



USE AND INSTALLATION OF POLYETHYLENE PIPE

July 2001



C.S.A. Certified Polyethylene Pipe

Good quality polyethylene (plastic) pipe is recommended for installation in farm water and sewage systems. It is economical, resistant to corrosion, easy to install and has a long life expectancy. To insure years of trouble-free service, pipe quality and size should be properly selected and the pipe must be correctly installed.

Quality

Use only Canadian Standards Association (C.S.A.) certified polyethylene pipe. The words "C.S.A. Certified B 137.1" are clearly stamped on the pipe together with the C.S.A. monogram (Figure 1). Other information stamped on the pipe includes the size, series number (pressure rating), generic symbol (density) and manufacturer's trade name.

Series 75 is recommended for most farm installations. For specialized installations such as a drop pipe for submersible pumps, Series 100 polyethylene pipe should be utilized. Low density polyethylene (type 1) PE 1404 is the most flexible polyethylene pipe and is best suited to Manitoba climatic conditions.



Figure 1

C.S.A. Monogram

Pipe Sizing

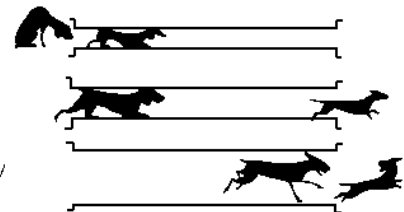
By using an undersized pipe the velocity (speed) and friction of flowing water increases. However, the pressure or line capacity **does not** increase.

As liquid moves through a pipe it must overcome resistance caused by the liquid rubbing along the pipe walls. When the flow (ie quantity) increases, the rubbing or friction becomes more intense resulting in a rapid increase in pressure loss.

This occurrence is similar to a stone boat operation. When the load (ie quantity) increases, the rubbing and the friction of the skids becomes more intense. Undersizing pipe causes a lower discharge pressure and capacity. As a result, the performance of watering devices and future water system expansion is restricted. By doubling the capacity in a pipe, the pressure loss increases four times.

Figure 2

Smaller pipes increase the friction loss; larger capacity and longer pipe also increase friction losses, reducing capacity and pressure.



This chart serves as a guide for selecting pipe sizes for smaller systems. No allowances for elevation differences are incorporated into the chart. However, extensive systems should be designed with detailed friction loss charts.

L/ min	Gal/ min	50m	100m	150m	200m
20	5.3				
30	8.0				
40	10.6				
50	13.2				
60	15.8				
70	18.5				
			1 1/4"		
			1 1/2"		
			2"		

Underground Installation

To prevent foreign objects such as stones and dirt from entering the water system, plug the ends of the plastic pipe before installation. Do not remove the plugs until the pipe is connected to the pumps and/or components.

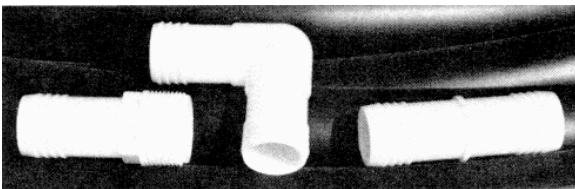
Plastic pipe may be cut with a sharp knife or a hack saw. Take care to prevent the cuttings from remaining inside the pipe since the cuttings can hinder pump and watering equipment performance.

After burial, plastic pipe will cool and contract. Therefore, the pipe should be snaked between the trench walls. Pipes that cross in a trench should not touch each other. One method of overcoming this problem is to deepen the trench for the lower pipe and cover it with sand before the top pipe is installed.

