STANDARD SPECIFICATION FOR LINING DUCTILE IRON PIPE: WATER OR SEWER SERVICE

I. CONDITION OF DUCTILE IRON PRIOR TO SURFACE PREPARATION

All ductile pipe and fittings shall be delivered to the application facility without asphalt, cement lining, or any other lining on the interior surface. Because removal of old linings may not be possible, the intent of this specification is that the entire interior of the ductile iron pipe and fittings shall not have been lined with any substance prior to the application of the specified lining material and no coating shall have been applied to the first six inches of the exterior of the spigot ends.

II. LINING MATERIAL

Ceramapure™ PL 90 Ceramic Epoxy. The material shall be an amine cured epoxy containing at least 20% by volume of ceramic quartz pigment. Any request for substitution must be accompanied by a successful history of lining ductile iron pipe and fittings, a test report verifying the following properties, and a certification of the test results.

A. The following test must be run on coupons from factory lined ductile iron pipe:

* Immersion testing rated using ASTM D-714
  -- 20% Sulfuric Acid Immersion-- no effect after 5500 hrs
  -- 5% Sodium Chloride Solution (Salt Water) Immersion--Unscribed panel--no effect after 2 years
  -- 5% Sodium Chloride Solution (Salt Water) Immersion--Panel Scribed to Metal--no effect after 2 years

*Distilled Water Immersion-- per AWWA C-550--- passed

*ASTM B-117 Salt Fog (Scribed Panel)-- Passed one year no undercutting

*Undercutting Resistance: Alternate Wet /Dry Immersion(5% NaCl, flowing, aerated, 120°F, Wet 1 hour followed by dry one hour- 12 Cycles daily)--Passed one year when rated using ASTM D-714--No undercutting at exposed edges.

*Weathering--Coupons with cut edges Exposure exposed to ambient weathering conditions in Birmingham, AL-- passed one year-- no undercutting at edges

B. ASTM G-22 Standard practice for determining resistance of Synthetic Polymeric materials to bacteria. The test should determine the resistance to growth of Acidithiobacillus Bacteria and should be conducted at 30 degrees centigrade for a period of 7 days on a minimum of 4 panels. The growth must be limited only to trace amounts of bacteria.

C. An abrasion resistance of no more than 3 mils (.075 mm) loss after one million cycles using European Standard EN 598

D. ASTM G-95 Standard Test Method for “Cathodic Disbondment Test of Pipeline Coatings (Attached Cell Method)”. Resulting cathodic disbondment must average less than 2 mm and be qualified by independent lab testing.

III. APPLICATION

Applicator

The lining shall be applied by a certified firm with a successful history of applying linings to the interior of ductile iron pipe and fittings. All applicators must be independently inspected at least two times per year to insure compliance with the requirements of this specification. This inspection must be coordinated and reviewed by the manufacturer of the lining material and any deviation from the application and/or quality requirements shall be corrected by the applicator. All inspections shall be in writing and a permanent record maintained.

Surface Preparation

Prior to abrasive blasting, the entire area to receive the protective compound shall be inspected for oil, grease, etc. Any areas with oil, grease, or any substance that can be removed by solvent, shall be solvent cleaned to remove those substances. 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 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 oxide may be left on the surface. Any area where rust reappears before lining must be reblasted.

Lining

After surface preparation and within 12 hours of surface preparation, the interior of the pipe shall receive 40 mils nominal dry film thickness of Ceramapure™ PL90. No lining shall take place when the substrate or ambient temperature is below 40° F. The surface also must be dry and dust free. If flange pipe or fittings are included in the project, the lining shall not be used on the face of the flange.

Coating of Bell Sockets and Spigot Ends

Due to the tolerances involved, the gasket area and spigot end up to 6 inches back from the end of the spigot end must be coated with 6 mils nominal, 10 mils maximum using Ceramapure Joint Compound. The Joint Compound shall be applied by brush to ensure coverage. Care should be taken that the Joint Compound is smooth without excess buildup in the gasket seat or on the spigot ends. Coating of the gasket seat and spigot ends shall be done after the application of the lining.

Number of Coats

The number of coats of lining material applied shall be as recommended by the lining manufacturer. However, in no case shall this material be applied above the dry thickness per coat recommended by the lining manufacturer in printed literature. The maximum or minimum time between coats shall be that time recommended by the lining material manufacturer. **To prevent delamination between coats, no material shall be used for lining beyond the recoat limitations published by the lining manufacturer without roughening of the surface of the lining prior to recoating.**

Touch-Up and Repair

Ceramapure™ PL 90 repair kits shall be used for touch-up or repair in accordance with manufacturer's recommendations. Refer to Ceramapure™ PL 90 repair procedure.

IV. INSPECTION AND CERTIFICATION

Inspection

- All ductile iron pipe and fitting linings shall be checked for thickness using a magnetic film thickness gauge. The thickness testing shall be done using the method outlined in SSPC PA-2 Film Thickness Rating.
- The interior lining of all pipe barrels and fittings shall be tested for pinholes with a non-destructive 2,500 volt test. Any defects found shall be repaired prior to shipment.
- Each pipe joint and fitting shall be marked with the date of application of the lining system along with its numerical sequence of application on that date and records maintained by the applicator of his work.

Certification

The pipe or fitting manufacturer must supply a certificate attesting to the fact that the applicator met the requirements of this specification, and that the material used was as specified.

V. HANDLING

Ceramapure ™ PL90 lined pipe and fittings must be handled only from the outside of the pipe and fittings. No forks, chains, straps, hooks, etc. shall be placed inside the pipe and fittings for lifting, positioning, or laying. The pipe shall not be dropped or unloaded by rolling.

Care should be taken not to let the pipe strike sharp objects while swinging or being off loaded. Ductile iron pipe should never be placed on grade by use of hydraulic pressure from an excavator bucket or by banging with heavy hammers.