

Snap-Tite Specification

Material Requirement

These specifications cover the purchase of high density polyethylene (HDPE) pipe liners for lining existing culvert pipes. Pipe liners furnished to this specification shall meet or exceed all requirements.

Bidders are cautioned to read the specifications carefully, as there may be special requirements not commonly offered by the pipe liner manufacturer.

Pipe liner shall meet the following requirements and conform to the reference specifications:

The liner pipe shall be made of high density polyethylene resins in accordance with the requirements of ASTM D-3350. The Cell Classification will be 345464C and shall have the Plastic Pipe Institute designation of PE 3408.

Pipe liner shall be a Dimension Ratio (DR) of 32.5. The installed pipe shall have a smooth non-corrugated interior and exterior surface.

The PPL shall be capable of being joined into a continuous length by an interlocking method. The joints shall not create an increase in the outside diameter of the liner pipe to eliminate any coupling difficulties. The joints must be water-tight with gaskets that are capable of handling pressures up to 25 feet of head per ASTM D-3212. Each HDPE shall have a male and a female end. The supplier shall furnish a manufacturer's certification stating that the material in the pipe meets the requirements of ASTM D 3350 with a cell classification of PE 345464 C with the physical properties indicated above.

The supplier shall certify the dimensions meet the requirements of ASTM F 714.

Before inserting the liner pipe, the existing pipe must be cleaned if needed. All debris or other materials must be removed from the host pipe.

After the liner is in place, the area between the original pipe and the liner shall be completely filled with low density flowable fill of cellular grout.

SAMPLE SPECIFICATION

Sample Specifications for Snap-Tite Culvert Liners

This Specification is available at www.culvert-rehab.com in a downloadable word format form for this format and CSI format.

A grout specification is also available at www.culvert-rehab.com in a downloadable CSI word format.

- 1) **Description** — This Item shall govern for furnishing, installing, grouting and providing all labor, material and equipment necessary to rehabilitate existing culvert pipe by slip lining an existing culvert pipe with high density polyethylene (HDPE) pipe. The pipes shall be sizes, types, design and dimensions shown on the plans and shall include all connections, joints and other appurtenances as required to complete the work. The slip lining process will require the contractor to completely grout the annular void between the host and insert pipe. The grouting process shall be considered subsidiary to this item.
- 2) **Materials** — Unless otherwise specified on the plans or herein, culvert pipe renewal shall conform to the following: Snap-Tite® Culvert Liner as provided by ISCO Industries or approved equal.
 - A. Liner Material – High Density Polyethylene (HDPE) Pipe
 1. High density polyethylene pipe and fittings shall meet the requirements in the AASHTO M326-08 Specification.
 2. Raw Materials. The pipes and the fittings shall be manufactured from PE resin compounds, which conform to the requirements of cell class 345464C as defined and described in ASTM D 3350.
 3. HDPE Resin Specifications.

Property	Specifications	Unit	Nominal Value
Material Designation	PPI/ASTM		PE3408/PE3608
Cell Classification	ASTM D 3350		345464C
1. Density (3)	ASTM D 1505	Gm/cm³	0.955
2. Melt Index (4)	ASTM D 1238	gm/10 min.	0.11
3. Flexural Modulus (5)	ASTM D 790	psi	135,000
4. Tensile Strength (4)	ASTM D 638	psi	3,200
5. Slow Crack Growth	ASTM D 1693		
a. ESCR	ASTM F 1473	hours in 100% igepal	>5,000
b. PENT (6)	ASTM D 2837	hours	>100
6. HDB @ 73 deg. F (4)	ASTM D 1603	psi	1,600
7. UV Stabilizer (C)		%C	2.5%

