

**Strength** and **Durability** for **LiFe**<sup>®</sup>



## The Facts About Inside Pipe Diameter

Based on 24" Pipe

# DUCTILE IRON PIPE

Inside Pipe Diameter **24.95"**

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**Unit Head Loss:** 1.73 ft/1000 ft

**Calculated Annual Pumping Cost:** \$73,225\*

\*See Calculation Parameters

Last Revised:  
2016

Steel pipe and concrete cylinder pipe (CCP) are both designed with a true to size inside diameter, while Ductile iron pipe's design creates inside diameters that are larger than the stated pipe size. Consequently, steel pipe and CCP both have increased head loss, resulting in higher annual pumping costs than Ductile iron pipe. In addition, Ductile iron pipe's internal design maintains a factor of safety of 2.0, regardless of surge pressures, whereas the internal design of steel and CCP allow surge pressures to reduce its factor of safety as low as 1.33.

## STEEL/CCP

**Unit Head Loss:** 2.09 ft/1000 ft

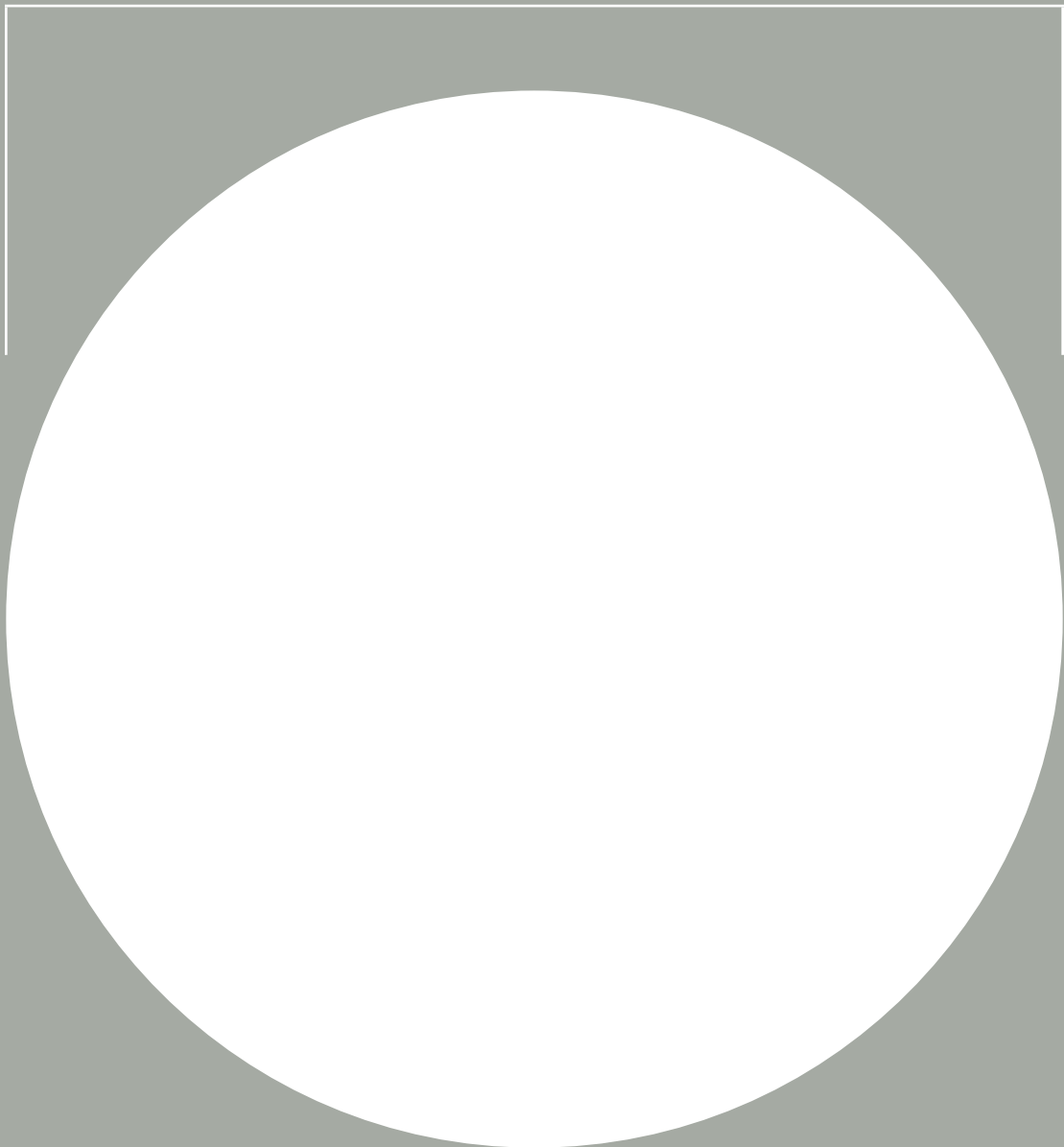
**Calculated Annual Pumping Cost:** \$88,511\*

**Annual Additional Cost Using Steel/CCP:** \$15,286

**Present Worth of Additional Cost:** \$672,178

\*See Calculation Parameters

Inside Pipe Diameter **24.00"**



Internal pressure design for PVC pipe is based on the Hydrostatic Design Basis (4,000 psi), while Ductile iron pipe's design is based on the minimum yield strength of ductile iron (42,000 psi). PVC pipe is designed with the same outside diameters as Ductile iron pipe, however, because PVC is a weaker material the pipe walls must be thicker. Consequently, the inside diameter is reduced, causing PVC to have increased head loss, resulting in higher annual pumping costs when compared to Ductile iron pipe.

