

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

PIPELINE

(Feet)

CODE 516

DEFINITION

Pipeline having an inside diameter of 8 inches or less.

The minimum size pipeline shall be 1-1/4 inches inside diameter for gravity flow and 3/4 inches inside diameter for systems with induced pressure.

PURPOSE

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

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

CONDITIONS WHERE PRACTICE APPLIES

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

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.

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 WV Conservation Practice Standard (CPS) 528, Prescribed Grazing, Appendix 6.*

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

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.

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% 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,

Additional water capacity will be provided for wildlife when applicable.

<p>Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resource Conservation Service.</p>

Note: Bold italics - Information added or changes made in the National Conservation Standard by WV.

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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 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 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. Reasonable measures should be taken to protect the pipe from potential vandalism.

Buried pipes shall be installed to a minimum depth of 24 inches. The depth of pipe shall be increased as necessary for applications where it is necessary to eliminate freezing potential and in areas with extreme frost penetration (approximately 30 inches in southern WV and up to 40 inches in northern WV). Pipes that are not able to be installed to the minimum depth shall be designed with measures to eliminate freezing potential.

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 **WV** Conservation Practice Standard (CPS) 342, Critical Area Planting.

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

CONSIDERATIONS

- 1. Pipelines shall be designed on a continuous, uniform grade if at all possible.***
- 2. The layout for pipelines shall avoid, where possible, areas where slips are likely to present serious hazards. Where***

slips are present, the line should be approximately normal (90 degrees) to the contour.

- 3. Check valves shall be installed between a pump discharge from a well and the pipeline where backflow may occur.***

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, **Part 650, Chapter 5, Preparation of Engineering Plans** will guide the development of plans.

The purpose of the pipeline (i.e. livestock water, wildlife, or recreation) will be documented on the 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

National Engineering Field Handbook, **Part 650, Chapter 5, Preparation of Engineering Plans**

NRCS Conservation Practice Standards

***Critical Area Planting
Irrigation Water Conveyance -Steel
Pipeline NCP430FF***

AWWA Specifications

C200, C203, C900, C901

ASTM Specifications

***D1527, D1785, D2104, D2239, D2241,
D2282, D2447, D2513, D2737, D2672,
D3035, D2464, D2466, D2467, D2468,
D2609, D2683, D3139, D3261, D2235,
D2564, D2855, F477***

**CONSTRUCTION SPECIFICATION
WEST VIRGINIA
PIPELINE**

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 where the depth required for protection is impracticable due to 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.

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

1. Before backfilling, the pipe shall be filled with water and tested at design working head or a minimum head of 10 feet, whichever is greater. All leaks shall be repaired and the test repeated before backfilling.

2. Pressure test at the working pressure for 2 hour. The allowable leakage shall not be greater than 1 gal. per diameter inch per mile. If leakage 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.

All backfilling shall be completed before the line is placed in service. For plastic or copper pipe, the initial backfill shall be of selected material, free from rocks or other sharp-edged material that would 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 should be done in a workmanlike manner. Provisions shall be made for stabilizing disturbed areas and control of erosion, as necessary.

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