Coorong Tatiara

Sustainability, Agriculture & the Environment

Best Practice to achieve a leak free service from on-farm pipelines & water reticulation systems

This fact sheet covers best practice considerations and steps involved in constructing farm water supply pipelines. Maintaining a reliable and sustainable farm water supply is a major concern for livestock producers today.

Background

The increasing mains water prices has driven some landholders to replace or upgrade old leaking poly pipe.

By careful planning and using best practice methods of laying poly pipe considerable savings can be made as well as substantially increasing the life of the pipe.

Selecting correct pipe size

To determine the best size/diameter of pipe to install for a specific water reticulation project, the whole of the proposed system must be evaluated first.

The purpose of the evaluation stage is to gather information on the physical conditions that will inform the best design of the system.

It is necessary for the 'Total Head' to be calculated which is the sum of three elements;

- Static Lift
- Static Height
- Friction Loss.

Static lift

In the case of using a pump to supply the water into the system, static Lift is the vertical distance of the suction pipe from the ground level at the pump site to the lowest water level in the bore, well, dam or creek. If the water supply is from a storage tank adjacent to the pump site, there is no Static Lift factor.

Similarly, where the water supply is from a reticulated pressurised mains supply, there is no static lift.

Static height

This is the maximum height to which the water has to flow, and is the vertical distance from the ground level at the water source to the highest point in the proposed delivery pipeline, eg a header tank. (When flowing downhill, water acquires a Static Height equal to the height of the fall.)

Friction loss

The same applies to pipes. If we double the quantity of water passing through a pipe, it must obviously travel at twice the speed. This then means a greatly increased friction factor, but doubling the speed of the flow doesn't mean the friction is doubled too. The increase in friction is almost 4 times.

Friction loss is the most important element in the determination of any reticulation system, because it is the only variable that can be changed. For example, friction loss can be reduced by an increase in the diameter of the delivery pipe.

Designing the system

Once all the information required to design your system has been gathered and evaluated, the next process is to use this information to select the correct pump (if required) and pipe diameter.

High ambient temperature can significantly reduce the rated pressure capability of polyethylene pipe.

Planning & Regulation for Roadsides

Introduction

Regulatory requirements have been established primarily in response to issues that have arisen over the years that have created either environmental damage, over-use of resources, infrastructure damage or even conflict between land users. Often these issues were not foreseen, and as such the regulatory frameworks have been put in place to prevent or limit any such adverse impacts occurring. In regards to piping water, the following may need to be considered as part of the overall plan (noting that this is based on use as stock water only).

Dial Before You Dig

The essential first step in any roadside excavation

Dial Before You Dig is a FREE national referral service designed to assist in preventing damage and disruption to Australia's vast infrastructure networks which provide essential services we use every day. Visit https://www.1100.com.au

Infrastructure for pumping water from River Murray system

Any new pumping infrastructure (including deposition of wastewater from desalination plants) in the River Murray Protection Area is classified as development. Impact on use and amenity of locality, and environmental impacts required to be assessed.

Laying pipeline on road reserve

Any alteration to a road or road reserve (including laying of infrastructure) requires the consent of the relevant Council. Impact on existing infrastructure, native vegetation etc. is assessed.

Authorisation to alter a public road

The following activities are considered to be making an alteration to a road pursuant to the Local Government Act 1999. It is an offence to undertake alterations to a road without a written Authorisation from the Council for any of the following works:

- Install Stormwater Pipe
- install Underground Pipe or Cable
- install Underground Electrical Service
- install Structure (e.g. pipes, wires, cables, fixtures, fittings or other objects)

Also

Is the Proposed Alteration

- Permanent
- Temporary (indicate period of time for which the authorisation is required):

Storage Tanks

Depending on the size, & possibly location, of water storage tanks, they may require development approval. Ensuring that the tank is structurally sound would be the primary concern.

Native Vegetation

A native vegetation clearance may be required if the pipeline goes through scrub or native vegetation on a road reserve. Contact the Native Vegetation Council**:** (08) 8303 9777

Alteration to a road or road reserve requires permission from Council

Alteration to a road or road reserve requires permission from Council

Permission is required to drill under a road

A native vegetation clearance may be required

Factors to achieve a leak free service from poly pipe water reticulation systems, *by John Croser*

DESIGN

Double length rolls equates to less joins and less potential failures. Minimal number of joins in regard to fittings such as "one piece Tees" doing away with threads.

