

**SPECIFICATIONS - DETAILED PROVISIONS**  
**Section 16640 - Corrosion Monitoring System for Underground Piping**

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**SECTION 16640**  
**CORROSION MONITORING SYSTEM FOR UNDERGROUND PIPING**

**PART 1 - GENERAL**

1.01 DESCRIPTION

Construct corrosion monitoring system for the pipeline by installing test stations as shown on the drawings and as specified herein.

1.02 SUBMITTAL

Submit catalog data on test boxes, wire, copper sulfate reference cells, thermite welds, and weld coating.

**PART 2 - PRODUCT**

2.01 TEST BOXES

Each test station enclosure shall be a concrete valve box with a cast iron cover marked "EMWD CPT". Test stations shall be Brooks Products valve box 1-RT or approved equal through EISEL Enterprises or J & R Concrete Products.

2.02 WIRE

Copper-Copper Sulfate (CSE) reference electrodes lead wires are specified under "Reference Electrodes" below. Other wiring to be copper of the size shown and shall have THWN insulation of the color shown. Dyed insulation is not acceptable.

2.03 REFERENCE ELECTRODES

Reference electrodes shall be copper-copper sulfate (CSE) suitable for direct burial. They shall be designed to remain stable for at least twenty years. The reference cell shall be capable of maintaining a potential within 15 millivolts of a freshly made cell while draining 2 microamperes. Reference cells shall contain a barrier to inhibit migration of chloride ions from the soil into the reference cell. Reference cell lead wire shall be #14 AWG copper, with yellow RHW insulation and shall be silver soldered to the copper core of the reference cell with the connection epoxy sealed by the manufacturer. CSEs shall be Stelth 2 by Borin Manufacturing, Staperm Model CU-1-UGPC by GMC Corrosion, or equal.

#### 2.04 THERMITE WELDS

Thermite weld shall be “Cadweld” by Erico Products, “Thermoweld” by Continental Industries, Inc., or equal. Mold shall be the type recommended by the manufacturer for the wire size, metal shape, and orientation. Weld alloy shall be formulated for use on steel or iron pipe as appropriate and shall be of the weight recommended by the manufacturer for the size cable and mold being used. Welds to be buried or submerged shall be primed with an elastomer resin based primer then be covered with a 100% solids mastic filled plastic cap or cement- mortar. Use the plastic cap on dielectric coated pipe following the manufacturer’s instructions. Use cement-mortar on cement-mortar coated pipe. Primer and cap shall be Roybond Primer 747 and Handy Cap as manufactured by Royston Laboratories, or equal.

### **PART 3 - INSTALLATION**

#### 3.01 REFERENCE CELLS

Install reference cells as detailed on the drawings. Backfill around each reference cell and compact to the relative compaction specified in Section 02201 taking care not to damage the reference cell. Coil the reference cell wire in slack loops to compensate for settlement both near the cell and near the cathodic test station. Any damage to the insulation on the reference cell wire shall be wrapped with two layers of Scotch No. 88 vinyl electrical tape or equal. Wet the reference cell and backfill per the manufacturer’s instructions.

#### 3.02 THERMITE WELD

Clean pipe to bright metal. Weld according the manufacturer’s instructions. Test completed weld by striking the side of the weld solidly with a 16 ounce or larger hammer. Remove flux and coat as specified above.

#### 3.03 SPLICE

Splices shall be made only where shown or allowed. Splices shall be made using split bolt connectors or crimp connectors of the smallest size compatible with the cables being used. Connections shall be insulated with two half lapped layers of rubber tape and at least one half lapped layer of plastic tape, by encasing in resin (3M Scotchcast), heat shrink sleeve (Raychem ASE), or equal.

3.04 TESTING PROCEDURES FOR COMPLETED TEST STATIONS AND JOINT BONDS After the pipeline is backfilled test each test station and joint bonds for effectiveness using the procedures described below. The testing and report shall be completed by or under the direction of a California licensed corrosion engineer or NACE International Certified Cathodic Protection Specialist.

Measure native pipe-to-soil potentials to a portable CSE using each wire at each test station and to the stationary CSE where installed. Repair or replace any wires or test stations that are not operating properly and remeasure to confirm proper operation. Record the data in clear tabular form.

Test to determine if the joint bonds are effective using a temporary cathodic protection system. Measure pipe-to-soil potentials at test stations at the ends of the pipe and other locations as necessary to confirm electrical continuity with cathodic current applied and immediately after turning the current off. Installer shall repair all discontinuities found. Repaired test station shall be retested until continuity is established throughout the installed piping. Record the potentials and currents.

During the corrosion monitoring system test described above, measure pipe-to-soil potentials on both sides of each insulated joint to determine its effectiveness. If defective insulated joints are found, repairs shall be made by the installer. Retests and measurements shall be reported until all insulated joints are proved effective.

Submit a written report with test data, conclusions, and any recommendations signed by licensed corrosion engineer or cathodic protection specialist.

**END OF SECTION**

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