

## **SECTION 431 PIPE LINER**

### **431-1 Description.**

Rehabilitate pipelines, where indicated in the plans, by using any one of the materials listed below and in strict accordance with the manufacturer's recommendations.

### **431-2 Materials.**

**431-2.1 General:** Furnish certification that materials incorporated meet with the requirements of this Section.

**431-2.2 Flexible Polyester Felt Liner:** Use lining materials made from a polyester fiber felt tubing, lined on one side with polyurethane and fully impregnated with a liquid, thermosetting resin in accordance with the manufacturer's recommendations and meeting the requirements of ASTM D 638 and ASTM D 790.

When directed by the Engineer, prior to the installation of the lining material, furnish written guarantee that materials meet the aforementioned requirements.

**431-2.3 HDPE Pipe Liner:** Use a pipe liner that consists of either high density profile wall polyethylene pipe manufactured in accordance with ASTM F 894, or a high density solid wall polyethylene pipe manufactured in accordance with ASTM D 714 with an SDR of 21. Use polyethylene liners with a minimum pipe stiffness of 46 psi [320 kPa] when tested in accordance with ASTM D 2417, equivalent to an SDR of 21 in solid wall HDPE pipe. Use polyethylene material, HDB rated with a PPI material designation of PE 3408 and a material classification of Type III C5 P34 with a cell classification per ASTM D 3350 of 345434C.

**431-2.4 Corrugated HDPE Pipe Liner:** Use a pipe liner that consists of corrugated polyethylene pipe meeting the requirements of 948-2.3.

**431-2.5 PVC Pipe Liner:** Use a pipe liner that consists of polyvinyl chloride corrugated pipe with a smooth interior meeting the requirements of ASTM F 949, having a minimum pipe stiffness of 46 psi [320 kPa] when tested in accordance with ASTM D 2412. Use pipe and fittings homogeneous throughout and free from visible cracks, holes, foreign inclusions, or other injurious defects. Use pipe made of PVC compounds having a cell classification of 12454B as defined in ASTM D 1784.

### **431-3 Installation.**

**431-3.1 General:** Size the pipe liner to allow approximately 10% clearance between the host pipe and the liner OD. Unless otherwise approved by the Engineer, use a liner that will maintain flows equal to 100% or greater of the original culvert or pipe. Fill the void or annular space between the HDPE liner and the host pipe for a minimum of one pipe diameter or other distance as directed by the Engineer with a non-shrink hydraulic grout, meeting the requirements of Section 934. If the plans or Engineer so directs, grout the entire annular space. In this case, use a wet slurry grout and take care to keep pressures low to prevent collapse of the pipe liner.

**431-3.2 Flexible Polyester Felt Liner:** Install the pipe liner in strict accordance with the manufacturer's recommendations and as specified in the plans.

**431-3.3 HDPE Pipe Liner:** Install the pipe liner in strict accordance with the manufacturer's recommendations and as specified in the plans, with the following additional requirements. Join HDPE pipe by the butt or heat fusion method in accordance with ASTM D 2657, or ensure that the HDPE pipe has a positive mechanical joint in which the outside diameter and inside diameter joint surfaces are substantially flush with the pipe outside diameter and inside diameter. Provide a joint capable of being pulled, winched or pushed into the host pipeline without joint separation.

**431-3.4 Corrugated HDPE Pipe liner:** Install the pipe liner in strict accordance with the manufacturer's recommendations and as specified in the plans, with the following additional requirements.

When the HDPE pipe is joined, the connection at the joint shall not reduce the interior diameter while maintaining a constant outside diameter. The assembled joint shall meet the performance requirements of ASTM D 3212. The elastomeric sealing gasket shall meet the requirements of ASTM F 477. Each joint must be capable of being pulled, winched or pushed into the host pipeline without joint separation.

**431-3.5 PVC Pipe Liner:** Install the pipe liner in strict accordance with the manufacturer's recommendations and as specified in the plans, with the following additional requirements.

PVC pipe shall be connected with a PVC coupling utilizing elastomeric sealing gaskets. When joined, the coupling shall not reduce the interior diameter while maintaining a constant outside diameter. The assembled joint shall meet the performance requirements of ASTM D 3212. Elastomeric seals (gaskets) shall meet the requirements of ASTM F 477. Each joint must be capable of being pulled, winched or pushed into the host pipeline without joint separation.

**431-4 Method of Measurement.**

The quantity to be paid for will be the plan quantity, in feet [meters], of existing pipe measured from manhole to manhole along the centerline of the pipe, or from culvert end to culvert end along the centerline of the pipe, lined, installed, completed and accepted.

**431-5 Basis of Payment.**

Price and payment will be full compensation for all work specified in this Section, including all materials, tests, equipment, labor, repairs, and incidental items necessary for satisfactorily performing the work.

Payment will be made under:

- Item No. 431- 70- Pipe Liner - per foot.
- Item No. 2431- 70- Pipe Liner - per meter.