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NTS: This specification is intended for pipelines of size 54 inches and less. Larger pipelines are to be treated as special cases, and will require a modified version of this specification.

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PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The WORK of this Section includes providing a prefabricated, cold-applied, multilayer, polyethylene tape coating system for steel pipe.

B. Except as described in this Section, the coating system shall be in accordance with ANSI/AWWA C214 for straight pipe sections and ANSI/AWWA C209 for fittings, specials, and field joints.

1.2 RELATED SECTIONS

A. The WORK of the following Section applies to the WORK of this Section. Other Sections of the Specification, not referenced below, shall also apply to the extent required for proper performance of this WORK.

1. Section 02651 Steel Pipe-Mortar Lined and Enamel or Tape-Coated

2. Section 02653 Fabricated Steel Pipe and Specials

3. Section 09800 Protective Coating

1.3 SPECIFICATIONS AND STANDARDS

A. Except as otherwise indicated, the current editions of the following apply to the WORK of this Section.

B. References herein to "SSPC Specifications" or "SSPC" shall mean the published standards of the Steel Structures Painting Council, 4400 Fifth Avenue, Pittsburgh, PA 15213.

C. **Commercial Standards:**

ANSI/AWWA C200	Steel Water Pipe 6 inches and larger
ANSI/AWWA C209	Cold-Applied Tape Coatings for the Exterior of Special Sections, Connections, and Fittings for Steel Water Pipelines

1.4 SHOP DRAWINGS AND SAMPLES

A. The following shall be submitted in compliance with Section 01300:

1. **Coating Materials List:** The CONTRACTOR shall submit a list of the tape coating materials which indicates the manufacturer, product numbers, and thickness of the materials.

2. **Materials Information:** For each material, the CONTRACTOR shall submit technical data sheets which itemize technical and performance information that indicates compliance with this Section.

3. **Samples:** Samples of the materials shall be submitted for testing by the ENGINEER. Each sample shall be clearly identified for catalog number, size, color, and other information required for testing.

1.5 FACTORY AND FIELD INSPECTION AND TESTING

A. The CONTRACTOR shall be responsible for all costs associated with inspection and testing of materials, products, or equipment at the place of manufacture. This shall include costs for travel, meals, lodging, and car rental for [two] OWNER-designated inspectors for [ ] days required to complete such inspections or observations exclusive of travel days, if the place of manufacture, fabrication and factory testing is more than fifty (50) miles outside the geographical limit of the City. The CONTRACTOR shall not be responsible for salary or salary-related costs of the inspectors. The CONTRACTOR shall comply with the requirements of Section 01400.

B. The CONTRACTOR shall provide the CONSTRUCTION MANAGER a minimum of 14 days advance notice of the start of any shop coating work and a minimum of 3 days advance notice for field work.

C. Unless the CONSTRUCTION MANAGER has granted prior approval, all coating work shall be performed in the presence of the CONSTRUCTION MANAGER.

D. **Inspection Devices:** The CONTRACTOR shall furnish inspection devices that are calibrated and in good working condition for the detection of holidays and measurement of coating film thicknesses.

E. **Inspection:** The CONTRACTOR shall retain the services of trained technicians to test the coating system in the shop and field, and prepare reports, at no additional cost to the OWNER. As a minimum, the tests shall include holiday detection and coating film thickness.

F. Tape application to straight pipe sections shall be monitored using instrumentation devices that continuously measure and record the tape width drawdown and the tape temperature. Each tape application station shall be equipped with the instrumentation devices. The tape tensions and temperatures shall be controlled using the data obtained from the instrumentation devices.

G. **Manufacturer Representative:** The CONTRACTOR shall require the tape material manufacturer to furnish a qualified factory technical representative to visit the pipe coating shop

for technical support at the beginning of the tape coating operation and as may be necessary to resolve shop or field problems.

H. **Holiday Detection:** Prior to application of the first layer of mechanical protection tape, the inner layer tape shall be electrically tested for coating flaws with a holiday detector approved by the CONSTRUCTION MANAGER. Holidays detected shall be immediately repaired and retested before application of the first layer of mechanical protection tape.

