

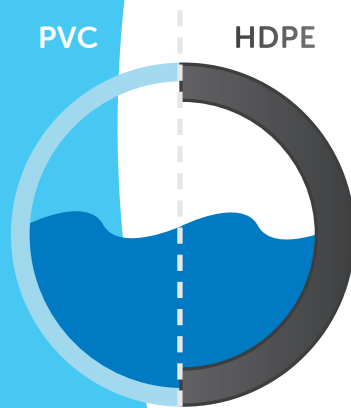
MUNICIPAL

Segmented PVC vs. HDPE

Horizontal Directional Drilling
Pipe Comparison

Westlake
Pipe & Fittings

PVC Requires Considerably Less Material than HDPE to Achieve Similar Strength Levels



**Larger flow area
increases flow
capacity by 49%***

*Comparison is based on similar pressure drop
along a pipeline's length

Consequently, PVC has a larger inside diameter resulting in greater flow capacity. Read on to learn why PVC is the smart choice for horizontal directional drilling applications.

REDUCED FINANCIAL RISK DURING INSTALLATION

Stronger Pipe

A stronger, lightweight material, PVC holds grade more accurately than HDPE pipe. PVC's strength allows for thinner pipe walls and a larger I.D., enabling engineers to specify a smaller pipe size while achieving desired flow capacity. This helps reduce material costs, bore hole size, mud, water, and vacuum truck use, resulting in lower overall project expenses.

Better Pulling Performance

PVC piping can be pulled with greater force and for a longer duration than HDPE pipe (Fig. 1). HDPE pipe must be significantly de-rated during "time under load" when pulled.

Better Thermal Performance

When exposed to hot (direct sunlight) or cold conditions prior to installation or as a result of temperature changes underground, segmented PVC pipe experiences minimal expansion that is accommodated at the joints. HDPE expands four times the rate of PVC, approximately 1" for each 10°F temperature change per 100 feet of pipe.¹ For example, 1,000 feet of HDPE pipe with a 10°F temperature change would expand or contract 10", compared to 2.5" for PVC.

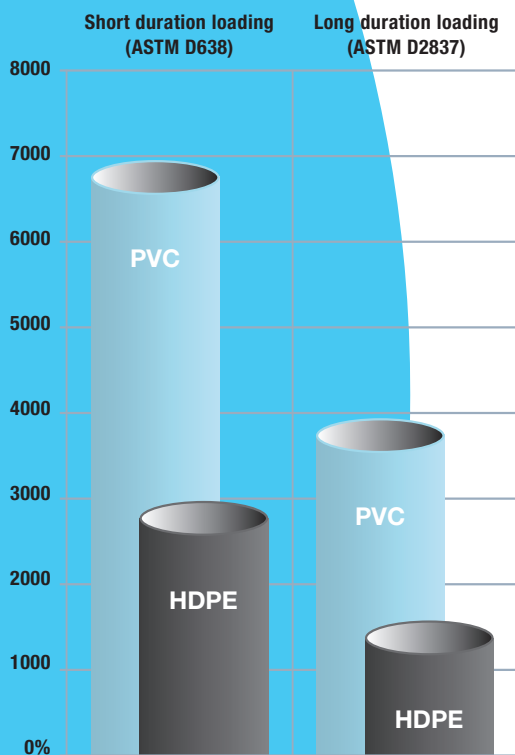
Product Integrity During Installation

Because of its greater tensile strength, PVC piping generally will not stretch during installation. By pulling too hard or too long on HDPE, the diameter of the pipe can be permanently altered, requiring replacement of the pipe and additional drilling. After pullback, HDPE pipe may take several hours (typically equal to the duration of the pull) to recover from the axial strain; recovery may lead to pipe retreating into the bore hole.²

Product Quality Control

Prior to shipping pipe to a job site, every 20-foot piece of C900 PVC pipe is hydrostatically tested at 600 psi (DR18) and 800 psi (DR14) for municipal applications. In comparison, only one piece of HDPE pipe is tested per production run. Out of 100, 1,000 or 10,000 pieces, one or possibly none of the HDPE pipes shipped to your job site may be tested.

FIGURE 1: Tensile Strength, psi





Lower installation cost

No Additional Onsite Power Required

Fusing HDPE piping onsite requires noisy and expensive electrical generators, which can be disruptive to local residents and adds to project cost.

