Section 02527

POLYURETHANE COATINGS ON STEEL OR DUCTILE IRON PIPE

PART 1 G E N E R A L

1.01 SECTION INCLUDES

A. Two-component polyurethane coating system for use as external coating for steel or ductile iron pipe.

1.02 MEASUREMENT AND PAYMENT

A. Unit Prices.

1. No separate payment will be made for work performed under this Section. Include cost of polyurethane coatings in contract unit prices for steel pipe or ductile iron pipe.

2. Refer to Section 01270 - Measurement and Payment for unit price procedures.

B. Stipulated Price (Lump Sum). If Contract is Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price.

1.03 REFERENCES

A. AWWA C 210 - Standard for Liquid Epoxy Coating Systems for the Interior and Exterior of Steel Water Pipelines.

B. ASTM D 522 - Standard Test Method for Mandrel Bend Test of Attached Organic Coatings.

C. SSPC-PA 2 - Measurement of Dry Paint Thickness with Magnetic Gauges.

D. SSPC-PA Guide 3 - A Guide to Safety in Paint Application.

E. SSPC-PS Guide 17.00 - Guide for Selecting Urethane Painting Systems.

F. SSPC-PS10 - Near-White Blast Cleaning.

1.04 SAFETY

A. Secure, from manufacturer, Material Safety Data Sheet (MSDS) for polyurethane coatings and repair materials listed in this Section.

B. Safety requirements stated in this specification and in related sections apply in addition to applicable federal, state and local rules and regulations. Comply with instructions of coating manufacturer and requirements of insurance underwriters.

C. Follow handling and application practices of SSPC-PA Guide 3; SSPC-PS Guide 17.00; Coating Manufacturer's Material Safety Data Sheet.

1.05 SUBMITTALS

A. Conform to requirements of Section 01330 - Submittal Procedures.

B. Submit coating manufacturer's catalog sheets and technical information for approval, prior to delivery of pipe.

C. Obtain from coating manufacturer and submit coating "affidavit of compliance" to requirements of this Section stating that coatings were applied in factory and in accordance with manufacturer's minimum requirements.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Use standard containers to prevent gelling, thickening deleteriously or forming of gas in closed containers within period of one year from date of manufacture.

B. Label each container of separately packaged component clearly and durably to indicate date of manufacture, manufacturer's batch number, quantity, color, component identification and designated name or formula specification, number of coatings together with special instructions. Do not use coating components older than one year.

C. Deliver coating materials to pipe manufacturer in sealed containers showing designated name, batch number, color, date of manufacture and name of coating manufacturer.

D. Store material on site in enclosures, out of direct sunlight in warm, ventilated and dry area.

E. Prevent puncture, inappropriate opening or other action which may lead to product contamination.

PART 2 P R O D U C T S

2.01 COATING MATERIAL

A. CORROPIPE II PW - TOUCHUP (two-component) or approved equal; mix in accordance with coating manufacturer's recommendations.

1. For areas less than or equal to 6 inches in diameter, brush apply.

2. For areas greater than 6 inches in diameter, spray apply.

B. Coating System: Use Type V system which is 2-package polyisocyanate, polyol-cured urethane coating, mixed in 1:1 ratio at time of application. Components shall be balanced viscosities in their liquid state and not require agitation during use.

C. Exterior Coating Material: CORROPIPE II-TX and Joint Coating Material CORROPIPE II-PW, manufactured by Madison Chemical Industries, Inc., 5673 Old Dixie Road, Forest Park, Georgia 30050, or approved equal.

D. Internal Coating Material: Joint Coating Material CORROPIPE II-PW, manufactured by Madison Chemical Industries, Inc., 5673 Old Dixie Road, Forest Park, Georgia 30050, or approved equal.

E. Cured Coating Properties:

1. Conversion to Solids by Volume: 97 percent plus or minus 3 percent.

2. Temperature Resistance: Minus 40 degrees F and plus 130 degrees F.

3. Minimum Adhesion: 500 psi, when applied without primer to ductile iron pipe which has been blasted to comply with SSPC-SP 10.

4. Cure Time: For handling in 1 minute at 120 degrees F, and full cure within 7 days at 70 degrees F.

5. Maximum Specific Gravities: Polyisocyanate resin, 1.20. Polyol resin, 1.15.

6. Minimum Impact Resistance: 80 inch-pounds using 1-inch diameter steel ball where coating is applied at 30 mils to ductile iron pipe surface which has been blasted to SSPC No. 10 finish.

7. Minimum Tensile Strength: 2000 psi.

8. Hardness: 55 plus or minus 5 Shore D at 70 degrees F.

9. Flexibility Resistance: ASTM D 522 using 1-inch mandrel. Allow coating to cure for 7 days. Perform testing on test coupons held for 15 minutes at temperature extremes specified in this Paragraph.

2.02 REPAIR AND TOUCHUP MATERIAL

A. CORROPIPE II PW (two-component, brush applied, or approved equal). Mix in accordance with coating manufacturer's recommendations.

PART 3 E X E C U T I O N

3.01 SURFACE PREPARATION

A. Remove deposits of oil, grease or other organic contaminates before blast cleaning by using solvent wash as specified in SSPC-PA Guide 3. Clean and dry surfaces making them completely dry, free of moisture, dust, grit, oil, grease or other deleterious substances prior to application of coating.

B. Exterior and Interior Surfaces: SSPC-SP10, near-white metal blast cleaning. Blast with clean, hard, sharp cutting abrasives with no steel or cast iron shot in mix.

