

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE SPECIFICATION**

**IRRIGATION PIPELINE
(FT)
CODE 430-S
PLASTIC PIPE (BURIED INSTALLATION)**

GENERAL

The work shall consist of furnishing and installing smooth wall buried plastic pipe 18 inch diameter and smaller, along with the necessary fittings and appurtenances, as specified using NRCS National Engineering Handbook (NEH) Part 636, Chapter 52, Structural Design of Flexible Conduits, the NRCS Conservation Practice Standard, Irrigation Pipeline Code 430 to the lines and grades shown on the drawings and/or as staked in the field. Details of construction shown in the design drawings shall be considered as part of this specification.

RECEIVING AND HANDLING

Each pipe shipment should be inspected carefully upon arrival. Pipe discoloration due to Ultraviolet (UV) exposure shall be brought to the attention of the Designer and Owner prior to installation. The effects of (UV) aging do not affect pressure rating and pipe stiffness; however it does affect impact strength and could also have a detrimental effect on the pipe gaskets.

Pipe at the bottom of the stack may become out-of round due to the weight of the material above it. Allow pipe adequate time to recover its shape which may range from a few minutes to a few days depending on the weather conditions. Use extra care when unloading pipe during cold conditions.

MATERIALS

Pipe and Fittings. Pipe shall be homogeneous throughout and free from visible cracks, holes, foreign matter, and other defects. The pipe shall be as uniform in color, opacity, density, and other physical properties as is commercially practicable. Pipe and fittings shall conform to the applicable requirements stated herein as called for on the drawings.

Polyvinyl Chloride (PVC) Pipe and Fittings. Polyvinyl chloride (PVC) pipe and fittings shall conform to the requirements of one or more of the following ASTM specifications.

- D 1785, Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
- D 2241, Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)
- 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 2564, Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems
- D 3139, Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals
- F 477, Elastomeric Seals (Gaskets) for Joining Plastic Pipe

Polyvinyl Chloride (PVC) Plastic Irrigation Pipe (PIP). Polyvinyl Chloride (PVC) plastic irrigation pipe (PIP) shall meet the requirements of ASTM D 2241 Annex, except that:

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- The outside diameters, wall thicknesses and tolerances in ASAE S376.2, “Design, Installation, and Performance of Underground, Thermoplastic Irrigation Pipelines” shall apply.
- The minimum burst pressure requirements for water at 23° C for PVC 1120 and 1220 plastic pipe, SDR 51, shall be 260 lb/in².

Polyethylene (PE) Plastic Pipe and Fittings. Polyethylene (PE) plastic pipe and fittings shall conform to the requirements of one or more of the following ASTM specifications.

- D 2239, Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter
- D 2737, Polyethylene (PE) Plastic Tubing
- D 3035, Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter
- F 714, Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter
- F 771, Polyethylene (PE) Thermoplastic High-Pressure Irrigation Pipeline Systems

Plastic pipe shall be marked with nominal pipe size (for example, 10 in.), applicable material designation code (for example, PVC 1120), pressure rating for water at 23° C, specification designation with which the pipe complies, and manufacturer’s name or trademark.

Fittings, Joints, and Couplers. All fittings, joints, and couplers shall meet the requirements of the applicable specification referenced in the ASTM specification for the pipe. They shall meet or exceed the same strength requirements as those of the pipe and shall be made of material that is recommended for use with the pipe. Where steel fittings, valves, bolted connections, and other flanged fittings are used, they shall be painted or coated as recommended by the manufacturer or as shown on the drawings.

Solvents for solvent welded pipe joints shall be compatible with the plastic pipe used and shall conform to the requirements of the applicable specification referenced in the ASTM specification for the pipe, fitting, or joint.

Valves and Appurtenances. Pipeline valves and appurtenances shall be of the size, type, material, and pressure rating shown on the drawings. If not shown on the drawings, pressure rating shall equal or exceed that of the pipe. All valves (including control valves, pressure relief valves, air and vacuum relief and/or combination air and vacuum relief valves) shall be installed at the locations shown on the drawings and shall be installed in accordance with the manufacturer’s recommendations or as shown on the drawings. Manually operated valves shall be equipped with geared operators, unless otherwise shown on the drawings.

