

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



## V-Bio<sup>®</sup> Enhanced Polyethylene Encasement

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. For years, polyethylene encasement has proven to be the most popular, economic and successful method of corrosion control for Ductile iron pipe.

Newly introduced V-Bio<sup>®</sup> enhanced polyethylene encasement expands on this protection by specifically addressing the potential influence of anaerobic bacteria and inhibiting the formation of corrosion cells under the wrap.

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# Installation

As with any corrosion-protection system, proper installation is important to the success of V-Bio® enhanced polyethylene encasement. Care taken during installation is as important as the installation method itself. The ANSI/AWWA C105/A21.5 Standard outlines four methods for installing polyethylene sleeving. Modified Method A, Method A and B use polyethylene tubes, and Method C uses polyethylene sheets.



## Method A

In this method one length of polyethylene tube, overlapped at the joints, is used for each length of pipe.



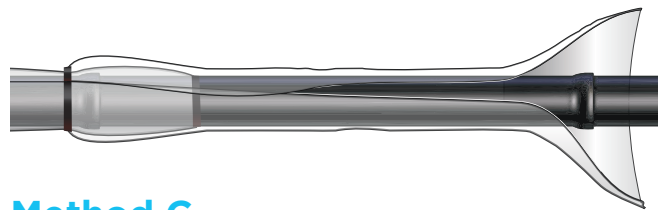
## Method B

A length of polyethylene tube is used for the barrel of the pipe and separate lengths of polyethylene tube or sheets are used for the joints.



## Modified Method A

This is a modification of Method A, which uses one length of polyethylene tube for each length of pipe. In this modified method, one end of the tube is secured to the spigot prior to making the joint. The 12-inch overlap is achieved when bringing the remaining film over the joint from the previous length of pipe.



## Method C

Each section of pipe is completely wrapped with a flat polyethylene sheet. When installing polyethylene, be sure to repair all small rips, tears, or other tube damage with adhesive tape.

If the polyethylene is badly damaged, repair the area with a sheet of polyethylene and seal the edges of the repair with adhesive tape. Carefully backfill the pipe according to the procedures found in the AWWA C600 standard for the installation of Ductile iron pipe. To prevent damage during backfilling, allow adequate slack in the tube at the joint. Backfill should be free of cinders, rocks, boulders, nails, sticks, or other damaging materials. [For more information, please see DIPRA videos on proper installation of V-Bio® enhanced polyethylene encasement.](#)

# Direct Tapping

## Tips for Proper Installation

1. Quality of installation is more important than the actual sequence followed.
  2. Don't leave the polyethylene outside in the sun for long periods of time before installation.
  3. Be sure to remove all lumps of clay, mud, cinders, etc., on the pipe surface before you encase the pipe.
  4. When lifting polyethylene-encased pipe with a backhoe, use a fabric-type "sling" or padded cable to protect the polyethylene.
  5. Take care to keep soil or bedding material from becoming trapped between the pipe and the polyethylene.
  6. When installing polyethylene encasement below the water table or in areas subject to tidal action, seal both ends of the tube as thoroughly as possible with adhesive tape or plastic tie straps at the joint overlap.
- Additionally, place circumferential wraps of tape or tie straps at 2-foot intervals along the barrel of the pipe to help minimize the space between the encasement and the pipe.



## Step 1



To perform the preferred method of tapping V-Bio® encased Ductile iron pipe, wrap two or three layers of plastic adhesive tape completely around the pipe to cover the area where the tapping machine and chain will be mounted.

## Step 2



Mount the tapping machine on the pipe area covered by the plastic adhesive tape. Then make the tap and install the corporation stop directly through the tape and polyethylene.

## Step 3



After making the direct service connection, inspect the entire circumferential area for damage and make any necessary repairs.

# How It Works

Traditional polyethylene encasement was first used experimentally in 1951 in Birmingham, Alabama to considerable success. As a result, it was first installed in a water system in 1958, and has been used to protect hundreds of millions of feet of Ductile iron pipe in corrosive environments.

At the trench, crews encase Ductile iron pipe with a tube or sheet of polyethylene immediately before installing the pipe. The polyethylene acts as an unbonded film, which prevents direct contact of the pipe with the corrosive soil. It also effectively reduces the electrolyte necessary to support corrosion activity and limits moisture that might be present between the pipe and the polyethylene film.

Although entrapped water initially has the corrosive characteristics of the surrounding soil, the available oxygen supply beneath the wrap is soon depleted, and the oxidation process stops long before any damage occurs. The water enters a state of stagnant equilibrium and a uniform environment exists around the pipe.

The polyethylene film also retards the diffusion of additional dissolved oxygen to the pipe surface and the migration of corrosion products away from the pipe surface.

