



**CONTECH**  
ENGINEERED SOLUTIONS

A2™ Liner PVC  
Trenchless Technology

**CONTECH**  
**PIPE SOLUTIONS**

# A2™ Liner Restores Deteriorated Sewers

## Cost-Effective Rehabilitation

The increasing rate of sanitary and storm sewer deterioration requires an efficient and cost-effective rehabilitation solution. Contech A2™ Liner uses proven trenchless installation methods to slipline existing sewer lines without the disruptions associated with open trenching—while increasing productivity and lowering costs.

## Proven Trenchless Installation Methods

### A2™ Liner is Less Costly Than Cured-In-Place

A2™ Liner provides a tremendous cost savings over cured-in-place pipe—up to 50% depending on the installation. Relining with A2™ Liner eliminates costly bypass operations because normal flow is maintained. Additionally, sliplining with A2™ Liner gives you a new pipe with direct-bury strength of 46 psi stiffness—which means it doesn't depend on the host pipe for long-term structural performance as cured-in-place liners do. Plus, the double-wall design provides extra stiffness for improved shape-control during installation and grouting.

### Restores Hydraulic Capacity

With a Manning's "n" of .009, A2™ Liner restores hydraulic capacity to your sewer. Its glossy-smooth interior allows the relined pipe to carry as much or more flow than the existing host pipe, even with diameter reductions (see page 3).

### Easy Installation


Contech provides A2™ Liner in 12-36 inch diameters and lengths of 10 and 20 feet. Custom lengths as short as 2.5 feet are available for installation within small insertion pits or manholes. Field installations demonstrate that workers can slipline with A2™ Liner at a rate in excess of 200 feet per hour. And because it is lightweight, you can use smaller, less expensive equipment for handling and joining—another savings.

## Dependable Joint Tightness

A2™ Liner's patented gasketed STAB-JOINT® meets the joint tightness test requirements of ASTM D3212. It is also designed to remain watertight up to 5 degrees angularity. Unlike other gasketed joints for segmental sliplining, the A2™ Liner STAB-JOINT ensures a positive connection even when sliplining misaligned, obstructed or curvilinear sewers. Additionally, this joint system incorporates a PVC coupling that maintains a constant outside and inside diameter.

## High-Quality PVC

Manufactured exclusively from low fill, cell class 12454 PVC compound—the most widely accepted sewer pipe material—A2™ Liner provides excellent durability and resistance to abrasion. It withstands corrosive attack from both acidic and alkaline soils and is unaffected by chemicals found in normal sewage.



The gasketed coupling of A2™ Liner allows sliplining of deteriorating pipes without diverting the flow of the existing sewer.



# A2™ Liner Increases Hydraulic Capacity

When reinforced concrete and vitrified clay pipe have offset joints, cracks, spalling or protrusions, there is greater resistance to flow, reducing hydraulic capacity. Significant hydraulic improvements are achieved when these deteriorated pipes are sliplined with A2™ Liner. Its Manning's "n" of .009 can actually result in increased flow capacity and higher flow velocities for improved self-cleaning.

The Manning equation can be used to determine the flow capacities for circular pipes before and after rehabilitation with A2™ Liner:

$$\% \text{ Existing Flow} = \frac{n_{\text{existing}}}{n_{\text{A2™ Liner}}} \left[ \frac{D_{\text{A2™ Liner}}}{D_{\text{existing}}} \right]^{8/3}$$

Table 1 compares the flow of existing concrete pipe after it is relined with A2™ Liner, in which:

n = Manning's coefficient:

A2™ Liner "n" = .009

Existing RCP "n" = 0.015

D = inside diameter

This analysis is based upon closed-system flow for sewers or outlet-controlled flow for culverts.



Existing Pipe Diameter (inches)	A2™ Liner Diameter (inches)	Percent Existing Flow*
15	12	92
18	15	103
21	18	111
24	21	117
27	24	122
36	30	103
42	36	111

\* Sliplining with A2™ Liner can actually **increase** the hydraulic capacity of exist RCP drainage systems.

