

USDA  
NATURAL RESOURCES  
CONSERVATION SERVICE  
DELAWARE  
CONSERVATION  
PRACTICE STANDARD  
  
POND SEALING OR LINING  
FLEXIBLE MEMBRANE  
  
CODE 521A  
(Reported by No.)

**DEFINITION**

A manufactured hydraulic barrier consisting of a functionally continuous sheet of synthetic or partially synthetic, flexible material.

**PURPOSE**

To control seepage from water and waste impoundments for water conservation and environmental protection.

**CONDITIONS WHERE PRACTICE**

**APPLIES**

On ponds and water storage structures that require treatment to control seepage rates within acceptable limits.

On waste storage and waste treatment facilities built in or of excavated earth, and which require treatment to prevent the migration of contaminants from the site.

**CRITERIA**

Structures to be lined shall have been constructed to meet all applicable NRCS standards. All inlets, outlets, ramps, and other appurtenances may be installed before, during, or after the liner placement, but shall be done in a manner that does not damage or impair the proper operation of the liner.

All flexible membranes shall be certified by the manufacturer to be suitable for the intended use.

Design of the flexible membrane shall be in accordance with manufacturer recommendations. All flexible membrane installations shall meet the material and installation requirements of the plans and specifications provided for each installation, and shall be certified by the installer.

**Minimum Criteria for Membranes**

**Type            Limiting Parameter**

HDPE            40 mil thickness

LLDPE          40 mil thickness

PVC             30 mil thickness

GCL             0.75 lb./sq ft (bentonite)

EPDM           45 mil thickness

HDPE = High Density Polyethylene

LLDPE = Linear Low Density Polyethylene

PVC = Polyvinyl Chloride

GCL = Geosynthetic Clay Liner

EPDM = Synthetic Rubber

Select soil materials shall be used as cover for liners where required for the proper performance, protection, and durability of the installation. Cover soils shall not contain sharp, angular stones or any objects that could damage the liner. Maximum allowable particle size of soil cover material shall be 3/8-in (10 mm), unless the liner is cushioned by a needle punched, non-woven geotextile. Cover materials shall be stable under all operational and exposure conditions.

Subgrade preparation shall conform to manufacturer recommendations. Subgrade

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service

materials shall not contain sharp, angular stones or any objects that could damage the liner or adversely impact its function.

All structures shall be fenced to protect the liner from damage and for the safety of humans, livestock, wildlife, and pets.

Manufacturer recommendations shall be followed with regard to protection from weather and exposure.

If venting is used, manufacturer recommendations shall be followed regarding vent type and spacing.

### **PLANNING CONSIDERATIONS**

Venting should be considered if gas build up under the liner is anticipated.

If high water tables could adversely affect the proper functioning of the facility, interceptor or relief type drainage systems should be considered to control uplift pressures.

### **PLANS AND SPECIFICATIONS**

#### **Scope**

This item shall consist of the clearing, excavation, backfill, site preparation and other appurtenances required for the installation of a pond sealing or lining, and the disposal of all cleared and excavated materials. Construction shall be carried out in such a manner that erosion, water, air, and noise pollution will be minimized and held within legal limits as established by State regulations.

#### **Clearing and Grubbing**

All trees, brush, and stumps shall be removed from the site and spoil areas before excavation is performed. All material cleared from the area shall be disposed of by burning or hauling to an appropriate landfill. All burning shall conform to regulations and laws of Delaware.

#### **Excavation**

Soils containing excessive organic material will be removed from the foundation area. The completed excavation and placement of spoil material shall conform as nearly to lines, dimensions, grades, and slopes shown on the plans or staked on the site as skillful operation of the excavating equipment will permit.

#### **Installation**

**Subgrade Preparation** – The area to be lined shall be drained and allowed to dry until the surface is firm and can support the workers and equipment that must travel over it during installation of the lining.

All banks and fills in the area to be lined must be sloped no steeper than 1 to 1 for exposed linings and 2 ½ horizontal to 1 vertical for buried linings.

The foundation area for flexible membrane linings shall be smooth and free of projections that can damage the lining. Stumps and roots shall be removed. Rocks, hard clods, and other such material shall be removed, rolled to provide a smooth surface, or covered with a cushion of fine soil.

If needed, an effective sterilant shall be applied to the subgrade at the rate recommended by the manufacturer.

An anchor trench shall be excavated completely around the area to be lined at the planned elevation of the top of the lining. The trench shall be 8 to 10 in. (203 to 254 mm) deep and about 12 in. (304 mm) wide.

All lining material shall be free of damage or defect. Each package delivered to the job site shall bear the name of the material, the manufacturer's name or symbol, the quantity therein, and the thickness or weight of the material.

**Placement** – Membranes shall be loosely spread over the subgrade. Polyethylene film requires about 5 percent of slack for satisfactory results.

All field splices shall be made according to the manufacturer's recommended technique, using materials furnished for the purpose. The joints shall be watertight and capable of maintaining

their integrity throughout the expected life of the lining.

Approximately 8 in. (203 mm) of the top of the lining shall be placed in the anchor trench and anchored with compacted backfill.

For covered membranes, the material to be used as a protective cover shall be free of large clods, sharp rocks, sticks, and other objects that can puncture the lining. The cover shall be placed to the specified depth without damage to the membrane.

### **Installation of Flexible Membrane**

Will be installed according to all national, state, and local laws, regulations, and codes, and the manufacturer's instructions.

### **Vegetation**

Vegetation shall be applied to all disturbed areas as critical area planting and will include liming, fertilizing, seedbed preparation, seeding, and mulching. If farm animals will have access to the area, the area around the pond will be fenced, if appropriate.

### **Approval**

A complete copy of the design will be filed by the district conservationist.

## **OPERATION AND MAINTENANCE**

The manufacturer's instructions regarding the operation and maintenance will be followed.

## **SUPPORTING DATA AND DOCUMENTATION**

The following is a list of the minimum data and documentation to be recorded in the case file:

### **Planning Information, Field Data, and Survey Notes**

1. Documentation of site visits on CPA-6. The documentation shall include the date, who performed the inspection, specifics as to what was inspected, all alternatives discussed and decisions made and by whom.

2. Field location of the pond liner. Also note the location of the pond liner on the conservation plan map.
3. Description of the objectives of the practice, including the desired functions which the pond liner is expected to provide.
4. Soil investigation logs and notes, as appropriate for the site conditions.
5. Topographic survey of the site, as appropriate for site conditions and the proposed design.

### **Design Data**

1. Location map with site identified.
2. Soil map with site identified.
3. Plan view with liner location, type and thickness.
4. Cross section showing liner installation.
5. Detail of anchor trench.
6. Fence location and description.

### **Construction Check Data/As Built**

1. Check notes recorded during or after completion of construction showing as-built conditions of the practice.
2. Copy of installer's certification.
3. Sign and date check-notes and plans by someone with appropriate approval authority. Include statement that practice meets or exceeds plans and NRSC practice standards.