

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSERVATION PRACTICE STANDARD**

**PIPELINE  
(Feet)  
CODE 516**

**DEFINITION**

Pipeline having an inside diameter of eight (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**

**Laws and Regulations.** The installation and operation of the pipeline shall comply with all federal, state and local laws, rules and regulations.

**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 local 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 to which it will be subjected, including hydraulic transients, internal pressures and external

pressures. As a safety factor against surge or water hammer, the working pressure for thermoplastic pipe 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 design consideration must be given to flow conditions and measures must be taken to adequately protect the pipeline against surge.

For design, the friction head losses shall be computed using Manning's, Hazen-Williams or Darcy-Weisbach equations. The applicable equation and friction roughness coefficient used for design shall be in accordance with design procedures in the National Engineering Handbook, Part 650, Engineering Field Handbook (EFH) for the applicable material(s).

**Pipe Materials.** Steel pipe shall meet the requirements of AWWA Specification C-200 or ASTM A 53.

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 PolyVinyl 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 PolyVinyl 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 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, 1/2 inch through 3 inches

ASTM D 3350 and D 2837 for HDPE pipe (material shall be PE 3408 as per ASTM D 3350)

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

D 2464 Threaded PolyVinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 80

D 2466 PolyVinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 40

D 2467 PolyVinyl 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 PolyVinyl Chloride (PVC) Plastic Pipe and Fittings

D 2855 Making Solvent-Cemented Joints with PolyVinyl 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. Standpipes shall be the same nominal diameter as the pipe on which they are installed.

Joints. Watertight joints that have a strength equal to or greater than that of the pipe shall be used. Couplings must be of material compatible with that of the pipe. Couplings made of material susceptible to corrosion must have a protective coating.

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

When the above ground installation of pipe is needed due to shallow soils, rock, easement limitations for pipe burial, etc., the installation shall meet the following provisions:

- 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. Pipe shall be supported on saddles and expansion/contraction joints shall be provided at a maximum spacing of 500 feet.

- HDPE pipe installed above ground shall be resistant to ultraviolet light deterioration. Pipe may be laid along the ground surface or supported on saddles. Pipe laid on the ground shall be bedded along its entire length. The ground surface shall be free of rocks, crevices or other irregularities that can create a point load or an abrasion situation on the pipe as movement from thermal expansion and contraction occurs. The allowable design pressure for HDPE pipe shall be adjusted for the expected maximum operating temperature of the pipeline per the manufacturer's recommendations. Aboveground pipe shall be anchored as needed to control movement and maintain general alignment of the pipe. The pipe shall be restrained at tees, wyes and connections to troughs, storage tanks, pumps, etc. On sloping ground the pipe shall be adequately anchored to avoid pipe wall stresses due to continual downhill creep of the pipe associated with movement from expansion and contraction associated with expected temperature changes that exceed the allowable stress for the specific pipe materials.

All pipes shall be protected from hazards presented by traffic, farm operations, freezing temperatures, fire, thermal expansion and contraction. Reasonable measures should be taken to protect the pipe from potential vandalism. The minimum cover for buried pipelines shall be 18 inches unless other means are provided to limit hazards from traffic and farm operations (i.e., earth mounding, fencing, etc.). Pipelines designed for winter use shall be designed with a minimum of 36 inches of cover. In areas of greater frost penetration, use a greater depth as local conditions dictate.

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 Critical Area Planting (342).

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

### **CONSIDERATIONS**

To reduce the hazard of air locks and plugging on gravity flow pipelines, a minimum one (1) inch diameter pipe should be used.

Select the pipeline route to minimize impacts to cultural resources.

Consider the effects of erosion and sedimentation from disturbed areas during and following construction.

On above ground pipelines include measures to minimize potential fire hazards.

To reduce the effects of direct sunlight temperature rise on the pipe, consider shading for above ground pipe installations.

### **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 be included in the plans and specifications.

The EFH, Chapter 5, will guide the development of site specific plans.

### **OPERATION AND MAINTENANCE**

An operation and maintenance 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**

-National Engineering Handbook Part 650,  
Engineering Field Guide

Chapter 3, Hydraulics

Chapter 11, Ponds and Reservoirs

-Idaho Range Technical Note 39

-Plastics Pipe Institute, "Above Ground  
Applications for Polyethylene Pipe"

-Idaho Engineering Technical Note #17, Above-  
Ground Applications for Polyethylene Pipe