

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE GENERAL SPECIFICATION
Texas**

**IRRIGATION PIPELINE
SMOOTH WALL, UNDERGROUND, PLASTIC PIPELINE
(Ft.)
Code 430**

1. SCOPE

The work shall consist of furnishing and installing underground smooth wall plastic pipe, fittings, and appurtenances as specified using NRCS National Engineering Handbook (NEH) Part 636, Chapter 52, Structural Design of Flexible Conduits, the NRCS Irrigation Water Conveyance Practice Standard, Irrigation Pipeline-Code 430, and criteria contained within this General Specification.

2. LOCATION

The pipeline shall be located as shown on furnished drawings or as staked in the field.

3. PUBLIC AND PRIVATE UTILITIES

Utilities are defined to be overhead and underground power or communication lines, and pipelines. All utilities discovered to be in the work area are shown on the drawings or sketches. However, the absence of indicators on the drawings or sketches does not assure the nonexistence of utilities in the work area. The contractor is alerted to conduct his/her own search and discovery for utilities in order to lessen or avoid potential damages. The owner/operator shall complete a TX-ENG-80A, Utilities Inventory and a TX-ENG-80B, Cooperator Confirmation of the One-Call Utility Safety System prior to layout or any ground disturbance and return it to a NRCS representative.

4. INSTALLATION**Maximum Pipeline Working Pressure for All Pressure Ratings**

As a safety factor against surge, the working pressure at any point in the pipeline shall not exceed 72 percent of the pressure rating of the pipe.

Pipe Pressure Rating (psi)	22	50	80	100	125	160	200	250
Maximum Working Pressure (psi)	16	36	58	72	90	115	144	180

Exception: Existing irrigation systems utilizing Low Pressure Pipe (less than or equal to 50 psi) installed under previous NRCS standards and specifications may be exempted from the 72 percent safety factor and the system may be operated up to the pressure rating of the lowest rated pipe in the system. Pressure relief valves may be set up to 5 psi above the pressure rating of the lowest rated pipe in the system under this exemption. All other pipe added to the existing system under this specification shall meet the 72 percent of pressure rating safety factor.

Pressure Relief

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.

Stands

Stands will be made of Galvanized or Painted Steel, except that PVC stands up to six inches in diameter may be utilized. The top of the stand shall be a minimum of 4 feet above the ground surface.

Exposure

All above ground plastic pipe shall be UV rated, or protected from sunlight by enclosure, or painted with an opaque Latex (water-based) paint.

Minimum Depth of Cover

Pipe shall be installed at sufficient depth below the ground surface to provide protection from hazards imposed by traffic crossings, farming operations, freezing temperatures, or soil cracking. The minimum depth of cover for pipe susceptible to any of these hazards shall be:

Minimum Depth of Cover	
Pipe Diameter, (inch)	Depth of Cover, (inch)
½ to 2 ½	18
3 through 5	24
6 or more	30

For pipe installed in soils subject to deep cracking the cover shall be a minimum of 36 inches.

For pipe with a pressure rating of 50 psi or less, the maximum depth of cover shall be 4 feet.

At low places on the ground surface, extra fill may be placed over the pipeline to provide the minimum depth of cover. The top width of the fill shall then be no less than 10 ft and the side slopes no steeper than 6:1. If extra protection is needed at vehicle crossings, encasement pipe or other approved methods may be used.

Trench Construction

The trench at any point below the top of the pipe shall be only 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 side of the pipe. The maximum trench width shall be 30" greater than the diameter of the pipe. If the trench is precision excavated and has a semicircular bottom that closely fits the pipe, the width shall not exceed the outside diameter of the pipe by more than 10 percent.

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 non-uniform support shall be removed. If rocks, boulders, or any other material that can damage the pipe are encountered, the trench bottom shall be under-cut a minimum of 4 in below final grade and filled with bedding material consisting of sand or compacted fine-grained soils.

Pipelines having a diameter of ½ through 2 ½ inch that are to be placed in areas not subject to vehicular loads and in soils that do not crack appreciably when dry may be placed by using "plow-in" equipment instead of conventional trenching.

Provisions shall be made to insure safe working conditions where unstable soil, trench depth, or other conditions can be hazardous to personnel working in the trench.

Placement

Care shall be taken to prevent permanent distortion and damage when handling the pipe during unusually warm or cold weather. 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 that needed for shading, or before connecting the pipe to other facilities.

The pipe shall be uniformly and continuously supported over its entire length on firm stable material. Blocking or mounding shall not be used to bring the pipe to final grade.

