



Iowa Department of Transportation

SPECIAL PROVISIONS
for
CATHODIC PROTECTION SYSTEM

Johnson County

ESIM-080-6(285)243- -0S-52

Effective Date

December 15, 2009

THE ENGLISH STANDARD SPECIFICATIONS, SERIES OF 2009, ARE AMENDED BY THE FOLLOWING MODIFICATIONS. THESE ARE SPECIAL PROVISIONS AND SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS

PART 1 DESCRIPTION

1.01 SUMMARY

- A. Cathodic protection for 12-inch diameter ductile iron pipe with field-applied polyethylene encasement using sacrificial anode system.

1.02 REFERENCES

- A. American Society for Testing and Materials (ASTM) – Applicable testing methods and materials.
- B. National Association of Corrosion Engineers (NACE) International Standard RP0169 (2002) – Control of External Corrosion on Underground or Submerged Metallic Piping Systems.
- C. National Electrical Code (NEC), latest edition.
- D. National Electrical Manufacturers Association (NEMA) – Standards and Specifications.
- E. Underwriters Laboratories, Inc. (UL) – Standards for safety.

1.03 SUBMITTALS

- A. Product Data
 - 1. Submit manufacturer's specifications, recommendations, and installation instructions for each product item.
 - 2. Manufacturer's product submittals shall be incorporated into a single document to demonstrate that the items have been properly coordinated and will function properly as a unit.
 - 3. A notation shall be made on each shop drawing submitted as to the item's specific use either by a particular type number referenced in the Contract Documents, or by a description of the item's specific locations.

1.04 QUALITY ASSURANCE

- A. The Contractor shall employ and pay for services of the independent testing laboratory for tests required to show compliance with the specifications. Test results submitted directly to the Engineer. Selection of the testing laboratory is subject to approval of the Engineer.
- B. Perform all work in accordance with NACE standards.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle products in accordance with manufacturer's instructions.
- B. Protect plastic materials from sunlight.

1.06 WARRANTY

- A. Full warranty against defects in materials and quality for two years after final acceptance by the Contracting Authority, including all parts, labor, and expenses.

1.07 SEQUENCING/SCHEDULING

- A. Coordinate scheduling, submittals, and work elements to assume efficient and orderly sequence of installation of interdependent construction elements.

1.08 PROJECT RECORD DOCUMENTS

- A. Accurately record location of cathodic protection devices, connections, and depth of cover.
- B. Identify and describe unexpected variations in subsoil conditions or discovery of uncharted utilities.

1.09 FIELD MEASUREMENTS

- A. Verify that field measurements and elevations are as indicated.

1.10 QUALIFICATIONS

- A. Testing Firm: Company specializing in testing cathodic protection systems, certified and approved by NACE.

PART 2 MATERIALS**2.01 APPROVED MATERIAL SUPPLIERS**

- A. Subject to meeting the requirements of this specification, cathodic protection materials are available from the following manufacturers-suppliers:
 1. Mesa Products, Inc., P.O. Box 52608, Tulsa, OK 74152, (918) 627-3188.
 2. Global Cathodic Protection, Inc., 5826 Schumacher Lane, Houston, TX 77057, (800) 235-0970.
 3. Champion Corrosion Products, 7050 S. State Highway 123, Seguin, TX 78155, (830) 303-8505.

2.02 ELECTRICAL CONTINUITY BOND CABLES

- A. Electrical Continuity Bond Cables
 1. High molecular weight polyethylene insulated stranded copper cable shall be used for continuity bond cables installed across pipe joints of mechanically-coupled pipe. Insulation shall conform to ASTM D1248 – Specification for Plastic Molding and Extrusion Materials, Type 1, Class C, Grade 5.
 2. Pipe joint continuity bond cables shall be sized as follows:
 - a. Wire Gauge: No. 4
 - b. No. of Strands: 7
 - c. Outer Jacket: 0.110" thickness
 - d. Length: 18"
 - e. Number of Bonds: 2 across each pipe joint

2.03 CORROSION MONITORING TEST STATIONS

- A. Non-Metallic Post-Type Test Stations
 1. Monitoring stations shall be a non-metallic post-type station mounted on a non-metallic conduit post. Test station shall be furnished with a covered terminal board equipped with terminal posts to permit ready access and testing and shall be constructed as follows:
 - a. Terminal Board: Polycarbonate plastic.
 - b. Binding/Terminal Posts: Nickel-plated marine brass (6 minimum).
 - c. Conduit Post: UV stabilized polyethylene.
 2. Subject to meeting the requirements of this specification, acceptable manufacturer's products which may be incorporated into the work include the following or an approved equal:
 - a. Tinker & Razor Company, Model T-3.
 - b. Cott Manufacturing, Model Big Fink.
- B. Test Station Enclosures
 1. Test station shall be enclosed in an H-20 traffic-rated flush-to-grade meter box constructed of UV-resistant modified polyethylene material (black in color) consisting of a body and removable lid.
 - a. The body shall have crush-resistant ribbing along the outside of the enclosure and shall have a flange around the lid opening to help prevent settling and aide in adjustment to grade.

