MUNICIPAL – WATER/WASTEWATER
FREQUENTLY ASKED QUESTIONS

A General

A1 What does the acronym HDPE stand for?

1. *HDPE stands for High Density Polyethylene.*

A2 Is PE pipe safe for drinking water?

1. *Yes. DriscoPlex® 4000 and 4100 pipes are made from PE compounds approved by NSF for public drinking water.*

A3 How does using PE pipe save my utility money?

1. *Aside from the low cost of PE pipe, long term savings may be realized due to PE pipe's fusion joints and corrosion resistance. Leakage rates for fused PE systems are far lower than for gasket jointed DI or PVC systems. PE pipe is resistant to corrosion. It will not undergo tuberculation and is unaffected by "hot" soils or electrogalvanic corrosion, thus PE pipes last longer in the ground. Additional savings may be realized by trenchless installation. Go to www.PEpipe.org for more information.*

A4 Is PE pipe a green solution for piping?

1. *Yes. It is safe when manufactured, used, or incinerated. It helps preserve water and electricity as there is no loss water through the fused joint. No toxins are released during the creation or disposal of PE pipe*.

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A5 What do the terms DR and SDR mean?

1. *DR stands for Dimension Ratio which is the average outside diameter of a PE pipe divided by its minimum wall thickness. A Standard Dimension Ratio (SDR) is a specific DR based on ANSI preferred number series. The use of SDR's enables manufacturers to produce pipe to a set of standardized DR's. SDR's include 9, 11, 13.5, 17, 21, 26, and 32.5. All SDR's are DR's, but the converse is not true.*

A6 How much water is lost in a typical month from a ¼" diameter leak from a gasket joint?

1. *NASSCO reports that a pencil sized hole (1/4" diameter) in an 80 psi main results in approximately15*,000 gals/day or 450,000 gals/month.

A7 Why is a fusion joint better than a gasket joint?

1. *A fusion joined pipeline may be thought of as a continuous pipeline without joints. On the other hand, gasket joints are a source of leakage and lost water in many water systems. Leaks may occur if the gasket is improperly installed, if dirt or grit sticks to the gasket, if the gasket is not properly lubricated, if negative pressure (vacuum) occurs in the pipeline, if ground movement or subtrench consolidation occurs, if significant thermal change occurs and if gaskets are blown out due to surge pressures. Fused joints are generally considered superior to gasket joints for leak prevention.*

A8 Will trenchless installation save money over open cut trenching?

1. *Yes. Everyday more utilities realize the advantages of trenchless technologies. More trenchless projects are being installed than in the past because of cost savings. Savings result from quicker installations, faster permitting and design time, fewer disruptions to business and residents, less damage to parks and tress, and less disturbance to road beds (and subsequent road repair.)*

B Engineering Properties

B1 Where can I find engineering properties such as the modulus and tensile strength for PE pipes?

1. *Engineering data for HDPE and PE pipes may be found in Chapter 3 of the Plastics Pipe Institute's Handbook of Polyethylene Pipe which may be found at www.plasticpipe.org. Engineering information may also be found in the various Performance Pipe Technical Notes and in the Engineering Manual. Look on the Technical Library page for a link to Technical Notes and to the Engineering Manual.*

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B2 Does PE pipe tuberculate like DI pipe?

1. *No. PE pipe does not tuberculate. Tuberculation is caused by ferrous seeking bacteria in iron, cast iron or ductile iron pipes. PE is immune to this attack.*

B3 How does PE pipe's capacity for recurring surge pressures (fatigue) compare to other pipes?

1. *PE has exceptional capacity for handling recurring surge pressures. For instance in AWWA standards recurring surge pressure must be subtracted from PVC pipe's Pressure Class whereas PE has resistance up to 150% of its Pressure Class. Marshall and Brogden report on the cyclical fatigue strength of PVC and HDPE and their report shows at a cyclical stress range of 10 Mpa (1450 psi) some PVC pipes failed at approximately 400,000 cycles whereas HDPE pipe reaches 10,000,000 million cycles before failure.*

B4 How does the impact strength of PE compare with other pipes?