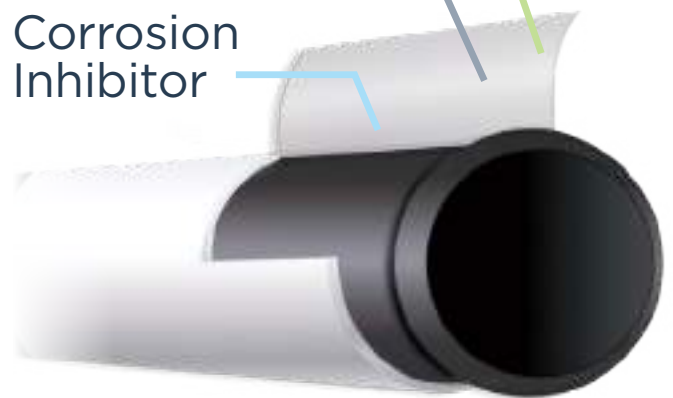
## V-Bio® enhanced polyethylene encasement

is an innovative product from DIPRA that expands on the success of traditional polyethylene encasement. Taking advantage of co-extrusion technology, the V-Bio® film is infused with a corrosion inhibitor and an anti-microbial additive. This co-extruded film reinforces and ensures the long service life utilities have come to expect from Ductile iron pipe, even in the most corrosive environments.

## V-Bio® Enhanced Polyethylene Encasement

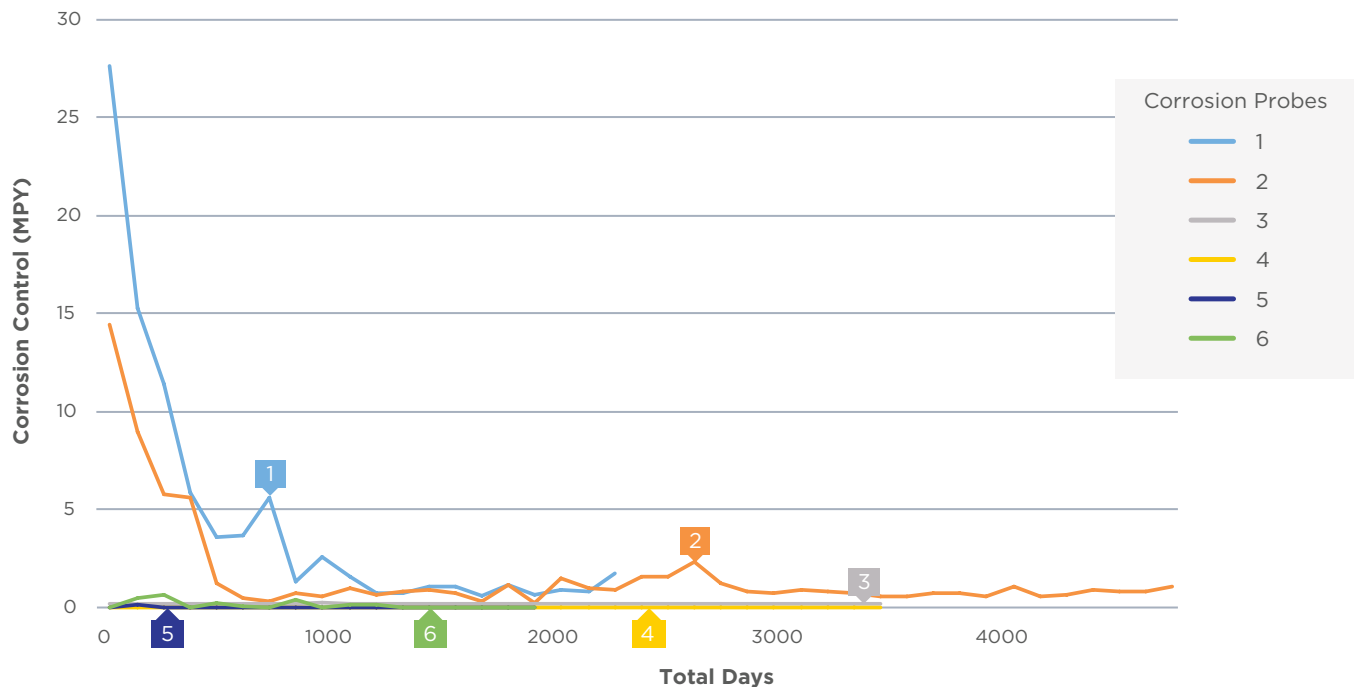
Anti-microbial

Corrosion  
Inhibitor



# Technical Data

## Active Corrosion Control Begins Where Corrosion Rate (MPY) for Probes Under Polyethylene Encasement



### Polyethylene Encasement Graph

Traditional polyethylene encasement provides corrosion control for Ductile iron pipe by providing an environment where moisture underneath the film will deoxygenate over time, resulting in only superficial corrosion on the pipe surface. As oxygen is depleted, corrosion rates migrate downward to the point where corrosion is brought under ongoing control (Horton, et al, 2013).

