# **SPECIAL NOTE FOR PVC FOLD-AND-FORM PIPE LINER**

# **GENERAL**

## SUMMARY

### Section Includes: Definition of the approved methods and materials to rehabilitate gravity pipelines by the insertion of a continuously extruded, folded, PVC Fold-and-Form Pipe Liner into a conduit (host pipe), and the “blow-molding” (thermoforming) of the pipe liner to conform to the shape of the existing pipe. The pipe liner shall:

#### Extend continuously from one access point to the next access point with no joints.

#### Provide a tightly conforming fit against the inner wall of the host pipe.

#### Definitions:

##### PVC Fold-and-Form Pipe Liner: A continuously extruded (joint-less), polyvinyl chloride (PVC) Pipe Liner that is shaped into a reduced form to facilitate insertion into existing pipelines or conduits. The Pipe Liner shall return to its extruded, round memory upon application of heat and pressure and form tightly against the host pipe by “blow molding” (thermoforming) techniques.

##### Host Pipe: An existing gravity pipeline or conduit to be internally rehabilitated by installation of the PVC Fold-and-Form Pipe Liner.

## REFERENCES

### Codes and standards referred to in this Special Note are:

#### ASTM D 256: Standard Test Methods for Determining the Pendulum Impact Resistance of Notched Specimens of Plastics.

#### ASTM D 638: Standard Test Method for Tensile Properties of Plastics

#### ASTM D 790: Standard Test Method for Flexural Properties of Unreinforced and Reinforced Plastics

#### ASTM D 1784: Standard Specification for Rigid Polyvinyl Chloride (PVC) Compounds and Chlorinated Polyvinyl Chloride (CPVC) Compounds

#### ASTM D 2122: Standard Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings

#### ASTM D 2152: Standard Test Method for Extrusion Quality using Acetone Immersion

#### ASTM D 2444: Standard Test Method for Impact Strength

#### ASTM F 1057: Standard Test Method for Extrusion Quality using Heat Reversion

#### ASTM F 1504: Standard Specification for Folded/Formed Poly (Vinyl Chloride) Pipe for Existing Sewer and Conduit rehabilitation

## PIPE DESIGN AND DIMENSION

### Submittals: The Contractor shall furnish engineering data covering materials and installation procedures.

### Unless otherwise specified, the Contractor shall determine the minimum and maximum length of liner to effectively span the distance from the inlet to the outlet of the respective pipelines.

### The pipe liner shall have a nominal outside diameter and minimum wall thickness based upon project parameters and the condition of the host pipe.

## SAFETY

### The CONTRACTOR shall conform to all safety requirements of pertinent regulatory agencies and shall secure the site for the working conditions in compliance with the same. The CONTRACTOR shall erect signs and devices as are necessary for the safety of the work site.

### The CONTRACTOR shall also provide all of the WORK in accordance with applicable OSHA standards. Emphasis shall be placed upon the requirements for entering confined spaces and working with steam.

# **PRODUCTS**

## MATERIAL SPECIFICATIONS:

### PHYSICAL PROPERTIES: The PVC Fold-and-Form Pipe Liner will be manufactured from virgin PVC Fold-and-Form Pipe Liner compound, containing no fillers, and meet or exceed the following minimum physical properties:

#### COMBUSTIBILITY: Self-Extinguishing

#### FLEXURAL MODULUS: ASTM D 790 280,000 PSI @73F

#### FLEXURAL STRENGTH: ASTM D 790 5,000 PSI @73F

#### IZOD IMPACT: ASTM D 256 1.5 FT-LB/IN

#### CHEMICAL RESISTANCE: suitable under general sanitary sewer conditions

### CHARACTERISTICS: The PVC Fold-and-Form Pipe Liner shall be designed to meet the following installation performance requirements:

#### The Pipe Liner shall be capable of expanding a full pipe size larger than the nominal diameter (ex: 8” to 10”) without splitting, or rupturing with the understanding that the pipe liner dimension ratio will increase when so expanded.

#### After being expanded by “blow-molding”, the installed Pipe Liner will match the configuration of the host pipe.

#### The Pipe Liner shall be capable of negotiating pipe line bends in the host pipe without splitting, rupturing, or wrinkling of the pipe liner material.

#### The pipe liner shall be dimensionally stable after cool-down.

#### Processing of the pipe liner shall cause no degradation of the pipe liner physical properties.

### MARKINGS: The pipe liner shall be marked at maximum five (5) foot intervals indicating ASTM D 1784 cell classification, manufacturer, and size (diameter and SDR). Each production lot will be uniquely coded.