I. Immediately before the coated pipe is lowered into the trench, the CONTRACTOR shall provide a visual and holiday inspection of the coating on the underside of the pipe.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Materials shall be stored within the temperature ranges specified for application, using heated areas if necessary. Tape shall be stored at a minimum temperature of 70 degrees F.

B. Pipe shall be square-stacked no more than 2 high on padded supports or racks. Lifting equipment shall be padded and wide fabric slings shall be used. To the extent possible, the coated pipe shall be handled from the cut-back ends.

C. Tie down devices shall be padded where in contact with the pipe.

PART 2 -- PRODUCTS

2.1 COATING SYSTEMS

A. Straight pipe sections shall be provided with a four layer polyethylene tape system as described below.

1. Primer layer.

2. Filler tape, extruded butyl rubber compound compatible with the primer and tape.

3. Weld stripping tape, if required (25 mils).

4. Inner layer, corrosion protection tape (20 mils).

5. Middle layer, mechanical protection tape (30 mils).

6. Outer layer, mechanical protection tape (30 mils) with ultraviolet light stabilizers.

7. Total system thickness shall be at least 80 mils.

8. The coating materials shall be supplied by a single manufacturer, and shall have a successful application and service history on pipe fabricated in accordance with ANSI/AWWA C200.

B. Fittings, specials, and field joints shall be provided with a three layer polyethylene tape system as described below:

1. Primer layer

2. Filler tape, extruded butyl rubber compound compatible with the primer and tape.

3. Inner layer, corrosion protection tape (50 mils).

4. Outer layer, mechanical and ultraviolet light protection tape (30 mils).

5. Total system thickness shall be at least 80 mils.

6. The coating materials shall be supplied by the same manufacturer as the materials for straight pipe.

C. **Storage of Materials:** Materials shall be stored within the temperature ranges specified for application, using heated storage areas if necessary. Tape shall be stored at a minimum temperature of 70 degrees F.

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NTS: The specifier should consider use of the following optional mortar coating as a rock shield. A rock shield should be used for a pipeline that requires a high degree of reliability or one that cannot be taken out of service for repair. The mortar coating protects the tape system from damage during handling, shipping and installation, provides a secondary corrosion protection, and serves as ballast when required. Ballast mortar coatings of two-inches or more in thickness are often necessary for subaqueous crossings or to resist flotation during seismic events.

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[D. **Mortar Coating:** A [one-inch] thick reinforced mortar coating shall be applied over the tape coat system. The mortar coating shall meet the requirements of ANSI/AWWA C205.]

2.2 MANUFACTURERS

A. Products shall be of the following manufacture, type, and model (or equal):

1. Straight Pipe: Polyken Technologies

Primer	1029
Filler tape	939
Weld stripping tape	933-25 black
Inner layer tape	989-20 black
Middle layer tape	955-30 gray
Outer layer tape	956-30 white

2. Fittings, Specials, and Field Joints: Polyken Technologies

Primer	1029
Filler tape	939
Inner layer tape	930-50 black
Outer layer tape	955-30 white

PART 3 -- EXECUTION

3.1 TAPE APPLICATION

A. Tape coating materials shall be applied in accordance with this Section, the product application instructions of the tape manufacturer, and the field technical support instructions from the manufacturer.

3.2 WELD SURFACE PREPARATION

A. To provide for an effective, long-term bond between the tape coating system and the substrate, the following pipe weld surface preparation shall be provided.

1. Weld surfaces with a reinforcement greater than 1/32-inch and all longitudinal and coil splice welds shall be ground to provide a smooth surface with a reinforcement not exceeding 1/32-inch. The resulting weld surface shall have a cross-section shape that is free of discontinuities, abrupt changes in curvature, with no ridges or valleys that may promote bridging or disbondment of the tape from the substrate.

2. **Weld Stripping Tape:** Weld stripping tape, 6 inches wide, shall be used if any of the following conditions are present. The tape shall be applied with the center of the tape at the weld.

a. If the CONTRACTOR elects to use stripping tape in lieu of grinding or part of the grinding required above. In such a case, the weld reinforcement shall not exceed 3/32-inch, and the weld surface shall have a cross-section shape that is free of discontinuities, abrupt changes in curvature, with no ridges or valleys that may promote bridging or disbondment of the tape from the substrate.

b. If the initial pipe sections taped have indications that the inner tape layer is not bonding completely to the pipe at the welds.

c. If the tape bond to the welds or adjacent surfaces is less than the tape bond to the pipe surface away from the welds.