Pressure relief valves shall be stamped with the pressure at which the valve starts to open. Adjustable valves shall be sealed or otherwise altered to insure that the setting marked on the valve is not changed. Pressure relief valves shall be set to open at a pressure as low as practical, but no greater than 5 psi above the pressure rating of the pipe.

Check valves shall be rated as quick-closing, non-slamming.

INSTALLATION

Stands: Pipeline shall be connected to the discharge piping from the well by either a steel z-pipe (dog-leg) as shown in Figure 1, or steel pump stand (surge tank or riser tank) as shown in Figure 2. The steel shall be painted, epoxy coated, power coated, or galvanized to protect against corrosion.

Figure 1. Z-pipe.

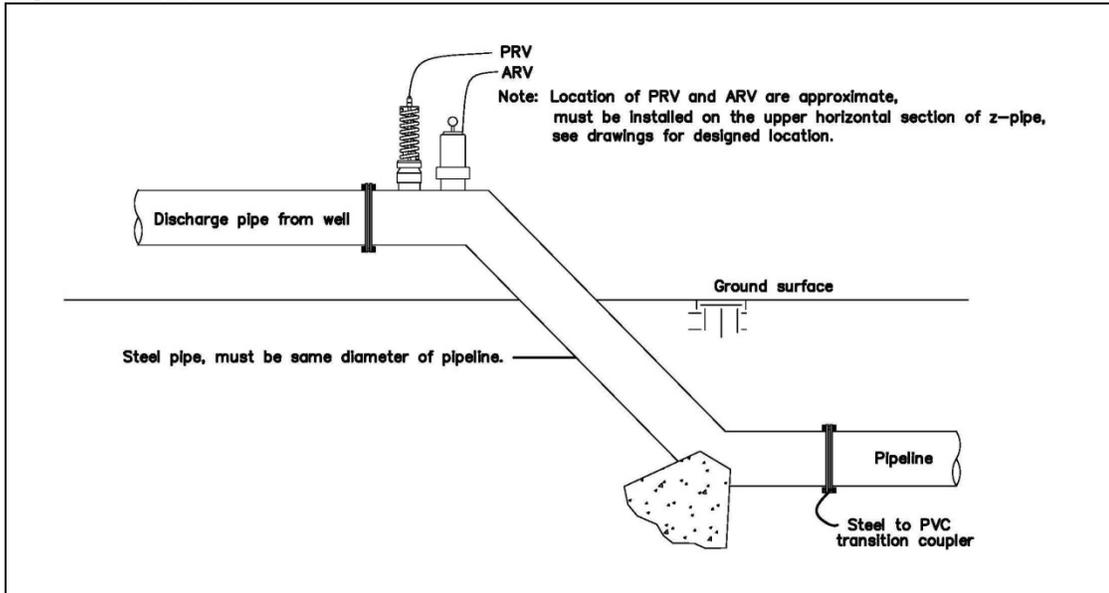
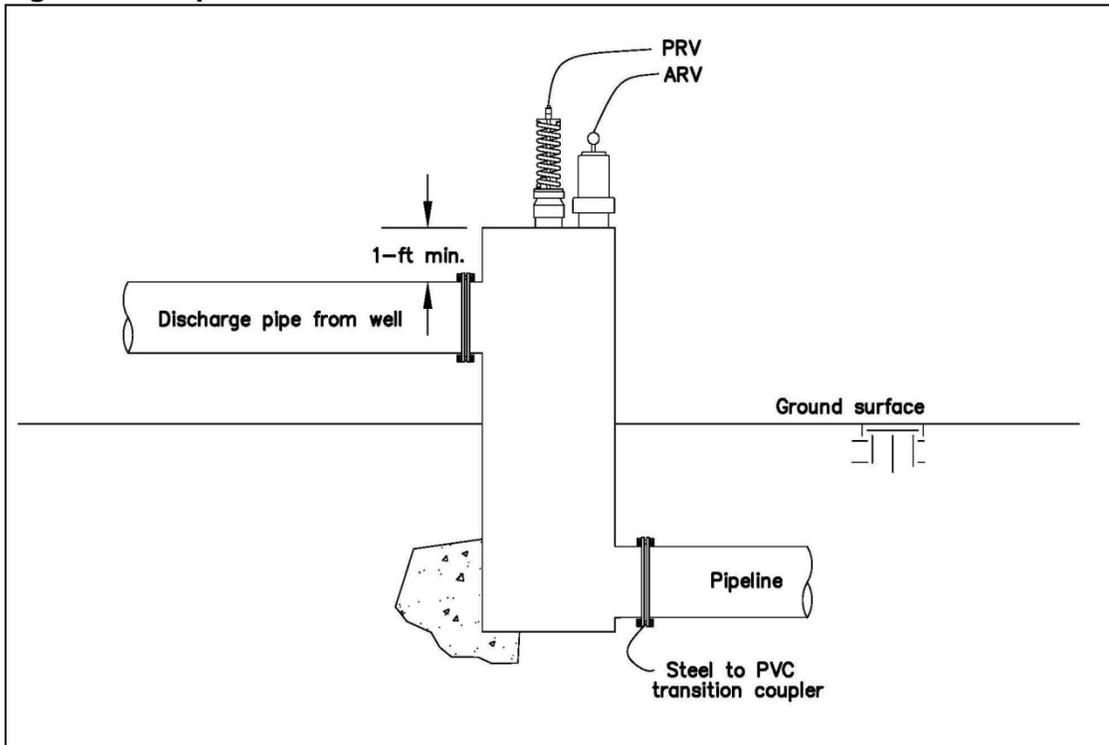