- b. The solid lid shall seat securely inside the top of the enclosure and shall be lockable.
 - c. A ¼-inch thick diamond pattern steel overlay shall be securely fastened with a minimum of four 3/8-inch carriage bolts, a nut and a washer to the top of the lid to distribute loads across the lid and increase its load bearing ability in non-deliberate traffic.
 2. Subject to meeting the requirements of this specification, acceptable manufacturer's products which may be incorporated into the work include the following or an approved equal:
 - a. DFW Plastics, Inc., Model DFW36C-OKSBSM.
 - b. Pen-Cell Plastics, Model PE-14.
 - C. Prepackaged Cu-CuSO₄ Reference Electrodes
 1. Description: Cu-CuSO₄ electrodes shall be used for soil environments to provide a stable electrical benchmark from which to measure the cathodic protection system's effectiveness. Electrodes shall be constructed as follows:
 - a. Element: Copper rod encapsulated in a proprietary backfill electrolyte containing high purity copper sulfate crystals and a chloride ion trap to prevent contamination of the electrolyte.
 - b. Service life of the reference electrode shall be no less than 20 years.
 - c. Lead Wire: No. 14 RHH-RHW (yellow) stranded copper wire. Lead wire shall be sufficiently long to reach its termination point without splicing.
 2. Subject to meeting the requirements of this specification, acceptable manufacturer's products which may be incorporated into the work include the following or an approved equal:
 - a. Borin Manufacturing, Inc. Model SRE-007-CUY.
 - b. Electrochemical Devices, Inc., Model UL.
 - D. Calibrated Shunts
 1. Description: Color-coded calibrated shunts shall be used to connect the cathodic protection system's anode header cable and structure return connection circuits.
 - a. Yellow: 0.01 ohm rated at 8 amps maximum capacity.
 2. Subject to meeting the requirements of this specification, acceptable manufacturer's products which may be incorporated into the work include the following or an approved equal:
 - a. Tinker & Razor Company, Model Test Station Shunt.
 - b. Cott Manufacturing, Model Cott Shunt.

2.04 ELECTRICAL ISOLATION DEVICES AND PETROLATUM TAPE OVERWRAP

- A. Electrically Isolating Corporation Stops
 1. Electrically isolating corporation stops shall be constructed as follows:
 - a. All brass construction conforming to AWWA Standard C800 (ASTM B-62 and ASTM B-584).
 - b. Solid one-piece tee-head and stem with EPDM O-ring in stem.
 - c. Molded EPDM seat to support fluorocarbon-coated brass ball.
 - d. Threaded nylon insulator factory inserted between the body assembly and flared copper/nut service line.
 - e. Entire assembly threads secured with adhesive to prevent unintentional disassembly and to render unit leak resistant rated at 300 psi working pressure.
 2. Subject to meeting the requirements of this specification, acceptable manufacturer's products which may be incorporated into the work include the following or an approved equal:
 - a. Ford Meter Box Company, Model Service Insulator Corporation Stops.
 - b. Mueller Company, Model Insulated Water Service Products.
- B. Flange Isolation Kit Assemblies
 1. Isolation flanges shall be constructed as follows:
 - a. Gasket: Full faced G-10 Epoxy Glass w/nitrile O-Ring.

