

The Ductile Iron Pipe

Advantage

Strength and **Durability** for **Life**®

www.dipra.org



Member Companies



AMERICAN Ductile Iron Pipe

P.O. Box 2727
Birmingham, Alabama 35202-2727



Canada Pipe Company, Ltd.

1757 Burlington Street East
Hamilton, Ontario L8N 3R5 Canada



McWane Ductile

P.O. Box 6001
Coshocton, Ohio 43812-6001



United States Pipe and Foundry Company

Two Chase Corporate Drive
Suite 200
Birmingham, Alabama 35244

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INTRODUCTION

The Ductile Iron Pipe Research Association

From its inception more than 100 years ago, the Ductile Iron Pipe Research Association has provided accurate, reliable, and essential engineering information about cast iron — and now Ductile Iron — pipe to a wide variety of utilities and consulting engineers.

Founded in 1915, the organization's initial role was to promote the superior qualities of iron pipe through advertising programs. Over time, it has evolved to become a technically based and research-oriented organization. DIPRA provides a variety of resources and services, such as brochures and publications, representation on standards making committees, technical research on applications-based topics (such as corrosion control and design of Ductile Iron Pipe), and personal technical services through our regional engineer program.

While DIPRA member companies have different names and locations, they share a common commitment to produce and deliver the finest quality water and wastewater pipe material in the world: Ductile Iron Pipe.

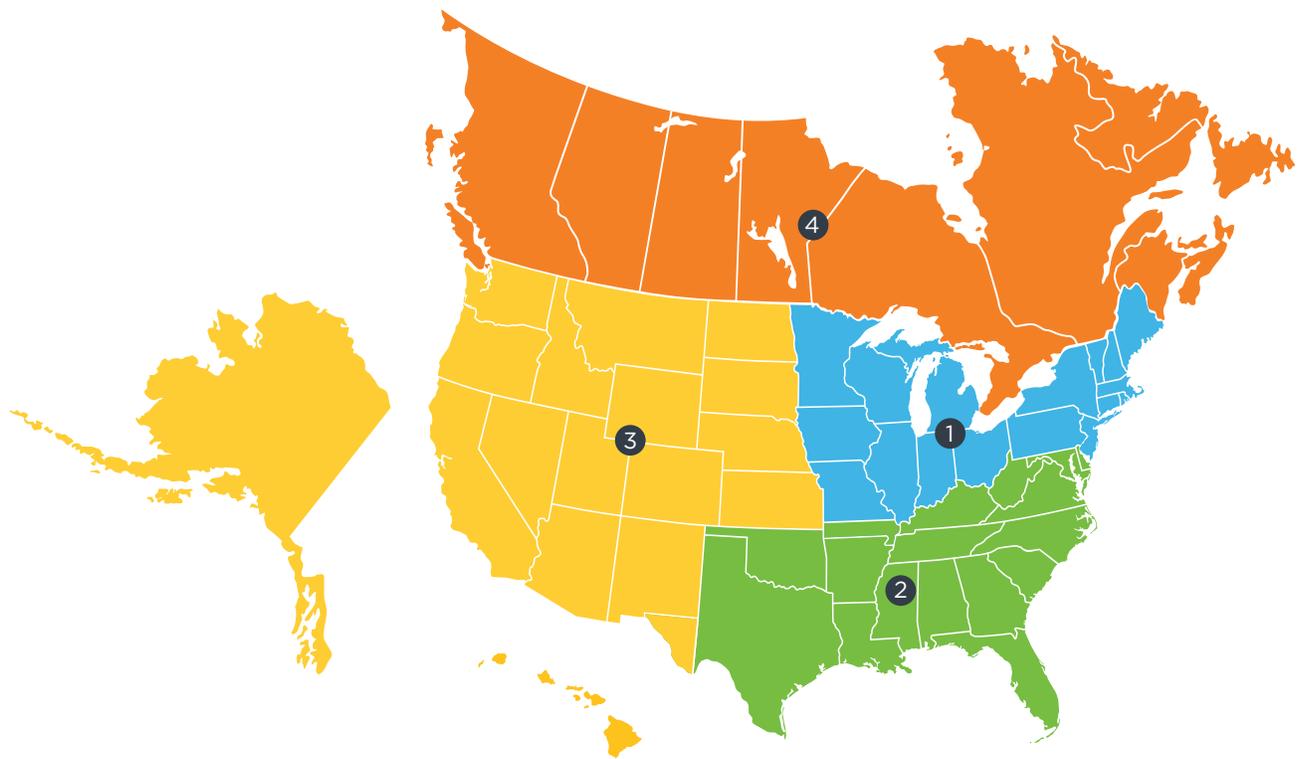
DIPRA member companies, which together represent 650 years worth of experience in applied research and manufacturing, are:

- AMERICAN Ductile Iron Pipe
- Canada Pipe Company, Ltd.
- McWane Ductile
- United States Pipe and Foundry Company

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DIPRA Regional Engineers



Region 1: Northern States

Paul Hanson, P.E.,
ENV SP
Regional Director,
NACE International
Corrosion Specialist

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Region 2: Southern States

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NACE International
Corrosion Specialist

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Region 3: Western States

Interm Engineer
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Staff Engineer/Project
Manager

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Region 4: Canada

Normand DeAgostinis, Eng.,
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Corrosion Specialist

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The History of Ductile Iron Pipe

Ductile Iron Pipe is a pipe that takes advantage of a metallurgical improvement invented in 1943 by Keith Millis, an American metallurgical engineer. On October 25, 1949, Millis, Albert Paul Gagnebin and Norman Boden Pilling received U.S. patent 2,485,760 for a Cast Ferrous Alloy. Their development reshaped the flaked graphite inherent in gray iron into spheroids or nodules. This simple difference allowed the iron, itself, to dominate physically, greatly increasing the strength of the material used to make Ductile Iron Pipe. Modern Ductile Iron Pipe not only has twice the ultimate strength of gray iron, but it has a tensile yield point, which gray iron did not have.

Since its introduction into the marketplace in 1955, Ductile Iron Pipe has been recognized as the industry standard for strength and durability in modern water and wastewater systems. More than five decades of field experience have proven its reliability for transporting raw and potable water, reclaimed water, and sewage.

The first official record of the use of iron pipe shows that the pipe was installed in 1455 in Siegerland, Germany. Two centuries later, King Louis XIV of France ordered the construction of a cast iron pipeline to extend 15 miles from a pumping station at Marly-on-Seine to the town and palace at Versailles. Today, on the palace grounds, that original pipe still serves to provide water to the palace fountains and gardens, more than 350 years after its installation.

Today, there are over 500 water utilities in DIPRA's Century Club that have enjoyed 100 years or more of continuous service from their pipelines.

The Production Process of Ductile Iron Pipe

Ductile Iron Pipe is produced by adding a controlled amount of magnesium alloy to molten iron of low phosphorous and low sulfur content. The magnesium produces changes to the internal structure of the molten iron by causing the graphite in the iron to become spherical or nodular in shape. In contrast, the graphite in cast iron pipe manifests as flakes, making it less strong and adaptable than Ductile Iron Pipe. The magnesium also produces a finer-grained iron matrix in the surrounding ferrite structure of Ductile Iron Pipe.

The pipe is manufactured in 18- or 20-foot nominal laying lengths and 3- through 64-inch diameters in a range of standard pressure classes. Ductile Iron Pipe is furnished with several different types of joints and a wide variety of standard fittings are available — no special ordering is necessary. Although Ductile Iron Pipe is usually furnished with cement- mortar lining, optional internal linings are also available for special applications. And, Ductile Iron Pipe's generally larger than nominal inside diameters, combined with its high flow coefficient ($C = 140$), offers substantial savings on pumping and power costs over the life of the pipeline.

In fact, a 30,000 foot-long 24-inch Pressure Class 200 Ductile Iron Pipeline could result in savings of \$300,000 in energy costs over 20 years compared to DR 18 PVC pipe of the same size.

The Benefits of Ductile Iron Pipe

More than a century ago, dedicated American engineers installed iron pipe to create the country's water systems. This strong, safe, and reliable product has stood the test of time. Modern Ductile Iron Pipe is made to last over 100 years, and is an environmentally preferable product due to its recycled content, energy savings while in service, its durability, its own recyclability and because of the commitment of the Ductile Iron Pipe industry.