Figure 2. Pump stand.



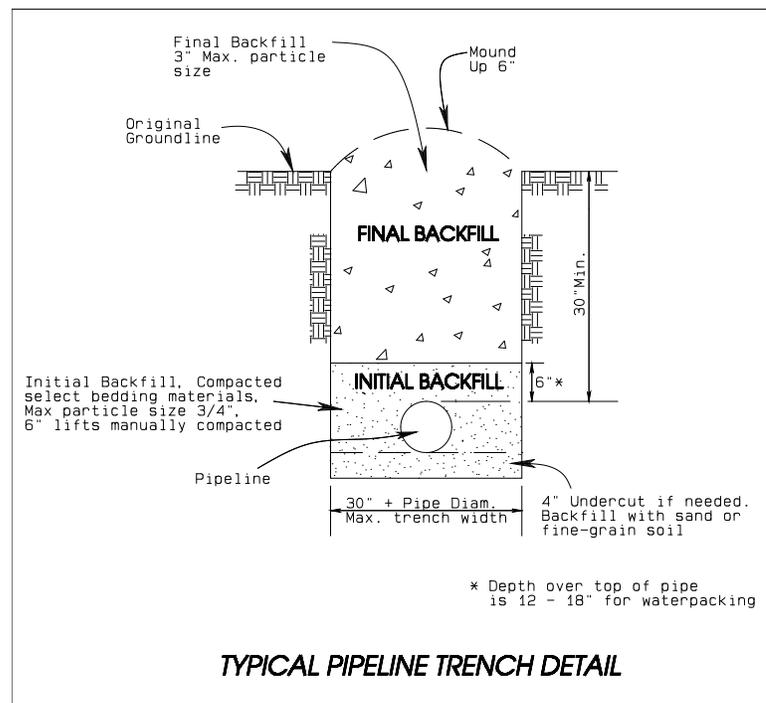
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Trench Construction. Pipe trench excavations shall be to the lines and grades shown on the drawings or as laid out in the field, if not otherwise specified. Vertical alignment shall be uniform and graded such as to maintain the cover requirements, unless otherwise noted on the drawings. If irregular grades are required, thrust blocks, air valves, drains, and other appurtenances shall be installed as needed. Trench walls shall be sloped or shored as necessary to insure safe working conditions in accordance with OSHA regulations. Where trench shoring is used, its use shall not disturb the pipe location, jointing, or backfill.

Trench width at any point below the top of the pipe shall only be wide enough to permit the pipe to be easily placed and joined and to allow the initial backfill material to be uniformly placed under the haunches and along the sides of the pipe. The minimum trench width shall be as shown in Figure 3. The maximum trench width shall be 30 inches greater than the diameter of the pipe (i.e., the maximum clearance between the pipe and trench wall shall be 15 inches).