- b. Sleeves: Full-length 1/32" thick spiral wound Mylar.
- c. Isolation Washers: Double 1/8" thick G-10 Epoxy Glass.
- d. Backup Washers: Double 1/8" thick Type 304 stainless steel.
- e. Temp. Range: minus 65 °F to 250 °F.
- 2. Subject to meeting the requirements of this specification, acceptable manufacturer's products which may be incorporated into the work include the following or an approved equal:
 - a. Pipeline Seal and Insulator, Inc. Model Line-Backer.
 - b. Advance Products and Systems, Inc. Model Trojan.
- C. Petrolatum Tape-Wrap Encapsulation of Buried Flange Isolation Kits
 - 1. All buried flange isolation kits shall be encapsulated in a three-part cold-applied petrolatum tape coating consisting of a primer, profiling mastic, and a low-temperature petrolatum tape.
 - a. Primer:
 - (1) Solids Content: 100%
 - (2) Specific Gravity: 1.08
 - (3) Specific Volume: 26 cubic inches/pound
 - (4) Flash Point: > 356 °F
 - (5) Coverage: 10-22 square feet/pound
 - b. Profiling Mastic:
 - (1) Solids Content: 100%
 - (2) Specific Gravity: 0.605
 - (3) Specific Volume: 46 cubic inches/pound
 - (4) Flash Point: 356 °F
 - (5) Coverage: Varies by application
 - c. Low-Temperature Petrolatum Tape:
 - (1) Thickness: 46 mils
 - (2) Maximum Service Temperature: 122 °F
 - (3) Roll Width: 2" to 12"
 - (4) Roll Length: 33'
 - (5) Coverage with 55% Overlap: 87 square feet of tape per 100 square feet of pipe
 - 2. Subject to meeting the requirements of this specification, acceptable manufacturer's products which may be incorporated into the work include the following or an approved equal:
 - a. Denso North America, Inc. Denso Paste S105/Profiling Mastic/LT Tape.
 - b. Central Plastics, Inc. Model STAC Coating System.
 - c. The Tapecoat Company, Model Envirocoat System.

2.05 GALVANIC ANODES

- A. Sacrificial Anodes and Accessories
 - 1. Magnesium Anodes
 - a. Description: Magnesium anodes shall be capable of delivering a minimum efficiency of 500 amp-hours per pound of magnesium and shall have the following metallurgical analysis and physical properties:
 - b. Ingot Weight: 48 pounds.
 - c. Metallurgy:
 - (1) Aluminum: 0.01% (max.)
 - (2) Manganese: 0.50% - 1.3%
 - (3) Copper: 0.02% (max.)
 - (4) Nickel: 0.001% (max.)
 - (5) Iron: 0.03% (max.)
 - (6) Other (each): 0.05% (max.)
 - (7) Other (total): 0.30% (max.)

- (8) Magnesium: Balance
2. Packaged Magnesium Anode Backfill
 - a. Magnesium anodes shall be packaged within a cotton sack in a special chemical backfill .having the following proportions:
 - (1) Ground Hydrated Gypsum: 75%
 - (2) Powdered Bentonite: 20%
 - (3) Anhydrous Sodium Sulfate: 5%
 - b. Backfill shall have a grain size such that 100% is capable of passing a 20-mesh screen and a 100-mesh screen shall retain 50 %.
 - c. Backfill shall completely surround the anode ingot without voids.
 - d. Package Dimensions: 8" diameter by 38" long.
 - e. Package Weight: 98 pounds.
 - f. Anode Lead Wire
 - (1) The standard lead wire for a magnesium anode shall be a 10' length of No. 12 AWG solid copper wire with Type TW (red) thermoplastic insulation
 - g. Lead Wire Connection to Anode Core
 - (1) Magnesium anodes shall be cast with a minimum 20 gauge galvanized steel core.
 - (2) One end of the anode shall be recessed to expose the core for silver-soldering the lead wire.
 - (3) The silver-soldered lead wire connection and anode recess shall be filled with an electrical potting compound before packaging.

2.06 WIRE, CABLE, AND SPLICES

- A. Anode Header Cable and Structure Return Connection (Direct Burial)
 1. High molecular weight polyethylene insulated stranded copper cable shall be used for all underground portions of the cathodic protection system's anode header cable and structure return connection circuits. Insulation shall conform to ASTM D1248 – Specification for Plastic Molding and Extrusion Materials, Type 1, Class C, Grade 5.
 2. The DC cables shall be sized as follows:
 - a. No. of Strands: 7
 - b. Outer Jacket: 0.110" thickness
 - c. Anode Header Cable: No. 8 AWG
 - d. Structure Return Connection: No. 8 AWG
- B. Test Wires for Cathodic Protection System Monitoring
 1. Oil and gas resistant insulated/jacketed stranded copper wire shall be used for structure connections as part of the system's monitoring circuits. Insulation shall conform to ASTM Standard UL-83 for Thermoplastic Insulated Wires.
 2. The test wires shall be sized as follows:
 - a. No. of Strands: 19
 - b. Primary Insulation: 0.015" thick thermoplastic
 - c. Outer Jacket: 0.004" thick nylon
- C. Compression Crimp Splice Connectors
 1. All underground spliced connections used within the DC cathodic protection circuit shall be made through the use of copper compression crimp connectors.
 - a. The proper size connectors shall be used in accordance with the manufacturer's recommendations.
 - b. Connectors shall be crimped with a hand tool capable of delivering a minimum of 12 tons of compressive force.
- D. Splice Encapsulation
 1. All aboveground spliced connections used within the DC cathodic protection circuit shall be sealed with rubber and plastic tape contained within a waterproof coating.