Use brass on brass fittings for the inlets to troughs to prevent damage by stock rubbing on them.

Dependent upon the minimum pressure in the line, use underwater full flow servo activated float valves for totally drip free dependable service life. No water loss due to wind gusts affecting the float valve. (see further information and photos of the underwater full flow servo float on page 5)

FREIGHT & HANDLING

Pallet forks can bruise the internal rings of pipe on a roll particularly double length rolls when used to lift and transfer the rolls of Pipe.

Pallet forks are NOT ideal as the upper edges which take the weight can bruise the inner rings on a roll of pipe. Although not visible to the naked eye, the bruising can lead to premature pipe failure.

At least one manufacturer and their transport distributor use a half circle attachment to the top of the forks to prevent damage during loading and unloading.

PE pipes stacked for transport must be evenly supported in order to prevent distortion. All bearing surfaces must be free from contact with sharp objects. Any projecting sections such as stub flanges must be supported to prevent damage.

Where coils are stacked vertically the stacks may need to be restrained in order to prevent the bottom section of the coil being flattened or distorted.

SAFETY

Safety aspects need to be addressed. In cold and wet weather PE pipes may become slippery and difficult to handle.

In hot weather the pipe surface may reach 70°C, when the ambient temperatures reach 40°C. Handling PE pipes at these temperatures requires gloves, or other protection, to prevent the possibility of skin burns.

Care should be taken to release and uncoiled coiled pipe in a controlled manner. Coils are under tension and the amount of energy stored can be significant, causing injury, damage or death if released in an uncontrolled manner. Coil ends should be restrained at all times and straps released sequentially, starting from the outer layers.

A sling is the easiest way to lift coils of poly pipe.

An old pressure vessel covering the pallet forks can prevent pipe damage

Pallet forks can bruise the pipe which can lead to failure. Ideally a half circle attachment to the forks or a lifting sling should be used when unloading or handling the coils of pipe.

PIPE LAYING & INSTALLING FITTINGS

Ideally poly pipe should be laid in a trench, then the pipe flushed with cold water to reduce its length, then back filled. But trenching is expensive compared to using a poly pipe layer which can do multiple tasks in one pass.

There are several manufacturers of poly pipe layers which take the joiners down the chute with the pipe. This concept permits the couplings to be installed at optimal conditions, (waist height and dirt free)

One of the manufacturers is exploring the concept of being able to flush the pipe with cold water before laying in order to have the pipe shrunk to operating length and to ensure that no debris is in the pipe

Water can be seen running out the pipe as it is being laid

The concept of flushing with cold water before laying in order to shrink the pipe to its normal operating temperature has great merit for the longevity and maintenance free operation of the pipeline.
During operating conditions such as hot summers and cold frosty winters the pipe expands and contracts according to the temperature. However, because the coupling diameters are several times larger than the pipe diameter they act as anchor blocks on the sections of the pipe-line.

Hence when the pipe is shrinking or expanding lengthwise because of the temperature it is restricted by the couplings [anchor blocks] to the area between the individual couplings. This creates stress, usually near to the couplings which is invariably where the pipe fails by splitting, causing leaks.

This can be demonstrated by cutting an existing pipe line at right angles to release the stress which creates a shrinkage gap of sometimes 50 mm.

USE BEST PRACTICE METHODODS WHEN INSTALLING PIPE FITTINGS

Choice of fittings is also a factor. One brand of fitting does not use an external nut to ensure a seal, hence the seal is free floating and seals by the internal water pressure in the pipeline.
Cleanliness of both pipe and fittings is of paramount importance.

CUTTING THE PIPE

Cut the ends of the pipe to be joined with pliers action cutters at right angle to length of pipe.
Check that there are not any internal burrs in the pipe, if so remove.

Poly Pipe Cutter—*Easy Cutting with ratchet design. Large handles make straight and clean cuts.*

CHAMFER THE PIPE ENDS

Chamfer the square cut ends with special tool to ensure that the internal seal of the coupling is not damaged when the pipe is inserted.