# A2™ Liner Installation Procedures

## Sliplining Considerations

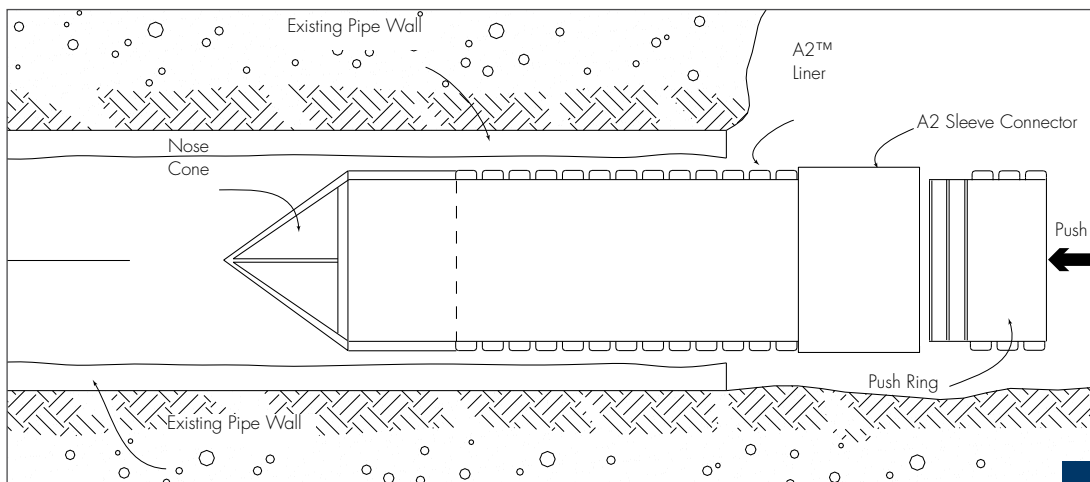
- Inspect and clean the existing pipeline and verify the liner clearance prior to sliplining.
- Remove any obstructions, protrusions, joint offsets, debris, out-of-roundness or other irregularities that could damage or prohibit passage of the liner pipe.
- Install the liner pipe by either pushing or pulling it through the existing pipe. The leading pipe spigot end is usually fitted with a nose cone to help the liner pipe ride over small joint misalignments and other small obstructions or inconsistencies in the existing host pipe.
- The pipe jacking/pushing loads should be monitored. Excessive force could telescope pipe joints or damage the liner pipe. The safe compressive/jacking loads for A2™ Liner are listed in Table 2. The pushing distances shown are based on the following:
  - Dry conditions
  - Unobstructed, clear, straight pushing/pulling
  - Coefficient of sliding friction – 0.75
- When required, service reconnections can be accomplished by small point repairs using PVC tapping saddles or INSERTA TEE® fittings.
- The annular space between the liner pipe and the host pipe is usually filled with cement or cellular grout, depending on site conditions. Low-strength grouts (150-1,000 psi compressive strength) are typically used.

Pipe Diameter (inches)	Safe Compressive Jacking Loads (pounds)	Unobstructed Pushing Distances (feet)
12	3,200	1,000
15	9,100	1,250
18	14,000	1,250
21	19,000	1,250
24	23,830	1,250
30	30,900	1,250
36	37,000	1,500

\* For straight pushing of A2™ Liner

\*\* Greater pushing/pulling distances are possible depending on site conditions

Additional installation instructions can be found in the "Instructions for Unloading, Handling and Installing Contech A2™ Liner" booklet available from your local Contech representative.



A2™ Liner insertion detail

# A2™ Liner Rapidly Renovates Culverts

In addition to repairing sanitary and storm sewers, the design features of A2™ Liner design features make it the obvious choice for relining distressed culverts. The corrugated exterior design provides high strength and high stiffness without the additional weight of solid wall pipe alternatives.

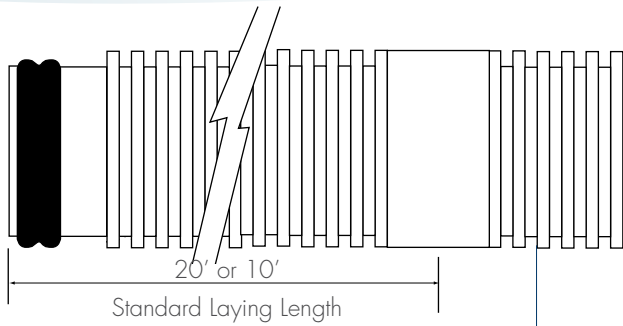
A2™ Liner's lightweight design, coupled with a unique gasketed STAB-JOINT, makes joining easy. Lubricant, two chains and one or two come-alongs are usually all that is required to join sections. The light, easy-to-handle sections allow for maneuvering in tight workspaces. They can be installed either manually or with assistance from a backhoe.