### DIMENSIONS:

#### The Pipe Liner outside diameter will be manufactured substantially smaller than the inside diameter of the host pipe. The pipe liner shall be manufactured with sufficient excess wall thickness to allow the pipe liner to meet or exceed the DR requirements after being expanded by “blow-molding” within the host pipe.

#### Unless otherwise specified, the Standard Dimension Ration (SDR) of 4” to 15” diameter Pipe Liner will be SDR 35. 18” to 36” Pipe Liner will be specified by wall thickness. The Pipe Liner will be continuously extruded (no joints) at the factory to the minimum length required to effectively span the distance between access points, in accordance with actual distances which shall be field verified by the Contractor prior to manufacturing.

## TESTING: Each production lot of Pipe Liner will be inspected and tested at the time of manufacture for defects is accordance with ASTM D 2444, and ASTM D 2152. All pipe liners shall conform to the specified dimensions. Material design properties shall be confirmed in accordance with ASTM D 790.

# **EXECUTION**

## HOST PIPE PREPARATION

### The existing pipeline shall be cleaned of any obstructions and televised using CCTV immediately prior to installation of the pipe liner. The host pipe condition shall be acceptable to the ENGINEER as appropriate for lining prior to the insertion of the pipe Liner.

### Prior to beginning the insertion of the pipe liner, the CONTRACTOR shall confirm that the host pipe is adequately cleaned.

## INSTALLATION PROCEDURES:

### The pipe liner manufacturer’s installation instructions and procedures shall be followed during installation.

### Point Repairs

#### Point repairs and obstruction removals shall be completed, as necessary, to enable lining.

### Liner Insertion

#### The entrance to the host pipe shall be covered so as to provide a smooth surface to prevent damage to the Pipe Liner.

#### The Pipe Liner shall be positioned to enable it to naturally curve into the access point and the host pipe.

#### The insertion end of the Pipe Liner shall be sealed to inhibit fluids and solids form entering the lumen of the Pipe Liner.

#### Insert the Pipe Liner into the entry access point. Slowly feed the Pipe Liner from the supply reel, while simultaneously pulling the Pipe Liner at the exit access point, to minimize tension on the Pipe Liner. Maintain two-way communication between personnel at entry and exit access points to coordinate the rate of Pipe Liner supply and pulling operations.

#### Use a power winch and a steel cable connected to the pulling head as recommended by the manufacturer to advance the Pipe Liner.

### Pipe Liner Processing and “Blow-Molding”:

#### Process and “blow-mold” the PVC Fold and-Form Pipe Liner in accordance with the manufacturer’s instructions for heating and expanding the Pipe Liner. Upon completion of processing and “blow-molding”, the Pipe Liner shall fit tightly against the inside wall of the host pipe and be locked into the joints of the host pipe, if possible.

#### Temperature and pressure gauges shall be used at the insertion and termination access points to monitor internal conditions during Pipe Liner processing and “blow-molding”.

#### Introduce pressurized steam to heat and relax the Pipe Liner in strict accordance with the recommendations of the Pipe Liner manufacturer.

#### Continue the application of steam while introducing compressed air to increase internal pressure on the Pipe Liner as recommended by the manufacturer. DO NOT ALLOW PRESSURE TO EXCEED 12 PSI, AS DAMAGE MAY OCCUR TO HOST PIPE.

#### Discontinue the use of steam while continuing the use of compressed air to maintain the internal pressure. Allow the Pipe Liner to cool below 100 F before releasing pressure.

### Liner Termination:

#### During the pulling in place and “blow-molding” process, the PVC liner shall form a bell shape at each end effectively locking the liner in place.

# **PAYMENT**

## The Department will make payment for the completed and accepted quantities under the following:

Code Pay Item Pay Unit

24860EC PVC Fold and Form Pipe Liner – 12 Inch LF

24861EC PVC Fold and Form Pipe Liner – 15 Inch LF

24862EC PVC Fold and Form Pipe Liner – 18 Inch LF

24863EC PVC Fold and Form Pipe Liner – 24 Inch LF

24864EC PVC Fold and Form Pipe Liner – 30 Inch LF

24865EC PVC Fold and Form Pipe Liner – 36 Inch LF

## The Department will consider payment as full compensation for all work, equipment, and incidentals necessary to install the pipe liners in accordance with this note.