



Standard Practice for Installation of Prefabricated Asphalt Reservoir, Pond, Canal, and Ditch Liner (Exposed Type)¹

This standard is issued under the fixed designation D 3745; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

^{ε1} NOTE—Editorially switched from English dominant to SI dominant.

1. Scope

1.1 This practice covers the description of suitable materials and procedures for installing prefabricated asphalt reservoir, pond, canal, and ditch liner (exposed type).

1.2 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:

- D 5 Test Method for Penetration of Bituminous Materials²
- D 6 Test Method for Loss on Heating of Oil and Asphaltic Compounds³
- D 36 Test Method for Softening Point of Bitumen (Ring-and-Ball Apparatus)³
- D 92 Test Method for Flash and Fire Points by Cleveland Open Cup⁴
- D 113 Test Method for Ductility of Bituminous Materials²
- D 312 Specification for Asphalt Used in Roofing³
- D 2042 Test Method for Solubility of Asphalt Materials in Trichloroethylene²
- D 2643 Specification for Prefabricated Asphalt Reservoir, Pond, Canal, and Ditch Liner (Exposed Type)³
- D 2822 Specification for Asphalt Roof Cement³
- D 5295 Guide for Preparation of Concrete Surfaces for Adhered (Bonded) Membrane Waterproofing Systems³

3. Terminology

3.1 There are no terms in this practice that require new or other dictionary definitions.

4. Significance and Use

4.1 The practices described are only for water bearing

reservoirs, ponds, canals, and ditches.

5. Materials

5.1 The materials needed for the installation consist of the lining sheets, a joint sealant (either a hot-mopped asphalt or a cold-applied asphalt mastic type), and batten or cover strips for the joints between sheets; all of which are manufactured for compatibility to prevent exudation.

5.2 The lining sheets should conform to Specification D 2643.

5.3 The hot-mopped asphalt joint sealant should conform to one of the following specifications:

5.3.1 Specification D 312, Types II, III, or IV.

5.3.1.1 The choice of which type of roofing asphalt to use for a particular application will be influenced by climatic conditions and must be determined by the installer.

5.3.2 An asphalt manufactured to the requirements in Table 1.

5.3.3 *Test Methods*— The properties specified in Table 1 may be determined as follows:

5.3.3.1 *Flash Point*— Test Method D 92.

5.3.3.2 *Softening Point*— Test Method D 36.

5.3.3.3 *Penetration*— Test Method D 5.

5.3.3.4 *Ductility*— Test Method D 113.

5.3.3.5 *Weight Loss*— Test Method D 6.

5.3.3.6 *Asphalt Soluble in Trichloroethylene*— Test Method D 2042.

5.4 The cold-applied joint sealant should meet the requirements of Specification D 2822 and should have the approval of the manufacturer of the lining material.

5.5 The batten or cover strips should meet the requirements of Specification D 2643, except with a minimum thickness of 8 mm (5/16 in.) and a width of 203 mm (8 in.), unless other materials or thicknesses are recommended by the lining manufacturer or agreed upon between the purchaser and seller.

6. Preparation of Subgrade

6.1 Prepare the subgrade, whether soil, brick, concrete, or other substrate, by whatever means are necessary to remove any irregularities that might puncture or deform the lining.

6.2 The subgrade should be designed to support the load of the particular installation under consideration. Compaction of

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² *Annual Book of ASTM Standards*, Vol 04.03.

³ *Annual Book of ASTM Standards*, Vol 04.04.

⁴ *Annual Book of ASTM Standards*, Vol 05.01.

TABLE 1 Requirements for Asphalt

| Property | min | max |
|--|-----------|-----------|
| Flash point, °C (°F) | 218 (425) | ... |
| Softening point, °C (°F) | 96 (205) | 107 (225) |
| Penetration at 25°C (77°F), 100 g, 5 s | 25 to 40 | |
| Penetration at 0°C (32°F), 200 g, 60 s | 15 | ... |
| Penetration at 46°C (115°F), 50 g, 5 s | ... | 75 |
| Ductility at 25°C (77°F), 5 cm/min, cm | 30 | ... |
| Mass loss at 163°C (325°F), 5 h, % | ... | 1 |
| Penetration at 25°C (77°F) of residue from | 60 | ... |
| mass loss, compared to penetration before 25°C (77°F) of residue from heating, % | | |
| Asphalt soluble in trichloroethylene, % | 98 | ... |

the soil to give a minimum 95 % modified proctor density is recommended.

7. Cleaning the Liner Sheets

7.1 Remove parting material from the lining prior to installation. The cleaning equipment required will be determined by the type of parting material used to separate the sheets during shipment. Removal of some parting material may simply mean lifting off a sheet of paper or plastic. Other parting material, such as sand or mica, may require vigorous brushing with power equipment.

7.2 **Caution**—If loose powdery material is involved, conduct the cleaning process outside the installation area and wear suitable protective equipment to prevent damage to the eyes or the respiratory system.

8. Installation of Bottom Lining in a Reservoir or Pond

8.1 Lay the lining sheets in any pattern agreeable to the purchaser and the installer. The following pattern has proven successful:

8.1.1 Place a row of lining sheets on a line near the center and parallel to the long side of the reservoir or pond. Lay the sheets end-to-end using butt-joints.

