

SOIL CONSERVATION SERVICE**WEST VIRGINIA****ENGINEERING STANDARD**

POND SEALING OR LINING (No.)

Asphalt Sealed Fabric LinerDefinition

Installing a fixed lining of impervious material or treating the soil in a pond mechanically or chemically to impede or prevent excessive water loss.

Scope

This standard applies to the sealing of ponds by the use of flexible membrane linings made of asphalt sealed fabric.

Purpose

To reduce seepage losses in ponds to an acceptable level and preserve or improve water quality.

Conditions Where Practice Applies

This practice applies where water loss from a pond through leakage is, or will be, of such proportion as to prevent the pond from fulfilling its planned purpose. This practice also applies where leakage will damage land and crops, cause waste of water or environmental problems.

Design Criteria

The design shall be based on adequate investigation and documentation of the leaking soil materials.

Ponds to be lined shall be constructed to meet the SCS standards for irrigation pits or regulating reservoirs (552), irrigation storage reservoirs (436), ponds (378), waste treatment lagoons (359), waste storage ponds (425), or wildlife watering facilities (648), as appropriate.

Flexible membranes to be used as linings shall be constructed of high quality materials and shall be certified by the manufacturer to be suitable for this use. Base material used for asphalt sealed liners shall be highly resistant to bacteriological deterioration. Asphalt used shall be Anionic Asphalt Emulsion SS-1h.

All membranes shall be a quality that meets or exceeds the attached material specification for asphalt sealed fabric liner. Minimum nominal thickness shall be 100 mils.

The liner need not be covered unless it will be subject to animal traffic. In areas of animal traffic, the liner shall be protected from puncture by covering it with at least 9 inches of soil material. The bottom 3 inches of the cover shall not be coarser than silty sand (SM).

Plans and Specifications

Plans and specifications for sealing ponds with an asphalt sealed fabric liner shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

Operation and Maintenance

An operation and maintenance plan shall be prepared which includes as a minimum, the following items:

1. Liner installed on the surface shall be permanently protected from puncture by animal trampling.
2. The liner shall be inspected regularly and punctures or tears repaired as recommended by the manufacturer.
3. The pond shall be used in such a way that damage to the liner is prevented.
4. For covered linings, the depth of cover shall be checked at least annually and material added as needed.

MATERIAL SPECIFICATION
 POND SEALING OR LINING
 Asphalt Sealed Fabric Liner

<u>TEST DESCRIPTION</u>	<u>REQUIREMENT</u>	<u>TEST METHOD</u>
Fabric Material	95 Percent Polypropylene Staple	-
Fabric Structure	Nonwoven and Fused One Side	-
Fabric Weight	5.0 ounces Per Square Yard	-
Fabric Maximum Pore Diameter	500 Microns	ASTM E-128
Asphalt Sealant-R&B Softening Point	200 Degrees-F	ASTM D-36 (Solvent Extraction)
Weight of 7M-O2 Asbestos Fibers in Cured Sealant	10 Percent by Weight	-
Ductility of Cured Sealant	5 Centimeters	ASTM D-113
Minimum Weight Asbestos Asphalt Residual	3.5 Pounds Per Square Yard	ASTM D-113
Minimum Membrane Thickness	100 Mils	ASTM D-113
Minimum Membrane Specific Gravity	1.0 (Air Evacuated from Fabric)	ASTM D-113
Breaking Strength-Either Direction	50 Pounds	ASTM D-1682
Elongation-Either Direction	80 Percent	ASTM D-1682
Joint Strength-Percent of Tensile	100 Percent	ASTM D-1682
Tear Resistance (Notched Sample in Tension)	20 Pounds	ASTM D-1004-Die C
Elmendorf Tear Resistance	3200 Grams	ASTM D-1922
Puncture Resistance	64 Pounds	USDA-ARS ^{1/}

^{1/} Three-eighths of an inch sphere forced into membrane at 10 inches per minute. Pounds force at rupture is recorded.

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MATERIAL SPECIFICATION

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TEST DESCRIPTION

Hydrostatic Burst-Mullen
Hydraulic Testing - 35 Feet Head

REQUIREMENT

200 Pounds Per Square Inch
No Water Loss

TEST METHOD

ASTM 0-751
Pressure Cell ^{2/}

^{2/} Six inch diameter placed in pressure cell. One side of the sample, reinforced by 1/4-inch mesh screen, is open to air. Water under pressure equivalent to 35 feet water depth (15 PSI) at 100 degrees Fahrenheit is applied to the other side for 7 days. Observe for water loss through the membrane.