For pipe with bell joints, bell holes shall be excavated in the bedding material, as needed, to allow for unobstructed assembly of the joint and to permit the body of the pipe to be in contact with the bedding material throughout its length.

Joints and Connections

All joints and connections shall be capable of withstanding the design maximum working pressure for the pipeline without leakage and shall leave the inside of the line free of any obstruction that can reduce its capacity below design requirements.

All fittings, such as couplings, reducers, bends, tees, and crosses, shall be installed according to the recommendations of the pipe manufacturer. Fittings and appurtenances made of steel or other metals susceptible to corrosion shall be adequately protected by wrapping them with plastic tape or applying a coating having high corrosion preventative qualities. If plastic tape is used, all surfaces shall be thoroughly cleaned and then coated with a primer compatible with the tape before wrapping them.

Thrust Blocks

Thrust blocks must be formed against a solid hand-excavated trench wall undamaged by mechanical equipment. They shall be constructed of concrete, and the space between the pipe and trench wall shall be filled to the height of the outside diameter of the pipe or as specified by the manufacturer.

Testing

The pipeline shall be thoroughly and completely tested at the design pressure for pressure strength and leakage while uncovered or only partly backfilled. If it is necessary to partly backfill the line before testing to hold the pipeline in place, backfilling shall be according to the specifications under "Initial Backfill." All joints and connections shall be left uncovered for inspection; only the body of the pipe sections shall be covered.

The line shall be slowly filled with water. Adequate provision shall be made for air release during filling operations; taking care to bleed all entrapped air. The pressure shall be slowly built up to the maximum design working pressure of the system. While this pressure is maintained, all

exposed pipe, fittings, valves, hydrants, joints, appurtenances, and covered parts of the line shall be examined for leaks. Any leaks shall be repaired and the system retested.

It shall be demonstrated by testing that the pipeline will function properly 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, vents or stands.

Initial Backfill

All pipelines with a pressure rating of less than 80 psi shall be filled with water and maintained near design working pressure during backfilling for any method used.

Water packing, hand, or mechanical methods may be used.

The initial backfill material shall be soil or sand that is free from rocks or stones larger than 1 inch in diameter and earth clods greater than 2 inches in diameter. At the time of placement, the moisture content of the material shall be such that the required degree of compaction can be obtained with the backfill method to be used. The initial backfill material shall be placed so that the pipe will not be displaced, excessively deformed, or damaged.

Water packing shall be used when possible to consolidate the initial backfill around the pipe. 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 conditions do not permit water packing, the initial backfill shall be placed in layers and compacted around and about 6 inches above the pipe by hand or mechanical methods to the soil density required to provide adequate lateral support to the pipe.

An exception to water packing or to completely compacting the initial backfill is permitted if the trench is precision excavated and has a semicircular bottom that closely fits the pipe and the width does not exceed the outside diameter of the pipe by more than 10 percent. With this type of trench construction, all other initial and final backfill requirements shall apply, including having the pipe under water pressure during backfilling.

Final Backfill

Final backfill material shall be free of large rocks, frozen clods, and other debris greater than 3 inches in diameter. The material shall be placed and spread in approximately uniform layers so that there will be no unfilled spaces in the backfill and the backfill will be level with the natural ground or at the design grade required to provide the minimum depth of cover after settlement takes place. Rolling equipment shall not be used to consolidate the final backfill.

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

5. MATERIALS

Irrigation Water Conveyance, Plastic Pipeline, Material Specifications 430-MS shall be followed with regard to materials used.

6. BASIS OF ACCEPTANCE

The acceptability of the pipeline shall be determined by inspections to check compliance with all the provisions of this standard and specifications including the design of the line, the pipe, and pipe marking, the appurtenances, and the minimum installation requirements.

7. CERTIFICATION AND GUARANTEE

All materials shall conform to these minimum requirements and to the tests prescribed in the applicable ASTM Specification. If requested by the state conservation engineer, a qualified testing laboratory must certify with supporting test results that the pipe meets the requirements specified in this specification. The seal of approval of a recognized laboratory on pipe bearing one of the ASTM designations listed in the Material Specifications 430-MS may be accepted for this certification.

The installing contractor shall certify to the purchaser that the materials and installation comply with the requirements of these specifications. He shall furnish the purchaser a written guarantee against defective workmanship and materials to cover a period of not less than one year. He shall record on the guarantee the manufacturer's name and markings of the installing high pressure underground plastic pipe used.

The installing contractor shall furnish the Natural Resources Conservation Service a copy of his certification and guarantee, which will be made a part of the supporting records of the pipeline.