In most cases, a small crew with minimal equipment can reline at a fraction of the time and expense of replacement. And because pavement cuts are usually eliminated, traffic disruption in congested areas and the potential for future pavement settlement is minimized.



**SMALL CREWS AND MINIMAL EQUIPMENT REQUIRED**

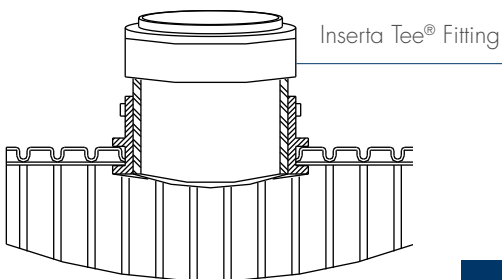
# A2™ Liner Product Details



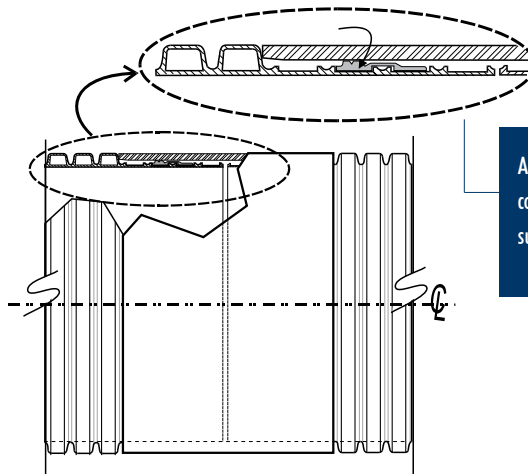
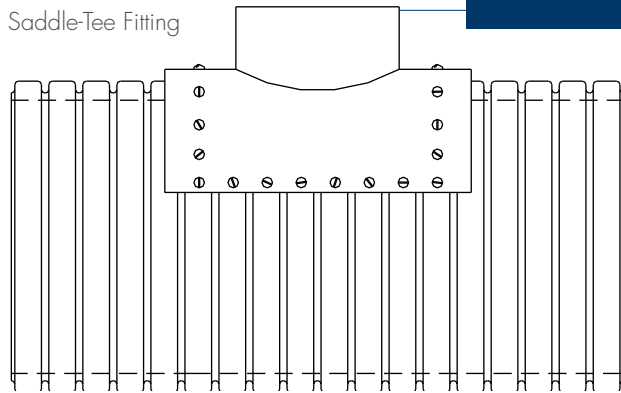
A2™ Liner is available in standard lengths of 10 and 20 feet. 2.5-foot lengths are available for insertion via manholes.

**Table 3**  
A2™ Liner  
Sizes & Dimensions

Nominal Pipe Diameter (inches)	Average O.D. (inches)	Average I.D. (inches)
12	12.8	11.7
15	15.7	14.3
18	19.2	17.6
21	22.6	20.7
24	25.6	23.5
30	32.2	29.5
36	38.7	35.5



Either INSERTA TEE® or saddle tee fittings allow easy-to-make connections for A2™ Liner. Saddle tee fittings employ stainless steel fasteners.



A2™ Liner's patented STAB-JOINT coupler fits flush with the outer wall surface for easy insertion.

# PVC Corrugated Sewer Pipe with a Smooth Interior for Sliplining Installation

## PART I GENERAL:

### 1.01 PVC PROFILE WALL SEWER PIPE

This specification covers PVC Corrugated Sewer Pipe With a Smooth Interior for Sliplining Applications.

### 1.02 REFERENCES

- A. ASTM F949—Standard Specification for Poly (Vinyl Chloride) (PVC) Corrugated Sewer Pipe With a Smooth Interior and Fittings.
- B. ASTM D3212—Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
- C. ASTM D1784—Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
- D. ASTM D2412—Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading.
- E. ASTM F477—Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
- F. ASTM D2122—Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings.

