

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE SPECIFICATION**

SUBSURFACE DRAIN

CODE 606

SPECIFICATIONS

INSPECTION AND HANDLING

Material for subsurface drains shall be carefully inspected before the drains are installed. Plastic pipe and tubing shall be protected from hazard-causing deformation or warping. Plastic pipe and tubing with physical imperfections shall not be installed. A damaged section shall be removed and a suitable joint made connecting the retained sections. All material shall be satisfactory for its intended use and shall meet applicable specifications and requirements.

MATERIALS

The following specifications pertain to products currently acceptable for use as subsurface drains.

Type	Specification ¹
Corrugated Polyethylene (PE) Tubing and Fittings (3-6 in)	ASTM-F-405
Large Diameter Corrugated Polyethylene Pipe and Fittings (8-24 in)	ASTM-F-667
Corrugated Poly (Vinyl Chloride) Tubing and Compatible Fittings (2-12 in)	ASTM-F-800
Poly (Vinyl Chloride) (PVC) Corrugated Sewer Pipe and Fittings (4-36 in)	ASTM-F-949
Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings (2-6 in)	ASTM-D-2729
Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings (4-15 in)	ASTM-D-3034

¹ Specifications can be obtained from the American Society for Testing and Materials, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, Pennsylvania, 19428-2959

PERFORATIONS

Where perforated conduit is required, the water inlet area shall be at least 1 in²/ft of conduit length. Round perforations shall not exceed 3/16-in diameter except where filters, envelopes, or other protection is provided or for organic soils, where a maximum hole diameter of ½ in may be used. Slotted perforations shall not exceed 1/8 in. in width.

GENERAL

Flexible conduit installations shall meet the minimum requirements of ASTM-F-449, "Standard Practice for Subsurface Installation of Corrugated Polyethylene Pipe for Agricultural Drainage or Water Table Control."

All conduits shall be laid to line and grade in such a way that the side walls are continuously and uniformly supported with suitable bedding material. Such material shall be properly placed and compacted to provide lateral restraint against deflection and to protect the conduit against collapse during backfilling.

TRENCHING

Trench widths must be adequate for proper installation of the conduit, allow proper joining of sections, and allow proper placement of filter, envelope, or blinding materials. The trench bottom shall be constructed to proper grade before placement of the conduit.

If the conduit is to be laid in a rock trench or if rock is exposed at the bottom of the

trench, the rock shall be removed a minimum of 6 inches below grade so that the trench can be backfilled, compacted, and bedded.

Provisions for safety during trenching operations shall be in compliance with the applicable safety and health regulations for construction.

PLOW INSTALLATION

Plow installation is allowed. Minimum trench width shall be 2 inches wider than the conduit on each side. Special care shall be exercised relative to grade control and bedding conditions.

BEDDING

The trench bottom shall be smooth and free of clods and loose or exposed rock. Where a sand-gravel filter or envelope is not specified, the bottom of the trench shall be shaped to conform to the pipe. The groove may be semi-circular, trapezoidal, or a 90 degree "V"-shape (90 degree "V" suitable for 3 - 8 in. only) and shall be of such dimensions that the bottom quarter of the pipe is below the contact points of the groove.

In unstable soils, a firm foundation shall be provided by over-excavation and backfilling with processed stone or gravel, suitably graded so as to act as a mat into which unstable soil will not penetrate.

PLACEMENT

Conduit will be placed in such a way that maximum stretch does not exceed 5 percent. Caps are needed at the ends of lines.

Fittings shall be installed in accordance with instructions furnished by the manufacturers. Couplers are required at all joints and fittings, at all changes in direction (where the centerline radius is less than three times tubing diameter), at changes in diameter, and at junction with another line. The use of internal couplers for corrugated plastic tubing is allowed.

All fittings shall be compatible with the tubing. Where certain fittings are not available, handcut holes are acceptable provided care is taken when making the connection not to create a means of obstructing flow, catching debris, or allowing soil to enter the line.

The conduit will be held in place mechanically until secured by blinding. If a sand-gravel filter or envelope is not specified, place selected blinding material, containing no hard object larger than 1 ½ in. in diameter, in the trench to a minimum depth of 3 in. over the conduit.

FILTERS AND ENVELOPES

If a filter is required, all openings in the subsurface drain shall be protected by the filter.

If a fabric filter is specified, it shall consist of one of the following materials, or equivalent:

- Drainguard (Cerex Type F-11) - 0.65 oz/sy
- Reemay - 0.8 oz/sy
- Typar (Style 3351) - 3.5 oz/sy
- Bidim (Type C-22) - 4.4 oz/sy
- Mirafi (Tyoe 140) - 4.1 oz/sy

If a sand-gravel filter is specified, it shall be clean, hard, durable material and of the gradation specified.

If a sand-gravel envelope is specified, it shall be clean, hard, durable material with less than 5 percent passing the No. 200 sieve, not more than 10 percent passing the No. 60 sieve, 90-100 percent passing the 3/4 in. sieve, and with a maximum size of 1½ in. ASTM-C-33 fine aggregate for concrete meets this gradation.

For installation of filters or envelopes, the trench shall be over excavated 3 inches and backfilled to grade with the material. After the conduit is placed on the material, additional material shall be placed over the conduit to fill the trench to a depth of 3 inches over the conduit.

BACKFILLING

Place backfill material so that displacement or deflection of the conduit, filter, envelope, or blinding will not occur. This is preferably on an angle, so the material flows down the front slope. Avoid large stones, frozen material, and dry clods that cause concentrated point loads on the tubing. The trench should be backfilled as soon as practical. When installing the tubing on a hot day, backfilling should be delayed until tubing temperature cools to the soil temperature.

The minimum depth of cover shall be 2 feet for mineral soils and 2.5 feet for organic soils, unless otherwise shown on the plans. Backfill of the trench shall extend at least 6 inches above the finished ground surface and be well rounded over the trench, unless the backfill has been compacted in layers, or the conduit was installed with a plow.

OUTLET

The outlet of the subsurface drain shall be a length of non-perforated rigid pipe with at least two-thirds of its length embedded in the ditch bank. The cantilever section must extend to the toe of the ditch side slope or the side slope protected from erosion. The outlet may be recessed such that the cantilever section will be protected from ice or floating debris. An animal guard shall be installed to exclude rodents and other small animals. The openings shall not be less than 1 inch. Swing gates shall be used where surface water enters the drain directly.

CERTIFICATION AND SOURCE

The installing contractor shall certify that the installation complies with the requirements of these specifications. The contractor shall also name the source of materials.