2.07 EXOTHERMIC WELDS AND CONNECTION DEVICES

- A. All connections used within the DC cathodic protection system circuit shall be by exothermic welds. The proper size welders, metal charges, and wire sleeves shall be used in accordance with the manufacturer's recommendations.
 - 1. Subject to meeting the requirements of this specification, acceptable manufacturer's products which may be incorporated into the work include the following or an approved equal:
 - a. Continental Industries, Model Therm-O-Weld.
 - b. Erico International, Model Cadweld.
- B. Coating of Wire and Cable Connections to Structures
 - 1. A pre-fabricated plastic sheet with an igloo-shaped dome and entry tunnel filled with an oil- and gas-resistant elastomeric rubber and a primer-less elastomeric tape for bonding directly to the structure.
 - 2. Subject to meeting the requirements of this specification, acceptable manufacturer's products which may be incorporated into the work include the following or an approved equal:
 - a. Continental Industries, Model Therm-O-Cap PC.
 - b. Chase Specialty Coatings/Tapecoat-Royston Division, Model Handy Cap IP.

PART 3 CONSTRUCTION

3.01 REGULATORY REQUIREMENTS

- A. Conform to applicable federal, state, and local regulations for safe installation of the system.

3.02 DESCRIPTION OF WORK

- A. General: Refer to additional notes on the Plans and details included hereinafter during execution of Work under this Section.
- B. Examination: Examine the areas and conditions under which cathodic protection materials are to be installed, and notify Engineer in writing of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected.
- C. Drawings: Install all cathodic protection components and equipment according to the following CP Installation Detail Drawings included in the plans on sheets U.18 through U.24.
 - 1. Drawing No. 13110 -1: Pipe Continuity Bonding for Ductile Iron Pipe.
 - 2. Drawing No. 13110 -2: Insulating Rubber & Tape Splice for Sacrificial Anode Cable Connections
 - 3. Drawing No. 13110 -3.A: Potential Test Station (PTS).
 - 4. Drawing No. 13110 -3.B: PTS Terminal Board Installation Details.
 - 5. Drawing No. 13110 -4.A: Casing Test Station (CTS).
 - 6. Drawing No. 13110 -4.B: CTS Terminal Board Installation Details.
 - 7. Drawing No. 13110 -5.A: Isolator Test Station Without Tapping Tee (ITS).
 - 8. Drawing No. 13110 -5.B: Isolator Test Station at Tapping Tee (ITS).
 - 9. Drawing No. 13110 -5.C: ITS Terminal Board Installation Details.
 - 10. Drawing No. 13110 -6.A: Foreign Test Station (FTS) Crossing below New Pipeline.
 - 11. Drawing No. 13110 -6.B FTS Terminal Board Installation Details.
 - 12. Drawing No. 13110 -7.A: Anode Test Station (ATS).
 - 13. Drawing No. 13110 -7.B: ATS Terminal Board Installation Details.
 - 14. Drawing No. 13110 -8: Flush-Mounted Enclosure for CP Test Station Terminal Board & Wires.
 - 15. Drawing No. 13110 -9: Flange Isolator Kit (FIK).

16. Drawing No. 13110 –10: Water Service Isolation Connector at Corporation Stop to CI/DI Pipe
17. Drawing No. 13110 –11: Electrical Isolation Devices for Metallic Casing Sleeves

3.03 INSTALLATION OF ELECTRICAL CONTINUITY BOND CABLES

- A. General:
 1. Inspect each cable to ensure a continuous electrical conductor with no cuts or tears in the cable insulation.
 2. Attach cable to water main by the exothermic welding process.
 3. Cover all exothermic welds with a pre-fabricated igloo-shaped domed plastic elastomeric rubber cover as described in this specification.
- B. Method:
 1. Perform exothermic welding of bond cables in accordance with the manufacturer's instructions.
 2. Do not use any exothermic weld equipment that is damp or wet.
- C. Post-installation Inspection:
 1. Inspect electrical continuity bond cables by visually examining each exothermic weld connection for strength and suitable coating prior to backfilling.
 2. If, in the opinion of the Engineer, the exothermic weld is deficient, the Contractor shall remove and replace the weld at no expense to the Owner.
- D. Backfilling of Bond Cables:
 1. Perform backfilling that will prevent damage to the bond cables and connections to the water main.
 2. If construction activity damages a bond cable, the Contractor shall remove and replace the bond cable at no expense to the Owner.