## PVC (DR 18)

**Unit Head Loss:** 2.38 ft/1000 ft

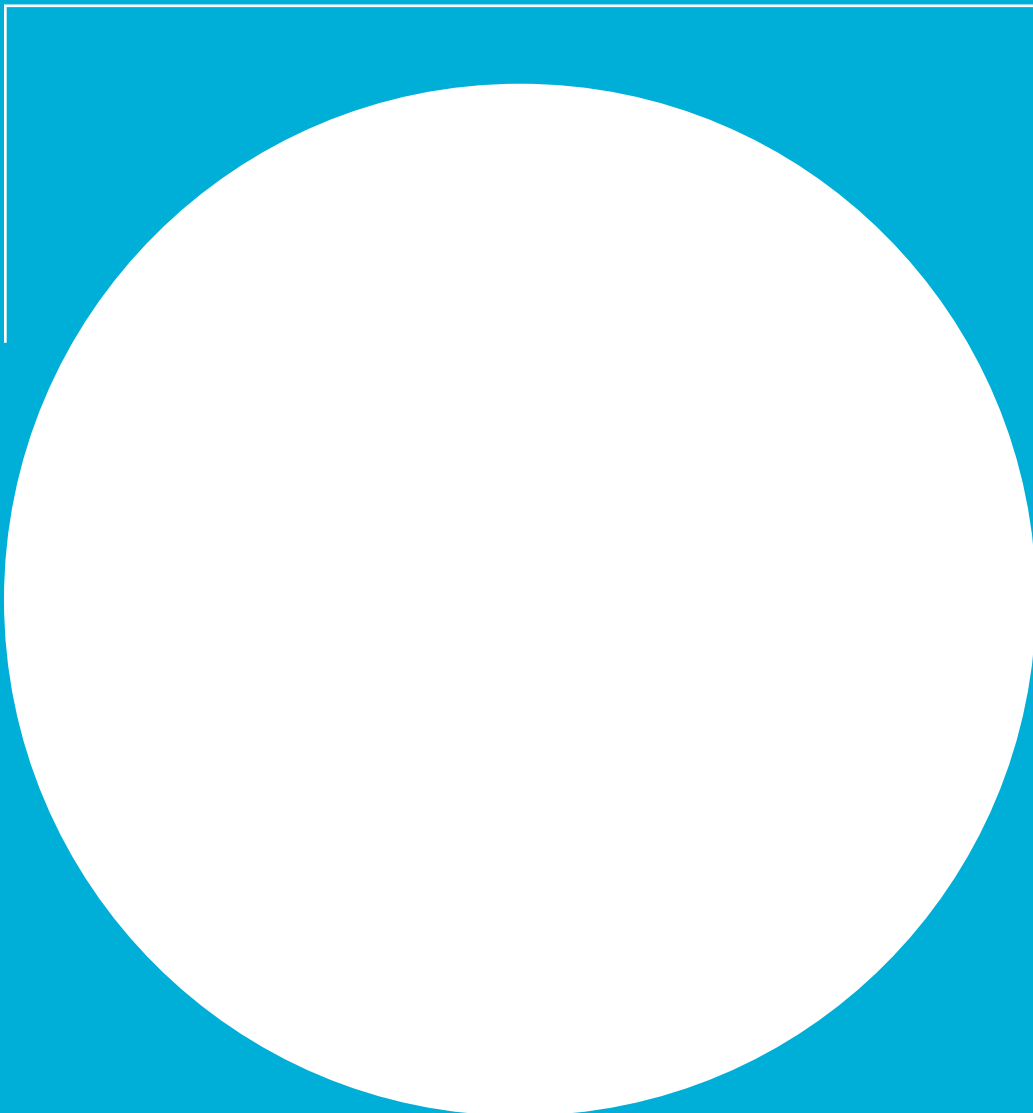
**Calculated Annual Pumping Cost:** \$100,817\*

**Annual Additional Cost PVC:** \$27,592

**Present Worth of Additional Cost:** \$1,213,307

\*See Calculation Parameters

Inside Pipe Diameter **22.76"**



Similar to PVC, internal pressure design for HDPE uses the Hydrostatic Design Basis, but for HDPE it is only 1,600 psi, 2.5 times weaker than PVC. HDPE also has the same outside diameters as Ductile iron pipe, with thicker pipe walls to compensate for the weaker material. This increased wall thickness causes HDPE to have significantly greater head loss, resulting in higher annual pumping costs when compared to Ductile iron pipe.

