

**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.

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 **Table 1**.

Table 1

Livestock Daily Water Consumption

Type of Livestock	Gallons per Day per Head
Beef Cattle and Horses	10 - 15
Dairy Cows (Drinking only)	15
Dairy Cows (Drinking and barn needs)	35
Hogs	4
Sheep and Goats	1 - 2

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. All pipe installed in New

Mexico shall bear the seal of approval of the National Sanitation Foundation (NSF).

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, special consideration must be given to flow conditions and measures must be taken to adequately protect the pipeline against surge.

The pipeline shall be designed without an operating or static pressure at any point greater than the pressure rating of the pipe used at that point.

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

Plastic pipe shall conform to the requirements of the following ASTM or AWWA 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,
- D2104 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,

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

- 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. If freezing temperatures pose a hazard, if the manufacturer of the pipe recommends drainage, or if drainage of the line is specified for the job, provision shall be made for completely draining the pipeline. If provisions for drainage are required, drainage outlets shall be located at all low places in the line. These outlets may drain into dry wells or to points of lower elevation. If drainage cannot be provided by gravity, provisions shall be made to empty the line by pumping or by other means. Check valves shall be installed as needed to protect groundwater quality or maintain a full pipeline.

Steel Pipe Working Pressure. Table 2 will be used for determining the maximum allowable working pressure, to include water hammer, for Standard Steel Pipe (ASTM-A120).

Table 2

Maximum Allowable Working Pressure (PSI) for Standard Steel Pipe (ASTM-A120)

Nominal Pipe Size - Inches -	Standard Weight Schedule 40	Extra Strong Schedule 80	Double Extra Strong Schedule 120
1/8 to 1	700	850	1,000
1-1/4 to 3	1,000	1,300	1,400
3-1/2 to 8	1,200	1,700	2,000

As pipes larger than 8 inches are outside the definition of this standard, for steel pipes, refer to NRCS Practice Standard 430FF, Irrigation Water Conveyance - Steel 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 a vacuum pump may be required. Provisions shall be made for pressure relief, air relief and vacuum relief as needed to protect the pipeline. Air vents shall be placed at high points or summits. Vents shall have a minimum opening of one-eighth (1/8) the pipeline diameter. Air release valves may be used in lieu of open vents. On gravity lines, place air-vacuum valves or vents downstream from all in-line valves. Faucets may be used for air vents only but will not suffice for vacuum release installations.

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.

The pipe shall be placed below the frost line, and not less than 15 inches in range land and 30 inches when crossing cultivated fields. The minimum depth may be obtained by mounding soil over the pipeline on range land where site conditions such as shallow soils or rock make it impractical to attain the minimum depth of cover by usual means. The engineer may waive this minimum depth of cover requirement when a minimum of 6 inches of cover is provided and the pipe is high-density PE (not PVC or ABS) and has a pressure rating of at least 160 pounds per square inch (psi).

Surface installation of plastic pipelines. Surface installations of plastic pipelines may be approved if all of the following conditions are met:

- Due to rock, steep slopes, or forest cover, steel pipe would be the only other feasible alternative.
- Design pressure of the pipeline will not exceed 50 percent of the pressure rating of the pipe used.
- Plastic pipe will be high density, PE3408, black resin, or approved equal.
- Pipe will have a minimum pressure rating of 200 psi.
- The installer will guarantee pipeline installation for a period of at least one year.
- The state conservation engineer, or designee, prior to installation will approve design of the pipeline.
- Landowner will be cautioned of the hazards to the pipeline imposed by fire, surface vehicles, and 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.

Erosion control. Provisions will be made to prevent surface runoff from concentrating along the pipeline. This can be accomplished with turnouts or water bars at

intervals that will prevent erosion along the pipeline. Proper conservation practices shall be applied to minimize soil erosion from borrow sources where soil for mounding is obtained.

Friction loss calculations. For design purposes, friction head losses shall be no less than those computed by the Hazen-Williams equation, using a roughness coefficient, "C", equal to 150 or a Manning's "N" value of 0.009.

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 plans 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.