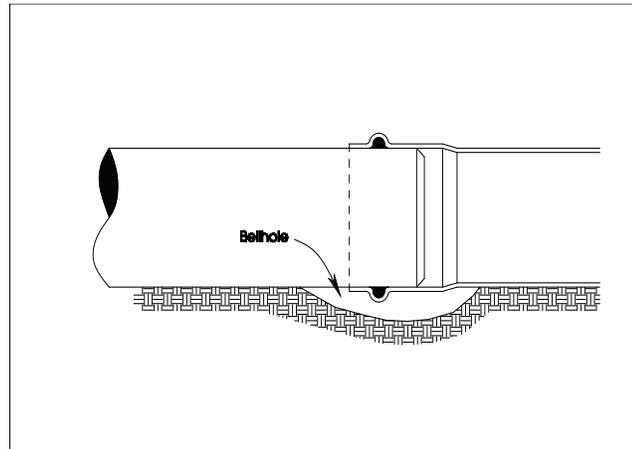
The trench bottom shall be uniform so that the pipe lies on the bottom without bridging. Clods, rocks, and uneven spots that can damage the pipe or cause uneven support shall be removed. Where rock, hardpan, cobbles, or other hard material that can damage the pipe are encountered in the bottom of the trench, the trench shall be undercut a minimum of 4 inches below the final grade and filled back to grade with bedding material consisting of sand or compacted fine-grained soils.

Figure 3. Trench detail.



Laying and Bedding the Pipe. Plastic pipe conduits, complete with fittings and other related appurtenances shall be installed to the lines and grades shown on the drawings. The pipe shall be firmly and uniformly bedded throughout its entire length, to the depth and in the manner specified on the drawings. Bedding material, if necessary, shall be placed and spread in uniform layers and in such a manner as to fill the trench so there are no unfilled spaces (air pockets) below the pipe. Holes shall be dug in the bedding at belled couplings and other fittings to permit the body of the pipe to be in contact with the bedding along its entire length. Figure 4 illustrates a bell hole. Blocking or mounding beneath the pipe shall not be used to bring the pipe to the final grade.

Figure 4. Bell hole in bedding.



The pipe and the couplings shall be free of foreign material when assembled. At the termination of pipe laying, the open end(s) of the pipeline shall be closed off by a suitable cover or plug until laying operations are resumed.

Care shall be taken to prevent permanent distortion and damage when handling the pipe. To minimize stresses and movement due to expansion and contraction, the pipe shall be allowed to come within a few degrees of the temperature it will have after it is completely covered before placing the backfill, other than the backfill needed for shading, or before connecting the pipe to other facilities.

Joints and Connections. Joints and connections shall be constructed to withstand the design working pressure for the pipeline without leakage and shall leave the inside of the pipeline free of any obstruction which could reduce the pipe capacity below design requirements. Insert fittings for joining PE pipe are permitted. Fittings, such as couplers, reducers, bends, tees and endives shall meet or exceed the same strength requirements as that of the pipe. They shall be made of material that is recommended for use with the type of pipe specified and shall be installed in accordance with the recommendations of the pipe manufacturer. Fittings made of steel or other materials susceptible to corrosion shall be painted or coated as recommended by the manufacturer or as shown on the drawings.

Rubber gaskets shall conform to ASTM F 477.

Thrust Blocks. Thrust blocks shall be placed at the locations shown on the drawings. They shall be constructed of concrete and shall be formed against a solid trench wall. They shall be

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of the minimum size and materials as specified on the drawings or as recommended by the pipe manufacturer.

Backfill. Either water packing or hand or mechanical methods may be used for backfill consolidation for pipes. All pipelines with a pressure rating of less than 80 psi shall be filled with water prior to backfilling for either method.

Initial Backfill. When water packing, the pipeline shall be filled with water and maintained near design working pressure during backfilling. The initial backfill, before wetting, shall be of sufficient depth to insure complete coverage of the pipe after consolidation occurs. Water packing is accomplished by adding enough water to diked reaches of the trench to saturate the initial backfill thoroughly without excessive pooling. After the initial fill is saturated, the pipeline shall remain full until after final back filling. The water packed backfill shall be allowed to dry until firm enough to walk on before final backfill is begun.

