

CERAMAWRAP SPECIFICATION FOR THE EXTERIOR OF DUCTILE IRON

Pipe Condition

All pipe shall be delivered to the coating applicator bare. Because removal of old coatings may not be possible, the intent of this specification is that the entire exterior of the ductile iron pipe or fitting shall not have been coated with any substance prior to the application of the specified coating material.

Surface Preparation

The entire surface to be coated shall be abrasive blasted. The intent of this specification is that 100% of the surface be struck by the blast media so that all loose oxides and rust are removed.

Coating of Pipe

After surface preparation and within 8 hours of surface preparation the entire exterior surface up to the gasket groove with the exception of the spigot end, shall receive an average of 25 mils, 20 mils minimum, of Ceramawrap Epoxy. If any rusting is apparent prior to coating the surface, the entire area must be reblasted as specified.

Coating of the Spigot Ends

Due to the tolerances involved, the spigot end from the gasket area to the end of the spigot must be coated with 6 mils average, 10 mils maximum of Ceramawrap Epoxy. Care should be taken that the Ceramawrap Epoxy is smooth without excess buildup on the spigot end.

Testing of Coating

- A. The film thickness of the coating shall be checked using a magnetic film thickness gauge. Measurements shall be taken per SSPC PA2 Section 5.1.
- B. The coated areas of the pipe from the socket edge area of the spigot back to the bell face shall be tested for pinholes using a 2000 volt pinhole detection test. Any pinholes found shall be repaired prior to shipment.

Jobsite Repair

Any areas where damage has occurred due to handling shall be repaired using Ceramawrap Epoxy prior to installation to equal the original coating.

Handling

All pipes shall be handled with belt slings and padded forks to avoid damage. All shipping timbers and straps should be padded when shipping pipe.

Because the specifications for application and testing of Ceramawrap Epoxy have been developed for pipe using test data and performance history, no deviations from the specification shall be permitted without prior written approval of the lining manufacturer. If required, third party inspection of Ceramawrap Epoxy shall be done only after written notice to the applicator of Ceramawrap Epoxy. Any third party inspection shall be accomplished using Standard Ceramawrap Epoxy Quality Control Procedures and shall take place at the application facility.

- DESCRIPTION:** An exterior protective pipe coating incorporating ceramic pigment and amine cured epoxy for maximum protection of the exterior of ductile iron pipe and fittings.
- USE:** This product is excellent for protection of the exterior of ductile iron pipe and fittings in aggressive atmospheres and liquids. May be used for hot air piping applications in dry heat conditions up to 300°F.
- SURFACE PREPARATION:** Prior to abrasive blasting, the entire area to receive the protective compound shall be inspected for oil, grease, etc. Any areas where oil, grease, or any substance that can be removed by solvent is present shall be solvent cleaned using the guidelines outlined in DIPRA-1 Solvent Cleaning. After the surface has been made free of grease, oil or other substances, all areas to receive the protective compounds shall be abrasive blasted using compressed air nozzles with sand or grit abrasive media. The entire surface to be lined shall be struck with the blast media so that all rust, loose oxides, etc. are removed from the surface. Only slight stains and tightly adhering annealing oxide may be left on the surface. Any area where rust reappears before lining must be re-blasted.
- DRY FILM THICKNESS:** This product may be applied at a film thickness of 20-25 mils dry for protection of ductile iron pipe and fittings.
- CLIMATE:** Use this product only if the substrate temperature and ambient air temperature is above 45°F and is expected not to decrease for at least two hours after application. Also, the substrate temperature must be 5°F above the dew point for a period of at least two hours after application to avoid condensation occurring on wet paint. Do not apply Ceramawrap Epoxy over wet or frozen surfaces.
- DRY TIME:** To handle: 3 hours at 80°F.
- VOLUME SOLIDS:** 99% solids, solvent free as applied.

Manufactured Under U. S. Patent No. 4171228

CERAMAWRAP EPOXY

SIMULATED ACCELERATED TESTING AS IT RELATES TO THE PROTECTION OF THE EXTERIOR OF DUCTILE IRON PIPE AND FITTINGS IN IN AGGRESSIVE ATMOSPHERES AND LIQUIDS