### 3.03 SPECIFICATIONS

The specifications contained herein govern, unless otherwise agreed upon between purchaser and manufacturer.

## PART 2 PRODUCTS

### 2.01 MATERIALS

- A. PVC Compound: Pipe and fittings shall be made of PVC compound having a minimum cell classification of 12454 in accordance with ASTM D1784. Additional fillers (such as calcium carbonate for modulus enhancement) that lower the tensile strength of the compound and change the minimum cell classification shall not be allowed.
- B. Elastomeric Gaskets: Gaskets shall meet the requirements of ASTM F477 and be suitable for the service intended.

### 2.02 MANUFACTURE AND CONSTRUCTION

- A. Pipe: Pipe shall be manufactured as a single extrusion of the smooth inner and the corrugated outer walls. The corrugated exterior profile shall be annular and seamless.
- B. Joints: Pipe shall be field connected with molded or fabricated PVC couplings. Couplings shall not increase the outside diameter or reduce the inside diameter when assembled. The joint shall utilize elastomeric sealing gaskets as the sole means to maintain joint water tightness and shall meet the requirements of ASTM D3212.
- C. Fittings: Couplings, elbows, reducers, tees, wyes, laterals and other fittings shall be capable of withstanding all operating conditions when installed. They may be molded or fabricated.
- D. Manufacturer: The acceptable manufacturer shall be Contech Engineered Solutions LLC.

### 2.03 DIMENSIONS

- A. Diameters: The actual outside diameters of the pipe barrel for 12"-36" nominal diameters shall be in accordance with ASTM F949.
- B. Lengths: Pipe shall be supplied in nominal lengths of 10 or 20 feet. When required by radius curves, pit size or sewer misalignment, etc., pipe shall be supplied in special lengths that are an even division of 20 feet. The minimum laying length shall be 2.5 feet.
- C. Wall Thickness: The minimum wall thickness shall be as stated in Table 1 of ASTM F949 when measured in accordance with ASTM D2122.
- D. Sockets: All socket (bell) dimensions shall be sufficiently deep to allow for maximum joint angularity without joint separation. The minimum socket depth shall be 4.25 inches. The outside diameter of sockets shall be equal to the pipe outside diameter.

### 2.04 TESTING

- A. Pipes: Pipes shall be manufactured and tested in accordance with ASTM F949.
- B. Joints: Joints shall meet the requirements of ASTM D3212 and shall remain watertight at 5 degrees angularity.
- C. Stiffness: The minimum pipe stiffness shall be 46 psi when tested in accordance with ASTM D2412.

### 2.05 OWNER INSPECTION

- A. The owner or other designated representative shall be entitled to inspect pipes or witness the pipe manufacturing.

### 2.06 PACKAGING, HANDLING AND SHIPPING

- A. Packaging, handling and shipping shall be performed in accordance with the manufacturer's instructions.

## PART 3 EXECUTION

### 3.01 INSTALLATION

- A. Unloading, Handling and Installation: Unloading, handling and installation of pipe and fittings shall be in accordance with the project plans and spec and the manufacturer's requirements booklet: "Instructions for Unloading, Handling and Installing Contech A2™ Liner."
- B. Pipe Grouting: Annular space grouting shall be in accordance with project plans and specs and the manufacturer's requirements. The grouting shall not damage the pipe liner.
- C. Acceptance: Acceptance of the installed liner shall be based on a video taped inspection after installation to assure that all joints are properly assembled and that no damage exists.



Contech® Engineered Solutions provides innovative, cost-effective site solutions to engineers, contractors and developers on projects across North America. Our portfolio includes bridges, drainage, erosion control, retaining wall, sanitary sewer and stormwater management products.



STORMWATER  
SOLUTIONS



PIPE  
SOLUTIONS



STRUCTURE  
SOLUTIONS

Contech Engineered Solutions provides site solutions for the civil engineering industry. Contech's portfolio includes bridges, drainage, retaining walls, sanitary sewer, stormwater, erosion control and soil stabilization products.

**For more information, call one of Contech's Regional Offices located in the following cities:**

<b>Ohio (Corporate Office)</b>	<b>513-645-7000</b>
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Florida (Orlando)	321-348-3520
Maine (Scarborough)	207-885-9830
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