3.04 INSTALLATION OF CORROSION MONITORING TEST STATIONS

- A. Reference Electrode:
 1. Keep permanent reference electrodes dry and protect from freezing before installation.
 2. Remove plastic or paper shipping bags from around the reference electrode prior to installation.
 3. Place reference electrode in native soil within 12 to 36 inches of the water main.
- B. Test Wires:
 1. Provide test station lead wires that are continuous with no cuts or tears in the insulation covering the conductor.
 2. Attach test leads to the water main by the exothermic welding process.
 3. Connect all test station wires to one side of the terminal board using the test station manufacturer's standard binding posts at the locations shown on the Plans.
 4. Install wire shunts and shorting bars to the opposite side of terminal board from the incoming wires but do not complete anode-to-pipe circuit until authorized by the Owner.
 5. Maintain sufficient slack in test leads to allow the test station terminal board to be completely removed from the test station enclosure for future maintenance or repair.
- C. Test Station Terminal Board and Flush-Mounted Enclosure:
 1. Install test station terminal board within color-coded cap and mount vertically to white PVC pipe.
 2. Set the PVC pipe within enclosure and support with a minimum 6" gravel base to support and drain the inside of the enclosure.
 3. Extend bottom of PVC pipe to a minimum of 24" below bottom of enclosure with the top of the test station cap no more than 2" from the underside of the enclosure lid.

4. Thoroughly backfill and compact the area immediately surrounding the enclosure to prevent settling.
 5. Set the top of the enclosure flush to no more than one quarter-inch lower than the final pavement to prevent the enclosure from being struck by snowplow blades.
- D. Post-Installation Backfilling:
1. Protect test leads during the backfilling operation to avoid damage to the wire insulation and integrity of the conductor.
 2. Protect permanent reference electrode during backfilling to avoid damage to the electrode and its lead wire.
 3. If, in the opinion of the Engineer, the installation of the test station wires or the reference electrode is deficient, the Contractor shall remove and replace these components at no expense to the Owner.
- E. Install corrosion-monitoring test stations at the locations shown on the site plans.

3.05 INSTALLATION ELECTRICAL ISOLATION DEVICES AND PETROLATUM TAPE OVERWRAP

- A. Electrically Isolating Corporation Stop Procedure: Follow manufacturer's written instructions for the specific device to be installed.
- B. Flange Isolation Kit Procedure:
1. Inspect the gasket kit and verify that the material is as specified and that the material is not damaged.
 2. Clean the bolting materials. Apply lubricant or anti-seizing compound to all threads required for alignment with nuts and nut facings.
 3. Align flange faces so that they are parallel and concentric with each other and within 0.010 inch without external loading or springing.
 4. Line up bolt holes by driving two tapered drift pins in opposite directions to each other into two diametrically opposite bolt holes.
 5. Insert insulating sleeves into bolt holes. Sleeves must slide in easily; if not, flanges must be realigned. Do not force sleeves into bolt holes.
 6. Assemble studs/bolts as follows:
 - a. Run one nut on each stud so that two full threads are showing beyond the nut.
 - b. Slide steel backup washer onto stud and insert into bolt hole. If flange requires two-sided insulation, add an insulating washer after the steel washer.
 - c. From the opposite end of the stud, place an insulating washer, steel backup washer, and a nut; tighten by hand.
 7. Torque the first two studs at diametrically opposite locations to a maximum of 30 percent of the final torque value in a star pattern.
 8. Repeat star-torquing pattern at each bolt by increasing torque to 50-60 percent of final value.
 9. Continue torquing all studs in a star pattern using the specified torque setting (100 percent) until there is no further rotation of the nuts.
- C. Acceptance:
1. Immediately after a flange isolation kit has been installed and has been torqued to the manufacturer's specifications, an electrical isolation test will be conducted by the Engineer using a radio frequency isolating flange meter.
 2. If, in the opinion of the Engineer, the installation of the flange isolation kit is deficient, the Contractor shall remove and replace these components at the Contractor's expense.
- D. Sealing Flange Assembly:
1. After the flange isolation kit has been tested and found to be 100 percent effective, the entire flange isolation kit shall be encapsulated in a three-part non-toxic, petrolatum tape wrap before burial.