The following tests were run on the exterior of ductile iron pipe coupons:

| TEST | RESULTS |
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| 20% Sulfuric Acid Immersion | After 1 year 8 months exposure No effect when rated using ASTM D-714. |
| 25% Sodium Hydroxide Immersion | After 1 year 8 months exposure No effect when rated using ASTM D-714. |
| 5% Sodium Chloride Solution (Salt Water) Immersion Unscribed panel | After 1 year 8 months exposure No effect when rated using ASTM D-714. |
| 5% Sodium Chloride Solution (Salt Water) Immersion Panel Scribed to Metal | After 1 year 8 months exposure None to very slight under-film corrosion at the scribe. No effect when rated using ASTM D-714. |
| Distilled Water Immersion | After 1 year 8 months no effect when rated using ASTM D-714. |
| Salt Fog (5% Sodium Chloride Solution Mist at 95°F) Scribed Panel | After 1 year 8 months exposure None to very slight under-film corrosion at the scribe. No effect when rated using ASTM D-714. |
| Impact Resistance for Pipe Line Coatings ASTM G-14 | Passed - 140 in./lbs. |
| Standard Test Method for Resistance to Cathodic Disbondment by the attached Cell Method ASTM G-95 | No coating surface irregularities, (No blistering or hydrolysis) 0.0mm average disbondment after 30 days |
| Standard Test Method for Permeability ASTM D-1653 | 0.00 Metric Perms |

CERAMAWRAP Ceramic Epoxy History

CERAMAWRAP Epoxy was developed over a two-year period using ceramic sphere technology similar to Protecto 401. The first project was a small 30" ductile iron exterior coated project in 1996, shipped to Nashville, Tennessee. The largest project to date was for Morrison-Knudsen Engineering. The project consisted of approximately 16,750' of 350mm ductile iron pipe and small quantities of 100mm, 500mm, and 600mm ductile iron pipe protected on the exterior with Ceramawrap Epoxy. The job was shipped to Charleston, SC and then loaded on a ship, with Egypt as its final destination. The project was begun and completed in 1999. Since then, Ceramawrap has been used in various applications including saltwater immersion, bridge crossings, and installations in sewage wet wells all across the country.

Most of the other projects completed using Ceramawrap were produced for supply houses and fabricators, which makes the tracking of the jobs extremely difficult. The destination may not be known because the material is returned to the supplier for shipment, and supply houses also do not want to reveal their customers.

A unique Ceramawrap coating project was on American Cast Iron Pipe's "push-pipe" (designed to be pushed inside a smaller diameter cast iron pipe to burst the existing pipe to enlarge the pipeline without excavation). Ceramawrap was chosen because of its smoothness and abrasion resistance. The job was shipped to Oklahoma City, Oklahoma in 2000.

Another unique use for Ceramawrap (marketed as *Permasafe* for the Pole Industry) is for the protection of the bases of ductile iron electric utility poles. The ductile iron poles are coated for ground level protection and buried (and, in some coastal areas, submerged in salt water coral beds). The ductile iron poles have been installed since 2009.

There are many projects that were completed between 1996 and the present where the destination is unknown. The jobs have covered a wide range of fittings and pipe (sizes from 60" down to 12"). Based on an average of 20 mils thickness, our production records indicate that approximately 640,000 sq. ft. of the exterior of ductile iron pipe has been protected with Ceramawrap Epoxy. Ceramawrap coated pipe have been produced now for over 16 years. The product has been shipped long distances and even overseas with very little shipping damage.

Ceramawrap gives the end user the sure adhesion of epoxy with the added patented feature of ceramic sphere technology resulting in low permeability, excellent chemical and stray electrical current resistance, along with low handling damage.

Sample CERAMAWRAP Job References

1. FL, TX, TN, NC, SC, LA, AL, GA- Over 10,000 ft and counting on buried/submerged base of ductile iron utility poles- McWane Ductile Iron Poles- 2009- Present
2. VERO BEACH, FL – Storm Sewer Outfalls into the Sea- Various Pipe and fittings- 2010- Present
3. EGYPT- Acipco- (Morrison-Knudsen Eng) 36,500 ft Ceramawrap OD coated 350mm & 600mm pipe/fittings – 1999
4. CAPE CORAL, FL- RO Plant (Guyman Const.) 5000 ft 30”, 20”, and 16” Pipe/Fittings - 2007
5. NASHVILLE, TN- C&B (Max Foote Const.) – Various 60” pipe/fittings
6. EL PASO, TX- 500’ of 30” pipe/fittings (Rio Grande water intake/wet well) – 2012
7. MECHANICSVILLE, VA- (Southland Builders) 140’ of 48”- 2001
8. OKLAHOMA CITY, OK- Acipco- DI Pipe “Bursting” Project and HDD- 1999
9. NASHVILLE, TN-Waste Water Treatment –(Barge, Waggoner, Sumner and Cannon Eng)- 400'-60: and a 600'-12" installed 2000
10. NATIONWIDE- Thousands of individual pieces for aggressive sewage wet well immersion!