

NATURAL RESOURCES CONSERVATION SERVICE  
CONSERVATION PRACTICE STANDARD

PIPELINE

(Ft.)

CODE 516

**DEFINITION**

Pipeline having an inside diameter of 8 inches or less.

**PURPOSE**

To convey water from a source of supply to points of use for livestock, wildlife, or recreation.

**CONDITIONS WHERE PRACTICE APPLIES**

Where it is desirable or necessary to convey water in a closed conduit from one point to another.

**CRITERIA**

**Capacity.** For livestock water, the installation shall have a capacity to provide seasonal high daily water requirements for the number and species of animals to be supplied. Animal water requirements can be obtained from the NRCS Field Office Technical Guide.

For recreation areas, the water capacity shall be adequate for all planned uses. Typical examples are drinking water, fire protection, showers, flush toilets, and irrigation of landscaped areas.

Additional water capacity will be provided for wildlife when applicable.

**Sanitary Protection.** If water from the pipeline is to be used for human consumption, applicable state and local regulations shall be met.

**Pipe.** All pipe must withstand the pressure it will be subjected to, including hydraulic transients, internal pressures and external pressures. As a safety factor against surge or water hammer, the working pressure should not exceed 72 percent of the pressure rating of the pipe and the design flow velocity at system capacity should not exceed 5 ft/sec. If either of these limits is exceeded, special consideration must be given to flow conditions and measures must be taken to adequately protect the pipeline against surge.

The minimum size pipeline shall be 1 ¼ inches inside diameter for gravity flow and ¾ inches inside diameter for systems with induced pressure.

The minimum size gravity flow pipeline may be used without further design calculations when all of the following conditions are met:

1. Pipe slope is not less than 1.0% along any section of the pipe.

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2. The total fall from the source to the point of use is greater than 1 foot per 100 feet of pipeline length.
3. Water is being provided for wildlife or livestock only, and
4. The required capacity is less than 2 GPM.

All other systems will be designed based on the topographic profile of the pipeline and procedures contained in NEH Part 650, EFH chapters 3 and 12.

Steel pipe shall meet the requirements of AWWA Specification C-200.

Plastic pipe shall conform to the requirements of the following ASTM specifications, as applicable:

- D 1527 Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe, Schedules 40 and 80
- D 1785 Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
- D 2104 Polyethylene (PE) Plastic Pipe, Schedule 40
- D 2239 Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter
- D 2241 Poly (Vinyl Chloride) (PVC), Pressure-Rated Pipe (SDR)
- D 2282 Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe (SDR-PR)
- D 2447 Polyethylene (PE) Plastic Pipe, Schedules 40 and 80, Based on Outside Diameter
- D 2513 Thermoplastic Gas Pressure Pipe, Tubing and Fittings
- D 2737 Polyethylene (PE) Plastic Tubing
- D 2672 Joints for IPS PVC Using Solvent Cement
- D 3034 Polyvinyl Chloride (PVC) Sewer Pipe and Fittings
- D 3035 Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Controlled Outside Diameter
- AWWA C900 Polyvinyl Chloride (PVC) Pressure Pipe, 4 inches through 12 inches
- AWWA C901 Polyethylene (PE) Pressure Pipe and Tubing, ½ inch through 3 inches

Plastic pressure pipe fittings shall conform to the following ASTM specifications, as applicable:

- D 2464 Threaded Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
- D 2466 Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40
- D 2467 Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
- D 2468 Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe Fittings, Schedule 40

D 2609 Plastic Insert Fittings for Polyethylene (PE) Plastic Pipe

D 2683 Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing

D 3139 Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals

D 3261 Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing

Solvents for solvent-welded plastic pipe joints shall conform to the following ASTM specifications, as applicable:

D 2235 Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings

D 2564 Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings

D 2855 Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings

Rubber gaskets for pipe joints shall conform to the requirements of ASTM F477, Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

**Drainage.** Valves or unions shall be installed at low points in the pipeline so that the line can be drained as needed. Check valves shall be installed as needed to protect groundwater quality or maintain a full pipeline.

**Vents.** Design shall provide for entry and removal of air along the pipeline, as needed, to prevent air locking or pipe collapse. If parts of the line are above the hydraulic gradient, periodic use of an air pump may be required. Provisions shall be made for pressure relief, air relief and vacuum relief as needed to protect the pipeline.

**Joints.** Watertight joints that have strength equal to that of the pipe shall be used. Couplings must be of material compatible with that of the pipe. If they are made of material susceptible to corrosion, provisions must be made to protect them.

