

**NATURAL RESOURCES CONSERVATION SERVICE
INTERIM CONSERVATION PRACTICE SPECIFICATION
IRRIGATION WATER CONVEYNCE
MODULAR POLYETHELENE DITCH AND CANAL LINING**

(ft)
CODE 788

1. SCOPE

The work shall consist of installing modular polyethylene ditch and canal lining for the purposes listed in Interim Conservation Practice Standard 788.

2. MATERIALS

Fittings and appurtenances that are fabricated from steel shall be coated with a manufacturer's coating suitable for burial such as coal tar epoxy paint or a tape wrap. Elbows, tees, reducers and connectors fabricated from steel shall be lined with coal tar enamel or coal tar epoxy paint or a tape wrap. Lining and coating material shall be installed in accordance with the manufacturer's recommendations.

Refer to **Table 1** for material requirements for medium density polyethylene.

3. INSTALLATION

Site preparation. Remove all vegetative matter such as brush, willows, weeds, and roots larger than ½ inch diameter from inside existing ditches. Trees, with root systems that constitute a potential root intrusion problem shall be addressed. Unsuitable material shall be disposed or in an acceptable manner.

Subgrade preparation. The subgrade shall be scarified to a depth of six inches and compacted to the designed slope and elevation.

The unlined ditch, at any point below the top of the liner, shall be wide enough to permit the liner to be easily placed and joined, and to allow the backfill material to be uniformly placed and compacted under the haunches and along the sides of the liner

Liner placement. The liner shall be handled in a manner to prevent damage during transportation, placement and backfilling. The liner shall not be dropped or allowed to roll freely down skids. In hot weather, after the liner has been assembled, it shall be allowed to cool to ground temperature before backfilling to prevent pullout of the joints. The liner shall be uniformly and continuously supported over its entire length on firm stable material. Blocking or mounding shall not be used to bring the liner to final grade. Where bells, fittings or connections extend below grade, holes shall be excavated in the trench bottom to allow for unobstructed assembly of the joint and to permit the body of the liner to be in contact with the trench bottom throughout its entire length. Liner shape and design top width shall be maintained during construction.

Anchoring. Two anchoring stakes (#6 rebar), 42 inch long, are to be installed in the anchor handle on each end of the jointed connection. Ensure that the liner is level and pulled tight before anchoring with stakes. Once leveling/stretching is completed, anchor stakes are installed in each connection by drilling a ¾ inch hole in anchor handle (4 per connection) and pounding ¾ inch by 42 inch rebar stake with a sledge hammer until flush with connector saddle. Anchors should be installed vertical and plumb and in a manner that will provide lateral support to liner system connection

Connections. Joints, fittings, and appurtenances shall be installed according to manufacturer's recommendations.

Liner sections shall be connected using the connectors and/or rivets supplied by the manufacturer. Connectors shall be installed as per manufacturer's recommendations. In addition an approved sealant, such as silicon,

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shall be placed between the connector and the liner.

Initial backfill. All special backfilling requirements of the liner manufacturer shall be met. Hand or mechanical compaction methods shall be used to compact the initial backfill. The initial backfill material shall be Class I, II or III as described in **Figure 1**. Initial backfill material shall be placed from the bottom of the trench to at least 0.5 the height of the liner diameter. The initial backfill material shall be compacted firmly in 4 inch to 6 inch lifts.

Each lift shall be shoveled and tamped between the liner and the side of the trench to provide satisfactory liner support. Care should be taken to assure that the backfill is placed under the liner sufficiently to fill all voids and provide uniform bearing. Caution must be practiced to ensure that the planned shape of the liner is maintained.

At the time of placement, the moisture content of the material shall be such that compaction can be obtained. The liner shall be held in place, if necessary, during installation of the initial backfill.

Final backfill. The final backfill shall be soil or sand free of hard earth clods or stones greater than 1 ½ inch diameter. The material shall be placed and spread in approximately uniform layers so that there will be no unfilled spaces in the backfill. The backfill shall be placed to the level of the natural ground, or to the design grade.

Tolerances. All construction shall be completed to design lines, grades and elevations within the following tolerances:

- a. Channel bottom grade shall not vary more than 0.1 foot above design grade and not more than 0.2 foot below grade.
- b. Elevations of the embankments shall vary not more than 0.1 foot below design grade and not more than 0.2 foot above design grade.
- c. The constructed cross sectional dimensions shall meet or exceed the design cross section

Construction operations. Construction shall be done in such a manner that erosion and air and water pollution are minimized and held within legal limits. The completed job shall be workmanlike and present a good appearance as per manufacturer's recommendations.

4. OPERATION AND MAINTNENCE PLAN

A properly operated and maintained irrigation ditch or canal is an asset to a farming operation. When federal funds are used to pay for this practice, it must be maintained for a period of 10 years. The estimated life span of this installation can be assured and usually increased by developing and carrying out a good operation and maintenance program.

The following are some recommendations to help develop an operation and maintenance program.

- Do not allow water or sediment to get beneath the liner.
- Remove all foreign debris that hinders system operation.
- Drain the system and components in areas that are subject to freezing.
- Eradicate or otherwise remove all rodents or burrowing animals. Immediately repair any damage caused by their activity.
- Periodically check and repair all gates, inlets, and outlets to the ditch system to ensure proper operation.
- Immediately repair any vandalism, vehicular, livestock, or other damage to any components.

FIGURE 1**INITIAL BACKFILL MATERIAL DESCRIPTION**

Class of Select Initial Backfill Material	Description
I	Angular ¼ to 1 ½ inch size, graded, crushed stone with a maximum of 10% non-cohesive fines.
II	Coarse sands (>0.5 mm) and gravels with a maximum particle size and gravels containing a maximum of 12% non-cohesive fines. Soil types GW, GP, SW and SP are included in this class
III	Fine sand and clayey gravels, including fine sands, sand-clay mixtures and gravel-clay mixtures. Soil types GM, GC, SM and SC are included in this class.

Table 1
Material Requirements – Medium Density Polyethylene

Physical Properties	Values	Comments
Density	0.935 g/cc	ASTM D792
Apparent Bulk Density	0.61 g/cc	
Melt Flow	5 g/10 min	ASTM D1238
Environmental Stress Crack Resistance	1000 hours	ASTM D1693
Mechanical Properties		
Tensile Strength @ Yield	2,509 psi	ASTM D638
Tensile Strength @ Break	3,944 psi	ASTM D638
Elongation @ Yield	17.4%	ASTM D638
Elongation @ Break	1500%	ASTM D638
Flexural Modulus	88 ksi	ASTM D790
Impact Strength	0.99 ft-lb/in	ASTM D256
Tensile Impact Strength	78 ft/in ²	ASTM D1822
Thermal Properties		
Deflection Temperature @ 0.46MPa	140° F	ASTM D1525
Vicat Softening Point	235° F	ASTM D1525
Melting Point	262° F	ASTM 3417
Crystallization temperature	234° F	
Melt Temperature Range	482° F	

Source: Nova Chemical Novapol® TR-0535-UG Hexene MDPE