1. *PE is a ductile material and has exceptional impact strength. As an example. AWWA publishes an Izod Impact resistance value of 10-12 ft-lbf/in for HDPE and of 0.65 ft-lbf/in. for PVC. PE superior impact strength provides a piping system that is near impervious to impact damage and to damage from improper tapping.*
2. *In the real world, engineers understand that pipes must be tough and resist impact and handling damage. PE pipes are field tested and proven to be impact tough.*

B5 How do the hydraulic wear characteristics of PE pipe compare to steel?

1. *An Army Corp of Engineers study reported that PE pipe wore at a rate of 3 to 5 times less than steel pipe in sand slurry. Best results are obtained with PE when the flow is turbulent to keep particles suspended. See Chapter 6 of the PPI Handbook of PE Pipe for slurry applications.*

C Manufacturing

C1 To what specification are DriscoPlex® 4000 and DriscoPlex® 4100, water and sewer pipe manufactured?

1. *DriscoPlex® 4100 2" and 3" pipes are manufactured in accordance with ASTM D3035 and AWWA C901. For 4" and larger pipes, DriscoPlex® 4000 and 4100 pipes are manufactured to ASTM F714 and AWWA C906. All Driscoplex® 4000 and 4100 pipes meet NSF 61. NSF 14 is available as an option.*

C2 To what specification is DriscoPlex® 1000 pipe manufactured?

1. *DriscoPlex® 1000 pipe is made to ASTM F714.*

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C3 What is the difference between IPS and DIPS sizing?

1. *IPS (Iron Pipe Size) pipes have the same outside diameter as black iron pipe. DIPS (Ductile Iron Pipe Size) pipes have the same outside diameter as cast iron pipe.*

C4 What diameter pipe is available on a coil?

1. *PE coils are available in diameter sizes up to 6". Typical coil lengths are 500 ft. and 1000ft. Availability varies with pipe diameter.*

C5 What fittings are available from Performance Pipe?

1. *A complete line of molded PE fittings including tees and MJ adapters up to 8" IPS and molded PE flange adapters up to 18" are available from Performance Pipe. For more information, click on the link that says Fittings in the Technical Library. http://www.performancepipe.com/ Additional fittings and sizes are available through other PE suppliers.*

C6 Why are there two material codes (PE3408/3608 or PE3408/4710) printed on the side of my pipe?

1. *In 2005 ASTM allowed the introduction of new codes for PE pipes. Prior to that time HDPE had a material designation code of PE3408. Under the new system material with a PE3408 code is classified either as PE3608 or PE4710. To facilitate a smooth transition manufacturers are allowed to dual mark pipe as PE3408/3608 or PE3408/4710. For details on this transition see Technical Note PP816. A link to Technical Notes is found in the Technical Library.*

D Hydraulics

D1 How does surge pressure in HDPE pipe compare with DI or PVC pipe?

1. *Surge pressures in HDPE pipe are significantly lower than in DI pipe and lower than PVC pipe due to the lower value of dynamic modulus for HDPE. For example in a typical 8" line a velocity change of 5 fps would cause a 51 psi surge in HDPE DR17 pipe, a 87 psi surge in PVC DR18 pipe, and a 262 psi surge in DI Class 350 lined pipe. Lower surge pressures often means longer life for pumps and valves in an HDPE pipeline, as well as lower pressure class pipes.*

D2 How does the Hazen-Williams C factor for HDPE compare with DI pipe?

1. *The C factor for HDPE butted fused pipe was found experimentally to be about 155. A conservative design value is 150. DI manufacturers publish an initial value of 140 for cement lined DI pipe. Many engineers assume that this value will be reduced over the life of a pipeline due to corrosion and use design values of 120 or 100. Such a reduction is not required for HDPE pipe. AWWA*

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M-55 states that "No allowance for corrosion and therefore, no subsequent lowering of the flow capacity need be considered when using PE pipe."

D3 What is the maximum flow velocity for HDPE?

1. *In a pumped system the maximum operating velocity is limited by the surge pressure capacity of the pipe. The Plastics Pipe Institute's Handbook of Polyethylene Pipe states that "if surge is not a consideration, water flow velocities exceeding 25 feet per second may be acceptable."*

D4 Does the fusion bead affect flow?