3. Welds that have been prepared with a reinforcement not exceeding 1/32-inch, and a cross-section slope that is free of discontinuities, abrupt changes in curvature, with no ridges or valleys that may promote bridging or disbondment of the tape from the substrate require no additional preparation.

3.3 PIPE SURFACE PREPARATION

A. Surfaces to be coated shall be detergent cleaned in accordance with SSPC-SP1 prior to abrasive blasting.

B. All burrs, sharp edges, and weld splatter shall be removed prior to abrasive blasting.

C. Immediately before application of the primer, abrasive blasting shall be performed using sand, metallurgical slag, or a combination of steel grit and shot to produce a surface in conformance with SSPC-SP6. Steel grit shall comprise at least 60 percent of the working mix of abrasive, if

a centrifugal wheel abrasive blaster is used. The prepared surface shall have a surface profile not exceeding 2 mils.

D. Abrasive blasting and primer application shall be done when the substrate surface is at least 5 degrees F above the dew point. Abrasive blasting, priming, and inner layer tape application shall be done during the same working day for each pipe section.

3.4 PIPE END PREPARATION

A. Coating cut-backs at the pipe ends shall be 6 inches, with the cuts parallel to the pipe ends. Exposed substrate surfaces shall be protected with a storage primer applied immediately after taping and before flash rusting of the surface.

B. Spiral or longitudinal pipe welds within two feet of the pipe ends shall be ground flush prior to abrasive blast cleaning.

C. Pipe ends that will be connected with sleeve-type couplings shall be epoxy coated for immersion service as specified in Section 09800. The cut-backs shall be greater than 6 inches at couplings to provide clearance between the coupling and tape. The epoxy coating shall extend at least 6 inches beyond each side of the sleeve coupling on the outside surface of the pipe.

3.5 APPLICATION OF TAPE

A. Pipe shell temperature shall be maintained within a range of 45 degrees F to 100 degrees F during application of the tape system.

B. Inner layer tapes shall be maintained at a minimum temperature of 70 degrees F during application. Middle and outer layer tapes shall be maintained at a minimum temperature of 90 degrees F during application.

C. Tape application tension shall be maintained at a value that produces a tape width reduction equal to 1.0 to 2.0 percent of the tape width during application, as recommended by the tape manufacturer. This width reduction shall be maintained simultaneously with the minimum tape temperature.

D. At the point of tape application, all tape, including weld stripping tape, shall be pressed onto the pipe with a pressure roller that maintains a constant pressure. Enough pressure shall be used to fully bond the tape at all welds.

E. Filler tape shall be used at lap joints, weld step-downs, and other discontinuities.

F. The tape application equipment and materials shall result in a fully bonded tape coating system, without blisters, voids, wrinkles or any areas that have a lack of bond to the pipe.

G. Succeeding layers of tape shall be applied so that the laps are staggered by at least two inches.

H. Before tape application, the primer shall be dried sufficiently so that the primer is in a tacky to dry condition.

I. Primer shall be applied while it is in a temperature range of 50 degrees F to 80 degrees F, using airless spray equipment and a drum agitator. The primer application shall be of uniform

thickness on all pipe surfaces.

3.6 REPAIR PATCHES

A. Repair patches shall be applied by wrapping tape completely around the pipe, using the tape system for joints.

3.7 TAPE APPLICATION TO FITTINGS, SPECIALS, AND PIPE JOINTS

A. Filler tape shall be used to fill voids on fittings, specials, welds, and pipe joints.

B. All bell and spigot joints, lap joints, and other locations where voids will otherwise exist shall be provided specially shaped, filler tape applied after priming.

C. Field pipe joints shall be prepared as required by the paragraph entitled "Pipe Surface Preparation," except that shop blasted surfaces that have been coated with a storage primer or an epoxy coating may be power tool cleaned instead of abrasive blast cleaned. The power tool cleaning shall be done in accordance with SSPC-SP2. Pipe ends not effectively protected with a storage primer shall be abrasive blasted to SSPC-SP6.

** END OF SECTION **