

STANDARD SPECIFICATION
SECTION 09850 PLASTIC SHEET LINER

PART 1 - GENERAL

1.01 DESCRIPTION

This section covers premolded PVC plastic sheet liner for use as the concrete protective liner at all exposed interior areas indicated on the drawings.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Standard Drawings.
- B. Record Drawings and Submittals: STD SPEC 01300.
- C. General Concrete Construction: STD SPEC 03000.
- D. Precast Concrete Manholes: STD SPEC 03461.

1.03 SUBMITTALS

- A. Submit submittal packages in accordance with Standard Specification Section 01300.
- B. Submit catalog data, descriptive literature and assembly drawings. Show dimensions, materials of construction by specification reference and grade.
- C. Show dimensions and materials of construction.
- D. Drawings shall be submitted showing a complete layout indicating the limits of work and details of materials of construction and installation. The manufacturer shall provide site-specific detailed drawings of all areas of special construction including, but not necessarily limited to, corners, pipe penetrations, slide gates, concrete benching, termination strips, construction joints, and any other miscellaneous penetrations. The drawings shall show the limits and locations of all these special construction areas.

1.04 SAMPLES

Contractor shall also submit the following samples:

1. Two 12 inch x 12 inch pieces of liner sheet including the locking extensions.
2. Two outside and inside corner strips.
3. Two tie rod patching strips.
4. Two joint strips.
5. All weld strips.
6. Two termination strips.

7. Two angle strips.

PART 2 - MATERIALS

2.01 ACCEPTABLE PRODUCTS

The plastic liner shall be as manufactured by Ameron "T-Lock Amer-Plate", Poly-Tee Incorporated "Poly-Tee PVC Liner", or Serrot Corporation "SERROTLCK". No other manufacturers are acceptable.

2.02 MATERIALS

- A. Plastic Lining: Flexible PVC sheet, capable of withstanding a back pressure of 40 psi applied to the under surface of the lining without causing anchorage failure and without sheet rupture. The liner shall be white in color. At least 0.065 inch thick with internally molded rib on one side of the sheet.
- B. Joint corner, strips, angles, and sheets: As recommended by the lining manufacturer and designed for joining sheets of membrane at joints, corners, and penetrations, respectively.
- C. Welding strips: As recommended by the lining manufacturer and designed to join sections of lining by means of hot air welding for PVC. Solvent welding or adhesive bonding will not be allowed.
- D. Adhesive, primer, and tape: As recommended by the lining manufacturer.

2.03 SHOP HOLIDAY TESTING

Prior to preparing the sheets for shipment, the sheets shall be tested for pinholes using an electrical spark tester set at 20,000 volts minimum. Any holes shall be repaired and retested.

2.04 DELIVERY, STORAGE, AND HANDLING

- A. The contractor shall take all reasonable precautions during the receipt, handling, and storage of the liner to prevent scratching, denting, or puncturing the liner surface or damaging the anchorage system. Sheets shall be stored in a flat position. During cold weather, special precautions shall be made for handling.
- B. Any damage to the liner shall be repaired by the Contractor in accordance with the liner manufacturer's instructions and recommendations.

PART 3 - EXECUTION

3.01 QUALITY ASSURANCE

- A. Applicators: The installation of the specified liner shall be considered as highly specialized work, and personnel performing this type of work shall be trained in methods of installation and shall demonstrate their ability to the satisfaction of the Engineer.

- B. Qualification of Welders: Each welder shall prequalify by successfully passing a welding test before doing any welding. Requalification may be required at any time deemed necessary by the District. All test welds shall be made in the presence of the District's Representative and shall consist of the following:

Two pieces of liner, at least 15 inches long and 9 inches wide, shall be lapped 1-1/2 inches and held in a vertical position. A welding strip shall be positioned over the edge of the lap and welded to both pieces of liner plate. Each end of the welding strip shall extend at least 2 inches beyond the liner plate to provide tabs.

- C. The weld specimen will be tested by the District's Representative as follows:
1. Each welding strip tab, tested separately, shall be subjected to a 10-pound pull normal to the face of the liner with the liner being held firmly in place. There shall be no separation between the welding strip and liner when the welding tabs are submitted to the test pulls. The edges of the weld shall be probed with a putty knife to check for separation at the edge.
 2. The test specimens shall be cut from the welded sample and tested in tension across the welds. If none of these specimens fail when tested, the weld will be considered as satisfactory in tension.
 3. If one of the specimens fails to pass the tension test, a retest will be permitted. The retest shall consist of testing 3 additional specimens cut from the original welded sample. If all 3 of the retest specimens pass the test, the weld will be considered satisfactory.
- D. A disqualified welder may submit a new welding sample when, in the opinion of the Engineer, he has had sufficient off-the-job training or experience to warrant re-examination.

