



## **PolyPipe® - A Leader in Total Piping System Solutions for the Municipal Water & Wastewater Market**

PolyPipe® is a leading manufacturer of high density polyethylene (HDPE) PE3608 and PE4710 pipe products for municipal water and wastewater systems. We are one of the largest producers of pressure-rated polyethylene pipe in North America. Whether your application calls for new construction or rehabilitation of existing lines in horizontal/directional drilling applications, pipe bursting, sliplining, plowing or river crossing, PolyPipe® HDPE pipe offers innovative products for your total piping system solution.

PolyPipe® offers a complete range of polyethylene (PE) piping system products. PolyPipe® is known for quality products, superior service, state-of-the-art facilities and a team of people dedicated to the industry and our customers. PolyPipe® is one of the largest manufacturers of pressure rated High Density Polyethylene pipe.

PolyPipe® uses only select resins that meet our demanding standard of excellence and quality. As a result, you can safely predict the performance of any PolyPipe® system, as specified.

### **Superior Flow Characteristics**

Unlike other products in the market that must allow for a reduction in flow capacity over time, the smooth inner surface of PolyPipe® HDPE pipe remains relatively constant for the life of the pipe.

In addition, the smooth inner surface of PE provides a higher maximum flow rate for a given size compared to other types of piping materials.

PolyPipe® has excellent fluid flow properties. For liquid flow under pressure, the Hazen-Williams equation may be used with a value of 150 for "C".

Even though HDPE pipe will typically have thicker walls than ductile iron, comparable flow rates can be achieved with a smaller ID for HDPE. By utilizing PolyPipe® high-density polyethylene (HDPE) with its smoother surface, the pipeline ID can be 3.8–15.4% smaller than ductile iron pipe.

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## **PolyPipe®: Meeting the demands of the municipal market**

- Applications include Potable Water, Reclaim Water, Intake Water, Raw Water and Waste Water
- Heat-fused, fully restrained, leak proof joints
- Flexible and lightweight
- Maintains optimum flow rates
- Improved flow, reduced pumping costs
- Superior corrosion, chemical and abrasion resistance
- Durability, long-term strength and integrity
- Pipe, fittings, custom fabrications and valves provide total system solutions
- Sub-zero temperatures do not cause failure
- No damaging effects from freeze-thaw cycles
- Black HDPE contains a minimum of 2% carbon black to protect against ultraviolet degradation, which eliminates storage problems
- Flexibility allows for fewer fittings
- Wide variety of joining methods, including fittings for transition to other piping materials
- Material of choice for trenchless technology
- Excellent resistance to water hammer events – 100% for occasional surges, 50% recurring surges, (see AWWA C-901 and C-906).

## **Pressure ratings, Working pressure ratings and Water hammer**

The inherent advantages of PolyPipe® HDPE pipe, when compared to a rigid piping system, lie in the material's ability to withstand continuous system pressures with additional surges resulting from dynamic events such as an instantaneous change in water velocity. Fused lengths of HDPE pipe, as opposed to gasket push joints, can also eliminate thrust blocking requirements.

### **Design Pressure Rating (PR)**

The pressure rating of PolyPipe® polyethylene pipe is determined in accordance with the Plastics Pipe Institute (PPI) recommended hydrostatic design basis for the material and the physical dimensions of the pipe. Pressure design calculations are based on the "ISO" equation, which relates the stress on the pipe to the internal pressure.

### **Working pressure (WP) and working pressure rating (WPR)**

Per AWWA, the working pressure (WP) is defined as the maximum anticipated, sustained operating pressure applied to the pipe exclusive of transient pressures.

For recurring pressure surges, the sum of the WP and maximum anticipated recurring pressure surge may not exceed 1.5 times the pipe's nominal pressure class. For occasional pressure surges, this value may not exceed two times the pipe's nominal pressure class.

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The WPR establishes a pipe's pressure design capacity for the anticipated system temperature and surge pressure conditions. The WPR, which considers pipe DR system surges and temperature, must be equal to or greater than the WP of the system with consideration for the effect of anticipated pressure surges.

### **WPR > WP**

By comparison, AWWA defines working pressure rating for PVC to be equal to or less than the pressure rating of the pipe depending on the safety factor and allowances for pressure surge.

For further explanation, please refer to AWWA C-906, "Polyethylene Pressure Pipe and Fittings, 4" through 65", for Water Distribution and Transmission."

### **Pressure surge and water hammer events**

Water hammer in a piping system is best described as a hydraulic transient pressure and is a sudden change in pressure due to fluctuations in the velocity of flowing fluids. The change in velocity can be caused due to sudden opening or closing of valves, a pump shutdown or start-up, a pump failure or other dynamic event.