1. *No. The Hazen Williams C factor of 155 was determined with pipe that was fused together and thus contained inner fusion beads.*

D5 What is the safe peak pressure (surge plus pumping) for HDPE?

1. *AWWA C906 defines two types of surge pressure, recurring and occasional. The safe peak pressure or allowed total pressure for HDPE pipe is 1.5 times the pipe's pressure rating for recurring surge and 2.0 times the pipe's pressure rating for occasional surge. For instance a DR17 pipe which has a pressure rating of 100 psi can safely handle total pressure during recurring surge of 150 psi and total pressure during an occasional surge of 200 psi.*

E Design

E1 Where can I find design manuals for HDPE pipe?

1. *Design information for HDPE pipe is located on the Technical Library Page of Performance Pipe's website. You will find links to Technical Notes, the Engineering Manual, and the Field Handbook. There is also a link to the Plastics Pipe Institute's Handbook of Polyethylene Pipe. Other resources include AWWA Manual M-55 and various ASCE publications including MOP 108 Pipeline Design for Horizontal Directional Drilling and MOP 112 Pipe Bursting Project.*

E2 Where do I find the pressure rating for PE pipe?

1. *Pressure ratings are given in PP401-3608 and PP401-4710 for Municipal and Industrial pipes as well as on Size and Dimension Sheets for each specific product. The Performance Pipe website Technical Library contains a link to the Size and Dimension sheets.*

E3 Where can I find a table of dimensions including inside diameter, outside diameter, and wall thickness for PE pipe?

1. *This information is given in the Size and Dimension Sheets. Go to the Technical Library for a link*

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E4 Is thermal expansion or contraction a concern for HDPE pipelines?

1. *Normally it is not a concern for buried municipal water or sewer pipelines. Soil will provide sufficient restraint against movement. However, thermal effects must be considered for above grade or aerial pipelines. The unrestrained expansion/contraction coefficient for PE pipes is approximately 1 x 10^{-5} in/in/^{o}F. See Technical Note PP814, "Thermal Effects" for more information.*

E5 Do I need an expansion joints for HDPE pipe?

1. *Generally there are better ways to handle temperature change in an above grade or aerial pipeline than using expansion joints. See Technical Note PP814, "Thermal Effects". If an expansion joint is used, the joint should be specifically manufactured for use with HDPE pipe. Use of an improper expansion joint such as one designed for steel pipe could damage the PE pipe.*

E6 What are the safe maximum and minimum burial depths for HDPE pipe?

1. *Safe burial depths vary and should be calculated. In lieu of calculations AWWA says that for an embedment soil with an E' of 1000 psi and no surface water, HDPE pipes with DR's ranging from 7.3 to 21 can be safely buried from a depth of 2 ft to 25 ft where no traffic load is present and from 3 ft to 25 ft where H20 live load is present.*
2. *Most pipes can be buried to deeper depths. Equations for calculating burial depth may be found in the Performance Pipe Engineering Manual, Book 2, Chapter 7 or Chapter 6 of the PPI Handbook of Polyethylene Pipe. Links to both documents are in the Technical Library.*

E7 Does Performance Pipe have a pipe calculation program?

1. *Yes. PlexCalc II will do many of the calculations that are in the Performance Pipe Engineering Manual and the PPI Handbook of Polyethylene Pipe. To order one, go to Contact Us and request Literature on CD-Rom. The CD contains PlexCalc II.*

F Installation

F1 Will a surface scratch hurt my pipe?

1. *AWWA M-55 states that "minor scratches or scuffing will not impair serviceability" and that "pipe with gouges or cuts in excess of 10 percent of the product wall should not normally be used."*

F2 Can I install HDPE pipe with the same embedment used for PVC and DI pipe?

1. *Yes. The same embedment materials are generally suitable. The particulars of the application may influence this somewhat. For instance very high DR pipes at shallow cover subjected to live load may require a higher level of compaction for the embedment material than required by a lower DR PE pipe or stiffer pipe.*

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F3 Does HDPE pipe require cathodic protection? Can it be installed in "hot" soils that attack metal pipe?