Bevelling Tools

Pipe bevelling tools are used to remove the sharp edges on the outside of small bore HDPE pipe, from 20 mm to 63 mm. The bevel tool operates like a pencil sharpener, and bevels the poly pipe so it is suitable for electro fusion welding.

USE BEST PRACTICE METHODODS WHEN INSTALLING PIPE FITTINGS

FULL FLOW SERVO ACTIVATED FLOAT VALVES

Dependent upon the minimum pressure in the line, use under water full flow servo activated float valves for totally drip free dependable service life. No water loss due to wind gusts affecting the float valve.
One brand can be easily exchanged in the paddock under mains pressure in the event of a malfunction. They couple/uncouple using a simple bayonet connection.

CHOOSING THE BEST FITTINGS

Choose good quality fittings. They may cost more but will save money by reducing leaks.
The fitting on the left has a better quality seal and the pipe extends well past the seal which helps prevent leaks through pipe shrinkage.

LUBRICATION

Lubricate the coupling seals & the chamfered pipe ends with glycerine or a non-reactive pipe joint lubricant.

Ensure that the coupling seals are not displaced or rolled out of their natural shape when inserting the pipe into the coupling.

The seals are potentially a weak link in the water reticulation system.

Get it Right the first time as it costs a lot of time to find and fix a small leak in a long pipeline.

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PIPELAYERS

New developments in pipe layer design and features include using nylon tapered rollers to efficiently guide the pipe with minimum resistance & a removable back carriage for access to the pipe while laying.

New developments in pipe reel design features adjustable arms for easy loading of pipe coils, hydraulic lift to adjust the height from the tractor seat, and an adjustable friction brake for smooth uncoiling of the pipe

OTHER WATER SAVING OPTIONS

Leak Detection Units

Water leaks can be as high as 20% to 40% of total usage.
Advantages of installing a leak detection unit include;

- Monitor & record flow from SA Water meters & domestic bores
- Rapid detection of major leaks
- Identify minor system leaks
- Daily water usage alerts via SMS & email
- View graphs online 24/7
- Simple to fit on existing water meters

More info:
Alpha Group - https://www.thealphagroup.com.au/
Tim Powell - http://www.integratedirrigation.com.au/

Tank Level Sensors

- Saves time checking tank levels
- Saves water loss from overflowing tanks
- Prevents the risk of tanks running dry

More info: https://www.thealphagroup.com.au/

Pressure Reducers

- Pressure reducers can significantly reduce leaks in pipelines and water infrastructure.
- Particularly useful with older class B poly pipe.

Pressure Gauges

- Helps identify loss of pressure through leaks or overflowing tanks.
- Cheap & easy to install.
- Useful to check if pressure gages are set correctly.
- Best to have gauge on a riser in a spot you regularly drive past (visible without getting out of the ute or off the bike}.

DIAL BEFORE YOU DIG
www.1100.com.au
The Essential First Step.

Additional Resources

On Farm Piping Projects
Coorong Tatiara Local Action Plan:
https://www.coorong.sa.gov.au/council-services/coorong-tatiara-local-action-plan/water-security/on-farm-piping-projects

Planning information
Coorong District Council 1300 785 277
(or your local Council)
https://www.coorong.sa.gov.au/council-services/coorong-tatiara-local-action-plan/water-security/planning-considerations

Dial before you dig
6A, 128 Fullarton Road
Norwood SA 5067 (08) 7231 1111

Native vegetation Council
https://www.environment.sa.gov.au/about-us/boards-and-committees/native-vegetation-council
(08) 8303 9777

Laying pipe on a road reserve
Coorong District Council 1300 785 277
(or your local Council)

Other Fact Sheets in this series
https://www.coorong.sa.gov.au/council-services/coorong-tatiara-local-action-plan/water-security/water-security-technology-project

Coorong Tatiara Local Action Plan

Tintinara Office

37 Becker Tce Tintinara
PO Box 399
Tailem Bend SA 5260
P: 1300785277

https://www.coorong.sa.gov.au/council-services/coorong-tatiara-local-action-plan/water-security

Australian Government | National Landcare Program

LANDSCAPE SOUTH AUSTRALIA LIMESTONE COAST

This project is supported by the Limestone Coast Landscape Board, through funding from the Australian Government's National Landcare Program