## HDPE (DR 11)

**Unit Head Loss:** 3.45 ft/1000 ft

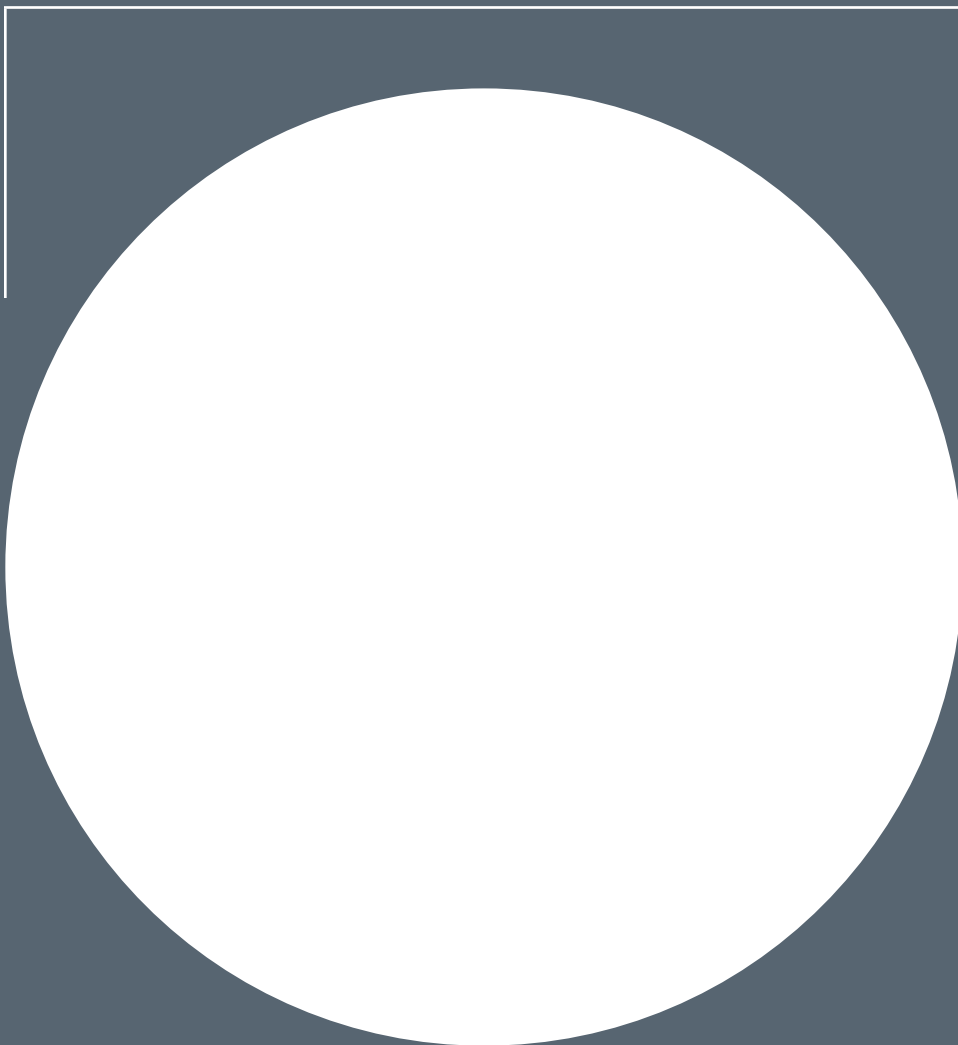
**Calculated Annual Pumping Cost:** \$146,195\*

**Annual Additional Cost Using HDPE:** \$72,970

**Present Worth of Additional Cost:** \$3,208,741

\*See Calculation Parameters

Inside Pipe Diameter **20.83"**



Ductile iron pipe manufactured in accordance with ANSI/AWWA C151/A21.51 and specified with the standard cement-mortar lining will have a larger inside diameter than other pipe materials. As a result, for a given flow and nominal size of pipe, cement-mortar lined minimum pressure class Ductile iron pipe typically experiences less head loss than substitute material pipelines. In other words, less energy is consumed to pump through Ductile iron pipe than any other pipe material. When this is taken into account, significant savings can result from the use of Ductile iron pipe.

**\*Calculation Parameters Based on 24" Pipe**

Length of Pipeline:	30,000 ft	C factors:	Ductile iron pipe - 140
Flow Rate:	6,000 gpm		Steel/CCP - 140
Unit Power Cost:	\$0.10/kWh		PVC (DR 18) - 150
Pump Efficiency:	70%		HDPE (DR 11) - 155
Pump Rate:	24 hrs/day		
Design Life:	100 years		
Rate of Return:	5%		
Inflation Rate of Power Cost:	3%		



# For more information contact DIPRA or any of its member companies.

## Ductile Iron Pipe Research Association

An association of quality producers dedicated to the highest pipe standards through a program of continuing research and service to water and wastewater professionals.

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## Member Companies

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