1. *HDPE pipe does not undergo galvanic corrosion and therefore it may be safely installed in hot soils that would attack metal pipes without any cathodic protection.*

F4 Are thrust blocks required with buried HDPE pipe?

1. *No. When transitioning from an HDPE pipeline into a DI or PVC pipeline with unrestrained gasket joints it is necessary to provide restraint. See Performance Pipe Technical Note PP813, "Mechanical Restraint and Poisson Effect".*

F5 What is the bending radius of pipe? How does it compare to PVC?

1. *PE pipes can be safely bent to a radius about 1/10th that of the same size PVC pipe. See Performance Pipe Technical Note PP819, "Field Bending of DriscoPlex® Pipe".*
2. *HDPE pipe can be cold bent to the dimensions shown below for a long term application based on the pipe DR. (The pipes may be bent to a tighter radius during installation see Technical Note PP819)*

Pipe DR	**Minimum Long Term Cold Bending Radius**
9 or less	20 times pipe OD
11 and 13.5	25 times pipe OD
15.5, 17, and 21	27 times pipe OD
26	34 times pipe OD
32.5	42 times pipe OD
41	52 times pipe OD
Fitting or flange present in bend	100 times pipe OD

F6 Where can I find the safe pull strength for HDPE pipe?

1. *See Performance Pipe Technical Note PP803, "Pull-in Applications"*

F7 How do I stack and store pipe on the job site?

1. *See Performance Pipe "Field Handbook" found on the Technical Library page. Information is also given in AWWA Manual M55 and the PPI Handbook of Polyethylene Pipe, Chapter 2.*

F8 Are their hazardous vapors or fumes that come off of HDPE pipe when it is cut?

1. *There are no hazardous fumes associated with the cutting of HDPE pipe.*

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F9 Can I pour concrete safely around HDPE pipe?

1. *Yes.*

F10 What is the recommended test pressure and test procedure for HDPE pipe?

1. *See Performance Pipe Technical Note PP802, "Leak Testing".*

G Joining

G1 Are heat fused pipe joints safe?

1. *Yes. Polyethylene Pipe has been heat fused for almost fifty years in a wide range of service applications. The window of conditions that are acceptable for good quality fusion joints is broad, and the long term performance is documented in actual field applications as well as in long term testing. PE pipe joints are standardized through ASTM fusion procedures as well as recognition in AWWA, PPI, ASME, and other industry standards.*
2. *There are new technologies that attempt to mimic the advantages of PE fused joints for other pipe materials. However, these materials do not have the history, the proven performance, and the industry peer reviewed standardization of PE pipe fusion joints. The physical chemistry of PVC pipes requires much more precision than is required by HDPE when fusing.*

G2 Can I fuse and install HDPE pipe in sub-zero weather?

1. *Yes. You have to protect the joint during cold weather fusion from wind, moisture, and blowing snow so that the heater plate uniformly heats the end of the pipes. Guidelines for cold weather fusion are given in PP750, "Heat Fusion Joining Procedures and Qualification Guide" found in the Technical Library.*

G3 Where do I find information on fusing HDPE pipe?

1. *ASTM F2620 addresses heat fusion of HDPE pipes. Also, see Performance Pipe PP750, "Heat Fusion Joining Procedures and Qualification Guide" for information on fusing DriscoPlex® pipe products. A link to PP750 is located on the Performance Pipe website in the Technical Library. Fusion information on Performance Pipe historical products such as Driscopipe® and Plexco® pipe are there as well.*

G4 How many joints can I make in a day?

1. *Fusion time depends on the pipe size and DR as well as field conditions. Larger diameter and heavier wall pipes take longer to fuse as more time is required to heat and cool the pipe. For instance, 6" DR11 pipe might take 10 to 12 minutes including the time to allow the joint to cool under pressure. Table 2-2 in Book 3, Chapter 2 of the Performance Pipe Engineering Manual gives approximate butt fusion joining rates.*

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G5 Can solvent cement or adhesive be used to join HDPE pipe?

1. *No. Heat fusion, which includes butt fusion, socket fusion, and electrofusion, and Mechanical joints are the only permitted methods for joining HDPE pipe.*

G6 Where do I get the equipment to fuse HDPE pipes?

