

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

POND SEALING OR LINING - FLEXIBLE MEMBRANE

(No.)
Code 521A



DEFINITION

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

PURPOSE

To restrict, impede, and control seepage of contaminants from water and waste impoundments structures for water conservation and environmental protection.

CONDITION WHERE PRACTICE APPLIES

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

On earthen waste storage facilities and other waste impoundment structures that require treatment to control seepage of contaminants from the storage structure.

CRITERIA

Impact to cultural resources, wetlands and Federal and state protected species shall be evaluated and avoided or minimized to the

extent practicable during planning, design and implementation of this conservation practice in accordance with established National and Florida policy, General Manual (GM) Title 420-Part 401; Title 450-Part401, Title 190-Parts 410.22 and 410.26, National Planning Procedures Handbook (NPPH) Florida Supplements to Parts 600.1 and 600.6, National Cultural Resources Procedures Handbook (NCRPH), National Food Security Act Manual (NFSAM), and the National Environmental Compliance Handbook (NECH).

Design. Construct all structures to be lined to meet all applicable NRCS standards. Install all inlets, outlets, ramps, and other appurtenances before, during, or after the liner placement and in a manner that does not damage or impair the proper operation of the liner.

Design and install the flexible membrane in accordance with manufacturer's recommendations. Design liner material to meet the minimum requirements in Table 1. All flexible membrane installations shall be certified by the installer as meeting the material and installation requirements of the plans and specifications.

Follow manufacturer's recommendations with regard to protection from weather and exposure.

Analysis if venting is required to dissipate the gas pressure from beneath the liner shall be completed. If venting is required, follow manufacturer's recommendations regarding vent type and spacing. A minimum vent spacing of 50 feet is recommended.

Construct seams according to manufacturer's recommendations and test to assure water tightness. Place the bottom of the liner a minimum of one foot above seasonal high water table when used in a manure storage or treatment facility.

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

Table 1 - Minimum Criteria for Membranes

Type	Limiting Parameter	
	Wastewater	Clear Water
HDPE	40 mil	30 mil
LLDPE	40 mil	20 mil
PVC	30 mil	20 mil
GCL	0.75 lb./sq ft (bentonite)	
EPDM	45 mil	
PP (Reinforced)	36 mil	24 mil
(Un-reinforced)	40 mil	20 mil
RPE	NR	24 mil

1 mil = 1/1000 of an inch

HDPE – High Density Polyethylene Geomembrane

LLDPE – Linear Low Density Polyethylene Geomembrane

PVC – Polyvinyl Chloride Geomembrane

GCL – Geosynthetic Clay Liner

EPDM – Synthetic Rubber Geomembrane

PP – Polypropylene Geomembrane

RPE – Reinforced Polyethylene Geomembrane

NR – Not Recommended

Subgrade Preparation. Prepare subgrade to manufacturer's recommendations. Use subgrade materials that do not contain sharp, angular stones or any objects that could damage the liner or adversely impact its function.

Padding. Place a cushion or padding beneath the liner if the subgrade particles contain sharp angular stones that could damage the liner or particles greater than 3/8-inch for geomembrane liners and 1/2-inch for geosynthetic clay liners.

The padding or cushion may be an 8-ounce or greater non-woven geotextile or a soil meeting the particle size and shape requirements of the subgrade.

Cover Soil. Cover PVC and GCL liners with a minimum of 12 inches of soil. Cover soil may be used on other liners but is not required.

Cover soil shall be used as cover for liners when 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. Cover soil material shall have a maximum allowable

particle size of 3/8-inch for geomembrane liners and 1/2-inch for geosynthetic clay liners, unless the liner is cushioned by an 8-ounce or greater needle punched, non-woven geotextile padding material. Stabilize cover materials against slippage down the slope under all operational and exposure conditions.

Anchorage. Anchor liners to prevent uplift due to wind or slippage down the side slope.

Safety. Include appropriate safety features in the design to minimize the hazards of the structure. Provide warning signs, fences, ladders, ropes, bars, rails, and other devices, as appropriate, to ensure the safety of humans and livestock.

Provide a means of emergency egress for all facilities with exposed flexible membranes. For those facilities with intended access points, provide emergency egress at each access point.

CONSIDERATIONS

Consider venting of wastewater pond liners not covered with soil unless other site conditions exist to allow dissipation of gas pressure from beneath the liner. One such condition is the presence of granular foundation soils (SW, GW or GP). A minimum vent spacing of 50 feet is recommended.

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

Consider including provision for the liner protection from damage during cleaning operations in designs.

If agitation equipment is to be used, consider installing a concrete pad to protect the liner.

PLANS AND SPECIFICATIONS

Prepare plans and specifications for specific field sites in accordance with this standard and describe the requirements for applying the practice to achieve its intended uses.

As a minimum include the following in the plans and specifications:

- Plan view of system layout, including containment structure, collection points,

- waste transfer locations or pipelined, and topography of the site;
- Subgrade preparation, including tolerances on smoothness of the finished grade;
- Padding type and placement if required;
- Type and thickness of liner;
- Method of installation, including seaming requirements, and requirements for attachment of appurtenances;
- Method and details to protect liner, including soil cover, etc.;
- Structural details;
- Drain and vent location and details;
- Quality control testing
- Fence and signage requirements, if required;
- Quantity of materials.

OPERATION AND MAINTENANCE

A plan for operation and maintenance (O&M) of the liner and structure shall be prepared. The plan shall be consistent with purpose and type of liner chosen, intended life, safety requirements, and design criteria. The plan shall contain requirements including but not limited to:

1. Design capacity and liquid level of the structure.
2. A description of the normal operation, safety concerns and maintenance requirements including but not limited to:
 - Exclusion of animals and equipment from the liner;
 - Protection of the liner during initial filling;

- Agitation;
 - Pumping procedures.
3. Repair procedures.
 4. Periodic inspection of the following:
 - Visible portions of the liner for tears punctures, or other damage;
 - Liner interface with inlets, outlets, ramps, or other appurtenances for damage;
 - Liquid level in the structure;
 - Ballooning of the liner indicating presence of gas beneath the liner.

Included the following Maintenance activities required for this practice consist of those operations necessary to prevent damaging the liner. Include, but not limited to, exclusion of animals and equipment from the liner, protection of the liner during initial filling, agitation, or pumping operations, and reparation of the liner.

REFERENCES

- Florida NRCS Material Specification Pond Sealing or Lining – Flexible Membrane MS 521A
- General Manual
 - Title 420-Part 401
 - Title 450-Part401
 - Title 190-Parts410.22 and 410.26
- National Cultural Resources Procedures Handbook
- National Environmental Compliance Handbook
- National Food Security Act Manual
- National Planning Procedures Handbook
 - Florida Supplements to Parts 600.1 and 600.6