3.02 INSTALLATION

- A. Preparation of concrete forms and liner shall be done in accordance with the manufacturer's recommendations. Plastic liner shall be installed in accordance with the manufacturer's recommendations and the requirements set forth herein. All work for and in connection with the installation of plastic sheet liner, the preparation of surfaces, and the sealing and welding of joints shall be performed by the manufacturer of the liner or by a firm or individual who is authorized by and recommended to the Owner and the Engineer in writing by the manufacturer.
- B. Walls
1. Liner sheets for wall linings shall be set and properly secured to the concrete contact faces of the forms which form the surfaces to be lined. The sheets shall be placed with the smooth face next to the form and the line of tees or anchoring devices on the back side of the sheets vertical in the walls. The sheet shall be overlapped or butt jointed without more than 1/8 inch opening in any joint between adjacent sheets and the sheets held in place with small-headed finishing nails placed within 1/4 inch of the edge of the sheets. After all sheets are in place on the form being lined, the joints between sheets shall be sealed on the back side with a 1-inch wide welding strip or other means

acceptable to the Engineer shall be used to prevent concrete from flowing around edges. A termination strip shall be provided at the intersection of the walls and slab.

2. Where possible, the form to be lined shall be set in place, the lining attached, and all lining joints covered before the reinforcing steel is installed. The outer form shall then be set in place and the form ties installed through the liner in the normal manner. The number of form ties used shall be held to the minimum.
 3. The lining installation and sealing shall provide a continuous plastic lining and prevent entrance of concrete or mortar between the lining and the form.
 4. Forms shall be removed in a careful manner after the concrete has attained sufficient strength and has been properly cured. Finishing nails used to hold the liners in place on the forms may pull out with the forms but if not, shall be removed afterwards.
 5. After the forms have been removed, the exposed butt joints in the liner, including nail and form tie holes, shall be sealed with welding strip heat-welded over the areas involved. Sealing shall provide a continuous plastic lining.
- C. Ceilings: Liner sheets for ceiling surfaces shall be set, properly secured, and joints sealed in accordance with the requirements specified for wall surfaces. Care shall be taken to form and securely seal the corners formed between the wall and ceiling sheets.
- D. Wrapping: Underneath slabs or along walls where an opening, such as an access opening, is indicated on the drawings, the liner shall be wrapped or placed along the opening ledge or exposed vertical section of concrete.
- E. Connection to Existing PVC Liner: Existing PVC liner shall be neatly trimmed prior to being welded to new PVC liner. All joint interfaces between old and new liner shall be connected as though they were new weld splices.

3.03 FIELD QUALITY CONTROL

- A. The surface of the liner shall be cleaned as required to permit visual inspection and spark testing.
- B. After liners are installed, all surfaces covered with lining, including welds, shall be tested at the expense of the Contractor, with an acceptable electrical spark tester with the instrument set at 20,000 volts minimum.
- C. All welds shall be physically tested by a nondestructive probing method. All patches over holes, or repairs to the liner wherever damage has occurred, shall be made as specified herein.
- D. At least 25 percent of the transverse welding strips which extend to a lower edge of the liner shall be tested. The welding strips shall extend 2 inches below the liner to provide a tab. A 10-pound pull shall be applied to each tab. The force shall be applied normal to the face of the structure by means of a spring balance. Liner adjoining the welding strip shall be held against the concrete during application of the force. The 10-pound pull shall be maintained if a weld failure develops, until no further separation occurs. Defective welds shall be retested after repairs have been made. Tabs shall be neatly trimmed away after

the welding strip has passed inspection. Inspection shall be made within 2 days after joint has been completed in order to prevent tearing the projecting weld strip and consequent damage to the liner from equipment and materials used in or taken through the Work.

3.04 PROTECTION

- A. All necessary measures and precautions shall be taken to prevent damage to liner plate from equipment and materials used in, or taken through the Work. Any damage to the installed liner shall be repaired by the Contractor in accordance with the liner manufacturer's instructions and recommendations.
- B. All holes and all cut, torn, and seriously abraded areas in the lining shall be patched. Patches made entirely with welding strip shall be fused to the liner over the entire patch. The use of this method is limited to patches which can be made with a single welding strip. The use of parallel, overlapping, or adjoining welding strips will not be permitted. Patches over grout holes and larger areas may consist of smooth liner over the damaged area with edges covered with welding strips fused to the patch and to the liner adjoining the damaged area. The size of a single patch of the latter type shall be limited to its width, which shall not exceed 4 inches.
- C. Wherever the liner is not properly anchored to concrete, or wherever patches larger than those permitted above are necessary, the repair of the liner and the restoration of anchorage shall be as recommended by the manufacturer and shall be acceptable to the Engineer.

END OF SECTION