Benefits include:

- It requires very little maintenance once it's installed and is designed to last at least 100 years.
- According to a recent report by the American Water Works Association, the projected service life for modern Ductile Iron Pipe is at least 105 years. There is more iron pipe in service in the U.S. than any other pipe material, and Ductile Iron Pipe has the longest service life of any material on the market today.
- Having as much as 98% recycled content, Ductile Iron Pipe is itself a 100% recyclable material.
- Lower costs from increased flow capacity lead to significant energy savings during the pipe's lifetime in service. Ductile Iron saves money.
- It is strong enough to withstand the most severe conditions, from high-pressure applications, to heavy earth and traffic loads, to unstable soil conditions.
- It is resistant to corrosion in most soils, and typically requires only effective, economical polyethylene encasement, a loose sheathing standardized by the American Water Works Association, in aggressive environments.
- With its strength, durability, and conservative design, Ductile Iron is the pipe of choice to protect against surges and increased pressure loadings over the years.
- Installation is easy and safe for workers who can cut and tap Ductile Iron Pipe on site.
- Ductile Iron Pipe is rugged and resists damage during handling and installation.
- The metallic nature of Ductile Iron Pipe means the pipe can be easily located underground with conventional pipe locators.

DIPRA Resources

DIPRA.org

The Ductile Iron Pipe Research Association is a technically based, research-oriented organization providing a variety of resources and services, including representation on standards-making committees, technical research on a variety of applications-based topics, and personal technical services through our Regional Engineer Program.

Social Media Updates

Get in the flow with Ductile Iron Pipe by connecting with us on Facebook, Twitter, and LinkedIn.

Videos and Webinars

Visit our website, www.dipra.org/videos, and click on the YouTube icon for informational videos on Ductile Iron Pipe's ease of use, economic benefits, strength and durability, advantages over PVC, and more.

Over 30 Technical Publications

DIPRA has brochures to address virtually every aspect of the application of Ductile Iron Pipe. They are available in PDF format on topics including design, corrosion control, tapping, material comparisons, interactive tools, thrust restraint, and installation. To download any of the brochures, visit

www.dipra.org/publications.

Paper copies of some brochures may be ordered at www.dipra.org/contact-us.

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Online Calculators

DIPRA has a number of online calculators to help you with Design of Pipe on Supports, Hydraulic Analysis, Thickness Design, and Thrust Restraint. Find them at www.dipra.org/interactive-tools.

Ask an Engineer

If you have any questions about Ductile Iron Pipe, one of our expert engineers can provide answers and information. Visit www.dipra.org for contact information.

Member Companies

DIPRA is a non-profit association supported by all of the Ductile Iron pressure pipe manufacturers in North America. While DIPRA member companies have different names and locations, they all have one thing in common: a commitment to produce and deliver the finest quality water and wastewater pipe material in the world—Ductile Iron Pipe.



V-Bio[®] Enhanced Polyethylene Encasement and Corrosion Control

The Ductile Iron Pipe Research Association (DIPRA) and its member companies are constantly working to improve the products and services they provide to the water and wastewater industries. This includes finding new ways to maintain the long service life municipalities have come to expect from their Ductile Iron Pipelines. Polyethylene encasement is the most popular, economical, and successful method of corrosion control for Ductile Iron Pipe. Since it was first installed in a water system in 1958, polyethylene encasement has been used to protect hundreds of millions of feet of Ductile Iron Pipe in aggressive environments.

The Ductile Iron Pipe industry has always been innovative; one result, V-Bio[®] Enhanced Polyethylene Encasement, is a method that specifically addresses the potential influence of anaerobic bacteria and inhibits the formation of corrosion cells under the wrap.

Key facts about the V-Bio[®] Enhanced Polyethylene Encasement:

- Builds upon a proven method of corrosion control — polyethylene encasement — that has been protecting iron pipe from aggressive soils since it was first installed in 1958.
- Represents a significant advancement in corrosion protection for Ductile Iron Pipe.
- Consists of three co-extruded layers of linear low-density polyethylene (LLDPE) film that are fused into one.
- Features an inside surface that is infused with a proprietary blend of an anti-microbial to mitigate microbiologically influenced corrosion (MIC) and a volatile corrosion inhibitor (VCI) to actively control galvanic corrosion.
- Protects against corrosion without involving consumption or degradation of either the antimicrobial or the corrosion inhibitor. The film's enhanced properties will not wear out.
- Meets all requirements of the American National Standards Institute/American Water Works Association (ANSI/AWWA C105/A21.5) standard for polyethylene encasement.
- Provides an active component to a proven, successful method of corrosion control.

