

SECTION 026612
GLASS FIBER REINFORCED LINER PIPE FOR SLIPLINING (S-67A)

1. SCOPE

- 1.1 This specification covers glass fiber reinforced plastic mortar pipe intended for use as a liner to rehabilitate existing pressurized pipelines conveying sanitary sewage, storm water and those industrial wastes and corrosive fluids for which the pipe is determined to be suitable.
- 1.2 The pipe furnished under this specification shall be a composite structure manufactured from thermosetting resin, glass fiber reinforcement and aggregate. The pipe shall have a chemical resistant resin inner surface liner meeting ASTM specification D-3754. This liner shall be capable of conveying sewage flows with a pH range lower than 3 and higher than 11.
- 1.3 Liner pipe furnished under this specification shall be furnished in classes designated as C150, intended to operate at up to 150 psig internal pressure.

2. MATERIALS

- 2.1 The structure of the pipe shall be a composite of resin binder, an aggregate filler and fiberglass reinforcement.

Resin - The resin shall be a thermosetting polyester or epoxy resin.

Aggregate - The aggregate shall be siliceous and conform to the requirements of the current specifications for concrete aggregate (ASTM C-33), except that the requirements for gradation shall not apply.

Fiberglass - The fiberglass reinforcement shall be a borosilicate "E" type glass roving with a polyester compatible finish.

Liner - The chemical resistant resin liner shall be a reinforced thermosetting resin without aggregate filler.

- 2.2 The gaskets used with this pipe shall conform to the requirements of ASTM F-477, "Specifications for Elastomeric Seals (Gaskets) for Joining Plastic Pipe." Gasket material shall be chemically resistant to the fluids described in Section 026612.1.2.

3. PHYSICAL REQUIREMENTS

- 3.1 Axial Compressive Strength - Each length of liner pipe shall have sufficient strength to withstand, without structural damage, an axial compressive proof load of 110% of the minimum longitudinal compressive strength shown in the beam strength requirements of ASTM D-3754. The pipe shall pass the hydrostatic soundness test after withstanding the axial compressive proof load.
- 3.2 Hydrostatic soundness - Liner pipe shall meet the requirements of ASTM D-3754.
- 3.3 Joints - The liner pipe shall be sealed with a solid, uniform cross section gasket conforming to Section 026612.2.2. The gasket shall be contained in a groove and shall not support the weight of the pipe when

two sections are joined. The joint assemblies shall be so formed that when pipe sections are drawn together, the pipe shall form a continuous watertight conduit, and shall provide for slight movements of any pipe in the pipeline due to contraction, settlement or lateral displacement.

- 3.4 Stiffness Factor - Liner pipe shall meet the requirements of ASTM D-3754.
- 3.5 Beam Strength - The beam strength of the liner pipe shall meet the requirements of ASTM D-3754. This is a design qualification requirement and a copy of the manufacturer's test report shall be the basis of acceptance.

4. DIMENSIONS AND PERMISSIBLE VARIATIONS

- 4.1 The nominal size of liner pipe furnished for this project will be 18 inch cast iron pipe equivalent diameter.
- 4.2 The inside diameter of the liner pipe at any point shall not vary from the nominal inside diameter by more than one percent or one quarter inch, whichever is greater.
- 4.3 The typical laying length of each liner pipe sections shall be 20 feet, plus or minus 2 inches. Other laying lengths will require the approval of the Engineer.
- 4.4 The average wall thickness of the pipe shall not be less than the nominal wall thickness published in the manufacturer's literature current at the time of purchase, and the wall thickness at any point shall not vary from the nominal by more than 10 percent.

5. WORKMANSHIP, FINISH AND APPEARANCE

- 5.1 The inside surface of each liner pipe shall conform to the requirements of ASTM D-3754 and shall be free of bulges, dents, ridges, or other defects that result in a variation of inside diameter of more than one-eighth inch from that obtained on adjacent unaffected portions of the surface.
- 5.2 Joint sealing surfaces shall be free of dents and gouges that will affect the integrity of the joints.
- 5.3 No glass fiber reinforcement shall penetrate the interior surface of the pipe wall.

6. CONSTRUCTION

6.1 General

The Contractor shall provide all necessary pits to completely reline the sewers. The location of any access pits shall be subject to the approval of the Engineer. The number of access pits shall be kept to a minimum.

Access pits shall be constructed to the minimum size necessary for insertion of liner pipe. All pits shall be constructed with properly applied vertical side support. At access pits, lateral service connections, and at all points where liner pipe is exposed, the Contractor shall encase liner and fittings as detailed in the plans.