C. Ductile Iron Pipe: Prior to start of production blasting, prepare specimens for white metal blast and near-white metal blast using equipment and abrasives proposed for work. During preparation of specimens, Change blasting intensity and abrasive as necessary to provide degree of cleaning required by SSPC-SP10, except that color of blasted substrate is not expected to match color of blasted steel. After examination and concurrence by City Engineer, production blasting may begin. Monitor and control production blasting so that production pipe surfaces match surface of approved blasting specimens.

3.02 THICKNESS

A. External Coatings: Minimum DFT of 25 mils (0.025 inch).

B. Internal Coatings: Minimum DFT of 35 mils.

C. Thickness Determinations: Use Type 1 magnetic thickness gauge as described in SSPC-PA2 specification. Individual readings below 90 percent of specified minimum are not acceptable. Average individual spot readings (consisting of three point measurements within 3 inches of each other) less than 95 percent of minimum are not acceptable. Average of all spot readings less than minimum thickness specified are not acceptable.

3.03 FACTORY APPLICATION OF POLYURETHANE COATING

A. Equipment: Two-component, 1:1 mix ratio, heated airless spray unit.

B. Temperature: Minimum 5 degrees F above dew point temperature. Temperature of surface shall not be less than 60 degrees F during application.

C. Humidity: Heating of pipe surfaces may be required to meet requirements of Paragraph 2.01E, Cured Coating Properties, when relative humidity exceeds 80 percent.

D. Do not thin or mix resins; use as received. Store resins at temperature above 55 degrees F at all times.

E. Application: Conform to coating manufacturer's recommendations. Apply directly to substrate to achieve specified thickness. Multiple-pass, one-coat application process is permitted provided maximum allowable recoat time specified by coating manufacturer is not exceeded.

F. Recoat only when coating has cured less than maximum time specified by coating manufacturer. When coating has cured for more than recoat time, brush-blast or thoroughly sand coating surface. Blow-off cleaning using clean, dry, high pressure compressed air.

G. Cure at ambient temperature above 0 degrees F. Do not handle pipe until coating has been allowed to cure as follows:

Ambient Temperature	Minimum Full Cure Time
Over 70 degrees F	7 days
50 to 70 degrees F	9 days
0 to 50 degrees F	12 days

3.04 JOINTS

A. Apply coating to unlined pipe surfaces including inside of bell socket and outside of spigot.

B. Coating thickness on sealing areas of spigot end of pipe exterior: Minimum 8 mils (0.008 inch), maximum of 10 mils (0.010 inch). Maximum 10 mils may be exceeded in spigot end provided maximum spigot diameter as specified by pipe manufacturer is not exceeded.

3.05 INSPECTION

A. City Engineer may inspect coatings at coating applicator's facilities.

B. Secure approval of surface preparation by coating manufacturer’s representative prior to coating application.

C. Holiday Inspection: Conform to AWWA C 210, Section 5.3.3.1. Follow coating manufacturer's recommendation. Conduct inspection any time after coating has reached initial cure. Repair in accordance with Paragraph 3.07, Repair and Field Touchup.

3.06 PIPE INSTALLATION

A. When required by City Engineer, provide services of manufacturer's representative for period of not less than 2 weeks at beginning of actual pipe laying operations to advise Contractor regarding installation including but not limited to handling and storing, cleaning and inspecting, coatings repairs, and general construction methods as to how they may affect pipe coatings.

B. Use nylon straps, padded lifts and padded storage skids. Field cuts should be kept to minimum. Repair damage to coating due to handling or construction practices. See Section 02501 - Ductile - Iron Pipe and Fittings and Section 02502 - Steel Pipe and Fittings for additional requirements.

C. Just before each section of pipe is to be placed into trench, conduct visual and holiday inspection. Repair defects in coating system before pipe is installed.

3.07 REPAIR AND FIELD TOUCHUP

A. Apply repair and touchup materials in conformance with factory application of polyurethane coating requirements specified in this Section, excluding equipment requirements.

B. Repair Procedure - Holidays:

1. Remove traces of oil, grease, dust, dirt, and other deleterious materials

2. Roughen area to be patched by sanding with rough grade sandpaper (40 grit).

3. Apply one coat of repair material described above. Work repair material into scratched surface by brushing.

C. Repair Procedure - Field Cuts or Large Damage:

1. Remove burrs from field cut ends or handling damage and smooth out edge of polyurethane coating.

2. Remove traces of oil, grease, dust, dirt, and other deleterious materials

3. Roughen area to be patched with rough grade sandpaper (40 grit). Feather edges and include overlap of 1 inch to 2 inches of roughened polyurethane in area to be patched.

4. Apply thick coat of repair material described above. Work repair material into scratched surface by brushing. Feather edges of repair material into prepared surface. Cover at least 1 inch of roughened area surrounding damage, or adjacent to field cut.

D. Repair Procedure - Thermite Brazed Connection Bonds:

1. Remove polyurethane coating with power wire brush from area on metal surface, which is to receive thermite, brazed connection.

2. Grind metal surface to shiny metal with power grinder and coarse grit grinding wheel.

3. Apply thermite-brazed connection using equipment, charge and procedure recommended by manufacturer of thermite equipment.

4. After welded surface has cooled to temperature below 130 degrees F, apply protective coating repair material to weld, exposed pipe surface and damaged areas of polyurethane coating.

5. Do not cover or backfill freshly repaired areas of coating at thermite-brazed connection until repair material has completely cured. Allow material to cure in conformance with manufacturer's recommendations.

END OF SECTION