8. MEASUREMENT

The amount of pipeline completed as specified will be determined by measuring the length, in feet, of each size and kind of pipe installed.

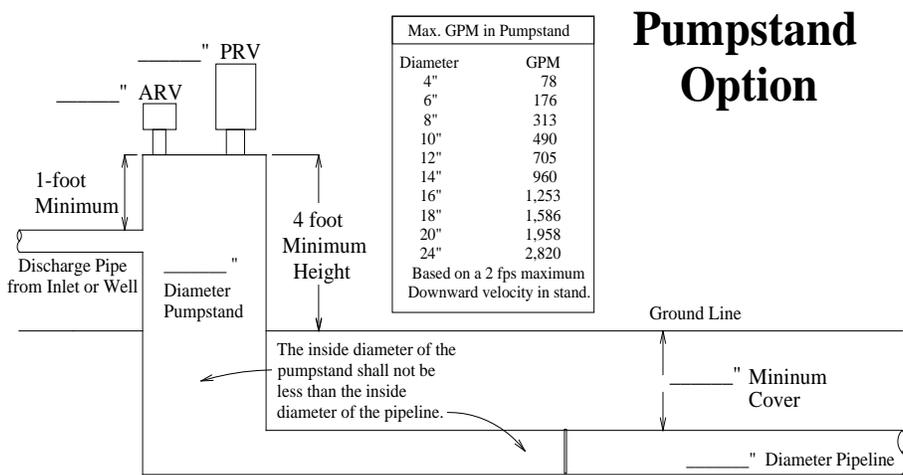
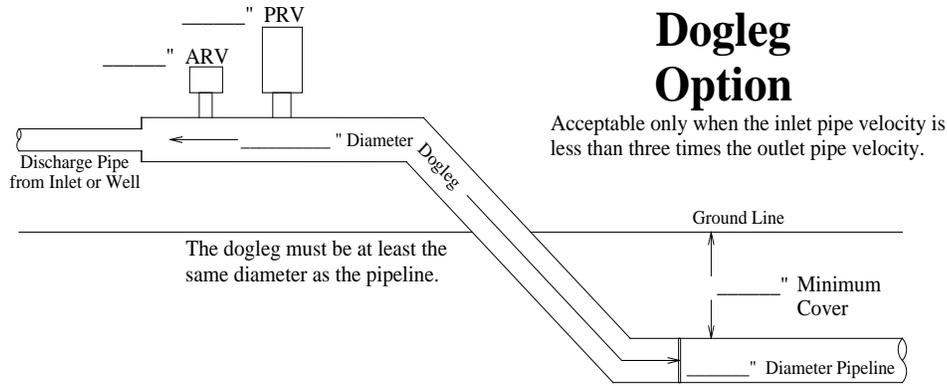
9. CONSTRUCTION DETAILS

<u>Air Relief Valves (ARV)</u>		
Pipe Diameter	ARV Orifice Diameter (Minimum)	
	≤ 50 psi	> 50 psi
4 inch	0.88 inch	0.40 inch
6 inch	1.32 inch	0.60 inch
8 inch	1.76 inch	0.80 inch
10 inch	2.20 inch	1.00 inch
12 inch	2.64 inch	1.20 inch
15 inch	3.30 inch	*****
16 inch	*****	1.60 inch
_____ inch	_____ inch	_____ inch

For Pipe ≤ 50 psi, the ARV orifice diameter will be a Minimum 0.22 inch for each inch of pipeline diameter and for pipe > 50 psi, the ARV will be a Minimum 0.1 inch of pipeline diameter.

<u>Pressure Relief Valves (PRV)</u>	
Pipe Diameter	PRV Nominal Size (Minimum)
4 inch	1.0 inch
6 inch	1.5 inch
8 inch	2.0 inch
10 inch	2.5 inch
12 inch	3.0 inch
14 inch	3.5 inch
15 inch	4.0 inch
16 inch	4.0 inch
_____ inch	_____ inch

PRV's shall be no smaller than 0.25 inch, nominal size, for each inch of pipeline diameter and set to open at a pressure no greater than 5 psi above the pressure rating of the pipe. The pressure at which the valve starts to open shall be marked on the PRV.



Additional Details

All pumpstands, doglegs, and outlets shall be made of galvanized or painted steel, except that 6 inch diameter and smaller may be made from Schedule 40 PVC or equivalent and have a durable coating of exterior latex (water based) paint.

This construction specification, attached construction details, and the requirement for completion of a TX-ENG-80A and TX-ENG-80B have been reviewed with me and I agree to install my irrigation pipeline according to these construction specifications.

Owner/ Operator

Date