Pipe and fittings shall be stockpiled in a safe manner at each Contractor

staging area or liner pit location. The stockpiling shall be arranged to cause a minimum of interference to pedestrian and vehicular traffic. No stockpiling will be permitted on the opposite side of the street from construction with prior approval of the Engineer. When handling liner pipe, the Contractor shall take all precautions necessary to avoid damage to the pipe. Dragging of the pipe over sharp objects shall be avoided. Pipe with deep cuts, scratches or gouges shall be rejected and replaced.

6.2 Liner Pipe Installation

Liner pipe grade shall be maintained equal to the grade of the sewer being relined. At times when work is not in progress for whatever reason, open ends of pipe or fittings shall be protected.

Pipe shall not be installed if the condition of the existing sewer line is unsuitable or if the weather is such that anticipated sewer flows will be in excess of those flows maintained during insertion.

The Contractor shall make all necessary arrangements and provide all necessary equipment to maintain sewage flows at all times. This shall be accomplished by allowing flows to pass around and through the liner pipes or by other means acceptable to the Engineer. The Contractor will be responsible for any necessary bypassing of sewage around the section of sections or line to be sliplined. Under no circumstances will dumping of raw sewage on private or City property be allowed. Bypass shall be made by pumping the sewage into a downstream manhole or adjacent system, or other methods as may be approved by the Owner and the Engineer. The pump and bypass line shall be of adequate capacity to handle the flow. If bypass pumping is not a continuous operation, flow through the sewer line shall be restored at the end of each work day. Complete plugging of the existing line will not be permitted unless adequate bypass capacity for anticipated flows is provided or other means of handling the flows is approved by the Engineer.

Cleaning - All lines to be rehabilitated shall be cleaned prior to the installation of the liner. The Contractor shall select the method of cleaning. The Contractor shall take such precautions as necessary to protect the line from further damage during the cleaning process and shall be responsible for repairing any such damages. All materials resulting from the cleaning operations shall be removed at the downstream manhole of the section being cleaned.

Television Inspection - Upon completion of the cleaning operation and prior to insertion of the liner material, a closed circuit television camera will be pulled through each line. The interior of the main shall be carefully inspected to determine the location and extent of any condition which may prevent proper installation of lining materials.

A television report log and video tape shall be furnished on each line inspected. The observations are to be recorded on a television inspection form. This log shall indicate the internal condition of the sewer segment, the deviations in line and grade, abnormal conditions of the pipe barrel and joints, and the location and quantity of each source of infiltration and inflow. The distance from the beginning manhole shall be noted for each observation made on the report form. Photographs of each defect shall be made from the television monitor for further study and justification for rehabilitation.

Liner Pipe Installation - Within the insertion pit, the top half of the exposed existing pipe is to be removed to the springline. The bottom half is to be left in place where it shall serve as a cradle for the liner pipe. The liner pipe shall be either jacked into the existing pipe or

pushed as determined by the Contractor. An aqueous solution of bentonite may be used as a lubricant to minimize jacking loads. A tapered guide shall be attached to the leading end of each section to be installed to help pipe clear small obstructions. A jacking ring shall be used to distribute load as per manufacturer's recommendations for installation of the liner pipe. For each section to be lined, insertion shall be one continuous operation until the planned termination point is reached. Closure in the insertion pit after jacking may be accomplished using a long bell closure kit or other methods, as approved by the Engineer.

Pipe jointing shall be carried out in strict accordance with the manufacturer's recommendations. Total jacking loads shall not exceed the values recommended by the manufacturer. The Contractor shall provide a suitable means for measuring jacking loads, and shall monitor the load as the liner pipe is being installed. If at any time the load appears to rise non-uniformly, indicating possible obstruction of the pipe, jacking operations shall be terminated and the obstruction removed before continuing.

Manhole Replacement - In those places where the entrance pit is excavated at an existing manhole, the manhole shall be repaired or it shall be replaced with a new manhole conforming to the section of manhole construction and, further, in accordance with Standard Details included in the drawings.

- 6.3 Manholes - Pipe at manholes shall be grouted one pipe diameter back from inside edge of manholes. The liner pipe shall be cut out at manholes as detailed after insertion and grouting. The method of cutting shall be such as to leave a smooth clean straight plastic edge. Where detailed or required, mild steel ties shall be provided to tie the liner to the manhole benching. The liner pipe shall be suitably strutted or blocked during grout and concrete placement so that no bowing or other deviation from a parallel sided channel occurs.
- 6.4 Pipe grade shall be maintained within the limits shown on the drawings. The Contractor shall be responsible for and take all necessary precautions to ensure that no liner pipe flotation, adverse pipe grades, or pipe rotation about the vertical axis results, or collapse of the liner pipe occurs during grouting operations. Multiple low pressure application grout lifts are recommended. Grouting shall be in accordance with Section 026608.3.8.
- 6.5 Measurement and Payment - Unless indicated otherwise in the Proposal, Glass Fiber Reinforced Liner Pipe for Sliplining shall be measured and paid for by the linear foot, complete in place.