- B. Designation of Type
 1. The HDPE pipes used for liners in gravity flow culverts shall be solid wall construction with mechanical end connectors, male and female.
 2. Individual liner section lengths shall be a minimum of 6-ft but shall not exceed 50 ft. unless pre-approved
- C. Pipe joints shall comply with ASTM D 3212 Standard Specification and gaskets must be installed on male ends per manufacturer’s recommendations for Joint tightness.
- D. Hydraulic flow characteristics for the liner pipe shall provide a Manning’s coefficient of n = 0.00914.
- E. Grouting Material – Contractor shall utilize material specifications for solidification of the annular void between host and the inserted liner with low density flowable fill or cellular grout. The cellular grout with a density between 40 and 80 lbs. per cubic foot may be used. Reduced density flowable fill grout with a density between 80 and 120 lbs. per cubic foot may be used.
- F. End Treatment – The upstream/inlet end of the new liner pipe shall be fitted with a flow enhancement device to reduce inlet control effects. The device shall be HDPE material, same as the liner pipe and have

a male connector included for connection to the liner pipe. The opening at the end of the device shall be larger than the ID of the host pipe. Test data shall be provided upon request to show improvement of flow by at least 10%. The device shall be the Hydro-Bell or approved equal.

3. Cleaning — The existing culvert pipe shall be cleaned by whatever means necessary to remove all obstructions which may be encountered that would prevent insertion of the pipe liner into the host pipe as approved by the engineer. This work will not be paid for directly, but shall be considered subsidiary to this item

4. Construction

- A. Liner Pipe – Liner pipe shall be inserted and installed in accordance with manufacturer's recommendations. Slip liner pipe grade shall be maintained parallel to grade of host pipe.
- B. Grouting – Upon completion or partial completion of the slip lining process grouting will be required to be placed in the annular void between the insertion pipe and the host pipe. Cellular grout with a density between 40 and 80 lbs. per cubic foot may be used. Reduced density flowable fill grout with a density between 80 and 120 lbs. per cubic foot may be used. Project engineer shall state density of grout to be used on drawings or in specifications.

A detailed plan on holding the liner pipe on the invert of the host pipe shall be submitted to the engineer for approval.

The annular void shall be completely grout filled without deflecting the insertion pipe greater than 1.5 percent.

The contractor shall provide end seals at the open points of each run of pipe to be grouted.

Penetration of the host pipe shall be permitted for host pipe constructed with Corrugated Metal Pipe (CMP) to facilitate grouting of the annular void. Multiple fills pipes will be required.

The annular void shall be grouted solid by injecting grout from one end of the pipe run and allowing it to flow toward the other end. Venting of the annular void shall be performed to assure uniform filling of the void space during the grouting process.

An open ended, high point tap or equivalent vent must be provided and monitored at the bulkhead opposite to the point of grouting.

Pressure on the annular void shall not exceed 2 PSI to avoid damage to the liner pipe. Regardless of the pressure, the contractor shall be solely responsible for any damage or distortion to the insertion pipe due to the grouting process.

- C. Pipe Stockpiling and Handling – Pipe and fittings shall be stockpiled in a safe manner at each contractor staging area or pit location. The stockpiling shall be arranged to cause a minimum of interference to pedestrian and stored outside the safety clear zone of vehicular traffic. When handling slip lining pipe, the contractor shall take all precautions necessary to avoid damaging the pipe. Pipe with cuts greater than 10% of the wall thickness shall be rejected or replaced at the entire expense of the contractor.

5. Clean-up and Restoration — Upon acceptance of the installation work and testing, the contractor shall clean-up and restore the project area affected by operations as approved by the engineer.

6. Measurement — This item shall be measured by the foot. Such measurement shall be made along the flowline of the liner pipe complete in place. For multiple culverts to be lined, the measurement length shall be the sum of the lengths of each barrel, measured as prescribed above. The accepted quantities of pipe liner will be paid for at the contract unit price per linear foot for the size of the existing pipe in which the liner is installed, complete in place.

7. Payment — The work performed and the materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for as the unit bid for "Slip Lining Culvert Pipe" of the type, design (if required) and size specified. This price shall be full compensation for cleaning existing pipe; for furnishing, hauling, installing liner pipe and placing grout, all connections and for all labor, tools equipment, materials, clean-up and incidentals.