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Ductile Iron Pipe Testimonials

“Ductile Iron Pipe offers flexibility for us in implementing our infrastructure needs and our infrastructure plans.”

Gwendolyn Ruff, Vice President, Strategic Planning and Employee Services, Columbus Water Works, Columbus, GA

“In my 33 years in the water infrastructure industry, I have not found any material stronger than Ductile Iron Pipe.”

Gregg Loesch, Utilities Engineer, Akron Water Bureau, Akron, OH

“We have not had any instances of failure with Ductile Iron Pipe since we started using it in the 1970s.”

Chandrika Winston, Manager, Memphis Light, Gas and Water, Memphis, TN

“Iron Pipe provides a reduction in energy costs.”

Michael Milhiser, Director, Monte Vista Water District, Montclair, CA

“Our crews prefer to tap Ductile Iron Pipe over other pipe materials due to the fact that the pipe wall is thicker and will hold the threads tighter.”

Gregg Loesch, Utilities Engineer, Akron Water Bureau, Akron, OH

“We really don’t have pipe materials out there at this point that match the strength of Ductile Iron Pipe.”

Patrick Sherlock, Water Systems Construction Engineer, Onondaga County Water Authority, Syracuse, NY

“We had the lowest amount of main breaks per mile in Montana. Ductile Iron has proven itself to be the pipe of choice.”

John Alston, Public Service Water and Sewer Superintendent, Bozeman Water and Sewer Department, Bozeman, MT

NEWS ARTICLE

DIPRA Leaders Earn Renowned Sustainability Professional Credentials from the Institute for Sustainable Infrastructure

September 17, 2015—Golden, CO—The Ductile Iron Pipe Research Association (DIPRA) is proud to announce that DIPRA leaders L. Gregg Horn, Vice President for Technical Services, and Regional Engineers Paul Hanson, Norm DeAgostinis and Allen Cox have earned the Envision Sustainability Professional Credential presented by the Institute for Sustainable Infrastructure. Horn, Hanson, DeAgostinis and Cox reached a significant level of professional recognition, "indicating a proficiency in addressing triple bottom line sustainability dimensions in design, construction, and operation of an infrastructure project."

DIPRA's support for its staff in pursuing this certification demonstrates its member companies' dedication to sustainable production and business practices. A century ago, our country's water systems were created using iron pipe. Now, modern Ductile Iron Pipe is strong, durable, and designed for a minimum average service life of 100 years. It is an environmentally preferable product, in part, due to its recycled content, its capacity to save energy over its service life and the commitment of the industry to improve the sustainability of Ductile Iron Pipe.

"Everything that we care about as a society is intimately linked to our civil infrastructure—our personal security, public health, economic well-being and quality of life. Envision is a tool that helps us assure that this critical infrastructure is sustainable," said Bill Bertera, President and CEO of the Institute for Sustainable Infrastructure. "Knowing how best to use this tool through the ISI Credentialing Program is an investment in the future...one that provides tangible benefits to DIPRA, but more importantly, to the clients they serve. It is also a sign of real leadership and commitment, on the part of the company and its professional staff, in achieving sustainable communities."

Horn, Hanson, DeAgostinis and Cox will now be referred to as ENV Sustainability Professionals (ENV SPs) and are trained to use the Envision sustainable infrastructure rating system. Envision® offers a framework for rating the environmental, economic, and public benefits of various infrastructure projects. Infrastructure projects of all sizes and types are considered and assessed for sustainability factors over their life cycle.

"By becoming ENV SPs, Horn, Hanson, DeAgostinis and Cox will continue to offer their expertise as an integral part of DIPRA. They will help guide our entire team in detailing sustainability accomplishments, submitting any relevant projects for recognition, and maintaining a high level commitment to sustainability," said Jon R. Runge, CAE, President of DIPRA.

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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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Social Media

Get in the flow with Ductile Iron Pipe by connecting with us on Facebook, Twitter, and LinkedIn.

Visit our website, www.dipra.org/videos, and click on the YouTube icon for informational videos on Ductile Iron Pipe's ease of use, economic benefits, strength and durability, advantages over PVC, and more.



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