## Minimum Physical Properties of V-Bio<sup>®</sup> Enhanced

### Tensile Strength

3,600 psi per ASTM D882

### Elongation

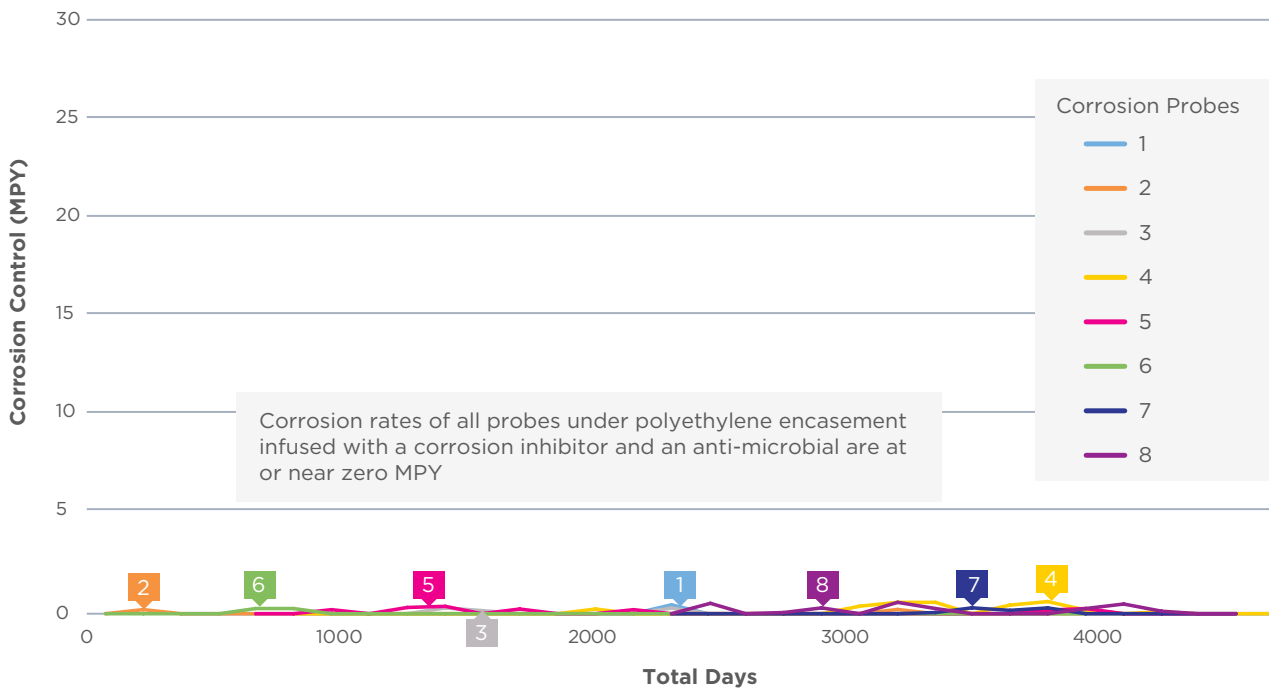
800% min. per ASTM D882

### Dielectric Strength

800 V/mil thickness per ASTM D149

# Passive Polyethylene Encasement Ends

## Corrosion Rate (MPY) for Probes Under V-Bio® Enhanced Polyethylene Encasement



### V-Bio® Enhanced Polyethylene Encasement Graph (Horton, et al, 2013)

The V-Bio® film is infused with a corrosion inhibitor to control galvanic corrosion and an anti-microbial additive to mitigate microbiologically influenced corrosion. These active components in V-Bio® enhanced polyethylene encasement provide immediate corrosion control.

## Polyethylene Encasement

### Impact Resistance

600 grams per  
ASTM D1709 Method B

### Propagation Tear Resistance

2,550 grams force per ASTM D1922

### Thickness

8mil - .008"

# Key Facts

- Builds upon a proven method of corrosion control — polyethylene encasement — that has protected iron pipe from corrosive soils since it was first installed in 1958.
- Represents a significant advancement in corrosion protection for Ductile iron pipe by adding an active component to a proven, successful method of corrosion control.
- 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 control galvanic corrosion.
- Meets all requirements of the American Water Works Association standard for polyethylene encasement of Ductile iron pipe (ANSI/AWWA C105/21.5).

## References

Horton, M. & Ash, G. (2013), "Polyethylene Encasement Methodologies: A 10 Year Filed Study on Ductile Iron Pipe in a Severely Corrosive Environment," [Paper Published], NACE Corrosion Conference & Expo, Corrosion '13, Orlando, FL.

Horn, L.G. (2023), "Evaluation of a 60-Year-Old Iron Pipeline," Materials Performance, May 2023, AMPP, Houston, TX.

# Case Study

## Inspection Report of 4-inch Cast Iron Pipe Encased in Loose Polyethylene Lafourche Parish, Louisiana

A 4-inch cast iron pipeline owned and operated by the Lafourche Parish Water District No. 1, and protected from corrosive soil with 8-mil thick, loose polyethylene encasement, was inspected for the ninth time in 18. The District installed 12,000 feet of the water main along Delta Farms Road — LA 657 in early 1958. The pipe has push-on type joints and conveys potable water at approximately 65-70 psi.

The investigation revealed that after 60 years of service, polyethylene encasement continues to provide excellent protection for this cast iron pipe in a highly corrosive environment (Horn, 2023).

	Transverse	Longitudinal	1972 Standard Minimum
Tensile (psi)	1,879	2,328	1,200
Elongation (%)	588	448	300



Pipe exposed before removing encasement



Superficial oxidation of cast iron pipe since 1958



Pipe after cleaning

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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