1. *Manufacturers of fusion equipment include McElroy Manufacturing, Connectra Fusion Technologies, Ritmo America and Wegner Welding. The equipment is readily available through distributors.*

G7 Mechanical Connections, Maintenance, and Repair

G8 How do I transition from PE pipe to DI valves or pipe?

1. *The most common method is to use a PE MJ adapter to connect the PE pipe end in a DI MJ bell using the bolt and gland kit supplied by the PE MJ manufacturer. See Technical Note PP812, "MJ Adapter Connections". Connections may also be made using a flange adapter which is essentially a HDPE Van Stone style flange with a backup ring. See Technical Note PP811, "PE Flange Adapter". DIPS sizes HDPE pipe may be inserted directly into an MJ bell with a restraint ring and stiffener for the HDPE pipe. When jointing HDPE pipe to a DI pipeline either the DI joints must be restrained or the transition connection must be anchored. See Technical Note PP813, "Mechanical Restraints and Poisson Effects".*

G9 How do I repair HDPE pipe is the ditch is full of water?

1. *If the ditch can be dewatered and the pipe dried off, fusion repair may be used. Otherwise a mechanical repair is recommended.*

G10 Can be HDPE pipe be hot or cold tapped to install service connections with fittings presently available?

1. *HDPE pipe can be cold or hot/wet (under pressure) tapped using piping products presently available. Saddle fusion tapping tees, electrofusion tapping tees, Fuse-A-Corps, and branch-saddles are readily available in the industry. There are also bolt-on mechanical connections qualified for use with HDPE pipelines as well. With this variety of fittings, tapping is a straightforward procedure.*

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G11 Can a fully body tapping saddle be used with HDPE pipe?

1. *Generally speaking, many saddle manufacturers have saddles/sleeves specifically made for use with HDPE pipe and they are typically the same as those used with PVC pipe and sometimes the same as those used with Ductile Iron pipe. Service saddles often include double straps or extra wide straps and Belleville (spring) washers for use with HDPE pipe so that the tension on the strap remains constant once the nuts are properly torqued. As for tapping sleeves, some manufacturers such as JCM indicate that as long as it is a full sleeve in accordance with AWWA C110/111, it can be used on HDPE pipe.*
2. *Can HDPE pipe be threaded using the same tapping tools commonly used to tap PVC or ductile iron pipe?*
   No. Tapped threads are not recommended for use on PE. The industry standards for service taps to HDPE mains recommend the use of saddle fusion tapping tees, electrofusion tapping tees, Fuse-A-corps, branch-saddles, and certain metal mechanical clamps.

G12 If HDPE pipe is punctured, how is it repaired?

1. *When external third-party damage does occur, there are several repair methods. Punctures in PE pipe may be repaired using electrofusion repair saddles or mechanical repair clamps.*

   If the damage is sufficiently extensive that a pipe section must be removed, the pipe section may be replaced with a spool piece of the pipe connected on each end to the exiting pipe using mechanical fittings, electrofusion couplings, or flanged connections. Refer to the PPI Handbook on HDPE pipe repair and maintenance.

G13 What are some applications where an insert stiffener is required?

1. *Insert stiffeners are normally used when inserting HDPE pipe into a PVC bell or DI MJ bell. The stiffener ensures compression of the gasket to the PE pipe. Stiffeners are also typically used in FM MJ adapters and in some large diameter MJ adapters. Check with the MJ adapter manufacturer for their specific recommendations.*

G14 What type of equipment is used to insert stiffeners into large diameter HDPE Pipe?

1. *PE is considered to be a re-roundable pipe and the cold ring clamps of a McElroy fusion machine may be used to reround larger pipe. Where desire, expandable stiffeners are available. They can be inserted into the pipe and then expanded with a triangular wedge. Romac makes these for pipes up to 12". Cascade Waterworks sells these up to 20" DIPS.*

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G15 Can I use a butterfly valve on HDPE pipe?

1. *Yes. For PE pipe, connections to butterfly valves are usually made with Beveled Flange Adapters. This prevents interference between the valve and the inside diameter of the.*

G16 Can I pig HDPE pipe?

1. *Yes, a soft pig should be used.*

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