining may be performed either upstream or downstream. When the host pipe is half full of water, Easy-Liner™'s weight is reduced by buoyancy to about 25% of its dry weight. This allows long pushing distances with minimal friction.



*Either Inserta-Tee® or a tapping saddle allow easy connections.*

## Reinstating Lateral Connections

Service laterals should be restored using tapping saddles or Inserta-Tee fittings by point excavation before grouting.

## Bulkheads

Bulkheads must be constructed in sequence from upstream to downstream allowing sewage trapped in the annulus to escape. If annular grouting is to be performed, grout tubes, ventilation tubes and drainage tubes must be constructed into the bulkheads.

## Grouting

The annulus between the Easy-Liner™ and the host pipe may require grouting. Always grout the annulus if the host pipe is significantly deteriorated. Grout will stabilize and add strength to the finished system. The grout should consist of Portland cement, pozzolanic fly ash and/or foaming agents and water. Cellular grout should weigh about 55 pounds per cubic foot. The grout should have a compressive strength after 28 days of between 100 and 300 psi. It should pass through a flow cone in less than 20 seconds for proper viscosity. No aggregates or sand should be used in the grout mix. With annular spaces of more than three inches, flotation of the slipliner should be taken into consideration. For very large annular spaces, heat of hydration should also be considered. Do not exceed 5 psi during grouting.

## Encasement

At points where Easy-Liner™ is exposed (service connections, insertion pits, etc.), the liner pipe can be backfilled using the same procedures as any high stiffness, flexible, direct bury pipe. Particular care should be taken to ensure proper compaction beneath lateral connections in order to prevent stress at the connections. PVC couplings and gaskets are available for closures at pit locations.

## Dimensions & Weights

Pipe Dimensions & Weights			
Nominal Diameter (inches)	Outside Diameter (inches)	Inside Diameter (inches)	Weight (lbs/ft)
24	25.58	23.47	19.0
27	28.86	26.44	21.0
30	32.15	29.47	27.0
36	38.74	35.47	38.0

## Short Form Specifications

The following guide specification may be used to specify Easy-Liner™ Sliplining pipe in rehabilitation and carrier pipe applications.

### Guide Specification for Profile Wall Sliplining Pipe

The pipe shall be corrugated PVC meeting the requirements of ASTM F 794 or ASTM F 949. The joint shall be designed to provide a constant inside and outside diameter. A gasketed joint on each coupling shall be provided to assure zero leakage. The joint shall meet the requirements of ASTM D 3212. The joint shall be capable of being restrained. The pipe shall have a minimum pipe stiffness of 46 psi when tested in accordance with ASTM D 2412. The pipe shall have a seamless uniform cross-sectional wall with radial corrugations that are perpendicular to the axis of the pipe and a smooth interior for excellent flow characteristics. The pipe shall be green in color.

By placing the above paragraph in your standard specification, you specify Easy-Liner™ Sliplining pipe and all of its superior features and benefits.

## Reference Specifications

- ASTM D 1784** Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds
- ASTM D 2412** Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading
- ASTM D 3212** Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
- ASTM F 477** Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
- ASTM F 794** Standard Specification for Poly(Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter
- ASTM F 949** Standard Specification for Poly(Vinyl Chloride) (PVC) Corrugated Sewer Pipe With a Smooth Interior and Fittings

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