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CONSTRUCTION SPECIFICATION

POND SEALING OR LINING

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Subgrade Preparation

The area to be lined shall be drained and allowed to dry until the surface is firm and will support the men and equipment that must travel over it during installation of the lining.

All banks and fills within the area to be lined must be sloped not steeper than 1 to 1 for exposed lining and 2-1/2 horizontal to 1 vertical for buried linings.

The foundation area shall be smooth and free of projections that might damage the lining. Stumps and roots shall be removed. Rocks, hard clods, and other such material shall be removed, rolled so as to provide a smooth surface, or, covered with a cushion of fine soil material. Cavernous or jointed limestone shall have plugs of adequate strength to bridge openings wider than 3 inches. Cavernous openings shall be plugged by a minimum of 2 feet of compacted fine-grained soil.

Where 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 inches deep and about 12 inches wide.

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

Placement

The liner will be fabricated on site to the shape of the basin in accordance with the manufacturer's instructions. Joints shall be machine sewn with heavy duty inert synthetic fiber thread.

The fabric shall be unrolled so that the unfused side will be up after installation. Joints shall be made by placing two widths of the fabric together, one directly on top of the other, aligning the edges and seaming at least one inch from the fabric edge. The top layer of fabric shall then be unfolded so that the seam edge lies beneath the liner. The jointing operation shall be continued until the entire liner is completed.

Attachment to any pipe projecting through the lining shall consist of boots fabricated of the lining material, slipped over the projecting pipe, bonded to the pipe with mastic, and hand or machine sewn to the liner. Attachments to concrete and similar structures shall be sealed with mastic and fastened with a batten strip.

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Liner edges shall be trimmed and a minimum of 12 inches of fabric placed in the perimeter anchor trench., Trenches shall be backfilled only enough to secure the edges.

When the polypropylene fabric is in place, it shall be sealed by spraying with the following proportioned mixture of sealant per 100 square yards of fabric:

Anionic Asphalt Emulsion SS-lh	100 gal.
Asbestos Fiber 7M-02	60 lbs.
Water	44 gal.
Wetting Agent (Phillips or equivalent)	2 lbs.

The water and wetting agent shall be mixed in a tank or suitable container. The asbestos shall be added and mixed. The asphalt emulsion shall then be added and thoroughly mixed.

Sealant temperature shall not exceed 200 degrees F. when applied. Ambient air temperature shall be 45 degrees F. or higher to insure sealant cure. Two coats of sealant mix shall be applied to the liner at a rate of 0.7 gallon per square yard per coat. Each coat shall be allowed to cure sufficiently so that it is not tacky before applying the next coat or placing the liner in service. Trenched edges shall be sprayed a minimum of 6 inches below grade.

Following curing, the anchor trenches shall be back-filled and compacted.

Where covered liner is specified, the soil used to cover the cured fabric shall be free of large clods, sharp rocks, sticks, and other objects that could puncture the fabric. The cover shall be placed to the specified depth without damage to the fabric.

Safety

Workers exposed to asbestos material shall comply with the Occupational Safety and Health Act and Environmental Protection Agency regulations concerning handling and use of asbestos material.

Fabric liner construction shall be done in such a manner that erosion and air and water pollution are minimized. The completed job shall present a workmanlike finish.

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Planning considerations for water quantity and quality

Quantity

1. Effects on the water budget, especially effects on volumes and rates of runoff, infiltration, evaporation, transpiration, deep percolation, and ground water recharge.
2. Variability of the practice's effects caused by seasonal or climatic changes.
3. Effects on downstream flows or aquifers that would affect other water uses.
4. Effects on the volume of downstream flow to prohibit undesirable environmental, social or economic effects.
5. Potential use for water management.

Quality

1. Effects on the movement of sediment, pathogens, and soluble material carried by seepage water.
2. Effects on the trapping of nutrients and pesticides and altering their effect on surface and ground water quality.
3. Effects on the visual quality of downstream water resources.
4. Short-term and construction-related effects on the quality of the pool and downstream water .
5. Effects of water level control on the temperatures of pool and downstream water to prevent undesired effects on aquatic and wildlife communities.
6. Effects on wetlands or water-related wildlife habitats associated with the practice.