IRRIGATION WATER CONVEYANCE (Ft.)

Rigid Gated Pipeline

Definition

A rigid pipeline, with closely spaced gates, installed as part of a surface irrigation system.

Scope

This standard applies to the design and installation of rigid gated pipe. It includes material specifications for aluminum and polyvinyl chloride (PVC) plastic gated pipe.

Purpose

To efficiently convey and distribute water to the land surface for better water management, without causing excessive erosion, water losses, or reduction in water quality.

Conditions Where Practice Applies

The rigid gated pipeline shall be planned and located to serve as an integral part of an irrigation distribution system that has been designed to help conserve soil and water resources on a farm. This practice shall not be used in lieu of buried pipelines for conveyance systems; however, reaches of ungated pipe may be used to obtain necessary working pressure for the system or to convey the water to various points in the field.

Water supplies and rates of irrigation delivery for the area served by the gated pipe shall be sufficient to make irrigation practical for the crop to be grown and for border, furrow, corrugation, or contour water application methods.

Design Criteria

A. Working Pressure

The maximum working pressure shall be 10 psi or 23 ft. of head. Design working heads in excess of 23 feet shall be controlled by installing orifice plate head reducers, butterfly valves, stand pipes, or other appurtenances for head control.

B. Friction Losses

For design purposes, friction head losses shall be no less than those computed by the Hazen-Williams equation, using a roughness coefficient of C=130 for aluminum pipe and C=150 for plastic pipe. A multiple outlet factor shall be used in computing losses only when in affects the design pipe size. A multiple outlet factor maybe used in computing losses.

C. Flow Velocity

The design velocity in the pipeline when operating at system capacity shall not exceed 5 ft/s.

D. Capacity

The design capacity of the pipeline shall be sufficient to deliver an adequate irrigation stream to the design area for the planned irrigation method.

E. Outlet Gates

Individual outlet gates shall have the capacity at design working pressure to deliver the required flow to a point at least 0.3 ft. above the field surface.

F. Head Requirement

The working head shall not be less than 0.5 ft. above outlet gates, unless a detailed design is completed to indicate that a lower head requirement is adequate. Where streamflows are erosive, a "sock" shall be installed on each gate or some other means of erosion control shall be provided.

G. Flushing

A suitable outlet shall be installed at the terminal end of the pipeline if needed for flushing the line free of sediment or other foreign material.

H. Quality of Water

Water quality shall be evaluated for all aluminum pipeline installations. A copper content in excess of 0.02 ppm produces nodular pitting and rapid deterioration of pipe if water is allowed to become stagnant. The pipeline should be drained after use. Provisions shall be made to prevent trash inflow into the gated pipeline.

I. Materials

Pipe materials shall equal or exceed the physical requirements specified under "Materials."

Related Structures

On farm irrigation delivery systems shall meet or have a plan for improving the system to meet the appropriate irrigation water conveyance standard.

Appurtenances used to join the gated pipeline to the delivery system outlet must have adequate capacity at design working head to deliver the required flow.

Plans and Specifications

Plans and specifications for installing gated pipelines shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purposes.