The magnitude of the pressure wave and associated pressure surge can be calculated using equations provided in the AWWA design manual M-55 or the Plastics Pipe Institutes Handbook of Polyethylene Pipe. By using these equations, the magnitude of the expected surge pressure and the total system pressure can be compared for different piping materials.

Different materials respond to water hammer events in different ways. This depends on the material's ability to dissipate the energy from the pressure wave.

The elastic properties of polyethylene absorb a significant amount of the energy from a pressure surge in comparison to more rigid materials such as ductile iron and PVC.

This elasticity provides for a reduction of the shock wave. As a result, HDPE pipe can withstand repetitive surges up to 150% and occasional surges up to 200% of the design operating pressure. This characteristic of HDPE means that the system is not "over designed" to handle water hammer and may result in a cost savings for the piping system.

High Density Polyethylene, Extra High Molecular Weight PolyPipe® is manufactured in accordance with one or more of the following standards: ASTM - D3035 or F714 and AWWA C-901 or C-906. In addition, this product meets NSF Standard 61 for potable water and is approved for Factory Mutual PC150 and PC200. Other dimensional standards or custom requirements are available.

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## **Specify PolyPipe® for:**

- Potable Water Mains
- Potable Water Service Lines
- Raw Water Lines
- Forced Sewer Mains
- Pipeline Rehabilitation or Trenchless Pipeline Replacement
- Combined Storm & Sanitary Sewer Lines
- Sludge Lines
- Intake & Outfall Lines
- Culvert Relining
- Digester Lines
- Laterals
- Complete Systems (Open and Closed)

## **Practical, Cost-Effective Solutions**

The degradation and corrosion of water and wastewater systems in the U.S. is a natural fact. PolyPipe® offers a long-term, cost effective solution to handle these situations. The inherent physical properties and design potential of HDPE pipe present an ideal combination in meeting the critical demands of water and wastewater piping systems.

## **Eliminates Long-Term Effects of Corrosion**

HDPE piping products from PolyPipe® will not corrode. They are immune to most chemicals, microbiological agents and scale buildup. In addition, they will not rust or deteriorate and are proven to be fully resistant to the forces of organic and inorganic corrosion.

## **Designed for Trouble Free Service**

There is no better material available in the market that offers more durability than HDPE. Our pipe product offers assurances of years of reliable performance without degradation and is made from highest grade resins under demanding design and production standards. Due to the flexibility of the polyethylene molecular structure, this pipe can withstand severe pressure surges, ground shifts and freezing without any breaks or disjoints.

## **Fully Restrained, Fused Joints**

PolyPipe® HDPE pipe is joined by the butt fusion method conforming to ASTM D2657 and PolyPipe® recommendations. This process provides for a precision heat weld as strong as the pipe wall. A properly fused pipe eliminates root penetration, infiltration and exfiltration of the joint. The fusion bond also creates a fully restrained joint. The strength of the joint enhances the flexibility and resiliency of the whole line, permitting bending and flexing.

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## **Improved Flow Rates**

The exceptionally smooth inner surface of HDPE pipe presents minimal resistance to fluids, effluent and materials in flow. The original flow dynamics remain relatively constant for the entire life of the pipe. This is unlike other piping products that must allow for a reduction in flow capacity over time. Therefore, when using PolyPipe® polyethylene pipe, a higher maximum flow rate for a given size can be predicted, compared to other types of piping materials.

## **Traditional Installations - Open Cut, New Construction**

The construction of a new water or forced sewer main can be significantly faster and easier with PolyPipe®. This is due to the pipe's lighter weight, ease of handling, fusion capabilities and the reduced trenching parameters. A narrower trench is typical procedure since the crews do not have to enter the trench during the pipe laying process. Long lengths of pipe are fully assembled outside and parallel to the trench and then slipped into the trench in a simple, quick operation. Since HDPE is flexible, it can bend during installation to position in the trench. In addition, it can curve around obstructions and angles within the trench path. Another cost saving advantage of HDPE is trenchless applications where the lengths of pipe are pulled through tunnels underneath roads or structures through the use of a pulling head.

## **Trenchless Applications - Horizontal/Directional Drilling**

PolyPipe® HDPE products are an ideal choice for horizontal and directional drilling applications. The inherent properties of HDPE accommodate all the desired performance characteristics needed for this demanding application.

## **Trenchless Applications - Slip Lining**

One practical application for HDPE pipe is in pipeline rehabilitation using the slip lining method. Although this process is traditionally thought of for gravity or drain line restoration, forced sewer mains have been slip lined for years. Slip lining is a viable alternative to open-cut replacement.

For additional information about PolyPipe® products and their application and installation for municipal water and wastewater systems, contact our Engineering Department at 940-668-4419.

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