Significantly Less Time to Assemble

Joining Time: HDPE requires a trained operator with expensive and energy-intensive equipment to fuse the pipe, with additional equipment required to maneuver large diameter piping. Butt fusion joining rates begin at 24 to 48 fusions per 8 to 10 hour day (~20 minutes/joint)³ for small diameter pipe (4" to 8"), and fusion times increase with larger diameter sizes. Segmented PVC joints with gaskets and O-rings are simple to install and can be assembled in under 5 minutes regardless of pipe diameter. Segmented PVC pipe can be assembled in any weather, is ready for immediate installation, and requires no special equipment, increasing speed of installation and reducing cost.

Cooling Time: ISCO recommends cooling guidelines of 10 to 20 minutes per fused joint and allowing the joint to cool an additional 30 minutes minimum outside the fusion machine before subjecting the joint to any rough handling or severe bending.⁴ Segmented PVC has no cooling requirement, increasing its speed of installation.

¹ 2nd Edition Handbook of PE Pipe, Chapter 6, page 244

² 2nd Edition Handbook of PE Pipe, Chapter 12, page 444

³ ISCO Fusion Manual, Tips for Success, page 17

⁴ ISCO Fusion Manual, Tips for Success, page 28

Direct comparison of specified O.D. pipe

8" Pipe, 200 PSI Rating (Safety Factor of 2.0)		
	PVC	HDPE
O.D.	8.625"	8.625"
SDR	21	9
Min. Wall	0.411	0.958
I.D.	7.804"	6.708"
Flow (GPM)	745	501

Minimal disruption

Smaller Job "Footprint"

PVC piping can be assembled one joint at a time during trenchless construction, while HDPE installation requires greater physical distances to fuse pipe. The larger HDPE footprint can result in added costs for flagmen, along with traffic congestion and disruption to area residents and businesses.



A Sustainable Solution with a Lower Cost of Ownership

Chlorine-Resistant

PVC is resistant to oxidation when chlorine and disinfectant chemicals are used in potable water distribution systems, whereas HDPE will oxidize and corrode. Since the 1950s, studies have consistently shown chlorinated water can lead to premature failure of HDPE piping.

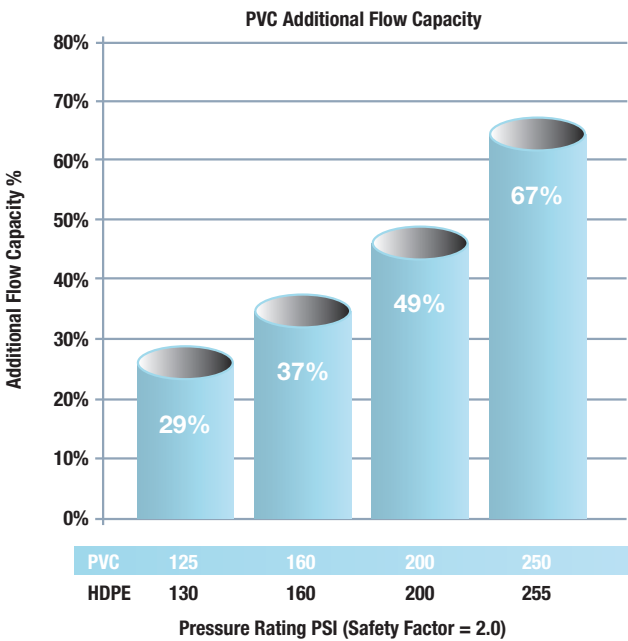
Reduced Inventory Requirements

PVC piping is generally compatible with all commonly used pipeline accessories. HDPE requires system operators to manage the HDPE portion of their system independently with special training, procedures, equipment and components, which results in increased costs.

The “Greener” Solution

PVC piping is manufactured using predominantly renewable and readily available domestic raw materials and consumes less energy to produce than petroleum-based HDPE.

FIGURE 2: PVC Pipe Flow Capacity Compared to HDPE Pipe of a Similar Pressure Rating



Note 1: PVC is compared to the closest HDPE pressure class
Note 2: Comparison based on similar pressure drop along a pipeline's length (percentage values are independent of flow velocity)
Note 3: HDPE must often be upsized at significant cost to achieve comparable flow performance
*Comparison is based on similar pressure drop along a pipeline's length