8.1.2 Butt-joint succeeding rows adjacent to the first row, with transverse joints offset to the approximate midpoint of the sheets of each adjacent row.

8.2 Seal the transverse and longitudinal joints using batten or cover strips and joint sealant. Use battens at least 305 mm (12 in.) longer than the joint to be covered. The ends of longitudinal cover strips should be overlapped 150 mm (6 in.) about midway between alternating perpendicular butt joints of the lining sheets.

8.2.1 Apply joint sealant along all joints at least as wide as the cover strips. If sealant application is by any method other than pouring (for example, mopping, troweling, or spraying), apply another coat of sealant to the underside of the cover strips.

8.2.2 Position and press the cover strips immediately before the joint sealant solidifies. Apply sufficient pressure to force out some of the sealant all along the edges.

8.2.3 Point the ends of the batten strips with cold asphalt mastic or overmop with sealant.

9. Installation on Side Slope of a Reservoir or Pond

9.1 Do not attempt this type of installation on inclines greater than 50 % (1 unit of rise for each 2 horizontal units).

9.2 Position all sheets on slopes with their long dimension parallel to the slope.

9.3 Lay or trim all bottom sheets so that all joints are at least 0.3 m (1 ft) up the slope or 0.3 m from the end of the slope on the bottom. The joint on the bottom is preferred.

9.4 Continue up the slope and at least 1 m (3 ft) over the berm, following the method of installation described in 8.1.2 and 8.2.

10. Installation in Corners of Side Slopes of a Reservoir or Pond

10.1 Follow the same general procedure used with composition shingles in the valley area of a roof.

10.2 Where the end of a sheet from one side meets the side of a sheet from the adjoining side of the reservoir, trim the end so that it makes a neat, tightly butted joint.

10.2.1 Where corners are formed by gradual curves, intersecting joints may be in any position.

10.2.2 Where corners are angular or of small radius, plan work so that intersecting joints are not in the angular areas.

11. Installation of Lining in Canals, Ditches, and Certain Reservoirs

11.1 In structures where flows are involved, lap the liner sheets rather than butting them.

11.1.1 Lay all upstream sheets of liner so they overlap downstream sheets, shingle fashion, by at least 150 mm (6 in.).

11.1.2 Stagger transverse lap joints; that is, transverse lap joints in one row of sheets should not coincide with the transverse lap joints in an adjacent row.

11.2 Thoroughly seal all lapped joints with joint sealant in the same manner described for batten strips in 8.2.

12. Sealing Reservoir, Pond, Canal, and Ditch Liners Around Penetrations

12.1 When concrete foundations, piers, or piping supports, etc., are poured, provide at least a 150 mm (6 in.) wide, 100 mm (4 in.) thick apron in the same plane as the surrounding surface for sealing the lining in place.

12.1.1 Prior to pouring the foundations, piers, or supports, if fixed structures such as pipes will pass through or bear against them, apply a light coating of asphalt sealing mastic (cold application) at the points where contact with the concrete will occur.

12.2 If pipes or other like structures will penetrate the lining, concrete collars should be provided at the interface. The collars should be at least 300 mm (12 in.) larger in diameter than the penetrating structure and at least 100 mm (4 in.) thick.

12.2.1 Thoroughly coat the surface between the pipe and the collar with the cold-applied mastic.

12.3 For cinching purposes, set 13 by 130-mm (0.5 by 5 in.) anchor bolts approximately 75 mm (3 in.) into the concrete apron and space about 0.3-m (12-in.) on centers. (Power-driven pins with galvanized metal strips may also be used.)

12.4 Give particular care to the compaction of the soil or other fill around each concrete structure.

12.5 Before sealing the sheets to the concrete apron, prime the apron with an asphalt primer recommended by the manufacturer of the lining.

12.6 Trim all lining sheets to fit around all penetrations. If anchor bolts are being used, make appropriate holes.

12.6.1 After all material is trimmed and ready to lay in place, coat the concrete apron or collar with joint sealant and immediately lay the sheets, pressing firmly into place.

12.6.2 Where cinching bolts have been used, place batten strips [either 25 mm (1 in.) thick by 75 mm (3 in.) wide redwood, or 6 mm (0.25 in.) thick by 50 mm (2 in.) wide corrosion-resistant metal] with appropriate holes over the bolts and secure with nuts to fit the bolts.

12.6.3 Point all joints and edges with cold mastic or overmop with hot-applied joint sealant.

12.6.4 Seal and point the lining around all penetrations using a stiff, cold-applied mastic with a minimum of a 40-mm (1 1/2-in.) throat.

13. Berm Anchoring

13.1 Extend the lining 1 m (3 ft) above the top of the walls of the installation. This lining material is required for anchoring along the berm.

13.2 Approximately 0.6 m (2 ft) after the breakover at the top of the berm, dig a narrow, V-shaped ditch approximately 0.3 m (1 ft) deep.

13.3 Shape the berm so that a minimum 0.3-m (1-ft) radius is formed in the lining when it is placed in the bottom of the ditch.

13.4 Drive wooden or steel pins 0.5 m (18 in.) long on approximately 1-m (3-ft) centers near the end of the lining sheets and within the ditch itself.

13.5 Then backfill the anchoring ditch with soil and thoroughly compact it.

14. Keywords

14.1 asphalt prefabricated sheet; canal; ditch; installation; liner; pond; reservoir

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