If hand or mechanical methods of backfill are used, the initial backfill shall be placed in layers and compacted around and above the pipe to the soil density required to provide adequate lateral support to the pipe. Compaction by hand or by hand-directed mechanical means shall be accomplished in lifts not to exceed 6 inches for all pipe sizes. The initial backfill shall be compacted firmly and evenly around and above the pipe to provide adequate lateral support, free from voids, to the pipe. The pipe shall not be displaced, deformed, or damaged by the backfilling operation.

The initial backfill shall be soil or granular material that is free from rocks, gravel, and frozen material larger than 0.75 inch or earth clods greater than 2 inches in diameter and shall be installed to an elevation no less than 6 inches above the top of the pipe (refer to Figure 3).

The degree of compaction for all pipe sizes shall be such that lateral deflection of the pipe sidewalls will be minimal. Unless special compaction requirements are noted on the drawings, or water packing methods are used, the initial backfill material shall be compacted firmly to achieve a soil density at least equal to the density of the undisturbed side walls of the trench.

Final Backfill. Unless otherwise shown on the drawings, the final backfill material within 6 inches of the top of the pipe to the top of the trench shall be free of rocks, frozen clods or other debris larger than 3 inch in diameter. The material shall be placed and spread in approximately uniform layers so there are no unfilled spaces in the backfill. Rolling equipment or heavy tampers shall not be used to consolidate the final backfill until after the minimum depth of cover has been placed, or where the pipe has a wall thickness less than that of DR or SDR 41. Final backfill may be mounded over the top of the trench above ground level, but in no case shall the final backfill be lower than the natural ground along the top of the trench.

All special backfilling requirements of the pipe manufacturer shall be met.

Depth of Cover. Unless otherwise shown on the drawings, the minimum depth of cover over the top of the pipe shall be:

<u>Pipe Diameter (inches)</u>	<u>Depth of Cover (inches)</u>
½ through 2½	18
3 through 5	24
6 or more	30

At low places on the ground surface or at locations where it is shallow to rock, extra fill may be placed over the pipeline to provide the minimum depth of cover. In such cases, the top width of the fill shall be no less than 10 feet and the side slopes no steeper than 6 horizontal to 1 vertical.

TESTING

The pipeline shall be tested for pressure strength, leakage, and proper functioning. When water is available at the time the pipeline is installed, the system shall be tested at that time. For pipelines with a pressure rating of less than 80 psi, the pipeline shall be tested before placing backfill over the field joints. Pipelines with a pressure rating of 80 psi and higher, may be tested after backfilling. When water is not available to complete a test, the installer shall provide a guarantee stating that he will return and fix any leaks or other problems that are found when the pipe is initially filled with water and operated.

When cemented or solvent welded joints are used, the assembled pipeline shall be allowed to cure as specified by the manufacturer before flushing and testing to insure complete setting of the joints.

Prior to testing, the pipeline shall be flushed and cleaned. Partial backfills needed to hold the pipe in place during testing shall be placed as specified in "Initial Backfill" and only the body of the pipe shall be covered, leaving the joints and connections uncovered for inspection.

For the test, the pipeline shall be filled with water, taking care to safely release any air in the pipeline and prevent water hammer. When the line is full, all valves shall be closed and the line shall be brought up to full design working pressure. All joints and valves shall then be carefully inspected for leakage and any visible leaks shall be repaired. The system shall then be re-tested.

It shall be demonstrated by testing that all valves, vents, surge chambers, and other appurtenances function properly when the pipeline is operated at design capacity. At or below design capacity there shall be no objectionable flow conditions such as water hammer, continuing unsteady delivery of water, damage to the pipeline, or detrimental discharge from control valves. Defective appurtenances shall be repaired or replaced.

BASIS OF ACCEPTANCE

The acceptability of the pipeline installation shall be determined by inspections by NRCS or Contractor certification to verify compliance with all the provisions of this specification with respect to the drawings, pipe materials, pipe markings, the appurtenances, and the minimum installation and testing requirements.

The installing contractor shall certify that his installation complies with the requirements of the specification. And the certification will identify the manufacturer and markings of the pipe used.