

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

PIPELINE

(Feet)

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 areas.

CONDITIONS WHERE PRACTICE APPLIES

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

Water quality and quantity shall be adequate for the pipeline to facilitate the conservation use of forage resources by livestock.

Water for distribution can be from wells, springs, flowing streams, ponds, or rural water districts.

Refer to Conservation Practice Standard 614, Watering Facility, for spacing of the tank, trough, or fountain.

CRITERIA

Laws, rules, and regulations. This practice shall conform to all federal, state, and local laws, rules, and regulations. Laws, rules, and regulations of particular concern include those involving water rights, land use, pollution control, property easements, wetlands, preservation of cultural resources, and endangered species.

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 National Range and Pasture Handbook Chapter 6, Table

6-7, "Expected water consumption of various species."

For livestock water, the installation shall have the capacity to provide at least 12 gallons per head per day for beef cattle and horses, 25 gallons for dairy cattle, 3 gallons for swine, and 1 1/2 gallons for sheep and goats.

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 area.

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 size. The minimum pipeline inside diameter (I.D.) shall be 1 inch. In areas where water is hard and deposits in pipelines occur, the pipe size shall be at least 1 nominal size larger than would be adequate if there were no hardness in the water.

Capacities of plastic pipelines shall be computed using a Manning's equation roughness coefficient "n" value of 0.009, Hazen-Williams "c" of 150, or approved friction loss tables or nomographs. Capacities of other pipeline materials will be determined using values or tables for the type and size of pipeline.

Delivery and overflow pipelines from spring boxes shall be adequate to prevent clogging with foreign matter. The minimum pipe sizes for spring developments are as follows:

- 1¼ inches diameter for line grades over 1 percent

- 1½ inches diameter for line grades of 0.5 to 1 percent
- 2 inches diameter for line grades from 0.2 to 0.5 percent

Pipe. All pipe must withstand the anticipated pressure—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 feet/second. 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.

Steel pipe shall meet the requirements of American Water Works Association (AWWA) Specification C 200.

Plastic pipe shall conform to the requirements of the following American Society for Testing and Materials (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 (SDR-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 3035 Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Controlled Outside Diameter

The following AWWA specifications also apply:

- C 900 Polyvinyl Chloride (PVC) Pressure Pipe, 4 inches through 12 inches
- C 901 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 F 477, Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

Drainage. Valves or unions shall be installed at low points in a steel pipeline so that the line can be drained as needed. Buried unions should be referenced to known landmarks so they can be readily located. Drain valves or unions are optional in a plastic pipeline that is buried below

the expected frost line. Check valves shall be installed as needed to protect ground water quality or maintain a full pipeline.

Valves. A check valve will be installed at the pump when the pipeline delivers water to points of higher elevation and will be subject to reverse flow. Pressure relief should be provided at the pump by means of an air tank or pressure relief valve. This is to protect the line from a sudden pressure surge or rise caused by the abrupt closing of the check valve. Pressure relief should be provided at the end of the line if the sudden closing of a valve would produce excessive pressure.

All valves in the pipeline shall be of the same nominal size as the line; however, float valves in stock tanks may be reduced to 1/2 inch if adverse hydraulic conditions are not a factor.

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.

A 1-inch (minimum) air release valve is adequate on most installations (with 1/4 inch nominal size for each inch of pipeline diameter on a pipeline larger than 4 inch). Manually operated hydrants or valves may be used to release air on filling or at other times as needed. When a hydrant is used, it is normally a 3/4 inch or 1 inch non-freeze hydrant.

Joints. Watertight joints that have a 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 Conservation Practice Standard 430, Irrigation Pipeline. 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 2 or more final coats.

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

A pipeline installed above ground or buried above the expected frost line shall have provisions for draining, and the operation and maintenance plan shall detail the required drainage before cool weather.

All pipes shall be protected from hazards presented by traffic, farm operations, freezing temperatures, fire, and thermal expansion and contraction.

Vegetation. Disturbed areas shall be established with vegetation or otherwise stabilized as soon as practical after construction. Seedbed preparation, seeding, fertilizing, and mulching shall comply with 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.

OPERATION AND MAINTENANCE

An operation and maintenance plan shall be developed and reviewed with the landowner or individual responsible for operation and maintenance. The plan shall include, but not be limited to:

- 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.
- Inspecting after rains for settlement and erosion of the backfill. Restore the backfill as required.
- Maintaining erosion protection at outlets.
- Checking for debris, minerals, algae, and other materials which may restrict system flow.
- Draining and/or providing for cold weather operation of the system.