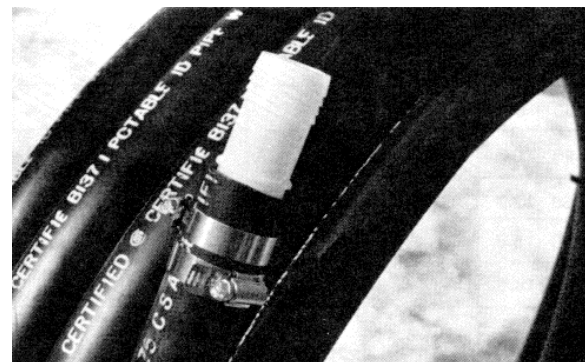
Water pipes should be buried a minimum of 2.5m (8 ft.) deep where good snow cover is expected. When the snow is heavily compacted or is normally bare of snow, a depth of 2.7 m (9 ft.) or greater is recommended. When the pipe is being installed under driveways the depth should not be less than 3m (10 ft.).

If possible, check the plastic pipe for pressure leaks before backfilling. Cover the pipe and connections with about 300 mm (1 ft.) of loose fill to protect the pipe from possible damage when backfilling.

Connections



Typical Nylon Insert Fittings



Insert Coupling Clamped into pipe.

Use insert fittings (serrated edge is inserted into the pipe) to make connections into polyethylene pipe. The most common materials for fittings are nylon (white in colour), galvanized steel, brass, and polymer (grey in color). Characteristics of these materials include:

- Nylon and brass insert fittings are recommended for earth burial because of their long service.
- Nylon is more economical than brass insert fittings.
- The brittle nature of polymer insert fittings leads to premature failures of buried connections.
- Galvanized steel has a service life of 5-15 years depending on water quality and soil conditions.

Heat the polyethylene pipe using hot water (a temperature no greater than 60° C or 140° F) or an indirect heat source. A propane torch should never be used for heating a plastic pipe. A direct flame on the pipe causes the polyethylene pipe to weaken due to crystallizing, which is invisible to the naked eye.

All connections up to 40mm (1 ½ in.) size must be double clamped using all stainless steel clamps. The heads of the screws on the clamp should face in opposite directions to each other (Figure 3). Pipes 50 mm (2 in) and larger should be triple clamped with all stainless steel bolt and nut type clamps (ie lox-on). Beware of clamps featuring stainless steel bands and cadmium plated screws because these types of clamps are not considered suitable for burial.



Figure 3



Stainless Steel Clamps in Opposite Direction.

Waterhammer

Waterhammer is caused by a sudden stopping of the flow of water inside a pipe resulting in a sudden increase in pressure. For example, the closing of a swing check valve causes the pressure to rise above normal. The amount of waterhammer or pressure rise depends on the time required to stop the flow, the type of pipe and velocity of the liquid. Waterhammer is greater in rigid pipes made of steel or copper, but is virtually non-existent in flexible pipes (i.e. rubber, polyethylene) since they can expand to absorb the increased pressure created from the stopping of flow.

Precautions

Keep people and livestock away from all excavations and trenching machinery. Trenches that are deeper than 1.8 m (6 ft.) require special precautions (e.g. shoring) before safe entering. The Manitoba Department of Labour and Manpower should be contacted for further details. Remember:

- No person, regardless of experience in excavation work, can accurately predict if the soil is safe.
- An excavation in or adjacent to backfilled ground is dangerous.
- Water increases the possibility of cave-ins.
- Clay can be very treacherous. If dried by the sun, large chunks can break off a trench wall or may suddenly become unstable.
- More people have been buried alive in trench cave-ins than any other type of construction accident.
- You do not have to be completely buried to suffocate.

**REMEMBER! THE LIFE YOU
SAVE MAY BE YOUR OWN!**

For further information, please contact your Regional Farm Water Source Technologist at one of the following locations:

Wes Friesen
Dauphin, MB
(204)622-2116

Rob Sykes
Brandon, MB
(204)726-6078

Mursel Kluge
Beausejour, MB
(204)268-6059

Prepared by:

**The Manitoba Water Services Board
Box 22080
2022 Currie Blvd.
Brandon, Manitoba
R7A 6Y9
Telephone: (204) 726-6076
Fax:(204)-726-6290**

E-mail: farmwater@gov.mb.ca