**Protection.** When steel pipe is used, interior protective coatings shall be provided in accordance with NRCS Conservation Practice Standard 430FF, Steel Pipe. If a coal-tar enamel protective coating is needed for corrosion protection, the coating shall meet the requirements of AWWA Specification C-203.

Steel pipe installed above ground shall be galvanized or shall be protected with a suitable protective paint coating, including a primer coat and two or more final coats.

Plastic pipe installed above ground shall be resistant to ultraviolet light throughout the intended life of the pipe.

All pipes shall be protected from hazards presented by traffic, farm operations, freezing temperatures, fire, thermal expansion and contraction, or soil cracking. Other means of protection must be provided if the depth required for protection is impractical because of shallow soils over rock or for other reasons. Abrupt changes in grade must be avoided to prevent rupture of the pipe. Trenches for plastic pipelines shall be free of rocks and other sharp-edged materials, and the pipe shall be carefully placed

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to prevent damage. Plastic pipelines may be placed by plow-in equipment if soils are suitable and rocks and boulders will not damage the pipe. A minimum depth of 36 inches shall be used in Area 1 and Area 2; Marion and Morrow Counties of Area 5; Richland, Ashland, Wayne, Stark, and Columbiana Counties of Area 3. All other areas of the State shall have a minimum depth of 30 inches. Reasonable measures should be taken to protect the pipe from potential vandalism.

**Vegetation.** Disturbed areas shall be established with vegetation or otherwise stabilized as soon as practical after construction. Seedbed preparation, seeding, fertilizing, and mulching shall conform to NRCS Conservation Practice Standard 342, Critical Area Planting.

**Visual resources.** The visual design of pipelines and appurtenances in areas of high public visibility shall be carefully considered.

### **CONSIDERATIONS**

No special considerations have been identified for this practice.

### **PLANS AND SPECIFICATIONS**

Plans and specifications for installing pipelines shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose. If the pipeline is a component of a system that includes additional conservation practices, the information necessary to construct these additional practices will also be conveyed on the plans.

The Engineering Field Handbook, Chapter 5, will guide the development of plans.

### **OPERATION AND MAINTENANCE**

An O&M plan specific to the type of installed pipeline shall be provided to the landowner. The plan shall include, but not be limited to, the following provisions:

- Opening/closing valves to prevent excessive water hammer;
- Filling at the specified rate requirements;
- Inspecting and testing valves, pressure regulators, pumps, switches and other appurtenances;
- Maintaining erosion protection at outlets;
- Checking for debris, minerals, algae and other materials which may restrict system flow; and
- Draining and/or providing for cold weather operation of the system.

### **REFERENCES**

Engineering Field Handbook

NATURAL RESOURCES CONSERVATION SERVICE  
CONSTRUCTION SPECIFICATION

PIPELINE

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**Site Preparation**

All trees, brush, stones, or other objectionable material shall be removed from the pipeline route and disposed of so that they will not interfere with construction, operation, or maintenance of the pipeline.

**Placement**

Pipelines shall be placed so that they are protected against hazards imposed by traffic, farm operations, freezing temperatures, or soil cracking. Other means of protection must be provided if the depth required for protection is impracticable because of shallow soils over rock or for other reasons. Abrupt changes in grade must be avoided to prevent rupture of the pipe. Trenches for plastic pipelines shall be free of rocks and other sharp-edged materials, and the pipe shall be carefully placed to prevent damage. Plastic pipelines may be placed by plow-in equipment if soils are suitable and rocks and boulders will not damage the pipe.

**Testing**

Pipelines shall be pressure tested by one of the following methods:

1. Before backfilling, fill the pipe with water and test at the design-working head or at a minimum head of 10 ft., whichever is greater. All leaks must be repaired, and the test must be repeated before backfilling.
2. Pressure test at the working pressure for 2 hours. The allowable leakage shall not be greater than 1 gal. Per diameter inch per mile. If the test exceeds this rate, the defect must be repaired until retests show that the leakage is within the allowable limits, but all visible leaks must be repaired.

**Backfilling**

All backfilling shall be completed before the line is placed in serve. For plastic or copper pipe, the initial backfill shall be of selected material that is free of rocks or other sharp-edged material that can damage the pipe. Deformation or displacement of the pipe must not occur during backfilling.

Plastic pipelines installed by the plow-in method require surface compaction and shaping in addition to the normal plow-in operations. Installation and backfilling shall be done in a workmanlike manner. Provisions shall be provided for stabilizing disturbed areas and controlling erosion, as necessary.