3.06 INSTALLATION OF GALVANIC ANODES

- A. General:
 - 1. New Water Main: Install the required number of anodes with test station at the locations shown on the site plans or as directed by the Engineer.
 - 2. Casing Sleeve: Install the required number of anodes directly to the casing sleeve as described on the CP Installation Details or as directed by the Engineer.
 - 3. Install additional anodes at the locations determined by Owner after pipe installation is completed and Owner has conducted field-electrical tests on pipeline.
- B. Method:
 - 1. Remove plastic or paper shipping bags from around prepackaged anodes prior to installation.
 - 2. Install in the manner and at the dimensions from the feeder main as shown on the Plans. Field modifications shall be made only with the approval of the Engineer.
 - 3. Attach anode lead wire to insulated header cable or directly to casing sleeve as shown on the Plans. Splices are not permitted within the lead wire of an anode except to repair damaged lead wires.
 - 4. Install prepackaged anodes with compacted backfill material, such that no voids exist between the anode material and the backfill.
 - 5. Handle galvanic anodes in such a manner to avoid damaging anode materials and wire connections.

3.07 INSTALLATION OF WIRE, CABLE, AND SPLICES

- A. Install underground wires, cables, and connections at a minimum 24 inches below final grade with a minimum separation of 6 inches from other underground structures.
- B. Crimp Connectors:
 - 1. All spliced connections will be made by the use of copper compression crimp connectors.
 - 2. Contractor must furnish a hand tool capable of generating a minimum of 12 tons of compressive force to install crimp connectors. Use only tools compatible with Burndy copper compression taps.
- C. Seal splices against water penetration as follows:
 - 1. Clean and then wrap with a minimum of two half-lapped layers of rubber electrical tape.
 - 2. Apply two half-lapped layers of plastic electrical tape.
 - 3. Cover with a fast-drying electrical sealant.

3.08 INSTALLATION OF EXOTHERMIC WELDS AND CONNECTION DEVICES

- A. All exothermic welding shall be performed in accordance with the manufacturer's recommendations for welding equipment, weld metal charge size and applicability to the structure. Do not use exothermic weld equipment if the graphite mold is wet.
 - 1. Structure Surface Preparation
 - a. All bare steel shall be free of dust, dirt, grease, oil and other foreign matter.
 - b. Practical removal shall be by either power or hand wire brushing.
 - c. Weld areas shall be cleaned of all welding lag, spatter, and scale.
 - d. Grinding or filing shall remove sharp edges or burrs.
 - e. The weld areas shall be no more than warm to the touch before applying the mastic.
 - f. Moisture, if present, shall be removed before applying coal tar mastic and weld cap.
 - 2. Installation of Elastomeric Cover over Exothermic Welds
 - a. Clean the pipe surface which is to be covered by removing all moisture, dirt, grease and other contaminants

- b. Remove the release paper from the back of the mastic pad. Avoid touching the exposed elastomeric tape.
- c. Apply the mastic pad to the structure by firmly pressing on all edges making sure that the tunnel area of the plastic dome completely covers the lead wire entering the exposed copper of the connection.
- d. Push the dome of the plastic weld cap firmly over the exothermic weld area and the wire entering the weld cap.

3.09 FIELD QUALITY CONTROL

- A. Contractor's Quality Control System
 1. The Contractor shall implement a quality control system to ensure the cathodic protection system components conform to the applicable plans and specifications established by the Contract Documents.
 2. The quality control system shall ensure that standards for materials, workmanship, construction, and functional performance are adhered to throughout the course of the Work.
 3. The Contractor's superintendent shall be used to monitor the Contractor's quality control system.

3.10 POST-INSTALLATION TESTING OF CATHODIC PROTECTION SYSTEMS

- A. General: Owner will provide services of a NACE-certified Cathodic Protection Specialist for periodic field inspections and final commissioning services.
- B. Energizing: Assist Owner and Owner's Cathodic Protection Specialist during initial energizing of the cathodic protection systems.

PART 4 METHOD OF MEASUREMENT AND BASIS OF PAYMENT

4.01 CATHODIC PROTECTION

- A. Include cost to furnish all materials, equipment and labor necessary to install the cathodic protection system described in this section in the unit price bid for "Cathodic Protection of Water Main."